Lexicon® QLI-32
Immersive Processor

QUANTUMLOGIC®
IMMERSION

Lexicon®
by HARMAN

Professional Audio Equipment

IMPORTANT SAFETY INSTRUCTIONS

IMPORTANT SAFETY INSTRUCTIONS

DECLARATION OF CONFORMITY

Manufacturer's Name: Lexicon Pro
Manufacturer's Address: 10653 South River Front Parkway, Suite 300
South Jordan, UT 84095, USA

declares that the product:

Product name: Lexicon QLI-32 Immersive Processor
Note: Product name may be suffixed by the EU.

Product option: None

conforms to the following Product Specifications:

Safety: IEC 60065 – 2001:7th ED + AM 1– 05
UL 60065 – 2007
CAN/CSA 60065 – 2003 + AM 1– 05

EMC: EN 55103:2009
EN 61000–3:2010
EN 55022:2010
EN 61000-4:2010

Supplementary Information:

The product herewith complies with the requirements of the:
Low Voltage Directive 2006/95/EC
EMC Directive 2004/108/EC.
RoHS Directive 2002/95/EC
WEEE Directive 2002/96/EC

With regard to Directive 2005/32/EC and EC Regulation 1275/2008 of 17 December 2008, this product is designed, produced, and classified as Professional Audio Equipment and thus is exempt from this Directive.

Jim Pennock
Director of Technology
10653 South River Front Parkway, Suite 300
South Jordan, UT 84095, USA
Date: April 21, 2015

European Contact: Your local Lexicon Sales and Service Office or

Harman Music Group
10653 South River Front Parkway, Suite 300
South Jordan, UT 84095, USA

ELECTROMAGNETIC COMPATIBILITY

This device complies with part 15 of the FCC Rules and the Product Specifications noted on the **Declaration of Conformity**. Operation is subject to the following two conditions:

- this device may not cause harmful interference, and
- this device must accept any interference received, including interference that may cause undesired operation.

Operation of this unit within significant electromagnetic fields should be avoided.

U.K. MAINS PLUG WARNING

A molded mains plug that has been cut off from the cord us unsafe. Discard the mains plug at a suitable disposal facility. NEVER UNDER ANY CIRCUMSTANCES SHOULD YOU INSERT A DAMAGED OR CUT MAINS PLUG INTO A 13 AMP POWER SOCKET. Do not use the mains plug without the   cover in place. Replacement fuse covers can be obtained from your local retailer. Replacement fuses are 13 amps and MUST be ASTA approved to BS1362.

If you want to dispose this product, do not mix it with general household waste. There is a separate collection system for used electronic products in accordance with legislation that requires proper treatment, recovery and recycling.

Private household in the 25 member states of the EU, in Switzerland and Norway may return their used electronic products free of charge to designated collection facilities or to a retailer (if you purchase a similar new one).

For Countries not mentioned above, please contact your local authorities for a correct method of disposal.

By doing so you will ensure that your disposed product undergoes the necessary treatment, recovery and recycling and thus prevent potential negative effects on the environment and human health.

Warranty

This warranty is valid only for the original purchaser and only in the United States. If outside the United States please contact the local Lexicon® distributor.

1. The warranty registration card that accompanies this product must be mailed within 30 days after purchase date to validate this warranty. Proof-of-purchase is considered to be the burden of the consumer.

2. Lexicon Professional warrants this product, when bought and used solely within the U.S., to be free from defects in materials and workmanship under normal use and service.

3. Lexicon Professional's liability under this warranty is limited to repairing or, at our discretion, replacing defective materials that show evidence of defect, provided the product is returned to Lexicon Professional WITH RETURN AUTHORIZATION from the factory, where all parts and labor will be covered up to a period of 3 years. A Return Authorization number must be obtained from Lexicon Professional by telephone. The company shall not be liable for any consequential damage as a result of the product's use.

4. Lexicon Professional reserves the right to make changes in design or make additions to or improvements upon this product without incurring any obligation to install the same additions or improvements on products previously manufactured.

5. The foregoing is in lieu of all other warranties, expressed or implied, and Lexicon Professional neither assumes nor authorizes any person to assume on its behalf any obligation or liability in connection with the sale of this product. In no event shall Lexicon Professional or its dealers be liable for special or consequential damages or from any delay in the performance of this warranty due to causes beyond its control.

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INTRODUCTION

Congratulations and thank you for purchasing the QLI-32 Immersive Processor! Intelligent and flexible, this cinema processor is fully compatible with existing cinema processors and designed to deliver up to 32 channels of surround sound. For an immersive and life-like sound experience, the QLI-32 is the smart solution for any cinema.

INCLUDED ITEMS

• QLI-32 Immersive Processor
• This owner's manual
• Power Cord
• Lexicon Warranty Card

QLI-32 SURROUND SPECIFICATIONS

ANALOG INPUTS

Connector	One 25-pin Dsub connector, Female
Level (for -20dBFS)	+300mV
Freq Response @48K	20Hz - 20kHz, ±.15dB
A/D Conversion	24 bits
A/D Dyn Range	105dB A-weighted
THD	<0.002% 20 → 20kHz @ -20dBFS
Crosstalk @ 1Khz	<−75dB at 20 → 20k with a -20dBFS input signal

MICROPHONE INPUT

Connector	XLR/TRS Combo Jack, Female
Impedance	20K Ohm, balanced
Nominal Input Level	+3mV
Freq Response	20Hz - 20kHz, ±.3dB
THD	<.008% 20Hz → 20kHz @ 3µV
A/D Dyn Range	>112 dB unweighted, 115dB A-weighted

AES DIGITAL AUDIO INPUT

Connectors	2 Stacked RJ45 Connectors
Format	AES/EBU
Sample Rate	48, 96 kHz
Bit Depth	24-bit
Channel Count	8 Channels

BLU LINK AUDIO INPUT/OUTPUT

Connectors	2 Stacked RJ45 Connectors
Format	Harman® BLU link
Sample Rate	48kHz
Bit Depth	24 bit
Channel Count	In: 8 Channels Out: 32 Channels
Maximum Cable Length	100 meters (328 feet)
Latency	54ms

AUTOMATION INTERFACES

Connector	12 Pin GPI Block Connector

INTERNAL STORAGE

Internal non-volatile Flash.

POWER

Requirements	100-240 VAC (±10%)
	50-60Hz, 36W max
Connector	3-pin IEC

DIMENSIONS

Rack Units	1RU
Size	19.0" W x 1.75" H x 9.5" D
	(483mm x 445mm x 241mm)
Weight	7.70 lbs

REGULATORY APPROVALS

EMC:
EN 55103-1:2009
EN 61000-3-2:2010
EN 61000-3-3:2008
EN 55022:2010
EN 55103-2:2009
EN 61000-4-2:2008 Ed 2.0
EN 61000-4-3:2010 Ed 3.2
EN 61000-4-4:2007
EN 61000-4-5:2006
EN 61000-4-6:2006
EN 61000-4-11:2004

SAFETY:
IEC 60065 – 2001: 7th Ed + AM 1-05
UL 60065 – 2007
CAN/CSA 60065 – 2003 + AM 1-05

ENVIRONMENT

Operating	0° to 40° C
Storage	0° to 40 °C

THE FRONT PANEL
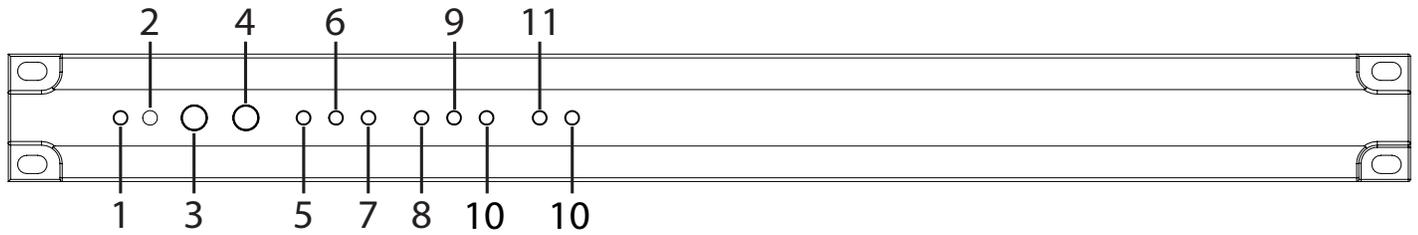
1. ON / OFF LED Indicator
Indicator is lights Green when device is powered on.

2. STATUS LED Indicator
Lit Green when system is operating and Red when there is an error condition. Flashing green means the system is not yet ready for operation (performing initialization).

3. QLI Immersive Processing Button
Pressing the button toggles the QLI state between enabled (normal) and bypassed. Button backlight is Green when QLI processing is enabled. Not lit while in bypass mode.

4. MUTE Button
Pressing the button toggles the device state between muted and unmuted. When the device is Muted the backlight will be red and all outputs will be muted.

5. Analog In Indicator
Green LED lights when 8 channel analog input is selected.

6. AES / EBU Digital In Indicator
Green LED lights when 16 channel AES/EBU input is selected.

7. BLU link In Indicator
Green LED lights when input audio is taken from the BLU link loop.

8. Stereo Input Mode
Green LED lights when two channels of stereo input are being processed.

9. 5.1 Input Mode
Green LED lights when 6 channels (5 + LFE) of input are being processed.

10. 7.1 Input Mode
Green LED lights when 8 channels (7 + LFE) of input are being processed.

11. Signal In Indicator
Green LED that lights if any enabled channel (stereo, 5.1, 7.1) of the selected source (analog, AES/EBU, BLU link) had a level exceeding -60 dBFS in the past 10 seconds.

12. BLU link Out Indicator
Green LED that lights if any output had a level exceeding -60 dBFS in the past 10 seconds.

THE REAR PANEL
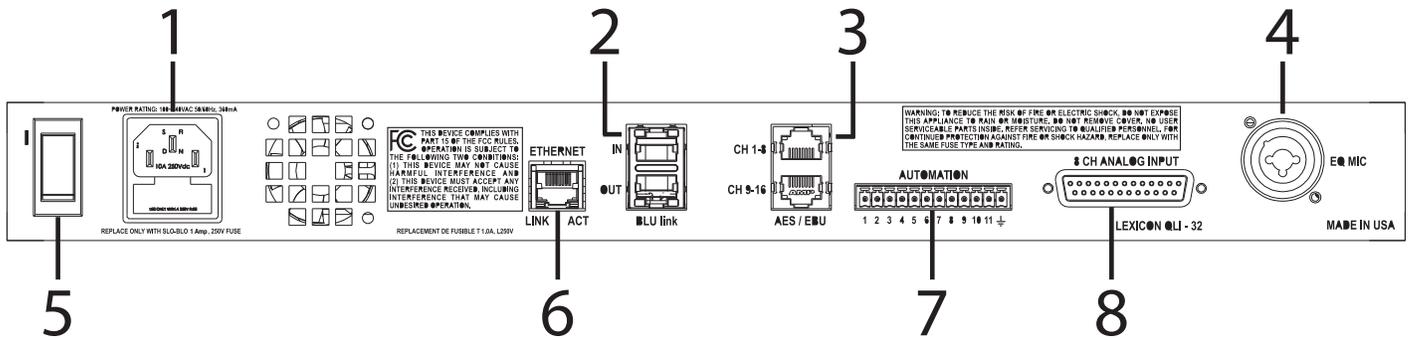
1. POWER JACK
Standard 3-pin IEC power connector. 100-240 VAC (±10%), 50-60Hz automatic switching to correct voltage range.

2. BLU LINK IN/OUT
RJ-45 connectors carrying 16 audio channels in and 32 channels out over BLU link digital audio interface.

3. AES/EBU IN
Two RJ-45 connectors allow eight AES/EBU digital channels in each.

4. MICROPHONE IN
TRS/XLR combo jack for EQ microphone input. Mic level input signal expected. Balanced & Unbalanced 10V phantom power available.

5. POWER SWITCH
Flip the rocker switch to turn QLI-32 ON or OFF.

6. ETHERNET INPUT
RJ-45 connection used to network the QLI-32 device and control it via Ethernet.

7. AUTOMATION PINS
Twelve pin block connector to send GPI automation controls to the device.

8. DB25 8-CHANNEL ANALOG IN
DB25 connector carries eight analog inputs.

NOTE:
*Refer to the Appendix (Page 24) for connector pin out diagrams.

USING THE QLI

INSTALLATION

1. Install the QLI-32 Immersive processor below any existing Cinema Processor in the B-chain signal flow.
2. Disable any equalization, delays, matrixing, or crossovers prior to the QLI-32 device.
3. Connect the power cable to any 50-60Hz 120-220V wall outlet.
4. Using an ethernet cable connect the device to the auditorium network switch.
5. Connect the existing Cinema Processor audio output to one of the audio inputs of the QLI-32 Immersive Processor (8 channel analog, BLU link, or digital AES/EBU).
6. Connect the QLI-32 BLU link output to the BLU link loop of Crown® DCi Amplifiers or BLU link-to-Analog converter in your audio equipment rack.

POWERING UP THE QLI-32

1. Plug in the power cord.
2. Flip the Power switch on the rear panel to the on position.
3. Allow 30 seconds for the QLI-32 Immersive Processor to boot up.

NETWORK CONFIGURATION ☁

The QLI-32 processor can fit into a number of different network architectures. The most simple configuration available is with a direct ethernet connection to machine. Configuring the device to a theater control network will allow more devices to connect and automation commands to be sent.

To configure the QLI-32 Immersive Processor and apply custom network address settings access the web user interface.

NETWORK SETUP FOR FACTORY QLI-32

1. Directly connect a computer to the unit **or** connect unit to the same router/switch as the computer.
2. Type **169.254.1.15** into the address bar of any web browser. If the QLI-32 has factory settings this will be the correct IP Address to reach the web interface.
3. Navigate to the CONFIGURATION page by selecting the **gear icon** ⚙ in the upper right corner of the page. username: admin password: admin
4. Navigate to the SYSTEM TAB then the NETWORK SETTINGS sub menu.
5. Input the IPv4 IP Address, Subnet Mask, and Default Gateway that match your current control network scheme.

CHANGE NON-FACTORY NETWORK SETTINGS

1. Directly connect a computer to the unit **or** connect unit to the same router/switch as the computer.
2. Type the current device IP Address into the address bar of any web browser.
3. Navigate to the **CONFIGURATION** page by selecting the **gear icon** ⚙ in the upper right corner of the page. username: admin password: admin
4. Navigate to the **SYSTEM TAB** then the **NETWORK SETTINGS** sub menu.
5. Input the new IPv4 IP Address, Subnet Mask, and Default Gateway that match your control network scheme.

LOCATE A QLI-32 ON NETWORK

If a units IP Address is forgotten or goes missing on the network use the following procedure:

1. Install the USL Ethernet Discoverer software on a Windows PC.
2. Open the program and start a network device scan.
3. Find the device that matches the serial number on the rear panel of the QLI-32.
4. Write down the matching IP Address or bookmark the web interface page in your web browser.

RESET A QLI-32 IP ADDRESS

If unit cannot be found using the prior procedures the following steps will reset the QLI-32 to its factory settings.

1. Hold the **Mute** button on the front panel for seconds until the left-to-right light sequence completes.
2. Power reset the device.
3. The IP Address of the device will now be **169.254.1.15**.

NOTE:
*Resetting the device IP settings **will not reset all** settings (EQ, Network, Room Dimensions, etc...) to factory default.

OVERVIEW PAGE ⊞

The QLI-32 **OVERVIEW** page shows real time status of the device through the front panel graphic. Additionally, it provides network information, site data, BLU link status, and firmware versions.

To visit the **OVERVIEW** page enter the assigned IP Address of the QLI-32 into any web browser. Once on the initial overview page, you can navigate to other pages using the menu bar links or, with a narrow browser window, by selecting other pages in the drop down menu selector on the far right.

CONTROL MENU 🖵

To manually control the QLI-32 Immersive processor use the **CONTROL** page of the web interface. The Front Panel graphic and separate sections show the current status of the device. All changes to the control settings will be reflected on the front panel graphic above and on the actual front panel of the device. Only the **SOURCE** and **INPUT MODE** settings are retained after system restarts.

SOURCE

Choose the expected input type coming from the cinema processor to the QLI-32. This setting is preserved on system restart.

INPUT MODE

Select the channel format of the source input. Changing the Input mode state will reset the QLI mode to Normal. This setting is preserved on system restart.

QLI STATUS

Enable or **Bypass** Quantum Logic processing or Mute audio output. When enabled, Quantum Logic immersive processing will be handled by the device. When bypassed, surround inputs will be arrayed across surround speakers with an adjustable bypass surround delay. Channel equalization is applied in either case.

QLI MODE

QLI has been designed to provide a highly immersive cinematic audio experience with all movie soundtracks. QLI is also equally effective for Alternative Content such as live broadcasts of music concerts (eg, opera), theater performances, and sporting events. In some instances, it may be preferable to set QLI to ALTERNATIVE CONTENT MODE in order to obtain an immersive experience more suitable to this type of content.

SURROUND INPUT LEVEL

Content (movie soundtracks) produced for professional cinema applications expect the surround loudspeakers to be calibrated to a reference level of 82dB SPL, whereas content produced for consumer applications (DVD/Blu-ray) expect the surround loudspeakers to be calibrated to a reference level of 85dB SPL. The SURROUND INPUT LEVEL control allows QLI to account for relative source level differences between Cinema and Consumer (DVD/Blu-ray) content if a consumer surround decoder is used. Set the SURROUND INPUT LEVEL control to match the type of surround decoder in use.

Source Routing	Surround Input Level
Cinema Server → Cinema Processor → QLI-32	Cinema
DVD/Blu-ray (DD/DTS) → Cinema Processor → QLI-32	Cinema
DVD/Blu-ray → Built-in Decoder → QLI-32	Consumer
DVD/Blu-ray (DD/DTS) → Consumer Decoder → QLI-32	Consumer

EQUALIZATION

The QLI-32 EQUALIZATION tab allows the user to adjust the equalization curves of each channel to improve frequency response in auditoriums. The Real Time Analyzer (RTA) graphic provides 1/3 octave resolution in the frequency spectrum for each of the 32 channels of output.

The device factory settings have flat equalization curves and gains at zero on every channel. It is highly recommended to either manually EQ each channel or run the Auto-EQ procedure to create the best listening experience.

SIGNAL GENERATOR

A signal generator exists on each channel with the following types of signals:

- Pink Noise - equal energy per octave noise
- Sweep - 20Hz to 20kHz sweep with 4 second per octave rate
- 100 Hz - sine wave with 100 Hertz frequency
- 1 kHz - sine wave with 1000 Hertz frequency
- 10 kHz - sine wave with 10,000 Hertz frequency

CALIBRATION MIC SETUP

• <u>Step 1</u>
Connect four omni-directional microphones to a microphone multiplexor device such as the USL MMP-10.

• <u>Step 2</u>
Position the microphones at ear height (3.3-4 ft) in a diamond shaped pattern at several locations in the seating area (not closer than 5 ft to any wall or 16 ft from the screen).

• <u>Step 3</u>
Connect the multiplexor output to the mic input of the QLI-32.

• <u>Step 4</u>
Press the yellow SPL button to calibrate the microphone(s) driving the RTA while the pink noise generator of the processor is enabled.

• <u>Step 5</u>
Adjust the Microphone Gain control until the indicated SPL matches the SPL on a reference meter.

<u>NOTE</u>:
*Multiple microphone positions ensures spatial averaging and improves the overall quality of equalization by reducing the effect of specific room modes.

*All SPL readings are C-weighted decibels at a slow polling rate.

AUTO EQUALIZATION PROCEDURE

With the calibration microphones properly placed and the microphone multiplexor connected to the QLI-32 you are now ready to run an Auto-EQ.

• <u>Step 1</u>
Select the Auto-EQ button on the EQUALIZATION page.

• <u>Step 2</u>
Using the drop down menus and check boxes select all the channels to EQ.

• <u>Step 3</u>
Select any addition parameters (Gain Smoothing/Centering) to be processed during Auto-EQ.

• <u>Step 4</u>
Select "Go!". The processor will now go through the Auto-EQ process. Allow up to two minutes per channel to complete the process.

GAIN SMOOTHING - Applies smoothing to adjacent bands to create a more uniform EQ curve.

GAIN CENTERING - Applies a adjustment to the whole EQ curve to center on 0dB.

NOTE:
*All Auto-EQ generated curves target the X-Curve and 85dBc SPL per SMPTE ST 202:2010 specification.

LFE PARAMETRIC EQ

The LFE channel uses a parametric equalizer instead of a graphic equalizer. Note that selecting the LFE channel in the equalizer tab does NOT turn off pink noise on the previously selected channel. This allows pink noise to drive the LFE and center channels simultaneously so the transition frequency region can be viewed for possible phase errors. A suggested LFE adjustment procedure is below:

• Step 1
On the Outputs Tab turn the generator on for both the Center channel and the LFE.

• Step 2
Navigate to the Equalizer tab and select the LFE channel. The generator should already be on and pink noise should be visible on the RTA.

• Step 3
At this point, confirm that pink noise is driving both the center and LFE channels.

• Step 4
Adjust the leftmost (master) gain control until the LFE level matches the mid-band level of the center channel on the RTA display.

• Step 5
Adjust the frequency control on the PEQ to the worst dip or peak in the LFE portion of the RTA display. You may use up to four PEQ's depending on the amount of peaks and dips in the RTA.

• Step 7
Set the Q and adjust the PEQ gain as required to remove the peak or dip. The Q can be increased to make the peak or notch narrower, or decreased to make it wider. The frequency can be adjusted as required to center the peak or notch on the notch or peak displayed on the RTA.

• Step 8
If there is a notch in the transition region between the LFE and center channel frequencies, try reversing the phase on the LFE channel (Invert button on the Outputs tab).

• Step 9
Finally, adjust the leftmost gain control up to increase the LFE output as required. SMPTE RP 200-2002 calls for LFE to be 10dB above the center channel, but this may be excessive in some auditoriums.

COPY EQUALIZATION CURVES

To copy the EQ curve of one channel and apply it to another channel(s) select the "Copy" button below the RTA graphic on the **EQUALIZATION** page. Note that this only copies the EQ curve of the source channel to the destination channel. The Gain fader level is excluded in the copy.

RTA VIEWING CONTROLS

To adjust the viewing parameters of the RTA mouse over the graphical area. Here you can zoom in/out, increase the resolution of the Y-axis (dbC), change the decay, and offset the X-Curve. Smaller decay values will increase the polling rate while larger values give a more stable value over time. X-Curve control can be used to move the limit curves up or down to best fit the current RTA data.

MANUAL OUPUT ADJUSTMENTS ▁▃▅▇

Visit the **OUTPUTS** tab to manually **mute**, **invert phase**, or adjust channel **output faders**. Channels are categorized into either Stage, Surrounds, Heights, and Back Surrounds. Grab a fader with a mouse-click and drag up or down to adjust the gain of that specific channel. Inverting a channel will invert the phase 180°, helpful if the wiring polarity is backwards on a speaker.

SENDING TCP AUTOMATION COMMANDS

The QLI-32 is capable of receiving TCP/IP commands from digital cinema servers or automation controllers if on the same network as the device sending commands.

Commands use the following ASCII form: "qli32.sys.**command value**". TCP command strings must be sent to port 10001. To query the current state of an automation command ommit the **value** from the string.

For a full listing of all QLI-32 TCP command strings refer to page 27 - TCP Automation Commands.

BLU LINK I/O

The QLI-32 accepts up to 8 channels of BLU link inputs and outputs up to 32 channels. By default the QLI-32 will be mapped to the following BLU link channels:

   Input channel range: BLU link #65-81
   Output channel range: BLU link #1-32

The routing of these channels are fully interchangable within their given BLU link range. To customize the starting channel of the input and output ranges or change the mapping within view the Channel Routing section on page 22.

SYSTEM CONFIGURATION

The **CONFIGURATION** menu can be accessed by selecting the **gear icon** ⚙ in the top right corner of the user interface. The login credentials are **admin:admin**. In the **CONFIGURATION** menus the user is able to save/load configuration files, define room characterstics, alter channel routing, and edit system settings.

NOTE:
*Saving configuration parameters may cause a short pause in audio playback. It is not recommended to edit system settings during a live show.

FILE MANAGEMENT 📥

The File tab allows a user to **load** or **save** a configuration to the device. A configuration file (.qli) is a snapshot of every setting on the device at that moment including:

- Room Dimensions
- Seating Areas
- Speaker Definitions & Locations
- Equalization Curves
- Bypass Surround Delays
- Channel Routing
- Network Settings

To **load** a previously saved configuration file select the folder icon. 📂

To **save** a new configuration file select the disk icon. 💾

ROOM CONFIGURATION ⬨

In order to get a full immersive experience the user must provide the processor with data regarding room dimensions, seating area, and speaker locations. Measurements can be input in units of feet or meters depending on what is chosen in **SYSTEM -> GENERAL SETTINGS**. After all Auditorium Size, Seating Area, and Speaker Location values have been entered and saved, values highlighted in red should be examined for possible mistakes.

NOTE:
*If the **Measurment Unit** setting is changed after room information has been entered, all values will automatically converted to the new units.

AUDITORIUM SIZE

Define the rectangular dimensions of the auditorium that the QLI-32 is installed for.

- Width — distance of the left wall to right wall at the front and rear
- Length — distance from the front to the rear of room
- Height — distance from the floor to ceiling at the front and rear
- Rear Elevation — height of floor at rear above the floor at the front
- Reference Listening Position —

  X = distance from the theater center line, this should be 0.0

  Y = distance from Y origin, normally 2/3rds of room length

  Z = height of reference listener's ears above floor at front, normally 4ft (1.2m) + height of floor at reference position

Press the **save** button when each category is complete before moving to the next.

TOP VIEW

FRONT WIDTH

-X ← → +X

-Y

+Y

LENGTH

REFERENCE POSITION Y

REFERENCE POSITION X = 0

REAR WIDTH

SIDE VIEW

+Z

-Y   +Y

FRONT HEIGHT

REAR HEIGHT

REFERENCE POSITION Y

REFERENCE POSITION Z

REAR ELEVATION

LENGTH
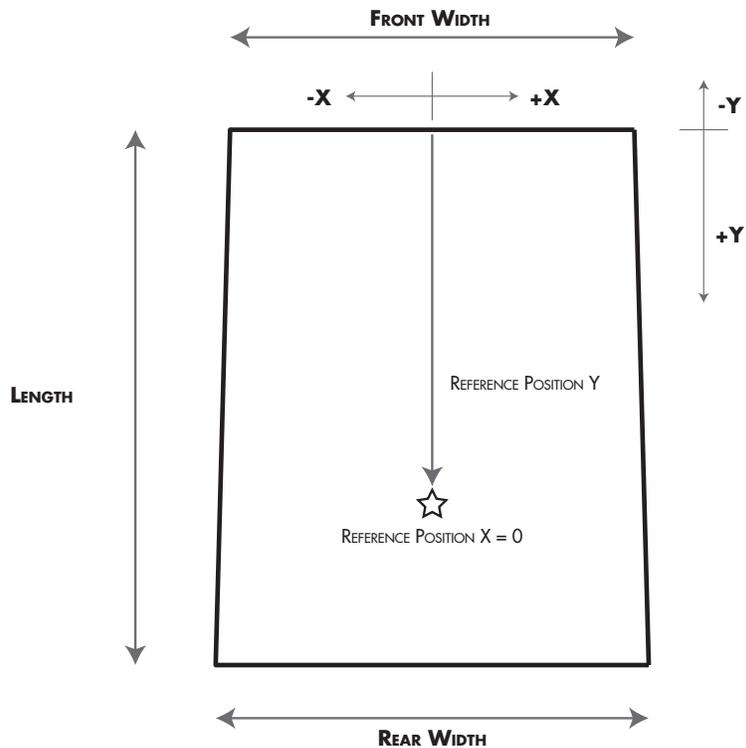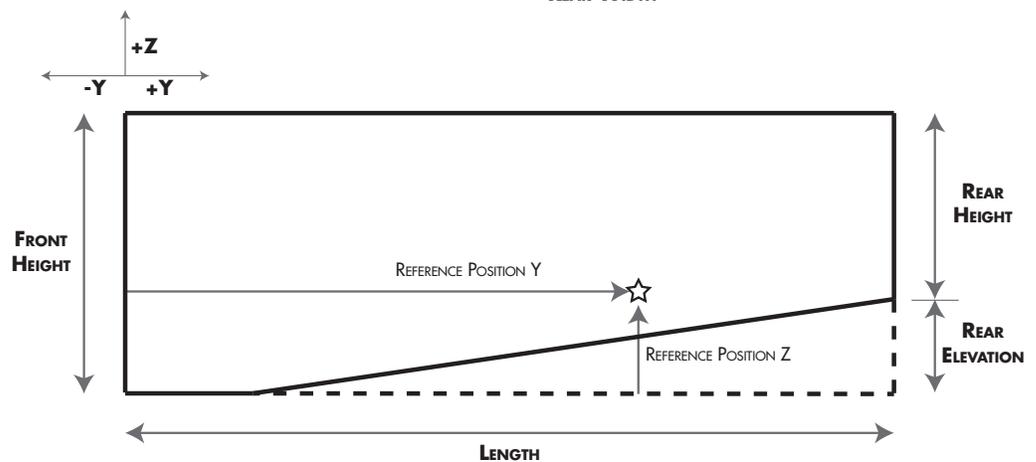
SEATING AREAS

The next step in calibrating the Quantum Logic engine is to define the seating area(s) within the cinema auditorium. Normally, a room will be sufficiently defined within a single seating area.

If there is a gap creating distinct seating areas (i.e. a wide dividing aisle in stadium seating or a change in seating width due to a side entrance hallway) then you may define a second or third seating area in the menu. When more than one seating area is defined, they must be defined in order of front of theater to the rear (increasing Y values from Seating Area 1 to Seating Area 2).

Input the X, Y, and Z coordinates at the 6 vertices that outline the seating area. The middle vertex will help capture the general shape of a curved row of seating. The **origin** point in the room is defined as the center of the screen at the floor. The coordinates are defined:

X = distance from center line origin (negative value to left, positive to right)
Y = distance away from the screen
Z = height of floor at that vertex above the floor at front

Press the **save** button when each category is complete before moving to the next.

SINGLE SEATING AREA EXAMPLE

DIMENSIONS

X	Y	Z		X	Y	Z		X	Y	Z
-16	12	0		0	12	0		+16	12	0

FRONT

SEATING AREA 1

REAR

X	Y	Z		X	Y	Z		X	Y	Z
-16	58	8		0	58	8		+16	58	8

-X ⟵ | ⟶ +X

60

2

4   16

40

TOP VIEW

+Z
-Y   +Y

SIDE VIEW

12

8
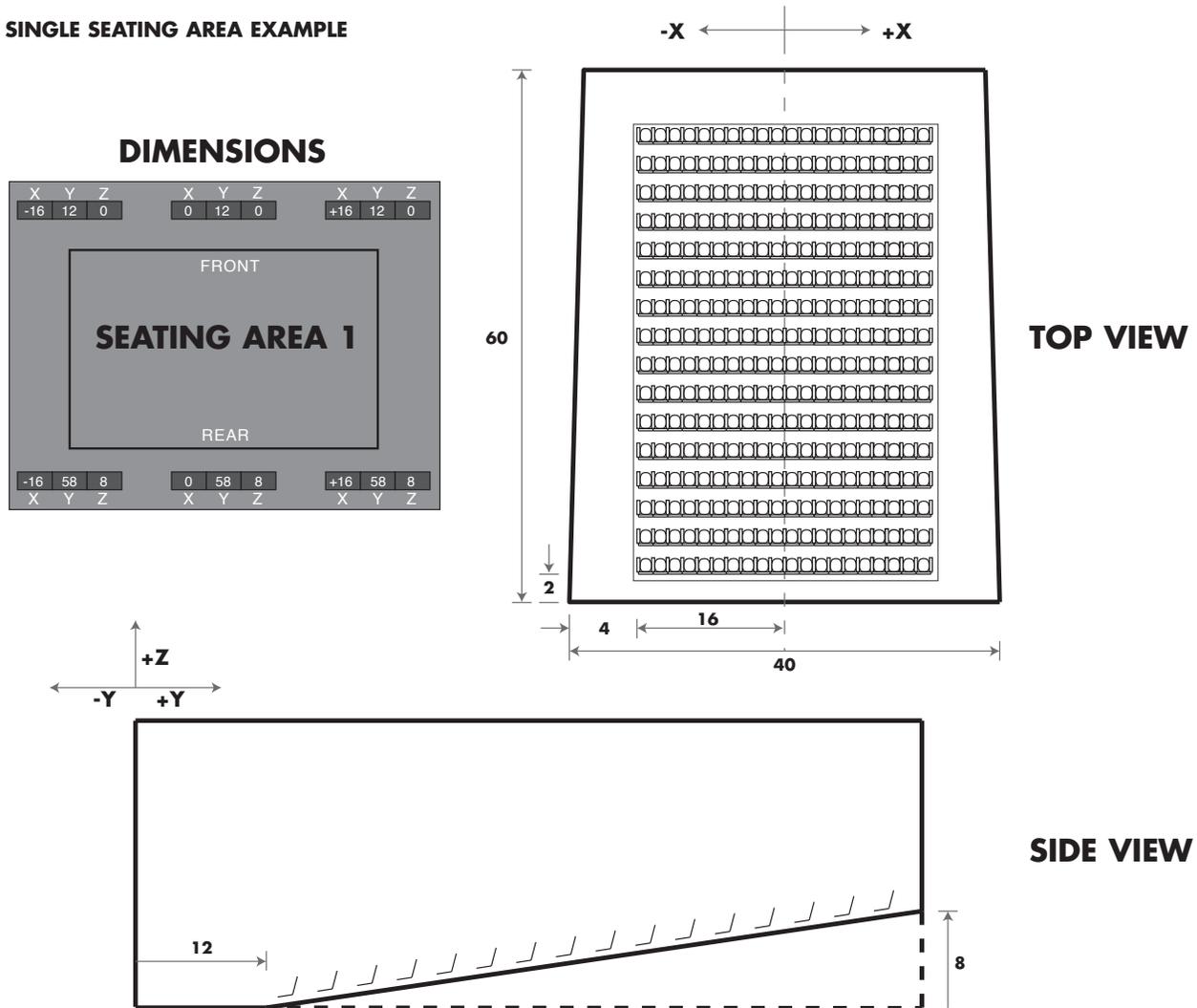
Shown below is an example of an auditorium with three distict seating areas. Each defined seating area is able to accomodate curvatures, varied width, and sloped or stadium seating arrangements.

DIMENSIONS

X	Y	Z		X	Y	Z		X	Y	Z
-15	6	0		0	8	0		+15	6	0

FRONT
SEATING AREA 1
REAR

-15	18	0		0	20	0		+15	18	0
X	Y	Z		X	Y	Z		X	Y	Z

X	Y	Z		X	Y	Z		X	Y	Z
-16	22	3		0	22	3		+12	22	3

FRONT
SEATING AREA 2
REAR

-16	35	7		0	35	7		+12	35	7
X	Y	Z		X	Y	Z		X	Y	Z

X	Y	Z		X	Y	Z		X	Y	Z
-16	40	7		0	40	7		+16	40	7

FRONT
SEATING AREA 3
REAR

-16	58	12		0	58	12		+16	58	12
X	Y	Z		X	Y	Z		X	Y	Z

TOP VIEW

-X ← → +X

6   8   15   60   12   2   4   16   40

+Z
-Y   +Y

SIDE VIEW

40   35   22   18   6   3   7   12
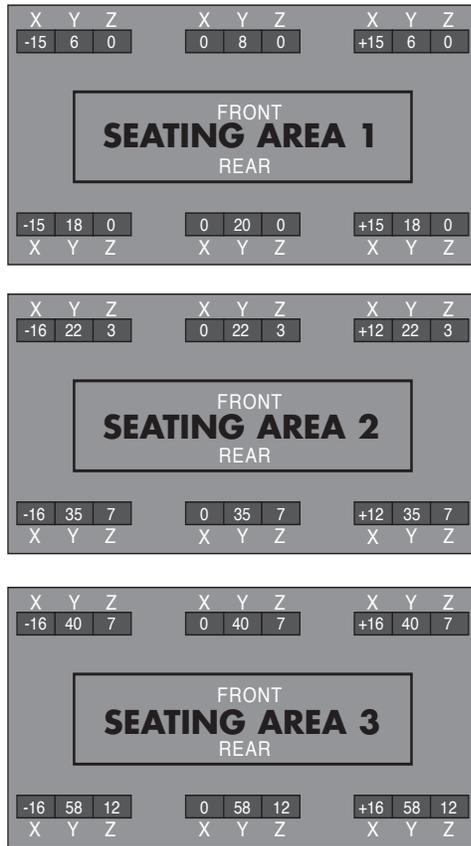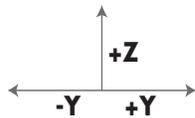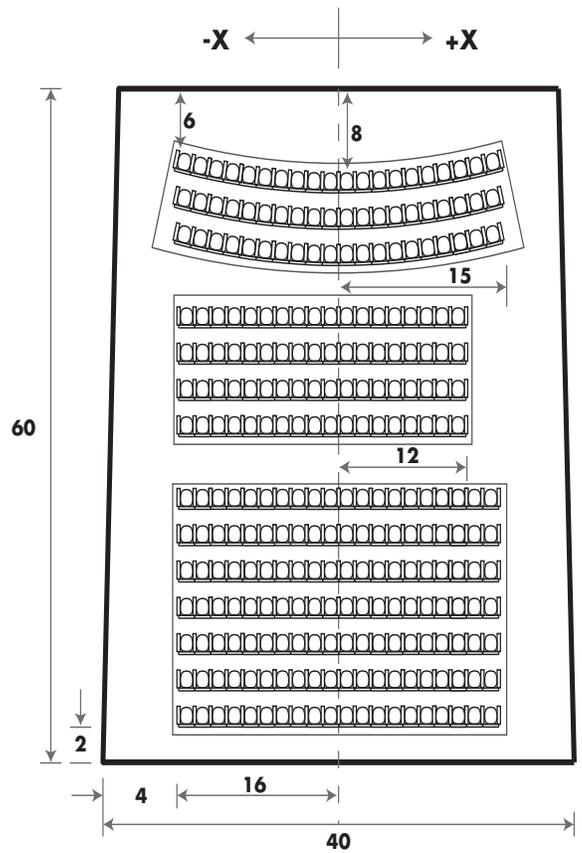
SPEAKER LOCATIONS

The last piece of information needed for the Quantum Logic immersive experience is the number and locations of the speakers in the auditorium. Like the seating area definitions, the **origin** point in the room is defined as the centerpoint of the screen at the floor.

On the dropdown of each speaker category choose the number of speakers or speaker pairs that exist. Next, enter the X, Y, and Z coordinates for each speaker defined.

Remember to press the **save** button before moving to the next category.

<u>**NOTE**</u>:
*The maximum amount of speakers than can be defined must be less than or equal to 32.

<u>Screens</u>
- Quantum Logic processing **always requires these seven stage speakers**.
- Normally, with the Y origin being the front of screen, stage speakers will have negative Y values.
- If Stage Height speakers are in front of the screen then may have positive Y values.
- Three screen height channels are a requirement for a Quantum Logic setup.
- Any speaker behind the screen will need a negative Y value.

<u>Surrounds</u>
- A **minimum of two pairs** (four speakers) are required.
- A **maximum of eight pairs** (sixteen speakers) is allowed.
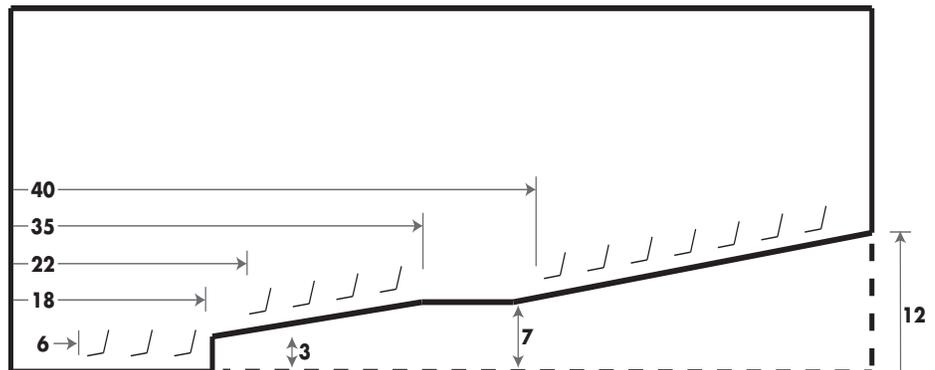- It is assumed that all surrounds are symmetrical so it is only necessary to define one surround wall of speakers.
- If the first speaker pair is on the wall between the screen and where the seating area begins check the **Gap** box.
- Speaker pairs must be defined from front to rear (increasing Y values).

<u>Heights</u>
- It is assumed that all height surrounds are symmetrical so it is only necessary to define one surround wall of speakers.
- A **minimum of two pairs** (four speakers) are required.
- A **maximum of four pairs** (eight speakers) are allowed.
- Speaker pairs must be defined from front to rear (increasing Y values).

<u>Rears</u>
- A **minimum of two** surround speakers are required.
- A **maximum of five** speakers is allowed.
- Speakers must be defined from rear corner to center of rear wall.

STAGE SPEAKERS WITH CURVED SCREEN

Shown below is an example of a symmetrical auditorium with a curved screen. In this configuration the Center and Center Height speakers with have X values of 0.0. Stage Left and Right (Mains or Heights) may have positive Y values based on the arc angle of the screen and placement variations.

-X **+X**

Mains

Heights

-Y

+Y

TOP VIEW

FRONT VIEW

Heights

Mains

Z
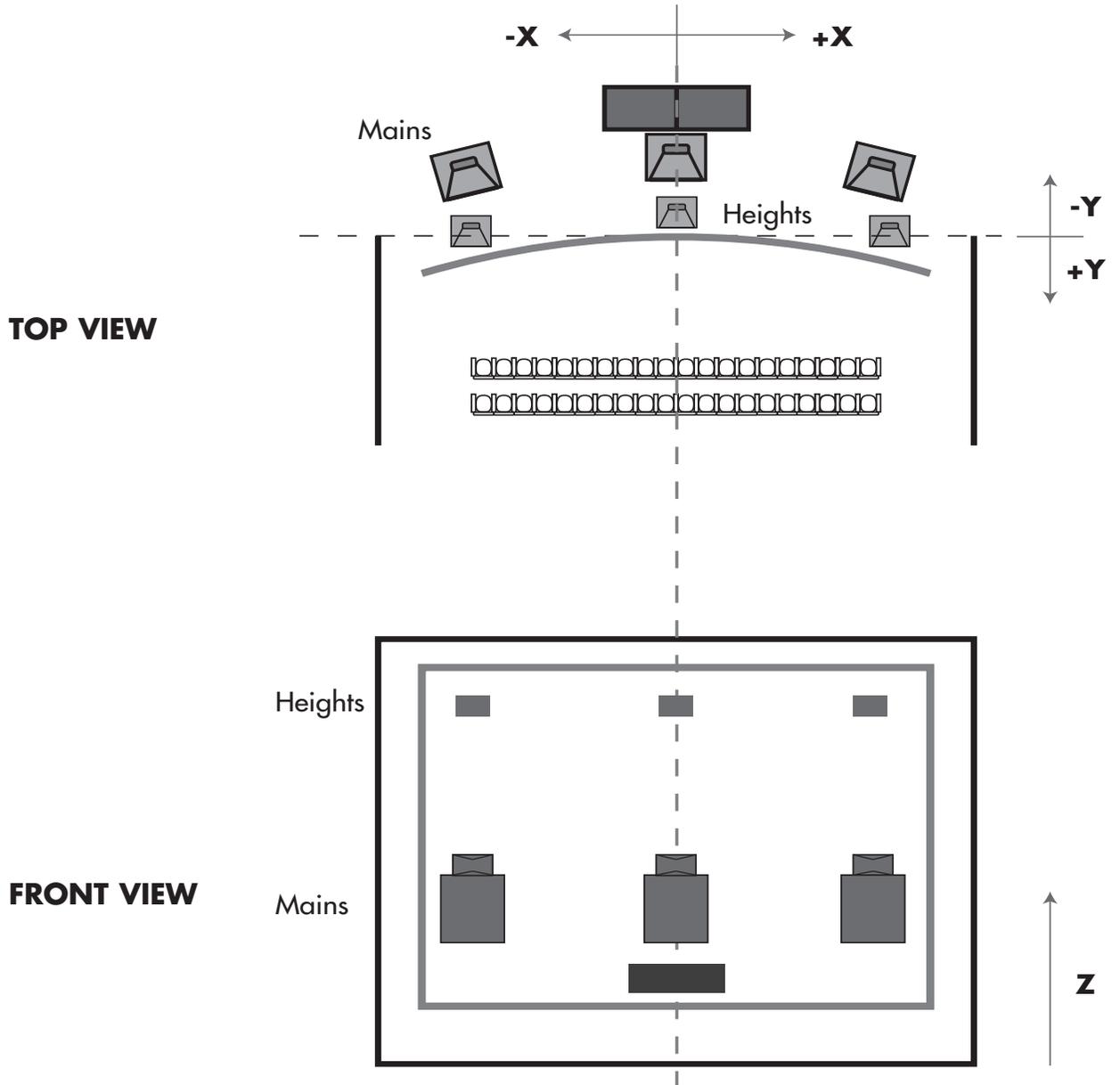
STAGE SPEAKERS WITH FLAT SCREEN

Shown below is an example of a symmetrical auditorium with a flat screen. In this configuration the Center and Center Height speakers with have X values of 0.0. Stage Left and Right (Mains or Heights) will have Y values less than or equal to 0.0.

-X ←————→ +X

Mains

Heights

-Y

+Y

TOP VIEW

Heights

Mains

FRONT VIEW

Z
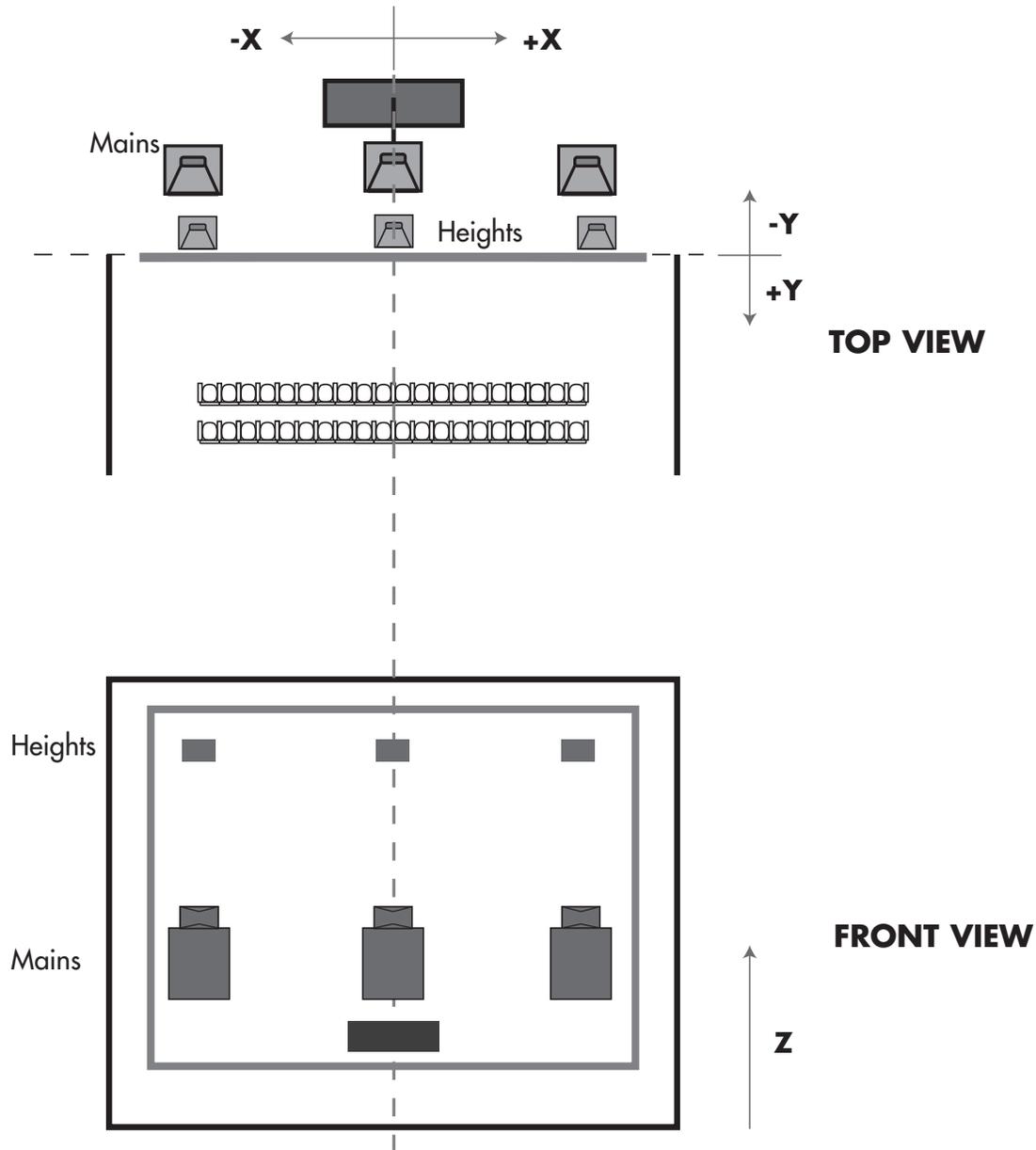
STAGE SPEAKERS WITH OFFSET CURVED SCREEN

The example below shows an auditorium with an offset screen to allow for an exit door on the right side of the room. In this configuration the Center and Center Height speakers with have negative X values. Stage Left and Right (Mains or Heights) may have positive Y values based on the arc angle of the screen and placement variations.

-X ← → +X

Mains

Heights

-Y
+Y

TOP VIEW

FRONT VIEW

Heights

Mains

EXIT

Z
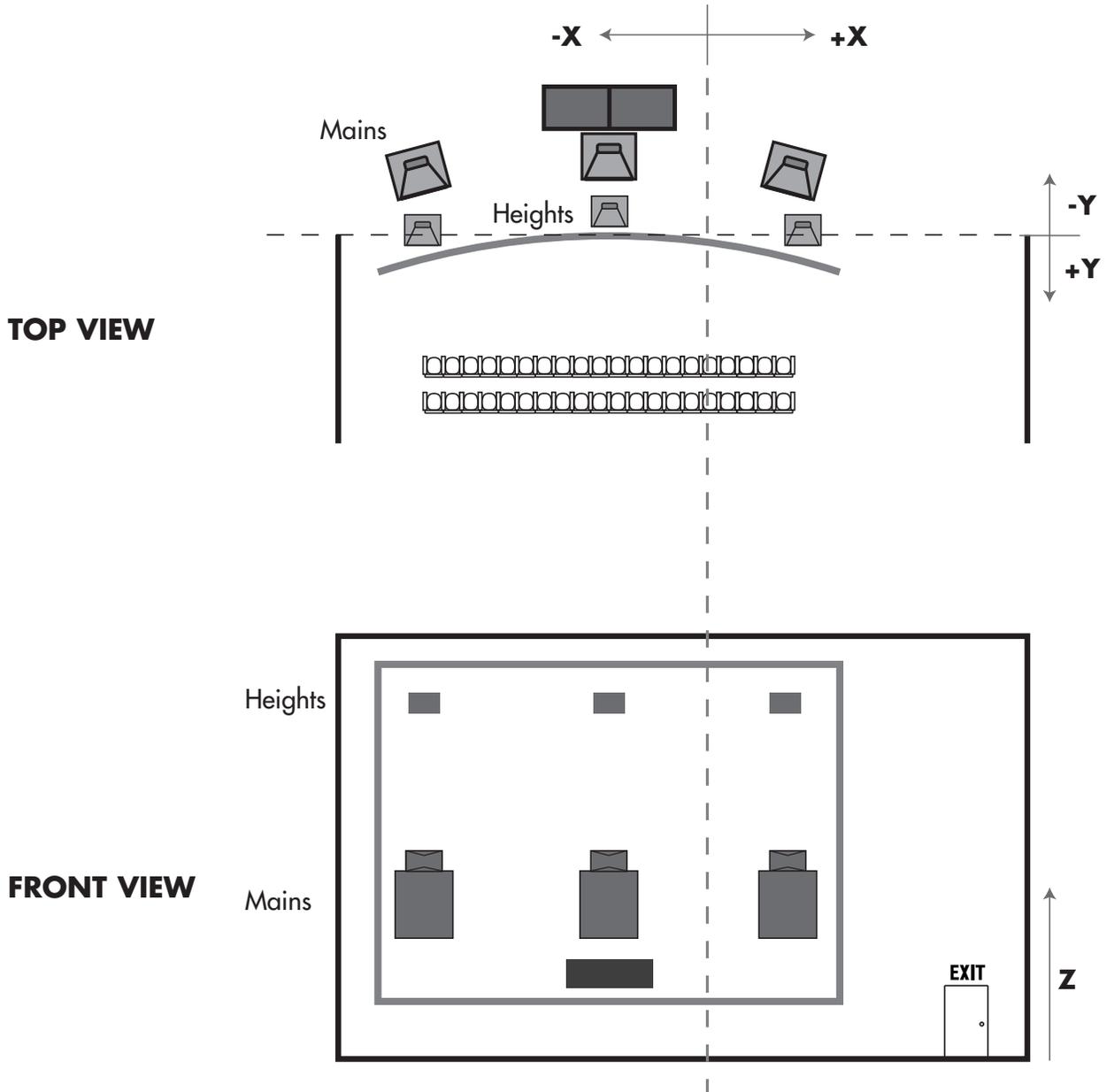
SURROUND SPEAKERS LAYOUT

The figure below is an example of an auditorium using 7 surround pairs, 4 height pairs, and 3 rear speakers. Each speaker pair will have ascending Y values starting from the front of the auditorium to the rear.

In this example all Height Surround Z values will be equal since they are mounted at the same level in the auditorium. Lower surrounds 2-7 will have increasing Z values since they follow the slope of the seating.

-Y **+Y**

-X **+X**

Y: Right Surround 5

X: Right Surround 5

TOP VIEW

Surrounds

Rear Surrounds

+Z

-Y **+Y**

Height Surrounds

Rear Surrounds

Y: Surround 5

Z: Surround 5

SIDE VIEW
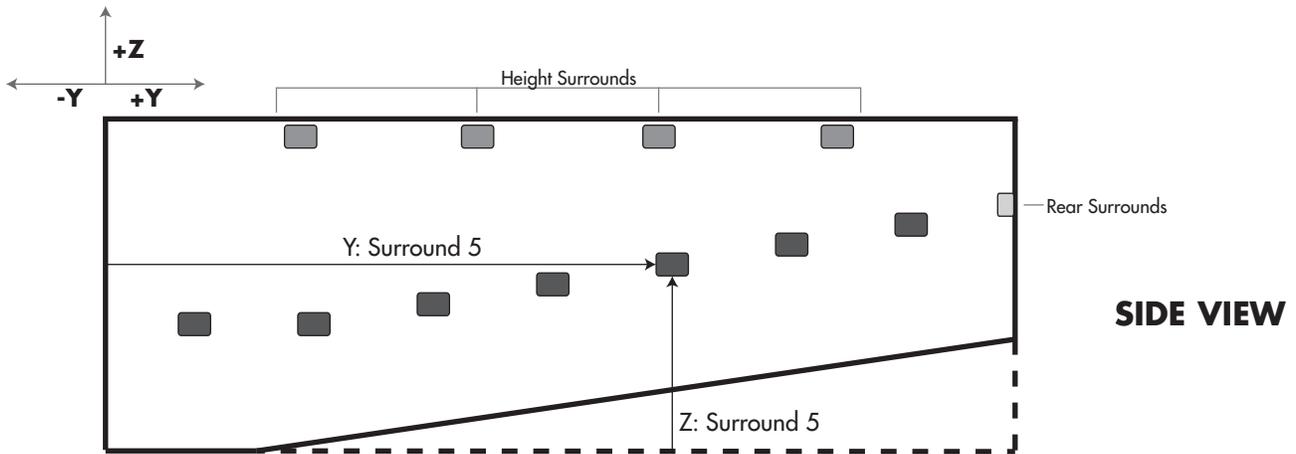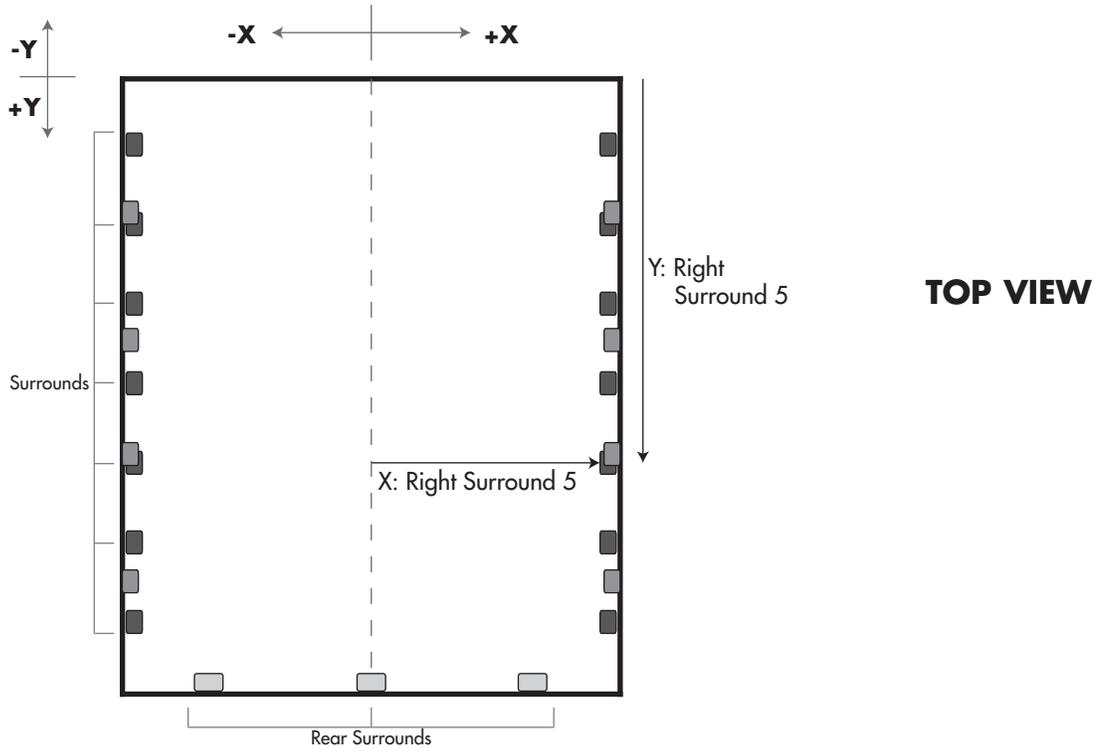
CHANNEL ROUTING ⤬

To alter the channel routing within the processor visit the **ROUTING** tab within the System Configuration Menu. You are able to edit the following routing configurations:

- Analog Inputs
- Digital AES Inputs
- BLU link Inputs
- BLU link Outputs

To make an edit to channel routing first choose the category of input/output. Next find the channel to re-route and use the drop down menu to make a change. You may mark a channel as unused if needed.

By default the QLI-32 will have standard SMPTE channel routing (L,C,R,LFE,Ls,Rs) for inputs. Ensure that the expected input channel routing of the QLI-32 is consistent with the output from your cinema sound processor.

BLU LINK OFFSETS

The BLU link Input/Output 'Starting Channel' dropdown menus allow for editing the BLU link channels on which the device operates. For input, match whatever channels the upstream device is sending and make sure the **input starting channel** does not conflict.

For example, a default Dolby® CP-850 will output on BLU link channels 1-64. This would require the QLI-32 to have an input starting channel of 1 and an output starting channel of 65. The BLU link amplifiers would also need to match the output of the QLI-32.

SYSTEM TAB ⬡

The **SYSTEM** tab in the System Configuration Menu allows the user to edit the following:

- General Settings - Change measurement unit and add bypass surround delay
- QLI Settings* - Edit the Room Factor Adjustment
- Network Settings - Edit IPv4 networking addresses
- NTP Settings - Point the device to a NTP server to syncronize the system clock
- Site Info - Edit the auditorium name, theater name, and audio processor type

*<u>NOTE</u>:

Based on Auditorium Size, Seating Area, and Speaker Location information, QLI automatically configures itself to provide optimal performance. However, not all aspects of the room or playback system can be accounted for based on this information. The **ROOM FACTOR ADJUST** control is provided to allow minor adjustments to be made to the automated QLI configuration if required. For the vast majority of rooms there is no need to alter the **ROOM FACTOR ADJUST**, and this control can be left to its Auto setting. If needed, the **ROOM FACTOR ADJUST** should be used as part of the calibration and tuning of the audio playback system.

FIRMWARE UPDATES

Visit the **UPGRADE** tab within the System Configuration Menu to push a system update to the QLI-32 immersive processor. Press the folder button to open a file prompt and select the .upd firmware file.

The latest QLI-32 firmware is available at the Lexicon Pro support page.

DIAGNOSTICS

The **DIAGNOSTICS** tab shows detailed system information for troubleshooting and error checking.

BLU LINK STATUS

The BLU link status menu shows all detailed information regarding the BLU link chip in the processor. This information may be helpful if troubleshooting BLU link related problems in a system.

- IN/OUT Cable Status — indicates the presence of a valid BLU link connection
- IN/OUT Corrected — shows the number of recoverable bit errors that have occurred
- IN/OUT Errors — shows the number of unrecoverable bit errors that have occurred
- Lock Source — mastership indicator
- Sample Rate — current sample rate negotiated in the BLU link loop
- BLU link Version — indicates the code version loaded onto the BLU link chip
- FPGA HDL Version — indicates the code version loaded onto the FPGA

SYSTEM LOGS

The system logs shows various information such as processor core temperatures and configuration edits. There are several color coded categories to improve readabilty.

RESTORE FACTORY SETTINGS

If unit cannot be found using the prior procedures the following steps will reset the QLI-32 to its factory settings.

1. Power down the device.
2. Power up the device.
3. Immediately hold the QLI button down until the light sequence ends and all lights blink solid (about 10 seconds).
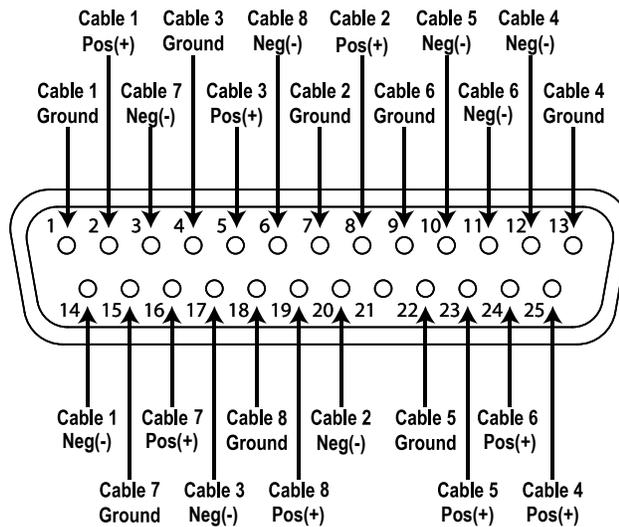4. The system will now have Factory Default Settings.

NOTE:
*Reverting the device to Factory Settings will cause **all saved settings to be lost**. It is recommended to save a backup beforehand.

ANALOG DB25 CABLE DIAGRAMS (INPUT)

Cable/Channel Number	DB25 Pin Number		
	Positive(+)	Negative(-)	Ground
1	2	14	1
2	8	20	7
3	5	17	4
4	25	12	13
5	23	10	22
6	24	11	9
7	16	3	15
8	19	6	18

QLI-32 Analog Input Cable (Male)

Cable 1 Pos(+) Cable 3 Ground Cable 8 Neg(-) Cable 2 Pos(+) Cable 5 Neg(-) Cable 4 Neg(-)

Cable 1 Ground Cable 7 Neg(-) Cable 3 Pos(+) Cable 2 Ground Cable 6 Ground Cable 6 Neg(-) Cable 4 Ground

1 2 3 4 5 6 7 8 9 10 11 12 13

14 15 16 17 18 19 20 21 22 23 24 25

Cable 1 Neg(-) Cable 7 Pos(+) Cable 8 Ground Cable 2 Neg(-) Cable 5 Ground Cable 6 Pos(+)

Cable 7 Ground Cable 3 Neg(-) Cable 8 Pos(+) Cable 5 Pos(+) Cable 4 Pos(+)

QLI-32 Analog Input Connector (Female)

Cable 4 Neg(-) Cable 5 Neg(-) Cable 2 Pos(+) Cable 8 Neg(-) Cable 3 Ground Cable 1 Pos(+)

Cable 4 Ground Cable 6 Neg(-) Cable 6 Ground Cable 2 Ground Cable 3 Pos(+) Cable 7 Neg(-) Cable 1 Ground

13 12 11 10 9 8 7 6 5 4 3 2 1

25 24 23 22 21 20 19 18 17 16 15 14

Cable 4 Pos(+) Cable 5 Pos(+) Cable 8 Pos(+) Cable 3 Neg(-) Cable 7 Ground

Cable 6 Pos(+) Cable 5 Ground Cable 2 Neg(-) Cable 8 Ground Cable 7 Pos(+) Cable 1 Neg(-)
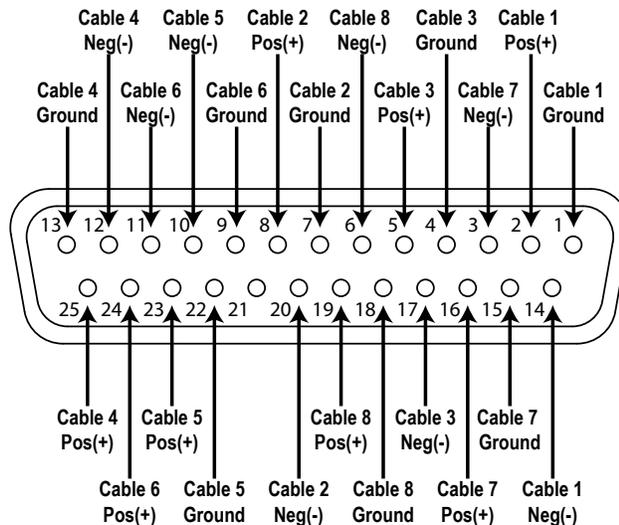
AES/EBU RJ-45 CONNECTOR DIAGRAM

Jack	RJ-45 pin	AES/EBU Signal
Top	1	1/2+
	2	1/2-
	3	3/4+
	4	5/6+
	5	5/6-
	6	3/4-
	7	7/8+
	8	7/8-
Bottom	1	9/10+
	2	9/10-
	3	11/12+
	4	13/14+
	5	13/14-
	6	11/12-
	7	15/16+
	8	15/16-

RJ-45 Connector & Cable Pinout

8 7 6 5 4 3 2 1

1 2 3 4 5 6 7 8

1 2 3 4 5 6 7 8
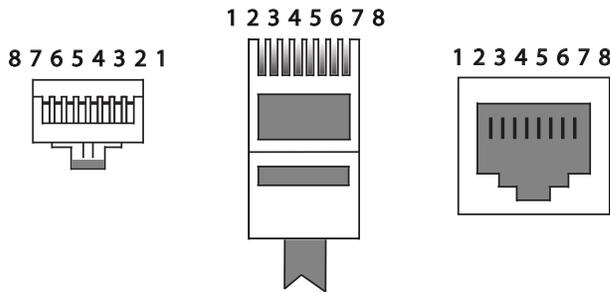
NOTE:
*Only 8 AES/EBU channel inputs can be processed at a time.

AUTOMATION CONNECTOR DIAGRAM

Terminal	Signal
1	Stereo Input Mode
2	5.1 Input Mode
3	7.1 Input Mode
4	Analog Input
5	AES /EBU Input
6	BLU link Input
7	QLI Enable
8	QLI Disable
9	Mute
10	Unmute
11	Alt. Content Mode
12	Ground / Return

QLI-32 GPI Terminal Block

1 2 3 4 5 6 7 8 9 10 11 12
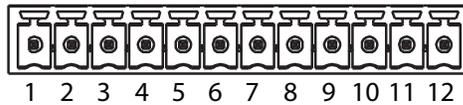
NOTES:

*Each pin requires a momentary connection to Ground/Return to fire that automation command.

*Since any change to Input Mode resets QLI Mode to **Normal**, whenever Alternative Content Mode is required, select the chosen **Input Mode** first, followed by the **Alternative Content Mode** command.

TCP AUTOMATION COMMANDS

SYSTEM COMMANDS

Read	Write
qli32.sys.input	qli32.sys.input [analog,aes,blulink]
qli32.sys.mute	qli32.sys.mute [0,1]

QLI MODE COMMANDS

Read	Write
qli32.sys.qli.mode	qli32.sys.qli.mode [normal,altcontent]
qli32.sys.qli.inputmode	qli32.sys.qli.inputmode [stereo,5.1,7.1]
qli32.sys.qli.surroundinputlevel	qli32.sys.qli.surroundinputlevel [cinema,consumer]
qli32.sys.qli.bypass	qli32.sys.qli.bypass [0,1]

TEST COMMANDS

Read	Write
qli32.sys.test.speaker_test	qli32.sys.test.speaker_test [(seconds per speaker, number of loops), stop]

NOTE:

*Telnet port 10001 required for all commands

*Since any change to Input Mode resets QLI Mode to **Normal**, whenever Alternative Content Mode is required, select the chosen **Input Mode** first, followed by the **Alternative Content Mode** command.

*Some digital cinema servers may need the "**\t**" tab character in place of spaces and the "**\r**" return character at the end of command.
   Ex: "qli32.sys.inputmode\t5.1\r"

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QLI-32 Immersive Processor

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or visit us online at www.lexiconpro.com