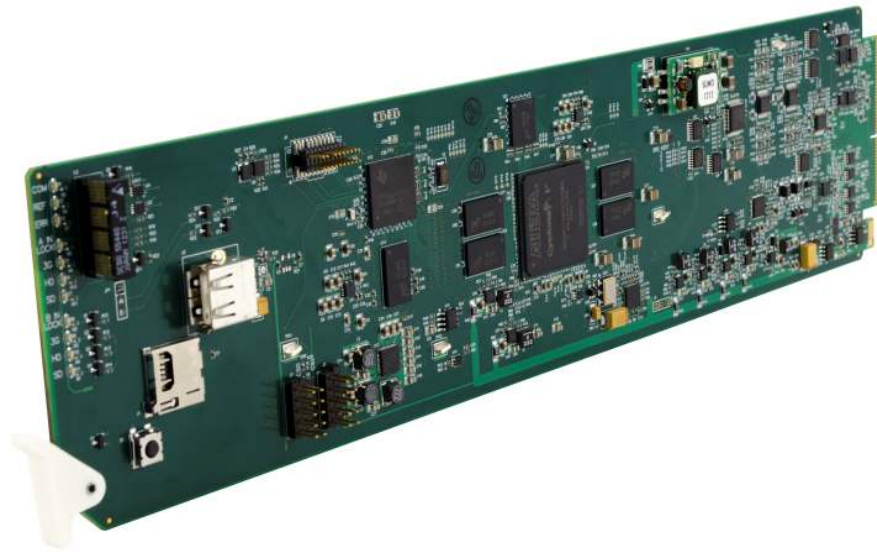

COBALT[®]

9980-CSC-3G



**3G/HD/SD-SDI RGB Color Space Corrector / Frame Sync
with Integrated Test Signal Generator and
OGCP-9000/CC Control Panel Support**

Product Manual

COBALT[®]

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Congratulations on choosing the Cobalt® 9980-CSC-3G 3G/HD/SD-SDI RGB Color Space Corrector / Frame Sync with Integrated Test Signal Generator and OGCP-9000/CC Control Panel Support. The 9980-CSC-3G 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 9980, please contact us at the contact information on the front cover.

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Introduction

Overview

This manual provides installation and operating instructions for the 9980-CSC-3G 3G/HD/SD-SDI RGB Color Space Corrector / Frame Sync with Integrated Test Signal Generator and OGCP-9000/CC Control Panel Support card (also referred to herein as the 9980-CSC-3G).

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 9980-CSC-3G.
- **Chapter 2, “Installation and Setup”** – Provides instructions for installing the 9980-CSC-3G in a frame, and optionally installing a 9980-CSC-3G Rear I/O Module.
- **Chapter 3, “Operating Instructions”** – Provides overviews of operating controls and instructions for using the 9980-CSC-3G.

This chapter contains the following information:

- **9980-CSC-3G Card Software Versions and this Manual (p. 1-2)**
- **Manual Conventions (p. 1-3)**
- **Safety and Regulatory Summary (p. 1-5)**
- **9980-CSC-3G Functional Description (p. 1-6)**
- **Technical Specifications (p. 1-12)**
- **Warranty and Service Information (p. 1-14)**
- **Contact Cobalt Digital Inc. (p. 1-15)**

9980-CSC-3G 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 9980-CSC-3G 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 9980-CSC-3G 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:

- **9980-CSC-3G** refers to the 9980-CSC-3G 3G/HD/SD-SDI RGB Color Space Corrector / Frame Sync with Integrated Test Signal Generator and OGCP-9000/CC Control Panel Support card.
- **Frame** refers to the HPF-9000, oGx, 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 9980-CSC-3G 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 and Regulatory 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 9980-CSC-3G 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 9980-CSC-3G 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 9980-CSC-3G 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.

EMC Compliance Per Market

Market	Regulatory Standard or Code
United States of America	FCC "Code of Federal Regulations" Title 47 Part15, Subpart B, Class A
Canada	ICES-003
International	CISPR 24:2010 IEC 61000-4-2:2008 IEC 61000-4-3:2006 with A1:2007 and A2:2010 IEC 61000-4-4:2004 IEC 61000-4-6:2008 IEC 61000-6-3:2006 with A1:2010 CISPR 22:2008

9980-CSC-3G Functional Description

Figure 1-1 shows a functional block diagram of the 9980-CSC-3G. In addition to a YCbCr proc features with RGB processing controls color corrector, the 9980-CSC-3G includes an advanced frame sync/pattern generator.

9980-CSC-3G Input/Output Formats

The 9980-CSC-3G provides the following inputs and outputs:

- **Inputs:**
 - **3G/HD/SD SDI IN A** thru **SDI IN D** – four 3G/HD/SD-SDI inputs. **SDI IN A** or **SDI IN B** can be set to failover to **A** or **B** in absence of opposite channel of this pair.
- **Outputs:**
 - **3G/HD/SD-SDI OUT (1-4)** – four 3G/HD/SD-SDI buffered video outputs. Each output can be independently set as processed output video or selected input video reclocked.

Input Video Select Function

A GUI-based control allows the card to select from up to four 3G/HD/SD-SDI inputs.

The input can be selected using DashBoard manual control, set to failover to an alternate input upon loss of the target input, and can be externally selected via a GPIO interface. An input **Allowed Rasters** and **Allowed Frame Rates** filter allows inputs to be filtered (screened) for only user-allowed raster sizes and frame rates, with unallowed raster/rates being rejected as an input (input unlock). Reclocked copies of any SDI input can be outputted by the card when selected as a choice on the output crosspoint.

Video Output Crosspoint

A four-output video matrix crosspoint allows independently applying the card processed video output or reclocked input to any of the four card discrete coaxial outputs (**SDI OUT 1** thru **SDI OUT 4**).

Using the appropriate rear module, an additional output (**RLY BYP B**) provides a relay-protected output that outputs a copy of **SDI OUT 1** crosspoint selection in normal operation. In power loss failover **RLY BYP B** passive outputs the signal connected to **SDI IN B**.

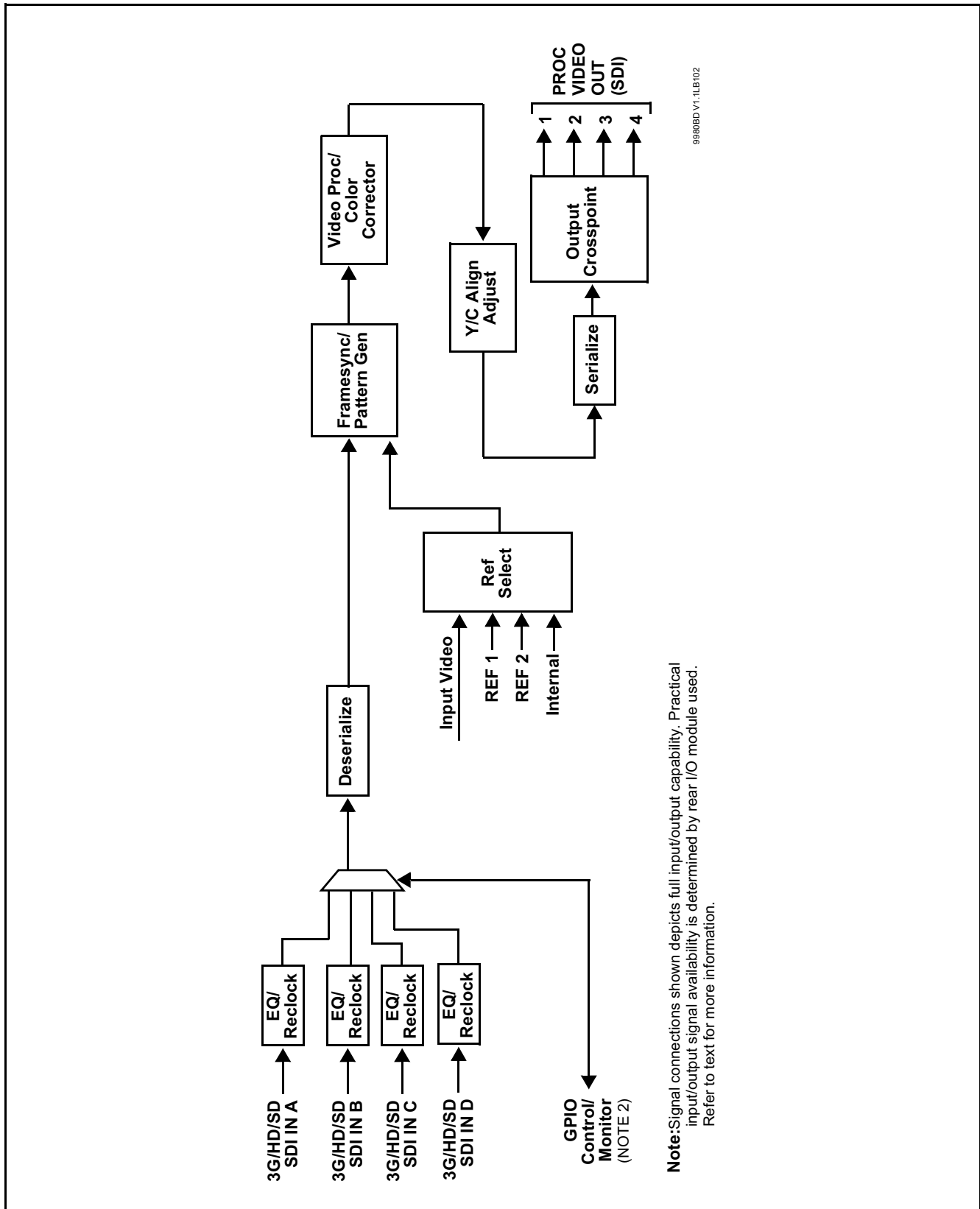


Figure 1-1 9980-CSC-3G Functional Block Diagram

Video Processor Description

Note: Although the 9980-CSC models are not furnished with full audio controls (such as input audio routing/controls), these models pass embedded audio fully intact with no modification to four-group audio.

Frame Sync Function

This function provides for frame sync control using either one of two external **FRAME REF IN (1,2)** reference signals distributed with the card frame, input video, or internal timing as a frame sync reference.

This function also allows horizontal and/or vertical offset to be added between the output video and the frame sync reference.

Frame sync can select from either of two card frame reference sources, or free-run input video sync. Selectable failover allows alternate reference selection should the initial reference source become unavailable or invalid. In the event of input video loss of signal, the output can be set to disable video, go to black, go to an internal test signal generator pattern, or freeze to the last intact frame (last frame having valid SAV and EAV codes).

An internal test signal generator provides a selection of various standard patterns such as color bars, sweep patterns, and other technical patterns. The test patterns can be applied to the output video upon loss of input or manually inserted at any time. Because the frame sync/pattern generator precedes the color corrector block, the 9980-CSC-3G can readily provide custom offset calibrations for on-set monitor/camera colorimetry characteristics which can be saved to yield a calibrated setting.

Color Corrector

The color corrector converts the YCbCr SDI input video to the 4:4:4 RGB color space (where the color correction is applied), and then back to YCbCr SDI on the output. Controls are available to adjust each RGB level independently for both white levels (gain) and black levels (offset). Gamma can also be independently adjusted for each RGB channels. Various controls can be ganged to provide adjustment for all three color channels simultaneously.

Y/C Alignment Corrector

A Y/C alignment processor provides controls for correcting upstream misalignment of Y and C phase. Y/C misalignment is typically introduced by upstream analog-to-digital conversion, especially where the Y and chroma paths may experience differing characteristics.

Control and Data Input/Output Interfaces

GPI Interface

Two independent ground-closure sensing GPI inputs (**GPI 1** and **GPI 2**; each sharing common ground connection as chassis potential) are available. Associated with each GPI user control is a selection of one of 32 user-defined card presets in which GPI activation invokes a card control preset. Because the GPI closure invokes a user-defined preset, the resulting setup is highly flexible and totally user-defined. Invoking a user preset to effect a change involves card setup communication limited **only** to the items being changed; the card remains on-line during the setup, and the called preset is rapidly applied.

GPI triggering can be user selected to consider the activity on discrete GPI ports, or combinations of logic states considering both GPI inputs, as well as be set for level or edge triggering. This flexibility allows multistage, progressive actions to be invoked if desired. Indication is provided showing whenever a GPI input has been invoked.

GPO Interface

Two independent phototransistor non-referenced (floating) contact pairs (**GPO 1/1** and **GPO 2/2**) are available. A GPO can be invoked by setting a GPO to be enabled when a card preset is in turn applied (i.e., when a preset is invoked (either manually or via event-based loading), the GPO is correspondingly also activated.

User Control Interface

Figure 1-2 shows the user control interface options for the 9980-CSC-3G. 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 9980-CSC-3G 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, “Operating Instructions”.

- **Cobalt® OGCP-9000 and OGCP-9000/CC Remote Control Panels** – The OGCP-9000 and OGCP-9000/CC Remote Control Panels conveniently and intuitively provide parameter monitor and control of the 9980-CSC-3G and other video and audio processing terminal equipment meeting the open-architecture Cobalt® cards for openGear™ standard.

In addition to circumventing the need for a computer to monitor and control signal processing cards, the Control Panels allow quick and intuitive access to hundreds of cards in a facility, and can monitor and allow adjustment of multiple parameters at one time.

The Remote Control Panels are totally compatible with the openGear™ control software DashBoard™; any changes made with either system are reflected on the other. The Remote Control Panel user interface is described in Chapter 3, “Operating Instructions”.

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

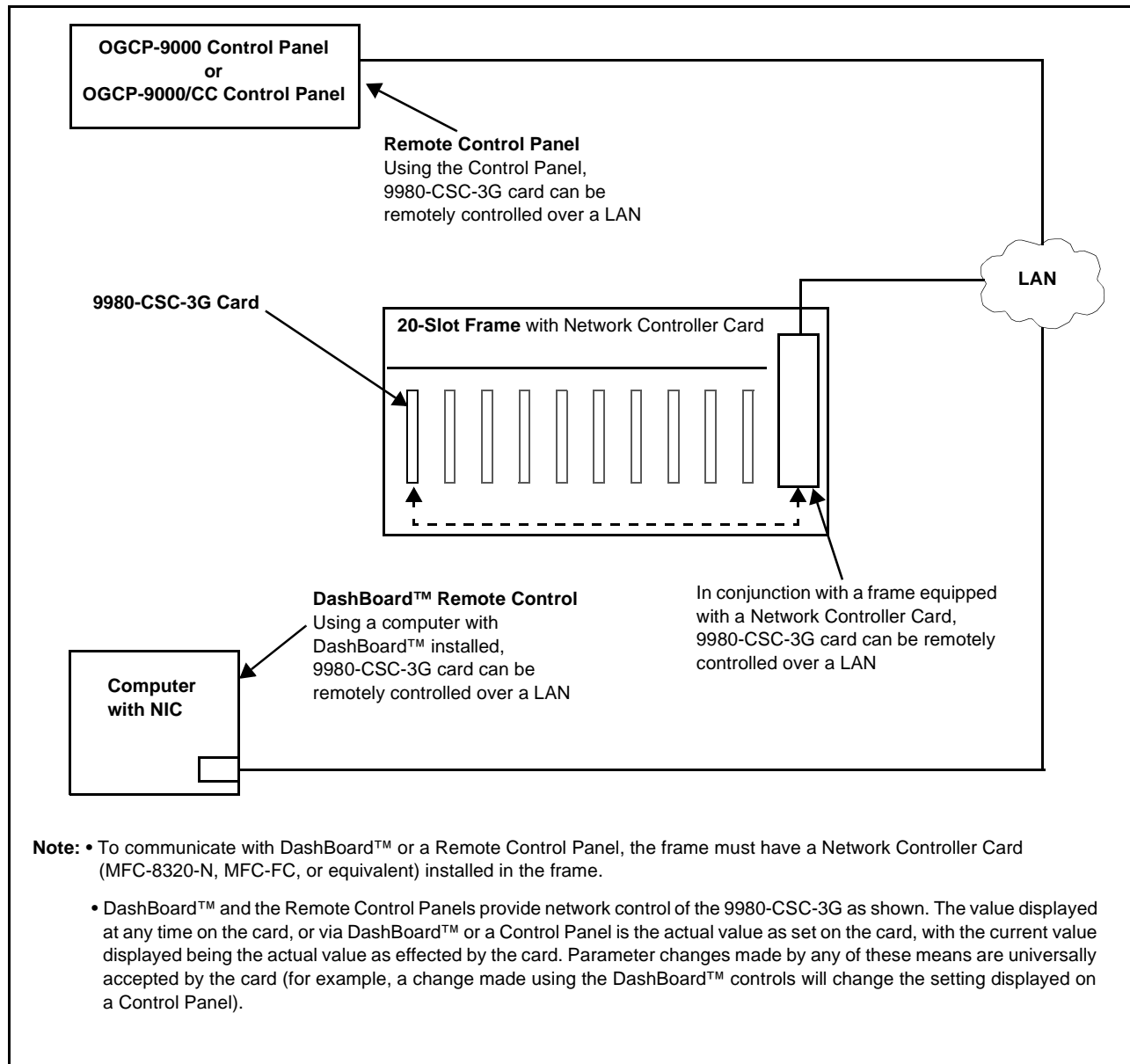


Figure 1-2 9980-CSC-3G User Control Interface

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. 1-15).

9980-CSC-3G Rear I/O Modules

The 9980-CSC-3G 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 9980-CSC-3G 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 9980-CSC-3G card edge connections to BNC and other connectors that interface with other components and systems in the signal chain.

The full assortment of 9980-CSC-3G Rear I/O Modules is shown and described in 9980-CSC-3G Rear I/O Modules (p. 2-4) in Chapter 2, “Installation and Setup”.

Technical Specifications

Table 1-1 lists the technical specifications for the 9980-CSC-3G 3G/HD/SD-SDI RGB Color Space Corrector / Frame Sync with Integrated Test Signal Generator and OGCP-9000/CC Control Panel Support card.

Table 1-1 Technical Specifications

Item	Characteristic
Part number, nomenclature	9980-CSC-3G 3G/HD/SD-SDI RGB Color Space Corrector / Frame Sync with Integrated Test Signal Generator and OGCP-9000/CC Control Panel Support
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 Presence LED indicators
Serial Digital Video Input	Number of Inputs: Up to (4) Data Rates Supported: SMPTE 424M, 292M, SMPTE 259M-C

Table 1-1 Technical Specifications — continued

Item	Characteristic
Serial Digital Video Input (cont.)	Impedance: 75 Ω terminating Return Loss: > 15 dB up to 1.485 GHz > 10 dB up to 2.970 GHz
Post-Processor Serial Digital Video Outputs	Number of Outputs: Up to four 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 Minimum Latency (frame sync disabled): SD: 127 pixels; 9.4 μ s 720p: 330 pixels; 4.45 μ s 1080i: 271 pixels; 3.65 μ s 1080p: 361 pixels; 2.43 μ s
Frame Reference Input	Number of Inputs: Two, REF 1 and REF 2 from frame with selectable failover Standards Supported: SMPTE 170M/318M (“black burst”) SMPTE 274M/296M (“tri-level”) Return Loss: > 35 dB up to 5.75 MHz
GPIO	(2) GPI; (2) GPO; opto-isolated GPO Specifications: Max I: 120 mA Max V: 30 V Max P: 120 mW GPI Specifications: GPI LO @ $V_{in} < 1.5$ V GPI HI @ $V_{in} > 2.3$ V Max V_{in} : 9 V

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.

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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
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Installation and Setup

Overview

This chapter contains the following information:

- Installing the 9980-CSC-3G Into a Frame Slot (p. 2-1)
- Installing a Rear I/O Module (p. 2-3)
- Setting Up 9980-CSC-3G Network Remote Control (p. 2-6)

Installing the 9980-CSC-3G 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 9980-CSC-3G 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 9980-CSC-3G 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 9980-CSC-3G 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 9980-CSC-3G 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 9980-CSC-3G into a frame slot as follows:

1. Determine the slot in which the 9980-CSC-3G 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 9980-CSC-3G Rear I/O Modules (p. 2-4).
9. Repeat steps 1 through 8 for other 9980-CSC-3G cards.

- Note:**
- The 9980-CSC-3G BNC inputs are internally 75-ohm terminated. It is not necessary to terminate unused BNC inputs or outputs.
 - External frame sync reference signals are received by the card over a reference bus on the card frame, and not on any card rear I/O module connectors. The frame has BNC connectors labeled **REF 1** and **REF 2** which receive the reference signal from an external source such as a house distribution.
 - 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 9980-CSC-3G Network Remote Control (p. 2-6).

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 9980-CSC-3G is to be installed.

If installing the 9980-CSC-3G 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 9980-CSC-3G 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.

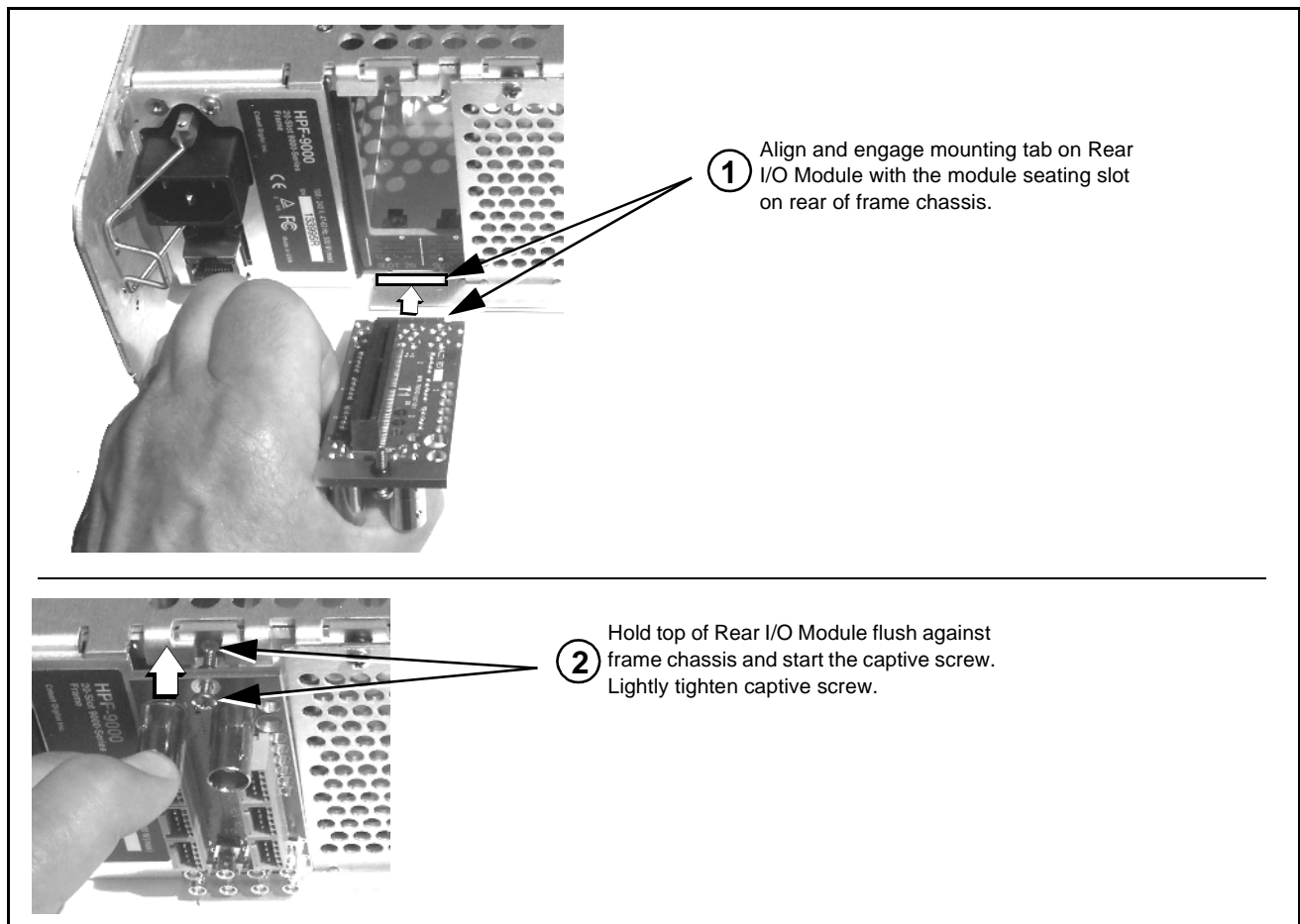


Figure 2-1 Rear I/O Module Installation

9980-CSC-3G Rear I/O Modules

Table 2-1 shows and describes the full assortment of Rear I/O Modules specifically for use with the 9980-CSC-3G.

Notes: Rear I/O Modules equipped with 3-wire Phoenix connectors are supplied with removable screw terminal block adapters. For clarity, the adapters are omitted in the drawings below.

Table 2-1 9980-CSC-3G Rear I/O Modules

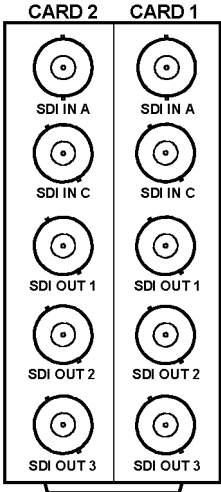
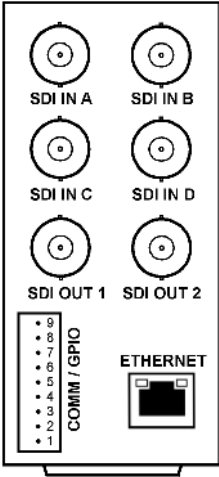
9980-CSC-3G Rear I/O Module	Description
<p>RM20-9980-A/S</p> 	<p>Split Rear Module. Provides each of the following connections for two 9980 cards:</p> <ul style="list-style-type: none"> • Two 3G/HD/SD-SDI coaxial input BNCs (SDI IN A and SDI IN C) • Three 3G/HD/SD-SDI Video Out BNCs (SDI OUT 1 thru SDI OUT 3)
<p>RM20-9980-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 - GPO RTN</p> <p>COMMIN / GPIO</p> <p>ETHERNET</p>	<p>Provides the following connections:</p> <ul style="list-style-type: none"> • Four 3G/HD/SD-SDI video inputs (SDI IN A thru SDI IN D) • Two 3G/HD/SD-SDI video outputs (SDI OUT 1 and SDI OUT 2) • COMM/GPIO multi-conductor connector • ETHERNET 10/100 connector (reserved) <p>Note: Ethernet connector is reserved for card IP data interface and direct web GUI access. This port is independent of frame network remote control.</p>

Table 2-1 9980-CSC-3G Rear I/O Modules — continued

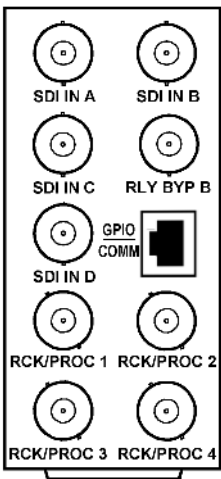
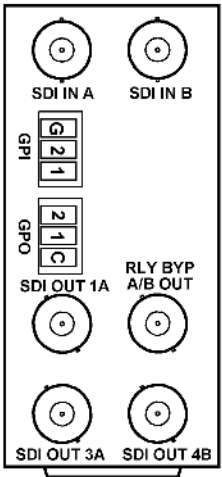
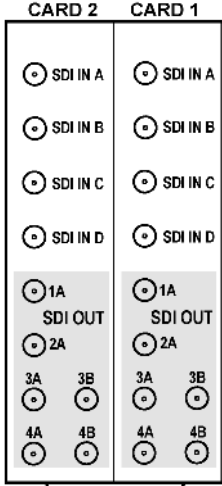
9980-CSC-3G Rear I/O Module	Description
<p>RM20-9980-C</p>  <p>Note: RCK/PROC 1 thru RCK/PROC 4 are DA outputs which can be individually set as reclocked or processed outputs of the currently-selected input.</p> <p>RLY BYP B is a relay-protected path which carries processed SDI out under normal conditions and passive routes SDI IN B to this BNC upon loss of power.</p>	<p>Provides the following connections:</p> <ul style="list-style-type: none"> • Four 3G/HD/SD-SDI video input BNCs (SDI IN A thru SDI IN D) • Four 3G/HD/SD-SDI video output BNCs (RCK/PROC 1 thru RCK/PROC 4; each GUI selectable as processed out or selected-input reclocked) • One relay-protected SDI processed output BNC • COMM/GPIO RJ-45 connector. Provides the following: <ul style="list-style-type: none"> - Multi-format serial interface - Two opto-isolated GPI inputs - Two opto-coupled GPO (GPO 1/G and GPO 2/G) <p>Note: Refer to GPIO and Serial (COMM) Connections (p. 2-6) for connector pinouts and important information regarding GPO electrical limits.</p>
<p>RM20-9980-F</p> 	<p>Provides the following connections:</p> <ul style="list-style-type: none"> • Two 3G/HD/SD-SDI video input BNCs (SDI IN A and SDI IN B) • Three 3G/HD/SD-SDI video output BNCs (SDI OUT 1A thru SDI OUT 4B; each GUI selectable as selected-input reclocked or processed out) • One relay-protected SDI processed output BNC (RLY BYP A/B OUT) • Two opto-isolated GPI inputs (terminals GPI 1-G and GPI 2-G) • Two opto-coupled GPO (GPO 1/G and GPO 2/G) <p>Note: Refer to GPIO and Serial (COMM) Connections (p. 2-6) for connector pinouts and important information regarding GPO electrical limits.</p>

Table 2-1 9980-CSC-3G Rear I/O Modules — continued

9980-CSC-3G Rear I/O Module	Description
RM20-9980-G/S 	<p>Split Rear Module. Provides each of the following connections for two 9980-CSC cards:</p> <ul style="list-style-type: none"> • Four 3G/HD/SD-SDI coaxial input BNCs (SDI IN A and SDI IN D) • Six 3G/HD/SD-SDI Video Out BNCs (SDI OUT 1A thru SDI OUT 4B) <p>Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9980-G/S-HDBNC or RM20-9980-G/S-DIN, respectively.</p>

GPIO and Serial (COMM) Connections

Figure 2-2 shows connections to the card multi-pin terminal block connectors. These connectors are used for card serial comm and GPIO connections.

Note: It is preferable to wire connections to plugs oriented as shown in Figure 2-2 rather than assessing orientation on rear module connectors. Note that the orientation of rear module 3-wire connectors is not necessarily consistent within a rear module, or between different rear modules. If wiring is first connected to plug oriented as shown here, the electrical orientation will be correct regardless of rear module connector orientation.

Setting Up 9980-CSC-3G 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 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. 1-15).

• 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.

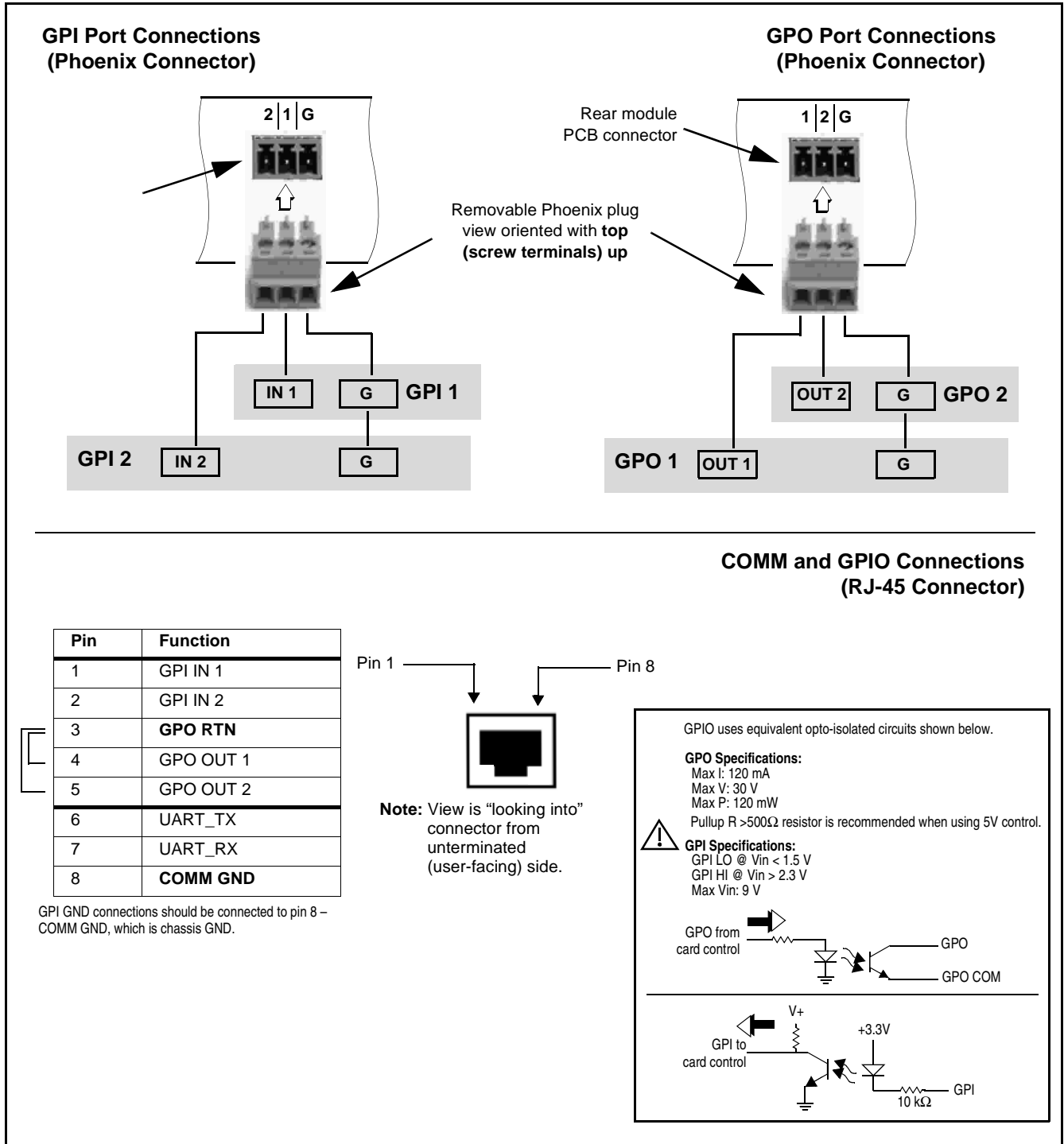


Figure 2-2 COMM and GPIO Connector Pinouts

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Operating Instructions

Overview

If you are already familiar with using DashBoard or a Cobalt Remote Control Panel to control Cobalt cards, please skip to 9980-CSC-3G Function Menu List and Descriptions (p. 3-10).

This chapter contains the following information:

- Control and Display Descriptions (p. 3-1)
- Accessing the 9980-CSC-3G Card via Remote Control (p. 3-6)
- Checking 9980-CSC-3G Card Information (p. 3-8)
- Ancillary Data Line Number Locations and Ranges (p. 3-9)
- 9980-CSC-3G Function Menu List and Descriptions (p. 3-10)
- Color and Video Correction Examples Using the 9980-CSC-3G (p. 3-31)
- Troubleshooting (p. 3-38)

Control and Display Descriptions

This section describes the user interface controls, indicators, and displays for using the 9980-CSC-3G card. The 9980-CSC-3G functions can be accessed and controlled using any of the user interfaces described here.

The format in which the 9980-CSC-3G functional controls, indicators, and displays appear and are used varies depending on the user interface being used. Regardless of the user interface being used, access to the 9980-CSC-3G 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 Overview below).

Note: When a setting is changed, settings displayed on DashBoard™ (or a Remote Control Panel) 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 Overview

The functions and related parameters available on the 9980-CSC-3G card are organized into function **menus**, which consist of parameter groups as shown below.

Figure 3-1 shows how the 9980-CSC-3G card and its menus are organized, and also provides an overview of how navigation is performed between cards, function menus, and parameters.

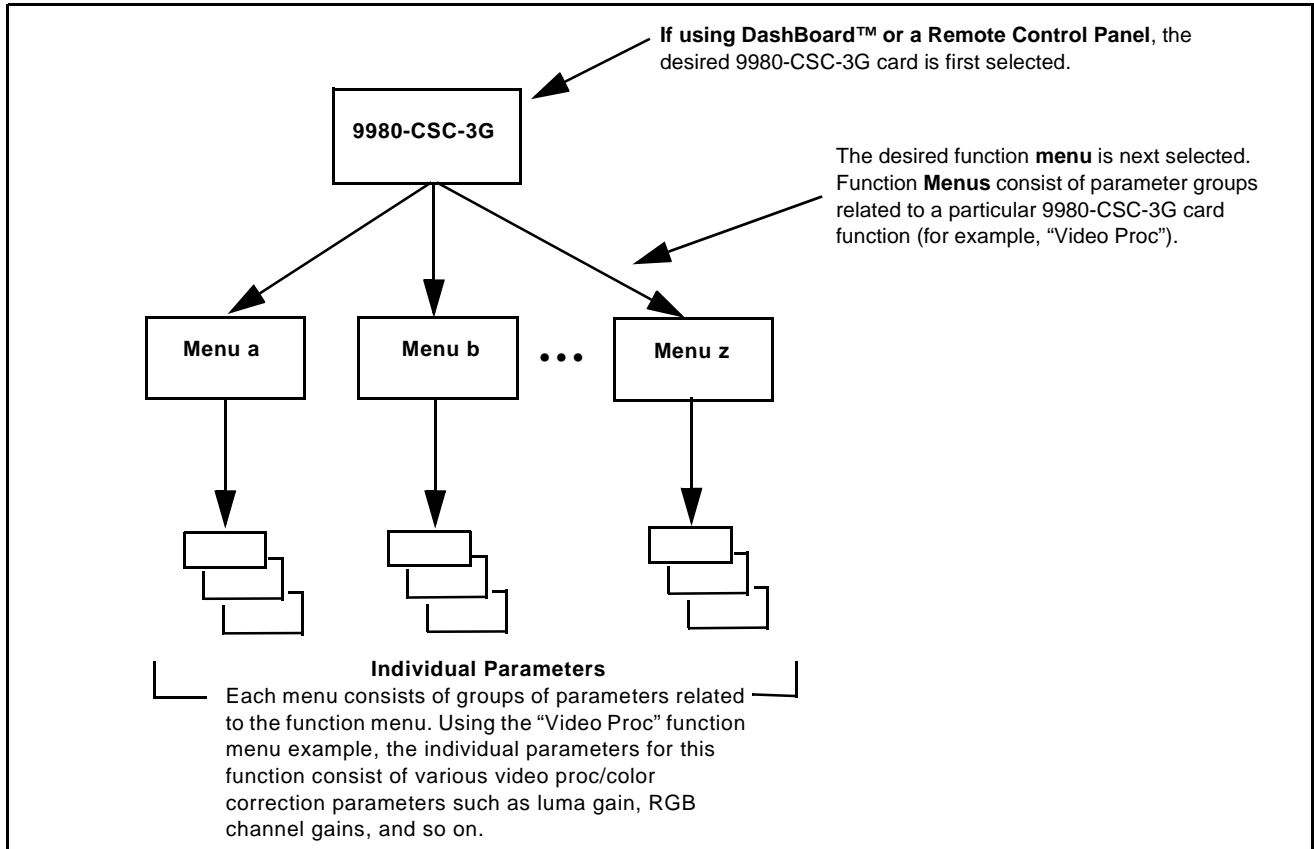


Figure 3-1 Function Menu/Parameter Overview

DashBoard™ User Interface

(See Figure 3-2.) 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.

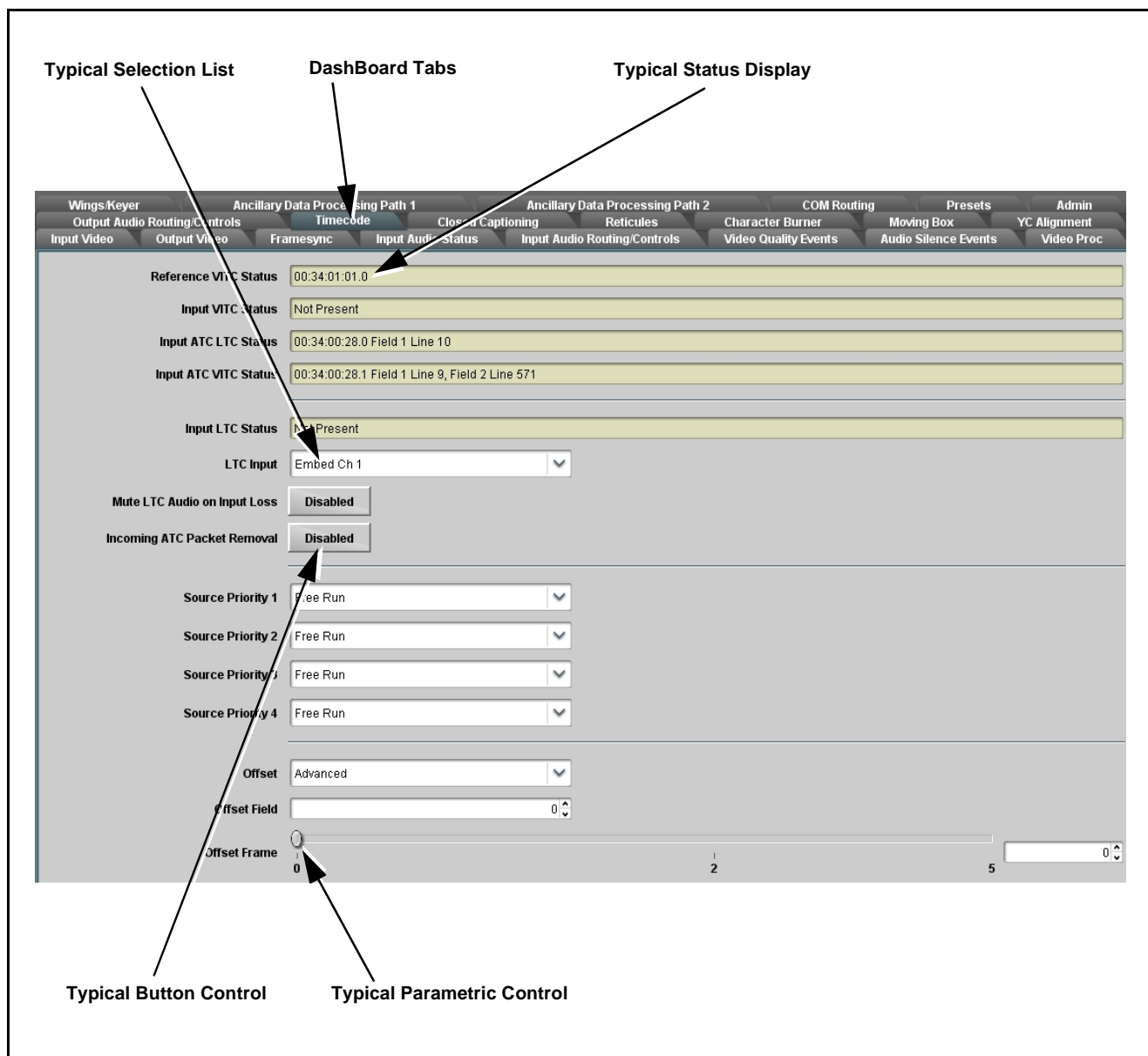


Figure 3-2 Typical DashBoard Tabs and Controls

Cobalt® Remote Control Panel User Interfaces

(See Figure 3-3.) Similar to the function menu tabs using DashBoard™, the Remote Control Panels have a Select Submenu key that is used to display a list of function submenus. From this list, a control knob on the Control Panel is used to select a function from the list of displayed function submenu items.

When the desired function submenu 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 control knobs, which act like a potentiometer. Items in a list can then be selected using the control knobs which correspondingly act like a rotary switch.

Figure 3-3 shows accessing a function submenu and its parameters (in this example, “Video Proc”) using the Control Panel as compared to using the card edge controls.

Note: Refer to “OGCP-9000 Remote Control Panel User Manual” (PN OGCP-9000-OM) or “OGCP-9000/CC Remote Control Panel User Manual” (PN OGCP-9000/CC-OM) for complete instructions on using the Control Panels.

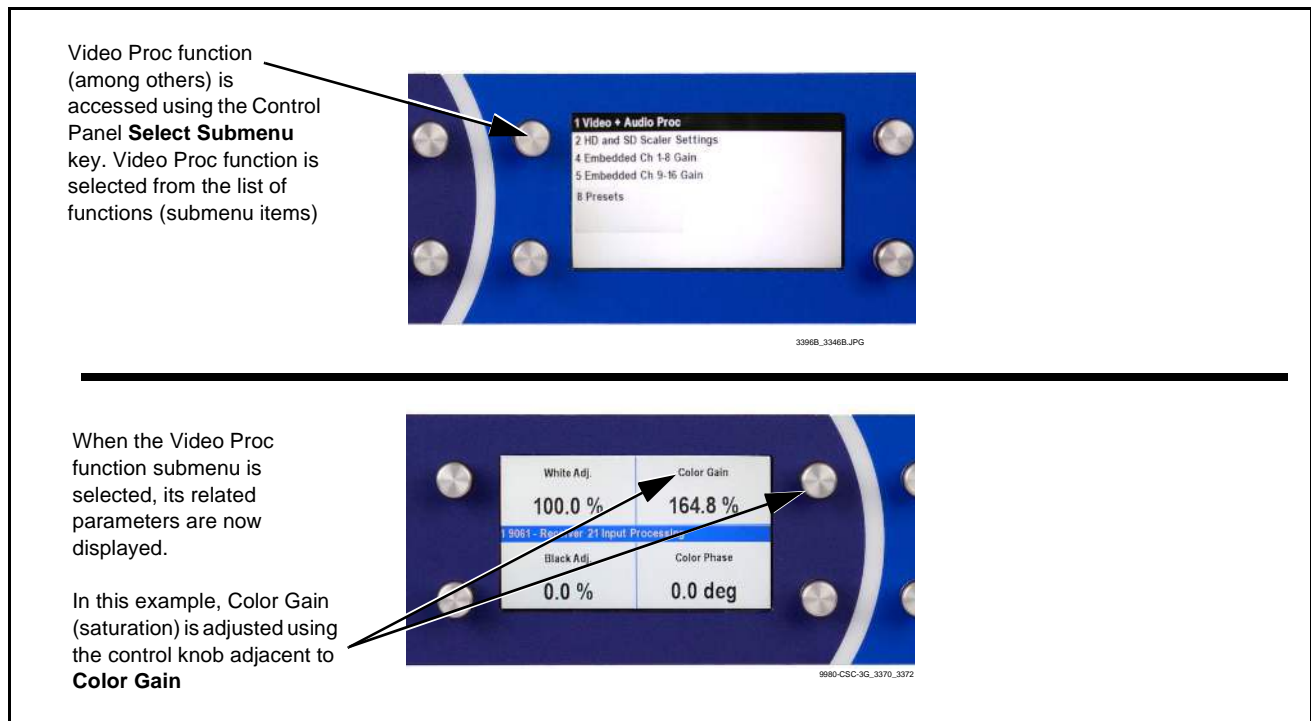


Figure 3-3 Remote Control Panel Setup of Example Video Proc Function Setup

Web HTML5 User Interface

(See Figure 3-4.) When equipped with a rear I/O module having an Ethernet port, the 9980-CSC-3G controls can be accessed via a web network connection with no additional remote control software needed. The web GUI shows the same tabs, controls and status displays as those accessed using DashBoard™. This allows very convenient control access to the card, even if using a computer without DashBoard remote control or in case the frame network connection is down.

The card can be accessed in a web browser by entering the card IP address as set in the card **Admin** tab. (See Admin (p. 3-27) for more information.)

Note: Card must be equipped with a rear I/O module with an Ethernet port, or installed in a “smart” frame with per-slot Ethernet, to use html access. The card address is entirely independent of, and requires no association with, the frame openGear IP address.

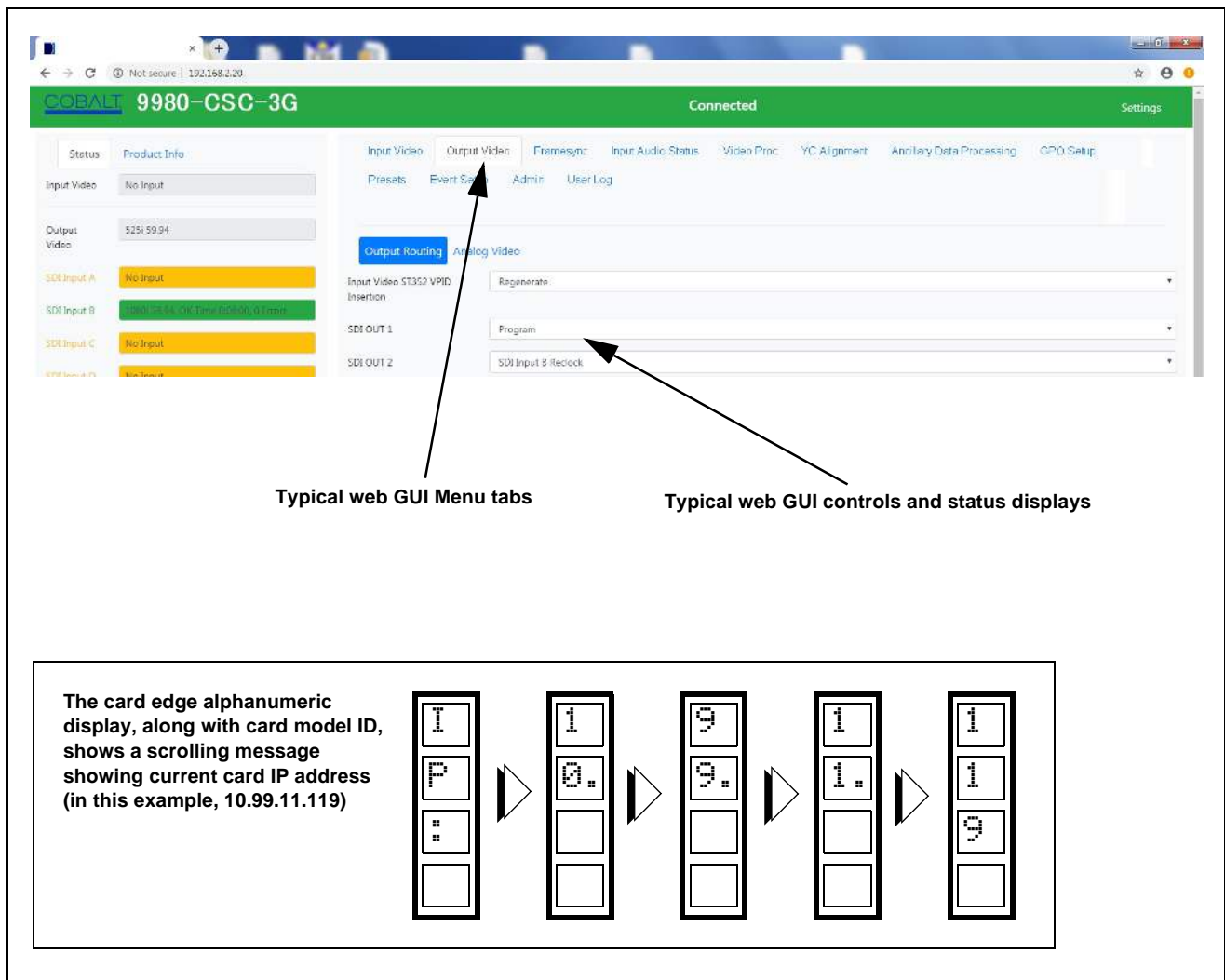


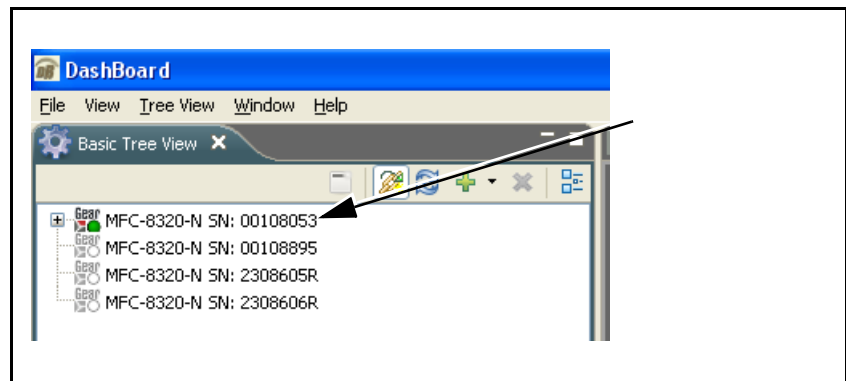
Figure 3-4 Typical Web GUI Tabs and Controls

Accessing the 9980-CSC-3G Card via Remote Control

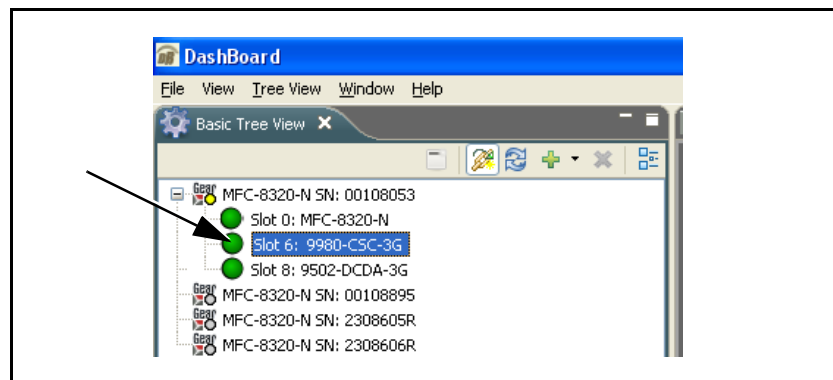
Access the 9980-CSC-3G card using DashBoard™ or Cobalt® Remote Control Panel as described below.

Accessing the 9980-CSC-3G Card Using DashBoard™

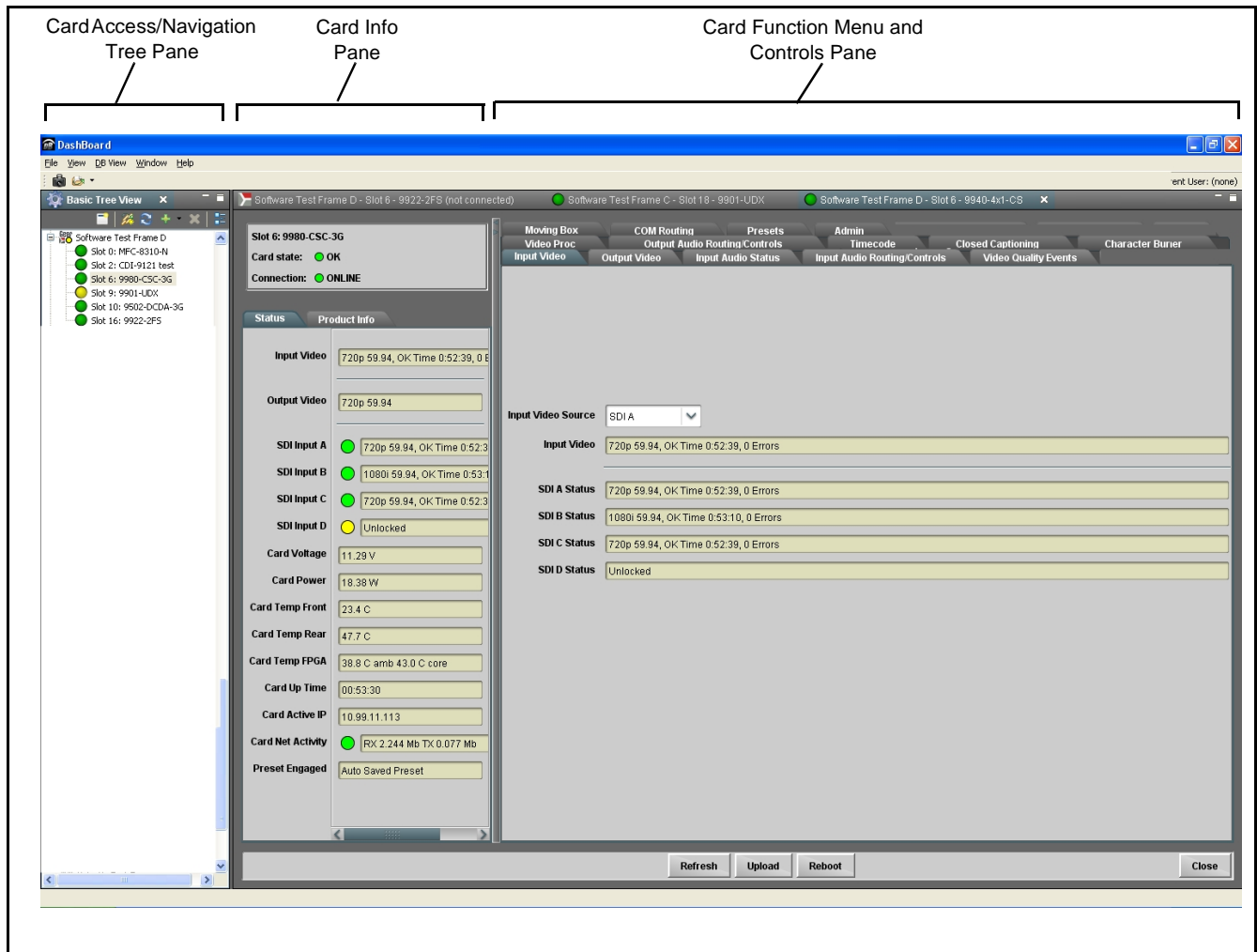
1. On the computer connected to the frame LAN, open DashBoard™.
2. As shown below, in the left side Basic View Tree locate the Network Controller Card associated with the frame containing the 9980-CSC-3G card to be accessed (in this example, “MFC-8320-N SN: 00108053”).



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: 9980-CSC-3G”).

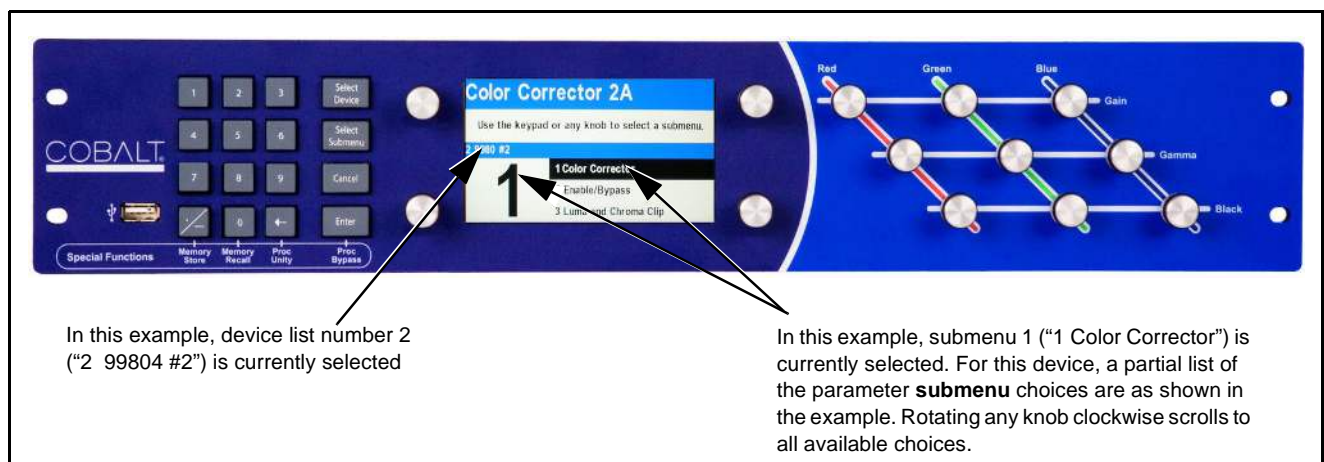


As shown on the next page, when the card is accessed in DashBoard™ its function menu screen showing tabs for each function is displayed. (The particular menu screen displayed is the previously displayed screen from the last time the card was accessed by DashBoard™).



Accessing the 9980-CSC-3G Card Using a Cobalt® OGCP-9000/CC Remote Control Panel

Press the **Select Device** key and select a card as shown in the example below.



Checking 9980-CSC-3G Card Information

The operating status and software version the 9980-CSC-3G card can be checked using DashBoard™ or the card edge control user interface. Figure 3-5 shows and describes the 9980-CSC-3G card information screen using DashBoard™ and accessing card information using the card edge control user interface.

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. 3-38) for corrective action.

The **Tree View** shows the cards seen by DashBoard™. In this example, Network Controller Card is hosting a 9980-CSC-3G card in slot 18.

Status Display
This displays shows the status and format of the signals being received by the 9980-CSC-3G, as well as card status.

Status		Product Info	
Product	9980-CSC-3G		
Product Options			
Supplier	Cobalt Digital Inc.		
Revision	1.109.6982-dev		
Build Date	Apr 1 2015 11:43:05		
FPGA Revision	1.04.0000		
FPGA Build Date	Mar 31 2015 10:27:05		
Kernel Revision	3.2.0-Local-1.1 #60 Fri May 30 16:28:26		
Filesystem Revision	1.0 Oct 20 2014 15:56:55		
Flash Storage	40.0 MB free		
RAM Usage	17.0 %		
CPU Usage	93.0 %		
Serial Number	371604		
Rear Module	1919		

Card Info Display
This displays (alternately selected in the Card Info pane) shows the the card hardware and software version info, as well as a Cobalt code number for the currently installed rear module.

Figure 3-5 9980-CSC-3G Card Info/Status Utility

Ancillary Data Line Number Locations and Ranges

Table 3-1 lists typical default output video VANC line number locations for various ancillary data items that may be passed or handled by the card.

Table 3-1 Typical Ancillary Data Line Number Locations/Ranges

Item	Default Line No. / Range	
	SD	HD
AFD	12 (Note 2)	9 (Note 2)
ATC_VITC	13 (Note 2)	9/8 (Note 2)
ATC_LTC	—	10 (Note 2)
Dolby® Metadata	13 (Note 2)	13 (Note 2)
SDI VITC Waveform	14/16 (Note 2)	—
Closed Captioning	21 (locked)	10 (Note 2)

Notes:

- The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data.
- While range indicated by drop-down list on GUI may allow a particular range of choices, the actual range is automatically clamped (limited) to certain ranges to prevent inadvertent conflict with active picture area depending on video format. Limiting ranges for various output formats are as follows:

Format	Line No. Limiting	Format	Line No. Limiting	Format	Line No. Limiting
525i	12-19	720p	9-25	1080p	9-41
625i	9-22	1080i	9-20		

Because line number allocation is not standardized for all ancillary items, consideration should be given to all items when performing set-ups. Figure 3-6 shows an example of improper and corrected VANC allocation within an HD-SDI stream.

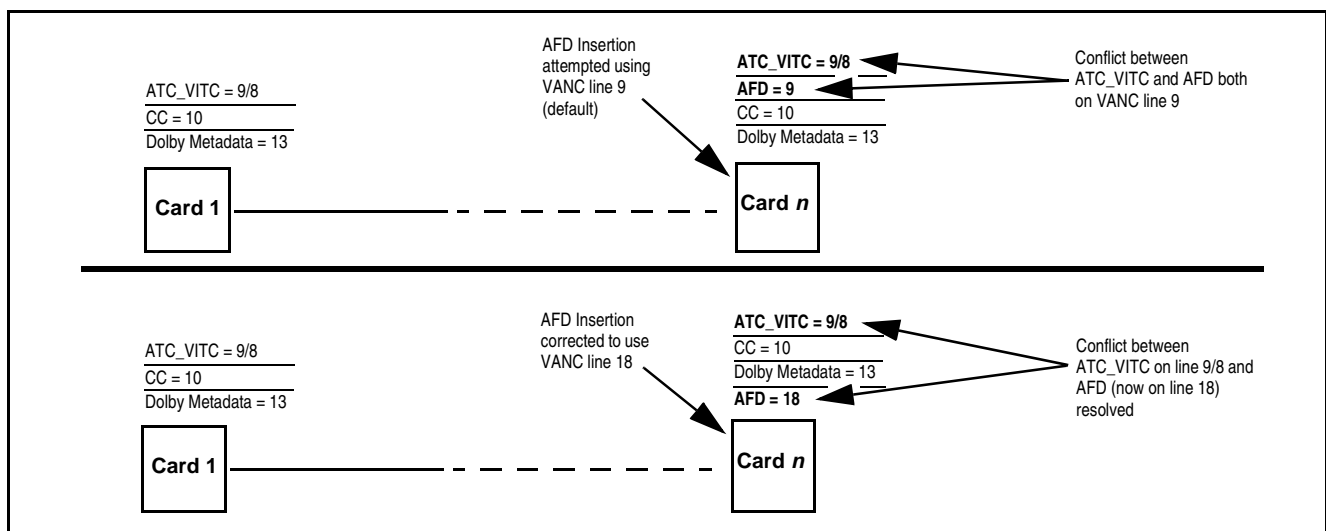



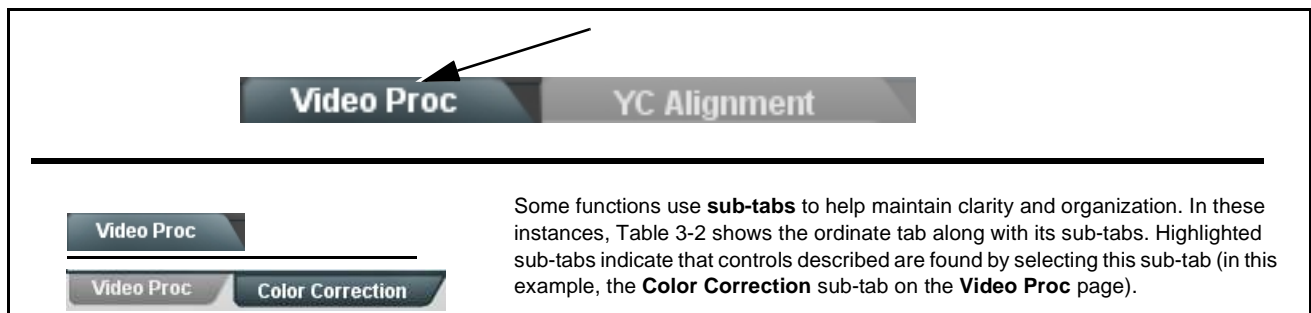
Figure 3-6 Example VANC Line Number Allocation Example

9980-CSC-3G Function Menu List and Descriptions

Table 3-2 individually lists and describes each 9980-CSC-3G function menu and its related list selections, controls, and parameters. Where helpful, examples showing usage of a function are also provided. Table 3-2 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.)

On DashBoard™ itself and in Table 3-2, 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
Input Video Controls	3-11	Ancillary Data Proc Controls	3-20
Output Video Mode Controls	3-12	GPO Setup Controls	3-20
Framesync	3-13	Presets	3-21
Input Audio Status	3-16	Event Setup Controls	3-24
Video Proc/Color Correction	3-16	Admin	3-27
Y/C Alignment Controls	3-19	User Log	3-30

Table 3-2 9980-CSC-3G Function Menu List

<div>Input Video</div>	Allows manual or failover selection of card SDI program video inputs and displays status and raster format of received SDI video.
<div><div>Input Video Source</div><div><div>Input Video Source</div><div>SDI A</div><div>SDI A</div><div>SDI B</div><div>SDI C</div><div>SDI D</div><div>Failover A to B</div><div>Failover B to A</div></div></div>	<div>Selects the input video source to be applied to the card's program video input.</div> <div><div><div>• SDI A and SDI B choices allow forced manual selection of correspondingly SDI IN A or SDI IN B.</div><div><div>• Failover A to B sets main path preference of SDI IN A.</div><div><div>- If SDI IN A goes invalid, then SDI IN B is selected.</div><div>- If SDI IN A goes valid again, failover automatically reverts to SDI IN A.</div></div><div><div>• Failover B to A sets main path preference of SDI IN B.</div><div><div>- If SDI IN B goes invalid, then SDI IN A is selected.</div><div>- If SDI IN B goes valid again, failover automatically reverts to SDI IN B.</div></div><div><div>• SDI C and SDI D choices allow forced manual selection of correspondingly SDI IN C or SDI IN D without failover choices.</div></div></div><div>Note: Failover criteria via this control is simple signal presence.</div></div></div></div>
<div><div>Input Video Status</div><div><div>SDI A Status</div><div>1080i_5994, OK Time 2:05:51, 0 Errors</div><div>SDI B Status</div><div>1080p_5994, OK Time 0:29:54, 0 Errors</div><div>SDI C Status</div><div>Unlocked</div><div>SDI D Status</div><div>Unlocked</div></div></div>	<div>Displays input status of each video input, along with elapsed time of signal acquire.</div> <div><div>SDI A thru SDI D Status show raster/format for all card inputs. If signal is not present or is invalid, Unlocked is displayed. (These status indications are also propagated to the Card Info pane.)</div><div>Note: Status display shows maximum card input complement. Input complement is determined by rear I/O module used.</div></div>

Input SDI Raster Size / Frame Rate Filtering

The controls shown below allow user filtering to only include selected raster or rate formats to be used as a program video input.

Default settings have all raster sizes and frame rates "checked", thereby providing no filtering (exclusion.)

Allowed Raster Sizes

525i

625i

720p

1080i

1080psf

1080p

☒

☒

☒

☒

☒

☒

Allowed Frame Rates

23.98

24

25

29.97

30

50

59.94

60

☒

☒

☒

☒

☒

☒

☒

☒

In the example below, only 720p and 29.97 are checked, filtering allowed input to only be 720p 29.97 ("720p half-rate").

Allowed Raster Sizes

525i

625i

720p

1080i

1080psf

1080p

☐

☐

☒

☐

☐

☐

Allowed Frame Rates

23.98

24

25

29.97

30

50

59.94

60

☐

☐

☐

☒

☐

☐

☐

☐

Note: Rates shown in selector are frame rates and not field rates.

Table 3-2 9980-CSC-3G Function Menu List — continued


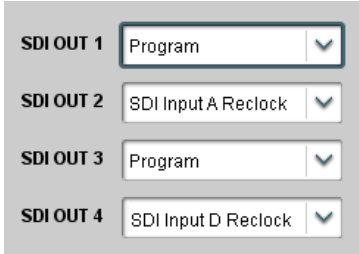
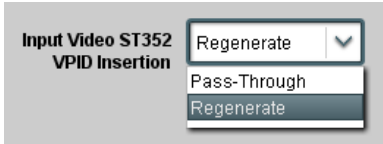

	<p>Allows selection of each of the four video output coaxial connectors as processed SDI out or reclocked SDI out.</p>
<p>• Output Video Crosspoint</p> 	<p>For each SDI output port supported by the card, provides a crosspoint for routing program processed video or selected-input reclocked to an SDI output.</p> <p>In this example, SDI OUT 1 and SDI OUT 3 are receiving Program (processed) video out, with SDI OUT 2 and SDI OUT 4 providing various reclocked input video.</p> <p>Note: Outputs set to Input Reclocked will pass input SDI regardless of Input SDI Raster Size / Frame Rate Filtering. Input filtering applies only to the program video path.</p>
<p>• ST352 VPID Insertion/Pass-Thru Select</p> 	<p>Selects from default Regenerate mode and special Pass-Through mode (see below for important usage notes).</p> <ul style="list-style-type: none"> • Regenerate makes certain ST352 is marked for whatever the card is passing, or if the payload is being modified by the card. (An example of where ST352 would have to be modified would be if the card Framesync is user-set to change the frame rate from 59.94 to 60.) • Pass-Through will extract and preserve the ST352 information from input SDI, and re-insert it on the output regardless of any changes the card has locally done to identifying characteristics carried in the ST352 metadata. <p> In all normal usages, it is recommended to leave this control set to default Regenerate setting. This ensures that downstream devices will “see” ST352 that represents the payload being provided by the card. Pass-Through is only used in highly specialized cases where special ST352 data must be preserved (even if the data may not match the payload).</p>

Table 3-2 9980-CSC-3G Function Menu List — continued

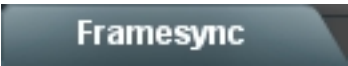
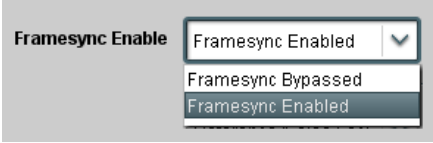
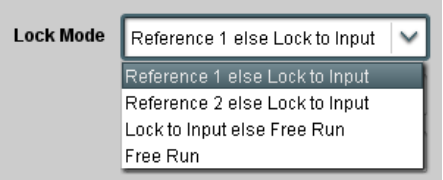

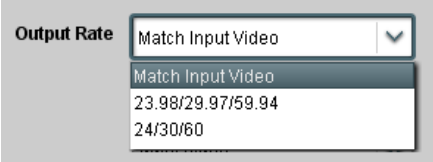
	<p>Provides video frame sync/delay offset control and output control/loss of program video failover selection controls.</p>
<p>• Framesync Enable/Disable Control</p> 	<p>Provides master enable/disable of all card framesync functions/controls.</p>
<p>• Lock Mode Select</p> 	<p>Selects Frame Sync functions from the choices shown to the left and described below.</p> <ul style="list-style-type: none"> • Lock to Reference: Output video is locked to selected external reference received on the frame reference bus. (External reference signal Ref 1 / Ref 2 are distributed to the card and other cards via the Ref 1 / Ref 2 buses on the frame.) <ul style="list-style-type: none"> Note: If valid reference is not received, the  Reference Invalid indication appears in the Card Info status portion of DashBoard™, indicating invalid frame sync reference error. • Lock to Input: Uses the program video input video signal as the reference standard. <ul style="list-style-type: none"> Note: If Lock to Input is used for framesync, any timing instability on the input video will result in corresponding instability on the output video. • Free Run: Output video is locked to the card's internal clock. Output video is not locked to external reference.
<p>• Output Rate Select</p> 	<p>Allows frame rate to be outputted same as input video, or converted to from the choices shown to the left and described below.</p> <ul style="list-style-type: none"> • Auto – output video frame rate tracks with input video. • 23.98/29.97/59.94 – forces standard North American frame rates. Can be used to convert 24/30/60 Hz camera frame rates to corresponding 23.98/29.97/59.94 standard North American frame rates. • 24/30/60 – forces 24/30/60 frame rates. Can be used to convert 23.98/29.97/59.94 Hz frame rates to corresponding 24/30/60 Hz frame rates.

Table 3-2 9980-CSC-3G Function Menu List — continued

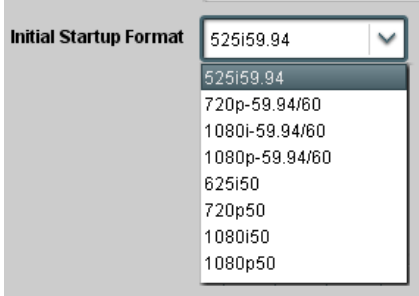
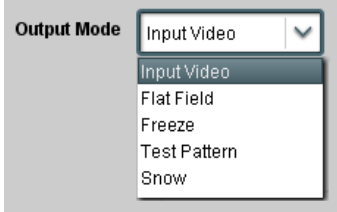
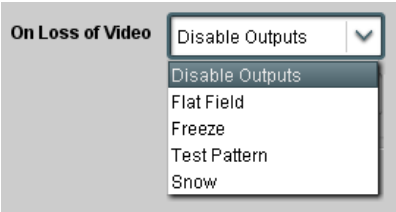
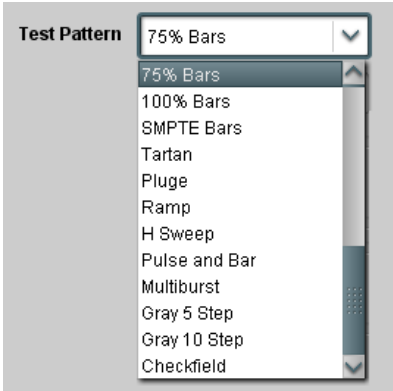
Framesync	(continued)
<p>• Initial Startup Format Select</p> 	<p>Selects a frame sync format/rate to be invoked (from the choices shown to the left) in the time preceding stable lock to external reference.</p> <p>Set this control to that of the intended external reference to help ensure smoothest frame sync locking. This control also sets the card test pattern format where the card's initial output at power-up is the internal pattern instead of program video.</p>
<p>• Program Video Output Mode Select</p> 	<p>Provides a convenient location to select between program video output and other technical outputs from the choices shown to the left and described below.</p> <ul style="list-style-type: none"> • Input Video – device outputs input program video (or loss of signal choices described below). • Flat Field – device outputs flat field. • Freeze – device outputs last frame having valid SAV and EAV codes. • Test Pattern – device outputs standard technical test pattern (pattern is selected using the Pattern drop-down described below). • Snow – device outputs snow multi-color pattern.
<p>• Loss of Input Signal Selection</p> 	<p>In the event of program input video Loss of Signal (LOS), determines action to be taken as follows:</p> <ul style="list-style-type: none"> • Disable Outputs: Disable program video SDI outputs. • Flat Field – go to flat field on program video output. • Freeze – go to last frame having valid SAV and EAV codes on program video output. • Test Pattern – go to standard technical test pattern on program video output (pattern is selected using the Pattern drop-down described below). • Snow – output snow multi-color pattern.
<p>• Test Pattern Select</p> 	<p>Provides a choice of standard technical patterns (shown to the left) when Test Pattern is invoked (either by LOS failover or directly by selecting Test Pattern on the Program Video Output Mode Select control).</p> <p>Note: Because the Framesync pattern generator precedes the color correction block, test pattern color parameters can be post-offset from the calibrated standard levels as desired. This is highly useful for developing offsets for use in on-set monitor offset calibration. See Color and Video Correction Examples Using the 9980-CSC-3G (p. 3-31) for examples and details of using these offsets.</p>

Table 3-2 9980-CSC-3G Function Menu List — continued

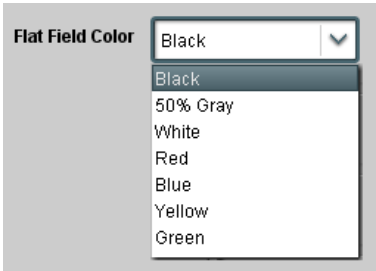
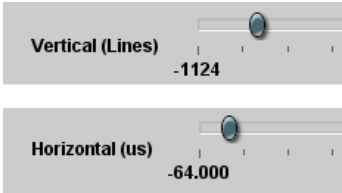

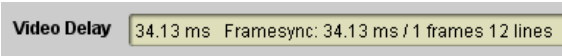
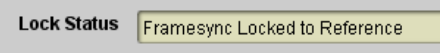
<div data-bbox="267 262 615 325" style="background-color: #333; color: white; padding: 5px; text-align: center; font-weight: bold;">Framesync</div>	(continued)
<p>• Flat Field Color Select</p> 	<p>Provides a choice of flat field colors when Flat Field is invoked (either by LOS failover or directly by selecting Flat Field on the Program Video Output Mode Select control).</p>
<p>• Output Video Reference Offset Controls</p> 	<p>With framesync enabled, provides the following controls for offsetting the output video from the reference:</p> <ul style="list-style-type: none"> • Vertical (Lines) – sets vertical delay (in number of lines of output video) between the output video and the frame sync reference. (Positive values provide delay; negative values provide advance) (Range is -1124 thru 1124 lines; null = 0 lines.) • Horizontal (μs) – sets horizontal delay (in μs of output video) between the output video and the frame sync reference. (Positive values provide delay; negative values provide advance) (Range is -64 thru 64 μsec; null = 0.000 μsec.) <p>Note: Offset advance is accomplished by hold-off of the reference-directed release of the frame, thereby effectively advancing the program video relative to the reference.</p>
<p>• Frame Delay Control</p> 	<p>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. The operational latency of the frame sync is always between the specified minimum latency and minimum latency plus one frame (not one field).</p> <p>Note: Due to card memory limits, the maximum available Minimum Latency Frames is related to the output video format selected. When using this control, be sure to check the Report Delay display to make certain desired amount of frames are delayed.</p>
<p>• Video Delay Display</p> 	<p>Displays the current input-to-output video delay (in msec units) as well as in terms of Frames/fractional frame (in number of lines).</p> <p>Status display shows total input-to-output video delay, along with any framesync delay.</p>
<p>• Framesync Lock Status Display</p> 	<p>Displays the current framesync status and reference source.</p>

Table 3-2 9980-CSC-3G Function Menu List — continued

<div>Input Audio Status</div>	Displays signal status and payload for embedded and discrete audio received by the card.																											
<p>Individual signal status and peak level displays for embedded audio input pairs as described below.</p> <ul style="list-style-type: none">• Absent: Indicates embedded channel pair does not contain recognized audio PCM data.• Present - PCM: Indicates embedded channel pair contains recognized audio PCM data.• Dolby E: Indicates embedded channel pair contains Dolby® E encoded data.• Dolby Digital: Indicates embedded channel pair contains Dolby® Digital encoded data. <p>Note: Dolby status displays occur only for valid Dolby® signals meeting SMPTE 337M standard.</p>																												
<div><table><thead><tr><th></th><th>Status</th><th>Peak</th></tr></thead><tbody><tr><td>Emb 1-2</td><td>Dolby Digital</td><td>Data</td></tr><tr><td>Emb 3-4</td><td>Present- PCM</td><td>-80 dBFS/-80 dBFS</td></tr><tr><td>Emb 5-6</td><td>Present- PCM</td><td>-80 dBFS/-80 dBFS</td></tr><tr><td>Emb 7-8</td><td>Present- PCM</td><td>-20 dBFS/-20 dBFS</td></tr><tr><td>Emb 9-10</td><td>Present- PCM</td><td>0 dBFS/-20 dBFS</td></tr><tr><td>Emb 11-12</td><td>Present- PCM</td><td>-14 dBFS/-10 dBFS</td></tr><tr><td>Emb 13-14</td><td>Present- PCM</td><td>-9 dBFS/-5 dBFS</td></tr><tr><td>Emb 15-16</td><td>Present- PCM</td><td>-3 dBFS/0 dBFS</td></tr></tbody></table></div>			Status	Peak	Emb 1-2	Dolby Digital	Data	Emb 3-4	Present- PCM	-80 dBFS/-80 dBFS	Emb 5-6	Present- PCM	-80 dBFS/-80 dBFS	Emb 7-8	Present- PCM	-20 dBFS/-20 dBFS	Emb 9-10	Present- PCM	0 dBFS/-20 dBFS	Emb 11-12	Present- PCM	-14 dBFS/-10 dBFS	Emb 13-14	Present- PCM	-9 dBFS/-5 dBFS	Emb 15-16	Present- PCM	-3 dBFS/0 dBFS
	Status	Peak																										
Emb 1-2	Dolby Digital	Data																										
Emb 3-4	Present- PCM	-80 dBFS/-80 dBFS																										
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Emb 11-12	Present- PCM	-14 dBFS/-10 dBFS																										
Emb 13-14	Present- PCM	-9 dBFS/-5 dBFS																										
Emb 15-16	Present- PCM	-3 dBFS/0 dBFS																										
<div>Video Proc</div> <div><div>Video Proc</div><div>Color Correction</div></div>	Provides the following Video Proc and Color Correction parametric controls.																											
<ul style="list-style-type: none">• Video Proc <div><div>Video Proc</div><div>Enabled</div></div>	<p>Video Proc (Enable/Disable) provides master on/off control of all Video Proc functions.</p> <ul style="list-style-type: none">• When set to Disable, Video Proc is bypassed.• When set to Enable, currently displayed parameter settings take effect.																											
<ul style="list-style-type: none">• Reset to Unity <div><div>Reset to Unity</div><div>Confirm</div></div>	<p>Reset to Unity provides unity reset control of all Video Proc functions. When Confirm is clicked, a Confirm? pop-up appears, requesting confirmation.</p> <ul style="list-style-type: none">• Click Yes to proceed with the unity reset.• Click No to reject unity reset.																											
<ul style="list-style-type: none">• Luma Gain <div><div>Luma Gain</div><div>0.0</div></div>	<p>Adjusts gain percentage applied to Luma (Y channel).</p> <p>(0% to 200% range in 0.1% steps; unity = 100%)</p>																											

Table 3-2 9980-CSC-3G Function Menu List — continued



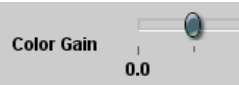






	(continued)
<ul style="list-style-type: none"> • Luma Lift 	<p>Adjusts lift applied to Luma (Y-channel).</p> <p>(-100% to 100% range in 0.1% steps; null = 0.0%)</p>
<ul style="list-style-type: none"> • Color Gain 	<p>Adjusts gain percentage (saturation) applied to Chroma (C-channel).</p> <p>(0% to 200% range in 0.1% steps; unity = 100%)</p>
<ul style="list-style-type: none"> • Color Phase 	<p>Adjusts phase angle applied to Chroma.</p> <p>(-360° to 360° range in 0.1° steps; null = 0°)</p>
<ul style="list-style-type: none"> • Gang Luma/Color Gain 	<p>When set to On, changing either the Luma Gain or Color Gain controls increases or decreases both the Luma and Color gain levels by equal amounts.</p>
 <hr/> 	<p>Provides color corrector functions for the individual RGB channels for the card program video path.</p>
<ul style="list-style-type: none"> • Color Corrector 	<p>Color Corrector (On/Off) provides master on/off control of all Color Corrector functions.</p> <ul style="list-style-type: none"> • When set to Off, all processing is bypassed. • When set to On, currently displayed parameters settings take effect.
<ul style="list-style-type: none"> • Reset to Unity 	<p>Reset to Unity provides unity reset control of all Color Corrector functions.</p> <p>When Confirm is clicked, a Confirm? pop-up appears, requesting confirmation.</p> <ul style="list-style-type: none"> • Click Yes to proceed with the unity reset. • Click No to reject unity reset.

Table 3-2 9980-CSC-3G Function Menu List — continued



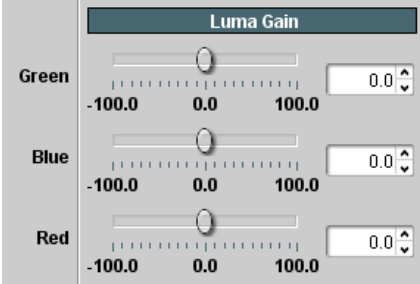
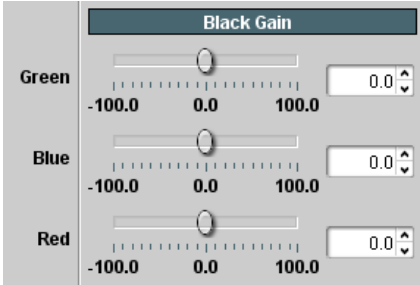
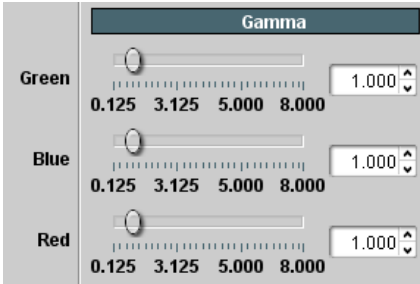

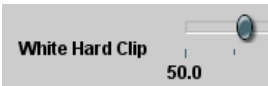
 	(continued)
<p>• Luma Gain R-G-B controls</p>  <p>• Black Gain R-G-B controls</p>  <p>• Gamma Factor R-G-B controls</p> 	<p>Separate red, green, and blue channels controls for Luma Gain, Black Gain, and Gamma curve adjustment.</p> <p>Gain controls provide gain adjustment from 0.0 to 200.0% range in 0.1% steps (unity = 100.0)</p> <p>Gamma controls apply gamma curve adjustment in 0.125 to 8.000 range in thousandths steps (unity = 1.000)</p> <p>Each of the three control groups (Luma, Black, and Gamma) have a Gang Column button which allows settings to be proportionally changed across a control group by changing any of the group's controls.</p>
<p>• Black Hard Clip</p> 	<p>Applies black hard clip (limiting) at specified percentage.</p> <p>(-6.8% to 50.0%; null = -6.8%)</p>
<p>• White Hard Clip</p> 	<p>Applies white hard clip (limiting) at specified percentage.</p> <p>(50.0% to 109.1%; null = 109.1%)</p>

Table 3-2 9980-CSC-3G Function Menu List — continued



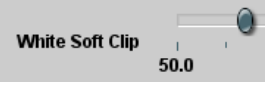


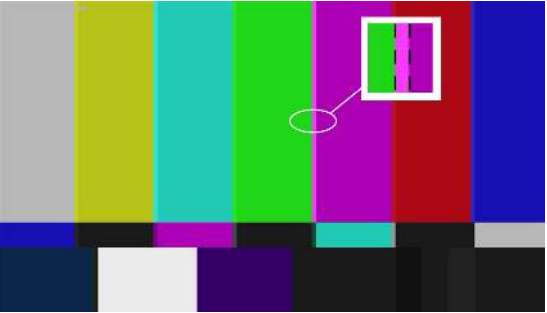
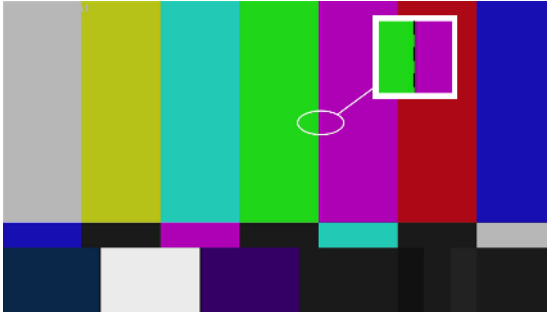
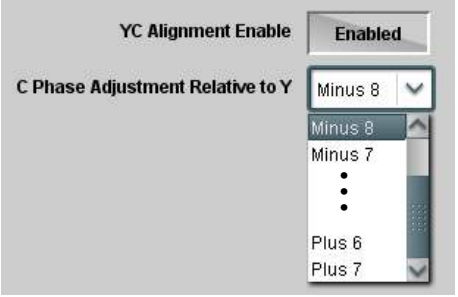
 	(continued)
<ul style="list-style-type: none"> • White Soft Clip 	<p>Applies white soft clip (limiting) at specified percentage.</p> <p>(50.0% to 109.1%; null = 109.1%)</p>
<ul style="list-style-type: none"> • Chroma Saturation Clip 	<p>Applies chroma saturation clip (limiting) chroma saturation at specified percentage.</p> <p>(50.0% to 160.0%; null = 160.0%)</p>
	<p>Provides controls for correcting upstream misalignment of Y and C phase.</p>
<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>SMPTE color bars showing Y/C misalignment (as evidenced by poor transitions at the color borders)</p>  </div> <div style="width: 45%;"> <p>SMPTE color bars showing proper Y/C alignment (as evidenced by crisp transitions at the color borders)</p>  </div> </div> <p>Y/C misalignment is typically introduced by upstream analog-to-digital conversion, especially where the Y and chroma paths may experience differing characteristics.</p>	
<ul style="list-style-type: none"> • Y/C Alignment Controls 	<p>Provides the following Y/C alignment controls:</p> <ul style="list-style-type: none"> • Enable control turns on alignment. • C Phase Adjustment Relative to Y provides a -8° to $+7^{\circ}$ phase offset of C phase from Y phase.

Table 3-2 9980-CSC-3G Function Menu List — continued

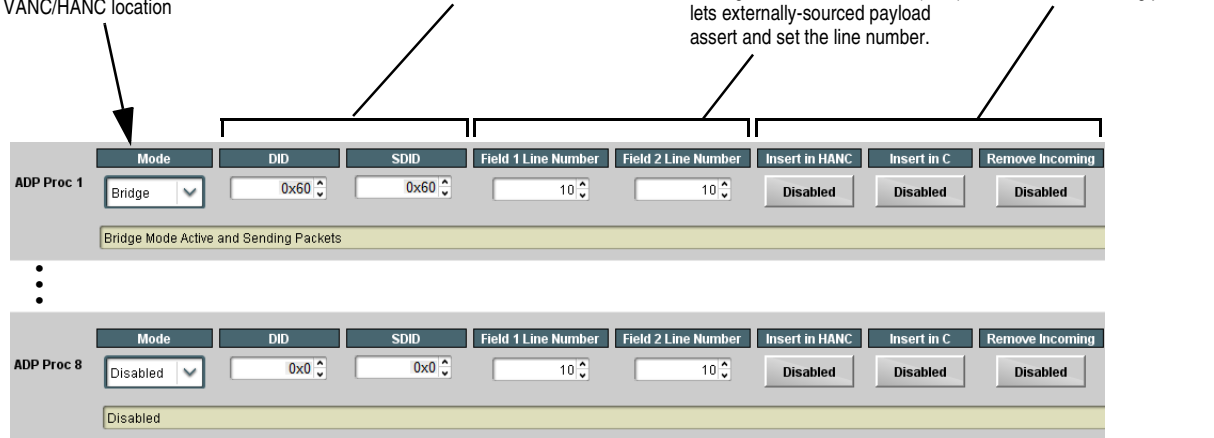
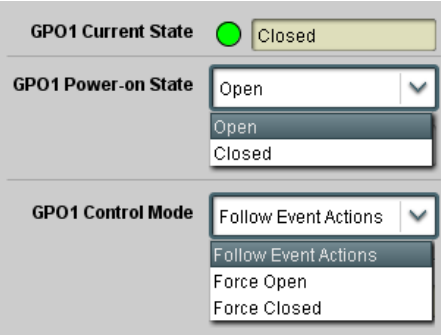
<h2>Ancillary Data Processing</h2>	<p>Provides controls for VANC/HANC ancillary data de-embedding and embedding to and from program video stream. Data can be extracted and inserted within the device (Bridge mode). This can be used to move ancillary data to another line, or to remove ancillary data.</p>
<p>Eight individual Ancillary Data Processors (ADPs) provide for bridging ancillary data to and from the program video SDI stream.</p>	
<p>Bridge extracts ANC from the deserialized input video and re-inserts in the output video, thereby allowing specialized ANC packets to be retained and moved to another VANC/HANC location</p>	<p>DID and SDID controls select the desired packet to be handled by the corresponding ANC Data Processor</p>
<p>Line Number controls select the VANC location of packet insertion/ extraction. Setting the line numbers to 0 (zero) lets externally-sourced payload assert and set the line number.</p>	<p>Insertion controls allow special insertions in HANC or the C-channel, as well as removal of incoming packets</p>
 <p>The screenshot shows the configuration for two Ancillary Data Processors (ADPs). ADP Proc 1 is configured in 'Bridge' mode, extracting ATC timecode at DID60h / SDID 60h. The status bar indicates 'Bridge Mode Active and Sending Packets'. ADP Proc 8 is currently disabled. The interface includes fields for Mode, DID, SDID, Field 1 Line Number, Field 2 Line Number, Insert in HANC, Insert in C, and Remove Incoming.</p>	
<p>In the example above, ADP Proc 1 is set to extract ATC timecode at DID60_h / SDID 60_h. Depending on the interface used to carry the extraction (COM or IP), status is displayed as shown below.</p>	
<p>Extracting 15.0 Kbit/s, dropped 0.0 Kbit</p>	<p>When set to extract to COM interface, displays rate and dropped data (if any)</p>
<p>Extracting 18.75 Kbit/s, total 125.78 Kbit</p>	<p>When set to extract to IP interface, displays rate and total amount transferred</p>
<p>Note: DashBoard versions 4.1 and earlier display DID and SDID numbers in decimal; newer DashBoard versions display DID and SDID numbers in hexadecimal. Hexadecimal notation is denoted by the "0x" preceding the value.</p>	
<h2>GPO Setup</h2>	<p>Provides controls for setting up the two GPO's power-up states as well as forced manual or event action triggered.</p>
<p>Note: This tab has identical independent controls for GPO 1 and 2. Therefore, only the GPO 1 controls are described here.</p>	
 <p>The screenshot shows the configuration for GPO1. The 'GPO1 Current State' is 'Closed'. The 'GPO1 Power-on State' is set to 'Open'. The 'GPO1 Control Mode' is set to 'Follow Event Actions'.</p>	<ul style="list-style-type: none"> • Current State indicates GPO status regardless of any pre-setup. • Power-on State allows the power-up GPO state to be set (initialized) upon power-up • Control Mode allows GPO manual asserted open or closed states, or hands over control to Event Action triggering.

Table 3-2 9980-CSC-3G Function Menu List — continued


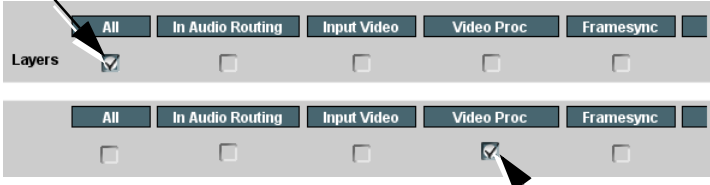

	<p>Allows user control settings to be saved in a Preset and then loaded (recalled) as desired, and provides a one-button restore of factory default settings.</p>
<p>• Preset Layer Select</p> <p>Allows selecting a functional layer (or “area of concern”) that the preset is concerned with. Limiting presets 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>Default All setting will “look” at all card settings and save all settings to the defined preset with no masking.</p>  <p>video proc setting in effect, and at a later time input routing or other settings need to be changed, selecting Video Proc here tells the preset save and load to not concern itself with other custom settings and apply only the video proc settings preset. In this manner, the saved video proc settings can be applied without disturbing any other settings.</p>	<p>Selecting a layer (in the example, “Video Proc”) will set the preset to only “look at” and “touch” video proc/color correction settings and save these settings under the preset. When the preset is loaded (recalled), the card will only “touch” the video proc layer.</p> <p>Example: Since other setups can be considered independent of custom video proc settings, if normal input routing was set up with a particular</p> <p>Example: Since other setups can be considered independent of custom video proc settings, if normal input routing was set up with a particular</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 modified or deleted. Use this setting when all presets are as intended. • New/Updated Preset Name: 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.

Table 3-2 9980-CSC-3G Function Menu List — continued

Presets	(continued)
<p>• Preset Save/Load Controls</p> <p>Load/Delete Existing Preset</p> <p>Select Preset: <input type="text" value="IRD Rcv1 22"/></p> <p>Load Selected Preset <input type="button" value="Confirm"/></p> <p>Update Selected Preset <input type="button" value="Confirm"/></p> <p>Rename Selected Preset <input type="button" value="Confirm"/></p> <p>Delete Selected Preset <input type="button" value="Confirm"/></p> <p>Delete All Presets <input type="button" value="Confirm"/></p> <p>Load Factory Defaults <input type="button" value="Confirm"/></p> <p>Download Presets <input type="text" value="StoredPresets.bin"/> <input type="button" value="Save"/></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 (engaging) the selected preset. When this button is pressed, the changes called out in the preset are immediately applied. Note: Controls below that modify or delete presets are grayed-out (inactive) when Save/Delete button is in Protected mode. To use these controls, make certain Protected is not enabled. • Update - Rename - Delete Selected Preset buttons allow selected preset to be updated (take in current custom settings), be renamed, or be deleted. A Confirm prompt appears in all cases. • Delete All Presets button allows a delete of all stored presets. (This is useful if all presets are to be replaced by a new Presets .bin file.) • 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. 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. • Download Presets saving the preset files to a folder on the connected computer.
<p>Upload Options</p> <p>Delete All Presets on Upload <input type="checkbox"/></p> <p>Delete Duplicate Presets on Upload <input type="checkbox"/></p> <p>Load Saved Settings on Preset Upload <input checked="" type="checkbox"/></p>	<ul style="list-style-type: none"> • Upload Options checkboxes function as follows: • Delete All Presets on Upload clears all stored presets, and then replaces or adds any presets as defined in the uploaded Presets .bin file. (This is useful to establish a "clean slate" and remove any presets that may no longer be desired.) • Delete Duplicate Presets on Upload clears stored presets bearing the same name as currently stored presets. (This avoids dual iterations of same preset name (plain and duplicate using "*" marking), and avoids possibility of "stale" presets no longer desired from appearing as a choice.) • Load Saved Settings on Preset Upload makes certain any local card settings card state is retained following a preset upload. When checked, a preset within the upload is invoked only when specifically selected and invoked. Note: Any combination of checkboxes can be checked or unchecked (enabled or disabled) as desired.

Table 3-2 9980-CSC-3G Function Menu List — continued


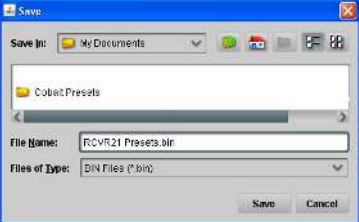

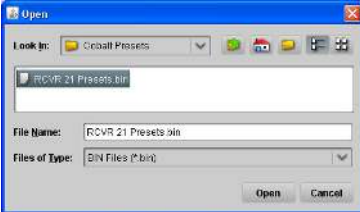
Presets	(continued)
<p>Download (save) card presets to a network computer by clicking Download Presets – Save at the bottom of the Presets page.</p>  <p>Browse to a desired save location (in this example, <i>My Documents\Cobalt Presets</i>).</p> <p>The file can then be renamed if desired (<i>RCVR21 Presets</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.

Table 3-2 9980-CSC-3G Function Menu List — continued

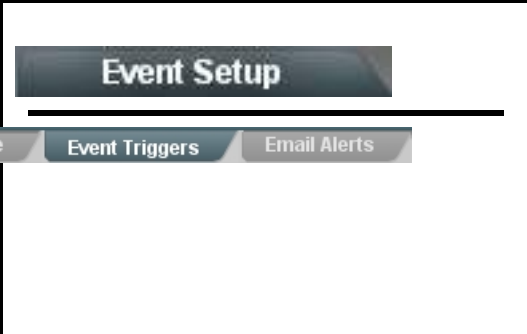

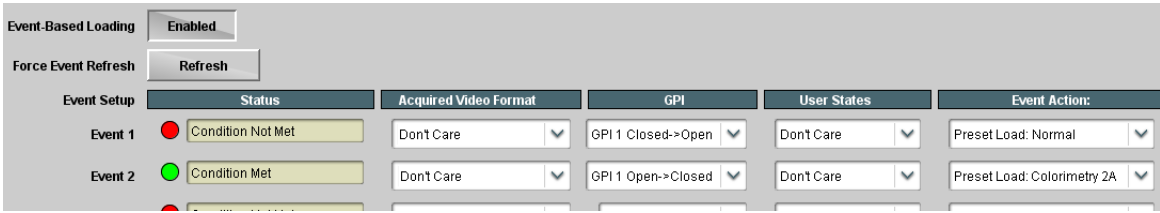
	<p>Provides event-based loading allowing a defined preset to be automatically engaged upon various received signal status or other conditions/actions. Actions can be “canned” control commands or user-defined by going to a user preset.</p> <p>Event-based loading is particularly useful for automated setup when transitioning from normal processing to processing supporting an alternate format. Up to 32 separate event can be set up.</p>
 <ul style="list-style-type: none"> Event based preset loading is not passive and can result in very significant and unexpected control and signal processing changes if not properly used. If event based presets are not to be used, make certain the Event Based Loading button is set to Disabled. Because event based preset loading applies control changes by invoking presets, loading conditions cannot be nested within a called preset (event-based loading settings performed here cannot be saved to presets). <p>Event triggers allow a variety of event screening criteria, and in turn provide an Event Action “go to” in response to the detected event(s). For each screened criteria, categories can be set as “don’t care” or set to specific criteria to broaden or concentrate on various areas of concern.</p> <p>The Event based loading button serves as a master enable/disable for the function.</p> <p>Go-to Event Actions can be user-defined presets, “canned” (hard-coded) selections (such as GPO triggers or routing changes), or automated E-mail alert to a respondent (see Email Alerts (p. 3-26) for setting up e-mail alerts).</p>	
<p>In the example here for Event 1 and Event 2, the device is set to invoke a preset that applies custom color correction settings nested in preset “Colorimetry 2A” whenever GPI 1 goes LO. When this GPI goes HI, corresponding action in preset “Normal” invokes another preset to revert the device to default settings.</p> 	<p>Note:</p> <ul style="list-style-type: none"> Screened conditions are triggered upon start of event. Any event-based setup must be done in advance of the triggering event in order for event to be detected. Loss of true conditions does not disengage an event-based triggering. A new set of true conditions must be defined and then occur to transition from one event-based trigger to another. Time required to engage an event-based trigger depends upon complexity of the called preset. (For example, a preset that invokes large-scale changes may take longer to engage than a preset involving only a small change.) Make certain all definable event conditions that the device might be expected to “see” are defined in any of the Event 1 thru Event 32 rows. This makes certain that the device will always have a defined “go-to” action if a particular event occurs. For example, if the device is expected to “see” a 720p5994 stream or as an alternate, a 525i5994 stream, make certain both of these conditions are defined (with your desired go-to presets) in any two of the Event 1 thru Event 32 condition definition rows.

Table 3-2 9980-CSC-3G Function Menu List — continued

Event Setup

Event Triggers

Email Alerts

(continued)

User States is a special column which allows a logic state to be set (similar to a register or latch) whenever a defined condition is first triggered. A user state (which is latched until cleared by some other definable action) can be sucessively used with other user states, thereby allowing a final action to be invoked only when subordinate user states have been sequentially satisfied as true.

In the example here, two independent units are used for an EAS alert input (one box supplies alert key video, and the other supplies automated alert audio). Both communicate their ready signal each using edge-trigger GPO's which are fed to the respective GPI 1 and GPI 2 on the device. Because these two boxes are independent and cannot be relied upon to provide coinciding triggers, a chain of user state definers are used here to engage a preset routing key video and EAS audio routing when both states from both boxes are true in the order of GPI 1 first and then GPI 2 second for this example.

From EAS Keyer Box

GPI 1

From EAS Audio Box

GPI 2

9980-CSC

Set User State 1

Clear User State 1 or 2

GPI 1

GPI 2

Set User State 2

Event Setup	Status	GPI	User States	Event Action:	
Event 1	Condition Met	GPI 1 Open->Closed	Don't Care	Set User State 1	GPI 1 (key) cue falling-edge sets user state 1
Event 2	Condition Met	GPI 2 Open->Closed	User State 1 Set	Set User State 2	GPI 2 (audio) cue falling-edge sets user state 2
Event 3	Condition Met	Don't Care	User State 2 Set	Set User State 3	User state 2 (which requires user state 1 being true first) sets state 3, which then invokes a preset to load settings to route EAS key and audio
Event 4	Last Active Event	Don't Care	User State 3 Set	Preset Load: EAS Key+Audio	
Event 5	Condition Not Met	Don't Care	User State 1 Cleared	Preset Load: Revert to Normal	
Event 6	Condition Not Met	Don't Care	User State 2 Cleared	Preset Load: Revert to Normal	
Event 7	Condition Not Met	GPI 1 Closed->Open	Don't Care	Clear User State 1	When either GPI 1 or GPI 2 has a rising-edge trigger (cease EAS), user states 1 or 2 are cleared, thereby clearing user state 3. Either state change calls a preset to revert to normal operation.
Event 8	Condition Not Met	GPI 2 Closed->Open	Don't Care	Clear User State 2	

Table 3-2 9980-CSC-3G Function Menu List — continued


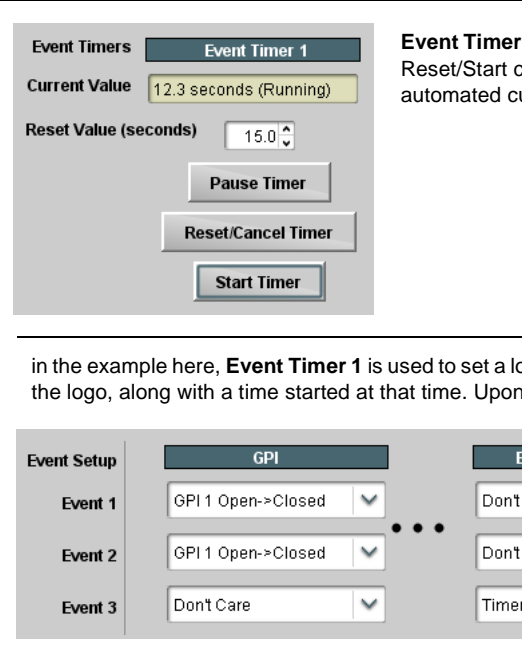
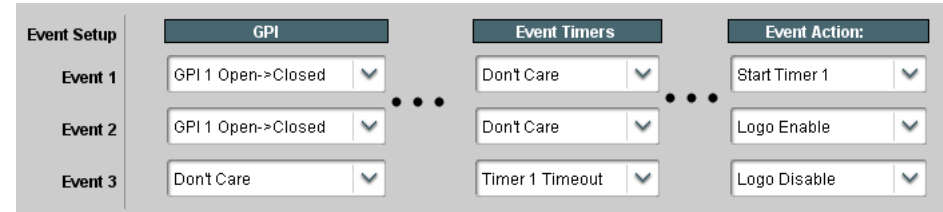
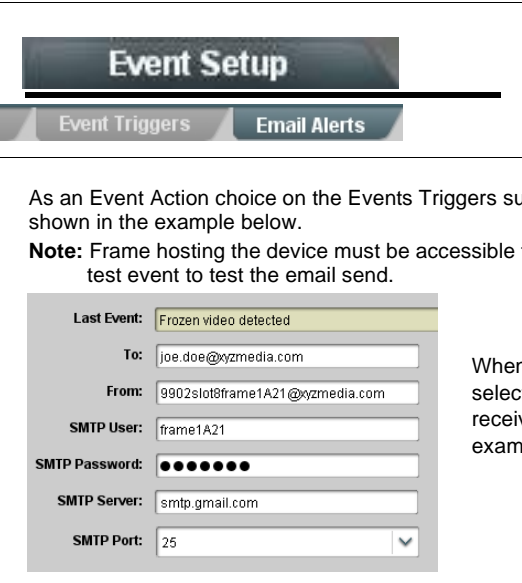
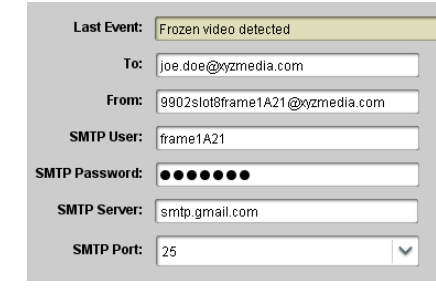
	<p>Provides three general-purpose timers that can be triggered to start, pause, reset, or stop upon event actions. The state of each timer, in turn, can also be used to invoke other actions.</p>
 <p>Event Timers 1 thru 3 (Timer 1 shown) can be set with count-down values. The Pause/Reset/Start control here are manual controls. The timers are typically used with automated cues to start and stop the timer(s), as shown below.</p> <p>in the example here, Event Timer 1 is used to set a logo insertion disable after a specific amount of elapsed time. A GPI inserts the logo, along with a time started at that time. Upon the timer timeout, a separate action sets logo insertion to Disabled.</p> 	
 <p>As an Event Action choice on the Events Triggers sub-tab, an Email alert can be sent as a response. Set up email fields as shown in the example below.</p> <p>Note: Frame hosting the device must be accessible to email recipient's network. It is recommended to set up and generate a test event to test the email send.</p>  <p>When fields are filled-in to specify recipient and sender, and email alert is selected for Event Action on Event Triggers sub-tab page, recipient receives an email alert upon event, with the triggering event shown (in this example, "frozen video detected").</p>	<p>Provides setup for automated Email alerts when an event has occurred.</p>

Table 3-2 9980-CSC-3G Function Menu List — continued

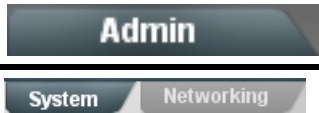


	<p>Provides a global card operating status and allows a log download for factory engineering support. Also provides controls for selecting and loading card firmware upgrade files.</p> <p>Networking controls provide dedicated card networking setup in conjunction with rear module Ethernet port.</p>
<p>• Log Status and Download Controls</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). <div style="background-color: black; color: white; padding: 5px; text-align: center;">CAUTION</div> <p>The 9980-CSC-3G 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>
<p>• Parameter Blast</p> 	<p>When enabled, Parameter Blast can reduce the time it takes for the card to appear and populate in DashBoard (this is especially relevant where high-latency connections are present). This is facilitated by reducing some handshakes on initial DashBoard setup where control settings are static (not being manipulated) while the card is first appearing.</p> <p>Note: The frame network card is the arbiter of all frame/card communications and in some cases may not accept full extent of parameter blast under some conditions.</p>

Table 3-2 9980-CSC-3G Function Menu List — continued

<div data-bbox="196 262 509 317">Admin</div> <div data-bbox="196 338 496 373">System Networking</div>	(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. 	<div data-bbox="1062 678 1386 768"> </div> <div data-bbox="972 795 1396 1020"> </div>
<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. 	<div data-bbox="959 1071 1364 1232"> </div>
<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. 	<div data-bbox="954 1287 1391 1449"> </div>
<ul style="list-style-type: none"> • Card DashBoard Name Control <div data-bbox="224 1675 695 1856"> </div>	<p>Allows card name In DashBoard to be changed as desired. Click return to engage change.</p> <ul style="list-style-type: none"> • Append to Product Name appends (or adds to) existing OEM name (for example, "9980-CSC-3G Processing 1A"). • Replace Product Name completely replaces the OEM name OEM name (for example, "Processing 1A"). <p>Note: DashBoard instance(s) may have to be refreshed before name change appears.</p>

Table 3-2 9980-CSC-3G Function Menu List — continued





	(continued)
<p>• Card Check and Restore Utilities</p> <p>Memory Test</p> <p>FPGA Memory Test <input type="button" value="Test"/></p> <p>Memory Test Status Running Memory Test: 8.99%</p> <p>Memory Test Status Memory test completed successfully, please reboot the card</p> <p>Restore From SD Card <input type="button" value="Confirm"/></p> <p>Please contact support</p>	<p>Memory Test allows all cells of the card FPGA memory to be tested.</p> <p> This control should only be activated under direction of product support. Exercising the memory test is not part of normal card maintenance.</p> <p>Restore from SD Card allows card rendered inoperable to be restored using an SD memory card fitted to the card internal SD slot.</p> <p> Product support must be contacted prior to performing this operation. Use of any SD card not supplied by support can corrupt the card.</p>
	<p>The Networking sub-tab 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> <p>(Dedicated card control using IP has not been fully implemented at this release. Some functions may be reserved.)</p>
<p>• Card IP Physical Port Select Control</p> <p>Network Interface Frame <input type="button" value="v"/></p> <p>Frame</p> <p>Rear I/O</p>	<p>Allows card dedicated IP interface (as set below) to use frame communications or dedicated rear I/O module Ethernet RJ-45 port.</p> <p>Note:</p> <ul style="list-style-type: none"> • Frame net connection allows cards with per-card Ethernet connection to connect with network via a shared frame Ethernet port instead of per-card dedicated Ethernet connectors on the card's rear module. Frame net connection is available only on certain frame models. • Card slot must be fitted with a rear I/O module equipped with an Ethernet connector in order to use Rear I/O selection.
<p>• Card IP Setup Controls</p> <p>Addressing Mode DHCP <input type="button" value="v"/></p> <p>Static IP Address 192.168.1.106</p> <p>Static Subnet Mask 255.255.255.0</p> <p>Static Default Gateway 192.168.1.1</p> <p>Static DNS 0.0.0.0</p>	<p>Provides controls for setting up card dedicated IP interface.</p> <ul style="list-style-type: none"> • Addressing Mode selects either DHCP or static. <p>Where Static is selected, standard IP fields allow entry of Address, Subnet Mask, and Default Gateway.</p>
<p>• Card SNMP MIB Download</p> <p>Download SNMP MIB Files MIB-FILES.tar.gz <input type="button" value="Save"/></p>	<p>Where supported, allows card SNMP MIB files to be downloaded and saved using user-configured name.</p>

Table 3-2 9980-CSC-3G Function Menu List — continued

<div><div>Admin</div><div>SystemNetworking</div></div>	(continued)																		
<div><div><div>• NTP Clock Setup</div><div><div>Clock Setup</div><div><div>NTP IP (use 0.0.0.0 for pool NTP)</div><div>0.0.0.0</div></div><div><div>Local Timezone (NTP Only)</div><div>US-Central</div></div><div><div>NTP Status</div><div>Synchronized with NTP</div></div><div><div>Use Network Interface for NTP</div><div><input checked="" type="checkbox"/></div></div><div><div>Use Frame Network Card for NTP</div><div><input type="checkbox"/></div></div></div></div></div>	<p>Allows device NTP clock IP source and localization. This is the clock/time device will use for logs and other recorded actions.</p> <ul style="list-style-type: none">• NTP IP sets the IP address where NTP is to be obtained.• Local Timezone sets the recorded time to the localized time.• NTP Status shows if time is synced with NTP or if an error exists.• Use Network Interface and User Frame Network Card checkboxes allows selecting the network source that will provide NTP time.																		
<div><div>User Log</div></div>	Automatically maintains a log of user actions and input lock status.																		
<p>User Log shows input lock and other user conditions (with most recent event at top of list).</p> <p>Clear User Log clears all entries.</p> <p>Download Log File opens a browser allowing the log file to be saved on the host machine.</p>	<div><table><tr><th>Time</th><th>Type</th><th>Event</th></tr><tr><td>22:40:36 12/02/15</td><td>Info</td><td>SDI Input sdi_in_c Locked to 720p 59.94</td></tr><tr><td>22:40:34 12/02/15</td><td>Info</td><td>SDI Input sdi_in_d Locked to 1080i 59.94</td></tr><tr><td>21:17:36 12/02/15</td><td>Info</td><td>SDI Input sdi_in_b Locked to 1080i 59.94</td></tr><tr><td>21:17:18 12/02/15</td><td>Info</td><td>Log file cleared</td></tr><tr><td></td><td></td><td></td></tr></table><div><div>Clear User Log</div><div>Confirm</div></div><div><div>Download Log File</div><div>9922-F8.tar.gz</div><div>Save</div></div></div>	Time	Type	Event	22:40:36 12/02/15	Info	SDI Input sdi_in_c Locked to 720p 59.94	22:40:34 12/02/15	Info	SDI Input sdi_in_d Locked to 1080i 59.94	21:17:36 12/02/15	Info	SDI Input sdi_in_b Locked to 1080i 59.94	21:17:18 12/02/15	Info	Log file cleared			
Time	Type	Event																	
22:40:36 12/02/15	Info	SDI Input sdi_in_c Locked to 720p 59.94																	
22:40:34 12/02/15	Info	SDI Input sdi_in_d Locked to 1080i 59.94																	
21:17:36 12/02/15	Info	SDI Input sdi_in_b Locked to 1080i 59.94																	
21:17:18 12/02/15	Info	Log file cleared																	

Color and Video Correction Examples Using the 9980-CSC-3G

Shown below are examples of using the 9980-CSC-3G to provide parametric color and video correction.

On-Set Monitor Color Correction Example

A typical use for the 9980-CSC-3G Color Corrector function is to provide color correction for a monitor when an anchor desk set includes a monitor, as shown in Figure 3-7.

In the example setup shown in Figure 3-7, a monitor is located behind the anchor desk. When the camera includes the monitor in its shot, typically the color balance of the monitor will appear to be incorrect due to the colorimetry characteristics of the camera responding differently to the spectral light emissions from the monitor as compared to the natural light spectra emissions that exist across the set overall. This monitor color balance problem is a function of the camera(s), and can vary with different camera models.

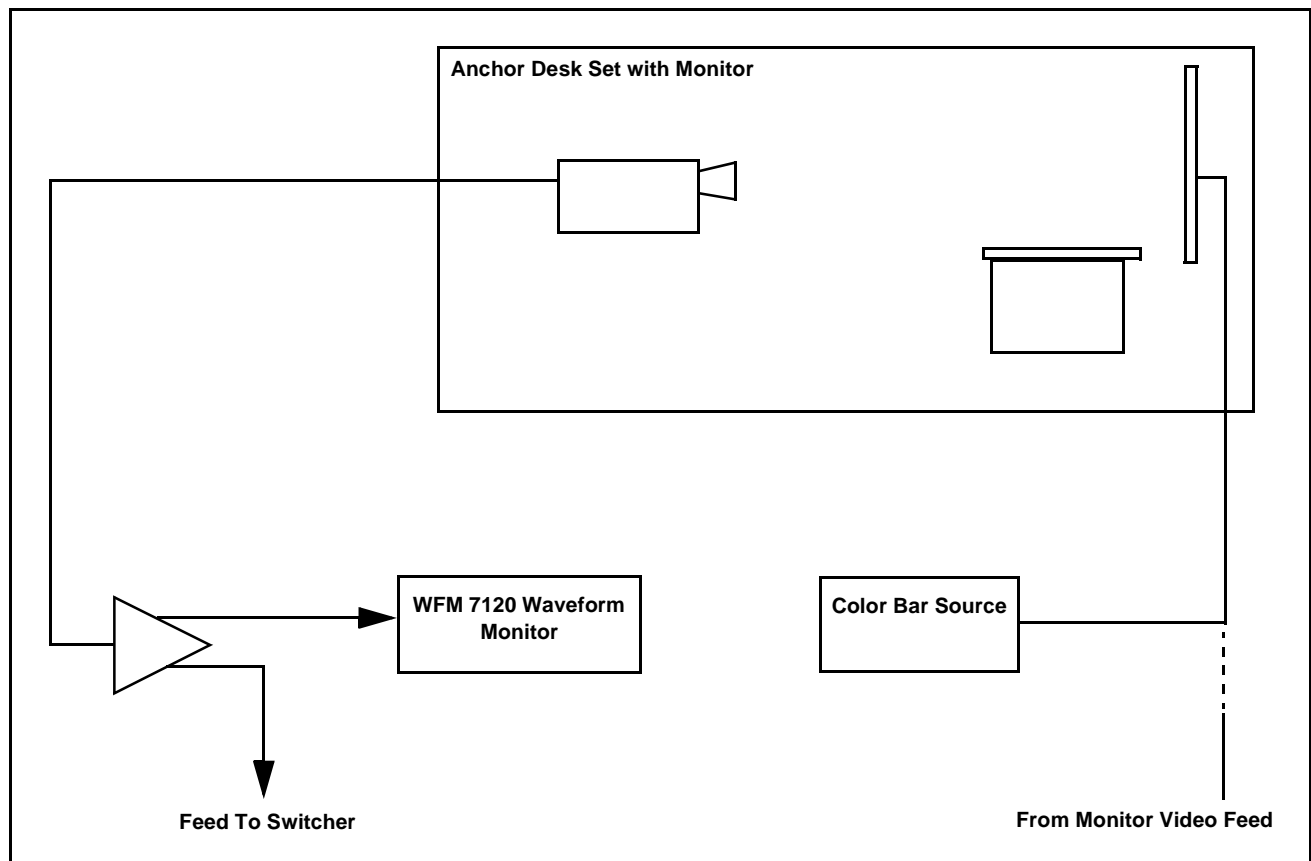


Figure 3-7 Example Uncompensated Setup

Ideally, this display would essentially result in a waveform showing identical RGB components corresponding to the grayscale monochrome bar spectrum being fed to the set monitor. However, as shown in Figure 3-8 with no correction applied, the waveform monitor shows imbalance between the RGB channels due to the reasons discussed above. Note the excessive offset, level, and deviation from an ideal gamma curve for the blue channel.

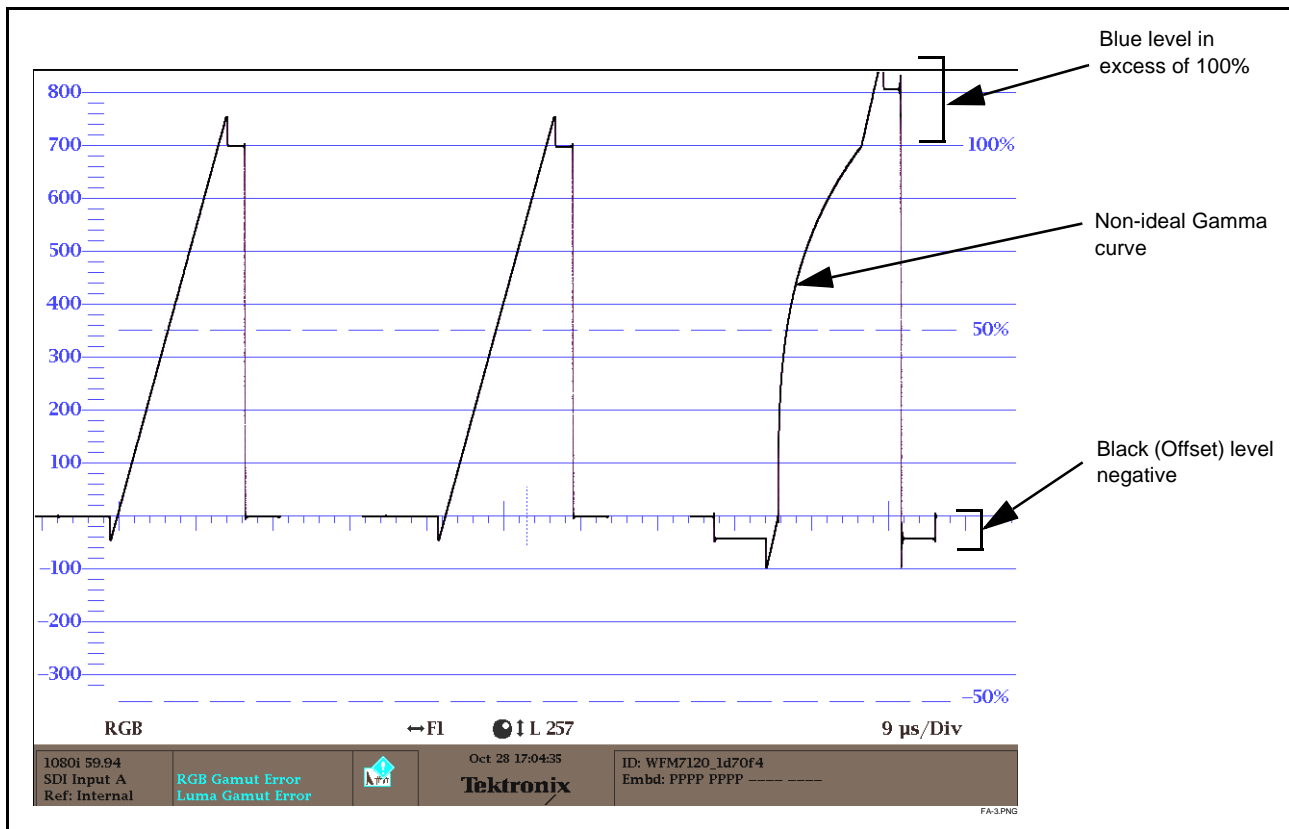


Figure 3-8 Uncorrected (Uncompensated) Monitor Waveform

Figure 3-9 shows the same setup using the 9980-CSC-3G Color Corrector function, along with the card test pattern signal source standard and a video waveform monitor to assess and determine the color correction required. In the calibration setup shown in Figure 3-9 the feed to the switcher is monitored by a WFM 7120 Waveform Monitor, with the set monitor being fed a linear limit ramp by the 9980-CSC-3G test pattern generator.

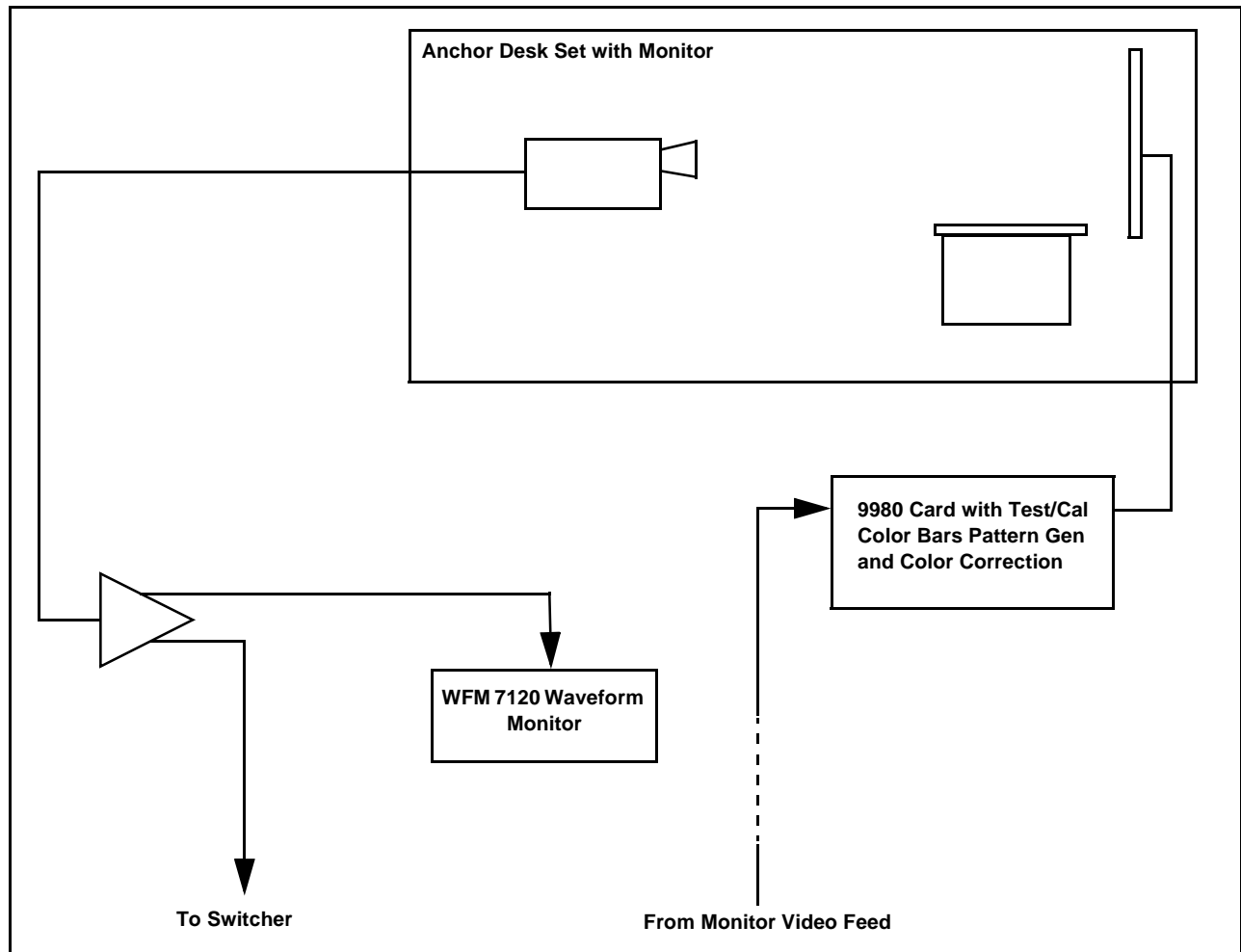
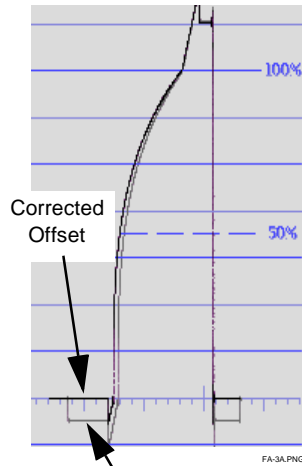


Figure 3-9 Example Setup Using Control Panel Color Corrector Function

Using the 9980-CSC-3G Color Corrector function and setup shown in Figure 3-9, this condition can be corrected through compensation using the 9980-CSC-3G Color Corrector function as shown in Figure 3-10.

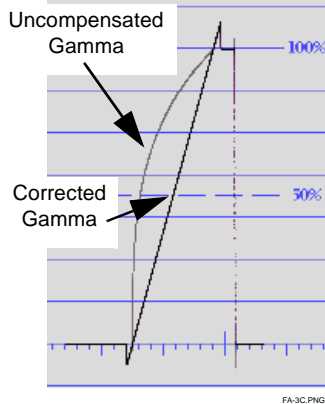
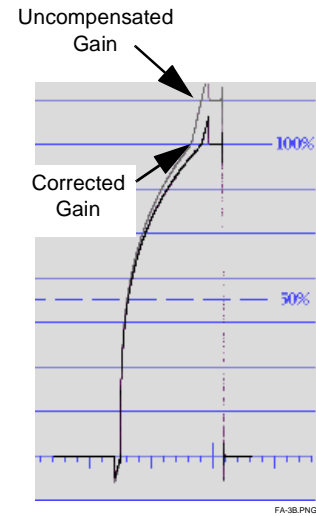
Note: As shown in Figure 3-10, a recommended approach to performing color corrections is to first apply offset correction, then gain correction, and finally gamma correction. When the various offsets that provide proper on-set monitor/camera characteristics are determined, these control offsets can be saved to a card preset, allowing these settings to be engaged as a one-button set-up using card or OGCP-9000/CC presets.



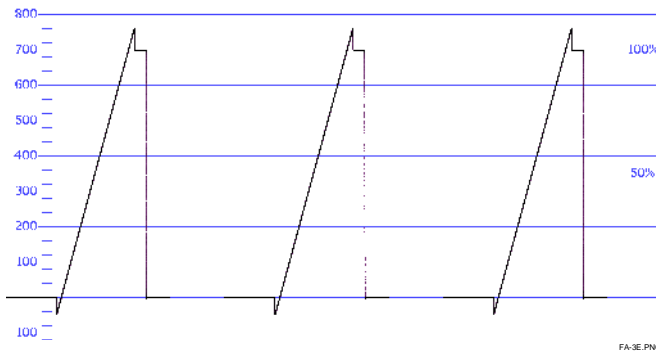
Uncompensated black Offset

(Left) Noting that the uncompensated black offset for the blue channel is negative, a correspondingly equivalent positive setting is applied using the blue channel **Black** offset control (in this example, adjusting the Black offset from unity to 5.0 provides compensation).

(Right) Noting that the uncompensated blue Gain exceeds ideal 100% level, a correspondingly smaller gain percentage setting is applied using the blue channel **Gain** control until the gain is observed as 100% (in this example, adjusting blue **Gain** from unity to 87.5% provides compensation).



(Left) Noting that the uncompensated blue Gamma curve indicates gamma factor is less than ideal 1.000, a correspondingly greater numeric gamma factor is applied using the blue channel **Gamma** control until the blue gamma function is observed as linear (in this example, adjusting blue **Gamma** from unity to 3.333 provides compensation).



(Left) Compensated Offset, Gain, and Gamma are now symmetrical across all three color channels, resulting in proper monitor appearance in the OTA feed.

Figure 3-10 Applying Correction to Example Monitor Waveform Signal

Miscellaneous Color and Video Correction Examples

Table 3-3 provides examples showing and describing various color and video condition corrections using the 9980-CSC-3G.

Table 3-3 Color and Video Corrections Using the 9980-CSC-3G

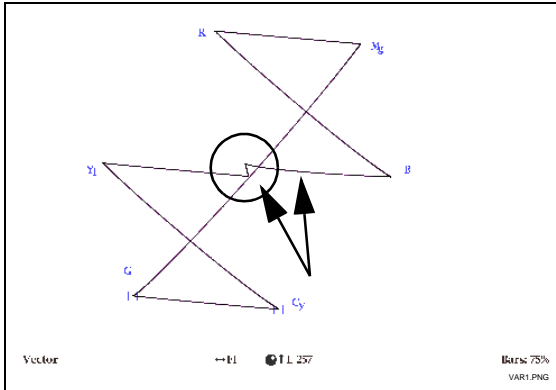
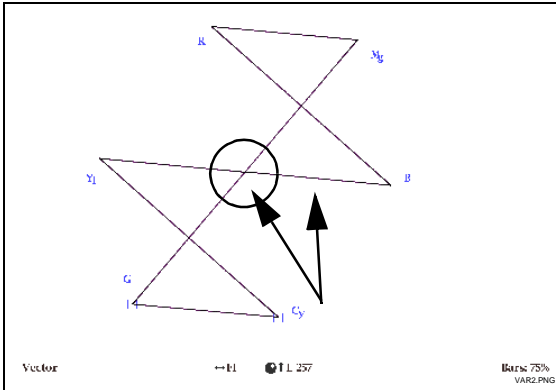
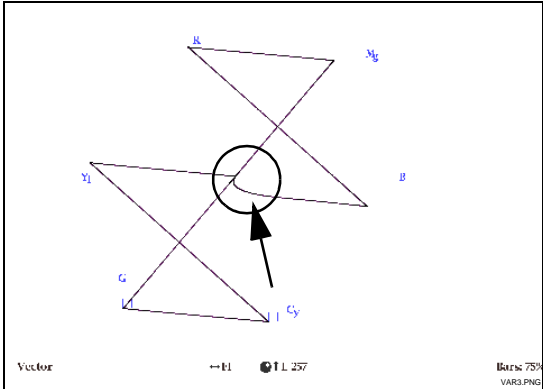
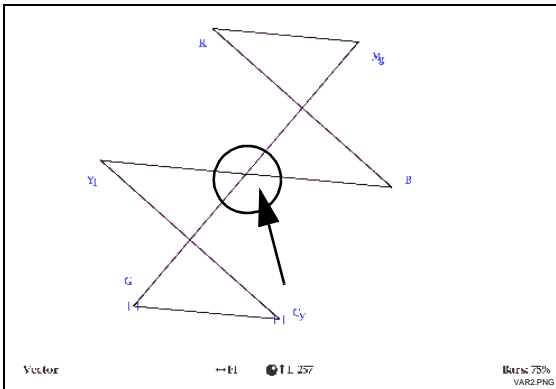
Condition Observed On Waveform Monitor	Correction Using 9980-CSC-3G
<p>Excessive red channel Gamma (as shown below for SMPTE color bars on vectorscope display)</p>  <p>Vector → E1 T.L. 257 Bars: 75% VAR1.PNG</p>	<p>Using the red channel Gamma control to reduce Gamma factor, vectorscope display now shows correction with no knee or curvature at intersection of axes.</p>  <p>Vector → E1 T.L. 257 Bars: 75% VAR2.PNG</p>
<p>Excessive green channel lift/offset (as shown below for SMPTE color bars on vectorscope display)</p>  <p>Vector → E1 T.L. 257 Bars: 75% VAR3.PNG</p>	<p>Using the green channel Black control to reduce green channel lift/offset, vectorscope display now shows no droop along axis.</p>  <p>Vector → E1 T.L. 257 Bars: 75% VAR2.PNG</p>

Table 3-3 Color and Video Corrections Using the 9980-CSC-3G — continued

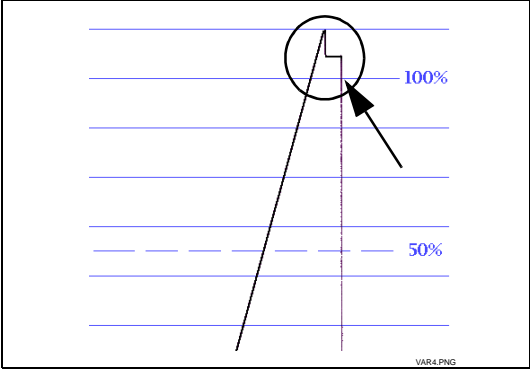
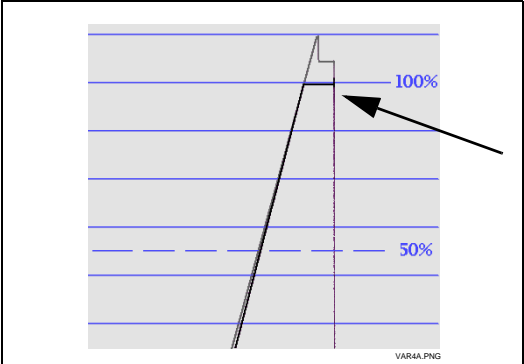
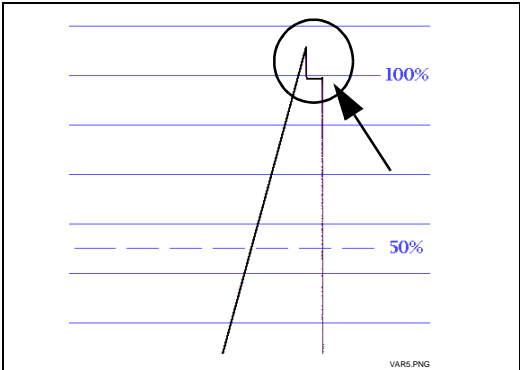
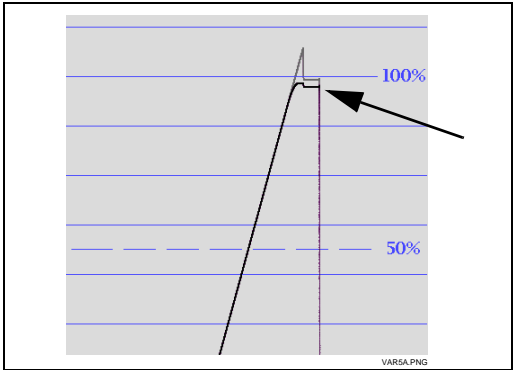
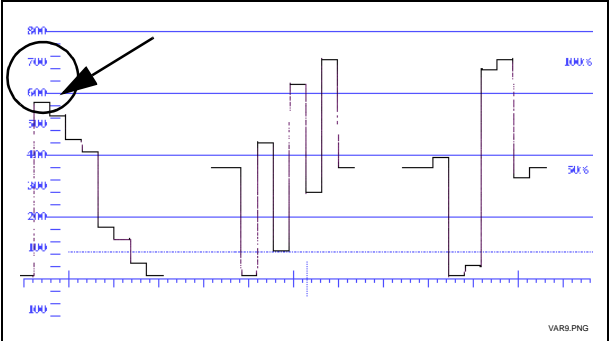
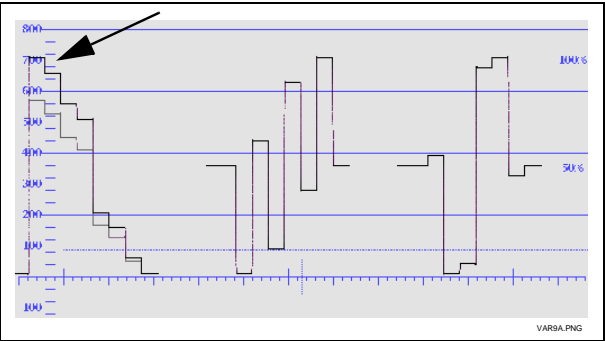
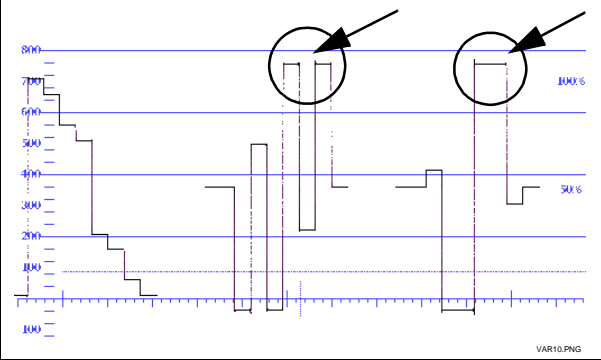
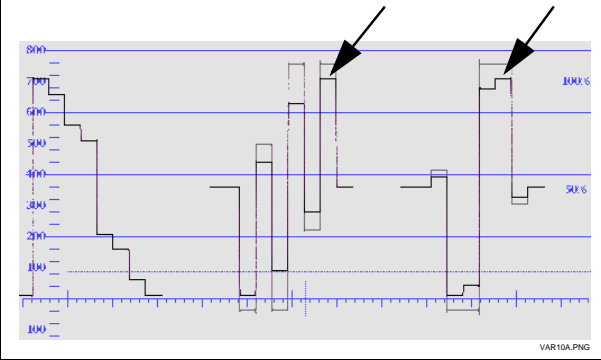
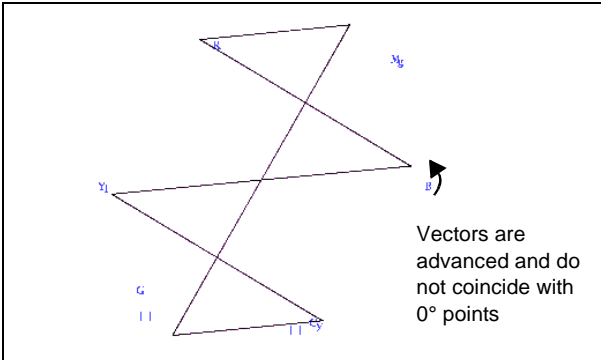
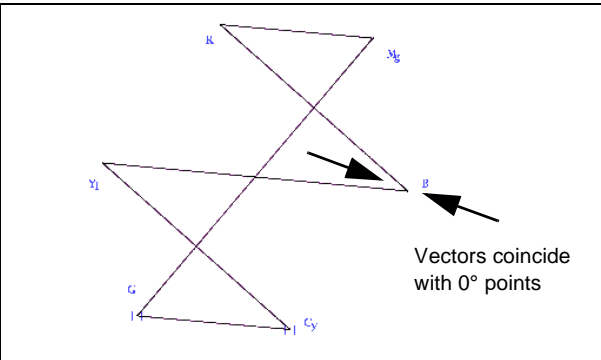
Condition Observed On Waveform Monitor	Correction Using 9980-CSC-3G
<p>White (luma) level exceeding 100% level (as shown below for limit ramp monochrome bars on waveform monitor display)</p>  <p>VAR4.PNG</p>	<p>Using the White Hard Clip control, a lowered white hard clipping threshold is applied to now limit the level to 100%.</p>  <p>VAR4A.PNG</p>
<p>White (luma) level exceeding 100% level (as shown below for limit ramp monochrome bars on waveform monitor display)</p>  <p>VAR5.PNG</p>	<p>Using the White Soft Clip control, a lowered white soft clipping threshold is applied to now limit the level to 100%.</p>  <p>VAR5A.PNG</p>
<p>Luma gain less than 100% level (as shown below for 100% color bars on YPbPr waveform monitor display)</p>  <p>VAR6.PNG</p>	<p>Using the Luma Gain control to increase luma gain, luma gain is now restored to 100%.</p>  <p>VAR6A.PNG</p>

Table 3-3 Color and Video Corrections Using the 9980-CSC-3G — continued

Condition Observed On Waveform Monitor	Correction Using 9980-CSC-3G
<p>Chroma gain exceeds 100% level (as shown below for 100% color bars on YPbPr waveform monitor display)</p>  <p>VAR10.PNG</p>	<p>Using the Color Gain (Chroma) control to reduce chroma gain, chroma gain is now restored to 100% level.</p>  <p>VAR10A.PNG</p>
<p>Leading color phase condition (as shown below for SMPTE color bars on vector display)</p>  <p>Vectors are advanced and do not coincide with 0° points</p> <p>Vector → E1 ● TL 257 Bars: 75% VAR6.PNG</p>	<p>Using the Color Phase control to provide phase lag, color phase condition is now corrected.</p>  <p>Vectors coincide with 0° points</p> <p>Vector → E1 ● TL 257 Bars: 75% VAR6A.PNG</p>

Troubleshooting

This section provides general troubleshooting information and specific symptom/corrective action for the 9980-CSC-3G card and its remote control interface. The 9980-CSC-3G 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 9980-CSC-3G card itself and its remote control systems all (to varying degrees) provide error and failure indications. Depending on how the 9980-CSC-3G card is being used (i.e, standalone or network controlled through DashBoard™ or a Remote Control Panel), check all available indications in the event of an error or failure condition.

The various 9980-CSC-3G 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. 3-42)
- 9980-CSC-3G Processing Error Troubleshooting (p. 3-43)
- Troubleshooting Network/Remote Control Errors (p. 3-44)

9980-CSC-3G Card Edge Status/Error Indicators and Display

Figure 3-11 shows and describes the 9980-CSC-3G 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.

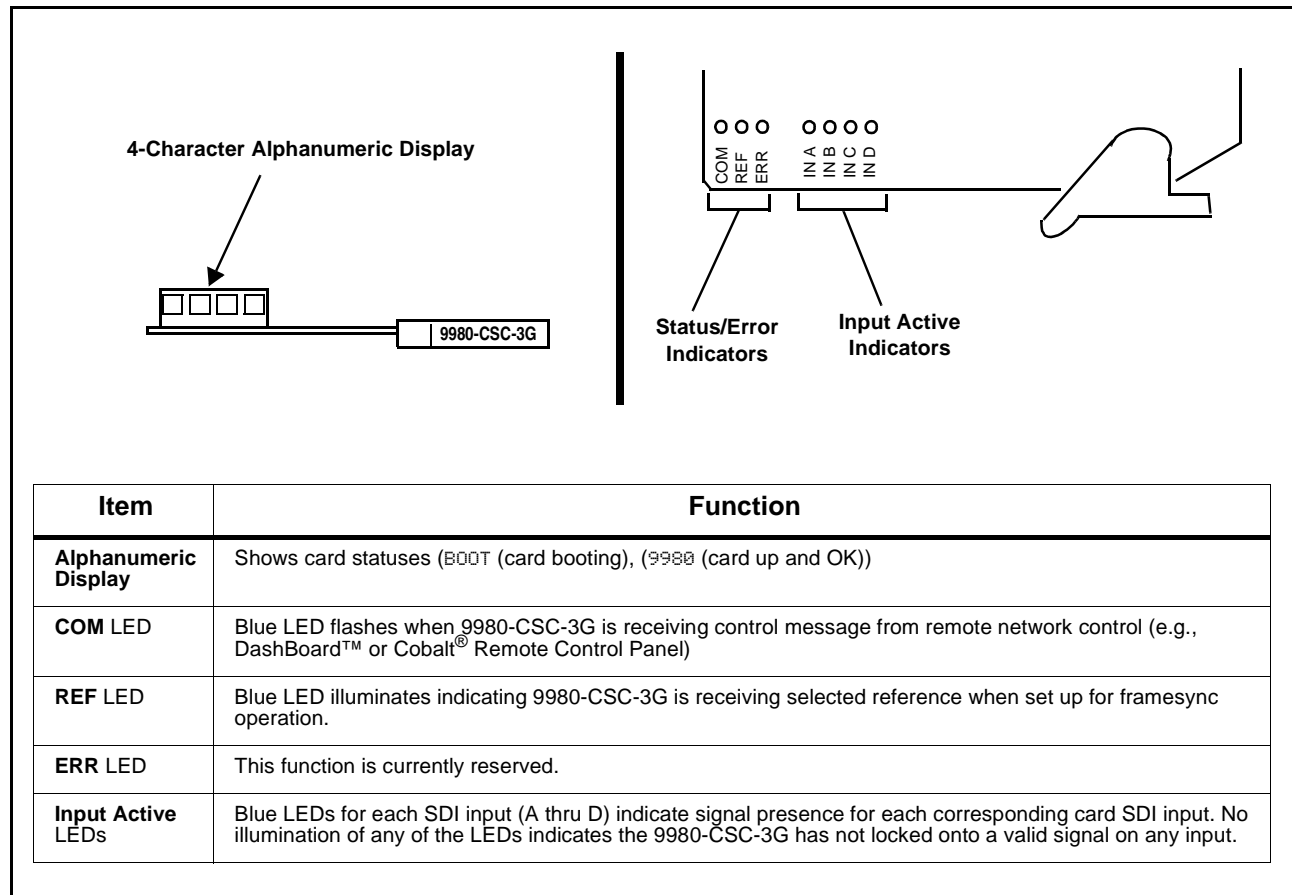


Figure 3-11 9980-CSC-3G Card Edge Status Indicators and Display

DashBoard™ Status/Error Indicators and Displays

Figure 3-12 shows and describes the DashBoard™ status indicators and displays. These indicator icons and displays show status and error conditions relating to the 9980-CSC-3G card itself and remote (network) communications.

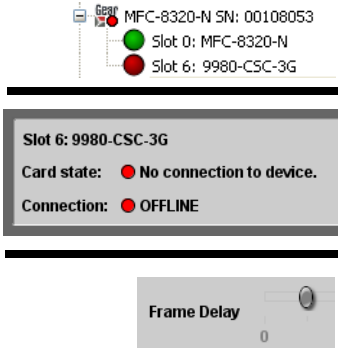
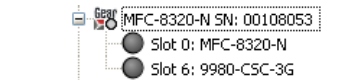
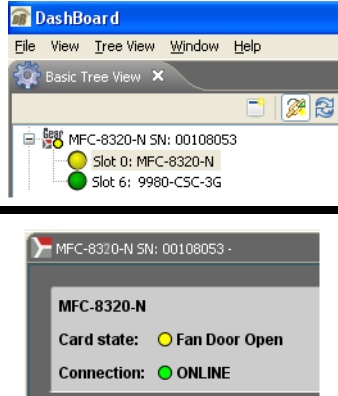
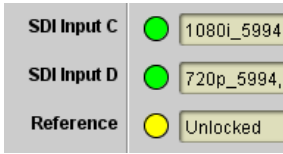
Indicator Icon or Display	Error Description
	<p>Red indicator icon in Card Access/Navigation Tree pane shows card with Error condition (in this example, the Card Access/Navigation Tree pane shows a general error issued by the 9980-CSC-3G card in slot 6).</p> <p>Specific errors are displayed in the Card Info pane (in this example “No connection to device” indicating 9980-CSC-3G card is not connecting to frame/LAN).</p> <p>If the 9980-CSC-3G card is not connecting to the frame or LAN, all controls are grayed-out (as shown in the example here).</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 9980-CSC-3G card in slot 6 and the MFC-8320-N Network Controller Card for its frame in slot 0 are not being seen).</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>Yellow indicator icon in 9980-CSC-3G Card Info pane shows error alert, along with cause for alert (in this example, the 9980-CSC-3G is not receiving an enabled framesync source).</p>

Figure 3-12 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 3-13).

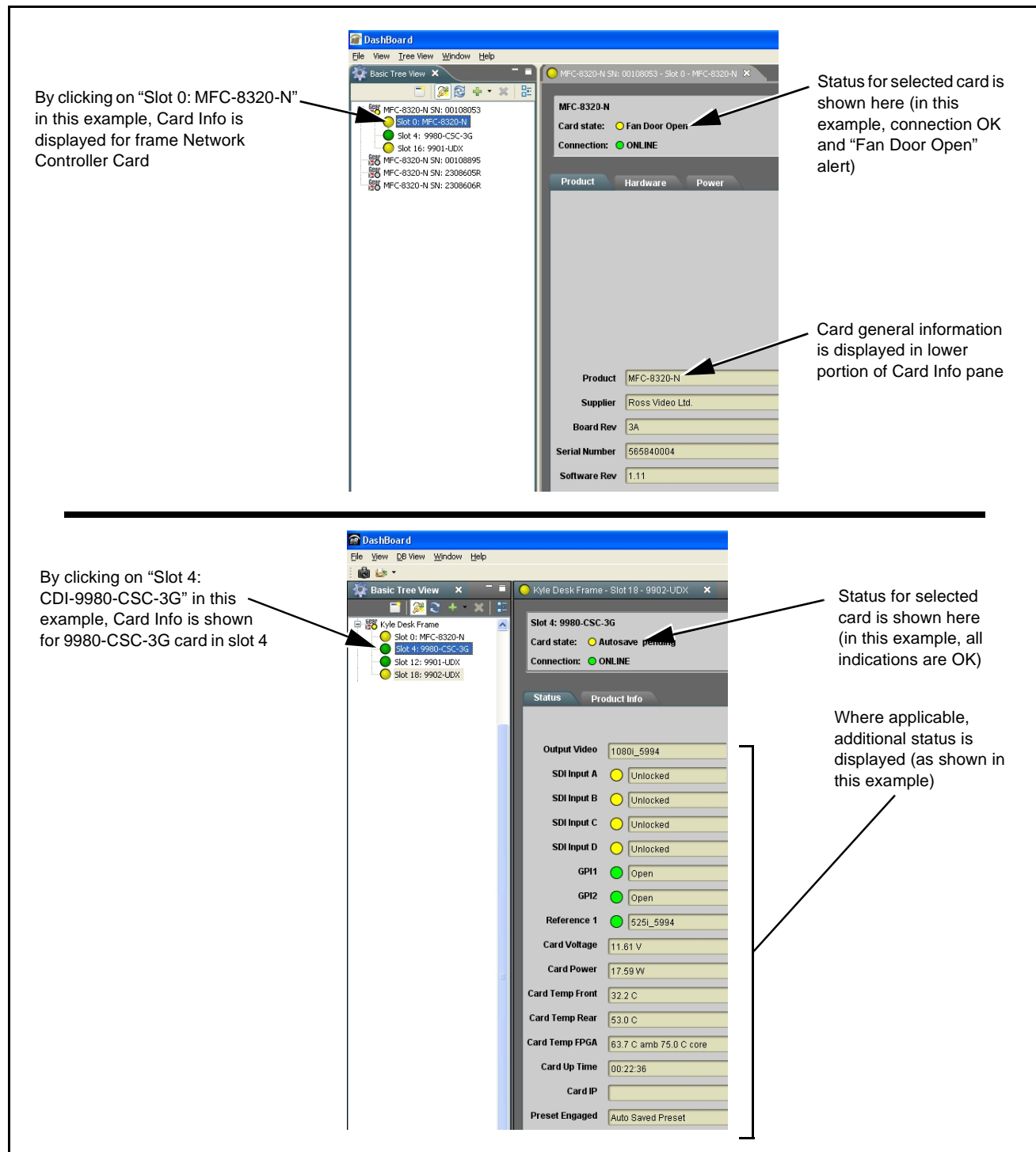


Figure 3-13 Selecting Specific Cards for Card Info Status Display

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 3-4 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 3-4 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 9980-CSC-3G, 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 9980-CSC-3G 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 9980-CSC-3G card itself is defective. If display shows excessive power being consumed (see Technical Specifications (p. 1-15) in Chapter 1, "Introduction"), the 9980-CSC-3G 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 9980-CSC-3G 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.

9980-CSC-3G Processing Error Troubleshooting

Table 3-5 provides 9980-CSC-3G processing troubleshooting information. If the 9980-CSC-3G card exhibits any of the symptoms listed in Table 3-5, follow the troubleshooting instructions provided. In the majority of cases, most errors are caused by simple errors where the 9980-CSC-3G 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 9980-CSC-3G card edge status indicators.
 - Where errors are displayed on both the 9980-CSC-3G card and network remote controls, the respective indicators and displays are individually described in this section.

Table 3-5 Troubleshooting Processing Errors by Symptom

Symptom	Error/Condition	Corrective Action
<ul style="list-style-type: none"> • DashBoard™ shows Unlocked message in 9980-CSC-3G Card Info pane  <ul style="list-style-type: none"> • Card edge Input LED corresponding to input is not illuminated 	No video input present	Make certain intended video source is connected to appropriate 9980-CSC-3G card video input. Make certain BNC cable connections between frame Rear I/O Module for the card and signal source are OK.
Ancillary data (closed captioning, timecode) not transferred through 9980-CSC-3G	<ul style="list-style-type: none"> • Control(s) not enabled 	<ul style="list-style-type: none"> • Make certain respective control is set to On or Enabled (as appropriate).
	<ul style="list-style-type: none"> • VANC line number conflict between two or more ancillary data items 	<ul style="list-style-type: none"> • Make certain each ancillary data item to be passed is assigned a unique line number (see Ancillary Data Line Number Locations and Ranges on page 3-9).
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.
Card does not pass video or audio as expected. Control settings spontaneously changed from expected settings.	Event-based preset inadvertently invoked	Event-based preset loading (Event Setup tab) should be set to Disabled if this function is not to be used. Read and understand this control description before using these controls to make sure engagement for all expected conditions is considered. See Presets (p. 3-21) for more information.
Card will not retain user settings, or setting changes or presets spontaneously invoke.	Event Based Loading sub-tab inadvertently set to trigger on event	If event based loading is not to be used, make certain event-based loading on Event Setup tab is disabled (either using master Enable/Disable control or through events settings. See Event Setup Controls (p. 3-24) for more information.

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

Recovering Card From SD Memory Card

New production cards come equipped with an SD card installed in a slot receptacle on the underside of the card. The data on this SD card can be used to restore a card should the card become unresponsive (can't communicate with DashBoard or other remote control). Recovering a card using the procedure here will restore the card to any installed option licenses and the most recent firmware installed.

1. (See Figure 3-14.) Make certain the card has the proper SD card installed in the under-card slot. If SD card is **not** installed, contact Product Support to obtain an SD card.

- Note:**
- (Option +TTS only) Cards shipped with option +TTS use an SD card for the TTS library in addition to recovery files. If your +TTS-equipped device was received **earlier than December 2015**, your SD may not contain the recovery files. Contact Product Support to obtain the updated SD card containing both TTS library and SD recovery files.
 - If unit is a BBG-1000 Series device, remove the top cover before proceeding.

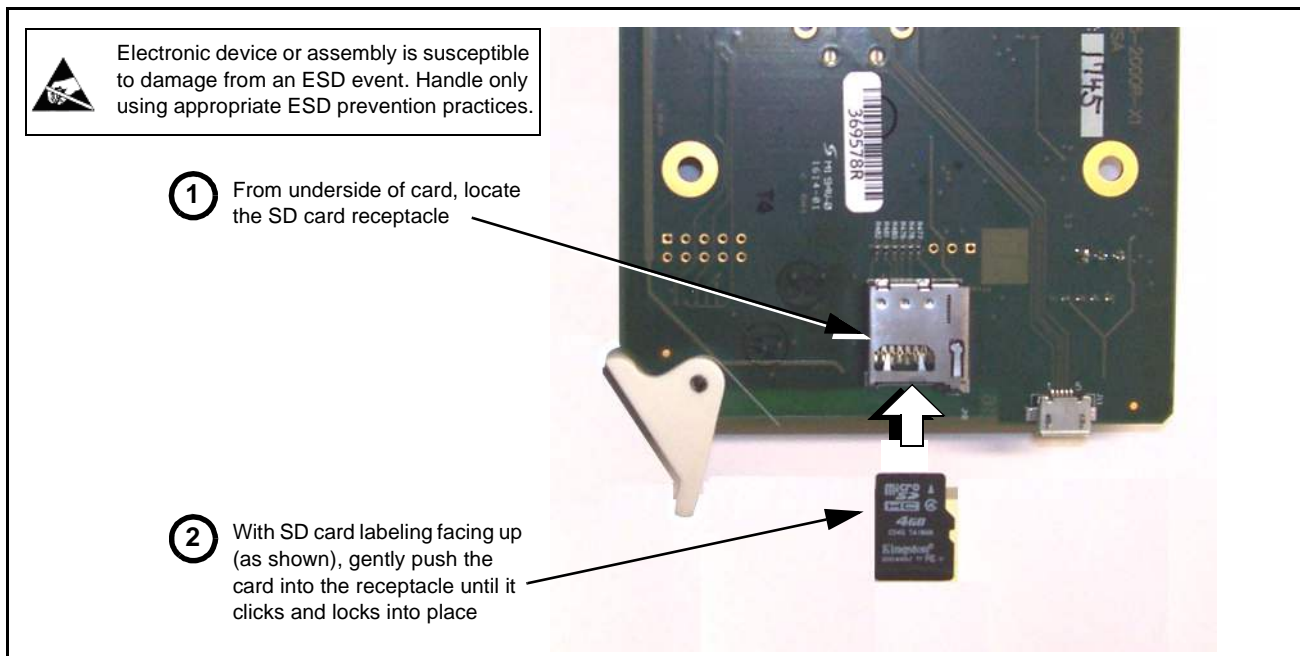


Figure 3-14 SD Card Installation

2. (See Figure 3-15.) With card powered-down, locate the **MMC BOOT** button on the card. Proceed as shown in picture.

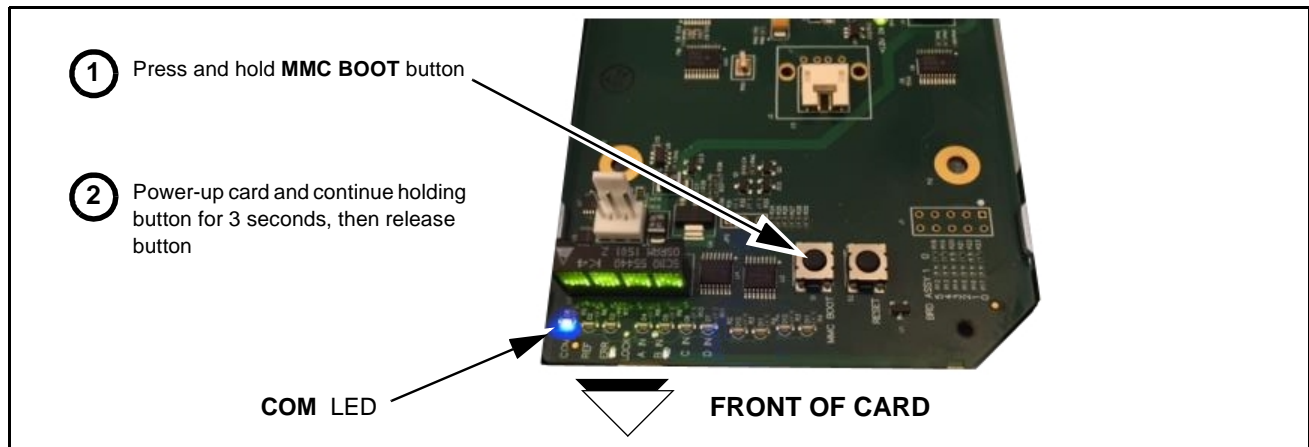


Figure 3-15 MMC Boot Button

3. With button now released, the card will begin reprogramming:
 - **COM LED** illuminates and remains illuminated.
 - When reprogram is complete, **COM LED** turns off, on, and then off again (entire process takes about 1-1/2 minute).
4. Remove power from the card (remove card from slot or power-down BBG-1000 Series unit).
5. Re-apply power to the card. The card/device will display as “**UNLICENSED**” in DashBoard/remote control.
6. In Dashboard or web remote control, go to **Admin** tab and click **Restore from SD Card**. After about 1/2-minute, the card license(s) will be restored and card will be using its most recently installed firmware.
7. Card/device can now be used as normal. On BBG-1000 Series unit, re-install top cover.

Contact and Return Authorization

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. 1-15) in Chapter 1, “Introduction“ for contact information.

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