

COBALT®

9970-QS



3G/HD/SD-SDI/CVBS Quint-Split Multi-Image Display Processor

Product Manual



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Congratulations on choosing the Cobalt® 9970-QS 3G/HD/SD-SDI/CVBS Quint-Split Multi-Image Display Processor. The 9970-QS is part of a full line of modular processing and conversion gear for broadcast TV environments. The Cobalt Digital Inc. line includes video decoders and encoders, audio embedders and de-embedders, distribution amplifiers, format converters, remote control systems and much more. Should you have questions pertaining to the installation or operation of your 9970-QS, please contact us at the contact information on the front cover.

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Introduction

Overview

This manual provides installation and setup instructions for the 9970-QS 3G/HD/SD-SDI/CVBS Quint-Split Multi-Image Display Processor card (also referred to herein as the 9970-QS).

- Information in this manual describes technical aspects, installation, setup/integration, and full operating instructions for this product intended for **engineering personnel**.
- “9970-QS Operators’s Guide” is limited to user operating instructions for using the 9970-QS PiP user interface to manipulate and set up the quint-split/multiviewer functions of this product. This guide (which is furnished with this product) is intended for **operating personnel** who will be using the 9970-QS to manipulate and configure the multi-split PiP multiviewer functions (“day-to-day use”) of this product. It is recommended that this condensed guide be made available to operating personnel.

This manual consists of the following chapters:

- **Chapter 1, “Introduction”** – Provides information about this manual and what is covered. Also provides general information regarding the 9970-QS.
- **Chapter 2, “Installation”** – Provides instructions for installing the 9970-QS in a frame, and connecting signal and control cabling to the 9970-QS.
- **Chapter 3, “Setup Instructions”** – Provides overviews of setup operating controls and instructions for setting up the 9970-QS to integrate within its signal flow environment.

This chapter contains the following information:

- **9970-QS Card Software Versions and this Manual (p. 1-2)**
- **Manual Conventions (p. 1-3)**
- **Safety Summary (p. 1-4)**

- **9970-QS Functional Description (p. 1-5)**
- **Technical Specifications (p. 1-13)**
- **Warranty and Service Information (p. 1-15)**
- **Contact Cobalt Digital Inc. (p. 1-16)**

9970-QS Card Software Versions and this Manual

When applicable, Cobalt Digital Inc. provides for continual product enhancements through software updates. As such, functions described in this manual may pertain specifically to cards loaded with a particular software build.

The Software Version of your card can be checked by viewing the **Card Info** menu in DashBoard™. See Checking 9970-QS Card Information (p. 3-8) in Chapter 3, “Operating Instructions” for more information. You can then check our website for the latest software version currently released for the card as described below.

Note: Not all functionality described in this manual may appear on cards with initial software versions.

Check our website and proceed as follows if your card’s software does not match the latest version:

Card Software earlier than latest version	<p>Card is not loaded with the latest software. Not all functions and/or specified performance described in this manual may be available.</p> <p>You can update your card with new Update software by going to the Support>Firmware Downloads link at www.cobaltdigital.com. Download “Firmware Update Guide”, which provides simple instructions for downloading the latest firmware for your card onto your computer, and then uploading it to your card through DashBoard™.</p> <p>Software updates are field-installed without any need to remove the card from its frame.</p>
Card Software newer than version in manual	<p>A new manual is expediently released whenever a card’s software is updated and specifications and/or functionality have changed as compared to an earlier version (a new manual is not necessarily released if specifications and/or functionality have not changed). A manual earlier than a card’s software version may not completely or accurately describe all functions available for your card.</p> <p>If your card shows features not described in this manual, you can check for the latest manual (if applicable) and download it by going to the card’s web page on www.cobaltdigital.com.</p>

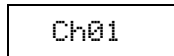
Cobalt Reference Guides

From the Cobalt® web home page, go to **Support>Reference Documents** for easy to use guides covering network remote control, card firmware updates, example card processing UI setups and other topics.

Manual Conventions

In this manual, display messages and connectors are shown using the exact name shown on the 9970-QS itself. Examples are provided below.

- Card-edge display messages are shown like this:



- Connector names are shown like this: **SDI IN A**

In this manual, the terms below are applicable as follows:

- **9970-QS** refers to the 9970-QS 3G/HD/SD-SDI/CVBS Quint-Split Multi-Image Display Processor card.
- **Frame** refers to the HPF-9000, OG3-FR, 8321, or similar 20-slot frame that houses Cobalt® or other cards.
- **Device** and/or **Card** refers to a Cobalt® or other card.
- **System** and/or **Video System** refers to the mix of interconnected production and terminal equipment in which the 9970-QS and other cards operate.
- Functions and/or features that are available only as an option are denoted in this manual like this:



Warnings, Cautions, and Notes

Certain items in this manual are highlighted by special messages. The definitions are provided below.

Warnings

Warning messages indicate a possible hazard which, if not avoided, could result in personal injury or death.




Cautions

Caution messages indicate a problem or incorrect practice which, if not avoided, could result in improper operation or damage to the product.

Notes

Notes provide supplemental information to the accompanying text. Notes typically precede the text to which they apply.

Labeling Symbol Definitions

	Important note regarding product usage. Failure to observe may result in unexpected or incorrect operation.
	Electronic device or assembly is susceptible to damage from an ESD event. Handle only using appropriate ESD prevention practices. If ESD wrist strap is not available, handle card only by edges and avoid contact with any connectors or components.
	Symbol (WEEE 2002/96/EC) For product disposal, ensure the following: <ul style="list-style-type: none"> • Do not dispose of this product as unsorted municipal waste. • Collect this product separately. • Use collection and return systems available to you.

Safety Summary

Warnings

! WARNING !

To reduce risk of electric shock do not remove line voltage service barrier cover on frame equipment containing an AC power supply. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

Cautions

CAUTION

This device is intended for environmentally controlled use only in appropriate video terminal equipment operating environments.

CAUTION

This product is intended to be a component product of an openGear® frame. Refer to the openGear® frame Owner's Manual for important safety instructions regarding the proper installation and safe operation of the frame as well as its component products.

CAUTION

Heat and power distribution requirements within a frame may dictate specific slot placement of cards. Cards with many heat-producing components should be arranged to avoid areas of excess heat build-up, particularly in frames using only convection cooling. The 9970-QS has a moderate power dissipation (<18 W). As such, avoiding placing the card adjacent to other cards with similar dissipation values if possible.

CAUTION

If required, make certain Rear I/O Module(s) is installed before installing the 9970-QS into the frame slot. Damage to card and/or Rear I/O Module can occur if module installation is attempted with card already installed in slot.

CAUTION

If card resists fully engaging in rear I/O module mating connector, check for alignment and proper insertion in slot tracks. Damage to card and/or rear I/O module may occur if improper card insertion is attempted.

CAUTION

The 9970-QS FPGA is designed for a normal-range operating temperature around 85° C core temperature. Operation in severe conditions exceeding this limit for non-sustained usage are within device operating safe parameters, and can be allowed by setting this control to Disable. However, the disable (override) setting should be avoided under normal conditions to ensure maximum card protection.

9970-QS Functional Description

Figure 1-1 shows a functional block diagram of the 9970-QS. The 9970-QS includes input processing functions to accommodate SDI and CVBS analog inputs, a validity check function to provide indication of input defects, timecode and audio data handling and routing control, multi-split ARC/scaling functions, a timing alignment function to synchronize the inputs to house reference, up to 5:1 Picture-in-Picture (PiP) video combining, and burn-in attributes and control of borders, UMD display text, audio meters, and other accessory displays. The output is available as a 2x DA 3G/HD/SD-SDI output or HDMI/DVI. The output raster format and aspect ratio is user-configurable.

9970-QS Program Video Input/Output Formats

The 9970-QS provides the following inputs and outputs:

- **Inputs:**
 - **SDI/CVBS IN A** thru **SDI/CVBS IN E** – five coaxial video inputs (auto-detecting 3G/HD/SD-SDI or CVBS analog video)
- **Outputs:**
 - **3G/HD/SD-SDI OUT** – 2x DA 3G/HD/SD-SDI multi-image video outputs
 - **HDMI/DVI OUT** – Multi-image HDMI/DVI out with selectable audio embedding (suitable for direct connection to monitor panels)

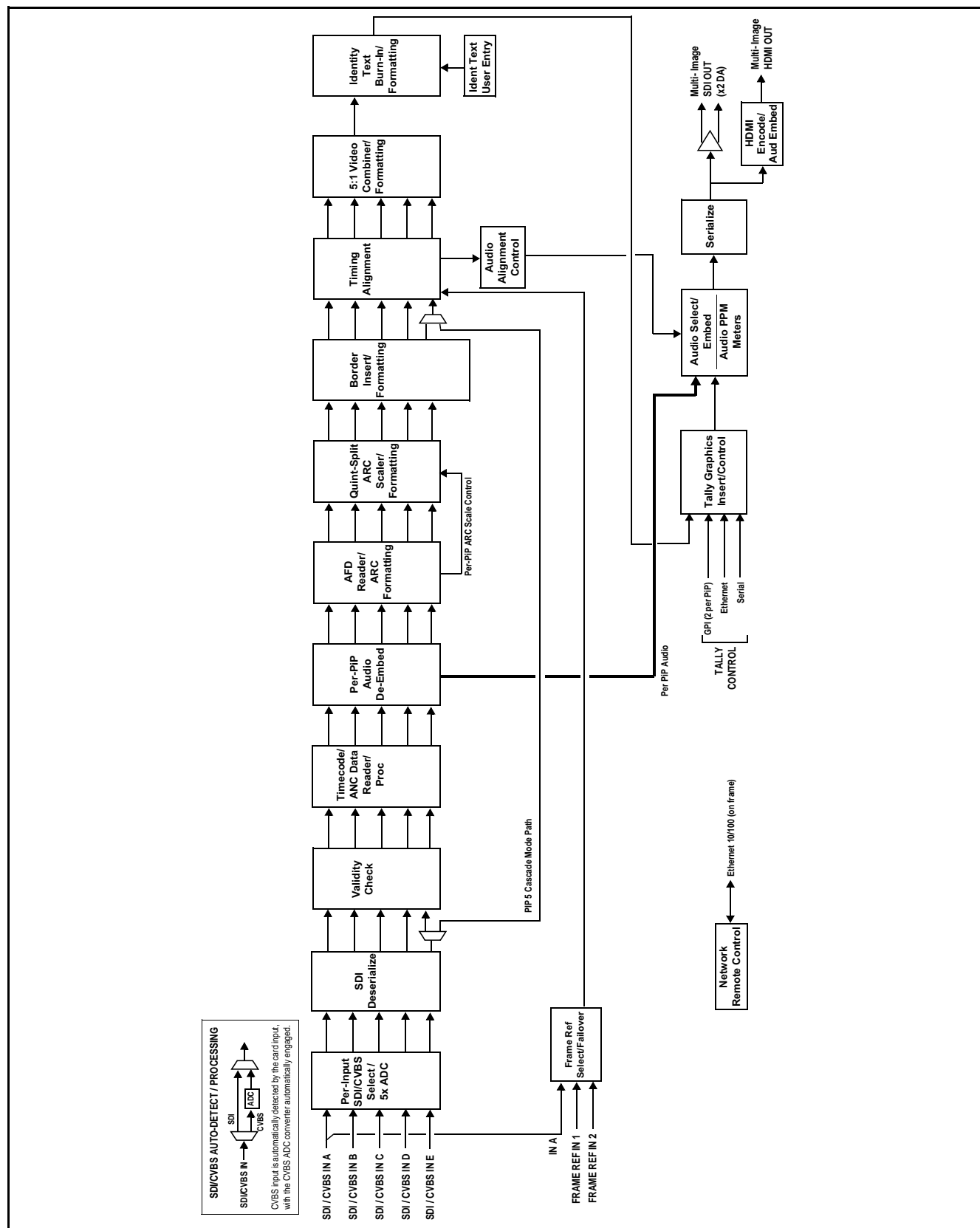


Figure 1-1 9970-QS Functional Block Diagram

Video Processing Description

The 9970-QS features input select and validity check functions, timing alignment, and PiP ARC/scaling functions as described below.

Input Video Select Function

Auto-detect per PiP inputs independently set each of the card video inputs as 3G/HD/SD-SDI or CVBS SD analog video. Either mode preserves waveform and packet-based ancillary data for extraction and usage later in the card processing chain. A CVBS input is automatically detected by the card input, with the CVBS ADC converter automatically engaged in these cases.

Timecode Processor

This function provides for extraction of timecode data from any of the five per-PiP input video sources, and in turn allows timecode strings to be burned into the respective PiP images. The function can monitor any of the video inputs of the card for supported timecode formats such as HD ATC_LTC or ATC_VITC, and ATC_VITC or VITC waveform for SD SDI or CVBS inputs.

Option

When licensed with option **+LTC**, this function also can receive and translate audio LTC timecode (from Emb Ch 1-16) for insertion as SMPTE 12M ATC timecode formats onto the output video as described above.

ARC Processor

This function provides separate ARC controls for each PiP input. The separate controls can re-aspect SD to match the aspecting used for HD inputs, and vice versa. Custom aspecting is also available for both HD and SD formats.

Quint-Split ARC Scaler/Formatting Function

This function provides conversion of each PiP input to match a common user-selected format, resulting in images that are format-matched and suitable for combining into a single PiP image. When the PiP images are sized by this function, the borders and other accessory attributes are now integrated into each PiP image. In addition to full user control of PiP image H/V sizing, accessory attributes such as border size, weight, and color can be user configured.

Quint Timing Alignment Function

This function provides for frame alignment control of the five PiP inputs using either one of two external **FRAME REF IN (1,2)** reference signals distributed with the card frame, or a selected input video as a frame reference. As such, the card can accommodate asynchronous program video inputs.

This function also allows frame offset delay to be added between the output video and the frame sync reference.

Frame sync can select from either of two card frame reference sources, input video, or free-run (internal) timing. Selectable failover allows alternate reference selection should the initial reference source become unavailable or invalid.

5:1 Video Combiner/Formatting Function

This function combines the five video images into the user-configured positions within the overall image. At this point, all PiP images are of the same raster format and fully synchronous. User positioning controls provide the H and V offsets that position the images as desired by the operator using the DashBoard controls.

Identity Text Burn-In/Formatting Function

This function provides user controls for entering UMD text that is burned into each PiP image. Controls allow full control of positioning, sizing, and color/background/opacity attributes. Burn-in text can be user entry text, video format of the corresponding PiP, wall-time clock, or external text sourced via IP from an automation system.

Tally Graphics Insert/Control

This function accommodates tally inputs (received as GPI, serial, or network commands) and allows configuring the commands to provide tally indications for each PiP image. All visual attributes are configurable, including “lamp” color, size, and positioning.

Two GPI inputs are furnished (with the two inputs comprising a 2-bit binary coded number which can select up to four states; 0 thru 3) that are applied to a demux user control for selecting per-PiP tally lamp insertions and border attributes such as colors. Tally activation can also be controlled via IP from an automation system/router. UMD text can be inserted using local user text entry or integrated with router automation to receive text from the automation system.

Audio Processor Description

Audio Select/Embed

The audio processor operates as an internal audio router for selecting PiP-input embedded channels 1-16 as channels (as a four-group package) to be embedded into the combined PiP SDI and HDMI video outputs. The audio processor function operates with the timing alignment function to align audio with the selected reference.

- Note:**
- Output audio always corresponds to a single particular selectable PiP input. Various output embedded channels cannot be sourced from a mix of various PiP input embedded channels.
 - To maintain conformance with CEA-861D HDMI audio channel line-up specifications and industry standard SDI convention, the HDMI output swaps between the C and LFE channels for the HDMI output.

Per-PiP Audio PPM Meters

Each PiP image area has setup controls to provide audio meters in several formats (channel count) as desired. Each PiP image has an audio meter display that can display from 2-bar stereo up to all four embedded audio groups for the audio associated with the PiP input. User controls allow setting meter complement, position, size, and other graphic attributes.

Cascading (Multi-Card) 9970-QS Operation and Setup Overview

(See Figure 1-2.) The 9970-QS **PIP 5** input is ideally suited to allow multiple 9970-QS cards to operate in a **cascading** arrangement, where four of the card inputs serve as program video inputs, and the fifth input receives the cascading combined layout of a preceding 9970-QS card in a daisy-chain arrangement. In this mode, the **PIP 5** input is configured to serve as a full-size underlay with **PIP 1** thru **PIP 4** being overlays. In this manner, added PiPs can be positioned within the imported underlay resulting in a combined image of the imported underlay PiPs and the locally added PiPs.

Cascading Low-Latency Operation

Low-latency modes provide for reducing card I/O latency by bypassing the cascade input framesync. Low-latency modes apply framesyncing when needed (applying framesync and bypassing low-latency during these intervals). When alignment is again detected by the local card, framesyncing is correspondingly disabled and low-latency operation is again applied.

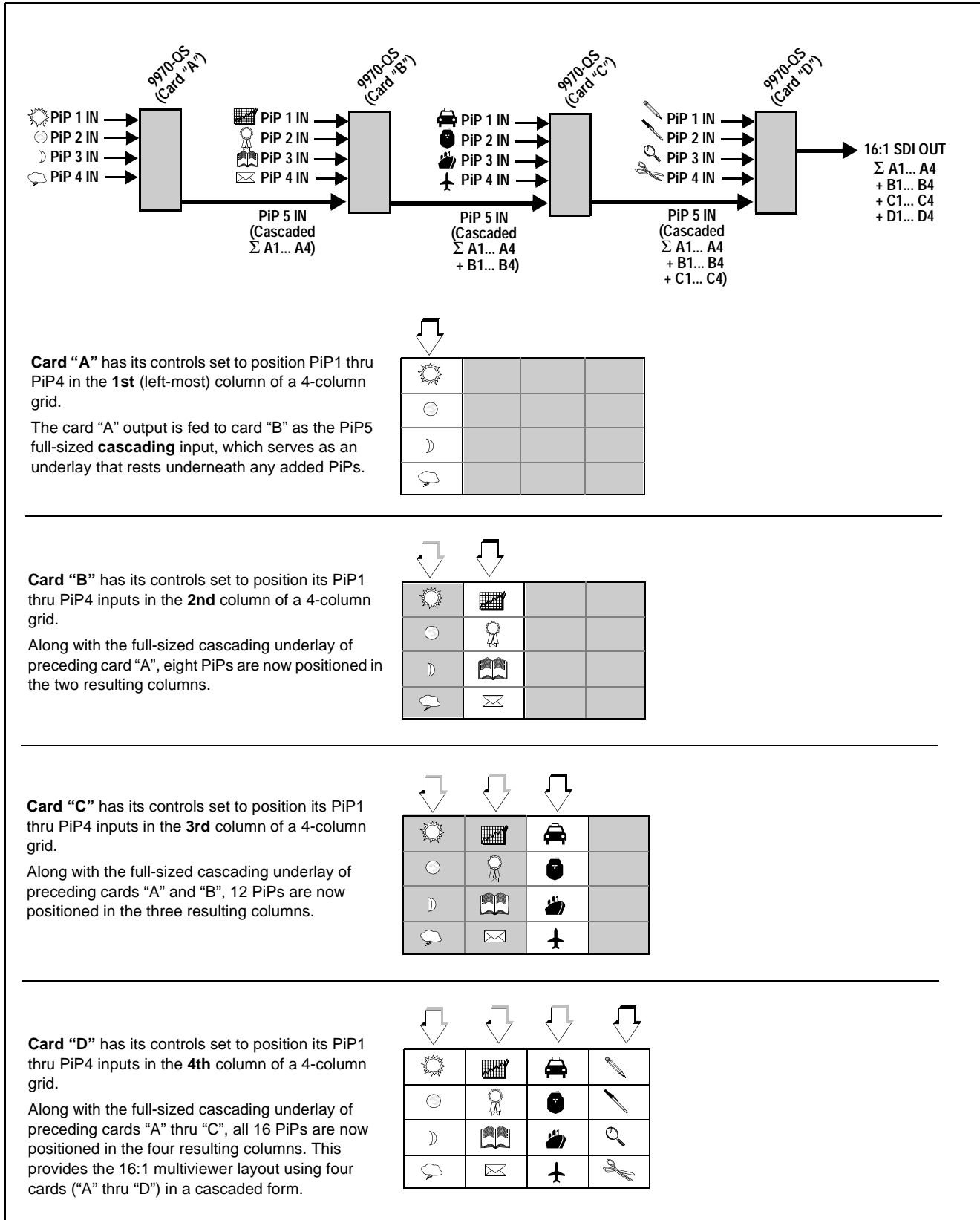


Figure 1-2 Cascaded 9970-QS Example 16:1 Setup and Overview

User Control Interface

Figure 1-3 shows the user control interface options for the 9970-QS. These options are individually described below.

Note: All user control interfaces described here are cross-compatible and can operate together as desired. Where applicable, any control setting change made using a particular user interface is reflected on any other connected interface.

- **DashBoard™ User Interface** – Using DashBoard™, the 9970-QS and other cards installed in openGear®¹ frames can be controlled from a computer and monitor.

DashBoard™ allows users to view all frames on a network with control and monitoring for all populated slots inside a frame. This simplifies the setup and use of numerous modules in a large installation and offers the ability to centralize monitoring. Cards define their controllable parameters to DashBoard™, so the control interface is always up to date.

The DashBoard™ software can be downloaded from the Cobalt Digital Inc. website: www.cobaltdigital.com (enter “DashBoard” in the search window). The DashBoard™ user interface is described in Chapter 3, “Setup Instructions”.

- **Cobalt® OGCP-9000 and OGCP-9000/CC Remote Control Panels** – The OGCP-9000 and OGCP-9000/CC Remote Control Panels are not intended to be used for PiP sizing and other visual abstract configuration aspects. However, the control panel can be used as a convenient “one-button” control surface for launching non-abstract functions such as a user preset that invokes setups such as PiP splits and other presets.

1. openGear® is a registered trademark of Ross Video Limited. DashBoard™ is a trademark of Ross Video Limited.

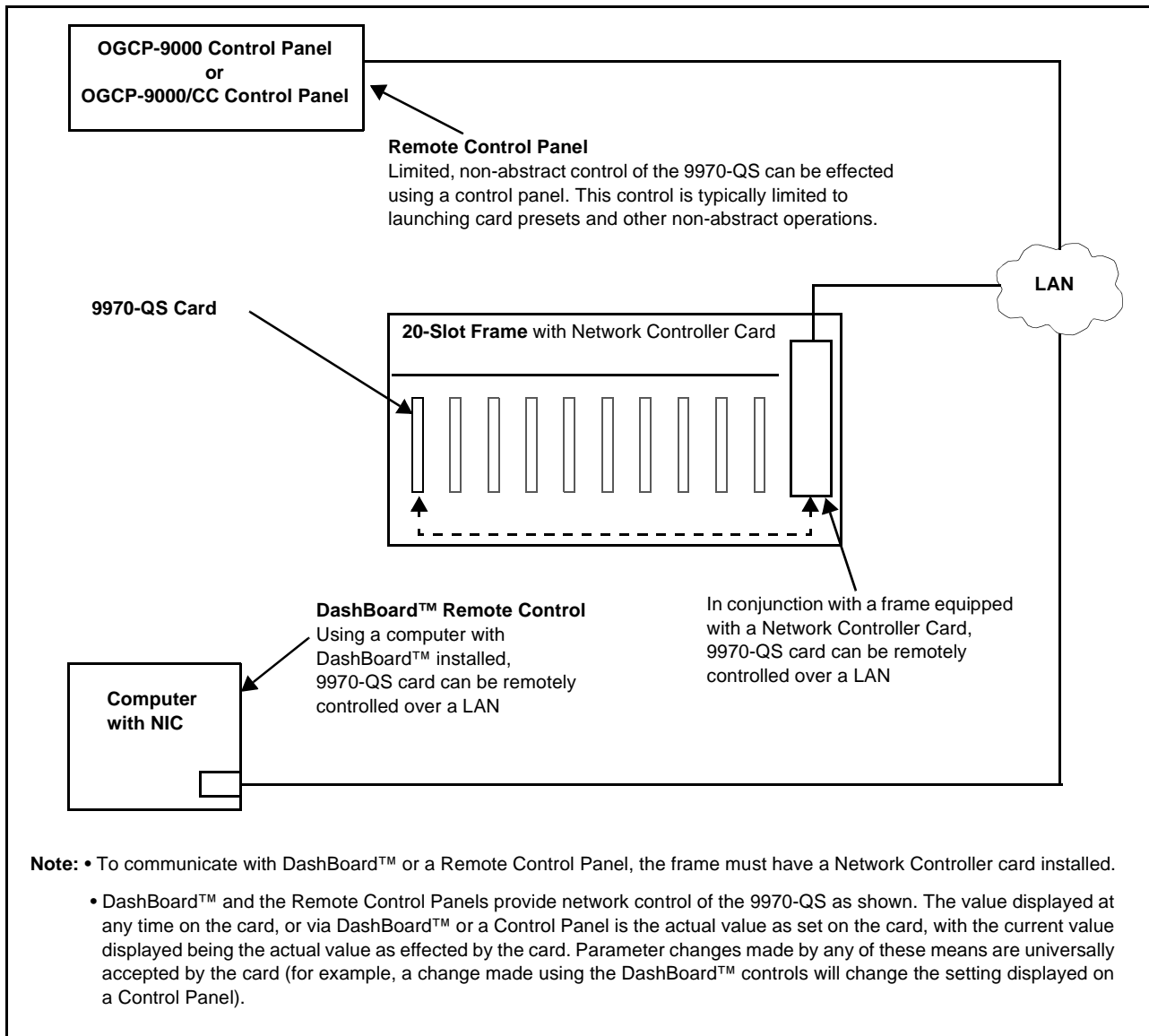


Figure 1-3 9970-QS User Control Interface

Note: If network remote control is to be used for the frame and the frame has not yet been set up for remote control, Cobalt® reference guide **Remote Control User Guide (PN 9000RCS-RM)** provides thorough information and step-by-step instructions for setting up network remote control of Cobalt® cards using Dashboard™. (Cobalt® OGCP-9000 and OGCP-9000/CC Remote Control Panel product manuals have complete instructions for setting up remote control using a Remote Control Panel.)

Download a copy of this guide by clicking on the **Support>Reference Documents** link at www.cobaltdigital.com and then select Dashboard Remote Control Setup Guide as a download, or contact Cobalt® as listed in Contact Cobalt Digital Inc. (p. 1-16).

9970-QS Rear I/O Modules

The 9970-QS physically interfaces to system video connections at the rear of its frame using a Rear I/O Module. All inputs and outputs shown in the 9970-QS Functional Block Diagram (Figure 1-1) enter and exit the card via the card edge backplane connector. The Rear I/O Module breaks out the 9970-QS card edge connections to BNC and other connectors that interface with other components and systems in the signal chain.

The full assortment of 9970-QS Rear I/O Modules is shown and described in 9970-QS Rear I/O Modules (p. 2-3) in Chapter 2, “Installation and Setup”.

Technical Specifications

Table 1-1 lists the technical specifications for the 9970-QS Up/Down/Cross Format Converter, Video/Audio In with Frame Sync card.

Table 1-1 Technical Specifications

Item	Characteristic
Part number, nomenclature	9970-QS 3G/HD/SD-SDI / CVBS 3G/HD/SD-SDI/CVBS Quint-Split Multi-Image Display Processor
Installation/usage environment	Intended for installation and usage in frame meeting openGear™ modular system definition.
Power consumption	< 18 Watts maximum
Installation Density	Up to 20 cards per 20-slot frame
Environmental: Operating temperature: Relative humidity (operating or storage):	32° – 104° F (0° – 40° C) < 95%, non-condensing
Frame communication	10/100/1000 Mbps Ethernet with Auto-MDIX.
Indicators	Card edge display and indicators as follows: <ul style="list-style-type: none"> • 4-character alphanumeric display • Status/Error LED indicator • Input Format LED indicator
Program Video Input	Five video inputs, auto-detecting CVBS or 3G/HD/SD-SDI Data Rates Supported: SMPTE 424M, 292M, SMPTE 259M-C Impedance: 75 Ω terminating Receive Cable Length: 3G/HD/SD-SDI: 120/180/320 m (Belden 1694A) Return Loss (SDI): > 15 dB up to 1.485 GHz > 10 dB up to 2.970 GHz

Table 1-1 Technical Specifications — continued

Item	Characteristic
Serial Digital PiP Video Output	Number of Outputs: Two 3G/HD/SD-SDI BNC Impedance: 75 Ω Return Loss: > 15 dB at 5 MHz – 270 MHz Signal Level: 800 mV \pm 10% DC Offset: 0 V \pm 50 mV Jitter (3G/HD/SD): < 0.3/0.2/0.2 UI
SDI Input-Output Latency (720p5994)	Basic I/O latency < 1.5 frames (max) PiP channel derived from cascaded preceding-card output consists of source card basic delay with < 2 line added delay.
HDMI PiP Video Output	HDMI CEA-861D
Tally Inputs	- Serial - GPI (Opto-isolated ports with self-sourcing current on 3-wire (IN 1, IN 2, GND) Phoenix connector with removable screw terminal blocks (Phoenix PN 1803581; Cobalt PN 5000-0013-000R) Triggering: User-configurable. GPI activation invokes a selected user preset. Response: GPI acknowledge upon falling-edge input triggered by $R \leq 10 \text{ k}\Omega$ (or $V_{in} \leq 2.0 \text{ V}$) GPI release upon rising-edge input triggered by $R \geq 10 \text{ k}\Omega$ (or $V_{in} \geq 2.0 \text{ V}$) “G” (GND) terminal at chassis-ground potential Suitable for use with 3.3V LVCMOS logic Maximum Recommended Logic Control Voltage Range: 0 to 5 VDC - 10/100/1000 Base-T Ethernet
Frame Reference Input	Number of Inputs: Two non-terminating (looping) Frame Reference inputs with selectable failover Standards Supported: SMPTE 170M/318M (“black burst”) SMPTE 274M/296M (“tri-color”) Return Loss: > 35 dB up to 5.75 MHz

Warranty and Service Information

Cobalt Digital Inc. Limited Warranty

This product is warranted to be free from defects in material and workmanship for a period of five (5) years from the date of shipment to the original purchaser, except that 4000, 5000, 6000, 8000 series power supplies, and Dolby® modules (where applicable) are warranted to be free from defects in material and workmanship for a period of one (1) year.

Cobalt Digital Inc.'s ("Cobalt") sole obligation under this warranty shall be limited to, at its option, (i) the repair or (ii) replacement of the product, and the determination of whether a defect is covered under this limited warranty shall be made at the sole discretion of Cobalt.

This limited warranty applies only to the original end-purchaser of the product, and is not assignable or transferrable therefrom. This warranty is limited to defects in material and workmanship, and shall not apply to acts of God, accidents, or negligence on behalf of the purchaser, and shall be voided upon the misuse, abuse, alteration, or modification of the product. Only Cobalt authorized factory representatives are authorized to make repairs to the product, and any unauthorized attempt to repair this product shall immediately void the warranty. Please contact Cobalt Technical Support for more information.

To facilitate the resolution of warranty related issues, Cobalt recommends registering the product by completing and returning a product registration form. In the event of a warrantable defect, the purchaser shall notify Cobalt with a description of the problem, and Cobalt shall provide the purchaser with a Return Material Authorization ("RMA"). For return, defective products should be double boxed, and sufficiently protected, in the original packaging, or equivalent, and shipped to the Cobalt Factory Service Center, postage prepaid and insured for the purchase price. The purchaser should include the RMA number, description of the problem encountered, date purchased, name of dealer purchased from, and serial number with the shipment.

Cobalt Digital Inc. Factory Service Center

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Contact Cobalt Digital Inc.

Feel free to contact our thorough and professional support representatives for any of the following:

- Name and address of your local dealer
- Product information and pricing
- Technical support
- Upcoming trade show information

Phone:	(217) 344-1243
Fax:	(217) 344-1245
Web:	www.cobaltdigital.com
General Information:	info@cobaltdigital.com
Technical Support:	support@cobaltdigital.com

Installation

Overview

This chapter contains the following information:

- Installing the 9970-QS Into a Frame Slot (p. 2-1)
- Installing a Rear I/O Module (p. 2-3)
- Setting Up 9970-QS Network Remote Control (p. 2-5)

Installing the 9970-QS Into a Frame Slot

CAUTION

Heat and power distribution requirements within a frame may dictate specific slot placement of cards. Cards with many heat-producing components should be arranged to avoid areas of excess heat build-up, particularly in frames using only convection cooling. The 9970-QS has a moderate power dissipation (<18 W). As such, avoiding placing the card adjacent to other cards with similar dissipation values if possible.

CAUTION



This device contains semiconductor devices which are susceptible to serious damage from Electrostatic Discharge (ESD). ESD damage may not be immediately apparent and can affect the long-term reliability of the device.

Avoid handling circuit boards in high static environments such as carpeted areas, and when wearing synthetic fiber clothing. Always use proper ESD handling precautions and equipment when working on circuit boards and related equipment.

Note: If installing the 9970-QS in a slot with no rear I/O module, a **Rear I/O Module is required** before cabling can be connected. Refer to Installing a Rear I/O Module (p. 2-3) for rear I/O module installation procedure.

CAUTION

If required, make certain Rear I/O Module(s) is installed before installing the 9970-QS into the frame slot. Damage to card and/or Rear I/O Module can occur if module installation is attempted with card already installed in slot.

Note: Check the packaging in which the 9970-QS was shipped for any extra items such as a Rear I/O Module connection label. In some cases, this label is shipped with the card and to be installed on the Rear I/O connector bank corresponding to the slot location of the card.

Install the 9970-QS into a frame slot as follows:

1. Determine the slot in which the 9970-QS is to be installed.
2. Open the frame front access panel.
3. While holding the card by the card edges, align the card such that the plastic ejector tab is on the bottom.
4. Align the card with the top and bottom guides of the slot in which the card is being installed.
5. Gradually slide the card into the slot. When resistance is noticed, gently continue pushing the card until its rear printed circuit edge terminals engage fully into the rear I/O module mating connector.

CAUTION

If card resists fully engaging in rear I/O module mating connector, check for alignment and proper insertion in slot tracks. Damage to card and/or rear I/O module may occur if improper card insertion is attempted.

6. Verify that the card is fully engaged in rear I/O module mating connector.
7. Close the frame front access panel.
8. Connect the input and output cables as shown in 9970-QS Rear I/O Modules (p. 2-3).
9. Repeat steps 1 through 8 for other 9970-QS cards.

Note: The 9970-QS BNC inputs are internally 75-ohm terminated. It is not necessary to terminate unused BNC inputs or outputs.

Note: To remove a card, press down on the ejector tab to unseat the card from the rear I/O module mating connector. Evenly draw the card from its slot.

10. If network remote control is to be used for the frame and the frame has not yet been set up for remote control, perform setup in accordance with Setting Up 9970-QS Network Remote Control (p. 2-5).

Note: If installing a card in a frame already equipped for, and connected to DashBoard™, no network setup is required for the card. The card will be discovered by DashBoard™ and be ready for use.

Installing a Rear I/O Module

Note: This procedure is applicable **only if a Rear I/O Module is not currently installed** in the slot where the 9970-QS is to be installed.

If installing the 9970-QS in a slot already equipped with a suitable I/O module, omit this procedure.

Install a Rear I/O Module as follows:

1. On the frame, determine the slot in which the 9970-QS is to be installed.
2. In the mounting area corresponding to the slot location, install Rear I/O Module as shown in Figure 2-1.

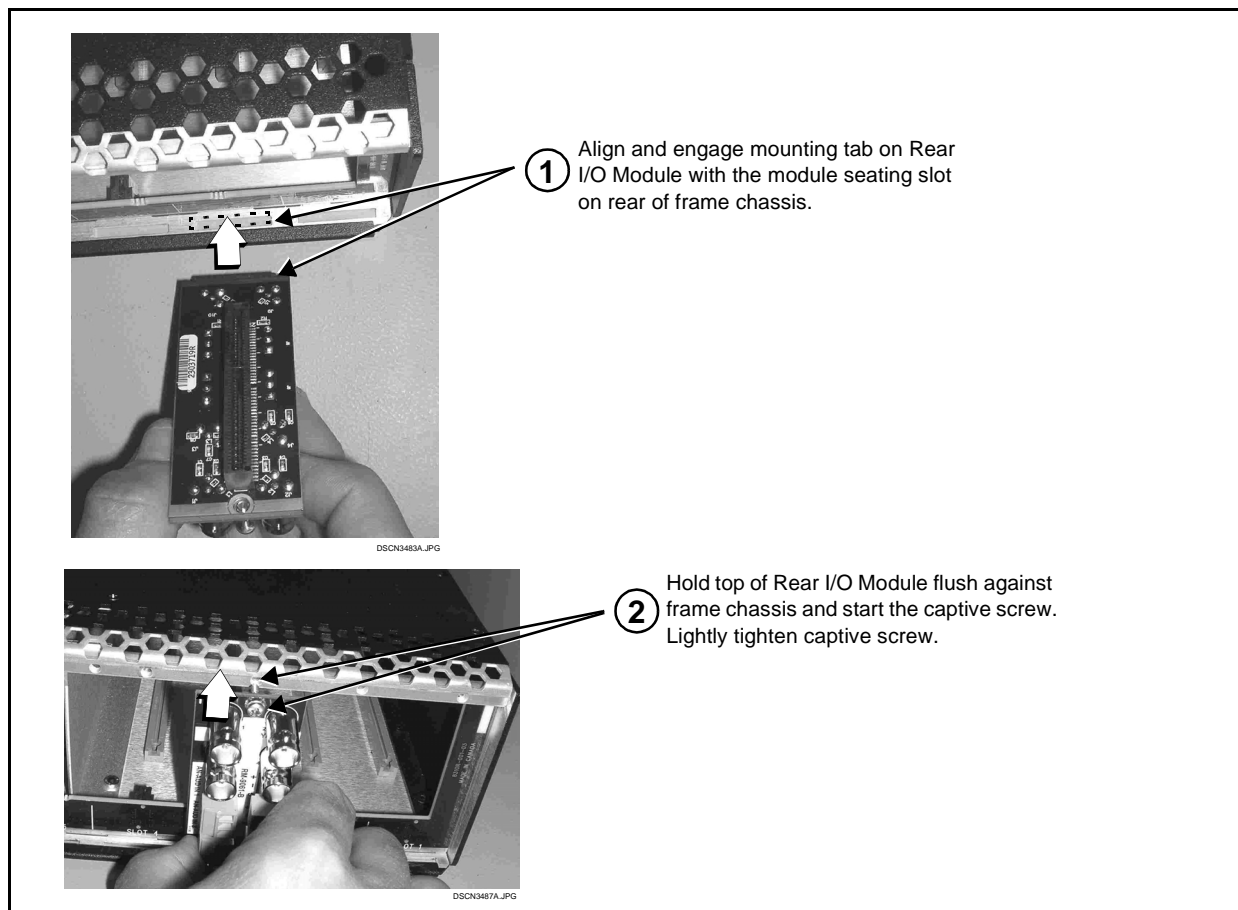


Figure 2-1 Rear I/O Module Installation

9970-QS Rear I/O Modules

Table 2-1 shows and describes the full assortment of Rear I/O Modules specifically for use with the 9970-QS.

Table 2-1 9970-QS Rear I/O Modules

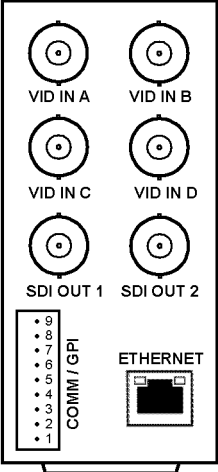
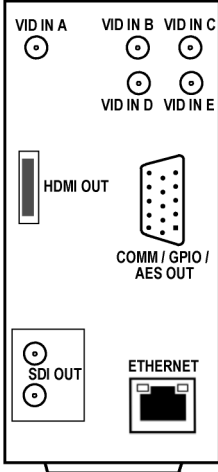

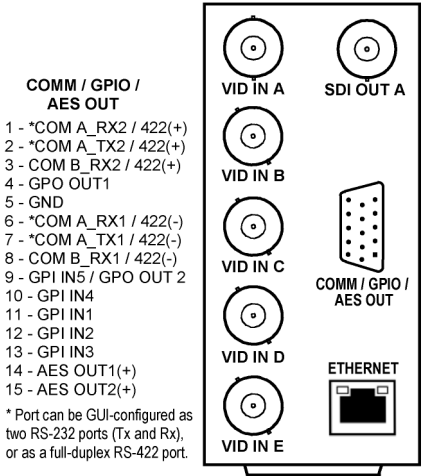
9970-QS Rear I/O Module	Description
<p>RM20-9970-B</p>  <p>9 - UARTA TX 8 - UARTA RX 7 - GND 6 - GPI IN1 5 - GPI IN 2 4 - GND 3 - GPO OUT 1 2 - GPO OUT 2 1 - GPIO COM</p>	<p>Provides the following connections:</p> <ul style="list-style-type: none"> • Four PiP Video In BNCS (VID IN A thru VID IN D); auto-detecting as 3G/HD/SD-SDI or CVBS • Two 3G/HD/SD-SDI PiP Combined Video Out BNCS (SDI OUT 1 and SDI OUT 2) • COMM/GPI multi-conductor connector • ETHERNET 10/100 connector (reserved) <p>Note: Ethernet connector is reserved for tally, UDM control, and other functions. This port is independent of card/frame network remote control.</p>
<p>RM20-9970-C</p>  <p>COMM / GPIO / AES OUT</p> <p>1 - *COM A_RX2 / 422(+) 2 - *COM A_TX2 / 422(+) 3 - COM B_RX2 / 422(+) 4 - GPO OUT1 5 - GND 6 - *COM A_RX1 / 422(-) 7 - *COM A_TX1 / 422(-) 8 - COM B_RX1 / 422(-) 9 - GPI IN5 / GPO OUT 2 10 - GPI IN4 11 - GPI IN1 12 - GPI IN2 13 - GPI IN3 14 - AES OUT1(+) 15 - AES OUT2(+)</p> <p>* Port can be GUI-configured as two RS-232 ports (Tx and Rx), or as a full-duplex RS-422 port.</p>	<ul style="list-style-type: none"> • Five PiP Video In (VID IN A thru VID IN E); auto-detecting as 3G/HD/SD-SDI or CVBS • Two 3G/HD/SD-SDI PiP Combined Video Out (SDI OUT 1 and SDI OUT 2) • COMM/GPIO/AES OUT multi-conductor connector • ETHERNET 10/100 connector (reserved) • HDMI OUT connector <p>Note: • Ethernet connector is reserved for tally, UDM control, and other functions. This port is independent of card/frame network remote control.</p> <ul style="list-style-type: none"> • Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9970-C-HDBNC or RM20-9970-C-DIN, respectively.
<div data-bbox="357 1512 786 1654">  <p>COBALT RM20-9001-B/S-DIN</p> </div> <p>**SAMPLE-NOT FOR USE**</p> <div data-bbox="800 1528 1279 1747"> <p>Due to the density of connector placement on Rear Modules using high-density connectors (e.g., RM20-9001-B/S-DIN), these modules use a QR barcode label instead a regular label. Simply scan the image with a smart phone and a link to the rear module label (as shown in our catalog) will appear. (Smart phone must have a QR reader app such as QuickMark QR Code Reader or equivalent.)</p> <p>Not all devices may be able to acquire the image. If this occurs, use the device to access the web page for card/rear module to view the diagram.</p> </div>	

Table 2-1 9970-QS Rear I/O Modules — continued

9970-QS Rear I/O Module	Description
RM20-9970-D  <p>Diagram of the RM20-9970-D rear I/O module showing connectors and pin configurations:</p> <ul style="list-style-type: none"> COMM / GPIO / AES OUT (15-pin connector): <ul style="list-style-type: none"> 1 - *COM A_RX2 / 422(+) 2 - *COM A_TX2 / 422(+) 3 - COM B_RX2 / 422(+) 4 - GPO OUT1 5 - GND 6 - *COM A_RX1 / 422(-) 7 - *COM A_TX1 / 422(-) 8 - COM B_RX1 / 422(-) 9 - GPI IN5 / GPO OUT 2 10 - GPI IN4 11 - GPI IN1 12 - GPI IN2 13 - GPI IN3 14 - AES OUT1(+) 15 - AES OUT2(+) * Port can be GUI-configured as two RS-232 ports (Tx and Rx), or as a full-duplex RS-422 port. VID IN A (BNC) SDI OUT A (BNC) VID IN B (BNC) VID IN C (BNC) VID IN D (BNC) VID IN E (BNC) ETHERNET (RJ45) 	<ul style="list-style-type: none"> • Five PiP Video In (VID IN A thru VID IN E) BNCs; auto-detecting as 3G/HD/SD-SDI or CVBS • One 3G/HD/SD-SDI PiP Combined Video Out BNC (SDI OUT A) • COMM/GPIO/AES OUT multi-conductor connector • ETHERNET 10/100 connector (reserved) <p>Note: Ethernet connector is reserved for tally, UDM control, and other functions. This port is independent of card/frame network remote control.</p>

Setting Up 9970-QS Network Remote Control

Perform remote control setup in accordance with Cobalt® reference guide “Remote Control User Guide” (PN 9000RCS-RM).

- Note:**
- If network remote control is to be used for the frame and the frame has not yet been set up for remote control, Cobalt® reference guide **Remote Control User Guide (PN 9000RCS-RM)** provides thorough information and step-by-step instructions for setting up network remote control of Cobalt® cards using DashBoard™. (Cobalt® OGCP-9000 and/or OGCP-9000/CC Remote Control Panels are not recommended for use with this product.)

Download a copy of this guide by clicking on the **Support > Reference Documents** link at www.cobaltdigital.com and then select DashBoard Remote Control Setup Guide as a download, or contact Cobalt® as listed in Contact Cobalt Digital Inc. (p. 1-16).

- If installing a card in a frame already equipped for, and connected to DashBoard™, no network setup is required for the card. The card will be discovered by DashBoard™ and be ready for use.
- Cards using current firmware version 1.62.0000 or greater (or cards upgraded to this firmware) require DashBoard™ version 6.0 or greater. This is due to the added user interface controls which can only be accommodated with DashBoard version 6.0 or greater. While cards with the current firmware version 1.62.0000 will appear in the frame Basic Tree View in earlier DashBoard versions, the card controls will not be accessible. For a free download of the latest DashBoard version, please go to www.cobaltdigital.com, and select **Products > Software Control > DashBoard™**, and then select the version applicable to your computer.

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Setup Instructions

Overview

If you are already familiar with using DashBoard to control Cobalt cards, please skip to 9970-QS Function Menu List and Descriptions (p. 3-9).

This chapter contains the following information:

- Control and Display Descriptions (p. 3-4)
- Accessing the 9970-QS Card via Remote Control (p. 3-6)
- Checking 9970-QS Card Information (p. 3-8)
- 9970-QS Function Menu List and Descriptions (p. 3-9)
- Troubleshooting (p. 3-44)

Note: Information in this chapter describes setup/integration of this product intended for engineering personnel. Most of these functions described are limited to initial setup in integrating the 9970-QS into its operating environment.

Instructions for using the 9970-QS are contained in “9970-QS Operators’s Guide”, which is limited to user operating instructions for using the 9970-QS PiP user interface to manipulate and set up the quint-split/multiviewer functions of this product. This guide (which is furnished with this product) is intended for operating personnel who will be using the 9970-QS to manipulate and configure the multi-split PiP multiviewer functions (“day-to-day use”) of this product. This condensed guide should be made available to operating personnel.

Overview of Operator User Controls Outline/Overview

Figure 3-1 shows an example quint-split output image along with the 9970-QS menus and functions that control the attributes shown. Figure 3-2 outlines the basic overall arrangement of the operator user interface menus and the aspects and attributes that can be set up and controlled using each menu and control.

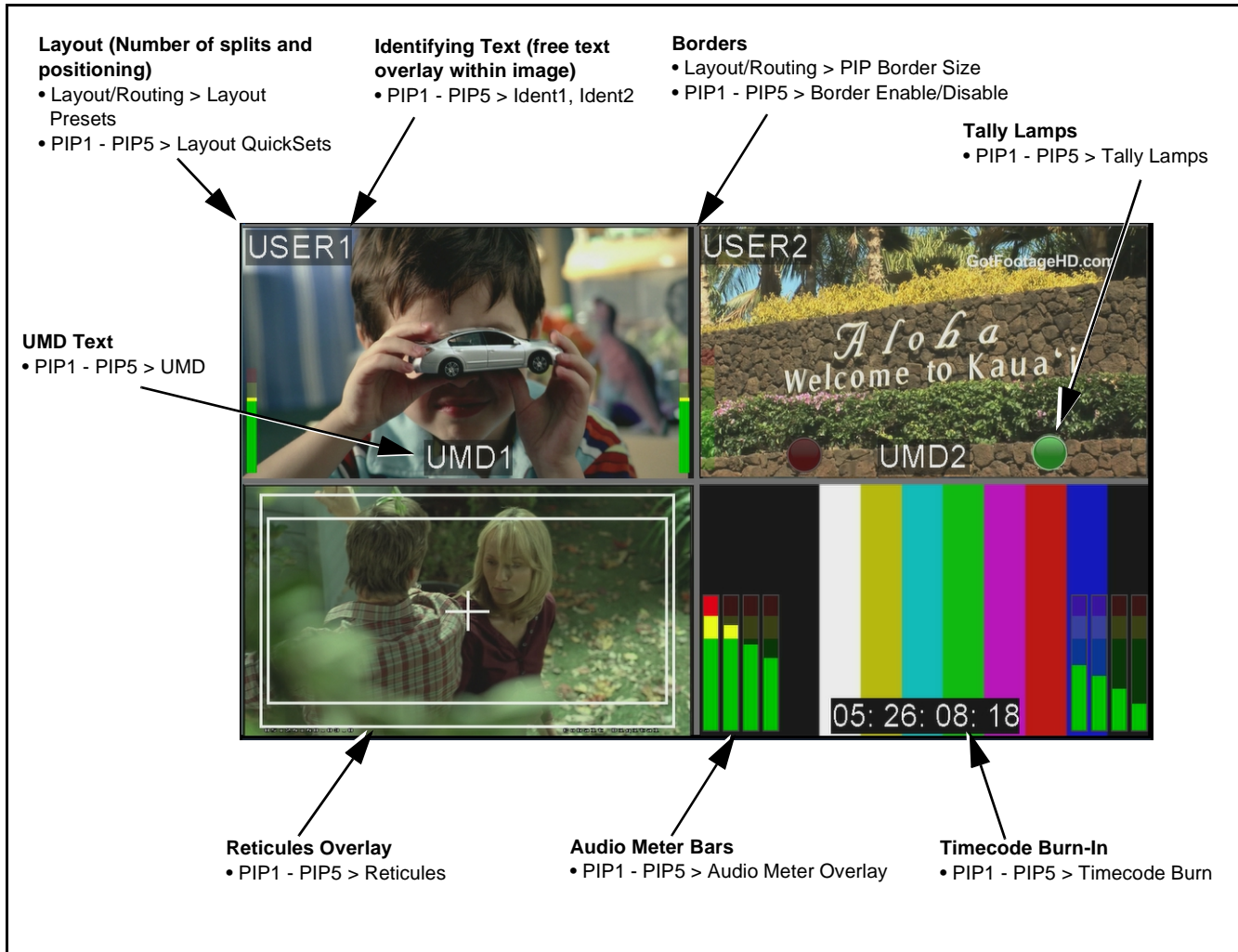


Figure 3-1 Example Quint-Split Image and Configurable Functions

DashBoard Menu Tab

Layout/Routing

Setting the controls on this menu tab is the first step. Using the controls on this tab, you set the number of splits and can apply one-button preset layout templates for various split layouts, or set up custom layouts. Global settings such as overall border attributes are also set here.

- **PIP Input Source** — Sets the input source to be applied to each PiP sector.
- **Layout** — Sets the layout from several preset templates, or allows custom-split PiP sizing.
- **Border Sizing**
- **Output Format** — Sets the merged multi-view output SDI format.

PIP 1 thru PIP 5

The controls here allow you to individually set multiple functions and attributes for each PiP. The functions include tally lamps, per-PIP Aspect Ratio Conversion (ARC), UMD text, user identify text, timecode burn-in, reticules, and audio meters. The appearance attributes (such as size, position, and colors) of these insertions are set here. **Independent tabs are provided for each PiP, allowing each to be set as desired.**

• PiP Position

- **ARC**
- **H/V Position**
- **PIP Width/Height**

Each PiP input can be imported into its PiP area as 1.0 unity aspect ratio, or imported as 0.75H pillar box, 0.75V letter box, or custom aspected.

• Tally Lamps

- **Lamp Insertion Enable/Disable**
- **Lamp Position**
- **Lamp Size**

Red and/or green tally "lamps" can be inserted to anchor to the UMD text, or be positioned as desired in the PiP area. Lamp size can also be user-configured.

• UMD

- **UMD Insertion Enable/Disable**
- **User Text Entry**
- **Text H/V Position**
- **Text and Background Color/Opacity**

UMD text insertion can be set as inserted or disabled. User text is entered here, and can be positioned, sized, and have color and opacity set as desired.

• Ident 1 (User Burn-in Text 1)

• Ident 2 (User Burn-in Text 2)

- **Text Insertion Enable/Disable**
- **User Text Entry**
- **Text H/V Position**
- **Text and Background Color/Opacity**

Two text active video area insertion burn-ins (Ident 1 and Ident 2) can be set as inserted or disabled. User text is entered here, and can be positioned, sized, and have color and opacity set as desired. Text 1 and/or Text 2 can be set to show PiP input video format instead of user text.

PIP 1 thru PIP 5 (cont.)

• Timecode Burn-In

- **Insertion Enable/Disable/LOS Enable**
- **H/V Position**
- **Format (hh:mm, hh:mm:ss, etc)**
- **Text and Background Color/Opacity**

Timecode active video area insertion burn-in can be set as inserted always/disabled, or inserted only on loss of PiP video. The timecode inserted is that present on the respective PiP input video. Timecode string displayed can be set as full mode or progressively truncated to minutes or hours only. Timecode burn-in can be positioned, sized, and have color and opacity set as desired.

• Audio Meters Overlays

- **Insertion Enable/Disable**
- **H/V Position**
- **Layout**
- **Audio Bars and Background Color/Opacity**

Each PiP sector can display full 4-group audio levels or be set to other layouts of progressively lesser pair combinations. Audio bars can be positioned, sized, and have color and opacity set as desired. (Audio displayed are the channels associated with the respective PiP video input.)

• Reticules (Basic and Advanced)

- **Insertion Enable/Disable**
- **H/V Sizing**
- **Appearance Attributes**

Reticule insertion can be set as inserted always/disabled. Individual Safe Action Area (SAA) and Safe Title Area (STA) can be set as desired. Color, line thickness, and opacity can be set as desired. An Advanced sub-menu tab allows insertion of other reticule elements such as custom graticules and center crosses.

Output Audio Routing/Controls

- **Emb Audio Crosspoint**
- **Group Enable/Disable**
- **Gain/Mute/Invert**
- **DashBoard Level Meters**

Routes selected embedded audio channels to the merge SDI output. Provides group enable/disable, level, invert, and mute controls, as well as output audio DashBoard level meters. Audio sources are from a selected PiP input and cannot be selected from mixed PiP input sources. Embedded channels 1 thru 8 directly correspond to HDMI channels 1-8. Channels 3 and 4 are swapped on the HDMI output to maintain conformance with CEA-861D. See detailed instructions for more information.

Output Format

- **Output Format**
- **Underscan/Compensation**
- **Ref Lock Mode**

Merged SDI output format is set here, as well as merged image underscan and 16x10 compensation if desired. A master card reference lock source is also selected here. See detailed instructions for more information.

Presets

- **Preset Layer Select**
- **Preset Save**
- **Preset Load**

Allows custom settings to be saved as a one-button preset as desired. Preset Layer Select allows selecting a functional layer (or "area of concern") that the preset is concerned with. Limiting presets to a layer or area of concern allows for highly specific presets, and masks changing device settings in areas outside of the layer or area of concern. See detailed instructions for more information.

Figure 3-2 Outline Overview of Operator Controls

Control and Display Descriptions

This section describes the user interface controls, indicators, and displays for using the 9970-QS card.

Access to the 9970-QS functions (and the controls, indicators, and displays related to a particular function) follows a general arrangement of Function Menus under which related controls can be accessed (as described in Function Menu/Parameter Menu Overview below).

Note: When a setting is changed, settings displayed on DashBoard™ are the settings as effected by the card itself and reported back to the remote control; the value displayed at any time is the actual value as set on the card.

Function Menu/Parameter Menu Overview

The functions and related parameters available on the 9970-QS card are organized into function **menus**, which consist of parameter groups as shown below.

Figure 3-3 shows how the 9970-QS card and its menus are organized, and also provides an overview of how navigation is performed between cards, function menus, and parameters.

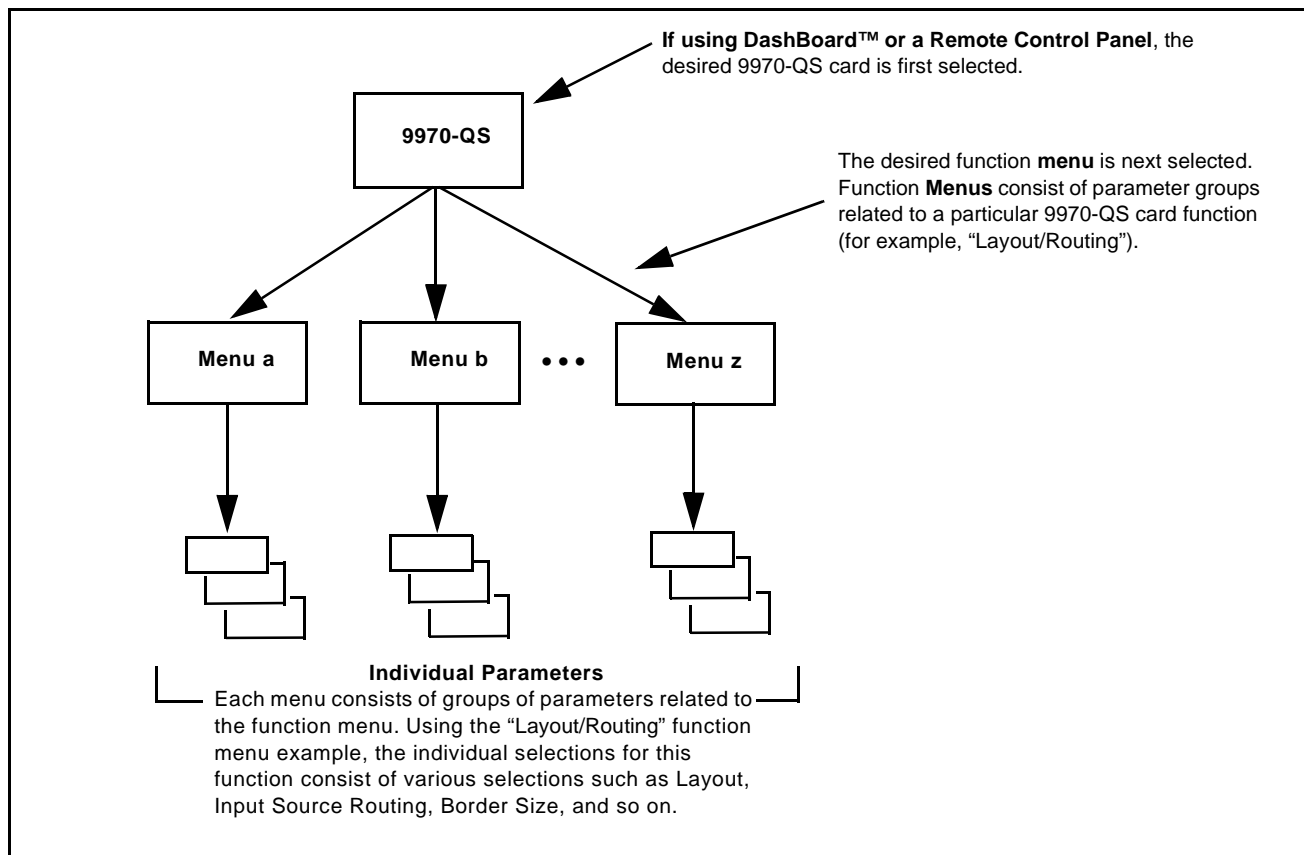


Figure 3-3 Function Menu/Parameter Menu Overview

DashBoard™ User Interface

(See Figure 3-4.) The card function menus are organized in DashBoard™ using tabs. When a tab is selected, each parametric control or selection list item associated with the function is displayed. Scalar (numeric) parametric values can then be adjusted as desired using the GUI slider controls. Items in a list can then be selected using GUI drop-down lists.

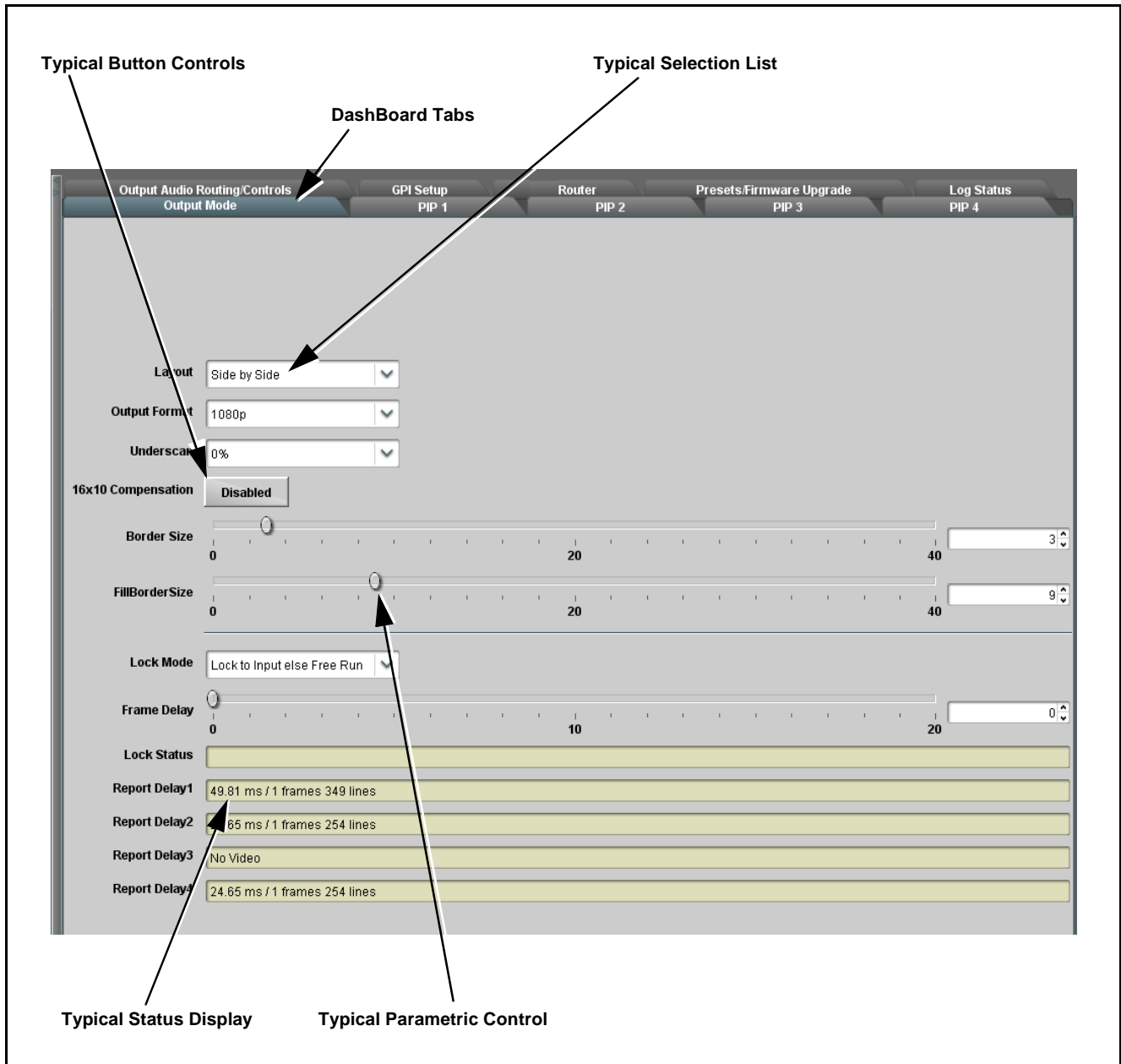


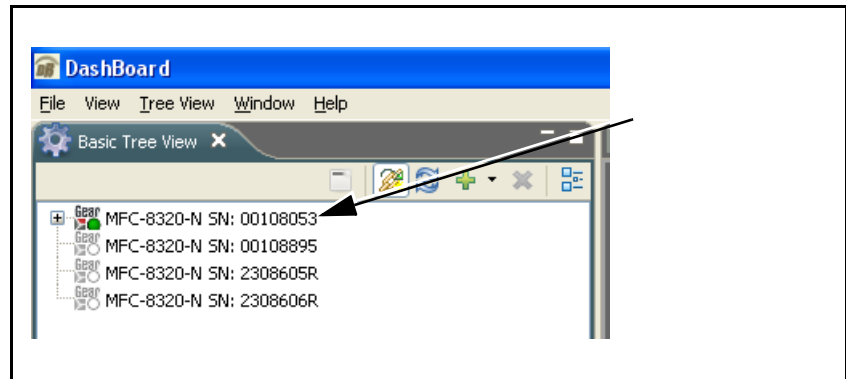
Figure 3-4 Typical DashBoard Tabs and Controls

Accessing the 9970-QS Card via Remote Control

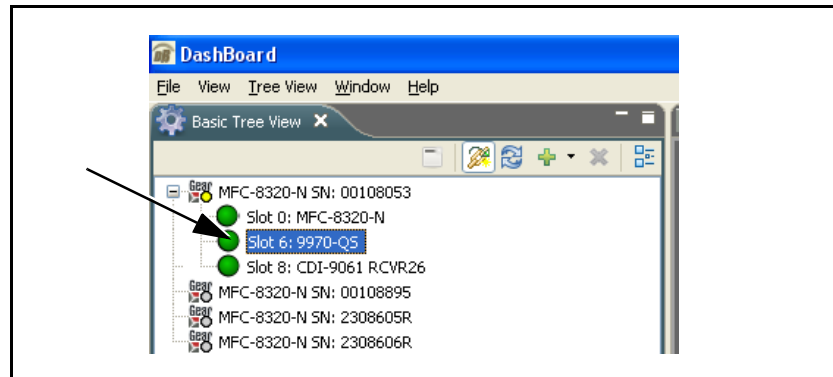
Access the 9970-QS card using DashBoard™ or Cobalt® Remote Control Panel as described below.

Accessing the 9970-QS Card Using DashBoard™

1. On the computer connected to the frame LAN, open DashBoard™.
2. As shown below, in the left side Basic View Tree locate the Network Controller Card associated with the frame containing the 9970-QS card to be accessed (in this example, “MFC-8320-N SN: 00108053”).



3. As shown below, expand the tree to access the cards within the frame. Click on the card to be accessed (in this example, “Slot 6: 9970-QS”).



As shown on the next page, when the card is accessed in DashBoard™ its function menu screen showing tabs for each function is displayed. (The particular menu screen displayed is the previously displayed screen from the last time the card was accessed by DashBoard™).

Card Access/Navigation
Tree Pane

Card Info
Pane

Card Function Menu and
Controls Pane

The screenshot displays the 9970-QS remote control interface. The interface is divided into three main sections:

- Card Access/Navigation Tree Pane:** Located on the left, it shows a hierarchical tree of frames and cards. The selected card is "Slot 6: 9970-QS".
- Card Info Pane:** Located in the middle, it displays the status and product information for the selected card. The status is "Video Input Invalid" and the connection is "ONLINE".
- Card Function Menu and Controls Pane:** Located on the right, it contains various controls and settings for the card, including Output Video, SDI Input A, SDI Input B, SDI Input C, SDI Input D, GPI1, GPI2, Reference 1, Card Voltage, Card Power, Card Temp Front, Card Temp Rear, Card Temp FPGA, Card Up Time, and Card IP.

The Card Info Pane shows the following details:

- Slot 6: 9970-QS
- Card state: Video Input Invalid
- Connection: ONLINE
- Status: ONLINE
- Product Info: 1080p_5994
- SDI Input A: 1080p_5994, OK Time 0:12:02, 0 Er
- SDI Input B: 1080p_5994, OK Time 0:12:02, 0
- SDI Input C: (Unlocked)
- SDI Input D: 1080p_5994, OK Time 0:12:02, 0
- GPI1: (Closed)
- GPI2: (Closed)
- Reference 1: 1080p_5994
- Card Voltage: 11.67 V
- Card Power: 18.77 W
- Card Temp Front: 30.6 C
- Card Temp Rear: 53.7 C
- Card Temp FPGA: 63.7 C amb 69.0 C core
- Card Up Time: 00:12:09
- Card IP: 10.99.11.183

The Card Function Menu and Controls Pane shows the following settings:

- Output Mode: PIP 1
- Layout: Side by Side
- Output Format: 1080p
- Underscan: 0%
- 16x10 Compensation: Disabled
- Border Size: 3
- Fill Border Size: 9
- Lock Mode: Lock to Input else Free Run
- Frame Delay: 0
- Lock Status: (Locked)
- Report Delay1: 49.81 ms / 1 frames 349 lines
- Report Delay2: 24.65 ms / 1 frames 254 lines
- Report Delay3: No Video
- Report Delay4: 24.65 ms / 1 frames 254 lines

At the bottom of the Card Function Menu and Controls Pane, there are buttons for Refresh, Upload, Reboot, and Close.

Checking 9970-QS Card Information

The operating status and software version the 9970-QS card can be checked using DashBoard™. Figure 3-5 shows and describes the 9970-QS card information screen using DashBoard™.

Note: Proper operating status in DashBoard™ is denoted by green icons for the status indicators shown in Figure 3-5. Yellow or red icons respectively indicate an alert or failure condition. Refer to Troubleshooting (p. 3-44) for corrective action.

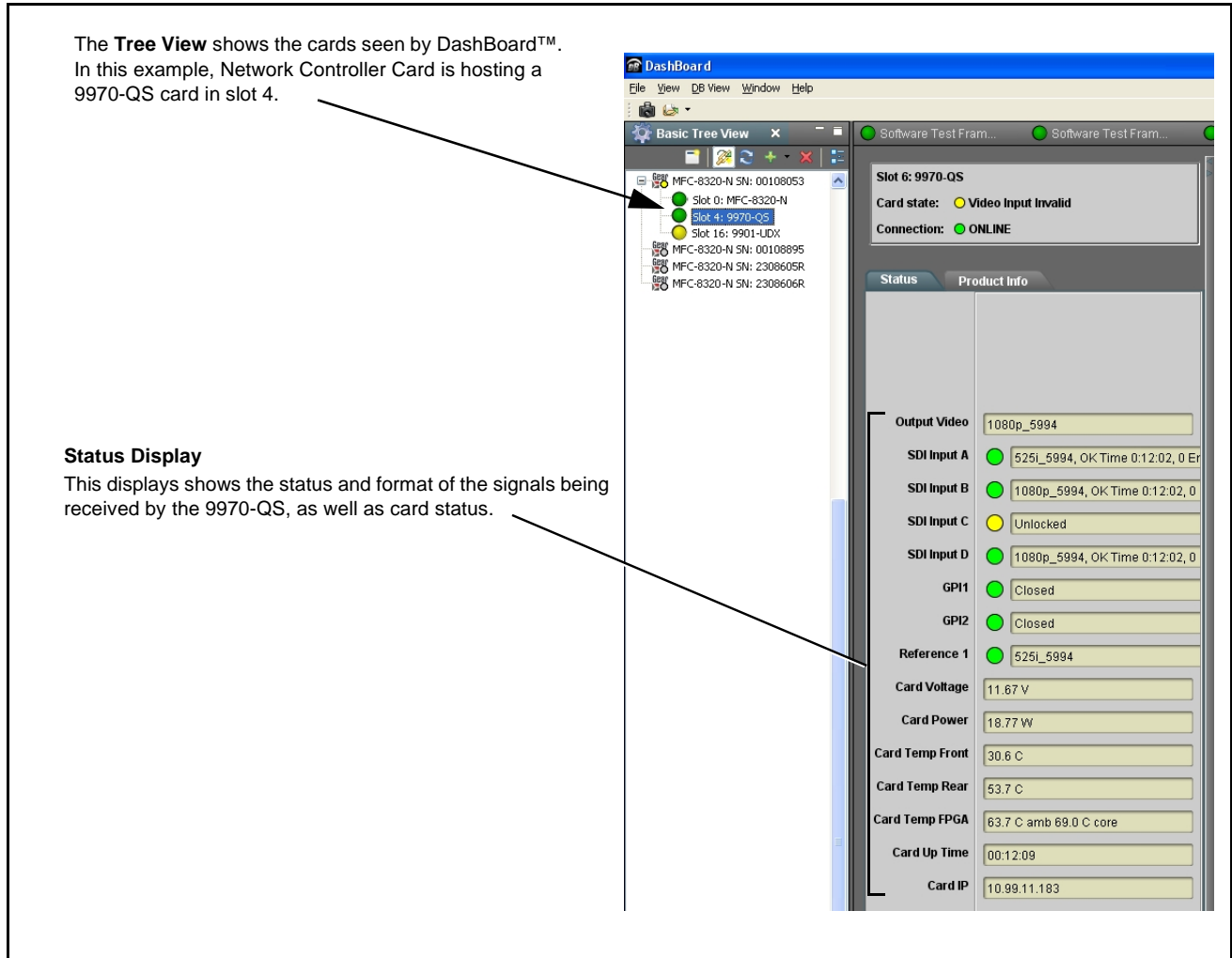



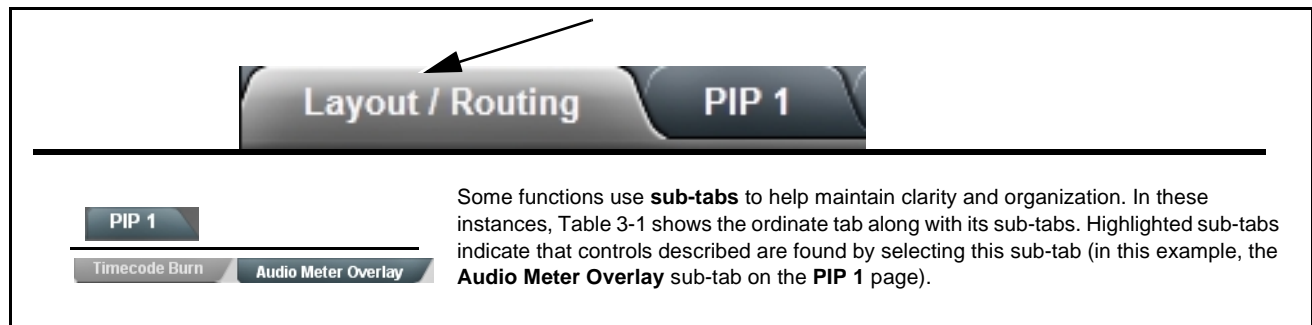
Figure 3-5 9970-QS Card Info/Status Utility

9970-QS Function Menu List and Descriptions

Table 3-1 individually lists and describes each 9970-QS function menu and its related list selections, controls, and parameters. Where helpful, examples showing usage of a function are also provided. Table 3-1 is primarily based upon using DashBoard™ to access each function and its corresponding menus and parameters.

- Note:**
- All numeric (scalar) parameters displayed on DashBoard™ can be changed using the slider controls,  arrows, or by numeric keypad entry in the corresponding numeric field. (When using numeric keypad entry, add a return after the entry to commit the entry.)
 - Cards using firmware version 1.74.0000 (or greater) require DashBoard™ version 6.0 or greater. This is due to the added user interface controls which can only be accommodated with DashBoard version 6.0 or greater. While cards with the most recent firmware version will appear in the frame Basic Tree View in older DashBoard versions, the card controls will not be accessible. For a free download of the latest DashBoard version, please go to www.cobaltdigital.com, and select **Products > Software Control > DashBoard™**, and then select the version applicable to your computer.

On DashBoard™ itself and in Table 3-1, the function menu items are organized using tabs as shown below.



The table below provides a quick-reference to the page numbers where each function menu item can be found.

Function Menu Item	Page	Function Menu Item	Page
Layout/Routing	3-10	GPI Setup Controls	3-36
PIP 1 thru PIP 5 Controls	3-15	Protocols (Router Integration) Controls	3-37
Output Format Controls	3-33	Clock (Wall-Clock Time) Controls	3-38
HDMI/DVI Mode Controls	3-34	Presets	3-41
Output Audio Routing/Controls	3-35	Admin (Log Status/Firmware Update)	3-42

Note: Some control descriptions in this section are also contained in “9970-QS Operator’s Guide” and are repeated here for convenience. It is however recommended that operators use 9970-QS Operator’s Guide (included with this product) for using the 9970-QS rather than this manual.

Table 3-1 9970-QS Function Menu List


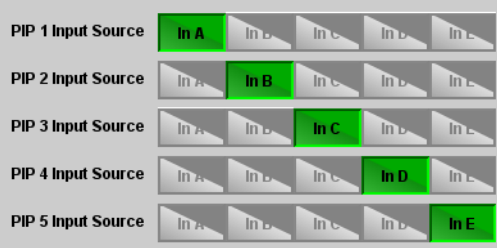


	<p>Provides controls to select inputs to be applied to each PiP. Also provides PiP layout presets templates and other controls related to the overall layout.</p>
<p>Note: Layout/Routing controls description section here is repeated in “9970-QS Operator’s Guide”.</p>	
<p>• PiP Input Source Select</p> 	<p>Routes the card SDI inputs (VID IN A thru VID IN E as In A thru In E, respectively) to the respective card PiP input.</p> <p>(In this example, VID IN A thru VID IN E are respectively routed as PIP 1 thru PIP 5 input sources.)</p> <p>Note: A CVBS input is automatically detected by the card input, with the CVBS ADC converter automatically engaged.</p>
<p>• Identify PiPs Button</p> 	<p>Pressing this button momentarily displays an overlay on each PiP image that correlates the PiP to its card PiP identity. This control is useful if you “lose track” of which displayed PiP correlates to which card PiP input channel.</p>  <p>Pressing Identify PiPs shows the PiP assignment in the merged output (display ceases after about 3 seconds)</p>

Table 3-1 9970-QS Function Menu List — continued

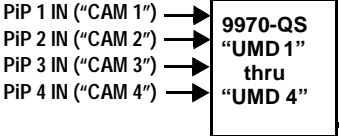
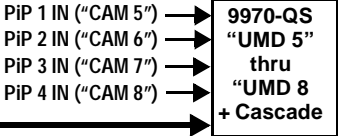


Layout / Routing	(continued)
<p>• Cascade Mode Select</p> <div data-bbox="280 422 553 499"> <p>Cascade Mode Enabled</p> </div>	<p>Note:</p> <ul style="list-style-type: none"> • See Cascading (Multi-Card) 9970-QS Operation and Setup Overview (p. 1-9) in Chapter 1, Introduction for an overview of multi-card cascading that provides multiviewer images exceeding that of a single quint-split card. • See Cascade Mode Using PiP Layout QuickSet Template Presets (p. 3-16) for examples control settings using Cascade Mode along with other per-PiP settings to provide a cascaded multiviewer image setup. <p>Cascade Mode Select sets PiP 5 as a input to be used to receive a cascade output from another 9970-QS card or to be set as a regular fifth PiP input as follows:</p> <ul style="list-style-type: none"> • Enabled: Sets PiP 5 input to receive a cascade output from another 9970-QS card. Because this cascaded underlay will have any burn-in insertions already in place from the upstream source card, all PiP 5 burn-in insertions are automatically disabled in this mode. Also, since this PiP will serve as an underlay for any added PiPs, in this mode PiP 5 is inserted full-size, with all sizing and positioning controls locked out for this PiP insertion. • Disabled: Sets PiP 5 input to be used as regular input, with full aspect and sizing/positioning control and burn-ins as PiPs 1 thru 4. Use this mode when only a single, non-cascaded 9970-QS is to be used for multi-image processing.
	
	
<p>First 9970-QS card receives "CAM 1" thru "CAM 4", as PiP 1 thru PiP 4 inputs. This output is fed to a second, daisy-chained 9970-QS as a cascading input.</p>	<p>The second 9970-QS card receives "CAM 5" thru "CAM 8", as PiP 1 thru PiP 4 inputs and is set to position these images in a 2nd column. The imported PiP 5 cascade input (carrying "CAM 1" thru "CAM 4") serves as an underlay.</p> <p>The resulting output (consisting of eight PiPs) now consists of the imported cascading "CAM 1" thru "CAM 4" images, as well as the local input "CAM 5" thru CAM 8" images.</p>
<p>Note: When using cascade mode, the symmetrical alignments shown here are available as "QuickSet" presets using the card per-PiP controls as described in PIP 1 thru PIP 5 Controls (p. 3-15) and in the example shown in Cascade Mode Using PiP Layout QuickSet Template Presets (p. 3-16).</p>	

Table 3-1 9970-QS Function Menu List — continued

<div>Layout / Routing</div>	(continued)
<p>• Cascade Mode Low-Latency Mode Select</p> <div data-bbox="191 426 695 667"> <p>Cascade Low Latency Mode Disabled</p> <ul style="list-style-type: none"> Disabled Enabled - Automatic alignment Enabled - Manual alignment <p>Cascade Alignment Apply Align</p> </div>	<p>Provides modes where card I/O latency can be reduced (by bypassing cascade input framesync) using the choices shown and described below.</p> <ul style="list-style-type: none"> • Disabled: Normal default mode where an upstream cascaded input is always aligned to the local card's selected reference. This results in the normal, expected one-frame delay due to the framesyncing action. Where low-latency is not required, it is recommended to use this mode. • Enabled – Automatic alignment: This mode applies framesyncing when needed (applying framesync and bypassing low-latency during these intervals). When alignment is again detected by the local card, framesyncing is correspondingly disabled and low-latency operation is again applied. Because this mode can automatically enable and disable framesyncing, an occasional video "hit" should be expected when using this mode. • Enabled – Manual alignment: Similar to the AUtomatic alignment mode, this mode will disable low-latency framesync bypass when needed. However, it will not apply alignment until the Cascade Alignment Apply button is pressed, thereby circumventing an unexpected auto-align video "hit". <p>Note: Where a multi-card cascaded arrangement is being used, locking all inputs and all 9970-QS cards to the same house reference will optimize alignment and help allow unimpeded low-latency operation (with Latency Mode being set to Enabled - Automatic alignment).</p>
<p>• Cascade Mode Low-Latency Status</p> <div data-bbox="215 1056 779 1392"> <p>Cascade Low Latency Status ● Cascade low latency is disabled</p> <hr/> <p>Cascade Low Latency Status ● Cascade input is drifting low latency disabled</p> <hr/> <p>Cascade Low Latency Status ● Cascade input is locked low latency requires alignment</p> <hr/> <p>Cascade Low Latency Status ● Cascade low latency is enabled and aligned</p> </div>	<p>Displays the low-latency framesync bypass status as shown below.</p> <ul style="list-style-type: none"> • Green indicator and "disabled" message indicates low-latency framesync bypass is disabled by Low Latency control being set to Disabled. • Yellow indicator and "drifting" message indicates low-latency framesync bypass is disabled by event requiring framesync with low-latency correspondingly disabled. This message typically appears when auto mode is selected and cascaded input is experiencing timing drift versus local card timing. • Yellow indicator and "requires alignment" message indicates cascading input is now detected as being locked, but local card requires Align button to be pressed to remove any buffer excess and re-establish sync. • Green indicator and "enabled and aligned" message indicates cascading input is now detected as being locked, with full bypass of framesyncing and low-latency now is effect.

Table 3-1 9970-QS Function Menu List — continued

<div>Layout / Routing</div>	(continued)	
<div>• Layout Preset Template Select</div>	<div>Selects from several preset layout templates from the choices shown and depicted below.</div> <div>Note: The Preset templates described below are intended for non-cascading layouts. For symmetrical cascaded layouts (layouts exceeding five PiPs), see Cascade Mode Using PiP Layout QuickSet Template Presets (p. 3-16).</div>	
<div><div>Layout Presets</div><div><div>Quint</div><div>Quad</div><div>Three Bottom</div><div>Side by Side</div><div>Over / Under</div></div><div><div>Apply</div><div>Apply</div><div>Apply</div><div>Apply</div><div>Apply</div></div><div><div>PIP 1 Full</div><div>PIP 2 Full</div><div>PIP 3 Full</div><div>PIP 4 Full</div><div>PIP 5 Full</div></div><div><div>Apply</div><div>Apply</div><div>Apply</div><div>Apply</div><div>Apply</div></div></div>		
<div>Quint</div> <div><div>PIP 1</div><div>PIP 2</div><div>PIP 3</div><div>PIP 4</div><div>PIP 5</div></div>	<div>Quad (symmetrical)</div> <div><div>PIP 1</div><div>PIP 2</div><div>PIP 3</div><div>PIP 4</div></div>	<div>Three Bottom</div> <div><div>PIP 1</div><div>PIP 2</div><div>PIP 3</div><div>PIP 4</div></div>
<div>Side-by-Side</div> <div><div>PIP 1</div><div>PIP 2</div></div>	<div>Over / Under</div> <div><div>PIP 1</div><div>PIP 2</div></div>	<div>PiP 1, 2...thru PiP 5 Full</div> <div><div>PIP 1... PIP 5</div></div>

Table 3-1 9970-QS Function Menu List — continued



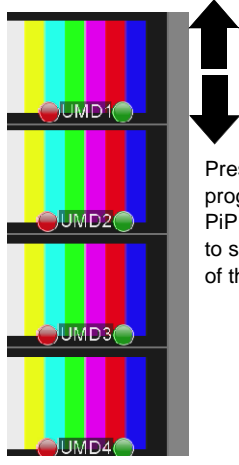
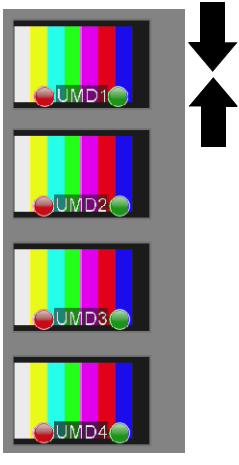



Layout / Routing	(continued)
<p>• Decrease/Increase Fill Controls</p> <div data-bbox="250 415 509 554"> <p>Decrease Fill </p> <p>Increase Fill </p> </div>	<p>Provides tailoring of the PiP image sizes relative to background fill.</p>
<div data-bbox="272 617 509 1079">  </div> <p>Pressing Decrease Fill progressively removes fill from PiP fill areas, allowing each PiP to symmetrically occupy more of the image area</p>	<div data-bbox="1133 617 1370 1079">  </div> <p>Pressing Increase Fill progressively adds fill to PiP fill areas, allowing fill to symmetrically occupy more of the PiP image area</p>
<p>• PiP Border Size Control</p> <div data-bbox="250 1205 558 1289"> <p>PIP Border Size </p> <p>0</p> </div>	<p>Sets the border widths between the PiP sections (see examples below).</p>
<div data-bbox="315 1365 688 1575">  </div> <p>Border set for 0 (all images touch with no border)</p>	<div data-bbox="867 1365 1240 1575">  </div> <p>Border set for 10 (a 10-pixel border is added)</p>
<p>Note: PiP border colors are typically controlled in an automated manner using GPI coding or IP automation. However, the borders of each PiP can be set using static manual user control with no external interfaces using manual control via the GPI Setup tab. See pg. 3-36 for setting borders using manual control.</p>	

Table 3-1 9970-QS Function Menu List — continued




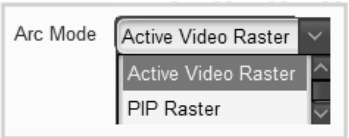
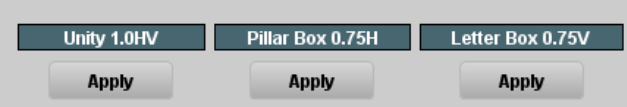
	<p>Provides controls to individually set multiple functions and attributes for each PiP, including tally lamps, per-PiP Aspect Ratio Conversion (ARC), UMD text, user identify text, timecode burn-in, reticules, and audio meters.</p> <p>PIP Position sub-tab provides controls for within-PiP window ARC and PiP custom sizing controls, and provides multiviewer layout QuickSet templates for cascaded multi-card operation.</p>
<p>Note:</p> <ul style="list-style-type: none"> • PIP 2 thru PIP 5 menu tabs have controls identical to the controls described here for PIP 1. Therefore, only the PIP 1 controls are shown here. • PiP 1 thru PiP 5 control description section here is repeated in “9970-QS Operator’s Guide”. 	
<p>• PiP Image/Border Enable Controls</p> 	<p>Provides per-PiP image and border enable/disable.</p> <ul style="list-style-type: none"> • When PiP is disabled, area set for PiP insertion is replaced by black fill. Other PiP images and positioning are not affected. • When Border is disabled, PiP is resized to fill the entire PiP image area.
<p>• PiP Input Select</p> 	<p>Routes the card SDI inputs (VID IN A thru VID IN E as In A thru In E, respectively) to the respective card PiP input.</p> <p>(In this example, VID IN A is routed as PIP 1 input source.)</p> <p>Note: The Input Select control also appears on the Layout/Routing tab and are mutually ganged with the selection performed on either tab.</p>
<p>• PiP ARC Mode Select</p> 	<p>ARC Mode select allows the ARC controls to either use the aspect ratio defined by the incoming PiP video to serve as the referenced aspect ratio for other ARC controls, or to use a custom-sized aspect ratio PiP raster as the referenced aspect ratio.</p> <ul style="list-style-type: none"> • Active Video Raster selection sets ARC action to use the incoming PiP video as the referenced aspecting (e.g., with a 16:9 input, setting ARC to Unity 1.0 HV results in a PiP with a 16:9 aspect ratio). • PiP Raster selection ARC action to use a custom-configured aspect ratio to serve as the referenced aspecting. PiP Raster selection can accommodate use cases where non-standard aspect ratios are desired even with image stretching or collapsing.
<p>• Standard Preset Template Aspect Ratio Conversion Selectors</p> 	<p>Selects between the standard preset Aspect Ratio Conversions (ARC) shown below.</p>

Table 3-1 9970-QS Function Menu List — continued

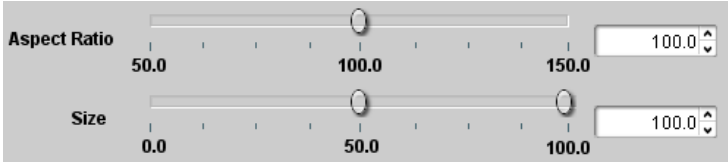
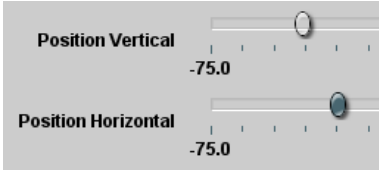
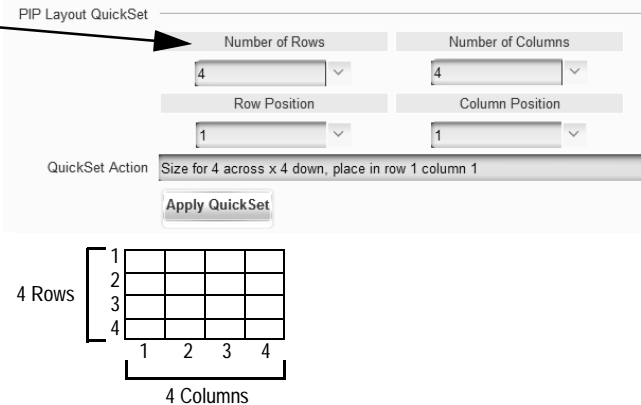
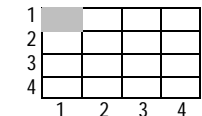

<div> <div>PIP 1</div> <div>PIP 5</div> </div> <div> <div>PIP Position</div> <div>Tally Lamps</div> </div>	(continued)
<ul style="list-style-type: none"> • User-defined Aspect Ratio Controls 	<p>Aspect Ratio Horizontal and Aspect Ratio Vertical controls adjust horizontal and vertical zoom percentage. Settings less than 100% provide zoom-out; settings greater than 100% provide zoom-in.</p> <p>(50% to 150% range in 0.1% steps; null = 100.0)</p> <p>Aspect Ratio control applies a custom ARC with scaling reflecting the division of the aspect ratio (e.g., “50%” setting is equivalent to 2H:4V, or 2 divided by 4).</p> <p>Size control provides a proportional scaling of the PiP Image within the PiP area, maintaining whatever aspect ratio is in effect.</p>
<ul style="list-style-type: none"> • Within-PiP Positioning Controls 	<p>Where ARC settings result in an image smaller than the PiP active area, allows the image to be vertically and horizontally positioned within the PiP area boundaries.</p> <p>(-75% to 75% range in 0.1% steps)</p> <p>Note: This control affects only image positioning within the PiP image area. It will not move an image to an area outside the currently-defined PiP area.</p>
<ul style="list-style-type: none"> • PiP Layout QuickSet Template Presets (Cascade Mode) <p>The Number of Rows and Number of Columns drop-downs set the grid format to be used for a multi-card, multiviewer setup. Once the number of rows/columns is set, this is propagated to other PiP controls on the card, since this will be a card global setting that allows other PiP insertions to conform with the desired grid layout.</p> <p>The QuickSet Action field shows a summary of the configured layout. Click Apply QuickSet to enact the layout setup.</p> <p>In this example, a 4-row x 4-column grid is being set up (which can provide a 16:1 multiviewer layout using four 9970-QS cards, each handling four PiP images).</p>	<p>Layout QuickSets provide for layouts consisting of symmetrical columns and rows that are intended for cascade layouts where, for example, an upstream 9970-QS card provides a first column of PiP images, and then a second 9970-QS provides the second column of PiP images.</p> <p>The descriptions here describe using the controls and also provide examples using the controls and the resulting multi-card cascade setups.</p>  <p>The Row Position and Column Position drop-downs set where in the grid the PiP image will be inserted (in this example, position row 1 / column 1).</p>  

Table 3-1 9970-QS Function Menu List — continued

PIP 1

PIP 5

PIP Position

Tally Lamps

(continued)

Example 16:1 Multiviewer Setup Using Multi-Card Cascading Mode and Quicksets

This example shows a layout setup that provides a 16:1 multiviewer output. It uses four 9970-QS cards, each handling four PiP inputs, and with each card set to work with a 16-PiP (4x4) grid.

1. First, on the **PIP 1 > PIP Position** tab a 4x4 grid is set up. This setup will propagate to the PiP 2 thru PIP 4 same controls on the card. (This must also be done for any other 9970-QS cards in the chain.)

PIP Layout QuickSet

Number of Rows

4

Number of Columns

4

2. On the **first** 9970-QS card, PiP 1 thru PiP 4 images ("CAM 1" thru "CAM 4") are routed and positioned as Row Positions 1 thru 4, all in Column 1. This results in the first column of four images for the 16:1 multiviewer setup.

The SDI output of this card is routed to the next 9970-QS card as the PIP 5 input, with this card set up with **Cascade Mode > Enabled**. This places the first card output as an underlay with its merged PiP output positioned in the first column.

Row Position

1

Column Position

1

Row Position

2

Column Position

1

Row Position

3

Column Position


1

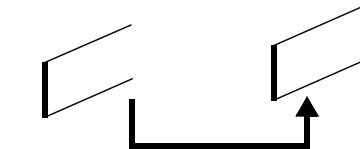
Row Position

4

Column Position

1






Card A:
"CAM 1" – "CAM 4" in
1st column

Card B:
"CAM 1" – "CAM 4" in 1st column imported as underlay.
"CAM 5" – "CAM 8" (card 2 local inputs 1-4) positioned
in 2nd column.

3. On the **second** 9970-QS card, PiP 1 thru PiP 4 images ("CAM 5" thru "CAM 8") are routed and positioned as Row Positions 1 thru 4, all now set in Column 2.

Along with the underlay imported from card 1 as column 1, this now results in the first column of four underlay imported images and the second column of four more locally input PiP images ("CAM 1" thru "CAM 8").



Row Position

1

Column Position

2

Row Position

2

Column Position

2

Row Position

3

Column Position

2

Row Position

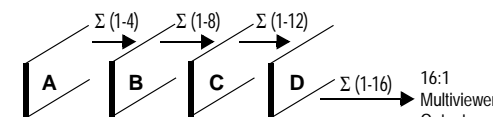
4

Column Position

2

4. Using a total of four 9970-QS cards (**Card A** thru **Card D**) similarly configured in a daisy-chain arrangement, the SDI output of an upstream 9970-QS card provides the cumulative built-up underlay, and allows positioning local PiP images in successive columns. In this example, four cards each are set to progressively position local PiP inputs in columns 1 thru 4, respectively. This results in four multiviewer columns consisting here of:

"CAM 1" – "CAM 4"
"CAM 5" – "CAM 8"
"CAM 9" – "CAM 12"
"CAM 13" – "CAM 16"



1	5	9	13
2	6	10	14
3	7	11	15
4	8	12	16

Σ (1-4)

Σ (1-8)

Σ (1-12)

Σ (1-16)

16:1 Multiviewer Output

Table 3-1 9970-QS Function Menu List — continued

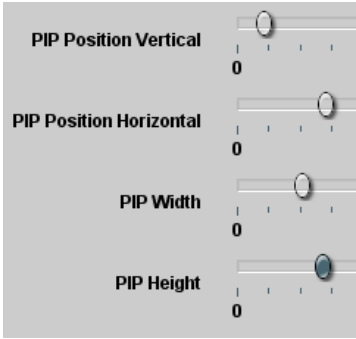
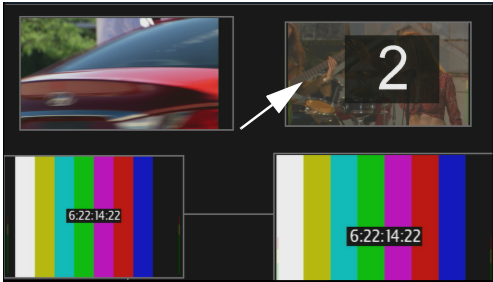
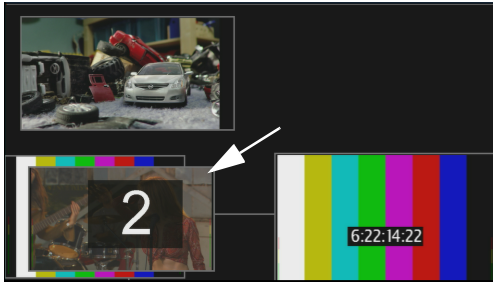

<div> <div>PIP 1</div> <div>PIP 5</div> </div> <div> <div>PIP Position</div> <div>Tally Lamps</div> </div>	(continued)
<p>• PIP Custom Positioning Controls</p> 	<p>Controls allow the positioning and sizing of the PiP within the overall merged output image.</p> <ul style="list-style-type: none"> • Position Vertical and Position Horizontal sets the PiP origin location (Vertical in lines; horizontal in pixels) • Width and Height sets the PiP size (Vertical in lines; horizontal in pixels) <p>The PIP Size display shows the PiP size and H/V origin point position.</p> <p>Note: Even if a PiP layout QuickSet was applied, these controls allow manipulating PiP position and size as desired.</p>
 <p>PiP 2 with custom positioning/sizing placed in normal upper-right corner of merged quint-split output</p>	 <p>PiP 2 with new custom positioning/sizing now places PiP 2 in lower-left corner (over PiP 3) of merged quint-split output</p>
	<p>When using custom positioning, it is helpful to first size all the PiP small (as thumbnail sized). This helps avoid a PiP "hiding" underneath another PiP. Pressing the Identify PiPs button as shown here will help make sure each PiP input correlation is known, and all PiP are present as expected.</p> <p>With the PiP identities now known, one-by-one each PiP can be sized and positioned to its desired size/position as shown in the example here.</p>

Table 3-1 9970-QS Function Menu List — continued

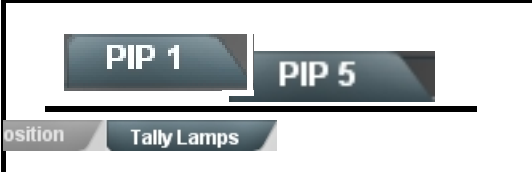

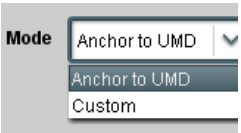
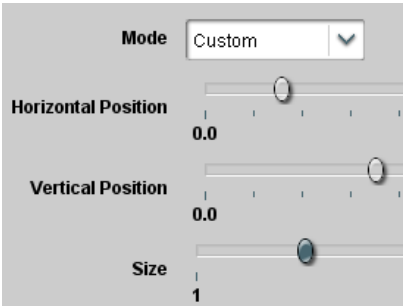
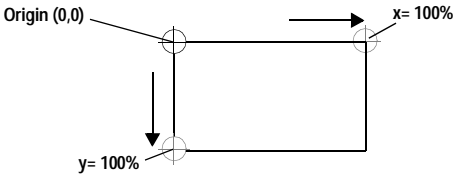
	<p>Provides controls for each PiP to insert red and green tally indicator “lamps” as overlays into the output video.</p>
<p>Note:</p> <ul style="list-style-type: none"> • Tally lamp activation (ON/OFF control) is set using GPI coding (see GPI Setup Controls (p. 3-36)) or IP-based automation. The controls here enable lamp overlay insertion, and control size and position attributes. These controls do not control tally activation. • Identical independent controls are provided for a red tally lamp and green tally lamp. Therefore, only the Red Lamp controls are shown here. 	
<p>• Tally Insertion Select</p> 	<p>Enables or disables lamp insertion overlay.</p>
<p>• Tally Position Select</p> 	<p>Sets the location of the tally lamp as anchored to UMD or custom. (When Custom is selected, tally lamp position and size is configured using the controls described below.)</p>
<p>• Tally Custom Sizing/Position Controls</p> 	<p>Where Custom is selected, allows tally lamp to be positioned anywhere in the image area of the respective PiP.</p> <p>Horizontal and Vertical Position controls set the origin point for the tally lamp overlay.</p> 

Table 3-1 9970-QS Function Menu List — continued



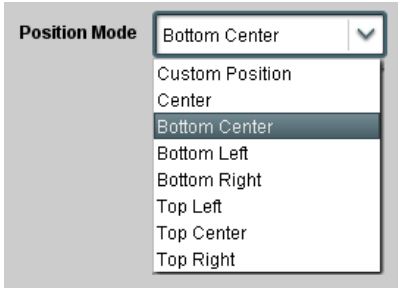


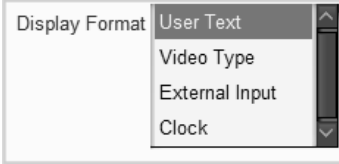
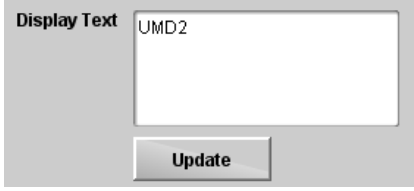
	<p>Provides controls for each PiP to insert UMD text, and set insertion rules and UMD text attributes such as size and color.</p>
<p>• UMD Insertion Select</p> 	<p>Selects the rules for UMD overlay insertion into the PiP area.</p>
<p>• UMD Position Select</p> 	<p>Sets the location of the UMD insertion from choices shown or custom. (When Custom is selected, UMD position and size is configured using the controls described below.)</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Example: Top Center</p> </div> <div style="text-align: center;">  <p>Example: Bottom Center</p> </div> </div>
<p>• UMD Text Type (Format) Select</p> 	<p>Selects the type of data to be displayed as UMD text from choices shown.</p> <ul style="list-style-type: none"> • User text allows user text to be entered using field described below. • Video type inserts an overlay showing the video format of the respective PiP input. • External Input inserts an overlay using data provided by an automation system received over the card Ethernet port. • Clock inserts a wall-clock time overlay (see Clock (Wall-Clock Time) Controls (p. 3-38) for setting the wall-clock time clock feature). <p>Note: Drop-down may contain other choices which are not yet fully implemented in this release.</p>
<p>• UMD Text Entry Field</p> 	<p>Dialog entry box that allows entry of desired ident text string. Enter desired text as click Update when done to input the text string.</p> <p>Note:</p> <ul style="list-style-type: none"> • All normal keyboard alphanumeric characters are supported. Not all ASCII special characters (Windows ALT+nnnn) are supported. • Up to 126 characters can be entered.

Table 3-1 9970-QS Function Menu List — continued

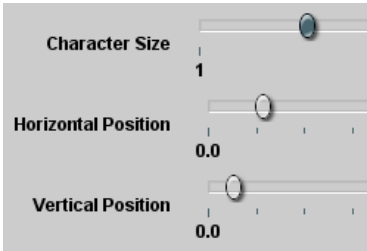
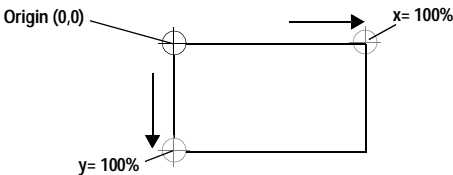
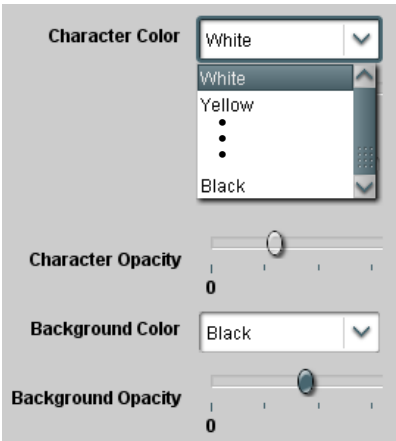
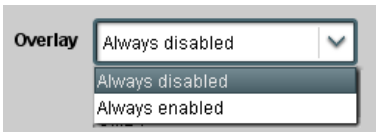
<div> <div>PIP 1</div> <div>PIP 5</div> </div> <div> <div>UMD</div> <div>Ident 1</div> </div>	(continued)
<ul style="list-style-type: none"> • UMD Character Size and Custom Position Controls 	<ul style="list-style-type: none"> • Character Size controls character size for all positioning modes. • Where Custom Position is selected, Position controls allow UMD to be positioned anywhere in the image area of the respective PiP. <p>Horizontal and Vertical Position controls set the origin point for the UMD overlay.</p> 
<ul style="list-style-type: none"> • UMD Text Character/Background Attributes Controls 	<p>Provides independent controls for setting the color and opacity of the UMD text and its background.</p> <ul style="list-style-type: none"> • Color drop-downs set text or background color from multiple choices. • Opacity controls set text or background opacity from 0% (least opacity) to 100% (full opacity).
<div> <div>PIP 1</div> <div>PIP 5</div> </div> <div> <div>UMD</div> <div>Ident 1</div> </div>	Provides controls for each PiP to insert identifying active-video area burn-in text, and set insertion rules and text attributes such as size and color.
<p>Note: Identical independent controls are provided for additional ident text insertion Ident 2. Therefore, only the Ident 1 controls are shown here.</p>	
<ul style="list-style-type: none"> • Ident Insertion Select 	Selects the rules for ident text overlay insertion into the PiP area.

Table 3-1 9970-QS Function Menu List — continued

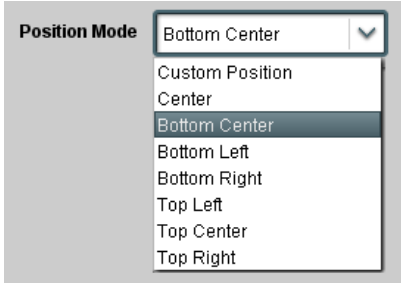

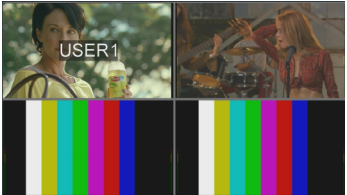
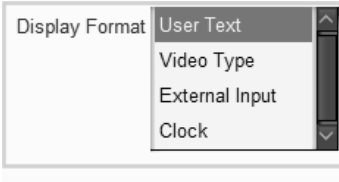
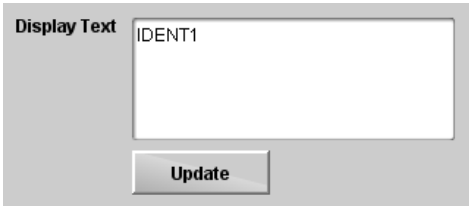
<div> <div>PIP 1</div> <div>PIP 5</div> </div> <div> <div>UMD</div> <div>Ident 1</div> </div>	(continued)
<p>• Ident Position Select</p> 	<p>Sets the location of the ident text insertion from choices shown or custom. (When Custom is selected, position and size is configured using the controls described below.)</p> <p>Example: Ident 1 text for PiP 1 using Top Left position</p>  <p>Example: Ident 1 text for PiP 1 using Center position</p> 
<p>• Ident Text Type (Format) Select</p> 	<p>Selects the type of data to be displayed as Ident text from choices shown.</p> <ul style="list-style-type: none"> • User text allows user text to be entered using field described below. • Video type inserts an overlay showing the video format of the respective PiP input. • External Input inserts an overlay using data provided by an automation system received over the card Ethernet port. • Clock inserts a wall-clock time overlay (see Clock (Wall-Clock Time) Controls (p. 3-38) for setting the wall-clock time clock feature). <p>Note: Drop-down may contain other choices which are not yet fully implemented in this release.</p>
<p>• Ident Text Entry Field</p> 	<p>Dialog entry box that allows entry of desired ident text string. Enter desired text as click Update when done to input the text string.</p> <p>Note:</p> <ul style="list-style-type: none"> • All normal keyboard alphanumeric characters are supported. Not all ASCII special characters (Windows ALT+nnnn) are supported. • Up to 126 characters can be entered.

Table 3-1 9970-QS Function Menu List — continued

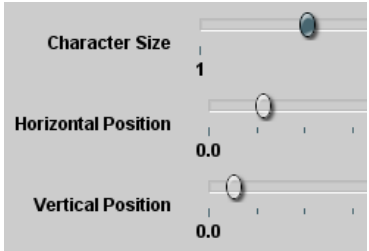
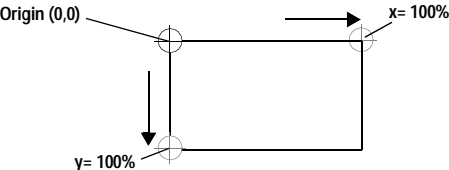
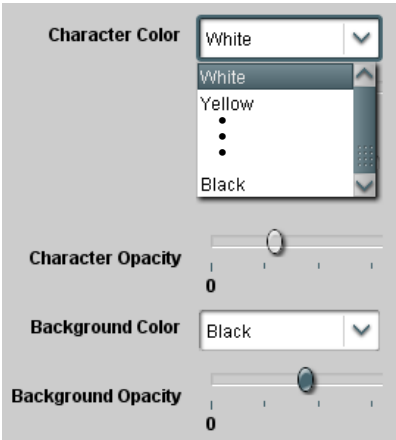

<div> <div>PIP 1</div> <div>PIP 5</div> </div> <div> <div>UMD</div> <div>Ident 1</div> </div>	(continued)
<ul style="list-style-type: none"> Ident Character Size and Custom Position Controls 	<ul style="list-style-type: none"> Character Size controls character size for all positioning modes. Where Custom Position is selected, Position controls allow text to be positioned anywhere in the image area of the respective PiP. <p>Horizontal and Vertical Position controls set the origin point for the text overlay.</p> 
<ul style="list-style-type: none"> Ident Text Character/Background Attributes Controls 	<p>Provides independent controls for setting the color and opacity of the text and its background.</p> <ul style="list-style-type: none"> Color drop-downs set text or background color from multiple choices. Opacity controls set text or background opacity from 0% (least opacity) to 100% (full opacity).
<p>Using both Ident 1 and Ident 2 provides enhanced flexibility in burn-in identification.</p> <p>In this example, Ident 1 is being used to display user text, and Ident 2 is being used to display PiP input video format</p>	 <p>Ident 1 set to display user text (in this example, "USER 1")</p> <p>Ident 2 set to display video format (in this example, PiP input with 1080i_5994)</p>

Table 3-1 9970-QS Function Menu List — continued



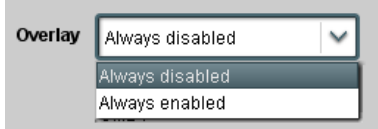
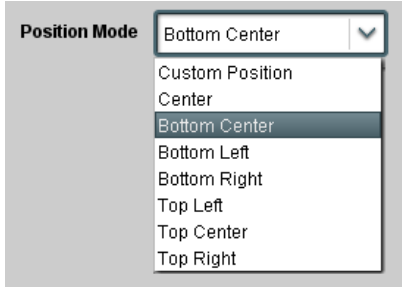
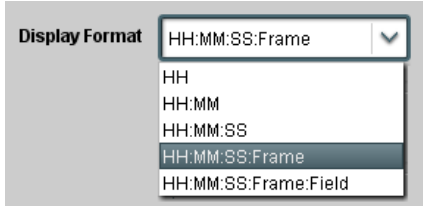
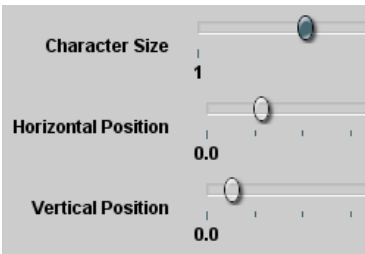
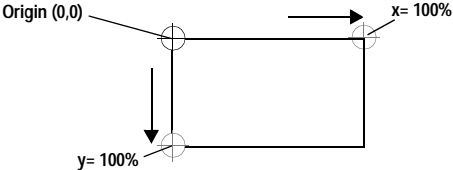
 	<p>Provides controls for each PiP to insert active-video area timecode burn-in, and set insertion rules and attributes such as size and color.</p>
<p>Note: Timecode character burn-in is always the embedded timecode associated with the PiP (i.e., PiP 1 Timecode Burn uses only the timecode value embedded on PiP 1 input video).</p>	
<p>• Timecode Insertion Select</p> 	<p>Selects the rules for timecode overlay insertion into the PiP area.</p>
<p>• Timecode Position Select</p> 	<p>Sets the location of the timecode insertion from choices shown or custom. (When Custom is selected, position and size is configured using the controls described below.)</p>
<p>• Timecode Format Display Select</p> 	<p>Selects the format of timecode string burn-in overlay insertion from choices shown.</p>
<p>• Timecode Character Size and Custom Position Controls</p> 	<p>• Character Size controls character size for all positioning modes.</p> <p>• Where Custom Position is selected, Position controls allow text to be positioned anywhere in the image area of the respective PiP.</p> <p>Horizontal and Vertical Position controls set the origin point for the timecode overlay.</p> 

Table 3-1 9970-QS Function Menu List — continued

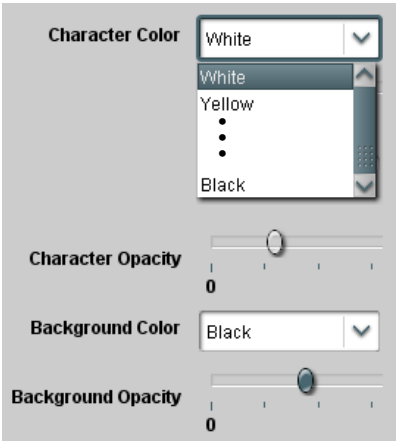

<div>PIP 1</div> <div>PIP 5</div> <div>ent 2 Timecode Burn</div>	(continued)
<p>• Timecode Character/Background Attributes Controls</p> 	<p>Provides independent controls for setting the color and opacity of the timecode burn-in and its background.</p> <ul style="list-style-type: none"> • Color drop-downs set text or background color from multiple choices. • Opacity controls set text or background opacity from 0% (least opacity) to 100% (full opacity).
	<p>In this example, timecode insertion is enabled for multiple PiPs. Each PiP shows its respective timecode (as received on the corresponding PiP video input).</p> <p>Positioning, size, and other attributes are independently configurable (in this example, both are set for Bottom Center positioning).</p>

Table 3-1 9970-QS Function Menu List — continued



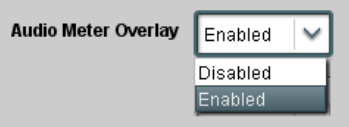
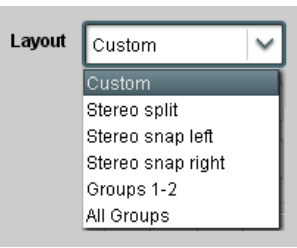




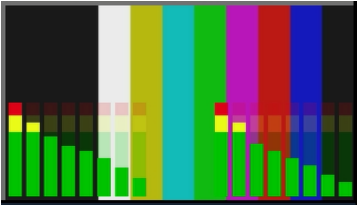
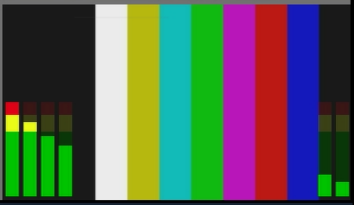
 	<p>Provides controls for each PiP to insert active-video area audio meters (bars), and set insertion rules and attributes such as layout, size and position.</p>
<p>Note: Audio meters are correlated with the embedded audio associated with the PiP input video. Each PiP can be set to display audio meters as desired.</p>	
<p>• Meter Insertion Enable/Disable</p> 	<p>Selects the rules for audio meters overlay insertion into the PiP area.</p>
<p>• Layout Select</p> 	<p>Selects from several preset layout templates and custom from the choices shown and depicted below.</p> <p>Note: Stereo selections are always correlated to embedded channels 1 and 2.</p>
<p>Example Meter Layouts</p>	
<p>Stereo snap left</p>  <p>L R</p>	<p>Stereo snap right</p>  <p>L R</p>
<p>Stereo split</p>  <p>L R</p>	
<p>Groups 1-2</p>  <p>Group 1 Group 2</p>	<p>All Groups</p>  <p>Group 1-2 Group 3-4</p>
<p>Custom</p>  <p>In this example, ch 1-4 on left, and ch 5-6 on right; 6 meters total</p>	

Table 3-1 9970-QS Function Menu List — continued



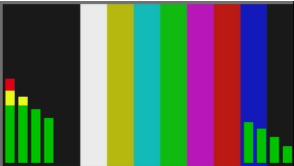

<div>PIP 1</div> <div>PIP 5</div> <div>Burn Audio Meter Overlay</div>	(continued)
<p>• Number of Meters / Split Between Meters / Position (Custom Mode only)</p> <div> <div>Number of Meters</div> <div>1</div> <div>1</div> <div>2</div> <div>...</div> <div>16</div> </div> <div> <div>Split Between Meters</div> <div>No Split</div> <div>No Split</div> <div>1 and 2</div> <div>...</div> <div>15 and 16</div> </div> <div> <div>Split Width</div> <div>0.0</div> </div> <div> <div>Vertical Position</div> <div>0.0</div> </div> <div> <div>Horizontal Position</div> <div>0.0</div> </div>	<p>Where Custom mode is selected, allows for custom number of meter channels displayed, as well as a split between meters (if desired) which can be set between any pair.</p> <p>Split Width controls sets the space between the space between the division set using the Split Between Meters control.</p> <div>  <p>Split Width set at minimum (no split)</p>  <p>Split Width set at maximum (split pushes 2nd pair flush right)</p> </div> <p>Position controls raise the meter base when the control setting is increased, and move the display as a unit left or right.</p> <p>Note: Where custom channel number complement is configured, channel correlation is always contiguous assignments starting at embedded channel 1.</p>
<p>• Meter Width Control</p> <div> <div>Meter Width</div> <div>1</div> </div>	<p>Sets the relative height of the audio bars.</p> <div>  <p>Width set at middle</p>  <p>Width set at less</p> </div>

Table 3-1 9970-QS Function Menu List — continued



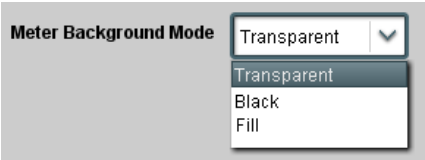
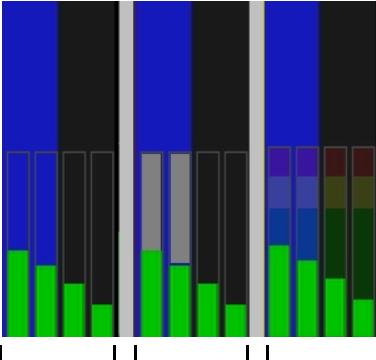


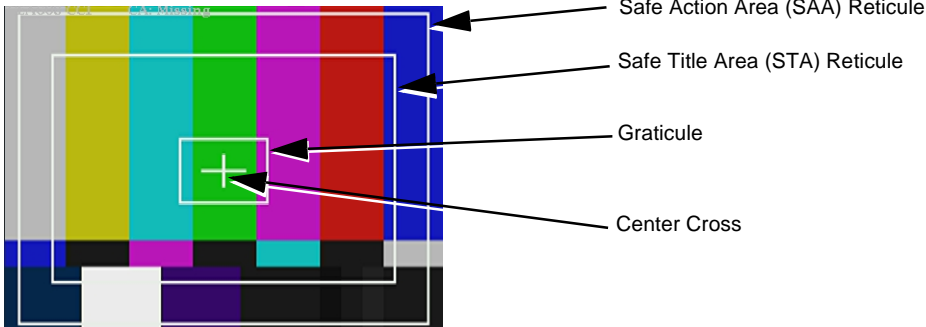
 	(continued)
<p>• Meter Background Select</p> 	<p>Provides choice of three background themes for each meter bar.</p>  <p>Transparent provides empty background Black provides dark background Fill provides fill showing full meter limits background</p>
 	<p>Provides controls for each PiP for Safe Action and/or Safe Title overlays and other static markers to be added to the output video image.</p>
<p>Typical Reticule/Overlay Marker Insertions</p> <p>The 9970-QS allows any combination of the reticule/overlay markers to be applied to the output video. Sizing and other characteristics for each type of marker can be set as described below.</p>  <p>Note: Multiple overlay markers described below can be simultaneously enabled as desired.</p>	

Table 3-1 9970-QS Function Menu List — continued

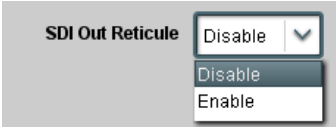
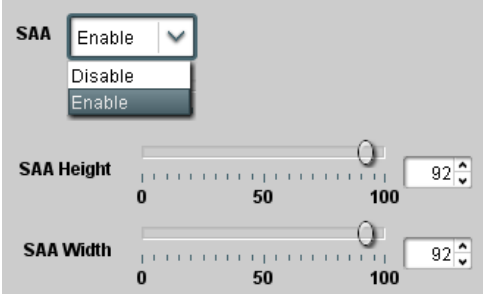
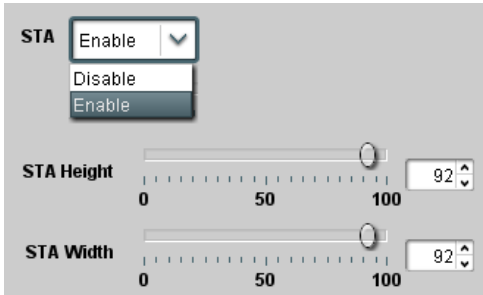
<div> <div>PIP 1</div> <div>PIP 5</div> </div> <div> <div>Reticules Basic</div> </div>	(continued)
<p>• Insertion Master Enable/Disable</p> 	<p>For each PiP, provides master reticule enable/disable for any or all reticule(s) inserted for each PiP.</p> <ul style="list-style-type: none"> • When enabled, any combination of reticules or other markers described below can be inserted. • When disabled, insertion of all reticules or other markers is disabled.
<p>• Safe Action Area (SAA) Controls</p> 	<ul style="list-style-type: none"> • SAA provides enable/disable of safe action area graticule insertion. • SAA Height and SAA Width control height and width of insertion (from 0% to 100% of 4:3 outputted image area). <p>Note: Reticule Size control is locked to Custom for this card, with safe action area size control as described above.</p>
<p>• Safe Title Area (STA) Controls</p> 	<ul style="list-style-type: none"> • STA provides enable/disable of safe title area graticule insertion. • STA Height and STA Width control height and width of insertion (from 0% to 100% of 4:3 outputted image area).

Table 3-1 9970-QS Function Menu List — continued




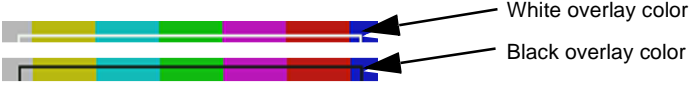


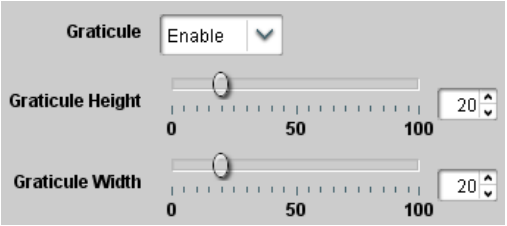
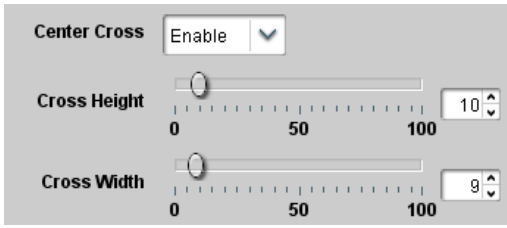
 	(continued)
<p>• Overlay Color Controls</p>  	<p>• Overlay Color selects from white or black colors.</p> <p>• Thickness sets the line thickness of each reticule element.</p>
 	Provides controls for each PiP for insertion and sizing controls for custom graticules and other markers. Also provides NTSC legacy 4:3 master reticule sizing.
<p>Note: Color attributes of markers described below are set using the master Overlay Color Controls described on the previous page.</p>	
<p>• Graticule Controls</p> 	<p>• Graticule provides enable/disable of user graticule insertion.</p> <p>• Graticule Height and Width control height and width of insertion (from 0% to 100% of 4:3 outputted image area).</p>
<p>• Center Cross Controls</p> 	<p>• Center Cross provides enable/disable of center cross insertion.</p> <p>• Cross Height and Width control height of vertical line and width of horizontal line (from 0% to 100% of 4:3 outputted image area).</p>

Table 3-1 9970-QS Function Menu List — continued

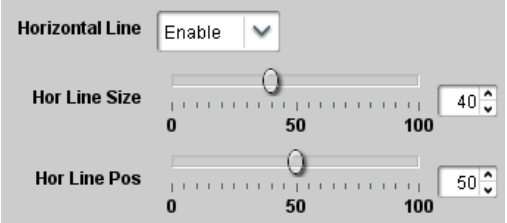
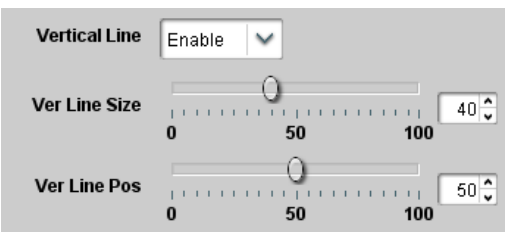
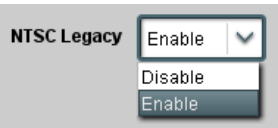
<div> <div>PIP 1</div> <div>PIP 5</div> </div> <div> <div>Reticules Basic</div> <div>Reticules Advanced</div> </div>	(continued)
<p>• Horizontal Line Controls</p> 	<ul style="list-style-type: none"> • Horizontal Line provides enable/disable of horizontal line insertion. • Horizontal Line Size controls the width of the horizontal line (from 0% to 100% of 4:3 outputted image area). • Horizontal Line Pos controls the vertical positioning of the horizontal line (from 0% to 100% of 4:3 outputted image area).
<p>• Vertical Line Controls</p> 	<ul style="list-style-type: none"> • Vertical Line provides enable/disable of vertical line insertion. • Vertical Line Size controls the height of the vertical line (from 0% to 100% of 4:3 outputted image area). • Vertical Line Pos controls the horizontal positioning of the line (from 0% to 100% of 4:3 outputted image area).
<p>• NTSC Legacy Reticule Fixed Control</p> 	<p>When set to enable, provides fixed-size safe action area 4:3 reticule suited for CRT-based displays.</p>

Table 3-1 9970-QS Function Menu List — continued


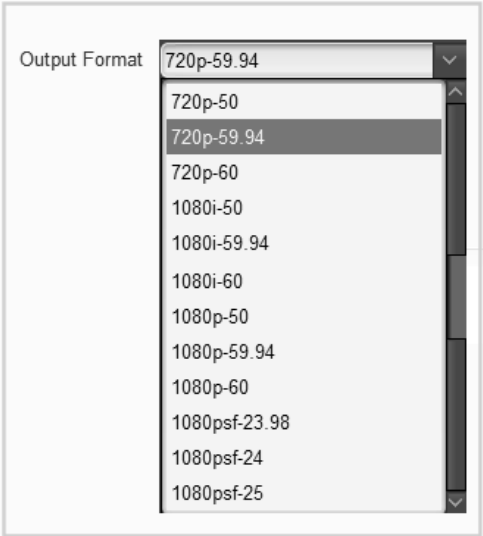
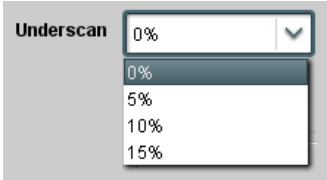

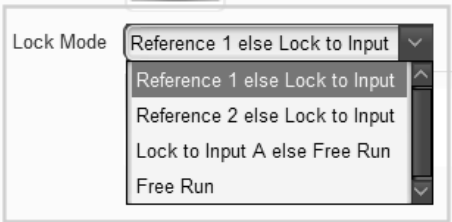
	<p>Provides controls to set merged split output format/conditioning and card global ref lock mode.</p>
<p>• Output Format Selector</p> 	<p>Provides conversions to formats as shown.</p> <p>Note: Although drop-down and card will allow output video raster/rate choices unrelated to the input rates (for example, PAL 50Hz rate for NTSC 59.94Hz input rates), cross-rate conversion choices should not be used for critical applications (frames will be dropped when performing such conversions).</p>
<p>• Underscan Select</p> 	<p>Provides underscanning to reduce the merged output raster size by choices shown.</p>
<p>• 16x10 Compensation Select</p> 	<p>Provides compensating rescaling to fully fit a native 16x10 aspect ratio image into the 16x9 aspect ratios used for various layouts.</p>
<p>• Video Lock Mode Select</p> 	<p>Selects lock to reference functions from the choices shown and described below.</p> <ul style="list-style-type: none"> • Free Run: PiP inputs and output video is locked to the card's internal clock. Output video is not locked to external reference. • Lock to Reference: PiP inputs and output video is locked to selected external reference (Ref 1 or Ref 2) received on the frame reference bus, else input. • Lock to Input A: Uses Input A program video input video signal as the reference standard, else free-run. <p>Note: Lock to reference provides the most stable operation, and is preferred where available. In this case, source video should also be locked to the same reference.</p>

Table 3-1 9970-QS Function Menu List — continued

<div>Output Format</div>	(continued)
<div><div>• Frame Delay Control</div><div><div>Frame Delay</div><div><div>1</div><div>0</div></div></div></div>	<div>When Framesync is enabled, specifies the smallest amount of latency delay (frames held in buffer) allowed by the frame sync. The frame sync will not output a frame unless the specified number of frames are captured in the buffer.</div>
<div>HDMI</div>	<div>Provides settings to force an HDMI or DVI output suitable for direct connection to monitors using a DVI input in case the connection is not detected by the monitor. Also provides color mode controls to match HDMI/DVI output to the color space of the monitor.</div>
<div><div>• Mode Control</div><div><div>Mode</div><div><div>Automatic</div><div>Automatic</div><div>Manual Control</div></div></div></div>	<div>Sets HDMI/DVI output to use the connected monitor to inform 9970-QS to automatically detect the monitor format, or to use manual (forced) control. Where the monitor may not be able to provide this handshake signal, it is recommended to use Manual mode and force the desired mode as described below.</div>
<div><div>• Format Manual (Forced) Mode Control</div><div><div>Format</div><div><div>HDMI</div><div>HDMI</div><div>DVI</div></div></div></div>	<div>Sets HDMI card output as forced HDMI or DVI mode.</div>
<div><div>• Colorspace Control</div><div><div>Colorspace</div><div><div>YCbCr</div><div>YCbCr</div><div>RGB</div></div></div></div>	<div>Forces output colorspace as either YCbCr or RGB.</div>
<div><div>Note: The HDMI output on this card conforms with CEA-861D HDMI audio channel line-up specifications. As such, a swap between the C and LFE channels for the HDMI output is automatically performed.</div><div>If connecting to a device that does not meet CEA-861D HDMI, a Ch3 / Ch4 swap using the Output Audio Routing/Controls may be required to effect desired C - LFE line-up.</div></div>	
<div><div><div><div>SDI SMPTE Convention</div><div>9970-QS Conversion</div><div>Automatic Re-Line-up to CEA-861 Convention</div></div><div><div><div>L</div><div>R</div><div>C</div><div>LFE</div><div>Ls</div><div>Rs</div></div><div><div><div>L</div><div>R</div><div>LFE</div><div>C</div><div>Ls</div><div>Rs</div></div></div></div></div></div>	

Table 3-1 9970-QS Function Menu List — continued


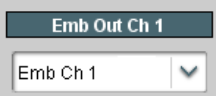

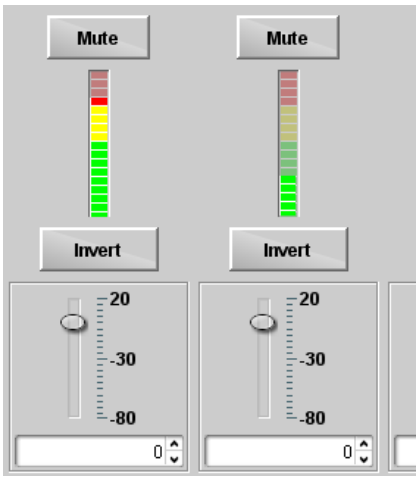
Output Audio Routing/Controls	<p>Provides an audio crosspoint allowing the audio source selection for each embedded audio output channel. Also provides Gain, Phase Invert, and Muting controls and peak level meters for each output channel.</p>
<p>Note:</p> <ul style="list-style-type: none"> • Embedded Ch 2 thru Embedded Ch 16 have controls identical to the Source, Gain, Mute, and Invert controls described here for Embedded Ch 1. Therefore, only the Embedded Ch 1 controls are shown here. • For each channel, its source and destination should be considered and appropriately set. Unused destination channels should be set to the Silence selection. • Output Audio Routing/Controls description section here is repeated in “9970-QS Operator’s Guide”. 	
<p>• Embedded Audio Output Input Source</p> 	<p>Selects the four-group embedded audio to be embedded in the output embedded SDI audio (and HDMI Ch1 - Ch8 embedded audio).</p> <p>(In this example, PIP1 input audio is selected as the output four-group audio.)</p>
<p>• Embedded Output Channel Source</p> 	<p>Using the drop-down list, selects the audio input source to be embedded in the corresponding embedded output channel from the following choices:</p> <ul style="list-style-type: none"> • Card Audio Bus (Emb) Ch 1 thru Ch 16 • Built-in Tone generators Tone 1 thru Tone 16 (all are -20 dBFS level; freq (Hz) in ascending order are 100, 200, 300, 400, 500, 600, 700, 800, 900, 1k, 2k, 4k, 6k, 8k, 12k, and 16k) <p>Note: Multiple tone generators, even if set to the same frequency, may not exhibit phase coherence. If identical tones with frequency and phase coherence are required, use a single tone generator (e.g., “Tone 1”) across multiple channels instead of multiple generators set to the same frequency.</p> <ul style="list-style-type: none"> • Option  Audio LTC
<p>• Channel Mute/Phase Invert/Gain Controls and Peak Level Display</p> 	<p>Provides Mute and phase Invert channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.)</p> <p>Gain controls allow relative gain (in dB) control for the corresponding destination Embedded Audio Group channel.</p> <p>(-80 to +20 dB range in 1.0 dB steps; unity = 0 dB)</p> <p>Note: Although this card can pass non-PCM data such as Dolby® E or AC-3, setting the gain control to any setting other than default 0 will corrupt Dolby data.</p>

Table 3-1 9970-QS Function Menu List — continued

<div>GPI Setup</div>	<p>Provides controls for GPI setup of tally borders and indicators.</p>
<p>Up to five GPI inputs are available by PiP 1 thru PiP 5 to define PiP border colors and red/green tally indicator illumination enable. Tying various closed (“on”) states of these various GPI inputs using the DashBoard matrix described below allows a wide range of custom settings for each PiP border color and tally lamp enable. Use the matrix by matching the desired border and tally attributes to the GPI states desired to effect this control.</p>	
<p>Example GPI Setup of Border and “Green Tally ON” for PiP 2</p>	
<p>In this example, it is desired to set PiP 2 border to GREEN and green tally to ON when GPI 3 is closed.</p>	
<p>GPI 3 status indicator shows the open/closed status of the GPI input (green= closed/on)</p>	
	<p>With Border Color = GPI 3 > Closed set to Green, green border is applied when GPI 3 is closed. (with settings shown here, border reverts to gray when GPI 3 opens)</p>
	<p>With Green Lamp Enable= GPI 3 > Closed, green tally turns on when GPI 3 is closed. (with settings shown here, green tally turns off when GPI 3 opens)</p>
	<p>PiP border color and tally lamp enable can be set as static manual selections by setting the attribute as desired, and then selecting Manual Control. In this example PiP 1 border is set to Yellow by invoking this selection using the corresponding Manual Control drop-down selection.</p>
<p>Note: Border color settings are persistent when set using Manual Control. They can only be changed using another color drop-down selection, or changed using a GPI command in this dialog where available.</p>	

Table 3-1 9970-QS Function Menu List — continued



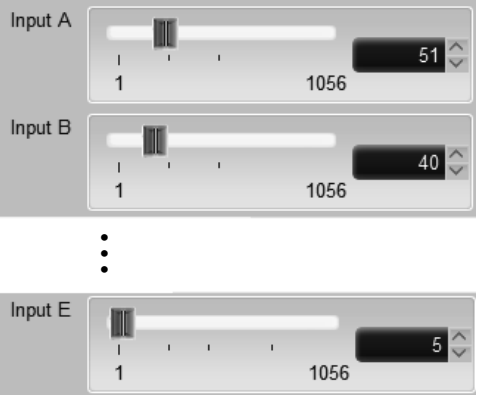
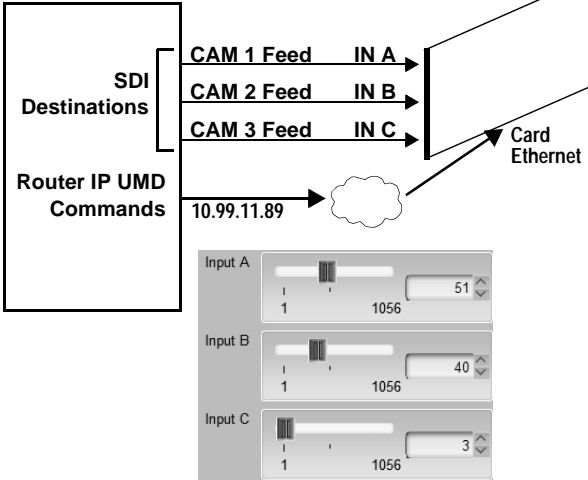

	<p>Provides controls for integrating Utah Scientific™ router (such as SC-4) IP communication with 9970-QS to provide automated UMD and Ident text burn-in, independently for PiP IN A thru IN E input channels.</p>
<p>Note:</p> <ul style="list-style-type: none"> Router address must be accessible to network used for 9970-QS rear module Ethernet port (as set using the card Admin > Networking function (see pg. 3-44). When router access (fetch) is enabled, control of certain burn-in aspects is asserted by router control, with user manual control locked out. Utah routers (such as SC-4) are limited to UMD text assert only. This router cannot assert tally lamp activation states. 	<p>Router Fetch Enable / Address Controls</p>  <p>Enables or disables Utah router command fetch and provides entry for Utah router address.</p> <p>Note: When router access (fetch) is enabled, UMD text is asserted by Utah router commands. The UMD > Display Format control is locked to External Input, with user text entry or other UMD type selections locked out.</p>
<p>Router Fetch Enable / Address Controls</p> 	<p>Sets the router logical port-to-card input correlation for up to 5 card inputs (IN A thru IN E).</p> <p>In the example below:</p> <ul style="list-style-type: none"> Router logical port 51 is correlated to card input A Router logical port 40 is correlated to card input B Router logical port 5 is correlated to card input E
<p>Utah Router</p> 	<p>With the router destination commands for Input A thru Input C as shown here, router-enabled settings allow router to assert UMD text correlated to router destination outputs, and in turn, 9970-QS inputs (in this example, router IP ports 51, 40, and 3 used for packet streams for IN A thru IN C, respectively).</p> <p>As shown in the example, this asserts the “CAM 1” thru CAM 3” UMD text insertions for these three card inputs.</p> 

Table 3-1 9970-QS Function Menu List — continued



	<p>Provides controls for integrating Image Video™ router IP communication with 9970-QS to provide automated UMD and Tally burn-ins, independently for PiP 1 thru PiP 5.</p>
<p>Router Image Video</p> <p>• Router Enable Controls</p> <p>PIP 1</p> <p>Update From Display <input type="text" value="1"/></p> <p>Update From Line <input type="text" value="1"/></p> <p>Enable Updates <input type="button" value="Enabled"/></p> <p>PIP 2</p> <p>Update From Display <input type="text" value="1"/></p> <p>Update From Line <input type="text" value="1"/></p> <p>Enable Updates <input type="button" value="Enabled"/></p> <p>⋮</p> <p>PIP 5</p> <p>Update From Display <input type="text" value="1"/></p> <p>Update From Line <input type="text" value="1"/></p> <p>Enable Updates <input type="button" value="Enabled"/></p>	<p>Enables or disables Image Video router updates for each of the five card PiPs.</p> <ul style="list-style-type: none"> • Update from Display asserts PiP tally lamp activation. • Update from Line asserts UMD text. <p>Note: • The Image Video integration works on a PiP-by-PiP basis (rather than commands being tied to card input channels).</p> <ul style="list-style-type: none"> • Image Video router/server holds 9970-QS IP address to establish connection. Therefore, the Image Video address is not required here.
	<p>Provides controls for setting and inserting wall-clock time into merged output or as a per-PiP insertion selection.</p>
<p>• Clock Mode / Set Controls</p> <p>Current Time <input type="text" value="15:24:00"/></p> <p>Clock Mode <input type="text" value="24 Hour"/></p> <p>Clock Source <input type="text" value="Sync with NTP"/></p> <p>Local Timezone (NTP Only) <input type="text" value="UTC-6 (US Central)"/></p>	<p>Allows clock time and display mode to be set as follows:</p> <ul style="list-style-type: none"> • Clock Mode selects between 24-hour (“military”) time, or time using AM and PM designations. • Clock Source selects user-entered arbitrary time or NTP-synced time. • Local Timezone provides timezone offsets for localization when using NTP time. Provides range of UTC-12 up to UTC+12, with identification for popular locations (for example, “UTC-8 (US Pacific)”). • Current Time display shows the currently configured running wall-clock time (whether set as user-entered arbitrary time or NTP-synced time). <p>Note: NTP syncing is only done at various intervals. To invoke resyncing, power-cycle to card to immediately sync with NTP.</p>
<p>• User Set Mode Controls</p> <p>Clock Source <input type="text" value="User Set Time"/></p> <p>Time Zone Text <input type="text" value="Central CST"/></p> <p>User Set Time <input type="text" value="09:45:22 AM"/></p> <p><input type="button" value="Set Time"/></p>	<p>When Clock Source is set to User Set Time, allows entry of user time, and also allows entry of user text identifying the time zone or other text (this time zone text is displayed when entered for either user time or NTP time)</p> <p>Click Set Time to invoke user set time.</p>

Table 3-1 9970-QS Function Menu List — continued


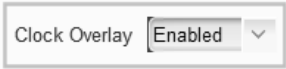

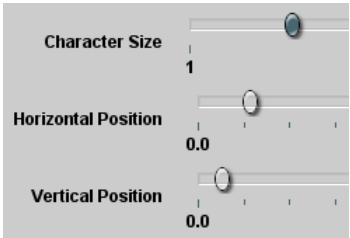
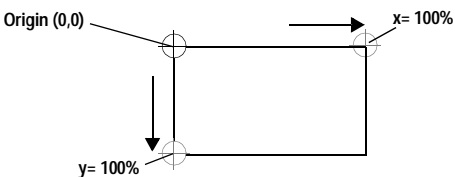
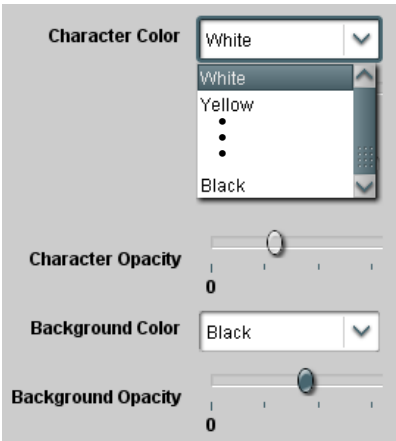
	(continued)
<p>Note: Clock can be burned in as an overlay over the merged split output (using the controls below) and/or as a per-PiP insertion using the individual PiP 1 thru PiP 5 Ident insertion controls. Where insertion as a per-PiP Ident burn-in is desired, the enable control below does not have to be set to Enabled.</p>	
<p>• Clock Overlay Enable</p> 	<p>Allows wall-clock time to be burned into the overall merged video output.</p> <p>Clock Overlay set to Enabled inserts a clock burn-in into the merged video output and not directly bound to any PiP area</p> 
<p>• Clock Character Size and Custom Position Controls</p> 	<p>Horizontal and Vertical Position controls set the origin point for the clock overlay.</p> 
<p>• Clock Text Character/Background Attributes Controls</p> 	<p>Provides independent controls for setting the color and opacity of the clock text and its background.</p> <ul style="list-style-type: none"> • Color drop-downs set text or background color from multiple choices. • Opacity controls set text or background opacity from 0% (least opacity) to 100% (full opacity).

Table 3-1 9970-QS Function Menu List — continued




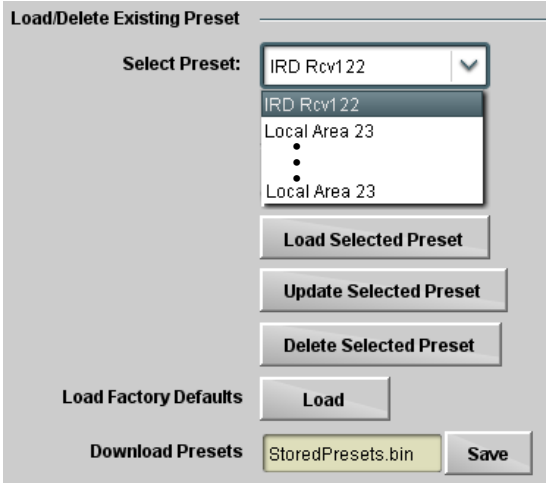
	<p>Allows user control settings to be saved in a one-button Preset and then loaded (recalled) as desired, and provides a one-button restore of factory default settings.</p>
<p>• Preset Layer Select</p> <p>Allows selecting a functional layer (or “area of concern”) that the preset is concerned with. Limiting presets to a layer or area of concern allows for highly specific presets, and masks changing card settings in areas outside of the layer or area of concern.</p>  <p>Routing”) will set the preset to only “look at” and “touch” output audio routing settings and save these settings under the preset. When the preset is invoked (loaded), only the output audio routing layer is “touched”.</p> <p>Example: Since audio routing can be considered independent of PiP layout settings, if normal audio routing was set up with a particular PiP setting in effect, and at a later time audio routing is desired to be saved as a preset, selecting Out Audio Routing here limits preset-invoked changes to only the audio routing layer, “telling” the preset save/load to not concern itself with other aspects such as PiP settings. In this manner, when the preset is invoked any PiP settings in effect will remain untouched, with only the audio routing changes invoked.</p>	<p>Default All setting will “look” at all device settings, and save and invoke all settings when the preset is invoked (loaded).</p> <p>Selecting a layer (in this example, “Out Audio Routing”) will set the preset to only “look at” and “touch” output audio routing settings and save these settings under the preset. When the preset is invoked (loaded), only the output audio routing layer is “touched”.</p>
<p>• Preset Enter/Save/Delete</p>  <p>Protected state – changes locked out</p> <p>Ready (open) state – changes can be applied</p>	<p>Locks and unlocks editing of presets to prevent accidental overwrite as follows:</p> <ul style="list-style-type: none"> • Protect (ready): This state awaits Protected and allows preset Save/Delete button to save or delete current card settings to the selected preset. Use this setting when writing or editing a preset. • Protected: Toggle to this setting to lock down all presets from being inadvertently re-saved or deleted. Use this setting when all presets are as intended. • Create New Preset: Field for entering user-defined name for the preset being saved (in this example, “IRD Rcv122”). • Save: Saves the current card settings under the preset name defined above.
<p>• Preset Save/Load Controls</p> 	<ul style="list-style-type: none"> • Select Preset: drop-down allows a preset saved above to be selected to be loaded or deleted (in this example, custom preset “IRD Rcv122”). • Load Selected Preset button allows loading (recalling) the selected preset. When this button is pressed, the changes called out in the preset are immediately applied. • Update Selected Preset button allows saving any card settings changes to the selected preset. When this button is pressed, the changes in effect are rolled into the selected preset. • Delete Selected Preset button deletes the currently selected preset. • Load Factory Defaults button allows loading (recalling) the factory default preset. When this button is pressed, the changes called out in the preset are immediately applied. <p>Note: Load Factory Defaults functions with no masking. The Preset Layer Select controls have no effect on this control and will reset all layers to factory default.</p> <ul style="list-style-type: none"> • Download Presets saving the preset files to a folder on the connected computer.

Table 3-1 9970-QS Function Menu List — continued

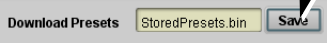
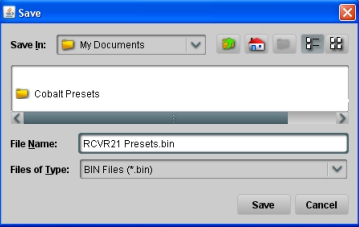

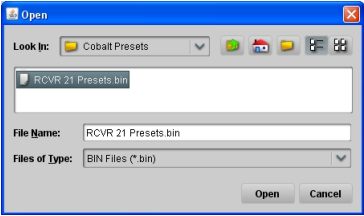

Presets	(continued)
<p>Download (save) card presets to a network computer by clicking Download Presets – Save at the bottom of the Presets page.</p>  <p>Browse to a desired save location (in this example, <i>My Documents\Cobalt Presets</i>).</p> <p>The file can then be renamed if desired (<i>RCVR21 Presets</i> in this example) before committing the save.</p> 	<p>Upload (open) card presets from a network computer by clicking Upload at the bottom of DashBoard.</p>  <p>Browse to the location where the file was saved on the computer or drive (in this example, <i>My Documents\Cobalt Presets</i>).</p>  <p>Select the desired file and click Open to load the file to the card.</p> <p>Note:</p> <ul style="list-style-type: none"> • Preset transfer between card download and file upload is on a group basis (i.e., individual presets cannot be downloaded or uploaded separately). • After uploading a presets file, engagement of a desired preset is only assured by selecting and loading a desired preset as described on the previous page.
Admin	
<p>• Log Status and Download Controls</p> 	<p>Provides a global card operating status and allows a log download for factory engineering support.</p> <p>Also provides controls for selecting and loading card firmware upgrade files.</p> <ul style="list-style-type: none"> • Log Status indicates overall card internal operating status. • Download Log File allows a card operational log file to be saved to a host computer. This log file can be useful in case of a card error or in the case of an operational error or condition. The file can be submitted to Cobalt engineering for further analysis. • Thermal Shutdown enable/disable allows the built-in thermal failover to be defeated. (Thermal shutdown is enabled by default). <p>CAUTION</p> <p>The 9970-QS FPGA is designed for a normal-range operating temperature around 85° C core temperature. Operation in severe conditions exceeding this limit for non-sustained usage are within device operating safe parameters, and can be allowed by setting this control to Disable. However, the disable (override) setting should be avoided under normal conditions to ensure maximum card protection.</p>

Table 3-1 9970-QS Function Menu List — continued

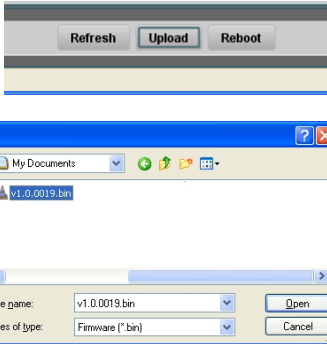
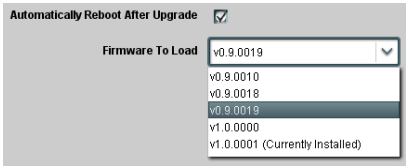
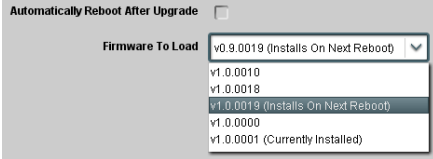
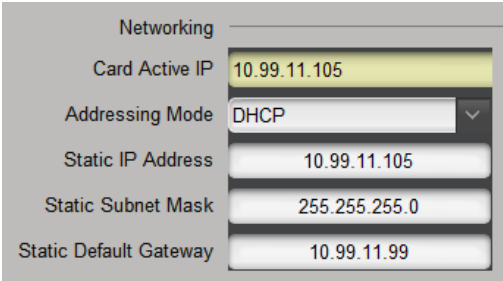
Admin	(continued)
<ul style="list-style-type: none"> • Firmware Upgrade Controls 	<p>Firmware upgrade controls allow a selected firmware version (where multiple versions can be uploaded to the card's internal memory) to invoke an upgrade to a selected version either instantly, or set to install on the next card reboot (thereby allowing card upgrade downtime to be controlled at a scheduled point in time).</p>
<p>Note: The page/tab here allows managing multiple firmware versions saved on the card. New upgrade firmware from our web site can always be directly uploaded to the card without using this page. Instructions for firmware downloading to your computer and uploading to the card can be found at the Support>Firmware Downloads link at www.cobaltdigital.com.</p>	
<ol style="list-style-type: none"> 1. Access a firmware upgrade file from a network computer by clicking Upload at the bottom of DashBoard. 2. Browse to the location of the firmware upgrade file (in this example, <i>My Documents\lv1.0.0019.bin</i>). 3. Select the desired file and click Open to upload the file to the card. 	 <p>The screenshot shows a web interface with three buttons: Refresh, Upload, and Reboot. Below the buttons is a file selection dialog box titled 'Open'. The dialog shows the file 'lv1.0.0019.bin' selected in the file list. The file name field shows 'lv1.0.0019.bin' and the file type is set to 'Firmware (*.bin)'.</p>
<ul style="list-style-type: none"> • Immediate firmware upload. The card default setting of Automatically Reboot After Upgrade checked allow a selected firmware version to be immediately uploaded as follows: <ol style="list-style-type: none"> 1. Click Firmware To Load and select the desired upgrade file to be loaded (in this example, "v1.0.0019"). 2. Click Load Selected Firmware. The card now reboots and the selected firmware is loaded. 	 <p>The screenshot shows the 'Automatically Reboot After Upgrade' checkbox checked. Below it is a dropdown menu titled 'Firmware To Load' with a list of firmware versions: v0.9.0019, v0.9.0010, v0.9.0018, v1.0.0019 (selected), v1.0.0000, and v1.0.0001 (Currently Installed).</p>
<ul style="list-style-type: none"> • Deferred firmware upload. With Automatically Reboot After Upgrade unchecked, firmware upgrade loading is held off until the card is manually rebooted. This allows scheduling a firmware upgrade downtime event until when it is convenient to experience to downtime (uploads typically take about 60 seconds). <ol style="list-style-type: none"> 1. Click Firmware To Load and select the desired upgrade file to be loaded (in this example, "v1.0.0019"). Note now how the display shows "Installs on Next Reboot". 2. Click Load Selected Firmware. The card holds directions to proceed with the upload, and performs the upload only when the card is manually rebooted (by pressing the Reboot button). 3. To cancel a deferred upload, press Cancel Pending Upgrade. The card reverts to the default settings that allow an immediate upload/upgrade. 	 <p>The screenshot shows the 'Automatically Reboot After Upgrade' checkbox unchecked. Below it is a dropdown menu titled 'Firmware To Load' with a list of firmware versions: v0.9.0019 (Installs On Next Reboot) (selected), v1.0.0010, v1.0.0018, v1.0.0019 (Installs On Next Reboot), v1.0.0000, and v1.0.0001 (Currently Installed).</p>

Table 3-1 9970-QS Function Menu List — continued

Admin	(continued)
<ul style="list-style-type: none"> • Networking Settings Controls 	<p>Various card status and control functions (such as router integration and IP control of card tally, UMDs, and other attributes) can be effected using a network connection. (Control using IP has not been fully implemented at this release.)</p>
	<p>The Networking section provides a dedicated Ethernet connection to card control and monitoring via a rear module Ethernet port. (This IP interface is entirely independent and separate from the card's DashBoard frame-based remote control/monitoring interface.)</p> <ul style="list-style-type: none"> • Addressing Mode selects either DHCP or static. • Where Static is selected, standard IP fields allow entry of address, subnet mask, and default gateway.

Troubleshooting

This section provides general troubleshooting information and specific symptom/corrective action for the 9970-QS card and its remote control interface. The 9970-QS card requires no periodic maintenance in its normal operation; if any error indication (as described in this section) occurs, use this section to correct the condition.

Error and Failure Indicator Overview

The 9970-QS card itself and its remote control systems all (to varying degrees) provide error and failure indications.

The various 9970-QS card and remote control error and failure indicators are individually described below.

Note: The descriptions below provide general information for the various status and error indicators. For specific failures, also use the appropriate subsection listed below.

- Basic Troubleshooting Checks (p. 3-48)
- 9970-QS Processing Error Troubleshooting (p. 3-48)
- Troubleshooting Network/Remote Control Errors (p. 3-50)

9970-QS Card Edge Status/Error Indicators and Display

Figure 3-6 shows and describes the 9970-QS card edge status indicators and display. These indicators and the display show status and error conditions relating to the card itself and remote (network) communications (where applicable). Because these indicators are part of the card itself and require no external interface, the indicators are particularly useful in the event of communications problems with external devices such as network remote control devices.

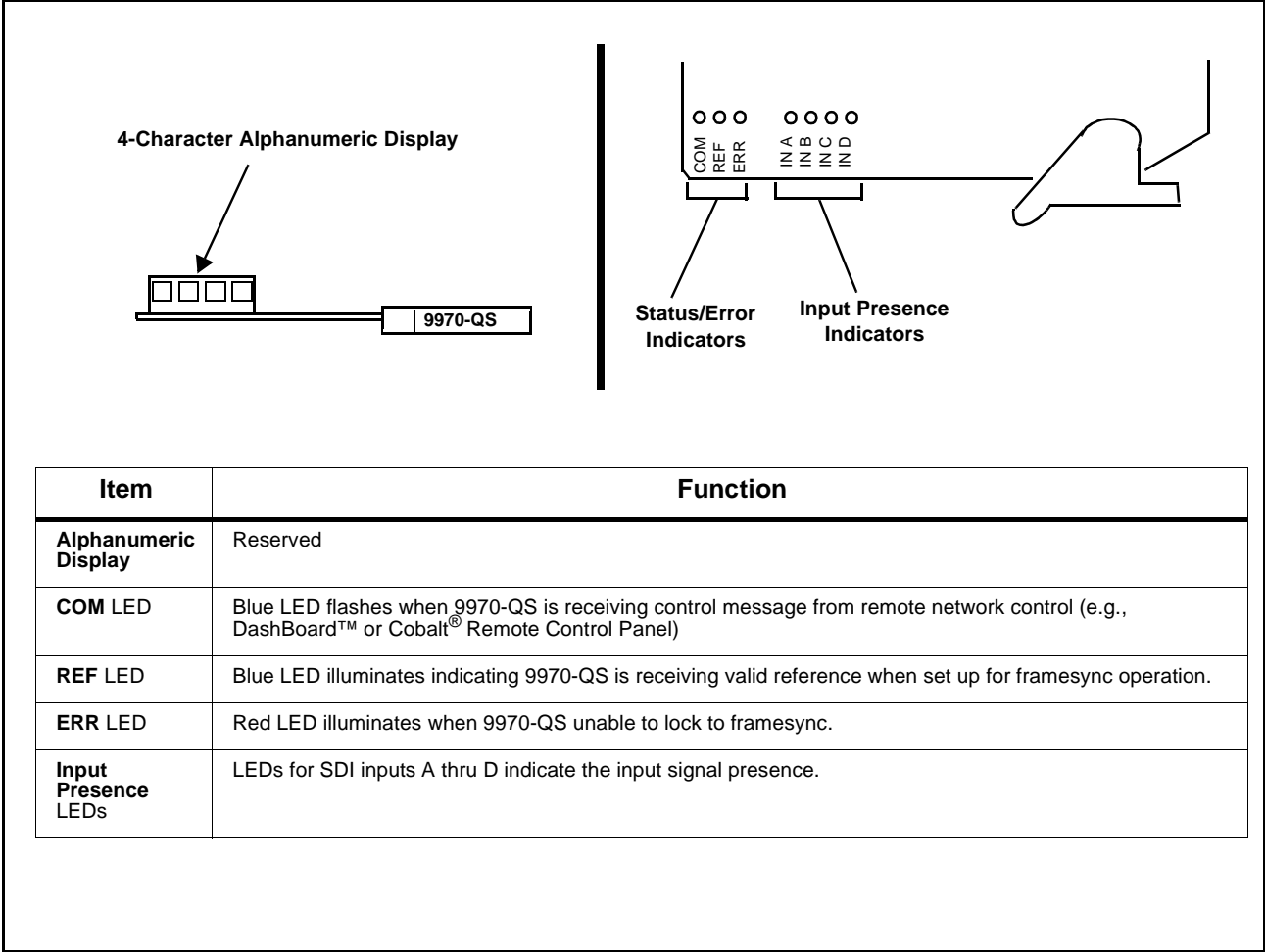


Figure 3-6 9970-QS Card Edge Status Indicators and Display

DashBoard™ Status/Error Indicators and Displays

Figure 3-7 shows and describes the DashBoard™ status indicators and displays. These indicator icons and displays show status and error conditions relating to the 9970-QS card itself and remote (network) communications.

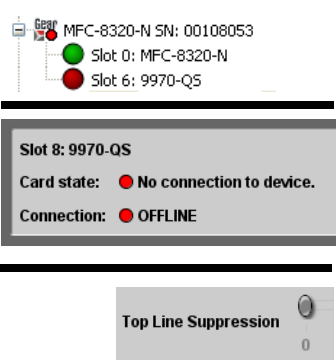
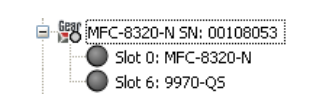
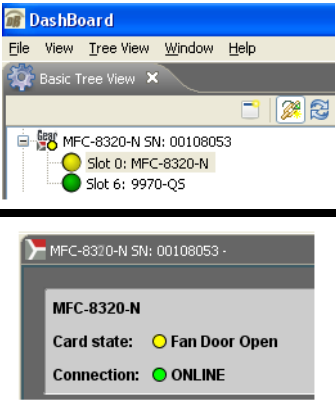
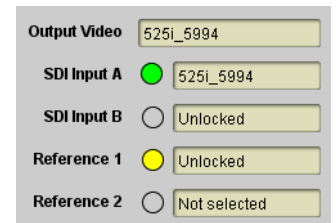
Indicator Icon or Display	Error Description
 <p>The screenshot shows the DashBoard interface. In the Card Access/Navigation Tree, Slot 6: 9970-QS is highlighted with a red indicator. Below, the Card Info pane for Slot 8: 9970-QS shows 'Card state: No connection to device' and 'Connection: OFFLINE'. A 'Top Line Suppression' control is also visible.</p>	<p>Red indicator icon in Card Access/Navigation Tree pane shows card with Error condition (in this example, the Card Access/Navigation Tree pane shows a general error issued by the 9970-QS card in slot 6).</p> <p>Specific errors are displayed in the Card Info pane (in this example "No connection to device" indicating 9970-QS card is not connecting to frame/LAN).</p> <p>If the 9970-QS card is not connecting to the frame or LAN, all controls are grayed-out (as shown in the example here).</p>
 <p>The screenshot shows the DashBoard interface. In the Card Access/Navigation Tree, Slot 0: MFC-8320-N and Slot 6: 9970-QS are highlighted with gray indicator icons.</p>	<p>Gray indicator icon in Card Access/Navigation Tree pane shows card(s) are not being seen by DashBoard™ due to lack of connection to frame LAN (in this example, both a 9970-QS card in slot 6 and the MFC-8320-N Network Controller Card for its frame in slot 0 are not being seen).</p>
 <p>The screenshot shows the DashBoard interface. In the Card Access/Navigation Tree, Slot 0: MFC-8320-N is highlighted with a yellow indicator. Below, the Card Info pane for Slot 0: MFC-8320-N shows 'Card state: Fan Door Open' and 'Connection: ONLINE'.</p>	<p>Yellow indicator icon in Card Access/Navigation Tree pane shows card with Alert condition (in this example, the Card Access/Navigation Tree pane shows a general alert issued by the MFC-8320-N Network Controller Card).</p> <p>Clicking the card slot position in the Card Access/Navigation Tree (in this example Network Controller Card "Slot 0: MFC-8320-N") opens the Card Info pane for the selected card. In this example, a "Fan Door Open" specific error is displayed.</p>
 <p>The screenshot shows the 9970-QS Card Info pane. It displays various settings: Output Video (525i_5994), SDI Input A (525i_5994 with a yellow indicator), SDI Input B (Unlocked), Reference 1 (Unlocked), and Reference 2 (Not selected).</p>	<p>Yellow indicator icon in 9970-QS Card Info pane shows error alert, along with cause for alert (in this example, the 9970-QS is not receiving an enabled framesync source).</p>

Figure 3-7 DashBoard™ Status Indicator Icons and Displays

Access Card Info panes for specific cards by clicking the card slot position in the Card Access/Navigation Tree pane (as shown in the example in Figure 3-8).

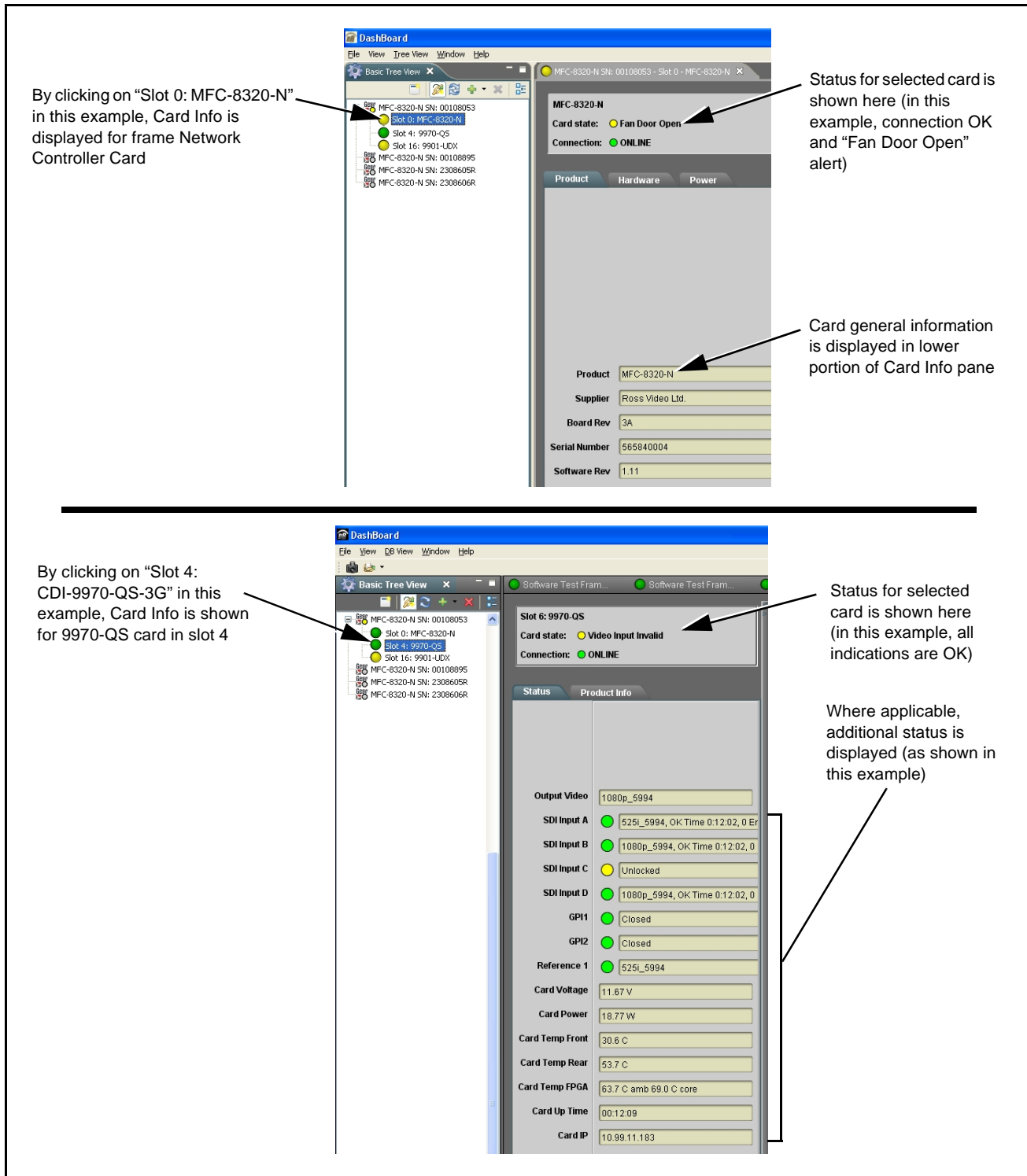


Figure 3-8 Selecting Specific Cards for Card Info Status Display

Basic Troubleshooting Checks

Failures of a general nature (affecting many cards and/or functions simultaneously), or gross inoperability errors are best addressed first by performing basic checks before proceeding further. Table 3-2 provides basic system checks that typically locate the source of most general problems. If required and applicable, perform further troubleshooting in accordance with the other troubleshooting tables in this section.

Table 3-2 Basic Troubleshooting Checks

Item	Checks
Verify power presence and characteristics	<ul style="list-style-type: none"> On both the frame Network Controller Card and the 9970-QS, in all cases when power is being properly supplied there is always at least one indicator illuminated. Any card showing no illuminated indicators should be cause for concern. Check the Power Consumed indication for the 9970-QS card. This can be observed using the DashBoard™ Card Info pane. <ul style="list-style-type: none"> If display shows no power being consumed, either the frame power supply, connections, or the 9970-QS card itself is defective. If display shows excessive power being consumed (see Technical Specifications (p. 1-12) in Chapter 1, "Introduction"), the 9970-QS card may be defective.
Check Cable connection secureness and connecting points	Make certain all cable connections are fully secure (including coaxial cable attachment to cable ferrules on BNC connectors). Also, make certain all connecting points are as intended. Make certain the selected connecting points correlate to the intended card inputs and/or outputs. Cabling mistakes are especially easy to make when working with large I/O modules.
Card seating within slots	Make certain all cards are properly seated within its frame slot. (It is best to assure proper seating by ejecting the card and reseating it again.)
Check status indicators and displays	On both DashBoard™ and the 9970-QS card edge indicators, red indications signify an error condition. If a status indicator signifies an error, proceed to the following tables in this section for further action.
Troubleshoot by substitution	All cards within the frame can be hot-swapped, replacing a suspect card or module with a known-good item.

9970-QS Processing Error Troubleshooting

Table 3-3 provides 9970-QS processing troubleshooting information. If the 9970-QS card exhibits any of the symptoms listed in Table 3-3, follow the troubleshooting instructions provided.

In the majority of cases, most errors are caused by simple errors where the 9970-QS is not appropriately set for the type of signal being received by the card.

- Note:**
- The error indications shown below are typical for the corresponding error conditions listed. Other error indications not specified here may also be displayed on DashBoard™ and/or the 9970-QS card edge status indicators.
 - Where errors are displayed on both the 9970-QS card and network remote controls, the respective indicators and displays are individually described in this section.

Table 3-3 Troubleshooting Processing Errors by Symptom


Symptom	Error/Condition	Corrective Action
Card appears in DashBoard Basic Tree View, but card controls and menu tabs do not appear (blank slate instead of control pages).	Legacy version of DashBoard not compatible with this card's latest firmware version. This is due to the added user interface controls which can only be accommodated with DashBoard version 6.0 or greater.	Cards using current firmware version 1.62.0000 or greater require DashBoard™ version 6.0 or greater. For a free download of the latest DashBoard version, go to www.cobaltdigital.com , and select Products > Software Control > DashBoard™ , and then select the version applicable to your computer.
<ul style="list-style-type: none"> • DashBoard™ shows Unlocked message in 9970-QS Card Info pane.  <ul style="list-style-type: none"> • Card edge Input Presence LED(s) not illuminated. 	No video input present	Make certain intended video source is connected to appropriate 9970-QS card video input. Make certain BNC cable connections between frame Rear I/O Module for the card and signal source are OK.
Cannot see one of five PiPs on output	PiP obscured by another PiP	When custom layouts are being used, it is easy for a PiP to “hide” underneath another PiP. When using this mode, size all PiPs small enough such that a PiP cannot be obscured. See Layout/Routing (p. 3-10) for more information.
Cascade mode upstream card image not as expected	<ul style="list-style-type: none"> • Cards in cascade chain not set for same grid layout 	<ul style="list-style-type: none"> • All cards used in a cascading chain must be set for the same number of columns and rows. See Cascade Mode Using PiP Layout QuickSet Template Presets (p. 3-16) for more information.
	<ul style="list-style-type: none"> • Downstream card importing a cascade input not set for cascading mode 	<ul style="list-style-type: none"> • Downstream 9970-QS which are receiving a cascade output from an upstream 9970-QS card must use the PiP 5 input and have the card set with Cascade Mode > Enabled. This ensures the imported upstream image is inserted as full-screen and with no burn-ins caused by the receiving card. See Layout/Routing (p. 3-10) controls for more information.
Cascade grid layout has been inadvertently lost	Non-cascade mode using the Layout Presets (Quint, Quad, Three Button, etc.) was possibly applied	The non-cascade Layout Presets will clear or change row/column settings previously set for a custom cascading grid that was set up using the cascading QuickSet setup controls. The basic non-cascade Layout Presets should not be re-applied once a cascade layout is set up.

Table 3-3 Troubleshooting Processing Errors by Symptom — continued

Symptom	Error/Condition	Corrective Action
Cannot set UMD text Display Format to choice other than External Input	Protocols tab inadvertently set to use router for UMD assert/burn-in	If the Protocols tab > Enable Utah Router Fetch control is set to Enabled, UMD text is asserted by Utah router commands. The UMD > Display Format control is locked to External Input, with user text entry or other UMD type selections locked out.
Audio not processed or passed through card	Enable control not turned on	On Output Audio Routing/Controls tab, Audio Group Enable control for group 1 thru 4 must be turned on for sources to be embedded into respective embedded channel groups.
Selected upgrade firmware will not upload	Automatic reboot after upgrade turned off	Card Presets > Automatically Reboot After Upgrade box unchecked. Either reboot the card manually, or leave this box checked to allow automatic reboot to engage an upgrade upon selecting the upgrade.

Troubleshooting Network/Remote Control Errors

Refer to Cobalt® reference guide “Remote Control User Guide” (PN 9000RCS-RM) for network/remote control troubleshooting information.

In Case of Problems

Should any problem arise with this product that was not solved by the information in this section, please contact the Cobalt Digital Inc. Technical Support Department.

If required, a Return Material Authorization number (RMA) will be issued to you, as well as specific shipping instructions. If required, a temporary replacement item will be made available at a nominal charge. Any shipping costs incurred are the customer’s responsibility. All products shipped to you from Cobalt Digital Inc. will be shipped collect.

The Cobalt Digital Inc. Technical Support Department will continue to provide advice on any product manufactured by Cobalt Digital Inc., beyond the warranty period without charge, for the life of the product.

See Contact Cobalt Digital Inc. (p. 1-16) in Chapter 1, “Introduction” for contact information.

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