LX-24

Modular Control Surface

TECHNICAL MANUAL

Wheatstone Corporation

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LX-24 Modular Control Surface Technical Manual

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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.***

Attention!

PSE-2 Power Supply

Important Safety Instructions

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. This equipment must be installed and operated in a dry location free from dripping or splashing liquids. No objects filled with liquid (such as beverage containers and the like) shall be placed on or near the unit.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Unplug this apparatus during lightning storms or when unused for long periods of time.
13. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into an apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
14. DISCONNECTING DEVICE FROM MAINS – Main power cord plug is the disconnecting device. The power plug of an installed unit must remain readily accessible/operable at all times.

WARNING!

To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

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(PRODUCT IDENTITY)
8D48

Attention!

PSE-2 Alimentation

Consignes De Sécurité Importantes

1. Lire ces instructions.
2. Conserver ces instructions.
3. Observer tous les avertissements.
4. Suivre toutes les instructions.
5. Ce matériel doit être installé et utilisé dans un endroit sec à l'abri d'éclaboussures de liquides ou de gouttes. Aucun objet rempli de liquides tel que breuvages ou autres, ne doit être placé sur le dessus ou à côté de cet appareil.
6. Nettoyer uniquement avec un linge sec.
7. Ne pas bloquer les ouvertures de ventilation. Installer d'après les instructions du manufacturier.
8. Ne pas installer près de sources de chaleur tels que des radiateurs, registres de chaleur, poêles ou autres appareils (incluant les amplificateurs) pouvant de la chaleur.
9. Ne pas contourner le dispositif de sécurité de la fiche polarisée ou de mise à la terre. Une fiche polarisée a deux lames dont une plus large que l'autre. Une fiche de terre a deux lames et une troisième broche de mise à la terre. La lame large ou la troisième broche est fournie pour votre sécurité. Si la fiche fournie ne rentre pas dans votre prise, consultez un électricien pour le remplacement de la prise obsolète.
10. Protéger le cordon d'alimentation en évitant qu'il ne soit piétiné ou écrasé notamment au niveau des fiches et le point de sortie de l'appareil.
11. N'utiliser que les fixations et accessoires spécifiés par le fabricant.
12. Débrancher cet appareil pendant les orages ou lorsqu'il n'est pas utilisé pendant de longues périodes de temps.
13. Confier toute réparation à un personnel qualifié. Une réparation est nécessaire lorsque l'appareil a été endommagé de quelque façon que ce, soit tel que : le cordon d'alimentation ou la fiche est endommagée, du liquide a été renversé ou des objets sont tombés dans l'appareil ou celuici a été exposé à la pluie ou à l'humidité ou ne fonctionne pas normalement ou s'il est tombé.
14. DÉBRANCHEMENT DE L'APPAREIL DU SECTEUR – Le cordon d'alimentation principal est le dispositif de déconnexion. Le cordon d'alimentation d'une unité installée doit rester facilement accessible / utilisable à tout moment.

ATTENTION!

Pour réduire le risque d'incendie ou de choc électrique, ne pas exposer cet appareil à la pluie ou à l'humidité.

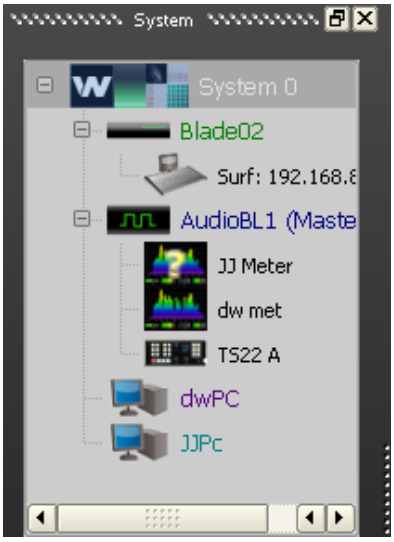
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Adding Devices To The 3rd Party Tab

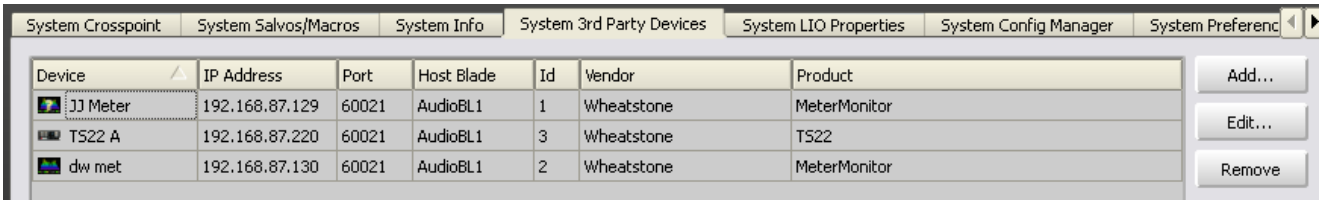
In order to utilize all the features of the LX-24 control surface the device must be added to the *System 3rd Party Devices* tab in the Wheatstone WheatNet-IP Navigator program (aka the Navigator GUI). This sheet shows you the basics of that procedure. Refer to the *WheatNet-IP Audio Over IP Network Technical Manual* for additional details.

You will need to know the IP address of the device being added, so you will want to find that out before you start.

Launch the Navigator GUI and make sure that **System 0** is selected in the *System* pane. You will see something like this:



Now, to the right of the *System* pane, select the *System 3rd Party Devices* tab.



Click the *Add* button to bring up the *Add 3rd Party Device* dialog:

Type in a convenient *Name* and insert the *IP Address* of the device being added. Leave the *TCP Port* at the default setting of **60021**. From the *Host Blade* drop down select the Blade that you want to associate the 3rd Party device with. Click *Ok*.



This completes the process of adding the device to the *System 3rd Party Devices* tab. The added device should show up in the *System* pane under the Blade you added it to. If it does not show up, or if it shows up but has a yellow question mark on it, then there is either a network issue that needs attention, or the device is not connected to the network at all, or one or more steps have been omitted or done incorrectly in the configuration process.

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Installation and Configuration

Introduction

The LX-24 modular control surface comes with an Embedded Graphical User Interface program (GUI) and is designed for use with Wheatstone's WheatNet-IP Intelligent Network. An IP-88e Mix Engine Blade provides mixing and DSP functionality. Additional Blades can be added for inputs and outputs in a variety of digital and analog formats. This I/O can be shared with other control surfaces and devices throughout the Intelligent Network. Please refer to the *WheatNet-IP Audio Over IP Network* Technical Manual for information on configuring your system, and for descriptions of the various types of Blades, and the Windows XP Navigator GUI.

The meterbridge features three or four sets of bright, ultra-high resolution LED meters, as well as LED metering for auxiliary levels and pan control. A digital timer is also included. Stereo CUE speakers are built into the meterbridge.

Each fader provides access to four stereo busses, plus four pre-fader aux sends, a stereo CUE bus, and four mix-minuses. An LED source name display, an A/B source selector, and two programmable soft buttons are also available. A SET button provides access to assignable controls in the master section.

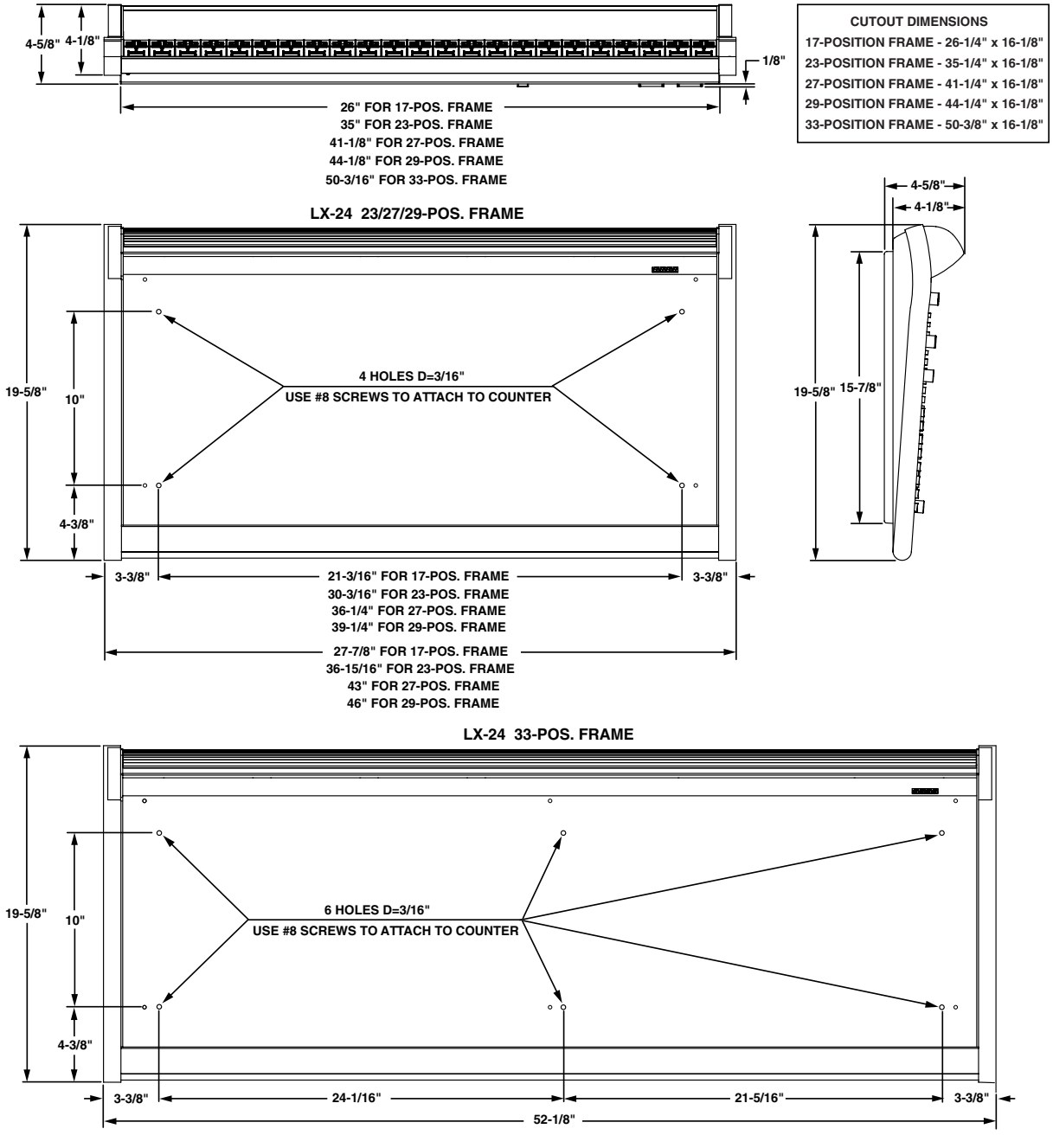
Control room and headphone outputs with level control and source selection are provided, as well as two independent studio monitor outputs.

On-board VGA and PS2 connectors allow a user-supplied monitor and mouse to be connected to the control surface for configuration. They are not required during normal operations. Snapshots of the LX-24's configuration can be saved and recalled at the touch of a button, making setup for different shows or dayparts a snap.

Control Surface Placement

The LX-24 modular control surface is designed for countertop mounting or drop-in installation in counter top.

Although the rubber feet on the bottom keep the surface from being easily moved when simply placed on the counter, pre-drilled holes have been provided so that screws may be used to mount the surface securely to the countertop. Locate the LX-24 on the counter, and remove the screws (two per module) that hold the second and next to the last modules in place (for the 33-position frame remove also module in slot 18). Carefully remove these modules from the frame. Attach the mainframe to the counter top, using the holes provided in the bottom of the chassis and screws appropriate to the counter material, and reinstall the removed modules.



Power Supply



Front view of the PSE-2 rackmount power supply

Rear view of the PSE-2 rackmount power supply

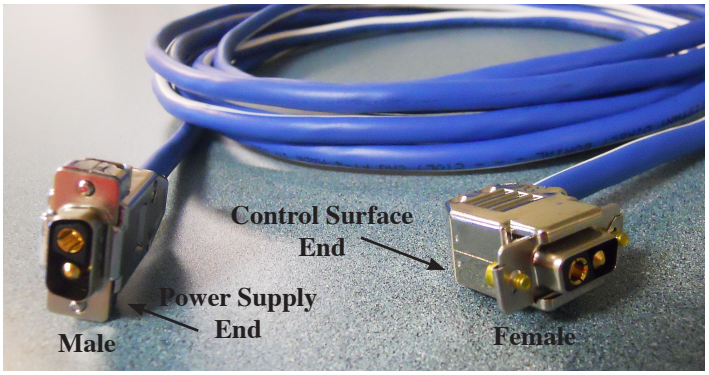
The LX-24 control surface is powered by a Wheatstone Model PSE-2 rackmount power supply. This unit occupies a single 19" wide rack space. Convection cooled, it requires ample ventilation space above and below it.

Note the power supply (supplies) should be mounted in an equipment rack within fifteen feet of the control surface (but no closer than 3 feet). Avoid locating any high gain equipment (such as phono preamps, tape recorders, etc.) too near the rackmount supplies, to avoid magnetic interference into that equipment.

If failsafe redundant supplies have been ordered, you will be installing two PSE-2 units.

Once the supply is rackmounted, it should be connected to the control surface using the factory supplied cable.

Unscrew the LX-24's rear panel to access its power connectors that located on the right side of the HC-24 PCB. The cable has two "D-SUB 2V2" style connectors on it: a female connector that plugs into either one of the control surface's power supply connectors, and a male connector that plugs onto the power supply.



In case of redundancy use two PSE-2 units. If you are using one supply, connect it to one of the control surface connectors (it doesn't matter which one). If you are using the failsafe option (two PSE-2 supplies), connect one end of a power supply cable to either control surface power connector and connect the other end of the cable to one of the two power supply units. Then use the other cable to connect the second power supply to the remaining control surface power supply connector.

Note each power supply is fitted with a 3-wire grounded AC cord that should be plugged into a "clean" AC power source, that is, an AC source that feeds only the control room audio gear. This source should be a separate feed from those powering lighting, air-conditioning, or any other non-audio machinery. The third pin ground wire of the AC source should be tied to the central system ground point.

The power feed recommended in the text is often installed and referred to in studios as an "isolated AC ground" outlet. It is usually orange in color.

Failsafe Dual Redundant Supply

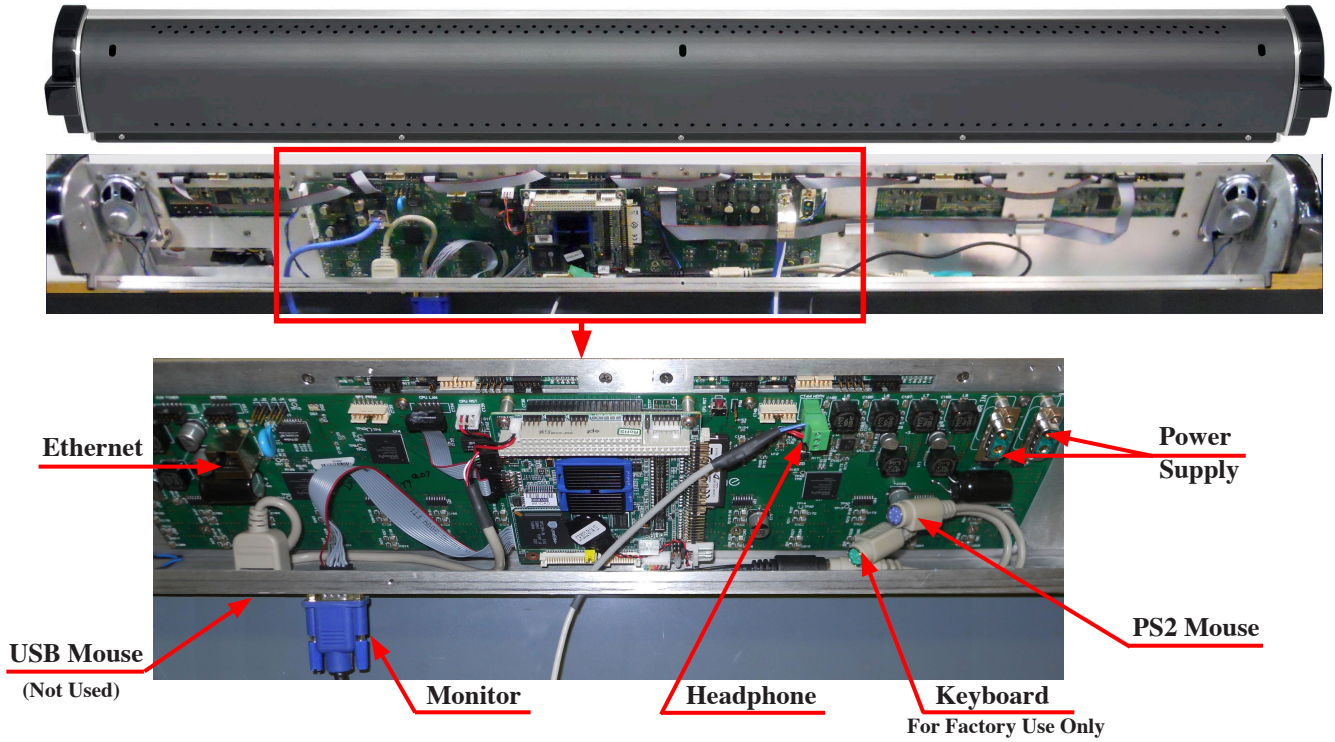
Wheatstone failsafe power supply systems use two PSE-2 power supplies for each piece of powered equipment. Though either is capable of running a full load on its own, in failsafe operation both units run in tandem: if one fails, the other takes over, assuring uninterrupted operation.

In order for failsafe systems to perform as designed, always have BOTH rackmount supplies powered up and connected to their associated equipment.

Connections

Wiring to and from the LX-24 control surface is made via connectors mounted on the bottom of the rear panel and on the Host Controller card (HC-24 PCB) located behind the control surface's rear panel.

Unscrew the rear panel to make power supply, headphone, and Ethernet connections.



Two 2-pin "D-SUB 2V2" style connectors at the right of the HC-24 board are for power supply connections. See the "Power Supply" section for power supply cable connection.

Headphone connection is made via the factory supplied cable with a TRS headphone jack connected to a bracket that can be mount to the counter for your convenience, and a 3-pin plug terminal that plugs into the HDPN 3-pin header in the center of the HC-24 PCB.

The RJ-45 connector on the left part of the HC-24 PCB provides control surface connection to a standard Ethernet network switch via a straight (pin to pin) CAT5 cable.

There are also two PS2 connectors for keyboard and mouse (user-supplied) connection. Note that the keyboard connection is for factory use only.

Note that there is a clearance at bottom of the rear panel for cable passage.

A VGA monitor (user-supplied) connect to the DB-15 connector mounted on the bottom of the control surface's rear panel.

On the left side of the rear panel are two openings for Accessory module connections.

Energizing

Assuming the LX-24 control surface mainframe is properly placed, and its PSE-2 power supply (or supplies) correctly rackmounted and connected to the control surface, you may now energize the rackmount power supply by plugging it into the AC mains. The "GOOD" LED on the power supply front panel should light up to indicate the presence of DC output voltage. Individual module switches will assume factory default settings.

Note: To de-energize the control surface, unplug the rackmount power supply's AC cord from the AC mains. ***Never de-energize the control surface by disconnecting the cable that connects the control surface and power supply together.***

Control Surface Scanning

At power-up the LX-24 performs a scan to identify the module positions in the control surface. If you rearrange the module layout you **must** restart the control surface.

Getting Started

The LX-24 control surface comes with an Embedded Graphical User Interface (GUI) program, intended to be straightforward in use, with controlling and displaying graphics, production tools, and set up screens. The LX-24 VGA monitor is vertically divided into two halves with a METERING PANE on the left side and a FUNCTION PANE on the right side. All controls of the GUI's main screen are in fixed positions, except that the FUNCTION PANE area contents change according to selected function.

Connect the user-supplied VGA monitor LCD or other display to the DB-15 connector on the control surface's rear panel, power up the surface, and the GUI will appear on the monitor display.



Tabbed Navigation

The LX-24 GUI features a "tabbed" navigation architecture to easily access features with a minimum number of mouse clicks. There are a few subtleties you need to be familiar with to efficiently get around the tabbed software screens. This section introduces you to the tabs; detailed function information is included in the module sections.



The Function Tabs are located across the top of the function display area. You may access any desired screen by simply clicking on the appropriate Function tab. To access Input functions, press an Input module's SET button or CHANNEL STATUS button on the VGA screen, and the Function Pane will jump to settings for that input fader strip.

Main Tab – Displays Timer, Clock, Current Event, Switched Meter, Headphone Mode controls, and the External Source for monitors.

Input Tab – Displays interactive Source and Programmable button windows, Mode, Phase, Pan, and Aux Send settings for the selected channel. Note you must press an Input fader's SET button to show the settings for that channel, or click on a CHANNEL STATUS button in the lower left side of the VGA to access any fader.

Aux/MixMinus Tab – Displays controls for the four Aux Master outputs and the Mix-Minus Outputs.

Presets Tab – The LX-24 includes the ability to save, copy, and paste individual EQ, dynamics, and even whole channel strip settings. Settings for each category are stored as Presets. The Presets Pane allows you to manage and apply presets to Sources and faders.

Events Tab – The LX-24 can store a "snapshot" of the entire control surface in a file called an EVENT. The Event Pane is divided into two sections. The Event Recall section lets you recall previously saved Events. The Event Editor is a manager for creating, editing, and deleting Events. Optional permissions let you limit access to Event Recall and Event Editor functions.

Options Tab – A wide variety of programmable options are found here to customize the LX-24 for your application.

Note: Each Tab is described in detail in subsequent manual sections.

Log-In

When the surface boots, it enters the log in level that was last accessed. Look in the lower left corner of the VGA screen to see the current access authorization level. Pressing the *USER:* button opens the PASSCODE ACCESS window. Select a user level – *Intern, Operator, Production, or Engineering* – with the mouse, then enter a numeric passcode and press the *OK* button. All default passcodes are "111," and can be changed for each mode by any user who knows the password for that mode. This can be done by clicking the *EDIT* button on the PASSCODE ACCESS form to bring up the EDIT



PASSCODE box, where you enter the old (current) passcode and then enter the new passcode twice and click *OK* to effect the change.



Once a given control mode is selected for a surface, that setting will persist through a power cycle or surface reset. Engineering mode, by default, allows the user to perform all surface functions.

A fifth mode, *Factory*, is for use by Wheatstone personnel only.

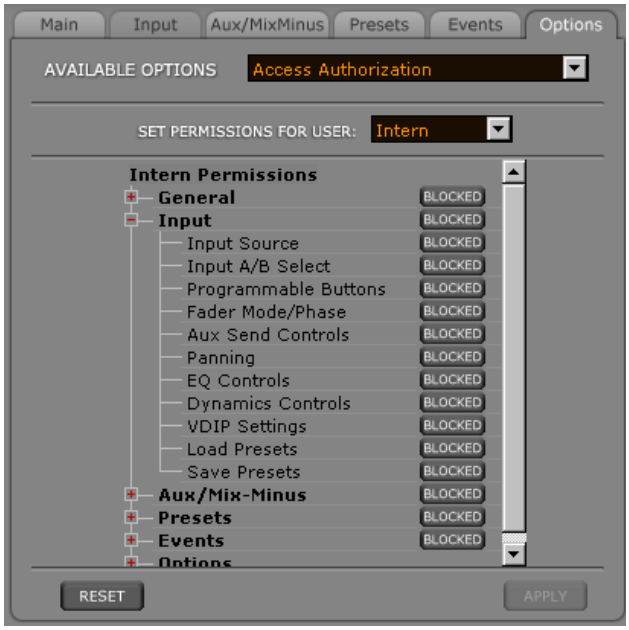
Control Modes – User Permissions

To set passcodes, press the *Options* Tab and choose User Config from the AVAILABLE OPTIONS scroll down list.





All four end user modes can have their permission levels modified by any user with permission to do so. This is done by pressing the GUI *Options* tab and choosing Access Authorization from the AVAILABLE OPTIONS scroll down list to bring up the Access Authorization dialog box. Personnel with the designated authority to set the permission levels should spend some time with this dialog box and experiment to see what levels of authority can be granted or denied.

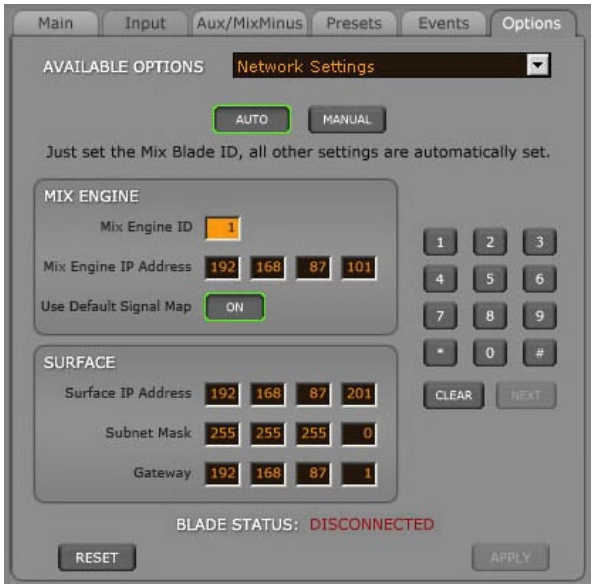


Network Settings

When your surface is connected to the WheatNet-IP Engine BLADE and first powered up, it will ask you to configure its network parameters.



To configure the network settings for the control surface select "YES" from the dialog box. The surface will now display the Network Settings screen, where you will set the Mix Engine ID and IP address of the Engine to which the surface will connect, along with the Surface IP Address, Subnet Mask, and Gateway. If Automatic mode is selected (AUTO button lit), enter the Mix Engine ID of the WheatNet-IP Mix Engine to be associated with the surface and the remaining settings are configured for you. You can manually enter this information by pressing the MANUAL button and using the numbered keypad on the screen. Pressing NEXT will advance to the next field.

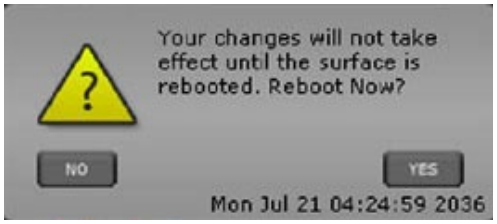


For convenience, Wheatstone uses the following convention for IP Addressing in the WheatNet-IP system:

1. The IP Address of a BLADE is equal to the BLADE ID plus 100; i.e. BLADE 3 = 192.168.87.103
2. The IP Address of a control surface is equal to the Engine BLADE ID plus 200; i.e. Engine BLADE = 5, Surface IP Address = 192.168.87.205

Unless you have a compelling reason to do otherwise, you should also have the Use Default Signal Map button ON.

When done, simply press APPLY to finalize these settings and the surface will request a reboot.



Select YES from the dialog box and the surface will reboot.

Once the surface has been rebooted navigate to the Options Tab and select Network Settings from the drop down menu. If all information was entered properly the BLADE STATUS will display CONNECTED. The control surface has been successfully configured.

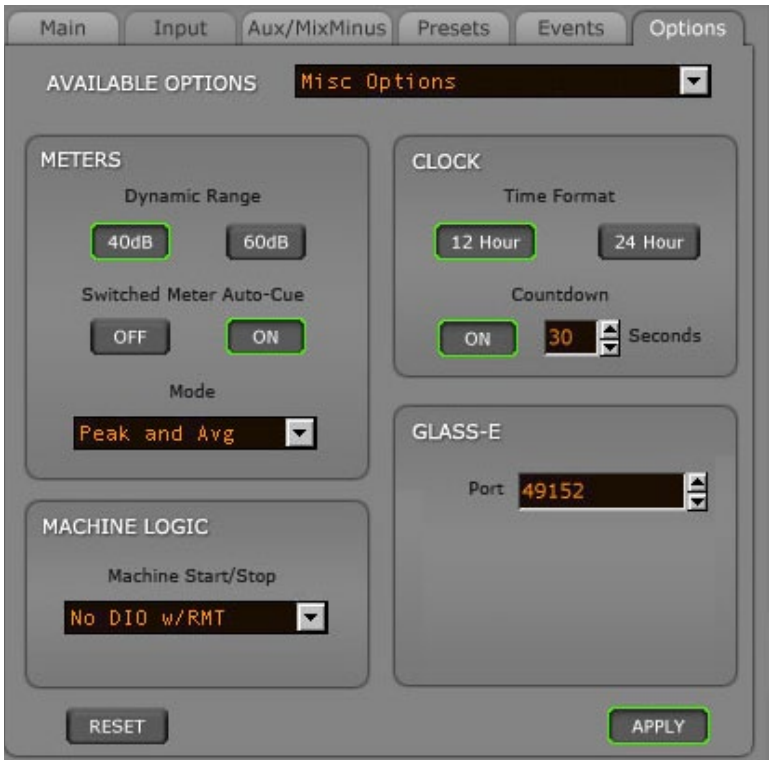


Surface Software Version

In the event that you need to consult the factory about the LX-24 control surface, you may need to have the surface software version number available. Click the Wheatstone logo on the top of the start-up screen to display the INFORMATION form, which shows technical information about the surface's software version and connection status to its Ethernet link and automation interface.



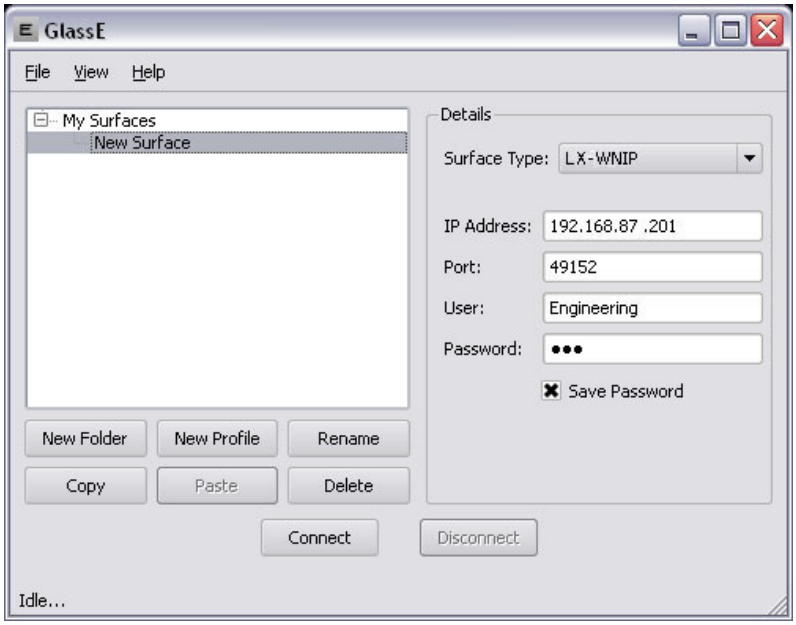
Optional Glass E Interface



Wheatstone offers the optional PC-based software, "Wheatstone Glass E Virtual Control Surface," to control the LX-24 surface from a remote PC. The Windows XP-based PC software accesses remotely through a LAN/WAN. It brings studio control surfaces anywhere in the world under remote control of an internet-connected PC. Glass E is a graphical replication of the control surface to which it is assigned. All surface functions and features are accessed by the Glass E. The surface presets, system X-Y access, system programming, and configuration are password protected.

Before you can run the GLASS E software to control a particular surface, that surface needs to be set up to allow the Glass E interface to function. In the LX-24 GUI press the *Options* Tab and choose Misc Options from the AVAILABLE OPTIONS scroll down list to display the screen that has the Glass E interface options. Enter a Port number (the default is 49152), then click APPLY. The surface is now ready to host a link to the Glass E software.

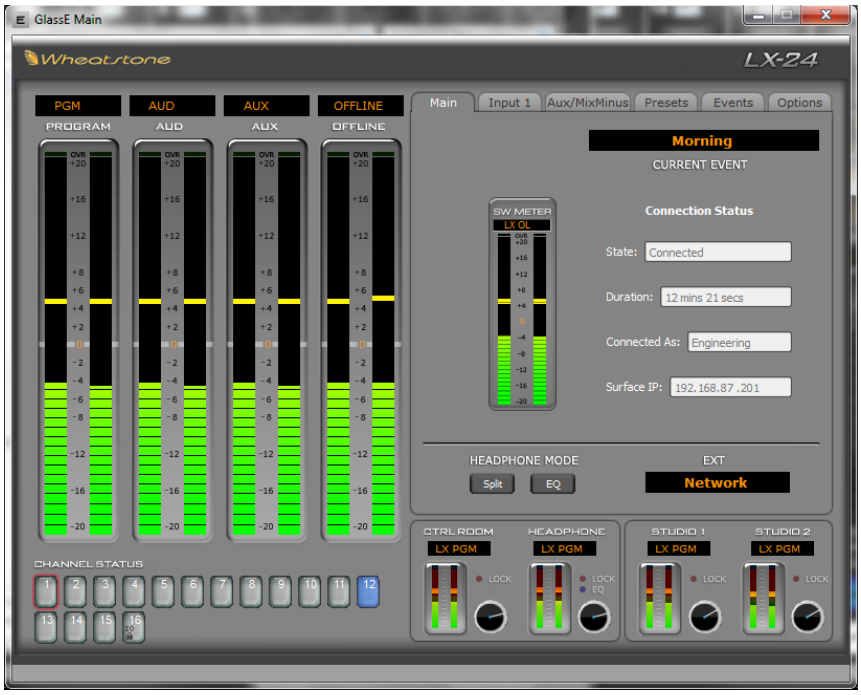
On the PC that's running the Glass E software, start the software. You should see the following screen:



Select the Surface Type, enter the surface's IP address, and enter the Port you previously set up at the LX-24. Then enter the user name and password that corresponds to the user type you want to operate the surface as, click *Connect*, and you should then see three screens (shown on the next page) on the PC running Glass E.

The first screen is a duplicate of the LX-24 GUI as it appears on the surface's VGA screen. All controls and functions of the GUI that have been described in chapters 2 and 3 of this manual work the same on this Glass E screen.

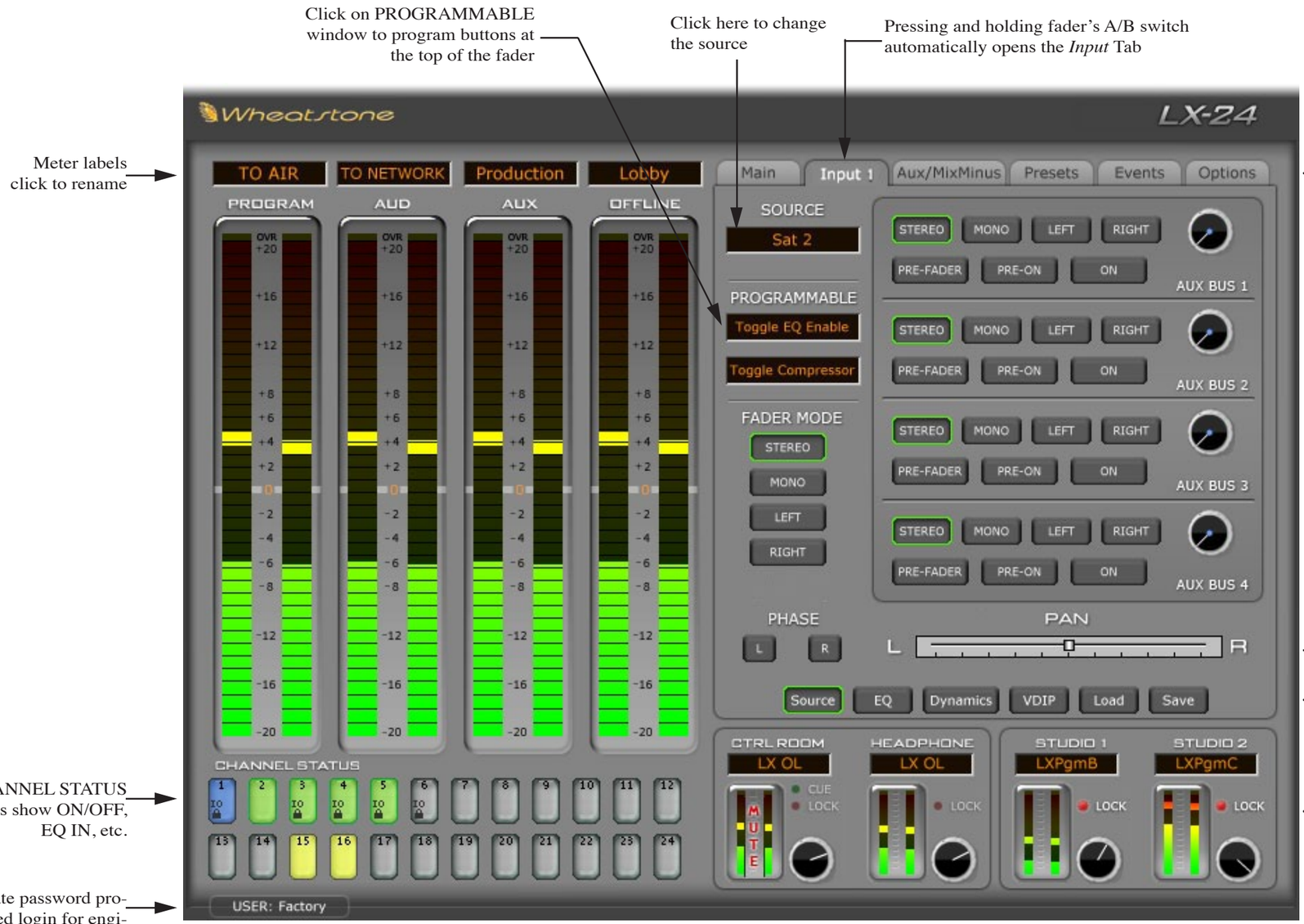
The second and third screens are a replication of the actual surface panels, and are operated in much the same fashion as the actual physical controls in the surface.








Meter Labels
Click label windows to rename
Program meters
Channel Select / Status Buttons
Access Authorization
Function Tabs
Functions display:
Clock, timer, current event, and switched meter
Click on EXT windows to choose source
Monitor Controls
Wheatstone
LX-24
TO AIR
TO NETWORK
Production
Lobby
PROGRAM
AUD
AUX
OFFLINE
Main
Input 1
Aux/MixMinus
Presets
Events
Options
00:15.6
TIMER
Morning Show
CURRENT EVENT
SW METER
LXBM20
04:30:10 PM
HEADPHONE MODE
SPLIT
EQ
EXT
analog 1
CHANNEL STATUS
CTRL ROOM
LX OL
HEADPHONE
LX OL
STUDIO 1
LXPgmB
STUDIO 2
LXPgmC
CUE
LOCK
MUTE
USER: Factory


Click on PROGRAMMABLE window to program buttons at the top of the fader
Click here to change the source
Pressing and holding fader's A/B switch automatically opens the *Input* Tab
Meter labels click to rename
A typical Input Tab
Easily create up to 4 stereo aux sends for remotes, voice tracking and effects
Drag PAN slider or use Pan Pot
Button Bar
CHANNEL STATUS buttons show ON/OFF, EQ IN, etc.
Use "Monitor Config" in the OPTIONS tab to lock monitor levels feeding amplifiers.
Separate password protected login for engineers, jocks, interns.
MUTE labels let you see when speakers are muted.
Wheatstone
LX-24
TO AIR
TO NETWORK
Production
Lobby
PROGRAM
AUD
AUX
OFFLINE
Main
Input 1
Aux/MixMinus
Presets
Events
Options
SOURCE
Sat 2
PROGRAMMABLE
Toggle EQ Enable
Toggle Compressor
FADER MODE
STEREO
MONO
LEFT
RIGHT
STEREO
MONO
LEFT
RIGHT
PRE-FADER
PRE-ON
ON
AUX BUS 1
AUX BUS 2
AUX BUS 3
AUX BUS 4
PHASE
PAN
L
R
Source
EQ
Dynamics
VDIP
Load
Save
CTRL ROOM
LX OL
HEADPHONE
LX OL
STUDIO 1
LXPgmB
STUDIO 2
LXPgmC
CUE
LOCK
MUTE
CHANNEL STATUS
USER: Factory

AUX MASTERS – Separate ON/OFF and master volume for each Aux bus

Select this tab for master control of Aux Sends + MixMinus



Input channel Pre-Fader and Pre-0n/Off are global for MXM bus

Adds MXM assign attribute to source signals. For example, if you have a source called ISDN1 and you assign it to MXM 2, 3, 4 but not MXM1, you can move ISDN1 to any fader and it will automatically get assigned to the desired MXM signals – cool!

Invert LED's – When you say YES all input fader sources automatically feed all 4 MXM busses. Now all you have to do is press the MXM assign switch to "drop" a source out of an MXM bus. In this mode, when the MXM LED is lit, the audio on that fader is NOT going to the bus. It is very easy to see which faders are "minused" out.

Use the TYPE drop down list to pick a category

Click here to open Preset Manager tab

- Use this tab to view, rename, copy presets
- TIP – Use the *Input* Tab and SAVE on the Button Bar to save a new preset



Shows which fader strips have the selected preset applied to them

Shows which sources have the selected preset applied to them



Events Manager tab – "Events" are snap-shots of the entire control surface. All faders, switches, sources, EQ, Dyn, etc. are stored and recalled.

Last event taken

Event Recall

To recall an event:

- click on event name
- click ARM
- click TAKE
- click UNDO to go back

Event Editor

This section lets you manage:

NEW – Save current surface state to a new event.

SAVE TO – Lets you save current surface state to an existing event.

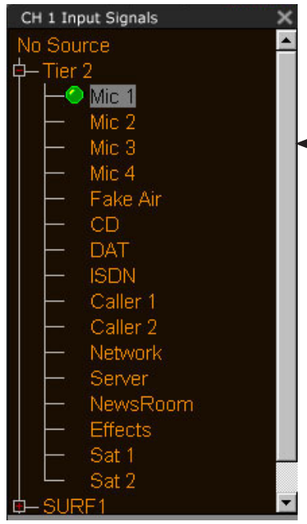
RENAME – Just click on the event name, the virtual keyboard opens up.

DELETE – Just click on the event name, click DELETE and confirm.

Options Manager tab – Provides access to a whole host of system options. Some are self explanatory, but see the Options Details section for details.



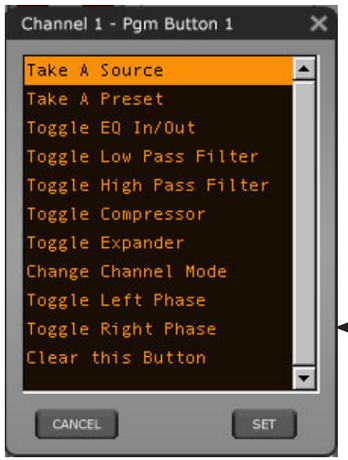
Choose fader sources



Press channel's SET button to open main INPUT screen



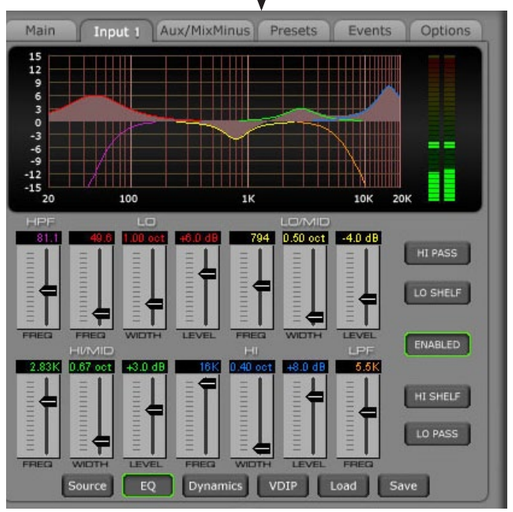
Setup Programmable Buttons



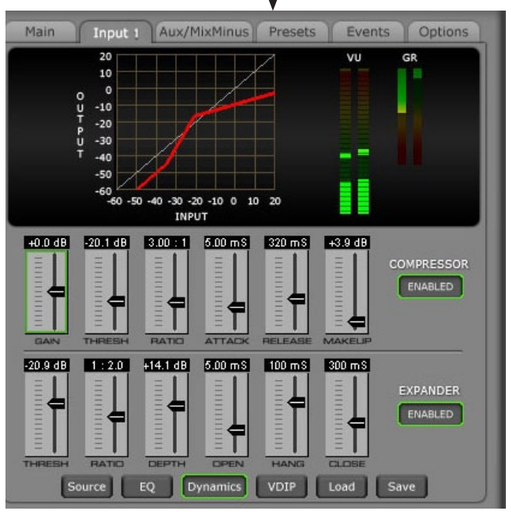
Use the Button Bar to navigate various input screens



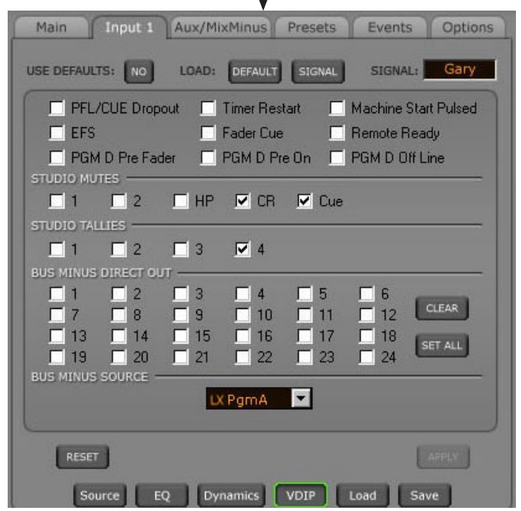
EQ



Dynamics



VDIP



Preset Load

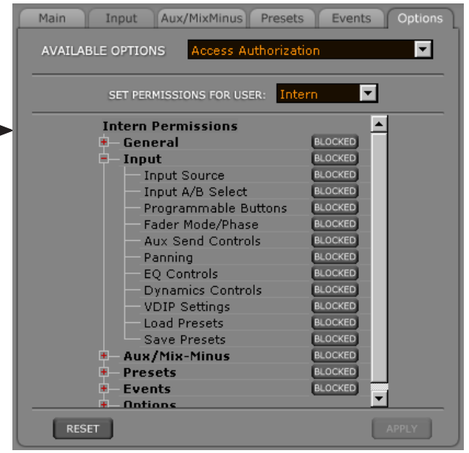


Preset Save





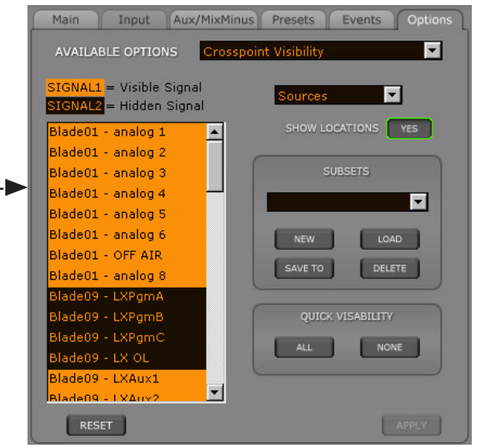
Access Authorization



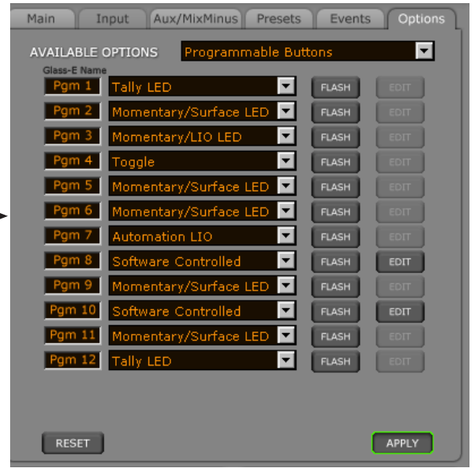
User Configuration



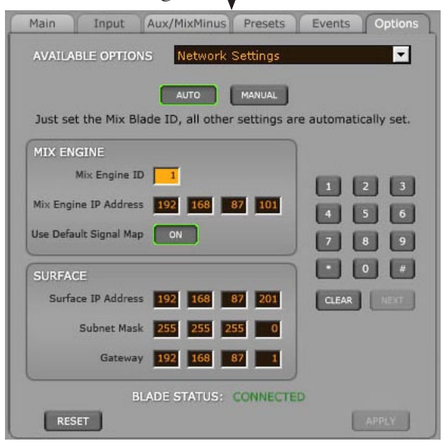
Crosspoint Visibility



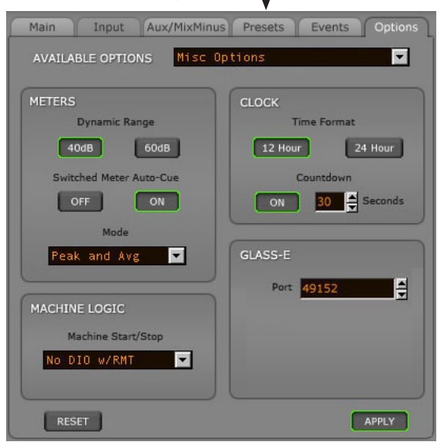
Programmable Buttons



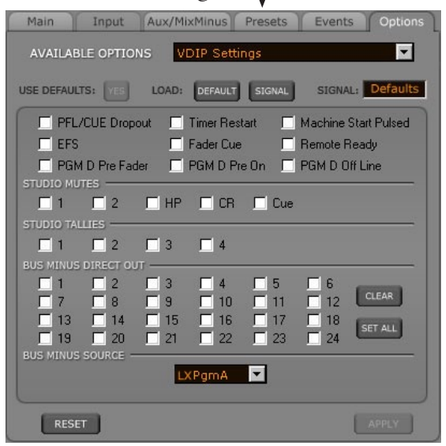
Network Settings



Miscellaneous Options



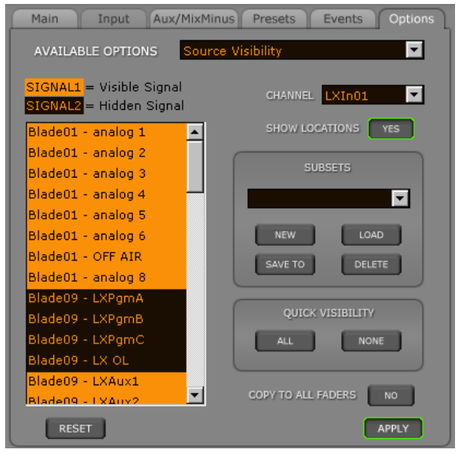
VDIP Settings



Monitor Configuration



Source Visibility



Input Module (IN-24)

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Input Module (IN-24)

Each input module of the LX-24 audio control surface represents two input channels. You control how each channel is set up by pressing physical switches on the module and configuring software settings through the *Input X* Tab.

Input Source

The A and B INPUT buttons at the top of each module determine what input source will feed the module. The buttons can be programmed to allow quick selection of two different sources for each module. If the source programmed for button A is the current source for the channel, then button A will be lit. Similarly, button B lights if its programmed source is the current source for the channel. The 8-character alphanumeric SOURCE display shows the name of the current source for that channel. If there is no current source for a channel, neither A or B button will be lit, and the display will read NoSource.

To select a new source for a channel, press the SET button, rotate the SOURCE SELECT encoder on the Control Room module, then press the TAKE button below the encoder.



CR-24 Module

To program a source for the A or B button, first press the channel's SET button, then press and hold the A or B input button until it lights. Now rotate the SOURCE SELECT encoder on the CR-24 module until the desired source appears in the display above the encoder and in the channel's SOURCE display; the TAKE button will light. Press the TAKE button below the encoder to finish programming the input source button. The selected input and TAKE buttons light go off. Please note that this process does not replace the current source for the channel, but only programs the selected button. If you then want to change to the source you just programmed, simply press the programmed button to select its source.

Depending on how the LX-24 is configured, you may be able to select any source in the system or you may have a limited choice of sources for one or more of the channels.

Pressing the SET button switches the VGA screen to the Input tab for this fader, where you can change the programmed sources for A and B, select the fader mode, adjust panning, and set up VDip. All of these functions are covered in this chapter.

Once lit, the SET button stays lit until you light SET on a different fader, or deselect the fader.



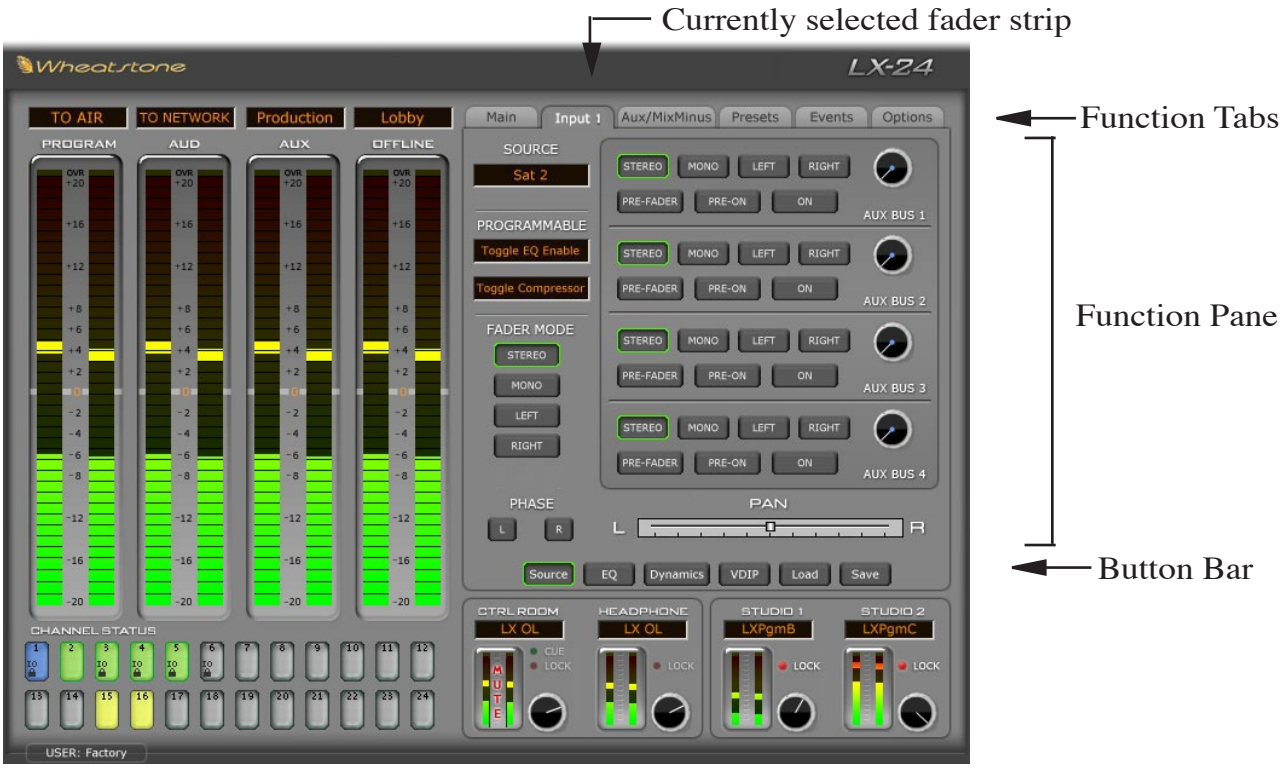
Input Tab Display

When you press an Input fader's SET button the Tab display switches to the *Input X* Tab for that channel. You can click on various buttons to configure the channel for your application. Note that the Source and Programmable Button windows are interactive. The SOURCE SELECT knob on the CR-24 module (see Chapter 3) serves double duty and acts as a parameter modifier when in the EQ or Dynamics screens.

NOTE:
When SET is pressed, the FUNCTION PANE displays the last feature selected from the Input Tab's "Button Bar" – Source - EQ - Dynamics - VDIP - Load - Save

A Button Bar located near the bottom of the *Input X* Tab provides for navigation between the Source, EQ, Dynamics, VDIP, Preset Load, and Save screens.

A typical *Input X* Tab Source screen is shown below, followed by descriptions for each of the functions.



SET Button

The SET button is located at the top of the module and forces the focus of the VGA to the selected input fader strip. This allows the operator to access various controls and displays and apply them to the selected channel. To use, press the SET button and then make your appropriate section settings in other areas of the control surface. Once a SET button has been pressed, the button lights up, and all setting changes will apply to **that input channel** until a different input SET button is pressed. The SET function may be configured in the Options.txt file (see Appendix 1) to enable a timeout.

Source Window





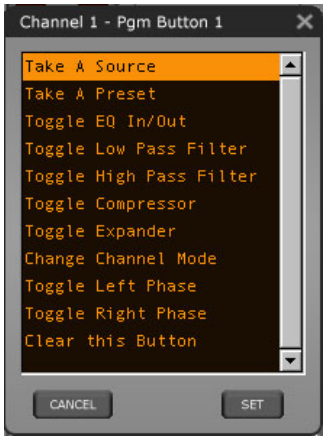
Click in the SOURCE window on the VGA screen to open the signal tree. Highlight a source name in the tree and double-click to select it.

You may use the Visibility feature to limit the signal list the user "sees" when selecting sources. This feature is especially useful in large systems with lots of sources. This procedure is outlined in the *Source Select Section* of Chapter 3.

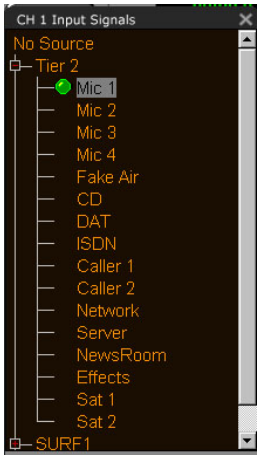
Programmable Button Windows

Each fader strip has two programmable (SOFT) buttons. There are two programmable button "windows" within the *Input* Tab associated with each input channel. To program a button, click in the desired button window or press and hold the button until the Channel X - Pgm Button Y screen pops up. Select the desired function from the list by clicking on it, then click the SET button on the pop-up window to confirm.





If your choice was "Take A Source" then the Source list pops up to allow you to choose the desired source.

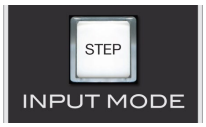


Mode Controls and Indicators

There are four available channel modes: Stereo, Mono, Left only, and Right only.

You can choose the desired mode by pressing the INPUT MODE - STEP switch on the CR-24 module. The channel's MODE indicators on the input panel will change to reflect the new mode.





CR-24 Module

To choose the desired mode using the VGA screen click on the desired mode. Its virtual switch will light, and the channel's MODE indicators on the input panel will change to reflect the new mode.

STEREO – selects stereo mode; Left in feeds fader L, right in feeds fader R. If a mono source is selected, it will feed both L and R.

MONO – selects mono mode. If a stereo source is selected it is summed to mono and reduced by 6dB.

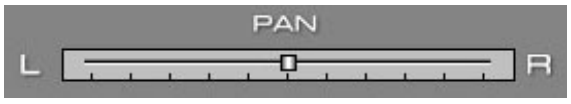
LEFT (left only) – passes only the left channel of a stereo source to both L and R.

RIGHT (right only) – passes only the right channel of a stereo source to both L and R.



Pan

L/R - slider moves the signal left to right.



Phase

A pair of switches, one for left and one for right, located on the left-bottom of the "INPUT" screen, are provided to allow for the reversal of absolute phase of the signal path.



Aux Sends

Use these controls to send the fader to any or all Aux Send outputs. Mode controls tap off the source signal in any combination of pre- and post-fader, pre- and post-channel ON switch. There are dedicated Aux Send ON and audio MODE controls for each of the four Aux sends. You may use the hardware Aux SEND knobs, located on the top of Control Room, Headphone, Studio 1, and Studio 2 modules, or the virtual AUX BUS knobs on this screen to set the signal level feeding the Aux Bus. All settings are saved with Events.

Assign Switches

Output switches assign the selected source signal to any combination of the surface's four stereo outputs – PGM (program), AUD (audition), AUX (auxiliary), and OL (off line). The button will be lit when the source is assigned to its respective bus. To remove a source from the bus, press the button again; the light will go off to indicate that the source is no longer assigned to that bus.

The OL Bus

The OL Bus has a special function in relation to a channel's Bus Minus output. Each signal that can be assigned to a channel will specify which bus (PGM, AUD, AUX, or OL) provides the base Bus Minus mix (that is, which bus the Bus Minus output is a mix-minus **of**) when that channel is on. When the channel is off, however, the base Bus Minus mix may be the same as when the channel is on, or may be configured to utilize the OL bus instead. This allows the Bus Minus output to have different content when the channel is off than it does when the channel is on.

Both the base Bus Minus mix and the use of the OL bus as base when the channel is off are configured in the VDip settings (described later in this chapter).

MXM Assign LEDs

Each channel can be assigned to any combination of the four MIX-MINUS busses. The MXM ASSIGN 1-4 LED group gives the operator a quick indication of what mix-minus busses the source is assigned to.



HP-24 Module

Channels are assigned to these MXMs in the following manner: press the SET button on the input fader section and then press the desired MXM ASSIGN button, located on the Headphone module. Note that you are normally assigning the channel, and not the source, to the MXM bus. But see the section on MIX MINUS options later in the manual (*MXM ASSIGN Switches*, Chapter 3).

LED Readout

An 8-character SOURCE display shows the name of the audio source selected to the fader.

TB Switch

The TB switch routes the TB audio, typically the operator's microphone, to the BUS MINUS output for that channel, allowing the operator to talkback to the talent hearing that BUS MINUS signal.

CUE Switch

The CUE switch assigns the selected source to the CUE bus, letting the control surface operator monitor the channel's pre-fader signal.



Bus-Minus / Direct Outputs

Each fader has a dedicated Bus-Minus output that includes all active faders on its selected source bus, except for itself. These auto generated monaural mix-minus signals may be routed to feed telephone hybrids, remote operator feeds, or other devices as required. Bus-Minus mix outputs for each surface fader appear as Sources in the Surface signal area of Navigator. A typical Bus-Minus output signal name is *LXBM01* but the exact name depends on the fader and surface ID number.

Any of the four output busses may be selected in the VDip settings (see the section on VDip Settings, page 2-16) as the source bus. Also in VDip, the OL Bus (PGM D) may be selected as the source bus when the channel is off regardless of the bus selected as the (channel on) Bus-Minus source.

Another selection that can be made in VDip is to repurpose the fader's Bus-Minus output as a Direct Output.

Fader

Channel output level is set by a 100mm, professional, conductive plastic linear fader. If the signal feeding the busses goes into clipping briefly the OVERLOAD light will flash briefly. If the signal is continually clipping the OVERLOAD will flash steadily. Clipping can be stopped by moving the fader down, or reducing the signal level in some other fashion.



Channel ON Switch

The channel ON switch turns the channel signal ON and fires any channel ON (START) logic mapped to the fader's source signal. The switch LED lights to indicate the channel is ON and the ON-AIR LED will light on the meterbridge.

Channel OFF Switch

The channel OFF switch turns the channel signal OFF and fires any channel OFF (STOP) logic mapped to the fader's source signal. The switch LED lights to indicate the channel is OFF.



Channel Status Buttons Display



A row of numbered buttons along the bottom of the main VGA screen shows the status of each channel. When a channel is OFF with the fader down its corresponding button appears gray. If the fader is brought up with the channel remaining OFF the button turns yellow. If the channel is ON and the fader is down, or if the channel is ON with the fader up but not assigned to any of the four PGM busses, the button color becomes green. If the channel is ON, and the fader is up, and the channel is assigned to one of the four PGM busses, the button color becomes blue.

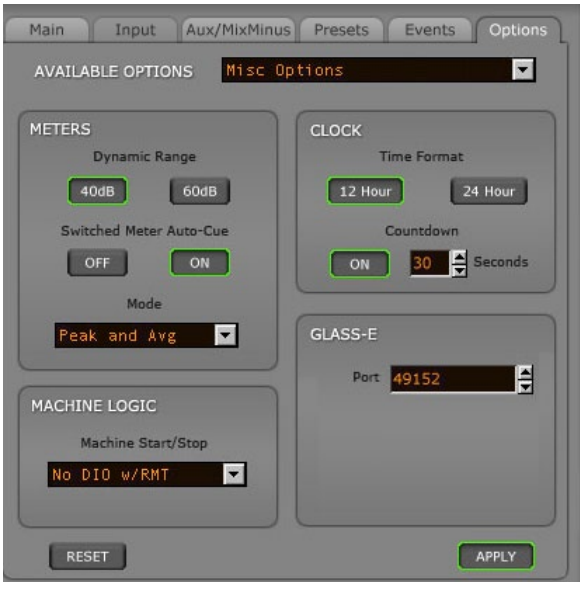
The CHANNEL STATUS button will also indicate a "logic lock" situation, which happens when a signal is assigned to multiple channels, either on the same surface or on different surfaces. As long as all of the affected channels are OFF there is no indication. But as soon as one of those channels is turned ON, the indicator, which consists of a padlock icon, will appear on the CHANNEL STATUS button of the rest of the affected channels. The purpose of the indicator is to tell the operator that the signal on that channel is in use elsewhere, and that logic control for the signal is owned by some other channel in the system. Operators should be made aware that logic associated with a signal will not act as expected when the logic lock indicator is ON.

A RED dot indicates that processing is active on that channel.

When viewing the Input tab on the VGA screen, the CHANNEL STATUS buttons can also be used to select the channel that settings are displayed for.

Machine Logic

The surface's start/stop logic options can be selected via the LX-24 GUI. Press the *Options* tab and choose Misc Options from the AVAILABLE OPTIONS scroll down list to display MACHINE LOGIC choices.



The purpose of this option is to allow the privileged operator to determine the conditions under which START and STOP signals (referred to herein collectively as DIO signals) are sent in response to a command to turn a channel ON or OFF. Channel ON and OFF commands can come from three different sources:

- Surface – A channel can be turned ON or OFF by a surface action, such as pressing the ON or OFF switch, or moving a fader if EFS has been enabled

• Remote (RMT) – A channel can be turned ON or OFF by sending it a command from a system Logic I/O card via the RemOn and RemOff functions, configurable from within Navigator

• Automation Control Interface (ACI) – Various automation systems are capable of sending ACI signals to the system via Ethernet to turn channels ON and OFF (and perform other functions as well).

There are four possible start/stop options:

DIO Always – START and STOP (DIO) signals are always sent in response to channel ON and OFF commands, regardless of the source.

No DIO w/ACI – DIO signals are blocked if the channel ON and OFF commands are from an automation system (ACI).

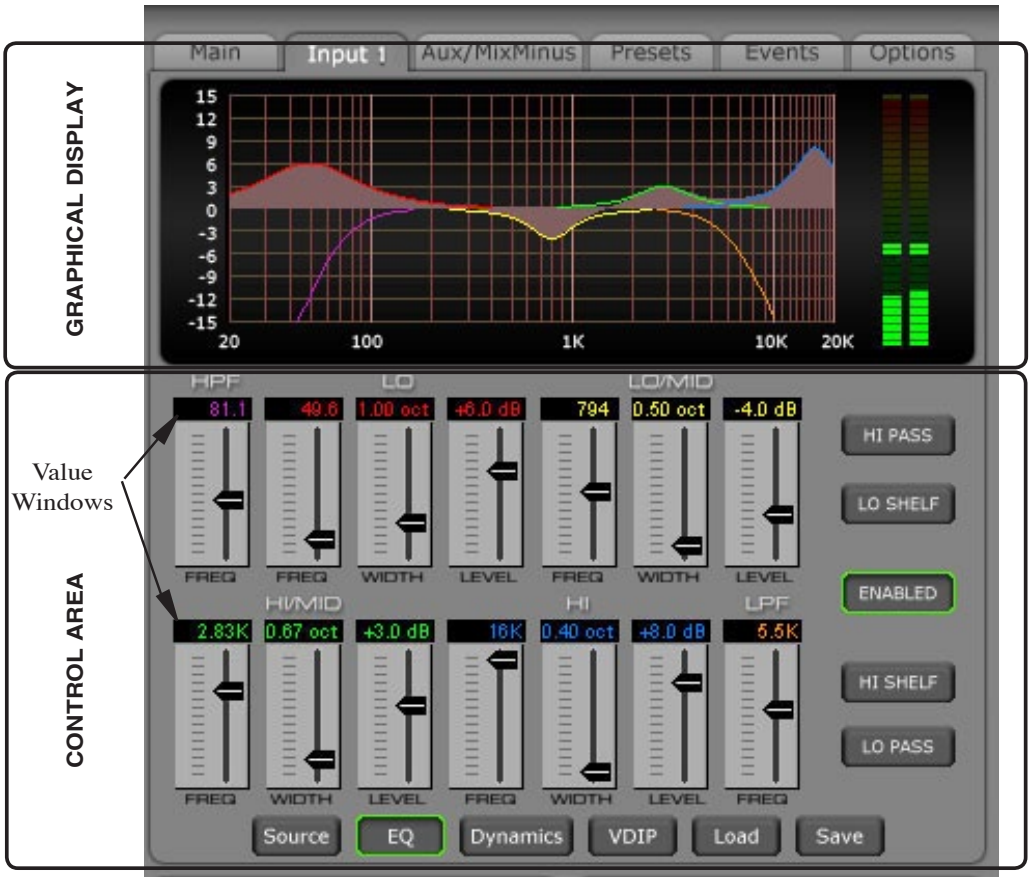
No DIO w/RMT – DIO signals are blocked if the channel ON and OFF commands are initiated from a system Logic I/O card.

No DIO w/ACI or RMT – DIO signals are blocked if the source of channel ON and OFF commands is either automation or Logic I/O.

Note that DIO signals are always issued if the corresponding channel ON or OFF command is initiated by a surface control.

EQ Controls

Click the *EQ* button in the Button Bar to display the EQ screen.



To change parameters in the Control Area, click on the *Value Window* for the parameter you wish to change. Then use the SOURCE SELECT knob on the CR-24 module to turn the value up or down as desired. You can also click on the parameter's slider and move it up or down.

In the upper part of the screen are the graphical EQ display and VU meters. The standard audio frequency range of 20Hz - 20kHz is ranged in logarithmic form across this graph with gradations at 0.1 decade below 10K - 0.01 decade above 10K. The vertical axis scale range is -15dB - +15dB, with gradations every 3dB.

The level meter is a dual-indicating peak-over-average, with peaks riding as a lone "dot" over a solid bar-graphed average. An "Over" indication is at the top of the input level bargraph.

The EQ system consists of a four-band parametric EQ with low band and high band PEAK/SHELF switching, plus variable frequency high and low pass filters. As any of the controls are adjusted, a real time graphic display shows the resulting frequency response curves.

Reasonably conventional parametric sections are employed, with +/-14dB boost and cut capability, centre-frequency sweepable over the range of 16.1Hz to 20.2kHz, and a filter sharpness (Bandwidth) sweepable between 0.2 and 3.0 octaves. The LOW and HIGH bands also have a shelving function. The entire EQ is switchable in or out (*ENABLED* switch).

Filter



HPF (High-Pass Filter) – This is a 24dB/octave variable high-pass filter with Butterworth characteristics, tunable between 16.1Hz and 500Hz, and with a separate in/out switch (*HI PASS* button). The relatively high order of filter is necessary to allow definite and decisive removal of unwanted low-frequency artifacts (air-conditioning rumble, line hum, traffic, or footstep impacts) with minimal effect on the required program.

LPF (Low-Pass Filter) – This is a 24dB/octave variable low-pass filter with Butterworth characteristics, tunable between 1KHz and 20.2KHz, and with a separate in/out switch (*LO PASS* button). This filter is used to remove unwanted high frequency artifacts (noise, squeaks, etc.) with minimal effect on the required program.

Low and High Shelving

The high and low "shelving" EQ sections are designed to correct for real or subjective lack in low or high frequency energy in the program material.

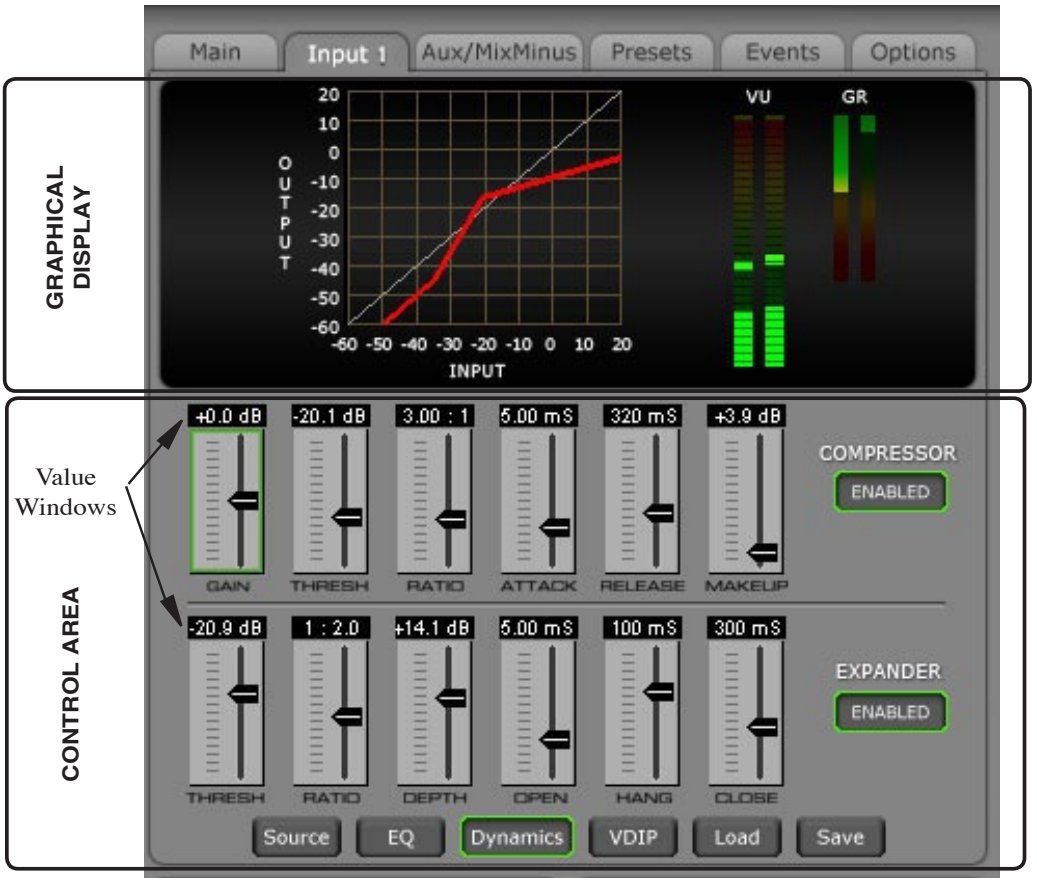
The low shelver (activated by the *LO SHELF* button) at the lower end of its range, will enable specific kick-drum or bass guitar elements of a source to be balanced with respect to the rest of the source; at higher frequency settings it acts progressively more as a conventional "bass" control.

Similarly, at lower frequency settings the high shelver (activated by the *HI SHELF* button) acts as a conventional "treble" control; as the frequency is raised the effect is confined to progressively higher frequencies, allowing "sizzle" or "sparkle" to be (re) introduced without adding the harshness that a corresponding rise in high-mid frequencies would introduce.

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

Dynamics Processing Controls

Click the *Dynamics* button on the Button Bar at the bottom of the Input screen to display the Dynamics control section.

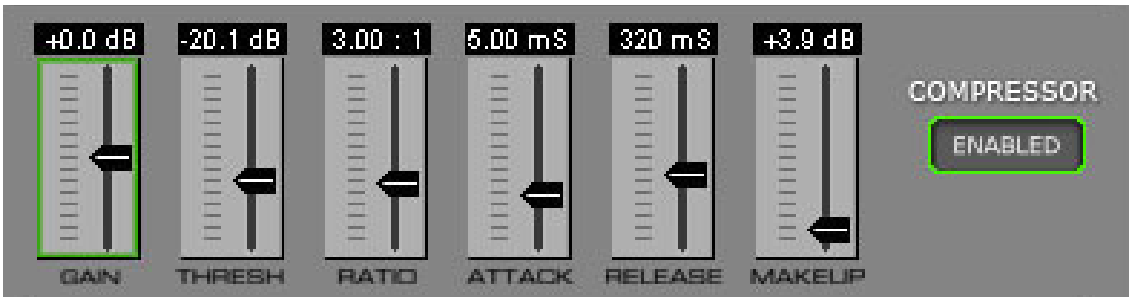


To change parameters in the Control Area, click on the *value window* for the parameter you wish to change. Then use the SOURCE SELECT knob on the CR-24 module to turn the value up or down as desired. You can also click on the parameter's slider and move it up or down.

In the upper part of the screen are the graphical dynamics display that shows an input/output transfer function plot, and VU and GR meters.

The level meter is a dual-indicating peak-over-average, with peaks riding as a lone "dot" over a solid bar-graphed average. An "Over" indication is at the top of the input level bargraph.

Compressor Settings



The compressor algorithm used in the LX-24 is designed to:

- prevent really ghastly noises from being achieved too easily;
- allow smooth, inaudible, and unobtrusive level control on uneven sources;
- act as a peak limiter for inadvertent overload control;
- enable deep effects if required.

The LX-24 compressor section is a compound of many diverse dynamics elements.

The level detector is a pseudo-RMS averaging type with its own symmetrical-in-time attack-and-release characteristic adjustable between 0.1mS and 330mS (ATTACK control). At the slower end of its range, by itself it achieves a nouveau-classic "dbx" style syllabic-rate level control. As the time-constant is shortened, it becomes progressively shorter in relation to the lower audio frequencies themselves; the effect is to turn the detector into more of a peak-level detector, necessary for limiting or wilder effects. A secondary effect at intermediate to fast attack-times is that low frequencies are peak sensed while high frequencies are average sensed, resulting in an effective high-frequency bias (up to as much as 6dB differential) which helps to mitigate the detrimental limiting effect of the resulting audio seeming "bottom heavy" that is normal to most compressors.

While the overall gain-reduction scheme is "feed-forward," the heart of the detector stage itself is a feedback limiter; this allows for this carefully-contrived loosely-damped servo-loop to permit far more interesting dynamic effects than the analytically perfect but deathly boring deterministic classic feed-forward detection schemes typically afford.

The compressor is "soft-knee," meaning the compression ratio increases slowly with increasing applied level, greatly easing the sonic transition into full compression; it helps avoid the "snatching" and "pumping" at threshold that many "hard-knee" dynamics units exhibit.

A full range of controls is available to affect the compressor's behavior:

COMPRESSOR *ENABLED* – A switch that allows the compressor to be enabled and disabled.

GAIN – controls the input gain of the signal on this fader. For Mic input the range is from 20dB to 80dB; for Line level input the range is from -18dB to +18dB.

THRESH (-40.0dB - +10.0dB) – Threshold, the level above which gain reduction is applied.

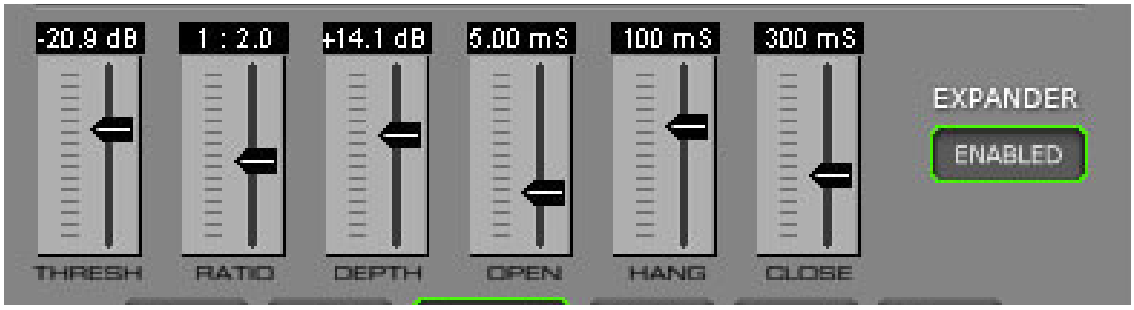
RATIO (1.00:1 - 20.0:1) – The proportion by which a signal exceeding the threshold is reduced in level. "3:1" means that a change in signal level above the threshold by 15dB will be reduced by only 5dB.

ATTACK (0.10mS - 330.0mS) – How quickly the compressor responds to a signal exceeding the threshold.

RELEASE (50.0mS - 3.000S) – The time during with which the compressor recovers as the exciting input signal falls below the threshold.

MAKEUP (0.0dB - 36.0dB) – When fairly deep compression is invoked (large gain reduction) it can be necessary to increase the compressor's output level back up to nominal system signal level; up to 36dB of output gain is available to allow this.

Expander Settings



An expander is a useful tool for reducing unwanted background noises. These could be variously air-conditioning rumble or noise, background conversation, phone-line noises, recording hiss, etc. It is also useful for reducing the inevitable general increase in background noise of some recorded material when subject to heavy compression. A common usage in live sound is to effectively turn a microphone off when not being talked/sung into, so as to reduce corruption of a mix or reduce the chances of feedback with an unwanted open microphone.

The expander is slightly counter-intuitive when first encountered, in that unlike nearly any other processing element it is active – i.e. working, attenuating away the input signal – when the input signal is at its quietest, at or below the threshold. If the expander is on, there will be gain reduction when no signal is present. The gain-reduction reduces as the threshold is approached, and there is none above the threshold.

The controls are:

EXPANDER *ENABLED* – A switch that allows the expander to be enabled and disabled.

THRESH (-60.0dB - 0.0dB) – The level below which the automatic attenuation starts to take effect.

RATIO (1:1.0 - 1:5.0) – The proportion of how many dB the input signal is attenuated for every dB it drops below the threshold. 1:3 indicates 18dB loss for 6dB drop in input signal level.

DEPTH (0.0dB - 40.0dB) – The maximum amount the expander is permitted to reduce the input signal level.

OPEN (1.00mS - 100.0mS) – The time-constant of the rate at which the expander un-attenuates, or opens; sometimes called "attack."

HANG (0.00mS - 1.000S) – An adjustable period of time the expander remains open without attenuating, before starting to close. Handy to keep the expander open during, say, speech inter-syllables or other short pauses, without having to resort to excessively long...

CLOSE (50.0mS - 3.000S) – ... close times, being the rate at which the expander attenuates away the input signal once below the threshold.

A graphical input/output plot at the top of the Dynamics screen shows the combined effects of the compressor and expander on the signal.

Almost always, the trick is to set the threshold of the expander – below which it starts to attenuate away the input signal – high enough to capture the noise, but not too high as to snatch at the lower levels of the desired parts of the program material. That can sound really irritating.

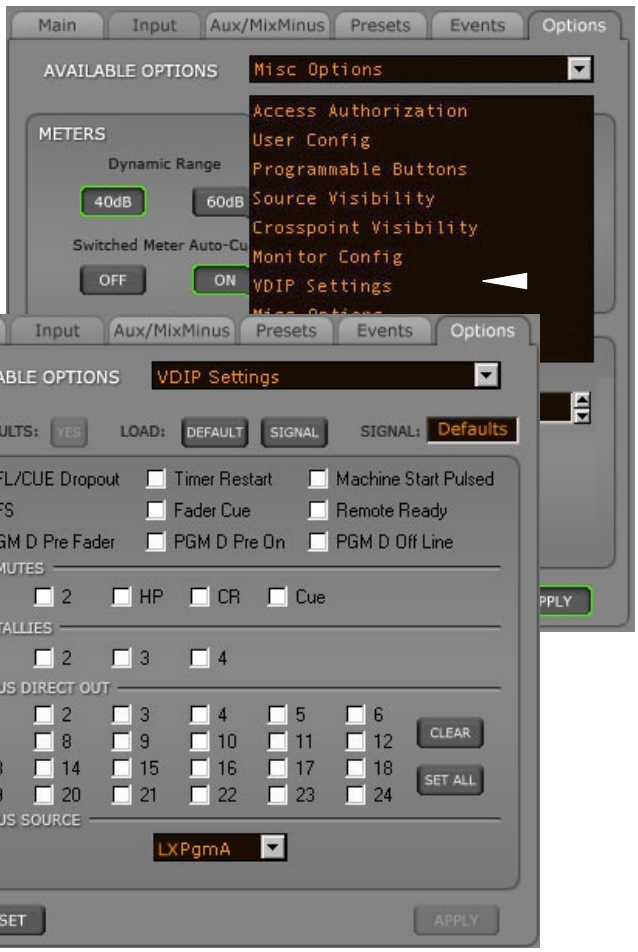
Sometimes the gain reduction is required to be subtle so as not to draw attention to the fact that the expander is in operation; under these conditions shallow expansion ratios, such as 1:1.5 or 1:2 are preferred, as are restricted depth - 6dB, or 10dB, is plenty and makes a substantial subjective improvement to the noise.

These, too, are the kind of settings used for another application of an expander: effectively shortening an excessively long room reverberation time, or an instrument's ring-out that is overly persistent. In these cases the threshold is set somewhat higher, well up into the desired audio levels – in this way the attenuation becomes part of the overall sound, but the gentle ratio prevents a sense of anything "odd" happening. Again, relatively shallow depths of 12dB or so are plenty to achieve the desired effect.

More aggressive expansion, or "gating," is accomplished with steep ratios (1:3, 1:5) and with shorter open and close times than for "unobtrusive." It is still best not to go overboard with depth – even just 14dB, 20dB tops, is enough to make a signal "disappear" in the context of a mix; the whole gating sound, especially surprisingly its opening, is less obvious with shallower depth. Sometimes the "Surprise!" element is required, though, for effect.

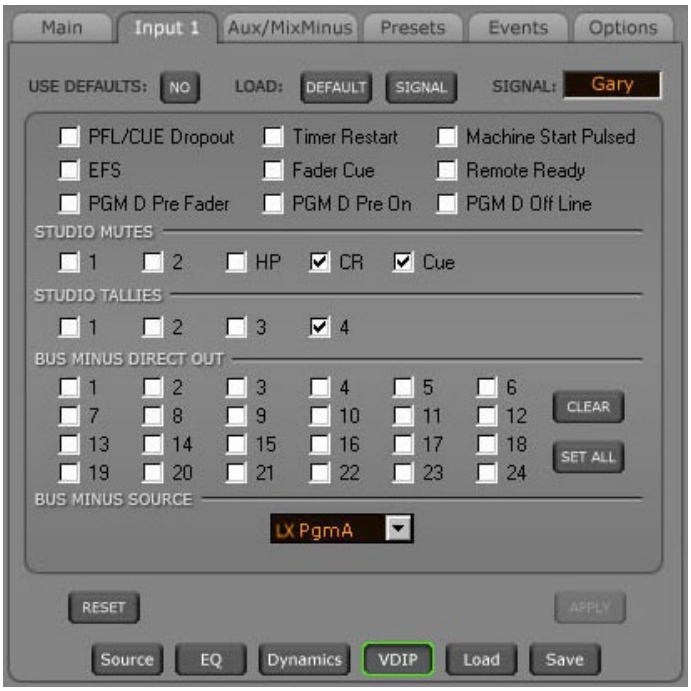
VDip Settings

Many surface functions, such as Mute, Tally, and Machine Start Pulsed, are programmed from the VDip Screen. VDip settings are attributes of the Source signal and will follow the signal onto different faders of the same control surface or even other surfaces, depending on how it is programmed. Configure VDip via the Embedded LX-24 GUI.



To configure VDip DEFAULT on the LX-24 press the *Options* tab and choose VDIP Settings from the AVAILABLE OPTIONS scroll down list, then check the functions that will be same for ALL signals.

To configure VDip for a particular source on the LX-24, first make sure that the source you need to program with VDip is assigned to an input fader. Press the fader's SET button and the *Input X* Tab will open to the last screen used. Select VDip from the Button Bar at the bottom. Make sure USE DEFAULTS is *NO* if you want this signal to work differently than the default settings, and then simply check the functions for this signal. If USE DEFAULTS is set to *YES*, that signal will use the default settings. Once you have the settings you want, click *APPLY*.





To load other signals you want to to change the settings of, press and hold another fader's SET button or click the *SIGNAL* button and choose which signal to load from the Signal List.

Click *DEFAULT* to change settings you want to be the same for ALL signals The default settings form then shows the default values used for any signal unless specifically overridden. If you have made changes and then decided you don't want to put the changes into effect, click *RESET*. This will cancel any changes you made since entering the screen or since clicking *APPLY*, whichever happened most recently.

PFL/CUE Dropout – When a channel's CUE button is pressed it will assign the channel's signal to the CUE bus. When "PFL/CUE Dropout" is checked it causes the channel's CUE function to be de-activated whenever the channel ON switch is pressed.

Timer Restart – The surface's digital timer can be programmed to automatically reset to zero and begin counting up when the channel's ON button is pressed. To enable this function the AUTO button in the timer section of the Headphone module has to be activated.

Machine Start Pulsed – When a signal is assigned to a fader, turning the fader on generates a Machine Start logic that can be used to start a machine, such as a CD player. This signal is normally active while the fader is on and is deactivated when the fader is turned back off. But if "Machine Start Pulsed" is checked, the logic is activated when the fader is first turned on, and then deactivates a brief time (roughly one half second) later. This is useful for remote starting machines that do not like to have a constant activation of their start input.

EFS – This function causes the channel to be OFF when the fader is fully down or ON when the fader is brought up from the fully down position. The ON and OFF switches can still control the channel.

Fader Cue – Assigns the signal to the Cue bus when the fader is moved all the way down. The CUE button can still be used to change the CUE status.

Remote Ready – The channel's OFF switch normally has its LED indicator controlled by the switch itself. This is the factory default setting. When "Remote Ready" is checked, the channel's OFF switch LED can be controlled by an external source machine. This requires additional configuration in Navigator to fully implement the feature.

PGM D Pre Fader – When checked, causes the signal, when assigned to the surface's PGM D output, to be tapped before the fader.

PGM D Pre On – When checked, causes the signal, when assigned to the surface's PGM D output, to be tapped before the channel ON switch.

PGM D Off Line – This function determines what will be heard at the fader's Bus Minus output when the fader is off. If the box is not checked, when the fader is off the same bus will feed the bus minus that feeds it when the fader is on, as determined by the BUS MINUS SOURCE selection below. But if the PGM D Off Line box is checked, when the fader is off the Bus Minus output will be fed from the PGM D bus instead.

STUDIO MUTES – Input channels can be programmed to mute the various monitors when the channel is ON. There are five STUDIO MUTES checkboxes, one for each monitor section plus one for CUE. The checked boxes show which speakers are muted.

STUDIO TALLIES – Turning the channel ON can activate a remote tally indicator. There are four tally control lines. The checked boxes show which tallies are activated. This requires additional configuration in Navigator to fully implement the feature.

BUS MINUS DIRECT OUT – For each signal, determines if the Bus Minus output is a mix-minus of the selected BUS MINUS SOURCE (unchecked) or is a Direct Output (checked). On signals where the BUS MINUS DIRECT OUT box is checked, the PGM D Off Line box (above) will have no effect.

BUS MINUS SOURCE – For each signal, determines which bus the Bus Minus output is a mix-minus of. Any of the four PGM busses, the four Mix Minus busses, or the four AUX busses can be selected as Bus Minus Source. If, for example, LXPgmA is selected, then the BUS MINUS output will consist of the audio on the LXPgmA bus, minus the signal assigned to the fader. This is true when the fader is turned on. It also true when the fader is turned off, **unless** the PGM D Off Line box is checked (above). This setting will have no effect on any signal where the BUS MINUS DIRECT OUT box is checked (above).

Load Button

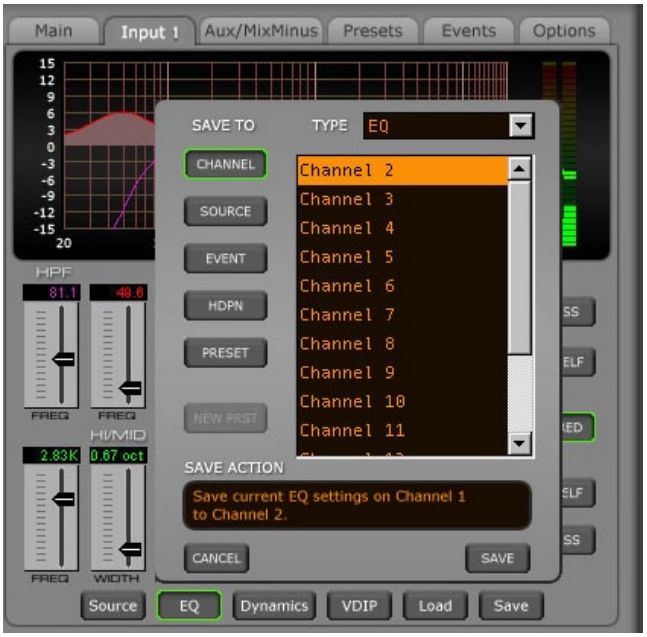
Click the Load button on the Button Bar at the bottom of the Input screen to display the Preset Load screen. Choose the PRESET TYPE, highlight the desired preset, and press *LOAD*.

See the Preset section of the Chapter 3 for details on Preset options.



Save Button

The user can save all adjustments for the compressor, expander, and equalizer with the *SAVE* button. Pressing the *SAVE* button at the bottom of the Input screen will bring up the "SAVE TO" form that allows all changes to be saved to a channel, a source, an event, the headphones, or a preset.



Master Section

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Master Section

Each LX-24 control surface has one Control Room module (CR-24), one Headphone module (HP-24), one Studio 1 module (S1-24), and one Studio 2 module (S2-24). Although they are individual modules, they are designed to function as a group. For example, one of the four SEND 1 - SEND 4 controls is located on the top of each module and the SEND TB buttons are located on the Studio 2 module. In this chapter we will describe the controls and functions of these modules as a group starting from the top of the modules and going down.

AUX Busses

The control surface has four AUX busses, which can be used to create record feeds, extra mix-minus busses, etc. The Aux SEND 1 - SEND 4 controls are located on the top of each module.

Input Aux Send control is accessed using the Aux Send section of the main Input Tab screen. Press the SET button on the desired input channel and the Input Tab automatically opens to the last screen in use. Press Source on the button bar near the bottom if you don't see the AUX BUS section right away.





Each AUX BUS feed has Mode, Pre-fader and Pre-On switches, and On/Off controls. A virtual AUX BUS knob indicates relative level. Use the physical Aux SEND knobs on the top of modules or the mouse on the screen to adjust levels. All adjustments can be saved to a Channel, a Source, an Event, or a Preset (see more on saving later).

The Aux SEND LED indicators are displayed on the meterbridge.



Multi-Function Aux Knobs

When a fader strip is selected by pressing the SET button, the SEND knobs set the Aux Send level to the Aux bus. When no SET buttons are active, these knobs act as Aux Bus Master level controls.

Pressing the *Aux/MixMinus* Tab switches the FUNCTION PANE to the *AUX and MIX-MINUS MASTERS* screen with four AUX MASTERS level controls and ON buttons. If no channel SET buttons are active, the physical Aux SEND knobs adjust the Master Aux Send output levels.



SEND TB (Talkback)

To interrupt an Aux bus signal with the surface's predefined TB signal, press the SEND TB switch for the desired SEND 1 - SEND 4, located on the top of Studio 2 module. This allows the control surface operator to communicate with the Talent or location receiving that Aux send.

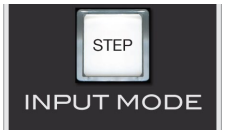


S2-24 Module

Note that the talkback source, typically a host mic, must first be cross connected to the surface's TB input using either Navigator software or the LX-24's built in Route function. The TB signal may be any Source signal in the router including MXM or Aux busses. The LX-24's TB input signal is a factory defined surface Destination signal with the name LXTkBack.

INPUT MODE Button

Choose the desired mode by pressing the INPUT MODE - STEP switch on the CR-24 module. The channel's MODE indicators on the input panel will change to reflect the new mode.



CR-24 Module

MXM ASSIGN Switches

These physical buttons are used to route input fader strips to MIX-MINUS busses. Press the SET button on any channel. If that channel is assigned to feed an MXM bus, the corresponding MXM ASSIGN switch and LED indicator on the fader strip will be lit (but this operation can be modified – see the INVERT LEDS button on the Aux/MixMinus Tab, as described below). Pressing an MXM ASSIGN switch will toggle that channel's signal into or out of the corresponding MXM bus.



HP-24 Module

MXM Master Controls

Click the *Aux/MixMinus* Tab on the GUI screen to bring up the MIX-MINUS MASTERS controls. Each MXM Master has a *PRE-FADER* and *PRE-ON* switch as well as a virtual level knob. Two global option buttons for LED inversion and Source follow control round out the section.



PRE-FADER – Normally any signal feeding a mix-minus does so with a post-fader signal. Selecting the *PRE-FADER* button for a given Mix-Minus bus globally configures the MXM bus to tap off the input strip audio before the fader.

PRE-ON – Normally any signal feeding a mix-minus does so with a post-ON switch signal. Selecting the *PRE-ON* button for a given Mix-Minus bus globally configures the MXM bus to tap off the input strip audio *before* the channel ON switch.

INVERT LEDs – This setting is used to flip the logic applied to the MXM assign LEDs on the fader strips. Set it to *NO* if you want the MXM assign LEDs on the fader strip to light up when the audio is feeding the bus. In this case you will have an MXM LED for every source that is *feeding* the MXM bus, and the MXM LED would be OFF on the strip that is not on the bus. This is how normal bus assign switches, like PGM, AUD, etc., work.

Choose *YES*, to flip that behavior. In this case all faders will normally feed the bus without lighting up the switches, and the fader that is NOT on the MXM bus will have its MXM LED lit. This inverted assign mode lets you quickly see which MXM bus the fader is subtracted from and may require fewer MXM assign switch presses to set up the mix-minus. When you first choose *YES* you will have to check that all MXM assign LEDs are OFF to normalize the setup, then simply press the desired MXM assign switch to remove the signal from an MXM bus. The MXM assign LED on the fader strip will light to indicate the signal is removed.

While it is much easier to visually determine the MXM bus assignment status using inverted LED mode, radio stations tend to operate in the NO mode and TV stations in the YES mode. Set this as required for your facility. Give Inverted Mode a try; it may actually be easier to use.

FOLLOW SOURCES – This setting is used to activate the MXM follow attribute for source signals. When set to *NO*, the MXM assignments made at the fader strip "stick"

with that strip no matter which source is selected. Choosing *YES* causes the MXM bus assign settings to "stick" to the Source signal selected for that channel. If the Source is moved to a different fader on this surface, or recalled at a later time, the MXM assign settings will automatically follow.

There is one caveat that needs to be considered when deciding whether to set FOLLOW SOURCE to YES or NO. In the NO mode, when you take an Event, the MXM settings for each channel will be set to the same state they were in when the Event was saved. However, in the YES mode, the MXM settings for each source will be set to the last state they were set to, which may or may not be the same as they were in when the Event was saved. What this essentially translates to is that MXM settings are not saved with the Event when FOLLOW SOURCE is operated in YES mode.

MXM Talkback

To interrupt a mix-minus output with the surface's predefined talkback signal, press any of the four MXM TB momentary switches located on the Studio 1 module. Note that the Talkback source, typically a host mic, must first be cross connected to the surface's TB input using either Navigator software or the LX-24's built in Route function. The TB signal may be any Source signal in the router including the MXM or Aux busses. The LX-24's TB input signal is a factory defined surface Destination signal with the name LXTkBack. There is only one TB bus input on the LX-24. You can use Programmable buttons to momentarily route other sources to the MXM outputs.



S1-24 Module

SOURCE SELECT Section

The CR-24 module houses the SOURCE SELECT knob with 8-character display and TAKE button.

The SOURCE SELECT knob serves three primary functions: as a Source signal selector for fader strips, as a Gain control, or as a Parameter Value controller when the Input EQ or Dynamics screens are selected.



CR-24 Module

Source Signal Selector

When the A or B button and the channel's SET button are pressed on the desired fader strip AND the Input Tab is positioned on the main SOURCE screen, the SOURCE SELECT knob can be used to select the desired A or B source depending on whether the channel is set to A or B. By turning this knob, the available inputs are displayed in the 8-character SOURCE display for the selected channel. When the desired input source is scrolled into the SOURCE window, pressing the TAKE button will cause that source to be programmed for the selected A or B button. If you fail to press TAKE, the display will revert to its original setting after a timeout of approximately 4 seconds, and the original source remains programmed.

There are also two ways to select the source using VGA screen:

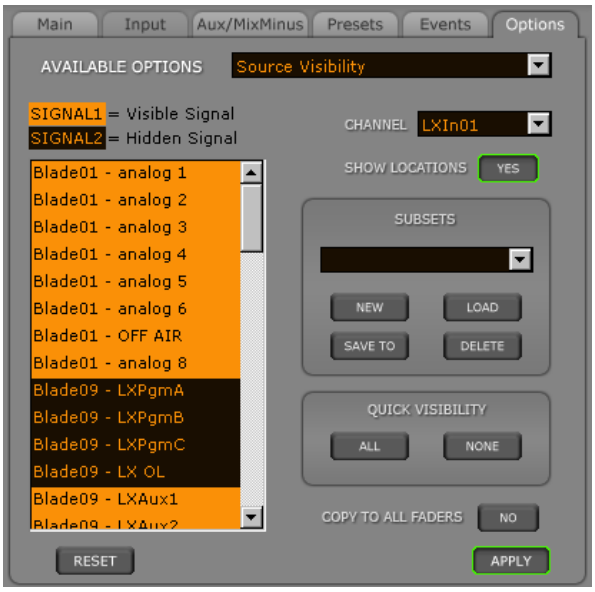
- Click in the SOURCE window on the Input Tab and select the desired Source from the Input Signals list
- When the channel's SET buttons is pressed on the desired fader strip, press the SOURCE SELECT knob once and select the desired Source from the pop-up Input Signals list. Press the SOURCE SELECT knob again to close the Input Signals list.



Use the Source Visibility option setting to limit the sources the user "sees" in the signal tree. This feature is helpful, especially in large systems with lots of signals.

On the VGA screen select "Source Visibility" from the AVAILABLE OPTIONS scroll down list to display the Source Visibility form (below).





With this form the user can set the channel's source visibilities. Scroll up and down the source list and highlight the desired source signal(s) and click the *APPLY* button to save the visibility options. If you have made changes and then decided you don't want to put the changes into effect, click *RESET*. This will cancel any changes you made since entering the screen or since clicking *APPLY*, whichever happened most recently.

In addition to the eight character name of a signal, signals may also have a second identifier, an eight character location, which is typically set up in the Navigator program. Using the SHOW LOCATIONS button on the Source Visibility Options screen you can determine if the location identifier will show up in the Source list on the monitor when setting visibility. Click the SHOW LOCATIONS button to toggle between *YES* (show locations) and *NO* (don't show locations).

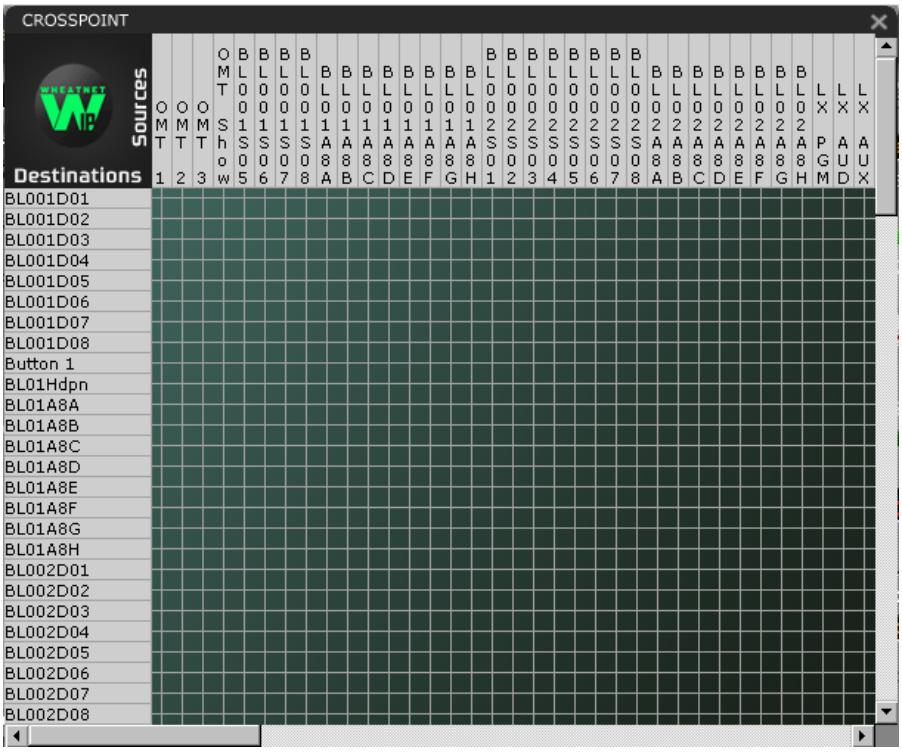
There are also "QUICK VISIBILITY" selection buttons. Clicking the *ALL* button will set all source signals to be visible. Clicking the *NONE* button will set all source signals to be hidden.

You can change the channel you are affecting visibility on by selecting the desired channel in the channel drop down box.

You can also make and use visibility SUBSETS. To apply a preset to the current channel, select the preset from the SUBSETS drop down box, then press *LOAD*. After a preset is loaded, you can make changes to it by altering the visibility as described above, then press *SAVE TO*. Creating new presets is covered later in the manual (see page 3-10).

There is an option to copy the Source Visibility settings to all faders by clicking the COPY TO ALL FADERS button so it display *YES*. If you applying the Source Visibility settings only to the selected fader, make sure the COPY TO ALL FADERS button displays *NO*.

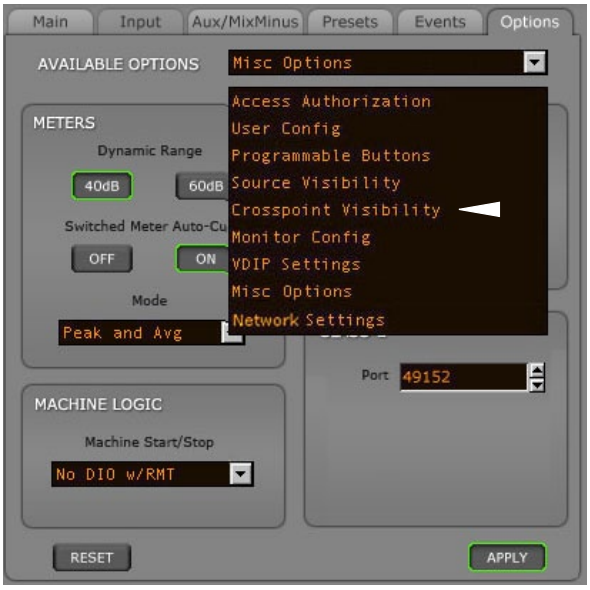
The operator also can make the source selection with the CROSSPOINT screen. Pressing the SOURCE SELECT encoder when no input channel SET buttons are ON opens the CROSSPOINT screen with a full matrix list of sources and destinations for quick source selection on a fader, or for making other connections within the system (subject to Permissions settings). Press the SOURCE SELECT encoder again to close the CROSSPOINT screen.

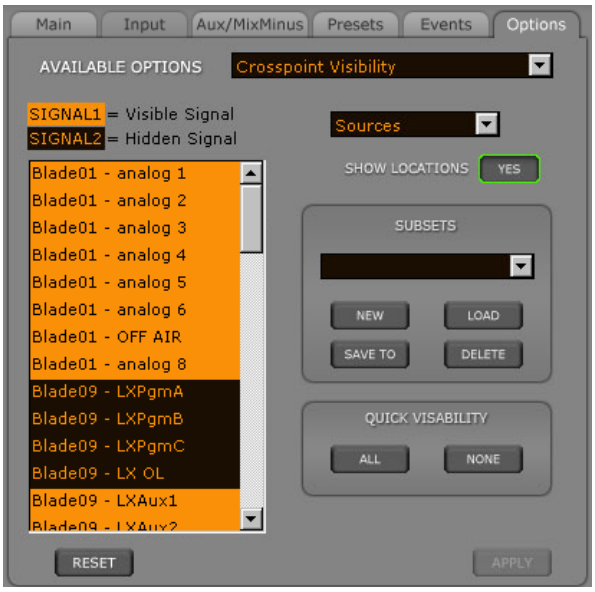


The CROSSPOINT matrix is analagous to an electronic patch bay. Audio sources (router inputs) are located along the X axis at the top, audio destinations (router outputs) are vertically stacked along the Y axis on the left side. Simply click at the intersection of the desired Source and Destination signals to "patch" them.

All surface mixes (e.g. PGM busses, MixMinus, Aux sends, etc.) appear as Sources. All surface inputs (faders, talk back, monitor source selects, etc.) appear as destinations. Surface signals may be routed just like any user I/O.

Use the Crosspoint Visibility option setting to limit the sources and destinations the user sees in the CROSSPOINT matrix. This feature is helpful, especially in large systems with lots of signals. On the VGA screen select "Crosspoint Visibility" from the AVAILABLE OPTIONS scroll down list to display the Crosspoint Visibility form.





With this form the user can set source and destination visibilities. Scroll up and down the list, highlight the desired signal(s), and click the *APPLY* button to save the visibility options. If you have made changes and then decided you don't want to put the changes into effect, click *RESET*. This will cancel any changes you made since entering the screen or since clicking *APPLY*, whichever happened most recently.

In addition to the eight character name of a signal, signals may also have a second identifier, an eight character location, which is typically set up in the Navigator program. Using the SHOW LOCATIONS button on the Crosspoint Visibility Options screen you can determine if the location identifier will show up in the Signal list on the monitor when setting visibility. Click the SHOW LOCATIONS button to toggle between *YES* (show locations) and *NO* (don't show locations).

There are also "QUICK VISIBILITY" selection buttons. Clicking the *ALL* button will set all signals to be visible. Clicking the *NONE* button will set all signals to be hidden.

You can also make and use visibility SUBSETS. To apply a preset to the current channel, select the preset from the SUBSETS drop down box, then press *LOAD*. After a preset is loaded, you can make changes to it by altering the visibility as described above, then press *SAVE TO*.

Gain Control

Press and hold the input channel SET button and rotate the SOURCE SELECT encoder (CR-24 module) to set gain, which is displayed in the 8-character display above the encoder.



CR-24 Module

Parameter Value Controller

To function as a Parameter Value controller when the VGA Input EQ or Dynamics screens are selected (described in Chapter 2) click on the parameter's value window and rotate the SOURCE SELECT encoder (CR-24 module) to turn the value up or down as desired.

PAN Control

The PAN knob acts as a panpot in MONO, LEFT only, and RIGHT only modes, and as a balance control in STEREO mode. This feature is activated for a given channel by pressing the channel's SET button. To easily set the PAN to center, you can press the control twice in rapid succession, like double-clicking a mouse button. You may also adjust PAN by clicking and dragging the PAN position indicator on the Input Tab. Pan position is also indicated for the currently selected channel on the PAN LED indicator on the meterbridge.





HP-24 Module

CUE Knob

The CUE signal is pre-fader, and is normally used to check signals. When a channel is CUEd, its pre-fader signal will appear in the cue speakers, and the switched meter screen on the VGA, if visible, will show the level of the pre-fader signal.

The CUE level control determines the overall loudness of the cue signal.

The cue speakers have the potential for feedback and should be muted whenever the control room speakers are. Use VDip to add the CUE MUTE attribute to any microphone signals located in the control room.

METERS

The METERS section consists up to of four VU meter pairs on the control surface's meterbridge and a METERS SET button.

NOTE: The Options Text File located on the surface's flash drive maps PGM, AUD, etc. to physical meters. This file is preconfigured at the factory.

VU Meter Pairs

VU meter pairs (PROGRAM, AUDITION, AUXILIARY, and SWITCHED) are stereo LED bargraph type meters. Note that the LX-24 small frames do not have the AUXILIARY meter pair.

The level of the signal being metered is indicated by the number of display elements that are lighted. The more elements lighted, the stronger is the signal being displayed. The right eight LEDs in each bargraph are red to indicate when the signal level is approaching a clipping (distorted) level. The next ten LEDs are yellow, indicating a normal level range, and the remaining LEDs are green. The top member of the pair indicates the level of the signal's left channel, while the bottom member of the pair indicates the level of the signal's right channel.



The switched meter displays the signal level of a user selected source – any source on the WheatNet-IP system – or the CUE signal level when an input fader's CUE switch is activated (but see below to disable this Auto-Cue function).

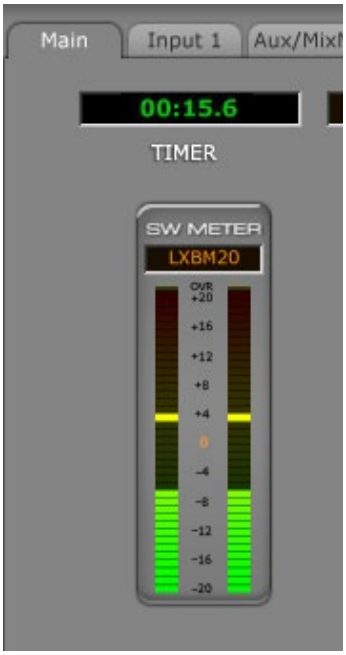
METERS SET Button

The METERS SET button selects the source for the switched meter pair. To select a signal to a meter, first press the METERS SET button (the button will light), then rotate the SOURCE SELECT encoder on the CR-24 module. Available sources will be displayed in the 8-character display above the SOURCE SELECT encoder, and the TAKE button will light. When the desired signal is displayed, press the TAKE button. The switched meter array will then display the signal level and the TAKE button light goes off. If, however, after a timeout period of approximately four seconds, the TAKE button is not pressed, the array will revert back to its previous selected program and the TAKE light will go out. The METERS SET button remains lit until pressed again, or until another SET button is pressed.

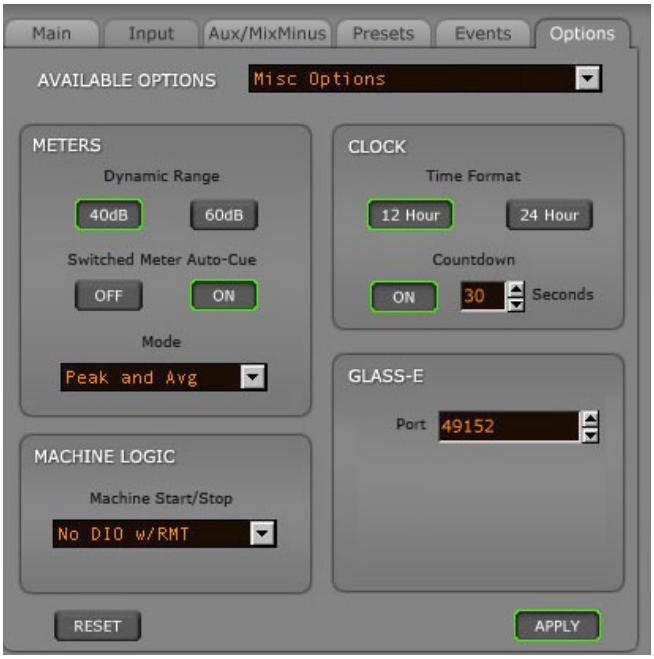


CR-24 Module

The switched meter display on the *Main Tab* shows the signal source being metered name at the top. Click on this name to bring up the source selection window and change the signal as desired.



A METERS setting on the *Option Tab* allows you to turn off Auto-Cue to this meter.



EVENT

The LX-24 includes a snapshot save and recall feature that saves all of the surface's switch, level, and DSP settings to a unique Event file. These saved Events may be recalled as required at any time. User access privileges may be configured to limit access to Event Save, Recall, or both.

Use the SELECT knob on the S1-24 module to dial up the desired Event, as seen in the EVENT display. Press TAKE to complete the process.

Events can also be taken from the *Events* Tab on the VGA screen.

Highlight the Event name in the list window, then press *ARM*, then press *TAKE*. Note that the board will completely reset to the previously saved state.

In order to accommodate Event switching while OnAir, any faders which are ON when the Event is recalled will NOT be affected.



S1-24 Module





The EVENT EDITOR acts an Event file manager. This is where you create, save, rename, and delete Events. It is pretty easy to use. To create a new "snapshot," simply click *NEW* and enter an Event name using the pop-up virtual keyboard. Highlight an existing Event name and click *SAVE TO* to overwrite the Event with the current surface configuration, *RENAME* to retitle it, or *DELETE* to permanently remove it.

Deleted Events may NOT be restored.

NOTE: The following characters are forbidden to use in Event or Preset names: **\, /, :, *, ?, ", <, >, |**.

You can recall an Event using the EVENT RECALL buttons located on the S1-24 module. To do so, press and release appropriate button 1, 2, 3, or 4. The button will light to indicate it is armed. Then press and release the button once more to take the Event. The EVENT display indicates the last Event taken. Please note that an Event will not change the status of a channel that is ON when the Event is recalled.

Events are assigned to the four EVENT RECALL buttons using the EVENT EDITOR on the VGA *Events* tab. Select the desired Event in the EVENT EDITOR list, then press the appropriate BUTTON ASSIGNMENT button 1, 2, 3, or 4 button in the EVENT EDITOR.

PRESET

Presets can be managed via LX-24 GUI. Click on the *Presets* tab on the VGA screen to open the Presets screen. The *Presets* Tab acts as a file manager for parameter presets. "Presets" on the LX-24 are simply snapshots of parameters that may be saved, recalled, and applied to individual fader strips or source signals. You can Save and Load individual EQ, Dynamics, or Processor (EQ+Dyn) Types directly to faders and Sources from the *Input X* Tab. The ALL Type lets you copy the entire channel strip and paste the settings to any other channel strip using Preset Load on the *Input X* Tab. Access to this feature can be limited within a control mode and thus, effectively, password protected.



Presets Tab Functions

TYPE – This drop down category list lets you select the preset type: Mode, Pan, Aux Sends, EQ, Dynamics, Processor, or All.

SELECTED PRESET – This drop down list lets you select one of the presets in the chosen **TYPE** to edit or delete.

COPY FROM CH – Use with **NEW** to select which fader channel you wish to copy *from*.

NEW – Creates a new Preset in the chosen category. Parameters copied from the **COPY FROM CH** channel. The virtual keyboard opens to name the new Preset.

RENAME – Opens the virtual keyboard to rename the **SELECTED PRESET**.

PRESETS list – This window displays a list of Presets in the current **TYPE**.

CHANNEL ASSOCIATIONS list – Displays which faders are mapped to Presets of the selected **TYPE**.

SOURCE ASSOCIATIONS list – Displays which Sources are mapped to Presets of the selected **TYPE**.

DELETE – You may use the **DELETE** buttons under each association list to remove the Preset or Channel /Source associations. ***Deleted Presets may NOT be restored.***

Copy a Preset From Channel

Choose the channel with the presets you want to copy from the COPY FROM CH drop down list, then click on the *NEW* button to display the virtual keyboard. Type a name for the new preset and click *SAVE*.



NOTE: The following characters are forbidden to use in Event or Preset names: **\, /, :, *, ?, ", <, >, |.**

Load a Preset

Press the *Input X* tab and click the *LOAD* button on the bottom of the Input screen to display the PRESET LOAD screen. Choose the PRESET TYPE, highlight the desired preset, and press *LOAD*.



Save

The user can save all adjustments with the *SAVE* button. Pressing the *SAVE* button will bring up the SAVE TO form that allows all changes to be saved to a channel, a source, an event, or a preset.



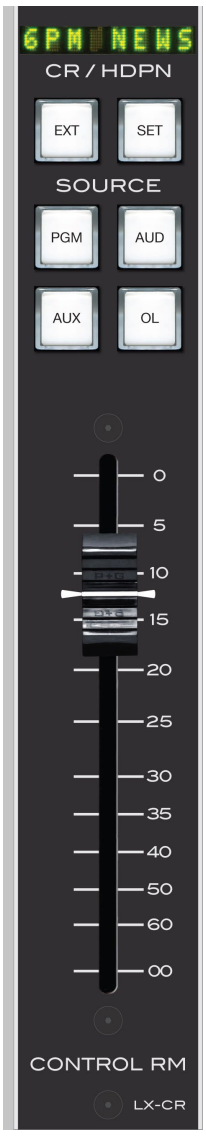
Monitor Speaker Controls

The bottom section of the modules has the controls for four monitor outputs: CONTROL RM, HEADPHONE, STUDIO 1, and STUDIO 2. The VGA always displays the monitor level, muting, and options status.

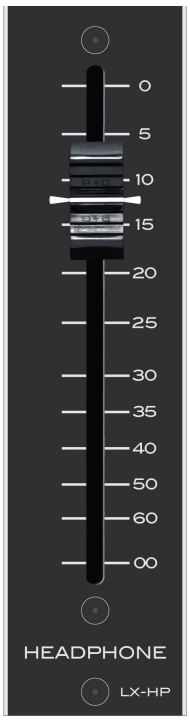
Each monitor has a LEVEL control. The Control Room, Studio 1 and Studio 2 each has a bank of source select buttons for PGM, AUD, AUX, and OL, as well as a programmable EXT button. The Headphone monitors the same source as the Control Room speakers. There are also TB buttons in the two STUDIO sections. Each monitor output has options for Muting, Locking the output level, and interrupting the output with Cue audio. The headphone output may also be fed with split CUE and an optional processed signal (see the description of the Headphone Mode Switches later in this chapter).

Source Select Switches

The bank of source select switches on the CR-24 module selects the audio signal sent to the speakers and the headphones. This bank includes dedicated switches for selecting PGM (program), AUD (audition), AUX (auxiliary), or OL (off line), and a programmable EXT source. Simply press the desired switch to listen to that output bus or external source signal. The button will be lit when the monitor is assigned to its respective bus, and the 8-character CR/HDPN display on the CONTROL RM module will display the source name.



The LX-24 can be programmed for mixing mode, which allows more than one audio signal to be sent to the speakers or headphones. Mixing mode is set via the Options Text File (see Appendix 1 for more information about the Options Text File). Scroll through the Options Text File until you see the code line: `STUDIO_SOURCE_MIXING:0`. Change the "0" to "1" and power cycle the control surface to activate the mixing mode.







Once the mixing mode has been enabled, here's how it works. Let's discuss the CR/HDPN monitor, starting with no monitor source selected. The CR/HDPN display will indicate "NoSource". Now press the PGM SOURCE button. The button will light, the CR/HDPN display will show "LX PGM", and the control room speakers and headphones will be playing the PGM bus audio. Press PGM again and the PGM goes out and the display again shows "NoSource". So far this is just like the normal monitor mode. Now press PGM again (PGM lights and the display reads "LX PGM") and then press AUD. Both AUD and PGM are

lit, and display reads “MIX MODE”. And the control room speakers and headphones are playing a mix of the audio that’s on PGM and the audio that’s on AUD.

Programming External Source Switch

The external switch may be programmed to select any allowed source in the system. Press and hold the button until it lights, then rotate the SOURCE SELECT until the desired source appears in the display above the encoder, then press TAKE (which is also lit) to finish programming the button.

Depending on how the LX-24 is configured, you may be able to select any source in the system or you may have a limited choice of sources for the external switch (see “Source Visibility” on page 3-6).

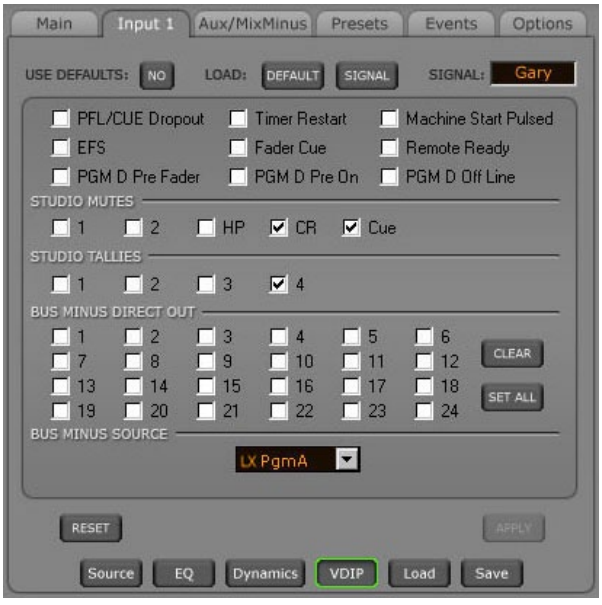
Talkback to Studio

Each Studio output has a dedicated TB button which lets the operator interrupt the normal feed to the studio speakers with a pre-determined TB signal. Note that the Talkback source, typically the board operator’s mic, must first be cross connected to the surface’s TB input using either Navigator software or the LX-24’s built in Route function. The TB signal may be any Source signal in the system, including MXM or Aux busses. The LX-24’s TB input signal is a factory defined surface Destination signal named LXTkBack. There is only one TB bus input on the LX-24. You can use Programmable Buttons to momentarily route other sources to the Studio outputs.

Speaker Muting

The board operator’s microphone is normally programmed to MUTE the monitor output and prevent the occurrence of feedback. To MUTE a monitor output you first need to configure the virtual dipswitches (VDip settings) for each microphone source signal. VDip is easily accessed by pressing the mic input SET button. The VGA automatically switches to the *Input X* Tab for that channel. Then choose VDIP from the Button Bar near the bottom of the *Input X* Tab. Check the Mute boxes as required to mute the CR, Headphone, or Studio outputs when the mic is turned ON.





When MUTE is active, the word MUTE appears in the center of the monitor's meter display. The monitor's level may also be locked to a user defined volume level. See the LX-24 Monitor Options section below. An Options Text File setting determines whether the Mute occurs when the fader is simply turned on or if the fader must be ON, up, and routed to the PGM bus (see Appendix 1 for more information about the Options Text File).

LX-24 Monitor Options



The Headphone, Control Room, and Studio outputs are normally subject to the control surface's muting and cue interrupt circuits. Use the *Options* Tab > Monitor Config screen to modify speaker behavior.

Cue Defeat – Click on the *Options* Tab, choose Monitor Config from the AVAILABLE OPTIONS scroll down list, and set the Cue Defeat option for Headphone, Control Room, and the Studios. If you program a Cue Defeat option to be ON, that means that cue will not interrupt that monitor output.

Level Lock – You can lock any of the surface's monitor level control pots. Use the slider to set a level and switch the Level Lock to be ON. Press the *APPLY* button at the bottom to confirm. The corresponding LOCK LED will be lit in the monitor speaker section of the VGA.

Control Room Level Control

The CONTROL RM level control determines the overall loudness of the signal being monitored as it appears in the Control Room speakers. As the fader on the CR-24 module is moved up or the knob on the GUI is turned clockwise, the loudness increases up to a maximum at the limit of mechanical movement. To decrease the loudness, slide the fader down or turn the knob in a counterclockwise direction.

NOTE: If the Control Room is muted and you turn the level control all the way up, then remove the condition that has the Control Room muted, the sound in the Control Room speakers will suddenly be VERY LOUD!

If the Control Room level has been locked in the LX-24 configuration, the CONTROL RM control will have no effect.

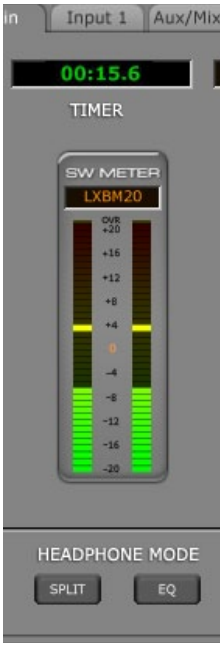
Headphone Level Control

The HEADPHONE level control determines the overall loudness of the headphone output signal, which monitors the same source (PGM, AUD, AUX, OL, or EXT) as the Control Room speakers. As the fader on the CR-24 module is moved up or the knob on the GUI is turned clockwise, the loudness increases up to a maximum at the limit of mechanical movement. To decrease the loudness, slide the fader down or turn the knob in a counterclockwise direction.

The headphone output signal appears at the headphone jack, located on the rear of the control surface. The jack is provided as a place to plug in user-supplied **stereo** headphones having an impedance of **60 Ohms or higher**.

If the HEADPHONE level has been locked in the LX-24 configuration, the HEADPHONE control will have no effect.

Headphone Mode Switches



On the *Main* GUI screen there are HEADPHONE MODE switches to set the Headphone mode.

Split Cue - Activating the SPLIT switch allows a summed (L+R) version of the regular program to be sent to the right side of the headphone output, while CUE audio is sent to the left side.

EQ - Activating the EQ switch routes the headphone source signal through a pre-defined processing loop. To apply processing to the HP mix you first must use the EQ and Dynamics controls on a Mic input channel to achieve the desired settings. Then click the Save button at the bottom of the *Input X* Tab. This brings up the Preset Save window. Under SAVE TO click the HDPN button. This activates the SAVE button at the bottom of the Preset Save window; click this SAVE button to finish the procedure. Now, when the HEADPHONE MODE EQ button is lit, the DJ will hear the processed sound of the selected output or External mix in the headphones. This is useful for monitoring the board output with processing without the delay problems associated with HD air signals.

Studio Level Control

The STUDIO level control determines the overall loudness of the signal being monitored as it appears in the Studio speakers. As the knob on the S1-24 or S2-24 module or on the GUI is turned clockwise, the loudness increases up to a maximum at the limit of mechanical rotation. To decrease the loudness, turn the knob in a counterclockwise direction.

NOTE: If the Studio is muted and you turn the level control all the way up, then remove the condition that has the Studio muted, the sound in the Studio speakers will suddenly be VERY LOUD!

If the Studio level has been locked in the LX-24 configuration, the STUDIO 1 or STUDIO 2 control will have no effect.

Timer Section

The control surface timer is provided with an AUTO-RESTART function so that programmed (via the GUI) input modules can automatically reset the timer display (located on the lower-right side of meterbridge and on the upper-left side of the main LX-24 GUI screen) to zero and start a new count (if the timer is running), allowing the announcer to easily track his own pace. The AUTO button must be lit to enable this function.





HP-24 Module

The S/S (start/stop) button halts the timer, holds the last count, and then restarts and accumulates the count when depressed again – perfect for compiling tapes of desired duration.

RESET has a dual-mode capability:

- if you depress it while the timer is counting, the display will instantly reset to zero and start a fresh count;
- if the timer is already stopped, depressing this button will reset the timer to zero, where it will hold until start is pressed.

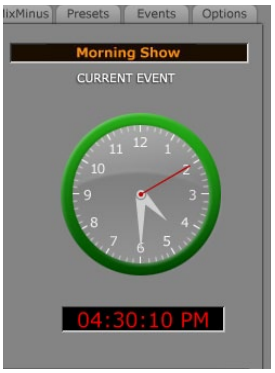
The HOLD button allows you to hold the display for a longer viewing duration, while still allowing the counter to continue in the background. Releasing the button will then display the current count.

Normally the timer counts up, but it can also be used as a countdown timer. Press the v button and it lights to indicate the timer is in the countdown mode, with the display indicating the value it will count down from. To set this time, press the ^ button until you get to the time you want to count down from. If you overshoot the desired time, or if it is already a larger value you want as the result of a previous setting, use the RST button to reset the value to zero, then press ^ to set the time you want. Once you have the start value set, simply press the S/S button to start the timer. Press v again to exit countdown mode.

Time of Day Clock

The main LX-24 GUI screen includes the digital and analog displays of a time of day clock in 12 or 24 hour format. 12/24 operation is set by making the desired choice on the *Options* Tab – Misc Options. If the LX-24 surface is part of a WheatNet-IP system its clock will automatically be synchronized to system's time. The system time can be synchronized to an NTP time server or to a particular PC connected to the system and running Navigator. Please refer to the *WheatNet-IP Audio Over IP Network* Technical Manual, Chapter 4 *(WheatNet-IP Navigator GUI)*, in the section titled *Set Date and Time*, for details.





The clock includes a red "countdown" area, the length of which can be set using the Countdown Seconds spin dial.

Programmable Buttons

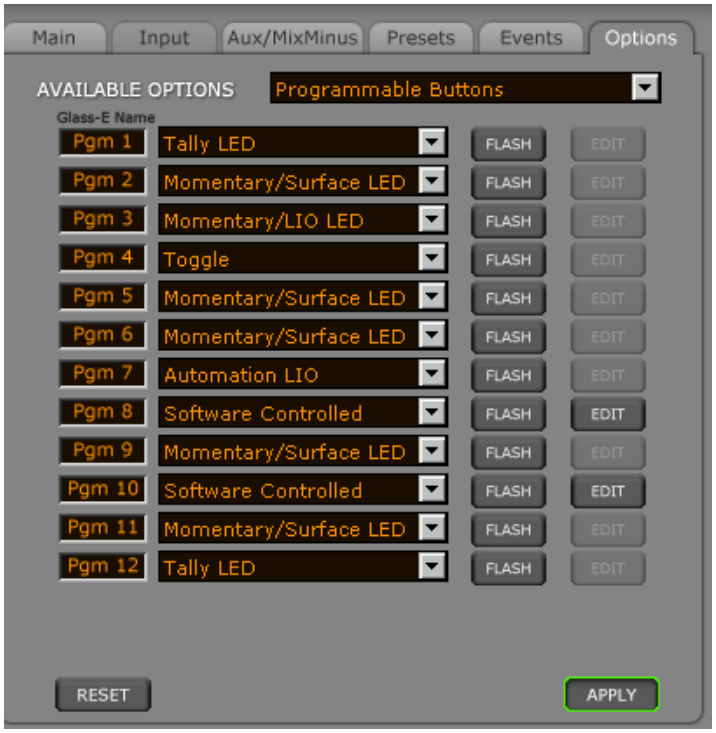
Also known as "SOFT" buttons these twelve (12) switches and indicating LEDs are designed to perform user-programmable functions. Some functions, such as firing Salvos, making temporary connections, or interfacing with the logic input and output ports on system Logic I/O cards, must be configured through the WheatNet-IP Navigator application. See the *WheatNet-IP Audio Over IP Network* Technical Manual for details.



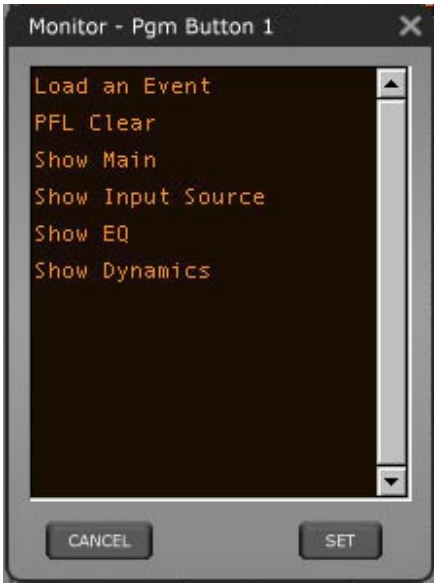
Some of the SOFT button programming can be done via the LX-24 GUI. Press the *Options* tab and choose Program-



mable Buttons from the AVAILABLE OPTIONS scroll down list to display the Programmable Buttons form. You will see a separate line on the form for each of the 12 buttons; each line has a drop down mode selector, a *FLASH* button, and an *EDIT* button.



- Mode selection – the programmable buttons can be operated in various modes:
  - Tally LED – in this mode button presses are ignored – the button illumination is controlled by logic signal programmed (in Navigator) to do so.
  - Toggle – in this mode the button acts like a toggle; one press turns it on and another press turns it off – the button's LED state is controlled by the surface, with the LED lit when the button is on and unlit when the button is off – the actual function performed by the button is configured in Navigator
  - Momentary / Surface LED – in this mode the button has a momentary action; it is on while pressed and off when released – the button's LED is controlled by the surface, with the LED on while the button is pressed and off when it is not being pressed – the actual function performed by the button is configured in Navigator
  - Momentary / LIO LED – in this mode the button has a momentary action, with its function configured in Navigator – the button LED is controlled by a system LIO which is also configured in Navigator
  - Software Controlled – in this mode the button's function is set up by the LX-24 GUI using the EDIT button, as described below – the LED is controlled by the surface and is on while the button is pressed and off when released
  - Automation LIO – in this mode the button's function is set up by the signals from various automation systems via Ethernet to turn channels ON and OFF (and perform other functions as well)
- *FLASH* – press this button to make a particular programmable button light – this helps you see which button you are programming
- *EDIT* – this button is only active when the programmable button mode is "Software Controlled" – in all other modes it is grayed out – when active, this button brings up the Monitor – Pgm Button Y form.



Accessory Module (AC-24)

Chapter Contents

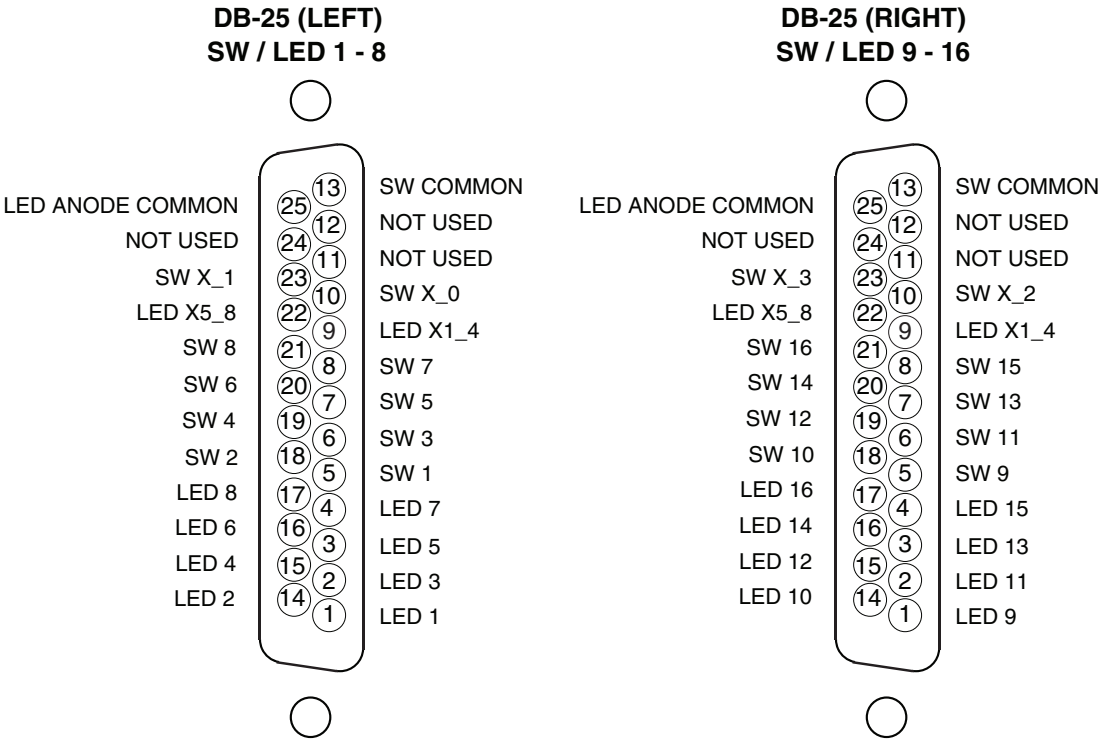
General Purpose Module 4-2
16 Programmable Buttons Module 4-3

Accessory Module (AC-24)

This optional module contains the 16 buttons and can function as a general purpose module (AC-24-G) or as a programmable module (AC-24-P).

AC-24-G – General Purpose Module

The AC-24-G provides connections to the 16 button switches and LED indicators via two DB-25 connectors located on the left side of the control surface rear.



Typical wiring connections will use pin 13 of the left DB-25 as the common connection for switches 1 - 8 and pin 13 of the right DB-25 as the common connection for switches 9 - 16. Thus, when switch 1 is pressed it provides a closure from pin 5 to pin 13 on the left DB-25. Switch 2 gives a closure from pin 18 to pin 13 on the left DB-25, and so on.

In a similar fashion, pin 25 of the left DB-25 is the common connection for the indicator LEDs 1 - 8 and pin 25 of the right DB-25 is the common connection for LEDs 9 - 16. So to light switch 9, for example, connect the positive terminal of an external DC power supply, in the 5VDC to 24VDC range, to pin 25 of the right DB-25 and connect pin 1 of the right DB-25 back to the minus terminal of that same external supply. The rest of the LEDs can be lit in a similar fashion.

Please note that pins 13 of both connectors are connected directly together inside the module, thus providing a single electrical common connection for all 16 switches. Similarly, pins 25 of both connectors are connected directly together within the module and provide a single electrical source connection to power all 16 LEDs.



AC-24-P – 16 Programmable Buttons Module

The AC-24-P module can be programmed for a variety of functions by using the WheatNet-IP GP-16P Configuration Tool software (refer to the GPC-IP System Manual). This module connects to Ethernet via an RJ-45 connector located on the provided GPC-1PCB.



Host CPU (HC-24)

Chapter Contents

Overview **5-2**

Ethernet IP Addressing **5-2**

Ethernet Interface Wiring **5-2**

"CT43" RJ-45 - Main Ethernet Connector 5-2

Typical Ethernet Cable 5-3

Host Controller (HC-24)

Overview

The host controller provides the centralized intelligence for the LX-24 control surface. The HC-24 communicates to the WheatNet-IP Blade via TCP/IP over Ethernet through a standard ethernet hub or switch.

Hardware and software configuration, as well as real time crosspoint information, is saved in non-volatile storage on the HC-24 card and is restored at power up or reset. This configuration information provides details to the host application running on the HC-24, such as the specific audio hardware available.

Ethernet IP Addressing

The Wheatstone LX-24 control surface ships with the host controller IP address set to 192.168.87.201. Stand-alone systems (not interfaced to a station's existing network) require no IP address changes.

Ethernet Interface Wiring

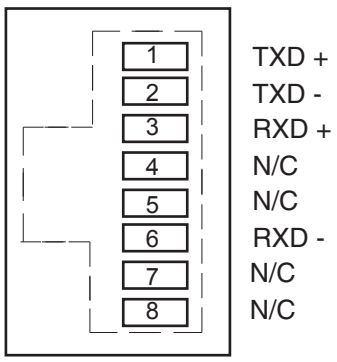
Networked systems are connected to the network hub or switch via a straight (pin to pin) CAT5 cable. This connection is for communicating with the WheatNet-IP Blade, or any controllers in the system, and the configuration computer.

The "CT43" RJ-45 connector for Ethernet connection is located on the center of the bottom side of the HC-24 PCB.

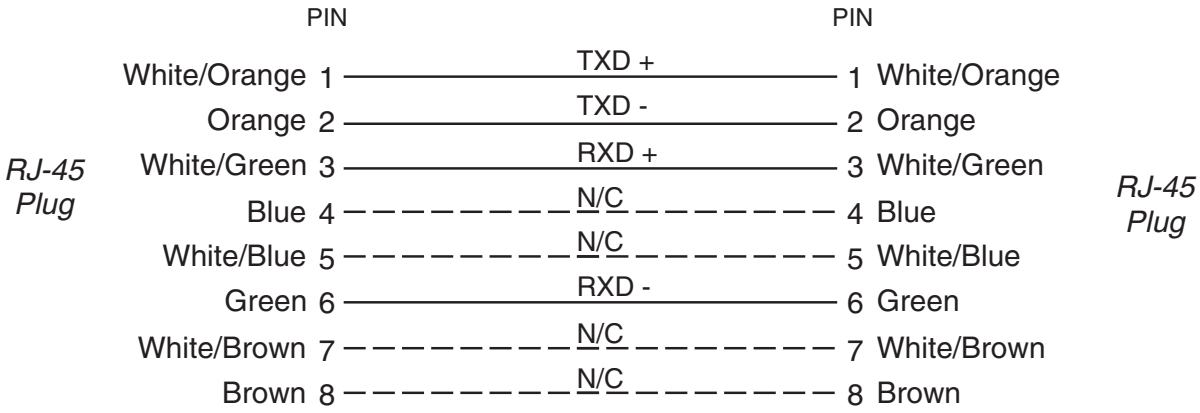
"CT43" RJ-45 – Ethernet Connector

PIN 1 – TXD +
PIN 2 – TXD -
PIN 3 – RXD +
PIN 4 – N/C
PIN 5 – N/C
PIN 6 – RXD -
PIN 7 – N/C
PIN 8 – N/C

Ethernet Connector (RJ-45)



TYPICAL ETHERNET CABLE



Used for connecting the host controller to your network hub.

Appendices

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Options Text File

Introduction

There are a number of operational features on the LX-24 surface that are controlled by the contents of the Options Text File (LX24_OPTS.TXT) that resides on the surface's flash drive. In order to configure these features it is necessary to modify this file.

Modifying The Options Text File

There are several steps involved in modifying the file:

1. Establish an FTP (File Transfer Protocol) session with the surface. This is best done using an FTP program with a graphical interface, such as FileZilla or FTP Surfer by Whisper Technology. You will set up an anonymous session using the following information:

   Name: something useful, assuming you will save the setup
   Address: use the IP address of the surface
   User name: knockknock
   Password: whosthere

2. When the FTP session connects you will see a list of files and folders that are on the surface. One of those files is the Options Text file, named as specified above. Drag this file over to your PC's desktop so you can save a copy. Save a copy of the unmodified file so that you can restore the original in case of a problem or editing error.
3. Make any required changes to the copy of the file on your desktop, according to the information in the following sections, then save the file and drag its icon back to the FTP window to send the modified file back to the surface.
4. Once the modified file is on the surface, wait a minute to be sure that the file has actually been written to the surface's flash memory. Then close the FTP session.
5. Reboot the surface for the changes to take effect.

A Simple Example From The File

As a simple example let's look at the MUTE_METHOD option. Scroll through the Options Text File (or look at the sample file listing at the end of this Appendix) until you see the following three lines of code:

```
// Syntax: MUTE_METHOD:?
// ? 0 (default) = ON button, 1 = ON AIR.
MUTE_METHOD:0
```

The first line describes the syntax for this option. It starts with two slashes, which are interpreted as the start of a comment line. Comment lines are made for **us** to read, and the surface CPU ignores them. This line shows that the syntax for the option is the keyword MUTE_METHOD followed by a colon (:) followed by some character, as represented by the '?' character.

The next line indicates that the '?' can be replaced by a '0' (a zero, not the letter O) if a muting channel being ON will trigger the mute, or a '1' if the muting channel must be both ON and assigned to a main bus (thus making it ON AIR) before it will trigger the mute. This specific example shows that the default setting is '0' for this option. Please note that this may or may not be the case for your particular surface, as the default option is subject to change. The **idea** of how to use the file remains true.

The third line is not a comment; this is the line the surface CPU actually reads from the file. This line, as shown, sets the muting method to ON (channel must be ON to activate a mute, but need not be ON AIR). If this is not the desired operation, this line must be edited. Change the '0' to a '1' and the muting method will change so that a channel is required to be ON AIR before it will activate a mute. As indicated in the instructions above for modifying the file, the actual change to operation will not happen until the surface has been rebooted and has read the modified file.

The edited line must follow the established syntax precisely or the surface may not behave as expected.

A Second Example

As a second example, lets look at something a little more involved. Once again, scroll through the Options Text File to find the following code (please note that some surfaces may have a different number of code lines in this section; the following is just for the purposes of example):

```
// Syntax: SPARE#:?
// # is the spare button number (1 - 12)
// ? is the mode (default = 2)...
//   0 = None, Button presses are ignored, LED controlled by DIO
//   1 = Toggle, Button state toggles on each press, LED controlled by Surface
//   2 = Momentary, Button is active when held down, LED controlled by Surface
//   3 = Momentary, Button is active when held down, LED controlled by DIO
//   4 = Automation, Button & LED are controlled by automation interface
//   5 = Preset Select, Button selects pre-configured preset, LED controlled by Surface
SPARE1:2
SPARE2:2
SPARE3:2
SPARE4:2
SPARE5:2
SPARE6:2
SPARE7:2
SPARE8:2
SPARE9:2
SPARE10:2
SPARE11:2
SPARE12:2
```

Once again, our first line is a comment line that shows the syntax used for this particular option. In this case there are several code lines, each one referring to a different spare (or programmable) button. Thus the '#' in the example syntax is replaced with a number on the actual code line to indicate which of the spare buttons that particular code line refers to. This fact is described on the second comment line.

The third comment line explains that a number indicating button mode will be used in place of the '?' on each actual code line.

The next few comment lines explain the possible modes that the spare buttons can operate in. You may have fewer or greater modes available depending on the surface model and vintage. In any event you can select the same or a different mode from the available modes for each programmable button on the surface.

An Example File - Complete

The following listing shows a typical Options Text File for the surface type covered by this manual. Your actual Options Text File may be somewhat different, depending on vintage, but the general ideas involved in editing the file will apply.

```
// Syntax: METER_BRIDGE#:?
// ? is the meter bridge stream
//   0 = None
//   1 = PGM A
//   2 = PGM B
//   3 = PGM C
//   4 = PGM D (OL)
//   5 = Switched/PFL
METER_BRIDGE1:1
METER_BRIDGE2:2
METER_BRIDGE3:3
METER_BRIDGE4:4
METER_BRIDGE5:5
// Syntax: METERMODE:?
// ? is the meter mode (default = 0)
//   0 = PEAK & AVG
//   1 = PEAK only
//   2 = AVG only
METERMODE:0
// Syntax: DYNRANGE:?
// ? is the Dynamic Range (default = 0)
//   0 = 40dB
//   1 = 60dB
DYNRANGE:0
// Syntax: AUTOCUE:?
// ? is the mode (default = 1)
//   0 = Auto Cue Off
//   1 = Auto Cue On
AUTOCUE:1
// -------------------------------
// MIX MINUS OPTIONS
// -------------------------------
// Syntax: MM#:?
// # is the mix minus bus number (1 - 8)
// ? is the mode (default = 0)...
//   0 = Post Fader, Post ON (default mode)
//   1 = Pre  Fader, Post ON
//   2 = Post Fader, Pre  ON
//   3 = Pre  Fader, Pre  ON
MM1:0
MM2:0
MM3:0
MM4:0
// -------------------------------
// SPARE OPTIONS
// -------------------------------
// Syntax: SPARE#:?
```

```
// # is the spare button number (1 - 12)
// ? is the mode (default = 2)...
//   0 = None, Button presses are ignored, LED controlled by DIO
//   1 = Toggle, Button state toggles on each press, LED controlled by Surface
//   2 = Momentary, Button is active when held down, LED controlled by Surface
//   3 = Momentary, Button is active when held down, LED controlled by DIO
//   4 = Automation, Button & LED are controlled by automation interface
//   5 = Preset Select, Button selects pre-configured preset, LED controlled by Surface
SPARE1:2
SPARE2:2
SPARE3:2
SPARE4:2
SPARE5:2
SPARE6:2
SPARE7:2
SPARE8:2
SPARE9:2
SPARE10:2
SPARE11:2
SPARE12:2
MASTER_SPARE1:6
MASTER_SPARE2:6
MASTER_SPARE3:6
MASTER_SPARE4:6
MASTER_SPARE5:6
MASTER_SPARE6:6
MASTER_SPARE7:6
MASTER_SPARE8:6
// --------------------------------
// MISC OPTIONS
// --------------------------------
// Syntax: SET_TIMEOUT:?
// ? 1 (default) = 20 sec set button timeout enabled, 0 = no timeout.
SET_TIMEOUT:0
// Syntax: ALPHA_SORT:?
// ? 1 (default) = XY controller alpha sorting enabled, 0 = no sort.
ALPHA_SORT:1
// Syntax: INVERT_MM:?
// ? 1 (default) = MM button state inverted, 0 = no invert.
INVERT_MM:0
// Syntax: CUE_DEFEAT_STU1:?
// Syntax: CUE_DEFEAT_STU2:?
// Syntax: CUE_DEFEAT_HDPN:?
// Syntax: CUE_DEFEAT_CR:?
// ? 1 = cue defeat to this monitor, 0 cue enabled to this monitor.
CUE_DEFEAT_STU1:1
CUE_DEFEAT_STU2:1
CUE_DEFEAT_HDPN:1
CUE_DEFEAT_CR:1
// Syntax: MUTE_METHOD:?
// ? 0 (default) = ON button, 1 = ON AIR.
```

```
MUTE_METHOD:0
// Syntax: HDW_LOGGER:?
// ? 1 = use hardware logger, 0 (default) no hardware logger.
HDW_LOGGER:0
// Syntax: XYC_CHECKSUM:?
// ? 1 (default) = use checksum in XYC messages, 0 no checksum.
XYC_CHECKSUM:1
// Syntax: XCHAN_VIS_DISABLE:?
// ? 0 = do not allow X visibility disable, 1 (default) allow X visibility disable.
XCHAN_VIS_DISABLE:1
// Syntax: MXM_BY_SIGNAL:?
// ? 0 = (default) MxM assigns stored by fader, 1 change MxM assigns as sources change.
MXM_BY_SIGNAL:0
// Syntax: MXM_LVL_CTL:?
// ? 0 = (default) No Mix Minus level control on Monitor card.
//   1 Monitor card has Mix Minus control.
MXM_LVL_CTL:0
// Syntax: BM_BY_SIGNAL:?
// ? 0 = Bus Minus return assigns stored by fader, 1 (default) change Bus Minus return
                                                   assigns as sources change.
BM_BY_SIGNAL:1
// Syntax: INPUT_GAIN_SLIDERS:?
// ? 0 (default) = No input gain sliders, 1 = Input gain sliders.
INPUT_GAIN_SLIDERS:0
// Syntax: GLE_CONTROLS:?
// ? 0 = No GLE Controls, 1 = (default) = GLE Controls.
GLE_CONTROLS:1
// Syntax: GLE_PORT:?
// ? Port Number to listen for Glass E connections on - default=49152.
GLE_PORT:49152
// Syntax: MOUSE_TYPE:?
// ? PS2 = PS/2 Mouse, COM2 = (default) = Serial Mouse.
MOUSE_TYPE:PS2
// Syntax: MOUSE_SCALE_FACTOR:?
// ? 1-20 (default is 5)
MOUSE_sCALE_FACTOR:5
// Syntax: ACI_DISABLE_MSS:?
// ? 0 (default) = send machine start/stop DIOs whenever input channels go on/off.
//   1 = supress machine start/stop DIOs when input channels on/off via ACI.
//   2 = supress machine start/stop DIOs when input channels on/off via remote on/off DIO.
//   3 = supress machine start/stop DIOs when input channels on/off via ACI and/or DIO.
ACI_DISABLE_MSS:0
// Syntax: PCI_NORMAL:0xRRGGBB
// 0x848484 (default) = Color for dialog backgrounds.
PCI_NORMAL:0x848484
// Syntax: PCI_SELECTED:0xRRGGBB
// 0xfff0c0 (default) = Color for selected item background.
PCI_SELECTED:0xfff0c0
// Syntax: PCI_NTEXT:0xRRGGBB
// 0x000000 (default) = Color for text.
PCI_NTEXT:0x000000
// Syntax: PCI_STEXT:0xRRGGBB
// 0x000000 (default) = Color for selected text.
```

```
PCI_STEXT:0x000000
// Syntax: READOUT_NORMAL:0xRRGGBB
// 0x190e01 (default) = Color for readout backgrounds.
READOUT_NORMAL:0x190e01
// Syntax: READOUT_SELECTED:0xRRGGBB
// 0xfa9007 (default) = Color for selected readout background.
READOUT_SELECTED:0xfa9007
// Syntax: READOUT_NTEXT:0xRRGGBB
// 0xfa9007 (default) = Color for readout text.
READOUT_NTEXT:0xfa9007
// Syntax: READOUT_STEXT:0xRRGGBB
// 0x000000 (default) = Color for selected readout text.
READOUT_STEXT:0x000000
// Syntax: ACTIVE_TAB_TEXT:0xRRGGBB
// 0xffff (default) = Color for text on the active tab
ACTIVE_TAB_TEXT:0xffff
// Syntax: INACTIVE_TAB_TEXT:0xRRGGBB
// 0x333333 (default) = Color for text on inactive tabs
INACTIVE_TAB_TEXT:0x333333
DEBUG_FLAGS:0x00000060
CLOCK_MODE:12
CLOCK_SECONDS_COUNTDOWN:20
CR_LEVEL_LOCK:-1
HDPN_LEVEL_LOCK:-1
STU1_LEVEL_LOCK:-1
STU2_LEVEL_LOCK:-1
PGMA_LABEL:PGM A
PGMB_LABEL:PGM B
PGMC_LABEL:PGM C
PGMD_LABEL:PGM D
EVENTS_SAVE_ON_OFF:0
STARTUP_CHANNELS_OFF:0
VISIBILITIES_SHOWS_LOCATIONS:1
PFL_EXCLUSIVE_MODE:0
PFL_PRE_ON:1
PFL_PRE_FADER:1
AUTO_CONNECT_CB_SIGNALS:1
PGMA_TRIGGERS_OFFLINE:0
SET_BTN_AB_SELECT:0
PREFER_TCP_METERS:0
STUDIO_SOURCE_MIXING:1
METER_DIMMING:00000
```

Appendix 2

Contents

Replacement Parts List.....A-11

For the most part there are no user-replaceable parts in the LX-24 control surface. Exceptions are those controls and components that in the course of normal use may need maintenance (i.e., faders, pots, ON switches, etc.). A complete list of available components is shown on the next page. Contact Wheatstone technical support for further information.

Wheatstone Corporation (600 Industrial Drive, New Bern, North Carolina, USA 28562) may be reached by phone at 252-638-7000, fax 252-637-1285, electronic mail "techsupport@wheatstone.com".

REPLACEMENT PARTS - LX-24 CONTROL SURFACE

COMPONENT	DESCRIPTION	*WS P/N*
IP-24 MODULE	INPUT MODULE	***010000***
CR-24 MODULE	CONTROL ROOM MODULE	***010001***
HP-24 MODULE	HEADPHONE MODULE	***010002***
SC1-24 MODULE	STUDIO CONTROL 1 MODULE	***010003***
SC2-24 MODULE	STUDIO CONTROL 2 MODULE	***010004***
ACC-24-G MODULE	ACCESSORY GENERAL PURPOSE MODULE	***010005***
ACC-24-P MODULE	ACCESSORY PROGRAMMABLE MODULE	***010006***
BK-24	BLANK FACEPLATE	***010019***
IP-24 LOADED CARD	INPUT MODULE LOADED CARD ASSEMBLY	***010030***
CR-24 LOADED CARD	CONTROL ROOM MODULE LOADED CARD ASSEMBLY	***010031***
HP-24 LOADED CARD	HEADPHONE MODULE LOADED CARD ASSEMBLY	***010032***
SC1-24 LOADED CARD	STUDIO CONTROL 1 MODULE LOADED CARD ASSEMBLY	***010033***
SC2-24 LOADED CARD	STUDIO CONTROL 2 MODULE LOADED CARD ASSEMBLY	***010034***
ACC-24 LOADED CARD	ACCESSORY MODULE LOADED CARD ASSEMBLY	***010035***
PGMVU-24 LOADED CARD	PROGRAM VU LOADED CARD ASSEMBLY	***010040***
AUXVU-24 LOADED CARD	AUXILIARY VU LOADED CARD ASSEMBLY	***010041***
HC-24 LOADED CARD	HOST CONTROLLER LOADED CARD ASSEMBLY	***010043***
DISPIP-24 LOADED CARD	DISPLAY LOADED CARD ASSEMBLY FOR IN-24, CR-24, S1-24 (EVENT) MODULES	***010047***
DISP-24 LOADED CARD	DISPLAY LOADED CARD ASSEMBLY FOR S1-24 (STUDIO1), S2-24 MODULES	***010029***
GPC-1 LOADED CARD	GPC-1 CONTROLLER LOADED CARD ASSEMBLY	***008736***
PSE-2 POWER SUPPLY	1RU RACKMOUNT POWER SUPPLY LX-24	***007380***
PSE-2 POWER CABLE	LX-24 POWER CABLE ASSEMBLY	***007381***
VGA CABLE	LX-24 VGA CABLE ASSEMBLY	***010045***
HEADPHONE CABLE	LX-24 HEADPHONE CABLE ASSEMBLY	***010046***
FADER	MONO LINEAR TAPER FADER WITH LONGER KNOB BRACKET AND BLACK KNOB ROHS COMPLIANT	***540052***
FADER KNOB	BLACK FADER KNOB, 11mm FOR 3000 SERIES FADER	***520001***

REPLACEMENT PARTS - LX-24 CONTROL SURFACE

COMPONENT	DESCRIPTION	*WS P/N*
POT	POT SINGLE LINEAR 10K 6MM SHAFT	***500128***
POT KNOB	BLACK SOLID ALUMINUM 23MM KNOB NO INDICATOR 6MM SHAFT	***520127***
POT KNOB	BLACK SOLID ALUMINUM 18MM KNOB NO INDICATOR 6MM SHAFT	***520131***
ENCODER	11MM ROTARY ENCODER WITH THREADED BUSHING, 17MM SHAFT LENGTH	***560004***
ON/OFF SWITCH	SINGLE POLE MOMENTARY REED KEYBOARD SWITCH	***510109***
SWITCH CAP	CUSTOM BLUE RECTANGULAR BUTTON	***530343***
SWITCH CAP	CUSTOM CLEAR RECTANGULAR BUTTON	***530346***
SWITCH CAP	V2 BUTTON BASE, CAP AND WHITE CAP INSERT	***530356***
SWITCH CAP	.5” x .5” CUSTOM CLEAR CAP WITH BASE AND INSERT	***530362***
ON/OFF SWITCH CAP	SOLID WHITE CAP FOR 03 STYLE SWITCH	***530361***
FLAT RIBBON CABLE	1MM PITCH 40 COND FLAT RIBBON CABLE FOR 2MM CONNECTOR, 5 FEET LONG	***150198***
FLAT RIBBON CABLE	40 COND FLAT RIBBON CABLE	***150204***
FLAT RIBBON CABLE	25 COND FLAT RIBBON SHIELDED CABLE, FLAT JACKET, 28 AWG	***150213***
PLUG	3 PIN .098” PLUG FOR #26 AWG	***230028***
PLUG	4 PIN .098” PLUG FOR #26 AWG	***230029***
PLUG	5 PIN .098” PLUG FOR #26 AWG	***230030***
PLUG RIBBON	26 PIN RIBBON PLUG	***250043***
PLUG RIBBON	2MM 10 POSITION RECEPTACLE IDC RIBBON PLUG	***250138***
PLUG RIBBON	2MM 20 POSITION RECEPTACLE IDC RIBBON PLUG	***270067***
HEADER	3 PIN .098” HEADER	***250062***
HEADER	4 PIN .098” HEADER	***250063***
HEADER	5 PIN .098” HEADER	***250064***
HEADER	5 PIN .098” R/A HEADER	***250156***
HEADER	3 POSITION STRAIGHT BOXED HEADER EURO 3.5MM CLOSED ENDS	***260098***
HEADER	20 POSITION 2MM BOX HEADER	***270066***
HEADER	HEADER POST .100 36X2 CKT DUAL ROW	***250087A***

REPLACEMENT PARTS - LX-24 CONTROL SURFACE

COMPONENT	DESCRIPTION	*WS P/N*
SOCKET RIBBON	CONN SOCKET 34 PIN FLAT CABLE	***250107A***
POWER PLUG	40 AMP RDM HIGH POWER PCB MOUNT PLUG	***200114***
POWER SOCKET	40 AMP RDM PCB MOUNT SOCKET	***200115***
POWER CONNECTOR	2 PIN DB HOUSING MALE	***200142***
CONNECTOR	25 PIN DB CONNECTOR	***200018***
CONNECTOR	RJ45 SINGLE UPRIGHT SHIELDED CONNECTOR	***260048***
SWITCH LED	RED LED ON/OFF SWITCH	***600027***
SWITCH LED	YELLOW LED ON/OFF SWITCH	***600031***
SOURCE DISPLAY	GREEN ALPHA/NUMERIC DISPLAY	***610016***
SPEAKER	NOTEBOOK SPEAKER	***960016***
SOFTWARE CD	LX-24 SOFTWARE ON CD	***071709***
MANUAL	TECHNICAL MANUAL FOR LX-24 CONTROL SURFACE	***010099***