3Mb to 3Gb Digital Video Routing

USER MANUAL

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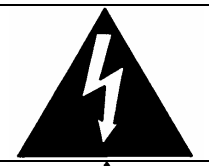
IMPORTANT SAFETY INSTRUCTIONS

	The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of un-insulated “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 these instructions
- 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 ELECTRIC – SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE

WARNING
DO NOT EXPOSE THIS EQUIPMENT TO DRIPPING OR SPLASHING AND ENSURE THAT NO OBJECTS FILLED WITH LIQUIDS ARE PLACED ON THE EQUIPMENT

WARNING
TO COMPLETELY DISCONNECT THIS EQUIPMENT FROM THE AC MAINS, DISCONNECT THE POWER SUPPLY CORD PLUG FROM THE AC RECEPTACLE

WARNING
THE MAINS PLUG OF THE POWER SUPPLY CORD SHALL REMAIN READILY OPERABLE

INFORMATION TO USERS IN EUROPE

NOTE

This equipment with the CE marking complies with both the EMC Directive (2004/108/EC) and the Low Voltage Directive (2006/95/EC) issued by the Commission of the European Community.

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

- EN60950 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	EN60950 EN55103-1: 1996 EN55103-2: 1996	Safety Emission 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.

Evertz Microsystems Ltd  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
0.1	Preliminary	Feb 07
0.2	Reformatted sections, added specifications	May 07
0.3	Updated information on setting the IP address Added information on EQX communication ports	May 07
0.4	Added Safety instructions into installation section	Jul 07
0.5	Updated module IP addresses and LED functions	Sept 07
1.0	Released Version. Added setup instructions (section 2.2) Added instructions on setting the frame controller IP address (section 8.1)	Nov 07 Nov 07
1.1	Updated Safety warnings in Installation instructions and drawings	Feb 08
1.2	Added Optical Input, Output, SFP, performance information	Jan 09
1.3	Updates to monitoring connections, LEDs, menus, etc Added information on connections to DC power sources	Feb 09
1.4	Added rear plate information (sections 4.4.3 to 4.4.6)	Feb 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 EQX 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 EQX router with a full one-year manufacturing warranty.

Figure 1-1: EQX Router (26RU and 16RU)

1.1. MISSION CRITICAL ROUTING

The EQX platform is Evertz's flagship routing and distribution solution designed for high availability by adopting extensive redundancy for all critical system elements. With this, and the ability to route up to 576x576 signals, the EQX is ideal for mission critical and demanding 24/7 environments including network, local broadcaster, mobile production, cable, military, government and corporate applications.

1.1.1. Ultra Wide Band Routing

By offering a format independent data path the EQX supports signals from 3 Mb/s to 3Gb/s including SDI, HDSDI, DVB-ASI, SMPTE310 digital video formats among others. It also supports four independent timing levels for SMPTE compliant multi-signal format switching.

1.1.2. Intelligent Auto-Configuration

The EQX's exceptional Source-By-Source intelligent auto configuration facility allows the destination path to be instantly re-configured to comply with the requirements of the source that it is being switched to. This includes auto-selecting Reclocking/Non-reclocking, ASI mode and the correct switch point.

1.1.3. System Flexibility

The modular approach of the EQX's design provides excellent in-service expansion capabilities in convenient groups of 18 inputs or 18 outputs, and allows expansion up to 576x576.

1.1.4. Compact Design

The EQX delivers high broadcast quality routing capability in a compact frame.

The larger 26RU frame supports a maximum matrix size of 576x576 within a single frame with the option to expand to 1152x1152 using multiple frames. This ensures a migration path for even larger applications. The smaller 16RU frame supports a maximum matrix size of 288x288.

1.1.5. Total Control

The EQX provides total control through its internal Frame Controller supporting Q-Link, F-Link, Ethernet and Serial communication to Evertz products and third party control devices.

1.1.6. Independent Monitoring

The EQX provides comprehensive signal monitoring of both inputs and outputs, power supply voltages, interior temperatures and fan speeds. All monitored data is available through SNMP for facility-wide monitoring systems such as VLPRO.

1.1.7. Simple Maintenance

All active components including input, output and crosspoint modules, frame controllers, cooling fans and power supplies are front-accessible and hot-swappable for simple maintenance.

1.1.8. Outstanding Redundant Protection

For the ultimate in terms of system availability, the EQX architecture has redundant protection for all critical system elements. The architecture has redundant crosspoint configurations, redundant frame controllers, external redundant load sharing power supplies, redundant easy access cooling fans and a dedicated monitoring bus that is independent of the system crosspoints. In the event of a failure, manual or automatic re-routing of signals on an output-by-output basis is fully supported by the system software. Using the EQX monitoring capabilities, output quality can be verified prior to switching to redundant signal paths. The EQX is fully SNMP enabled and supports seamless integration with *Vista*LINK® PRO command and control systems.

1.1.9. Key Features

High Performance Format Agnostic Platform:

- 3Mb/s to 3Gb/s digital video signals supported
- SDI, HDSDI, DVB-ASI, SMPTE 310M and more!
- Scalable to 576x576 in a single 26RU frame and 288x288 in a single 16RU frame
- Input expansion in increments of 18
- Output expansion in increments of 18
- Up to 1152x1152 in multiple frames
- Source-by-source intelligent auto configuration:
  - Input equalization (On/Off)
  - Output reclocking (On/Off)
  - ASI Mode (On/Off)
  - Switch Point (Variable)

High Availability, 24/7 Design:

- Full modular design
  - All modules are hot-swappable
  - Passive I/O
- Full redundant design
  - Redundant crosspoint
  - Redundant frame controller
  - Redundant power supply
  - Redundant cooling fans
- System-wide signal and environmental monitoring
  - VLPRO, SNMP, AVM and TSM monitoring of all I/O & crosspoint modules
  - Temperature monitoring
  - Power supply monitoring

Advanced System Control & Interfacing:

- Flexible control system, can work stand-alone or with the Quartz System Controller
- Supports the full range of Quartz remote control panels
- Full VLPRO command & control, SNMP & AVM
- Full integration with 3rd party automation systems
- Supports a wide range of control protocols
- Ethernet, Serial RS422/232, F-Link and Q-Link ports

1.2. ORDERING INFORMATION

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

1.3. SIGNAL FLOW OVER-VIEW

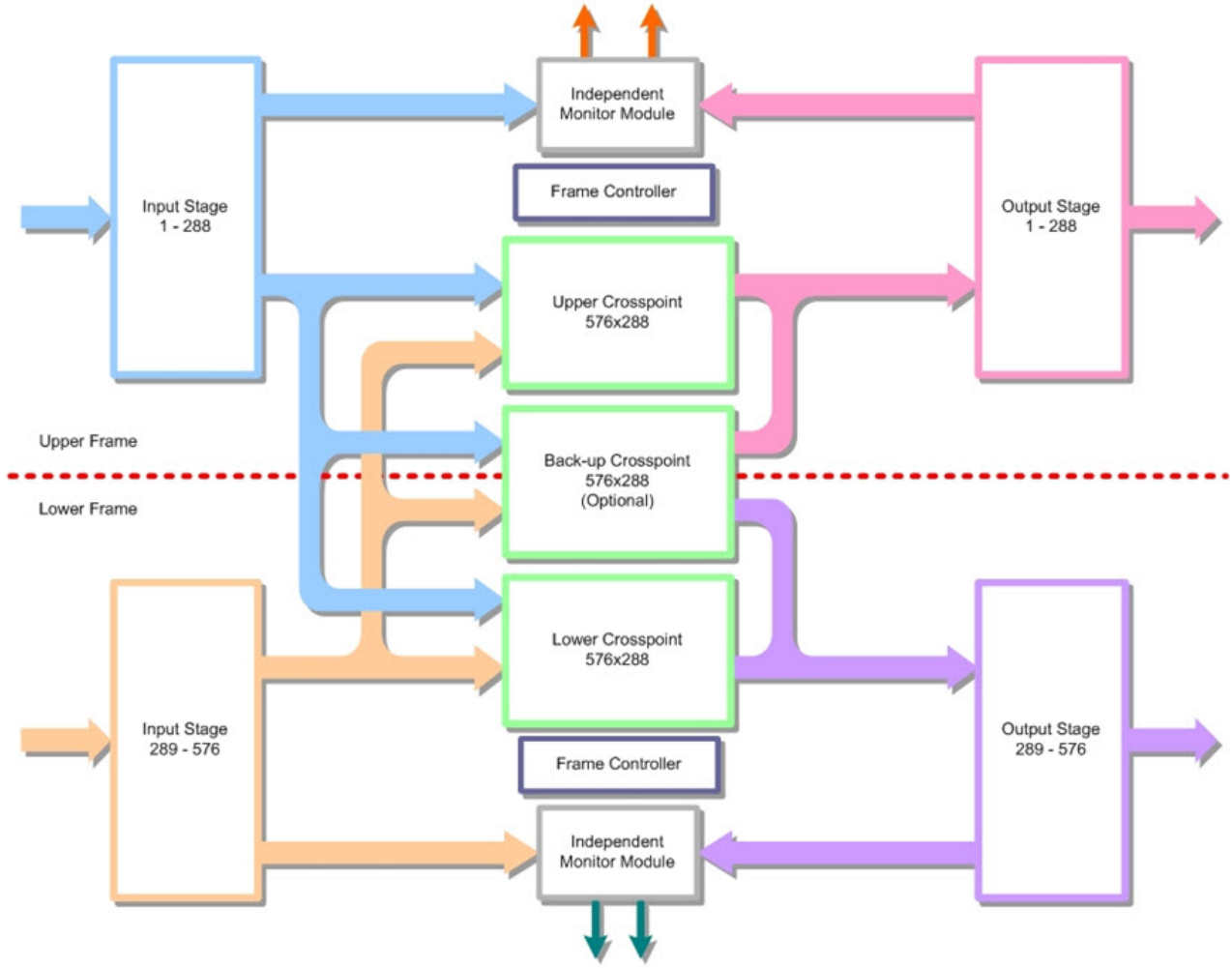


Figure 1-2: EQX Signal Flow Diagram

The simple design and signal flow of the EQX is shown in Figure 1-2. There are four main active module types:

- **Input Module** (x32)
- **Crosspoint Module** (x2 main and x1 back-up)
- **Output Module** (x32)
- **Frame Controller Module** (x1 main and x1 redundant)

All of the active modules are accessible from the front of the EQX frame providing easy access during maintenance. There are no active modules in the rear of the EQX frame.

The Back-up crosspoint module provides full protection in the case of a failed route. The switch over to the back-up crosspoint can be performed manually or automatically. In the event of a failure, only the faulty route needs to be switched over to the back-up crosspoint. The new route is checked before it is switched through the back-up crosspoint by the EQX monitoring facility.

1.4. SIGNAL AND SYSTEM MONITORING

The EQX 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 SNMP for facility-wide monitoring systems such as VLPRO. System status may also be monitored remotely by a network based remote connection over TCP/IP. User configurable closing contacts are also provided for connection to an external alarm system.

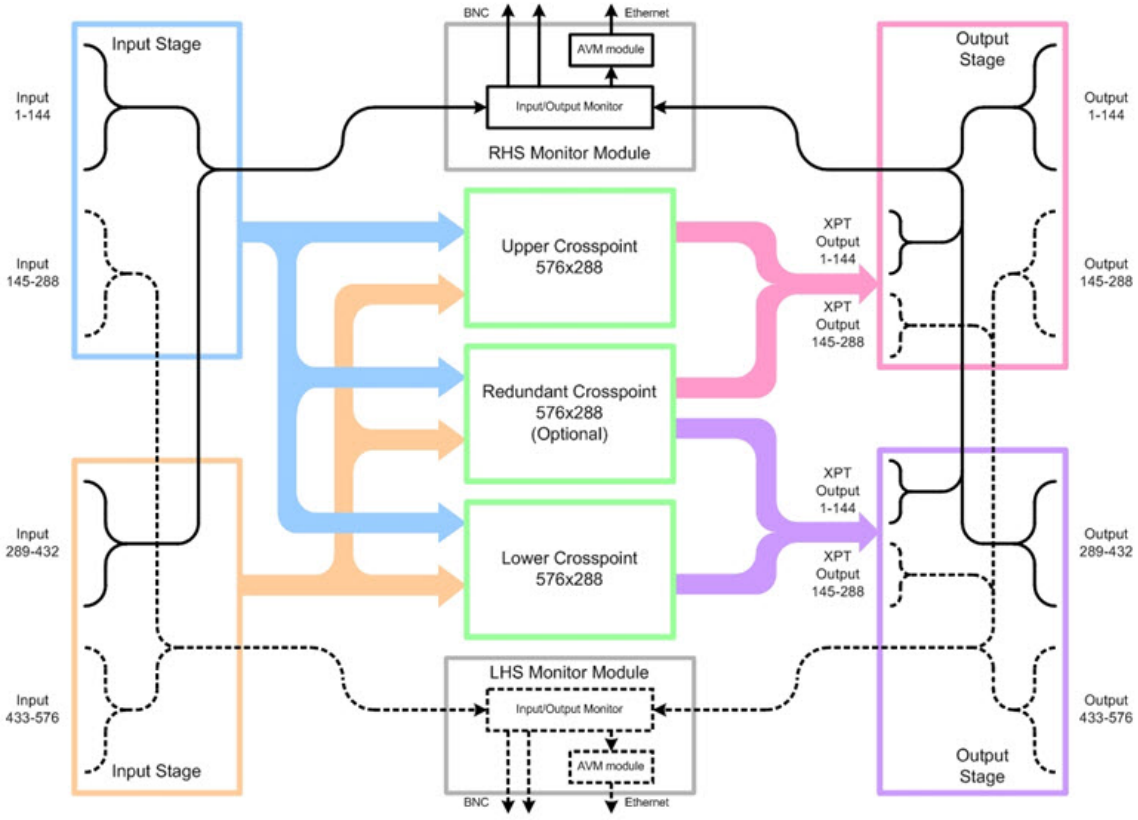


Figure 1-3: EQX Signal Monitoring Path

1.5. HOW TO USE THIS MANUAL

This manual will assist you in the use of the EQX routing switcher, 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 9 sections: Overview, Installation, Control, Signal Path, Control & Monitoring Modules, Cooling Modules, Configuring the EQX using WinSetup, Module IP Addresses and Technical Description. The overview section contains a brief overview of the EQX 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 EQX.

Section 3 describes how to control the EQX through the Q-Link EQX control panel network.

Section 4 describes the signal path of the EQX modules. More specifically, the signal path of the EQX input module, EQX crosspoint module, EQX output module, and EQX input/output (I/O) fins are outlined in this chapter.

Section 5 describes the operation of the EQX's control and monitoring modules. This chapter focuses on the EQX frame controller, EQX communication ports, EQX Reference Inputs and EQX monitoring outputs.

Section 6 provides information on the EQX's cooling modules. More specifically, the chapter focuses on the cooling of the EQX input/output module and the EQX crosspoint fan modules.

Section 7 provides information on how to configure the EQX using WinSetup.

Section 8 provides IP address information and a list of IP addresses for various modules.

Section 9 provides technical specifications and information on configuring the connector pin-outs of the EQX system.

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.

1.6. 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 review the packing list documentation supplied with the unit. The packing list outlines the items that have been shipped against your order. 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.

Inspect each item that was 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. Ensure that the power cords supplied are appropriate for your country and that the equipment is compatible with your mains (line) voltage.

Note that remote control panels are mains powered and must also be checked for the correct voltage.

2.2. GETTING STARTED: SETUP INSTRUCTIONS

The following list outlines the steps that must be taken **before** operating the EQX. Please ensure that you have setup the system according to the guidelines listed below.

1. All of the panels and the system controller must be properly terminated with "T" connectors and 75Ω terminators.

2. The correct final standard of reference should be wired into the 50Hz and 60Hz reference inputs.

3. Ensure that your PC is running the current version of the Evertz/Quartz WinSetup application.

4. Ensure that the white "quartz" serial cable is accessible. (Provided).

5. Wire the Ethernet inputs (at least 1B and 2B) into a network switch and make sure they are accessible to your PC.

6. Ensure that a standard "straight-thru" serial cable and Evertz Rainbow ribbon cable are accessible.

7. Reserve seventy-four (74) IP addresses in your IP address structure.

8. Properly wire the router to a patch bay with valid "known-good" test signals and a "known-good" test station or WFM, which is used for monitoring the signals.

2.3. PHYSICAL INSTALLATION

2.3.1. EQX Router Frames

All units are designed for mounting in standard 19" equipment racks. The depth of the frame is 460mm (18”) plus connectors. In addition, allowance must be made to accommodate the large number of cables to be installed at the rear of the frame.

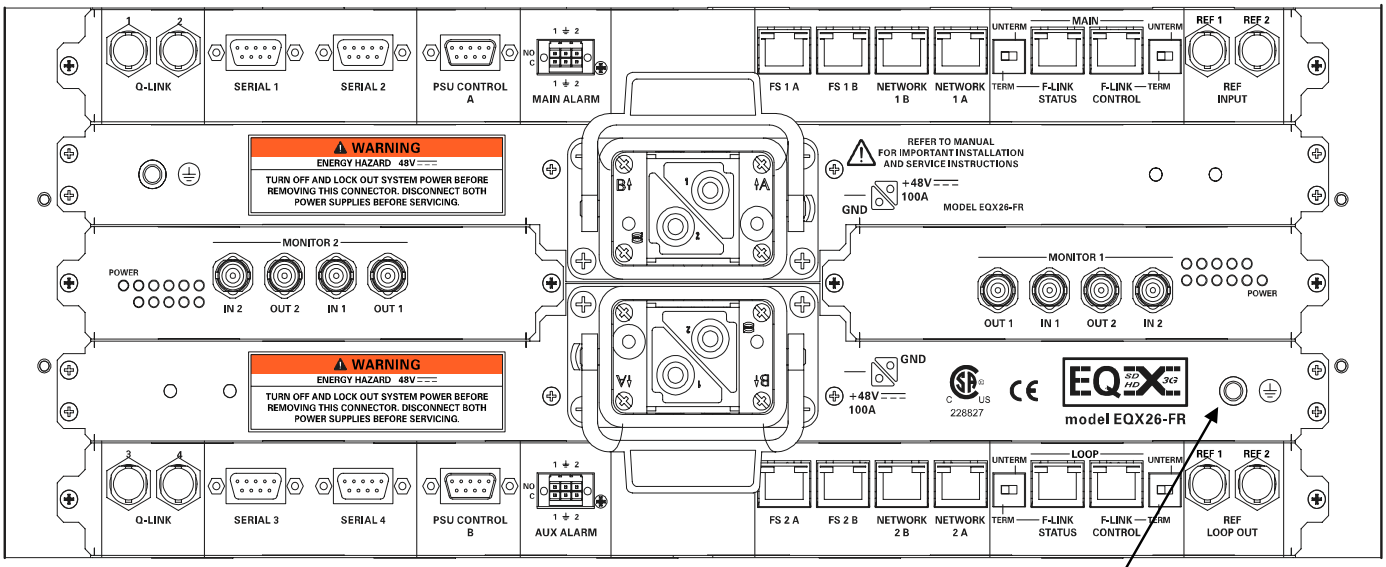
In order to prevent unauthorized access to the power connections, the EQX must be installed in an equipment rack that provides restricted access to the rear of the frame.

The EQX frame must be securely fastened to the equipment rack to prevent tipping.

Power dissipation in all units is low, and cooling is achieved by fan-assisted convection. The I/O modules in the upper and lower section of the EQX frame are independently cooled. Air is drawn into the front of the frame and expelled as hot air from the rear of the frame. The crosspoint modules are also independently cooled with cool air being drawn from the front of the frame and hot air being expelled from the side of the frame. (For further information refer to section 6).

When installed in the equipment rack, ensure that the air flow from the rear and side vents is not blocked or restricted.

Once installed ensure that the EQX frame is connected correctly to Earth/Ground using the Ground terminal on the rear of the EQX frame.



2.3.2. Remote Panels

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

2.4. ELECTRICAL CONNECTIONS

The following is a rear panel view of the EQX's connections:

Figure 2-1: EQX Rear View (26RU EQX)

2.4.1. Video Inputs and Outputs

The video input and output connections for the EQX are made using standard 75Ω video BNC connectors. A high quality coax cable, such as PSF1/3 (TF3304) for SDI video, Belden 8281 or 1694 for HD SDI video or suitable equivalents, should be used for optimum signal performance.

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.

2.4.2. Video Sync (Reference Input)

Standard Definition and High Definition Video routers have a separate reference input that takes any standard analog bi-level or tri-level video signal with standard sync.

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

2.4.3. Manual Remote Control - Using Q-Link

All EQX routers can be connected to other Quartz 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 75Ω.

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

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.

The installer must fit a 75Ω terminator at each end of the cable.

For further technical information on the manual remote control refer to section 5.

2.5. CONNECTING AN AC POWER SUPPLY

The EQX frame is powered from an external 48V DC source. In applications where you need to power the frame from 100 to 240 VAC sources, you will need to use the EQX external AC to DC power supply.

The external power supply for the EQX is a single rail, load-sharing design. It is housed within a single 1RU rack-mounting tray (EQX-PS-FR), which carries four power supply modules (EQX-PS), each with their own AC inlet. Power supply modules operate on either 100-115 or 220-240 volts AC at 50 or 60 Hz and automatically sense the input voltage.

The power supply modules can be hot-swapped while the EQX is operational, should one fail.

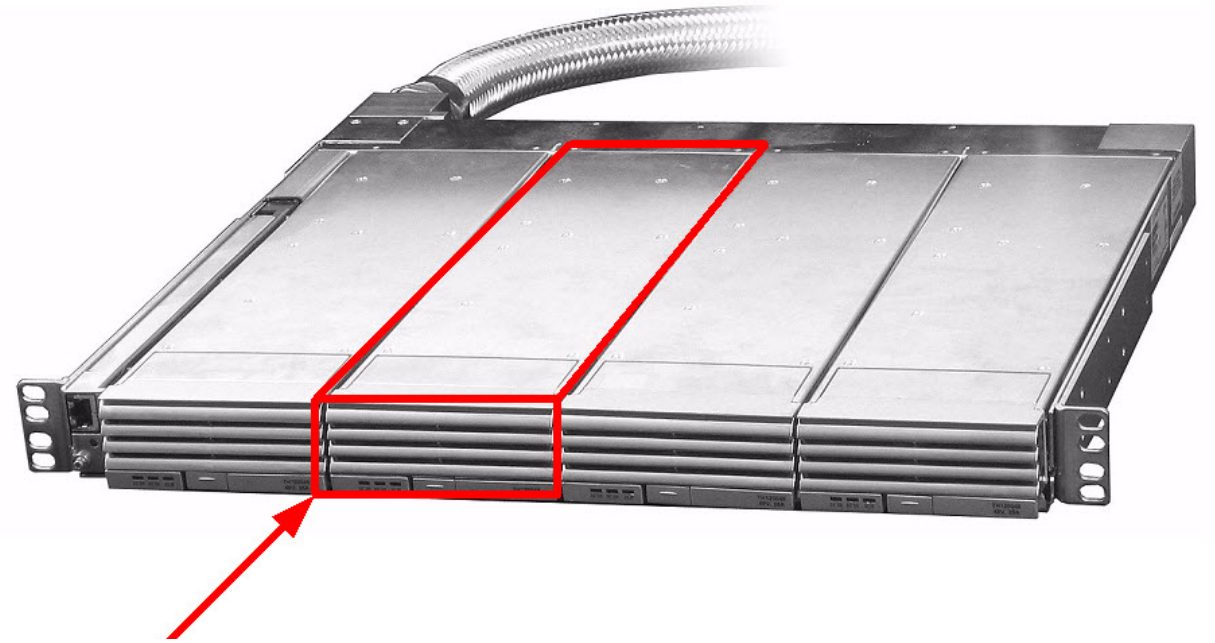


Figure 2-2: EQX External Power Supply – Tray holding 4 modules

A DC cable fitted with a lever locking connector provides a secure connection from the Power Supply to the EQX frame.

A second power supply tray containing 4 power supply modules can be attached (via its own dedicated lever locking connector) to the EQX frame to provide full redundant protection. The power supply modules in the second power supply tray must be powered from a different AC mains source to the primary power supply modules, to achieve complete AC supply redundancy.

RISK OF ELECTRIC SHOCK: If only one power supply is connected to the EQX frame, the second power supply connector on the rear of the EQX must be fitted with the safety cover to prevent electric shock as shown in Figure 2-3.

Each power supply module delivers up to 1250 watts of power to the EQX. Care must be taken when designing the AC distribution to the power supply so that sufficient AC circuits are available to power each module. Then the EQX is operating from a single power supply tray, each module in that tray will draw approximately 13.2 amperes maximum when connected to a 115VAC source, and approximately 7.2 amperes maximum when connected to a 220 VAC source.

Power should be applied by connecting a 3-wire grounding type power supply cord to the IEC320 AC inlets on the rear of the power supply tray. The power cord should be minimum 16 AWG wire size; type SVT marked VW-1, maximum 2.5 m in length.

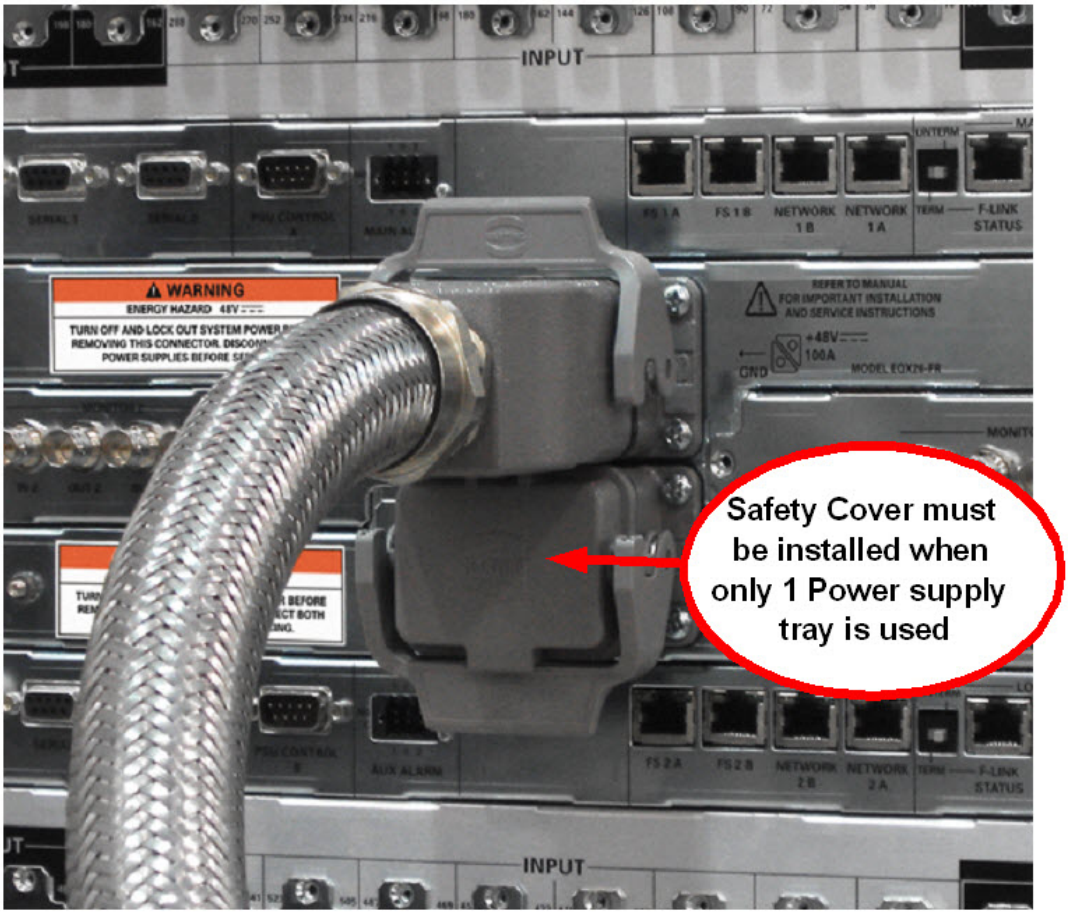


Figure 2-3: EQX External Power Supply – Connection to EQX

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. Once installed ensure that the Power Supply Tray frame is connected correctly to Earth/Ground using the Ground terminal on the rear of the tray.

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.

WARNING:
Once installed ensure that the Power Supply Tray frame is connected correctly to Earth/Ground using the Ground terminal on the rear of the tray,

Figure 2-4: EQX External Power Supply – Ground Teminal Location

Power Supply - Key Features

- 1RU 48V DC load sharing power supply frame carrying 4 power supply modules.
- One frame for standard operation.
- Two frames for redundant operation.
- Power supply modules can be hot-swapped.
- DC input power connections with a secure lever locking connector.
- Second DC connector for redundant power supply configuration.

2.6. CONNECTING A DC POWER SOURCE

The EQX frame may be powered directly from an external 48V DC source. A DC cable fitted with a lever locking connector provides a secure connection from the Power Supply to the EQX frame. A second 48VDC power source can be attached to the EQX frame via its own dedicated lever locking connector to provide full redundant protection.

RISK OF ELECTRIC SHOCK: If only one power supply is connected to the EQX frame, the second power supply connector on the rear of the EQX must be fitted with the safety cover to prevent electric shock as shown in Figure 2-3.

Each DC input delivers up to 100 amperes at 48VDC to the EQX. Care must be taken when designing the DC distribution to use a sufficient wore gauge to carry the full 100 ampere load, even though the actual current will typically be less, especially when redundant power is used.

Power should be applied by a minimum 4 AWG or IEC 60228 25mm^2 stranded wire size; type SVT marked VW-1. The wire must be terminated with a Harting HAN Axial 100 Screw terminal contact to mate with the connector on the rear of the EQX. The customer may purchase the connector parts directly from a component vendor, or can purchase a connector kit from Evertz. (Evertz part number EQX-PS-DC-KIT)

The connector kit consists of the following parts.

Qty	Evertz Part Number	Harting Part Number	Description
1	J/MOD/FEM/CONTACT	09 14 002 2751	Female Axial 100 Contact insert
1	J/FRAME/MOD	09 14 006 0303	Frame to hold insert
1	J/HOOD/6B	19 30 006 0447	Top entry hood – size 6B

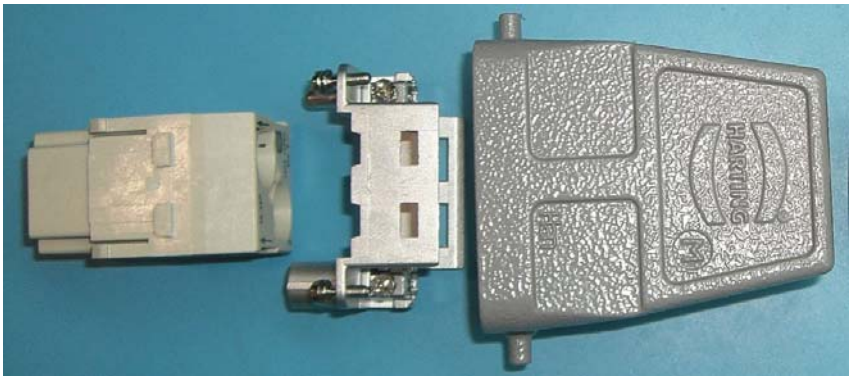


Figure 2-5: Connector Kit

The 48VDC input to the frame consists of a +48VDC terminal (pin 1 of the contact insert) and GROUND terminal (pin 2 of the contact insert). For +48VDC power sources, connect the +48 Volts to the +48VDC terminal and the power supply return to the Ground terminal. For – 48VDC power sources, connect the -48 volts to the Ground Terminal and the power supply return to the +48VDC terminal as shown in Figure 2-6. The 48 Volt power source and the power supply return must both be isolated from ground.

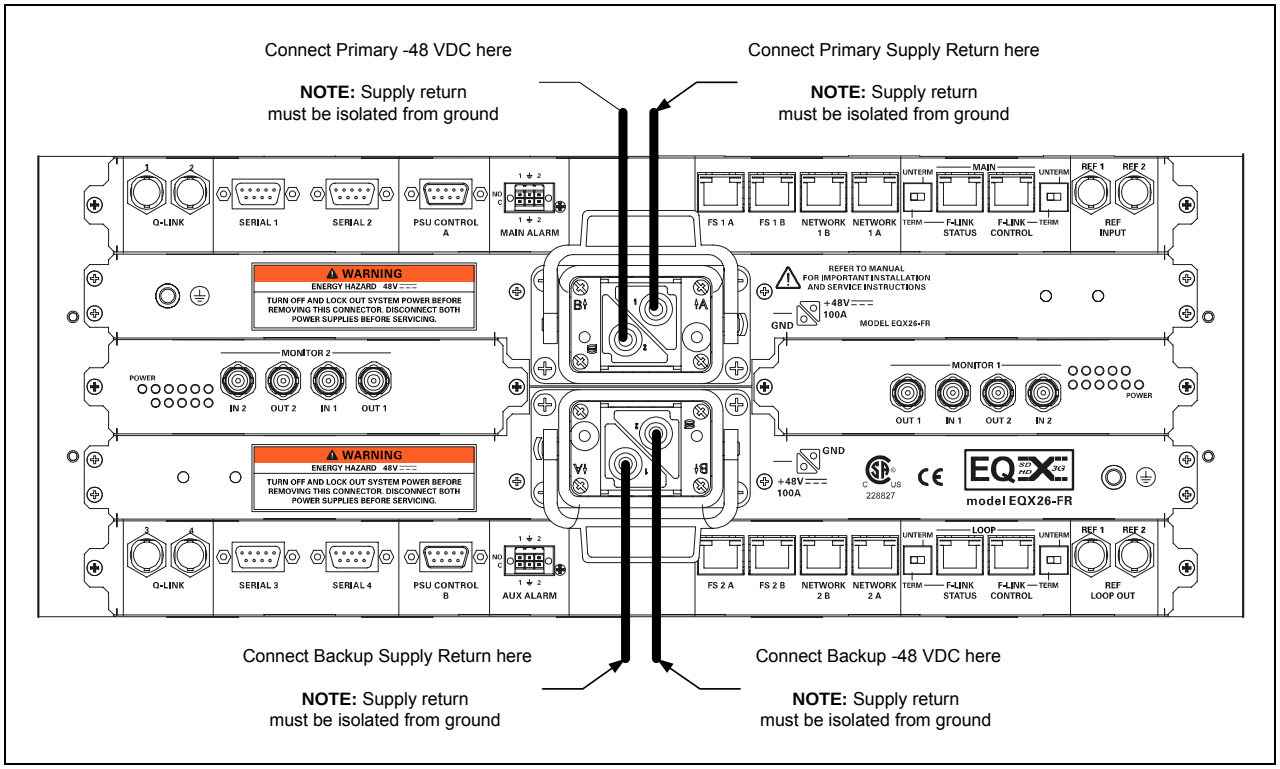


Figure 2-6: Connecting the EQX to a -48VDC System

WARNING: Severe damage will result if the polarity of the 48 VDC input is reversed. Ensure that you have wired the DC connector properly before connecting it to the rear of the chassis.

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3. CONTROL

The standard EQX router includes an internal Frame Controller module, which supports the Q-Link ports, F-Link ports, Ethernet ports and Serial ports that are mounted on the rear of the router.

Remote Control Panel: Any of the Quartz remote control panels can be used with the EQX router connected via Q-Link or Ethernet. This is typically used in conjunction with the EQX server or a 3rd party control system, where these panels are strictly used in emergency situations.

EQX Server: The EQX Server connects via Ethernet and is responsible for managing all connections, panels source and destination names etc.

External Third Party Control: The EQX router can be remotely controlled via an external third party control device, such as an automation system connected to the router's serial port or Ethernet port.

3.1. Q-LINK – EQX CONTROL PANEL NETWORK

Q-Link is the network that interconnects the Quartz routers and the Quartz remote control panels. Q-Link is a standard 75Ω video cable that daisy-chains from frame-to-frame and panel-to-panel. The maximum distance for a Q-Link chain is 500m.

Each end of the Q-Link must be terminated with a 75Ω terminator. It is also recommended that all unused Q-Link ports on the rear of the router are fitted with a 75Ω terminator.

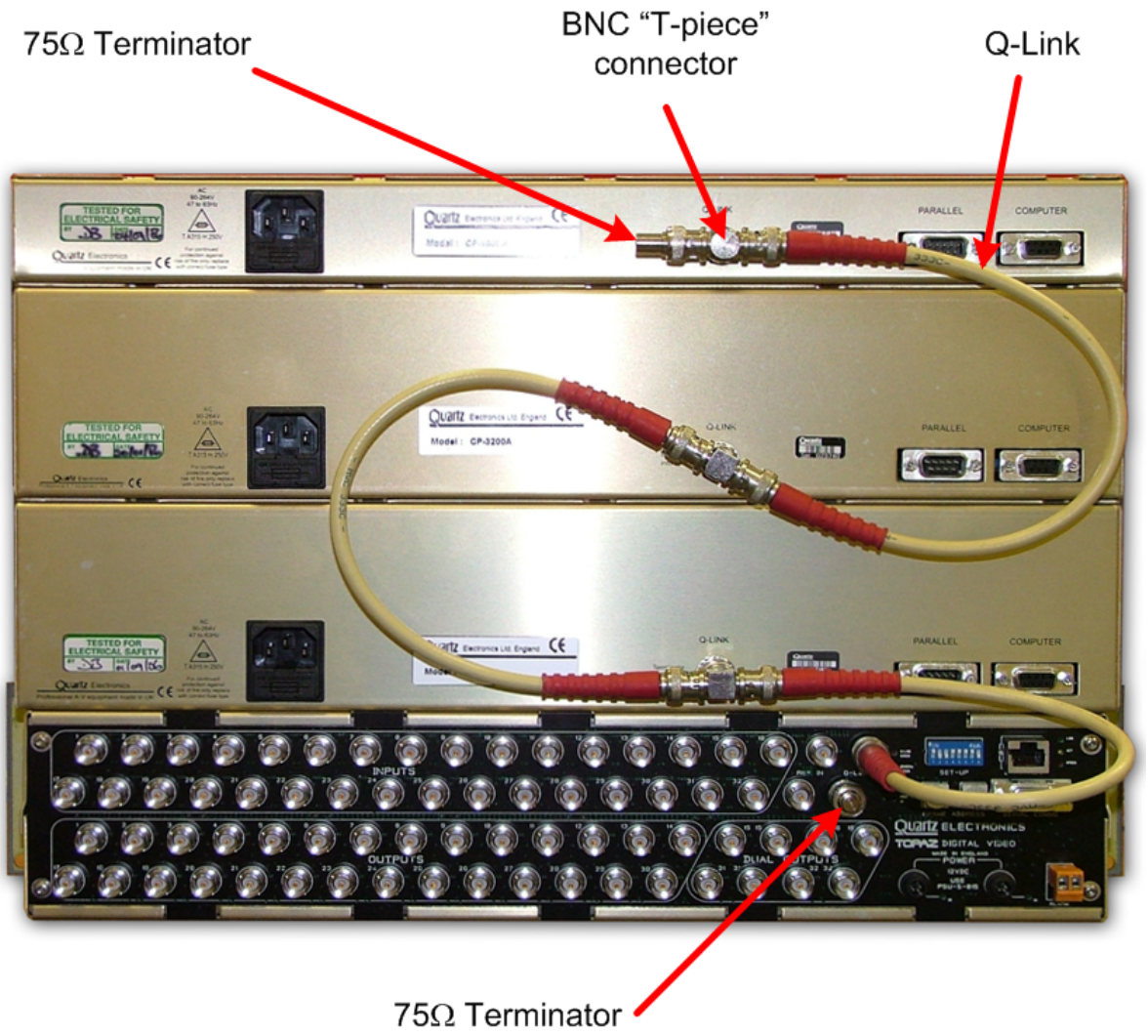

Figure 3-1: Q-Link to Three Remote Control Panels (shown with Topaz router)

The standard EQX router has four (4) Q-Link ports that are internally terminated with 75Ω.

Only one Q-Link connector is fitted on the remote control panel.

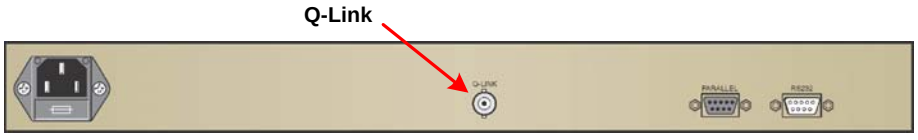

Figure 3-2: Example Control Panel, Rear View

A 'T-piece' is required to connect the control panel onto the Q-Link network.

Figure 3-3: T-piece

The “T-piece” allows any of the control panels within a Q-Link chain to be removed from service and replaced without disrupting the Q-Link.

This daisy chain method ensures the best transmission quality of the control signals down the cable. A total of 32 devices can be supported by Q-Link. This includes the router frames and remote control panels.

Each unit connected to the Q-Link, router and control panel has its own address, which is set via two rotary address switches.

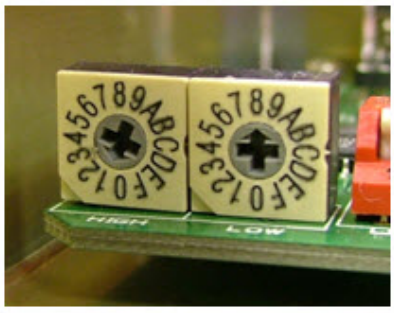

Figure 3-4: Router & Control Panel Address Switches

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4. SIGNAL PATH MODULES

4.1. EQX INPUT MODULE

The EQX input module consists of 18 channels of adaptive cable equalization that feeds the incoming signal directly through to the crosspoint modules. On each input the cable equalization facility can be switched On/Off as required.

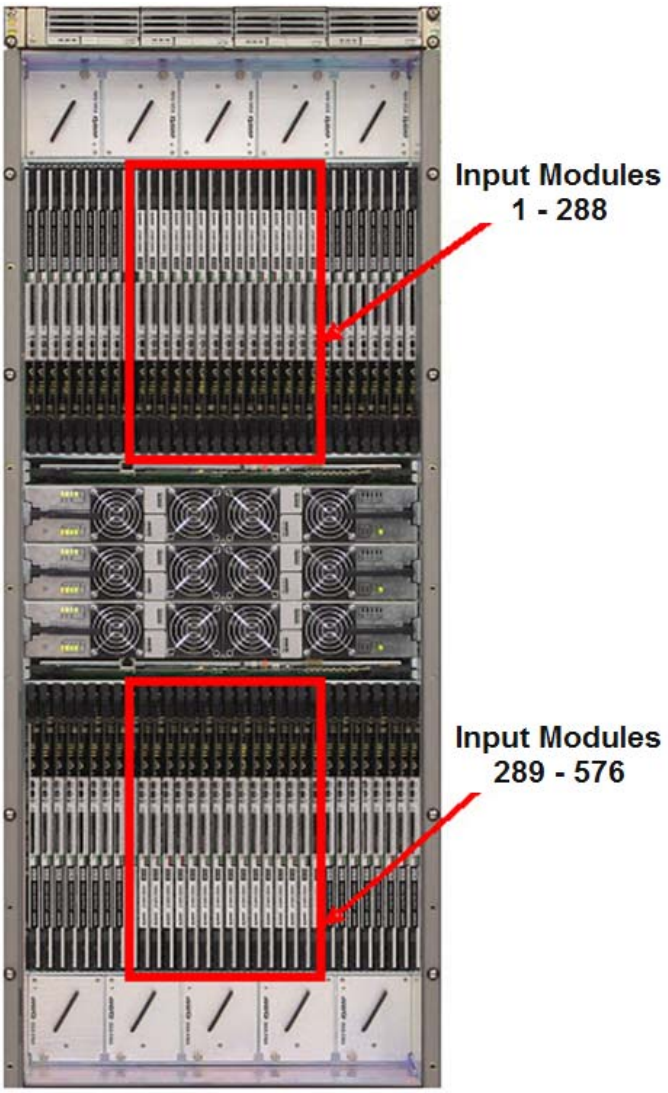
Each of the input modules supports eighteen (18) digital video inputs via the industry standard BNC connector mounted on the passive I/O Fin.

The EQX router can be loaded with a maximum of 32 input modules providing square and non-square matrix configurations from as small as 18 inputs through to 576 inputs, in increments of 18.

The input module manages digital video with or without embedded audio signals from 3Mb/s through to 3Gb/s.

- SDI (625 and/or 525)
- HDSDI (720p, 1080i, 1080p, etc)
- DVB-ASI
- SMPTE310
- *Plus* others

All of the input modules are accessed from the front of the frame and can be replaced while the EQX router is still operational should one of the modules fail. The input modules are air cooled by the fans mounted in the upper and lower half of the frame.



4.1.1. Input Module - Key Features

- HD SDI digital video plus Embedded Audio
- SDI digital video plus Embedded Audio
- Supports 3Mb/s to 3Gb/s digital video signals
- Optionally can be fitted as a FIBER OPTIC input module.
- Input expansion in increments of 18, from 18 through to 576
- Configurable signal equalization (On/Off)
- Front access to all input modules
- All input modules are hot-swappable
- Fan cooled

Figure 4-1: Input Module (with Air Dam Fitted)

Figure 4-2: Input Module – Air Dam Detail

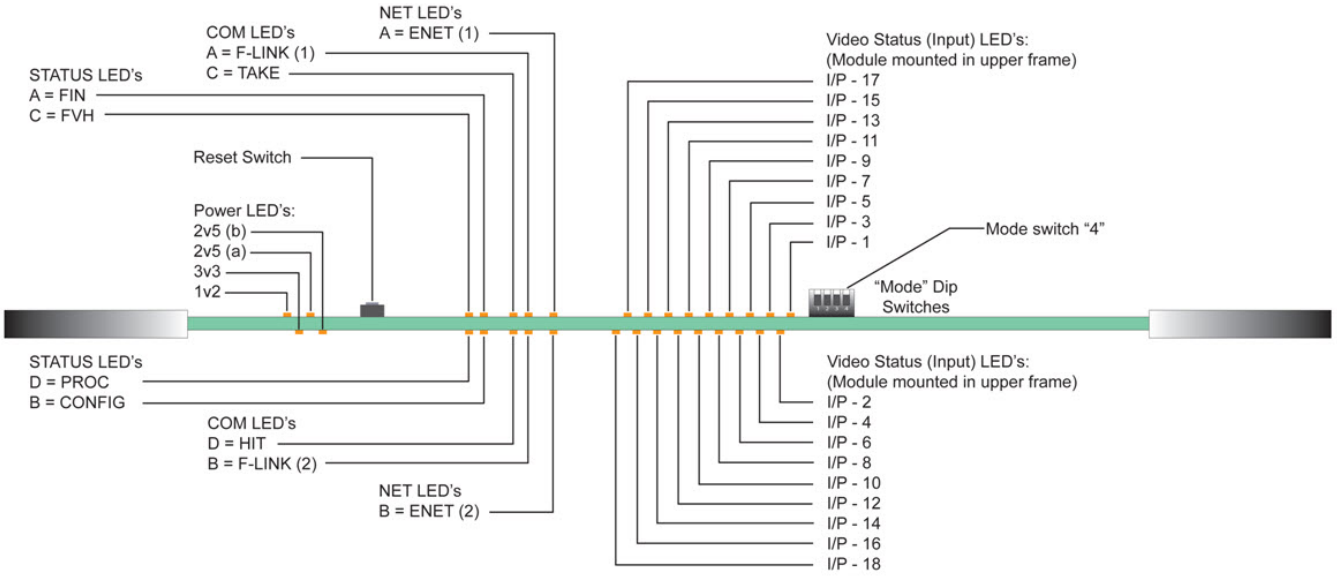


Figure 4-3: Input Module – Mounted in Upper Frame (with Air Dam Removed)

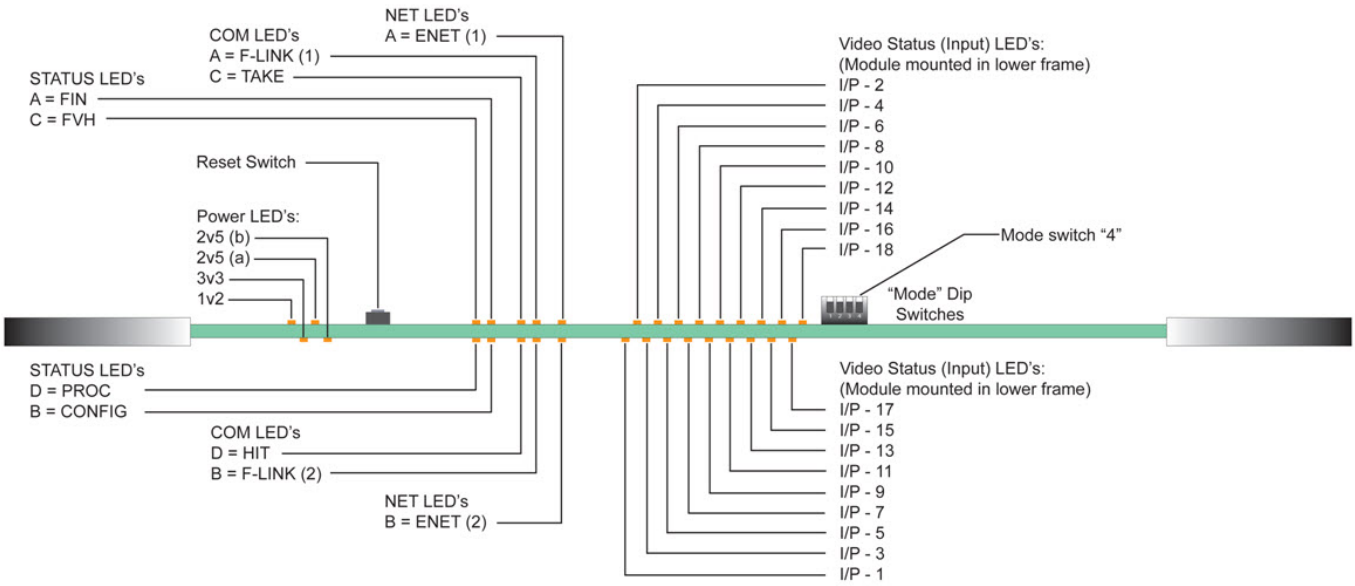


Figure 4-4: Input Module – Mounted in Lower Frame (with Air Dam Removed)

LED POWER LEDs	Colour	Function
1v2	Yellow	1v2 Power rail present
3v3	Yellow	3v3 Power rail present
2v5 (a)	Yellow	2v5 (a) Power rail present
2v5 (b)	Yellow	2v5 (b) Power rail present

LED STATUS LEDs	Colour	Function
FVH	Green	Single flash toggling with the Proc LED indicates 50Hz while double flash indicates 59.94Hz.
	Red	Steady Red indicates loss of input reference or error.
FIN	Red	Indicates that the I/O fin is not present.
CONFIG		Illuminates when all the FPGAs have been configured correctly.
PROC	Green	Flashes at approximately 1 second intervals when the processor is OK and the *ref* is present. Flashes quickly during FPGA configuration.

LED STATUS LEDs	Colour	Function
Take	Green	Flashes when the card has performed a “Take”.
F-Link (1) “TX”	Green	F-Link TX - Flashes when the F-Link card has transmitted data.
F-Link (2) “RX”	Yellow	F-Link RX - Flashes when any F-Link comms are detected.
	Red	Steady Red indicates error.
F-Link Address Hit	Green	Flashes when there was a valid hit on the card.

LED NET LEDs	Colour	Function
ENET (1)	Green	Rx - Flashes when Ethernet data is transmitted.
ENET (2)	Red	Tx - Flashes when Ethernet data is received.

LED VIEDO LED’s	Colour	Function
I/P - 1	Green	Indicates that a signal is present on I/P 1
I/P - 2	Green	Indicates that a signal is present on I/P 2
I/P - 3	Green	Indicates that a signal is present on I/P 3
I/P - 4	Green	Indicates that a signal is present on I/P 4
I/P - 5	Green	Indicates that a signal is present on I/P 5
I/P - 6	Green	Indicates that a signal is present on I/P 6
I/P - 7	Green	Indicates that a signal is present on I/P 7
I/P - 8	Green	Indicates that a signal is present on I/P 8
I/P - 9	Green	Indicates that a signal is present on I/P 9
I/P - 10	Green	Indicates that a signal is present on I/P 10
I/P - 11	Green	Indicates that a signal is present on I/P 11
I/P - 12	Green	Indicates that a signal is present on I/P 12
I/P - 13	Green	Indicates that a signal is present on I/P 13
I/P - 14	Green	Indicates that a signal is present on I/P 14
I/P - 15	Green	Indicates that a signal is present on I/P 15
I/P - 16	Green	Indicates that a signal is present on I/P 16
I/P - 17	Green	Indicates that a signal is present on I/P 17
I/P - 18	Green	Indicates that a signal is present on I/P 18

MODE DIP Switch			
Switch 1	F-Link Baud Rate	(Factory setting UP)	
Switch 2	Not Used	(Factory setting UP)	
Switch 3	UP = F-Link 1 DOWN = F-Link 2		(Factory setting = UP)
Switch 4	UP = FVH 50 DOWN = FVH 59.94		(Factory setting = N/A)

The order of the VIDEO STATUS LEDs is reversed when the Input module is fitted into the lower section of the frame. The LEDs confirm that a signal is present.

The F-Link LEDs display "F-Link 1" when mode switch 3 is in the up position and "F-Link 2" when mode switch 3 is in the down position.

The Ethernet LEDs display "ENET 1" when mode switch 3 is in the up position and "ENET 2" when mode switch 3 is in the down position.

4.1.2 Fiber Optic Inputs

The EQX router is able to accept Fiber Optic inputs when ordered with the optional Fiber Optic input modules. These modules utilize an "SFP" module (Small Form-Factor Pluggable). 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 and can accept signals from 3Mb/s to 3Gb/s depending on the type of input card that they are mated with.

- The SFP1R-2 supports SMPTE 259M, SMPTE 344M, SMPTE 292M and SMPTE 424M and other data rates
- The SFP1R-2 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 4-5: SFP1R-2 Module

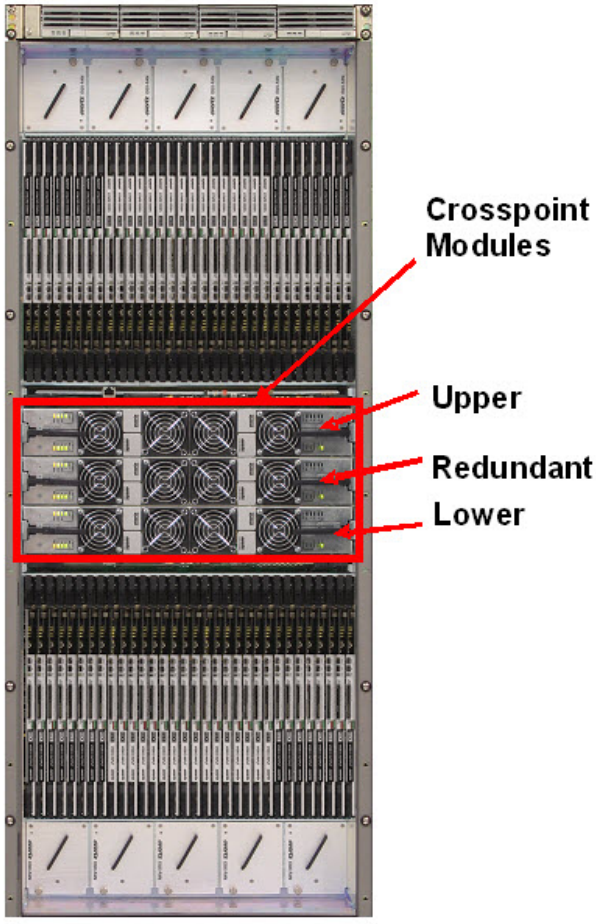
4.2. EQX CROSSPOINT MODULE

The EQX router has provisions for three crosspoint modules. Each crosspoint module switches 576 inputs through to 288 outputs.

The upper location houses the crosspoint module that provides the switching for outputs 1-288 (the upper section of the frame). The lower location provides the switching for outputs 289-576 (the lower section of the frame).

The Back-up crosspoint module, which is fitted into the central location, provides full protection in the case of a failed route(s). The switch over to the back-up crosspoint can be performed manually or automatically. In the event of a failure only the faulty route(s) needs to be switched over to the back-up crosspoint. The new route(s) can be checked before the switch is made through the output monitoring facility.

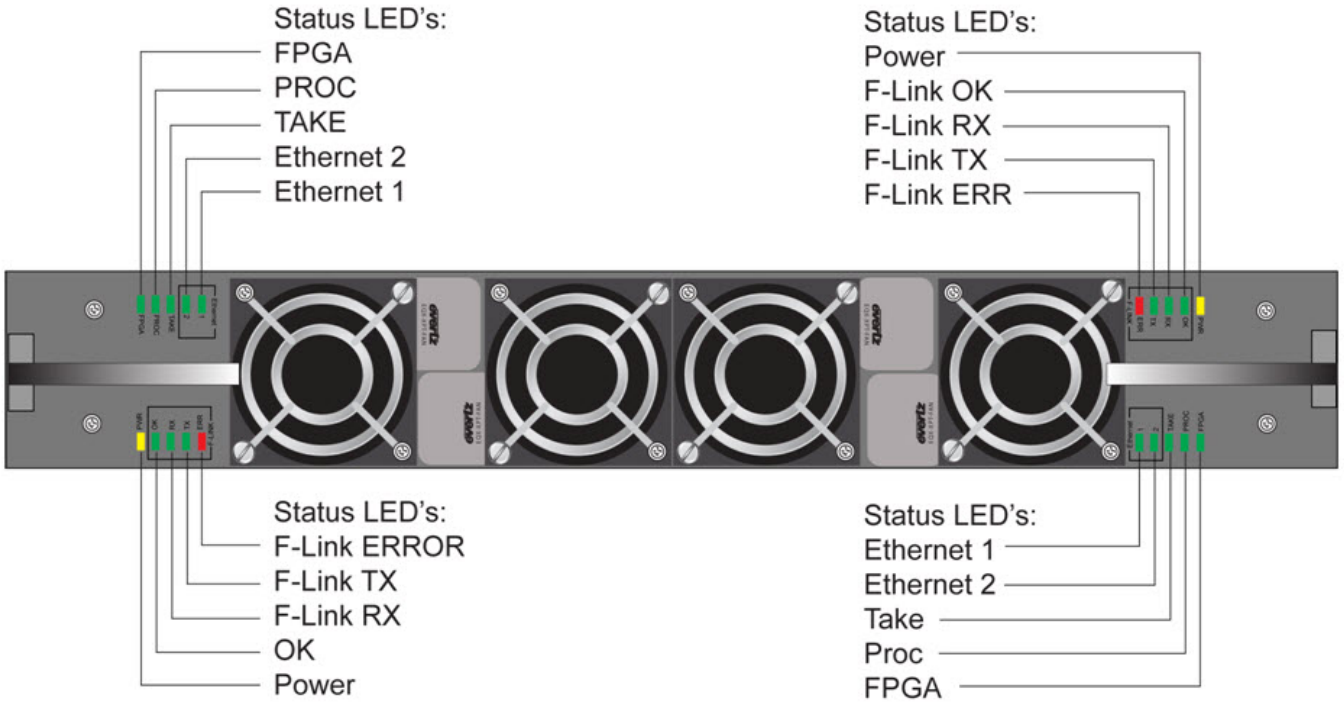
All of the crosspoint modules are accessed from the front of the frame and can be replaced while the EQX router is still operational should one of the modules fail. The back-up crosspoint provides continued full operation while a main crosspoint module is being replaced.



The crosspoint modules are air cooled by the fan modules that are mounted onto the front of the crosspoint assemblies.

4.2.1. Crosspoint - Key Features

- 576 input by 288 output crosspoint module
  - Upper crosspoint modules support outputs 1-288
  - Lower crosspoint modules support outputs 289-576
  - Centre crosspoint modules for back-up configuration (optional)
- Front access to all crosspoint modules
- All crosspoint modules are hot-swappable
- All crosspoint modules are independently fan cooled



LED	Colour	Function
Power	Yellow	Power rail present.
F-Link OK	Green	Flashes when there is a valid hit on the card.
F-Link Rx	Green	Flashes when there is any F-Link comms detected.
F-Link Tx	Green	Flashes when the card has transmitted F-Link data.
F-Link Error	Red	Flashes when the card receives F-Link data that was deemed to be erroneous (bad checksum)
Ethernet (1)	Green	Rx - Flashes when Ethernet data is transmitted.
	Red	Tx – Flashes when Ethernet data is received
Ethernet (2)	Green	Rx - Flashes when Ethernet data is transmitted.
	Red	Tx – Flashes when Ethernet data is received
Take	Green	Flashes when the card has performed a "Take"
Proc	Green	Flashes at approximately 1second intervals when the processor is OK. Flashes quickly during FPGA configuration.
FPGA	Green	Illuminates when all the FPGAs have been configured correctly.

4.3. EQX OUTPUT MODULES

The EQX output module comprises of 18 reclocked output channels fed from the crosspoint modules. On each output the reclocking facility can be switched On/Off or switched into ASI bypass mode as required.

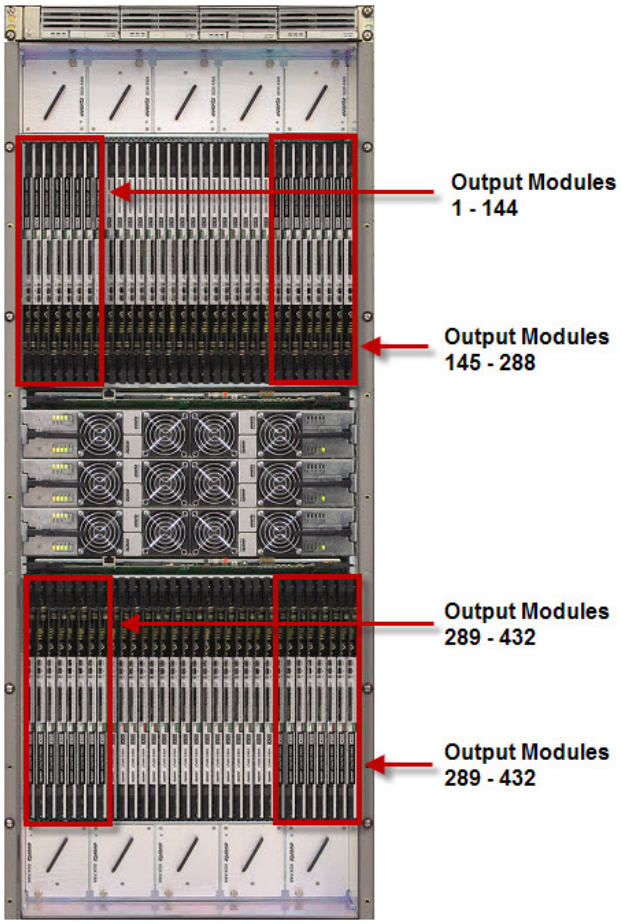
Like the input module, each of the output modules support eighteen (18) digital video outputs using an industry standard BNC connector mounted on the passive I/O Fin.

The EQX router can be loaded with a maximum of 32 output modules, providing square and non-square configurations from 18 outputs through to 576 outputs in increments of 18.

The input module manages digital video and embedded audio signals from 3Mb/s through to 3Gb/s. The following are supported:

- SDI (625 and/or 525)
- HDSDI (720p, 1080i, 1080p etc)
- DVB-ASI
- SMPTE310
- *Plus others*

All of the output modules are accessed from the front of the frame and can be replaced while the EQX router is still operational should one of the modules fail. The output modules are air cooled by the fans mounted in the upper and lower half of the frame.



4.3.1. Supported Reclocking Signal Frequencies

SD/HD Output Module:
Conforms to SMPTE 259M and SMPTE 292M
Signals supported: 143Mb/s (D2 @ 59.94Hz)
177Mb/s (D2 @ 50Hz)
270Mb/s
360Mb/s
540Mb/s
1483.5Mb/s @ 59.94Hz
1485Mb/s @ 50Hz

SD/HD/3G Output Module:
Conforms to SMPTE 259M-C, SMPTE 292M and SMPTE 424M
Signals supported: 270Mb/s
1483.5Mb/s @ 59.94Hz
1485Mb/s @ 50Hz
2967Mb/s @ 59.94Hz
2970Mb/s @ 50 Hz

Some 270Mb/s ASI signals occasionally can cause a Reclocker to incorrectly set to a 177Mb/s signal frequency. To prevent this from happening set the "177" option to "Disable" in the WinSetup application and download this new configuration to the EQX router.

4.3.2. Output Module - Key Features

- HD SDI digital video plus Embedded Audio
- SDI digital video plus Embedded Audio
- Supports 3Mb/s to 3Gb/s digital video signals
- Optionally can be fitted as a FIBER OPTIC output module
- Output expansion in increments of 18, from 18 through to 576
- Auto configurable:
  - Reclocking
  - Non-reclocking
  - ASI mode
- Front access to all input modules
- All input modules are hot-swappable
- Fan cooled

Figure 4-5: Output Module (with Air Dam Fitted)

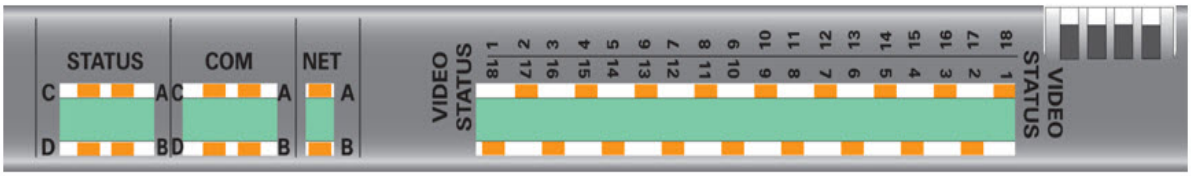


Figure 4-6: Output Module – Air Dam Detail

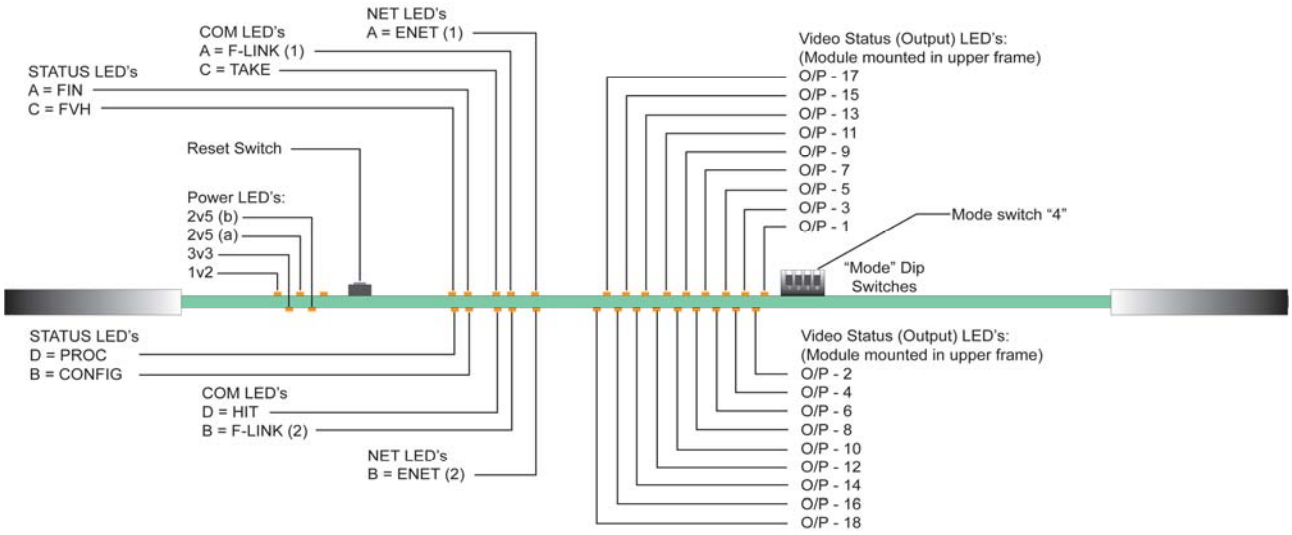


Figure 4-7: Output Module – Mounted in Upper Frame (with Air Dam Removed)

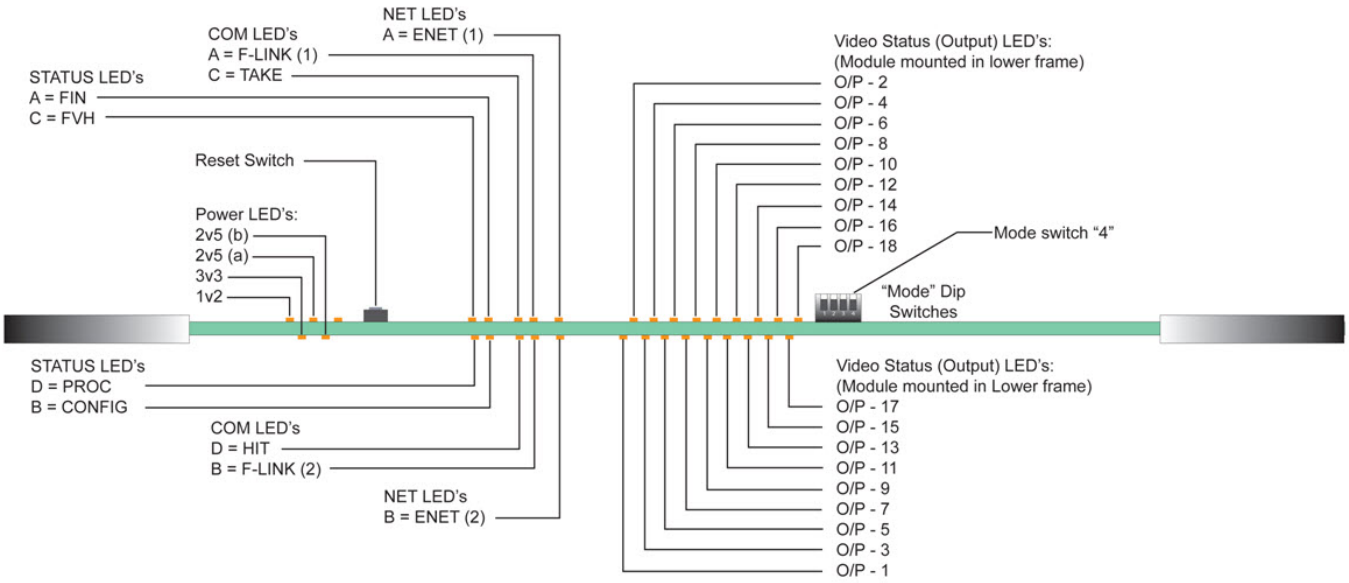


Figure 4-8: Output Module – Mounted in Lower Frame (with Air Dam Removed)

LED POWER LED's	Colour	Function
1v2	Yellow	1v2 Power rail present
3v3	Yellow	3v3 Power rail present
2v5 (a)	Yellow	2v5 (a) Power rail present
2v5 (b)	Yellow	2v5 (b) Power rail present

LED STATUS LED's	Colour	Function
FVH	Green	Single flash toggling with the Proc LED indicates 50Hz while double flash indicates 59.94Hz.
	Red	Steady Red indicates loss of input reference or error.
FIN	Red	Indicates that the I/O fin is not present.
CONFIG		Illuminates when all the FPGAs have been configured correctly.
PROC	Green	Flashes at approximately 1 second intervals when the processor is OK and the ref is present. Flashes quickly during FPGA configuration.

LED COM LED's	Colour	Function
Take	Green	Flashes when the card has performed a "Take".
F-Link (1) "TX"	Green	F-Link TX - Flashes when the F-Link card has transmitted data.
F-Link (2) "RX"	Yellow	F-Link RX - Flashes when any F-Link comms are detected.
	Red	Steady Red indicates error.
F-Link Address Hit	Green	Flashes when there was a valid hit on the card.

LED NET LED's	Colour	Function
ENET (1)	Green	Rx - Flashes when Ethernet data is transmitted.
ENET (2)	Red	Tx – Flashes when Ethernet data is received.

LED VIDEO LED's	Colour	Function
O/P - 1	Green	Indicates that a signal is present on O /P 1
O /P - 2	Green	Indicates that a signal is present on O /P 2
O /P - 3	Green	Indicates that a signal is present on O /P 3
O /P - 4	Green	Indicates that a signal is present on O /P 4
O /P - 5	Green	Indicates that a signal is present on O /P 5
O /P - 6	Green	Indicates that a signal is present on O /P 6
O /P - 7	Green	Indicates that a signal is present on O /P 7
O /P - 8	Green	Indicates that a signal is present on O /P 8
O /P - 9	Green	Indicates that a signal is present on O /P 9
O /P - 10	Green	Indicates that a signal is present on O /P 10
O /P - 11	Green	Indicates that a signal is present on O /P 11
O /P - 12	Green	Indicates that a signal is present on O /P 12
O /P - 13	Green	Indicates that a signal is present on O /P 13
O /P - 14	Green	Indicates that a signal is present on O /P 14
O /P - 15	Green	Indicates that a signal is present on O /P 15
O /P - 16	Green	Indicates that a signal is present on O /P 16
O /P - 17	Green	Indicates that a signal is present on O /P 17
O /P - 18	Green	Indicates that a signal is present on O /P 18

MODE Dip Switch		
Switch 1	F-Link Baud Rate	(Factory setting = UP)
Switch 2	DOWN = All channels to bypass reclock circuit	(Factory setting = UP)
Switch 3	UP = F-Link 1 DOWN = F-Link 2	(Factory setting = UP)
Switch 4	UP = FVH 50 DOWN = FVH 59.94	(Factory setting = N/A)

The order of the VIDEO STATUS LEDs is reversed when the Output module is fitted into the lower section of the frame. The LEDs confirm that the signal has been reclocked correctly. If the reclockers are bypassed (non-reclocking mode) then the corresponding LED will switch off.

The F-Link LEDs display "F-Link 1" when mode switch 3 is in the up position and "F-Link 2" when mode switch 3 is in the down position.

The Ethernet LEDs display "ENET 1" when mode switch 3 is in the up position and "ENET 2" when mode switch 3 is in the down position.

4.3.3 Fiber Optic Outputs

The EQX router is able to launch Fiber Optic output when ordered with the optional Fiber Optic output modules. These modules utilize an “SFP” module (Small Form-Factor Pluggable). 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 and can accept signals from 3Mb/s to 3Gb/s depending on the type of input card that they are mated with.

- The SFP1T-13-2 supports SMPTE 259M, SMPTE 344M, SMPTE 292M and SMPTE 424M and other data rates
- The SFP1T-13-2 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 4-9: SFP1T-13-2 Module

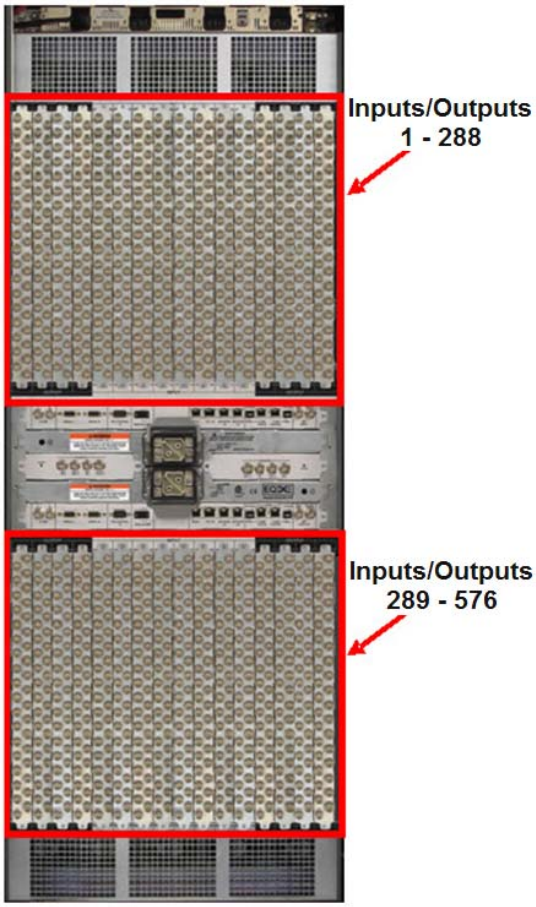
4.4. EQX COAXIAL INPUT & OUTPUT (I/O) FINS

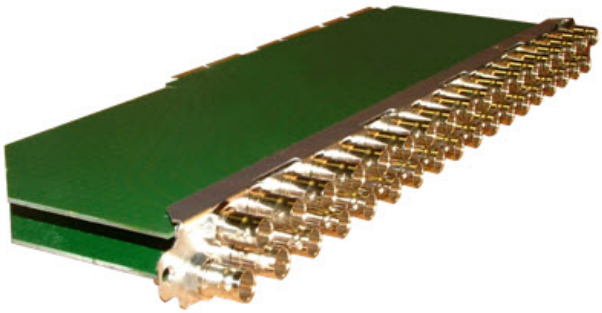
Mounted in the rear of the EQX frame are the Input and Output (I/O) fins. These modules are completely passive; they have no components other than the 18 BNC connectors.

The EQX router is fitted with industry standard BNC connectors.

The I/O fins provide the link through the EQX frame to the input and output modules. The layout of the I/O fins follows the same layout as the input and output modules.

The Output Fins occupy the 8 locations on the far right and far left hand side of the frame in both the upper and lower section. The Input Fins occupy the 16 central locations of the frame in both the upper and lower section.





4.4.1. I/O Fin - Key Features

- Completely passive module
- Provides the link from the BNC connector to the input or output module
- Each fin carries 36 industry standard BNC video connectors
- All I/O fins can be hot-swapped

4.4.2. Fiber Optic I/O Fin - Key Features

- Completely passive module, Active SFPs are hot swappable
- Provides the link from the SFP cage connector to the input or output module
- Each fin carries 18 standard SFP cages
- All I/O fins can be hot-swapped

As each fin supports 2 (two) cards of 18 channels each, this rear plate has a total of 36 signals on it. Each SFP module is dual channel so there are 18 SFP (18x2=36). Each card uses 9 SFP (9x2=18 signals per typical input/output card).

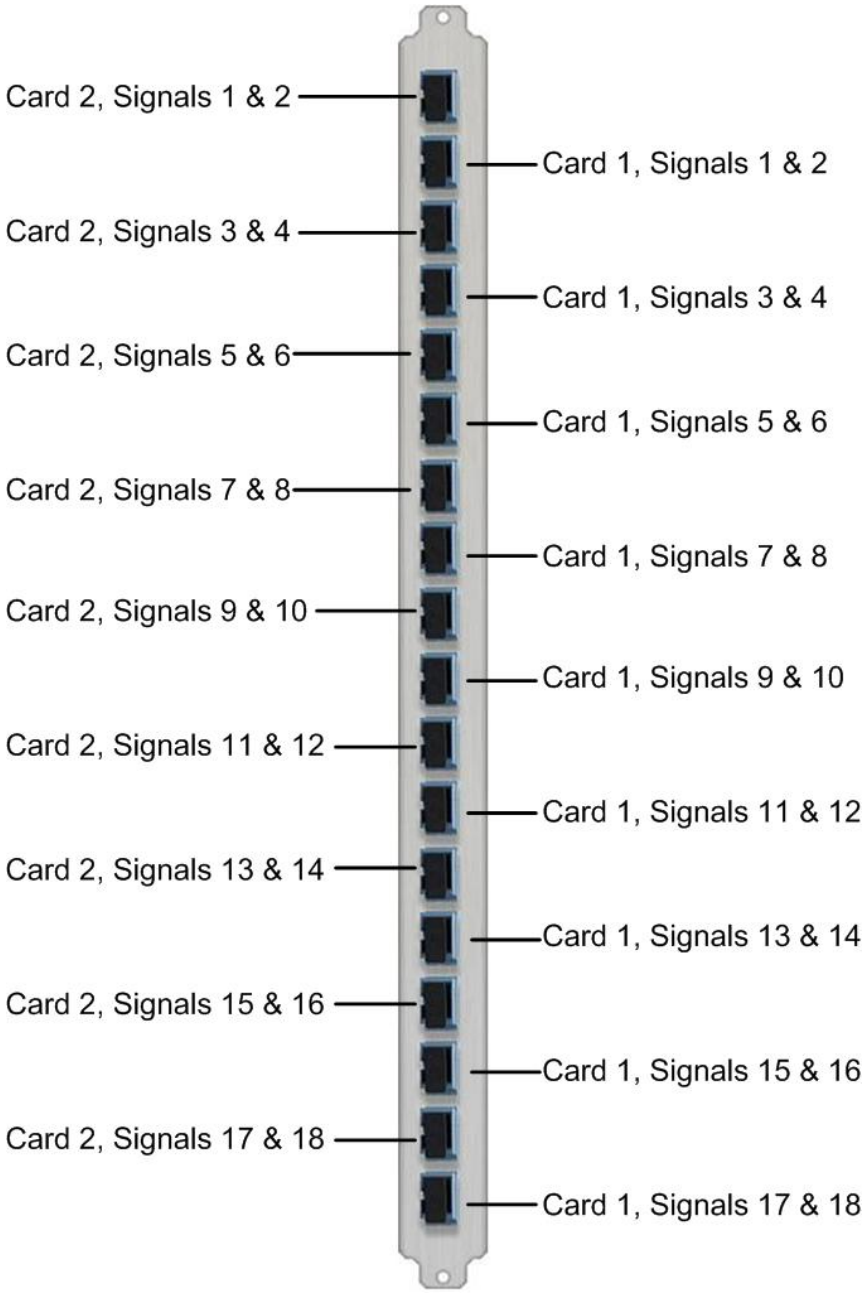


Figure 4-10: Fiber Optic Rear Fin

4.4.3. Coaxial I/O Fin - Key Features

- Completely passive module
- Each fin carries 36 Standard BNCs
- All I/O fins can be hot-swapped
- Same Fin for INPUT and OUTPUT cards

Each fin supports 2 (two) cards of 18 channels each.

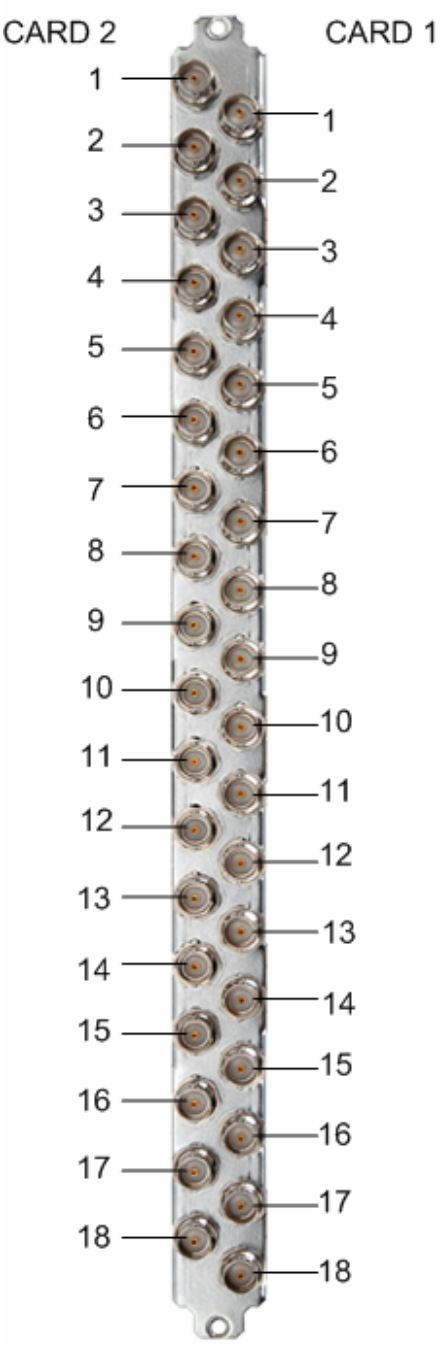


Figure 4-11: Coaxial I/O Fin

4.4.4. TDM I/O Fin - Key Features

- Completely passive module
- Each fin carries 36 Standard BNCs
- All I/O fins can be hot-swapped
- Same Fin for INPUT and OUTPUT cards

Each fin supports 2 (two) cards of 16 channels each and 2 TDM signals.

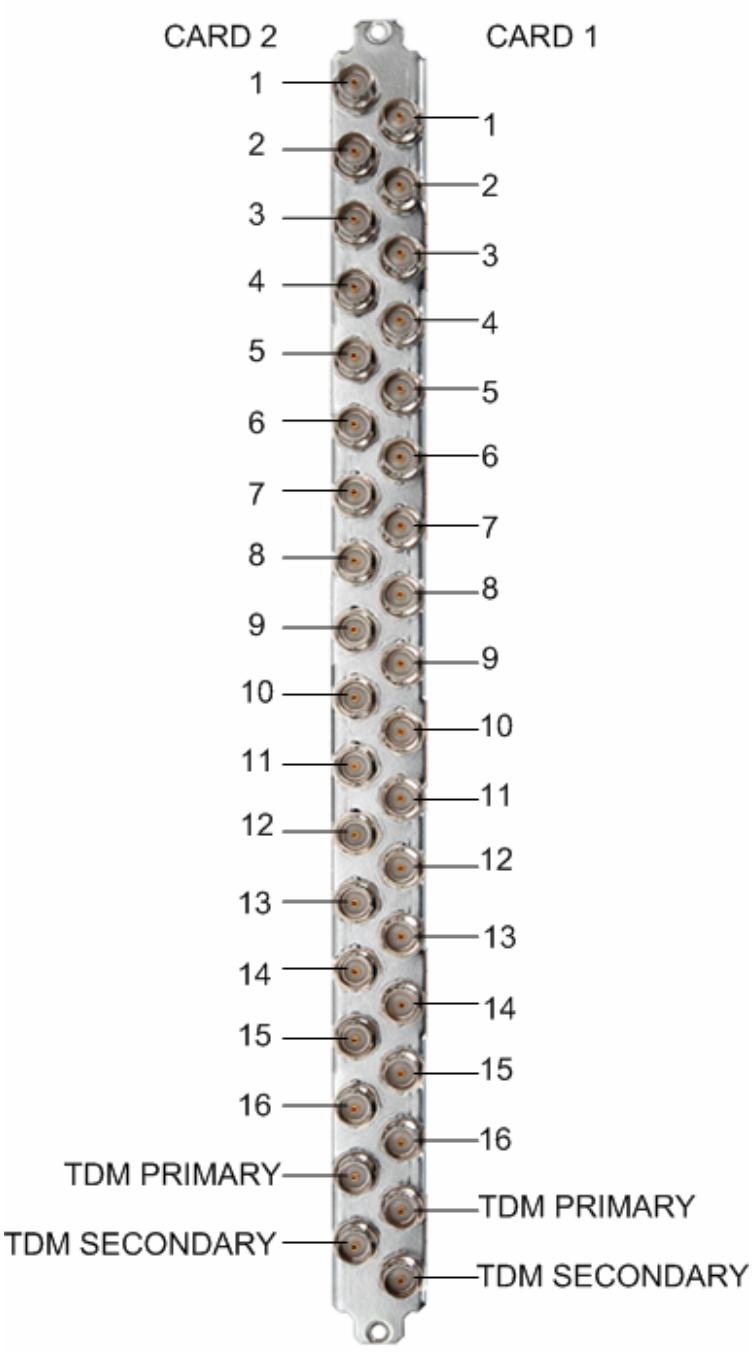


Figure 4-12: TDM I/O Fin

4.4.5. XLINK Output Fin - Key Features

- Completely passive module
- Each fin carries 2 XLINKS outputs and 8 Standard BNCs
- All I/O fins can be hot-swapped

Each fin supports 2 (two) cards.

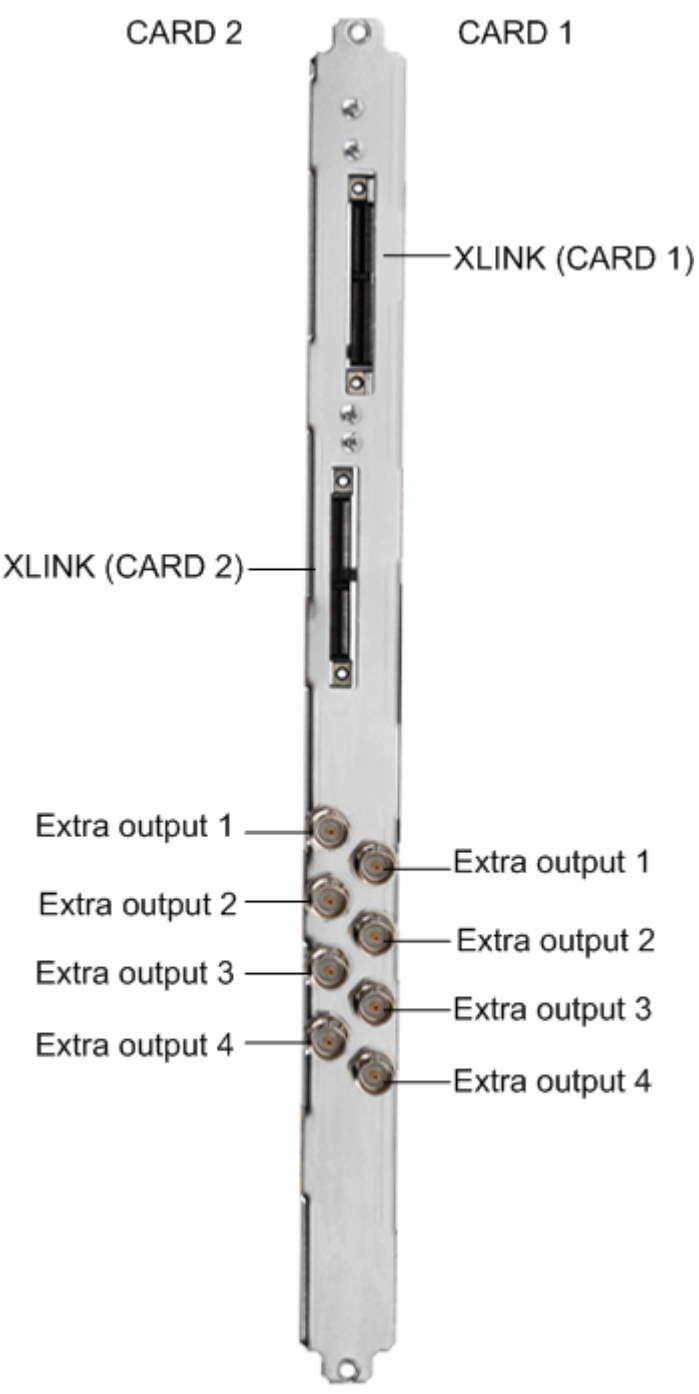


Figure 4-13: XLINK Output Fin

4.4.6. Double Density Output Fin - Key Features

- Completely passive module
- Each fin carries 72 DIN 1.0/2.3 connectors
- All I/O fins can be hot-swapped

Each fin supports 2 (two) cards of 36 channels each.

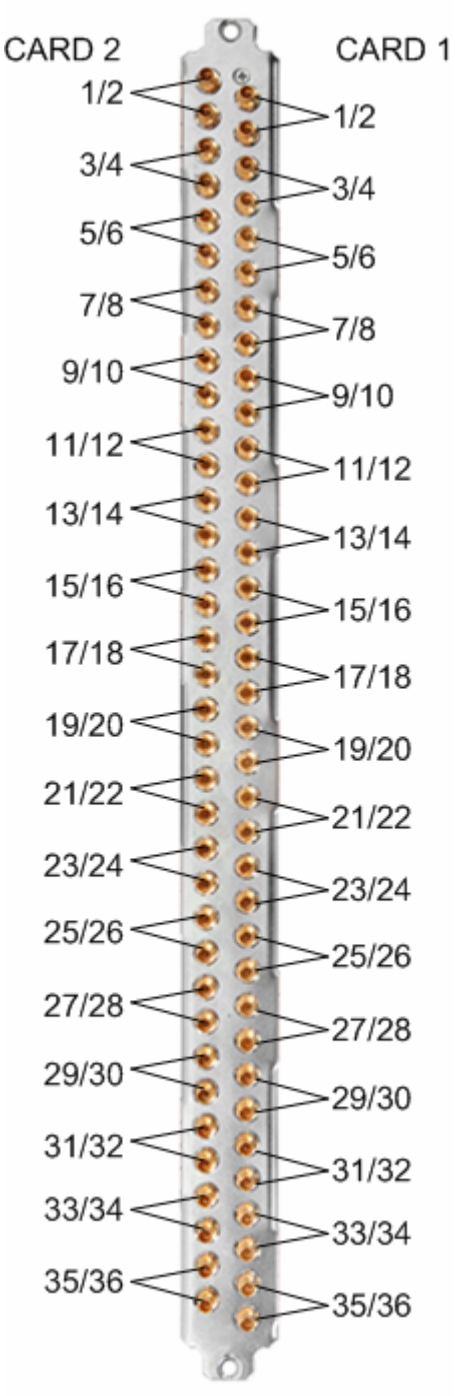


Figure 4-14: Double Density Output Fin

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5. CONTROL AND MONITORING MODULES

5.1. EQX FRAME CONTROLLER

The EQX router is fitted with an internal Frame Controller.

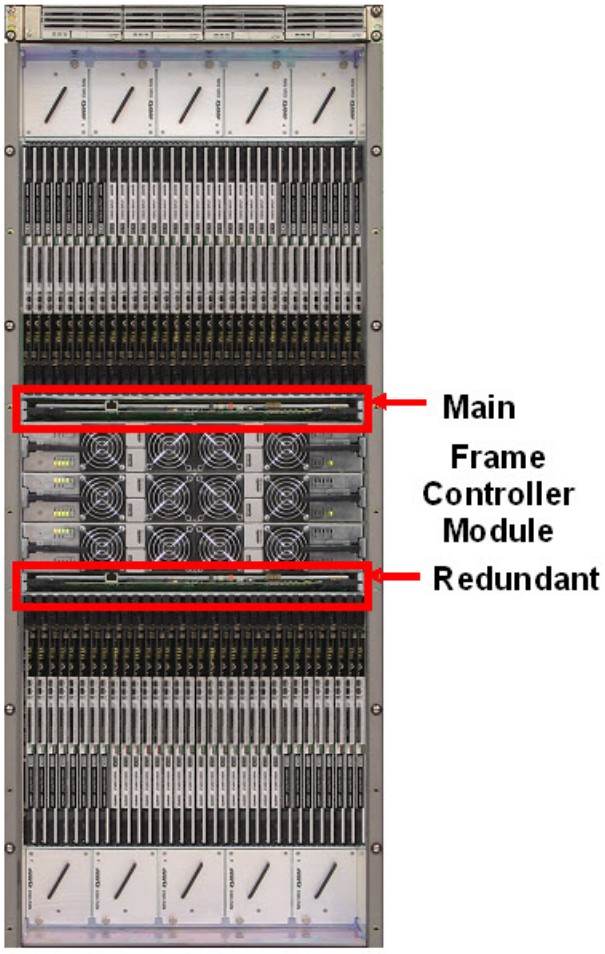
This frame controller manages all of the external and internal router communications from the remote control panels and third party devices, such as automation systems.

The standard EQX configuration requires a single frame controller; however, a second frame controller can be fitted to provide full redundancy.

Both the main and redundant controllers will automatically synchronize the routers crosspoint database allowing the redundant frame controller to instantly take over should the main frame controller fail.

Within the EQX router, the main internal and inter-frame communications are managed by F-Link. The frame control will automatically convert all Q-Link, Ethernet (for crosspoint switching) and Serial communications to F-Link.

The Frame Controllers are accessed from the front of the frame and can be replaced one at a time while the EQX router is still operational should one of the modules fail.



5.1.1. Frame Controller - Key Features

- Manages all internal and external router communications
  - F-Link (Internal and Inter-frame communications)
  - Q-Link (Remote Control Panels)
  - Ethernet (Automation systems & Remote Control Panels)
  - Serial RS422/232 (Automation systems)
  - F-Link & Ethernet ports on all active modules
- Redundant frame controller ensures continuous operation (optional)
- Full SNMP enabled

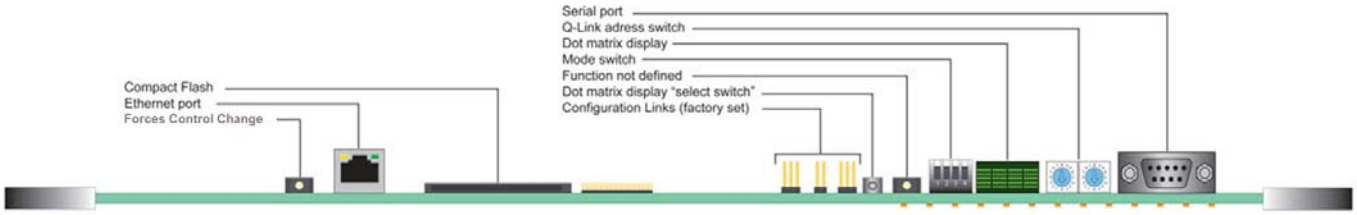


Figure 5-1: Frame Controller Module Card Edge Controls and Connectors

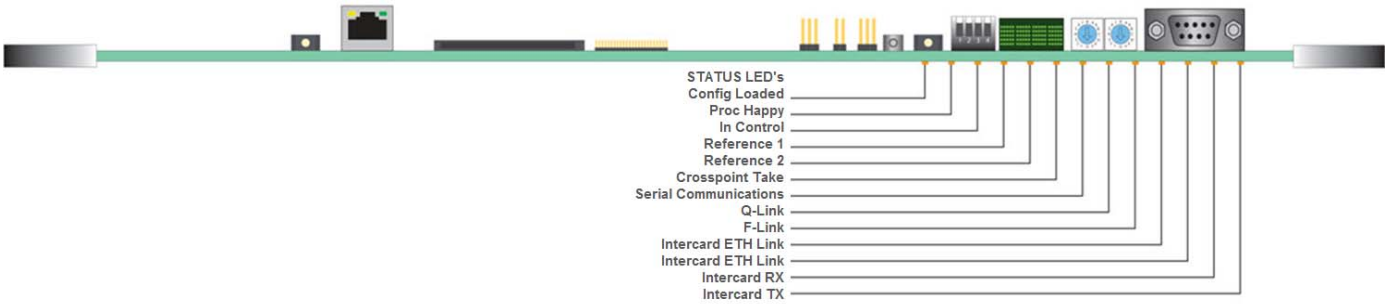


Figure 5-2: Frame Controller Module Status LEDs

LED	Colour	Function
Config Loaded	Green	This LED indicates that a config is loaded.
Proc Happy	Green	Flashes when the frame controller processor is working correctly.
		Turns off when a fault condition has been detected.
In Control	Green	This LED indicates which of the two frame controllers within a redundant system is currently in control.
Reference 1 (59.95Hz)	Green	Indicates that a valid reference signal is present. (Steady for 50.00Hz and flashing for 59.94Hz)
	Red	Indicates that the reference signal is invalid or missing, and is required for the current configuration.
Reference 2 (50.00Hz)	Green	Indicates that a valid reference signal is present. (Steady for 50.00Hz and flashing for 59.94Hz)
	Red	Indicates that the reference signal is invalid or missing, and is required for the current configuration.
Crosspoint Take	Green	The LED flashes when a crosspoint take command is acted upon.
Serial Communications	Green	TX data. Flashes when the frame controller transmits data.
	Red	RX data. Flashes when the frame controller receives data.
Q-Link	Green	Indicates that the Q-Link is operating correctly.
	Red	Indicates that an error has been detected with the Q-Link.
F-Link	Green	Indicates that the F-Link is operating correctly.
	Red	Indicates that an error has been detected with the F-Link.
Intercard ETH Link	Green	Indicates that there is an intercard Ethernet network link.
Intercard ETH Link	Green	Indicates that there is an intercard Ethernet network link.
Intercard RX	Green	Indicates that there is an intercard network link RX.
Intercard TX	Green	Indicates that there is an Intercard network link TX.

5.2. EQX COMMUNICATION PORTS

- 2x Ethernet Ports
- 2x F-Link Ports
- 4x Q-Link Ports
- 4x Serial Ports (RS422/232)
- 2x PSU Comms Ports
- 2x Alarm Ports

The Ethernet and Serial ports are used for automation control, remote control panels, router configuration and SNMP monitoring.

The Q-Link ports are used for the connection of the Quartz remote control panels.

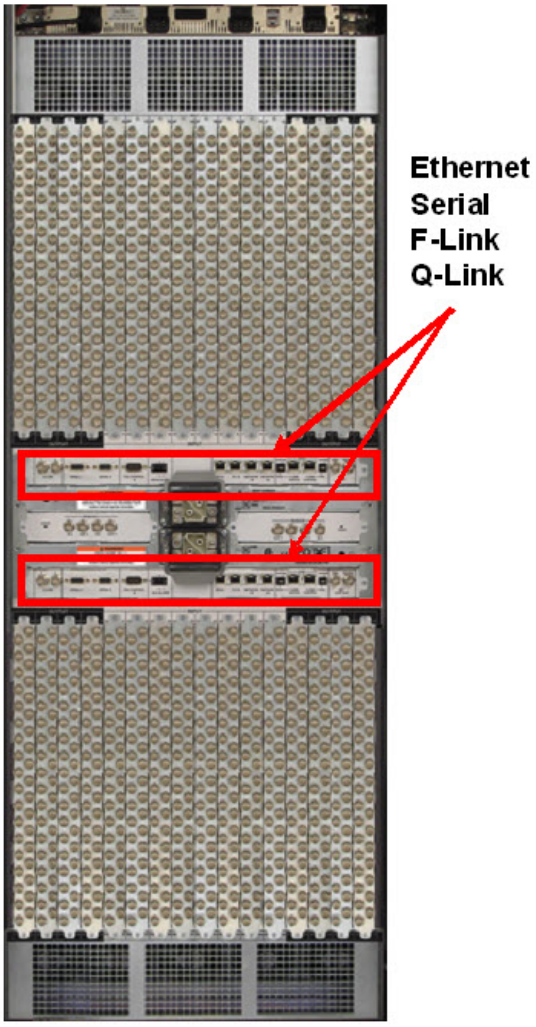


Figure 5-3: F-LINK and Q-LINK Connectors

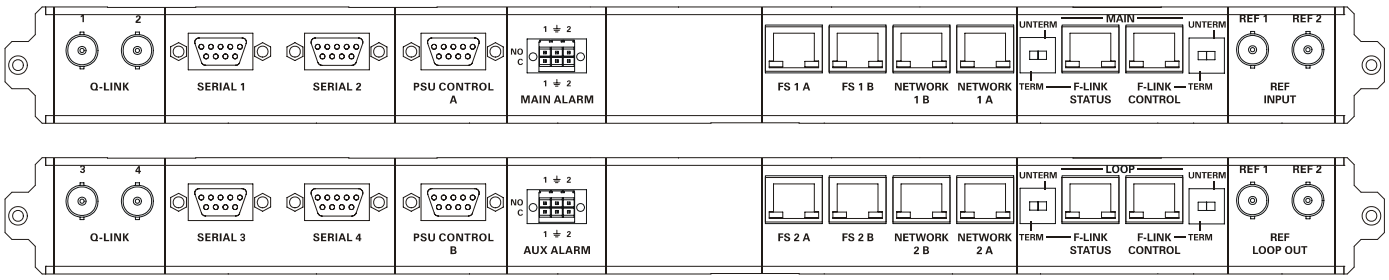


Figure 5-4: EQX Communication Ports

5.2.1. Upper Communication Fin (Left Side)

Q-Link 1: Q-Link serial communication port used to connect remote control panels, external system controllers or slaved Quartz brand routers.

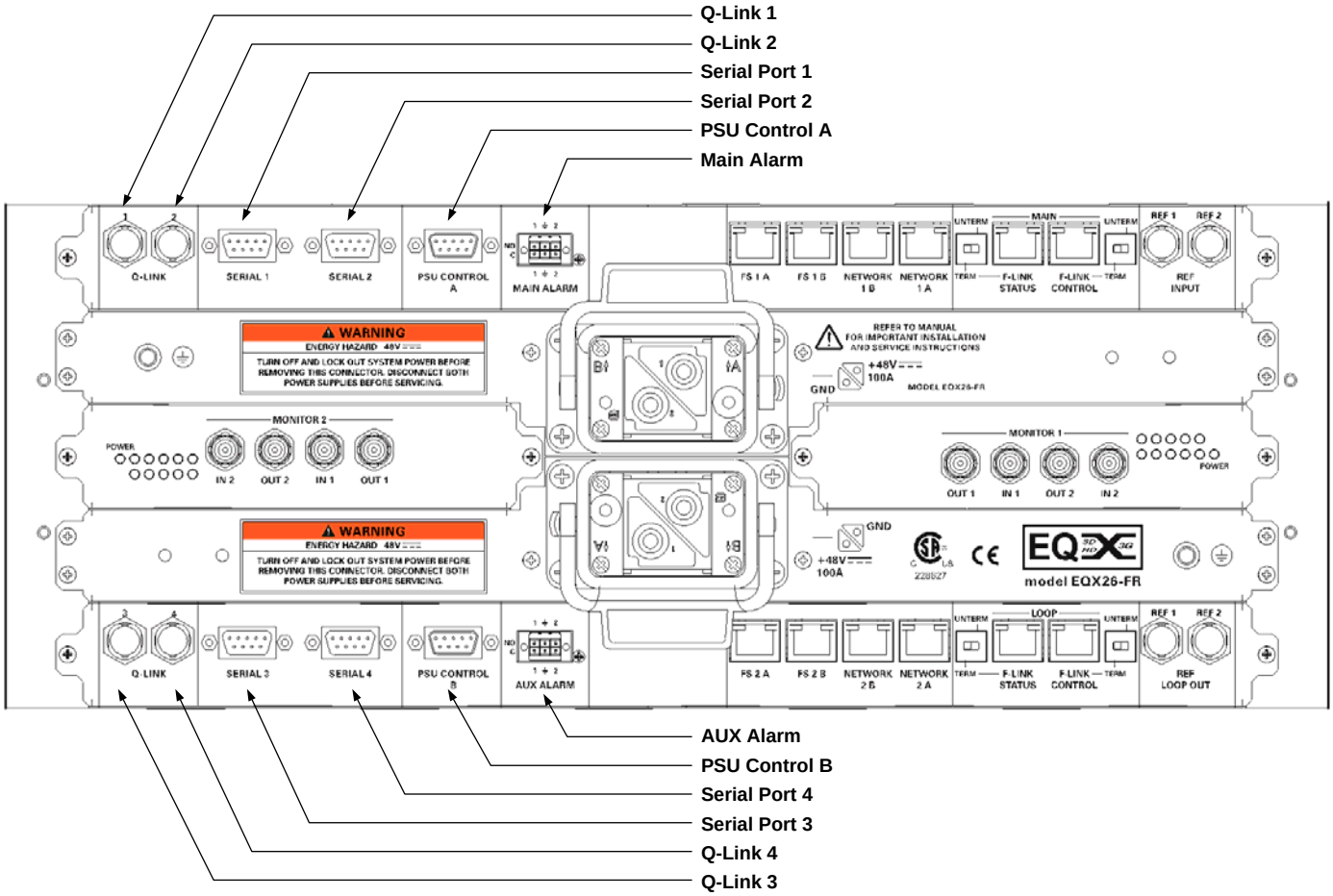
Q-Link 2: Q-Link serial communication port used to connect remote control panels, external system controllers or slaved Quartz brand routers.

Serial Port 1: RS-422/RS-232 serial communication port used to connect WinSetup configuration application (recommended) or 3rd party control devices such as automation systems or devices requiring a UMD feed (for example, an MVP). RS-422 or RS-232 mode is configured by a link on the Frame Controller.

Serial Port 2: RS-422/RS-232 serial communication port used to connect 3rd party control devices such as automation systems or devices requiring a UMD feed (for example, an MVP). RS-422 or RS-232 mode is configured by a link on the Frame controller.

PSU Control A: Not Used

Main Alarm: External alarm connection which is used to indicate a fault condition.



5.2.2. Lower Communication Fin (Left Side)

Aux Alarm: External alarm connection which is used to indicate a fault condition.

PSU Control B: Not Used

Serial Port 4: RS-422/RS-232 serial communication port used to connect 3rd party control devices such as automation systems or devices requiring a UMD feed (for example, an MVP). RS-422 or RS-232 mode is configured by a link on the Frame controller.

Serial Port 3: RS-422/RS-232 serial communication port used to connect 3rd party control devices such as automation systems or devices requiring a UMD feed (for example, an MVP). RS-422 or RS-232 mode is configured by a link on the Frame Controller.

Q-Link 4: Q-Link serial communication port used to connect remote control panels, external system controllers or slaved Quartz brand routers.

Q-Link 3: Q-Link serial communication port used to connect remote control panels, external system controllers or slaved Quartz brand routers.

5.2.3. Upper Communication Fin (Right Side)

REF 1/REF 2: Used to connect a 50Hz or 59.94Hz genlock signal. Any genlock signal at 59.94Hz (or 50Hz) (Bi-level or Tri-Level) can be used to switch any 59.94Hz (or 50Hz) signal. The Reference Module inside the router's Frame Controller can generate up to 4 different timing planes based on the type of genlock supplied and the frequency of the signals being switched (IE supplying a 59.94Hz Bi-Level genlock, the reference module can generate 720p/60, 1080i/60, 525/60, 1080p/60 internally)

F-Link Control: Used for external F-Link communication to other F-Link devices, such as Xenon.

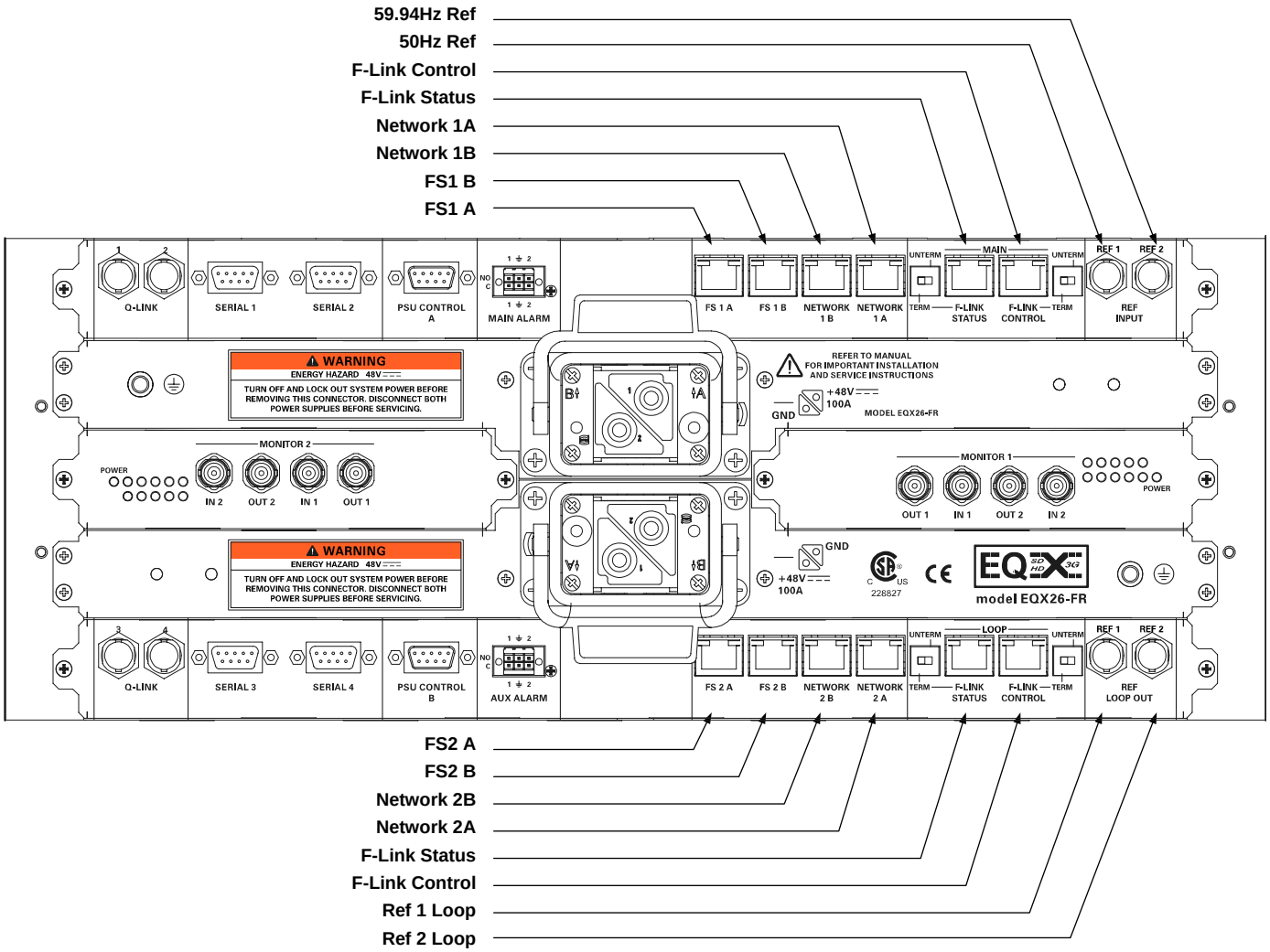
F-Link Status: Used for external F-Link communication to other F-Link devices, such as Xenon.

Network 1A: 100Mb Ethernet connection used for Ethernet based control systems, such as remote control panels, external system controllers, 3rd party control devices as well as SNMP monitoring systems, such as VistaLINK® Pro.

Network 1B: 1Gb Ethernet connection for SNMP/Thumbnail/Streaming traffic directly from the internal modules out to the network.

FS1 B: Used to link multiple EQX frames together for solutions over 576x576.

FS1 A: Used to link multiple EQX frames together for solutions over 576x576.



5.2.4. Lower Communication Fin (Right Side)

FS2 A: Used to link multiple EQX frames together for solutions over 576x576.

FS2 B: Used to link multiple EQX frames together for solutions over 576x576.

Network 2B: 1Gb Ethernet connection for SNMP/Thumbnail/Streaming traffic directly from the internal modules out to the network.

Network 2A: 100Mb Ethernet connection used for Ethernet based control systems, such as remote control panels, external system controllers, 3rd party control devices, as well as SNMP monitoring systems, such as VistaLINK® Pro.

F-Link Status: Used for external F-Link communication to other F-Link devices, such as Xenon.

F-Link Control: Used for external F-Link communication to other F-Link devices, such as Xenon.

REF 1 LOOP: Looping output of the 50Hz reference signal. This connector must be terminated with 75 ohms.

REF 2 LOOP: Looping output of the 59.94Hz reference signal. This connector must be terminated with 75 ohms.

Note that in order to avoid a network loop it is essential not to connect both ports from a particular frame controller to the same LAN or VLAN.

5.3. EQX REFERENCE INPUT

The internal timings and switch points for the EQX router are all generated from its signal feed to its reference input.

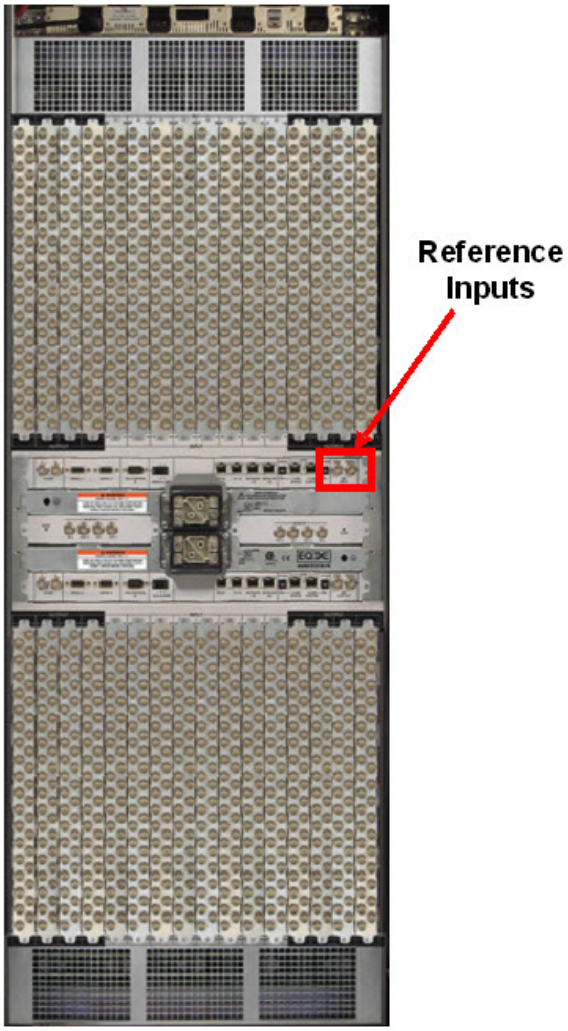
The EQX will accept either Bi-level or Tri-Level syncs, from which it is able to generate the required timing for switching SD and HD digital video signals.

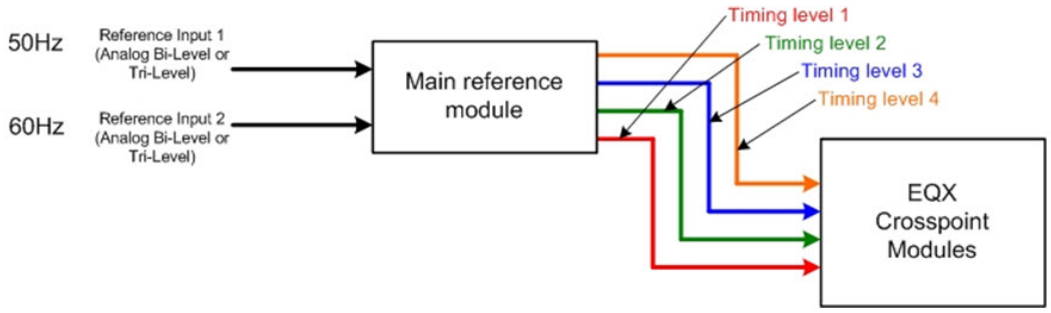
From this single reference signal the EQX can generate four independent timing levels, which provides SMPTE compliant switching for four different digital video standards within the same frame.

- SD Digital Video:
  - 525
  - 625

- HD Digital Video (at 50 to 60 Hz):
  - 720p
  - 1080i
  - 1080p
  - Plus others…

By supplying a second video reference at a different frequency to the first, the EQX is able to generate timing levels at both frequencies, for example 50Hz and 60 Hz.



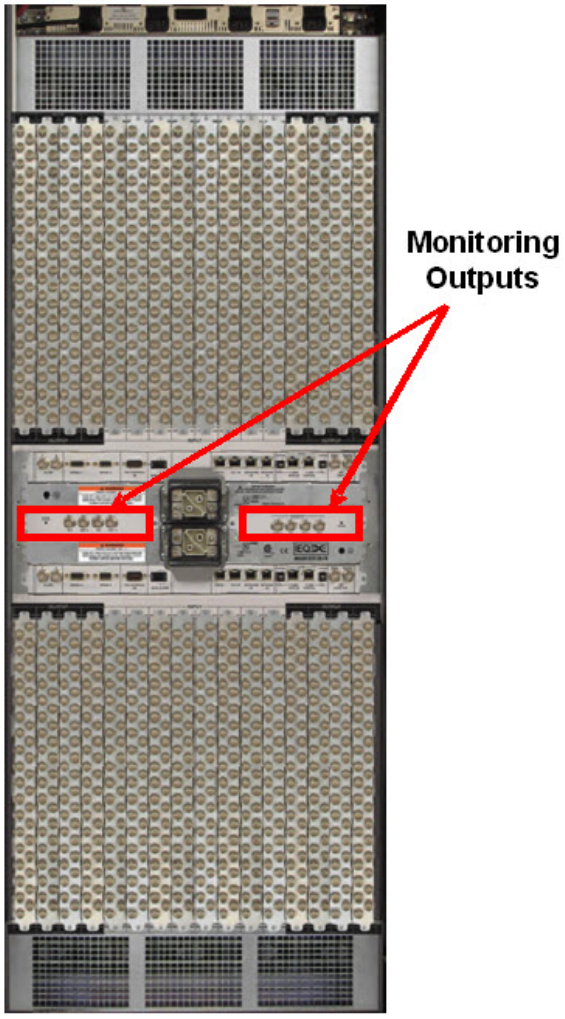


5.3.1. Reference Input - Key Features

- Two bi-level or tri-level reference inputs (SD/HD at 50Hz to 60Hz).
- Four independent timing levels for SMPTE compliant switching of up to four different digital video signals.
- Supports mixed digital video standards at mixed frequencies.

5.4. EQX MONITORING OUTPUTS

The EQX router supports signal monitoring of all of the video inputs and outputs via dedicated BNC connectors on the rear of the EQX frame. The EQX also incorporates comprehensive system status monitoring, including power supply voltages, interior temperatures and fan speeds. Monitored data is available through SNMP for facility-wide monitoring systems. System status may also be monitored remotely by a network based remote connection over TCP/IP. User configurable closing contacts are also provided for connection to an external alarm system.



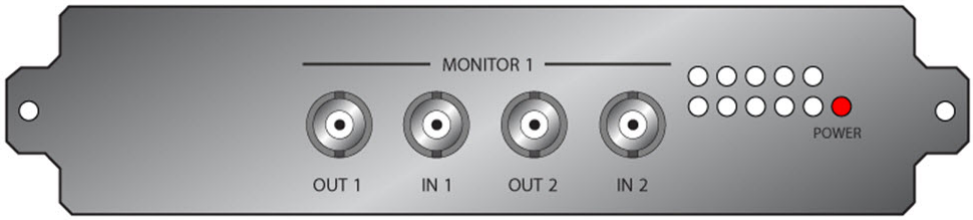


Figure 5-5: Monitor 1 (Right Side of Frame)

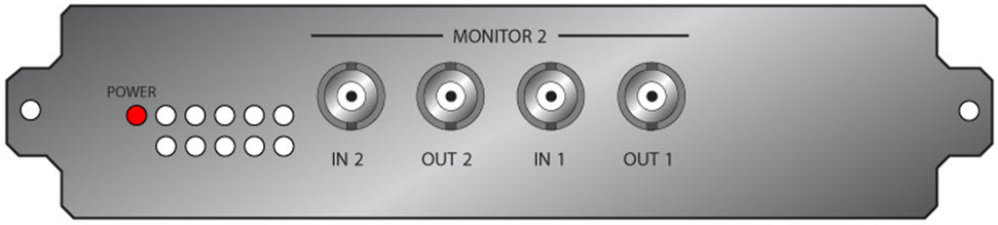


Figure 5-6: Monitor 2 (Left Side of Frame)

In order to view the Source and Destination monitoring of the EQX router on a monitor, connect “OUT 2” of Monitor 2 to “IN 2” of Monitor 1 and “OUT 2” of Monitor 1 to “IN 2” of Monitor 2. For Source Monitoring connect to “Monitor 1 OUT 1”. For Destination Monitoring connect to “Monitor 2 OUT 1”.

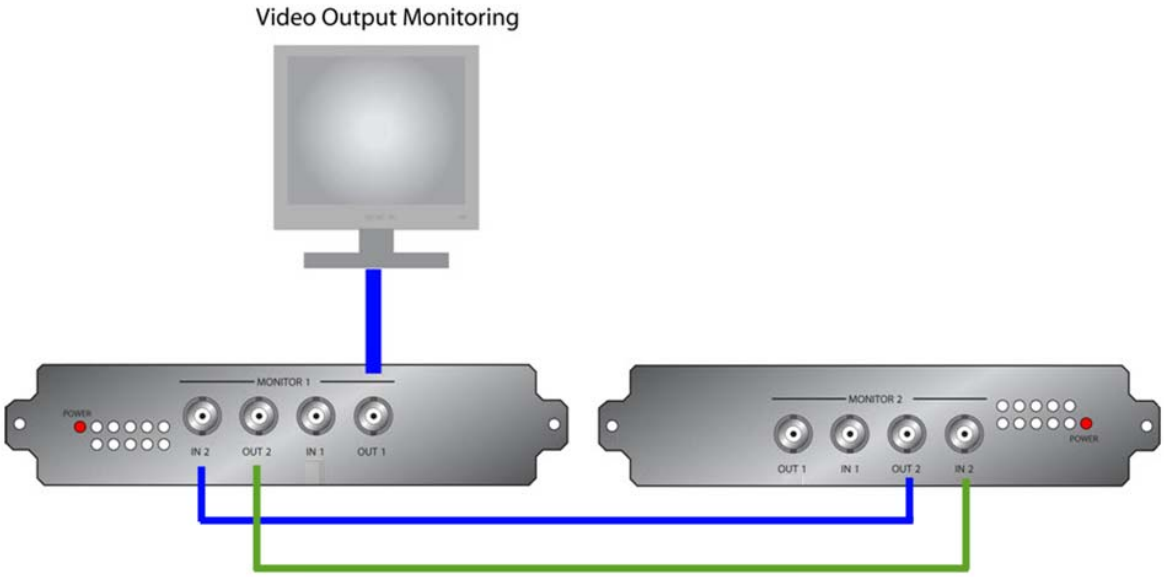


Figure 5-7: Video Output Monitoring

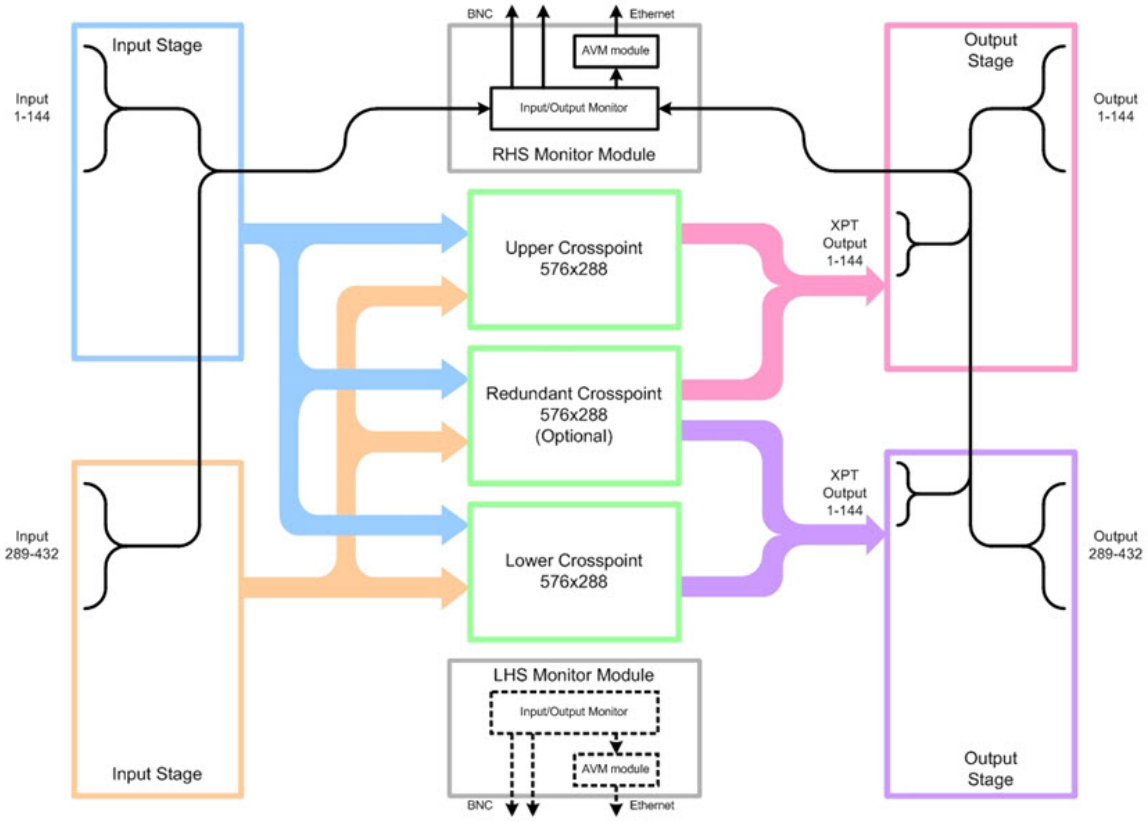


Figure 5-8: EQX Signal Monitoring Path – Monitor 1 (RHS)

Monitor module 1 provides the ability to monitor the following signal points within the EQX router:

- **Video Inputs**: 1 – 144
- **Video Inputs**: 289 – 432
- **Upper Crosspoint Outputs:** 1 – 144
- **Lower Crosspoint Outputs:** 1 – 144
- **Redundant Crosspoints:** 1 – 144
- **Video Outputs:** 1 – 144
- **Video Outputs:** 289 – 432

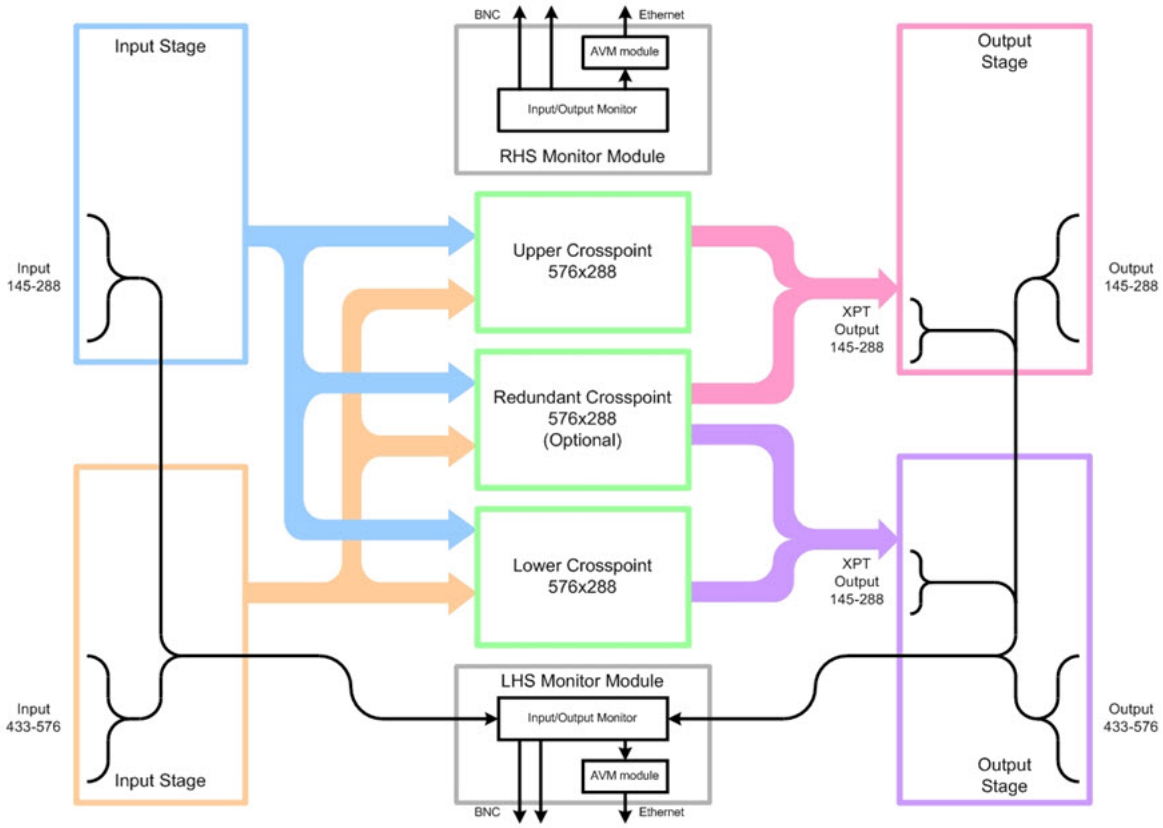


Figure 5-9: EQX Signal Monitoring Path – Monitor 2 (LHS)

Monitor module 2 provides the ability to monitor the following signal points within the EQX router:

- **Video Inputs:** 145 – 288
- **Video Inputs:** 433 – 576
- **Upper Crosspoint Outputs:** 145 – 288
- **Lower Crosspoint Outputs:** 145 – 288
- **Redundant Crosspoints:** 145 – 288
- **Video Outputs:** 145 – 288
- **Video Outputs:** 433 - 576

Each Monitor module provides two digital video input ports and two digital video output ports. Each of the digital output ports can be controlled independently and can be used to view different monitoring points within the EQX router, as long as the two ports are not trying to access the same Input or Output module.

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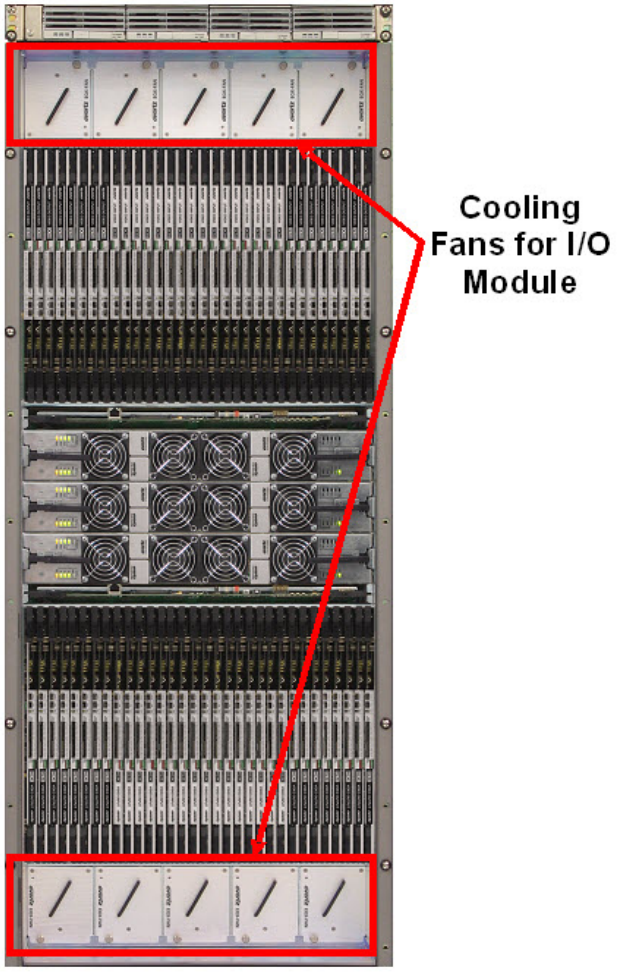
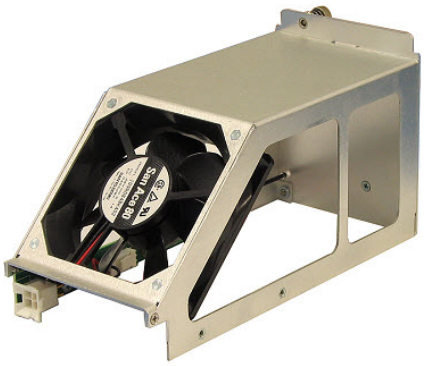
6. COOLING MODULES

6.1. EQX INPUT & OUTPUT MODULE COOLING

The EQX frame is fan-assisted and air-cooled. The input and output modules that are located in the upper and lower section of the EQX frame are independently cooled. Both the upper and lower section of the frame is equipped with a single row of five fans. These fans draw cool air in through the front door of the frame and expel the hot air out of the rear of the frame.





Each fan module is held in place by a single thumb screw and can be quickly and simply extracted and replaced from the front of the EQX frame should any one of them fail.

The single row of five fans that are located in both the upper and lower sections of the EQX frame are arranged in a n+1 configuration and provide redundancy, allowing a single fan to fail in either or both of the rows without causing the I/O modules to over heat. The performance of the fans is constantly monitored by the frame controllers. Any faults or failures are immediately reported.

The air-flow through the EQX is from front to rear. The cool air enters the frame at the front, passes over the input and output modules and then exits through the rear of the frame.

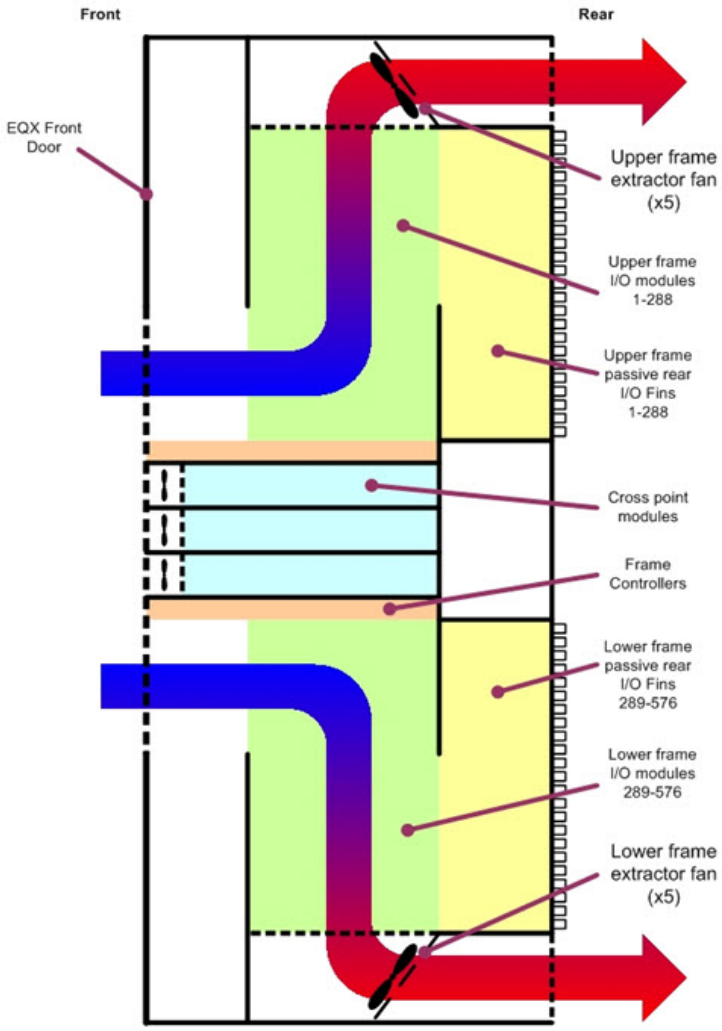


Figure 6-1: EQX Frame Air Flow

6.1.1. I/O Fan Modules - Key Features

- Five fans are installed into the upper & lower sections of the frame providing independent cooling of the Input and Output modules.
- Front access to all of the fan modules.
- Individual fan assemblies can be hot-swapped.
- Redundant configuration ensures continuous cooling should a fan fail.

The EQX I/O fans should be inspected every six months to ensure they are functioning correctly. There are no fan filters to change.

6.2. EQX CROSSPOINT MODULE FAN MODULES

Each of the crosspoint modules within the EQX frame are independently cooled by a row of four fan modules mounted onto the front of the crosspoint assembly.

The crosspoint fans are arranged in an n+1 configuration providing redundancy, which ensures sufficient cooling should a fan fail at any time. The performances of all of the crosspoint fans are constantly monitored by the frame controller. Any faults or failures are immediately reported.

Each of the crosspoint fan modules can be simply and quickly removed and replaced while the crosspoint module is still in place and operational.

Cool air is drawn into the front of the crosspoint module, passed over the crosspoint circuitry and expelled out of the side of the frame.

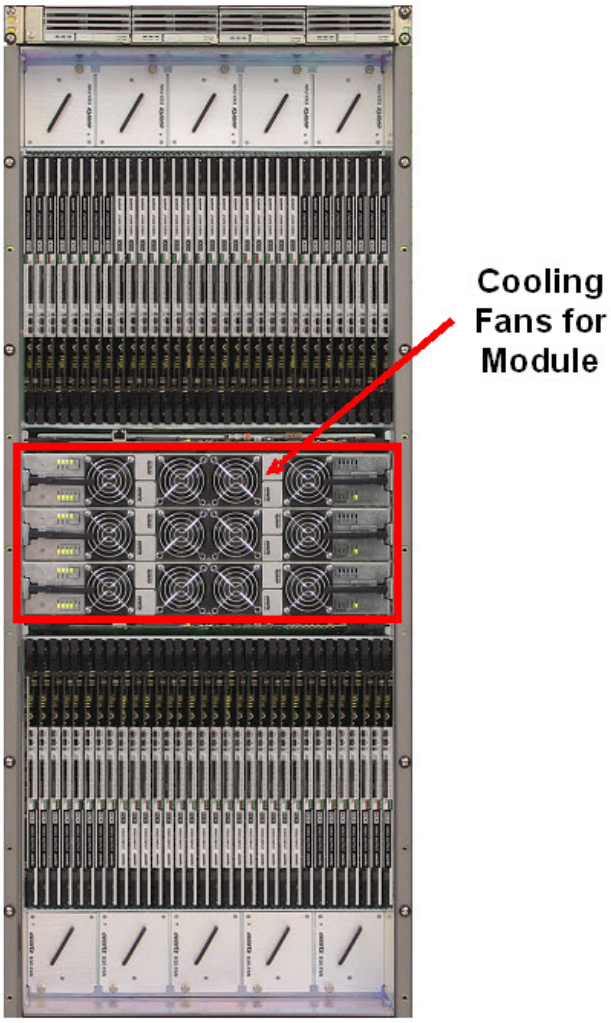


Figure 6-2: Cooling Fans for Module

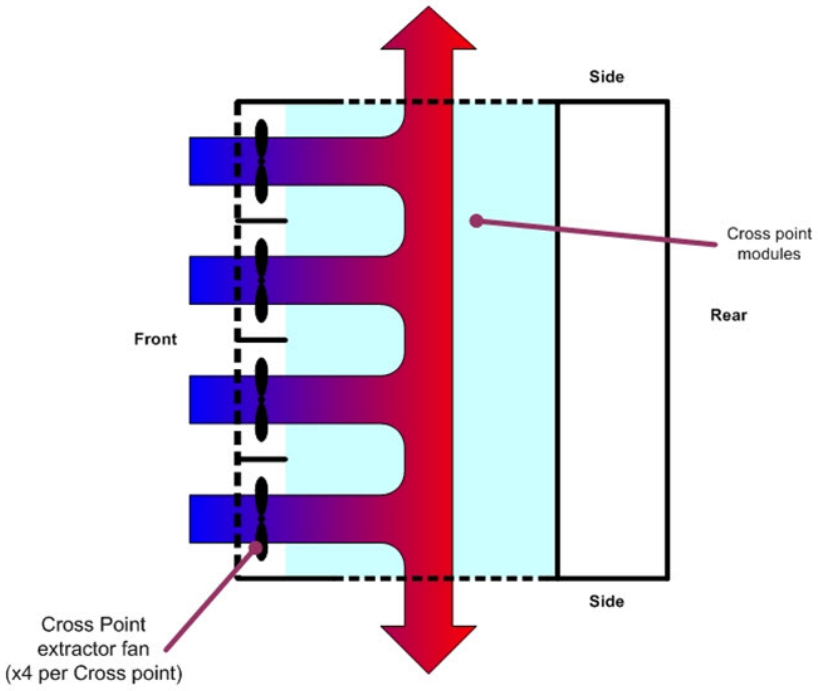


Figure 6-3: EQX Crosspoint Module Air Flow

6.2.1. Crosspoint Fan Modules - Key Features

- Each crosspoint assembly is independently cooled.
- N+1 configuration ensures continuous cooling should a fan fail.
- Individual fan assemblies can be hot-swapped.

The EQX crosspoint fans should be visually inspected every six months to ensure they are functioning correctly. There are no fan filters to change.

7. CONFIGURING EQX USING WINSETUP

The WinSetup program is used to configure the routing functions, including control panel operation. It configures such parameters 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 will guide you through the configuration of WinSetup.

This WinSetup guide assumes the configuration of an EQX router with full redundancy, including a redundant crosspoint module. It also assumes that the EQX router is being operated as a single level video with embedded audio.

Press **F1** to enter the help menu at any time.

Figure 7-1 shows the main WinSetup screen. Any part of the system can be configured from the menu at the top of the screen, or alternatively the gray bars above each main section can be used for quick access to specific items.

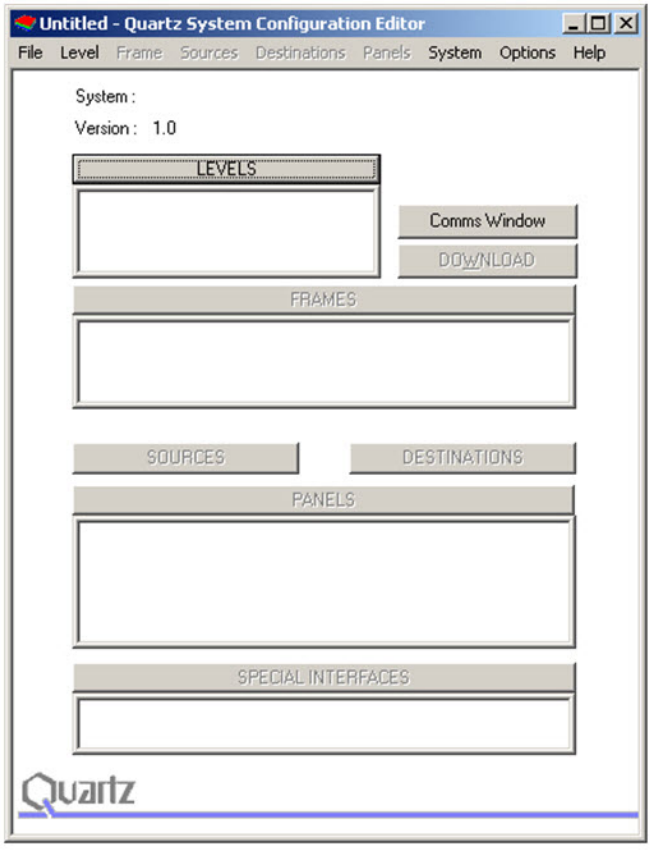


Figure 7-1: Quartz System Configuration Editor Window

If you are generating a new system configuration, then some of the menus and functions will be grayed out (indicating that they are not available), as shown in Figure 7-1. This is deliberate in order to 'lead you through' the functions that need to be set up.

To configure the EQX router using WinSetup, carry out the following functions described in sections 7.1. through 7.9.

7.1. SYSTEM CONTROLLER SELECTION

Before setting and creating the Source and Destination tables the system needs to be configured to operate with the SC-1000 System Controller.

1. From the main menu WinSetup screen, click on the “Options” tab to reveal the drop down list. From the list click on the “System Version” option. This will open a new window.

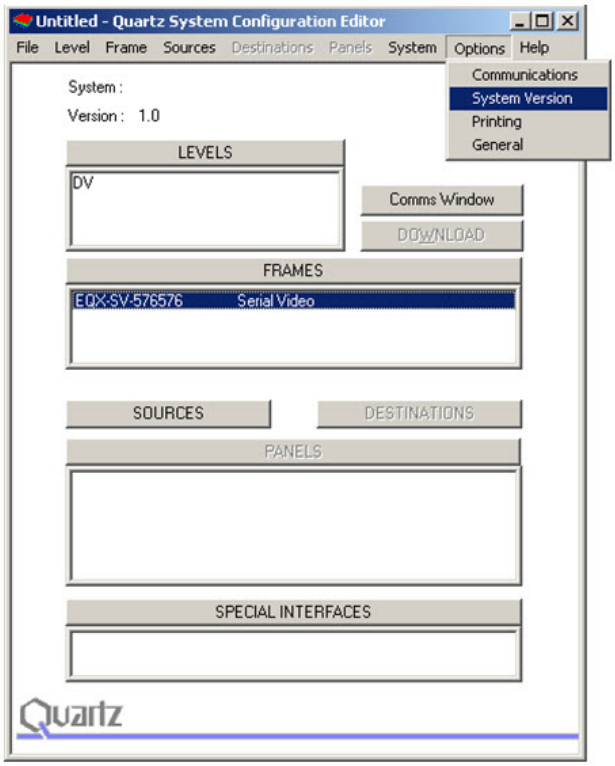


Figure 7-2: Quartz System Configuration Editor

2. From the “System Version Configuration” window check the box for the EQX-FC-SC and then click OK.

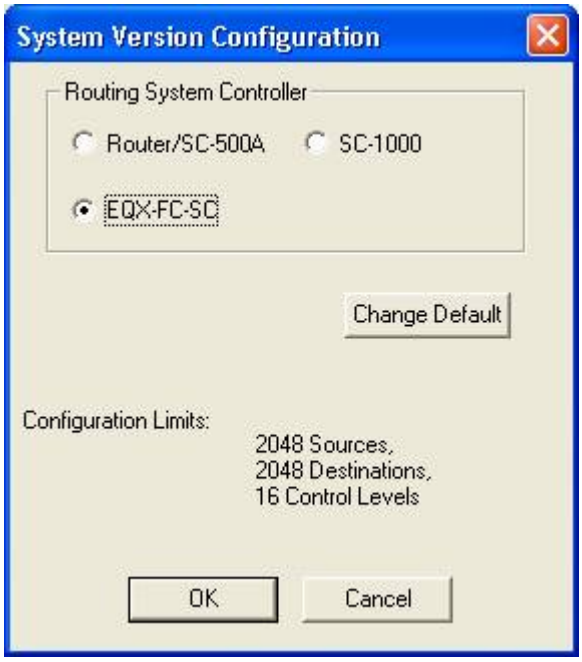


Figure 7-3: System Version Configuration Window

7.2. LEVELS

Traditionally, levels are used to define the make up of a routing system such as video, audio and control data. Each signal type is normally allocated its own level. The EQX router also uses the level system to define the *Routing Level* and the *Redundant Level* in addition to the more traditional signal levels.

To set up the EQX router, enter the *"Levels"* menu by clicking the gray *"Level"* section heading. This action will automatically open the *"System Levels"* window, as shown in Figure 7-4.

The EQX router requires that two (2) Levels are created within this menu if the back-up crosspoint is fitted:

- **Level 1** is used for the main video routes.
- **Level 2** is used for the redundant video routes. (Only required if the optional redundant crosspoint is fitted.)

To create a Level, click the Level to be set, in this example "Level 1". A blue background will highlight the text to confirm the selection.

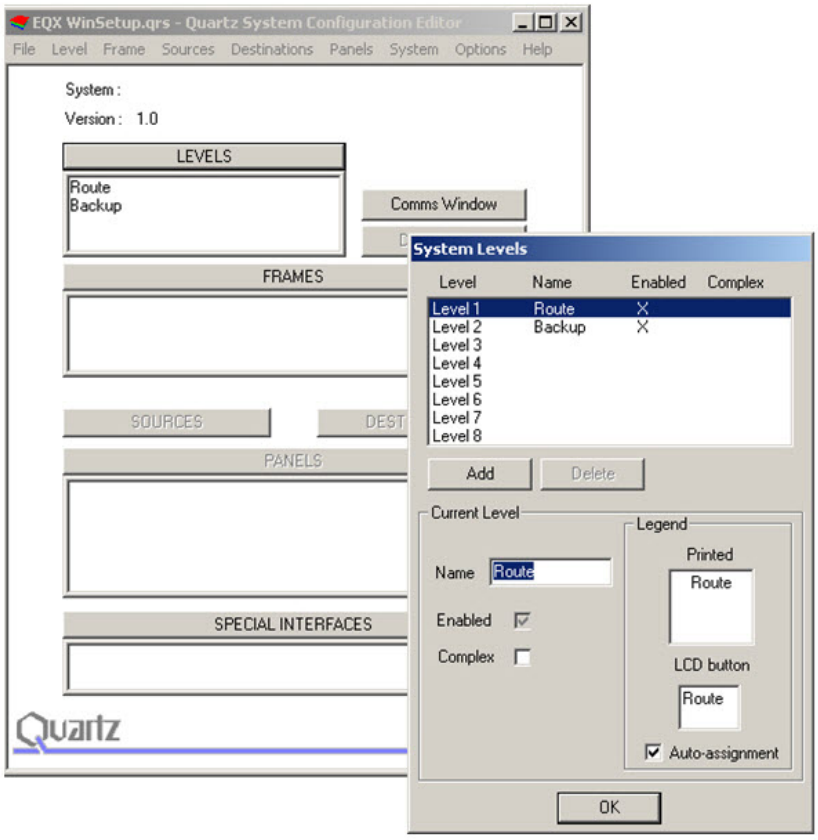
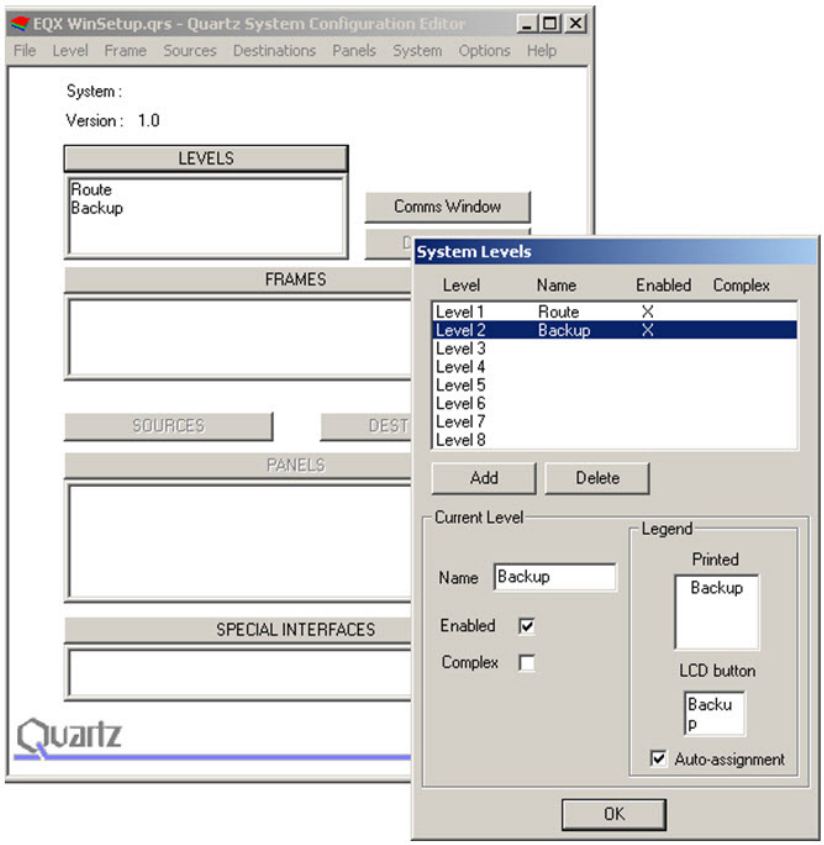


Figure 7-4: Creating the "Main Video Route" Level

Enter the required level name into the *"Name"* field; in this example the name "Route" has been used. Select the *Add* button. This will add Level 1 to the system configuration with the label set to "Route".

Create the second Level by clicking “Level 2”. Once again, a blue background will highlight the text to confirm the selection, as shown in Figure 7-5.



(Only required if the optional redundant crosspoint is fitted)

Figure 7-5: Creating the “Backup Video Route” Level

Enter the required level name into the *“Name”* field; in this example the name “Backup” has been used. Select the *Add* button. This will add Level 2 to the system configuration with the label set to “Backup”. Then select “OK” to close the window.

Additional levels, such as AES and/or analog audio, may be added as required. Enter a suitable name into the name field for each signal level that is required.

Do not check off the “Complex” box at this stage.

7.3. FRAMES

Next, enter the *"Frames"* menu by clicking on the gray *"Frames"* section heading. This automatically opens up the *"System Frames"* window as shown in Figure 7-6. From here click the *"New"* button. This will automatically open the *"Frame Type"* window.

The *"Frame Type"* window will display all of the Quartz branded routers listed by part number. To filter the list select the signal type, which will restrict the list to only show the routers that match this selection. Select the part number that matches the part number on the routers serial number label by clicking the corresponding line. The part number shown on the frame does not always represent a fully loaded router. Use the part number that correctly represents the router frame. For example, the part number for a 576x576 EQX router will start "EQX26", while the part number for a 288x288 EQX router will start "EQX16".

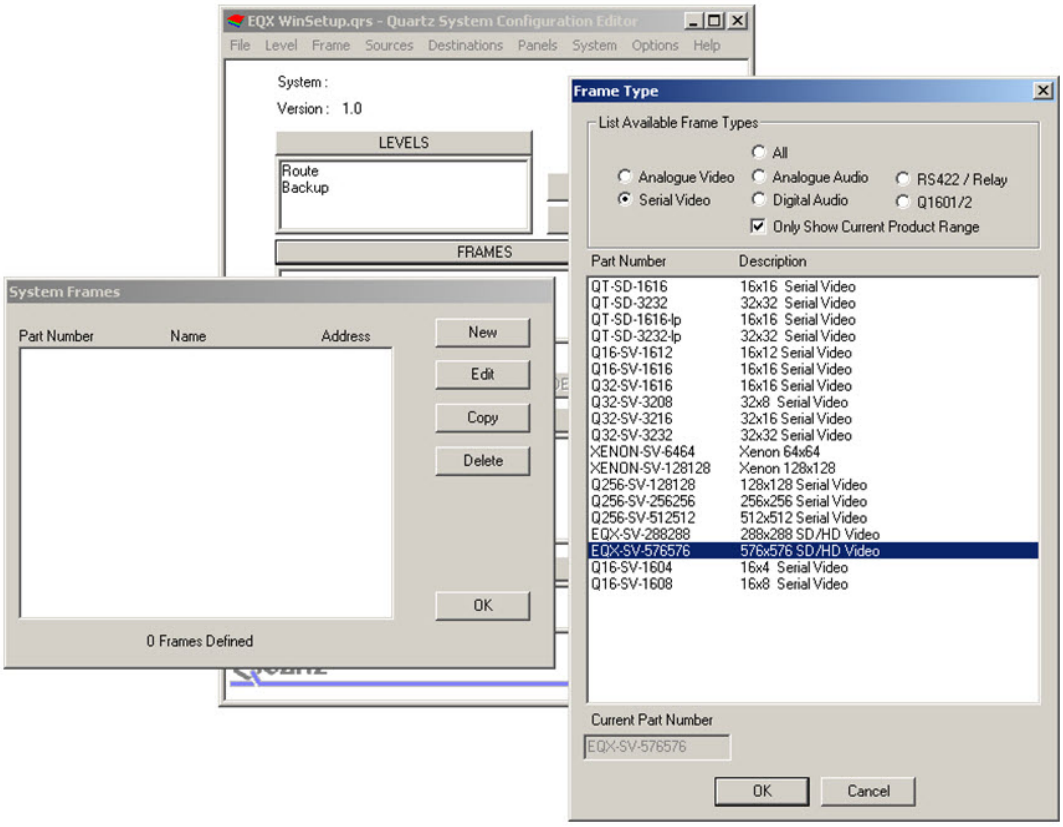


Figure 7-6: Selecting the Frame Type

A blue background will highlight the text to confirm the selection. There are two types of EQX router frames to choose from:

1. **EQX26-576576:** This is the 26RU 576x576 model
2. **EQX16-288288:** This is the 16RU 288x288 model

Click the *"OK"* button to confirm the frame selection. This automatically opens up the *"New Frame"* window.

The *"New Frame"* window allows the physical and control parameters of the inputs and outputs of the EQX router to be configured in more detail.

The *"New Frame"* can also be labeled *"Edit Frame"* window. The functionality of both these windows is the same and the name changes when the window is re-entered from the *"Frame"* menu.

The description and graphics shown here assume the configuration of the EQX router with a redundant crosspoint module fitted.

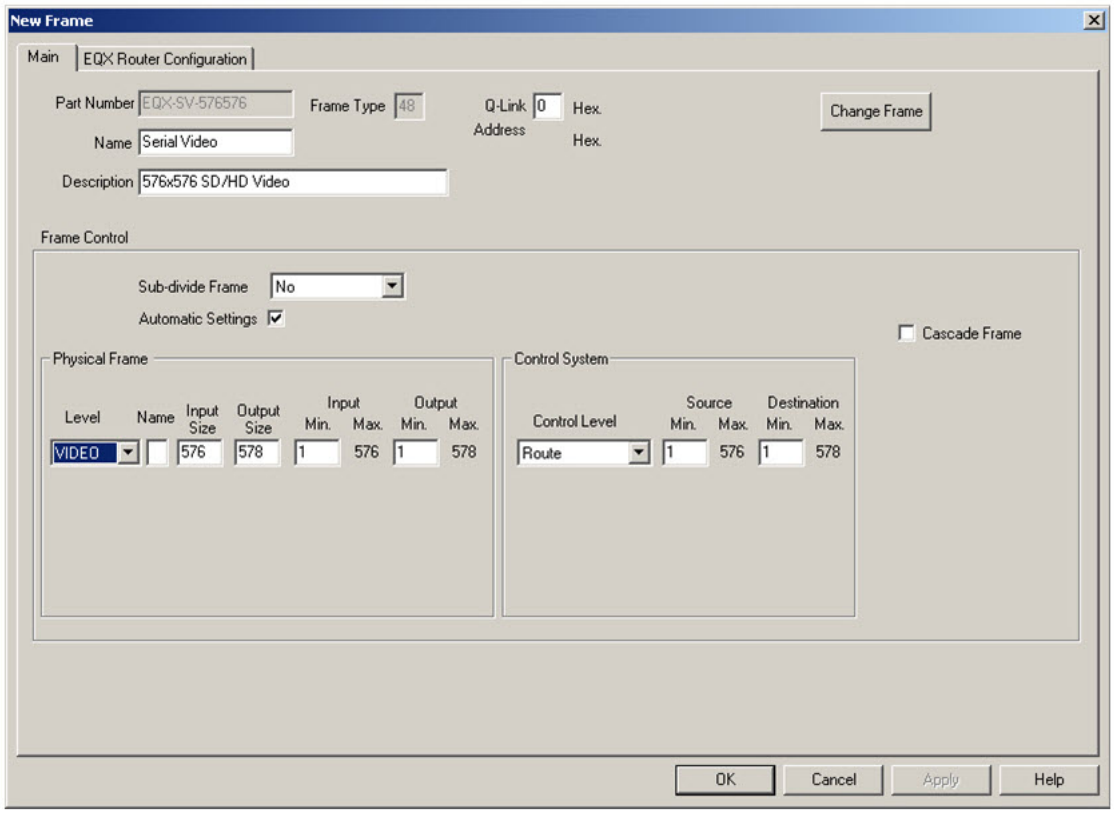


Figure 7-7: New Frame Window – Default setting when first opened

When the *"New Frame"* window is opened for the first time after selecting the EQX router, a default graphical view will be seen, as shown in Figure 7-7.

The part number for the selected frame along with its Frame Type number is shown (grayed out) for confirmation. If the wrong frame type has been selected then it can be changed by clicking on the *"Change Frame"* button.

The EQX frame is automatically given a Q-Link address; the default value is "0" and signifies that the EQX is the master frame within the system. The Q-Link address can be changed by entering a new Hex value into this field.

The physical Q-Link address on the EQX Frame Controller must match the Q-Link address set in this window.

The *"Name"* field is automatically picked up from the "Frame Type" window. It can be changed at any time by entering a new name directly into this field.

The *"Description"* field is also automatically picked up from the "Frame Type" window and will show a fully configured frame. It can be changed at any time to match the size of a sub-loaded frame by entering a new description directly into this field.

The next step is to Sub-divide the EQX frame into two (2) parts. This is required for the configuration of the redundant crosspoint.

Click on the "Sub-divide Frame" drop down list and select "Two parts". This will change the window display as shown in Figure 7-8.

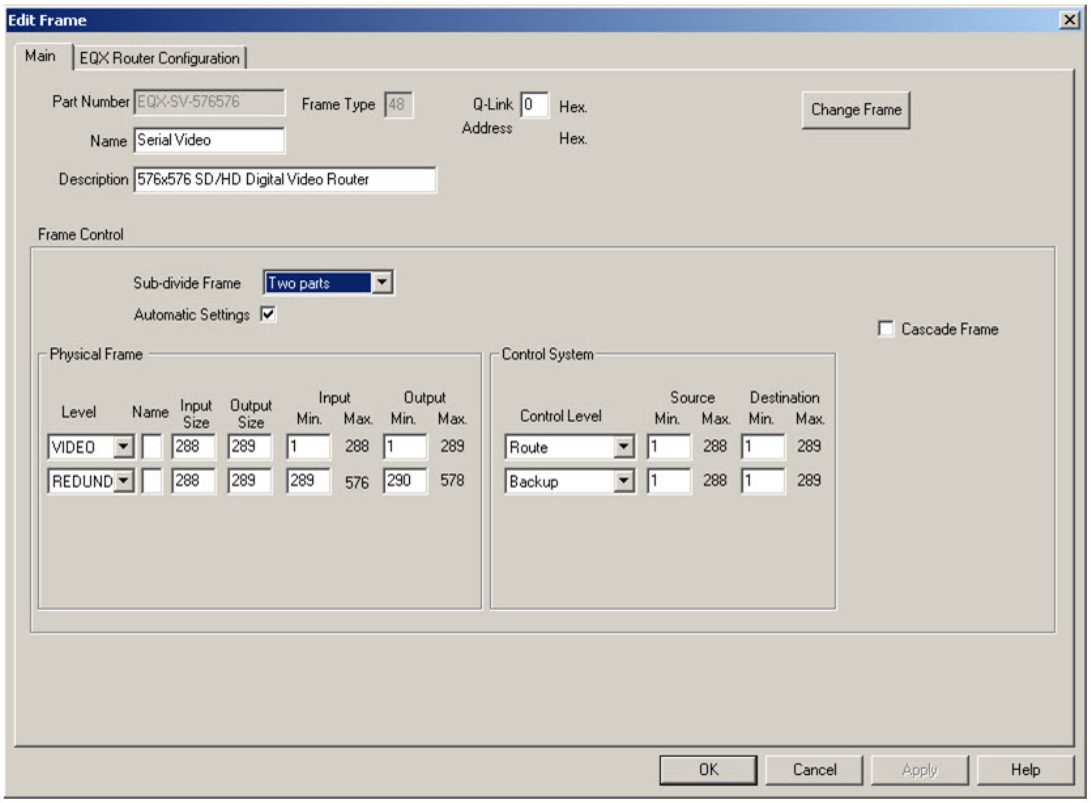


Figure 7-8: New Frame Window – Set for "Two parts"

In the *"Physical Frame"* area of the window, use the *"Level"* drop down menus to select each one of the two levels, shown in Figure 7-8 by the *"Video"* and *"Redundant"* headings.

The two levels shown in the *"Control System"* area of this window will automatically default to the two control levels created earlier, *"Route"* and *"Backup".* If not, use the relevant drop down menus and select the correct control level.

The numbers that appear in the boxes to the right of the *"Physical Frame"* and *"Control System"* areas are loaded by the WinSetup software as default values based on an equal split of the frame. When configuring the EQX router with a redundant crosspoint configuration these values must be changed. See section 7.4.

Once the two levels have been set, then the next stage is to correctly enter the input and output matrix size. Figure 7-9 assumes an EQX26 frame fully populated with 576x576 I/O's.

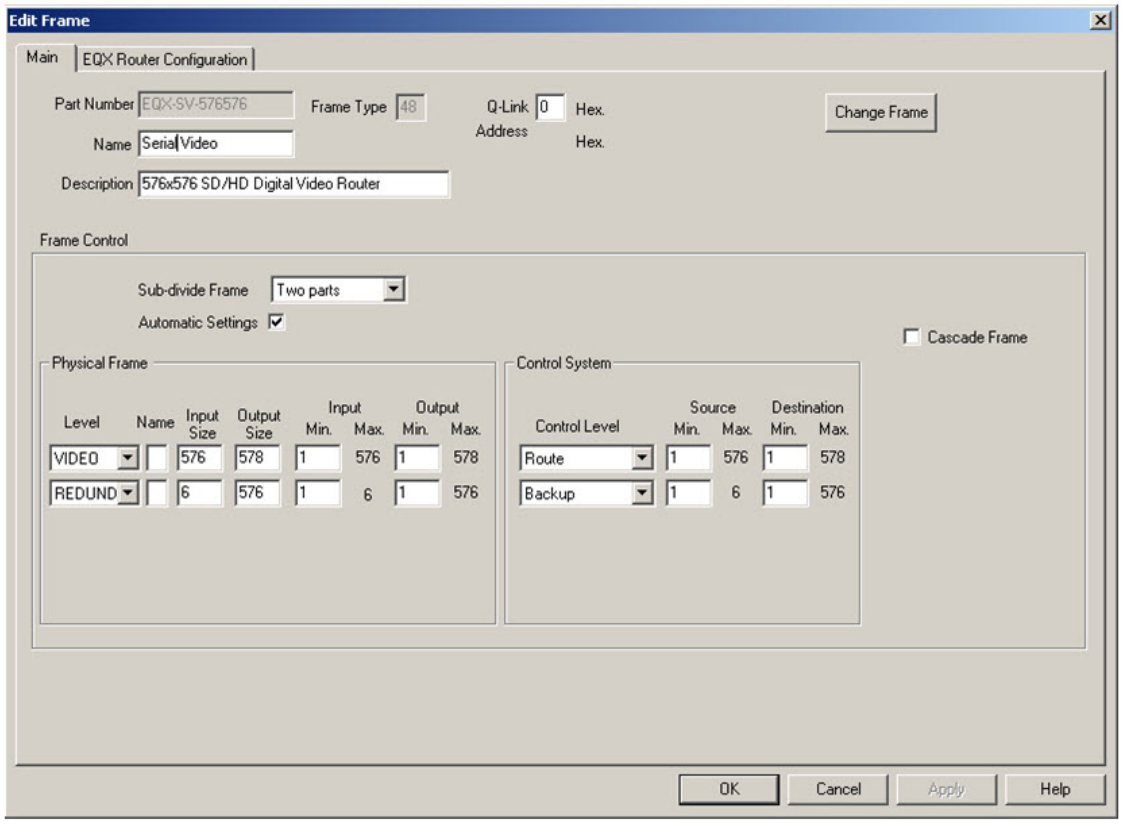


Figure 7-9: New Frame Window – Enter the Required Input and Output Values

Enter the following values for the *"Physical Frame".*
To configure the *"Video Level"* enter these values:

- *"Input Size"* set to 576.
- *"Output Size"* set to 578. The two additional outputs will be used for monitoring outputs.
- *"Input Min"* set to 1.
- *"Output Min"* set to 1.

The "*Control System*" will pick up these new values automatically.

The Redundant level is used to control the crosspoint redundancy. The six inputs assigned to this level are virtual inputs, and allow control to be made on a per-destination basis.

To configure the "*Redundant Level*", enter these values:

- *"Input Size"* set to 6.
- *"Output Size"* set to 578. The two additional outputs will be used for monitoring outputs.
- *"Input Min"* set to 1.
- *"Output Min"* set to 1.

The *"Control System"* will pick up these new values automatically.

7.4. FRAME CONFIGURATION

Now that the physical and control levels of the EQX router have been defined the next step is to configure the source and destination operational parameters.

Source Parameters: Each of the possible 576 sources of the EQX router has a number of operational parameters associated with them, for example non-reclocked or reclocked. These parameters are used to define the configuration of the internal path through the EQX router for the selected source as it is switched to any of the destinations (Source-by-Source intelligent auto-configuration). The parameters for each source can be different and are either configured individually (source-by-source), in groups of sources with common parameters, or as a single 576 block. The parameters for setting each source are shown in Figure 7-10.

Destination Parameters: If required, the parameters that are defined for any of the sources can be over-ruled, which is achieved by defining "Destination Parameters". This may be required, for example, if the device that is directly fed from destination 576 requires the source to always be reclocked, then output 576 should be configured to reclock the source regardless of the parameters that have been defined by the source. For more information on destination parameters refer to section 7.4.4.

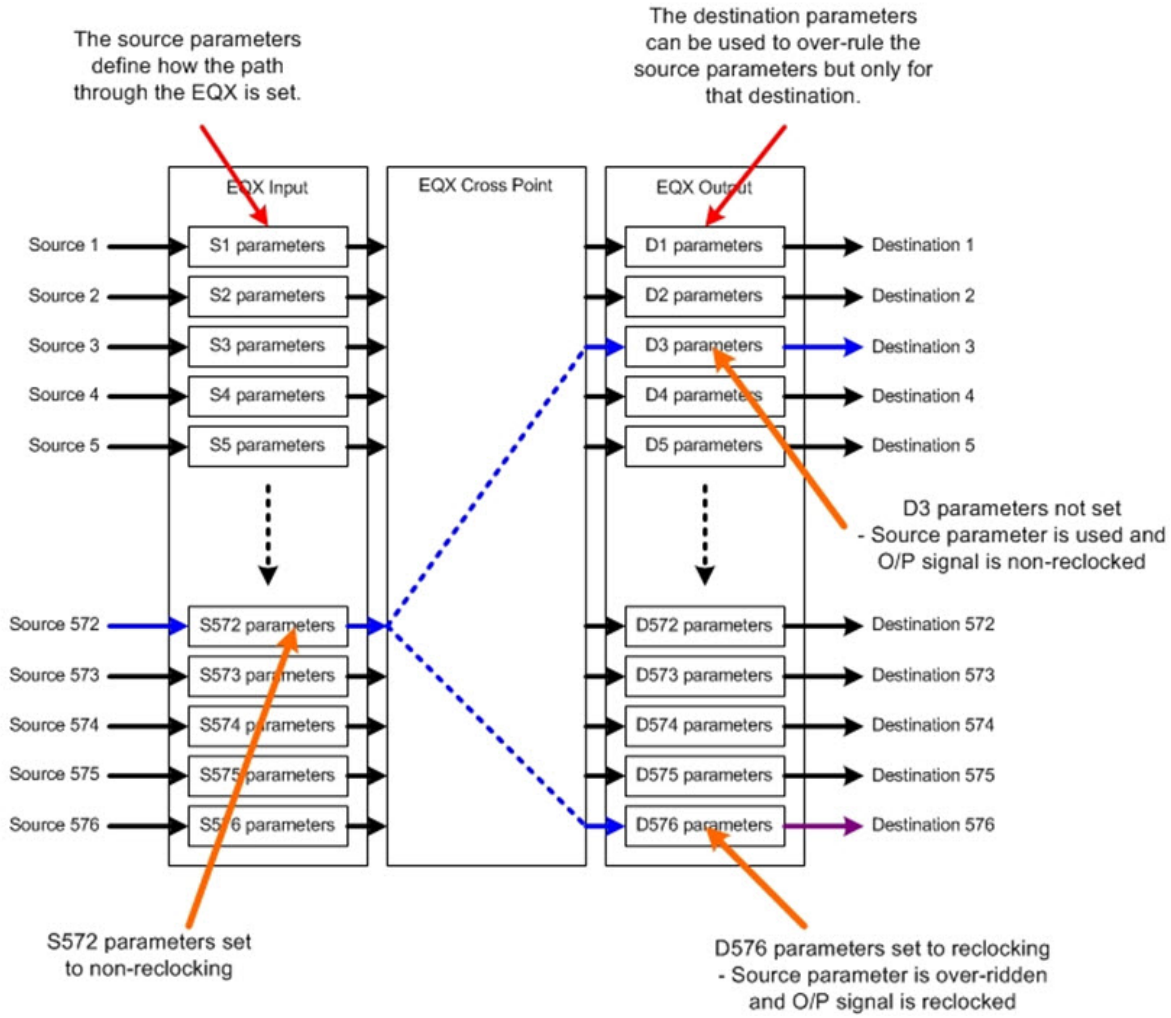


Figure 7-10: Source and Destination Parameters

The source and destination operational parameters of the EQX router can be defined in many different ways. The following examples are a few of the most common configuration examples.

1. Create a 'universal' set of source parameters and apply to all Sources. Then use the destination parameters to define any exceptions to this setting on a destination-by-destination bases. This method is particularly quick for configuring an EQX router that is dedicated to routing a single video format and, therefore, switch point.

2. Create a 'common' set of source parameters for each of the signal formats to be routed through the EQX, for example SD 625, HD 720p and HD 1080i. Then use the destination parameters to define any exceptions to these rules as required on a destination-by-destination bases. This method is particularly quick for configuring an EQX router that is switching multiple signal formats.

To set up the EQX, click on the "*EQX Router Configuration"* tab. This will provide access to the EQX configuration options, as shown in Figure 7-11. This view is used to set up the EQX Hardware as well as the Source Parameters.

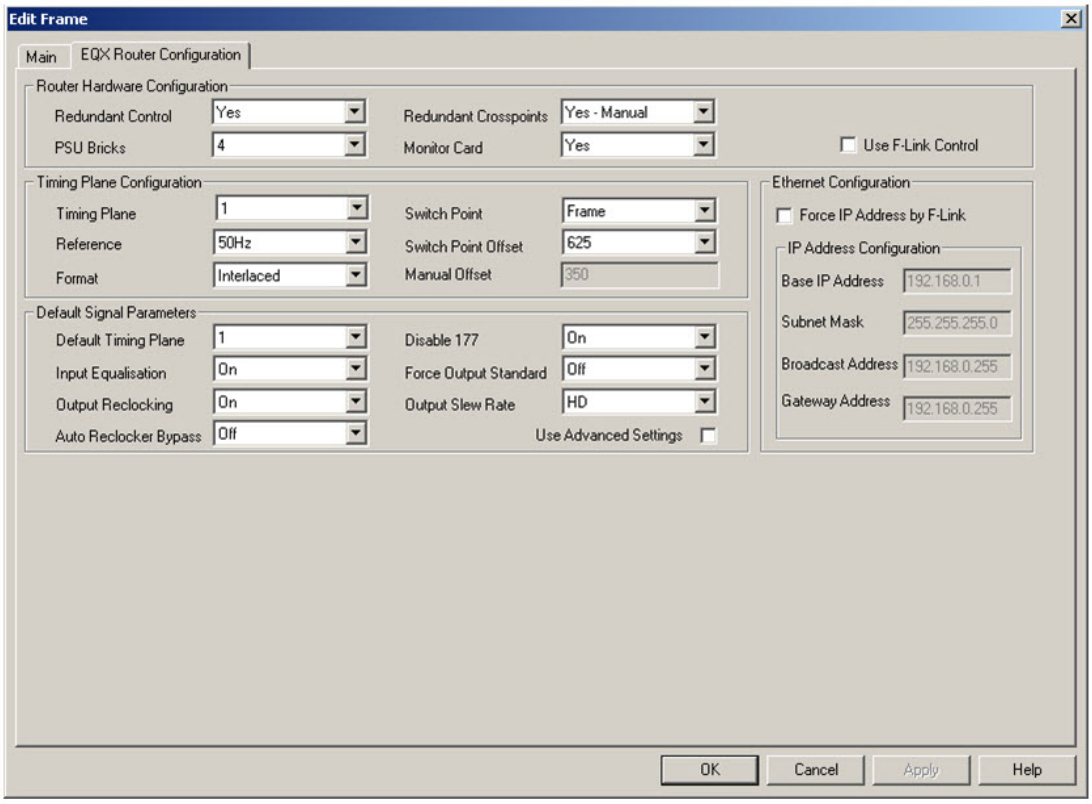


Figure 7-11: EQX Configuration Window (WinSetup version2.22)

When opened for the first time this screen will show a default configuration. Use the various drop down menus to change each or the EQX parameters as required.

The EQX router configuration window is divided into three distinct areas, which are:

a. **Router Hardware Configuration**
b. **Timing Plane Configuration**
c. **Default Signal Parameters**

7.4.1. Router Hardware Configuration

This section is used to select the hardware options that have been purchased as part of the EQX router. The options are as follows:

Redundant Controller: ***Yes***, this confirms that the redundant (second) frame controller module is fitted to the EQX frame.

No, this confirms that only one frame controller module is fitted to the EQX frame.

Redundant Crosspoint: ***No***, this confirms that the redundant crosspoint module is NOT fitted to the EQX frame.

Yes – Manual, this confirms that the redundant crosspoint module is fitted to the EQX frame and that it has been set into manual switch over mode, regardless of the setting made on the redundancy level.

Yes – Automatic, this confirms that the redundant crosspoint module is fitted to the EQX frame and that it has been set into automatic switch over mode. Note that automatic switchover only happens from a main crosspoint to the redundant. The switch back to main crosspoint must always be made manually.

PSU Bricks: ***1 through to 8***, select the number of power supply modules that are fitted into the external EQX power supply frame.

A fully populated 576x576 EQX router requires four (4) power supply modules for non-redundant operation and eight (8) for fully redundant operation.

A fully populated 288x288 EQX router requires two (2) power supply modules for non-redundant operation and four (4) for fully redundant operation.

Monitor Card: ***No***, this confirms that the monitor card is not fitted to the EQX Router.

Yes, this confirms that the monitor card is fitted to the EQX Router.

7.4.2. Timing Plane Configuration

In order for a router to provide a clean SMPTE compliant switch the video sources must be synchronous (correctly timed) with respect to the reference. The crosspoint must also be switched at the correct point within the video signal. However, the switch point for each type of video signal format (for example SD 625, HD 720p and HD 1080i) is different. This means that today's routers must be able to internally generate a number of different timing planes in order to correctly switch multiple video formats. The EQX is able to generate up to four independent timing planes each of which are defined by the values and settings that are selected in the *"Timing Plane Configuration"* window.

The video reference connected for the EQX can be a Bi-level or Tri-level signal, as the EQX will generate the correct timings for SD and HD video signals from either. A 50Hz or 59.94Hz reference must be used in order to generate 50Hz or 59.94Hz timings. If 50Hz and 59.94Hz video signals are to be switched through the EQX then both a 50Hz and 59.94Hz reference signal must be connected. The EQX has two reference input connectors to accommodate this requirement.

The timing plane configuration options are as follows:

Timing Plane: ***1, 2, 3 or 4***, this selection determines which of the four (4) timing planes is being configured. Any changes to the other parameters within this area will only affect the timing plane that is currently selected.

Each of the timing planes are independent and are dedicated to a single video signal format, for example SD 625 @ 50Hz, or HD 720p @ 59.94Hz.

Reference: ***50Hz***, this confirms that the selected timing plane is to use the 50Hz reference signal. This box will be grayed out as this selection is set automatically by the "Switch point Offset".

59.94Hz, this confirms that the selected timing plane is to use the 59.94Hz reference signal. This box will be grayed out as this selection is set automatically by the "Switch point Offset".

The EQX router has two (2) Reference inputs. Both of the reference signals connected to these two inputs can be either bi-level or tri-level (or one of each). From the reference input(s), the EQX router is able to calculate the correct switch point for up to four independent timing planes. However, a 50Hz and/or 59.94Hz signal must be connected in order for the EQX to generate the correct switch point for a 50Hz and/or 59.94Hz signal.

Switch Point: ***Frame***, this sets the switch point for the signal on the selected timing plane to be frame based. The selection will only be available for interlaced signals. When a progressive signal is selected this box will be grayed out.

Field, this sets the switch point for the signal on the selected timing plane to be field based. The selection will only be available for interlaced signals. When a progressive signal is selected this box will be grayed out.

Switch Point Offset: Manual / 626 / 525 / 1080i 50Hz / 1080i 59.94Hz / 720p 50Hz or 720p 59.94Hz, this sets the switch point offset for the signal on the selected timing plane. Selecting '*Manual'* allows the switch point offset to be manually adjusted.

Manual Offset: Enter a numeric value that represents the required switch point offset for the selected timing plane. The value represents micro-seconds and can be used to compensate for system timing issues. This box is only available when the drop down list for '*Switch Point Offset'* is set to **manual**.

7.4.3. Default Signal Parameters

This section is used to select the default settings for each timing plane for the additional features provided by the EQX router, such as Reclocking, ASI mode etc:

Default Timing Plane: ***1, 2, 3 or 4***, this defines which timing plane is used as the default. Unless otherwise specified all the sources will use the parameters that are defined by the default timing plane.

Input Equalization: ***ON***, this turns on the input equalization circuitry for each source.

Off, this turns off the input equalization circuitry for each source.

Output Reclocking: ***ON***, this turns on the output reclocking circuitry for each source.

Off, this turns off the output reclocking circuitry for each source.

Auto Reclocker Bypass: ***ON***, this turns on the auto reclocker bypass circuitry for each source. This setting will automatically bypass the output Reclockers if the Reclockers are unable to lock correctly to the signal.

Off, this turns off the auto reclocker bypass circuitry for each source.

The auto reclocker bypass circuit will attempt to reclock the incoming signal, if it fails to reclock the signal, it will automatically switch the reclocker into bypass mode and bypass the reclocking circuit.

Disable 177 (ASI): ***ON***, this turns on an optional mode within the EQX that prevents the Reclockers from incorrectly identifying the 270Mb/s ASI signal as a 177Mb/s signal.

Off, this turns off this mode.

Force Output Standard: ***143 / 177 / 270 / 360 / 540 or 1485***, this forces the reclocker to lock to the signal format that is selected. Recommended to be set to 270Mb/s when routing using ASI signal.

Off, this turns this feature off – recommended default position when not routing ASI signals.

If the reclocker is unable to lock the source to the selected format then an error message will be generated indicating that the wrong signal type has been switched to this destination. The signal will still pass through but will not be locked.

Output Slew Rate: ***SD***, this sets the slew rate to the slower SD setting.

HD, this sets the slew rate to the faster HD setting.

Xpt Redundancy Output Priority: ***Priority***, this identifies an output as having high priority. If contention for a redundant crosspoint route occurs, this priority is used to determine which output is routed. An output with higher priority will displace the incumbent output in this situation.

7.4.4. Advanced Signal Parameters

The advanced signal parameters are used to define the '**Destination Parameters**' (exception rules) and are used to over-rule the Source Parameters when required. This is achieved by defining 'Destination Parameters'. This may be necessary, for example, if the device that is directly fed from destination 576 requires the source to always be reclocked, then output 576 should be configured to reclock the source regardless of the parameters that have been defined by the source.

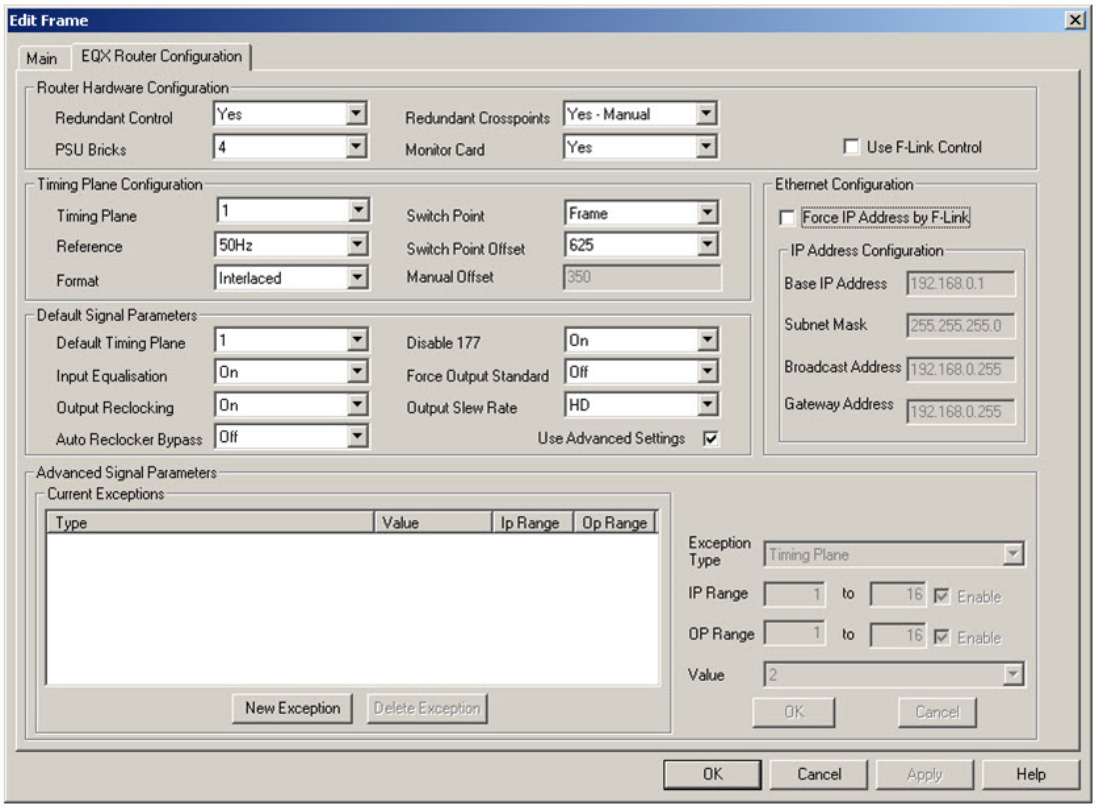


Figure 7-12: EQX Configuration Window – Showing the Advanced Signal Parameters

To gain access to the Advanced Signal Parameters check the box in the Default Timing Plane window called *'Use Advanced Settings'*.

The primary role of the advanced settings is to allow the Source Parameters to be over-ruled by defining a new parameter for a single or range of destinations. However, the advanced setting also allows the Source Parameters to be re-defined on a temporary or permanent base. The change to a Source Parameter can be applied to a single source or range of Sources.

There are a number of exception types:

- ***Timing Plane***
- ***Input Equalization***
- ***Output Reclocking***
- ***Auto Reclocker Bypass***
- ***Disable 177 (ASI)***
- ***Force Output Standard***
- ***Output Slew Rate***
- ***Xpt Redundancy Output Priority***

The operational functionality of the features listed above are the same as described in section 7.4.2. The drop down menu labeled '*Values'* is used in conjunction with the above features.

7.4.5. Creating an Exception Rule

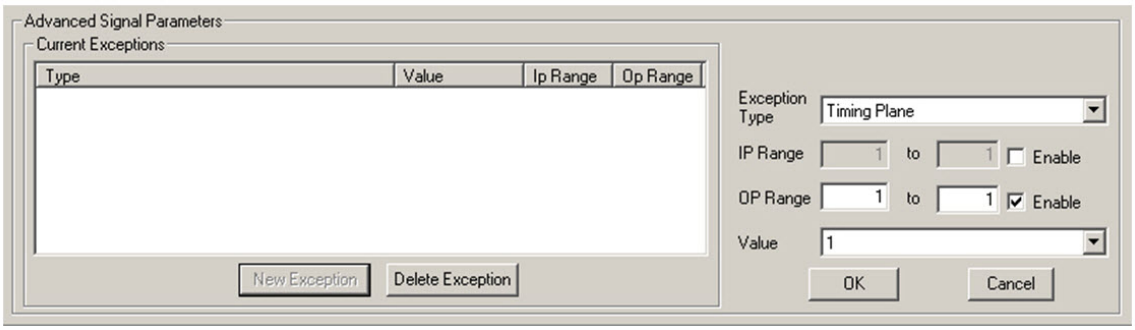


Figure 7-13: Current Exceptions Window

Step 1 – Click the *"New Exception"* button.
Step 2 – Identify if the exception rule needs to be applied to the input and/or output of the EQX router. Enable the relevant section by clicking the *"Enable"* box. The Input Equalization rule can only be applied to an input.
Step 3 – Set the range of inputs and/or outputs that the exception rule is to be applied to, for example 1 to 1 for a single I/O or 24 to 67 for multiple I/O's.
Step 4 – Select the *"Exception type"* from the drop down list.
Step 5 – Select the *"Value"* from the drop down list.
Step 6 – Click OK to return to the main menu screen.

Consider the following:
- **If the exception rule is applied to a Source (input) then this change will be carried through to every Destination (output) that the Source is switched to.**
- **If the exception rule is applied to a Destination (output) then this change will only affect that Destination.**

Example Exception Rules

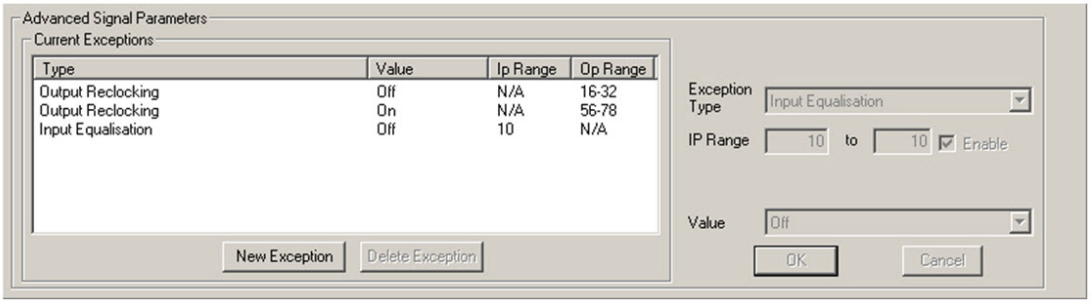


Figure 7-14: Exception Rules

Figure 7-14 provides examples of three exceptions:

- The output reclockers are turned off for outputs 16 through to 32.
- The output reclockers are turned on for outputs 56 through to 78.
- The input equalization circuit is turned off for input 10.

7.5. SOURCES

The next stage is to create the *"Source table"*. The source table defines the number and names of the sources connected to the EQX router. To enter the "Source Definition" window click on the *"Sources"* button from the main menu.

Click on the *"Add"* button and follow the instructions to add the relevant number of sources to the 'Source Definition' table. The software will prompt you to use default names - SRC-1 to SRC-n. The names can be edited later.

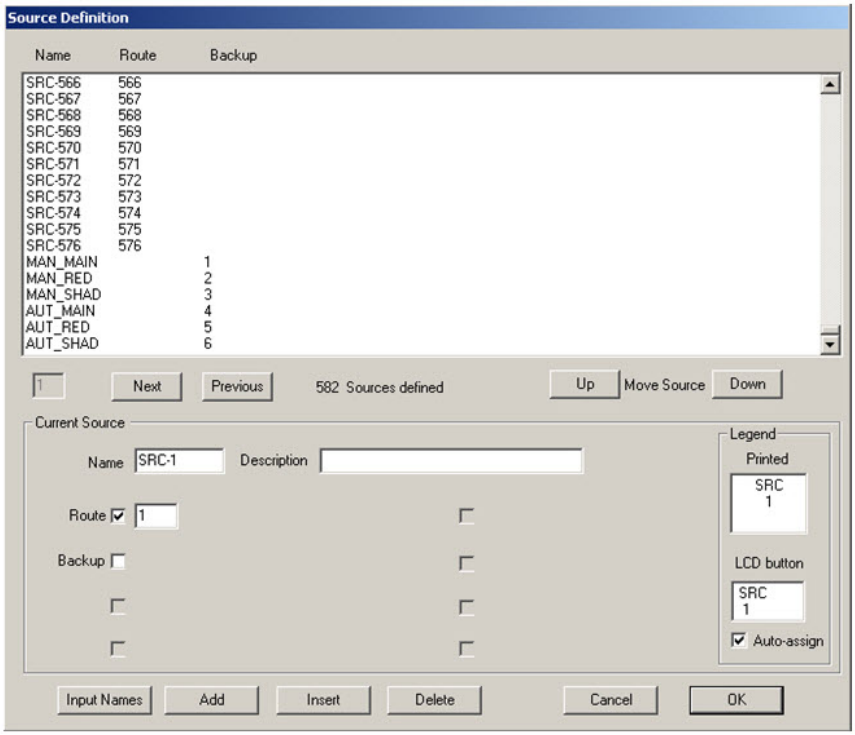


Figure 7-15: Source Definition Window

If you want to edit a name, select the required row from the list of names in the upper part of the screen. The selection will be confirmed by a blue highlight behind the text. The details, such as the name and description of the selection will appear in the lower part of the screen. From here you can edit the name and decide which signal levels that name will control.

The *'Legend'* area allows the printed or electronic (LCD) labels for the Control Panel buttons to be defined. Clicking the *'Auto-assign'* button initiates the software to automatically create the text for the button labels from the names used in the Source list. These labels can be overruled at any time by simply typing a new name directly into the relevant *"Legend"* box.

The last six Sources that are shown in the source list relate to the operation of the redundant crosspoint. The source routed on this level to a particular destination controls its crosspoint redundancy. The meaning of the values is as follows:

1) Main crosspoint selected
2) Redundant crosspoint selected
3) Main crosspoint selected, with auto switchover to redundant in the case of route failure detection.
4) Redundant crosspoint selected. At the moment there is no automatic switch back to main.
5) The redundant crosspoint will follow the main crosspoint settings, allowing faster changeover in the case of a failure.

Click OK to return to the main menu.

7.6. DESTINATIONS

Once the Source Definitions have been created the main menu will allow access into the 'Destination Definition' window where the 'Destination table' can be created. The destination table defines the number and names of the destinations connected to the EQX router. To enter the 'Destination Definition' window, click on the 'Destination' button from the main menu.

Click on the 'Add' button and follow the instructions to add the relevant number of destinations to the 'Destination Definition' table. The software will prompt you to use default names - DST-1 to DST-n. The names can be edited later.

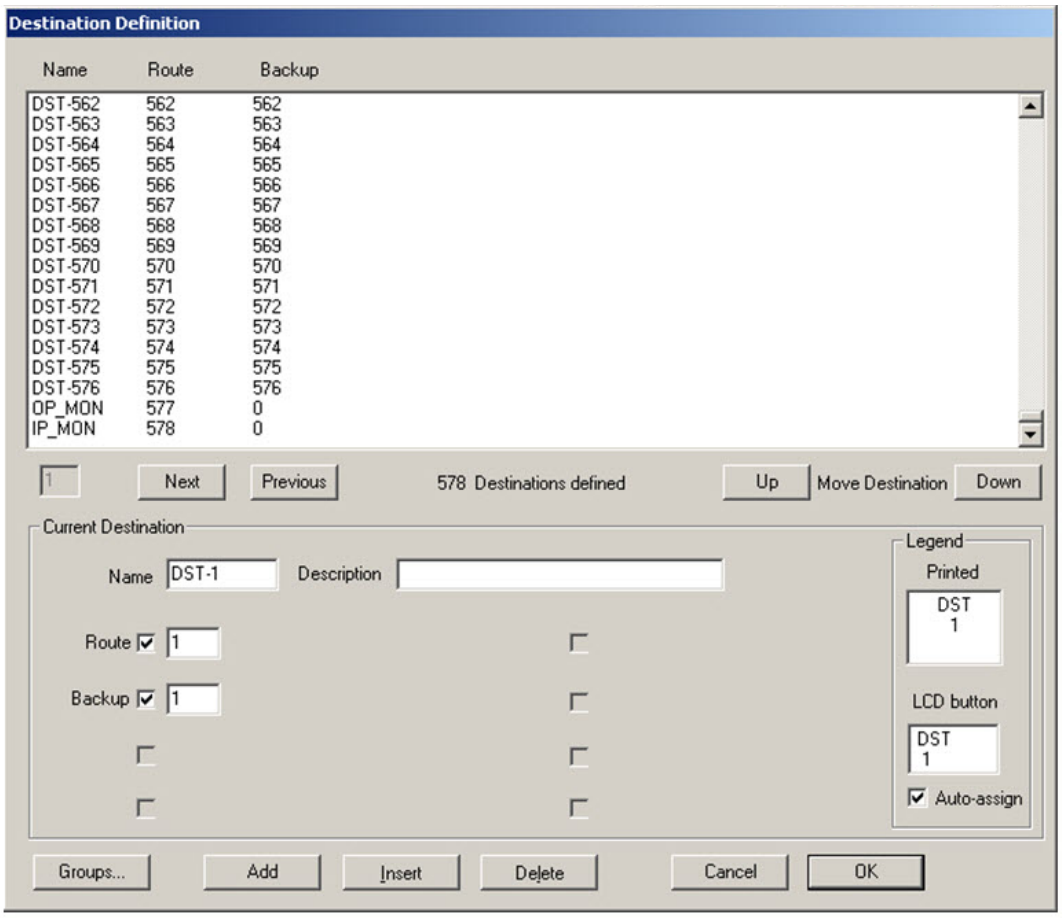


Figure 7-16: Destination Definition Window

If you want to edit a name, select the required row from the list of names in the upper part of the screen. The selection will be confirmed by a blue highlight behind the text. The details, such as the name and description of the selection will appear in the lower part of the screen. From here you can edit the name and decide which signal levels that name will control.

The *'Legend'* area allows the printed or electronic (LCD) labels for the Control Panel buttons to be defined. Clicking the *'Auto-assign'* button will initiate the software to automatically create the text for the button labels from the names used in the Destination list. These labels can be overruled at any time by typing a new name directly into the relevant 'Legend' box. The last two Destinations that are shown in the source list relate to the operation of the EQX monitoring circuit. Click OK to return to the main menu.

7.7. CONTROL PANELS

Enter the 'Panels' dialog and select 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 displaying a graphic of the panel. The example below shows a CP-1604 panel type.

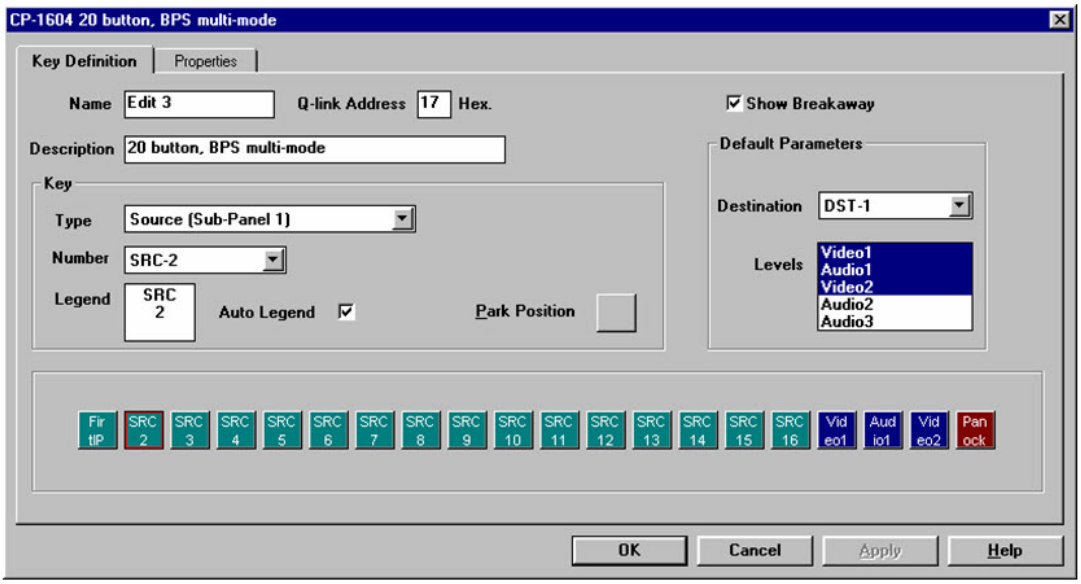


Figure 7-17: Key Definition Window

Each button can be programmed by selecting the button and then editing the functions in the *Key* section of the dialog. It is also recommended that each panel should be given a name for future identification. It is common practice for the name to reflect the panel's location, for example "EDIT 3".

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. Once setup, add any other panels that the system will need.

Each panel will be automatically allocated a Q-Link address (which can be changed).

Ensure that the Q-Link address switch on the Control Panel matches the Q-Link address set in your configuration.

7.8. 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.

7.9. COMMUNICATION WINDOW

Use the Comms Window to check for correct setup and working communication between the PC and the router.

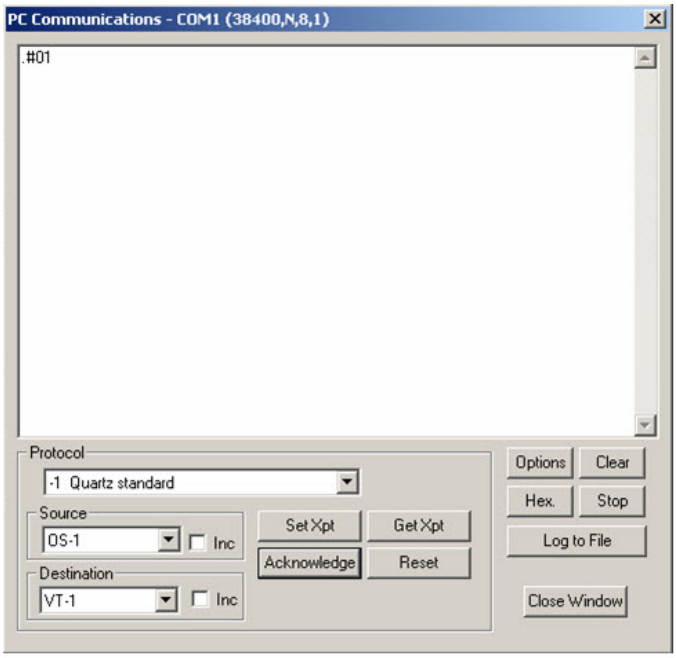


Figure 7-18: COM1 Window

Click the 'Comm Window' tab and the window shown in Figure 7-18 will open automatically. From the Protocol drop down list select *-1 Quartz Standard*. Click the *"Acknowledge"* button and WinSetup will send ".#01". Look for a response to the send command in the window. This response should be "A". If a response is not seen, check the settings under the options button. A response confirms the communication is OK between the PC and the Router.

Use the Comm Window to check the communication between the router and the PC.

8. MODULE IP ADDRESSES

8.1. SETTING THE EQX FRAME CONTROLLER(S) IP ADDRESS

Connect the upgrade cable to the upgrade jumper J13 of the Frame Controller. Pressing <ENTER> on your keyboard will bring up the Main Menu as shown in Figure 8-1.

```
----------------------------------------
(1) Network Configuration
(2) Serial Port Setup
(3) SNMP Setup
(4) Status Monitoring
(5) Runtime Statistics - Engineering Only
(6) Engineering/Debug

(X) Exit
>
----------------------------------------
```

Figure 8-1: HyperTerminal Main Menu

To open a menu item, type the corresponding number from the list, and then press <ENTER>. **Remember to SAVE when a change has been made before exiting the menu**.

Selecting menu item (1) *Network Configuration* from the Main Menu will enable the user to set the IP address properties for the Frame Controller.

```
 network 1 (backplane 'B' and Front connector) is enabled
 MAC:               00:02:c5:10:52:be
 ip address:        192.168.10.200
 netmask address:   255.255.255.0
 broadcast address: 192.168.10.255
 DHCP enabled:      False
 ------------------------------------------------
 gateway:           0.0.0.0
 remote address:    192.168.20.201
 ------------------------------------------------
 network 2 (inter FC) is enabled
 ip address 2:      192.168.20.200
 netmask address 2: 255.255.255.0
 ------------------------------------------------
 network 3 (backplane 'A') is enabled
 ip address 3:      192.168.30.200
 netmask address 3: 255.255.255.0
 ------------------------------------------------
(1) Set IP Address 1
(2) Enable Network 1
(3) Set Netmask 1
(4) Set Broadcast Address
(5) Use DHCP
(6) Set Gateway
(7) Set remote IP Address
(8) Enable Network 2
(9) Set IP Address 2
(10) Set Netmask 2
(11) Enable Network 3
(12) Set IP Address 3
(13) Set Netmask 3

(S) Save and Exit
(X) Exit
>
```

Figure 8-2: Network Configuration Menu

In the above menu (Figure 8-2), selecting options (1) through (13) allows the user to set the networking parameters of the Frame Controller. DHCP is not recommended as control of the EQX requires static IP addresses. Once completing the IP configurations, save and exit this menu by selecting the “S” option. All modules ship with DHCP disabled (or DHCP enabled set to “FALSE”). If you are not sure whether you should use this option, contact your networking/IT administrator. After you have saved and exited the menu, the frame controller will need to be restarted

8.2. SETTING THE IP ADDRESS FOR THE ALL OTHER EQX MODULES

The IP address of each module within the EQX has been pre-assigned to the values shown in this document for testing purposes. They can be left as they are or changed to a value that better reflects your exact network topology.

There are two separate Ethernet networks within the EQX router – 'A' and 'B'. Each network has two RJ45 connectors mounted onto the rear of the EQX frame. The router supports TCP/IP protocol, the address of which can be set via the serial port when using Quartz (-1) protocol and the EQX configuration software, WinSetup.

Use the WinSetup configuration application to change the IP address of the EQX modules (apart from the Frame Controllers).

1. Open the WinSetup application and load the current WinSetup configuration file.
2. In the main Window click on the EQX router that appears in the "Frames" section. The "Edit Frame" window will open.
3. In the "Edit Frame" window, click on the "EQX Router Configuration" tab to open this window, as shown below.

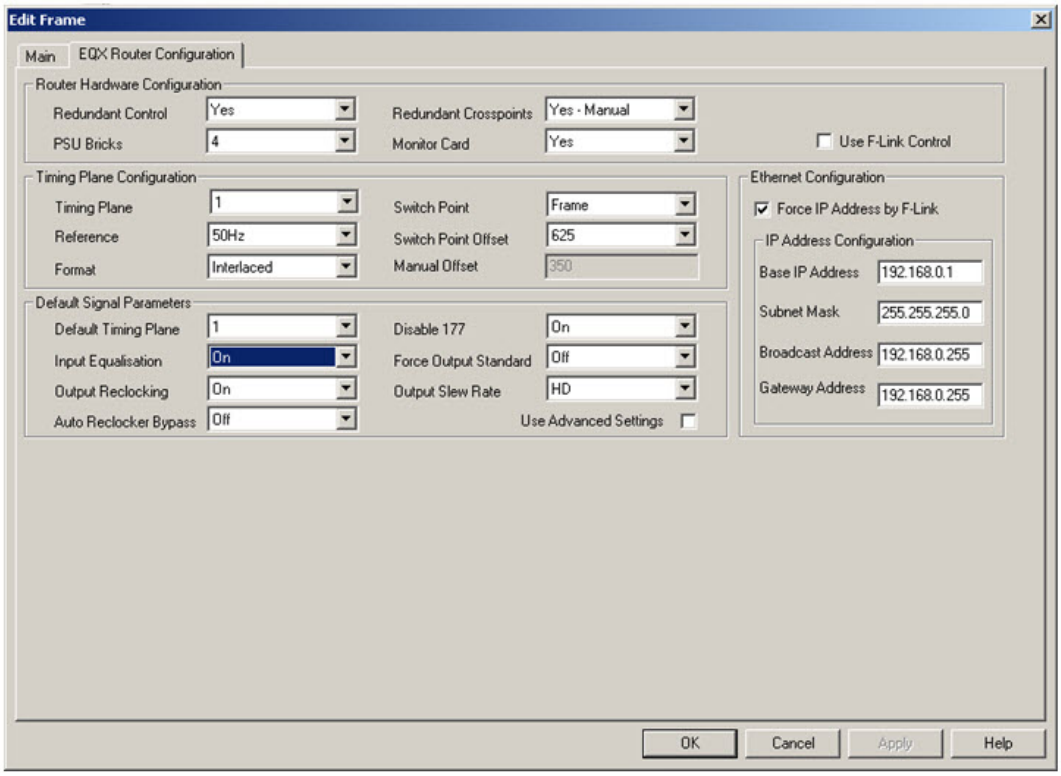


Figure 8-3: Edit Frame Window

4. Check the box "Force IP Address by F-Link".

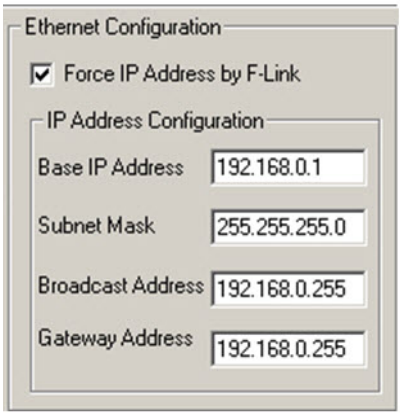


Figure 8-4: Ethernet Configuration Window

5. Enter the required IP address into the “Base IP Address” box – this example shows the default IP Address of 192.168.0.1.
6. Enter the “Subnet Mask” IP Address of 255.255.255.255
7. Enter the “Broadcast Address” and “Gateway Address” of 192.168.0.255

The IP Addresses will be automatically allocated to all of the EQX Input, Output, Crosspoint and Monitor modules in sequence when the new configuration is downloaded, as shown in the following tables.

It is important that the factory configured IP Addresses are documented before any changes are made.

Slot	Module	Range	IP Address			
9	Digital Video Inputs	1-18	192	168	0	9
10	Digital Video Inputs	19-36	192	168	0	10
11	Digital Video Inputs	37-54	192	168	0	11
12	Digital Video Inputs	55-72	192	168	0	12
13	Digital Video Inputs	73-90	192	168	0	13
14	Digital Video Inputs	91-108	192	168	0	14
15	Digital Video Inputs	109-126	192	168	0	15
16	Digital Video Inputs	127-144	192	168	0	16
17	Digital Video Inputs	145-162	192	168	0	17
18	Digital Video Inputs	163-180	192	168	0	18
19	Digital Video Inputs	181-198	192	168	0	19
20	Digital Video Inputs	199-216	192	168	0	20
21	Digital Video Inputs	217-234	192	168	0	21
22	Digital Video Inputs	235-252	192	168	0	22
23	Digital Video Inputs	253-270	192	168	0	23
24	Digital Video Inputs	271-288	192	168	0	24
41	Digital Video Inputs	289-306	192	168	0	41
42	Digital Video Inputs	307-324	192	168	0	42
43	Digital Video Inputs	325-342	192	168	0	43
44	Digital Video Inputs	343-360	192	168	0	44
45	Digital Video Inputs	361-378	192	168	0	45
46	Digital Video Inputs	379-396	192	168	0	46
47	Digital Video Inputs	397-414	192	168	0	47
48	Digital Video Inputs	415-432	192	168	0	48
49	Digital Video Inputs	433-450	192	168	0	49
50	Digital Video Inputs	451-468	192	168	0	50
51	Digital Video Inputs	469-486	192	168	0	51
52	Digital Video Inputs	487-504	192	168	0	52
53	Digital Video Inputs	505-522	192	168	0	53
54	Digital Video Inputs	523-540	192	168	0	54
55	Digital Video Inputs	541-558	192	168	0	55
56	Digital Video Inputs	559-576	192	168	0	56

Table 8-1: Digital Input Modules

Slot	Module	Range	IP Address			
1	Digital Video Outputs	1-18	192	168	0	1
2	Digital Video Outputs	19-36	192	168	0	2
3	Digital Video Outputs	37-54	192	168	0	3
4	Digital Video Outputs	55-72	192	168	0	4
5	Digital Video Outputs	73-90	192	168	0	5
6	Digital Video Outputs	91-108	192	168	0	6
7	Digital Video Outputs	109-126	192	168	0	7
8	Digital Video Outputs	127-144	192	168	0	8
25	Digital Video Outputs	145-162	192	168	0	25
26	Digital Video Outputs	163-180	192	168	0	26
27	Digital Video Outputs	181-198	192	168	0	27
28	Digital Video Outputs	199-216	192	168	0	28
29	Digital Video Outputs	217-234	192	168	0	29
30	Digital Video Outputs	235-252	192	168	0	30
31	Digital Video Outputs	253-270	192	168	0	31
32	Digital Video Outputs	271-288	192	168	0	32
33	Digital Video Outputs	289-306	192	168	0	33
34	Digital Video Outputs	307-324	192	168	0	34
35	Digital Video Outputs	325-342	192	168	0	35
36	Digital Video Outputs	343-360	192	168	0	36
37	Digital Video Outputs	361-378	192	168	0	37
38	Digital Video Outputs	379-396	192	168	0	38
39	Digital Video Outputs	397-414	192	168	0	39
40	Digital Video Outputs	415-432	192	168	0	40
57	Digital Video Outputs	433-450	192	168	0	57
58	Digital Video Outputs	451-468	192	168	0	58
59	Digital Video Outputs	469-486	192	168	0	59
60	Digital Video Outputs	487-504	192	168	0	60
61	Digital Video Outputs	505-522	192	168	0	61
62	Digital Video Outputs	523-540	192	168	0	62
63	Digital Video Outputs	541-558	192	168	0	63
64	Digital Video Outputs	559-576	192	168	0	64

Table 8-2: Digital Output Modules

Slot	Module	Range	IP Address			
Top XPT	XPT A	Top Outputs	192	168	0	65
Top XPT	XPT B	Top Outputs	192	168	0	66
Middle XPT	XPT A	Redundant	192	168	0	67
Middle XPT	XPT B	Redundant	192	168	0	68
Bottom XPT	XPT A	Bottom Outputs	192	168	0	69
Bottom XPT	XPT B	Bottom Outputs	192	168	0	70

Table 8-3: Crosspoint Modules

Slot #	Module	IP Address			
monitor LHS	monitor LHS	192	168	0	71
monitor RHS	monitor RHS	192	168	0	72

Table 8-4: Monitor Modules

Slot	Module	IP Address			
Upper	Frame Controller	192	168	0	200
Lower	Frame Controller	192	168	0	201

Table 8-5: Frame Controller Modules

For instructions on changing the Frame Controller IP address please refer to section 8.1.

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9. TECHNICAL DESCRIPTION

9.1. SPECIFICATIONS

9.1.1. Configuration

EQX26:	576x576 in 26RU (PSU separate 1RU)
EQX16:	288x288 in 16RU (PSU separate 1RU)
Inputs:	Selectable in blocks of 18
Outputs:	Selectable in blocks of 18
Redundant Protection:	Redundant Crosspoint Redundant Frame Controller Redundant Power Supply Redundant Cooling Fans

9.1.2. Video Inputs

Standards:	SMPTE 259M, SMPTE 292M, SMPTE 310M, SMPTE 424M, ASI
Signal Level:	800mV p-p
Impedance:	75Ω terminating
Return Loss:	>15db typical (5-1500 MHz) >10db typical (1.5-3GHz)
Cable Equalization:	Belden 1694 @ 270 MHz 300m Belden 1694 @ 1.5GHz 100m
Connectors:	BNC per IEC 61169-8 Annex A
Optical Sensitivity:	-22 dBm
Optical Wavelength:	1260nm – 1620nm
Optical Format:	Single Mode

9.1.3. Video Outputs

Signals Supported:	SMPTE 259M, SMPTE 292M, SMPTE 310M, SMPTE 424M, ASI
Reclocking:	Configurable
Non-Reclocking:	Configurable
Signal Level:	800mV p-p ± 10%
Impedance:	75Ω terminating
Return Loss:	>15 db typical (5-1500 MHz) >10db typical (1.5-3GHz)
DC Offset:	0 ± 0.5V
Output Jitter:	0.2 UI
Connectors:	BNC per IEC 61169-8 Annex A
Average Optical Power:	-5 dBm
Optical Wavelength:	1310nm
Optical Format:	Single Mode

9.1.4. Reference Timing

Switching Reference:	Analog 525/625/tri-level HD looping connections
Connector:	2 BNC per IEC 61169-8 Annex A
Signal Level:	1 V p-p ± 3dB
Impedance:	75Ω terminating active loop out optional
Reference Timing:	4 independent timing planes, programmable output by output

9.1.5. Control

Q-Link:	4x 75Ω video cable (max length 500m)
F-Link:	2x RJ45
Serial	RS422/232: 2x D9 female
Ethernet:	10/100baseT, 2x RJ45

9.1.6. Physical

Height:	
EQX-26FR:	45.5” (115.5cm) 26RU
EQX-16FR:	28” (49cm) 16RU
Width:	19” (483mm) 19” Rack Mount
Depth:	19.4” (493mm) over hinges and BNCs
Weight:	
EQX-26FR:	374Lbs (171Kg) Fully Loaded
EQX-16FR:	218Lbs (99Kg) Fully Loaded
Operating Temperature:	0°C to -40°C
Cooling:	Fan cooled, front to rear

9.1.7. Electrical – Router

Input Voltage:	48 VDC
Maximum Input Current:	
EQX-26FR:	75 amps
EQX-16FR:	100 amps
Typical Input Power:	1500 W for fully loaded 288x288 config 3000 W for fully loaded 576x576 config
Redundancy:	Separate 1RU frame with up to 4 PS modules for 1:1 redundancy available

9.1.8. Electrical – External Power Supply

Configuration:	Up to 4 load sharing PS modules in 1RU frame
Connector:	IEC 60320 - separate mains input for each PS module
Input Voltage:	Auto ranging 100 ⇔ 240V nominal, 50/60Hz
Maximum Input Current:	13.2 A (@ 120 VAC), 7.2 A (@ 220 VAC) per PS module at 1200W load
Output Voltage:	48 VDC
Output Power:	1200 Watts per PS module

9.2. CONNECTOR PIN-OUTS

9.2.1. Serial Ports

The EQX router supports four (4) rear I/O Serial ports. Each of the four serial ports connect directly to each of the EQX frame controllers.

The serial ports are typically used for the connection of third party control devices, such as automation systems.

It is recommended that Serial Port 1 is left available for the connection of the PC running the EQX configuration software (WinSetup).

The pin-out for the Serial ports is shown in Table 9-1:

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

Table 9-1: RS422 Serial Port 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 PIN FEMALE D-TYPE	
PIN	**SIGNAL**
1	0V
2	RTS
3	RXD
4	0V
5	-
6	0V
7	TXD
8	CTS
9	-

Table 9-2: RS232 Serial Port Pin-out

The Serial Ports are set to RS422 or RS232 via the WinSetup configuration software.

9.2.2. Alarm Connector

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.

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

The EQX may be in one of three states:

1. **Normal Operation:** The EQX is currently not detecting any internal failures and is receiving power.
2. **Internal Failure:** The EQX is currently detecting an internal failure or has lost power.
3. **Incoming Signal Fault:** The EQX 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 the current should be limited to 20mA (See SMPTE 269M for further details). The pin-out for the Alarm connector is shown in Table 9-2.

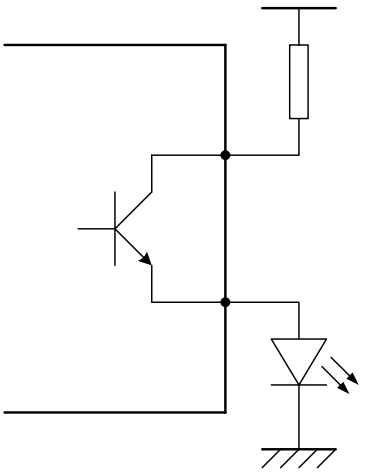

Figure 9-1: Example Alarm Circuit