Topaz Routing

System Manual

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IMPORTANT SAFETY INSTRUCTIONS

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

- Read 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

Safety

WARNING: Dangerously high voltages are present inside this equipment.

WARNING: To reduce the risk of fire or electrical shock, do not expose this appliance to rain or moisture.

WARNING: This equipment uses power/mains connectors fitted with earth pins. It is most important as a matter of personal safety that the equipment is properly earthed.

CAUTION: This equipment may have more than one power supply cord. To reduce the risk of electric shock, disconnect all power supply cords before servicing.

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

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

NEVER use flammable or combustible chemicals for cleaning components.

NEVER operate this product with any covers removed.

NEVER wet the inside of this product with any liquid.

NEVER bypass any fuse or replace any fuse with a value or type other than those specified.

NEVER operate this product in an explosive atmosphere.

NEVER block the airflow through ventilation slots.

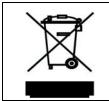NEVER expose this product to extremely low or high temperatures.

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

$C\epsilon$	EN60950	Safety		EN504192 2005
	EN55103-1: 1996	Emission		Waste electrical products should not be disposed of with household waste. Contact your Local Authority for recycling advice
	EN55103-2: 1996	Immunity		

Quartz Electronics Ltd	This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
FC Tested to comply with FCC Standards	1) This device may cause harmful interference, and
	2) This device must accept any interference received, including interference that may cause undesired operation.
For Home or Office Use	

REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.09	Quartz Version	Mar 06
2.0	Evertz Formatting	Jan 09

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Although every attempt has been made to accurately describe the features, installation and operation of this product in this manual, no warranty is granted nor liability assumed in relation to any errors or omissions unless specifically undertaken in the Evertz sales contract or order confirmation. Information contained in this manual is periodically updated and changes will be incorporated into subsequent editions. If you encounter an error, please notify Evertz Customer Service department. Evertz reserves the right, without notice or liability, to make changes in equipment design or specifications.

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1. OVERVIEW

Designed to meet the needs of both broadcast and professional video users, Topaz is an aggressively low priced routing system combining no-compromise technical specifications with a market leading control system. With broadcast quality, reliability, and affordability, Topaz is suited to many applications, including professional, corporate/industrial markets, educational uses and the AV and presentation markets.

Topaz - High Definition routers offer a full 1.5Gb/s bandwidth to handle uncompressed HD signals. Automatic Bit Rate Detection on the input equalizer allows any mix of HD and SD signals in the same unit. Up to 95m of cable equalization is provided at HD data rates (250m at SD rates).

Topaz - Analog Video routers provide excellent performance and reliability at an exceptional price for any analog video application. Full Broadcast Specifications with 75Ω terminating inputs. DC Restored Inputs and vertical interval switching for disturbance free switches.

Component Video signals can be handled by stacking multiple units, or internally splitting the unit into several virtual levels. This allows support of many formats by simple configuration changes.

1.1. FEATURES

Configuration for QT-1616N, QT-3232N:
The QT-1616N router is housed in a 2RU frame and switches 16 sources to 16 destinations. Both the input and output stage of the QT-1616N is fixed at 16. The QT-3232N router is also housed in a 2RU frame and can switch up to 32 sources to 32 destinations. Both the input and output stage of the QT-3232N is fixed at 32.

Configuration for QT-1616H, QT-3232H, QT-1616S, QT-3232S:
The QT-1616H's are housed in a 2RU frame and switches 16 sources to 16 destinations. Both the input and output stage of the QT-1616H are fixed at 16. The QT-3232H's are also housed in a 2RU frame and can switch up to 32 sources to 32 destinations. Both the input and output stage of the QT-3232H are fixed at 32.

Configuration for QT-0808H, QT-1616H, QT-3232H, QT-0808S, QT-1616S & QT-3232S:
The QT-0808H is housed in a 2RU frame and switches 8 sources to 8 destinations. Both the input and output stage of the QT-0808H are fixed at 16. The QT-1616H is housed in a 2RU frame and switches 16 sources to 16 destinations. Both the input and output stage of the QT-1616H are fixed at 16. The QT-3232H is also housed in a 2RU frame and can switch up to 32 sources to 32 destinations. Both the input and output stage of the QT-3232H are fixed at 32.

Control:
The entire range of Topaz routers are compatible with the existing range of Quartz routers, remote control panels and control systems. The Topaz routers include, as standard, an internal Frame Controller module which supports a single Q-Link and Serial port on the rear of the router.
The Topaz routers have a number of control options, they are:

> **Local Control Panel:** The CP-2402-LP can be fitted to the QT-1616N or QT-1616H and QT-3232N or QT-3232H.

Passive Remote Control Panels: The CP-1601A-P and CP-1604-P passive remote control panels can be fitted to the Topaz routers via a PI-1604 or PI-1608 parallel interface.

Remote Control Panel: Any panel(s) from the entire range of Quartz remote control panels can be used with the Topaz routers connected via Q-Link.

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

Expansion:
The input and output stage of the Topaz routers are fixed at 8, 16 and 32. They cannot be expanded beyond their frame size.

Power Supply:
The power supply for the Topaz routers is external and connects to the frame via secure bayonet locking connector. The Topaz routers can be fitted with an optional redundant external power supply. An optional mounting tray securely supports both of the power supplies without the need for additional rack space.

Feature Summary:
- Full broadcast specifications
- Silent operation - convection cooled
- Powerful built-in control systems
- Q-Link and Serial control
- Ethernet control
- Compatible with all Quartz routers and remote control panels
- Frames can be segmented into multiple smaller routers
- Optional power supply tray
- Redundant power supply option
- Bayonet locking power connectors

2.   INSTALLATION

This section describes how to install the system in the most effective and efficient manner. The system has been designed with the goal of being simple to install; we trust that you will agree.

2.1.   UNPACKING

Remove the equipment carefully from the boxes and check against the Packing List supplied with each unit. The list identifies what items have been shipped against your order and includes all options. Any error should be reported to your supplier immediately. After you have unpacked the equipment please save all the packing material as this could be useful in the future if the unit needs to be returned for maintenance.

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

2.2.   PHYSICAL INSTALLATION

2.2.1. Router Frames

All units are designed for mounting in standard 19" equipment racks. The depth of all the frames is 130mm plus connectors, except the Analog Video, which is 275mm. In addition, allowance must be made for the high number of cables to be installed at the rear of the frame.

Power dissipation in all units is low and cooling is achieved by natural convection.

2.2.2. Remote Panels

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

2.3.   ELECTRICAL CONNECTIONS

The following images provide a view of the rear panels and the connectors.

Figure 2-1: Rear View of Topaz QT-3232S Router

Figure 2-2: Rear View of Topaz QT-1616S Router

Figure 2-3: Rear View of Topaz QT-3232H Router

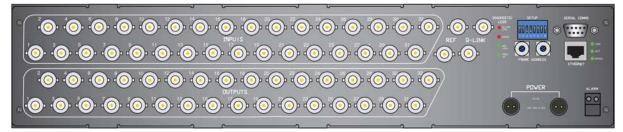**Figure 2-4: Rear View of Topaz QT-1616H Router**

Figure 2-5: Rear View of Topaz QT-3232N Router

Figure 2-6: Rear View of Topaz QT-1616N Router

Figure 2-7: Rear View of Topaz QT-3232-AA Router

Figure 2-8: Rear View of Topaz QT-1616-AA Router

2.3.1. Video Inputs and Outputs

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

On Topaz routers of 16x16 and 32x16, outputs 1-14 are single outputs and 15 and 16 are dual outputs. On 32x32 routers, outputs 1-14 and 17-30 are single outputs and 15, 16, 31, and 32 are dual outputs.

2.3.2. Video Sync

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

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

2.3.3. Audio Inputs and Outputs

Unbalanced AES digital audio should be routed using the Topaz Analog Video router. The connections of the analog audio signals to the equipment are made using 50 way multi-way connectors. One connector is used for each block of 16 audio channels.

The matching cable connectors are all PLUG types. They are not supplied as standard because many customers prefer to buy their connectors in bulk and prepare the cables in advance of the equipment being shipped.

Each connector has three pins for each signal: signal hot (+), signal cold (-) and screen. Figure 2-9 below shows how the cables are wired into the mating plugs. It is good analog audio practice to earth the cable screens at one end only, as hum can sometimes be introduced owing to earth potential differences. However, with digital audio it is better to ground at both ends. For digital audio it is important to use data cable with 110Ω characteristic impedance rather than audio cable. For error free transmission, care should be taken to ensure the cable losses are acceptable over the intended length.
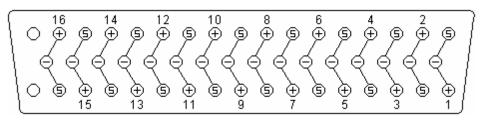

Figure 2-9: Audio Connector Wiring

2.3.4. Remote Control - using Q-link

All Topaz routers can be connected to other Quartz standard routers and standard 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. **The installer must fit a 75Ω terminator at each end of the cable.** A pair of looping connectors is fitted on each unit.

This daisy-chain method ensures the best transmission quality of the control signals down the cable. Shortcuts that might 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.

2.3.5. Ethernet Port

The Ethernet port will support TCP/IP protocol and can be used for the following functions:

- Setup download from WinSetup using TCP/IP protocol
- Router Control using TCP/IP protocol

2.3.6. RS232/422 Serial Port

The D9 connector on the rear of the router is always functional. The router has three rear panel DIP switches to set some of the serial port modes:

DIP Switch	Function
SW-1	Down/Off = Use WinSetup parameters to set the baud rate, etc
	Up/On = Force Quartz standard protocol and baud rate
SW-2	Down/Off = Remote control protocol mode
	Up/On = Diagnostics mode
SW-7	Down/Off = RS-422
	Up/On = RS-232

The router has been built to minimize RF emissions. It is important you use tin and dimple D-type connectors with metal shells connected to the screen of external cables in order to achieve low RF emissions from this equipment. The shells are fixed by screw locks with 4-40 UNC threads.

The Computer Interface connector on the equipment is a D-Type 9 socket using the pin connections shown below. The wiring of the connectors is different for RS232 and RS422. Note that the pin connections described below only apply to the Topaz units that also provide Ethernet support. Earlier models of the QT-SD router have the TX+/- and RX+/- signals inverted on the RS422 interface, otherwise they are the same.
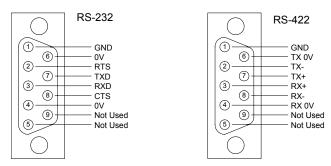
Figure 2-10: RS232/422 Connecting to the Router

2.3.7. RS232 PC Interface Cable

The cable between the PC and the router only needs to use TX, RX, and GND as shown below.
The cable between a PC with a D-Type 9 way connector and the router:
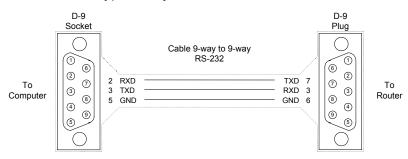
Figure 2-11: RS232/422 Connecting to the Computer

2.4. POWER

The Topaz range uses a common external PSU 'brick' that is auto-ranging and converts nominal 115V or 230V AC mains voltages to safe 12V DC. This then connects to the Topaz router where any internally required voltages are generated. The external PSU has an IEC inlet and approx 1.7m of DC lead terminated in a two-pin bayonet style connector.

IEC connectors have an earth pin and as matter of safety this earth pin must be connected to a solid ground to ensure a proper earth connection.

In the UK, equipment is supplied with a power cord already fitted with a 3 pin mains plug.   Should the lead be re-wired then please make connections using the colour code below:

Brown   Live (Line or Phase)
Blue   Neutral (Return)
Green/Yellow   Earth (Ground)

There is no power switch on the unit so it is essential that the power cord is removed before commencing to service the unit.

All Topaz router PSU's are auto-ranging and no adjustments are required.
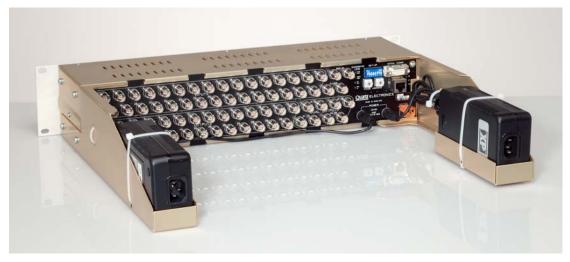
Figure 2-12: Topaz router with power supply mounting trays (optional)

2.5.   CONFIGURING THE FRAMES

All of the Topaz routers have a rear panel DIP switch and rotary address switches to allow basic operating modes to be controlled and the Q-Link address to be set.

2.5.1. DIP Switches

This is a small 8-way switch block. The switches should be moved with a small screwdriver or pen.

DIP Switch	Function
SW1-1	Up/On = Force protocol, Down/Off = Use WinSetup
SW1-2	Up/On = Diagnostics mode Down/Off = Protocol mode
SW1-3	Up/On = Q-Link Slave. Down/Off = Q-Link Master.
SW1-4	Up/On = 2 PSU in use, alarm if one fails. Down/Off = 1 PSU in use.
SW1-5	Up/On = Field rate switching. Down/Off = Frame rate switching
SW1-6	Up/On = 625 Line switching standard (line 6/319). Down/Off= 525 Line switching standard (line 10/273).

SW1-7	Up/On = RS232.
	Down/Off = RS422
SW1-8	QT-SD: Up/On = Self Test Off. Down/Off = Self Test On
	QT-HD: Up/On = Tri-Level Sync. Down/Off = Analog Sync
	QT-AA: Up/On = Self Test Off. Down/Off = Self Test On
	QT-AV: Up/On = DC Restore On. DC Restore Off

Note on earlier Topaz SD units, those without an Ethernet connector, SW 1-4 has a different function:

SW1-4	Up/On = Use last crosspoint settings at power up
	Down/Off = Force all outputs to specified input

Topaz units which provide Ethernet support always power-up with the last crosspoint settings; this is no longer an option and therefore cannot be changed.

2.5.2. Q-Link Address Switches

The rotary hex switches are used to set the unique address of the router. The purpose of the switch setting is to ensure that each router has a different code. This distinguishes different routers and panels in a multi-frame system so each is identified uniquely and updated with the correct settings.

A small screwdriver is needed to fit the slot and make the selection. Rotate the switch, which has 16 positions from 0 through 9, then A to F (hexadecimal notation). The two switches together support the address range from 00 to 3F.

2.5.3. TV Line Switching

2.5.3.1. Standard Definition Digital Video Router & Analog Video Router

Switching complies with the SMPTE RP-168 standard. SW1-6 is used to select the reference standard used to synchronize the switching. It is also possible to choose whether to permit switching on every TV field or only on the first field of each frame, which is important in some editing applications, using SW1-5. For Standard Definition Digital Video Routers SW1-8 should be in the down position as bi-level syncs have to be used for the correct switching point.

Function	SW1-5
Field mode	Up/On
Frame mode	Down/Off

Function	SW1-6
625	Up/On
525	Down/Off

2.5.3.2.   High Definition Router

The Topaz High Definition Router has one timing plane for crosspoint switching, it will switch according to the SMPTE RP-168 standard for Standard Definition Digital Video signals when using bi-level sync or High Definition Digital Video signals when using tri-level sync. The setting of SW1-8 determines which sync signal is expected on the reference input.

In Tri-Level mode, the switches have the following function:

Function	SW1-5
Field mode	Up/On
Frame mode	Down/Off

Function	SW1-6
625 mode (Line 6/319)	Up/On
525 mode (Line 10/273)	Down/Off

Note that SW1-6 is only used when SW1-8 is in 525/625 sync mode.

Function	SW1-8
Tri-level sync (Line 7/569)	Up
525/625 sync	Down

2.5.3.3.   Analog Audio Router

The Analog Audio Router has no video reference. The crosspoint matrix is updated at 40Hz intervals.

3. GENERAL DESCRIPTION

3.1. INTRODUCTION

The Topaz series are small routing switchers ideal for simple switching applications. The Topaz routers are available in a range of sizes and cover most signal formats.

Each router format: high definition (HD), standard definition (SD), analog video (AV), and analog audio (AA), is a stand-alone unit. They use external power 'bricks' and two such units can be used to provide a redundant PSU solution. A controller is built into each router. Options include the redundant PSU and rear mount PSU carrier trays.

3.1.1.1. Products Currently Available

QT-SD-1616	Standard Definition, 16x16, 2U
QT-SD-3232	Standard Definition, 32x32, 2U
QT-HD-1616	High or Standard Definition, 16x16, 2U
QT-HD-3232	High or Standard Definition, 32x32, 2U
QT-AA-1616	Analog Audio, 16x16, 2U
QT-AA-3232	Analog Audio, 32x32, 2U
QT-AV-1616	Analog Video, 16x16, 2U
QT-AV-3232	Analog Video, 32x32, 2U

3.1.1.2. Options

QT-PS	Additional PSU for backup or as a spare
QT-TR	PSU mounting tray, main/right-hand, fitted to rear of QT router
QT-TL	PSU mounting tray, backup/left-hand, fitted to rear of QT router

Units may be stacked together to form multi-level (video plus audio) routers. A local control panel may be attached in place of the blank front panel, usually as a factory installed option.

The internal controller supports Q-Link and is compatible with any other Quartz router or any of the standard Quartz remote control panels.

Routers are configured using the WinSetup program but a default configuration will have been factory installed.
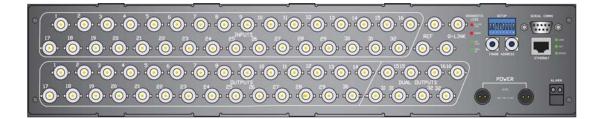
3.2. STANDARD DEFINITION VIDEO (SD)

The matrix is capable of handling signals in the following formats:

270Mb/s	D1 component
270Mb/s	ASI MPEG Compressed Video
143Mb/s	D2 NTSC composite
177Mb/s	D2 PAL composite
360Mb/s	future wide screen applications

The serial video inputs are terminated in 75Ω and fed to an input receiver circuit that provides equalization for losses to serial video signals, mainly at high frequencies, that have travelled down long cables. This equalization varies automatically to suit the length and type of video cable used. The crosspoint array switches the signal, which then passes to the output amplifiers that are designed to drive 75Ω video cables. Outputs 15, 16, 31, and 32 have twin feeds and all other outputs have just one feed of the signal.

Vertical interval switching is referenced to the Sync Input and complies with SMPTE RP-168.

3.3. HIGH DEFINITION VIDEO (HD)

The matrix is capable of handling signals in the following formats:

1.485Gb/s	HD 60Hz Frame Rate
1.485/1.001Gb/s	HD 59.94Hz Frame Rate
270Mb/s	D1 component
270Mb/s	ASI MPEG Compressed Video
143Mb/s	D2 NTSC composite
177Mb/s	D2 PAL composite
360Mb/s	future wide screen applications

The serial video inputs are terminated in 75Ω and fed to an input receiver circuit that provides equalization for losses, mainly at high frequencies, to serial video signals that have travelled down long cables. This equalization varies automatically to suit the length and type of video cable used. It automatically selects the correct sample rates from those mentioned above. The output amplifiers are designed to drive 75Ω video cables. Output 1 has twin feeds but the second output has just one feed of the signal.

Vertical interval switching is referenced to the Sync Input, which can be either HD tri-level sync or standard sync (complies with SMPTE RP-168).

3.4.   ANALOG VIDEO (AV)

The video inputs are terminated in 75Ω and DC coupled, enabling it to handle composite or component signals. The output amplifiers are adjustment-free with a bandwidth to over 100MHz.

Vertical interval switching is referenced to the Sync Input and complies with SMPTE RP-168.

This product can also route AES unbalanced audio signals.

3.5.   ANALOG AUDIO (AA)

The inputs are electronically balanced to provide a high common mode rejection over a wide frequency range. The input connectors are two D50 multi-way types and outputs are a single D15. The output stages are balanced and the insertion gain is so accurately maintained that no adjustment is required. A jumper link for each output is provided to correct the gain when driving into 600Ω loads. If it is necessary to drive unbalanced loads then just one of the output lines and 0V are used, resulting in a 6dB drop in level.

3.6.   AES/EBU DIGITAL AUDIO (DA)

3.6.1. Balanced (D50)

Not available yet.

3.6.2. Un-Balanced (BNC)

For applications using the SMPTE 276M 75Ω AES3-ID coaxial interface a standard video router can be used. Contact the factory for more details about this application.

3.7. POWER SYSTEM

The Topaz range uses a common external PSU 'brick' that is auto-ranging and converts nominal 115V or 230V AC mains voltages to safe 12V DC. This then connects to the Topaz router where any internally required voltages are generated. The external PSU has an IEC inlet and approximately 1.7m of DC lead terminated in a two-pin bayonet style connector.

3.8. CONTROL SYSTEM

3.8.1. Introduction

The Topaz internal controller module supports the full range of control features of the larger Quartz routers, resulting in the following major benefits:

1. Any standard Quartz remote panel can be connected to the router.
2. It is possible to connect this router into a larger Quartz routing system so that, for instance, it could provide output monitoring for another much larger router.
3. Several Topaz routers can be stacked, e.g. three routers to handle component analog video signals.
4. Up to three routers can be cascaded to provide a router of up to 64x16 for monitoring applications.
5. Support for an RS232/422 port, enabling the router to be controlled from another piece of equipment.
6. Crosspoint status is maintained while the unit is powered down.

Topaz routers are reconfigured using the Quartz WinSetup Windows software package.

Remote Control Panel:
Any panel(s) from the entire range of Quartz remote control panels can be used with the Topaz router connected via Q-Link or Ethernet.

External Third Party Control:
The Topaz 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.

Q-Link – Topaz 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 also fitted with a 75Ω terminator.**
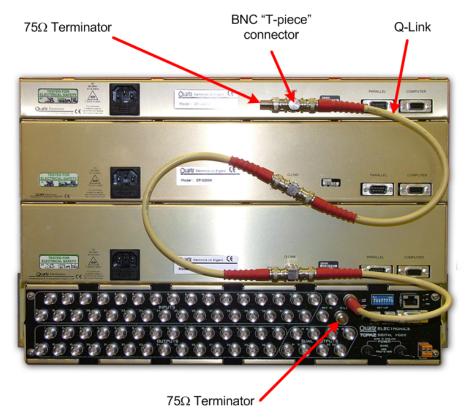
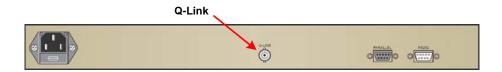**Figure 3-1: Q-LINK to Three Remote Control Panels (shown on Topaz Router)**

Figure 3-2: Example Control Panel, rear view

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

Figure 3-3: T-Piece

The "T-piece" allows anyone of the control panels within a Q-Link chain to be removed from service and replaced without disrupting the Q-Link, even temporarily.

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 are set via two rotary address switches.
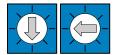

Figure 3-4: Router & Control Panel address switches

3.8.2. Ethernet Port

The Ethernet port will support TCP/IP protocol and can be used for the following functions:

- Setup download from WinSetup using TCP/IP protocol
- Router Control using TCP/IP protocol

3.8.3. Serial Port

The serial port is used to connect to computers or other third party equipment. This feature is always available but is controlled by the rear panel DIP switch.

3.9.   LOCAL CONTROL PANEL

The Topaz Local Control Panel can be installed on to the latest Topaz frames. It is fully programmable and provides control to all of the router I/O's.

Figure 3-5: Local Control Panel

3.10.   REMOTE CONTROL PANELS

Any of the Quartz Q-Link remote panels may be connected to the Topaz. Their operation is determined by the configuration of the master unit in the system. Refer to Quartz manual MANUAL-05 for details of the Q-Link control panels and their operation.

4. TECHNICAL SPECIFICATIONS

4.1. QT-1616N, QT-3232N TECHNICAL DESCRIPTION

4.1.1. Configuration

Inputs/Outputs: Fixed at 16x16 or 32x32

4.1.2. Analog Video Inputs

Nominal Signal Level:
  Video Signal: 1V p-p
  Sync Pulse (separate H+V): 2V p-p

Max Signal level:
  DC restored Inputs
  Video Signal: +6dB
  Sync Pulse (separate H+V): 2.5V p-p

  DC coupled Inputs
  Video: ±0.7V
Impedance: 75Ω Terminating
Return Loss, 5-270MHz: 40dB
DC on input (DC restored): ±3V
Connectors: BNC per IEC 61169-8 Annex A

4.1.3. Analog Video Outputs

Impedance: 75 Ω
Return Loss to 5.5MHz: 40dB
DC on output: ±50mV
Connectors: BNC per IEC 61169-8 Annex A

4.1.4. Insertion Gain

Insertion Gain: ±0.1dB
Gain Spread Between Inputs: ±0.05dB

4.1.5. Distortion

HF Response
  15kHz to 5.5MHz: ±0.1dB
  5.5 to 10MHz: ±0.2dB
  10MHz to 100MHz: +0.5, -1.0dB
  Above 100MHz: smooth roll off
LF Response, tilt at 50Hz: ±0.5%
Y-C Gain Inequality: ±0.5%
Y-C Delay Inequality: ±5ns
Differential Gain (10-90% APL): 0.25%
Differential Phase (10-90% APL): 0.15°

Path Length, Typical:	13ns typical

4.1.6. Unwanted Residual Effects

Crosstalk, at 5.5MHz worst case:	-60dB
Noise to 5.5Mz:	-70dBrms

4.1.7. Control Specs

Q-Link to Remote Panels:	75Ω video cable
Max. Length:	500m
Serial RS232/422:	
Connector:	D9 socket
Ethernet:	RJ45

4.1.8. Switching Reference

Reference Inputs:	Analog 625 or 525
Signal Level:	1V p-p +6dB, -3dB
Impedance:	75 Ω
Switching Line:	Lines 6/319 (625)
	Lines 10/273 (525)

4.1.9. Power Specs

Supply, external:	Auto ranging 100 to 240V AC 50/60Hz
Power Consumption:	20W
Connections:	Two pin bayonet locking
Power Fail Alarm Output:	
Relay contact:	Rated 250mA, 50V
Connector:	Screw terminals
Redundant PSU:	Optional

4.1.10. Physical Specs

Height:	3.5" (90mm)
Width:	19" (483mm)
Depth:	4.75" (260mm)
Weight:	
Frame:	1.45kg
PSU:	0.4kg
Operating temp. (ambient):	0-40°C
Specification maintained (ambient):	10-30°C
Humidity:	10-90% non-condensing
Ventilation:	Natural convection

4.2. QT-1616H, QT-3232H, QT-1616S, QT-3232S TECHNICAL DESCRIPTION

4.2.1. Configuration

Inputs/Outputs: Fixed at 16x16 or 32x32

4.2.2. Serial Video Inputs

Standard:	SMPTE 292M (1.5Gb/s),
	SMPTE 259M (143, 177, 270, 360)
Signal Level:	800mV p-p nominal
Impedance:	75 Ω terminating
Return Loss, 5-1485MHz:	15dB
Cable Equalization at 1485MHz:	
Belden 8281:	95m min
Connectors:	BNC per IEC 61169-8 Annex A

4.2.3. HD Video Outputs

Standard:	SMPTE 292M (1.5Gb/s),
	SMPTE 259M (143, 177, 270, 360)
	(non-reclocking)
Signal Level:	800mV p-p ±10%
Impedance:	75 Ω terminating
Return Loss, 5-1485MHz:	15dB
DC Offset:	0 ±0.5V
Connectors:	BNC per IEC 61169-8 Annex A

4.2.4. Signal Path

Rise/fall times:	200 to 400ps
Output jitter:	< 200ps

4.2.5. Control Specs

Q-Link to Remote Panels:	
Cable Type:	75Ω video cable
Max length:	500m
Serial RS232/422:	
Signal:	RS232/422
Connector:	D9 socket
Ethernet:	RJ45

4.2.6. Switching Reference

Reference Inputs:	Analog 625 or 525 tri-level
Signal Level:	1V p-p ±3dB or 1-4V pulses
Impedance:	75 Ω
Switching Line:	Lines 6/319, (625)
	Lines 10/273, (525)

4.2.7. Power Specs

Supply, external:	Auto ranging 100 to 240V AC 50/60Hz
Power Consumption:	20W
Connections:	Two pin bayonet locking
Power Fail Alarm Output:	Relay contact rated 250mA, 50V
	Connector screw terminals
Redundant PSU:	Optional

4.2.8. Physical Specs

Height:	3.5" (90mm)
Width:	19" (483mm)
Depth:	4.75" (120mm)
Weight:	
Frame:	1.45kg
PSU:	0.4kg
Operating Temp. (ambient):	0-40°C
Specification Maintained (ambient):	10-30°C
Humidity:	10-90% non-condensing
Ventilation:	Natural convection

4.3. QT-0808H, QT-1616H, QT-3232H, QT-0808S, QT-1616S & QT-3232S TECHNICAL DESCRIPTION

4.3.1. Configuration

Inputs/Outputs: Fixed at 8x8, 16x16 or 32x32

4.3.2. Serial Video Inputs

Standard: SMPTE 292M (1.5Gb/s),
                                  SMPTE 259M (143, 177, 270, 360)
Signal Level: 800mV p-p nominal
Impedance: 75Ω terminating
Return Loss, 5-1485MHz: 15dB
Cable Equalization at 1485MHz:
   Belden 8281:   95m min
   Connectors: BNC per IEC 61169-8 Annex A

4.3.3. HD Video Outputs

Standard: SMPTE 292M (1.5Gb/s),
                                  SMPTE 259M (143, 177, 270, 360)
                                  (non-reclocking)
Signal Level: 800mV p-p ±10%
Impedance: 75Ω terminating
Return Loss, 5-1485MHz: 15dB
DC Offset: 0 ±0.5V
Connectors: BNC per IEC 61169-8 Annex A

4.3.4. Signal Path

Rise/fall Times: 200 to 400ps
Output Jitter: < 200ps

4.3.5. Control Specs

Q-Link to Remote Panels:
   Cable Type: 75Ω video cable
   Max Length: 500m
Serial RS232/422:
   Signal: RS232/422
   Connector: D9 socket
Ethernet: RJ45

4.3.6. Switching Reference

Reference Inputs: Analog 625 or 525 tri-level
Signal Level: 1V p-p ±3dB or 1-4V pulses
Impedance: 75Ω
Switching Line: Lines 6/319, (625)
                                  Lines 10/273, (525)

4.3.7. Power Specs

Supply, external:	Auto ranging 100 to 240V AC 50/60Hz
Power Consumption:	20W
Connections:	Two-pin bayonet locking
Power Fail Alarm Output:	Relay contact rated 250mA, 50V
	Connector screw terminals
Redundant PSU:	Optional

4.3.8. Physical Specs

Height:	3.5" (90mm)
Width:	19" (483mm)
Depth:	4.75" (120mm)
Weight:	
Frame:	1.45kg
PSU:	0.4kg
Operating Temp. (ambient):	0-40°C
Specification Maintained (ambient):	10-30°C
Humidity:	10-90% non-condensing
Ventilation:	Natural convection

5. CONFIGURING THE SYSTEM: WINSETUP

The WinSetup program is used to configure most of the routing functions, including control panel operation. It allows such things as the number of signal levels to be defined, which routing frames and panels are connected to the system, and what the names are for 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 briefly guide you through the process of setting up WinSetup.

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

Figure 5-1: Quartz System Configuration Editor Window

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

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

(2) **Frames:** Enter the frames dialog and use the new button. This will show all Quartz routers listed by part number. Select the part number that matches the part number on

the routers serial number label. If you cannot find an exact match then use one of the generic part numbers like Qxx00-SV-3232 for a Q3200-SV-3232 or a Q6400-SV-3232.

Figure 5-2: Main Tab of Edit Frame Window

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

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

Figure 5-3: Properties Tab of Edit Frame Window

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

Figure 5-4: Source Definition

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

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

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

Figure 5-5: Key Definition Tab

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

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

6.　CONTROL PANEL OPERATION

The whole range of standard Q-Link panels are described in a separate manual MANUAL-05.

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