

EMX AUDIO CONSOLE

Networked AoIP Broadcast Console



Designed and built in the U.S.A.
by the Wheatstone Corporation

Publication Information

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

EMX User Manual (041299)

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A = Initial release, July 2018

B = Added info on saving and recalling EQ Files, Oct 2018

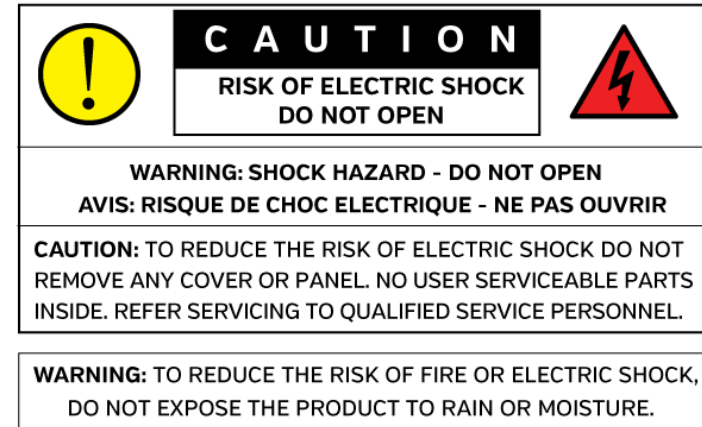
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Safety Instructions

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

Hazard and Warning Label Identification



The **Exclamation Point** symbol, within a circle 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 EMX Family of 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.

1 - INTRODUCING THE EMX CONSOLE

Thanks for joining the growing ranks of broadcasters employing PR&E products, now designed, manufactured, and supported by the Wheatstone Corporation.

Throughout PR&E's long history we've endeavored to provide the finest quality products, documentation, and after-sale support. To obtain maximum benefit from the EMX console's capabilities, please read through this introduction, along with Chapters 2 and 3, prior to installing the EMX console. For those in a hurry, an **EMX Quick Guide** (a PDF file on the USB thumb drive that ships with the console) summarizes the console's connections and Surface controls.

Each EMX console has these main components:

The EMX Surface - Commonly referred to as the "console" has all of the board operator controls. The model number denotes the number of fader channels installed (16, 20, or 24). Figure 1-1 shows an EMX-16 Surface with an optional SS-8 Button Panel installed (a 1.5" wide blank panel ships standard in that size EMX Surface). Although the EMX Surface can be used while set on top of the counter, to maintain its very low profile we recommend it be set into a countertop cutout.

Each EMX Surface has these parts:

- **Quad Fader Panels** – EMX consolidates the controls for four fader channels into one removable panel. EMX-16/EMX-16W Surfaces have four fader panels; EMX-20/EMX-20W Surfaces have five fader panels; and EMX-24/EMX-24W Surfaces have six fader panels. Each fader channel strip includes:
 - 13 buttons, with LED illumination, for: Channel on; Channel off; Cue on/off; Talkback (TB); Four PGM and one Offline bus assign; Auto FB on/off; and three user-set "Soft" buttons
 - A color OLED (Organic Light Emitting Diode) display shows the channel's source name and status; it also lists the visible alternate sources while selecting a new source; and, if enabled, shows the settings for the Advanced Channel Features
 - A 100 mm conductive-plastic fader
 - A large-knob rotary Channel Encoder to select the channel source; also allows access to the Advanced Channel Features: Mode, Pan, EQ & Dynamics, Aux1 and Aux2 bus settings (each is access-controlled using the [EMX Surface Setup](#) app)

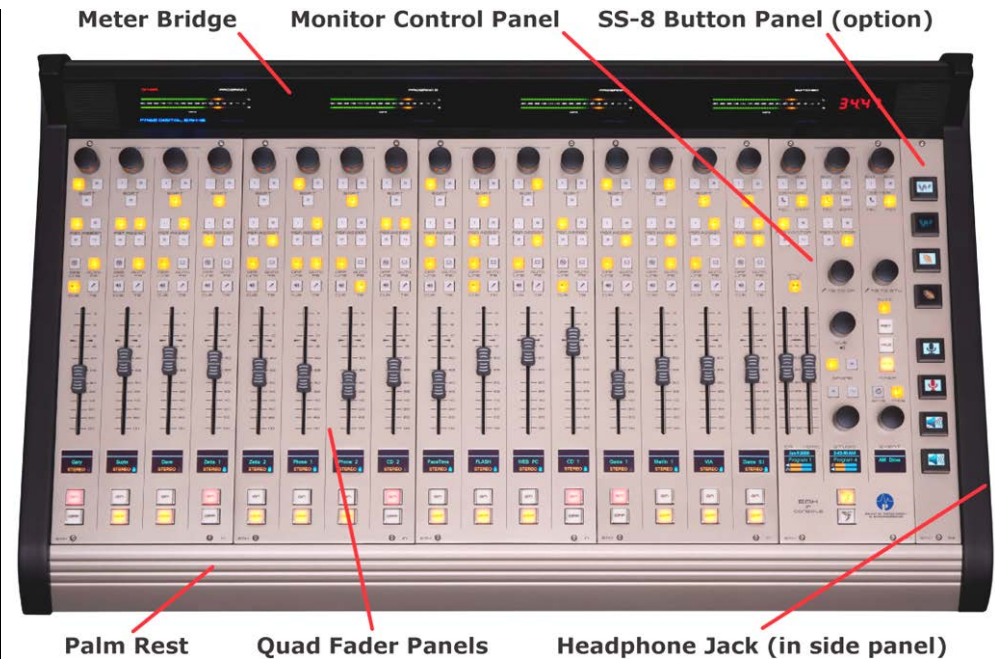


Figure 1-1 EMX-16 Surface, with Optional SS-8 Panel

- **Monitor Control Panel** – Has the controls to support the Control Room (CR), an associated talk studio, and an external location. The panel has monitor source selection and level controls for the CR (monitor speakers and board operator headphones) and the studio monitors, along with controls for adjusting CR & studio talkback and cue levels; the switched meter source; the timer; and to save and/or take console events
- **Meter Bridge** – The EMX Surface has four stereo LED meters (Program 1, Program 2, Program 3, and Switched) along with two cue speakers, an On-Air "Hot Mic" indicator, and a four-digit count up timer
- **Headphone output** – A headphone amp is included in the Surface with a ¼" TRS (Tip-Ring-Sleeve) jack, on the right side of the chassis, for the board operator's headphones
- **Accessory Panels** – The EMX-16, EMX-20, and EMX-24 each have one 1.5" wide blank panel allowing an optional SS-8 panel or other single-width WheatNet IP (WNIP) panel (or a custom panel) to be installed within the Surface. The EMX-16W, EMX-20W, and EMX-24W have five 1.5" blank panels at the right end, allowing the installation of a Telos VX phone control panel (3" wide) plus up to three SS-8 panels, or up to five 1.5" wide control panels, within the Surface



Figure 1-2 PR&E Mix Engine

PR&E Mix Engine – The 1RU Mix Engine (Figure 1-2) has the audio, logic, and network connections for the EMX console along with the DSP, signal mixing, and AoIP (Audio over IP) interface functions. It has these main features:

- **5-Port Gigabit AoIP Switch**—used to network the Surface and Mix Engine with three other AoIP or Ethernet devices (admin PC, audio playback server, VoxPro PC, Razor I/O Interface, or M4IP-USB Blade). Also used to network the EMX with a facility-wide Gigabit AoIP switch in order to network multiple EMX- and DMX-based studios together
- **Two Low-Noise Mic Preamps**—with female XLR inputs, each with switchable phantom power and an input gain/trim pot
- **Eight Stereo/Dual Mono Inputs**—Four analog and four AES/EBU
- **Four Stereo Line Outputs**— Each with Analog and AES/EBU
- **Four Stereo Analog Monitor Outputs**— CR (Control Room), STU (Studio), CUE, and HDPN (Headphone) to feed outboard amplifiers or powered speakers
- **One 6-port LIO Logic Connector**— WNIP-compatible logic



Figure 1-3 PR&E 1620 Power Supply

Surface Power Supply – The 1RU PR&E 1620 Power Supply (Figure 1-3) is rack mounted below the Mix Engine or in any convenient location within about 10 feet of the Surface (the supply includes a 16-foot DC cable with threaded locking connectors at each end). An optional Fail Safe Interface (FSI-DMX/EMX) can be used with a second 1620 supply for redundant EMX Surface power.

Installation Kit – A USB thumb drive, with PDF documentation files and the PR&E software installers ship with the EMX along with the DC cable for the Surface, two IEC AC power cords for the Engine and Surface Power Supply, and a short CAT5e cable to connect the Mix Engine to the built-in Ethernet switch.

EMX OVERVIEW

The EMX console is a compact, self-contained, Audio over Internet Protocol (AoIP) radio broadcast and production console designed for 24/7 operation. The console's three main hardware components: **PR&E Mix Engine**; **EMX Surface**; and **Surface Power Supply** are each fully FCC and CE certified.

The EMX console ships with a factory default configuration so it can be powered up and used straight out of the box. These default settings are easily changed once the console is physical installed to configure it for use in an on-air studio, a production room, a newsroom, or other application using the three Windows PC apps included with the console. Chapter 3, starting on page 20, covers how to use the apps to configure the console.

EMX Accessories

Most WheatNet-IP (WNIP) system peripheral devices can be used with an EMX console. One exception to this is the Sideboard mixer. It needs a Utility Mixer, which is included in every WNIP Blade but is not included in the Mix Engine. To use a Sideboard you must have an M4IP-USB Blade in the PRE-IP system. Each M4IP-USB Blade can support two Sideboards.

An EMX console can also be networked with: WNIP Talent stations (TS-4 for guests and TS-22 for hosts); WNIP button panels like the SS-8 panel, which has eight scriptable buttons with integral color OLED displays; any Wheatstone GP panel; any Vorsis audio processor; WNIP-compatible peripherals from Tieline, Eventide, and other vendors; and PCs and audio servers running the WNIP AoIP audio driver.

Several WNIP system apps (PC-XY; MeterApp; and Screenbuilder) also work with the EMX console since the EMX Surface supports ACI commands. Screenbuilder can be used to build a screen to remotely control the EMX fader levels along with channel on/off control.

Razor I/O Interface (1RU, FCC and CE certified) – Adds audio and logic I/O to an EMX console or to a PRE-IP network. Each Interface has sixteen RJ45 jacks for audio: eight for 8 stereo/16 mono inputs and eight for 8 stereo/16 mono outputs; along with one 6-port LIO Logic jack. There are three Razor models:

- **Razor 16A** has all analog I/O—plus two mic preamps (same type as included in the Mix Engine)
- **Razor 16D** has all AES/EBU I/O
- **Razor 16AD** has half-analog and half-AES/EBU I/O

M4IP-USB Blade (1RU, FCC and CE certified) – The only WNIP Blade pre-licensed for use with an EMX console. It has four matched SQ (Super-Quiet) mic preamps with Vorsis audio processing plus: four USB jacks, for local PC connection with stereo signal playback and/or recording on each

USB connection; four stereo analog and four AES/EBU outputs to connect to headphone amps, monitor speakers, or local recorders; and two RJ45 Logic jacks with twelve WNIP-compatible LIOs.

Razor I/O Interfaces, M4IP-USB Blades, WNIP peripherals, and PCs using WNIP audio drivers are each networked with the EMX using a CAT5e or CAT6 cable of up to 330 feet (100 meters). Up to three of these devices can plug into the open ports on the Mix Engine's switch. To connect more devices requires adding one or more network switches to create a larger PRE-IP network. Port 1, on each Mix Engine's switch, would then connect to the Wheatstone-recommended and AoIP-compatible network switch.

PRE-IP Network

EMX consoles use a subset of the WheatNet AoIP (WNIP) networking protocol. This protocol allows multiple DMX and EMX consoles, Razor I/O Interfaces, M4IP-USB Blades, and other WNIP-compatible devices (like PCs and audio servers) to share their resources over an AoIP network. Appendix A details how to move beyond a single EMX console to network multiple PRE-IP and WNIP devices together to form a facility-wide AoIP network.

The PR&E System Configuration Tool, supplied with the EMX console, is used when adding new EMX or DMX consoles and Razor I/O Interfaces to your existing EMX console. This app changes a new device's default settings to unique settings so the new device can be networked with your existing PRE-IP devices, allowing for "plug-and-play" system expansion.



NOTE: A PRE-IP network is not directly interoperable with a WNIP network. EMX and DMX consoles, and Razor I/O Interfaces, do not have the Intelligent Networking capabilities built into each WNIP Blade. However, audio resources can be streamed between a PRE-IP network and a WNIP network when the WNIP system's Navigator software has been licensed for "cross-networking." For more information, contact Wheatstone technical support—prior to networking a WNIP and PRE-IP system together, to ensure the two systems are running code that supports cross-network audio streaming.

EMX consoles support **WNIP ACI** (Automation Control Interface) which allows remote control and monitoring by 3rd party devices, tablets, and software apps. Note that the DMX Surface does not support ACI.

Both DMX and EMX consoles do support **WNIP SLIO** (Software Logic I/O) so automation systems, talent panels, script engines, and GPIO ports can send/receive logic commands over Ethernet. To interface external "old school" GPIO devices that do not support WNIP SLIO there are six hardware LIO (Logic Inputs/Outputs) ports on each Mix Engine and Razor I/O Interface and twelve on the M4IP-USB Blade.

EMX Surface

The EMX Surface has two types of operator control panels: multiple **Quad Fader** panels and one **Monitor Control** panel.

Each Quad Fader panel has four fader channels (one channel strip is shown in Figure 1-4), each has a 100 mm conductive-plastic fader for bus level control plus thirteen LED illuminated channel buttons for: Channel Off; Channel On; Cue on/off; momentary Talkback (TB); Telco Auto FB (Fold Back) on/off; five bus assignment buttons (Off Line, PGM 1, PGM 2, PGM 3, and PGM 4); and three user-assigned Soft buttons.

A large-knob rotary encoder, at the top of each channel strip, allows the board operator to select a new audio source for any fader channel. A channel display, located just below each channel fader, shows the audio source name currently connected to that fader channel, along with other source and channel status information.

When the channel encoder is rotated—while the channel is off, the channel display switches to show a list of alternate sources with one name being highlighted. Pressing once or "clicking" the rotary encoder "takes" the highlighted source, connecting it to that fader channel.

The fader channel audio can be assigned to any combination of the Program and Off Line buses using the PGM 1 – PGM 4 and Off Line bus assignment buttons. The buttons light up when assigned. The Off Line bus is exclusively used with callers and remotes to create a unique IFB (Interruptible Fold Back) or mix-minus signal for each hybrid and codec used with the console.

The Monitor Control panel mounts near the right end of the Surface. It has three control columns: the left column has the monitor controls for the Control Room (**CR/HDPN**); the middle column has the **Studio** monitor controls; and the right column (**Meter**) has controls to select the switched meter source; to control the meter bridge timer; and to save and/or take console events.

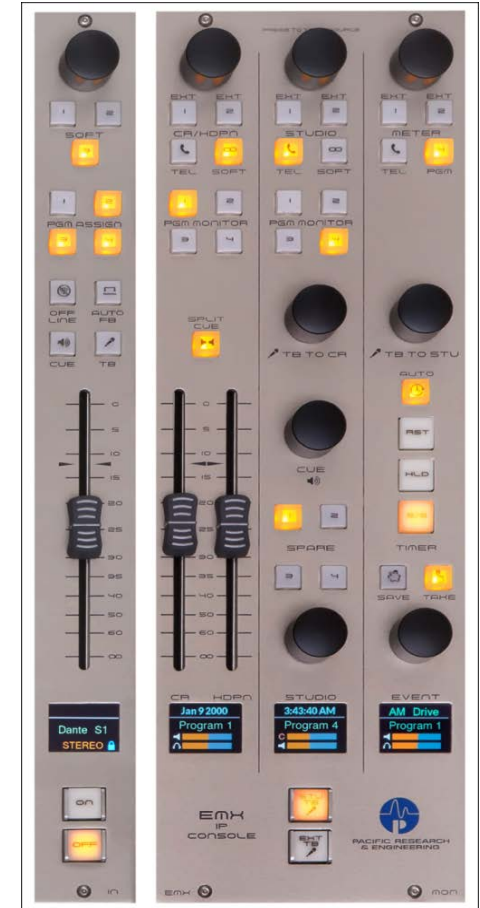


Figure 1-4 EMX Surface Controls

Each Surface control panel connects to a host board, within the meter bridge, using a single plug-in ribbon cable. This allows for rapid field replacement, with minimal interruption to operations, in case of spills or other damage to the EMX Surface controls.

Since the program audio resides within the Mix Engine, rather than going through the Surface, any control panel can be swapped out while the console is actively being used with minimal or no interruption to program audio. Chapter 5 (EMX Service Information) covers how to replace and/or obtain service on the control panels and other EMX console parts.

Meter Bridge

The integrated direct-view low-profile EMX Meter Bridge (Figure 1-5) sits above and behind the control panels. It has four horizontal stereo level meters with overload indicators, plus stereo cue speakers, a four-digit timer display, and a hot-mic On-Air indicator.



Figure 1-5 EMX Meter Bridge

The level meters, from left-to-right, display: Program 1; Program 2; Program 3; and a switched signal, which can display Program 4, three user-set external signals (EXT 1, EXT 2, TEL) and a wild on-the-fly signal (set using the switched meter selector on the Monitor Control panel). The switched meter can also be set to show cue levels while cue is active.

All four meters normally display both average and peak levels, but can be set to show average-only or peak-only levels for special purposes.

The four-digit count-up timer is controlled manually, using the Monitor Control panel Timer Start/Stop, Hold, and Reset buttons, or automatically, when the Auto button is lit and a channel is turned whose audio source has Timer Restart assigned (which is done during setup using the [EMX Surface Setup](#) app).

PR&E Mix Engine

All audio and logic connections are made on the rear of the Mix Engine (Figure 1-6). This 1RU device has a built-in **5-Port Gigabit** switch; two high-quality low-noise **Mic Preamps** (with gain control and 48-volt phantom powering); **Signal Processing** with EQ and dynamics (applied on a fader channel basis); **eight audio inputs** (four analog and four AES); **four stereo audio outputs** (four analog and four AES outputting the same set of signals); **four stereo analog monitor outputs** (to feed powered Control Room and Studio monitors, powered cue speakers, and an outboard board operator headphone amp); **six LIO logic contacts** (each independently set to function as a logic input or logic output); and an **Ethernet** jack to connect the Engine to the built-in Gigabit switch or to an AoIP network switch.

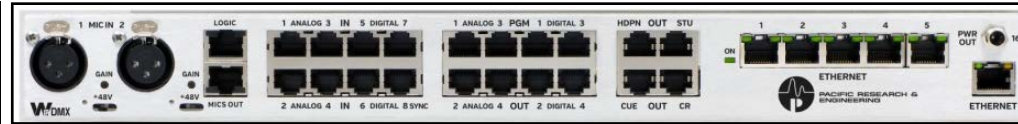


Figure 1-6 PR&E Mix Engine Rear Panel Audio, Logic & Network Connections

Input and Output Connectors

All audio, logic, and network connections on the Engine and on the optional Razor I/O Interface (Figure 1-7)—other than microphone preamp inputs which have female XLR connectors, use RJ45 connectors and category wiring (CAT5e or CAT6).

Analog and AES wiring conforms to the StudioHub+ convention with two balanced analog, or one AES/EBU (AES3) signal, per RJ45 jack.

The RJ45 Logic jack, which has six GPIO logic ports along with a +5V and a GND connection, uses the WheatNet-IP (WNIP) logic jack wiring format.

Figure 2-4 on page 12 has wiring pin outs for the RJ45 connectors used to connect analog audio, digital audio, and logic to/from the EMX console.



Figure 1-7 Razor 16AD Interface, Rear Panel RJ45 Connectors

EMX SPECIFICATIONS

Test Conditions:

- FSD = Full Scale Digital, 0 dB FSD equivalent to +24 dBu analog
- 0 dBu corresponds to 0.775 volts RMS—regardless of the circuit impedance, as measured using a 600 ohm circuit.
- Noise specs measured using a 22 Hz – 20 kHz bandwidth. A 30k Hz bandwidth increases the noise measurement by 1.7 dB.

Mic Preamp

Source Impedance: 150 – 600 Ω, balanced

Nominal Input Level: -50 dBu

Input Range: -70 to -31 dBu (using trim control to reach nominal level)

Equivalent Input Noise: -131 dBu

EMX SPECIFICATIONS (CONTINUED)

Logic GPIO

Six per RJ45 connector: Connection assignments made using PR&E Navigator (logic input or output; the type of logic command)

Logic Inputs: Current-limited using internal pull-up to support +5 or +12 volt logic. For a logic low, input voltage must fall below +2.5 volts.

Logic Output: +5 to +24 VDC logic, 50 mA nominal, 100 mA max

Analog I/O (Inputs & Outputs: +4 dBu, balanced)

Input Impedance: >10 k Ω , bridging

Optimal Source Impedance: <1 k Ω

Analog In > Analog Out Frequency Response:

+0.0, -0.25 dB, 20 Hz to 20 kHz @ +4 dBu

Analog In > Analog Out THD & Noise:

<0.0025%, 20 Hz-20 kHz @ +4 dBu

Nominal / Maximum Input Level: +4 dBu / +24 dBu

(\pm 18 dB of level gain/trim control available in the PR&E Navigator)

Output Source Impedance: <10 Ω balanced

Output Load Impedance: 600 Ω optimal

Nominal / Maximum Output Level: +4 dBu / +24 dBu

(\pm 18 dB of output level gain/trim control in the PR&E Navigator)

A > D Conversion: 24-bit resolution

D > A Conversion: 24-bit, advanced Delta-Sigma

Digital I/O (AES/EBU Inputs & Outputs)

Reference Level: -20 dB FSD (equivalent to analog +4 dBu)

Nominal / Maximum Input or Output Level: -20 dB FSD / 0 dB FSD

(\pm 18 dB of level gain/trim control available in the PR&E Navigator)

Digital In > Digital Out Frequency Response:

\pm 0.0 dB, 20 Hz to 20 kHz @ -20 dB FSD

Digital Input > Analog Output THD & Noise:

<0.00017%, 20 Hz-20 kHz @ -20 dB FSD

Signal Format: AES-3, S/PDIF (inputs only)

AES-3 Input Compliance: 24-bit (uses SRC to support incoming sample rates of 32 – 96 kHz, 16- to 24-bit resolutions)

AES-3 Output Compliance: 24-bit

Output Sample Rate: 44.1 or 48 kHz

Processing Resolution: 24-bit

Surface Dimensions

EMX-16: 5 1/4" x 32 1/8" x 18 5/8" (H, W, D)

EMX-16W: 5 1/4" x 38 1/4" x 18 5/8" (H, W, D)

EMX-20: 5 1/4" x 38 3/16" x 18 5/8" (H, W, D)

EMX-20W: 5 1/4" x 44 1/4" x 18 5/8" (H, W, D)

EMX-24: 5 1/4" x 44 9/64" x 18 5/8" (H, W, D)

EMX-24W: 5 1/4" x 50 3/16" x 18 5/8" (H, W, D)

Rack-Mount Device Dimensions

PR&E Mix Engine (1RU): 1 3/4" x 19" x 13 1/4" (H, W, D)

PR&E 1620 Power Supply (1RU): 1 3/4" x 19" x 13" (H, W, D)

Razor I/O Interface (1RU): 1 3/4" x 19" x 9 1/4" (H, W, D)

Power Supplies

Type: Internal switching supplies on all devices

AC input: Detachable IEC cord

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

1620 Supply Output: +16 VDC @ 4.00 amps

Power Requirements

PR&E Mix Engine: <30 watts at 120 VAC / 60 Hz

EMX-16 Surface: <15 watts at 120 VAC / 60 Hz

EMX-20 Surface: <25 watts at 120 VAC / 60 Hz

EMX-24 Surface: <35 watts at 120 VAC / 60 Hz

Razor: <15 watts at 120 VAC / 60 Hz

Environment

Ambient Temperature: Less than 40°C

Cooling: EMX Surface, PR&E Mix Engine, 1620 power supply, and the Razor I/O Interfaces are all convection cooled (no fans). We recommend leaving one rack space open above the power supply and Mix Engine to allow for proper heat radiation from those units.

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

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

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

- a) 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 in the discretion of Wheatstone Corporation and is the exclusive remedy hereunder.
- c) This Warranty DOES NOT apply to damage or defects resulting from abuse, careless use, misuse, improper installation, electrical spikes or surges, or alteration, repair, or service of the unit or equipment by anyone other than Wheatstone Corporation or its authorized dealer.
- d) This Warranty is void if the serial number has been removed, altered or defaced.
- e) This Warranty DOES NOT cover loss or damage, direct or indirect, arising out of the use or inability to use this unit or for shipping or transportation to any dealer.
- f) Wheatstone Corporation reserves the right to modify or change any unit in whole or in part at any time prior to return delivery 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 ANY IMPLIED OR STATUTORY WARRANTY CANNOT BE DISCLAIMED, THEY ARE LIMITED TO THIRTY (30) DAYS FROM THE DATE OF PURCHASE. WHEATSTONE CORPORATION IS NOT RESPONSIBLE FOR ELECTRICAL DAMAGE, LOSS OF USE, INCONVENIENCE, DAMAGE TO OTHER PROPERTY, OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL, WHETHER DIRECT OR INDIRECT, AND WHETHER ARISING IN CONTRACT, TORT, OR OTHERWISE. NO REPRESENTATIVES, DEALERS, OR WHEATSTONE PERSONNEL ARE AUTHORIZED TO MAKE ANY WARRANTIES, REPRESENTATIONS, OR GUARANTEES OTHER THAN THOSE EXPRESSLY STATED HEREIN.

Attention!

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

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



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

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

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



2 - EMX HARDWARE INSTALLATION

Every EMX Surface is 18 5/8" (47.3 cm) from the front of the palm rest to rear of the back panel. The side panel-to-side panel width varies by Surface model: EMX-16 is 32 1/8" (81.6 cm); EMX-16W is 38 1/4" (97.2 cm); EMX-20 is 38 3/16" (97 cm); EMX-20W is 44 1/4" (112.4 cm); EMX-24 is 44 9/64" (112 cm); and EMX-24W is 50 3/16" (127.5 cm).

LOCATING THE EMX COMPONENTS

The **EMX Surface** is designed to be set into a cutout in the studio furniture countertop with the front of its palm rest between six and twelve inches (15 to 30 cm) from the edge of the countertop (Figure 2-1). This "setback space" allows keyboards and mice, a VoxPro controller, copy, log sheets, etc. to be placed in front of the console.

A **16-foot locking DC cable** (included) connects the Surface to the 1RU **PR&E 1620 Power Supply**, which must be rack mounted (19" rack) so its DC cable is not under strain when connected to the Surface. The 1620 Supply is typically mounted at the top or bottom of an under-the-counter 19" equipment rack. It can alternately be mounted below the Mix Engine when a 1RU blank or vented panel is placed in between the power supply and Mix Engine to ensure adequate ventilation for both devices.

The **PR&E Mix Engine** (1 RU) is also mounted in an under-the-counter 19" rack. We recommend adding a 1RU blank or vent panel above the Mix Engine to ensure adequate ventilation. Mount the Mix Engine in a location that allows easy access to its rear panel since that's where all audio, logic, and network connections for the EMX console are made. There are no controls on the Mix Engine, but there are front panel status LEDs that may need to be viewed.

Unlike the 1620 Supply, the Mix Engine's mounting location is not constrained by cable length since it connects to the EMX Surface using one straight-thru category cable (**customer-supplied CAT5e or CAT6 cable**) which can extend up to 330 feet (100 meters). This cable connects the *Ethernet jack* on the Surface to Port 4 on the PR&E Mix Engine's rear panel Ethernet switch.

When locating the Surface, Mix Engine, and 1620 Supply avoid mounting them in close proximity to any products using unshielded switching power supplies, motors, or large power transformers since these generate strong electromagnetic fields that could adversely affect their operation.

The EMX can be installed and operated while it's sitting on a countertop, but to maintain its low profile—and to allow its palm rest to sit flush to the

countertop, the EMX Surface must be set into a rectangular countertop cutout. The cutout depth (front-to-back dimension) is 15" (38.1 cm) for any size EMX Surface. The cutout width varies by the Surface model, as listed in Figure 2-1.

The cutout must be parallel with the countertop edge. It starts 2" (5 cm) beyond the desired setback dimension (e.g., for a 6" (15 cm) setback, begin the cutout 8" (20 cm) from the countertop edge).

When cutting a laminate countertop, use a large drill bit to drill fully through the countertop at the four cutout corners. Use a jigsaw or reciprocating saw to then cut out the hole. Leave the corners rounded to prevent future laminate cracking caused by a sharp corner. Corian® and other solid surface material should be cut out by an authorized installer.

Depending upon how the cabinet is braced, a steel support strut (1-5/8" x 1-5/8" slotted strut channel, 12 gauge, or similar) may need to be attached to the underside of the countertop, typically just behind the rear of the cutout, to maintain countertop rigidity.

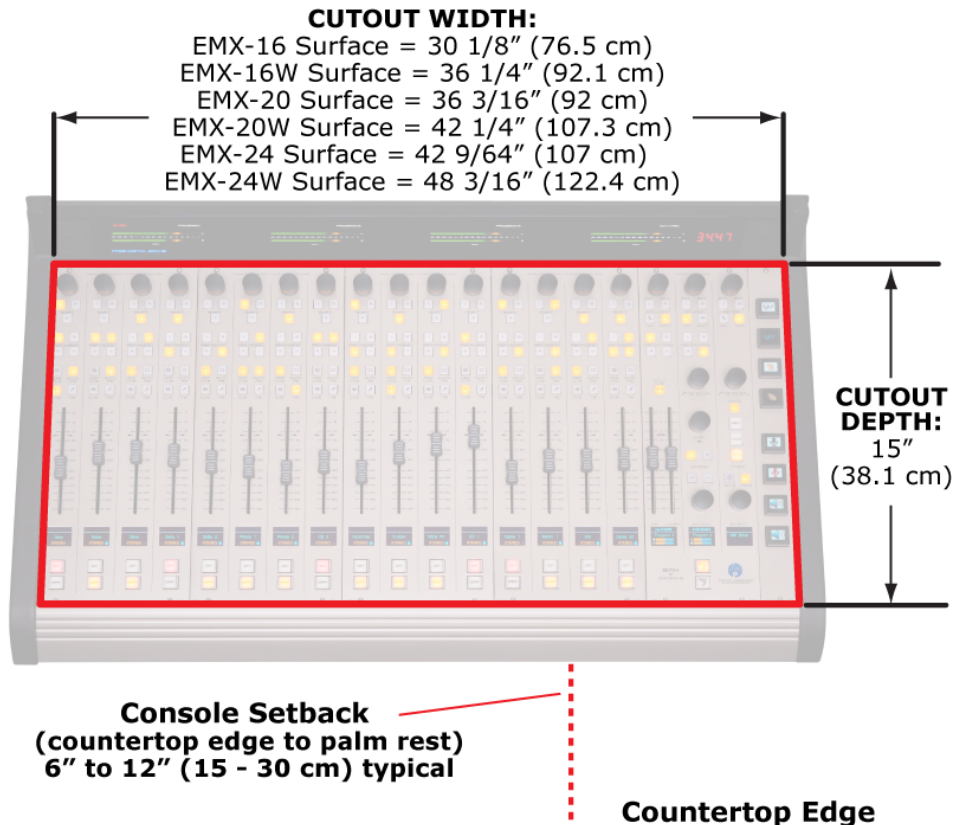


Figure 2-1 EMX Surface Cutout Placement & Dimensions

Surface Placement & Cable Connections

Set the Surface on the counter, or into the cutout, and verify its palm rest is parallel with the countertop edge. The weight of each Surface should hold it in position when set on the countertop. If the cutout is oversized, allowing the Surface to shift slightly, place thin soft rubber pads under the side panels or use angled shims, placed between the countertop and each side of the chassis, to firmly hold the Surface in position.

To connect the Surface's DC cable, and the Ethernet cable that connects the Surface to the Mix Engine, remove the upper rear cosmetic cover from the back of the meter bridge. Remove the black #1 Phillips screws from along the bottom of the upper rear cover. Since its top edge fits into a slot in the meter bridge's top cover, the upper rear cover may need to be pulled down slightly to pull it out of the slot.

When removed, the network host board, with the DC power jack and RJ45 Ethernet jack is revealed (Figure 2-2). Route the supplied DC cable, and the customer-supplied category cable (CAT5e or CAT6), up through the access holes in the bottom of the chassis. Plug and latch the category cable into the upper shielded **RJ45 Ethernet jack**. Plug the DC cable into the **DC Power Jack**, tightening its housing onto the threaded jack. Reattach the upper rear cover.

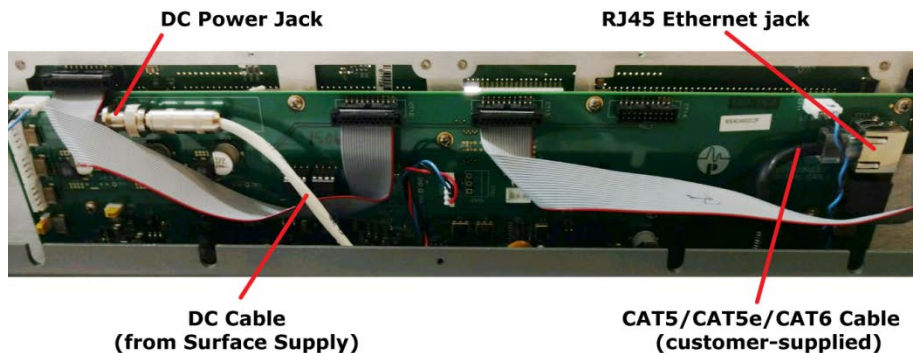


Figure 2-2 EMX Surface, Rear View, Upper Rear Cover Removed

Route the CAT5e/CAT6 cable from the Surface to the back of the PR&E Mix Engine (Figure 2-3) and plug it into **Port 4** on the built-in **ETHERNET** switch. Route the DC cable to the **1620 Supply** and connect it to the threaded **DC Jack** on the rear of the supply.

If a redundant 1620 Supply and FSI-DMX/EMX Failsafe Interface are being installed, connect the DC cable from the Surface to the **DC OUT** jack on the Failsafe Interface. Connect the two short DC cables supplied with the FSI-DMX/EMX between the two **DC IN** connectors on the Failsafe Interface and the **DC Out jacks** on each 1620 Supply. The two 1620 power supplies should connect to different AC circuits, if possible.

Available for a setup PC, VoxPro PC, an Audio Server, etc. Use **Port 1** to connect the EMX to a facility-wide AoIP switch.

CAT5e Cable from EMX Surface plugs into **Port 4** (customer-supplied cable)

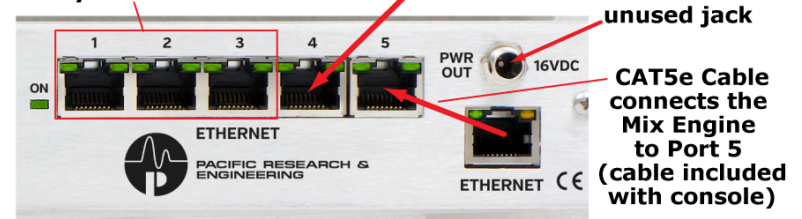


Figure 2-3 Mix Engine, Rear Panel Ethernet Connections

PR&E MIX ENGINE CONNECTIONS

To facilitate wiring the PR&E Mix Engine, create a wire list, listing all connections to and from peripheral devices. Identify and create labels for each end of each audio, logic, and network cable. List these connections in a master facility wiring logbook to ease installation, future system wiring and equipment changes, and system troubleshooting.

Audio cabling to and from the Mix Engine should always be run with the maximum practical distance from all AC mains wiring. The Surface's power cable only carries DC voltage, so audio wiring can run parallel to or even be tie wrapped with this cable without problem.

All line level analog audio, AES/EBU, and logic signals connect to the Mix Engine on RJ45 jacks. Pin out signal lists, and the standard category wire colors used for the analog and digital audio connectors and the Logic connector are shown in Figure 2-4.

STUDIOHUB+ WIRING	
RJ45 PIN (WIRE)	SIGNAL
1 (WHT/ORG)	Left + or AES +
2 (ORG)	Left - or AES -
3 (WHT/GRN)	Right +
6 (GRN)	Right -
4,5,7,8	No Connection

WHEATNET-IP LOGIC WIRING	
RJ45 PIN (WIRE)	SIGNAL
1 (WHT/ORG)	GROUND
2 (ORG)	LOGIC 1
3 (WHT/GRN)	LOGIC 2
4 (BLU)	LOGIC 3
5 (WHT/BLU)	LOGIC 4
6 (GRN)	LOGIC 5
7 (WHT/BRN)	LOGIC 6
8 (BRN)	+5 VOLTS

Figure 2-4 Audio & Logic RJ45 Pin Outs & Signals

For most applications, either shielded twisted pair (STP) or unshielded twisted pair (UTP) wiring can be used interchangeably. When crimping your own CAT5 cables, UTP has an advantage because it's a lot easier to crimp than STP wiring. To simplify audio wiring, standard length straight-thru CAT5 cables can be used with RJ45 Audio Adapters to connector to peripheral devices.

StudioHub and other vendors have a wide variety of RJ45 Audio Adapters, most of which are carried by Wheatstone and PR&E dealers and distributors. For more information on what adapters are available, and on StudioHub+ wiring practices, refer to the StudioHub adapter web page: <http://www.studiohub.com/adaptordonglessplitterscouplers.php>

To simplify logic wiring, various GPIO Interfaces for WheatNet-IP Logic connectors are available from NotaBotYet (www.notabotyet.com). Each break out the six GPIO connections from the Mix Engine or Razor RJ45 Logic jacks to screw terminals so “old school” hardware wired peripherals, like warning lights and hot mic LEDs, can easily be connected.

When RJ45-to-audio and RJ45-to-logic adapters are used, generic pre-made straight-thru CAT5 cables, with RJ45 plugs on each end, can be used to quickly connect the Mix Engine and Razor I/O Interfaces to the audio and logic connections on peripheral devices.

When wiring directly from an RJ45 jack on the Mix Engine or a Razor to individual XLR, TRS, or other audio connectors, single-pair UTP (DataMax 5100 or similar) can be used to wire an AES or mono analog connection. Dual-pair UTP (DataMax 5200 or similar) can be used for wiring to stereo connections that use a single connector (like a D-Sub) on the peripheral device.

When wiring to a stereo analog device that uses two connectors, two single-pair UTP wires could be connected to a common RJ45 to cleanly connect the two audio connectors. Alternately, when breaking out the two wire pairs from a single CAT5 cable to reach the two audio connectors, place shrink tubing over each wire pair and then shrink them together at the stripped end of the CAT5 jacket to create a reliable, and clean looking, connection.

The exception to the practice of using UTP cable is for the microphone cables that plug into the female XLR connectors on the Mix Engine, Razor 16A, and M4IP-USB. These must use shielded analog wiring specifically designed for low-level balanced signals. Room monitor outputs that connect to self-powered monitor speakers may also need to use shielded cable, with the shield terminated at the monitor speaker end, since there is no shield connection on the Mix Engine’s RJ45 jacks.



Note: The StudioHub+ wiring convention specifies pin 4 as DC Ground to support POE (Power over Ethernet). The Mix Engine and Razor RJ45 connectors do not tie pin 4 (the blue CAT5 wire) to ground since neither product supports POE. Thus, a ground connection can only be made at the peripheral device end. If the peripheral device has an unbalanced input with a Tip-Sleeve or RCA connector, an audio balun transformer (balanced: unbalanced) or a signal matchbox must be used.

All Mix Engine analog line-level inputs and outputs are intended to connect balanced +4 dBu signals using only the plus (+) and minus (-)

signals from the peripherals to connect to the + and - terminals on the RJ45 plugs (as shown in Figure 2-4 on page 12).

Unbalanced device outputs can directly connect to **EMX analog inputs** by connecting the low (-) signal wires (pin 2, ORG, and/or pin 6, GRN) to GND on the unbalanced device. Connect the hot wire (the unbalanced + signal) to the WHT/ORG and/or WHT/GRN wires (terminals 1 and 3). Since the unbalanced device will have a very low output level—as compared to a balanced signal, use the **PR&E Navigator Device > Sources** tab to adjust the input gain. Every EMX input can be increased by up to +18 dB.

When **EMX analog outputs** need to connect to unbalanced devices, a matchbox or an audio balun transformer (balanced:unbalanced) must be used. You can, alternately, connect the + wires (the WHT/ORG and/or WHT/GRN wires on terminals 1 and 3) to the unbalanced device directly, but the ground wires from the unbalanced device must be broken out of the wiring and connected to the Mix Engine or Razor chassis in order to connect to ground. One way to do this would be to connect a small spade lug and ground wire to a Phillips screw on a MIC XLR connector.



Note: On an output, **do not ground** the two low (-) signals (the ORG and GRN wires on terminals 2 and 6) at the unbalanced device in an attempt to connect an unbalanced device directly to a Mix Engine or Razor output. This can cause phase issues and crosstalk and could lead to component failure since this effectively shorts an active op amp output to ground.

Ethernet Connections

Ethernet network wiring also uses RJ45 jacks but, because a PRE-IP network is running at 1000Base-T (1 Gigabit or 1GB) for the most reliable network operation only CAT5e or CAT6 cabling should be used.

For short connections, like connecting the PR&E Mix Engine and EMX Surface to the **Ethernet switch** (Figure 2-3 on page 12), CAT5 cables can be used but CAT5e or CAT6 cables should be used for all long cable runs.

Ports 1, 2, and 3 on the five-port Gigabit Ethernet switch are available to connect an “EMX admin PC” with the PR&E applications installed on it. This PC will not need to remain connected during normal use unless **PR&E Navigator** is used to control signal connections. Alternately, if a VoxPro or other audio editor PC is networked with the EMX, the PR&E apps can be installed on that PC, and it would then be the admin PC. The remaining switch ports can be used to network a WNIP-compatible media server, and/or Razor I/O Interface and an M4IP-USB Blade.

Port 1 can alternately connect the EMX to an AoIP switch to network the EMX with additional DMX and EMX consoles, Razor I/O Interfaces, M4IP-USB Blades, and WNIP-compatible media servers to create a large PRE-IP network. See Appendix A for details on PRE-IP network expansion.

EMX POWER UP

The PR&E Mix Engine, PR&E 1620 Power Supply, and the Razor I/O Interfaces do not have power switches since all are designed for continuous 24/7 operation. They are designed to work with AC mains supplying 90 - 240 VAC @ 50 or 60 Hz. For the most reliable operation, all EMX components should only plug into isolated ground circuits (orange outlets in the USA) which are on a UPS (Uninterruptible Power Supply).

When AC power is applied, it takes about 90 seconds for each EMX device to boot up, connect to the PRE-IP network, and be ready for use. If the EMX Surface is powered up without being connected to its Mix Engine, or if the Mix Engine itself is not powered, the meter bridge level displays' peak LEDs will scan up all meters, visually indicating the Surface is not communicating with its Mix Engine. Once the Surface and Mix Engine are properly connected via Ethernet, the meters' LEDs will stop scanning.

When power is first applied to the Mix Engine, the rear panel green On LED (next to the Ethernet switch) lights up first. This is followed by the green LEDs blinking on active Ethernet switch ports. Note that the Surface's Ethernet jack only blinks one LED since it communicates at 100Base-T. The Mix Engine and Razor ports will have both green LEDs blinking since they communicate at 1000Base-T. A networked PC will also only blink one LED if its NIC does not support 1GB speeds.

The front panel LINK LED (Figure 2-5) lights up solid when the Mix Engine's Ethernet jack is connected to port 5 of the Ethernet switch. On a stand-alone EMX, the other two front panel green LEDs: ROUTE MSTR (Route Master) and CLOCK MSTR (Clock Master) also light up solid—after about 90 seconds, indicating the Mix Engine is ready for use.

When a new EMX is networked with existing EMX and DMX consoles, the new PR&E Mix Engine may not be designated as a master, thus its ROUTE MSTR and CLOCK MSTR LEDs could both be off. This simply indicates there's other networked Mix Engines in the PRE-IP network which are set as the Route Master or Clock Master. With multiple Mix Engines in a system, one Mix Engine is designated as the Route Master while a second one is designated as the Clock Master.

If the red ERROR LED should light, it indicates an error condition has occurred within the Mix Engine. To reset this error, first try rebooting the Mix Engine using [PR&E Navigator](#). If the red LED remains lit after it reboots, power cycle the Mix Engine (unplug the AC cord from the Mix Engine, wait five seconds then plug the AC cord back in).



Figure 2-5 Mix Engine Front Panel Status LEDs

If the red error LED lights up again after it restarts, this would indicate a fault in the Mix Engine which requires service. Contact Wheatstone technical support for assistance. See Chapter 5 (page 60) for information on obtaining service and support for your EMX console.

CHECKING OUT THE EMX FEATURES

With the PR&E Mix Engine and EMX Surface powered up and plugged into the built-in Ethernet switch on the Mix Engine, on a stand-alone EMX the three green LEDs will be lit on the Engine's front panel (Figure 2-5). The Surface should appear as shown in Figure 1-1 on page 5—but without any meter displays since there's no audio connected to the console yet!



Page 46 has an overview of the channel strip controls and page 50 has an overview of the Monitor Control panel's controls.

With fader channel 3 turned off, rotate channel 3's **Channel Encoder**. The normal display, showing *NoSource* as the channel's source, switches to show alternate sources with one name highlighted (Figure 2-6). That source's device, the Mix Engine or Razor that it plugs into, appears above the white line for reference. **Blade01** is default name for the PR&E Mix Engine.

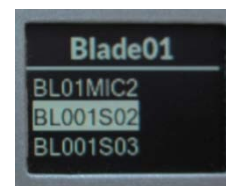


Figure 2-6 Channel Visibility List

Rotate the encoder clockwise to move the highlighting down the alphanumeric list of names. Rotate the encoder counter-clockwise (CCW) to move the highlighting up through the names. The names wrap around to present a continuous list. *NoSource*, which appears at the top of the list, is a good way to identify when the names have wrapped around.

Every physical input on the PR&E Mix Engine has a signal name of up to eight characters. The default names all start with BL, for Blade, followed by that Blade's ID number (1 is the default ID number for the PR&E Mix Engine). The default names end with a signal number, like S02, to identify its physical connection on the Mix Engine or optional Razor I/O Interface.

All EMX inputs are set as stereo, except for **Analog Input 1**, which is set as two mono inputs with the default names: BL01MIC1 and BL01MIC2. The remaining **Analog inputs** have the default names: BL001S02, BL001S03, and BL001S04; while the four **AES inputs**' default names are: BL001S05 thru BL001S08. The last number matches the RJ45 jack number silkscreened onto the rear panel of the Mix Engine and Razor I/Os.

Analog input 1 is meant to jumper to the **MICS OUT** jack so the two built-in mic preamps can be used without having to make any changes to Input 1's configuration since it's set for two mono mic signals. If the two built-in mic preamps will not be used, Analog Input 1 can easily be changed back to stereo using [PR&E Navigator](#) (see Chapter 3, page 39).

After the Mix Engine's physical input signal names you'll see the internal signals within the EMX. Many, if not most, of these signals are typically not set as "visible" on fader channels, but on a new console all signals are set as visible to ease installing and checking out the EMX. Setting signal visibility is covered in Chapter 3, starting on page 30.

Rotate the channel 3 encoder until **BL001S02** is highlighted (as shown in Figure 2-6, on page 14). Press once on the channel encoder to select that signal. This is called "clicking" the encoder—just like clicking a PC mouse button. The click "takes" or connects the highlighted signal to the fader channel. BL001S02 should now be shown, in green, in the middle of the channel 3 display as shown in Figure 2-7.

The area above the white line is used to show which Advanced Channel Features (covered in the next section) are active on the channel. The console's factory default settings turn on preset mic processing for channels 1 and 2, hence the **EQ** (equalization is active) and **DYN** (dynamics processing is active) icons on those channels. Other icons in this area indicate when the HPF (High Pass) and/or LPF (Low Pass) filters are active and whether the channel's fader was remotely set using an ACI fader level command (a small red up or down arrow in the middle indicates which way the fader must be moved to regain local fader control).

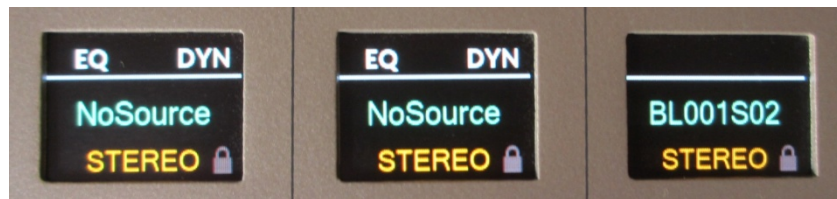


Figure 2-7 Channel Display for channels 1, 2, and 3

Below the name, in orange, is the channel's mode setting. The default setting for every channel is STEREO (a mono signal like a mic is fed to both left and right channels by default). To either side of the mode name are icons to indicate source status. On the right side you can see a faint lock icon which will indicate that source's LIO status (logic control status) when the channel's turned on. To the left—if the channel source is set as a mic, will be a mic icon which turns red when the channel is on.

Advanced Channel Features

Every channel has five **Advanced Channel Features** which are accessed by "double-clicking" or tapping twice on the channel encoder.

These advanced features can be selectively locked out from operator access but, as shipped from the factory, all features are unlocked.

"Double-click" the channel 3 encoder (tap it twice quickly) and **Mode** appears above the white line. Rotating the encoder, while Mode is shown in the display, steps through the four audio modes (Right, Left, Mono, and Stereo). Make sure STEREO is shown then double-click the encoder again.

Now **Pan** is shown above the white line. Rotating the encoder now pans or balances the signal to the left or right of center. Readjust the encoder so CENTER is shown then double-click the encoder again.

The displays on channels 1-8 switch to show the **EQ & Dynamics** control screens. The initial display screens show which EQ & Dynamics controls are turned on (In) or off (Out) for that channel. On fader channels 1 and 2, both EQ and Dynamics are set In by default, for "light mic processing," since these channels are typically assigned to the Host and Guest mics. The rest of the fader channels do not have any default EQ or Dynamics settings applied. Refer to the Chapter 4 section, *EQ & Dynamics*, starting on page 53, about how to: set EQ and Dynamics in/out; how to adjust their settings; how to save the EQ & Dynamics settings on any channel; and how to recall previously saved settings to any channel.

For now, double-click the channel 3 encoder again. The other seven channel displays return to normal while the channel 3 display switches to show **AUX1** above the white line.

The **AUX1** screen shows how that channel is feeding the Aux 1 Send bus, including: whether AUX 1 is set for Pre or Post Fader and Pre or Post On operation (set using the [EMX Surface Setup](#) app); whether that channel is feeding the bus (On) or is unassigned (Off); and the current channel level setting using a bar graph display. To change the On/Off assignment, click the channel encoder once and the On/Off setting is highlighted. Rotate the encoder CW to select on (the channel is now feeding the Aux 1 bus), rotate it CCW to select off (to unassign that channel to the Aux 1 bus). Leave it set to off then click the encoder again to highlight the bar graph. Rotating the channel encoder now adjusts the level of that channel's signal going to the Aux 1 bus.

Double-click the encoder to switch to the **AUX2** adjustment screen (**AUX 2** is now shown above the white line). It has the same controls as the Aux1 screen, so double-click the encoder one more time to exit from the Advanced Channel Features.

The channel display reverts to showing the channel source name as shown in Figure 2-7. If any EQ or Dynamics settings had been set In then **EQ**, **DYN**, or the symbols for the HP or LP filters would be shown above the white line.



Note: The Advanced Channel Features have a timeout period of twenty seconds. If no control is touched over that time the channel displays revert to their normal source name displays. When this

happens the current settings for that Advanced Channel Feature are auto-saved. This twenty-second timeout period can be defeated—which is especially useful when setting up EQ & Dynamics, in the [EMX Surface Setup](#) app by unchecking *Timeout Enabled* on the **Talent Access** page tab and clicking *Apply* to upload the new setting to the Surface.

The Mode, Pan, EQ & Dynamics, and Aux Send controls should be selectively disabled from board operator access prior to releasing the console for daily use. This is also done on the Talent Access tab in the [EMX Surface Setup](#) app (see page 24).

Connecting Audio to the EMX

Connect a stereo analog audio signal (like a +4 dBu test tone) to the **ANALOG 2 IN** jack on the PR&E Mix Engine following the RJ45 wiring shown in Figure 2-4 on page 12. This jack's default signal name is **BL001S02**, which should already be shown in the Channel 3 display as the current source for that fader channel. Figure 2-8 identifies this jack on the back of the Mix Engine.

To verify you have audio, press the channel 3 **Cue** button (it lights) to connect that channel's audio input to the stereo cue speakers in the meter bridge. Adjust the **CUE** encoder on the Monitor Control panel to adjust the cue speaker level. Press the cue button again (the LED turns off) to unassign channel 3 from the cue bus.

Assign channel 3 to **PGM 1**, **PGM 2**, **PGM 3**, and **PGM 4** (light up all four assignment buttons). Set the channel 3 fader to unity gain by aligning the middle line of the fader knob to the two arrows at the -12 dB setting. Turn Channel 3 on by pressing and releasing the **On** button (directly below the channel display). This button turns red when pressed, indicating the audio source is now being applied to the selected Program buses.



Figure 2-8 Mix Engine, rear panel partial, showing Audio and Logic Jacks

When the input is a +4 dBu test tone all of the green meter segments will light along with the first yellow segment. This indicates the level is -20 dbFS (dbFS = decibels below Full Scale) which is equivalent to 0 VU on an analog VU meter. The three dedicated **Program meters** (Program 1, Program 2, and Program 3) should show this level. The **Switched Meter** will show Program 4 when the **PGM 4** button is lit in the **Meter column** of the Monitor Control panel (press the button to light it).

If desired, connect a test set to each of the four PGM ANALOG outputs to confirm that each has +4 dBu. Connect a digital test set to each of the four PGM DIGITAL outputs (which have the same set of signals as the four analog jacks) and confirm each is -20 dbFS. The four PGM default sources are the PGM 1 to PGM 4 buses, but [PR&E Navigator](#) can be used to connect an alternate source to any of these four stereo outputs.

To test the four analog monitor outputs (OUT jacks) connect a test set (or balanced input powered monitor) to the **CR** jack. In the left column of the Monitor Control panel, select **PGM MONITOR 1** (it lights) as the monitor source. The **CR fader** adjusts the level of the **CR** output. The orange/blue bar graphs in the left and middle monitor displays show the relative levels of the **CR**, **HDPN**, **CUE**, and **STU** outputs (Figure 2-9). The CR monitor output level (speaker icon) is the upper left bar graph.

Move the test output to the **HDPN** jack. Its output is set by the **HDPN fader**. A headphone icon indicates its bar graph (left display, bottom). This fader also affects the EMX Surface's headphone jack output.

Move the test output to the **STU** jack. In the middle column of the Monitor Control panel, select **PGM MONITOR 1** as the studio monitor source. Adjust the **STUDIO encoder** to control the **STU** output. Its level is shown in the bottom bar graph (speaker icon) in the middle display.

Move the test output cable to the **CUE** jack. Press the **Cue button** on channel 3 so that it lights. Adjust the **CUE encoder** to control both the meter bridge cue speaker level as well as the Cue output jack. The upper bar graph (C) in the middle display indicates the cue output level.

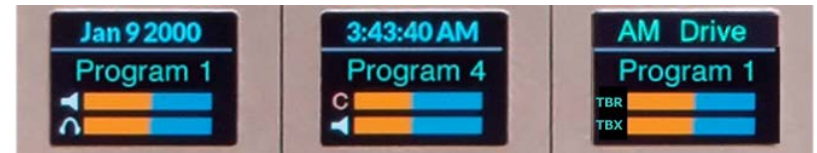


Figure 2-9 Monitor panel displays showing the monitor output Levels

The right-hand display's bar graphs show the levels of the Monitor panel's Talkback to Control Room level control (TBR) and the Talkback to Studio (TBX) level control. The **TB TO CR encoder** sets the talkback level into the control room from studio mics. The **TB TO STU encoder** sets the level of the Control Room talkback into the STU output.

By following the preceding steps, you should now have a basic understanding of EMX console operations and Mix Engine signal connections. If you have a list of audio devices, and which inputs and outputs they'll plug into, you can use [PR&E Navigator](#) and the [EMX Surface Setup](#) apps to name the input signals and configure the console for your application.

The next chapter covers how to use the PR&E apps ([EMX Surface Setup](#), [PR&E Navigator](#), and the [PR&E System Configuration Tool](#)) to configure the Mix Engine, the EMX Surface, and the Razor I/O Interfaces for your

specific application. Chapter 4 covers EMX Surface operations from a board operator perspective. The remainder of this chapter presents additional details about the audio and logic connections on the Mix Engine and Razor.

PR&E MIX ENGINE SIGNAL NOTES

This section covers the PR&E Mix Engine connections and which PR&E app is used to configure that signal or connection. Figure 2-8, on page 16, shows the RJ45 jacks on the back of the Mix Engine for reference.

Mic Preamps – There are two microphone preamps in the Mix Engine with female XLR jacks. One or two, dynamic or condenser, mics can be plugged into the low noise preamps in order to boost the mics up to line level. The two mics are typically assigned to fader channels 1 and 2, which have factory-set EQ and Dynamics Processing already applied, so having to use external mic processors is not required with the EMX. If additional mic preamps are needed, each **Razor 16A I/O Interface** has two mic preamps and each **M4IP-USB Blade** has four SQ mic preamps and Vorsis mic processing.

Each Mix Engine preamp has an input trim control and a 48-volt phantom power switch. Set the phantom switch on to power condenser mics. A yellow LED lights to show phantom power is active. For dynamic mics, like an RE-27, set the phantom power switch to off (LED off).

The trim level adjustment should be made after the console is wired since it requires the mic to be assigned to a fader channel so its level can be seen on the meters. Typically, the trim level is adjusted with the channel fader set to unity gain. With the talent speaking at their normal “radio voice level” adjust the trim pot so the top of their average bar graph signal is around -20 dB FSD and their peaks are around -8 dB dBFS on the Program meters. If you want to add EQ and Dynamics Processing, do that after the mic preamp gain trim is properly adjusted.

MICS OUT – This jack has the line level outputs from the mic preamps: Preamp 1 is “left” and Preamp 2 is “right.” Connect a short straight-thru CAT5 cable from **MICS OUT** to **ANALOG IN 1** since that input is preset for two mono mic signals.

LOGIC - The Mix Engine and Razor I/O Interfaces each have one RJ45 Logic jack for connecting logic to non-IP external devices like a Henry warning light interface or a CD player. Each Logic jack has six LIO logic ports (pins 2–7) plus ground (pin 1) and +5 volts (pin 8). Each logic port is independently assigned, using [PR&E Navigator](#), to set it as either a logic output (e.g., On Tally, Studio In Use tally, Start Pulse, etc.) or as a logic input (e.g., Channel On, Channel Off, Cue, etc.).

Each Blade (PR&E Mix Engine, Razor, and M4IP-USB) also has 128 Soft LIO (SLIO) logic signals that can be used with WNIP-compatible devices, like talent stations and media servers, for bi-directional command and

control of the EMX console over Ethernet. SLIO signals are also assigned using [PR&E Navigator](#) as either an input or an output. See page 41 for details on assigning both LIO and SLIO logic.

ANALOG IN - Analog inputs are designed for balanced +4 dBu signals, but unbalanced -10 dBv signals can also be connected—without needing a match box, since each input has input gain/trim/balance settings in [PR&E Navigator](#). Up to 18 dB of gain or trim can be applied to any input.

Inputs are labeled as **ANALOG IN 1-4** on the Mix Engine. They are assigned the default names: BL01MIC1 (input 1 left), BL01MIC2 (input 1 right), BL001S02 (input 2), BL001S03 (input 3), and BL001S04 (input 4) in the EMX signal lists. Inputs 2, 3, and 4 can also be separated into two mono inputs using [PR&E Navigator](#) to allow two independent mono signals, like a pair of phone hybrids, to connect to one RJ45 jack.

DIGITAL IN – The four digital inputs are designed for stereo differential AES/EBU (AES3) signals which, in most cases, can alternately have an unbalanced S/PDIF digital signal connected. These jacks are labeled as **DIGITAL IN 5–8** on the Mix Engine. Their default names are BL001S05 – BL001S08 in the signal lists. Each has gain/trim settings in [PR&E Navigator](#) to adjust their input level as required. Any AES/EBU input can also be split into two mono signals, a common occurrence with digital phone systems.



Note: Digital In 8 can also be used as a Sync Reference input to synchronize the EMX to an external sample clock signal.

PGM OUTPUTS – These eight outputs: four stereo balanced analog outputs and four AES/EBU outputs, connect to the Program 1 – 4 buses by default but any output can be connected to a different source using [PR&E Navigator](#) (System > Crosspoint tab) by first unlocking that output and then connecting a different source. The PGM outputs cannot be set for dual mono outputs and the same source gets applied to both the analog and AES/EBU outputs. When a different source is connected to any PGM output uncheck the [EMX Surface Setup](#) option *Use Default Signal Mapping* (page 23) since that option automatically reconnects the four Program buses to the PGM outputs if the console is rebooted or power cycled.



Note: The four AES/EBU outputs can only connect to balanced AES/EBU inputs. Connecting them to unbalanced S/PDIF inputs requires using an AES3-to-S/PDIF converter.

MONITOR OUTPUTS – The default sources for these four stereo analog outputs are: Cue; CR monitor; Studio monitor; and Headphone. Normally the four Surface controls (CUE encoder, CR fader, STUDIO encoder, and HDPN fader) control the monitor output levels. When an alternate source is connected using [PR&E Navigator](#), the Surface control will no longer affect that output's level, and the [EMX Surface Setup](#) option *Use Default Signal Mapping* (page 23) should be unchecked.

The **CR OUT** jack (destination: CBxxCR) normally connects to powered monitor speakers and is not typically changed from its default source. Since the EMX has built-in cue speakers, if external cue speakers are not needed the **CUE OUT** jack (destination: CBxxCUE) could connect the Telco Mix (source: TELCO MX) to a call recorder. If there's no associated talk studio the **STU OUT** jack (destination: CBxxSTU) could be used to connect a different source to feed a skimmer, an Internet streamer, or other device. Likewise, if the **HDPN OUT** jack (destination: CBxxHDPN) is not needed to connect to an outboard headphone amp it can connect to a different source to add another stereo line output on the Mix Engine.



Note: The built-in ¼" headphone jack on the right side of Surface (destination: EMXHDPN) is not affected when the HDPN OUT jack on the Mix Engine gets changed to an alternate source.

Additional Operational Features

This section covers some of the special operational features found on the EMX Surface, including using the Off Line bus and assigning sources for the Monitor Control panel monitor and meter select buttons, as well as how to adjust input and output levels and signal balances, and how to set mic and monitor muting.

Callers & Remotes

The EMX console uses the WheatNet-IP *bus-minus* convention to create a unique *To Network* return audio signal when a caller or remote is the channel's source. Callers (phone hybrid or digital phone system) and remotes (ISDN or POTS codecs) are collectively called Telco sources.

A Telco source not only has a *From Network* audio signal which is set as a channel's source, they also need a *To Network* audio signal to be sent back to them so that the caller/remote can hear the board operator or the on-air signal—always minus their own *From Network* audio. The *To Network* audio is typically derived from the bus-minus signal on that Telco source's channel. The bus-minus signal can be manually connected using the Crosspoint tab in [PR&E Navigator](#) or automatically connected using an Associated Connection. Each method is covered in detail in Chapter 3.

The Off Line (OL) bus is typically used to create the *To Network* signal for both callers and remotes when they are not on-air. This allows the board operator and/or producer to carry on a hands-free conversation with them. When the caller/remote goes live, the PGM 1 bus is typically used to create the *To Network* signal so that caller/remote hears everything else going to air (but always minus their own *From Network* audio).

When a channel has a Telco source on it the **Auto FB** and **TB** (Talkback) buttons are activated. The **Auto Fold Back** feature, active when the Auto FB button is lit, automatically toggles their *To Network* return signal between the OL bus, while their channel is off, and the on-air PGM bus (typically PGM 1), while their channel is on. This feature is used when the

caller/remote goes live-to-air so the board operator doesn't have to change any board settings in order for the *To Network* return audio to automatically toggle between the OL and PGM 1 buses. If the board operator needs to talk to the caller/remote while they are live they can press the **TB** button to override the PGM bus-minus audio allowing them to talk to the caller/remote using their board mic.

When a caller/remote is assigned to a dedicated fader channel, setting up their Telco device is simple: the *From Network* audio signal is "dialed up" on that fader channel and that fader channel's bus-minus signal is connected (using [PR&E Navigator](#)) to the output connected to the phone hybrid or codec.

When a Telco source is set as an alternate source on multiple fader channels things get more complicated since now their mix-minus signal, typically derived from the bus-minus signal for the channel the Telco source is taken on, varies according to which channel they're "dialed up on." Fortunately, the [PR&E Navigator Associated Connections](#) feature can simplify connecting the bus-minus signal. It sets up a "trigger condition" for the system to monitor. When that trigger is detected, one or more actions can be taken. For example, if taking a codec on fader channel 15 is the trigger, the Associated Connection can be to connect the bus-minus for fader 15 to that codec.

Typically one sets up an Associated Connection for each fader that a codec is set visible on so that no matter which channel the codec is taken on, it will always be connected to the correct bus-minus signal. Setting up Associated Connections is covered in Chapter 3 on page 43.

Using the Off Line Bus

Typically, the board operator mic and the caller/remote channel are assigned to the OL bus. The caller/remote channel's Off Line button blinks indicating the OL bus is the bus-minus source for that caller/remote. Their channel is off and assigned to cue so the board operator can hear the caller/remote and carry on a hands-free conversation using their mic.

If a host or call screener also need to talk with the caller/remote, their mic channels would also be assigned to OL. They would then talk to the caller using their mics and hear the caller through the cue speakers.

Telco Device Connections

Each caller/remote device's *From Network* signal typically connects to a Razor analog or digital input with two devices sharing a common RJ45 jack input, set for two mono signals rather than one stereo signal. A Razor mono analog or digital output is then connected to the *To Network* input on the caller/remote device. The caller/remote output is connected, in [PR&E Navigator](#)'s Crosspoint tab, to the bus-minus signal for the channel the caller/remote is on. See the note on the next page regarding mono vs. stereo signals on Razor I/O Interfaces.

Input Trim/Gain/Balance Adjustment

[PR&E Navigator](#) has level controls for each physical input and output on the Mix Engine and Razor. Up to 18 dB of gain, or 18 dB of trim, from unity gain (0 dB), can be applied in real time to the audio. Viewing and adjusting the level controls for the inputs is done in the **Blade > Sources** tab for each Blade. The outputs are viewed and adjusted in the **Blade > Destinations** tab for each Blade. See page 40 for details.

Monitor Muting & Hot Mic Logic

Although any signal can be set to mute the monitor outputs, typically only microphones are set to mute outputs. For Control Room mics you'll want to mute the CR and CUE outputs, unless Cue only feeds the studio, in which case the Studio mics would be set to mute the STU and CUE outputs. These settings are made using the [EMX Surface Setup](#) app's *VDips page tab*. See page 26 for details on VDip settings.

Setting Monitor & Meter Button Sources

The EMX Surface's Monitor Control panel has three columns of controls: Control Room (CR); Studio; and Meter (see Figure 4-7 on page 50). The top of each column has a large knob source selector. Adjacent to each source selector are four source select buttons. For the CR and Studio columns they are: EXT 1, EXT 2, TEL, and SOFT. For the Meter column they are: EXT 1, EXT 2, TEL, and PGM 4. Of these twelve buttons, only the Meter PGM 4 button is a dedicated source, the other eleven buttons are all user-assigned. The list of sources that can be assigned to these buttons is set using the [EMX Surface Setup](#) app's *Visibilities page tab* (see page 30).

To assign a source, press/hold a source select button until it begins blinking (about three seconds). That column's display switches to show the list of available source names. Use that column's source selector to highlight the desired source then click the source selector to assign the highlighted source to the blinking button. The button LED turns off and the display returns to its normal display. Verify the desired source was assigned by pressing that source select button. The assigned source name will appear in green in that column's display.

RAZOR I/O INTERFACE NOTES

Each Razor has eighteen RJ45 connectors: eight have the audio inputs; eight have the audio outputs; one has the Logic LIO; and one (Ethernet) connects that Razor to a PR&E Mix Engine Ethernet switch port or to a facility AoIP switch port in a larger PRE-IP network.

On a **Razor 16A**, sixteen RJ45 connectors are used for the analog inputs and outputs, each carrying two analog signals (stereo or dual mono). The Razor 16A also has two built-in mic preamps, like the PR&E Mix Engine, so it also has two female XLR **Mic Inputs** and one **Mics Out** RJ45 jack, which is connected to an Analog Input using a short CAT5 patch cord. That input

would then need to be split into two mono inputs from its default stereo setting using the [PR&E Navigator](#) (see *Changing Signal Type* on page 39 for details on splitting a stereo input or output into two mono signals).

On the **Razor 16D**, the sixteen RJ45 inputs and outputs each carry one stereo AES/EBU signal. Any input or output can be split into two mono signals in [PR&E Navigator](#) (page 39).

On the **Razor 16AD** (rear panel shown in Figure 2-10) the first four RJ45 jacks (IN 1–4) are stereo analog inputs. The remaining four RJ45 IN jacks (IN 5–8) have four stereo AES/EBU inputs. The first four RJ45 OUT jacks have the analog outputs (OUT 1–4) while the last four RJ45 jacks (OUT 5–8) have the stereo AES/EBU signals.



Figure 2-10 Razor 16AD rear panel connections



Note: The Razor's Ethernet connection has eight incoming and eight outgoing audio streams, each with a stereo signal. When a Razor input or output is split into two mono signals, each mono signal consumes one of the eight audio streams in or out of the Razor. This means that if four stereo inputs or outputs are split into eight mono signals, and all of those mono signals are connected in [PR&E Navigator](#), the remaining four stereo inputs or outputs cannot be used simultaneously because all eight audio streams would already be in use for the eight mono signals.

LOGIC - The RJ45 Logic connector is used to connect hard-wired logic to external devices like warning light interfaces and tallies. Each Logic connector is wired per Figure 2-4 on page 12. The logic connections are configured using [PR&E Navigator](#) as either a logic input or output with an assigned logic function.

FRONT PANEL DISPLAY & CONTROL - The Razor has a front panel OLED display and a rotary encoder (Figure 2-11). The encoder is used to step through the four screens that can be displayed on the Razor (shown in Figure 4-21, on page 59). One screen shows the levels for that Razor's inputs. A second screen shows the eight stereo output levels. The other two screens show technical details for that Razor like its system name, IP address, MAC address, and version of code that's running on that Razor.



Figure 2-11 Razor front panel OLED and Encoder

3 – PR&E APPS AND CONSOLE CONFIGURATION

The EMX console's factory-default settings allow it to be powered up and used straight out of the box. To set up the console for your specific application the default configuration settings are edited using the software apps included on a USB flash drive that ships with the console.

The apps can also be downloaded from a Wheatstone cloud-based file download site (contact Wheatstone Tech Support for download links).

The PR&E and WNIP software apps are installed on an **admin PC** running Windows 10, 8, 7, or even XP sp3. To communicate with the Mix Engine and EMX Surface the admin PC must be set for a fixed IP address in the **192.168.87.0** subnet. Even though the EMX IP could be changed to use a different Class C subnet, we recommend leaving the EMX set to use the default 192.168.87.0 subnet.

Before setting the IP on the NIC connected to the EMX, connect the admin PC to **Port 1, 2, or 3** on the Mix Engine's built-in Ethernet switch (see Figure 2-3, on page 12) then set the admin PC to **192.168.87.21** using a subnet mask of **255.255.255.0**. This puts it on the same subnet as the PR&E Mix Engine (IP address = **192.168.87.101** & name = **Blade01**) and the EMX Surface (IP address = **192.168.87.201** & name = **Surf01**).

To insure each PR&E or WNIP app is properly installed, right-click on the installer icon or on its file name and select "Run as Administrator." Accept the default installation settings. If a previous version was installed, the installer automatically uninstalls that version prior to installing the new version. A shortcut icon is typically added to the desktop. In the Windows Start menu the three PR&E apps are located in the *Wheatstone PR&E* folder. WNIP apps are located in a *Wheatstone* folder.

EMX SURFACE SETUP APP

The EMX Surface Setup app is one of the main apps used to configure the EMX console (the other is PR&E Navigator). Double-click its desktop icon, shown at right. The app opens showing the *Device Properties* tab (Figure 3-1).



The other Surface Setup App tab is *Locator*. Clicking it opens the Locator tab (Figure 3-2) which lists every PRE-IP device (EMX and DMX Surfaces, PR&E Mix Engines, Razor I/O Interfaces, M4IP-USB Blades, and any PCs running the WNIP audio driver) that are networked with the Mix Engine.

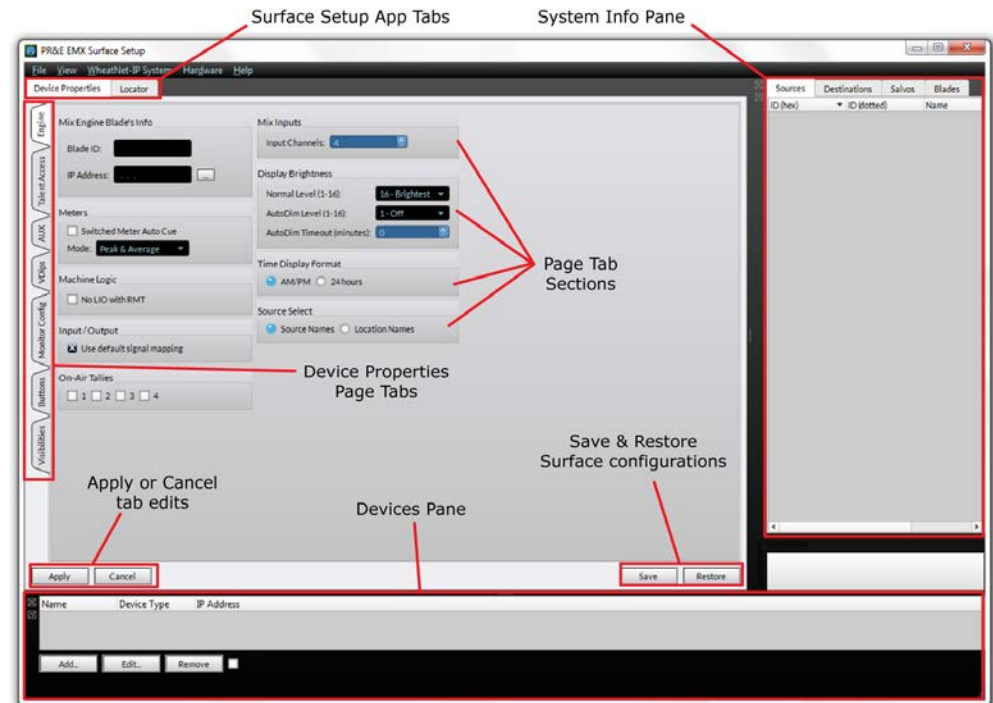


Figure 3-1 EMX Surface Setup app, initial view



Figure 3-2 EMX Surface Setup app, Locator Tab view

If no devices are listed in Locator confirm the admin PC, Mix Engine, and Surface are all plugged into the Mix Engine's Ethernet switch. Verify that the correct IP address (192.168.87.21) is shown above the *Select NIC...* button. To refresh the Locator's list of devices, click *Refresh*. This clears the list and re-queries the network to display detected devices.

If the app is using the wrong NIC, click *Select NIC...* to open the **Network Setup** window. Click *Set NIC...* to view the NICs on the admin PC. Select the correct NIC then click *Okay* twice to close the window. If the NIC is changed you must close and reopen the EMX Surface Setup app.

Clicking on a device row in the *Locator* pane (the Mix Engine is selected in Figure 3-2) shows the details for that device in the *Set Selected Device Properties* pane. The default settings for each device could be manually edited, by advanced users, who wish to use a different subnet and assign their own IP addresses when networking multiple EMX consoles together.



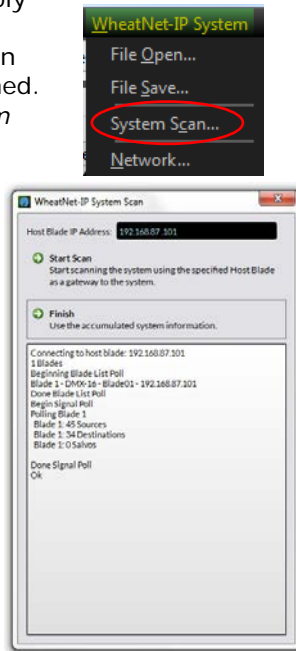
Note: When multiple EMX consoles are to be networked, use the PR&E System Configuration Tool rather than manually editing the entries as described above. This Tool automatically edits the IP address, device name, Blade ID, default signal names, and other parameters for a new EMX console or Razor I/O Interface to ensure no system conflicts occur when it's networked. See page 44 for information on using the System Configuration Tool.

System Scan—Marrying a Mix Engine & a Surface

Up to this point the EMX Surface Setup app is simply showing a list of the devices it's detected on the network. To show signal names and other information from the detected Blades, the system must be scanned. To do this, click the menu item: *WheatNet-IP System* and select *System Scan* to open the **System Scan** window. The *Host Blade IP Address*: entry box should show the IP address of the Mix Engine (on a new EMX console it's 192.168.87.101). If no address is shown, manually enter that IP address. Click *Start Scan*. The app now queries that Blade (the generic network identity for a PR&E Mix Engine) showing various messages in the logger window. Once *Finish* appears, click it.

A "save system info?" dialog pops up. Click *Yes* to save the system information. A Save File dialog box opens on the default save location. Click *Save* then *Yes* to save the **sysinfo.wnsi3** data file so that the next time the Setup app is used it opens up showing your system's information.

The empty *System Info* pane, at the right side of the app window in Figures 3-1 and 3-2, will



now be populated with the *Source* names (shown at right). Clicking the *Destination* tab will show the destination names. Clicking on the *Salvos* tab will not show anything at this point, but clicking the *Blades* tab will show that the PR&E Mix Engine is assigned **Blade ID 1** and the default name of **Blade01**.

Source	Destinations	Salvos	Blades
ID (hex)	ID (dotted)	Name	Location
00400001	10.0.1	BL03MFC1	Blade01
00400002	10.0.2	BL03MFC2	Blade01
00400003	10.0.3	BL001302	Blade01
00400004	10.0.4	BL001503	Blade01
00400005	10.0.5	BL001504	Blade01
00400006	10.0.6	BL001309	Blade01
00400007	10.0.7	BL001506	Blade01
00400008	10.0.8	BL001507	Blade01
00400009	10.0.9	BL001308	Blade01
00410000	11.0.0	EMX PGM1	Blade01
00410001	11.0.1	EMX PGM2	Blade01
00410002	11.0.2	EMX PGM3	Blade01
00410003	11.0.3	EMX PGM4	Blade01
00410004	11.0.4	EMX ALU1	Blade01
00410005	11.0.5	EMX ALU2	Blade01
00410006	11.0.6	EMX M01	Blade01
00410007	11.0.7	EMX M02	Blade01
00410008	11.0.8	EMX M03	Blade01
00410009	11.0.9	EMX M04	Blade01
0041000A	11.0.A	EMX M05	Blade01
0041000B	11.0.B	EMX M06	Blade01
0041000C	11.0.C	EMX M07	Blade01
0041000D	11.0.D	EMX M08	Blade01
0041000E	11.0.E	EMX M09	Blade01
0041000F	11.0.F	EMX M10	Blade01
00410010	11.0.10	EMX M11	Blade01
00410011	11.0.11	EMX M12	Blade01
00410012	11.0.12	EMX M13	Blade01
00410013	11.0.13	EMX M14	Blade01
00410014	11.0.14	EMX M15	Blade01
00410015	11.0.15	EMX M16	Blade01
00410016	11.0.16	EMX M17	Blade01
00410017	11.0.17	EMX M18	Blade01
00410018	11.0.18	EMX CUE	Blade01
00410019	11.0.19	EMX C.R	Blade01
0041001A	11.0.1A	EMX S01	Blade01
0041001B	11.0.1B	EMX S02	Blade01
0041001C	11.0.1C	EMX S03	Blade01
0041001D	11.0.1D	EMX S04	Blade01
0041001E	11.0.1E	EMX S05	Blade01
0041001F	11.0.1F	EMX T06	Blade01
0041100A	11.8.A	EMX T1V	Blade01

Click on the *Device Properties* tab to return to view that tab again. It has seven **page tabs** (Engine, Talent Access, Aux, VDips, Monitor Config, Buttons, and Visibilities) along the left side (shown in Figure 3-1 on page 20). Each Page Tab is separated into **sections** with each listing similar parameter settings. Click on each page tab to view the different parameters then reselect the *Engine* page tab.

Figure 3-3 shows the *Mix Engine Blade's Info* section on the Engine tab. Click the *Picker* icon (the small rectangular icon) to open the **Blade Picker**. It lists all detected Blades. For a new console just double-click on the **Blade01** row to select it and transfer its Blade ID and IP address into the two *Mix Engine Blade's Info* entry boxes. This action sets that PR&E Mix Engine as the host device for the EMX Surface.

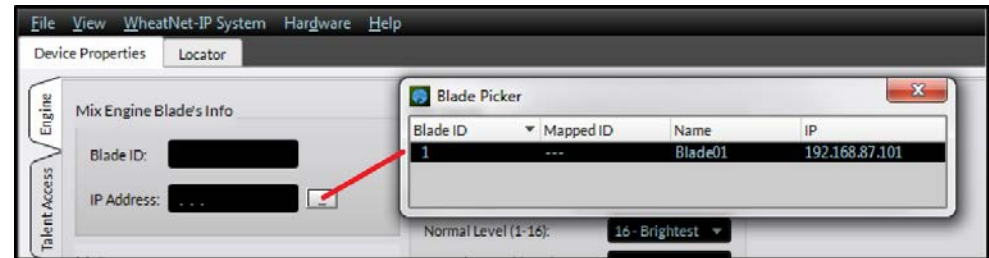


Figure 3-3 Setting the PR&E Mix Engine

The next step is to "marry" the EMX Surface to the selected Mix Engine so that the EMX Surface can be configured for your application. This is done using the *Devices* pane at the very bottom of the EMX Surface Setup app's window. When first using the app, this pane will be blank, as shown in Figure 3-2 on page 20.



Note: If this pane is not shown, select the menu item *View* then checkmark *Devices* to display the *Devices* pane.

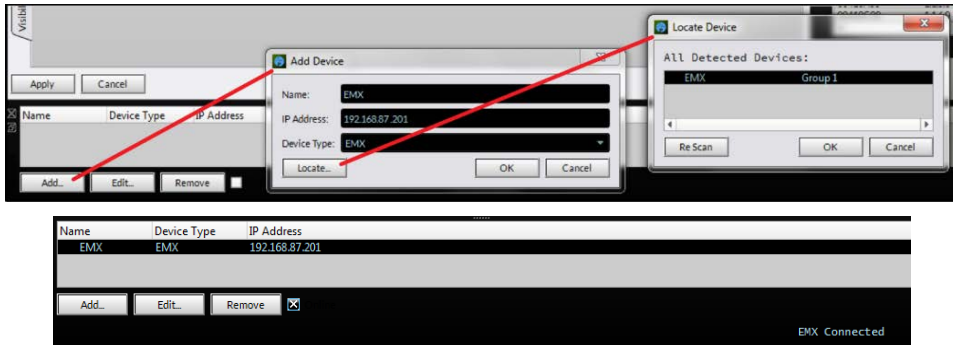


Figure 3-4 Selecting the EMX Surface in the Devices Pane

Click the *Add* button to open the *Add Device* dialog box (upper half of Figure 3-4) then click *Locate...* to open up the *Locate* dialog box. If no devices are shown, click *Re Scan*. Once **Surf01** (the default name for a new Surface) is shown, click on its name to highlight it then click *OK*. The new EMX Surface's name (**Surf01**) and its IP address (**192.168.87.201**) are entered into the *Add Device* dialog box. The *Device Type* is automatically set as **EMX**. In Figure 3-4, the Surface's name was changed to **EMX**. Click *OK* to transfer these settings to the *Devices* pane and close the *Add Device* window.

To now connect to that particular EMX Surface, click on its row to highlight it then click the small square next to *Remove* ("x" the box). This instructs the admin PC to contact that Surface. When **EMX Connected** appears in the lower right corner (as shown in the bottom half of Figure 3-4), the admin PC is now communicating with that EMX Surface and its current (default) settings are shown in the EMX Surface setup app.

Now that the admin PC is communicating with both the Mix Engine and the Surface, it's time to use the EMX Surface Setup app to configure the EMX console for your specific application.

Note: Many signal settings, like editing the default signal names, setting their format, and assigning logic, are made using the PR&E Navigator app which is covered starting on page 32.

Device Properties Tab Buttons

There are four important buttons along the bottom of the Device Properties tab: *Apply* and *Cancel*; and *Save* and *Restore*. These buttons are always visible, regardless of which page tab is active.

Clicking the *Apply* button saves whatever changes you have made on the current page tab and transmits them to the Surface where they immediately take effect.

Clicking the *Cancel* button undoes all changes you've made on that page tab since the last time *Apply* was clicked or the page tab was opened.

Clicking the *Save* button opens up a dialog box so all of the current Surface Setup app settings can be saved to a Surface Configuration file. For a single EMX, this can be done to save a backup of the settings so you can recover all your settings if the Surface must be replaced for some reason. But it can also be used to "clone" a new Surface so it has the same settings as the current Surface so that you don't have to start setting up a new console from scratch. But where this is really important is when there are multiple EMX consoles in the network. Each console's settings can be saved to a separate file so it can be recalled as required using *Restore*.

Clicking the *Restore* button opens a dialog box so a previously saved Surface Configuration can be loaded into the Surface Setup app and applied to the currently connected Surface. To use the new configuration settings, the currently connected Surface must be rebooted, so a pop-up box reminds you to do this (select *Reboot* from the *Hardware* menu item). After the Surface reboots, it'll be using the settings from the saved Surface Configuration file.

Page Tabs

There are seven **Page Tabs** on the **Device Properties** tab. Each is divided into sections to group similar configuration settings. When changes are made on a page tab they do not take effect until the *Apply* button, in the lower left corner of the Device Properties tab, is clicked to transmit the changes to the Surface.

If a different page tab is selected, after you've made any changes but *Apply* was not clicked, a pop-up warning box (Figure 3-5) asks whether you want to apply the changes made on the previous page tab. Click *Yes* to apply the changes or *No* to ignore applying the changes.

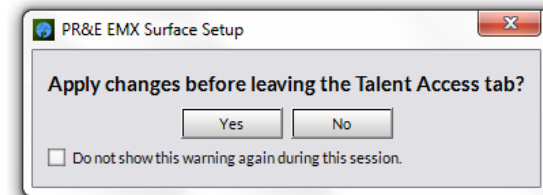


Figure 3-5 Apply Changes Warning Pop-Up

Note: Clicking *No* is the same as clicking the *Cancel* button: all changes made on the previous page tab, since the last time *Apply* was clicked or that page tab was opened, are discarded.

The "*Do not show this warning again during this session*" option is unchecked by default to warn you about un-applied changes on the previous page tab. If you hide this warning all changes made after *Apply* was clicked on the previous page tab are automatically discarded when a new page tab is selected.

Engine Page Tab

The *Engine* page tab has nine sections: Mix Engine Blade's Info (which you've already set), Meters, Machine Logic, Input/Output, On-Air Tallies, Mix Inputs, Display Brightness, Time Display Format, and Source Select. The settings in these sections affect the overall operation of the Surface.

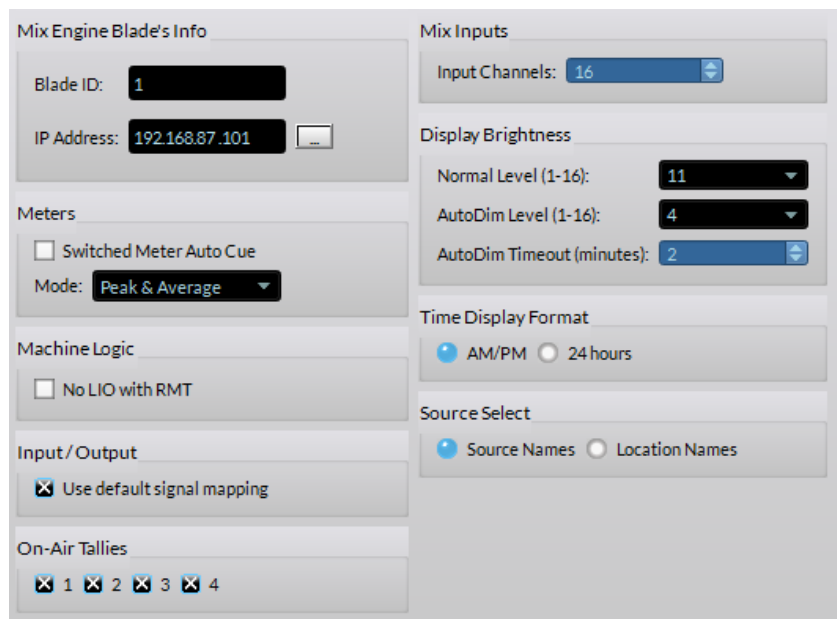


Figure 3-6 Engine Page Tab

Meters

When *Switched Meter Auto Cue* is unchecked (default) the cue level is not automatically displayed in the switched meter display while cue is active. When checked, the cue bus level is shown in the switched meter while cue is active temporarily overriding whatever source is selected by the switched meter source controls.

The *Mode:* setting is common to all four meters. *Peak and Average* is the default and most common setting, but all meters can alternately be set to show *Average Only* or *Peak only* indications. The average level is shown using a solid bar graph while the Peak level is shown using a single rapidly moving LED to indicate the highest instantaneous audio level, which is typically 6 – 10 dB above the top of the average level bar graph. The Peak LED decay time is fixed.

Machine Logic

This sets whether there's a logic output (a tally or start/stop pulse) when remote Channel On or Channel Off commands are received. When *No LIO with RMT* is unchecked (the default setting) tally or remote start/stop

commands are always sent. When checked, tally or remote start/stop commands are not sent out if a channel is remotely turned on or off.

Input/Output

When *Use Default Signal Mapping* is checked the console's default Monitor and Program output jacks are automatically reconnected and locked after the Mix Engine or Surface is rebooted or power cycled.



Note: Uncheck this option if any Mix Engine Monitor or Program output is changed from their default connections, otherwise the default monitor and program sources will be reconnected—in place of your alternate connections, when either the Mix Engine or Surface gets rebooted or power cycled.

On-Air Tallies

The four on-air tallies (1 – 4) should all be checked. Tally 1 and Tally 2 are typically used to provide hot mic warning tallies for the Control Room (Studio 1 In-Use) and a Talk Studio (Studio 2 In-Use). Checking Tally 3 and Tally 4 means that two additional mic locations (announcer booth, sports bullpen, newsroom, etc.) can light up hot mic warning tallies while those mic channels are on using Studio3 In-Use and Studio 4 In-Use.

Mix Inputs

The *Input Channels:* parameter (4 – 32) sets the number of fader channels present in the Surface. This number is set to the number of fader channels in the Surface but there is no automatic inventory done of fader panels so if a Quad Fader panel is not being used for some reason this number could be updated to reflect the total number of fader channels in the Surface. On EMX-16 and EMX-16W Surfaces the entry should be 16. On EMX-20 and EMX-20W Surfaces the entry should be 20. On EMX-24 or EMX-24W Surfaces the entry should be 24.

Display Brightness

These three parameters control the OLED displays' brightness level.

The *Normal Level* setting sets the brightness of the OLED displays from 16, the maximum OLED brightness, to 1, which is virtually off. Because OLED displays will burn-in after displaying the same graphic over a long period of time—and will also gradually dim over time, we do not recommend setting a new console to a *Normal Level* of 16. The default level is 11, but you'll want to use the lowest setting to yield an easy-to-read display. In production rooms with very low lighting this might mean a setting of 6 matches the ambient lighting in the studio. To see the new setting reflected in the OLED display brightness, click *Apply* to transmit the updated setting to the Surface.

The *AutoDim Level* setting is used with the *AutoDim Timeout* entry. When the *AutoDim Timeout* is reached the OLED displays dim to the assigned Dim level setting. If the *AutoDim level* is set to 1 the displays are

basically turned off. The default entry is 4 for this setting. The *AutoDim Timeout* entry sets how many minutes, from one to 59, must pass after a Surface control was last touched before switching the OLED displays from the *Normal Level* to the *AutoDim Level*. The default setting is 2, which means that after no Surface control has been touched for two minutes, the OLED displays dim down to the *AutoDim Level*. Touching any control immediately returns the dimmed OLED brightness to the *Normal Level*.

Setting the timeout to 0 defeats dimming and the *Normal Level* setting is used all of the time. Although this is OK for console configuration, we recommend setting the AutoDim Timeout to between 2 and 10 minutes and setting the AutoDim Level so the dimmed displays still show a dim image (settings of 2–4).

Time Display Format

The left monitor OLED display shows a date while the middle monitor display shows the time-of-day, in either standard USA 12-hour format (*AM/PM*) or in military/European format (*24 hours*). The date and time are set using *PR&E Navigator* (see page 34 for details). Until this is done, the date defaults to a date in the year 2000. The date is always shown as Month Day Year.



Note: The date and time must be reset, using *PR&E Navigator*, anytime the EMX is power cycled.

Source Select

The default selection is *Source Names*. When the channel encoders are used to select a new channel source, all visible source names are listed alphanumerically with the name of the Blade they're connected to shown above the white line in the channel display.

When *Location Names* is selected, rotating the channel encoder first shows a list of Blade names. Clicking a Blade name then shows all of the visible sources on that Blade. To view signals on another Blade, select << *locations* to step back to the Blade list so another device can be selected.

Needless to say most users leave *Source Names* selected.

Talent Access Page Tab

This page tab (Figure 3-7) has six sections: *Events*; *Bus Assignments*; *Channel Features*; *Timeout*; *Event Names*; and *EQ*.

During console configuration all settings are typically checked, but settings should be selectively unchecked—prior to releasing the console for daily operations, to prevent unauthorized access. This is especially important when it comes to saving events and having access to the EQ & Dynamics controls.

Allow Save Events is typically disabled once the four console events are assigned during console configuration. Likewise, *Allow EQ & Dynamics* in the Channel Features section should be disabled on on-air console to prevent board operators, without the requisite knowledge, from using the controls to set up channels with some “strange sounding” audio!

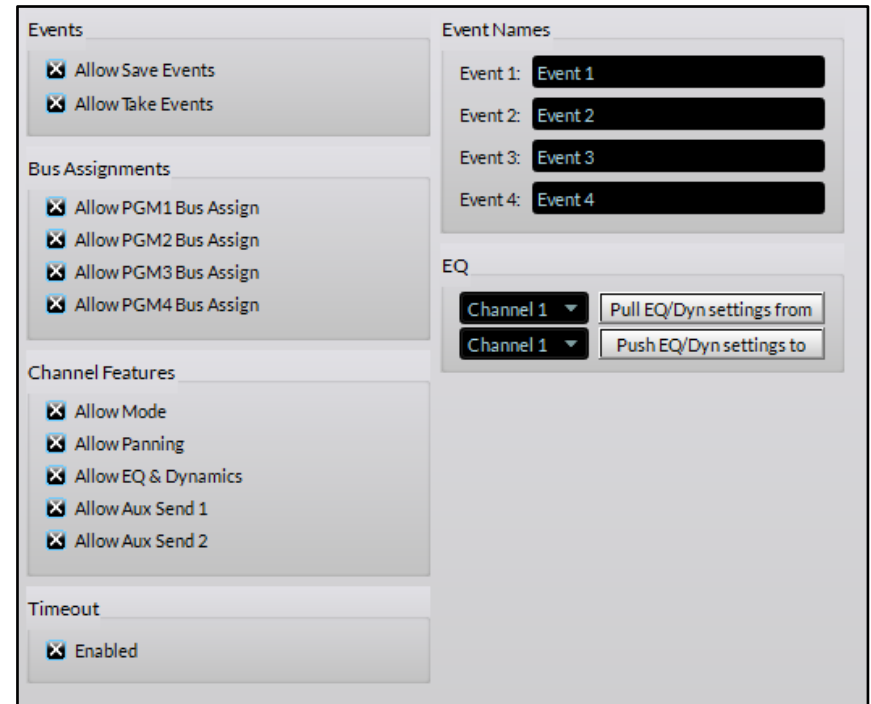


Figure 3-7 Talent Access Page Tab

Events

These two checkboxes control access to the very powerful **Event controls** on the Monitor Control panel. The **Save** button (with “piggybank” icon) is used along with the Event encoder to save, for later recall, up to four console setups. Each event saves the current monitor settings, the current channel sources and channel button settings, and the Advanced Channel Feature settings, so that the four most-commonly-used board setups can quickly be recalled using the **Take** button (with “finger clicking button” icon) and the Event encoder.

When *Allow Save Events* is checked anyone can save a new event, overwriting any existing settings for that event. When unchecked, the Save button is not active. This selection is typically **unchecked** once the four events are saved by engineering during console configuration.

When *Allow Take Events* is checked, the board operator can take any of the four events. When unchecked, the Take button is not active. If *Allow Take Events* is unchecked, *Allow Save Events* should also be unchecked. For most applications *Allow Take Events* is left **checked** when any events have been saved so the board operators can subsequently take events.

Event Names

Each console event can be renamed (their default names are Event 1 – Event 4) either before or after they are saved. Event names are limited to eight characters. The names appear in the right-hand OLED display in the Monitor Control panel when either the Save or Take button is active. The Event encoder is used to highlight one of the four names. Pressing the lit Save or Take button then either saves or takes that event.

Bus Assignments

These four selections set whether the board operator can change the current status of the **PGM assignment button** settings across the console. For most applications all four buttons are left checked so the board operator can change assignment button settings, as required.

To use this feature, set the bus assignments on the console then uncheck one or more Allow Bus Assigns. Click *Apply* to update the Surface with the new setting. The unchecked buses are now fixed in whatever state they were assigned and the board operators cannot change the PGM button assignments across the Surface for the unchecked buses.

Channel Features

Each fader channel includes several Advanced Channel Features to change the channel mode, adjust audio panning, assign EQ & Dynamics settings, and control how each channel feeds the two Aux Send buses. This section sets which controls are accessible by the board operators.

Allow Mode, when checked, allows the board operator to set the fader channel's audio mode between Stereo (the default setting), Left only, Right only, or Mono sum. When unchecked, this feature is locked out from board operator use.

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

Allow EQ & Dynamics, when checked, allows the four-band parametric equalization, the high and low pass filters and shelving, and the audio dynamics (compression and expansion) to be adjusted and set for any channel. This feature should only be accessed by engineering while configuring the console or when updating the settings. Once EQ & Dynamics are set, *Allow EQ & Dynamics* should be **unchecked** on on-air console to prevent board operators from accessing this powerful feature. In Production rooms this feature is typically left checked.

Allow AUX Send 1, when checked, allows board operator access to the Auxiliary Send 1 bus controls. When unchecked, this feature is locked out from board operator access.

Allow AUX Send 2, when checked, allows board operator access to the Auxiliary Send 2 bus controls. When unchecked, this feature is locked out from board operator access.

If the **EMX Surface Setup** app is installed on a PC in a studio, make sure a user password (File > Set Password) is assigned to prevent program access—if only to keep Allow EQ & Dynamics from being checked (assuming it's been unchecked by engineering before releasing the console for daily usage). In the wrong hands, changing the EQ & Dynamics settings could result in one or more fader channels sounding "very strange" or even being severely distorted.

Timeout

When any Advanced Channel Feature is active on a fader channel, if no Surface control is touched for twenty seconds the Advanced Channel Feature is turned off and the channel display, or displays, in the case of EQ & Dynamics, revert back to their normal screens.

Unchecking *Enabled* allows any Advanced Channel Feature to remain displayed until changed by the user. This is very useful for console configuration (especially when adjusting EQ & Dynamics), but once configuration is finished *Enabled* should be **checked** to turn on the timeout for daily console use.

Additional details on using the Advanced Channel Features are presented in Chapter 4 (beginning on page 54).

EQ

These two rows of controls allow the EQ settings on a channel to be saved as an EQ Configuration file in the Wheatstone > WheatNetIP_EMX folder in the admin PC's Documents folder. An EQ file saves the equalization and dynamics settings from any channel so the settings can be loaded into or applied to another fader on any EMX console.

The top row of controls is used to save the current EQ & Dynamics settings to an EQ file. Select a channel using the drop-down channel list then click the *Pull EQ/Dyn settings from* button. A Save Dialog box opens to name the EQ file (see Figure 4-19, on page 57). The file suffix `.emx_eq` is automatically added to the name entered.

The bottom row of controls allows the settings in a saved EQ file to be loaded into any channel. Select a channel from the drop-down list then click the *Push EQ/Dyn settings to* button. A pop-up warning confirms that you want to alter the settings on the selected channel. Clicking Yes opens a Find File Dialog box to select a previously-saved EQ file. Clicking No closes the warning box.

Note: The EQ settings are immediately applied—even if the channel is currently on.

A PRE_mic.emx_eq file was saved into the User Documents folder (Wheatstone > WheatNetIP_EMX) when the EMX Surface Setup app was installed. It has the EQ & Dynamics settings applied to channels 1 and 2 when the EMX shipped from the factory.

Aux Sends (AUX) Page Tab

The EMX has two auxiliary send buses (**AUX SEND 1** and **AUX SEND 2**) that do not have dedicated Surface controls. Whether the Auxiliary Sends are set for pre or post On switch, and pre or post fader, is set using this tab (Figure 3-8). Turning the Aux Sends on/off and setting their level is done using the two Advanced Channel Feature controls: *AUX1* and *AUX2*.

Each Aux Send bus can be set for Pre On switch and/or Pre Fader operation just like the Off Line bus. To setup an Aux bus to function just like a PGM bus, uncheck both *Pre On* and *Pre Fader*. The Aux Send bus audio is then controlled by each channel's on switch and each channel fader sets its level to that Aux bus. In this case the *Aux1* Level and/or *Aux2* Level would be set to maximum and the Aux Send would be set on using the Advanced Channel Feature controls. Here's a summary of what the AUX page tab settings do:

Pre On, when checked, means that the audio feeding that Aux Send is always present and is not affected by the channel on/off. Unchecked, the Send audio follows the channel on switch so it is turned on and off just as with the audio feeding the PGM buses.

Checking *Pre On* by itself, as shown for Aux Send 1 in Figure 3-8, might be used to do voice tracking by allowing the talent mic to be recorded on Aux Send 1 with the talent mic channel off. Unchecking *Pre Fader* allows the talent to still use their channel fader to adjust their mic record level.

Pre Fader, when checked, means that the channel faders don't affect the audio level going to the Aux Send bus. When unchecked, the fader affects the Aux Send level. Checking *Pre Fader* is often used when the Aux Send bus feeds an FX unit so that changing the channel fader doesn't affect the amount of audio going to the FX unit. The FX unit's return would go to another fader channel and its fader would control the overall FX level.

Setting an Aux Send to both *Pre On* and *Pre Fader* (Aux Send 2 in Figure 3-8) could be used to create a "summed direct out" from multiple channels. One use for this would be to sum the board operator, host

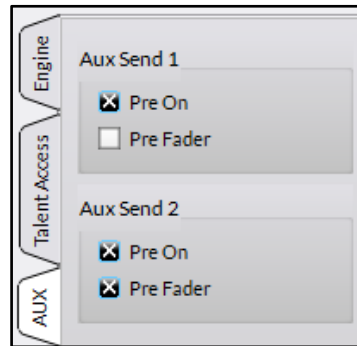


Figure 3-8 Aux Send 1 & Aux Send 2 Settings

and/or producer mics to allow for multiple mic talk back. That Aux bus would then be connected to "EMXTkBk" to allow multiple mics to be able to simultaneously talk to the studio, the callers or remotes, and to an external location.

VDips Page Tab

EMX console controls and logic features, which are associated with particular audio sources, are made on this page tab (Figure 3-9). Mix Engine and Razor source signals must be manually added to the *Signals* list. Clicking on a Signals row both highlights the signal name and displays its current settings in the seven assignment sections on the right half of the page tab allowing the assignments to be edited, as required.

Note: Click the *Apply* button after each new signal is added or edited to ensure the EMX Surface uploads the changes.

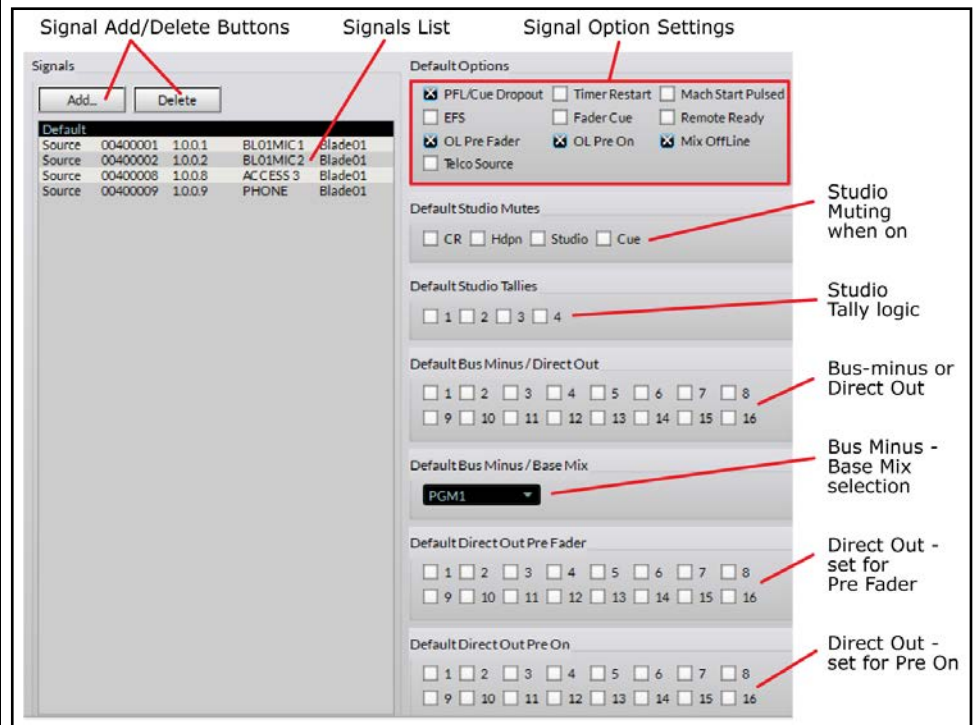


Figure 3-9 VDips Page Tab Sections

Default Settings

Before adding any signals to the *Signals* List, read through the descriptions of the various assignment selections in the following sections. You may find some selections should be applied to almost every source.

These common selections, called default settings, will automatically be checked for each new source that's added.

To set the default settings, click the **Default** row in the *Signals* list to highlight it (as shown in Figure 3-9, on page 26) then check the desired set of "Default Options" that should be applied to each newly added signal. Be sure to click *Apply*, to save the Default settings, before adding your first new source.

The **Default Options** settings for *PFL/Cue Dropout*, *OL Pre Fader*, *OL Pre On*, and *Mix Off Line* are shown checked in Figure 3-9, on page 26. Every new signal added to the Signals list will have these settings applied automatically. Of course, any default setting can be changed after a signal is added to the list. Likewise the default settings can be updated by clicking the Default row to highlight it and then changing the Default Options settings then clicking *Apply* after making changes to ensure they get applied.

Adding Sources to the Signals List

Sources are manually added to the Signals list to initially populate it. Figure 3-10 shows that Mic 1 and Mic 2 on the Mix Engine are already in the list. To add another signal, click *Add...*, just above the Signals List, to open the *Add Signal* pop-up selector. Click the *Picker* button (the icon) to open the *Source Picker*. Double-click a signal row to select that source (Analog in 2 or BL001S02 in Figure 3-10) which also closes the *Source Picker*. Click *OK* to add that source to the Signals list and close the Add Signal dialog box.

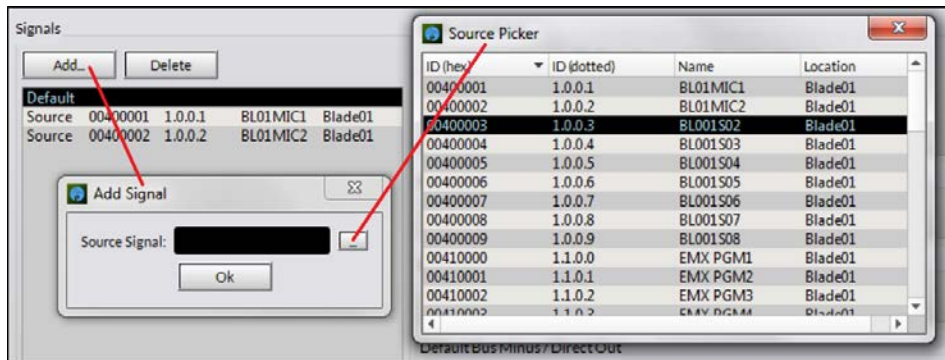


Figure 3-10 Adding a new Source to the Signals List

This process (click *Add...*, click the *Picker* button, double-click on another source row, click *OK*) must be repeated for each source you want to configure. Fortunately, this repetitive process only needs to be done once.

If any Default settings were assigned, those settings are automatically set on each newly added signal. Each new signal is automatically selected (highlighted) so that additional configuration settings can be edited as

required. Always click *Apply* after editing each source to ensure its settings are properly saved and to update the settings on the Surface.



Note: Clicking *Apply* immediately updates a source's settings—even when that source is on a channel that's currently turned on, so use caution when making **VDips page tab** changes after the console is in daily use and is on-air.

Options Settings

These ten settings (Figure 3-9, on page 26) are independently assigned to each source to control the listed channel function. The highlighted source name, or Default, is shown in front of *Options* to identify which source's settings are being displayed. After changes are made click *Apply* to save the changes before selecting another source to view and/or edit.

PFL/Cue Dropout – This option sets what happens when the source's channel is turned on. When checked, cue (also known as PFL or Pre Fader Listen) is turned off when the source's channel is turned on. When unchecked, cue on/off is not affected when the source's channel is turned on. This control is typically unchecked if *Fader Cue* is checked.

Timer Restart – When checked, a restart command is sent to the timer each time the source's channel is turned on from off. When unchecked, no timer restart command is sent to the timer.



Note: For the Timer Restart command to actually affect the timer, the **Timer Auto** button must be lit on the Monitor Control panel. If the Timer Auto button is unlit, the channel timer restart commands will not reach the timer.

Machine Start Pulsed – Sets the type of logic commands sent to the source's remote logic output when the channel is turned on and off. When checked, a momentary closure (pulsed logic) is sent. When unchecked, a sustained logic closure (tally logic) is sent.

EFS (Electronic Fader Start) – Controls whether moving the source's channel fader affects channel on and 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 enable this feature for microphones.

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

When unchecked, fader movement has no effect on cue—unless *EFS* and *PFL/Cue Dropout* are both enabled, in which case cue would be turned off when the fader is moved from full off because the channel turned on.

Remote Ready – When unchecked, the standard setting, the off button lights up whenever the channel is off. When checked, the off button lighting is controlled by the source's Ready command logic so it may not light when the channel is turned off.

This feature goes back to cart machines where no light indicated the cart machine was not ready; a lit off button indicated it was cued and ready to play; a blinking off button indicated the cart had played. Some CD players used the similar indications. Some automation systems also use Ready logic to indicate channel status when multiply channels are used for playback. A lit off LED typically indicates the last channel that played and a blinking off LED indicates the next play channel. Ready logic can use either LIO or SLIO logic, which are assigned to the source in [PR&E Navigator](#).

Off Line Selections - The Off Line bus (OL) is used exclusively with callers and remotes to allow for hands-free conversations between the board operator and a caller/remote when they are not on-air. Typically, *OL Pre Fader* and *OL Pre On* are both checked so that the board operator mic channel can be off and its fader down and still allow the board operator to talk with the caller/remote using their mic.

OL Pre Fader –When checked, that source feeds the OL bus without any fader level control (e.g., the same level that feeds the cue system). When unchecked, the channel fader affects the signal level going to the OL bus.

OL Pre On – When checked, the source always feeds the OL bus—if the channel's Off Line button is lit. When unchecked, the source only feeds the Off Line bus when the channel is turned on. Typically, this setting is checked for all sources so that no channel has to be turned on to feed the Off Line bus.

Mix Off Line – This setting can be used to create a bus-minus signal for a non-Telco source. It's only active when *Telco Source* is unchecked. When this setting is checked, the channel's bus-minus is fed the Off Line bus while the channel is off. When the source's channel is turned on, the bus-minus switches to the *Bus Minus/Base Mix* setting.

Telco Source – When checked the console identifies that source is a Telco or 4-wire device (e.g., a caller or remote). Examples of Telco devices are phone hybrids, ISDN interfaces, POTS codecs, IP codecs, and 2-way radios. Each Telco device has a *From Network* audio signal, which connects to the console channel, and a *To Network* audio signal, that's returned to the Telco device, which is typically that channel's bus-minus signal.

When a *Telco Source* is taken on a fader channel, one bus assignment button blinks to indicate the bus (Off Line, PGM 1, PGM 2, PGM 3, or PGM 4) that's currently being returned to that Telco device (the *To Network* signal). The correct channel's bus-minus signal can automatically be connected to the correct Telco device by using Associated Connections (see page 35 for details on using Associated Connections).

Studio Mutes

Microphones are set to mute one or more monitor outputs when their channel is turned on. Figure 3-11 shows the typical settings for Control Room microphones. Both *CR* and *Cue* are checked to mute those speakers when a CR Mic is turned on. For mics located in a separate talk studio, typically only *Studio* is checked, unless cue is being fed to that studio, then both *Studio* and *Cue* are checked. Typically, the HDPN output is never checked since it is normally never muted by any source.

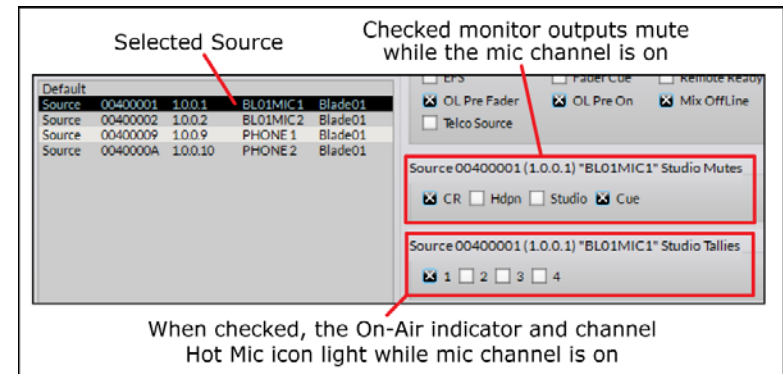


Figure 3-11 VDips Page Tab Settings for a Control Room Mic

Studio Tallies

A mic is identified as a mic when the source is set to trigger a tally output by checking the Studio 1 – Studio 4 Tallies. If no Studio Tally is checked, the mic status indicators on the channel displays are not shown and the *On Air* indicator in the meter bridge does not light up when the mic channel is turned on. Tally 1 is typically used for the Control Room hot mic tally and Tally 2 is typically used for the Talk Studio hot mic tally. Tallies 3 and 4 are available to trigger hot mic tallies at two external locations like an announce booth and a newsroom.

The four studio tally commands are labeled *Studio 1 In-Use* up to *Studio 4 In-Use* in [PR&E Navigator](#). These commands can be used to trigger LIO outputs on the Mix Engine, Razor, or M4IP-USB Blade to activate outboard warning light interfaces like a Henry Superelay, a Sonifex On-Air light, or M!ka mic arm lights. The *Studio 1 In-Use* up to *Studio 4 In-Use* commands can also drive SLIO commands to trigger a WNIP device connected to the EMX. See page 41 for details on assigning LIO and SLIO output logic in [PR&E Navigator](#).

Bus-Minus/Direct Out

The EMX has an internal mono signal associated with each fader channel with the source names: EMXBM01 up to EMXBM16, EMXBM20, or EMXBM24. These signals are most often used to create a *Bus-Minus* signal (hence the BM in their names) used with callers and remotes. But these

signals can alternately be used as Direct Outs to feed the channel source to an outboard FX unit, an air skimmer, or a system monitor.

The check boxes in this section set which type of signal is generated when the source is assigned to a checked channel. For a Telco device, no check boxes should be checked so that a bus-minus signal is automatically created regardless of which fader the Telco device is “dialed up on.”

When one or more boxes are enabled, and that source is taken on one of the checked channels, a Direct Out signal for that channel is created.



Note: The Direct Out audio is affected by the settings in the *Direct Out Pre Fader* and *Direct Out Pre On* sections. If *Mix Off Line* is checked, no Direct Out boxes should be checked.

Bus Minus / Base Mix

This setting is only used when *Telco Source* is unchecked and no channels are checked in the Bus-Minus / Direct Out section. This setting selects which bus (PGM 1, PGM 2, PGM 3, PGM 4, Aux Send 1, or Aux Send 2) feed that channel’s bus-minus when the channel is turned on.

Direct Out Pre Fader

When checked for the same channel numbers as set in the *Bus-Minus / Direct Out* section, the Direct Out audio is sent at a fixed level (same level as the cue bus). When unchecked the level feeding the Direct Out is controlled by the channel fader.

Direct Out Pre On

When checked for the same channel numbers as set in the *Bus-Minus / Direct Out* section, the direct out audio is not affected by the channel’s on/off status. The source audio is always feeding the Direct Out, unless *Direct Out Pre Fader* is also unchecked, which means the channel fader will still control the level going to the Direct Out. When unchecked the Direct Out audio follows the channel on/off status.

Monitor Config Page Tab

The Monitor Config page tab settings affect the Control Room (CR OUT), Studio (STU OUT), and Headphone (HDPN OUT) monitor outputs on the Mix Engine. The Headphone setting also affects the headphone jack on the Surface. Each output has independent settings for *Cue Defeat* and *Level Locked*. Typical settings are shown in Figure 3-12 where cue feeds the headphones but no other output and all outputs are controlled by the Monitor Control panel level controls.

Cue Defeat - When checked, cue does not affect that output. Normally this is checked for the Control Room and Studio and unchecked for the Headphones. When unchecked, and cue is active, stereo cue replaces the selected monitor audio in the Control Room and Studio. When Cue Defeat is unchecked in the Headphones, cue feeds that output in stereo if the

Split Cue button on the Monitor Control panel is unlit. When that button is lit (Split Cue mode) cue is summed in the left ear and the selected monitor source is summed in the right ear.

Level Locked - When checked, and *Apply* is clicked, the current level setting for that output (CR fader, HDPN fader, or Studio encoder) is fixed at that output level. The Monitor Control panel control no longer affects the output level.

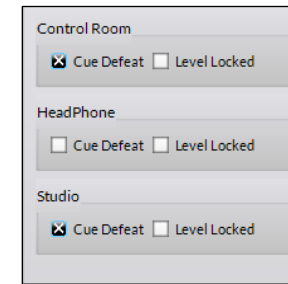


Figure 3-12 Monitor Config Page Tab, Typical Settings

The Level Locked setting is not typically used on the Control Room. Level Locked would be used for a Studio if the studio host has their own level control for the studio speakers. Level Locked would be used on the Headphone output when an external headphone amp is connected and there are cabinet-mounted headphone jacks and level controls for the board operator and guests. In this case the Surface headphone jack would not be used since it would also be at a fixed level.

Buttons Page Tab

The Buttons page tab is used to assign a function to each of the three **Soft Buttons** on the fader channels and to the five **Spare Buttons** on the Monitor Control panel. Figure 3-13 shows the Buttons page tab and the drop down list of settings available to each channel Soft button. The default setting for the Spare and Soft buttons is *None* (no action) so these buttons have no function until assigned on this page tab.



Figure 3-13 Buttons Page Tab Assignments

Each Soft button selection box has a drop-down list (displayed in Figure 3-13, right) to select its function. Setting a Soft button to any selection, other than *Take Source*, assigns that function to every channel. In Figure 3-13, *Soft 1* is assigned to toggle the **EQ In/Out**. *Soft 2* is set to toggle **Dynamics In/Out** while *Soft 3* is set for **Take Source** on channel 1, which means pressing that button will connect Mic 1 to that channel.

When **Take Source** is the selected action on any button, a *Channel Select* drop-down list box; a source name display; and a *Picker* button appear in-line with *Take Source*. Select a channel then click the *Picker icon* to open the *Source Picker* window (shown in Figure 3-10 on page 27). Double-click a source name in the *Picker* window to set it as that channel's "Hot Source Selection." Its name then appears in the source name display, replacing the default **NoSource** setting. Repeat this process for each channel that needs a hot source assigned.

Since the default setting for each channel is **NoSource**, when a source has not been assigned to a channel, pressing its Hot Source Soft button would assign NoSource (or silence) as that channel's source. Note that once you select a channel source you cannot set it back to NoSource since that is not a selection available in the *Source Picker*.

The Soft button lights up whenever the channel's source matches the Hot Source Selection. If a different source is active on a channel then the "Hot Source" soft button is unlit. Pressing the unlit Hot Source soft button—when the channel is off, will then take the Hot Source Selection.

Assigning six of the remaining seven Soft function selections (**EQ, HPF, LPF, DYN, AUX 1, AUX 2**) are pretty straight-forward. Each Soft button press will toggle the assigned Advanced Channel Feature either in/out or on/off. When that Advanced Feature is active the Soft button lights and that function's icon (except for Aux1 and Aux 2) appears in the channel display. When the feature is not active the Soft button is unlit and the function's icon is removed from the channel display.

Selecting **Toggle Mode** sets the Soft button so each press steps through the channel Modes, going from Stereo to Right, Left, Mono, and back to Stereo. The active Mode, shown in orange below the source name, updates with each button press. If the console is on-air and the channel is on, stepping through the modes will be heard over the air.

Spare Button Settings

The Monitor Control panel has five spare buttons. **SPARE 1 – 4** are between the Cue and Studio encoders while Spare 5 is the **EXT TB** button, located at the bottom of the panel. Most settings available to be assigned to these buttons require using [PR&E Navigator](#) to assign their actual logic functions. They are listed in Navigator as inputs *Spare01* to *Spare05*. Each button uses the logic Functions: Switch 1 and Switch LED 1, which are pre-assigned to the buttons in Navigator.

Here's an overview of the Spare Button selections:

- **None** - Default setting. The button's switch and LED have no assigned functions so pressing the button accomplishes nothing.
- **Tally** – Sets the button LED to be used solely as an indicator, with no switch functionality. This setting could be used for a hot line ring indicator or to indicate an off-air alarm.
- **Toggle** - Sets the button to function like a latching mechanical toggle switch with sustained logic. The Surface controls the button LED to indicate the output logic is on (lit) or off (unlit).
- **Momentary/Surface LED** - Sets the button to trigger an LIO or SLIO using momentary logic. The Surface controls the button LED to simply indicate the button is being pressed.
- **Momentary/LIO LED** – This also sets the button to generate a momentary logic closure but in this case the LED is controlled by a logic input. This setting could be used to create a profanity delay dump button with the LED indicating Delay status: when unsafe the LED would be off; delay rebuilding would blink the LED; and it would be lit solid to indicate the delay is ready (safe).
- **Take Preset 1 - 4** – Assigns the button to take Event 1 - Event 4. No additional logic setup is required for these settings. Pressing the button (which does not light) takes the assigned event and updates the Event name in the Event display.

When a button is set for Tally, Toggle, or either Momentary setting, this action merely sets the type of button operation. You must use [PR&E Navigator](#) to then assign the actual logic settings. Some settings are set in the **Device > LIO Assign** tab while others are assigned using by adding a new Logic-only destination in the **Device > Destinations** tab. See page 42 for details on assigning logic functions using [PR&E Navigator](#).

Visibilities Page Tab

Each EMX source selector: fader channel; CR monitor; Studio monitor; and Switched Meter, has its own **Visibilities List** to set which alternate sources are displayed while using each source 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" anywhere. But, for daily operation of the console, it's essential that the Visibilities lists—especially for the fader channels, be edited to remove signals which should not be shown like the PGM buses and other internal console signals as well non-air sources like pre-delays and tuners.

Figure 3-14 on page 31 shows the Visibilities page tab settings for Channel 1, which is typically dedicated to the board operator or host mic. There are five checked boxes for: Allow No Source; MIC 1; CINDY; JONNY; and SHOTGUN.

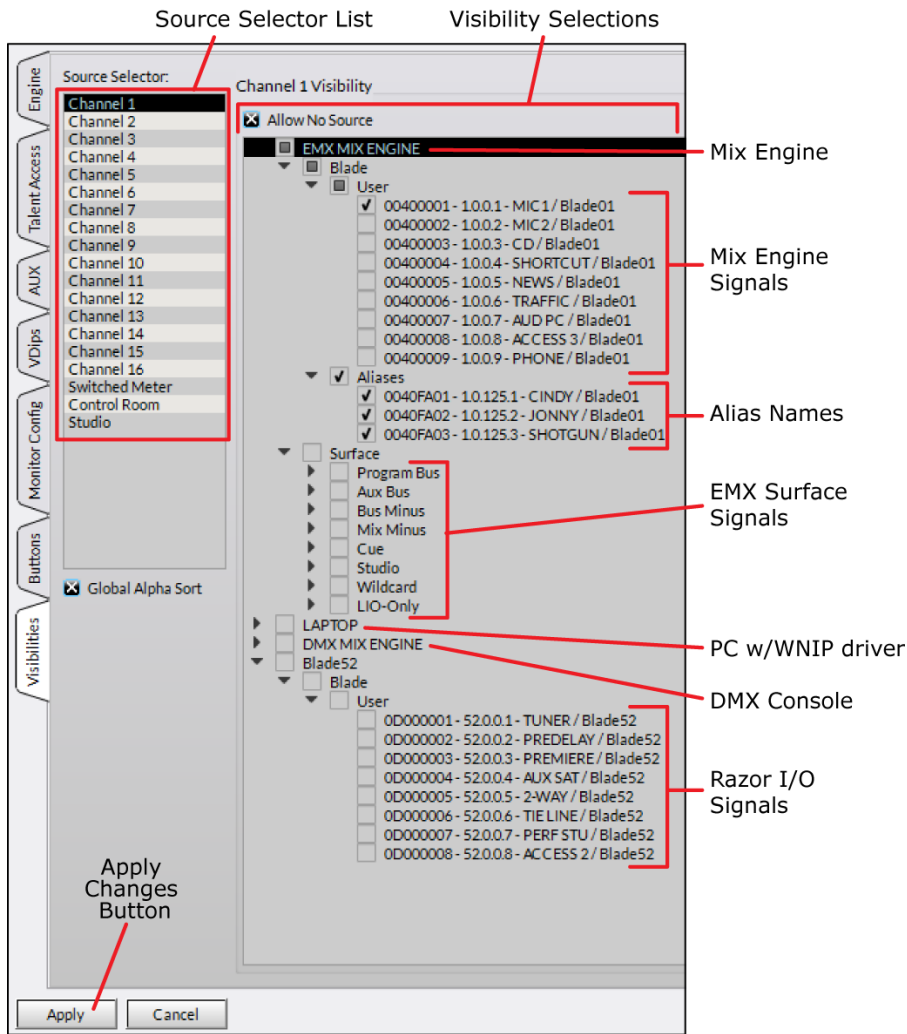


Figure 3-14 Visibilities Page Tab Settings

Taking **NoSource** silences the channel. If *Allow No Source* is unchecked then NoSource will not appear in the alternate source name list. This is typically done in the monitor and meter select lists. Leaving NoSource in every Visibilities list does let one know when the list has wrapped around since it's the first name in the list.

Setting the Visibility

In the *Source Selector List* click on a channel name or on one of the three monitor selectors (*Switched Meter*, *Control Room*, or *Studio*) to view the current *Visibility Selection* settings for that selector. The active selector name (e.g., *Channel 1 Visibility*) is also shown in the section title.

When the *Visibilities page tab* is first opened, all devices are shown collapsed with boxes indicating whether any sources are selected on that device (Figure 3-15). 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 EMX console). Clicking on a right-facing arrow expands that device (the arrow then points down). Sub-categories (*Blade*, *User*, *Surface*, etc.) are expanded in like manner until you reach the source names, as shown in Figure 3-14. The sub-categories and devices can be selectively collapsed by clicking their down-facing arrows, which then point right again. The current view is maintained when selecting a different channel or monitor selector—until the *Surface Setup* app is closed. Reopening the app will again show all devices as collapsed like in Figure 3-15.

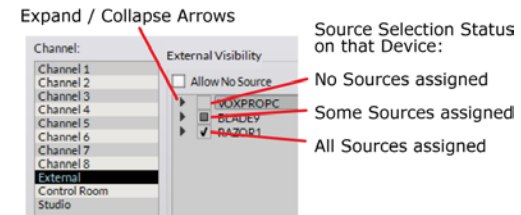


Figure 3-15 Visibilities Controls

Visibility Selection List

Figure 3-14 shows the signals for the Mix Engine, Surface, and a Razor I/O Interface. Two other devices, a PC and another console, are shown collapsed. The Program buses and other internal bus signals appear under the Surface sub-category below the Mix Engine. These signals are all normally **unselected** on channel selectors while many will be set as visible on the monitor and meter selectors.

When a device is fully expanded individual signals have their own checkbox. If checked that signal is visible. When unchecked, that signal does not appear on that selector. The *Allow No Source* selection is checked by default so that **NoSource** can be taken to silence a channel. It also serves as a handy signal list divider so you can tell when you've wrapped around the source list and are back at the top of the list again. Unchecking *Allow No Source* is typically done on the monitor and meter selectors so that **NoSource** is not an option on those selectors.

The *Source Selector*: channel, monitor, and meter selectors have a right-click context menu to allow the visibility setting from one selector to be copied and pasted to another selector. 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 channel, monitor, and meter selector.

Once the signal visibility is set, whether for one channel or for all channels, click *Apply* to transmit the changes to the Surface. The source selectors will immediately update to use the new visibility lists.

Telco Device Visibilities

Every fader channel has a bus-minus signal allowing any channel to have Telco devices included in their visibility list. This also allows any Telco device to be set visible on multiple or even all channels. But, in practice, those Telco devices which are always in use (like phone hybrids) typically are dedicated to one channel, while occasional use Telco devices (like remote codecs and connections to traffic or weather services) are typically limited to appearing on just a few channels because the bus-minus signal for those codecs must be changed when the Telco device is taken on different channels.

When the board operator takes a Telco device on a channel, the From Network audio is connected to that channel. But the To Network return audio must still be connected from that channel's bus-minus to the Telco device. This can be done manually: by using Screenbuilder to create an on-screen Mix-Minus selection screen; by using a button panel; by using PR&E Navigator's Crosspoint grid; or by using a salvo to set the bus-minus to Telco connection. But it can also be done automatically by creating Associated Connections for that Telco device so that no matter which fader it is taken on, it will always get the correct mix-minus signal. See page 35 about using Associated Connections with Telco devices.

Global Alpha Sort

This option is typically checked so that the visible source names are listed alphanumerically, regardless of which device they're on. The Blade's name is shown above the white line for each source name. This can be used to identify sources with the same name appearing on different devices. If identical names are used on different Blades each will still appear as separate entries in the list, but we recommend using unique names, if possible, if only to make it easier for board operator's to select the correct source.

When unchecked, sources are sorted and listed alphanumerically by Blade. The sources are listed in Blade ID number order.

PR&E NAVIGATOR

The PR&E Navigator app is used initially to name and configure the PR&E Mix Engine and Razor audio and logic signals. This can be done without licensing the app but, to continue to use all of its features, a site license for PR&E Navigator must be obtained from Wheatstone technical support.

Here are the other main uses for PR&E Navigator:

- View and update the operating system on PR&E Mix Engines and Razor I/O Interfaces
- Manually configure system devices (most users the PR&E System Configuration Tool to automatically adjust the settings on new devices)
- Assign a specific Mix Engine as the system master or clock master in a multiple console network
- Set system-wide configuration settings like: the system sample rate; the date/time displayed on Surface monitor displays; etc.
- Assign logic for the 6 "hard" and 128 "soft" LIOs (Logic Inputs or Outputs) available on each blade (Mix Engine and Razor)
- Connect signals using the X-Y Crosspoint grid
- Create Salvos to connect multiple signals simultaneously
- Set Associated Connections for controlling audio and logic connections based on system activity
- Evaluate and troubleshoot your PRE-IP system

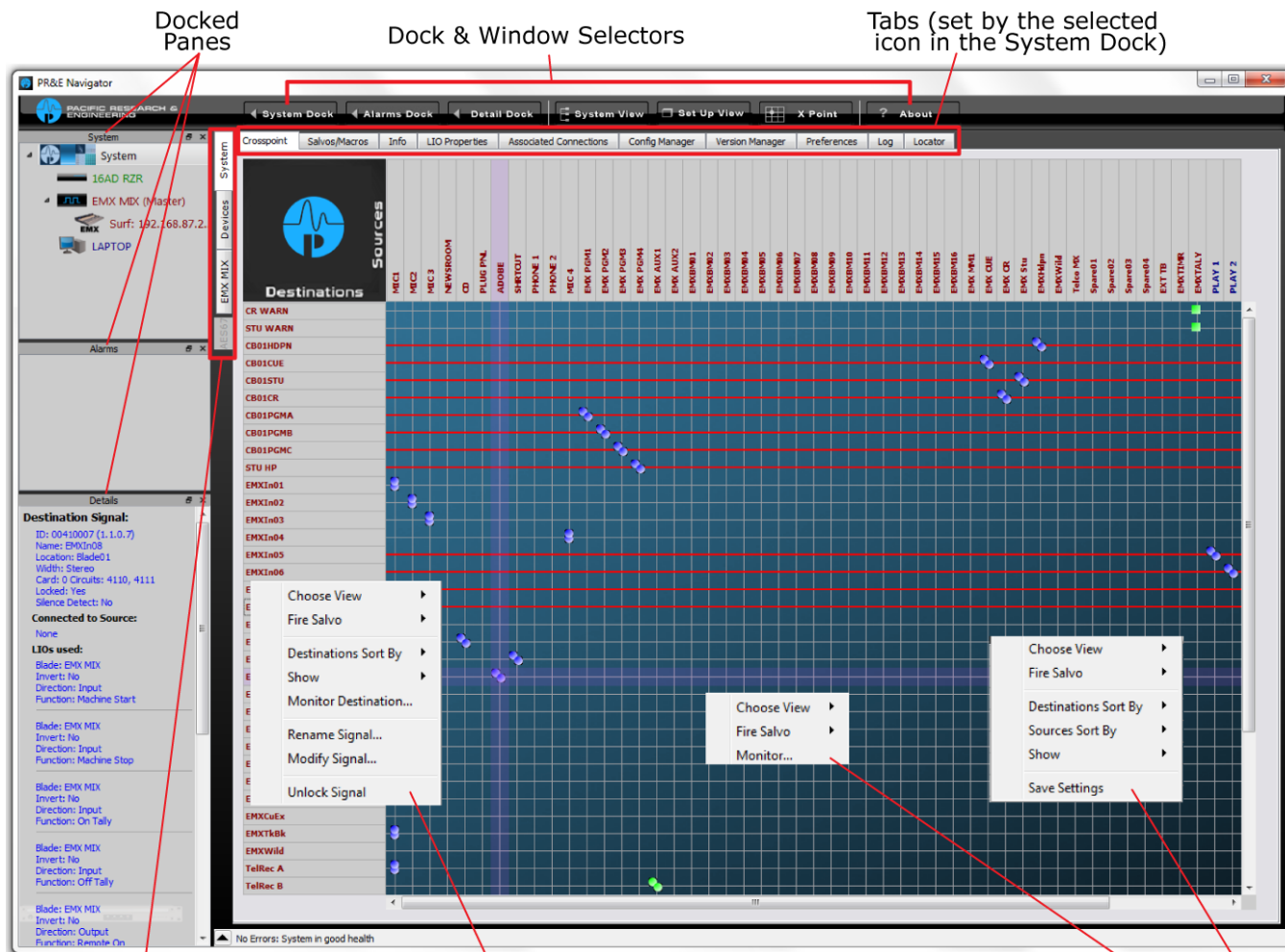
To start PR&E Navigator double-click its desktop icon or, from the Start Menu, select All Programs > Wheatstone PR&E > PR&E Navigator.



The app opens showing the *System Crosspoint Grid* (Figure 3-16 on page 33). 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 recommend setting a password—especially if PR&E Navigator is run on a studio PC, since improper use of the app could cause unexpected audio connection changes and other undesired system operation.

System Tabs

The **System > Crosspoint Tab** is shown when the app starts. Clicking on a Blade, Surface, or other device icon in the System Dock changes what's displayed, as will clicking on a different **System tab** or on another **Page Tab**. 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.



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 connected to a mono destination.

A square indicates a logic-only crosspoint. A horizontal red line indicates that destination is locked which indicates a default system connection or a signal connected to a channel that's currently on.

Connecting Signals

As you mouse over the grid, purple X-Y crosshairs point to a source and a destination so you can easily identify which signals will be connected if you click once on a crosspoint 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 silence the destination on an audio connection or turn off the logic on a logic crosspoint. As a safeguard, to prevent accidental connections or disconnections, you can require that the CTRL key be pressed when clicking to make or break a connection. This 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.

Page Tabs (active/inactive set by the selected device in System Dock)

Right-click context menus for:
 Crosspoint icon - Monitor the signal on the PC
 Source or Destination Signal Name - Unlock signal, et al
 PR&E Icon - Sets crosspoint options and selects views

Figure 3-16 PR&E Navigator Controls Overview

The Crosspoint grid shows the system sources (horizontal axis) and system destinations (vertical axis) along with icons indicating connected signals in an XY grid. The signal name colors match the device 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 small round dots. The dot colors indicate signal level (purple = no or low signal, green = normal level signal, red = high level signal). A single dot indicates a mono connection.



Note: Use caution when unlocking fader channel destinations. Locking indicates those channels are currently turned on.

Monitoring the Audio

Right-clicking on an active crosspoint connection; on a source name; or on a destination name, brings up a context menu (shown in Figure 3-16). Selecting *Monitor*, *Monitor Source*, or *Monitor Destination* opens a pop-up Monitor window (Figure 3-17 on page 34) 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.

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 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 3-18) you are connecting the signals needed for a future show or event. These connections are then saved as a Salvo, which means that all of these connections get taken when the Salvo is later "fired."

Dozens of audio and logic crosspoint connections can be set and saved in dozens of Salvos. Each Salvo begins life as a number (Salvo 1, Salvo 2, and so on) which doesn't mean much so you'll want to rename any Salvos you create (select the Salvo in the drop down list then click *Rename*) so you can use a name to remember what each Salvo was created to do.

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. When you assign a salvo using the LIO tab, only the first eight characters are shown, so it is best to use names with up to eight characters like: *DanceRMT*; *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 connections from the previous Salvo 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 in use. There is no Save Salvo button since the active Salvo is updated with each edit.

When you select a Salvo from the drop down list its connections are shown in the Salvo Edit Screen in read-only mode. The **Details Dock** also lists that Salvo's connections using their destination and source names. To make further changes, click the *Editable* button to allow connections to be added or removed.

To take the Salvo, select it from the drop down list then click *Fire*. The crosspoints assigned in the Salvo are all immediately connected—except for connections on locked destinations (e.g., channels that are on), their

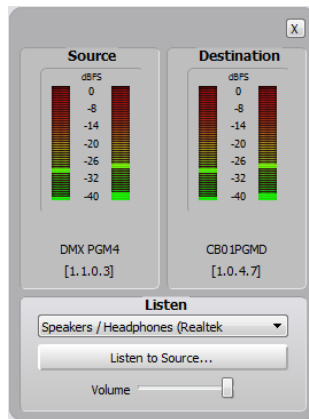


Figure 3-17 Signal Monitor Pop-Up Window

connections are not made. To make those connections, turn off the channel(s) and fire the Salvo again. You can also assign one of the spare buttons on the Monitor Control panel, or a button on a programmable button panel, to fire a salvo as well.

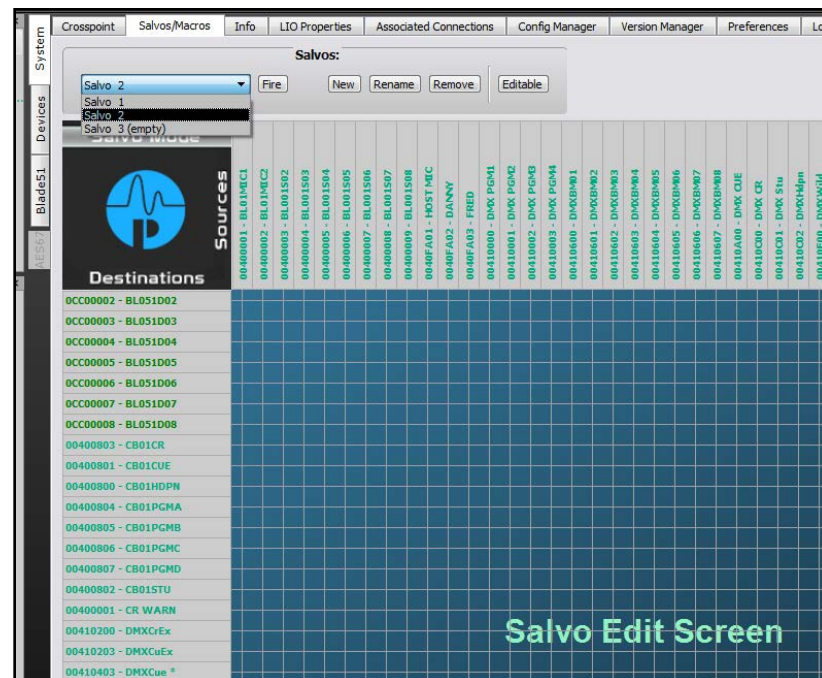


Figure 3-18 Salvo/Macro Tab

Info Tab

This tab's main use is to set the date and time shown on the console Monitor Control panel displays (highlighted in Figure 3-19 on page 35). Check *Use this PC's time* then click *Apply* to adjust the clock and time on the EMX monitor control panel displays. When the admin PC is also connected to the internet, click *NTP* to assign a remote time server to automatically keep the system time synchronized.

The only other setting that one may want to change is the Clock master sample rate, which can be set for 44.1 or 48 kHz. The other section's settings should be left at their default settings.

LIO Properties Tab

This tab is used to set the default configuration of the User-set logic functions (User 1 – User 500) in their unconnected state between High, Low, or leave it in the Last State. The default setting is Low (Figure 3-20 on page 35). This tab also shows the settings for the pre-assigned logic but does not allow any of those settings to be changed.

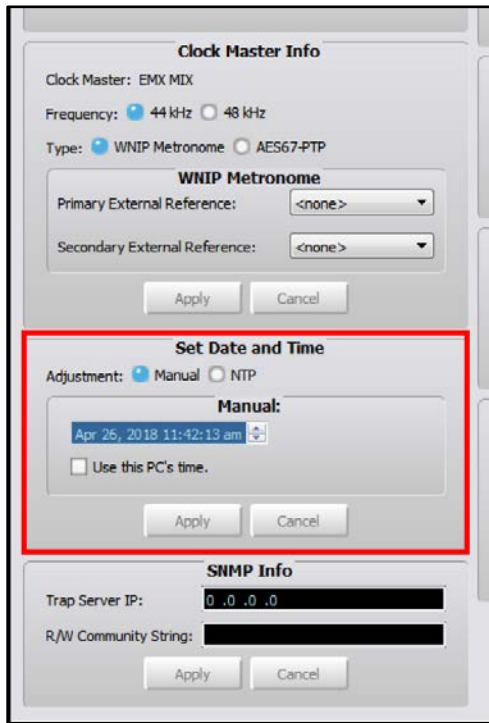


Figure 3-19 System Info Tab Details

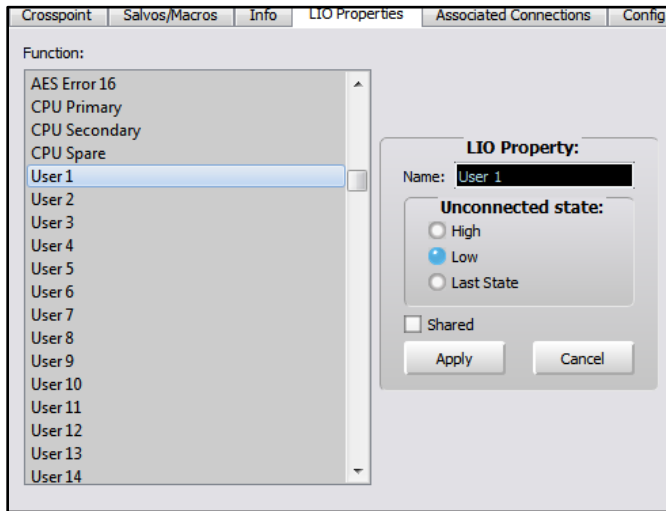


Figure 3-20 System LIO Info Tab

Associated Connections Tab

This tab is used to create, view, and edit Associated Connections, which can be used to automate console or system operations. An Associated Connection consists of two parts: a Triggered Connection and one or more Associated Connections. When the triggered connection is made, the system responds by automatically making the specified Associated Connections.

Associated Connections are often created for Telco devices in order to automatically connect the correct bus-minus signal to the Telco device. This is shown in Figure 3-21, but one can automate many system operations in response to the preset trigger connection being made by defining Associated Connections.

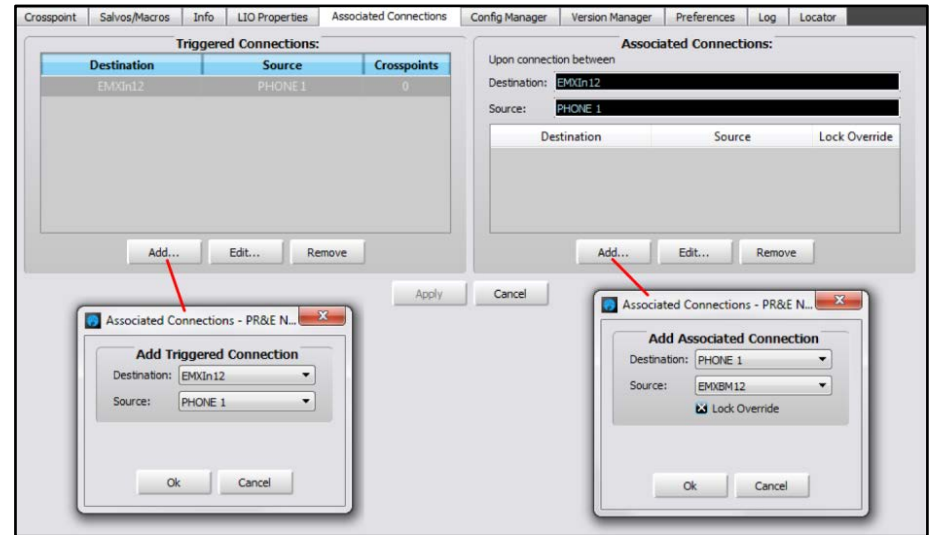


Figure 3-21 Associated Connections Tab

A Triggering Connection is assigned by clicking **Add...** in the **Triggered Connections:** section of the tab. This opens the *Add Triggered Connection* dialog box where a source and destination are selected. In the example, PHONE 1 taken on channel 12 on the EMX Surface. Clicking **OK** adds that entry to the Triggered Connections list.

With a triggered connection highlighted, click the **Add...** button in the **Associated Connections:** section to open the *Add Associated Connection* dialog box to 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 of the Associated Connections are assigned, clicking the all-important *Apply* button tells the Blade with the Triggered Destination to monitor the system waiting for the triggered connection to occur. When it's made (in the example PHONE 1 is taken on channel 12) all of the Associated Connections assigned to that triggered connection are connected.

Additional details on setting up and using Associated Connections can be found on page 43.

Config Manager Tab

This tab (Figure 3-22) is used to backup or restore parts of or the entire system's configuration. It's important to periodically save a system backup (especially after you finish completely setting up a system) so that all of your system settings are saved so they can be restored if a system device fails or some other issue occurs.

The **Current Crosspoint**: section of the tab also allows you to save all of the current Crosspoint connections to a file which can later be recalled to restore those crosspoint settings. Clicking *Save* saves the current crosspoint connections to a file in: Documents > Wheatstone > Navigator > Connections. Clicking *Restore...* opens up a dialog box to select between the saved crosspoint connection files.

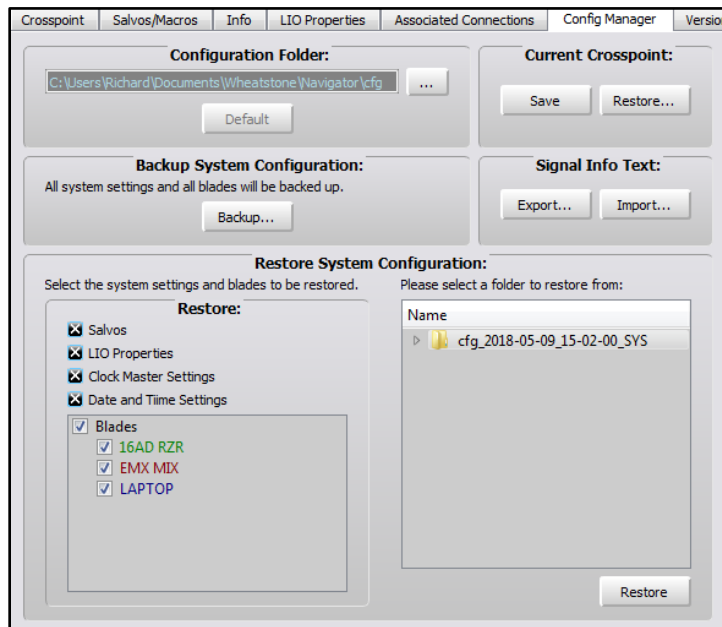


Figure 3-22 Config Manager Tab

If you manually rename the crosspoint files (they get named by the saved date and time) by an activity or daypart, one can use the Restore function as an alternative to using a salvo, but with one very important caveat: using *Restore Crosspoint* will overwrite locked signals (including ones locked because the signal is currently on-air) if the crosspoint source is different than what's currently connected, whereas a salvo will not change sources on locked destinations (like on-air channels).

The **Configuration Folder**: section sets the folder path for saving configuration files. The default is: Documents > Wheatstone > Navigator > cfg. Clicking the ... button opens up a save dialog box where the path can be changed. Clicking the *Default* button restores the save folder to 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 folder is then listed in the **Restore System Configuration**: section of the tab. Each of the folders can 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 **Restore**: section, allow you to select which system devices and 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 3-23 on page 37) is used to update the Blade (PR&E Mix Engine, Razor, and M4IP-USB) operating system code. The code is typically included as part of the PR&E Navigator app, so if the app is updated there may be also be a new version of operating system code as well.



Note: Updating the operating system code requires that your copy of Navigator be licensed. Contact Wheatstone/PR&E support to obtain a license.

Even though PCs with the WNIP driver installed are identified as Blades, they are not updated using this process so they are listed in the **Blades not available for an update**: section of the tab. This section lists the PC driver software version so you can identify if you're running the latest driver release.

In the **Blades available for update**: section, checkmark which Blades to update. Blades can be updated one at a time or all at once. Click *Select All* to checkmark all Blades. Click *Clear All* to uncheck all Blades.

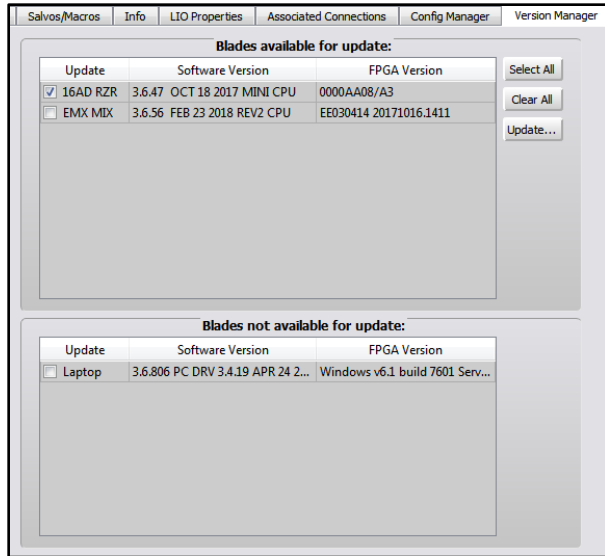


Figure 3-23 Version Manager Tab

Once the Blades you want to update are checked, click *Update...* to open a dialog box to select the binary code file with the updated code. In most cases there will only be one file in the directory. Select the file and click *Open* to load that file. A warning dialog box pops up asking the age old question: *Are you sure?* Click *Yes* to load the new code or *No* to cancel the update.

There will be no audio interruptions while the code is uploaded, but you must reboot the Blade to run the updated code. Rebooting may cause momentary audio interruptions as the Blades reboot.

Preferences Tab

This tab (Figure 3-24) sets Navigator's appearance and some of its functionality. The **General** section sets whether the default Crosspoint view or a custom view is shown when Navigator opens (**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 are on get listed in the grid.

The five check boxes at the bottom of the **General** section set: how Source and Destination signal ID numbers are shown (**Use dotted Signal IDs rather than hexadecimal**); the overall look of the Navigator app (**Use Style Sheet**); whether 12-hour or 24-hour is used in Navigator (**Use 24 Hour Time**); how a crosspoint connection is made or broken (**Use CTRL+click to make/break a crosspoint connection**); and whether to show the **Logger** section (**Enable Advanced Controls**).

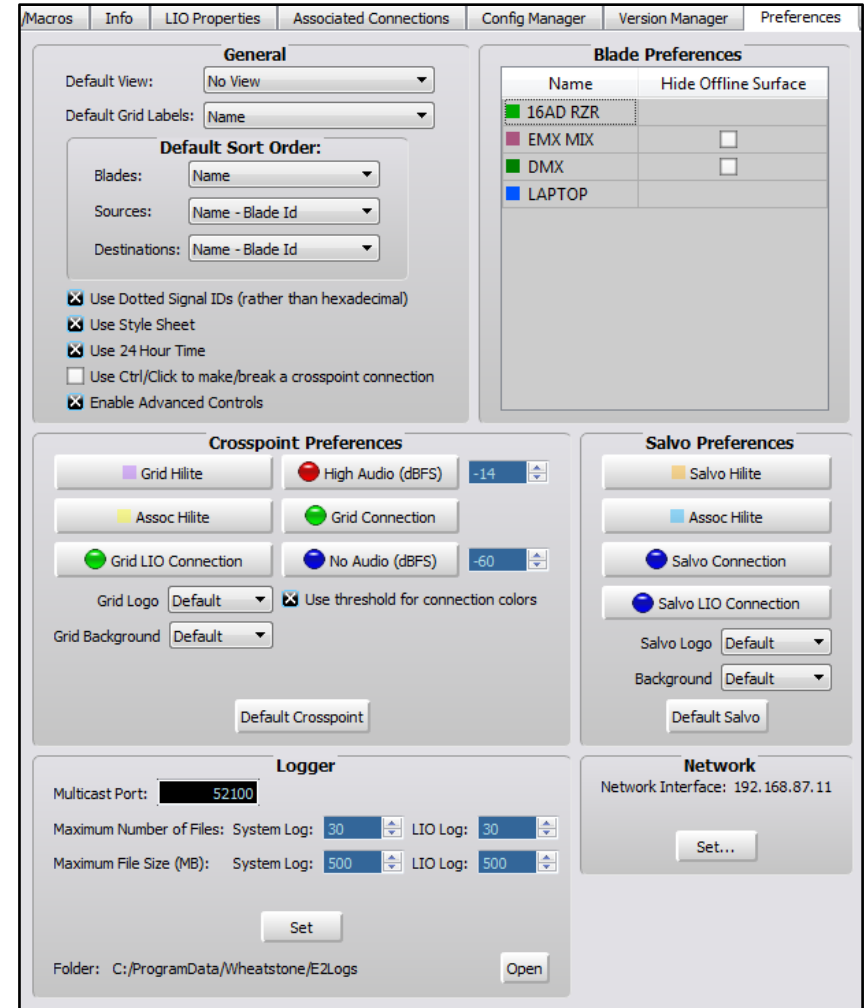


Figure 3-24 Preferences Tab

The **Blade Preferences** section allows a Blade's color to be edited by double-clicking on a Blade Name. A *Select Color* window opens so a new color can be assigned to that Blade. The color setting not only affects the color of the Blade names in the dock, it also affects signal name colors in the crosspoint and salvo tabs, and the color of log entries from that Blade. Since System Announcer log messages are black we don't recommend assigning that color to a Blade.

The **Crosspoint Preferences** section allows one to customize how the Crosspoint grid looks. You can change the color of the normal pointer crosshairs (**Grid Hilite**); the color of the crosshairs when over a crosspoint with Associated Connections (**Assoc Hilite**); the color of the audio

connection dots from their default purple, green, and red; the color of the logic connections from the default green; and change the grid background and grid logo. Fortunately, you can also click the *Default Crosspoint* button to return the settings to their defaults if you realize “customizing” the crosspoint didn’t work out the way you thought.

The same holds true for the salvo crosspoint display. You can customize it as well knowing there is a *Default Salvo* button that will return it back to “stock” settings.

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

The **Network** section shows which NIC Navigator expects is connected to PRE-IP devices. If no devices appear in the System Dock, look at the NIC address shown here. If it is not correct, click *Set...* to open a dialog box listing all of the NICs in the admin PC so the correct NIC (which should be an address in the 192.168.87.0 subnet) can be set.

Log Tab

The Log tab (Figure 3-25) shows system messages sent by the PRE-IP devices from the day and time Navigator was last started.

Num	Date/Time	From	Id	Name	Message
1	04/26/2018 11:27:00.164	General			-----
2	04/26/2018 11:27:00.164	General			-- PR&E Navigator Version: 3.6.56
3	04/26/2018 11:27:00.164	General			-- Qt Version: 5.5.1
4	04/26/2018 11:27:00.164	General			-- System started: Thu Apr 26 2018 11:27:00
5	04/26/2018 11:27:00.164	General			-----
6	04/26/2018 11:27:00.679	GUI	51	16AD RZR	Connected
7	04/26/2018 11:27:00.686	GUI	51	16AD RZR	Received: Version
8	04/26/2018 11:27:00.686	GUI	51	16AD RZR	Received: Net Info
9	04/26/2018 11:27:00.686	GUI	51	16AD RZR	Received: Src Signal List
10	04/26/2018 11:27:00.686	GUI	51	16AD RZR	Received: Src Signal List Message 8 Signals
11	04/26/2018 11:27:00.710	GUI	51	16AD RZR	Received: Dst Signal List
12	04/26/2018 11:27:00.710	GUI	51	16AD RZR	Received: Dst Signal List Message 8 Signals
13	04/26/2018 11:27:00.718	GUI	51	16AD RZR	Received: GPIO Pin Config
14	04/26/2018 11:27:00.725	GUI	51	16AD RZR	Received: LIO Wires
15	04/26/2018 11:27:00.725	GUI	51	16AD RZR	Received: LioWires: begin=true entries: 6
16	04/26/2018 11:27:00.727	GUI	51	16AD RZR	Received: Proxy Client Info
17	04/26/2018 11:27:01.231	General	1	EMX MXD	Setting as system master
18	04/26/2018 11:27:01.259	GUI	1	EMX MXD	Connected
19	04/26/2018 11:27:01.264	GUI	1	EMX MXD	Received: Version
20	04/26/2018 11:27:01.264	GUI	1	EMX MXD	Received: Net Info
21	04/26/2018 11:27:01.264	GUI	1	EMX MXD	Received: Src Signal List
22	04/26/2018 11:27:01.264	GUI	1	EMX MXD	Received: Src Signal List Message 46 Signals
23	04/26/2018 11:27:01.279	GUI	1	EMX MXD	Received: Dst Signal List
24	04/26/2018 11:27:01.279	GUI	1	EMX MXD	Received: Dst Signal List Message 34 Signals
25	04/26/2018 11:27:01.291	GUI	1	EMX MXD	Received: Route Master Info
26	04/26/2018 11:27:01.291	GUI	1	EMX MXD	Received: Clock Info
27	04/26/2018 11:27:01.291	GUI	1	EMX MXD	Received: Lio Data
28	04/26/2018 11:27:01.292	GUI	1	EMX MXD	Received: Salvo Data
29	04/26/2018 11:27:01.292	GUI	1	EMX MXD	Received: Assoc Conn List
30	04/26/2018 11:27:01.292	GUI	1	EMX MXD	Received: Timestamp
31	04/26/2018 11:27:01.292	GUI	1	EMX MXD	Received: Web Password
32	04/26/2018 11:27:01.292	GUI	1	EMX MXD	Received: Web Password
33	04/26/2018 11:27:01.292	GUI	1	EMX MXD	Received: Web Password
34	04/26/2018 11:27:01.292	GUI	1	EMX MXD	Received: SNMP Info
35	04/26/2018 11:27:01.292	GUI	1	EMX MXD	Received: Display Setting
36	04/26/2018 11:27:01.292	GUI	1	EMX MXD	Received: GPIO Pin Config
37	04/26/2018 11:27:01.292	GUI	1	EMX MXD	Received: Surface Pin Config

Figure 3-25 Log Tab

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 in use.

The log saves a log file each day but the log is reset each time Navigator is started, so if you want a complete log of operations we recommend keeping Navigator running on at least one PC connected to your PRE-IP network so you have an on-going log just in case you do run into problems or unexpected operation.

Locator Tab

This tab (Figure 3-26) shows all of the Blades and Surfaces connected to the network. Click *Refresh* to rescan the system and refresh the view. Note that a similar view is obtained by clicking on *System View* but in that view the Surfaces are shown under a separate tab from the Blades.

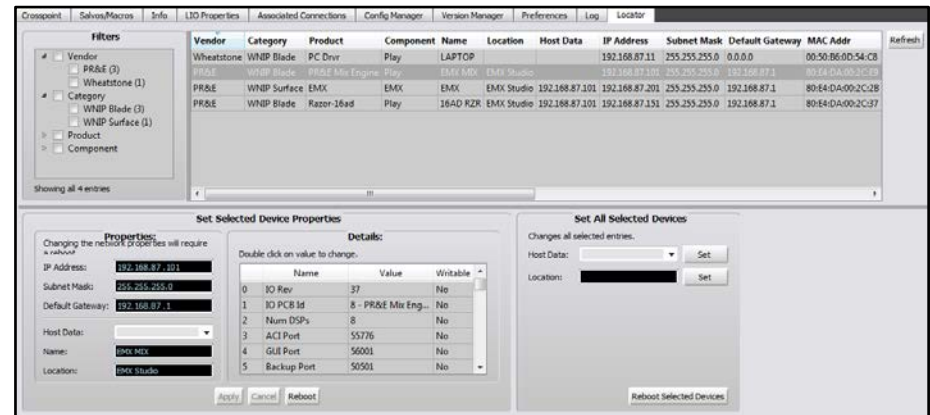


Figure 3-26 Locator Tab

Just as with the *EMX Surface Setup* Locator screen clicking on a device lists its properties in the **Set Selected Device Properties** section where the settings can be manually edited.

Blade Tabs

When any Blade: PR&E Mix Engine, Razor, M4IP-USB, or a PC with a WNIP driver, is selected in the System Dock, the list of tabs change from those shown while System is selected to show the **Blade tabs**. The Blade tabs allow one to update the settings for that Blade’s input signals (Sources tab); its output signals (Destinations tab, shown in Figure 3-27); to save and/or print out a list of input and output connections (Wire Info tab); to view and test the device’s logic connections (LIO Info tab); to view and edit the Blade network settings (Blade Info); and to save or restore that Blade’s settings (Config Manager tab). The M4IP-USB Blade has two additional tabs: Silence Sense and Utility Mixer.

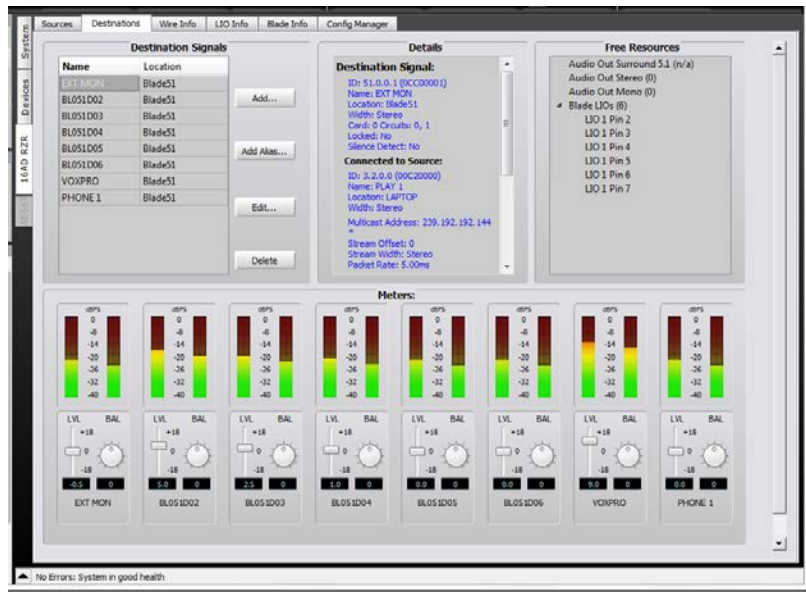


Figure 3-27 Blade Tabs

Sources & Destination Tabs

These two tabs have identical sections and are used to name the Source or Destination signals; edit the signals; associate logic commands with audio signals; add or edit logic-only signals; create signal Aliases; and edit the Blade location name.

The lower half of each tab, the **Meters**: section, shows the levels of the physical inputs (on the Sources tab) or outputs (on the Destinations tab) for that Blade. Just below the meters are level controls and, for stereo signals, a balance control. The level controls allow each signal level to be adjusted by up to +/-18 dB from nominal. Details on using the level and balance control can be found on page 40 in the Levels & Balance Controls section.

Naming Signal Inputs and Outputs

Every Blade input and output signal has a default name which can be edited using the **Blade > Sources** or **Blade > Destinations** tab to identify the peripheral devices or signals connected to the various inputs and outputs. The internal signal names (PGM buses, console channels, bus-minus signals, etc.) are typically left using their default names.

As an example of how to edit names, the PR&E Mix Engine Analog In 1 signals have the default names of BL01MIC1 and BL01MIC2 since those two inputs are meant to jumper to MICS OUT. These two signal names might be edited to MIC 1 and MIC 2, or to HOST and GUEST. Any name of up to eight characters. Input signals are edited using the **Sources tab**

(Figure 3-28). To see this tab, click on the Mix Engine icon (Blade01) in the **System Dock** then click the **Sources tab**.

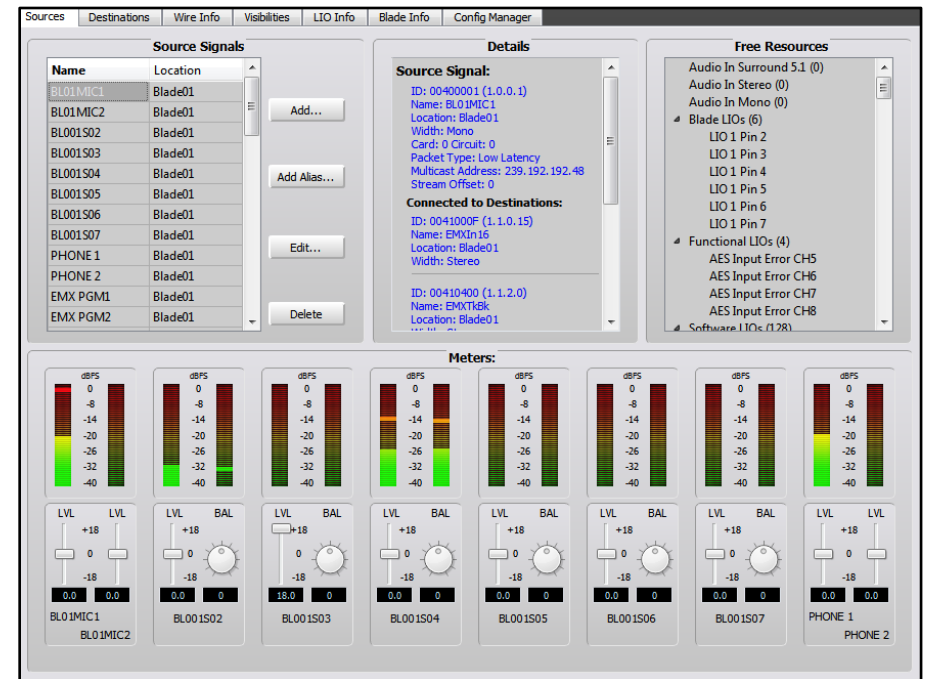


Figure 3-28 Sources Tab

To edit a name, click on the name in the **Source 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 **Signal Edit** window (shown in Figure 3-29 on page 40) and edit the name in that window.

Changing the Signal Type

If you aren't planning on using the two built-in mic preamps on a Mix Engine or on the Analog-only Razor, two other mono sources, like a pair of phone hybrids or a phone hybrid and a remote device, could alternately connect to Analog In 1. If no mono signals are being connected, the two mono Analog In 1 signals can be changed back into a single stereo input by clicking on BL01MIC2 to highlight it, then clicking **Delete** to remove that signal—after clicking *Yes* on the “Are You Sure?” pop-up box.

Select the other mono signal (BL01MIC1) and click **Edit...** to open the edit window (Figure 3-29). Change the **Signal Type** selection from Mono to Stereo. You can then edit the name back to a default name like BL001SO1, to indicate Analog In 1 or, if you know what stereo device will be connected to that input, enter the device name in the *Name* entry box. Click *Finish* to close the Edit Window.

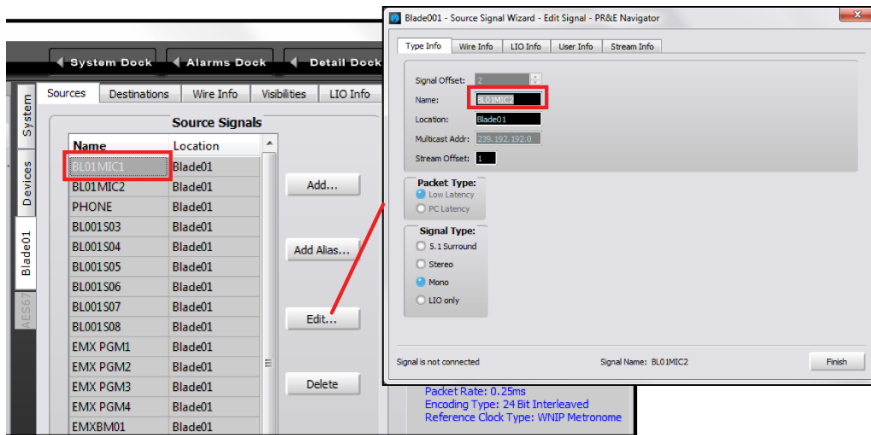


Figure 3-29 Editing a Signal



Note: You cannot edit a source or destination signal when it is connected in the Crosspoint grid. When the **Signal Edit** window opens (Figure 3-29) look at the bottom of the window to verify it shows “Signal is not connected.” If it shows “Signal is connected” you won’t be able to make any changes to that signal other than editing its name.

Creating Aliases

A source or destination name may need to have different names depending upon where or how that signal is being used in order to display a different name from the one assigned in Navigator. To do this an *Alias* can be created for a signal. An Alias is most often used with mics so that the generic source names are: MIC 1, MIC 2, MIC 3, and so on, but each mic can have multiple Aliases created so that the “Talent’s name” will appear in the channel display instead of the generic MIC 1, MIC 2, HOST, or CO-HOST names assigned to the mics.

To create an Alias, click on a Source name (you can also set up an Alias on a Destination and a logic signal, but most times an Alias is created for a Source). For example, if you want to create an Alias for BL01MIC1, click on that name (highlighted in Figure 3-29) then click *Add Alias...* to open up the *Add Alias* 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 list.

Once you add alias names and complete editing the source and destination names, use the EMX Surface Setup app to run a new System Scan (as shown on page 21). This action updates the Surface Setup app with the changes you made in PR&E Navigator, updating the signal names and adding the new Alias names to the Source and Destination lists.

Even though each Alias is associated with a specific source or destination, each Alias is treated as a completely new signal by the EMX

Surface Setup app. This means you have to add Aliases to the channel Visibilities lists and assign the same VDip settings (as shown on page 26) as you assigned to their original sources (especially settings like CR, Studio, and Cue mutes and studio tally settings).

Level & Balance Controls

The bottom half of both the **Sources** and the **Destinations** tab is labeled **Meters:** (Figure 3-30). There are sixteen meters showing the levels for the eight stereo/16 mono inputs, or the eight stereo/16 mono outputs, on the selected Blade.

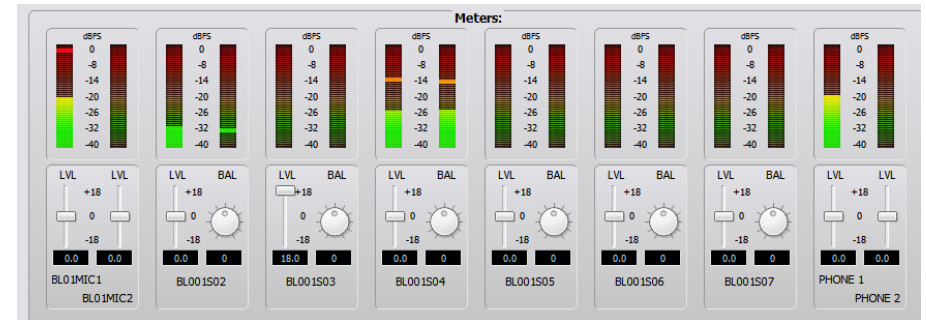


Figure 3-30 Meters: section of the Sources and Destination tabs

Below each meter are level (**LVL**) controls for mono inputs or outputs. On stereo inputs or outputs there is a level and a balance (**BAL**) control. These controls are prior to the meters so changing the level or balance is reflected in the meter display when audio is present on that input or assigned to that output. Since the level control affects the audio in real time, use caution on live consoles when adjusting levels.

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
- You can also directly 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 are valid. For balance, numbers from -100 (full left) to +100 (full right) are valid. Press *Enter* to set the new number

The top of the average signal bar graph on an active audio signal should be around the -20 mark and the peak LED should bounce around the -8 mark to allow for the proper headroom.



Note: When viewing Razor input or output signals only an average level bar graph is shown.

The EMX Surface meters have better resolution than the on-screen meters so they should be used for the most accurate input level adjustment. Connect a test tone, at +4 dBu, from a connected device then adjust the input control so the top of the bar graph is at -20 dBFS on the on-screen meters. Assign that signal to an EMX channel. Set the channel fader to align with the -12 dB unity gain arrows. Turn the channel on and assign it to a Program bus (with no other channels assigned to that bus). The EMX Surface meter's bar graph should light up all of the green LEDs and one yellow LED, which is the -20 dBFS point on the EMX Surface meters. If this is not the case, adjust the input level or balance control.

Balanced vs. Unbalanced Inputs & Outputs

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

The 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 lower than normal since it's unbalanced, but it often has a lower output level to begin with, so 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. Doing this eliminates having to use a level match box on that unbalanced signal.



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. Thus, you must use a balanced-to-unbalanced match box or a balanced-to-unbalanced transformer to connect any Blade's analog output to an unbalanced device.

Assigning Logic

Every Blade has six LIO (Logic Inputs or Outputs) on each RJ45 Logic jack on the Mix Engine, Razor I/O Interfaces, and M4IP-USB Blades. These LIO connections are used to connect legacy devices using hardware GPIO (General Purpose Input/Output) logic, like Henry Superrelays, CD players, hot mic arm LEDs, etc.

In addition to the six GPIO "pins" on each RJ45 Logic jack, every Blade also has 128 "Software" or SLIO signals which are used to carry logic between the EMX and networked WNIP-compatible devices like Wheatstone talent panels, Eventide BD600W+ delay units, and automation software from RCS, Wide Orbit, ENCO, and many other vendors.

LIO and SLIO logic is set using the same **Edit Signal** window as used to set the audio format (stereo/mono) and to name the audio signals.

When the logic is associated with an audio input signal, like BLO1MIC1, select that audio input name (it highlights) then click *Edit* to open the Edit Signal window (the process shown in Figure 3-29 on page 40). Click the **LIO Info** tab (Figure 3-31) to view, edit, or delete the logic settings associated with that audio signal.

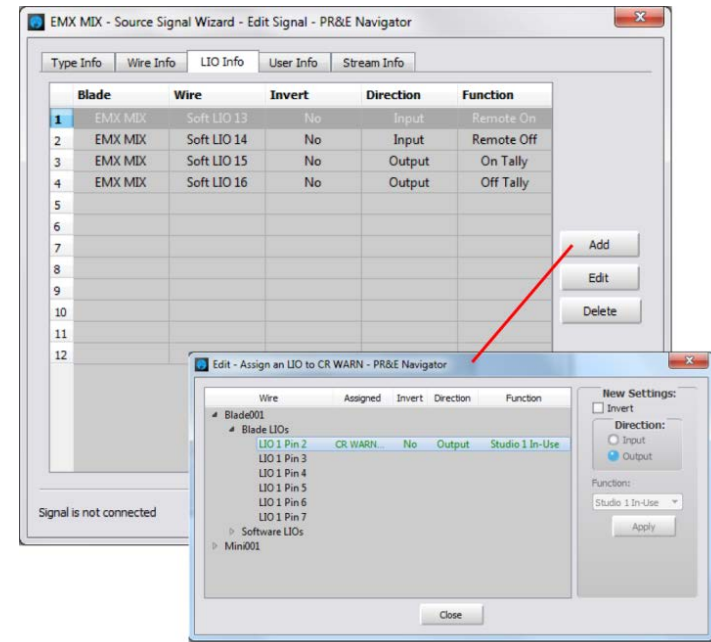


Figure 3-31 Logic Assignment tab

Figure 3-31 shows the typical settings used with a WNIP Talent Station (TS). It uses two logic signals to carry Remote On and Remote Off commands from the TS to the EMX channel, and two logic return signals to carry the On and Off Tally logic back to the TS. These are assigned using Software LIO since the TS is a networked device. Clicking *Add* opens the **Assign LIO** window, also shown in Figure 3-31.



Note: WNIP 6-channel GPIO Relay Interfaces are available from www.NotaBotYet.com. Each connects to a Logic jack using a standard straight-thru CAT5 cable. The interfaces have screw terminals to connect peripheral device wiring.

Logic Only Signals

In the **Blade > Sources** or **Blade > Destinations** tab, click *Add...* to open a new *Add Signal* window. To create a new logic-only signal, in the **Signal Type:** section, select *LIO only*. A default name is assigned (like BLO1D01) but this name should be changed to something useful, like CR

WARN, by double-clicking on the name in the **Name:** entry box and entering a new name of up to eight characters.

Clicking the *LIO Info* tab opens the **Logic Assignments** window (Figure 3-31 on page 41). On a new logic-only signal click *Add...* to open the **Assign LIO** window (also shown in Figure 3-31). To add output logic, select Output as the *Direction:*. Next, select the *Function:* from the drop down menu items. To create a CR WARN command, select *Studio 1 In-Use* since Studio 1 is typically set as the Control Room warning logic output. The physical pin number on the LOGIC connector is highlighted to indicate the pin with that logic command (each is set for input or output logic). Click *Apply* to set that logic command then click *Close* to close the window.

Switch to the Crosspoint map (**System > Crosspoint** tab) and locate the logic source for the console: EMXTally. That signal carries all the internal logic commands from the console so it must connect to the new CR WARN destination by clicking its crosspoint. A green square indicates it's a logic-only connection, as shown in Figure 3-16 on page 33, which also shows a second LIO destination named STU WARN which is also connected to EMXTally.

In the example, when a CR mic channel is turned on, the Logic jack will have a contact closure between pin 2 (CR WARN) and pin 1 (ground). With a second LIO assigned to pin 3, and labeled STU WARN since its Function is Studio 2 In-Use, when a Studio mic channel is turned on, they'll be a contact closure between pin 3 (STU WARN) and pin 1 (ground). These logic outputs are then physically connected to a hot studio warning interface; to a mic arm light; to a mic skimmer; etc.

Spare Button Logic Assignments

A Spare button can also be set to manually trigger external logic and/or to light up in response from an external logic input by adding a new LIO only Destination, as outlined in the previous section, using the Output Function: **Switch 1** or the Input Function: **Switch LED 1**. The logic destination is then connected to a Spare button, using the crosspoint grid, so it triggers the outgoing logic and/or lights up following incoming logic.

A Spare button can also be set to make a momentary connection or to fire a salvo using the **Blade > LIO Info** tab (Figure 3-32). The five Spare buttons are listed under Surface 1 Spares (Spare Btn 1 – Spare Btn 5).

Spare Btn 5 is typically set as a momentary talk button since it's labeled as EXT TB. The **Momentary Connection** column in the LIO Info tab is used to setup how a board operator can talk to an output, like a call screener that's getting pre-delay at their position. The Spare Button 5 is set for *Momentary/Surface LED* (so its button lights up when pressed) in the EMX Surface Setup Buttons page tab. In the LIO Info tab, double-click on <none> in the **Momentary Connection** column for *Spare Btn 5* to open the dialog box shown in Figure 3-33, left. Click the checkbox to activate the Source and Destination signal selections. In the example, the

source is MIC1 (the board operator mic) and the destination is the call screener's output (CALLSCNR in this example). Clicking *OK* closes that dialog box and adds the entry to the Momentary Connection column for *Spare Btn 5* (Figure 3-32). Pressing EXT TB then switches the board operator mic into the call screener's speaker. When the EXT TB button is released the monitor audio is reconnected to the speakers.

Pin Name	Input	Output	Function	Signal	Fire Salvo	Momentary Connection	Take Preset
LIO 1 Pin 2	<input type="radio"/>		Remote On	BL01MIC1	<none>	<none>	<none>
LIO 1 Pin 3	<input type="radio"/>		Remote Off	BL01MIC1	<none>	<none>	<none>
LIO 1 Pin 4		<input checked="" type="radio"/>	On Tally	BL01MIC1	<none>	<none>	<none>
LIO 1 Pin 5		<input type="radio"/>	Off Tally	BL01MIC1	<none>	<none>	<none>
LIO 1 Pin 6	<input type="radio"/>		<none>	<none>	<none>	<none>	<none>
LIO 1 Pin 7	<input type="radio"/>		<none>	<none>	<none>	<none>	<none>
Software LIOs							
Functional LIOs							
Surface 1 Spares							
Spare Btn 1	<input type="radio"/>				No BrdOp	<none>	<none>
Spare Btn 2	<input type="radio"/>				AM Show	<none>	<none>
Spare Btn 3	<input type="radio"/>				Syndicat	<none>	<none>
Spare Btn 4	<input type="radio"/>				<none>	<none>	<none>
Spare Btn 5	<input type="radio"/>				<none>	DST CB01CR => SRC BL01MIC1	<none>
Spare Btn 6	<input type="radio"/>				<none>	<none>	<none>
Spare Btn 7	<input type="radio"/>				<none>	<none>	<none>

Figure 3-32 Blade > LIO Info tab

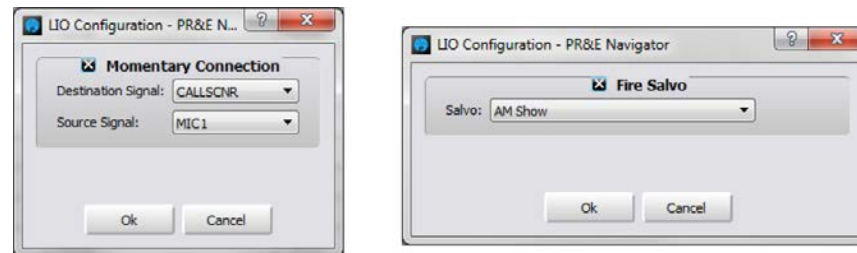


Figure 3-33 LIO Dialog Boxes

To assign a spare button to fire a Salvo, double-click <none> in the **Fire Salvo** column for the Spare Btn you want to use to fire a salvo. The Fire Salvo window opens (Figure 3-33 on page 42, right). Check the Fire Salvo checkbox to activate the Salvo: drop down list. Choose a salvo to fire then click *OK* to close the window and add the salvo name to the LIO Info window (like NoBrdOp, AM Show, and Syndicat shown in Figure 3-32).



Note: Even though most users assign a spare button to one action, they can be set to do any combination of: Fire a Salvo; make a Momentary Connection; and send out an LIO and/or SLIO command. This allows a spare button to be set up to accomplish very complex actions at one press of a button.

Associated Connections

To create a new Associated Connection, click **System > Associate Connections** tab. If any Associated Connections have already been entered, they will be listed in the tab, as shown in Figure 3-34.

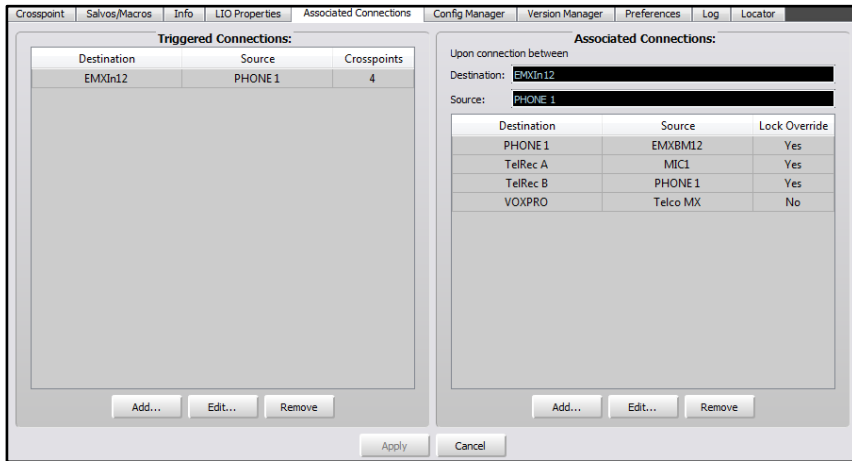


Figure 3-34 Associated Connections tab

An Associated Connection requires that a **Triggered Connection** be defined first using the left half of the tab. Click the **Add...** button to open the **Add Triggered Connection** window to assign the source connected to destination trigger connection. In Figure 3-35, left, the source is PHONE 1 and the destination is fader channel 12 (EMXIn12). Clicking **OK** in the dialog box adds that connection to the Triggered Connections list.

The Associated Connections that are made in response to that trigger are defined on the right side of the tab. Highlight the Triggered Connection then click the **Add...** button in the Associated Connections side of the window. This opens the **Add Associated Connection** window (Figure 3-35, right) to assign a source and destination. This window has one other setting: **Lock Override**. When checked this causes the source to destination connection to be made even when the destination is locked. When Lock Override is unchecked the source to destination connection is not made when the destination is locked.

In the Figure 3-34 example, there are four Associated Connections made when Phone 1 is taken on channel 12: the channel 12 bus-minus (EMXBM12) signal is connected to the PHONE 1 output; the host mic (MIC 1) is connected to TelRec A; PHONE 1 is connected to TelRec B; and the Telco Mix is connected to the VoxPro output.

These same Associated Connections can be assigned to other fader channels so that Phone 1 can be taken on several channels while always having the correct mix-minus signal for the caller and the correct Telco Mix signal for the VoxPro.

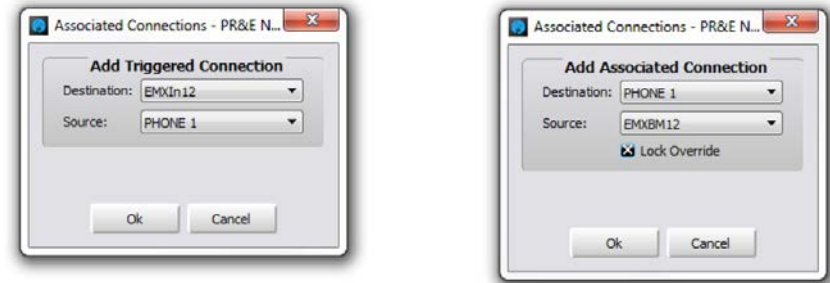


Figure 3-35 Associated Connection Dialog Boxes

Associated Connections can also be used to set up a Codec that's assigned to that studio so it can be taken on several faders without having to manually connect the different fader channel bus-minus signals to that Codec. Figure 3-36 shows this type of Associated Connection. In this example, Codec 1 is set visible on channels 13 – 16 on the console, thus, four Triggered Connections are setup to listen for Codec 1 being taken on any of those four channels. Each triggered connection only has one Associated Connection that connects that channel's bus-minus to Codec 1.

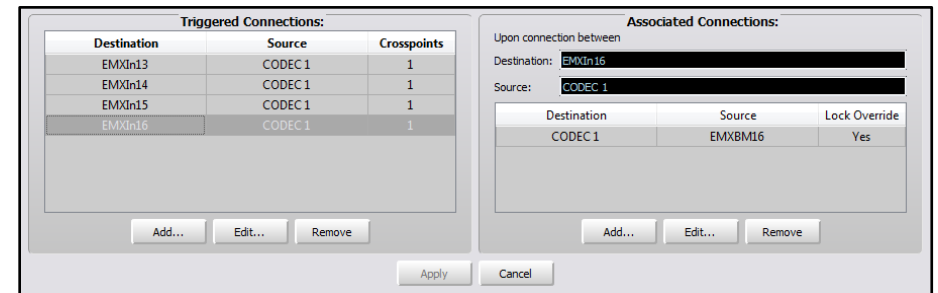


Figure 3-36 Creating Associated Connections for a Codec

An example of a more complicated Associated Connection is shown in Figure 3-37, on page 44, which switches four mics in a Talk Studio between an EMX console and a DMX console when the Host mic is taken on a specific channel on either console. On the EMX, when the Host mic is taken on channel 4, the Co-Host mic is automatically taken on channel 5, and the two Guest mics are taken on channels 6 and 7. The Studio warning logic is then connected to the EMX Tally.

Taking the Host mic on channel 1 on the DMX console switches all of the studio mic signals channels 1 – 4 on the DMX console and connects the DMX Tally to the STU WARN logic output.

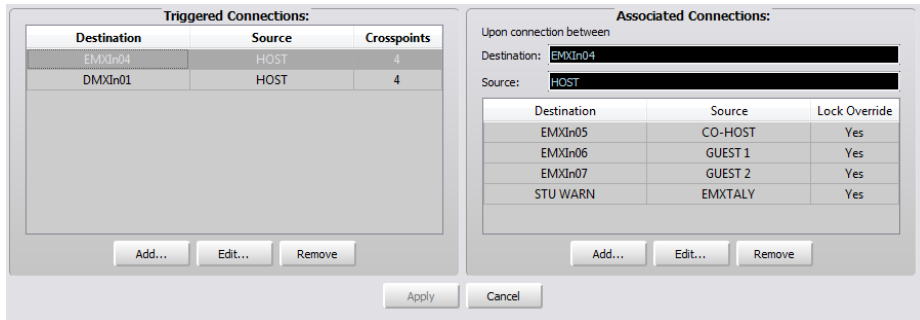


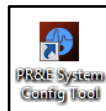
Figure 3-37 Creating Associated Connections for a Talk Studio

PR&E SYSTEM CONFIGURATION TOOL

The PR&E System Configuration Tool is used to uniquely configure a new PR&E Mix Engine and Surface, or a new Razor I/O Interface, so it can be networked with existing EMX devices. It does this by automatically editing all of the default identify settings on the new device (its IP address, device ID, device name, and signal names) to associate it with either a specific studio or room in the case of a new console or with a specific host device in the case of a Razor. The tool can also be used to reset any Mix Engine, Surface, or Razor back to its factory default settings.

If your new EMX console will always be used as a stand-alone device—never networked with other EMX or DMX consoles, then you can leave the EMX set to its default settings and not have to even open up this app. However, if you might network your EMX console with other EMX or DMX consoles in the future, then we recommend using this app to change the default settings on your console to assign it to another IP address, device number, and name. That way, when another new EMX or DMX console is networked with the console there will be no device conflicts.

Click the desktop icon or start the app from the Start Menu (All Programs > Wheatstone PR&E > PR&E System Configuration Tool).



The app only has one screen (Figure 3-38) which is divided into two sections: *Orphans* and *Groups*. When a new device is connected to the network it shows up in the *Orphans* section of the screen listing its current IP address and type of device.

If a new device does not appear in the Orphan column, click the *Refresh* button (round arrow button in the upper left) to rescan the network. If no devices appear in the Orphan column or in any Group, click the *Settings...* button (the gear icon) to open the app's Settings window. Click the *Network Interface* tab and select the NIC that's connected to the EMX system. If it is changed you must restart the app.

An Orphan can be click-dragged from the Orphan column into an existing group (used when adding a new Razor). That device then appears in that group ready to be configured. A new Mix Engine or Surface would be click/dragged up to the New Group box. This creates a new Group with a blank window for the matching Mix Engine or Surface, which can then be click/dragged into that group.

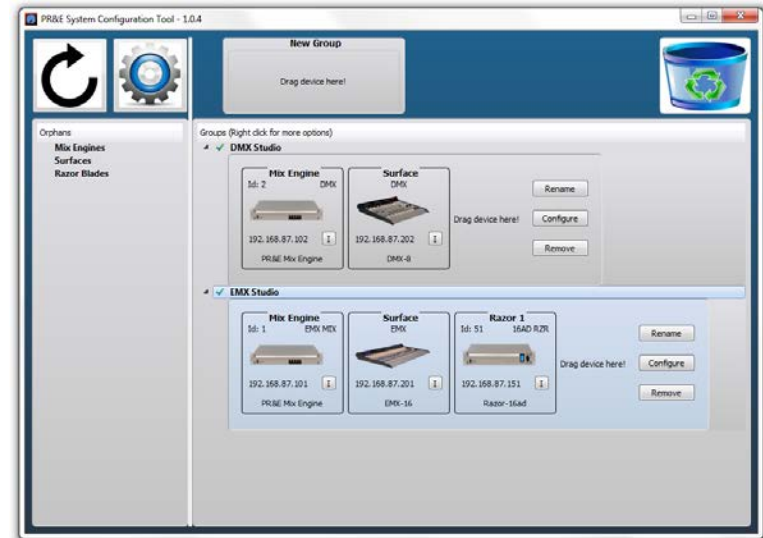


Figure 3-38 PR&E System Configuration Tool

To identify any device, click the "I" button in that device's window. Doing this on a Surface causes the PGM select buttons to blink. On a Razor, a large thumbprint appears in the front panel display. On a Mix Engine, two of the green LEDs (Route Master and Clock Master) blink.

Any configured device can be click-dragged to the recycle icon (upper right corner) to return that device back to its factory default settings. This might be done when an Engine and Surface or a Razor are being repurposed for a new studio. This will reset all of the names assigned to that device and set its IP address and device ID back to its factory default settings.

Configuring a Device

Once a Mix Engine and Surface are added to a new group, they can be configured with unique network settings so they can be networked with existing PRE-IP devices. This is done by clicking the *Configure* button in that group to open the *Configure Group* window (Figure 3-39, on page 45).

This window shows the suggested Mix Engine and Surface names and the Blade ID number. If you accept these settings, clicking the *Apply* button will configure the Mix Engine and Surface using these settings. In

most cases you'll want to edit the names from their default entries. This is done by double-clicking on the name of ID number. New names can then be type in, or a new ID number can be selected from the drop-down list.

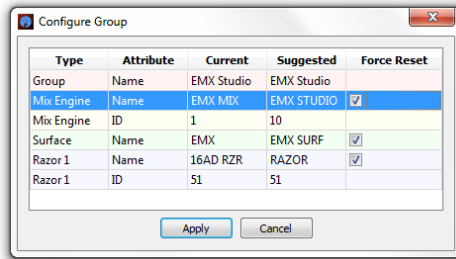


Figure 3-39 Configuring a New Device

SOFTWARE UPDATES

Wheatstone/PR&E may periodically issue software revisions for the EMX Surface, PR&E Mix Engine, and Razor I/O Interfaces. The EMX Surface code version is viewed and updated using the EMX Surface Setup app's Hardware menu (Figure 3-40). The Engine and Razor code is updated using PR&E Navigator's Version Manager tab (Figure 3-41).

Surface Code Update

To see the current version of code running on the Surface, in the *Surface Setup* app select the *Hardware* menu item > *Version...* A pop up window lists information about the current code that's running the EMX Surface, including the version number.

The Surface code is downloaded to the admin PC as part of the EMX Surface Setup app installation. But updated versions of the code may also be available to be downloaded separately. Click *Hardware* > *Update...* to open the folder holding the code downloaded with the Surface Setup app. If the code was downloaded separately, then navigate to that folder. The code file will be named: **PRE_EMX_surface_X_X_X.rbn** with the Xs being the number of the new code Version.

Click *Open* to upload the new code to the Surface. This action can be done while the console is actively being used since the code is only loaded into the Surface memory. A popup message advises that the Surface must be rebooted to use the new code.

The EMX continues to pass audio as the Surface is rebooted but, of course, no Surface controls will be available during the 45 seconds or so it takes the Surface to complete rebooting and be ready for use again.



Note: The PGM buses and monitor outputs may momentarily duck or change levels as the Surface regains control after rebooting.

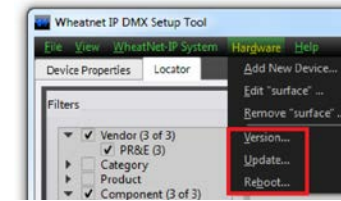


Figure 3-40 EMX Surface Code Version and Update options

Engine & Razor Code Update

The PR&E Mix Engine and Razor code is downloaded as part of the PR&E Navigator app download. But updated versions of the operating system code for these devices may also be available to be downloaded separately from the Navigator app.

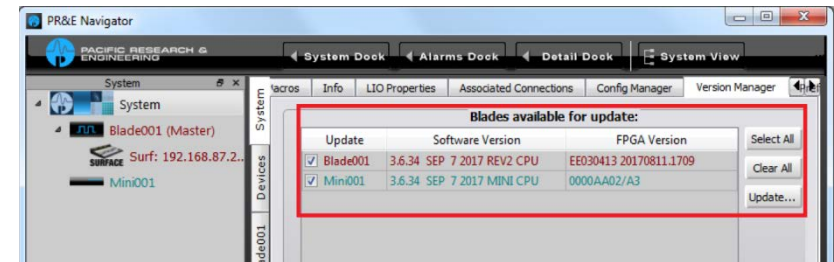


Figure 3-41 PR&E Mix Engine and Razor Code Version and Update options

The code version running on each device can be viewed, and the code can be updated, using the *Version Manager* tab in PR&E Navigator (Figure 3-41). The Software Version column lists the code build currently running on each Blade (the PR&E Mix Engine and each Razor I/O Interface). Blades can be individually updated or all of them can be updated simultaneously.

Click the *Update...* button to open up a file search window which opens on the folder PR&E Navigator uses to save the code that was downloaded with it. If the code file was downloaded separately, then the code file may be in a "Downloads" folder so use the file search window to locate the new code file. The Mix Engine and Razor code is in a compressed file named: **EMX_update_X_X_XX.tgz**, with the Xs being the code version number.

Once the code is uploaded to the Blade(s), each Blade must be rebooted to actually run the updated code. As the updated code is subsequently run there will be momentary muting or audio changes on the program buses and monitor outputs so, if possible, the code update process should be done while the console or Razor are not carrying on-air audio.

4 - EMX BOARD OPERATIONS AND EMX APPLICATIONS

This chapter covers EMX Surface operations from the board operator perspective. Also included: an overview of the control panels' features and functions; how to use the EMX to accomplish specific tasks and functions; how to use the Advanced Channel Features; and how to use the Razor I/O Interface's front panel control and display.

EMX CONSOLE OPERATION

EMX operation is identical, regardless of which size EMX Surface is being used—only the number of fader channels available and the number of optional control panels installed in the Surface will differ. Figure 4-1 is an overview of an EMX-16 Surface listing its main component parts.

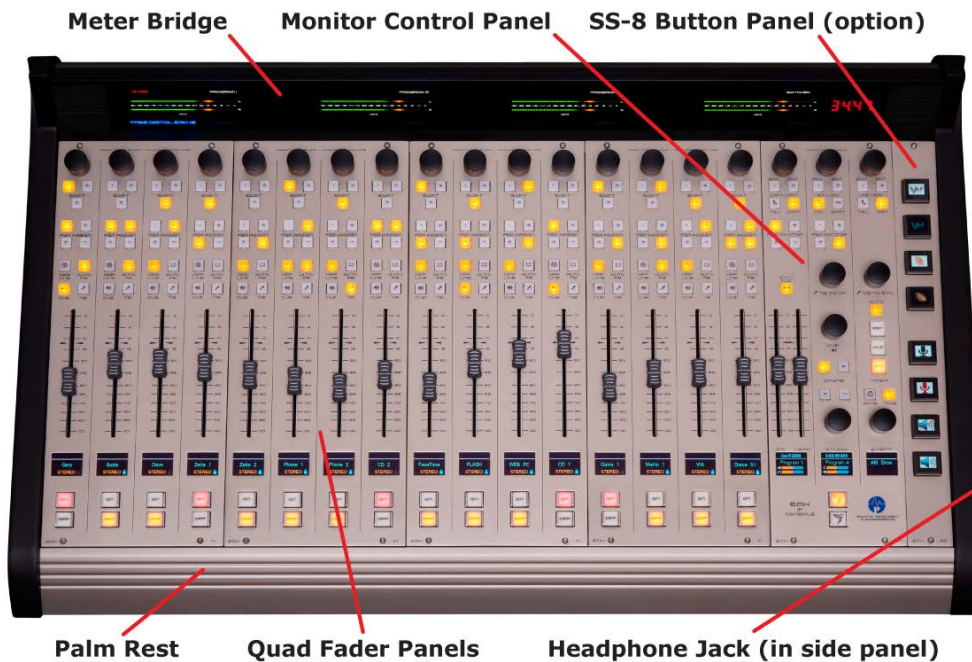


Figure 4-1 EMX Surface Overview

One fader channel strip is shown in Figure 4-2 with a summary of the controls and channel display. A Monitor Control panel overview is shown in Figure 4-7 on page 50. The first mention of each control is in **Bold** in the text.

Fader Channel Operation

There are four identical fader channel strips on each Quad Fader panel. Each fader channel typically has an audio source assigned to it. The channel sources may be manually taken, using the **Channel Encoder**, the large knob at the top of each fader channel, or by pressing a **Soft Button** which has been pre-set to take that channel's "Hot Source."

Sources can automatically be taken on multiple channels by taking a console Event or by taking a console Salvo that's assigned to one of the **Spare buttons** on the Monitor Control panel.

The channel's current source is shown in green in the middle of the **Channel Display** (detail in Figure 4-3 on page 47, left channel display). If no source is assigned the channel display shows *NoSource*.

Most fader channels have alternate sources available which can be "dialed up and taken" by the board operator using the channel encoder. The alternate source names are listed in alphanumeric order as the channel encoder is rotated.



Note: The list of alternate source names is not under board operator control. The lists were set during console configuration, but can easily be updated as required by engineering.

Selecting an alternate channel source can only be done when the channel is off. If the channel encoder is rotated while the channel is on, a **FADER ON** message appears in the channel display. With the channel off, rotate the channel encoder. The channel display switches to show three source names with the currently selected source shown highlighted (Figure 4-3, right channel display). Rotating the encoder Clockwise (CW) moves

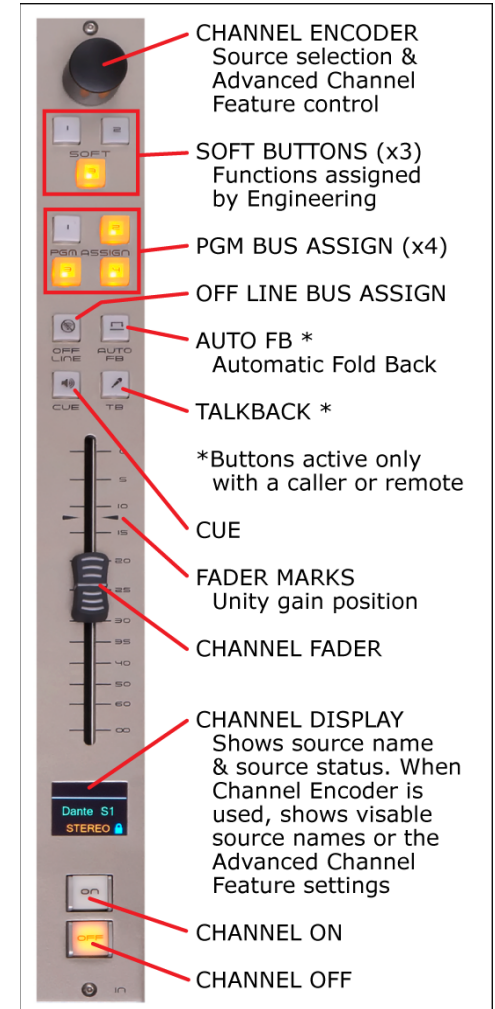


Figure 4-2 Channel Controls

the highlighting down through the list of names. Turning it counter-clockwise (CCW) moves the highlighting up through the list of names. The list wraps around for a continuous display.

To select a new source highlight its name in the list then press once on the encoder knob, like “clicking” a mouse button, to take that source. The channel display switches back to show the new source name in green in the middle of the display.



Figure 4-3 Channel Displays: Left = Normal (Source Name & Status)
Right = Selecting a New Source (Alternate Source Name List)

On channels with dedicated sources, like the board operator mic, phone, and automation server channels, only one or two sources may be listed when the channel encoder is rotated.

On channels with sources that are used periodically, like a CD player, a guest input, or a feed from a newsroom mixer, there might be a dozen or more alternate sources listed. Typically, two or three fader channels near the Monitor Control panel will have every system source—that might need to be aired or recorded, included in their lists.

Bus Assign Buttons

Fader channels can be assigned to any combination of the four program buses using the **PGM 1**, **PGM 2**, **PGM 3**, and **PGM 4** assignment buttons. A lit button indicates the channel is assigned to that bus. An unlit button indicates the channel is not assigned to that bus. If a PGM button status does not change when pressed, it indicates that engineering has locked that PGM bus from being changed across all fader channels.

The audio for the four Program (PGM) buses is post-fader and post-channel on switch. This means that to hear the channel’s audio (and see it in the meters): the channel must be assigned (the desired PGM button(s) must be lit); the channel must be turned on (the red On button must be lit); and the fader must be “potted up” or level adjusted to control the level of the channel audio going to the selected PGM buses.

! **Note:** For most signals the fader knob should be moved near the two **Fader Marks**. Aligning the middle line on the fader knob with the two arrows sets that channel for unity gain.

Any fader channel can also be assigned to the **Off Line** bus. This bus is used exclusively with callers and remotes. It differs from the four PGM buses in that it’s typically set for pre-channel On switch operation which

means the channel audio on the Off Line (OL) bus is not controlled by the channel On button. If the OL bus has also been set for pre-fader operation then the fader will not affect the OL bus level. Using the Off Line bus is covered in detail in the *Caller/Remote Operation* section on page 49.

In on-air studios, PGM 1 is typically used to create the live-to-air signal. Thus, all channels assigned to PGM 1, turned on, and potted up will feed the transmitter. PGM 2 can be used to create a network or an internet stream feed that requires alternate program elements from what’s going out over the air. PGM 3 and PGM 4 are available to feed selected channels to a recorder, to time-shift-record programming, or to do voice-tracking while the console continues to feed completely different source material to air on PGM 1.

In a production room PGM 1 is typically connected to a PC or server running Audition or other on-screen multi-track editor to record programming. When the EMX is in a newsroom or a talk studio, its PGM 1 bus is often included as a source on the air studio console to allow the talk show host to mix the talk studio mics or the news announcer to go live from the newsroom while controlling their own mix of playback actualities and other sounders that will play along with their mic audio.

Cue

The fader channel **Cue** buttons control whether that channel’s source is connected to the cue system. Cue audio is pre-fader and pre-channel On switch so the board operator can verify the correct source audio is present on that fader channel. Cue audio goes to two cue speakers in the **Meter Bridge** and may also go to external cue speakers. The cue speaker volume is controlled by the **Cue Level** on the Monitor Control panel.

Although cue is often used to verify a remote source, like a satellite receiver or a live remote codec, is correct, its main use today is to allow for hands-free phone call answering, which is covered in the *Caller/Remote Operation* section on page 49. Of course, if there’s a turntable in the studio, cue can also be used for its original purpose: helping the “jock” cue up a song on a record.

Cue can also be set to auto-switch into the board operator headphones—a console configuration setting. If the Monitor Control panel **Split Cue** button is unlit, typical for a production room, the monitor audio is cut off and stereo cue is fed to the headphones. In an air studio the Split Cue button is typically lit, which means cue audio feeds the left ear while the CR monitor audio is summed to mono and fed to the right ear.

! **Note:** If the board operator headphones have no audio, look at the Split Cue button. If it’s unlit, press it. If CR monitor audio returns to one ear that means at least one channel has a lit cue button and that’s why the CR monitor audio was interrupted. The headphones had auto-switched to stereo cue but there was no audio on the channels with lit cue buttons.

There are three other cue features which may be active on the console:

- Cue audio levels can be auto-switched to appear in the switched meter while cue is active
- Cue can automatically turn off when a channel is turned on
- Cue can automatically turn on when the fader is moved to full off

These cue features are set by engineering and cannot be changed by the board operator.

Fader Level Control

The **Channel Fader** controls the audio level going to the PGM 1 – PGM 4 buses (and the Off Line bus if it was configured for post-fader operation during console setup). The level range goes from full off, when the fader is set to the ∞ symbol, up to adding 12 dB of gain to the signal when the fader is at full on (the 0 mark).

The fader knob, in the ideal world, is positioned so that its center line aligns with the unity gain marks (the two arrows next to the fader slot). When a channel is assigned to Cue and to PGM 1—and the fader is set to unity gain then the switched meter, if it's displaying the cue level, and the PGM 1 meter levels will be identical.

Channel Control

To turn a channel on, press and release the **Channel On** button (Figure 4-2, on page 46). A red LED lights to indicate the channel is on. To turn the channel off, press the **Channel Off** button. For most channel sources a yellow LED lights the Off button to indicate the channel is off.

Some sources, like media server playback channels, may be set to control the Off button's illumination so it might not light when pressed. Off button lighting control was originally used with cart decks to show their status: no Off button light indicated the cart was not ready; a solid Off light indicated the cart was cued and ready to play; and a winking Off button indicated the cart had already played. Several automation systems continue to use this convention to indicate their play channel status.

The channel fader positions can also be used control the channel on and off as they are moved to/from being fully off (the ∞ symbol). The channel turns on when the fader is moved up from full off and turns off when the fader is moved back to full off.





Note: The channel on and off buttons still turn the channels on and off even when fader control of channel on/off is active.

Channel Displays

Each channel has a color OLED (Organic LED) display to show the channel status. The normal display shows the source connected to that channel in green letters in the middle of the display (**BL01MIC1** is the

source name for the channel shown in Figure 4-4). If there is no source connected to the channel **NoSource** is shown in green.

The area above the white line in each display is used to indicate if any Advanced Channel Features are active on the channel. If **EQ** is shown then equalization is active. If **DYN** is shown then Dynamics (compression/expansion) is active. The icons:   are shown when the low pass filter or high pass filter are active.

A small red up or down arrow in the middle of this area indicates that channel's fader has been remotely set by engineering. The arrow indicates which direction the fader must be moved to match the remote setting. The arrow turns off when the fader matches the remote setting indicating the fader has retaken control over that channel's level.



Figure 4-4 Channel Source and Status Display

Below the source name, in orange, is the channel's Mode setting. The default setting for every channel is Stereo with alternate settings for Left, Right, and Mono. The Mode setting may be changed if the board operator has access to using the Advanced Channel Feature: Mode control or when a channel Soft button is assigned to step through the Mode settings.



Note: Mode is a channel function not a source function. This means a channel with a mic or other mono source will still show "stereo" since mono sources are automatically connected to both the left and right channels.

The Mode setting might need to be changed for a phone call editor like VoxPro when its stereo signal has the caller on one channel and the talent's voice on the other. Switching the Mode to mono will blend those two channels together. The Left and Right modes might need to be selected when a satellite receiver or codec is improperly setup and the console is only receiving the left or right channel. Changing the Mode can then send the left or right channel from the source to both PGM left and right channels. Setting the Mode is covered in the Advanced Channel Features section on page 54.

To either side of the Mode name are icons that indicate channel status. On the right side is a lock icon to show whether that channel has logic control over the source. The lock icon's color indicates its status: Gray = no logic control; Blue = that channel fader currently has control; an opened Red lock icon = the source is active on another channel fader in the system and that other channel fader has logic control over the source.

A mic icon is shown to the left of the Mode name when the channel's source is a Control Room, Studio, or external location microphone. This icon is typically set to turn red when the channel is on.

Rotating the Channel Encoder, while the channel is off, changes the channel display (Figure 4-5) to show the list of alternate sources set for that channel. The current source is shown highlighted in the middle. Rotating the control clockwise moves the highlighting down through the list while rotating it counter-clockwise moves the highlighting up through the list. While the new source is being selected, the hardware device name, which has the highlighted source as one of its inputs, is shown above the white line. In Figure 4-5 the highlighted source is on **Blade01**, which is the default name for the PR&E Mix Engine, which is the rack-mounted device with the EMX console's audio inputs and outputs.

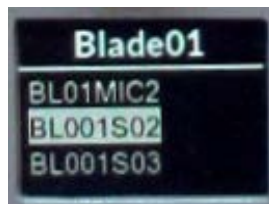


Figure 4-5 Alternate Source Name List

Source names are typically shown in one alphanumeric order list with their device names shown above the white line, but the console can be configured to show source names by device (a configuration choice set by engineering). When this mode is active, and the channel encoder is first rotated, a list of networked devices is shown. Selecting a device then lists the source names on that device in alphanumeric order.

Regardless of which method is being used, clicking the Channel Encoder with a highlighted source name connects that source to the channel. The display then switches to show the source name in green (Figure 4-4).

Caller/Remote Operation

When any channel source is from a caller or a remote, the Off Line assignment buttons can be used to create a special "return signal" for each caller/remote while their fader channel is turned off. This allows for hands-free conversations between the board operator and the caller or remote.

Typically, the caller/remote channel is assigned to Cue so the board operator can hear them. The board operator's mic channel and the caller/remote channel are both assigned to Off Line. The mic channel's Off Line button lights up solid while the caller/remote channel's Off Line button blinks. The blinking identifies which bus is being returned to that caller or remote—always minus that caller's or remote's voice.

Typically, no other channels are assigned to Off Line so that the caller/remote only hears the board operator's mic, unless a host or

producer also needs to talk to the caller/remote, in which case their mics can also be assigned to the Off Line bus.

When a caller or remote is the source on a fader channel the **TB** (Talkback) and **Auto FB** (Automatic Foldback) buttons become active.

TB (Talkback)

Press/hold the TB button to momentarily talk to the caller or remote, regardless of whether its return audio is the Off Line bus or a PGM bus. While TB is pressed, the bus audio that's being returned to the caller or remote is cut off and only talkback audio is heard.



Note: The console's talkback destination (the EMX TkBk destination in the Navigator app) is typically connected to the board operator or host mic. If there is no talkback audio when pressing the TB button, then it's a good chance the talkback destination has not been connected. This would also affect the Monitor Control panel talkback buttons: STU TB and EXT TB.

The TB button is mainly used with live remotes to give them cues about the program, but it can also be used with callers if there is a lot of noise in the control room (like during a morning zoo format). This condition means that using "hand's free" call answering, where the board operator mic channel is assigned to the Off Line bus, may not be desirable. Of course, you might just not want a caller to hear everything that's going on in the studio, so in these cases the board operator and/or host mic would be unassigned from the Off Line bus and the TB button would have to be press/held on the caller's channel to selectively talk to the caller.



Note: Since the caller/remote channel is usually assigned to cue, turning up the cue speaker too loudly during a hands-free call can allow the caller's voice to be picked up by the board operator or host mic. This can cause an echo due to acoustic feedback. For the best audio when recording a caller, turn down the cue speaker volume and listen to the caller using headphones.

Auto FB (Automatic Fold-Back)

If the caller/remote is to go live to air, light up the Auto FB button. When lit, the caller/remote's return audio feed automatically switches between the Off Line bus (when off) to the lowest-assigned PGM bus (typically PGM 1) while their channel is on. The PGM button blinks to indicate it's the bus being sent to the caller/remote. They'll then hear everything that's going to air—minus their own audio, so they can interact with guests in the studio and other show elements.

When the caller/remote channel is turned off their return audio switches back to the Off Line bus (the button blinks) so the board operator can give cues for a live remote or again talk privately with the caller.



Note: The return signal going back to the caller or remote is often called an IFB (Interruptible Fold Back) signal because while the

caller or remote listens to the fold back audio (typically the Off Line bus while their channel is off and PGM 1 while it's on) the board operator can interrupt the return audio at any time by pressing the Talkback button to give them cues.

Meter Bridge

The Meter Bridge has four digital level meters that display (from left-to-right) the PGM 1, PGM 2, and PGM 3 levels, and a switched meter signal. There is also a four-digit Timer and two cue speakers in the Meter Bridge. Figure 4-6 details the Switched Meter and Timer display.

The switched meter can show the level of one of four pre-set sources (PGM 4, EXT 1, EXT 2, or TEL) using the Meter Select Buttons on the Monitor Control panel (Figure 4-7). The switched meter can also display cue levels while cue is active (a console setup option). An on-the-fly source can also be selected using the Meter Source Selector.



Figure 4-6 Meter Bridge, Switched Meter and Timer

Each meter shows a stereo signal, the left channel's level in the upper display with the right channel's level in the lower display. Each meter can display both the average signal level, using a bar graph, and a peak level, using a single LED that's typically 8 -12 dB above the top of the bar graph.

The horizontal meters are calibrated in dBFS (decibels below Full Scale) with the lowest displayed level (-60) at the left end and the maximum signal level (0) at the right end of each meter.

The meters' LED colors indicate relative volumes. From -60 to -20 the LEDs are green (very safe levels with no chance of signal overload). Typically the average-level bar graph covers most or all of the green LEDs. The -20 to -8 levels use orange LEDs to indicate safe peak levels. The bar graphs should only extend occasionally into the orange LEDs.

Red LEDs are used to indicate levels from -8 up to 0. An occasional lighting of a red LED is OK, but one should not consistently see the peak LED in the red LEDs since this indicates the signal level is very close to the maximum level and there is very little signal headroom left.

If the signal is too hot, and the 0 red LED lights up, a blue Overload indicator rapidly blinks to indicate the level is way too hot and must immediately be lowered using the channel faders.

Monitor Control Panel Operation

The Monitor Control panel (Figure 4-7) is located to the right of the Quad Fader panels. It has three control columns: CR (Control Room); Studio; and Meter. Each has an on-the-fly monitor/meter **Source Selector** at the top. The **Monitor Select Buttons** are all user-set sources, except for the Meter column's **PGM 4** button which displays the PGM 4 bus level in the switched meter when lit.

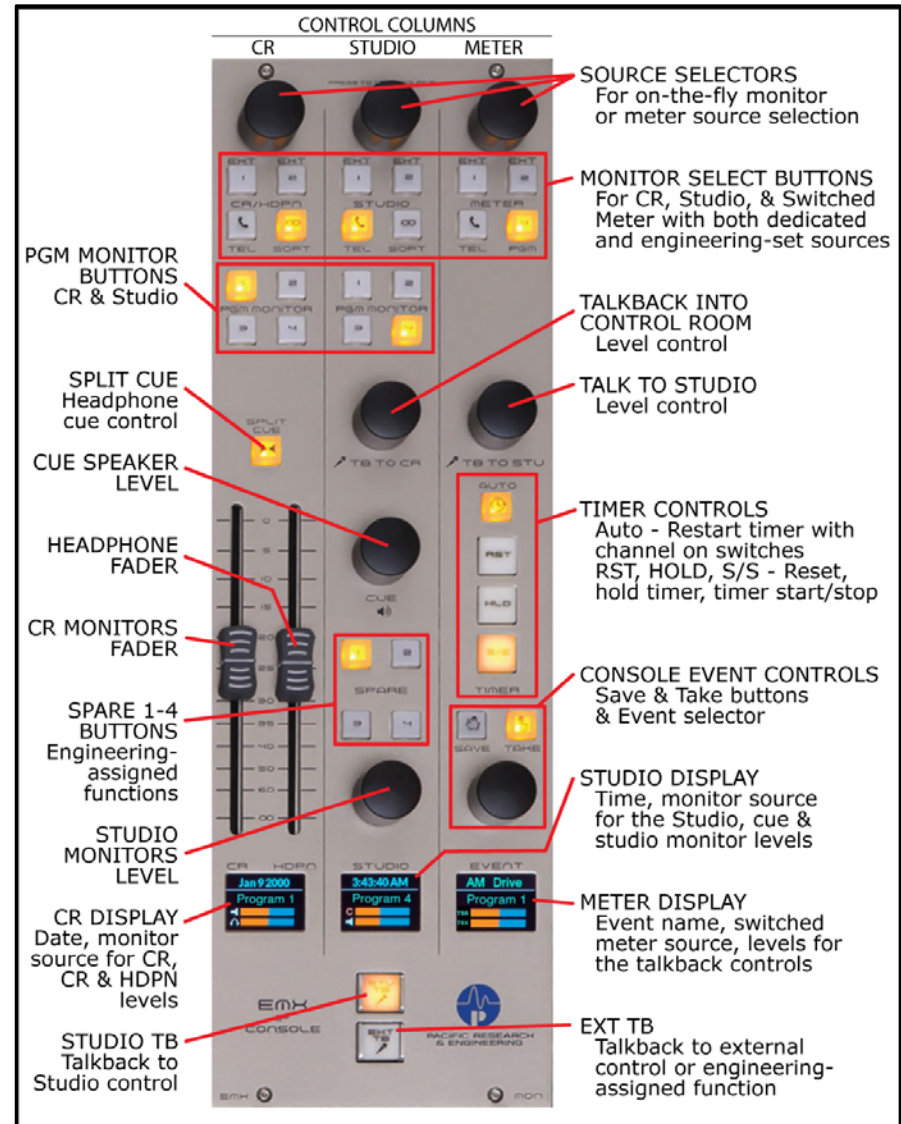


Figure 4-7 Feature summary, EMX Monitor Control Panel

Typically, the same source is set across each programmable selector button. **EXT 1** might be set for a pre-delay processed air signal; **EXT 2** set for an off-air tuner to verify you're still on-air; **TEL** could monitor the Telco Mix or Telco Record output; and **SOFT** could be set for another often-monitored source. Engineering sets what sources are assigned.

CR Column

The CR/HDPN (Control Room/Headphone) column has eight monitor select buttons to select between the four program buses (PGM 1, PGM 2, PGM 3, and PGM 4) and four engineering-assigned sources (EXT 1, EXT 2, TEL, and SOFT) to set the audio being monitored in the control room. A lit button indicates which source is going to the control room monitor speakers and to the board operator's headphone jack. The current source name is also shown in green in the **CR Display** (Figure 4-8).



Figure 4-8 Monitor Control Panel - CR Display

A "wild" or on-the-fly source can quickly be selected for the CR monitors by clicking the **CR Source Selector**. The CR Display switches to show the list of available sources (Figure 4-5, on page 49). Rotate the source selector to highlight the desired source then click the selector to choose that source. Its name is in red to indicate it's a wild source. A wild source can also be assigned by an event or salvo. Its name will also be red if the source is not assigned to one of the eight source select buttons.

Split Cue

Split Cue sets how cue audio is auto-switched into the board operator headphones. When lit, and a channel has a lit cue button, cue audio is fed to the left ear while the CR monitor audio is summed to mono and fed to the right ear. For air studios, the Split Cue is typically lit. When Split Cue is unlit, cue is auto-switched to both ears (stereo cue) cutting off the CR monitor source audio. This is the normal setting for production rooms where monitoring the PGM 1 or the air signal is not as critical.



Note: Auto-switching of cue into the board operator headphones is a console setup option so is not under board operator control.

Faders

The left fader (CR) controls the level of the control room monitor speakers. Its level is shown in the upper bar graph (with the speaker icon) in the CR display (Figure 4-8). The right fader (HDPN) controls the volume of the board operator headphones. Its level is shown in the lower bar graph (with the headphone icon) in the CR display.



Note: The board operator headphones plug into a recessed 1/4" TRS jack in the Surface's right side panel.

CR Display

The CR display (Figure 4-8) shows the date above the white line and the current CR monitor source below the white line. The monitor source name is green when the source is assigned to a CR monitor select button (that button is also lit). When the monitor name is red it indicates an on-the-fly monitor source selected using the CR Source Selector, or other method, in which case no CR monitor select button will be lit.

The Control Room monitor speakers and the cue speakers are typically automatically muted, and an on-air warning light triggered, whenever a control room microphone is turned on. A red X appears over the CR monitor speaker icon and the cue level icon (the C bar graph in the **Studio Display**) to indicate muting while a control room mic channel is on.

Studio Column

The Studio column also has eight monitor select buttons to choose between monitoring the four program buses and four engineering-set sources in the studio. A lit button indicates that source is feeding the studio monitor speakers. The current studio monitor source is shown in green (or in red if it's a wild source) in the Studio Display (Figure 4-9)

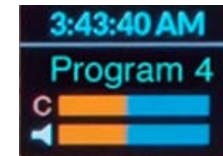


Figure 4-9 Monitor Control Panel - Studio Display

An on-the-fly source can quickly be selected for the studio monitors by clicking the **Studio Source Selector**. The Studio Display changes to show the list of available sources. Rotate the source selector to highlight the desired source name then click the selector to choose that source. Its name is shown in red to indicate it's a wild source. If a wild source is assigned by a console event or salvo the studio monitor source name will also be red and no studio source select button will be lit.

TB to CR

The **Talkback to Control Room** control adjusts the level of studio or external mics talking to the control room using a talent station or remote talkback switch. Its level is shown in the upper bar graph (TBR) in the **Meter Display** (Figure 4-10 on page 52). The talkback audio uses the cue system so the cue button lights on the studio/external mic channel while talkback is active. This also means the Cue Level control affects the talkback level along with the TB to CR control.



Note: Talkback audio will not be heard in the board operator headphones unless cue is set to auto-switch into the headphones. The TB to CR level affects both the cue speaker talkback level and the talkback level going to the board operator headphones.

Cue

The **Cue Level** control adjusts the level of the cue speakers in the Meter Bridge. It also adjusts the level of any external cue speakers. The control does not affect the cue level feeding the board operator headphones. The cue level is shown in the upper bar graph (labeled C) in the Studio Display.

Spare Buttons 1 - 4

Spare Buttons 1 – 4 have user-set functions so your engineering department will have to identify what functions (if any) are assigned to these buttons. Each button may be assigned to take a console event; to take a salvo to setup the console for a specific show or application (like voice tracking); or they can be set to control external devices, like a relay to unlock the studio door or as a profanity delay dump button.

Studio

The volume of the studio monitor speakers can be controlled by the **Studio Monitors Level** control, but often a studio-mounted level control is used to adjust the levels in lieu of using this control. When a studio-mounted control is used the Studio Monitors Level is set inactive (a console configuration setting).

The Studio level is shown in the lower bar graph, with the speaker icon, in the Studio Display (Figure 4-9 on page 51). The monitor speakers are automatically muted, and a studio warning light triggered, whenever a studio mic channel is turned on. This muting is indicated by a red X over the studio speaker icon.

STU TB

The board operator can talk to the studio monitor speakers using the **STU TB** button located below the Studio Display. The level of talk into the studio monitor speakers is controlled by the **TB to STU** level control in the Meter column.

EXT TB

The board operator can talk to an external location like a call screener or producer using the **EXT TB** button located below the Studio Display. Since the EMX does not have a dedicated “external monitor” output, this button is not defined from the factory. Engineering assigns this button’s functions like the Spare 1 – 4 buttons. If there is no external location to talk to, this button (identified as Spare 5 Button) can be set for the same type of functions as the other four Spare buttons.

Studio Display

This display (Figure 4-9 on page 51) shows the time above the white line and the current studio monitor source below the white line. If the monitor source name is green it indicates it’s a source selected by a studio monitor select button (that button is also lit). If the monitor name is red it indicates an on-the-fly monitor source selected using the Studio Source Selector or other method and no studio monitor select button is lit.

The studio monitor speakers are automatically muted, and a hot mic warning light triggered, whenever a studio microphone is turned on. A red X appears over the studio monitor speaker icon while a studio mic is on. If cue is also sent to the studio then the C bar graph icon would also have a red X.

Meter Column

The four Meter source selector buttons (EXT 1, EXT 2, TEL, and PGM 4) select a source for the switched meter. PGM 4 is a dedicated source so pressing it displays PGM 4 in the switched meter. The sources for the other three buttons are assigned by engineering during console configuration.

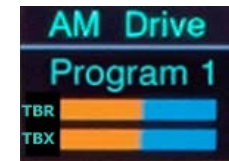


Figure 4-10 Monitor Control Panel – Meter Display

An on-the-fly source can quickly be selected for the switched meter by clicking the **Meter Source Selector**. The **Meter Display** (Figure 4-10) switches to show the list of available source names. Rotate the source selector to highlight the desired source name then click the selector to choose that source. Its name is shown in red to indicate it’s a wild source. If a wild source is assigned by a console event or salvo the switched meter source name will also be red and no meter source select button will be lit.

TB to STU

The **Talkback to Studio** control adjusts the level of control room talk going to the studio speakers. Its level is shown in the lower bar graph (TBX) in the Meter Display. The talkback audio typically comes from the board operator mic, but it can also be set for a host or a producer mic, or be set to combine several mics so several people can talk into the studio. Talkback is initiated by press/holding the STU TB button at the bottom of the Studio column.

Timer

The meter bridge count-up timer is manually controlled using three of the four **Timer Controls**: **RST** (Reset timer); **HLD** (Hold timer display);

and **S/S** (Start/Stop timer). The fourth button, **AUTO**, allows channel on commands to automatically reset the timer to 00:00 and start counting up. The manual timer controls operate the same whether or not the Auto button is lit.

To manually start the timer, press the S/S button. The button lights to indicate the timer is running. The timer begins counting up from the displayed time. If the timer reaches 59:59 the timer rolls over to 00:00 again and continues counting.

To stop the timer, press the lit S/S button (its LED goes out). The elapsed time is displayed on the timer. Pressing S/S again will start the timer from the displayed time.

To reset the timer to 00:00, while it is running or stopped, press the RST button.

To view the elapsed time—while the timer keeps counting, tap the HLD (Hold) button. It lights up indicating the displayed time is being held. Tap the HLD button again (its LED goes out) to return to displaying the current running timer time.

The timer can automatically be reset to 00:00 and start counting up when a fader channel, whose source is set for Timer Restart, is turned on. To use this feature, press the Auto button to light it up. To turn off Auto, press it again to turn off its LED. Which sources have the Timer Restart option enabled is a console configuration setting.

Console Event Controls

EMX supports four Console Events. Each console event can setup the console for a specific show, day part, or activity by changing channel sources and bus assignments, monitor sources, and turning Advanced Channel Features on or off. Each event can be renamed (their default names are Event 1 - Event 4) to better identify its purpose.

Press the **Take** button to take a previously saved console event. This lights up the Take button, activating the **Event Selector**, and switching the Meter Display to show the four event names (Figure 4-11). Rotate the event selector to highlight an event. Press Take again to update the console settings previously saved in that event. The event name is then shown in green above the white line in the Meter Display.

Press the **Save** button to save the current console settings to an event. This lights up the Save button, activates the event selector and switches the Meter Display to show the four event names. Use the event selector to highlight an event name. Press Save again to save the current console settings to the highlighted event—overwriting any previously saved event. The saved event name is then shown in the Meter Display.



Note: The Save and Take functions auto-cancel after 20 seconds if no event controls are subsequently touched. If the Save button is pressed, but does not light, that indicates it's been locked out from

board operator use (which would indicate engineering has already setup and saved the console events). If the Take button also doesn't light when pressed, that indicates console events are not being used.

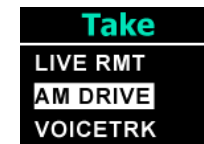


Figure 4-11 Meter Display when Taking an Event

Here's a typical example of how the four console events might be assigned. Your engineering dept. should supply a list of what show or day part is assigned to each console event:

- EVENT 1 – Console set for a single board operator who takes phone calls and records call-in requests/contest winners
- EVENT 2 – Console set for a regularly-scheduled live remote
- EVENT 3 – Morning show setup with multiple mics and multiple live remotes (traffic, news, weather, remote hosts or guests)
- EVENT 4 – Sets the console for voice tracking while the console continues broadcasting the air signal



Note: Fader channels that are on when an event is taken maintain their existing channel settings when an event is taken. Once those channels are all turned off, retake the event to update those channels' settings.

Advanced Channel Features

Each EMX fader channel has these Advanced Channel Features:

- Ability to change/set the channel **Mode**
- Ability to adjust the channel **Pan** or balance
- Ability to adjust channel **Equalization & Dynamics**
- Ability to set **Aux 1** bus on/off and adjust send level
- Ability to set **Aux 2** bus on/off and adjust send level



Note: The Advanced Channel Features are access-controlled by engineering, so not all features may be available. In fact, for an on-air console most features may be disabled to avoid any "accidental changes" whereas in a production room, or other non-air studio, all features may be enabled.

The Advanced Channel Features are accessed by "double-clicking" a channel encoder (rapidly tap it twice). The channel features appear in the order listed above when all features are enabled. If the channel's display does not change when the channel encoder is double-clicked, that

indicates that all of the advanced channel features are disabled from board operator access.

If double-clicking the channel encoder shows MODE above the white line in the channel display then channel Mode control is enabled. You can then view the next enabled Advanced Channel Feature by double-clicking the channel encoder again to view Pan (if it is enabled). Double-clicking the channel encoder again will show the next Feature that's enabled, and so on until you double-click the encoder and the normal channel display is again shown.



Note: When an Advanced Channel Feature is active, and the channel encoder has not been touched for 20 seconds, the feature is cancelled and the channel display returns to normal view. When this occurs the current settings for that feature are auto-saved.

The space above the white line in the normal channel display is available to show whether any EQ & Dynamics features are active. When EQ is set in then **EQ** is shown. When the HPF (High Pass Filter) is set in, a high pass icon (Γ) is shown at the left. When the LPF (Low Pass Filter) is set in, a low pass icon (Υ) is shown at the right. When Dynamics (Compression and Expansion) are set in then **DYN** is shown in the channel display.

Mode

If Mode access is enabled, double-clicking a channel encoder (tapping it twice quickly) changes that channel's display to show MODE above the white line in the channel display.

Rotating the encoder steps through the four audio modes: LEFT channel only, MONO sum, RIGHT channel only, and STEREO. These are shown in orange in the channel display. Once the desired mode is displayed double-click the channel encoder to open the next advanced feature that's enabled. If no other features are enabled the channel display is returned to its normal view.

Pan

If Mode is disabled, and Pan is enabled, then double-clicking any channel encoder (tapping it twice quickly) changes that channel's display to show PAN at the top of the channel display. If Mode and Pan are both enabled, then Pan is accessed from Mode by double-clicking the channel encoder again to change that channel's display from MODE to PAN (as shown at the top of the channel display).

Pan shows an orange/blue bar graph with a white bar to indicate the pan position in the channel display. Rotating the channel's encoder moves the audio in real time (use caution on a live signal) from "Center" toward being only on the left channel (Left 100) or toward only being on the right channel (Right 100).

Once the pan is adjusted, double-clicking the channel encoder saves that setting and either moves to the next enabled channel feature or returns to the normal channel display if no other channel features are enabled.

EQ & Dynamics

When EQ & Dynamics is enabled, along with Mode and Pan, double-clicking the channel encoder while Pan is active brings up eight EQ & Dynamics screens. If Mode and Pan are both disabled, and EQ & Dynamics is enabled, double-clicking the channel encoder switches the normal displays to show the EQ & Dynamics screens on eight channel displays.

When active on fader channels 1 - 8, the channel 1 - 8 displays switch to show the EQ & Dynamics screens. When active on fader channels 9 - 16, the EQ & Dynamics screens appear on the channel 9 - 16 displays. When active on fader channels 17 - 24, the EQ & Dynamics screens appear on the channel 17 - 24 displays.

Figure 4-12 shows the first set of EQ & Dynamics screens (In/Out Status) for the various EQ & Dynamics controls, which appear on the first six fader channel displays. The last two EQ & Dynamics screens (Figure 4-13) display different audio graphs along with a screen selector that sets which set of EQ & Dynamics screens are displayed. Rotating that channel's encoder (i.e., channel 8, 16, or 24) moves the highlighted selection up or down the list to show the different EQ & Dynamics screen displays.



Figure 4-12 EQ & Dynamics In/Out Select Screens

Figure 4-13 shows the two right-most displays for EQ & Dynamics when active on channel 7. The active channel's display is outlined in white. Its channel number also appears at the top of the screen selector display. In this case, the white box is around the audio graph on channel 7 and the channel 8 encoder is used to step through the EQ & Dynamics screen selections.

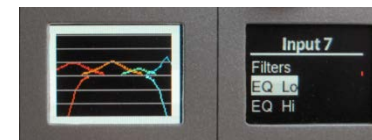


Figure 4-13 Active Channel Indications



Note: All Advanced Channel Feature settings—on all channels, are saved as part of a console event. Taking an event overrides the current Advanced Channel Feature settings on all channels that are off when that event is taken. To preserve any manually-set channel features leave those channels turned on when taking an

event since channels that are currently turned on are not updated when an event is taken.

The Advanced Channel EQ & Dynamics settings can also be saved to a file on any fader channel so those settings can be reapplied to that channel, or applied to any other channel, as required. See *Saving & Recalling EQ & Dynamics Settings* on page 57 for details.

Audio Graphs

The audio graph display (Figure 4-14) changes depending upon which set of EQ and Dynamics controls is active. The audio graph for EQ shows frequency response logarithmically from 20 Hz (left side) to 20 kHz (right side) with the display's center being roughly 600 Hz. The middle horizontal line represents 0 dB of gain and each white horizontal line above or below it represents about 5 dB of level.

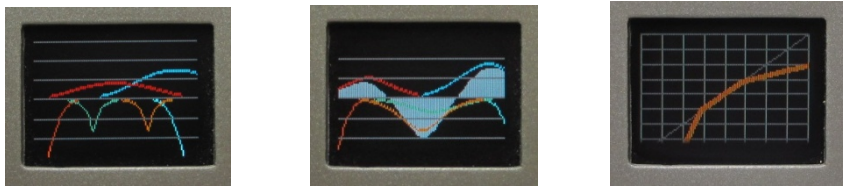


Figure 4-14 Screens for EQ Out, EQ In, and Dynamics

There are four parametric equalizers to adjust the channel's EQ. Each is color-coded and their filter settings are shown in the four audio graph lines with: **red** for the High Pass Filter (HPF) and Low EQ settings; **orange** for the Low-Mid EQ; **green** for the High-Mid EQ, and **blue** for the Low Pass Filter (LPF) and High EQ settings. When EQ is out, lines are shown across the audio graph (left screen in Figure 4-14). When the EQ is in (active) the audio pass band is represented in gray (middle screen in Figure 4-14).

When the Expander or Compressor controls are active the Dynamics display is shown (right screen in Figure 4-14). It's a very different type of display since it graphically shows the ratio between the incoming audio and the dynamically processed audio output. When Dynamics is out the ratio line is **gray**. When Dynamics is in the ratio line is **orange**. The upper half of the display reflects the Compressor's settings while the lower half reflects the Expander's settings.

High Pass & Low Pass Filters

The High Pass Filter (HPF) and Low Pass Filter (LPF) can be used independently on any channel (each filter can be set in or out) to narrow the overall frequency range of that channel's audio to less than 20 Hz – 20 kHz. The frequency pass band is shown graphically as the controls are adjusted: the **red** line represents the HPF or low frequency cutoff while the **blue** line represents the LPF or high frequency cutoff.

Figure 4-15 shows the two EQ Filter screens. Adjusting the channel encoder on the channel showing the HPF FREQ screen sets where the lower frequency sounds begin to be rolled off or attenuated. The control range is from 16 Hz up to 500 Hz. Any audio below the selected frequency is 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, cabinet noises being picked up by the mic arms, etc.

Adjusting the channel encoder on the channel showing the LPF FREQ screen sets where the higher frequency or brighter sounds begin to be attenuated. The control range is from 20 kHz down to 1 kHz. This control can selectively remove higher frequency sounds like 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.



Note: The HPF and LPF can be used to create the classic phone filter effect by adjusting the HPF FREQ to about 300 Hz and the LPF FREQ control to about 3 kHz.

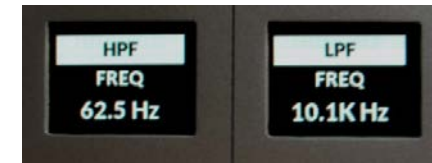


Figure 4-15 High and Low Pass Filter Screens

Four-Band Parametric Equalization (EQ)

The four parametric EQs (EQ Lo, EQ Lo Mid, EQ Hi Mid, and EQ Hi) are identical in operation. Each has a FREQ (frequency) control to adjust the center-point of 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 to that equalizer. These controls are active when EQ is in and the two Shelf EQs are out. The screen select channel encoder (8, 16, or 24) selects between showing the EQ Lo controls (shown in Figure 4-16) which show both the low and low-mid EQ screens, and the EQ Hi controls, which show both the high-mid and high EQ screens.



Figure 4-16 Parametric EQ Lo and Lo Mid Screens

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). Typically, the parametric equalization is adjusted before adding any compression or expansion since the EQ settings interact with the compression and expansion settings changing how they affect the audio.

EQ Lo Shelf & EQ Hi Shelf

These two filters are only active when EQ is also set in. Setting EQ Lo Shelf and/or EQ Hi Shelf in affects the EQ Lo and EQ Hi set of controls. In each case the bandwidth control screen is blank, only the channel displays for FREQ and LEVEL are shown in the EQ Low and/or EQ High controls.

The channel encoder on the channel with the EQ Shelf Level control sets the amount of boost (up to +14 dB) or cut (up to -14 dB) that's applied. The channel encoder on the channel with the EQ Shelf FREQ screen 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.

EQ Lo Shelf allows one to boost or cut all low frequencies below the frequency set by the FREQ control. The amount of boost or cut is set by the LEVEL control setting.

EQ 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 the LEVEL control setting.

Dynamics – Compression and Expansion

When Dynamics is set in, the Expander and Compressor functions are activated. The six Expander controls (teal background) are used to control what happens with low-level audio signals. The Compressor has five controls (orange background) that affect the overall dynamic range of the audio signal, but mainly offer control over the loudest audio levels.

Expander Functions

The Expander controls are shown in Figure 4-17. The Expander is an automatic attenuator controlled by the RATIO and DEPTH settings to dim, or virtually mute, the input audio once its level falls below a threshold point, set by the THRESH setting. The Expander can automatically mute inactive mics in a talk studio or decrease the background noise on phone calls by ducking or gating the audio below the THRESH setting.

How quickly the ducking/gating occurs and gets released, and thus how noticeable it is, is controlled by the OPEN (1.00 mS up to 100 mS), HANG (0.00 mS up to 1.00 S), and CLOSE (50 ms up to 3.00 S) settings.

The DEPTH control sets how much ducking is applied to the audio as the audio level drops below the threshold setting. At 0.0 dB no ducking or dimming of the audio occurs. Settings of 10 – 25 dB cause noticeable signal level ducking while the highest settings, 25 - 40 dB, create an audio gate that virtually mutes the audio once its level drops below the threshold setting.



Figure 4-17 Expander Screens

Compressor Functions

The Compressor's controls (Figure 4-18) affect the loudness of the audio signal, from adding "just a bit" of compression to a mic or phone caller to even out their audio to applying hard limiting in order to obtain the maximum volume possible from a mic. The compressor is called a "soft knee" compressor which means its operation is less noticeable for most settings. Of course, setting the controls to their extremes in order to get a "loud and in your face" volume right on the edge of audio distortion will make compression control artifacts much more apparent.



Figure 4-18 Compressor Screens

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 gets louder than the THRESH setting the compressor clamps down on the audio output level following the RATIO setting which ranges from 1.0:1 (no compression) up to 20:1 (functions as a signal limiter). For light to medium compression, set the RATIO in the 2.0:1 to 6.0:1 range. For these ratios, 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.

Setting RATIO to a very high setting, like 20:1, sets the compressor to function as a hard limiter. Thus for the same 10 dB increase on the input the output would only go up by .5 dB. Typically, a higher RATIO setting means a higher THRESH setting since you only want the compressor—now

functioning as a limiter, to only affect the loudest input signals to keep them from over-driving the console's bus and causing distortion.

The ATTACK control sets how fast the compressor reacts (from 0.10 mS up to 330mS) once the audio crosses the THRESH level. The RELEASE control sets how fast the compressor reacts after the audio drops below the THRESH level. It can be set from 50 mS up to 3.00 seconds. The MAKEUP level can be used to adjust the Dynamics output in order to compensate for high levels of compression which lower the overall level.

Saving & Recalling EQ & Dynamics Settings

When a channel has any of the five types of EQ set as In instead of Out, **EQ** is shown above the white line in that channel's normal display to indicate that equalization is active. When Dynamics (Compression and/or Expansion) is set In then **DYN** is shown above the white line in that channel's normal display to show that Dynamics control is active.

The EQ and Dynamics settings set on any channel can be saved to an "EQ configuration file" so that those same settings can be applied to other EMX console channels. Saving and applying EQ files is done using the [EMX Surface Setup](#) app, in the EQ Section of the *Talent Access page tab*.

! **Note:** The EQ & Dynamics settings are always saved regardless of whether either feature is set In or Out on that channel.

As shipped from the factory, fader channels 1 and 2—typically used for the Host and Guest mics, have microphone EQ and Dynamics pre-applied and set In (**EQ** and **DYN** are displayed on those two channels) by default. The factory-set EQ and Dynamics settings assigned to faders 1 and 2 is also saved in the pre-loaded EQ configuration file: PRE_mic.emx_eq so they can be applied to other channels as required.

Figure 4-19 shows how to save the current EQ and Dynamics settings from a channel. In the upper row of EQ controls, select the channel from the drop-down list then click the *Pull EQ/Dyn settings from* button. A File Save dialog box opens so you can name the file (like "Hybrid" shown in Figure 4-19). Clicking Save saves the EQ settings to a file. The .emx_eq suffix is automatically added to identify it as an EQ configuration file.

To recall a previously-saved EQ file, select which channel you want to apply the settings to using the lower EQ row channel select drop-down list, then click the *Push EQ/Dyn settings to* button. A warning dialog box pops up to warn about affecting the channel's sound since the EQ & Dynamics settings will be applied to the channel—even if it's currently turned on, immediately affecting its sound if either EQ or Dynamics are set In. Clicking Yes brings up a File Find dialog box so a saved EQ file can be selected to be applied to the selected channel.

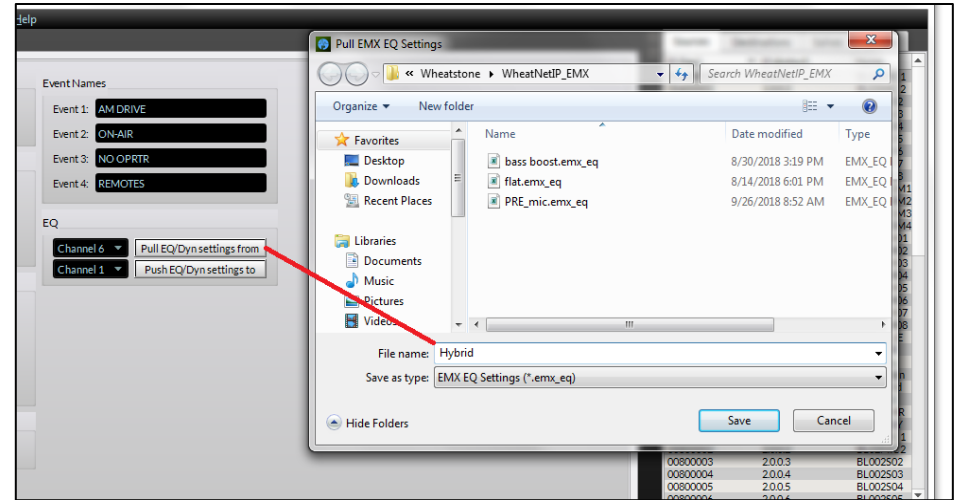


Figure 4-19 Saving & Recalling EQ Configuration Files

EMX APPLICATIONS

An EMX console is most often used in an on-air studio to control the audio going to a transmitter; for feeding a syndication network; and/or for streaming to the Internet. In almost all cases, the PGM 1 bus will be used to feed the air chain and thus would be your "air signal." PGM 2 can simultaneously be used to create a different console mix for a syndication feed, while PGM 3 could be used to feed a recorder or a mic skimmer, or to go to a jack panel to connect a camera or a field recorder.

Studio Monitor Output

When the EMX is in an air studio without a talk studio, the Studio monitor controls can be used to control the headphone source feeding the host and guest headphones. This allows the board operator to change their monitoring source without affecting the host and guest headphone audio. The studio monitor signal can be used to feed the host and guest headphones via Talent Stations or the studio monitor can be used to feed an outboard headphone distribution amp. The board operator can then talk into the host and guest headphones using the STU TB (studio talkback) button.

The Studio monitor output could alternately be used to connect the console to a newsroom or sports bullpen which goes live-to-air when there is no associated talk studio. The microphones in that room would be set as "studio mics" so they'll automatically mute the studio monitor output when turned on. In this application, the board operator can talk to the talent in the newsroom or sports studio using the STU TB button. If studio monitor

speakers are not required then the studio output could be sent to Talent Stations or connected to a headphone amp.

When the EMX does have a separate talk studio and at least one position (typically the host mic) has a TS-22 Talent Station (Figure 4-20) the EMX Surface's Studio output can be set to a fixed level so that the Studio level control is inactive. This allows the TS-22 *Speaker* control to then adjust the console's studio monitor output level.



Figure 4-20 TS-4H Talent Station

Network Origination

Flagship stations for sports teams often need a separate output, which differs from their main air signal, to function as a regional sports network feed. This output is typically identical to their broadcast signal except it does not have local commercial spots and station ID liners. It may also require special signal tones or other logic be associated with the signal.

Creating this secondary network is easily done by using PGM 1 as your main broadcast output and PGM 2 as your network feed. As long as the media server playback channels are setup to consolidate local spots and station ID liners onto a particular channel, then that fader channel can be unassigned from PGM 2, whereas the national spots playback fader and game liners, and the play-by-play remote channel, would be assigned to both PGM buses.

Production Usage

In a production studio, PGM 1 is typically the main record signal for an in-room PC running Pro Tools®, Audition®, or other digital editing system. If the Wheatstone WNIP audio driver is installed on that PC, and that PC is connected to the Mix Engine's Ethernet switch, no analog or digital audio connection is even required since the audio and logic control would all be done via Ethernet for both recording and playback.

Voice Tracking

Using the EMX to do voice tracking can be easily done by assigning the board op mic to two fader channels: one channel is the normal on-air mic channel assigned to PGM 1; the second channel would only be assigned to PGM 3 and PGM 4. No other channels on the console would be assigned to PGM 3, which connects to the automation system's record input.

The channel (or channels) with track playback are assigned to PGM 4 along with the board op's mic. The talent monitors PGM 4 to hear the playback track(s) and their mic. The second mic channel would need to have the same EQ & Dynamics applied to it so that the mic's voice sound is consistent with the air signal. This can easily be done by saving the EQ & Dynamics setting from the main mic channel and applying those settings to the second talent mic channel. If the console settings are then saved as a "VOICETRK" Event, they can be recalled at any time to set up the console for simultaneous on-air and voice tracking.

Callers and Remotes

Basic caller and remote channel operation was covered in the *Caller/Remote Operation* section on page 49. This section presents specific settings for accomplishing common tasks like answering the station hot line on the caller channel to take a song request or to give the caller the bad news they're not the contest winner; to record the caller for later broadcast because they are the contest winner; and, in the case of a talk show, to take the caller live-to-air. These are also applicable for remotes, although for the most part remotes are mainly used to go live-to-air although they can also be recorded for later broadcast.

If the caller/remote is not going live-to-air, the channel's **PGM 1** and **AUTO FB** buttons should be unassigned (unlit). The **Off Line** button should be assigned—and it should be blinking to indicate that's the bus which is being returned to that caller/remote. The caller/remote channel's **Cue** button should be lit, so the board operator can hear the caller/remote in the cue speakers and their headphones. The board operator mic channel should be assigned to Off Line (it's lit solid). The board operator can then talk to the caller/remote using their own microphone while hearing them in the cue system for a hands-free conversation.

When the caller/remote is being recorded we recommend using headphones to listen to the caller/remote and turning the cue speakers down or off so the board operator mic does not pick up any of the caller's audio. The Telco Record output has the talent mic on one channel and the caller/remote on the second channel of a "stereo" signal, thus if the talent mic also picks up the caller/remote audio it will make cleanly editing the recording that much harder.

When the caller/remote is to go live-to-air, their **PGM 1**, **Auto FB**, **Cue**, and **Off Line** buttons should all be assigned. With their channel turned off the Off Line button blinks indicating the caller/remote channel is hearing

the Off Line bus (minus their own audio, of course). The only other channel that should be assigned to Off Line is the board operator mic to allow the board operator to talk with the caller/remote to get them ready to go live-to-air.

When the caller/remote channel is turned on, the PGM 1 assignment button begins blinking (and Off Line is lit solid) to indicate the caller/remote now hears everything going to air (again, minus their own audio).

If the board operator needs to talk to the caller/remote they can momentarily press the **TB** button on the caller/remote channel to give them cues (like a break is coming up). Since doing this interrupts their return audio (the PGM 1 bus audio) using TB while live should be used sparingly.

RAZOR I/O INTERFACE

Razor I/O Interfaces are 1RU rack mount devices installed in the studio and/or in the TOC (Technical Operations Center) to connect peripheral equipment with the EMX console or PRE-IP network. Each Razor has sixteen inputs and outputs (set as eight stereo, sixteen mono, or some combination of stereo and mono signals).

Razors can be used to connect satellite receivers, tuners, phone hybrids, codecs, internet streamers, air chain processor, and recorders with the EMX. Their inputs often appear as sources on EMX fader channels and Monitor/Meter selectors while their outputs may come from a console PGM bus or a channel bus-minus signal.

If you're checking for levels to verify a signal is present, engineering should have supplied a list of the input and output signals on each Razor so you can quickly confirm that signals are present, since that is the biggest use for the Razor's front panel display.

The Razor's front panel has the same OLED display and large knob selector as used on EMX fader channels. Rotating the encoder lights up the display (which is normally dimmed), and steps through its four screens: Input Levels; Output Levels; and two screens displaying the technical details (name, ID#, IP address, sample rate, MAC address, software revision, and hardware revision) for that Razor. The four Razor displays are shown in Figure 4-21.

The main screens of interest for a board operator are the Inputs and Outputs screens. Each shows the signal levels for the sixteen input or output signals. Unlike the EMX console meters, these displays only show average levels, using vertical bar graphs, and are mainly used to confirm that a signal is present and that it's at a reasonable level on a particular input or output.

The Inputs display in Figure 4-21 shows normal signal levels on five active stereo inputs where all of the green and some yellow segments are lit up.

The Outputs display shows a test tone, set for maximum signal level, lighting up all segments on all eight stereo outputs. In practice, both input and output levels would be closer to the levels shown in the Inputs display.

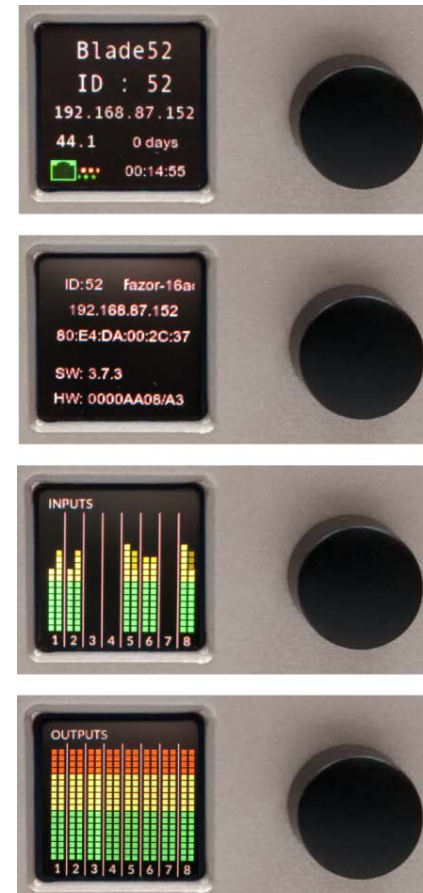


Figure 4-21 Razor Front Panel Displays

5 – EMX SERVICE INFORMATION

A

ll PR&E consoles are designed to yield many years of continuous trouble-free 24/7 operation, which is why there are no power switches on the EMX Surface, PR&E Mix Engine, Razor I/O Interface, or M4IP-USB Blade. However, if an EMX system component does “act up,” this chapter covers how to obtain service assistance, technical documentation, and replacement parts.

PARTS AND REPAIR SERVICES

There are only a handful of field-replaceable parts on the EMX console, each of which is listed in Table 5-1. The control panel assemblies and the various circuit boards used on the EMX Surface and Mix Engine are not field-serviceable due to the extensive use of surface-mount components. It is recommended that these items be returned to Wheatstone for board level repair.

EMX technical information (User Manual, Quick Guide, software revision information, wiring diagrams, application notes, and service bulletins) are typically available for downloading from the Wheatstone web site: www.Wheatstone.com. Technical documentation uses PDF files so Acrobat Reader 6.0 or later is required.

Parts Ordering and Repair Services

Replacement parts and EMX accessories can be purchased through SCMS (844.436.4327) and BSW (800.426.8434) in the USA; through a local Wheatstone distributor in the rest of the world; or by calling Wheatstone at 252.638.7000 (New Bern, North Carolina, USA, eastern time zone) or by sending an email to: techsupport@wheatstone.com.

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.

Any component or part being 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. Contact Wheatstone Technical Support to request an RA number or to obtain installation and other technical support for the EMX console by calling 252.638.7000 or by emailing: techsupport@wheatstone.com

Table 5-1 EMX Field Service Parts & EMX Accessories

<i>Wheatstone #</i>	<i>Item Description</i>
007491	FSI-DMX/EMX (DC Power Coupler for redundant powering of a DMX or EMX Surface)
007549	DC Cable, for EMX Surface
007550	PR&E 1620 Power Supply for EMX Surface
041200	EMX Quad Fader panel (plug-in assembly)
041201	EMX Monitor Control panel (plug-in assembly)
041202	EMX SS-8 (Smart Switch w/eight programmable buttons)
044300	Razor 16A with Analog I/O and two mic preamps
044301	Razor 16D with all AES I/O
044302	Razor 16AD with half Analog / half AES I/O
044303	PR&E Mix Engine
260005	TRS Headphone Jack (a soldered part)
520149	20mm Black Rotary Encoder Knob
520154P	Fader Knob
540043	Channel Fader (a soldered part)
560002	Rotary Encoder (a soldered part)
610029	1.27" OLED Display (plug-in assembly)
850088P	LN-21 1/16" Hex Driver (for control panel screws)

EMX CONSOLE SERVICE

The EMX console contains two primary assemblies: the PR&E Mix Engine, which does not have any field-serviceable parts; and the EMX Surface, which has a few field-replaceable parts, including the two Control Panel assemblies, the OLED displays, headphone jack, faders, encoders, and knobs. The optional Razor I/O Interface, like the Mix Engine, is not field-serviceable and must be returned to Wheatstone if service is required.

Tools Required

A standard #1 Phillips screwdriver is needed to remove the rear cover panel on the Surface's meter bridge to access the host card. A 1/16" hex driver is required to remove EMX Surface panels (blanks, Quad Fader panels, or the Monitor Control panel). A small flat blade screwdriver (like a “Greenie”) is needed to adjust the mic gain trim pots or to flip the phantom power switches on the Mix Engine and Razor-16AD mic preamps.

If you are constructing your own audio cables, an RJ45 crimper is required (and lots of RJ45 plugs). Having a Category cable checker, with a remote test plug, so that already-run cables can be easily checked in situ, is also a must.

Swapping Out a Control Panel

An EMX Surface control panel can be swapped out while the console remains on-air since all program audio flows through the Mix Engine. The only audio within the Surface is for the cue speakers and CR headphone jack. It should take less than five minutes to power down the Surface, swap out a defective control panel, and repower the Surface.

If a Quad Fader panel needs to be swapped, which has channels on it that are feeding air, note the fader positions since you'll need to match their positions on the replacement panel to ensure there are no level changes after the Surface reboots and reads the fader positions.

To swap out an EMX Surface control panel:

1. Unplug the 1620 power supply for the EMX Surface. If the Surface is using redundant power, unplug both supplies. All lights should be off on the EMX Surface.
2. Use a 1/16" hex driver to remove the panel's four hex mounting screws.
3. Use the encoder knobs, at the top of the control panel to lift up the panel enough so it can be flipped over and the keyed ribbon cable, which connects that control panel to the Host card, can be unplugged.
4. Hold the replacement control panel upside down next to its slot and plug in the keyed ribbon cable.
5. Set the replacement control panel into place on the chassis rails and fasten the four hex screws removed in step 2.
6. If the Monitor Control panel was replaced, pull the CR and HDPN faders to full off. On a Quad Fader panel with live audio on its channels, set the faders to the same positions as on the defective panel so that when the Surface is powered up, and the fader positions are read, the audio levels will not change appreciably.
7. Plug in the power supply (or supplies) to power the EMX Surface.

It takes about 90 seconds for the EMX Surface to boot up and be ready for use. The same audio sources, assignment button settings, channel on/off settings, and monitor selections, as set on the original panel, will be set on the replacement panel. If the faders were set like on the original panel, and the EMX console has continued playing on-air, there will be momentary audio level changes as the Surface retakes control (especially when EQ & Dynamics are active since there will be a couple seconds where the audio will be flat before the EQ & Dynamics settings are re-applied).

Replacing the Headphone Jack

The board operator's headphone jack can be serviced in the field. It screws into a threaded hole in the bottom chassis. A headphone cable

extends from that jack to a keyed 3-terminal Phoenix connector (CT21) on the host board. The upper rear cover on the meter bridge will need to be removed (#1 Phillips screws) to access that connector.

On an EMX Surface with one blank panel, remove that panel or the accessory panel in that position, and remove the Monitor Control panel to access the jack. The Monitor Control panel will not need to be unplugged. Set some padded material onto the last Quad Fader panel and set the Monitor Control panel upside down on it while the headphone jack is replaced. On Surfaces with five blank panels, remove the right-most two or three blank panels, or accessory panels, to access the headphone jack.

Use an adjustable wrench to rotate the square plastic jack housing to begin to loosen it then unscrew the jack by hand. Be sure to place shrink tubing over the new jack's solder joints to prevent shorting components when an accessory panel is installed in the right-most accessory slot.

Mix Engine Status LEDs

If the red Error LED lights up on the front of the Mix Engine, it indicates a fault in Mix Engine operation. Although audio may still be passing through the Engine and there may be no other sign of trouble, the error indicator is saying otherwise.

To clear the fault, first try rebooting the Mix Engine using [PR&E Navigator](#) (right-click on the Mix Engine icon in the System Dock and select *Reboot Blade*). If the Mix Engine reboots and the Error LED turns off then the issue was resolved.

If the Mix Engine reboots and the red Error LED is still lit, power cycle the Mix Engine. Since this action cuts off all audio through the Mix Engine, while being power cycled, the EMX console will have to be bypassed if it's on-air. Once this is done, unplug the AC cord from the Mix Engine. Wait a minimum of five seconds to ensure power is fully removed from all internal circuits, then plug the AC cord back in.

If the red Error LED remains lit after a power cycle it indicates there is a serious circuit fault in the Mix Engine and it needs to be sent in to Wheatstone for repair. See page 60 for information on obtaining an RA number.

Ethernet Switch LEDs

Each RJ45 jack on the built-in Ethernet switch has two green LEDs. Both blink rapidly for 1 GB (Gigabit) speed devices (like the Mix Engine and Razor Blade). One blinking green LED indicates the connected device is operating at 100 MB speed. The EMX Surface and many PCs use 100 MB NICs. Since each stereo audio stream uses about 5 MB of bandwidth, a 100 MB NIC can still carry about 16 simultaneous stereo audio streams.

APPENDIX A – CREATING A PRE-IP NETWORK

Any EMX console can be networked with up to three other PRE-IP or WNIP-compatible devices (PC or audio server, Razor I/O Interface, M4IP-USB Blade, talent station, etc.) using the five-port Gigabit switch built into each PR&E Mix Engine. When additional AoIP devices need to be networked with your EMX, or if you want to network your EMX with additional EMX and/or DMX consoles, one or more AoIP switches (e.g., a Wheatstone-approved 1 GB Ethernet switch) must be used to support the additional audio streams propagated over a PRE-IP network.

PR&E MIX ENGINE ETHERNET SWITCH

The PR&E Mix Engine contains a Netgear GS105Ev2 5-port Gigabit ProSafe Plus Ethernet switch that was factory-configured for use as a stand-alone EMX studio with the PR&E Mix Engine plugged into Port 5 and the EMX Surface plugged into Port 4. Ports 1 – 3 are available to connect additional PRE-IP devices like the admin PC, a Razor I/O Interface, a talent station, or a media server using a WNIP AoIP driver.

When the EMX console will be networked with additional EMX or DMX consoles—or if more than three AoIP devices need to connect to the EMX, an external AoIP-compatible Ethernet switch must be added to not only add network ports, but to also function as an “IGMP querier” in order to control audio streaming traffic on the network. Use Port 1 on the built-in switch to connect the EMX’s switch to an external AoIP switch since that port is designated as its “IGMP Snooping Static Router Port.”

The built-in Netgear switch configuration should not need to be changed even when it’s connected to an external AoIP switch. It is advisable however, to edit the EMX switch’s IP address so each console has a unique IP when creating a PRE-IP network. Doing this allows you to access each switch remotely from the system admin PC using the Netgear ProSafe Plus Utility (V2.7.2 or later).

To view the EMX’s switch settings, on a stand-alone EMX, use a web browser running on the admin PC. Enter the IP address: 192.168.87.239 (the factory-assigned default IP address) in the browser’s search bar. A log-in window appears (Figure A-1). The default password is *password*.



Figure A-1 Netgear Switch Login Page

This opens the System Management page showing various switch settings. To manage multiple Netgear switches, each should be assigned a unique IP address when networking multiple EMX and DMX consoles. Click on the IP Address entry (highlighted in Figure A-2) and edit it the .239 entry. Clicking *Apply* uploads the new IP address (the switch reboots to use the new IP address). We recommend using 192.168.87.240, then .241, and so on, up to .254 for the Mix Engine switches, leaving 192.168.87.239 available so a new EMX or DMX Mix Engine can be accessed by the admin PC when first connected to the network.

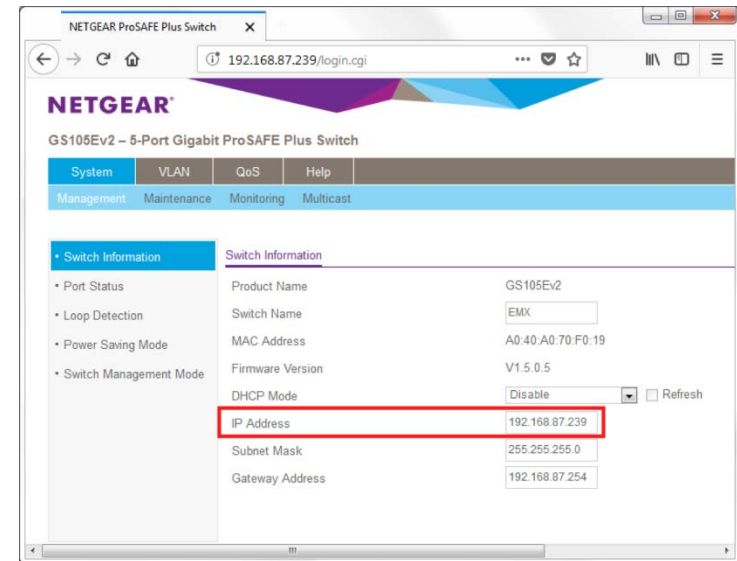


Figure A-2 Netgear Switch System Management Page



Note: Creating an IP address table—whether an Excel spreadsheet or a handwritten list, is essential. The list needs to include every device connected to your PRE-IP network: Mix Engines, Surfaces, Razors, M4IP-USB Blades, PCs, audio servers, talent stations, SS-8 panels, etc., with each device assigned a unique IP address since a PRE-IP network, like every AoIP network, does not support DHCP.

In order to remote into multiple console switches install the Netgear ProSafe Plus Utility on the admin PC. This app can be downloaded from Netgear’s website: http://www.downloads.netgear.com/files/GDC/GS105E/ProSAFE_Plus_Utility_V2.7.2.zip.

The default IP addresses assigned at the factory for EMX and DMX consoles and Razors should be reserved so that new devices can be plugged into the network and then be assigned a unique IP. Reserve these IP addresses: 192.168.87.101 (PR&E Mix Engine); 192.168.87.201 (DMX and EMX Surface); 192.167.87.50 (Razor-16A); 192.167.87.60 (Razor-16D); and 192.167.87.70 (Razor-16AD).

The [PR&E System Configuration Tool](#) should be used to assign a new IP address and to setup default signal names for each new PR&E device. The setup tool assigns IP addresses by the ID Number you assign to each device in the app. Thus, if a new Mix Engine is set for ID 9, the [Config Tool](#) will then set its IP address to 192.168.87.109 and the matching Surface's IP will be set to 192.168.87.209. Razor ID numbers should start with ID 51 and skip over ID 60 and ID 70. A Razor set for ID 51 would then be set to an IP address of 192.168.87.151.

Media servers and PCs with WNIP AoIP drivers are typically assigned IP addresses starting at 192.168.87.100 and moving down, reserving 192.168.87.21 for the admin PC. AoIP core and edge switches (talked about in the *Multi-Station Expansion* section on page 64) 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' IP addresses. Note that these devices' default IPs can often conflict with Surface IP addresses since a TS-22 panel's default IP is 192.168.100.218 (same as a Surface hosted by a Mix Engine set as ID 18) and an SS-8 panel's default IP is 192.168.87.220 (same IP as a Surface hosted by a Mix Engine set as ID 20).



Note: On a very large system (over 39 EMX and DMX consoles), the IP addresses assigned to the Mix Engine's internal switches should not be assigned IP addresses in the .240 to .254 range. Instead, they should be assigned in the AoIP switch range (the .1 up .20 range) or set for IPs in the .22 up to .99 range.

PRE-IP NETWORK EXPANSION

This section presents an overview of what's involved in creating a PRE-IP network beginning with a stand-alone EMX console and adding one or more AoIP switches to enable adding additional PRE-IP devices.

The main criteria in selecting an Ethernet network switch to use in a PRE-IP network is that they are "AoIP-compatible" switches. An AoIP-compatible switch, and a facility's Ethernet switch, might be exactly the same model switch. It is their configuration settings which classify whether a switch is suitable for use on a PRE-IP network (or any AoIP network). Thus, an "AoIP switch" definition is arbitrary and simply refers to a network switch that can specifically be configured for audio streaming.

For most installations this means that separate Ethernet switches are used to "air-gap" traffic on the AoIP network from the facility's Ethernet network. But, one could use one or more large Ethernet switches, configured into multiple VLANs or virtual networks, to isolate AoIP traffic from the facility's Ethernet traffic. Creating VLANs is not covered in this manual since we whole-heartedly recommend using separate AoIP switches to create your PRE-IP network. Doing this simplifies switch configuration and will make future network troubleshooting a lot easier.

Creating a Small PRE-IP Network

Once the built-in network switch within the Mix Engine is full, the only way to add additional PRE-IP or WNIP devices is to add a Wheatstone-recommended AoIP switch and connect the EMX switch (using Port 1) to a port on that AoIP switch using a straight-thru CAT5e or CAT6.

Various Ethernet switches from Cisco and HP have been used in WheatNet-IP (WNIP) systems over the years, but their model numbers change on such a regular basis it's best to visit the Wheatstone web site, or call Wheatstone tech support, to find out the currently recommended model numbers.

One current Cisco switch (as of October, 2018) we can recommend is the SG-300-series of layer 3 managed switches. Models with eight-ports up to 48-ports are available. Any of the switches in this series can be used to create a PRE-IP network.

For a single station facility with an EMX console in an on-air studio, a DMX console in a production room, and several Razors and audio servers in TOC, might just need a small eight or ten-port switch. Two in-room PRE-IP devices (Razor I/O Interface, M4IP-USB Blade, Talent Stations, VoxPro PC, or audio server) can plug into the built-in switch in each studio, using Ports 2 and 3, reserving Port 1 to connect to the main AoIP switch which would typically be located in the Technical Operations Center (TOC).



Note: PCs and audio servers must run the WNIP AoIP audio driver to play and record audio over their network connection. WNIP AoIP drivers are licensed for one up to twenty-four stereo channels of simultaneous playback and recording. WNIP AoIP driver licenses are purchased through any authorized Wheatstone or PR&E dealer.

The eight- or ten-port AoIP switch is typically located in the TOC along with multiple Razor I/O Interfaces and audio playback servers. It takes a single CAT5e or CAT6 cable, from Port 1 on each studio's switch, to connect each studio to a port on the main AoIP switch. The Razor Blades, audio servers, and admin PC in TOC then connect to the other ports on the main AoIP switch, again using a single CAT5e/CAT6 cable per device.

If the on-air studio has a separate talk studio, you would typically add a small AoIP switch in that studio to network that studio's PRE-IP/WNIP devices and to connect that studio to the main switch. If there are four mics in the talk studio, an M4IP-USB Blade could be installed since it has four mic preamps along with USB for connecting laptops for playback or recording. If a Talent Station is used at each mic position, for mic control and a headphone jack, then an eight-port switch could be used in that room for the M4 Blade, the four Talent stations, and the port to connect that switch to the "core AoIP switch."

Since Talent Stations can be powered by POE (Power-Over-Ethernet) using a switch that supports POE is recommended for any talk studio using Talent Stations. This means a single CAT5e cable needs to be connected to the Talent Station eliminating the need for a wall-wart supply.

Multi-Station Network Expansion

When two or more stations share a single facility, we recommend you follow the small PRE-IP network expansion model for each station. Each station's studios connect to an "AoIP Edge Switch," typically located in the station's main on-air studio. Each Edge Switch is then connected to a "Core AoIP Network Switch" located in the TOC. Depending upon how many stations, and how much TOC equipment is 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, so you don't put all your "eggs in one basket." This also makes troubleshooting network issues easier, and means you only need one 24-port switch as a backup.

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

Wiring Practices

Since the majority of studio wiring uses straight-thru category cables (the generic name for four-pair CAT5, CAT5e, and CAT6 cabling) we recommend taking advantage of the various category cable jacket colors that are available to differentiate your system's signals. This not only helps during installation it will also ensure future system troubleshooting will be a bit easier. Here are the cable jacket colors we recommend using to differentiate various system signals using category cabling:

- Orange** 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 are 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—most of whom offer WNIP support for SLIO (Software Logic I/O), which the PRE-IP network also supports. The Automation servers are typically located in the TOC since it's climate controlled and server fan noise is not an issue. 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 studio using cable runs of up to 160 feet (48 meters).

Signal Connection Control

Most users have several types of codecs which may be shared between studios or even between different stations in a cluster. These codecs might include older ISDN interfaces along with newer Tieline Merlins or Comrex Accesses, but no matter what type codec is used, one could create *Associated Connections* to automatically connect a mix-minus signal to each codec when it's taken on a console to simplify connecting the codecs.

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 PR&E 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 PRE-IP 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.