The Signal Processing Router ™

SYSTEM MANUAL

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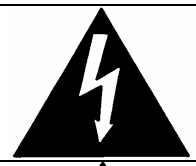
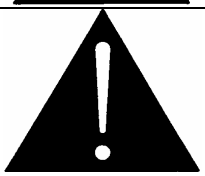
IMPORTANT SAFETY INSTRUCTIONS

	The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated “Dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.
	The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (Servicing) instructions in the literature accompanying the product.

- Read and keep these instructions
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- 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 the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

WARNING:
TO REDUCE THE RISK OF FIRE OR ELECTRICAL SHOCK, DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE. DO NOT EXPOSE THIS EQUIPMENT TO DRIPPING OR SPLASHING AND ENSURE THAT NO OBJECTS FILLED WITH LIQUIDS ARE PLACED ON THE EQUIPMENT

WARNING:
THIS EQUIPMENT USES POWER/MAINS CONNECTORS FITTED WITH SAFETY GROUND PINS. TO REDUCE THE RISK OF ELECTRIC SHOCK, GROUNDING OF THE GROUND PIN OF THE MAINS PLUG MUST BE MAINTAINED

WARNING:
DANGEROUSLY HIGH VOLTAGES ARE PRESENT INSIDE THE POWER SUPPLY FRAME.

WARNING:
TO COMPLETELY DISCONNECT THIS EQUIPMENT FROM THE AC MAINS, DISCONNECT THE POWER SUPPLY CORD PLUG FROM THE AC RECEPTACLE THIS EQUIPMENT MAY HAVE MORE THAN ONE POWER SUPPLY CORD. TO REDUCE THE RISK OF ELECTRIC SHOCK, DISCONNECT ALL POWER SUPPLY CORDS BEFORE SERVICING.

CAUTION: These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified personnel.

CAUTION: To reduce the risk of electric shock, plug each power supply cord into separate branch circuits employing separate service grounds.

NEVER use flammable or combustible chemicals for cleaning components.
NEVER operate this product with any covers removed.
NEVER wet the inside of this product with any liquid.
NEVER bypass any fuse or replace any fuse with a value or type other than those specified.
NEVER operate this product in an explosive atmosphere.
NEVER block the airflow through ventilation slots.
NEVER expose this product to extremely low or high temperatures.

This product complies with the requirements of the product family standards for video, audio, audio-visual entertainment, and lighting control apparatus for professional use as mentioned below.

INFORMATION TO USERS IN EUROPE

NOTE

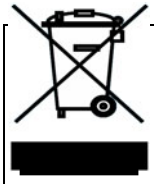
This equipment with the CE marking complies with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European standards:

- EN60065 Product Safety
- EN55103-1 Electromagnetic Interference Class A (Emission)
- EN55103-2 Electromagnetic Susceptibility (Immunity)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the European Union EMC directive. 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.

CE	EN60065	Safety
	EN55103-1: 1996	Emission
	EN55103-2: 1996	Immunity



EN504192 2005
Waste electrical products should not be disposed of with household waste. Contact your Local Authority for recycling advice

INFORMATION TO USERS IN THE U.S.A.

NOTE

FCC CLASS A DIGITAL DEVICE OR PERIPHERAL

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.

WARNING

Changes or Modifications not expressly approved by Evertz Microsystems Ltd. could void the user's authority to operate the equipment.

Use of unshielded plugs or cables may cause radiation interference. Properly shielded interface cables with the shield connected to the chassis ground of the device must be used.

Quartz Electronics Ltd FC For Home or Office Use	Tested to comply with FCC Standards	This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: This device may cause harmful interference, and This device must accept any interference received, including interference that may cause undesired operation.

REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.16	Quartz Revisions	Oct 06
1.17	Evertz Formatting Updates	Jul 07
1.18	Added Analog Audio information	Jan 08
1.2	Updated Safety Instructions, electrical specifications	Apr 08
2.0	Fixed formatting	May 08
3.0	Added MADI and SPT information	Jul 09
3.1	Updated xenon photos, added information about SFP3R-2 & SFP3T-13-2, Updated information on input, output, and x-link modules	Sept 09
3.2	Updated “Manual Remote Control - using Q-Link” section	Oct 09

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1. OVERVIEW

Thank you for selecting the Quartz brand of Evertz products for use in your video/audio system. The Xenon router offers outstanding quality and value, and will provide a long and cost effective working life with the minimum of maintenance.

In order to offer the best in customer support, Evertz supplies the Xenon router with a full one-year manufacturing warranty.

This guide is intended as an instructional reference for the Xenon routing switcher. If you require further product information or assistance, please contact Evertz or your local Evertz distributor.

There are many other products that range in sizes from 8x2 up to 1152x1152, in all signal formats including 3G, HD, SDI, AES, analog video and analog audio. We can also supply a range of data, tally, and relay routers.

Figure 1-1: The Xenon Signal Processing Router (4RU & 8RU)

Xenon is an advanced routing switcher. A new generation design built on a solid multi-format router core providing reliability and resilience. Xenon offers the flexibility of multi-format operation plus the ability to add additional functionality through the use of Signal Processing Technology (SPT) modules. The design of the Xenon avoids single points of failure; all active assemblies are hot-swappable from the front of the frame and power, control, cooling and reference generation available in redundant configurations.

Xenon provides for any mix of formats within a frame in independent blocks of 32 inputs or outputs (initial matrix size is 32x32). Any of the supported formats, including 3G, HD, SD video and AES, Analog audio can be expanded after installation by adding further I/O's to fill an entire frame.

- The 4RU Xenon can be expanded up to a maximum size of 64x64.
- The 8RU Xenon can be expanded up to a maximum size of 128x128.

The current supported signal formats are:

1. Standard Definition digital video with embedded audio – SD
2. High & Standard Definition digital video with embedded audio – HD / SD
3. 3G, High & Standard Definition digital video with embedded audio – 3G / HD / SD
4. Digital Audio – AES
5. Analog Audio – AA

1.1. KEY FEATURES

- 32x32 expanded to 64x64 router in 4RU
- 32x32 expanded to 128x128 router in 8RU
- Expandable in blocks of 32 inputs or outputs
- Digital composite and digital component in the same chassis
- 143 to 540Mbit compatible SD
- 143 to 1485Mbit compatible HD/SD
- 143 to 2970Mbit compatible 3G/HD/SD
- EQ bypass for sub 143Mbit operation, please contact the factory
- Flexible control system, can work stand-alone or with the Evertz System Controller, EQX-SERVER
- System-wide environmental monitoring
- Input and output signal monitoring with full EDH check
- Modular architecture
- Compact design
- Expandable after installation
- Software and firmware updates after installation
- Remote monitoring over Ethernet
- Optional built-in diagnostics
- Optional power supply redundancy
- Optional control card redundancy
- Optional reference card redundancy
- Automatic input equalization

1.2. APPLICATIONS

The Xenon routing switcher is designed for use in medium to large installations where a flexible expandable routing switcher is required. The Quartz router control system also allows control from multiple devices simultaneously, allowing replacement of smaller separate routing switchers.

By replacing the standard SD input and output cards with their high definition (HD) equivalents the router can be supplied as a HD/SD router. Furthermore, the input and output cards can be replaced with their 3G equivalents to provide a 3G/HD/SD routing solution. This upgrade can also be fitted after the unit has been installed.

1.3. ORDERING INFORMATION

Due to the complex nature of the Xenon router all enquires for configuration and expansion should be directed to your local Evertz office or your local Evertz/Quartz distributor.

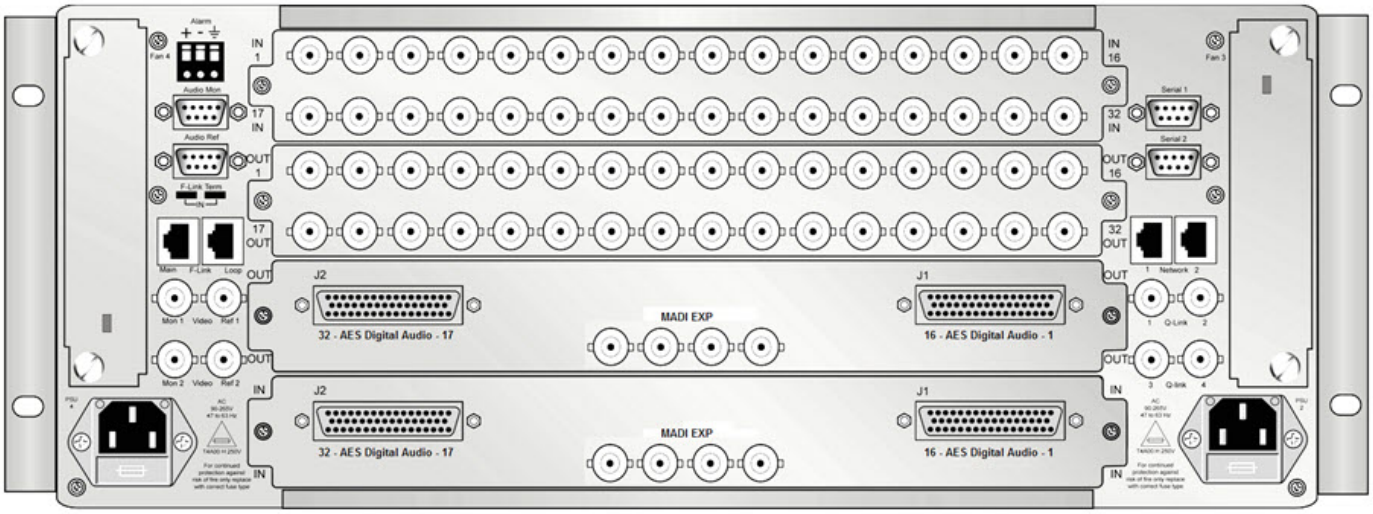

Figure 1-2: 4RU Xenon Populated with 32x32 SDI and 32x32 Balanced AES Audio

1.4. HOW TO USE THIS MANUAL

This manual will assist you in the use of the Xenon Signal Processing router, and contains all the necessary information to successfully operate this product. If further product information or assistance is required, please contact Evertz or your local Evertz/Quartz distributor.

This manual is organized into 8 sections: Overview, Installation, Technical Description, Control, System Overview, Communication & Monitoring Connections, Configuring the System Using WinSetup, and Maintenance. The overview section contains a brief overview of the Xenon operation, features and a glossary to define concepts and terms used throughout the remainder of the manual. We highly recommend taking the time to become familiar with the terms and concepts described here before proceeding into the rest of the manual.

Section 2 provides instructions on how to unpack, install and setup the Xenon.

Section 3 provides technical specifications and information on configuring the connector pin-outs of the Xenon system.

Section 4 describes how to control the Xenon. More specifically, front and rear view control, video and audio signals, and system monitoring and control are outlined in this chapter.

Section 5 describes the system overview of the Xenon router. This chapter includes information on the basic composition; input, output and crosspoint cards; signal processing modules; and control and reference modules.

Section 6 describes the operation of the Xenon's control and monitoring connections. This chapter focuses on the alarm, monitoring and reference. It also outlines the control via Q-Link, Ethernet and serial.

Section 7 provides instructions on how to configure the system using WinSetup.

Section 8 describes how to maintain the Xenon router.

This symbol is intended to alert the user to important operating instructions.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important safety related operating and maintenance (Servicing) instructions in this manual.

1.5. DEFINITIONS

4:2:2 The sampling ratio used in the HDTV digital video signal. For every 4 samples of luminance there are 2 samples each of R-Y (Red minus Luminance) and B-Y (Blue minus Luminance).

16x9 A wide screen television format such as HDTV in which the aspect ratio of the screen is 16 units wide by 9 high as opposed to the 4x3 of normal TV.

AES/EBU: (Sometimes abbreviated as AES) Refers to the digital audio standard (AES3-1992) set by the Audio Engineering Society and European Broadcast Union and used by most forms of digital audio from CDs to professional digital video.

ASPECT RATIO: The ratio of width to height in a picture. Theatre screens generally have an aspect ratio of 1.85 to 1, widescreen TV (16x9) is 1.77 to 1, and normal TV (4x3) is 1.33 to 1.

CCIR (International Radio Consultative Committee): An international standards committee. (This organization is now known as ITU.)

CCIR-601: See ITU-R601.

CLIFF EFFECT: (Also referred to as the 'digital cliff') This is a phenomenon found in digital video systems that describes the sudden deterioration of picture quality when due to excessive bit errors, often caused by excessive cable lengths. The digital signal will be perfect even though one of its signal parameters is approaching or passing the specified limits. At a given moment however, the parameter will reach a point where the data can no longer be interpreted correctly, and the picture will be totally unrecognizable.

COMPONENT ANALOG: The non-encoded output of a camera, video tape recorder, etc., consisting of the three primary colour signals: red, green, and blue (RGB) that together convey all necessary picture information. In some component video formats these three components have been translated into a luminance signal and two colour difference signals, for example Y, B-Y, R-Y.

COMPONENT DIGITAL: A digital representation of a component analog signal set, most often Y, B-Y, R-Y. The encoding parameters are specified by ITU-R709 for HDTV signals. SMPTE 274M and SMPTE 296M specify the parallel interface.

COMPOSITE ANALOG: An encoded video signal such as NTSC or PAL video that includes horizontal and vertical synchronizing information.

COMPOSITE DIGITAL: A digitally encoded video signal, such as NTSC or PAL video that includes horizontal and vertical synchronizing information.

DROP FRAME: In NTSC systems, where the frame rate is 29.97002618 frames per second, the drop frame mode permits time of day indexing of the frame numbers by dropping certain frame numbers. Specifically frames 0, and 1 at the beginning of each minute except minutes 0,10,20,30,40, & 50, are omitted, to compensate for an approximate timing error of 108 frames (3 seconds 18 frames) per hour. A flag bit is set in the time code to signal when the drop frame mode is in effect.

EBU (European Broadcasting Union): An organization of European broadcasters that among other activities provides technical recommendations for the 625/50 line television systems.

EMBEDDED AUDIO: Digital audio is multiplexed onto a serial digital video data stream.

ITU: The United Nations regulatory body governing all forms of communications. ITU-R (previously CCIR) regulates the radio frequency spectrum, while ITU-T (previously CCITT) deals with the telecommunications standards.

ITU-R601: An international standard for standard definition component digital television from which was derived SMPTE 125M and EBU 3246-E standards. ITU-R601 defines the sampling systems, matrix values and filter characteristics for Y, B-Y, R-Y and RGB component digital television signals.

NTSC: National Television Standards Committee established the television and video standard in use in the United States, Canada, Japan and several other countries. NTSC video consists of 525 horizontal lines at a field rate of approximately 60 fields per second. (Two fields equals one complete Frame). Only 487 of these lines are used for picture. The rest are used for sync or extra information such as VITC and Closed Captioning.

PAL: Phase Alternating Line. The television and video standard in use in most of Europe. Consists of 625 horizontal lines at a field rate of 50 fields per second. (Two fields equals one complete Frame). Only 576 of these lines are used for picture. The rest are used for sync or extra information such as VITC and Teletext.

PIXEL: The smallest distinguishable and resolvable area in a video image. A single point on the screen. In digital video, a single sample of the picture. Derived from the words *picture element*.

SMPTE (Society of Motion Picture and Television Engineers): A professional organization that recommends standards for the film and television industries.

SMPTE 12M: The SMPTE standard for Time and address code. SMPTE 12M defines the parameters required for both linear and vertical interval time codes.

SMPTE 125M: The SMPTE standard for bit parallel digital interface for component video signals. SMPTE 125M defines the parameters required to generate and distribute component video signals on a parallel interface.

SMPTE 259M-C: The SMPTE standard for 525 and 625 line serial digital component and composite interfaces.

SMPTE 272M: The SMPTE standard for embedding audio in serial digital standard definition (SMPTE 259M-C) video signals.

SMPTE 274M: The SMPTE standard for bit parallel digital interface for high definition component video signals with an active picture of 1080 lines x 1920 pixels.

SMPTE 276M: The SMPTE standard for transmission of AES/EBU Digital Audio Signals Over Coaxial Cable.

SMPTE 292M: The SMPTE standard for high definition serial digital component interfaces.

SMPTE 296M: The SMPTE standard for bit parallel digital interface for high definition component video signals with an active picture of 720 lines x 1280 pixels.

SMPTE 299M: The SMPTE standard for embedding audio in serial digital high definition (SMPTE 292M) video signals.

TRS: Timing reference signals used in composite digital systems. (It is four words long).

TRS-ID: Abbreviation for "Timing Reference Signal Identification". A reference signal used to maintain timing in composite digital systems. (It is four words long.)

2. INSTALLATION

2.1. UNPACKING

Remove the equipment carefully from the boxes and check against the Packing List supplied with each unit. This shows what items have been shipped against your order and includes all options.

Any error should be reported to your supplier immediately. After you have unpacked the equipment please save all the packing material as this could be useful in the future if the unit needs to be returned for maintenance.

Check each item supplied for transit damage. Any damage should be reported in detail to your supplier. You must state the serial number of the unit, which can be found on the rear of the frame. Check that power cords supplied are suitable for your country and that the equipment is compatible with your mains (line) voltage. Note that remote panels are mains powered and must also be checked.

2.2. PHYSICAL INSTALLATION

2.2.1. Router Frames

All units are designed for mounting in standard 19" equipment racks. The depth of all the frames is 450mm plus connectors. In addition allowance must be made for the high number of cables to be installed at the rear of the frame.

Power dissipation in all units is low and cooling is achieved by fan-assisted convection.

2.2.2. Remote Panels

The Q-Link remote panels are 130mm deep plus cables. All remote panels are designed to fit into standard 19" equipment racks and can be mounted at any angle.

2.3. ELECTRICAL CONNECTIONS

Figure 2-1 provides a rear panel view of the xenon connections.

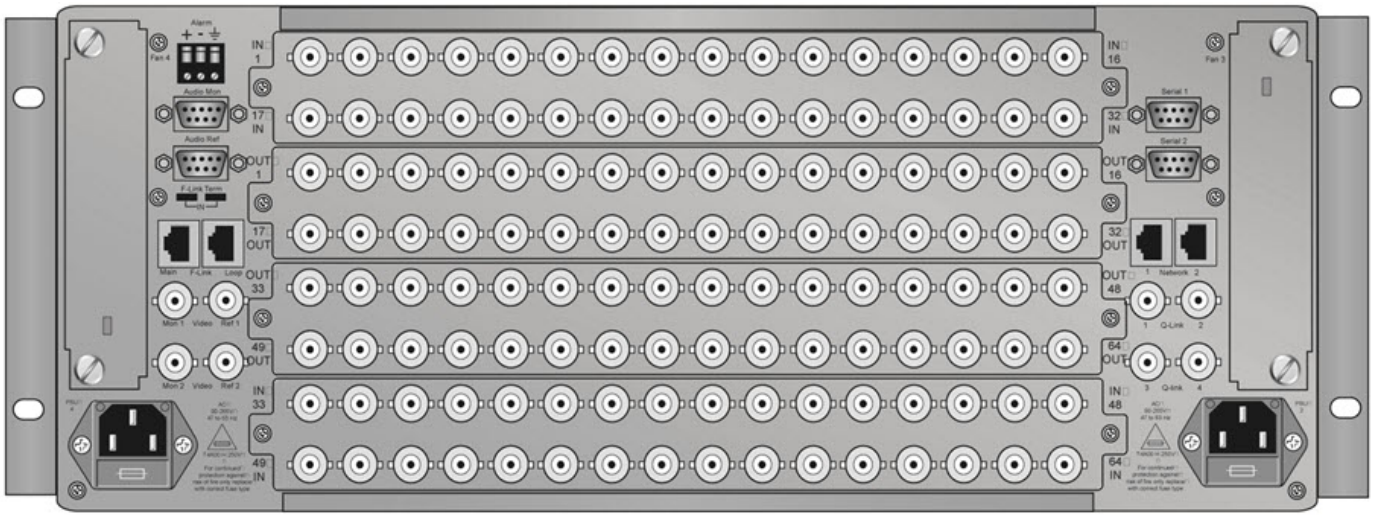

Figure 2-1: Xenon Rear View (4RU Xenon Shown)

2.3.1. Power Supply

The Xenon Router power supplies operate on either 100 to 240 volts AC at 50 or 60 Hz and automatically sense the input voltage. Power should be applied by connecting a 3-wire grounding type power supply cord to the power entry module on the rear panel. The power cord should be minimum 18 AWG wire size; type SVT marked VW-1, maximum 2.5 m in length.

The 4RU chassis is fitted with a power supply on one side, and an optional redundant supply on the opposite side. The 8RU chassis is fitted with two power supplies on one side, and an optional pair of redundant supplies on the opposite side. Note that on the 8RU chassis power MUST be applied to both the top and bottom supplies on the same side of the chassis to properly power the router.

The IEC 320 power entry modules combine a standard power inlet connector, two 5 x 20 mm fuse holders and an EMI line filter.

WARNING:
This equipment uses power/mains connectors fitted with safety ground pins. To reduce the risk of electric shock, grounding of the ground pin of the mains plug must be maintained. On the 8RU chassis, ensure that the frame is also connected correctly to Earth/Ground using the Ground terminal on the rear of the frame.

To completely disconnect this equipment from the AC mains, disconnect the power supply cord plug from the AC receptacle. This equipment may have more than one power supply cord. To reduce the risk of electric shock, disconnect all power supply cords before servicing.

2.3.2. Video Inputs and Outputs

These connections are made using standard 75Ω video BNC connectors. A high quality coax cable such as PSF1/2 (TF3255) for analog video, PSF1/3 (TF3304) for SDI video, Belden 8281 or 1694 for SDI-HD video or suitable equivalents should be used for optimum performance.

2.3.3. Audio Inputs and Outputs

These connections are made using 50 pin D-Type connectors (female) for balanced audio signals and standard 75Ω BNC connectors for unbalanced audio signals. High quality cable should be used for optimum performance.

! Warning: It is both important and good practice that cables are properly supported and not hanging on the connectors as this can put unnecessary stress on the connectors and possibly reduce their working life.

2.3.4. Video Sync

Standard Definition and High Definition Video routers have a separate looping Ref input that takes any standard analog video signal with standard sync. In addition, High Definition routers will also accept a tri-level sync.

If no reference signal is connected then the unit will make crosspoint changes at a rate of about 40Hz.

2.3.5. Manual Remote Control - using Q-Link

All Xenon routers can be connected to other Evertz routers and remote control panels by a single coaxial link called Q-Link. This link uses standard 75Ω video cable daisy-chained from frame to frame and from panel to panel over a maximum cable length of 500m. Each end of the link must be terminated in 75ohm; however, the Xenon router Q-Links are internally terminated, therefore, only the end that is not connected directly to the Xenon needs to have a terminator installed.

! Warning: The installer must fit a 75ohm terminator at the end of the cable that is not connected to the Xenon.

This daisy-chain method ensures the best transmission quality of the control signals down the cable. Short cuts that might save cable, such as running stubs to some panels, are not recommended as this may, under certain circumstances, cause data errors.

Important Note: The four (4) Xenon router Q-Links are internally terminated at 75Ω.

The system can support up to 32 devices. Each unit being connected to the Q-Link has its own address switch, which is set up as part of the system configuration.

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3. TECHNICAL DESCRIPTION

3.1. SPECIFICATIONS

3.1.1. Configuration

Inputs:	Selectable in blocks of 32
Outputs:	Selectable in blocks of 32

3.1.2. Standard Definition

3.1.2.1. SDI Video Inputs

Signals Supported:	SMPTE 259M 1997 ASI DVB standard
Signal Level:	800mV p-p nominal
Impedance:	75Ω terminating
Return Loss, 5 - 270MHz:	15dB typical
Cable Equalization:	Belden 8281A, 250m
Connectors:	BNC, 75Ω terminating

3.1.2.2. SDI Video Outputs

Signal Level:	800mV p-p +/- 10%
Impedance:	75Ω terminating
Return Loss, 5 - 270MHz:	15dB typical
DC Offset:	0 +/- 0.5V
Connectors:	BNC, 75Ω terminating

3.1.2.3. Signal Path

Rise/Fall Times:	<0.4ns
Path Length:	12ns, typical
Output Jitter:	0.2UI p-p with < 250m input cable

3.1.3. High Definition

3.1.3.1. HD-SDI Video Inputs

Signals Supported:	SMPTE 292M, SMPTE 424M
Signal Level:	800mV p-p nominal
Impedance:	75Ω terminating
Return Loss, 5 - 1485MHz:	15dB typical
Cable Equalization:	Belden 1694A, 90m @1.485Gb/s, 65m @ 2.97Gb/s
Connectors:	BNC, 75Ω terminating

3.1.3.2. HD-SDI Video Outputs

Signal Level:	800mV p-p +/- 10%
Impedance:	75Ω terminating
Return Loss, 5 - 1485MHz:	15dB typical

DC Offset:	0 +/- 0.5V
Connectors:	BNC, 75Ω terminating

3.1.3.3. Signal Path

Rise/Fall Times:	<0.4ns
Path Length:	12ns, typical
Output Jitter:	0.2UI p-p with < 95m input cable

3.1.4. Fiber Connections

3.1.4.1. Fiber Video Inputs

SFP1R-2:

Number of Fiber Inputs:	2 per SFP
Connector:	LC/PC
Operating Wavelength:	1270nm to 1610nm
Maximum Input Power:	-1dBm
Optical Sensitivity:	-21dBm +/- 1dBm

SFP3R-2:

Number of Fiber Inputs:	2 per SFP
Connector:	LC/PC
Operating Wavelength:	1270nm to 1610nm
Maximum Input Power:	-1dBm
Optical Sensitivity:	-21dBm (2.97Gb/s pathological) -23dBm (2.97 Gb/s color bars)
Fiber type:	Singlemode/Multimode (contact factory for multimode distance specs)

3.1.4.2. Fiber Video Outputs

SFP1T-13-2:

Number of Fiber Outputs:	2 per SFP
Connector:	LC/PC
Wavelengths:	1310nm
Output Power:	-2dBm +/- 1dBm

SFP3T-13-2:

Number of Fiber Outputs:	2 per SFP
Connector:	LC/PC
Wavelengths:	1310nm
Output Power:	-1dBm +/- 1dBm
Fiber type:	Singlemode/Multimode (contact factory for multimode distance specs)

3.1.5. Switching Reference (Video)

Reference Inputs (SD):	2x, BNC, analog 525/625
Reference Inputs (HD/SD):	Tri level analog 625 or 525
Signal Level:	1V p-p +/- 3dB

Impedance:	75Ω terminating
Line Switching:	Lines 6/319 (625) Lines 10/273 (525)
Connectors:	BNC, 75Ω terminating

3.1.6. AES Digital Audio

Sample Rates:		
Input:		
Asynchronous:		32 to 192 KHz
Synchronous:	in bypass mode	24 KHz to 192 KHz
	in synchronous mode	48 KHz or 96 KHz
Sample Rate Converted:	in bypass mode	24 KHz to 192 KHz
	in synchronous mode	48 KHz or 96 KHz
	in SRC mode	32 KHz to 108 KHz
Output:		
Asynchronous:		32 to 192 KHz
Synchronous:	in bypass mode	24 KHz to 192 KHz
	in synchronous mode	48 KHz or 96 KHz
Sample Rate Converted:	in bypass mode	24 KHz to 192 KHz
	in synchronous mode	48 KHz or 96 KHz
	in SRC mode	48 KHz or 96 KHz

3.1.6.1. Audio Inputs - Balanced

Signal Level:	0.2 – 7v p-p
Impedance:	110Ω +/- 20%, 0.1 – 12 MHz
Transformer Coupled	
D.C. on Input:	+/- 50v
Receiver Jitter Tolerance:	To AES-3/AES-3id specifications
Connectors:	D50 female (carrying 16 signals)

3.1.6.2. Audio Inputs – Unbalanced

Signal Level:	0.32 to 2v p-p
Impedance:	75Ω
Return Loss:	>25dB, 0.1 to 12MHz
Receiver jitter tolerance:	To AES-3/AES-3id specifications
Connectors:	BNC

3.1.6.3. Audio Outputs - Balanced

Signal Level:	2.9 +/- 20% p-p
Impedance:	110Ω +/- 20%, 0.1 to 12 MHz
Transformer Coupled:	
Jitter (Output):	To AES-3
Typical Fs Jitter:	
In bypass mode	2ns peak

In AES Sync mode	1.5ns peak
Connectors:	D50 female (carrying 16 signals)

3.1.6.4. Audio Outputs – Unbalanced

Signal Level:	1v p-p +/- 10%
Impedance:	75Ω
Return Loss:	>25dB, 0.1 to 12MHz
Jitter (Output):	To AES-3id
Typical Fs Jitter:	
In bypass mode	1.5ns peak
In AES Sync mode	1.0ns peak
Connectors:	BNC

3.1.7. Analog Audio

Sampling Frequency:	48kHz or 96kHz
Frequency Response:	+/- 0.08dB
Output Impedance:	400Ω
Input Impedance:	12kΩ minimum
Signal level:	0dBfs = 18dBu or 24dBu
Noise:	-110dB A-weighted
THD+N:	>95dB (typically > 98dB)
DC Offset:	>+/- 30mV
Crosstalk:	<-95dB
I/O Delay:	1.3ms @ 48kHz or 0.66ms @96kHz
Dynamic Range:	24 bits
Connectors:	D50 female

3.1.7.1. Analog to Digital Conversion

Sampling Frequency:	48kHz or 96kHz
Frequency Response:	+/- 0.05dB
Input Impedance:	12kΩ minimum
Signal Level:	0dBfs to18dBu or 24dBu
Noise:	-113dB A-weighted
THD+N:	>95dB (typically > 98dB)
CMRR:	>85dB @1kHz
Crosstalk:	<-95dB
I/O Delay:	0.85ms @ 48kHz or 0.43ms @96kHz
Connectors:	D50 female

3.1.7.2. Digital to Analog Conversion

Sampling Frequency:	48kHz or 96kHz
Frequency Response:	+/- 0.06dB
Output Impedance:	400Ω
Signal Level:	0dBfs to 18dBu or 24dBu
Noise:	-115dB A-weighted

THD+N:	>95dB (typically > 98dB)
DC Offset:	>+/- 30mV
Crosstalk:	<-95dB
I/O Delay:	1.3ms @ 48kHz or 0.66ms @96kHz
Dynamic Range:	24 bits
Connectors:	D50 female

3.1.8. Physical

Height:	**4RU:**	7” (178mm)
	8RU:	14” (355mm)
Width:		19" (483 mm) Rack mount
Depth:		17.75” (450mm)
Weight:	**4RU:**	35 lbs (16Kg)
	8RU:	68 lbs (31Kg)
Operating Temperature:		Spec maintained to 30°C Operation to 40°C
Ventilation:		Fan cooled from the front to the rear of the left hand and right hand side of the router

3.1.9. Electrical

Voltage:		Auto-ranging 100 to 240 VAC 50/60 Hz
Power:		
(Video I/O):	**8RU:**	Typical 300VA Max 500VA Not including the SPT modules
	4RU:	Typical 150VA Max 250VA Not including the SPT modules
(Audio I/O):	**8RU:**	Typical 175W Max 200W
	4RU:	Typical 95W Max 120W
Configuration:		
	8RU:	Standard: two PSU, separate power cords Optional: two additional hot swappable redundant PSU
	4RU:	Standard: one PSU Optional: one additional hot swappable redundant PSU
Safety:		ETL listed to UL60065 Complies with EU safety directive
EMI/RFI:		Complies with FCC Part 15 Class A, EU EMC Directive

3.1.10. Control

Q-Link:	4x 75Ω video cable (max length 500m)
Serial RS422/232:	2x D9 female
Ethernet, 10baseT	2x RJ45

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4. CONTROL

4.1. FRONT VIEW

Figure 4-1 shows the front view of the 8RU Xenon router with the door removed. The configuration shown is a 128x128 I/O unit with redundant power supplies, controllers and reference modules.

Figure 4-1: The Xenon 128x128 8RU Frame (Front View)

4.2. REAR VIEW

Figure 4-2 shows the rear view of the 8RU Xenon router. The configuration shown is a 128x128 I/O unit.

Figure 4-2: The Xenon 128x128 8RU Frame (Rear View)

4.3. VIDEO SIGNAL FORMATS

Xenon supports a mix of 3G/HD/SD, HD/SD, SD only, and ASI video routing via a common digital core in increments of 32 inputs and/or outputs.

A number of the digital video modules are available as 3G/HD/SD, HD/SD or SD only units. This provides a savings for customers who do not require 100% HD capability.

The signal path through the Xenon is extremely clean which means that signal reclocking is not normally required. However, for those applications that do require it, reclocking SPT modules are available and can be installed into the router in blocks of 8 outputs.

4.4. AUDIO SIGNAL FORMATS

Balanced AES, unbalanced AES on BNC's, or analog audio are supported in any mixture within the Xenon frame via the common digital core. The audio I/O is also configured in blocks of 32 inputs and/or outputs. Modules can be Asynchronous or Synchronous. There is also an optional MADI expansion that allows the audio router to be expanded.

4.5. SIGNAL AND SYSTEM MONITORING

The Xenon supports full signal monitoring of both inputs and outputs. It also incorporates comprehensive system monitoring, including power supply voltages, interior temperatures and fan speeds.

Monitored data is available through VistaLINK® SNMP for facility-wide monitoring systems. System status may also be monitored remotely by a network based remote connection over TCP/IP or a direct serial connection to a PC. User configurable closing contacts are also provided for connection to an external alarm system.

4.6. CONTROL SYSTEM

When Xenon is the only, or master, router in a system the internal controllers allow Xenon to run without an external system controller.

The Xenon controller is available in a redundant configuration to avoid single points of failure in the control system.

The Xenon router implements F-Link, a high-speed communication path used internally within the frame and externally between router frames and control systems.

The Xenon is fully compatible with all Evertz router control panels and interfaces, including connectivity to a comprehensive list of third-party control solutions.

4.6.1. Control Options

The Xenon can be configured with the following control option:

Master Mode: Running standalone or as a master and communicating to the control system via Q-Link, Serial or Ethernet. In this mode a Xenon control card must be fitted.

SC-1000 Mode: Running under the control of the SC-1000 system controller and communicating via Q-Link or Serial. In this mode a Xenon control card must be fitted.

SERVER Mode: Running under the control of the EQX-SERVER system controller and communicating via Ethernet. In this mode a Xenon control card must be fitted.

4.6.2. Control Features

- Redundant internal controllers
- No controllers needed for slave frames
- Q-Link, Ethernet and Serial interfaces
- Deterministic switching
- System monitoring with SNMP support through VistaLINK®
- Powerful and intuitive WinSetup Software

4.7. SIGNAL PROCESSING TECHNOLOGY ™

Xenon is the first router designed to incorporate Signal Processing Technology (SPT) modules.

By plugging in SPT modules within the frame, many tasks normally implemented with external equipment can be done within the router. This offers significant savings in rack space and capital cost. Embedded audio processing and advanced signal monitoring are just a few of the applications that SPT modules can be used for.

Xenon Video output cards are designed to accommodate any combination of up to four SPT modules per card. Each SPT module can process eight signals simultaneously. The nature of the signal processing is dependant upon the type of SPT module fitted.

Depending on the location of the SPT module the eight inputs to each of the SPT modules are either:

1. Fed directly from the inputs of the router to the input of the SPT module.
2. Or switched from the output of the crosspoint to the input of the SPT module.

The signals passing through the SPT module may be treated independently or combined together depending upon the functionality of that particular SPT module.

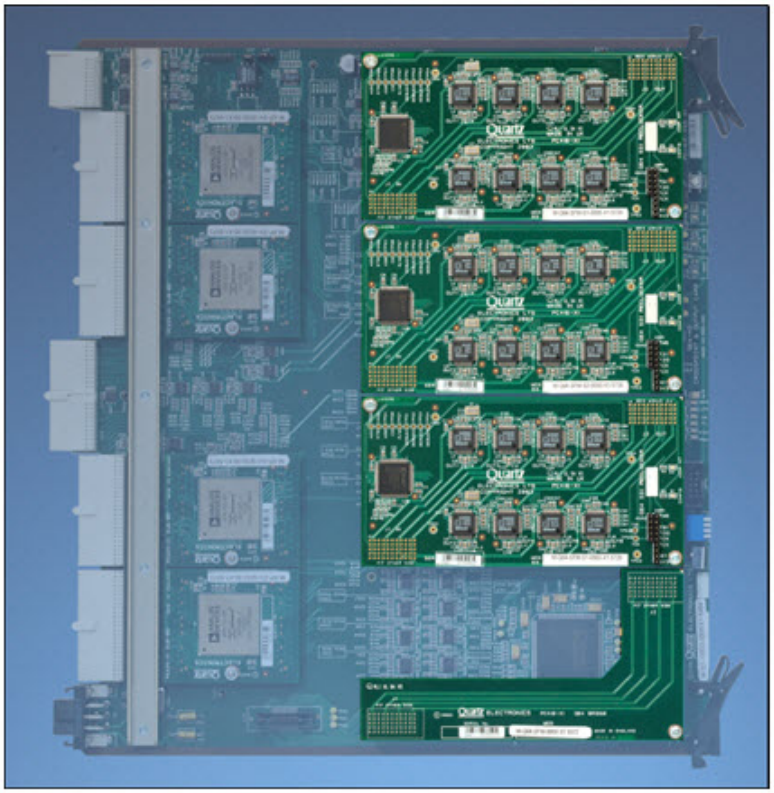


Figure 4-3: Four SPT Modules, One Non-reclocking and Three Reclocking, Mounted on the Crosspoint/Output Card

The SPT modules are primarily controlled through the internal Xenon control system apart from when the functionality of the SPT module requires additional control lines. When required additional control ports are supplied on the output fin of the router.

4.7.1. Example SPT Applications

Non-reclocking: The non-reclocking SPT module passes the signals through the router without applying any processing.

Reclocking: The reclocking module re-clocks the output signals. The reclocking module is SD, HD, and 3G compatible.

Line Sync: Supports the re-synchronization of the signal as it is routed through the Xenon if it is within +/- half a line with respect to the router reference.

Audio Processing: Provides the ability to process the embedded audio tracks within the signal, such as shuffling, gain control and phase inversion.

5. SYSTEM OVERVIEW

5.1. XENON 4RU – BASIC COMPOSITION

5.1.1. Block Diagram

A basic 64x64 matrix Xenon consists of one 4RU rack, which allows the system to be configured in increments of 32 inputs and 32 outputs up to 64x64. A fully loaded system consists of:

1. Two passive Input Fins
2. Two passive Output Fins
3. Two Input cards
4. Two Crosspoint & Output cards
5. Two Control Cards (second optional)
6. Two Reference Cards (second optional)
7. Two Power Supplies (second optional)

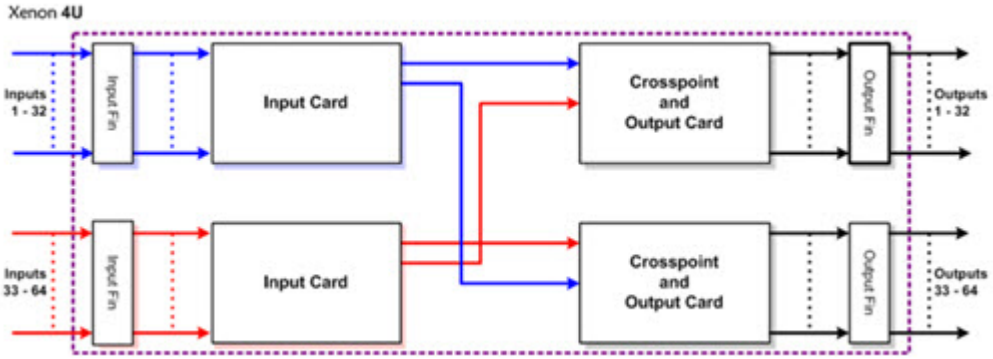


Figure 5-1: 4RU Xenon Block Diagram

5.1.2. Front View

Figure 5-2 represents the layout of the 4RU Xenon frame as viewed from the front. It shows a 64x64 configuration with all redundant features including power supplies, controllers and reference cards.

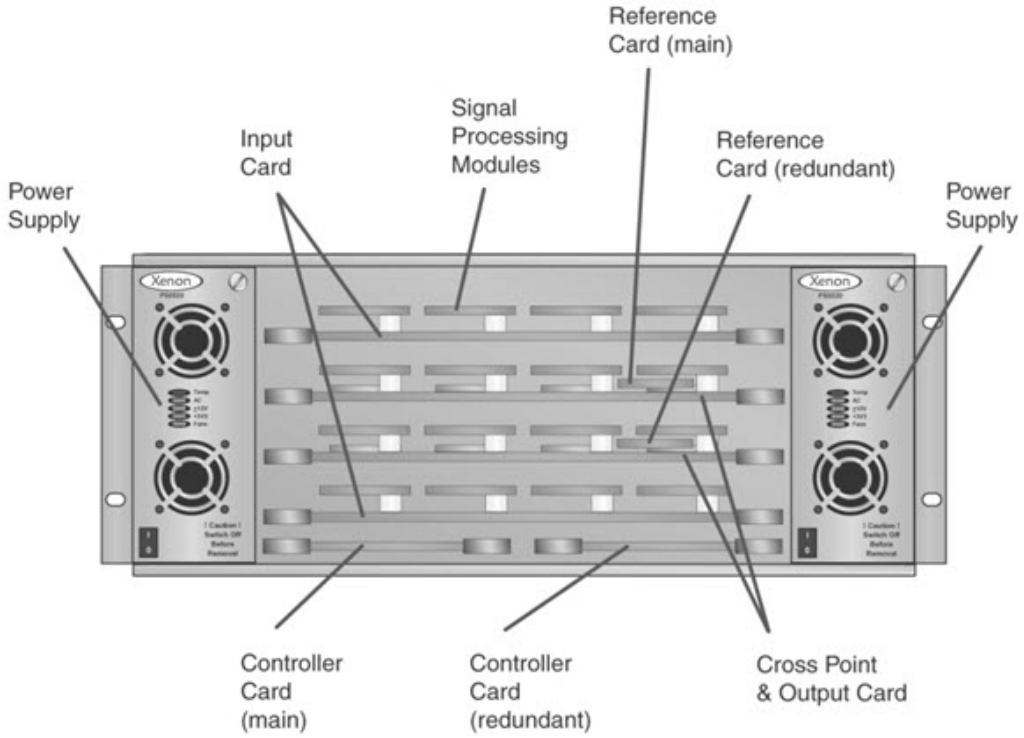


Figure 5-2: 64x64 Digital Video Xenon – Front View

The graphic shows the location of:

1. Redundant power supplies - (n+1 configuration)
2. Redundant controllers - (n+1 configuration)
3. Input cards, 2 required for a 64x64 configuration
4. Crosspoint & Output cards, 2 required for a 64x64 configuration
5. Signal Processing modules, mounted on both of the Input and Cross Point & Output cards
6. Redundant Reference cards, one mounted on each of the Cross Point & Output cards (n+1 configuration – this option is only available for the 64x64 configuration)

5.1.3. Rear View

Figure 5-3 represents the layout of the 4RU Xenon frame as viewed from the rear. It shows the location of:

1. Redundant fan configuration (n+1 configuration)
2. Redundant power connectors (n+1 configuration)
3. Input Fins, 2 required for a 64x64 configuration
4. Output Fins, 2 required for a 64x64 configuration

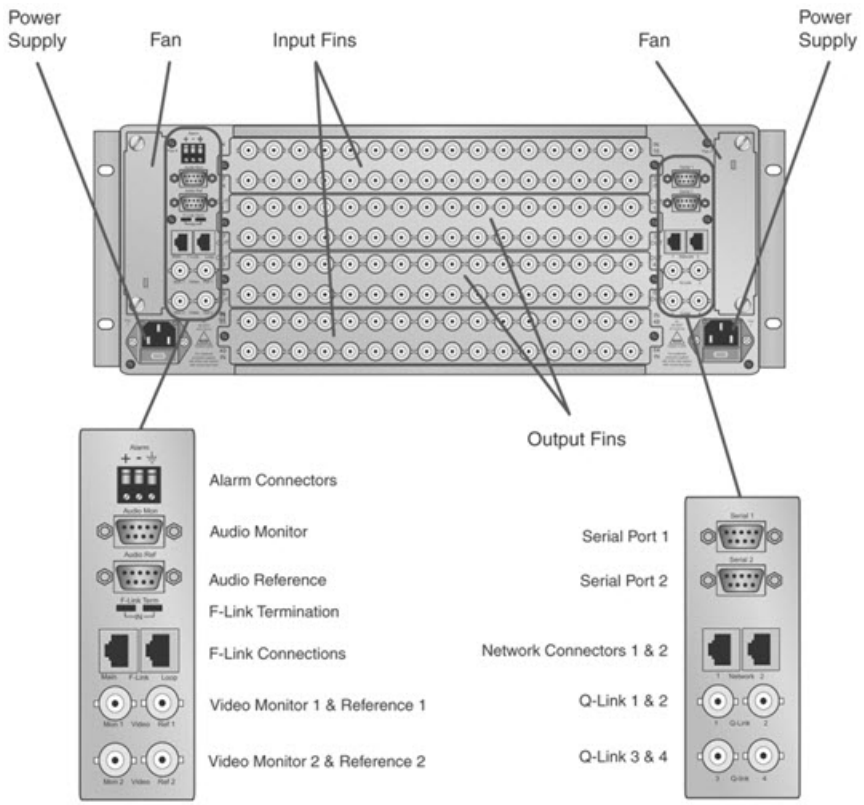


Figure 5-3: 64x64 Digital Video Xenon – Rear View

The magnified view shows the control and monitoring connections of the Xenon router. They are:

1. Alarm connections - screw terminals
2. Audio monitor - D9 (male)
3. Audio reference - D9 (male)
4. Video monitor 1 & 2 - 2x BNC
5. Reference 1 & 2 - 2x BNC
6. Q-Link 1, 2, 3 & 4 - 4x BNC
7. F-Link - 2x RJ45
8. Serial port 1 & 2 - 2x D9 (female)
9. Network 1 & 2 - 2x RJ45

5.2. XENON 8RU - BASIC COMPOSITION

5.2.1. Block Diagram

A basic 128x128 matrix Xenon consists of one 8RU rack, which allows the system to be configured in increments of 32 inputs and 32 outputs up to 128x128. A fully loaded system consists of:

1. Four passive Input Fins
2. Four passive Output Fins
3. Four Input cards
4. Four Crosspoint & Output cards

5. Two Control Cards (second is optional)
6. Two reference cards (second is optional)
7. Four Power Supplies (third and fourth are optional).

The 128x128 frame is organized into two 4RU sections with the first 64 inputs and outputs in the top half and the second 64 inputs and outputs in the lower half.

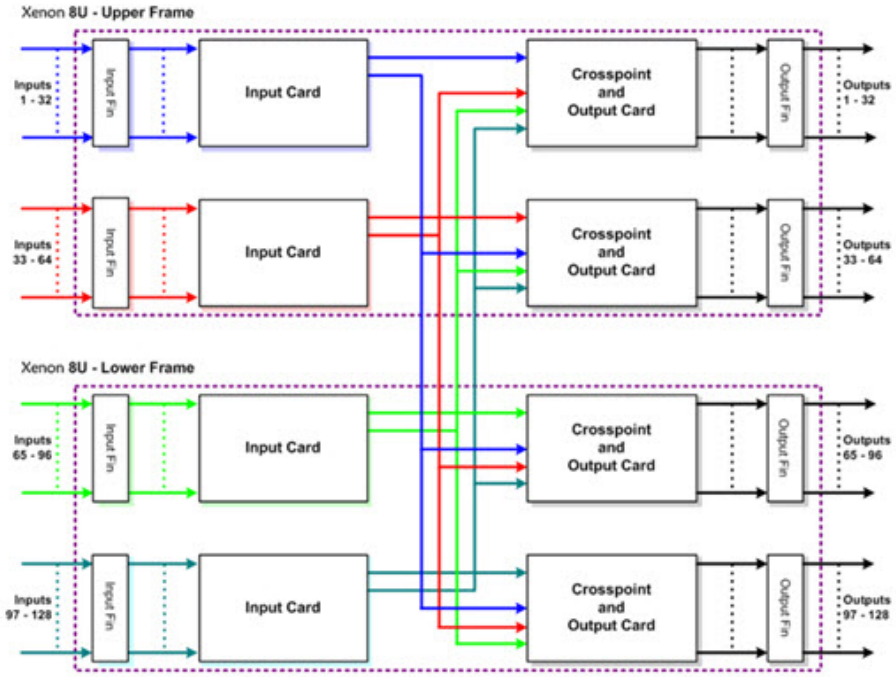


Figure 5-4: 8RU Xenon Block Diagram

5.2.2. Front View

Figure 5-5 represents the layout of the 8RU Xenon frame as viewed from the front. It shows a 128x128 configuration with all redundant features including power supplies, controllers and reference cards.

1. Redundant power supplies (n+1 configuration)
2. Redundant controllers (n+1 configuration)
3. Input cards, 4 required for a 128x128 configuration
4. Crosspoint & Output cards, 4 required for a 128x128 configuration
5. Signal Processing modules, mounted on both of the Input and Cross Point & Output cards.
6. Redundant Reference cards, one mounted on each of the top two Cross Point & Output cards. (n+1 configuration - this option is only available on 64x64 configuration).

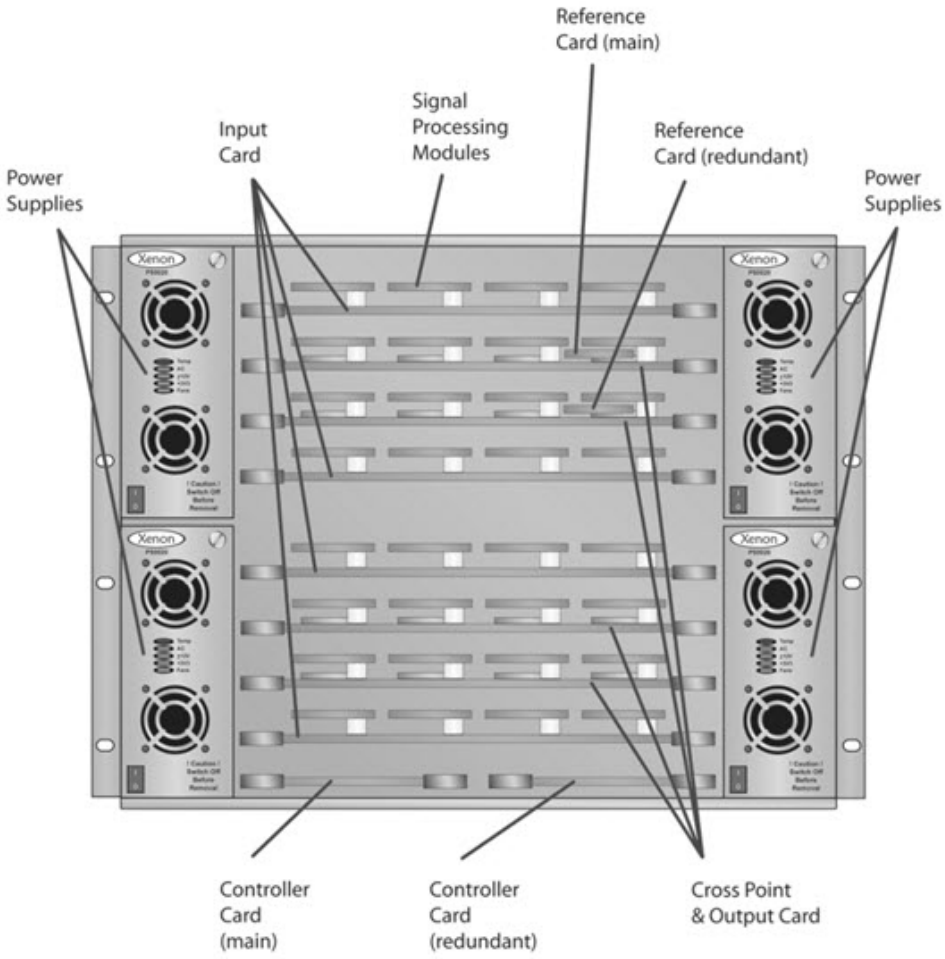


Figure 5-5: 128x128 Digital Video Xenon – Front View

5.2.3. Rear View

Figure 5-6 represents the layout of the 8RU Xenon frame as viewed from the rear. It shows the location of:

1. The redundant fan configuration (n+1 configuration)
2. The redundant power connectors (n+1 configuration)
3. The Input Fins, 4 required for a 128x128 configuration
4. The Output Fins, 4 required for a 128x128 configuration

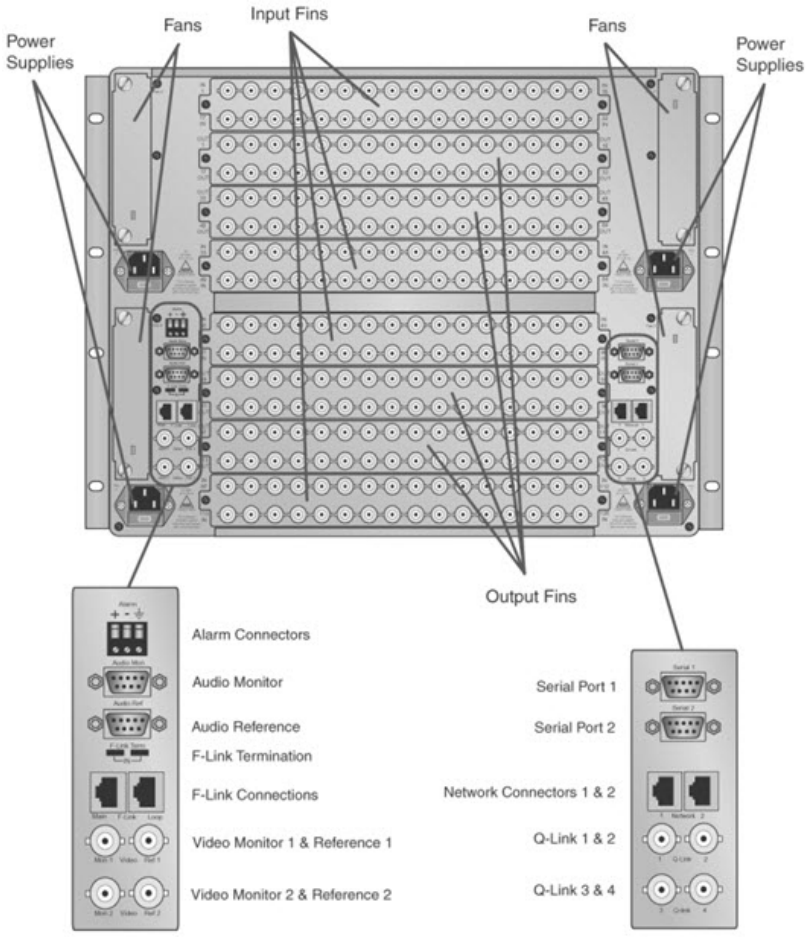


Figure 5-6: 128x128 Digital Video Xenon – Rear View

The magnified view shows the control and monitoring connections of the Xenon router. They are:

1. Alarm connections - screw terminals
2. Audio monitor - D9
3. Audio reference - D9
4. Video monitor 1 & 2 - 2x BNC
5. Reference 1 & 2 - 2x BNC
6. Q-Link 1, 2, 3 & 4 - 4x BNC
7. F-Link - 2x RJ45
8. Serial port 1 & 2 - 2x D9
9. Network 1 & 2 - 2x RJ45

5.2.4. Module Commonality

The Xenon has been designed so that the majority of modules used within the router are common between the various signal format versions.

5.2.5. Common Modules

- Frame and door, 4RU and 8RU
- Ventilation Fan
- Power supply
- Control Card
- Reference Module

5.2.6. Digital Video Modules – 3G, HD, SD

- Passive Input Fin
- Passive Output Fin
- Crosspoint & Output Card
- Crosspoint Module
- Non-Reclocking Module
- Reclocking Module
- Audio/Video Processing Module

5.2.7. Digital Audio Modules – AES

- Input Card – (Asynchronous)
- Input Card – (Synchronous)
- Input Card – (Synchronous plus Sample Rate Conversion)
- Crosspoint & Output Card
- Passive Unbalanced Input Fin with Expansion Port
- Passive Balanced Input Fin with Expansion Port
- Passive Unbalanced Output Fin with Expansion Port
- Passive Balanced Output Fin with Expansion Port

5.2.8. Analog Audio Modules

- Input Card
- Crosspoint & Output Card
- Passive Analog Input Fin with Expansion Port
- Passive Analog Output Fin with Expansion Port

5.3. INTERNAL SIGNAL PATH

The Xenon can be divided into four main functional areas:

1. Input Fin
2. Input Card
3. Output Fin
4. Crosspoint & Output card

5.4. INPUT FIN

The Xenon frame holds up to two input fins within a 64x64 configuration (4RU frame) and four input fins within a 128x128 configuration (8RU frame). Each input fin presents the 32 incoming sources to the input card via the motherboard through a high density connector.

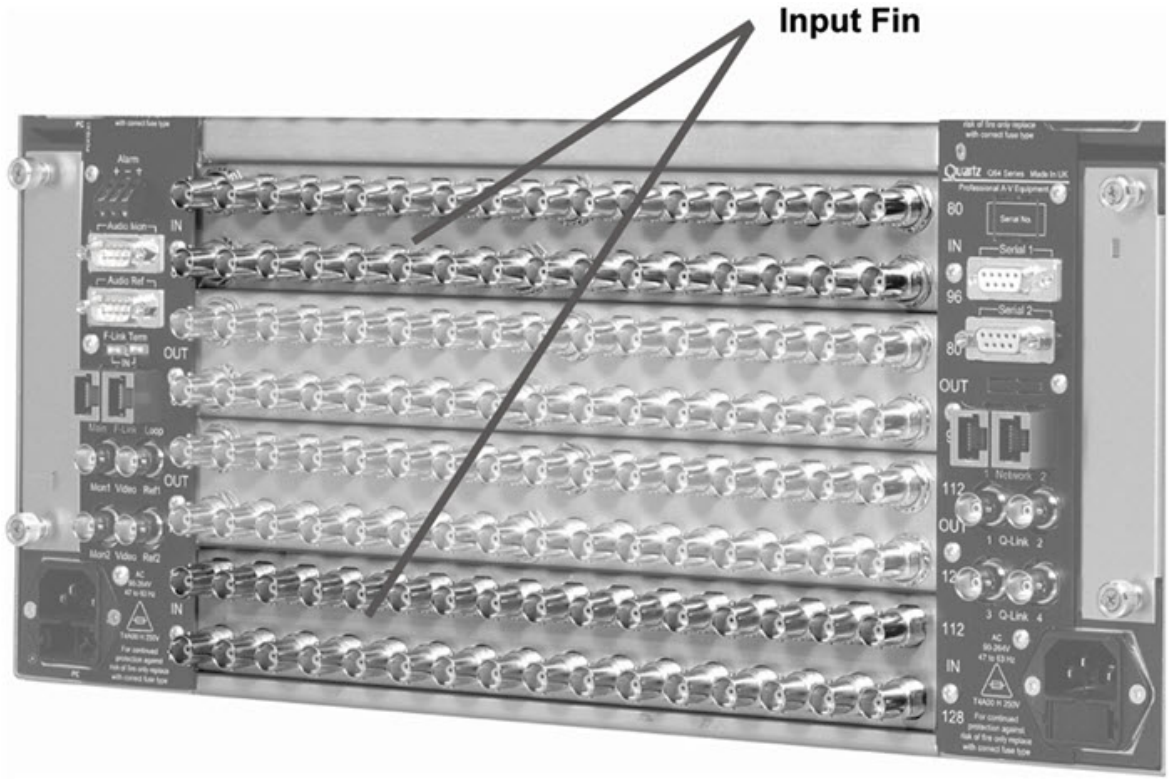


Figure 5-7: Input Fins Mounted in the Xenon Frame

All of the input fins are passive (with the exception of the Fiber rear panel) and there should never be a need to change them. However, should a need arise, for example, due to a damaged connector, then they can be hot-swapped.

5.4.1. Digital Video Input Fin

The digital video input fin is passive and carries thirty-two 3G, HD and SD input signals via BNC connectors. The connector number sequence reads left to right from 1 through to 16 on the top row and 17 through to 32 on the bottom row.

Figure 5-8: Input Fin for 3G, HD and SD Signals

! Warning: Ensure that the Input module is configured correctly when using an older digital video input fin. (Older versions are gold colored)

On older Xenon installations, the video input fin is gold colored. This fin has a different mapping for the input routes. To differentiate between the two fins, there is a setting in the Input module that must be configured. This can be set using the user menu which is accessed from the front serial connector, or by using VistaLINK®.

5.4.1.1. Fiber Optic Inputs

The Xenon router is able to accept Fiber Optic inputs when ordered with the optional Fiber Optic input modules. These modules utilize a Small Form-Factor Pluggable (SFP) module. Each SFP for the Fiber Optic input module is a dual channel RECEIVER. This means Optical signals can be wired as coaxial signals, where all inputs are wired to one type of card and all outputs are wired to another. The Input SFP (or receiver SFP) is called SFP1R-2 or SFP3R-2 and can accept signals from 3Mb/s to 3Gb/s depending on the type of input card that they are mated with.

Figure 5-9: Fiber Optic Input Fin for 3G, HD and SD Signals

- The SFP receiver module supports SMPTE 259M, SMPTE 344M, SMPTE 292M and SMPTE 424M and other data rates
- The SFP receiver module is hot swappable, and is inserted and removed without the need for specialized tools
- RoHS compliant
- Operating temperature range: 0°C to 70°C
- 56.5mm x 13.4mm x 8.6mm standard SFP Package
- Each signal is on an individual connector of type LC

Figure 5-10: SFP Receiver Module

5.4.2. Digital Audio (Unbalanced) Input Fin

The digital audio input fin is passive and carries 32 AES Audio (unbalanced) input signals via BNC connectors. For modules that have the MADI expansion module, the MADI I/O ports are carried via mini-BNC (DIN) connectors. It is constructed from two boards each supporting 16 input signals. The two boards are mounted onto a single metal plate, which is slotted into the rear of the frame and secured via two retaining screws.

Figure 5-11: Input Fin for AES Audio (Unbalanced) Signals

Figure 5-12: Input Fin for AES Audio (Unbalanced) Signals with MADI Expansion

Note: The connector number sequence is in an opposite direction to the digital video fin and reads right to left from 1 through to 16 on the top row and 17 through to 32 on the bottom row.

! Warning: The fin module must be engaged into the card guide using the lower of the PCB pair. DO NOT force them into the frame. If any resistance is felt, remove and check connectors.

5.4.3. Digital Audio (Balanced) Input Fin

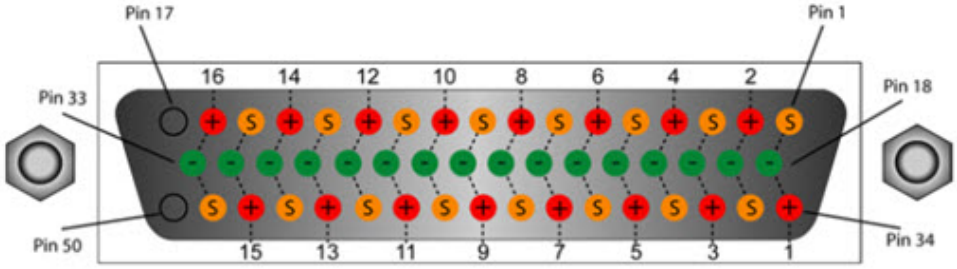
The balanced digital audio input fin is passive and carries 32 AES Audio (balanced) input signals via two D50 connectors. For modules that have the MADI expansion option, the MADI I/O ports are carried via mini-BNC (DIN) connectors. The balanced D50 Audio input and output fins are interchangeable.

Figure 5-13: Input Fin for AES Audio (Balanced) Signals

Figure 5-14: Input Fin for AES Audio (Balanced) Signals with MADI Expansion

5.4.3.1. AES D50 Connector – Pin Out

Xenon AES audio frames use female D50 connectors, with each connector carrying 16 signals.



D50 Audio Pin-Out Table			
Signal	**+ve Pin**	**-ve Pin**	**Screen**
1	34	18	1
2	2	19	35
3	36	20	3
4	4	21	37
5	38	22	5
6	6	23	39
7	40	24	7
8	8	25	41
9	42	26	9
10	10	27	43
11	44	28	11
12	12	29	45
13	46	30	13
14	14	31	47
15	48	32	15
16	16	33	49

Table 5-1: Digital Audio Input Pin-Out

5.4.4. Analog Audio Input Fin

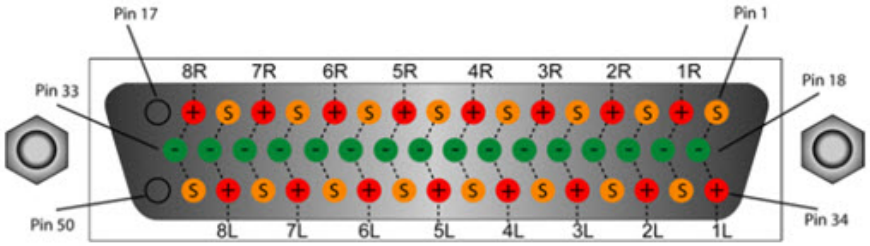
The analog audio input fin is passive and carries 32 AES Analog Audio input signals via four D50 connectors. For modules that have the MADI expansion option, the MADI I/O ports are carried via mini-BNC (DIN) connectors. The Analog Audio D50 input and output fins are interchangeable.

Figure 5-15: Input Fin for Analog Audio Signals

Figure 5-16: Input Fin for Analog Audio Signals with MADI Expansion

5.4.4.1. Analog Audio D50 Connector – Pin Out

Xenon analog audio frames use female D50 connectors, with each connector carrying 8 signal pairs.



D50 Audio Pin-Out Table			
Signal	**+ Pin**	**- Pin**	**Screen**
1L	34	18	1
1R	2	19	35
2L	36	20	3
2R	4	21	37
3L	38	22	5
3R	6	23	39
4L	40	24	7
4R	8	25	41
5L	42	26	9
5R	10	27	43
6L	44	28	11
6R	12	29	45
7L	46	30	13
7R	14	31	47
8L	48	32	15
8L	16	33	49

Table 5-2: Analog Audio Input Pin-Out

5.5. INPUT CARD

5.5.1. Digital Video: XE-IP32SX, XE-IP32HX, XE-IP32-3G

All 32 inputs from the input fin enter the Input card via the central high density connector. The Input card is comprised of 32 channels of adaptive cable equalization.

Up to four Input cards can be fitted into the Xenon frame providing 128 inputs in increments of 32.

The Input card has 3 power indicators, +12V, 3V3 and 1V8, all of which should be illuminated and should be of equal brightness. There are a further seven indicators; these indicators display successful FPGA programming, any input active, four devoted to F-Link, and there is one status indicator which usually flashes at 1 second intervals.

The card may be interrogated by the control system to ascertain input status, card type (either SD or HD or 3G), and card temperature.

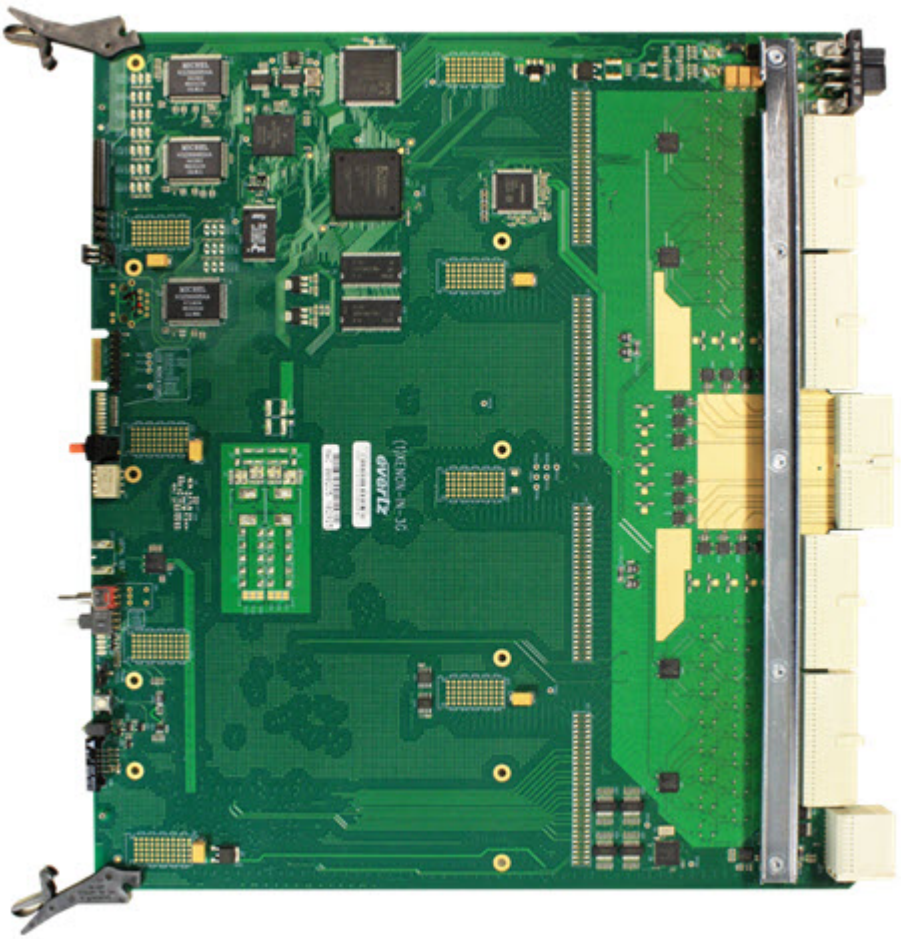


Figure 5-17: Video Input Card

5.5.1.1. Switch Settings & LED's

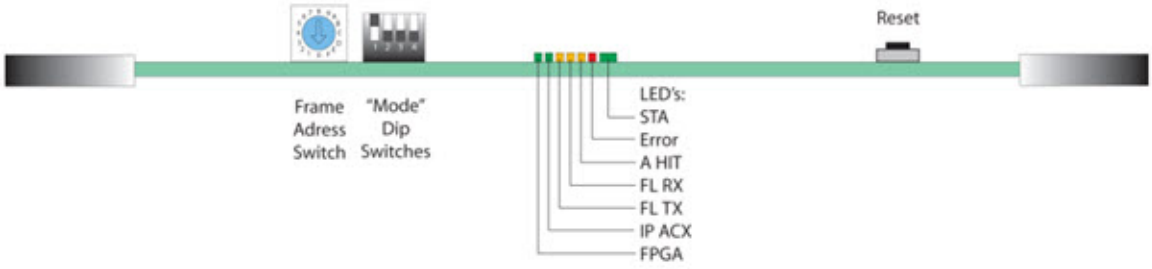


Figure 5-18: 3G / HD / SD Input Card Switches (Viewed from the Front)

Switch Settings:

1. "Mode" dip switch one (1) must be down on all Input cards to place the system to 'normal' F-Link operating speed.

2. The hex switch on the Input card is for setting the frame address and must be set to different addresses for each Xenon frame within a system. The default setting is - 1. The hex switch on all Input cards and Crosspoint & Output cards within the Xenon frame must be set to the same value.

LED's:

1. **FPGA** **Green** (Normal) indicates the associated programmable logic chip has loaded correctly.

2. **IP ACX** **Green** (Normal) shows that any one of the 32 inputs has valid video source connected.

3. **FL TX** **Amber** (Normal) indicates F-Link (internal processor to router communication) transmission from the Input module.

4. **FL RX** **Amber** (Normal) indicates F-Link received by the Input module.

5. **A HIT** **Amber** (Normal) indicates F-Link message addressed to the Input module.

6. **ERROR** Off (Normal), goes **Red** for 9 seconds if the Input module has any error conditions with the F-Link protocol.

7. **STA** Flashing **Green** (Normal) to show OK. The LED will turn red if there is a fault found on Input module.

5.5.2. Digital Audio: XE-IP32-AESU, XE-IP32-AESB, XE-IP32-AESU-MADI, XE-IP32-AESB-MADI

Up to four AES digital audio input cards can be fitted into the Xenon frame providing 128 inputs in increments of 32.

All 32 inputs from the input fin enter the AES digital audio input card via the central high density connector which is located under the TDM I/O expansion sub-module.

The inputs are all transformer coupled to the receivers, which for the balanced version removes the differential noise and common mode offset from the signal.

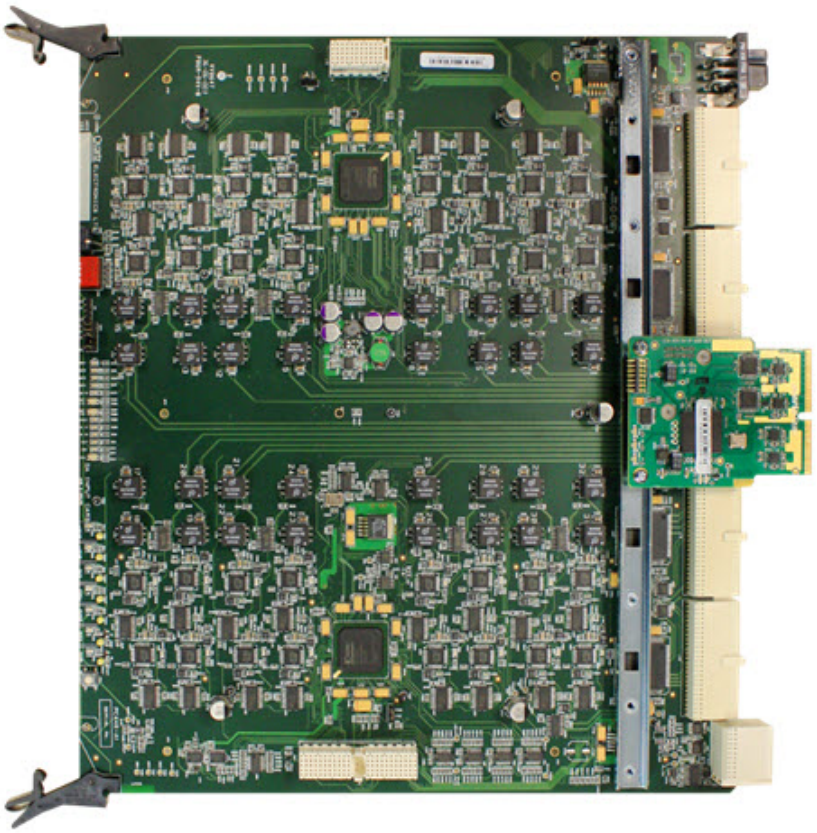


Figure 5-19: AES Digital Audio Input Card

5.5.2.1. Module Variants

There are 3 types of digital audio input modules:

- **Asynchronous** (Bypass) switching (XE-IP32-AES-0020). Always set as Asynchronous (Bypass) mode.
- **Synchronous** switching (XE-IP32-AES-0010). Can be set to one of two modes – Asynchronous (Bypass) or Synchronous modes.
- **Synchronous** switching with **Sample Rate Conversion** (XE-IP32-AES-0000). Can be set to one of three modes – Asynchronous (Bypass), Synchronous or Sample Rate Conversion modes.

Asynchronous (Bypass) Switching: The Asynchronous module (XE-IP32-AES-0020) provides basic crash switching between various AES sources including Dolby-E. It is not fitted with the circuitry for Synchronous switching or Sample Rate Conversion and therefore does not support the advanced operational features of soft switching and track shuffling. However asynchronous switching can occasionally lead to audible pops or clicks at the switch point depending upon the make-up of the audio signals at the switch point. This effect is very undesirable when the router output is being driven live in an edit suite or on-air. These audible pops and clicks can be avoided by a feature called Soft Switching which is available as part of the Synchronous switching mode.

Synchronous Switching: The Synchronous module (XE-IP32-AES-0010) provides synchronization of digital audio sources that are locked to the same reference as well as supporting the advanced operational features of soft switching and audio track shuffling. The asynchronous (bypass) mode is also available for crash switching any AES stream or signals that must not be altered such as Dolby-E™. This module is not fitted with the Sample Rate Conversion circuitry and therefore cannot be used to synchronize sources that are not locked to the same reference as the reference input to the router (usually the house reference). A number of extra features such as input and output gain control, mono mixing, soft switching, dual routing and wild shuffling are also available with synchronous operation.

Synchronous Switching with Sample Rate Conversion: The Synchronous module with Sample Rate Conversion (XE-IP32-AES-0000) provides all of the functionality offered by the synchronous switching mode plus the additional facility of Sample Rate Conversion (SRC). The SRC circuitry allows the router to harmonize input sources of various frequencies to the routers reference input, either 48kHz or 96kHz.

5.5.2.2. Signal Flow (including options)

The signal flow is dependent upon the mode that the input is set to. Each source can be independently controlled. It is also dependent upon the type of module fitted.

The following signal flow description is for the Synchronous module fitted with Sample Rate Conversion (XE-IP32-AES-0000). It also includes notes for the other module types.

Primary Bus: The primary bus signals use the standard high speed routing fabric of the Xenon router (the same paths that are used by the SD/HD video signals). Each path is completely independent and can carry AES signals in Sample Rate Conversion, Synchronous or Asynchronous (bypass) mode. All of the 32 sources on the input module are buffered through to the crosspoint module to maintain signal integrity. In an 8RU unit with 4 input modules fitted there are 128 (x 4) primary signals.

Secondary Bus: The secondary path is implemented as a TDM (Time Division Multiplexed) bus. It is capable of carrying 128 synchronous decoded AES streams at 48KHz or 96KHz.

All AES sources carried by the secondary bus must be at the same sample rate and use the same reference, however they can be either SRC or SYNC (FIFO) data.

Asynchronous (Bypass) Mode: The AES stream is received by the differential receiver and is routed directly to the Primary Bus buffers or may be routed via the *Auto Mute* controller.

Only available on the Primary Bus.

The auto mute facility is not available on the Asynchronous module (XE-IP32-AES-0020).

Synchronous Mode: The signal may be routed via either the Primary or Secondary Bus.

The AES stream received by the differential receiver is connected to the AES receiver where it is decoded, the 24 bit Audio sample word and validity bit are then routed through to the Primary and or Secondary Buses via several selectable functions:

AUTO SWAP: If selected and if the AES stream is locked to the synchronous clock reference then it will use the Synchronizer to realign the stream. If the stream is not locked to the synchronous clock reference then it will be routed via the Sample Rate Converter to resample and realign the audio stream. The stream must be locked for more than 2.5s before the Synchronizer is used. The Auto Swap facility will not detect frequency differences below 0.003Hz (0.06 PPM @ 48KHz).

This mode is only available on the input module that supports Synchronous switching with Sample Rate Conversion (XE-IP32-AES-0000).

AUTO MUTE: If the incoming stream is invalid (unlocked) then the 24 bit audio sample word will be zeroed to give silence. If locked then the sample word will be passed through.

GAIN: The gain of each of the Left and Right channel is individually controllable over the range +12dB to -132dB in 4096 linear steps (the size of the step increases as the gain value gets more negative). The default setting in WinSetup is set to give 0dB of gain.

The gain control can be used in either the primary or the secondary bus path, both or not used at all. There is only one gain engine which uses the synchronous source supplied via the secondary bus, therefore if the gain is used on the primary bus then it will use the secondary bus. Thus, if the primary bus is set to use SRC and the secondary bus is set to use SYNC then if gain is enabled for the primary bus then the primary bus mode will be SYNC and not SRC.

5.5.2.3. Sample Rate Conversion (SRC) Mode

The signal can be routed via the Primary or Secondary Bus.

The AES stream received by the differential receiver is connected to the AES receiver where it is decoded; the 24 bit Audio sample word is then routed via the Sample Rate Converter to the Primary and/or Secondary Bus. This can be completed via several selectable functions:

AUTO MUTE: If the incoming stream is invalid (unlocked) then the 24 bit audio sample word will be zeroed to give silence. If locked then the sample word will be passed through.

GAIN: The gain of each of the Left and Right channels can be controlled independently over the range +12dB to -132dB in 4096 linear steps (the size of the step increases as the gain value gets more negative). The default setting in WinSetup is set to give 0dB of gain.

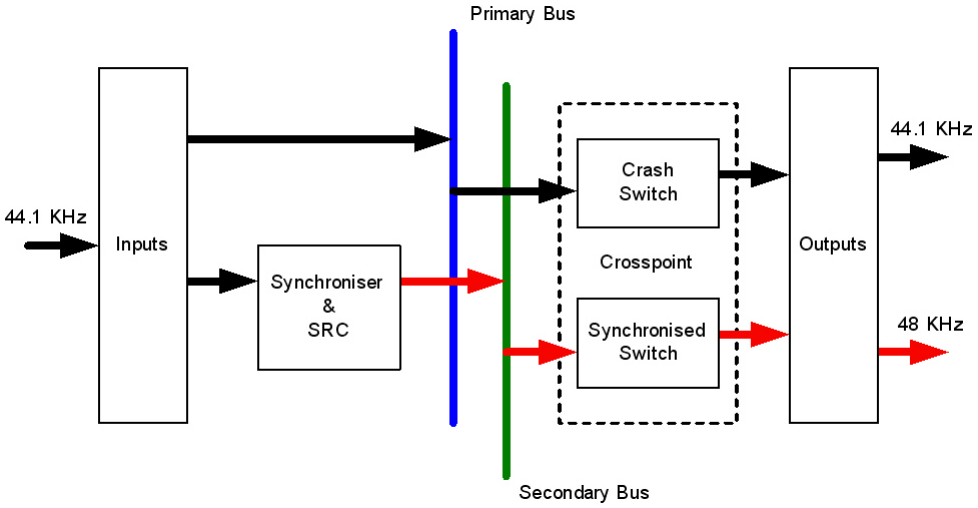
The gain control can be used in either the primary or the secondary bus path, both or not used at all. There is only one gain engine which uses the synchronous source supplied; therefore, the same level of gain will be applied to signal on both the primary and secondary bus.

5.5.2.4. Dual Path Routing

The Xenon router has the innovative feature of dual routing. This has been developed to provide a means of adding future options.

Even now the dual paths provide a means to route data in different ways such as:

- Routing of an AES source in synchronized (Bypass) and source modes at the same time. Thereby allowing the advanced switching options of the crosspoint to be used at the same time as the crash routing.



5.5.2.5. Switch Settings & LED's

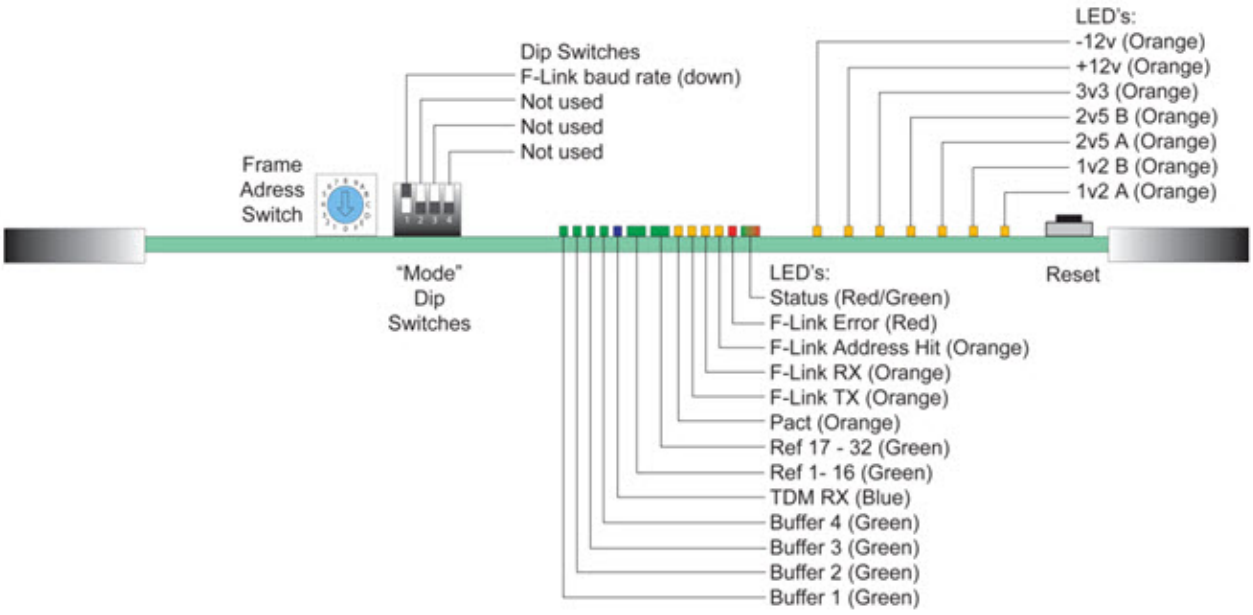


Figure 5-20: AES Digital Audio Input Card (Viewed from the Front)

Switch Settings:

1. "Mode" dip switch one (1) must be down on all Input cards to place the system to 'normal' F-Link operating speed.

2. The hex switch on the Input card is for setting the frame address and must be set to different addresses for each Xenon frame within a system. The default setting is - 1. The hex switch on all Input cards and Crosspoint & Output cards within the Xenon frame must be set to the same value.

LED's:

The AES digital audio input card has seven power indicators that can be viewed from the front, -12v (not used), +12v, 3v3, 2v5 (A & B) and 1V2 (A & B), all (apart from the -12v) should be illuminated and be of equal brightness.

There are a further thirteen indicators, that can be viewed from the edge of the card displaying various status information. (See notes below)

The card may be interrogated by the control system to ascertain the card type and temperature as well as the AES receiver status as follows: (XE-IP32-AES-0000 and XE-IP32-AES-0010 modules only).

- Parity/Bi Phase errors
- Unlocked (no valid AES signal present)
- The channel status Non audio bit value
- Cyclic Redundancy Check for Channel Status Error (CCRC)
- Validity Bit
- The Sample Frequency

1. **Status** — Flashing **Green** (Normal) to show OK. It will turn red if there is a fault found on Input module.
2. **F-Link Error** — Off (Normal), goes **Red** if the Input module has any error conditions with the F-Link protocol.
3. **F-Link Address Hit** — **Amber** - (Normal) indicates F-Link message addressed to the Input module.
4. **F-Link RX** — **Amber** - (Normal) indicates F-Link receive by the Input module.
5. **F-Link TX** — **Amber** - (Normal) indicates F-Link (internal processor to router communication) transmission from the Input module.
6. **IPACT** — **Amber** - (Normal) on the synchronous module type, indicates that a valid AES stream is present on one or more of the 32 inputs.
7. **Ref 1-16 and Ref 17–32** — Shows the reference and rate that the synchronous paths are running at:
   Green Slow Flash - Audio reference 1 or Video Ref 1 sample rate 48 KHz.
   Green Fast Flash - Audio reference 2 sample rate 48 KHz.
   Red Slow Flash - Audio reference 1 or Video Ref 1 sample rate 96 KHz.
   Red Fast Flash - Audio reference 2 sample rate 96 KHz.
8. **TDM RX** — **Blue** - Lit when the external TDM link has been present and has had no errors for longer than 6 seconds.
9. **Buffer 1-4** — Flashing **Green** (Normal). Indicates that the 4 primary path buffers have been correctly configured and are functional.

5.5.3. Analog Audio: XE-IP32-AA, XE-IP32-AA-MADI

Up to four analog audio input cards can be fitted into the Xenon frame providing 128 stereo inputs in increments of 32 stereo.

All 32 stereo inputs from the input fin enter the analog audio input card via the central high density connector which is located under the TDM I/O expansion sub-module.

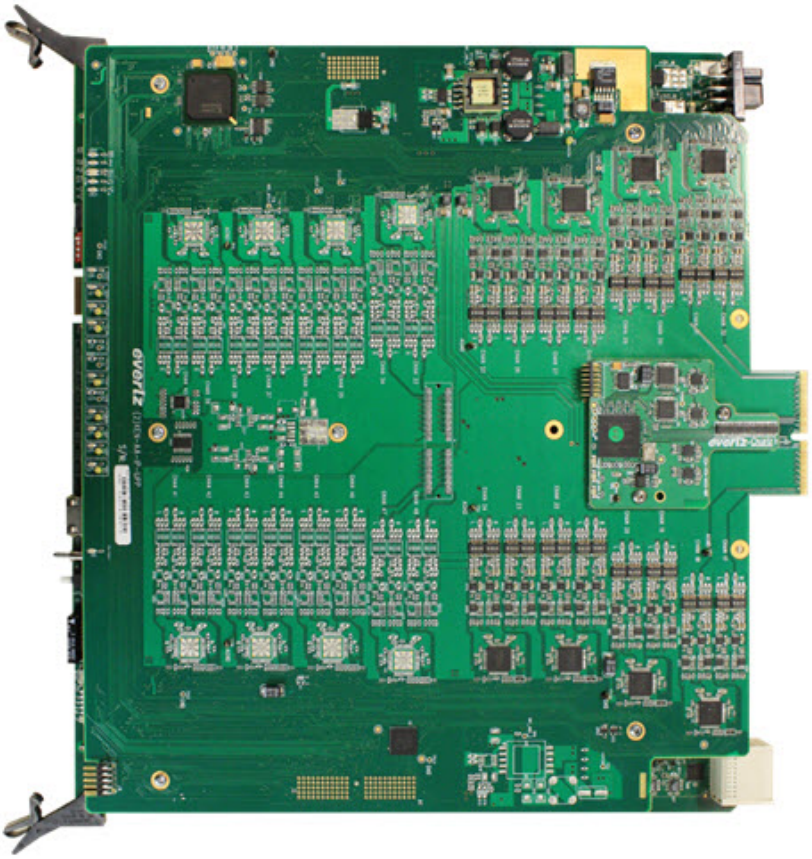


Figure 5-21: Analog Audio Input Card

The inputs are all converted to digital signals before being routed through the system. The advantage of this is that analog signals from an analog audio input card can be routed to an AES output without having to do any external conversions.

The configuration and functionality of the analog audio input card is similar to the AES digital audio input card with the Synchronous module with Sample Rate Conversion option. Refer to the previous section for details regarding the functionality.

Upgrading the firmware may cause calibration values to be corrupted. To ensure that this does not happen, please contact the Evertz service department for assistance before upgrading.

5.5.3.1. Switch Settings & LED's

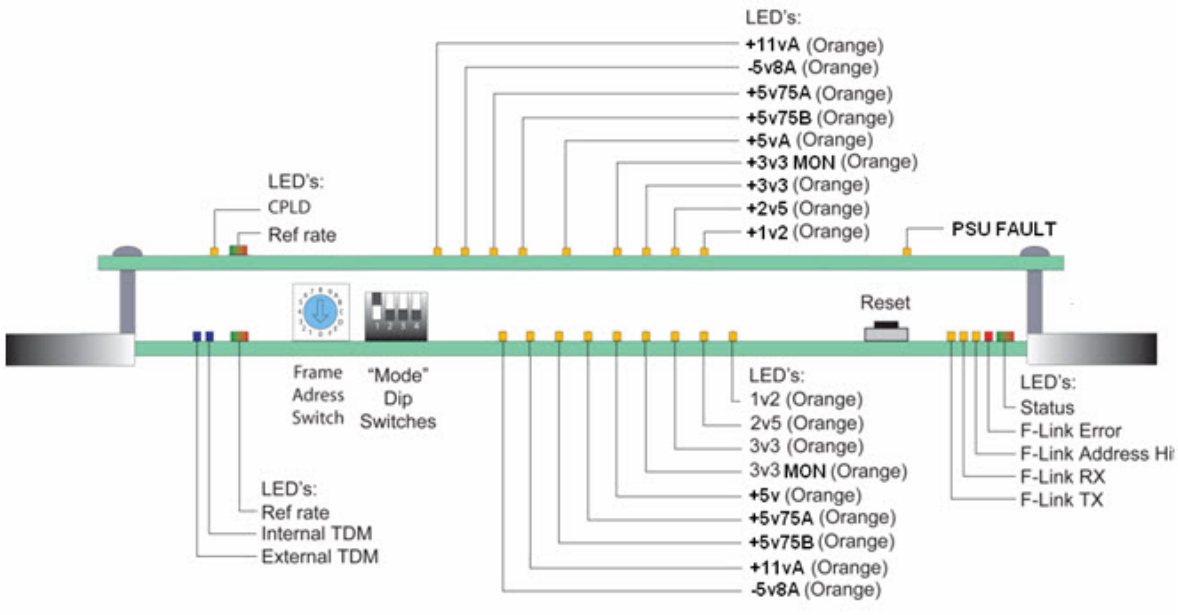


Figure 5-22: Analog Audio Input Card (Viewed from the Front)

Switch Settings

1. "Mode" dip switch one (1) must be down on all Input cards to place the system to 'normal' F-Link operating speed.

2. The hex switch on the Input card is for setting the frame address and must be set to different addresses for each Xenon frame within a system. The default setting is - 1. The hex switch on all Input cards and Crosspoint & Output cards within the Xenon frame must be set to the same value.

LED's

The top board on the analog audio input card has nine power indicators that can be viewed from the front, +11VA, -5V8, +5V75 (A & B), +5VA, +3V3 MON, +3V3, +2V5 and 1V2, all of which should be illuminated and should be of equal brightness. The bottom card also has nine power indicators that can be viewed from the front, -5V8A, +11VA, +5V75 (A & B), +5V, +3V3 MON, +3V3, +2V5 and 1V2, all of which should be illuminated and should be of equal brightness.

There are further indicators that can be viewed from the edge of the card displaying various status information. (See notes below)

1. **Status** — **Amber** if card is in control and OK, Flashing **Green** if slave and OK. It will turn **Red** if there is a fault found on Output module.

2. **F-Link Error** — Off (Normal), goes **Red** if the Output module has any error conditions with the F-Link protocol.

3. **F-Link** — **Amber** - (Normal) indicates F-Link message addressed to the Output module.

Address Hit

4. **F-Link RX** — **Amber** - (Normal) indicates F-Link received by the Output module.

5. **F-Link TX** — **Amber** - (Normal) indicates F-Link (internal processor to router communication) transmission from the Output module.

6. **Ref Rate** — Shows the reference and rate the SoftSwitch engine is running at:

   Green Slow Flash - Audio reference 1 or Video Ref 1 sample rate 48 KHz
   Green Fast Flash - Audio reference 2 sample rate 48 KHz
   Red Slow Flash - Audio reference 1 or Video Ref 1 sample rate 96 KHz
   Red Fast Flash - Audio reference 2 sample rate 96 KHz

7. **Internal TDM** — Flashing **Blue**. Shows the status of the 4 internal TDM links. The indicator flashes the number of the working link i.e.

   - For a 4RU unit with both input modules fitted:
     TDM from I/P 1 – one **Flash** followed by a long pause
     TDM from I/P 2 – two **Flashes** followed by a long pause
   - For a 8RU unit with all 4 input modules fitted:

   TDM from I/P 1 – one **Flash** followed by a long pause
   TDM from I/P 2 – two **Flashes** followed by a long pause
   TDM from I/P 3 – three **Flashes** followed by a long pause
   TDM from I/P 4 – four **Flashes** followed by a long pause
   If a TDM link fails then the flashes for that link will be missing.

8. **External TDM** — **Blue** - Lit when the external TDM link has been present and has had no errors for more than 6 seconds.

9. **PSU Fault** — Off (Normal), goes **Amber** if there are faults with the power supply to the Crosspoint & Output module.

5.6. OUTPUT FIN

The Xenon frame holds up to two output fins within a 64x64 configuration (4RU frame) and four output fins within a 128x128 configuration (8RU frame). Each output fin presents the 32 outgoing sources from the output card via the motherboard and a high density connector.

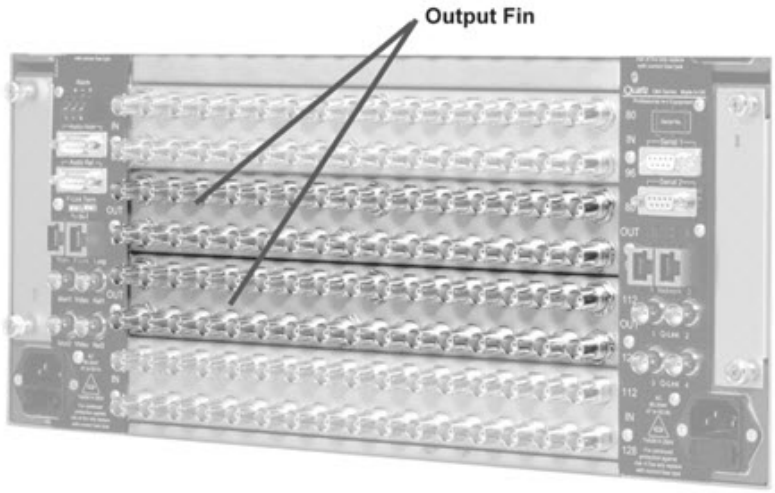


Figure 5-23: Digital Video BNC Connector Output Fins Mounted in the Xenon Frame

All of the output fins are passive (with the exception of the Fiber rear panel) and there should never be a need to change them. However, should a need arise, for example due to a damaged connector, then they can be hot-swapped.

5.6.1. Digital Video Output Fin

The digital video output fin is passive and carries 32 3G, HD and SD output signals via BNC connectors. The connector number sequence reads left to right from 1 through to 16 on the top row and 17 through to 32 on the bottom row.

! Warning: Ensure that the Crosspoint & Output module is configured correctly when using an older digital video output fin. (Gold colored)

Figure 5-24: Output Fin for 3G, HD and SD Signals

On older Xenon installations, the video output fin is gold colored. This fin has a different mapping for the output routes. To differentiate between the two fins, there is a setting in the Crosspoint & Output module that must be configured. This can be set using the user menu which is accessed from the front serial connector, or by using VistaLINK®.

5.6.1.1. Fiber Optic Outputs

The Xenon router is able to launch Fiber Optic output when ordered with the optional Fiber Optic output modules. These modules utilize a Small Form-Factor Pluggable (SFP) module. Each SFP for the Fiber Optic output module is a dual channel TRANSMITTER. This means Optical signals can be wired as coaxial signals, where all inputs are wired to one type of card and all outputs are wired to another. The Output SFP (or transmitter SFP) is called SFP1T-13-2 or SFP3T-13-2 and can accept signals from 3Mb/s to 3Gb/s depending on the type of input card that they are mated with.

- The SFP transmitter module supports SMPTE 259M, SMPTE 344M, SMPTE 292M and SMPTE 424M and other data rates
- The SFP transmitter module is hot swappable, and is inserted and removed without the need for specialized tools
- RoHS compliant
- Operating temperature range: 0°C to 70°C
- 56.5mm x 13.4mm x 8.6mm standard SFP Package
- Each signal is on an individual connector of type LC

Figure 5-25: Fiber Optic Output Fin for 3G, HD and SD Signals

Figure 5-26: SFP Transmitter Module

5.6.1.2. X-LINK® Outputs

The Xenon router can provide extra X-LINK® monitoring outputs when ordered with the optional X-LINK® output modules. Each X-LINK® rear panel provides 32 3G/HD/SD outputs via mini-BNC (DIN) connectors and three X-LINK® outputs. Each X-LINK® output is capable of carrying 32 video signals to X-LINK® enabled monitoring products. More information refer to section 5.7.1.3.

Figure 5-27: X-LINK® Output Fin for 3G, HD and SD Signals

5.6.1.3. Installing X-LINK® Output Modules

X-LINK® enabled output board must be installed in the first output slot of the Xenon router. Only a single X-LINK® output module can be installed in the 4RU Xenon, and only two X-LINK® enabled output modules can be installed in the 8RU Xenon. Please refer to Figure 5-28 and Figure 5-29 for frame layout examples of both the Xenon 4RU and Xenon 8RU.

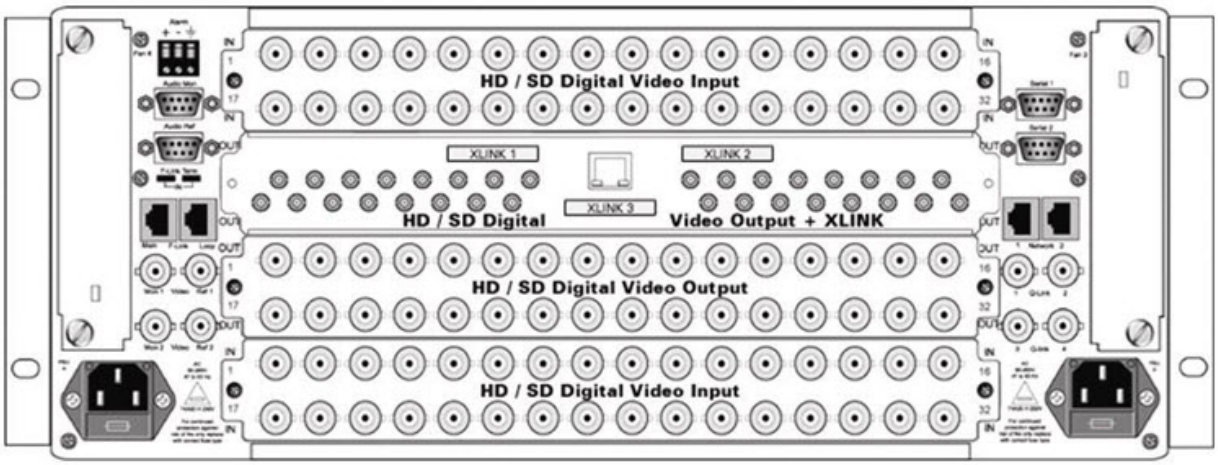


Figure 5-28: 4RU Xenon with One X-LINK® Output Card Installed

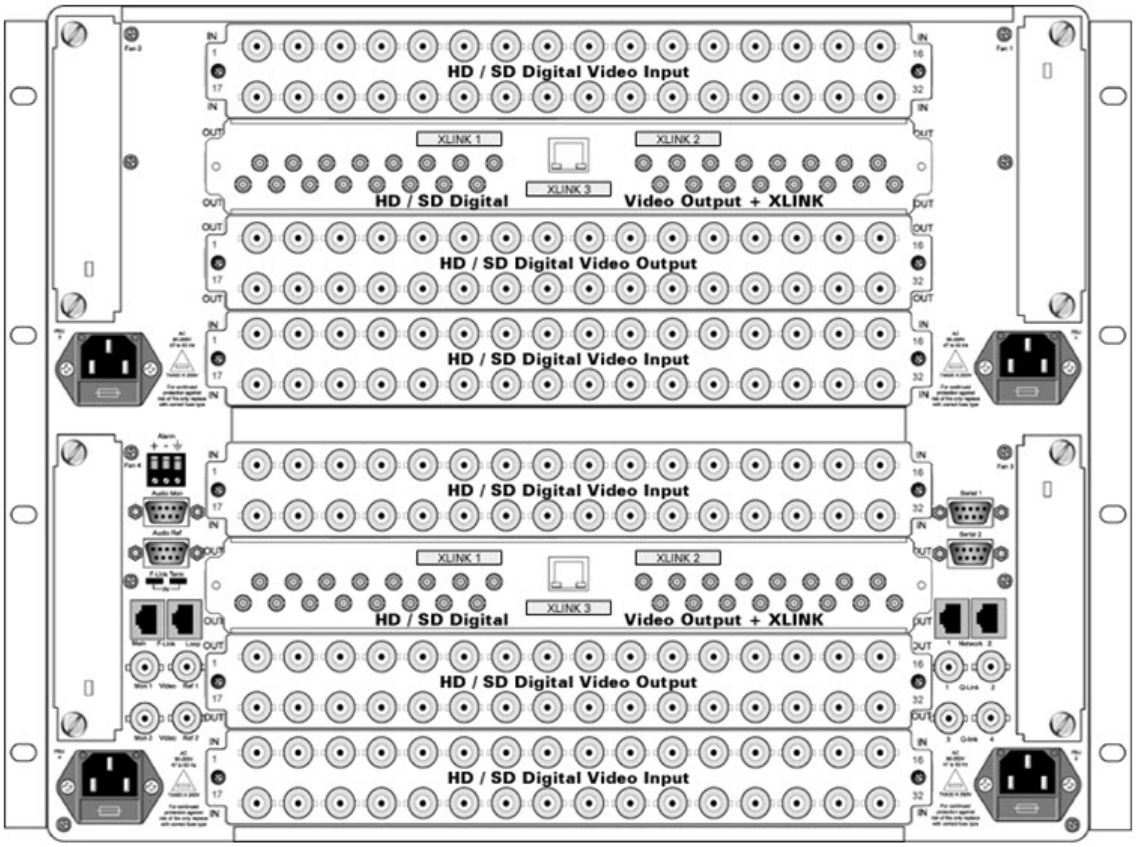


Figure 5-29: 8RU Xenon with Two X-LINK® Output Cards Installed

5.6.2. Digital Audio (Unbalanced) Output Fin

The digital audio BNC Connector output fin is passive and carries 32 AES 3id Audio (unbalanced) output signals via BNC connectors. For modules that have the MADI expansion option, the MADI I/O ports are carried via mini-BNC (DIN) connectors. It is constructed from two boards each supporting 16 input signals. The two boards are mounted onto a single metal plate, which is slotted into the rear of the frame and secured via two retaining screws.

Figure 5-30: Output Fin for AES Digital Audio (Unbalanced) Signals

Figure 5-31: Output Fin for AES Digital Audio (Unbalanced) Signals with MADI Expansion

The unbalanced input and output fins terminate the signals in a different way and should not be interchanged.

The connector number sequence is in an opposite direction to the digital video fin and reads right to left from 1 through to 16 on the top row and 17 through to 32 on the bottom row.

! Warning: The 'Fin' module must be engaged into the card guide using the lower of the PCB pair. DO NOT force them into the frame. If any resistance is felt, remove and check connectors.

5.6.3. AES Audio Output Fin

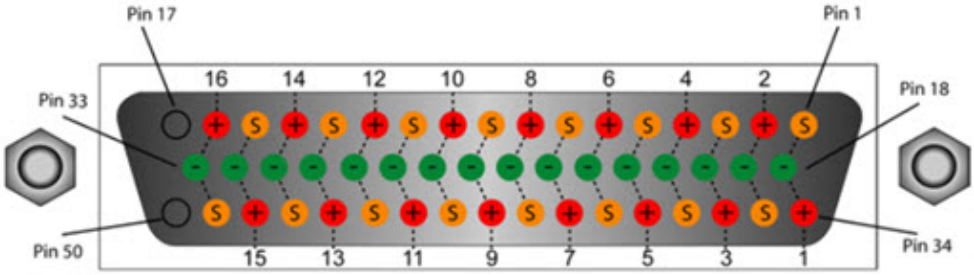
The AES audio output fin is passive and carries 32 AES Audio (balanced) output signals via two D50 connectors. For modules that have the MADI expansion option, the MADI I/O ports are carried via mini-BNC (DIN) connectors. The balanced D50 Audio input and output fins are interchangeable.

Figure 5-32: Output Fin for AES Audio (Balanced) Signals

Figure 5-33: Output Fin for AES Audio (Balanced) Signals with MADI Expansion

5.6.3.1. D50 Connector – Pin Out

Xenon AES audio frames use female D50 connectors, with each connector carrying 16 signals.



D50 Audio Pin-Out Table			
Signal	**+ve Pin**	**-ve Pin**	**Screen**
1	34	18	1
2	2	19	35
3	36	20	3
4	4	21	37
5	38	22	5
6	6	23	39
7	40	24	7
8	8	25	41
9	42	26	9
10	10	27	43
11	44	28	11
12	12	29	45
13	46	30	13
14	14	31	47
15	48	32	15
16	16	33	49

Table 5-3: Digital Audio Output Pin-Out

5.6.4. Analog Audio Output Fin

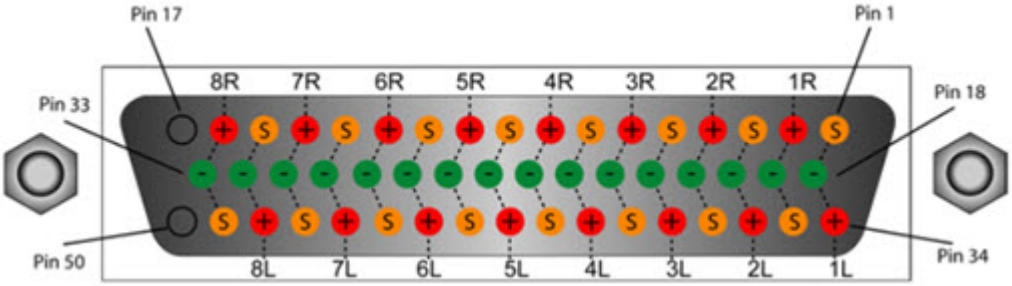
The analog audio output fin is passive and carries 32 Analog Audio output signals via four D50 connectors. For modules that have the MADI expansion option, the MADI I/O ports are carried via mini-BNC (DIN) connectors. The Analog Audio D50 input and output fins are interchangeable.

Figure 5-34: Output Fin for Analog Audio Signals

Figure 5-35: Output Fin for Analog Audio Signals with MADI Expansion

5.6.4.1. D50 Connector – Pin Out

Xenon analog audio frames use female D50 connectors, with each connector carrying 8 signal pairs.



D50 Audio Pin-Out Table			
Signal	**+ Pin**	**- Pin**	**Screen**
1L	34	18	1
1R	2	19	35
2L	36	20	3
2R	4	21	37
3L	38	22	5
3R	6	23	39
4L	40	24	7
4R	8	25	41
5L	42	26	9
5R	10	27	43
6L	44	28	11
6R	12	29	45
7L	46	30	13
7R	14	31	47
8L	48	32	15
8R	16	33	49

Table 5-4: Analog Audio Input Pin-Out

5.7. CROSSPOINT & OUTPUT CARD

5.7.1. Digital Video: XE-OP32SX, XE-OP32HX, XE-OP32-3G

The Crosspoint & Output card has a 128x32 matrix comprising of four 32x32 Crosspoint modules, as well as providing for four 8-channel output SPT modules.

Up to 128 differential video input signals enter the Crosspoint & Output card and are routed directly to the crosspoint module. Any input can be selected to any output.

The output then either enters the SPT module, or goes directly to the output cable driver. It then leaves the card via a single high density connector to the Output fin.

The process applied to the signal as it passes through the SPT module depends upon the type of unit fitted.

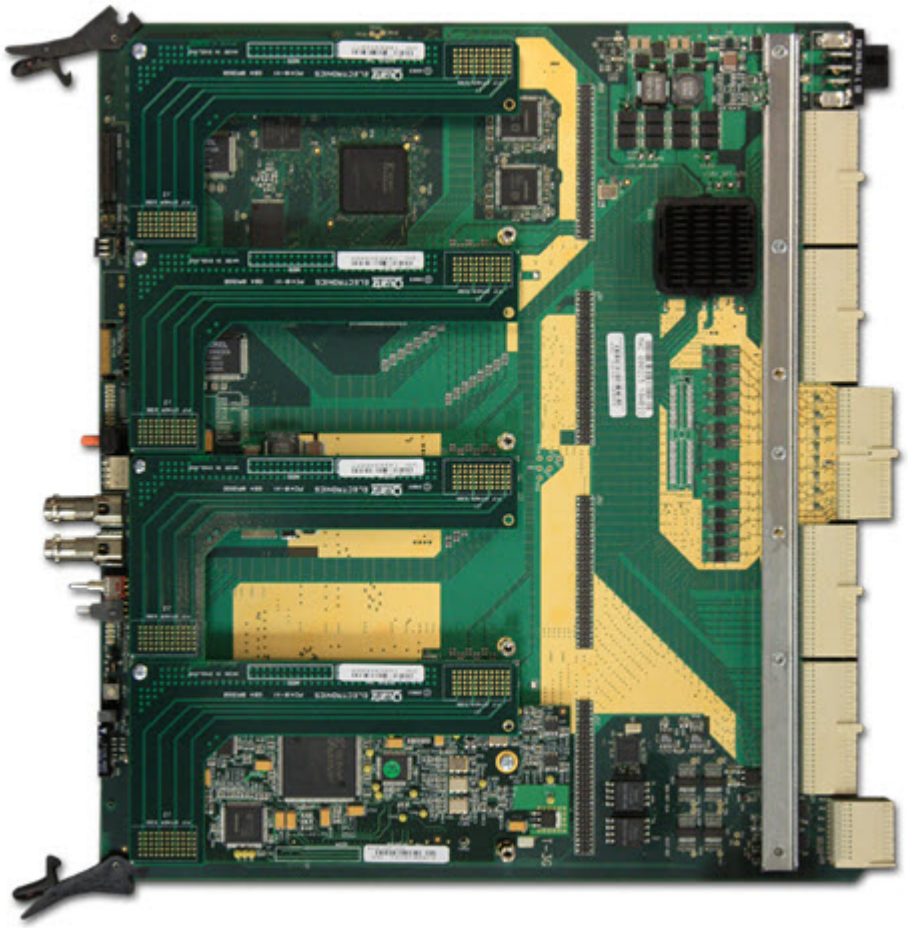


Figure 5-36: Crosspoint & Output Card

The Crosspoint & Output card also carries the output monitoring circuitry as well as an F-Link interface to the crosspoint controller and the serial diagnostic controller to collect ‘on’ card temperature and monitoring information and ‘off’ card power supply and fan monitoring information.

This card also carries the Reference module, which provides all the clocks and synchronising pulses for the system. Information regarding the Reference module can be found in section 1.1.

5.7.1.1. Switch Settings & LED's

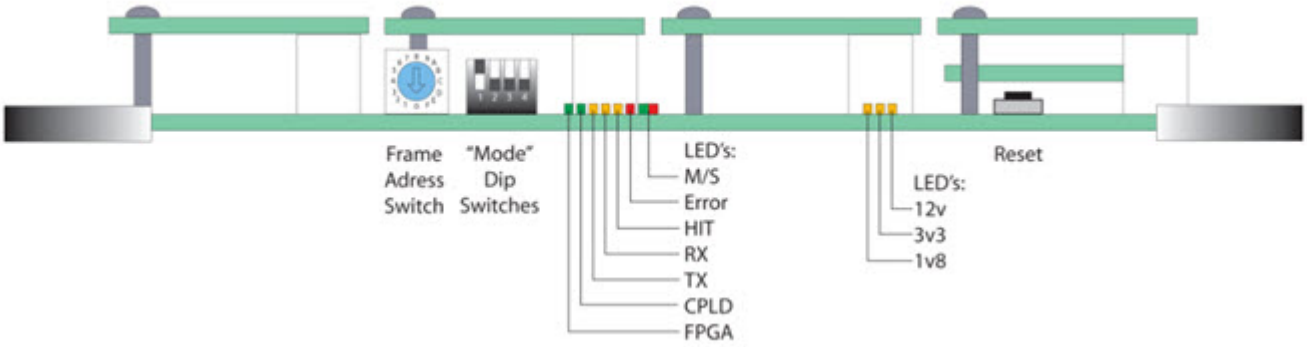


Figure 5-37: Crosspoint & Output Card Switches & LED's (Viewed from the Front)

Switch Settings

1. "Mode" switch one (1) must be down on all Crosspoint & Output cards to place the system to 'normal' F-Link operating speed.

2. The hex switch on the Output card is for setting the frame address and must be set to different addresses for each Xenon frame within a system. The default setting - 1. The hex switch on all Input cards and Crosspoint & Output cards within the Xenon frame must be set to the same value.

LED's

1. **FPGA** **Green** - (Normal) Indicates the associated programmable logic chip has loaded correctly.

2. **CPLD** **Green** - (Normal) Indicates the associated programmable logic chip has loaded correctly.

3. **TX** **Amber** (Normal) Indicates F-Link (internal processor to router communication) transmission from the Crosspoint & Output module.

4. **RX** **Amber** - (Normal) Indicates F-Link received by the Crosspoint & Output module.

5. **HIT** **Amber** - (Normal) Indicates F-Link message addressed to the Crosspoint & Output module.

6. **ERROR** **Red** - Off (Normal), goes red for 9 seconds if the Crosspoint & Output module has any error conditions with the F-Link protocol.

7. **M/S** On the upper most module this LED will be **Green**+**Red** indicating that this module is the master. If the upper most Crosspoint & Output module fails then the second Crosspoint & Output module will take over. Master status indicates the Crosspoint & Output modules Reference module is being used and that this module is in charge of PSU diagnostics. All other Crosspoint & Output modules below will show Green on this LED.

5.7.1.2. Crosspoint Control with VistaLINK®

The Crosspoint & Output card of the Xenon can be controlled using SNMP and VistaLINK®. Using the RJ45 connector on the rear fin of the Crosspoint & Output card, routes can be made from any of the inputs in the system to any of the 32 outputs on the connected output card. An Ethernet connection to each of the Crosspoint & Output card in the system must be made if all of the outputs are to be controlled through SNMP. The following image provides an example of the interface's appearance in VistaLINK®.

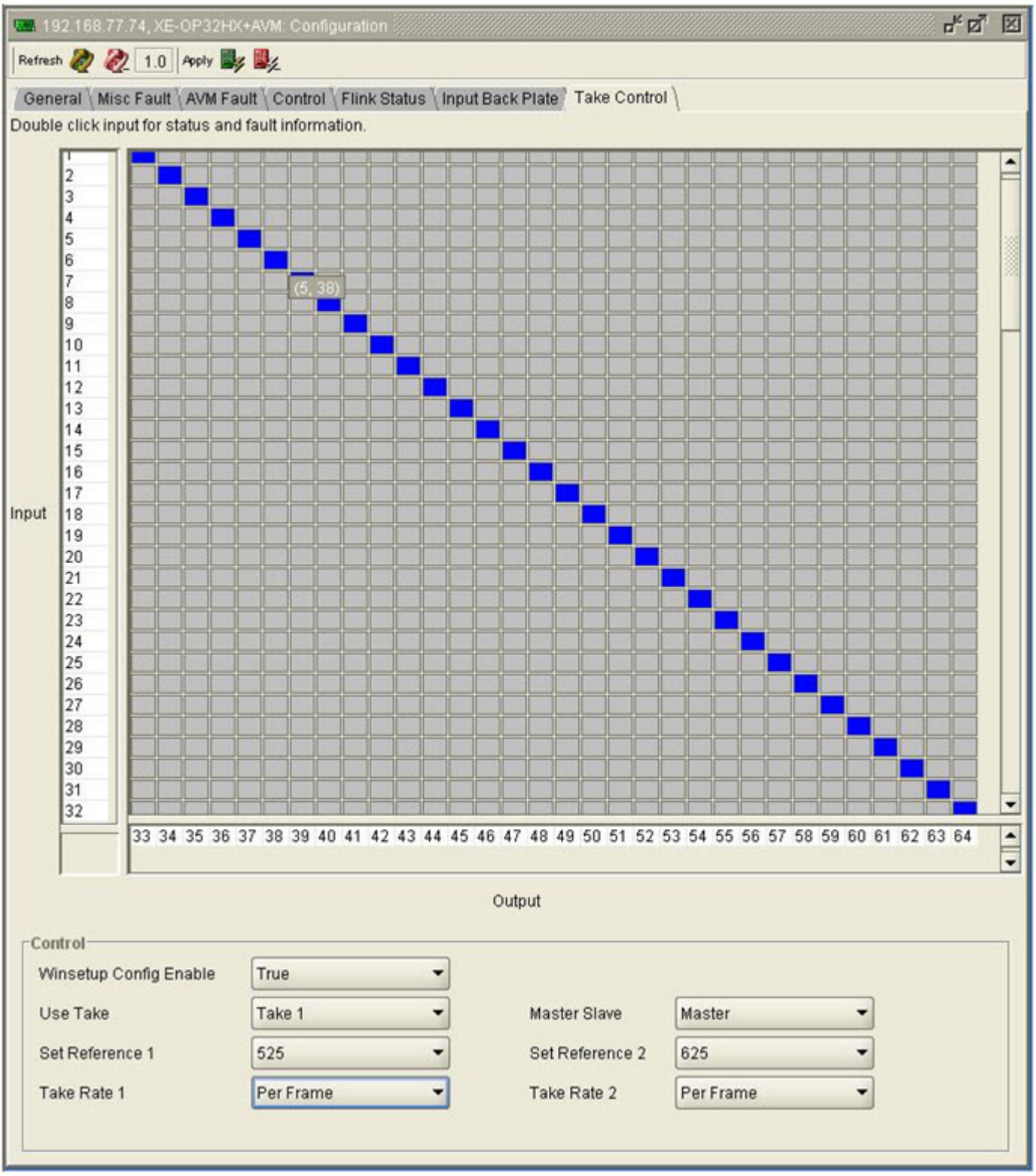


Figure 5-38: XE-OP32HX Crosspoint Control Using VistaLINK®

5.7.1.3. Output Monitoring with X-LINK®

X-LINK® outputs are an additional set of outputs from special Crosspoint & Output cards. They are for the purpose of providing connectivity to monitoring devices specifically designed by Evertz. X-LINK® outputs do not limit the number of outputs on the router, X-LINK® outputs are in addition to the standard video router outputs. Please refer to the table below for more details. X-LINK® outputs are completely independent of the standard video router; sources can be mapped to each output on the router including X-LINK® without blocking or compromise.

PRODUCT	INPUTS	STANDARD VIDEO OUTPUTS	X-LINK® OUTPUTS	TOTAL ROUTER OUTPUTS
Xenon 4RU	64 3G/HD/SD	64	96 (3*X-LINK®)	160
Xenon 8RU	128 3G/HD/SD	128	192 (6*X-LINK®)	320

Table 5-5: X-LINK® Output Mapping

In a 4RU Xenon, only one of the two output boards in the Xenon 4RU can be X-LINK® enabled to provide additional monitoring outputs to enabled monitoring products. In a 8RU Xenon, two of the four output boards in the Xenon 8RU can be X-LINK® enabled to provide additional monitoring outputs enabled monitoring products.

For more information regarding X-LINK® and how it is used with enabled monitoring products, refer to the VIP-X System Manual.

5.7.2. Digital Audio: XE-OP32-AESU, XE-OP32-AESB, XE-OP32-AESU-MADI, XE-OP32-AESB-MADI

The Crosspoint & Output card contains two separate crosspoint modules both of which are contained within a single FPGA. The crash crosspoint can handle 128x32 AES streams while the synchronous crosspoint can handle up to 288x32 AES streams or 576x64 AES mono channels.

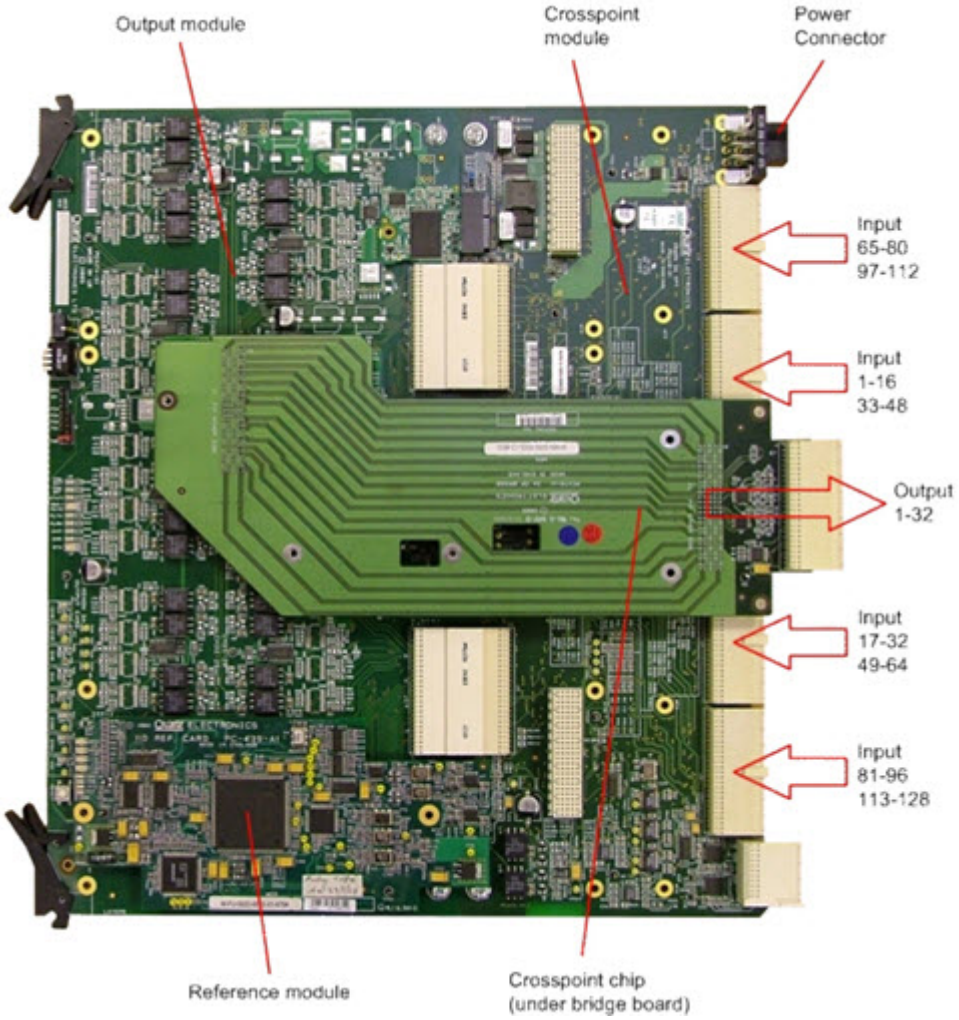


Figure 5-39: AES Digital Audio Crosspoint & Output Card

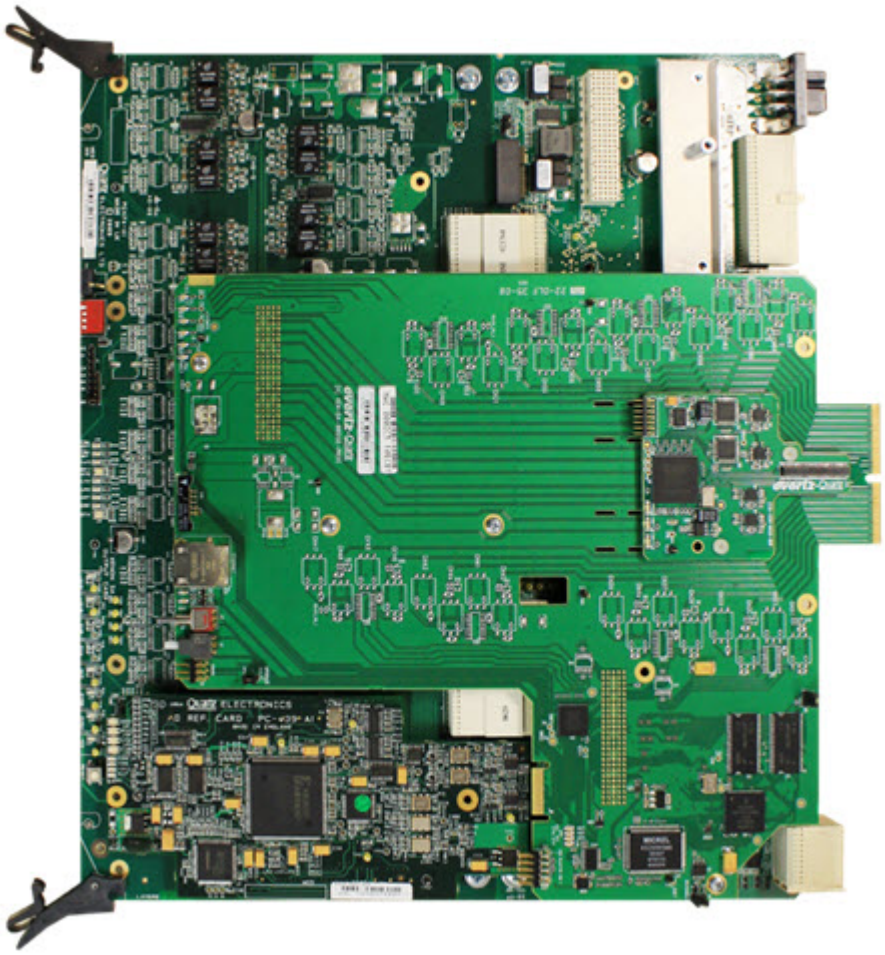


Figure 5-40: MADI Enabled AES Digital Audio Crosspoint & Output Card

5.7.2.1. Asynchronous Crosspoint

An asynchronous crosspoint is sometimes referred to as a "crash switch".

The inputs to the asynchronous crosspoint are connected to the 128 sources of the Primary Bus. However, the Primary Bus can be configured to carry either synchronous or asynchronous (bypass) data but the asynchronous crosspoint can only handle asynchronous data. Therefore any synchronous data on the Primary Bus will be routed through synchronous crosspoint.

The switch through the asynchronous can be made in one of three ways:

- **Immediate:** The switch made as soon as command is sent.
- **Video Ref 1:** The switch is queued and made at the next occurrence of the video ref 1 switch point.
- **Video Ref 2:** The switch is queued and made at the next occurrence of the video ref 2 switch point.

The two video referenced switches are used for clean switching of Dolby-E.

The asynchronous path through the Xenon does not process or manipulate the data in any way as it passes through the router. Each path is completely independent and can carry any AES stream from 24KHz to 192KHz.

The asynchronous crosspoint performs a “crash” switch and will disrupt the AES stream during the switch.

5.7.2.2. Synchronous Crosspoint

The synchronous crosspoint is connected to both the Primary Bus and the Secondary Bus. It allows up to 288 AES decoded streams to be split into Left and Right mono tracks and switched to any of the Left and Right mono tracks of the 32 output AES streams.

The 288 inputs to the synchronous crosspoint are connected as follows:

- 128 of the input signals are provided from the Primary Bus. In order to be switched through the synchronous crosspoint these signals must be configured as Synchronous (Sync) or Sample Rate Converted (SRC), not Asynchronous.
- A further 128 of the input signals are provided from the Secondary Bus. The Secondary Bus can only carry signals that are configured as Synchronous (Sync) or Sample Rate Converted (SRC).
- The final 32 of the input signals are provided from the external TDM expansion input. Again this bus can only carry data that is Synchronous (Sync) or Sample Rate Converted (SRC).

5.7.2.3. Synchronous Switching Options

All the data streams to the synchronous crosspoints are synchronized which allows not only clean switching of the AES streams but allows for ‘click free’ switching by cross fading between the 2 digitized analog sources. The switch rate (the rate of the crossfade) can be altered, but it is recommended that this is set to 10.7ms (medium) for optimum performance.

The synchronous switch will not corrupt the AES frames, but will generate a channel status CRC error as it is not switching on channel status boundaries.

5.7.2.4. Left & Right Track Shuffling

When operating the system in the “Stereo” mode then the Shuffler control level allows the following AES stream Left and Right shuffling to be implemented:

- LR Left input to the Left output and Right input to Right output (Normal)
- RL Left input to the Right output and Right input to Left output
- RR Right input to both outputs
- LL Left input to both outputs
- MONO Mono Mix of the Left and Right inputs (0.5L + 0.5R)

5.7.2.5. Phase Error Correction

During configuration of the unit it is possible to invert the phase of the inputs, allowing quick correction of wiring / phasing errors.

5.7.2.6. Test Tone Generator

The synchronous crosspoint has a built-in test tone generator, which is set at -24dBFs. In addition a silence AES output can be provided.

These are selected by additional sources just above the normal source range i.e. for a 128x128 stereo router:

SRC 130 = TEST TONE
SRC 129 = SILENCE

5.7.2.7. Output Gain Control

The synchronous crosspoint also provides the ability to individually control the gain of each of the Left and Right channels over the range +12dB to -132dB in linear steps. This is initialized to give 0dB of gain unless the user requests a specific value. The size of the step increases as the gain value becomes more negative.

5.7.2.8. Mono Operation & Wild Shuffling

If the router is configured in mono mode then the number of sources and destinations double for the main routing area i.e. for the sources:

128 Stereo + Tone + Silence =130 sources
256 Mono + Tone + Silence= 258 sources.

The same happens for the destinations. In this mode the AES stereo pair is split so that:

Input AES stream 1 is split to become sources 1 and 2
Input AES stream 2 is split to become sources 3 and 4
…. and so on.

In this mode any source may be routed to any destination allowing Wild Shuffling. The shuffler level is not required as each mono channel can be individually controlled.

Full wild shuffling is still available with multiple rack configuration.

5.7.2.9. Outputs

The Crosspoint/Output module provides balanced transformer coupled outputs, which are connected to the output fin via the Bridge module. Both output fins are passive and provide signals to the AES3 or AES3id specifications.

External I/O expansion is provided via a TDM interface, the buffers for which are situated on the Bridge module.

5.7.2.10.Switch Settings & LED's

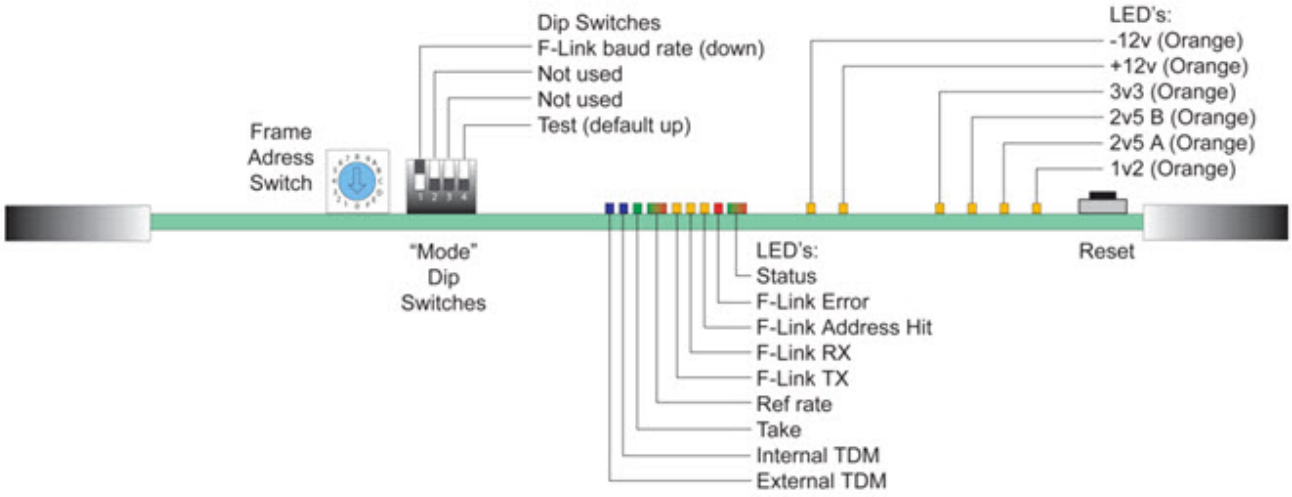


Figure 5-41: AES Digital Audio Crosspoint & Output Card Switches & LED's

(Viewed from the Front)

Switch Settings

1. "Mode" switch one (1) must be down on all Crosspoint & Output cards to place the system to 'normal' F-Link operating speed.
2. The hex switch on the Output card is for setting the frame address and must be set to different addresses for each Xenon frame within a system. The default setting - 1. The hex switch on all Input cards and Crosspoint & Output cards within the Xenon frame must be set the same value.

LED's

1.	**Status**	**Amber** if card is in control and OK, Flashing **Green** if slave and OK. It will turn **Red** if there is a fault found on Output module.
2.	**F-Link Error**	Off (Normal), goes **Red** if the Output module has any error conditions with the F-Link protocol.
3.	**F-Link Address Hit**	**Amber** - (Normal) indicates F-Link message addressed to the Output module.
4.	**F-Link RX**	**Amber** - (Normal) indicates F-Link received by the Output module.
5.	**F-Link TX**	**Amber** - (Normal) indicates F-Link (internal processor to router communication) transmission from the Output module.
6.	**Ref Rate**	Shows the reference and rate the SoftSwitch engine is running at: **Green** Slow Flash - Audio reference 1 or Video Ref 1 sample rate 48 KHz **Green** Fast Flash - Audio reference 2 sample rate 48 KHz.

Red Slow Flash - Audio reference 1 or Video Ref 1 sample rate 96 KHz
Red Fast Flash - Audio reference 2 sample rate 96 KHz

7. **Take** **Green** Flashes for 1/10s for Crash takes and 1/3s for SoftSwitch takes.

8. **Internal TDM** Flashing **Blue**. Shows the status of the 4 internal TDM links. The indictor flashes the number of the working link i.e.

   - For a 4RU unit with both input modules fitted:
     TDM from I/P 1 – one **Flash** followed by a long pause
     TDM from I/P 2 – two **Flashes** followed by a long pause
   - For a 8RU unit with all 4 input modules fitted:

   TDM from I/P 1 – one **Flash** followed by a long pause
   TDM from I/P 2 – two **Flashes** followed by a long pause
   TDM from I/P 3 – three **Flashes** followed by a long pause
   TDM from I/P 4 – four **Flashes** followed by a long pause
   If a TDM link fails then the flashes for that link will be missing.

9. **External TDM** **Blue** - Lit when the external TDM link has been present and has had no errors for greater than 6 seconds.

5.7.2.11. Multichannel Audio Digital Interface (MADI) Expansion

The Xenon provides additional functionality with the use of the MADI expansion module. Crosspoint & Output cards equipped with the MADI option can operate in two modes:

- **Standalone (Crosspoint) Mode:** This mode is the default operation that allows the Xenon to function as a standard audio router

- **MADI Mode:** In this mode the crosspoint is static and all 32 of the standard outputs are sourced by the audio from one of the MADI inputs

When the Crosspoint & Output card is in MADI mode, it acts as a MADI converter, converting a single MADI input stream into 32 AES outputs. It is a direct one-to-one mapping such that the first two channels in the MADI stream get directed to the first AES output, the next two get directed to the second AES output, and so on. In this mode, the Crosspoint & Output card no longer responds to the control module, and any audio routing must be done on the MADI side with an external device.

5.7.3. Analog Audio: XE-OP32-AA, XE-OP32-AA-MADI

The Crosspoint & Output card contains two separate crosspoint modules both of which are contained within a single FPGA. The crash crosspoint can handle 128x32 stereo analog signals while the synchronous crosspoint can handle up to 288x32 stereo analog signals or 576x64 mono channels.

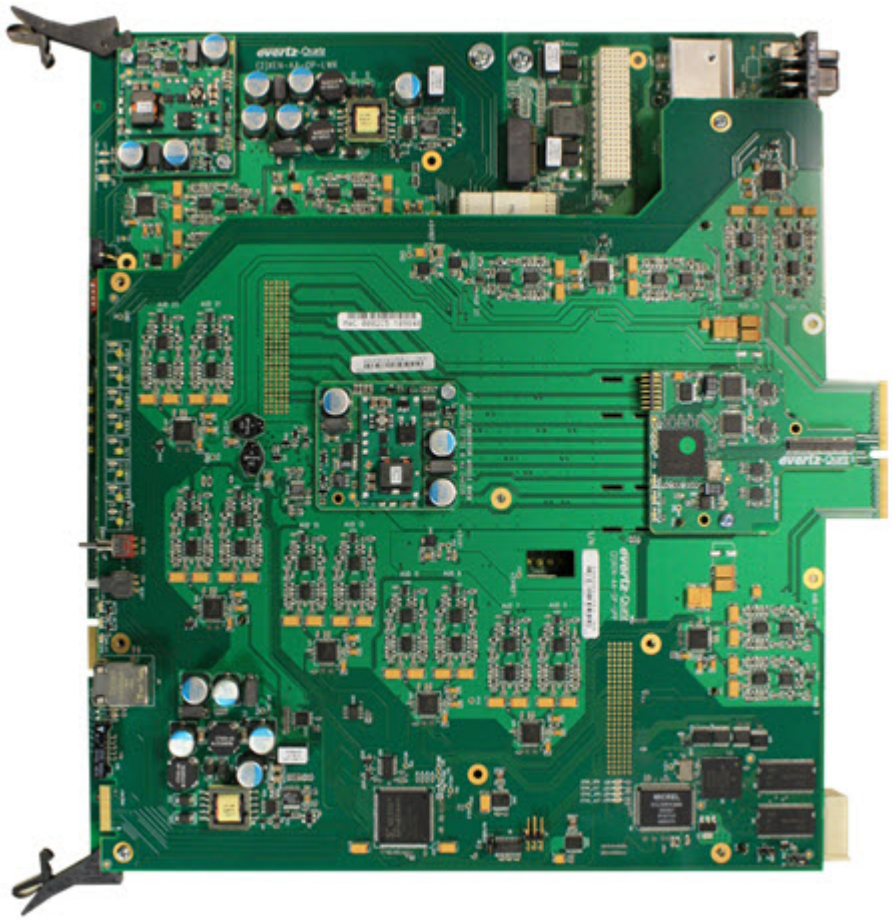


Figure 5-42: Analog Audio Crosspoint & Output Card

The analog audio Crosspoint & Output card utilizes a digital core such that all inputs to the card are digital. Once the digital signal has been routed, it is converted back to an analog signal before leaving the card.

The configuration and functionality of the analog audio Crosspoint & Output card is similar to the AES digital audio Crosspoint & Output card. Refer to the previous section for details regarding the functionality.

The exception to this is that the analog audio Crosspoint & Output card does not have an asynchronous crosspoint. All signals routed to the analog audio Crosspoint & Output card must be synchronous. As a result, signals from an AES digital audio input card must be a Synchronous module or a Synchronous module with Sample Rate Conversion.

Upgrading the firmware may cause calibration values to be corrupted. To ensure that this does not happen, please contact the Evertz service department for assistance before upgrading.

5.7.3.1. Switch Settings & LED's

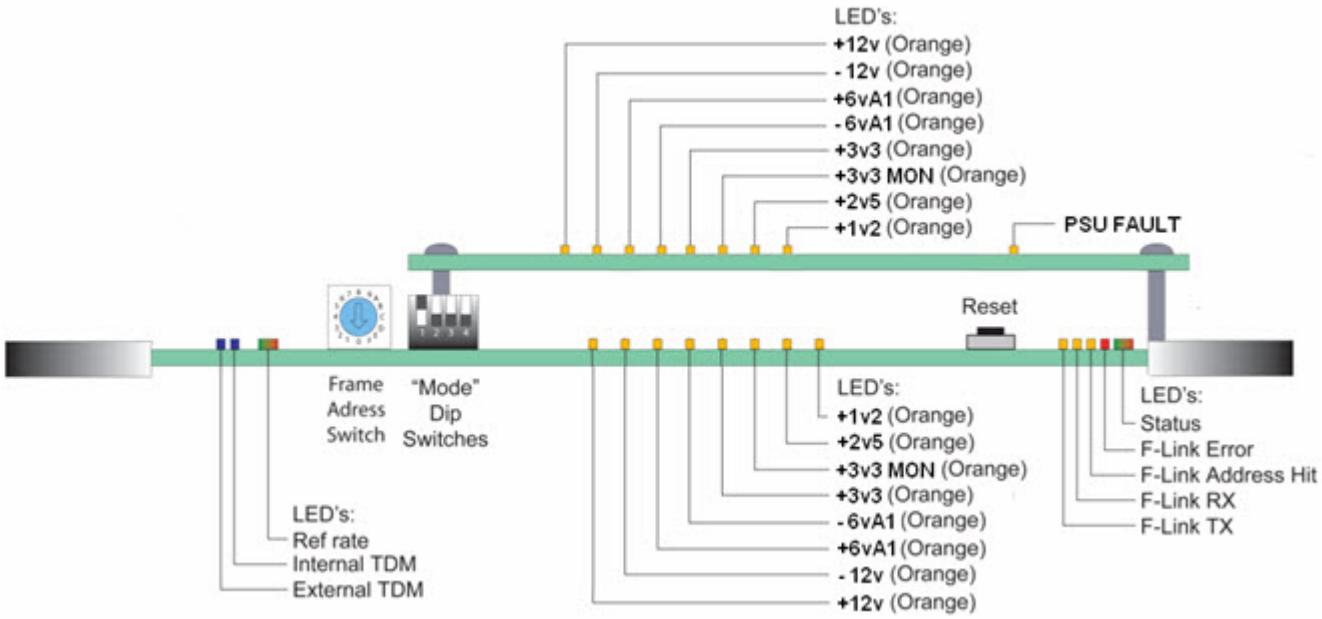


Figure 5-43: Analog Audio Crosspoint & Output Card Switches & LED's

(Viewed from the Front)

Switch Settings

1. "Mode" switch one (1) must be down on all Crosspoint & Output cards to place the system to 'normal' F-Link operating speed.
2. The hex switch on the Output card is for setting the frame address and must be set to different addresses for each Xenon frame within a system. The default setting is - 1. The hex switch on all Input cards and Crosspoint & Output cards within the Xenon frame must be set to the same value.

LED's

The top board on the analog audio output card has eight power indicators that can be viewed from the front, +12V, -12V, +6VA1, -6VA1, +3V3, +3V3 MON, +2V5 and 1V2, all of which should be illuminated and should be of equal brightness. The bottom card also has eight power indicators that can be viewed from the front, +12V, -12V, +6VA1, -6VA1, +3V3, +3V3 MON, +2V5 and 1V2, all of which should be illuminated and should be of equal brightness.

There are further indicators that can be viewed from the edge of the card which display various status information. (See notes below)

1. **Status** — **Amber** if card is in control and OK, Flashing **Green** if slave and OK. It will turn **Red** if there is a fault found on Output module.
2. **F-Link Error** — Off (Normal), goes **Red** if the Output module has any error conditions with the F-Link protocol.
3. **F-Link Address Hit** — **Amber** - (Normal) indicates F-Link message addressed to the Output module.
4. **F-Link RX** — **Amber** - (Normal) indicates F-Link received by the Output module.
5. **F-Link TX** — **Amber** - (Normal) indicates F-Link (internal processor to router communication) transmission from the Output module.
6. **Ref Rate** — Shows the reference and rate at which the SoftSwitch engine is running:

   Green Slow Flash - Audio reference 1 or Video Ref 1 sample rate 48 KHz
   Green Fast Flash - Audio reference 2 sample rate 48 KHz
   Red Slow Flash - Audio reference 1 or Video Ref 1 sample rate 96 KHz
   Red Fast Flash - Audio reference 2 sample rate 96 KHz
7. **Internal TDM** — Flashing **Blue**. Shows the status of the 4 internal TDM links. The indicator flashes the number of the working link i.e.
   - For a 4RU unit with both input modules fitted:
     TDM from I/P 1 – one **Flash** followed by a long pause
     TDM from I/P 2 – two **Flashes** followed by a long pause
   - For a 8RU unit with all 4 input modules fitted:

   TDM from I/P 1 – one **Flash** followed by a long pause
   TDM from I/P 2 – two **Flashes** followed by a long pause
   TDM from I/P 3 – three **Flashes** followed by a long pause
   TDM from I/P 4 – four **Flashes** followed by a long pause
   If a TDM link fails then the flashes for that link will be missing.
8. **External TDM** — **Blue** - Lit when the external TDM link has been present and has had no errors for greater than 6 seconds.
9. **PSU Fault** — Off (Normal), goes **Amber** if there are faults with the power supply to the Crosspoint & Output module.

5.7.3.2. Multichannel Audio Digital Interface (MADI) Expansion

The Xenon provides additional functionality with the use of the MADI expansion module. Crosspoint & Output cards equipped with the MADI option can operate in two modes:

- **Standalone (Crosspoint) mode:** This mode is the default operation that allows the Xenon to function as a standard audio router.
- **MADI Mode:** In this mode the crosspoint is static and all 32 of the standard outputs are sourced by the audio from one of the MADI inputs.

When the Crosspoint & Output card is in MADI mode, it acts as a MADI converter, converting a single MADI input stream into 32 stereo analog outputs. It is a direct one-to-one mapping such that the first two channels in the MADI stream get directed to channel 1 and channel 2 output, the next two get directed to the channel 3 and channel 4 output, and so on. In this mode, the Crosspoint & Output card no longer responds to the control module, and any audio routing must be done on the MADI side with an external device.

5.8. SIGNAL PROCESSING MODULES

The Signal processing modules can be fitted in any combination to the 3G, HD and SD Crosspoint & Output cards.

By plugging in SPT modules within the frame, many tasks normally implemented with external equipment can be done within the router. This offers significant savings in rack space and capital cost. Embedded audio processing, and advanced signal monitoring are just a few of the applications that SPT modules can be used for.

Each SPT module sits across eight outputs. Therefore a single Crosspoint & Output module, which handles 32 outputs, can be fitted with four SPT modules. Each SPT module can provide the same or different functionality.

5.8.1. Non-Reclocking SPT Module (standard)

The non-reclocking SPT module is fitted as standard to all 3G, HD and SD Crosspoint & Output cards. The non-reclocking SPT module acts as a bridge between the two connectors and therefore the signals that pass through this SPT module are unaffected.

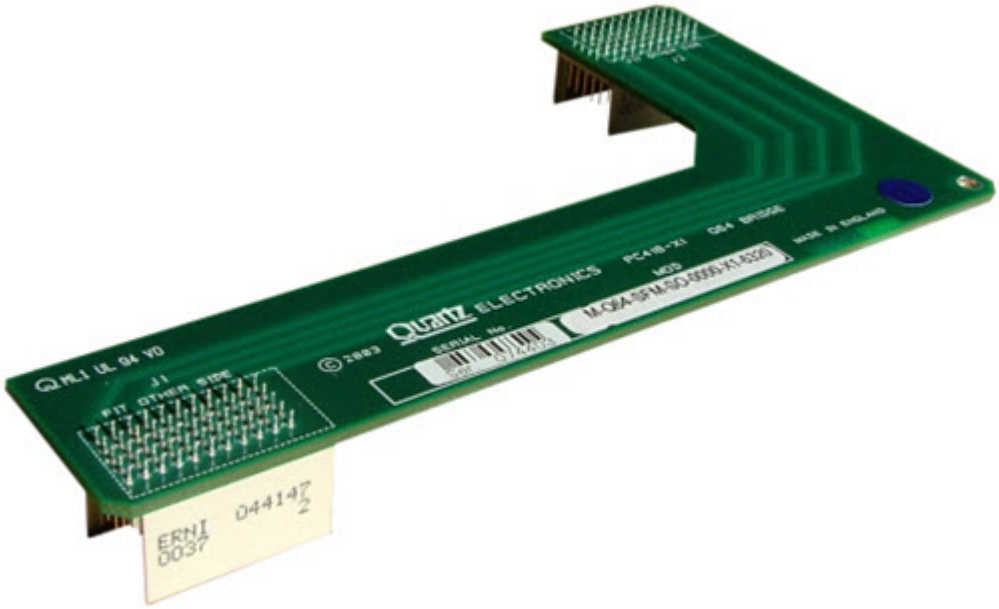


Figure 5-44: Non-Reclocking SPT Module

5.8.2. Reclocking SPT Module (optional)

The reclocking SPT module is used on the Crosspoint & Output card to re-clock the output signals. In this SPT module, 8 differential outputs received from the crosspoint are fed directly to 8 data reclocking circuits with automatic rate selection. Once the signal has passed through these devices it is driven off the SPT module and is fed into the output cable driver of the main card.

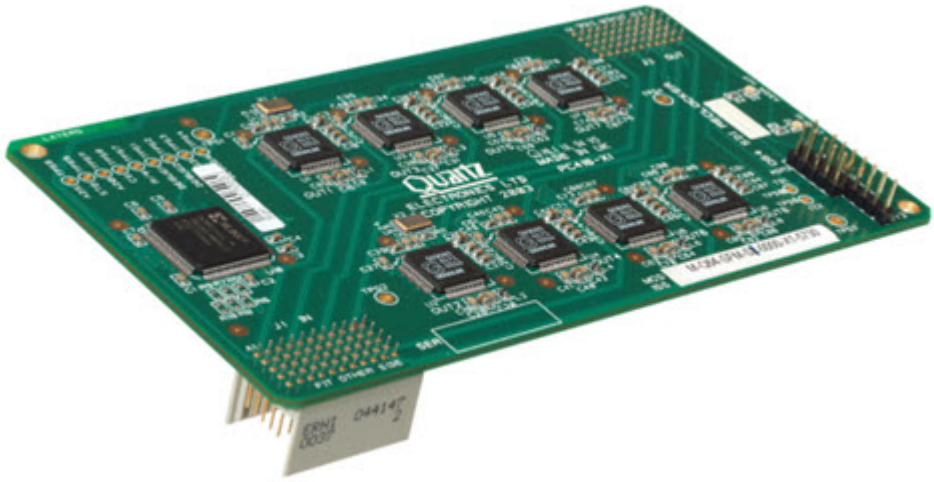


Figure 5-45: Reclocking SPT Module

5.8.3. XE-SPT-AVP-H SPT Module (optional)

The XE-SPT-AVP-H is only available for the XE-OP32SX and XE-OP32HX Crosspoint & Output cards. The key functions of this SPT module are for clean switching video signals that are not exactly timed to reference and SoftSwitching embedded audio to eliminate unwanted disturbances. The XE-SPT-AVP-H also provides advanced audio and video processing capabilities.

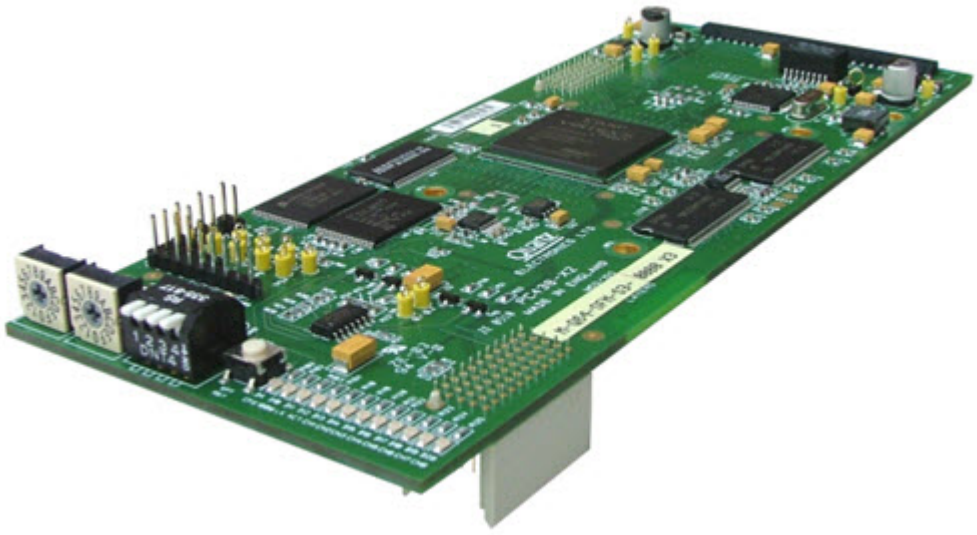


Figure 5-46: Programmable SPT Module

The advanced features of the XE-SPT-AVP-H are limited to a single video standard that is configurable or can be set to auto detect mode. This means all video inputs routed to the XE-SPT-AVP-H must be of the same video standard.

5.8.3.1. XE-SPT-AVP-H Video Processing

The XE-SPT-AVP-H provides the ability to clean switch sources that are not exactly in time with the system reference. Video signals that are within +/- half a line with respect to the system reference will switch without any noticeable disturbances to devices down stream of the Xenon.

The XE-SPT-AVP-H also provides additional video processing features such as: black level control, luma or contrast control, and chroma or saturation control. When the input video is SD, it also provides control over the hue of the output picture.

5.8.3.2. XE-SPT-AVP-H Audio Processing

The XE-SPT-AVP-H provides many advanced audio processing features. The key benefit of this module is the ability to SoftSwitch the embedded audio in all four groups, providing a popless audio signal to downstream devices. When switching between two sources with embedded audio, the XE-SPT-AVP-H will cross-fade the two sources so that the audible transition between the two is smooth and popless. This is very important when switching signals that are feeding sensitive audio processing equipment or when signals are taken directly to air.

The audio processing capabilities of the XE-SPT-AVP-H go beyond the SoftSwitching function to provide many advanced controls. The XE-SPT-AVP-H provides the ability to shuffle all input audio channels independently within the routed video signal, as well as all input audio channels within the adjacent routed video signal. For example, the audio within video signals routed to destination 32 and 16 can be freely shuffled between the two. Controls for changing the gain of the output audio signal and inverting the phase are provided for dynamic adjustments and corrections. In addition to this, the XE-SPT-AVP-H also provides the ability to do mono-mixdown of stereo pairs and custom mixing of mono channels.

5.8.3.3. XE-SPT-AVP-H Control with VistaLINK®

The XE-SPT-AVP-H is controlled through a common RJ45 connector on the back of the Xenon video output rear fin. The IP address of the XE-SPT-AVP-H is set using the front serial interface with an Evertz ribbon cable. Once set, the control is done over SNMP using VistaLINK®. The following screenshots show the controls available to the user.

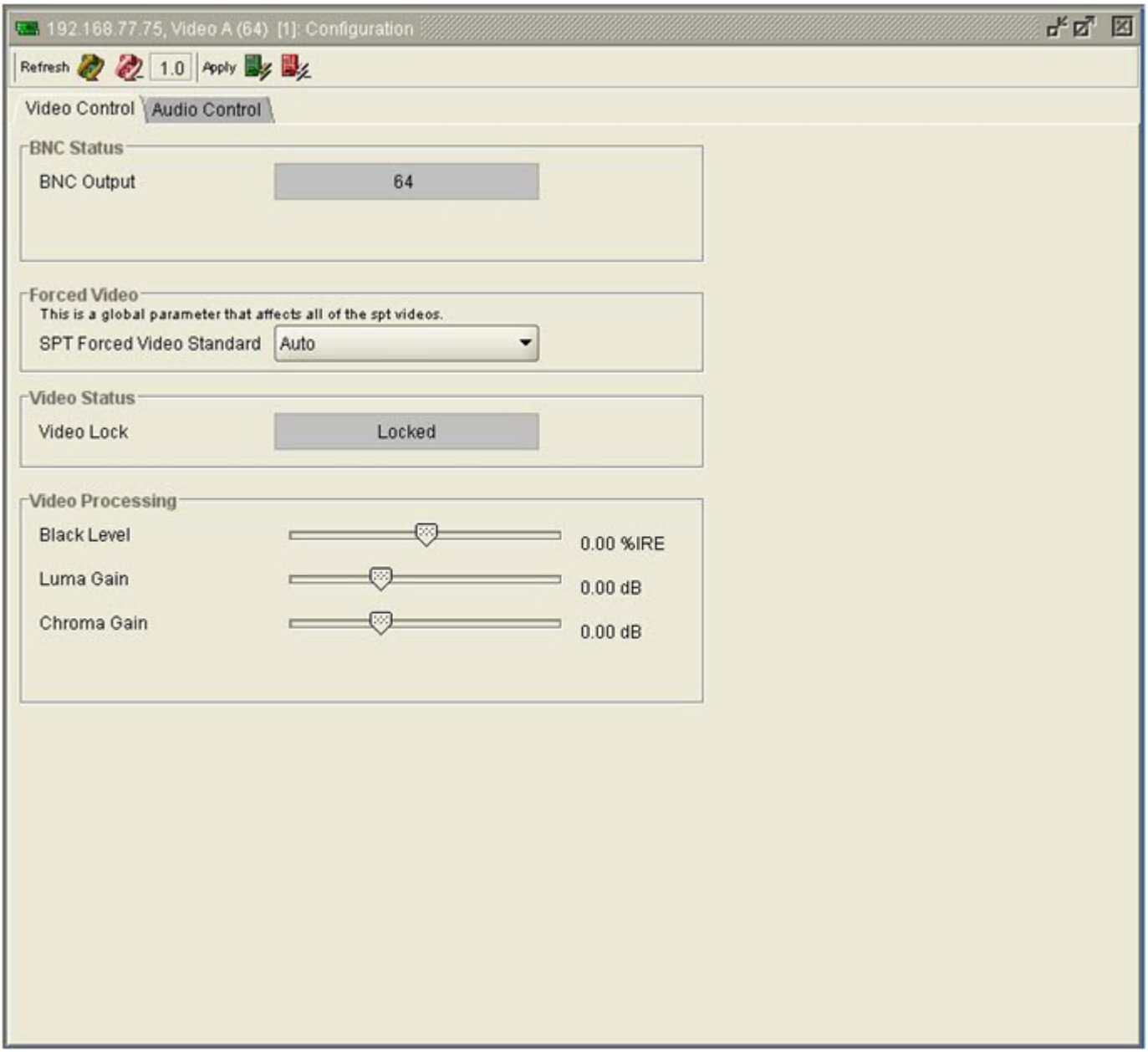


Figure 5-47: XE-SPT-AVP-H Video Configuration

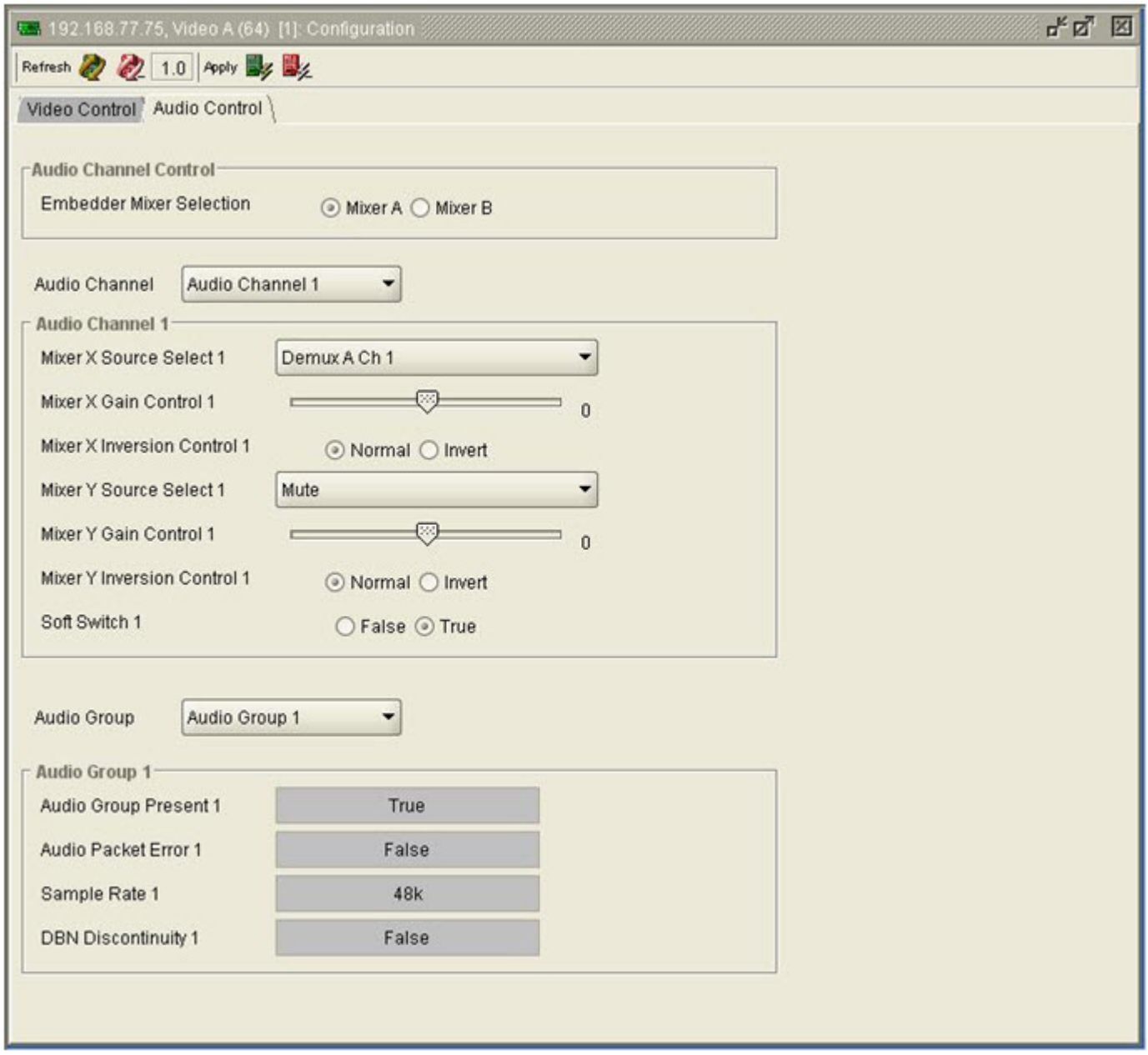


Figure 5-48: XE-SPT-AVP-H Audio Configuration

5.8.4. SPT Output Signal Location

When installing new SPT modules or when locating a faulty SPT module it is often necessary to be able to quickly locate the correct SPT module.

The digital video modules have been designed in such a way as to optimize the signal paths within the output module. The layout of the SPT modules with respect to the outputs are shown below on the view of the Crosspoint & Output module and the rear Output Fin in Figure 5-49 and Figure 5-51 respectively.

Older digital video modules were designed with less stringent requirements and therefore the location of the SPT modules were designed so that they were easier to locate. When viewed from the front or rear of the frame the I/O count always increments from the left to right as shown in Figure 5-50 and Figure 5-52.

The I/O location of the SPT modules is sequential (from left to right) on older versions of the Crosspoint & Output module. Old versions of the Crosspoint & Output module have a gold colored rear fin instead of silver.

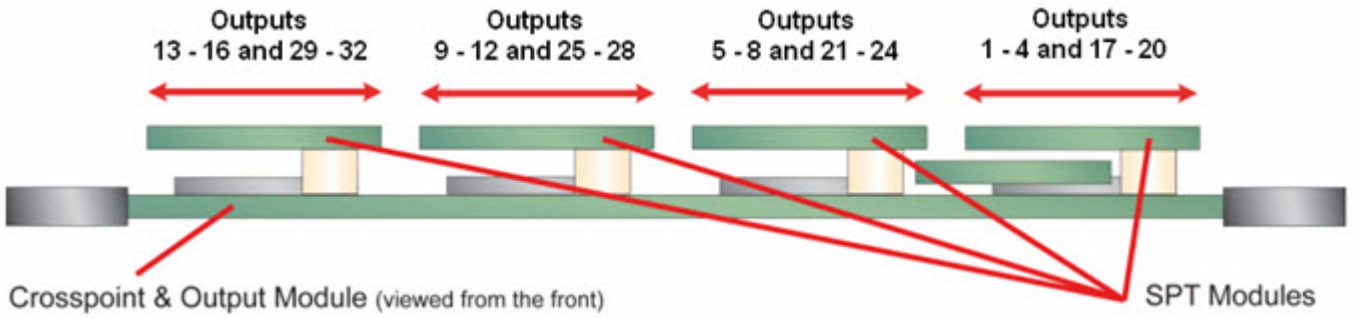


Figure 5-49: SPT Location (New Crosspoint & Output Module)

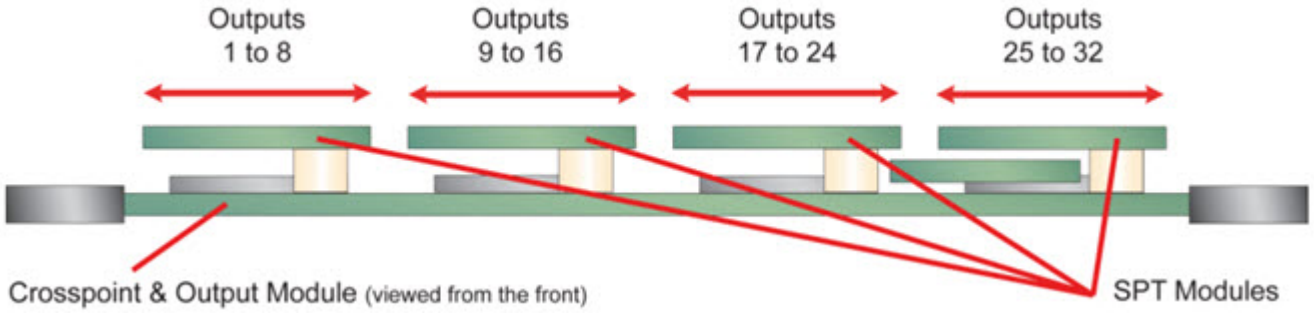


Figure 5-50: SPT Location (Old Crosspoint & Output Module)

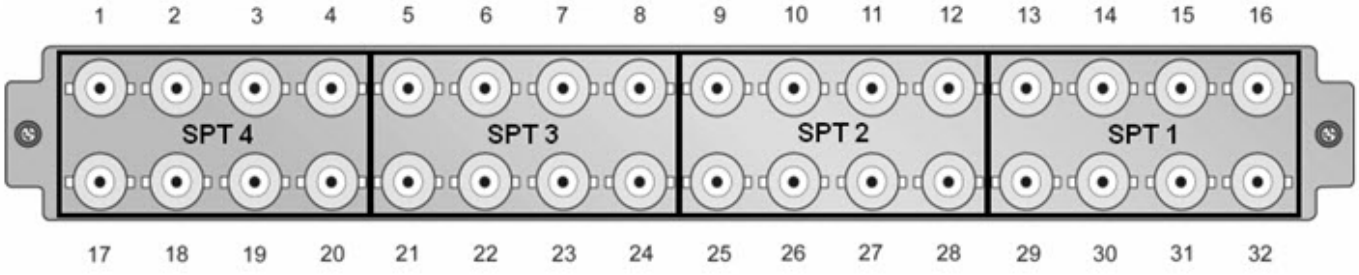


Figure 5-51: SPT Location (New Output Fin)

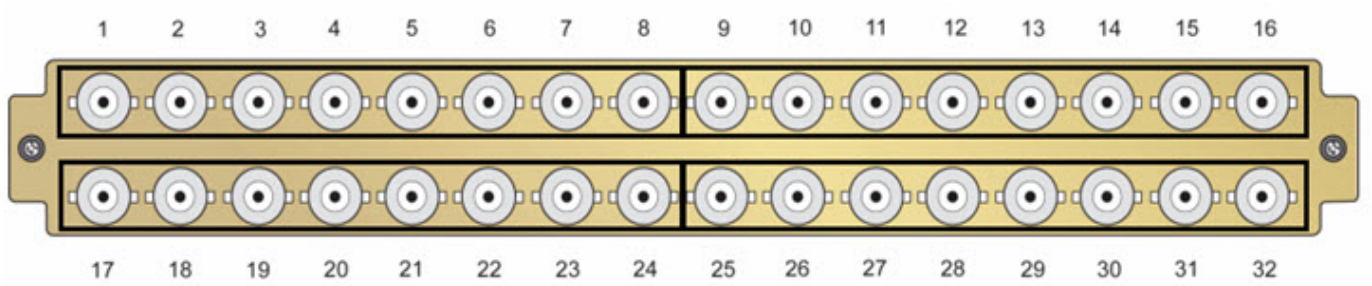


Figure 5-52: SPT Location (Old Output Fin)

The standard way in which the I/O modules are installed into the Xenon frame is sequentially starting from the top of the frame and working down towards the bottom. However, it is possible that the I/O sequence may deviate from the standard configuration; therefore the WinSetup configuration for the Xenon router should always be checked before removing any of the modules to ensure that the correct module is removed.

5.9. CONTROL MODULE

The control module is located in the base of the Xenon frame and is available in a redundant configuration (optional) to avoid a single point of failure.

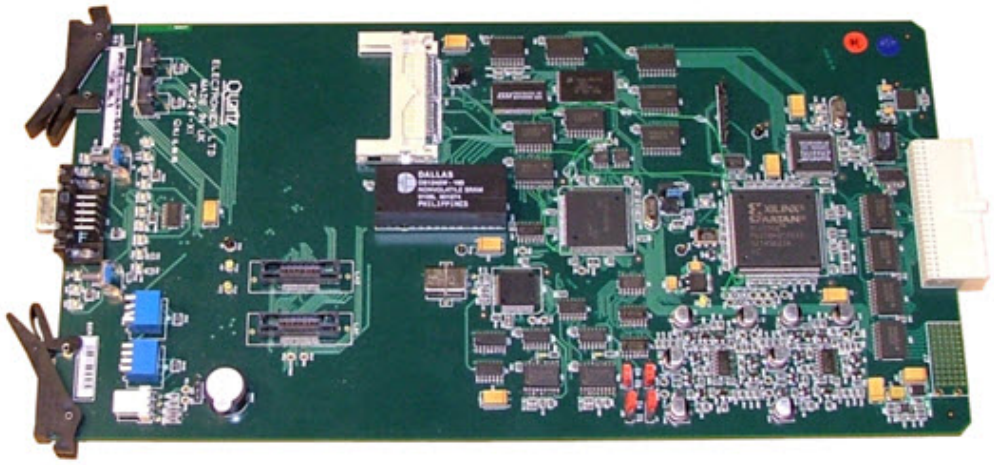


Figure 5-53: Control Module

When the Xenon is the only, or master, router within a system the internal controller removes the need for an external system controller. This allows the controlling device, such as a control panel or automation system, to communicate directly with the Xenon. This is required as the internal communication infrastructure of the Xenon is F-Link. The control module acts as a converter, taking the input control signal, in a Q-Link, Ethernet or Serial format, and converting it to F-Link.

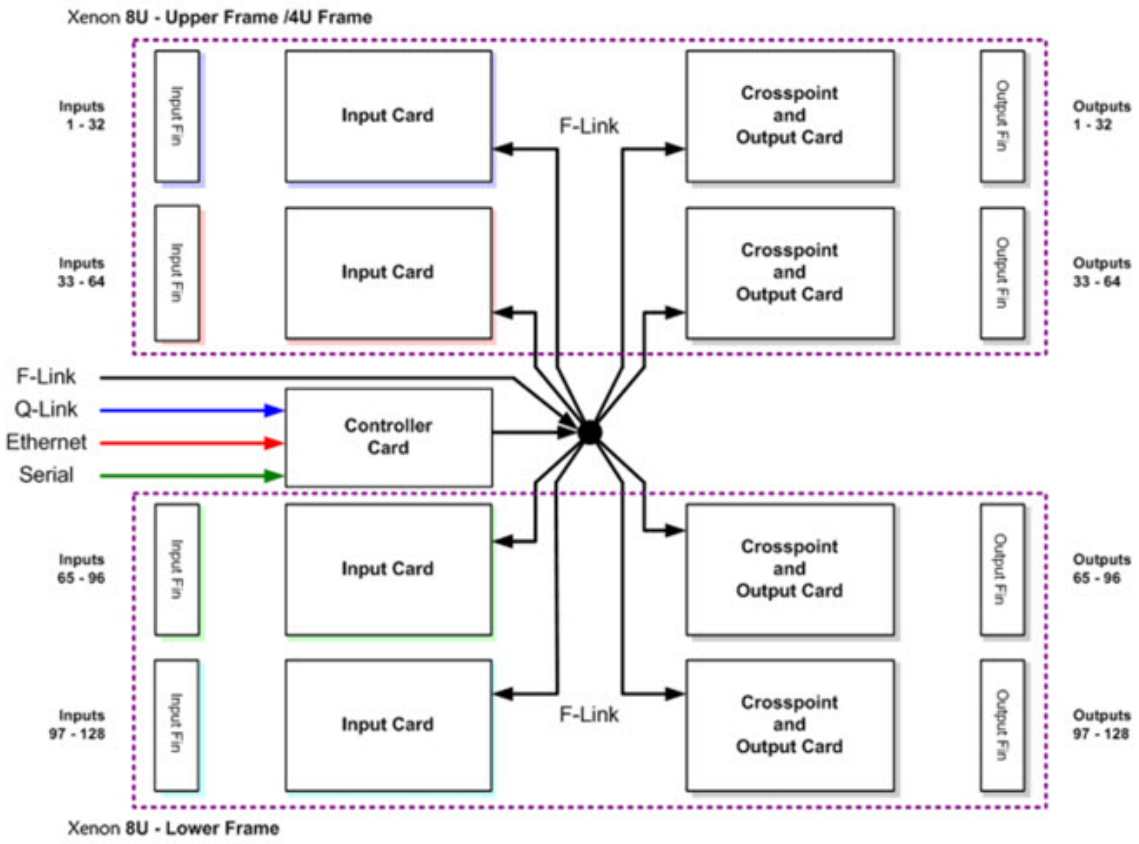


Figure 5-54: Control Module – Block Diagram

Xenon is fully compatible with all Quartz router control panels and interfaces, including connectivity to a comprehensive list of third-party control solutions.

5.9.1. Configuration

The hex and DIP switches must be set the same for both cards. Since only one card is in control at a time the router appears to only have a single control card. The only exception to this rule is when using Ethernet – both cards will allow a Quartz telnet connection regardless of their control state.

Figure 5-55: Control Module – Viewed from the Front

5.9.2. LED Descriptions

There is a small hold-off delay before the master tries to transfer either the route status or the configuration.

LED	State	Description
TX	FLASHING	Serial Tx (for now this includes the inter card tx - this might be removed when the dual card code has bedded in).
RX	FLASHING	Serial Rx (for now this includes the inter card rx - this might be removed when the dual card code has bedded in).
DBG1	ON	Route status has been transferred to the other card.
	OFF	Route status has not been transferred. The two cards are either not talking or are exchanging other information or the other card is not present.
	FLASHING	Status is currently being transferred
DBG2	ON	The current config has been transferred.
	OFF	Config has not been transferred. The two cards are either not talking or are exchanging other information or the other card is not present.
	FLASHING	Config is currently being transferred (can take up to 5 minutes).
INCTRL	ON	The card is currently in control.
	OFF	The card is not ready to take control - it may not have the route status and/or config. (see the taking control notes)
	FLASHING	The card is up-to-date and can take control.

Table 5-6: Control Module LED Descriptions

5.9.3. Taking Control

The cards can be made to transfer control under the following conditions:

- If a card is ready to take control (INCTRL LED is flashing)

Holding the control button for two seconds causes the reserve to request control from the master. After this time the control LED should light on the reserve to show it is now the master and turn off on the previous master.

- If the card is not ready to take control (INCTRL LED is off);

After holding the button for a second the controller will start to beep – to warn that the current configuration is not up-to-date. Holding the button in for a further 4 seconds forces it to take control.

- Removing a master will always cause the other card to take control.
- When booting, the left-hand-side card has priority over the right-hand-side.
- When a control conflict is detected the left-hand-side card has priority.
- Removing or inserting a card when the other is already in control has no effect.

5.9.4. DIP Switches

The MODE DIP switches functions the same as the FU-0003.

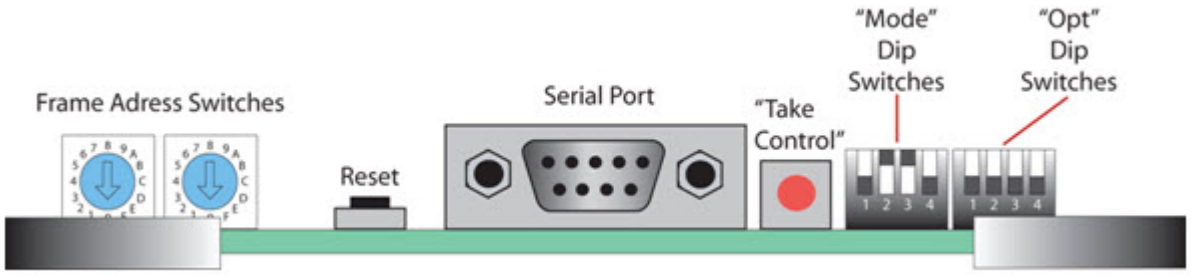


Figure 5-56: Control Module Switches (Viewed from the Front)

DIP	Function
DIP1	Up: Default baud rate, Down: WinSetup Protocol Parameters
DIP2	Up: Diagnostic mode, Down: Protocol Mode
DIP3	Up: Slave, Down: Master
DIP4	Up: Normal Boot, Down: Force all inputs to WinSetup value

Table 5-7: Controller Module DIP Switches

The OPT DIP switches are reserved for R&D use and should be all up for normal operation.

The two links for setting RS232 or RS422 comms for Serial port 1 and 2 must be identically configured on both Master and Slave Control modules.
Link J31 for Serial 1
Link J18 for Serial 2

5.10. REFERENCE MODULE

The Reference module is mounted onto the Crosspoint & Output card. On digital video units it sits under the right hand SPT module and can only be seen from the top when the non-reclocking SPT module is fitted. All other types of SPT modules obscure the Reference module from view. On AES audio or Analog audio units the Reference Module is sited in the similar position on the Crosspoint & output card.

A second, redundant, Reference module can be fitted. However this module has to be fitted on to the second Crosspoint & Output card.

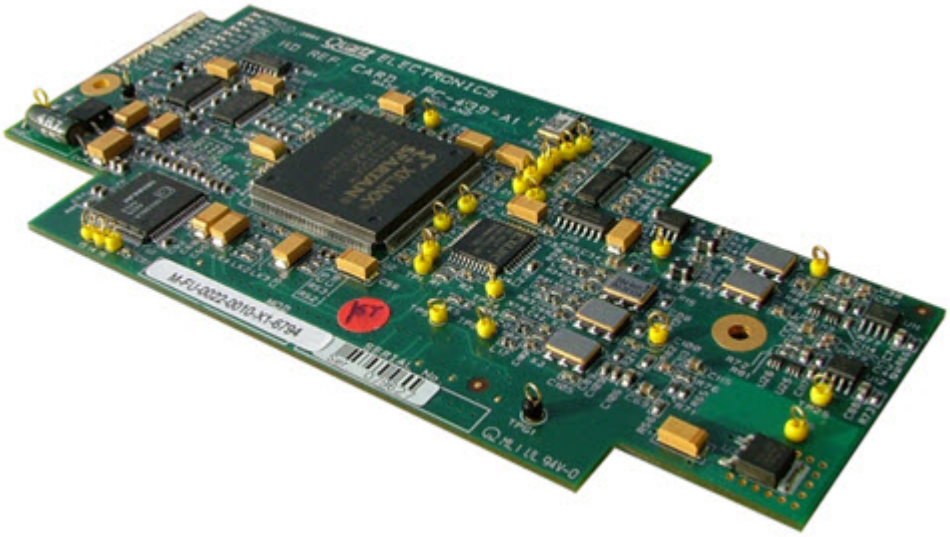


Figure 5-57: Reference Module

The redundant reference module is not available for configurations with less than 64 outputs.

5.10.1. Video Reference Signal

There must be an analogue reference present to ensure the crosspoint switch occurs during the field-blanking interval. If the reference is missing then the switching will occur asynchronously. If you experience problems with clean switching then refer to our application note AN-0008. The reference signal should be connected to the Ref 1 input and this is terminated in 75R.

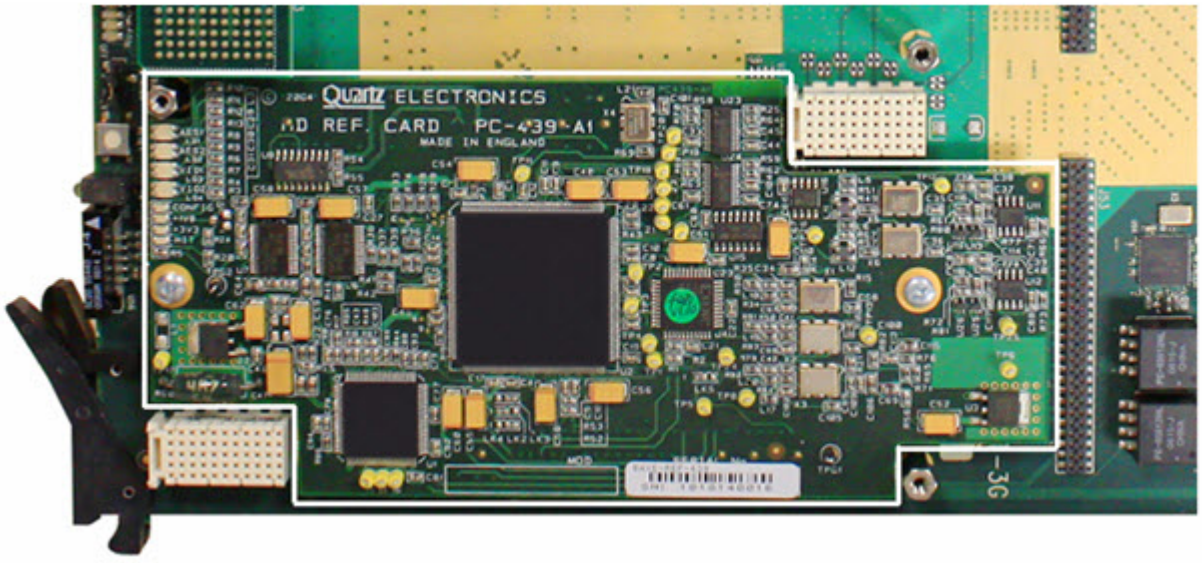


Figure 5-58: Reference Module Mounted on the Crosspoint & Output Card

5.10.1.1.Independent Timing Levels

The Xenon router has the ability to generate two independent timing levels from the two reference inputs. This allows the Xenon router to cleanly switch two different video formats simultaneously through the router, for example 525 SD and 720p HD. The two timing levels are selected and configured via the Xenon's WinSetup configuration software.

Any additional video formats being routed through the Xenon at the same time will still switch but not necessarily cleanly.

The same timing levels are used by the digital audio router to allow bypass (crash) routes to be switched coincidently with the video. Note: this is a crash switch and thus very likely to corrupt the AES stream.

In the case of Dolby-E there should be no data in the switching region (AES3 guard band) and thus by using the video timing level the Dolby-E stream will not be corrupted providing it is locked to the same reference as used by the timing level.

The redundant reference module is NOT required in order to generate the second timing level.

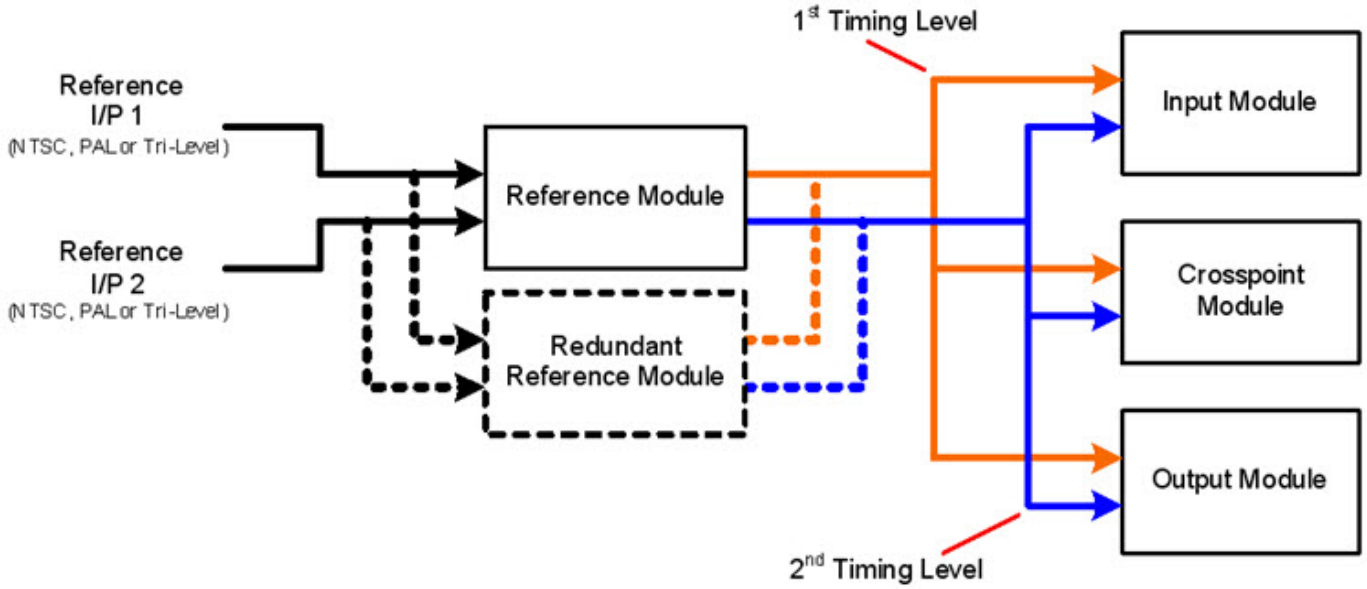


Figure 5-59: Generation of Independent Timing Levels

5.10.2. Audio Reference Signals

The Crosspoint & Output card carries the Reference module. The reference module is very important to the operation of the Xenon audio router when running in synchronous mode as it provides the main system clocks.

It recommended that a redundant Reference module is fitted as removal of the Crosspoint and Output module containing the reference module will stop the router from functioning as a router running in a non-redundant configuration.

The redundant reference module is not available in a 32 output configuration.

For the AES Xenon router and later SD/HD/3G routers the reference module 'in control' and therefore providing the timing level signals and the audio clocks is signified by the Config LED being solid AMBER, the reference module in standby is signified by the Config LED flashing AMBER.

Removal of the Crosspoint/Output module 'in control' will give a momentary glitch to all the synchronous outputs in the router as control passes to the redundant Reference module. This does not affect any of the asynchronous routes.

The reference module can be configured to run from Audio Ref 1, Audio Ref 2 or the Video Ref 1 inputs. It is recommended that the router be configured to run from Audio Ref 1 unless Synchronous mode requires it to be locked to an alternative reference.

The synchronous crosspoint may be configured to run at either 48KHz or 96KHz. If it is operated at 96KHZ then the output can be down sampled to 48KHz.

Running the crosspoint at 96KHz reduces the delay through the router but, at present, would mean that the synchronous mode cannot be used. However, the SRC mode is still fully operational. Check with Evertz/Quartz for further updates.

5.10.2.1.Independent Audio Timing Planes

In addition to the video switching levels the reference can provide two independent synchronous timing planes - Audio Ref 1 and Audio Ref 2, though normal operation only requires a single timing plane.

- Audio Ref 2 is connected directly to the AES 2 external reference input.
- Audio Ref 1 can be connected to the AES 1 external reference input or to the external Analog Video reference 1 input, which can be either NTSC (29.94Hz) or PAL (25.0Hz).

Note: Only the modules that are using the same timing plane can be interconnected. For example using two timing planes a 64x64 AES Xenon router can be divided into two independent 32x32 levels, each running different sample rates, e.g. 48KHz and 96KHz. However, in this mode the signals can only be routed within their own level and cannot cross over, for example a 48KHz input routed through to an output configured for 96KHz.

Timing planes have no effect on asynchronous routes.

5.10.2.2. AES Signal Alignment

The reference module controls the alignment of the AES frame boundaries to meet the AES11 specification. Such that when using the video 1 reference the start of the AES Preamble is aligned to start of video line 1. When using the AES references the output stream is aligned to signal on the Audio Ref connector input. It is possible to alter the alignment of the outputs by 1 AES frame when using either the AES references or the analogue video 1 reference. Contact the factory if this feature is required.

LED's

1. **AES1:**

Slow flashing **Green** shows 48KHz reference present on AES Ref 1 input.
Fast flashing **Green** shows 96KHz reference present on AES Ref 1 input.
Solid **Amber** shows AES signal present on AES Ref 1 input.
Solid **Red** shows no valid AES signal present on AES Ref 1 input.

2. **AES2:**

Slow flashing **Green** shows 48KHz reference present on AES Ref 2 input.
Fast flashing **Green** shows 96KHz reference present on AES Ref 2 input.
Solid **Amber** shows AES signal present on AES Ref 2 input.
Solid **Red** shows no valid AES signal present on AES Ref 2 input.

3. **VID 1:**

Red shows no valid video signal present on VID REF 1 input.
Green shows video signal present on VID REF 1 input.

4. **VID 2:**

Red shows no valid video signal present on VID REF 2 input.
Green shows video signal present on VID REF 2 input.

5. **CONFIG:**

Flashing **Amber** shows FPGA programmed and card in 'standby' mode.
Solid **Amber** shows FPGA programmed and card 'in control' mode.

6. **+1V:**

Amber indicates the local 1.8v DC rail is present.

7. **+3V:**

Amber indicates the local 3.3v DC rail is present.

8. **HIT:**

Amber (Normal) indicates F-Link message addressed to the Reference module.

5.11. POWER SUPPLY UNIT

The power supply unit of Xenon provides +3V3 at 50A and 12V at 20A with a maximum Power output of 250W.

Figure 5-60: Power Supply Mounted in the Xenon Frame

Each of the power supplies are hot swappable and are plugged into the frame from the front. The power supply for the 4RU Xenon is configured in a single PSU non-redundant configuration or in a dual PSU (n+1) redundant configuration.

In an 8RU Xenon the power supply is configured in a dual PSU non-redundant configuration or in a quad PSU (n+1) redundant configuration.

All standard PSU modules have five green LED indicators advising PSU module status. They indicate PSU Temperature, AC OK, 3V3 OK, 12V OK, and Fans OK. All LED's are 'positive'; if they are not illuminated there is a problem. If a PSU module develops a fault, and is not supported by a 'redundant' PSU module it may not be possible to deduce the fault as the whole router may fail. If the PSU module is operating in a redundant configuration and it fails the LED indicators should display the problem, or the PSU may be 'interrogated' via the control system.

The PSU module has a two-wire serial interface monitoring device that can provide information on PSU voltage O/P status, Motherboard voltage status, fan condition, and module temperature. The monitor is supplied from the motherboard, therefore, so long as 3V3 is available, monitoring will be possible even if the unit has failed. Similarly the fans are supplied from the 12V rail on the motherboard, so even if the modules own 12V O/P fails the unit will still be cooled.

The standard PSU modules are designed such that the 3V3 rail will not operate unless +12V (the cooling fan rail) is available. This can cause the disturbing but 'normal' situation whereby in 8RU systems the lower PSU modules will not turn on until one of the upper modules is on.
The PSU modules should not be plugged in with the switch in the 'on' position. If the PSU is inserted 'on', the DC connectors will mate first, followed by the 'Mains Earth, Live & Neutral'. Damage MAY occur to the 'Mains' Molex connector pins and this is the area to be investigated if the module fails to operate normally. It must be stressed that it would be unusual to damage the connector beyond repair with only one erroneous insertion.

5.12. FAN UNIT

The fan units for the Xenon are located and accessed from the rear of the frame. Each of the fan units are hot swappable. The fans operate as extractors removing air from the frame and exhausting to the sides at the rear of the frame. The design of the Xenon is such that the air cavity inside is common which prevents hot spots developing in the event of a fan failure.

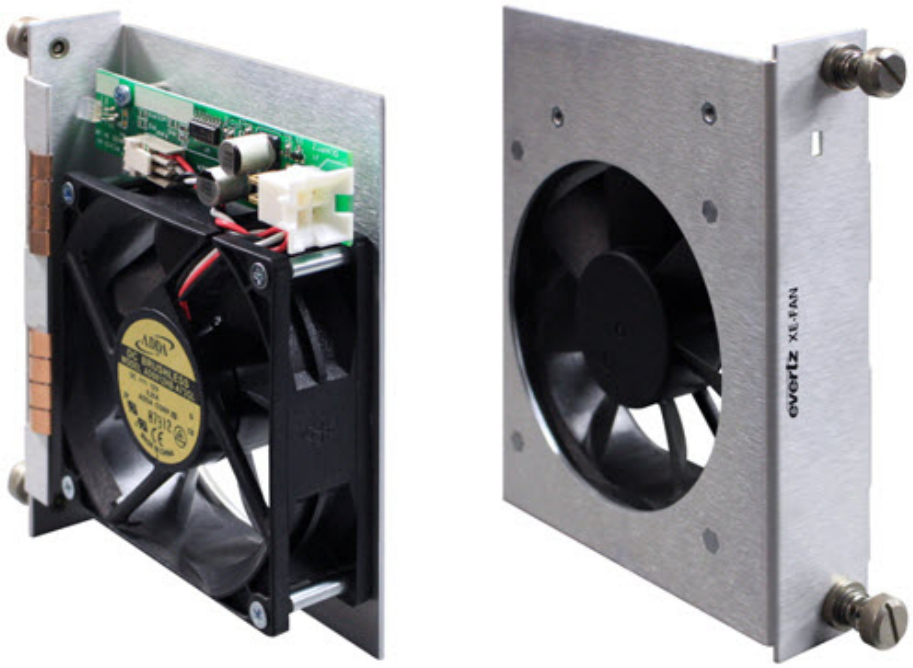


Figure 5-61: Xenon Fan Unit

4RU Xenon's have 2 rear pluggable fan units working in a n+1 configuration while the 8RU Xenon has 4 rear pluggable fan units working in a n+1 configuration.

The Fan module has a Fan speed 'good' (green) indicator. If the indicator shows amber or red the fan is failing or has stopped. If the indicator is off then no 3V3 is available to the module, the fan may well be operating normally. A fan unit should not be removed (even if it has failed) until a replacement is available. The Fan module speed and condition can also be verified via the control system.

The rear Fan modules do not cool the PSU modules and vice versa. Each is an independent cooling system.

6. COMMUNICATION AND MONITORING CONNECTIONS

6.1. OVERVIEW

There are a number of communication and monitoring connections on the rear of both the 4RU and 8RU Xenon frame. These connections provide access to the various communication and monitoring facilities of the Xenon router, such as alarms, control and video monitoring.

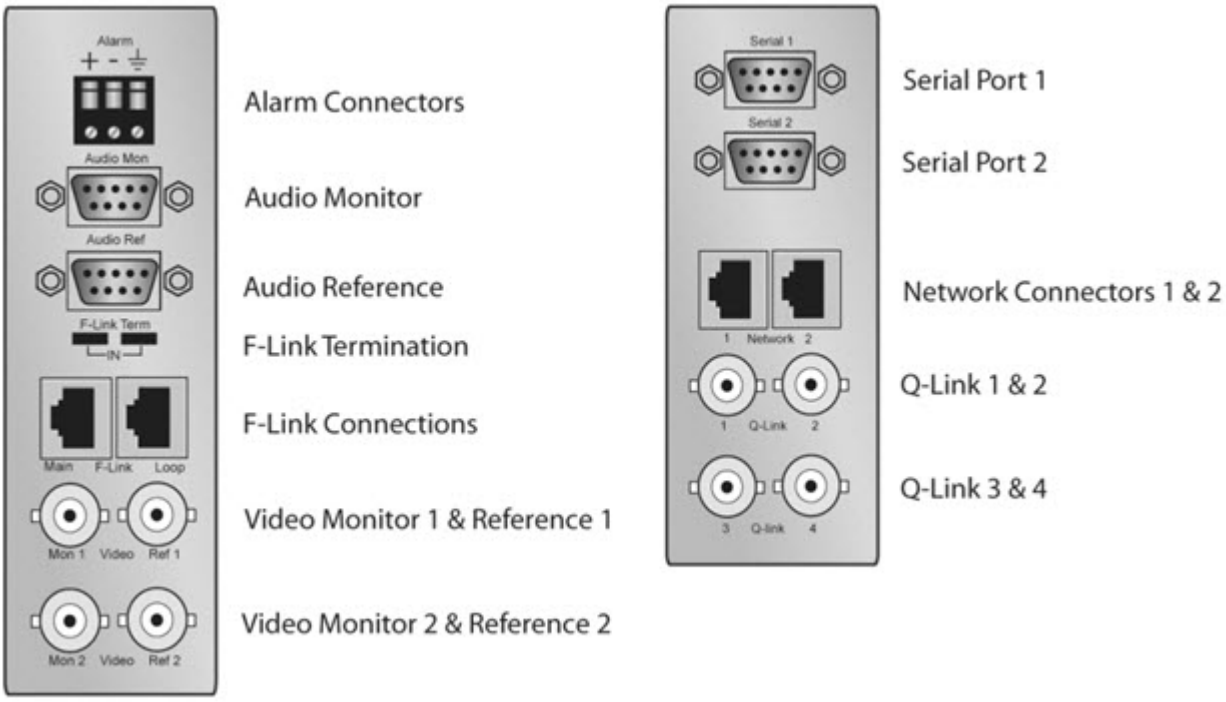


Figure 6-1: Rear Communication & Monitoring Connections on the Xenon

6.2. ALARM

A 3-pin alarm terminal provides external alarm indication. The alarm signal conforms to SMPTE 269M Standard for fault reporting in television systems. This is a simple interface over which television equipment can report the occurrence of internal failures and faults in incoming signals. It is intended for use in all television equipment.

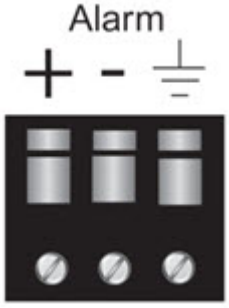


Figure 6-2: Alarm Connection

The interface consists of an isolated closure, which can assume one of three states: open, closed, or pulsing. The respective signal that the reporting device is okay, has detected an internal fault, or is detecting incoming signal faults.

The Xenon may be in one of three states:

1. **Normal operation:** The Xenon is currently not detecting any internal failures and is receiving power.
2. **Internal failure:** The Xenon is currently detecting an internal failure or has lost power.
3. **Incoming signal fault:** The Xenon is not detecting any internal failures, but is currently detecting faults in incoming signal(s).

This requires that the user connect an external fault indicator and power supply to the alarm terminals. The power supply should be 24 VDC max. and current limited to 20mA (See SMPTE 269M for further details).

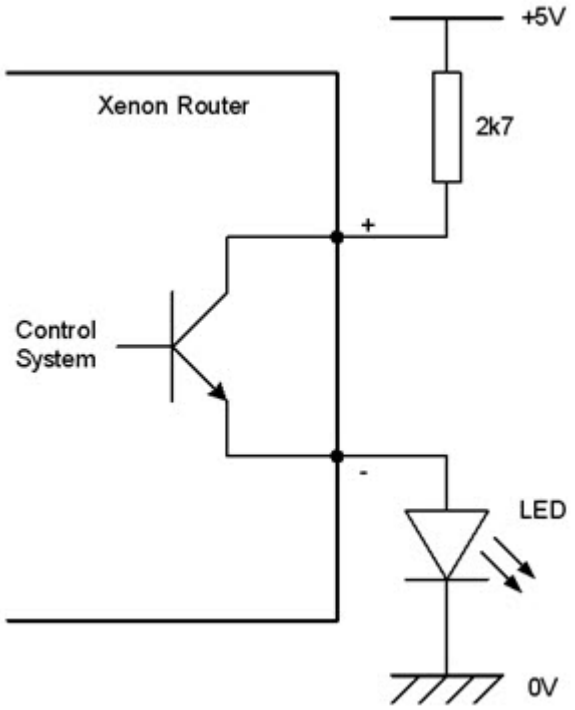


Figure 6-3: Example Alarm Circuit

6.3. MONITORING

6.3.1. Audio Monitor

The Audio monitor output connector provides 2 Digital Audio differential transformer coupled AES3 signals. The “O/P Mon” output provides a single point at which any one of the 128 outputs of the Xenon router can be monitored. The “I/P Mon” output provides a single point at which any one of the 128 Primary Bus input signals of the Xenon router can be monitored.

Figure 6-4: Audio Monitor Connection

RS422 9 WAY MALE D-TYPE	
PIN	**SIGNAL**
1	0V
2	OP MON-
3	OP MON+
4	0V
5	IP MON+
6	NC
7	NC
8	0V
9	IP MON-

Table 6-1: Audio Monitor Connection Pin-out

Control of this monitoring point can be achieved using the normal routing control system. Before this will work the router must be configured to identify what destination numbers the output and input monitors will respond to. This is normally the next two destinations outside the normal destination range of the router, for example:

Destinations 65 (O/P MON) and 66 (I/P MON) for a 64x64 router.
Destinations 129 (O/P Mon) and 130 (I/P MON) for a 128x128 router.

Control messages to these destinations then use the source number to select which output or input is to be monitored.

The output is always an AES 3 stream, in the case of an asynchronous route then it is a buffered version of the signal. When monitoring a synchronous route the internal signal is encoded into AES 3 before transmission.

! Warning: The Monitoring in the rack is daisy chained from the bottom of the rack to the top with the top most output and input modules driving the Audio Mon connector. Therefore if a module is removed then it will not be possible to monitor signals below the removed module.

6.3.2. Video Monitor

The Mon 1 output provides a single point at which any one of the 128 outputs of the Xenon router can be monitored. Control of this monitoring point can be achieved using the normal routing control system. Before this will work the router must be configured to identify what destination number the output monitor will respond to. This is normally the next destination outside the normal destination range of the router i.e. 65 for a 64x64 router or 129 for a 128x128 router. Control messages to this destination then use the source number to select which output is to be monitored.

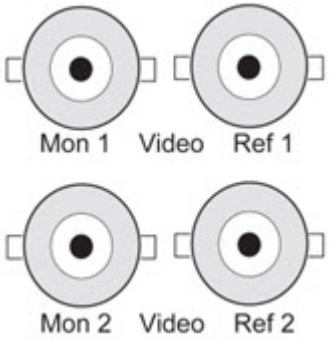


Figure 6-5: Video Monitor Connection

The selected video signal is also fed to the reference card, which analyses the video signal and reports back diagnostic information via the routers serial or Ethernet port.

Please note that the output monitor only works at HD and SD rates currently.

The Mon 2 output is not currently supported by the frame but will be used for input monitoring.

6.4. REFERENCE

6.4.1. Audio Reference

The Xenon Router provides two AES 3 Digital Audio reference inputs. Both balanced inputs are transformer coupled to the reference modules in the top 2 Crosspoint/Output slots in the chassis.

At present the reference module can only accept AES3 signals with a frame rate of 48KHz or 96KHz. See section 1.1 for more details

Figure 6-6: Audio Reference Connection

RS422 9 WAY MALE D-TYPE	
PIN	**SIGNAL**
1	0V
2	AES REF 1-
3	AES REF 1+
4	0V
5	AES REF 2+
6	NC
7	NC
8	0V
9	AES REF 2-

Table 6-2: Audio Reference Connection Pin-Out

6.4.2. Video Reference

There must be an analogue reference present to ensure the crosspoint changes occur during the field-blanking interval. If the reference is missing then the routing will occur asynchronously. If you experience problems with clean switching then refer to application note AN-0008 found on the Evertz website.

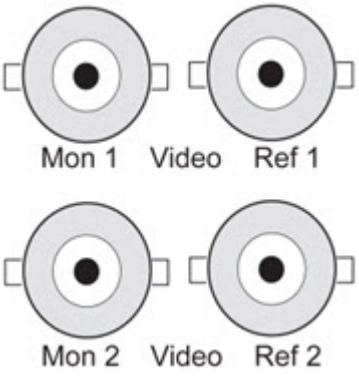


Figure 6-7: Video Reference Connection

The reference signal should be connected to the Ref 1 input and this is terminated in 75R. The Xenon supports dual references (525/625 standard def and high def) for combined operation. In these systems the Ref 2 connector should be used for the other reference signal.

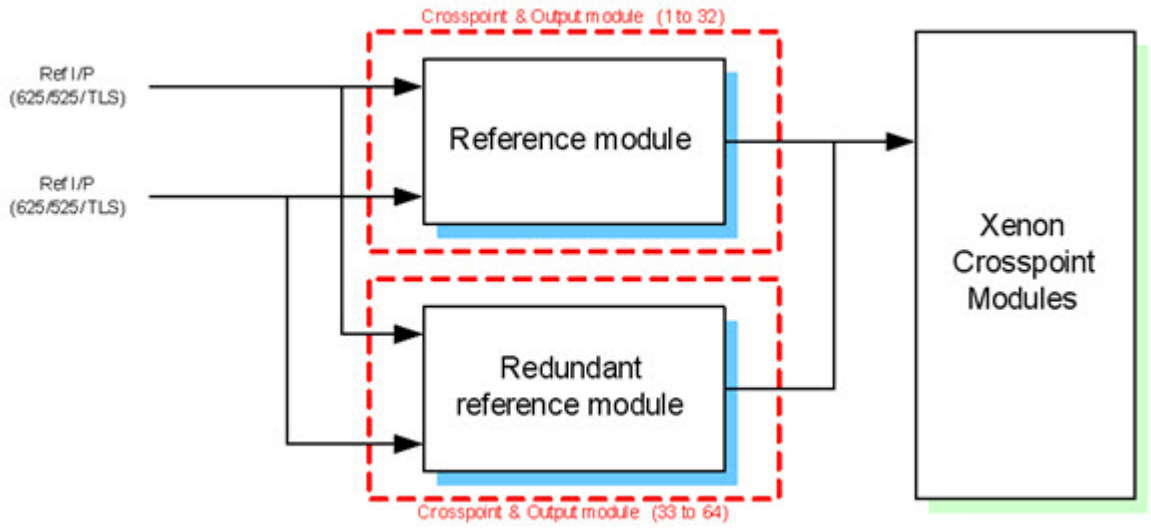


Figure 6-8: Connection of Reference Signal to Reference Module

6.5. CONTROL

6.5.1. Q-Link

The control cards interface to the external Q-Link connections. Internal communication within Xenon is over a high speed F-Link connection. The rear Q-Link module has four BNC connectors to allow connection to four terminated Q-Links.

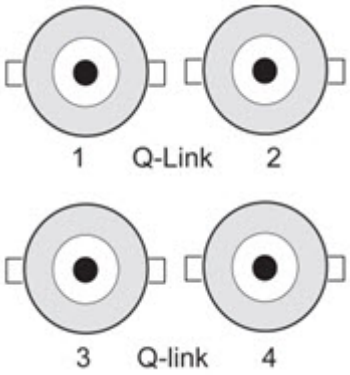


Figure 6-9: Q-Link Connection

The Q-Links connectors on the Xenon frame are internally terminated at 75Ω.

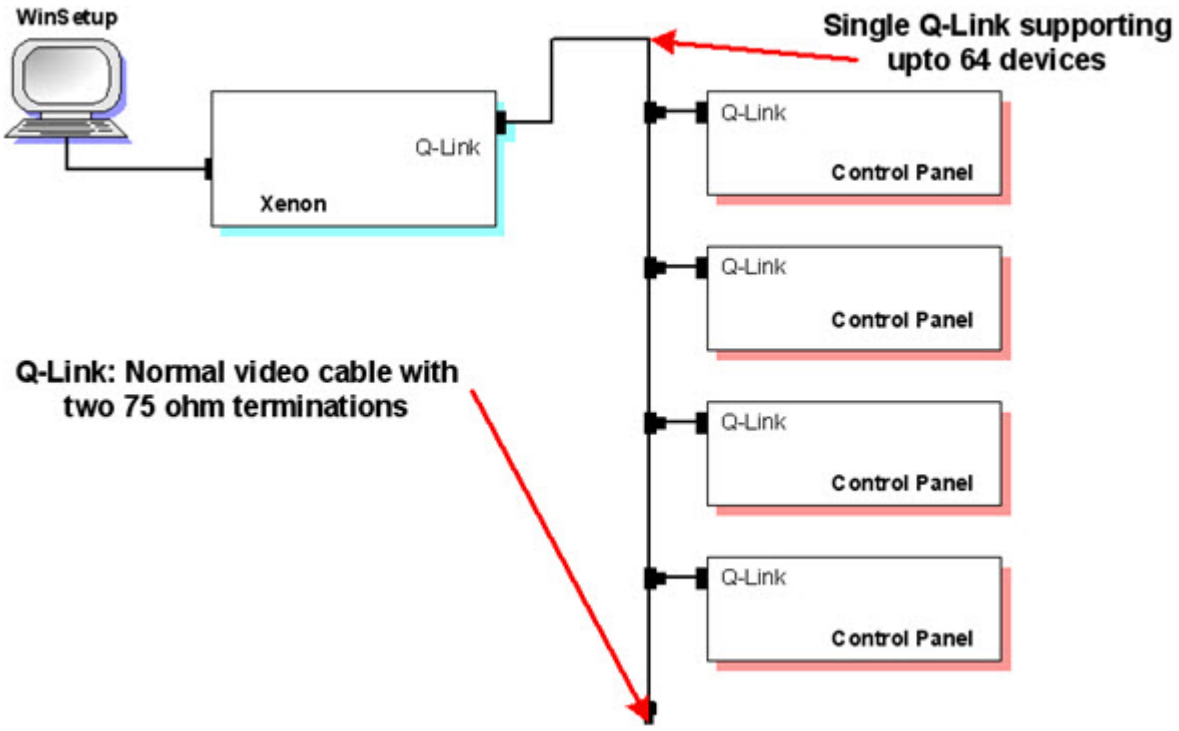


Figure 6-10: Single Q-Link Connection to Multiple Remote Control Panels

The Q-Link is used to connect remote control panels or the SC-1000 system controller as shown in Figure 6-10.

For systems with more than 64 control panels or when more protection is required the other Q-Links can be used as shown in Figure 6-11.

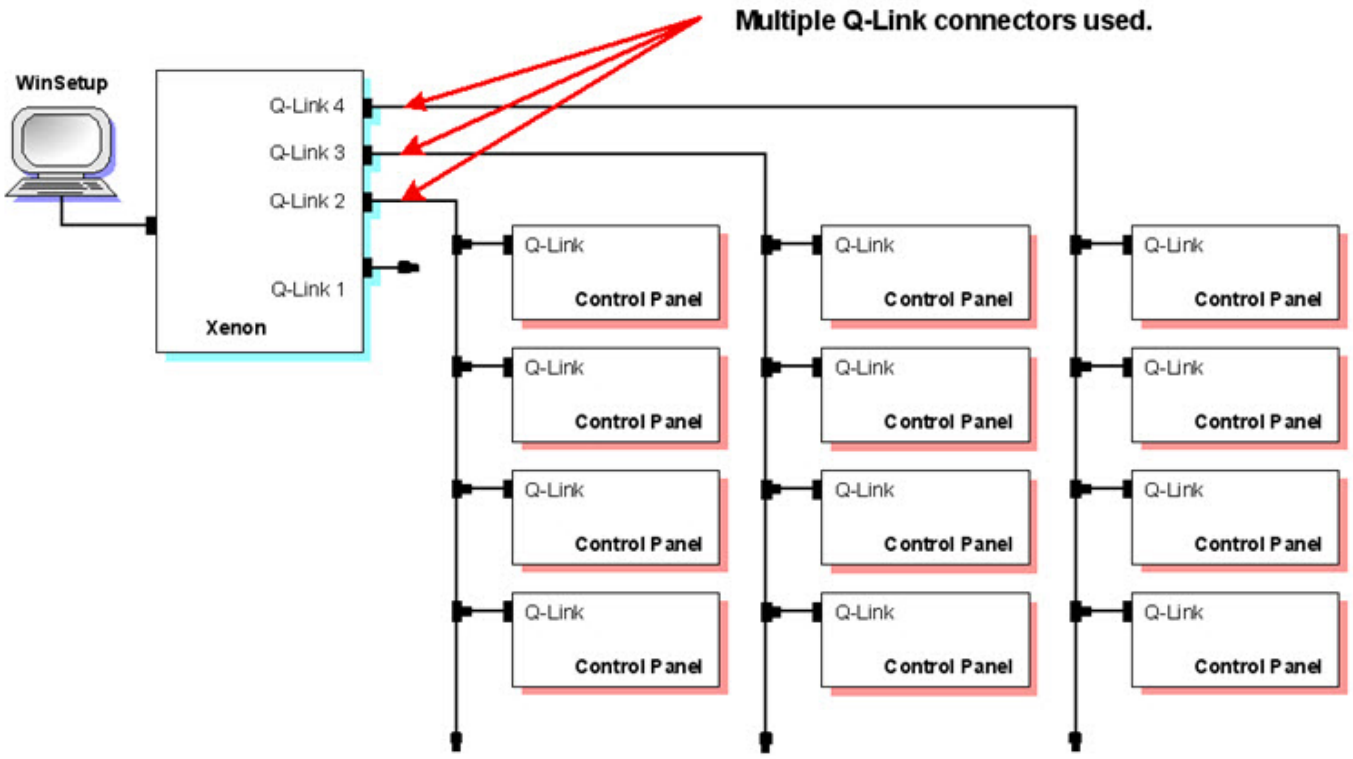


Figure 6-11: Multiple Q-Link Connection

The processor that is currently in control (usually the master) has control of the Q-Link connectors via a control signal passed on the back plane. Q-Link operation requires all Q-Link devices to have a unique one byte Q-Link address.

6.5.2. Ethernet

The control card links to the Ethernet connector. There are two separate RJ45 connectors for the main and backup controllers. If both controllers are to be joined on the same network then an external 10-Base-T or 100-Base-T hub should be used.

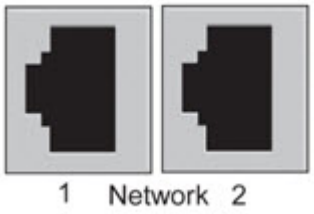


Figure 6-12: Ethernet Connection

The router supports TCP/IP protocol, the address of which can be set via the serial port when using Quartz (-1) protocol. The default factory settings of the TCP/IP address of the processors are as follows:

Main/Master (left) processor 192.168.0.200
Backup/Slave (right) processor 192.168.0.201

To change or inspect the TCP/IP parameters the following commands can be used via the serial port:

.&LOCALTCPIP	192.168.1.0
.&TCPNETMASK	255.255.255.0
.&TCPGATE	192.168.1.255

As standard the Xenon uses port 23 (telnet) as its server port, which allows control and monitoring to be achieved from a PC using the Telnet function.

If there is a problem using WinSetup over Ethernet then you can check there is a network connection to the router from a PC command prompt by typing ping followed by the IP address. e.g. > Ping 192.168.0.200

6.5.3. Serial

The control cards connect to two rear I/O Serial ports. The rear panel has two separate D9 female serial connectors as shown in Figure 6-13.

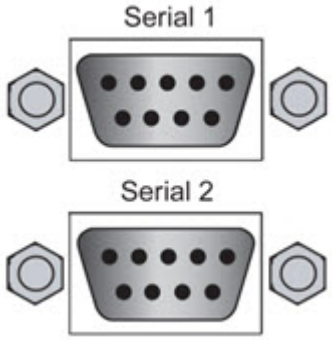


Figure 6-13: Serial Connection

The pin-out for the Serial ports is shown below:

RS422 9 WAY FEMALE D-TYPE	
PIN	SIGNAL
1	0V
2	Tx-
3	Rx+
4	0V
5	-
6	0V
7	Tx+
8	Rx-
9	-

Table 6-3: RS422 Pin out

As an option it is possible to convert either of the two serial ports to RS232 with the following pin-out.

RS232 9 WAY FEMALE D-TYPE	
PIN	SIGNAL
1	0V
2	RTS
3	RXD
4	0V
5	-
6	0V
7	TXD
8	CTS
9	-

Table 6-4: RS232 Pin out

The two serial connectors on the Xenon have been designed with some subtle differences.

Serial 1 uses an embedded UART with a single byte buffer. This means that the time interval between received commands and sent commands is very critical. If this timing requirement is not met the buffer can overflow and will cause incoming commands to be corrupted.

Serial 2, on the other hand, has a designated UART with a 16 byte buffer. This makes Serial 2 more robust and reliable in data-intense applications. For automation systems that interrogate the Xenon more frequently, Serial 2 should be used.

! Warning: When connecting the Xenon Serial ports to an automation system, Serial port 2 should be used instead of Serial port 1 where possible.

7. CONFIGURING THE SYSTEM USING WINSETUP

The WinSetup program is used to configure most of the routing functions, including control panel operation. It allows such things as the number of signal levels to be defined, which routing frames and panels are connected to the system and the names of the inputs and outputs.

WinSetup is supplied with a comprehensive help system that can be accessed by pressing **F1** (function key F1) from any screen (dialog). The help system can also be entered from the *Help, Index* menu. The following notes are a very brief guide to WinSetup intended to get you started.

The following dialog is the WinSetup main screen. Any part of the system can be configured from the menu at the top of the screen. The grey bars above each main section and the lines items within the main sections can both be used for quick access to specific items.

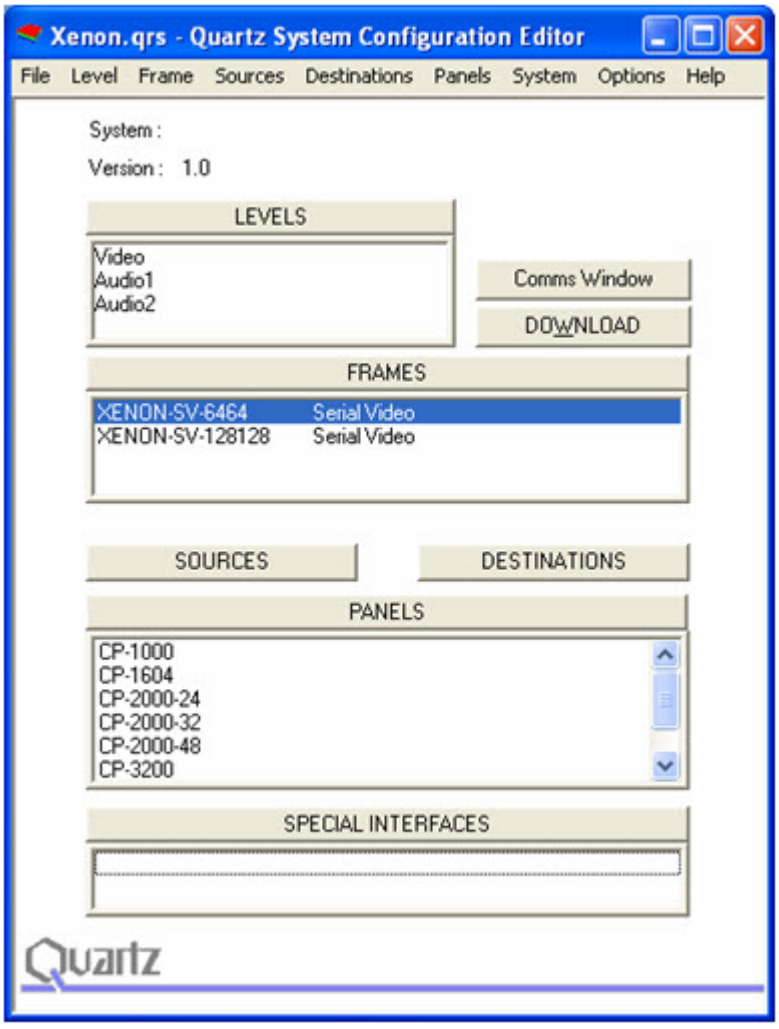


Figure 7-1: WinSetup Configuration Editor

If you are generating a new system configuration then some of the menus and functions are greyed out (not available). This is deliberate to 'lead you through' the functions that need to be set up. Carry out the following functions to configure your system.

(1) **Levels:** Enter the level names for each of the signal levels you want to control. The example above shows a typical small system with video and stereo audio. Do not tick the "Complex" box at this stage.

(2) **Frames:** Enter the frames dialog and use the new button. This will show all Quartz routers listed by part number. Select the part number that matches the part number on the routers serial number label. For a 4RU Xenon use XENON-SV-6464 and for a 8RU Xenon use XENON-SV-128128.

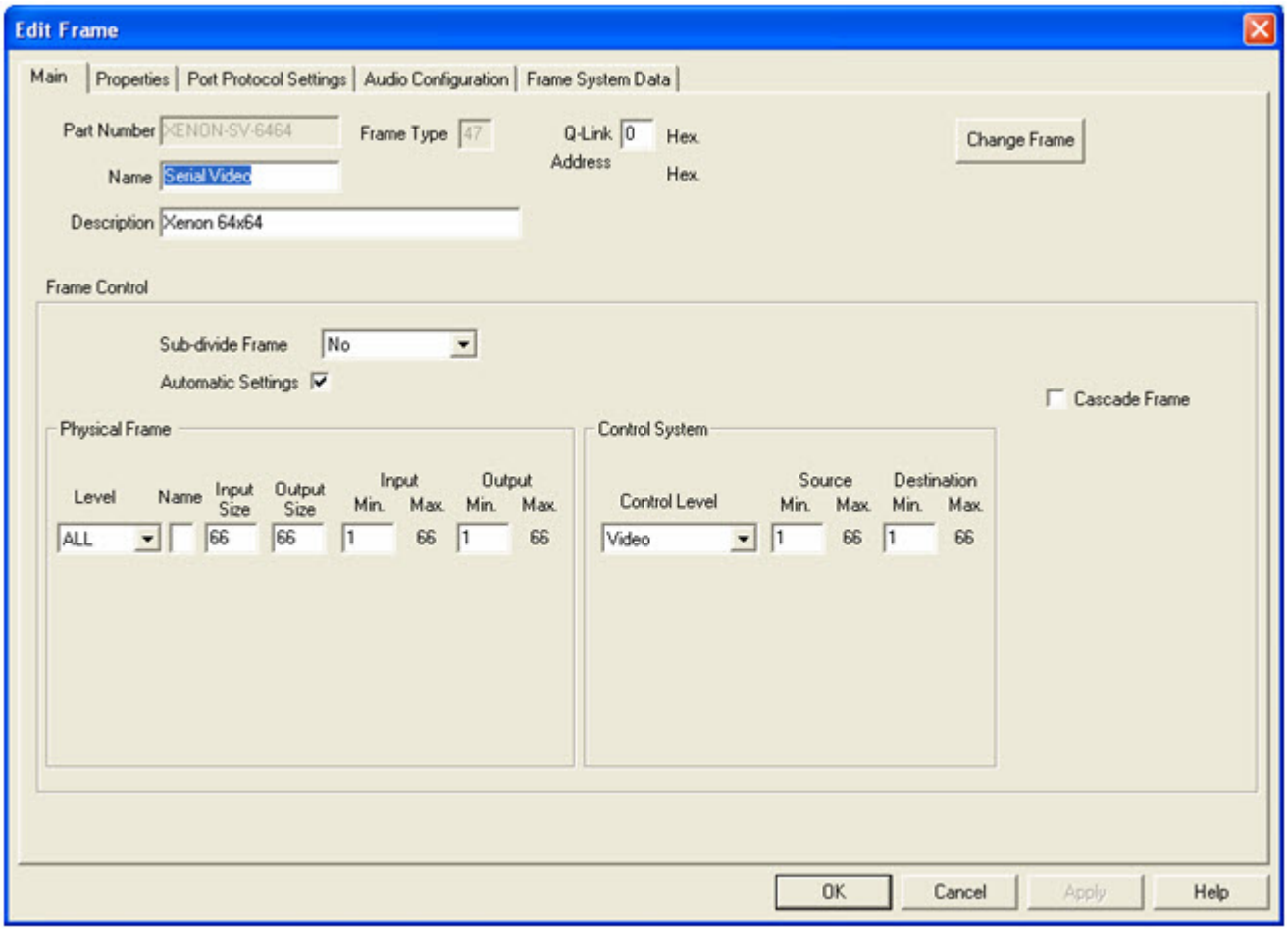


Figure 7-2: WinSetup Xenon Frame Editor

Router frames have to be 'attached' to the router level that they are to follow, and this is set in the level allocation section in the lower half of the screen.

Now use the properties tab to set the routers internal control functions. Note that this dialog is not essential for system operation, but if filled in helps to document how the system is to be used.

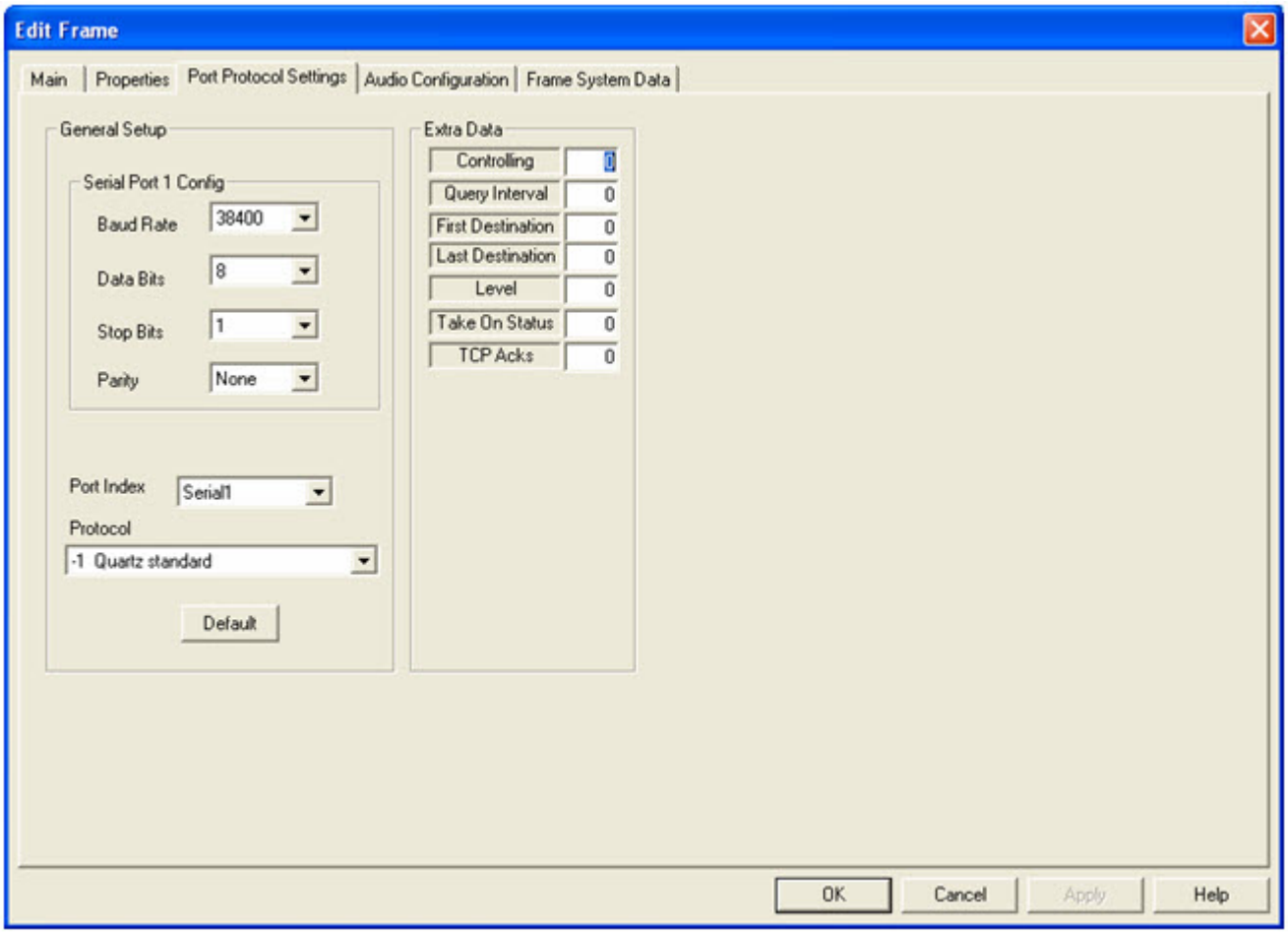


Figure 7-3: WinSetup Xenon Port Protocol Settings

(3) **Sources:** Enter the sources dialog and use the add button to fill the name table with SRC-1 to SRC-x. The names can be edited later when a few panels are configured and working.

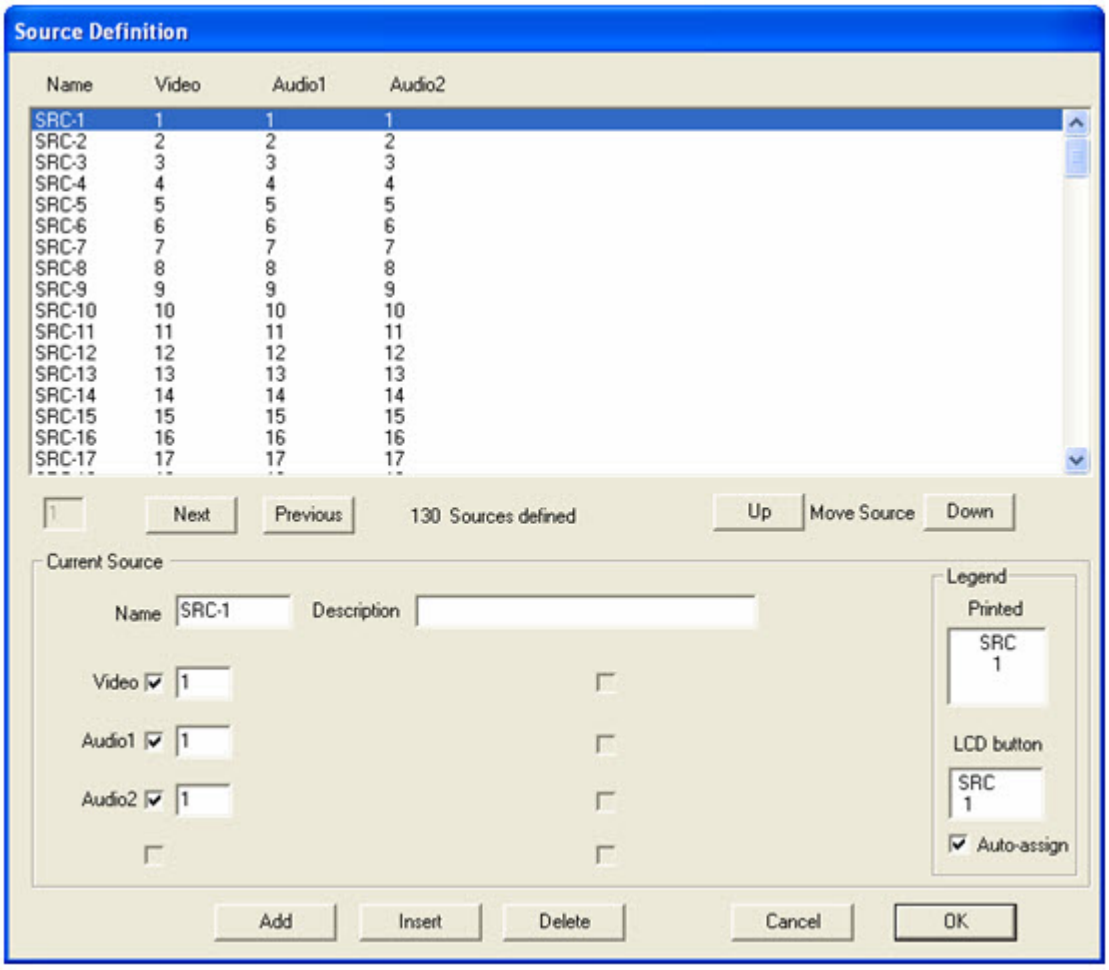


Figure 7-4: WinSetup Source Definition

If you want to edit a name now, select one row from the list of names in the upper part of the screen, the details appear in the lower part of the screen. From here you can edit the name and decide which signal levels that name will control when selected on a control panel.

(4) **Destinations:** Enter the destination dialog and set up the destination names in the same way as used for the source names.

(5) **Panels:** Enter the panel's dialog and use the new button. This will show all Quartz panels listed by part number. Select the part number that matches the part number on the panel's serial number label. A new dialog will appear showing a graphic of the panel.

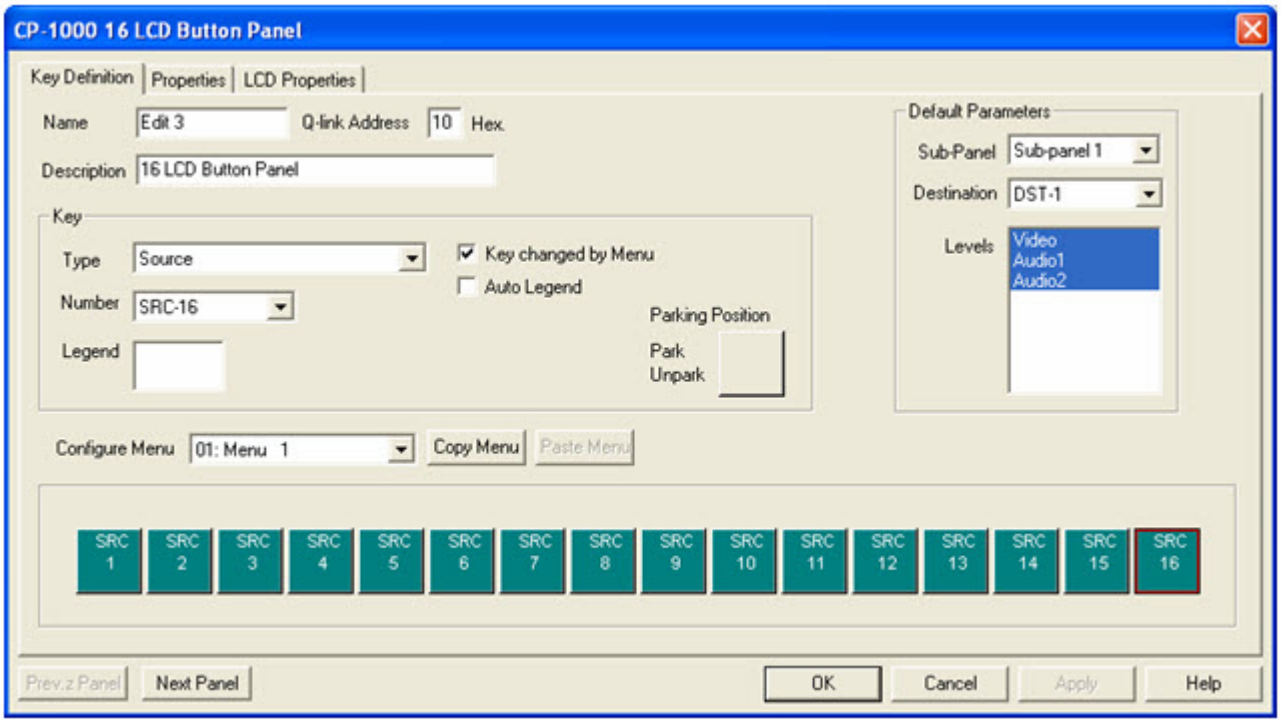


Figure 7-5: WinSetup Panel Configuration

Each button can be programmed by selecting the button and then editing the functions in the Key section of the dialog. Each panel should also be given a name for later identification, EDIT 3 in this example. The Q-Link address will be allocated automatically by the program but can be edited if required. The default parameters control how the panel will function at power up. In this example the panel will always control DST-1 to start with. Now add any further panels that the system will need.

(5) **Download:** Use the System menu, Download-to-Router to transfer the setup data to the router, having first set the correct COM port and baud rate (normally 38400). Remember to save the setup as it **CANNOT** be retrieved from the router.

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8. MAINTENANCE

8.1. "QUICK CHECK" OF THE XENON SIGNAL PATHS

As the system uses a multi-crosspoint architecture, the paths *to* and *from* the crosspoints need to be checked in a precise manner.

These 'Quick Checks' will prove the Input and Output cards but not fully test the Crosspoint modules.

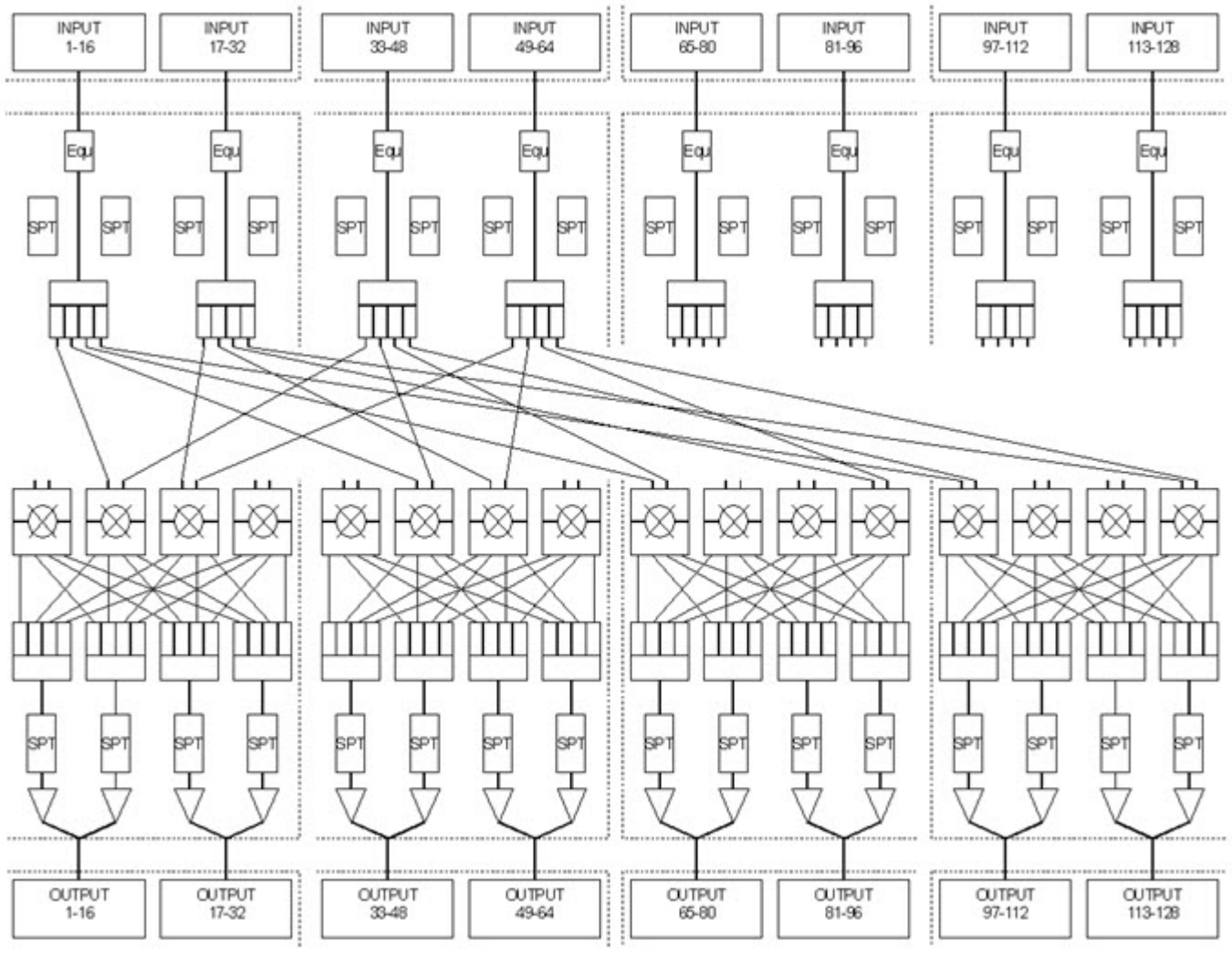

Figure 8-1: Xenon Signal Path

8.1.1. Input 1 to all Outputs

The purpose of this test is to get a 'feel' for the condition of the system as quickly as possible. As can be seen from the diagram below, this test exercises most of the components from the crosspoint to the outputs. It also checks that the control system has 'Reset' to its default condition.

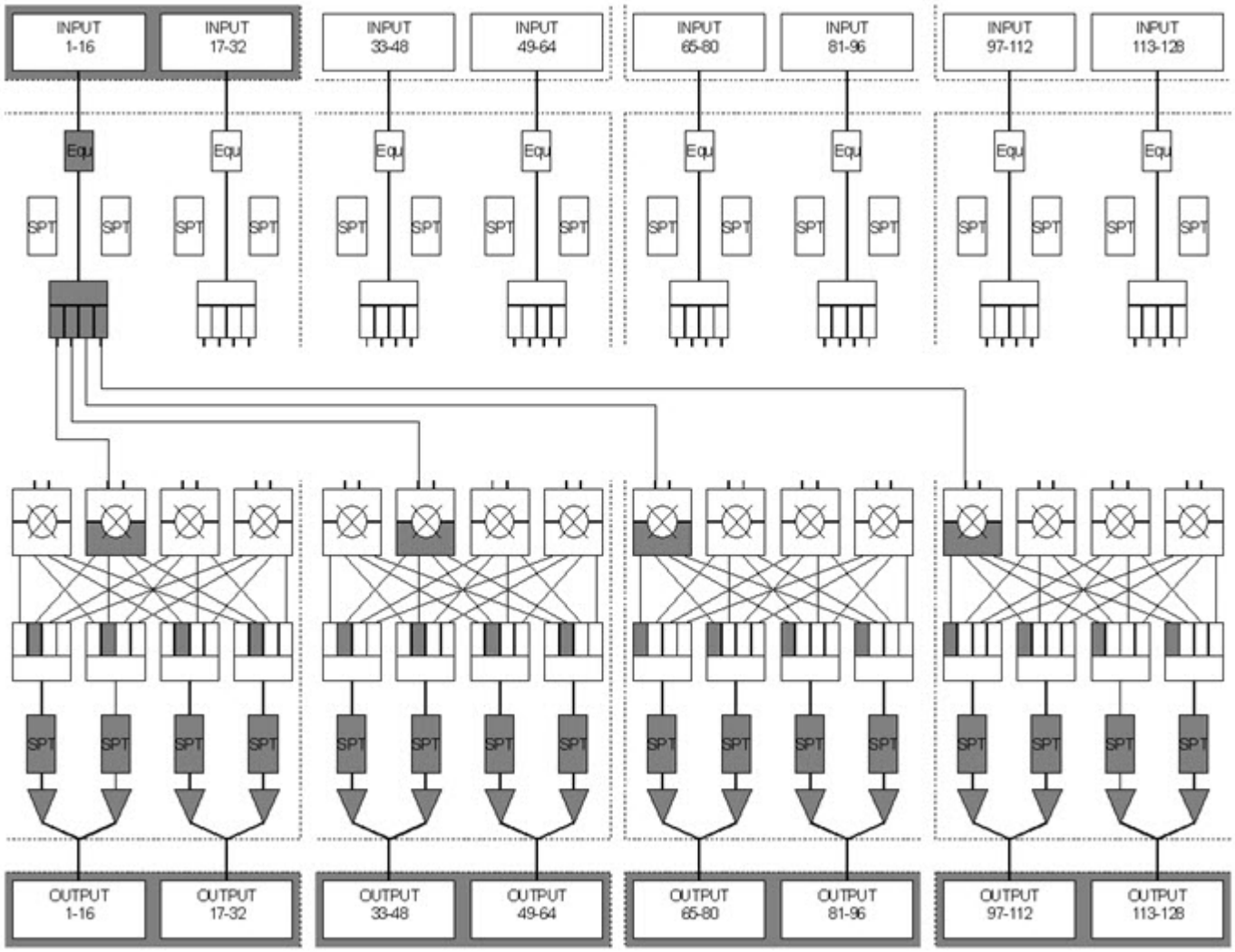

Figure 8-2: One to All Mapping

8.1.1.1. Set-up Configuration

For SD only routers:-
SUT = 625 75% Colour Bars (SMPTE 259), attached Input 1 (0dB attn.)

For SD / HD routers:-
SUT = 1080i 75% Colour Bars (SMPTE 292), attached Input 1 (0m attn.)

8.1.1.2. Test

Check all 128 Outputs are 'passing' colour bars, note down exceptions.

8.1.2. Stepping through all Inputs to Output 1

The purpose of this test is to ensure the Input Equalisers are working, and the Input signals are being passed between the Input cards and Crosspoint & Output cards correctly. The Xenon control system will be exercised as well.

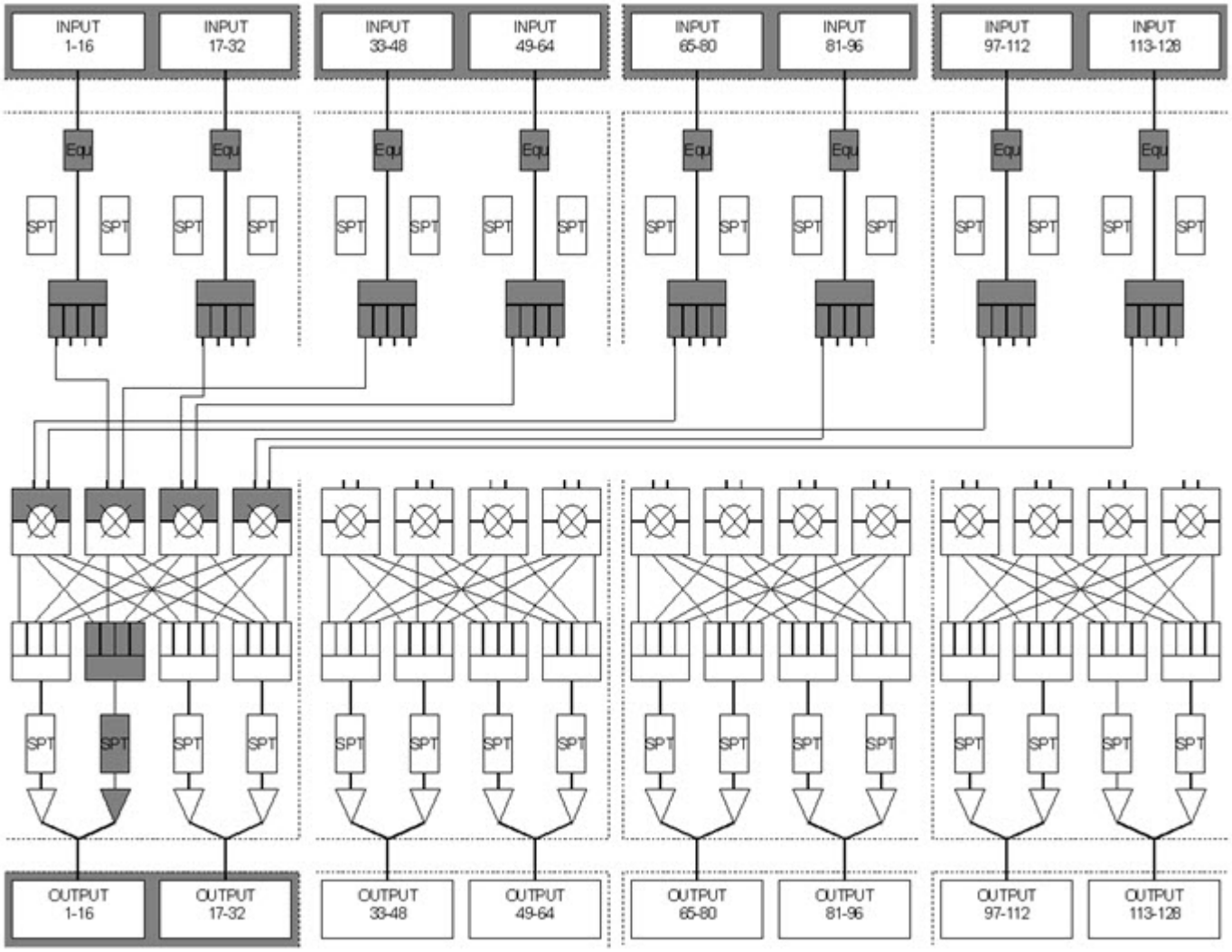

Figure 8-3: All to One Mapping

8.1.2.1. Set-up Configuration

For SD only routers:-
SUT = 625 75% Colour Bars (SMPTE 259), attached Input 1 (0dB attn.)

For SD / HD routers:-
SUT = 1080i 75% Colour Bars (SMPTE 292), attached Input 1 (0m attn.)

8.1.2.2. Test

Check all 128 Inputs are 'passing' colour bars, note down exceptions.

8.2. FANS

There are several fans in the Xenon router used to keep the power supplies and other electronics at a low operating temperature. The fans should be checked every six months to ensure they are functioning correctly. There are no fan filters to change.