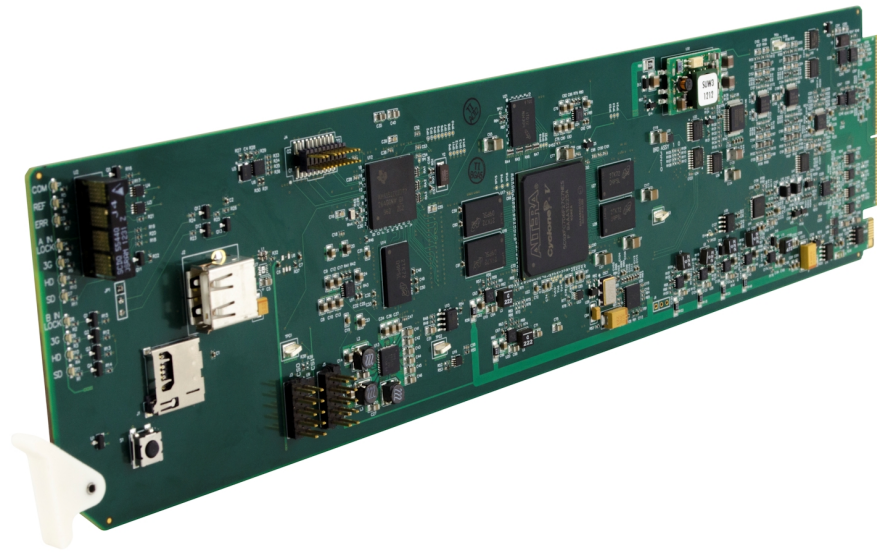# COBALT 9960-TG2-REF1

3G/HD/SD-SDI Dual Test Signal Generator
with Moving Box Active Signal Indication and Bi-Level/Tri-Level Sync Out

Product Manual

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Congratulations on choosing the Cobalt® 9960-TG2-REF1 3G/HD/SD-SDI Dual Test Signal Generator with Moving Box Active Signal Indication and Bi-Level/Tri-Level Sync Out. The 9960-TG2-REF1 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 9960-TG2-REF1, please contact us at the contact information on the front cover.

Manual No.:	9960-TG2REF1-OM
Document Version:	V1.4
Release Date:	August 1, 2018
Applicable for Firmware Version (or greater):	2.056 or greater
Description of product/manual changes:	- Update manual for latest card functionality, including new standard features. (This firmware version has significant user interface changes versus prior firmware versions and the use of this new Product Manual is **strongly** recommended.) - Correction to manual of minor errata and consistency items.

Table of Contents

Chapter 1

Introduction

Overview

This manual provides installation and operating instructions for the 9960-TG2-REF1 3G/HD/SD-SDI Dual Test Signal Generator with Moving Box Active Signal Indication and Bi-Level/Tri-Level Sync Out card (also referred to herein as the 9960-TG2-REF1).

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 9960-TG2-REF1.

- **Chapter 2, "Installation and Setup"** – Provides instructions for installing the 9960-TG2-REF1 in a frame, and optionally installing a 9960-TG2-REF1 Rear I/O Module.

- **Chapter 3, "Operating Instructions"** – Provides overviews of operating controls and instructions for using the 9960-TG2-REF1.

This chapter contains the following information:

- **9960-TG2-REF1 Card Software Versions and this Manual (p. 1-2)**

- **Manual Conventions (p. 1-3)**

- **Safety and Regulatory Summary (p. 1-5)**

- **9960-TG2-REF1 Functional Description (p. 1-6)**

- **Technical Specifications (p. 1-13)**

- **Contact Cobalt Digital Inc. (p. 1-15)**

- **Warranty and Service Information (p. 1-16)**

9960-TG2-REF1 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 9960-TG2-REF1 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	Card is not loaded with the latest software. Not all functions and/or specified performance described in this manual may be available.
	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™.
	Software updates are field-installed without any need to remove the card from its frame.
Card Software **newer** than version in manual	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.
	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.

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 9960-TG2-REF1 itself. Examples are provided below.

- Card-edge display messages are shown like this:

BOOT

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

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

- **9960-TG2-REF1** refers to the 9960-TG2-REF1 3G/HD/SD-SDI Dual Test Signal Generator with Moving Box Active Signal Indication and Bi-Level/Tri-Level Sync Out card.

- **Frame** refers to the HPF-9000, OG3-FR, 8321, or similar 20-slot frame that houses Cobalt® or other cards.

- **Device** and/or **Card** refers to a Cobalt® or other card.

- **System** and/or **Video System** refers to the mix of interconnected production and terminal equipment in which the 9960-TG2-REF1 and other cards operate.

- Functions and/or features that are available only as an option are denoted in this manual like this:

  Option ➲

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.
(ESD symbol)	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.
(WEEE symbol)	Symbol (WEEE 2002/96/EC) For product disposal, ensure the following: • 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 9960-TG2-REF1 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 9960-TG2-REF1 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 9960-TG2-REF1 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

9960-TG2-REF1 Functional Description

Figure 1-1 shows a functional block diagram of the 9960-TG2-REF1. The 9960-TG2-REF1 provides comprehensive test signal packages to test and validate downstream baseband SDI systems. Two independent generator blocks (**TG1**, **TG2**) can be set to offer dual test packages which can be simultaneously outputted or selectively fed to a single downstream path via a 2x4 output crosspoint.

In addition to numerous high-quality industry-standard test patterns and user static raster import, the 9960-TG2-REF1 also allows custom DID/SDID packages to be added to test non-conventional or custom processing.

The 9960-TG2-REF1 also provides AES and analog audio test tones (both using 24-bit data), and also provides waveform-based test data over its CVBS video output. A moving-box insertion can be enabled to serve as a dynamic raster confidence check. The 9960-TG2-REF1 can use either of two frame references to provide an output that's synchronous with house ref, or use its internal ref timing to generate its own ref. An analog video output offers SD black burst or HD bi-level/tri-level reference output, line 21 CEA 608 closed-captioning and VITC waveform TC outputs. Audio LTC test sequences are available over embedded, AES, and analog audio as well as via an RS-485 serial port.

9960-TG2-REF1 Outputs

The 9960-TG2-REF1 provides the following outputs:

- **3G/HD/SD-SDI IN (User Import)** – 3G/HD/SD-SDI input allows import (frame capture) of SDI input. This input can be routed either or both TSG **TG1** or **TG2**.

- **3G/HD/SD-SDI TG 1/2 OUT (1-4)** – four 3G/HD/SD-SDI outputs. Each output can be independently set to route the TSG **TG1** or **TG2** signal as its output.

- **REF/CVBS OUT –** CVBS coaxial analog video output; provides bi-level/tri-level ref, VITC waveform timecode, and CEA 608 line 21 closed-captioning data when an SD TSG output is selected.

- **AES OUT –** Multiple AES-3id ports which provide AES audio test signals such as tones or audio LTC. These outputs are timing-referenced to the selected TSG **TG1** or **TG2** signal; each AES test source output can be independently referenced to either of the **TG1** or **TG2**.

- **AN-AUD OUT –** Four balanced analog audio de-embed test signal outputs which provide configurable tone outputs.

- **RS-485 LTC OUT –** RS-485 LTC timecode output. This output is correlated to either of the selected **TG1** or **TG2** generator blocks.
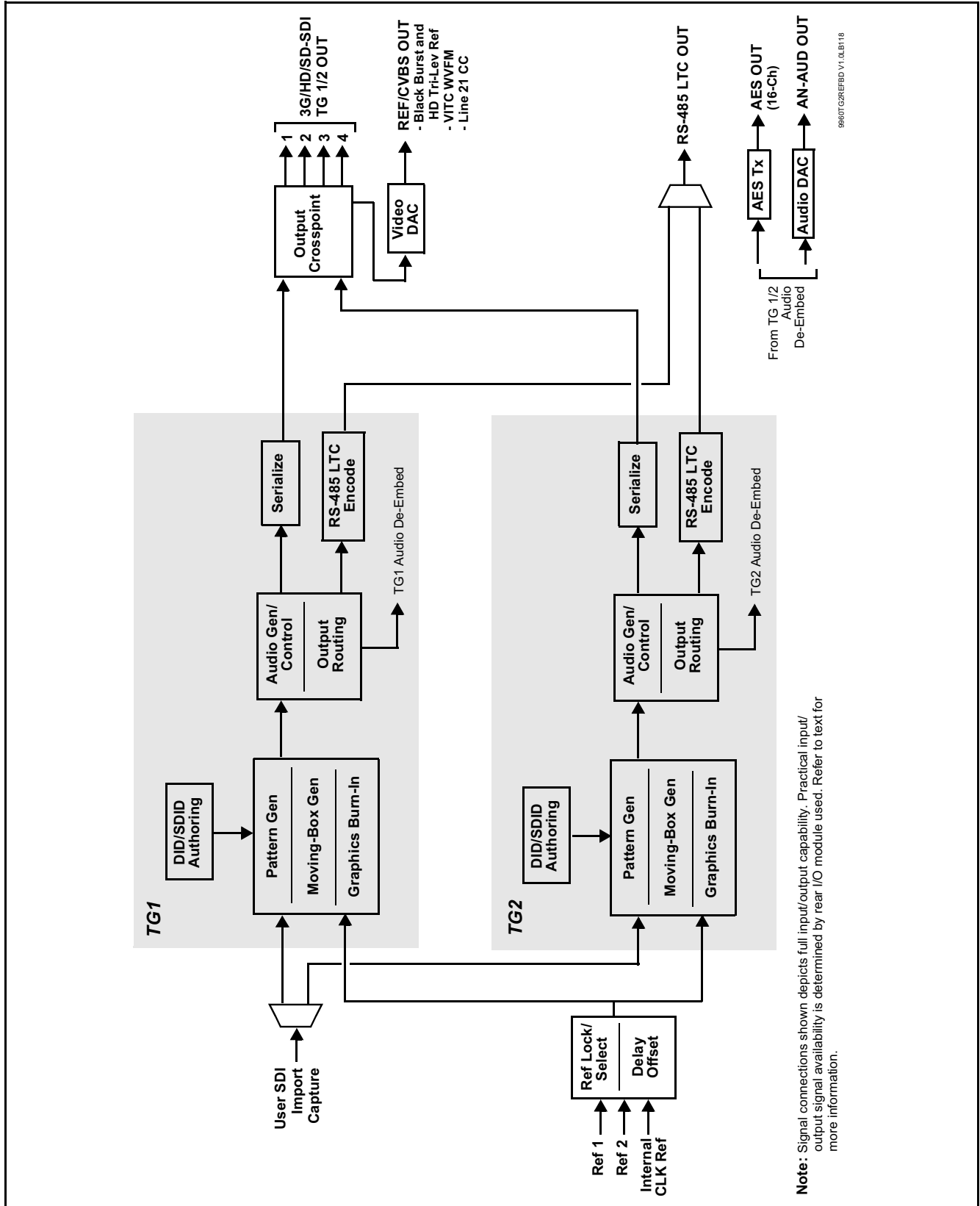
Figure 1-1 9960-TG2-REF1 Functional Block Diagram

Video TSG Description

The 9960-TG2-REF1 features dual independent video TSG blocks, each capable of independent rasters, output format, and embedded ancillary data.

Ref Lock Function

This function allows either of the **TG1** or **TG2** generators to receive ref lock using either one of two external **FRAME REF IN (1,2)** reference signals distributed with the card frame, or a card internal ref lock source. Selectable failover allows alternate reference selection should the initial reference source become unavailable or invalid. This function also allows independent delay offsets for the **TG1** and **TG2** generators to be added or removed relative to the selected ref source.

Test Pattern Generator Function

Independent internal test pattern generators provides a selection of various standard patterns such as color bars, sweep patterns, and other technical patterns. A user-captured TSG selection allows a full video frame to captured and stored, available then as one of the pattern choices.

Character/Image Burn-in Functions

User text and timecode (as selected using the timecode function) can be burned into the output video. Burn-in attributes such as size, position, background, color, and opacity are user-configurable. Two discrete character burn strings can be inserted on output video, with each string inserted as static text and/or insert only upon LOS. A moving-box insertion can be enabled to serve as a dynamic raster confidence check.

Logo Insertion Function

This function provides for a graphic insertion onto the SDI processed output raster. The function allows for uploading a .png image graphic file to the card/ device memory. (png files are converted to a .bin format using a web tool before uploading to the host card/device; this is described in the setup/ operating instructions in Chapter 3.) Insertion enable/disable is then manually controlled using DashBoard.

ANC Generator Description

Timecode Generators

This function embeds packet-based timecode strings on the output video. Independent timecode insertion is provided for the **TG1** or **TG2** generators. A user entry dialog allows a running count (including fields for interlaced formats) in ATC_LTC and/or ATC_VITC for 3G/HD, and ATC_VITC or VITC waveform (with selectable odd/even field line number control) for SD SDI or CVBS inputs. Waveform VITC timecode can also be extracted from a reference input and used as the output timecode value.

LTC timecode can also be outputted over embedded or discrete AES or analog audio, and can be outputted as RS-485.

AFD Generators

This function embeds user-entered static AFD code strings on the output SDI video. Independent strings and formatting can be inserted for the **TG1** or **TG2** generators. The function also allows the selection/changing of the AFD code and ancillary data line number for the outputted AFD code.

SCTE104 Insertion

SCTE104 functionality provides generation and insertion of SCTE 104 messages into baseband SDI. Message send can be triggered from automation GPI or other event action modes. The function can also execute card actions based on SCTE 104 messages received by the card, as well as send triggered SCTE 104 packets to other downstream systems.

The user interface is based on common SCTE 104 operations: Splice Start Normal, Splice Start Intermediate, Splice End Normal, Splice End Intermediate, and Splice Cancel (splice_request_data variants), offering full control of splice start, end, and cancel as well as pre-roll and break duration offsets.

CEA 608 Closed Captioning Insertion

Closed Captioning generator provides generation and insertion of CEA 608 Ch 1 -Ch 4 test messages to be inserted into VBI space for testing downstream systems ability to process and retain CEA closed captioning data. User text strings can be entered, and then set for display style (Paint On, Pop On, or Roll Up) messages.

Video Output Crosspoint

A four-output video matrix crosspoint allows independently applying either of the **TG1** or **TG2** generator SDI outputs to any of the four card discrete coaxial outputs (**SDI OUT 1** thru **SDI OUT 4**). For an SD output, a CVBS coaxial output is available as a processed video output.

De-Embed Audio Processor Description

The audio processor operates as an internal audio router that selects embedded audio channel content from either **TG1** or **TG2** for use as discrete audio channels over up to 16 AES channels and/or four balanced analog output channels. Any of the 32 total **TG1** and **TG2** embedded channels can be outputted over any of AES or analog audio output channels.

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. 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.

Serial (COMM) Ports

The 9960-TG2-REF1 is equipped with two, 3-wire serial ports (**COM 1 - Serial Port 1**, **COM 2 - Serial Port 2**). The ports provide for RS-485 LTC I/O. Either port can be configured as RS-232 Tx/Rx or RS-485 non-duplexed Tx or Rx.

User Control Interface

Figure 1-2 shows the user control interface functions for the 9960-TG2-REF1. These functions are individually described below.

Note: All user control interfaces described here are cross-compatible and can oper-ate 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 9960-TG2-REF1 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 9960-TG2-REF1 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".

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

**OGCP-9000 Control Panel
or
OGCP-9000/CC Control Panel**

Remote Control Panel
Using the Control Panel,
9960-TG2-REF1 card can be
remotely controlled over a LAN

9960-TG2-REF1 Card

LAN

20-Slot Frame with Network Controller Card

DashBoard™ Remote Control
Using a computer with
DashBoard™ installed,
9960-TG2-REF1 card can be
remotely controlled over a LAN

**Computer
with NIC**

In conjunction with a frame equipped
with a Network Controller Card,
9960-TG2-REF1 card can be
remotely controlled over a LAN

Note: • To communicate with DashBoard™ or a Remote Control Panel, the frame must have a network controller card installed in the frame.

• DashBoard™ and the Remote Control Panels provide network control of the 9960-TG2-REF1 as shown. The value displayed at any time on the card, or via DashBoard™ or a Control Panel is the actual value as set on the card, with the current value displayed being the actual value as effected by the card. Parameter changes made by any of these means are universally accepted by the card (for example, a change made using the DashBoard™ controls will change the setting displayed on a Control Panel).

Figure 1-2 9960-TG2-REF1 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).

9960-TG2-REF1 Rear I/O Modules

The 9960-TG2-REF1 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 9960-TG2-REF1 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 9960-TG2-REF1 card edge connections to BNC and other connectors that interface with other components and systems in the signal chain.

The full assortment of 9960-TG2-REF1 Rear I/O Modules is shown and described in 9960-TG2-REF1 Rear I/O Modules (p. 2-4) in Chapter 2, "Installation and Setup".

Technical Specifications

Table 1-1 lists the technical specifications for the 9960-TG2-REF1 3G/HD/SD-SDI Dual Test Signal Generator with Moving Box Active Signal Indication and Bi-Level/Tri-Level Sync Out card.

Table 1-1   Technical Specifications

Item	Characteristic
Part number, nomenclature	9960-TG2-REF1 3G/HD/SD-SDI Dual Test Signal Generator with Moving Box Active Signal Indication and Bi-Level/Tri-Level Sync Out
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: • 4-character alphanumeric display • Status/Error LED indicator • Input Presence LED indicators

SDI Input/Outputs	Number of Inputs: (1) 75Ω BNC
	Number of Outputs:
	  Up to (4)
	SDI Formats Supported:
	  SMPTE 424M, 292M, SMPTE 259M-C
	Impedance:
	  75 Ω terminating

Table 1-1   Technical Specifications — continued

Item	Characteristic
SDI Input/Outputs (cont.)	Return Loss: > 15 dB up to 1.485 GHz > 10 dB up to 2.970 GHz SDI Alignment Jitter: 3G/HD/SD: < 0.3/0.2/0.2 UI Timing Jitter: 3G/HD/SD: < 2.0/1.0/0.2 UI Signal Level: 800 mV ± 10% DC Offset: 0 V ± 50 mV
REF/CVBS Video Output	Number of Outputs: One SD analog CVBS (functional only when selected path is carrying SD-SDI; also provides bi-level SD and tri-lev HD ref) Impedance: 75 Ω
Discrete Audio Outputs	AES-3id 75Ω outputs (8 pair (16-Ch) max) Balanced analog audio outputs (4-Ch max) (I/O conforms to 0 dBFS = +24 dBu) Analog Output Impedance: < 50 Ω Analog Reference Level: -20 dBFS Analog Nominal Level: +4 dBu Analog Max Output Level: +24 dBu (0 dBFS) Analog Freq. Response: ±0.2 dB (20 Hz to 20 kHz) Analog SNR: 115 dB (A weighted) Analog THD+N: -96 dB (20 Hz to 10 kHz) Analog Crosstalk: -106 dB (20 Hz to 20 kHz)
Timecode Insertion/Burn-In	Burn-in and embedded video output timecode selected via user controls from input video SMPTE embedded timecode and/or audio LTC. Burn-in enable/disable user controls.
Text Burn-In	(2) independent strings supported. Independent insertions controls for enable/disable and enable upon LOS. User controls for text size and H/V position.
User Audio Delay Offset from Video	Bulk delay control: -33 msec to +3000 msec Per-channel delay controls: -800 msec to +800 msec

Table 1-1   Technical Specifications — continued

Item	Characteristic

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-color")
	Return Loss:
	  > 35 dB up to 5.75 MHz

GPIO/COMM	(2) GPI; (2) GPO; opto-isolated
	GPO Specifications:
	  Max I: 120 mA
	  Max V: 30 V
	  Max P: 120 mW
	GPI Specifications:
	  GPI LO @ Vin < 1.5 V
	  GPI HI @ Vin > 2.3 V
	  Max Vin: 9 V
	(2) RS-232/485 comm ports. All connections via rear module RJ-45 GPIO/COMM jack.

Contact Cobalt Digital Inc.

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

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

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

Warranty and Service Information

Cobalt Digital Inc. Limited Warranty

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

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

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

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

Cobalt Digital Inc. Factory Service Center

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www.cobaltdigital.com	Email: info@cobaltdigital.com

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Chapter 2

Installation and Setup

Overview

This chapter contains the following information:

- Installing the 9960-TG2-REF1 Into a Frame Slot (p. 2-1)
- Installing a Rear I/O Module (p. 2-3)
- Setting Up 9960-TG2-REF1 Network Remote Control (p. 2-5)

Installing the 9960-TG2-REF1 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 9960-TG2-REF1 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 9960-TG2-REF1 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 9960-TG2-REF1 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 9960-TG2-REF1 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 9960-TG2-REF1 into a frame slot as follows:

1. Determine the slot in which the 9960-TG2-REF1 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 9960-TG2-REF1 Rear I/O Modules (p. 2-4).

9. Repeat steps 1 through 8 for other 9960-TG2-REF1 cards.

Note: • The 9960-TG2-REF1 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 9960-TG2-REF1 Network Remote Control (p. 2-5).

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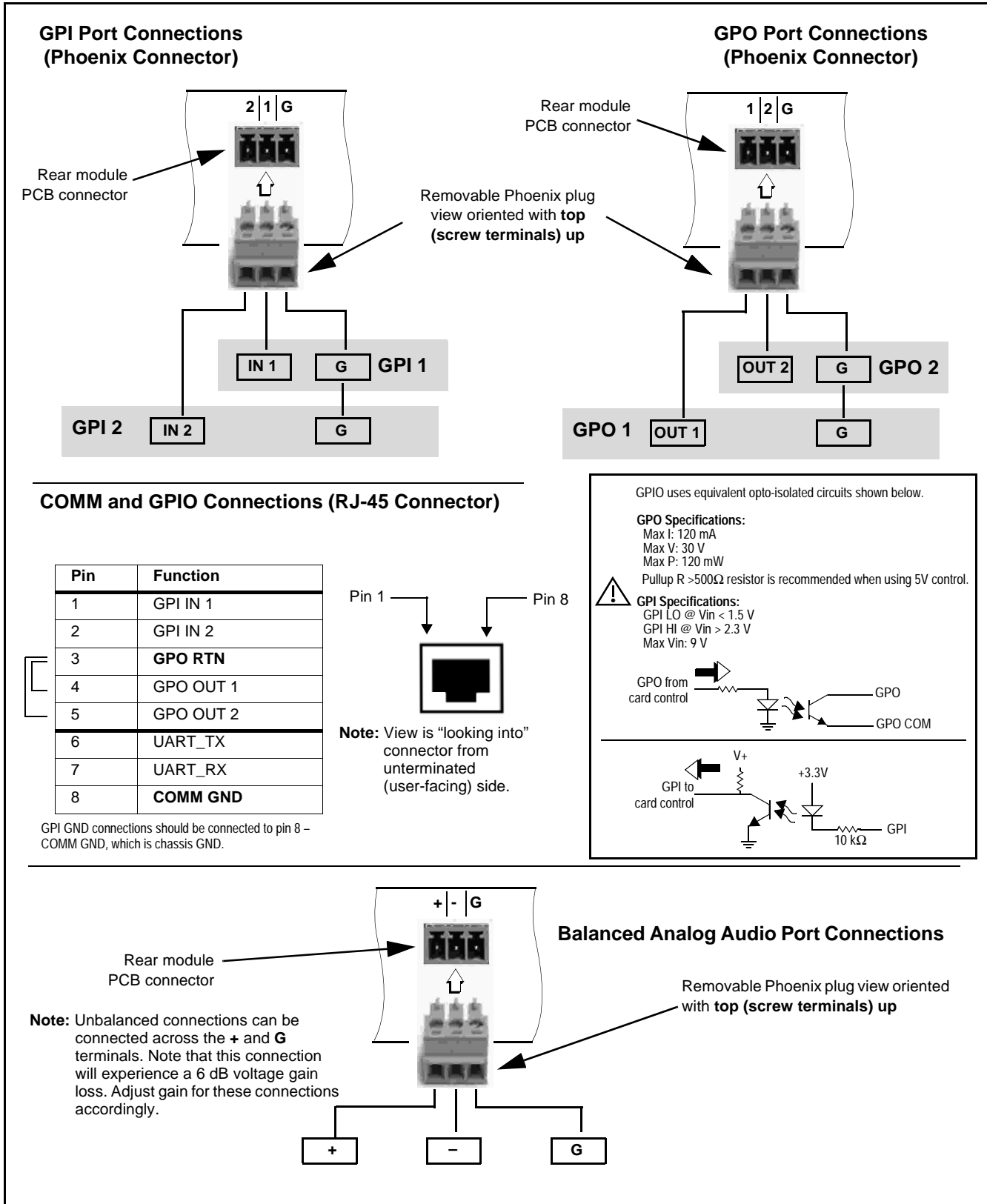
Installing a Rear I/O Module

Note: This procedure is applicable **only if a Rear I/O Module is not currently installed** in the slot where the 9960-TG2-REF1 is to be installed.

If installing the 9960-TG2-REF1 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 9960-TG2-REF1 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.

① Align and engage mounting tab on Rear I/O Module with the module seating slot on rear of frame chassis.

② Hold top of Rear I/O Module flush against frame chassis and start the captive screw. Lightly tighten captive screw.
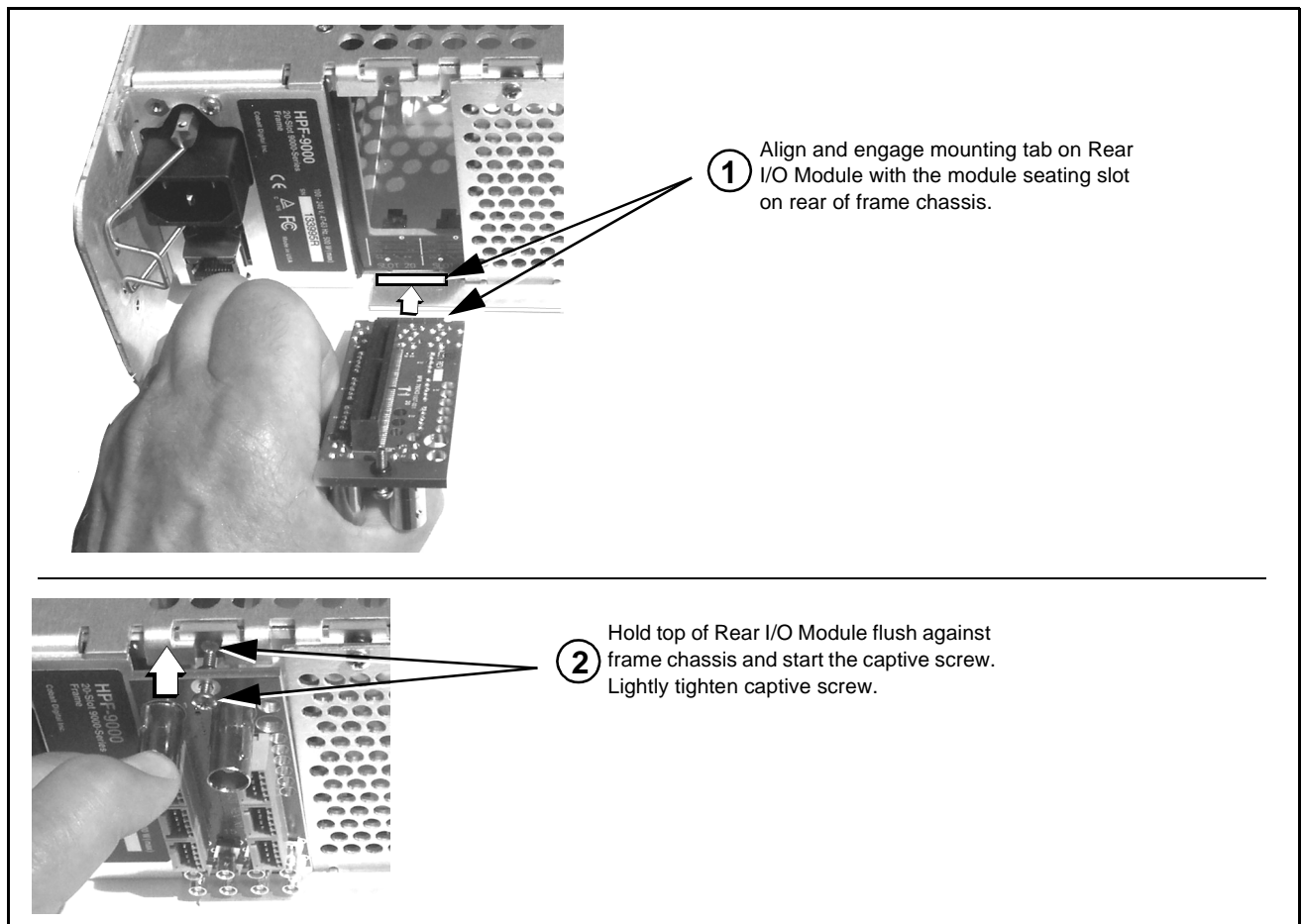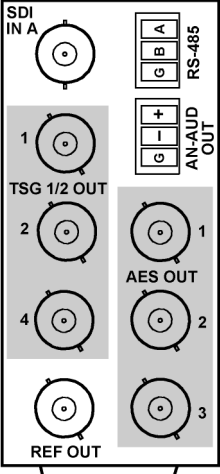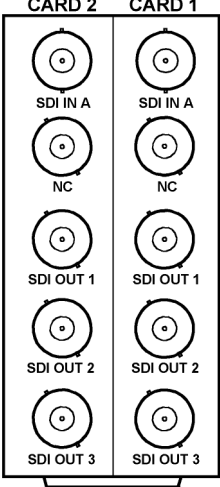
Figure 2-1 Rear I/O Module Installation

9960-TG2-REF1 Rear I/O Modules

Table 2-1 shows and describes the full assortment of Rear I/O Modules specifically for use with the 9960-TG2-REF1.

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   9960-TG2-REF1 Rear I/O Modules

9960-TG2-REF1 Rear I/O Module	Description
RM20-9960-A 	Provides the following connections: • One 3G/HD/SD-SDI coaxial input BNC (**SDI IN A**) • Three 3G/HD/SD-SDI coaxial output BNCs (**TSG 1/2 OUT 1**, **2**, and **4**) • One analog video CVBS coaxial output BNC (**REF OUT**) • Balanced audio output (**AN-AUD OUT**) • Three AES output BNCs (**AES OUT 1** thru **AES OUT 3**) • RS-485 I/O (**RS-485**)
RM20-9960-A/S 	Split Rear Module. Provides **each** of the following connections for two 9960-TG2-REF1 cards: • One 3G/HD/SD-SDI coaxial input BNC (**SDI IN A**) • Three 3G/HD/SD-SDI output BNCs (**SDI OUT 1** thru **SDI OUT 3**)

GPIO, Serial (COMM), and Analog Audio Connections

Figure 2-2 shows connections to the card multi-pin terminal block connectors. These connectors are used for card serial comm, GPIO, and balanced analog audio 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 audio 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 9960-TG2-REF1 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.

**GPI Port Connections
(Phoenix Connector)**

2 | 1 | G

Rear module
PCB connector

Removable Phoenix plug
view oriented with **top
(screw terminals) up**

IN 1   G   **GPI 1**

GPI 2   IN 2   G

**GPO Port Connections
(Phoenix Connector)**

Rear module
PCB connector

1 | 2 | G

OUT 2   G   **GPO 2**

GPO 1   OUT 1   G

COMM and GPIO Connections (RJ-45 Connector)

Pin	Function
1	GPI IN 1
2	GPI IN 2
3	**GPO RTN**
4	GPO OUT 1
5	GPO OUT 2
6	UART_TX
7	UART_RX
8	**COMM GND**

GPI GND connections should be connected to pin 8 –
COMM GND, which is chassis GND.

Pin 1   Pin 8

Note: View is "looking into"
connector from
unterminated
(user-facing) side.

GPIO uses equivalent opto-isolated circuits shown below.

GPO Specifications:
Max I: 120 mA
Max V: 30 V
Max P: 120 mW
Pullup R >500Ω resistor is recommended when using 5V control.

GPI Specifications:
GPI LO @ Vin < 1.5 V
GPI HI @ Vin > 2.3 V
Max Vin: 9 V

GPO from
card control   GPO
                                GPO COM

                V+   +3.3V
GPI to
card control   GPI
                        10 kΩ

+ | - | G

Rear module
PCB connector

Balanced Analog Audio Port Connections

Removable Phoenix plug view oriented
with **top (screw terminals) up**

Note: Unbalanced connections can be
connected across the **+** and **G**
terminals. Note that this connection
will experience a 6 dB voltage gain
loss. Adjust gain for these connections
accordingly.

+   −   G

Figure 2-2 COMM, GPIO, and Analog Audio Connector Pinouts

Operating Instructions

Overview

If you are already familiar with using DashBoard or a Cobalt Remote Control Panel to control Cobalt cards, please skip to 9960-TG2-REF1 Function Menu List and Descriptions (p. 3-10).

This chapter contains the following information:

- Control and Display Descriptions (p. 3-1)
- Accessing the 9960-TG2-REF1 Card via Remote Control (p. 3-6)
- Checking 9960-TG2-REF1 Card Information (p. 3-8)
- Ancillary Data Line Number Locations and Ranges (p. 3-9)
- 9960-TG2-REF1 Function Menu List and Descriptions (p. 3-10)
- Troubleshooting (p. 3-52)

Control and Display Descriptions

This section describes the user interface controls, indicators, and displays for using the 9960-TG2-REF1 card. The 9960-TG2-REF1 functions can be accessed and controlled using any of the user interfaces described here.

The format in which the 9960-TG2-REF1 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 9960-TG2-REF1 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 9960-TG2-REF1 card are organized into function **menus**, which consist of parameter groups as shown below.

Figure 3-1 shows how the 9960-TG2-REF1 card and its menus are organized, and also provides an overview of how navigation is performed between cards, function menus, and parameters.

If using DashBoard™ or a Remote Control Panel, the desired 9960-TG2-REF1 card is first selected.

The desired function **menu** is next selected. Function **Menus** consist of parameter groups related to a particular 9960-TG2-REF1 card function (for example, "Moving Box").

Individual Parameters
Each menu consists of groups of parameters related to the function menu. Using the "Moving Box" function menu example, the individual parameters for this function consist of various captioning parameters such as moving box H/W, speed, and so on.

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.
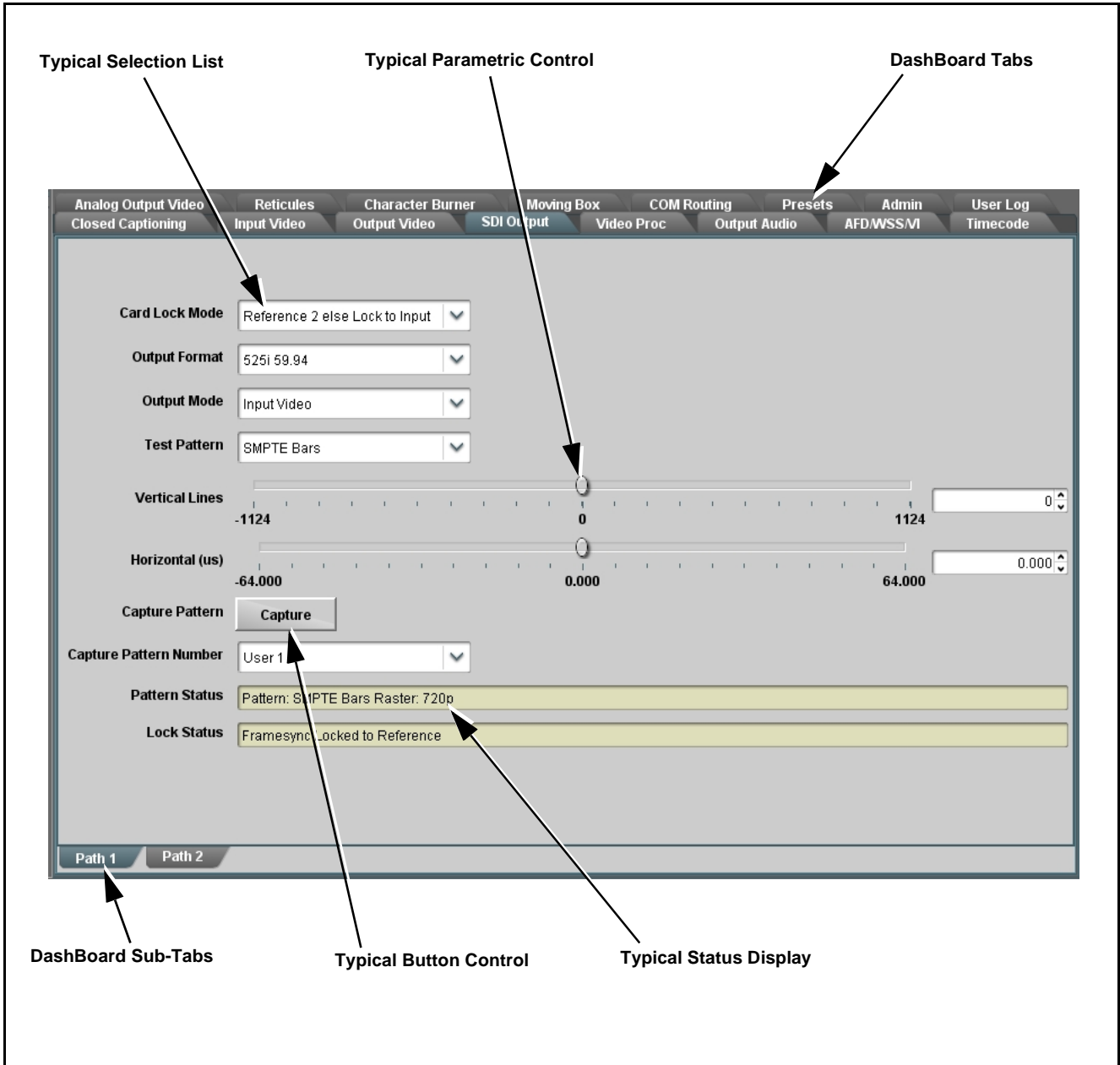
Figure 3-2 Typical DashBoard Tabs and Controls

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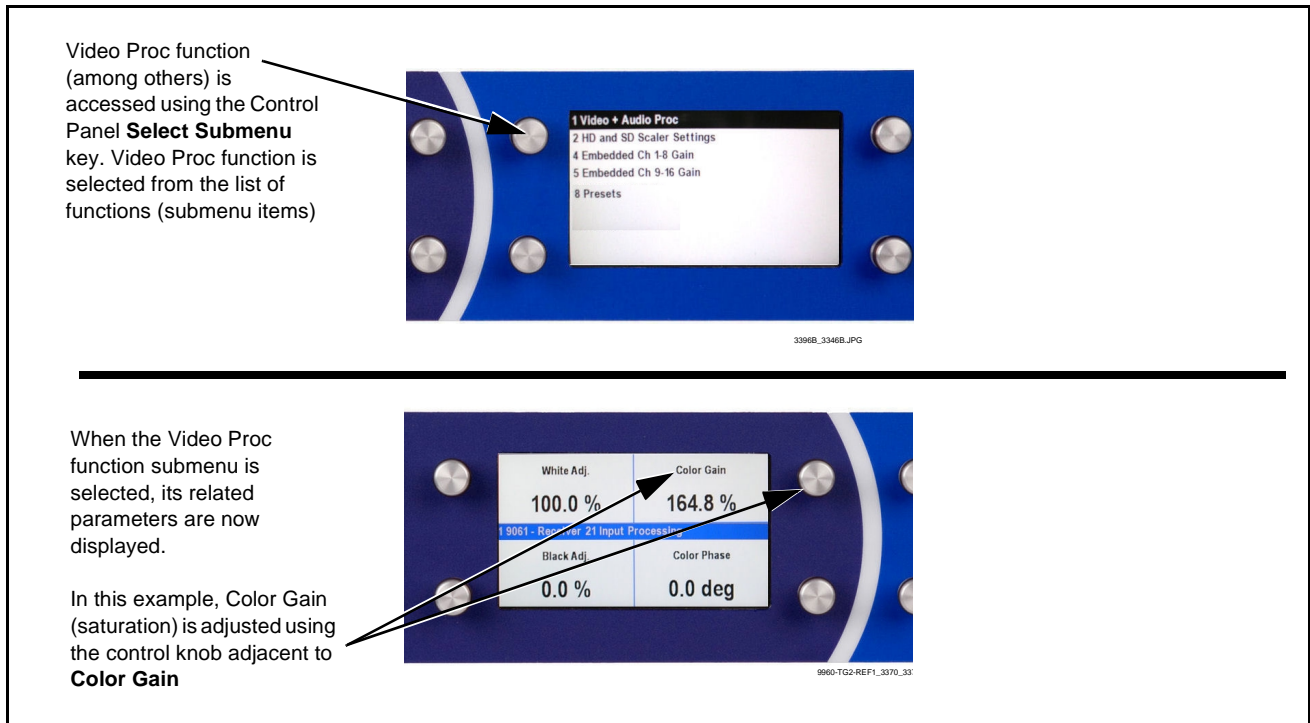
Figure 3-3 Remote Control Panel Setup of Example Video Proc Function Setup

Web HTML5 User Interface

(See Figure 3-4.) When equipped with a rear I/O module having an Ethernet port, the 9960-TG2-REF1 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. 3-48) for more information.)

Note: Card must be equipped with a rear I/O module with an Ethernet port to use html access. The card address is entirely independent of, and requires no association with, the frame openGear IP address.
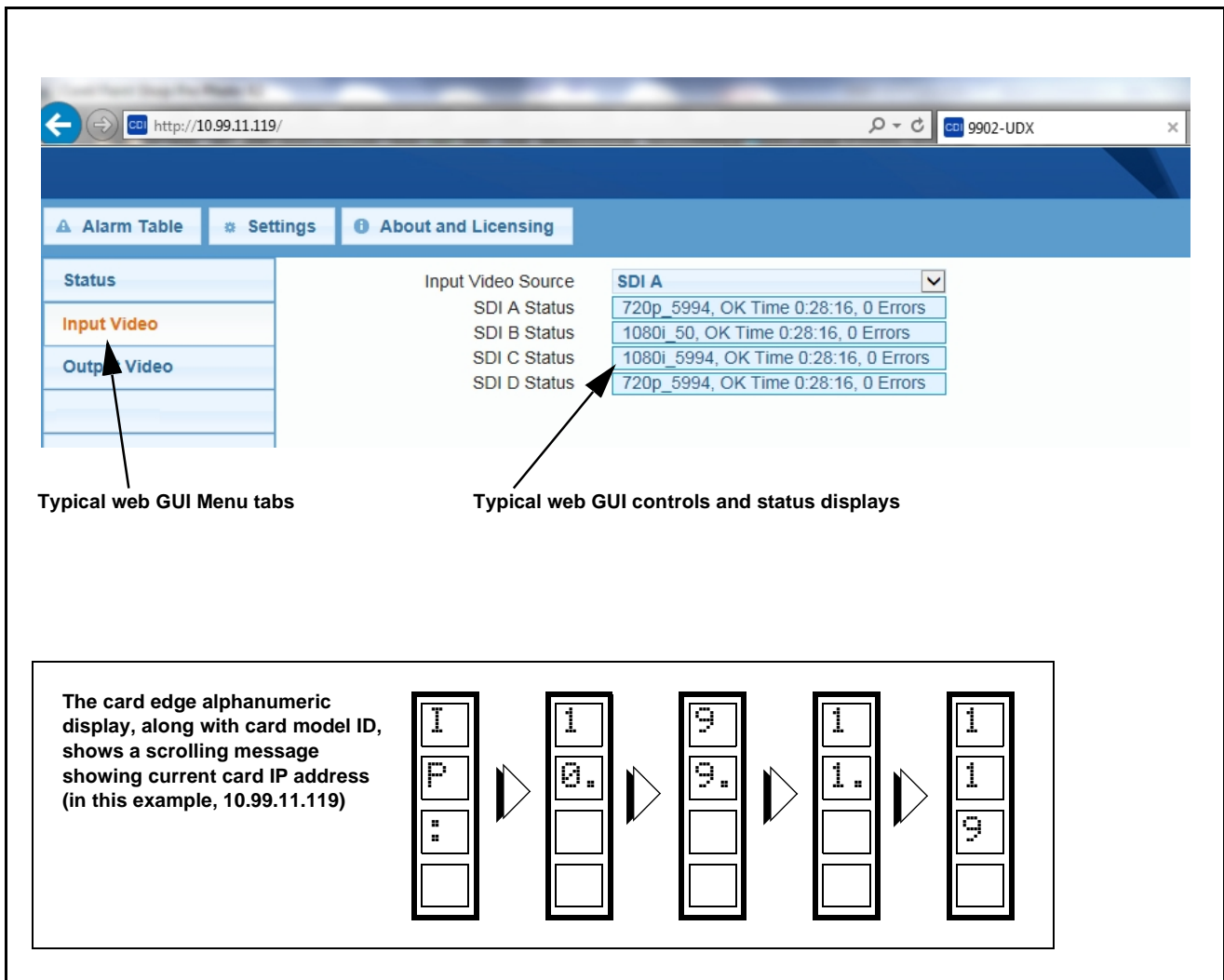
Figure 3-4 Typical Web GUI Tabs and Controls

Accessing the 9960-TG2-REF1 Card via Remote Control

Access the 9960-TG2-REF1 card using DashBoard™ or Cobalt® Remote Control Panel as described below.

Accessing the 9960-TG2-REF1 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 9960-TG2-REF1 card to be accessed (in this example, "MFC-8320-N SN: 00108053").
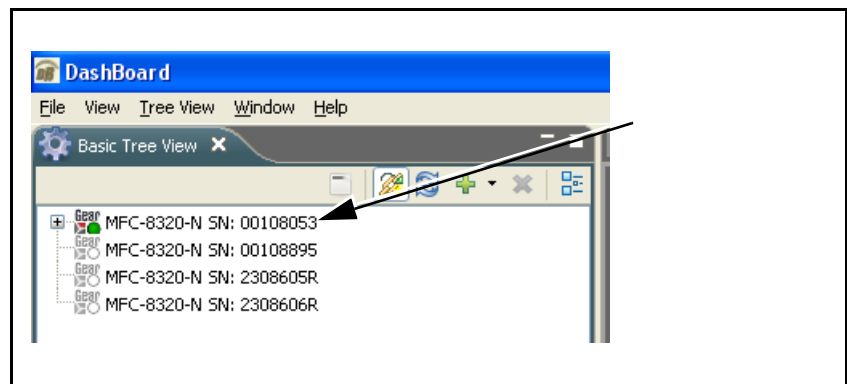
3. As shown below, expand the tree to access the cards within the frame. Click on the card to be accessed (in this example, "Slot 6: 9960-TG2-REF1").
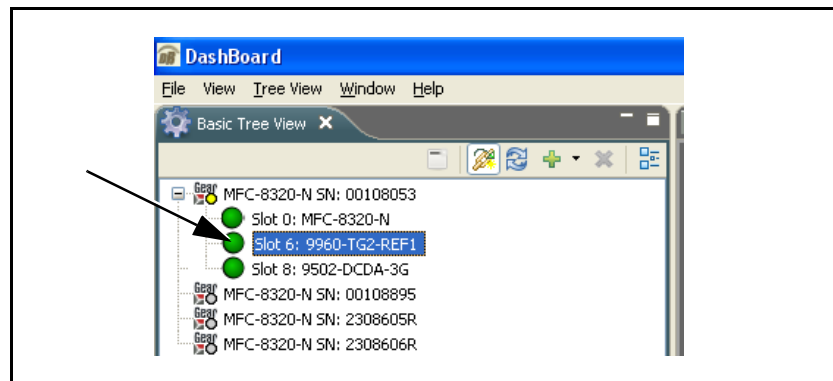
As shown on the next page, when the card is accessed in DashBoard™ its function menu screen showing tabs for each function is displayed. (The particular menu screen displayed is the previously displayed screen from the last time the card was accessed by DashBoard™).

Accessing the 9960-TG2-REF1 Card Using a Cobalt® Remote Control Panel

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

This display shows the list order number of the device that is ready for selection

This display shows the devices assigned to the Control Panel.

• Rotate any knob to select from the list of devices. The device selected using a knob is displayed with a reversed background (in this example, "1 9960-Test Gen 1A").

• Directly enter a device by entering its list number using the numeric keypad, and then pressing **Enter** or pressing in any knob).

Checking 9960-TG2-REF1 Card Information

The operating status and software version the 9960-TG2-REF1 card can be checked using DashBoard™ or the card edge control user interface. Figure 3-5 shows and describes the 9960-TG2-REF1 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. 3-52) for corrective action.

The **Tree View** shows the cards seen by DashBoard™. In this example, Network Controller Card is hosting a 9960-TG2-REF1 card in slot 8

Status Display
This displays shows the status and format of the signals being received by the 9960-TG2-REF1, as well as card status

Card Product 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 9960-TG2-REF1 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:

1. The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data.

2. 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.
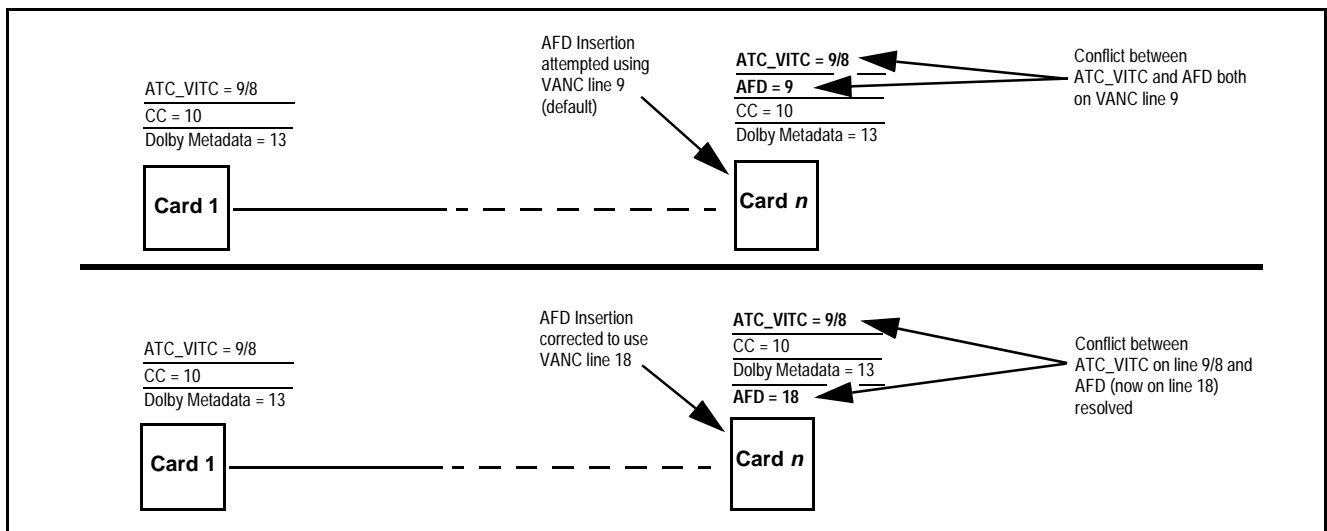
Figure 3-6 Example VANC Line Number Allocation Example

9960-TG2-REF1 Function Menu List and Descriptions

Table 3-2 individually lists and describes each 9960-TG2-REF1 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.

Some functions use **sub-tabs** to help maintain clarity and organization. In these instances, Table 3-2 shows the ordinate tab along with its sub-tabs. Highlighted sub-tabs indicate that controls described are found by selecting this sub-tab (in this example, the **Path 1** sub-tab on the **Timecode** page).
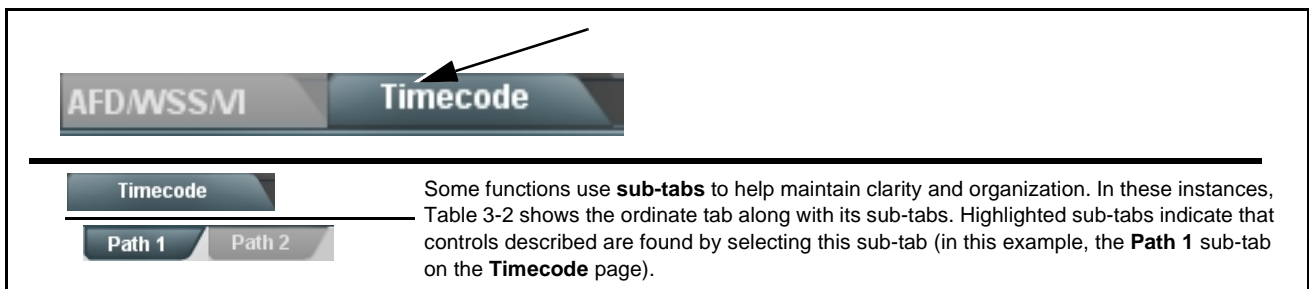
The table below provides a quick-reference to the page numbers where each function menu item can be found.

Function Menu Item	Page	Function Menu Item	Page
Input Video Controls	3-11	Character Burner	3-33
Output Video Mode Controls	3-11	Moving Box Insertion	3-38
SDI Output Format/Select	3-12	SCTE 104 Insertion Controls	3-39
Logo Upload/Insertion Controls	3-15	ANC Test Packet Insertion Controls	3-40
Analog Output Video	3-16	COMM Ports Setup Controls	3-41
Output Audio Routing/Controls	3-18	GPO Setup Controls	3-41
Clock (Wall-Clock Time/LTC) Controls	3-22	Presets	3-42
Timecode Controls	3-23	Event Setup Controls	3-44
Reticules	3-28	Admin	3-48
Video Proc Controls	3-31	User Log	3-51
Closed Captioning	3-32		

Table 3-2   9960-TG2-REF1 Function Menu List
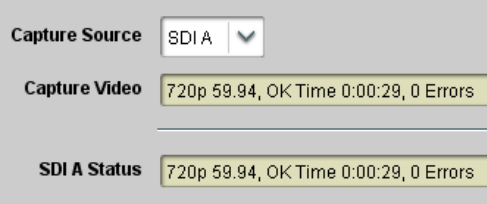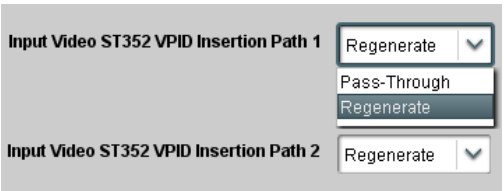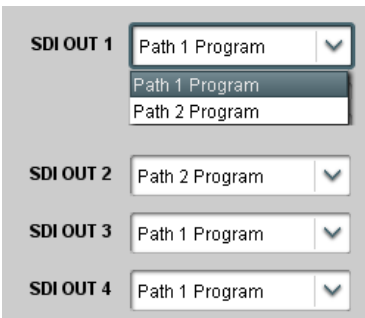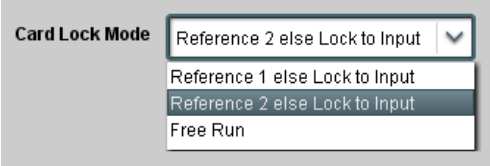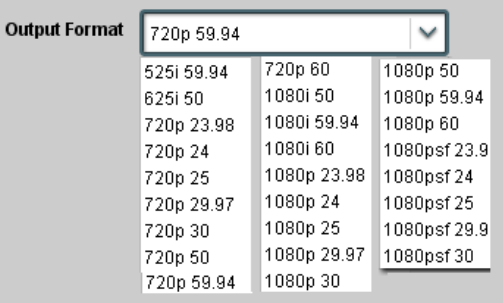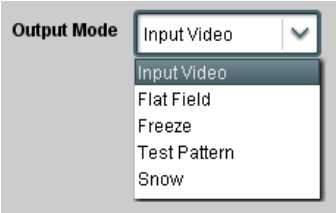
Input Video	Allows import of user video (frame capture) as a test material source.
• **Input Video Source/Capture Status** Capture Source: SDI A Capture Video: 720p 59.94, OK Time 0:00:29, 0 Errors SDI A Status: 720p 59.94, OK Time 0:00:29, 0 Errors	Shows status of SDI input used for frame capture, and the status of the captured video. **Note:** • Although a Capture Source drop-down selector is present, the card uses only **SDI IN A** as a capture source. • Activating a frame capture is performed using the Capture Pattern control on the SDI Output tab. See User Frame Capture Control on page 3-14 for more information.
Output Video	Allows selection of each of the four SDI outputs as test Program 1 or Program 2.
• **SDI Output VPID Regen/Pass-Thru Select** Input Video ST352 VPID Insertion Path 1: Regenerate Pass-Through Regenerate Input Video ST352 VPID Insertion Path 2: Regenerate	Allows pass-thru or regenerate for input video ST 352 VPID. **Note:** Since this model primarily produces its own SDI signal(s), **Regenerate** setting is the default setting and should be used in most cases.
• **SDI Output Video Crosspoint** SDI OUT 1: Path 1 Program Path 1 Program Path 2 Program SDI OUT 2: Path 2 Program SDI OUT 3: Path 1 Program SDI OUT 4: Path 1 Program	For each SDI output port supported by the card, provides a crosspoint for routing test generator Path 1 or Path 2 outputs.

Table 3-2   *9960-TG2-REF1 Function Menu List — continued*

SDI Output	Provides controls for card ref lock mode, output format, and test pattern select. Also provides controls H/V offset and user video frame capture from input video.

Note: **SDI Output** tab has identical independent controls for both Path 1 and Path 2 using the **Path 1 / Path 2** sub-tabs. Therefore, only the **Path 1** controls are shown here. Set controls for other path using the respective sub-tab.

• Output Ref Select Card Lock Mode: Reference 2 else Lock to Input Reference 1 else Lock to Input Reference 2 else Lock to Input Free Run	Selects ref lock from the choices shown to the left and described below. **• 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.) **Note:** If valid reference is not received, the Card state: ○ Reference Invalid indication appears in the Card Info status portion of DashBoard™, indicating invalid frame sync reference error. **Note:** If **Lock to Input** is used for ref lock, 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.
• Output Format Selector Output Format: 720p 59.94 525i 59.94, 720p 60, 1080p 50 625i 50, 1080i 50, 1080p 59.94 720p 23.98, 1080i 59.94, 1080p 60 720p 24, 1080i 60, 1080psf 23.9 720p 25, 1080p 23.98, 1080psf 24 720p 29.97, 1080p 24, 1080psf 25 720p 30, 1080p 25, 1080psf 29.9 720p 50, 1080p 29.97, 1080psf 30 720p 59.94, 1080p 30	Sets card SDI output to formats as shown.
• Program Video Output Mode Select Output Mode: Input Video Input Video Flat Field Freeze Test Pattern Snow	Selects card program video output mode from the choices shown to the left and described below. **• Input Video** – card outputs captured input program video frame (see Capture Pattern below) **• Flat Field** – card outputs flat field. **• Freeze** – card outputs last input video frame having valid SAV and EAV codes. **• Test Pattern** – card outputs standard technical test pattern (pattern is selected using the Pattern drop-down described below). **• Snow** – card outputs random-generation snow multi-color pattern.

Table 3-2   9960-TG2-REF1 Function Menu List — continued
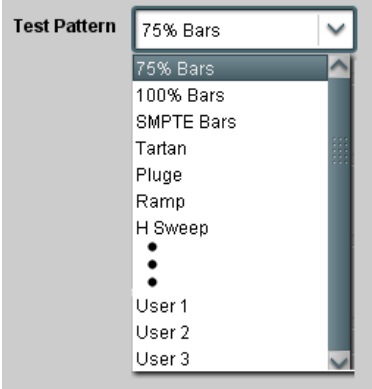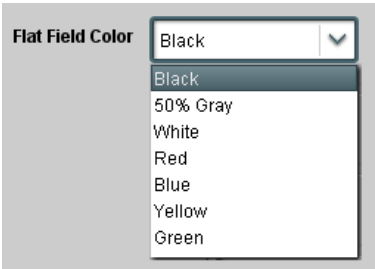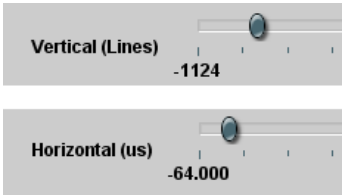
SDI Output	(continued)
• **Test Pattern Select** Test Pattern [75% Bars ▼] 75% Bars 100% Bars SMPTE Bars Tartan Pluge Ramp H Sweep ● ● ● User 1 User 2 User 3	Provides a choice of standard technical patterns, or up to three user captures (see below).
• **Flat Field Color Select** Flat Field Color [Black ▼] Black 50% Gray White Red Blue Yellow Green	Where **Flat Field** is selected for **Output Mode**, provides a choice of flat field colors.
• **Output Video Reference Offset Controls** Vertical (Lines) -1124 Horizontal (us) -64.000	Provides the following controls for offsetting the output video from the reference: • **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.)

Table 3-2   9960-TG2-REF1 Function Menu List — continued
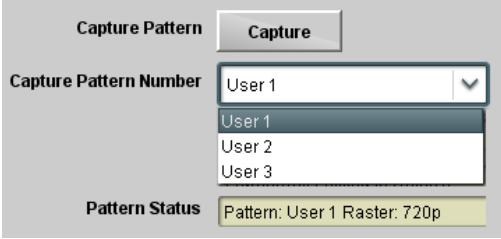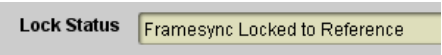
SDI Output	**(continued)**

• **User Frame Capture Control**
 	
Capture Pattern — Capture
Capture Pattern Number — User 1
   User 1
   User 2
   User 3
Pattern Status — Pattern: User 1 Raster: 720p
	Allows up to three discrete user frame captures from input video. When captured, these sources can be used for custom output test video patterns using the Test Pattern drop-down selector above.
	
	To use the Capture tool:
	1. With desired path selected, Set **Output Mode** to **Input Video**.
	
	2. Set **Capture Pattern Number** to the user space you want the capture stored in (i.e., User 1, 2, or 3).
	
	3. Press **Capture Pattern** when desired frame to be captured is present. The frame is now captured. The user capture frame can now be selected for static use by selecting User 1 thru User 3 in the Test Pattern select drop-down.
	
	Note: Because this model does not provide scaling of user captures to other formats, the format of the incoming SDI used for a capture should be that of the intended output format whenever a capture is to be used. For example, if the card is to provide a 720p 59.94 capture at a later time, set card **Output Format** to 720p 59.94 and furthermore, when frame is captured, the incoming video should also be 720p 59.94.

• **Ref Lock Status Display** Lock Status — Framesync Locked to Reference	Displays the current ref lock status and reference source.

Table 3-2　9960-TG2-REF1 Function Menu List — continued
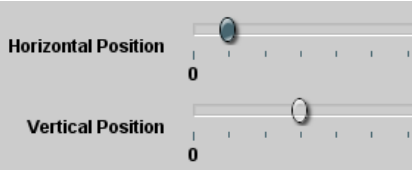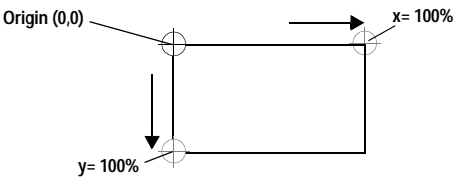
Logo Insertion	Provides controls for uploading logo/"bug" user graphics to the card and enabling insertion when desired.

Uploading Your Logo or Trouble Slate Graphic Images to Cobalt Card or BBG-1000 Device

A user memory area for images is reserved in the card/device. A standard .png file is converted to a .bin file which is uploaded to the card/device, where the .bin then provides the logo graphic used by the card/device. The conversion consists of an online tool that takes in a .png and outputs the image .bin file which is then uploaded to the card/device as described in the steps below.

Note: • Your file **must** be a **.png** file with a .png extension. The filename should not contain spaces.

　　　　• No scaling is applied or available using the generator tool. (For example, if a 100 x 100 pixel image is uploaded to the tool, the image overlay will also be 100 x 100 pixel regardless of program video format or raster dimensions.)

　　　　• Transparency aspects in your native file are preserved in the generator conversion.

Use the conversion tool as described below.

1. With your .png sized as desired for insertion, go to **http://a.cdi-eng.com:55080/cgi-bin/image_upload.py**

2. Browse to your file. A prompt will appear to save the generated .bin file. Select Save (or Save As) to store the generated file in your desired folder. Close the tool when done.

3. In DashBoard on the card/device page, click **Upload** to upload the image file to the card/device. Follow the prompts to browse to and upload the file. The image is now ready to be used by the card/device. Set **Graphic Overlay** to **Enabled** to activate insertion.

Note: **Logo** tab has identical independent controls for logo enable and insertion for both Path 1 and Path 2 using the **Path 1 / Path 2** sub-tabs.

• Logo Positioning Controls 	Sets logo burn-in position as follows: • **Horizontal Position** sets horizontal position (in percentage of offset from left of image area, left justified). (Range is 0 thru 100) • **Vertical Position** sets vertical position (in percentage of offset from top of image area, top justified). (Range is 0 thru 100)

Positioning with H and V controls at zero (origin)

Positioning with H and V controls both at 50

Table 3-2   9960-TG2-REF1 Function Menu List — continued
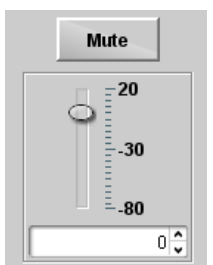
Analog Output Video / Analog Video	Provides timing and test content select controls for card Y/CVBS output.
• Output Ref Select Card Lock Mode: Reference 2 else Lock to Input Reference 1 else Lock to Input Reference 2 else Lock to Input Free Run	Selects ref lock from the choices shown to the left and described below. • **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.) **Note:** If valid reference is not received, the Card state: ○ Reference Invalid indication appears in the Card Info status portion of DashBoard™, indicating invalid frame sync reference error. **Note:** If **Lock to Input** is used for ref lock, 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. **Note:** This control is ganged with the lock mode control on the SDI Output Format/Select tab.
• Output Format Selector Output Video Format: 525i59.94 525i59.94 720p-59.94/60 1080i-59.94/60 625i50 720p50 1080i50	Sets card analog output to formats as shown. **Note:** • Analog Video Output will output only 59.94 Hz or 50 Hz frame rates. The Output Rate drop-down selector has no effect. This is true for CVBS or HD Y-channel outputs. • Analog Video Output is intended as a reference source only. The output does not currently support embedding of VITC waveform timecode or other analog VANC content.
• Output Mode Select Output Mode: Test Pattern Flat Field Test Pattern	Selects card program video output mode from the choices shown to the left and described below. • **Flat Field** – card outputs flat field. • **Test Pattern** – card outputs standard technical test pattern (pattern is selected using the Pattern drop-down described below).
• Test Pattern Select Test Pattern: 75% Bars 75% Bars 100% Bars SMPTE Bars Tartan Pluge Ramp H Sweep • • • User 1 User 2 User 3	Provides a choice of standard technical patterns, or up to three user captures.

Table 3-2   9960-TG2-REF1 Function Menu List — continued
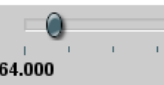
Analog Output Video Analog Output Video / Analog Video	**(continued)**
• **Flat Field Color Select** Flat Field Color [Black ▾] Black 50% Gray White Red Blue Yellow Green	Where **Flat Field** is selected for **Output Mode**, provides a choice of flat field colors.
• **Output Video Reference Offset Controls** Vertical (Lines) -1124 Horizontal (us) -64.000	Provides the following controls for offsetting the output video from the reference: • **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.)
Analog Output Video Analog Output Video / Analog Video	
• **CVBS Oversampling and Color Controls** Oversampling [Enable ▾] Color [Enable ▾]	• **Oversampling** enables or disables video DAC oversampling. Oversampling can improve rendering of motion for down-conversions to the CVBS SD analog output. • **Color** enables or disables chroma content in the CVBS output.

Table 3-2   9960-TG2-REF1 Function Menu List — continued
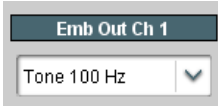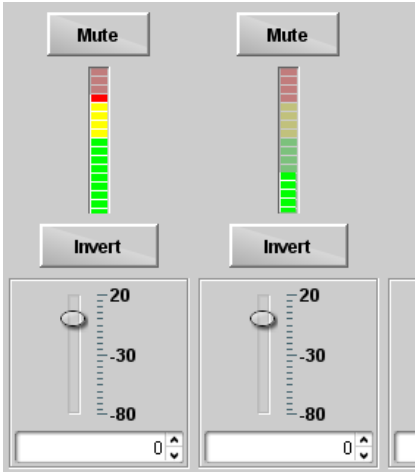
Output Audio Routing/Controls **Embedded Output Path 1**	Provides an audio crosspoint allowing the audio source selection for each embedded audio output channel. Also provides Gain, Phase Invert, and Muting controls and peak level meters for each output channel.

Note: • **Output Audio** tab has identical independent controls for both Embedded Path 1 and Path 2 using the **Path 1 / Path 2** sub-tabs. Therefore, only the **Path 1** controls are shown here. Set controls for other path using the respective sub-tab.

• **Embedded Ch 2** thru **Embedded Ch 16** have controls identical to the **Source**, **Gain**, **Mute**, and **Invert** controls described here for **Embedded Ch 1**. Therefore, only the **Embedded Ch 1** controls are shown here

• **Group Enable/Disable Controls** Group 1 Group 2 Group 3 Group 4 Enabled Enabled Enabled Enabled	Allows enable/disable of embedded audio groups 1 thru 4 on card program video output to accommodate some legacy downstream systems that may not support all four embedded audio groups. **Note:** Changing the setting of this control will result in a noise burst in all groups. This control should not be manipulated when carrying on-air content.
• **Embedded Output Channel Source** **Emb Out Ch 1** Tone 100 Hz	Using the drop-down list, selects the audio source to be embedded in the corresponding embedded output channel from the following choices: • Built-in Tone generators **Tone *n*** (-20 dBFS level tone generators with *n* being frequencies of 100, 200, 300, 400, 500, 600, 700, 800, 900, 1k, 2k, 4k, 6k, 8k, 12k, and 16k) • **LTC Path 1** / **LTC Path 2** • **Flex Bus A** thru **P** mixer sum node outputs • **Silence**
• **Channel Mute/Phase Invert/Gain Controls and Peak Level Display** Mute Mute Invert Invert 20 20 -30 -30 -80 -80 0 0	Provides **Mute** and phase **Invert** channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.) **Gain** controls allow relative gain (in dB) control for the corresponding destination Embedded Audio Group channel. (-80 to +20 dB range in 1.0 dB steps; unity = 0 dB)

Table 3-2   9960-TG2-REF1 Function Menu List — continued
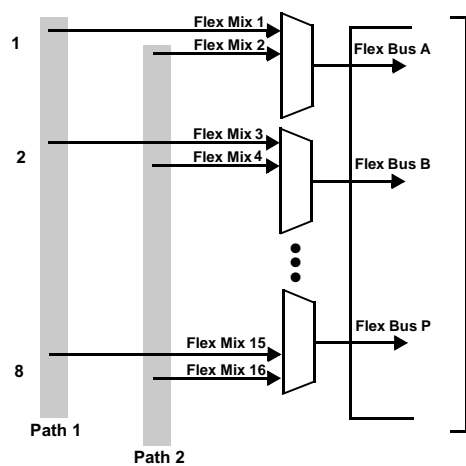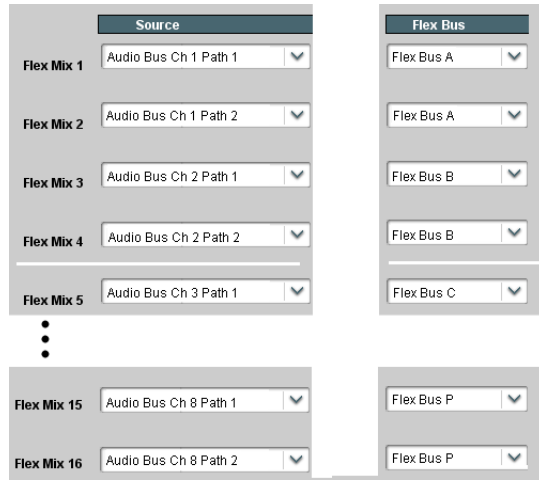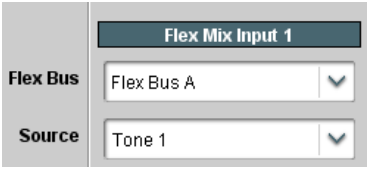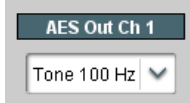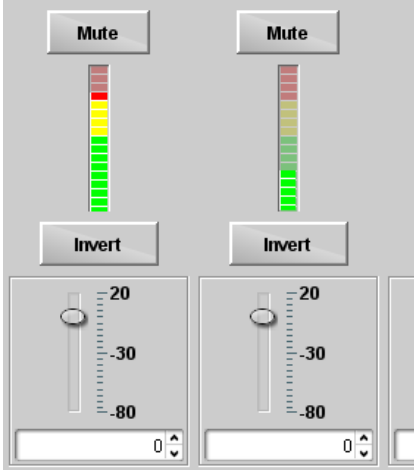
Output Flex Mix – Provides a 16-channel mixer in which each of the inputs can be mixed onto up to 16 independent output summing nodes. The input sources include audio bus channels from the card's two embedded audio paths. Each input channel has independent gain and mute controls.

In this example, audio bus channels 1 thru 8 from each path are summed with the like-channel of the other path. These summed outputs can then be outputted on any of the card's audio outputs. The output flex bus allows cross-sourcing from both Path 1 and Path 2 embedded internal Audio Bus sources to the Path 1 and Path 2 discrete output audio crosspoints.

Note: For each Flex Mix input channel, its source should be considered and appropriately set. Unused input channels should be set to the **Silence** selection.

• **Flex Bus Input Channel Source/Bus Assignment**	Using the **Source** drop-down list, selects the audio input source to be directed to the corresponding bus channel from the choices listed below.
	• **Silence** • **Tones 1** thru **16** The **Flex Bus** drop-down selects the bus (A thru P) to which the input is assigned to.
• **Gain / Mute Control** 	Provides relative gain (in dB) control and a channel **Mute** checkbox. (-80 to +20 dB range in 0.1 dB steps; unity = 0.0 dB)

Table 3-2   9960-TG2-REF1 Function Menu List — continued

Output Audio Routing/Controls ixer Path 2 AES Output	Provides an audio crosspoint allowing the audio source selection for each AES audio output channel. Also provides Gain, Phase Invert, and Muting controls and peak level meters for each output channel.
Note: • **AES Out Ch 2** has controls identical to the **Source**, **Gain**, **Mute**, and **Invert** controls described here for **AES Out Ch 1**. Therefore, only the **AES Out Ch 1** controls are shown here. • For each channel, its source and destination should be considered and appropriately set. Unused destination channels should be set to the **Silence** selection.	
• **AES Output Channel Source** AES Out Ch 1 Tone 100 Hz ∨	Using the **Path 1 Source** and **Path 2 Source** drop-down lists, selects the audio input source to be routed to the corresponding AES output channel from the choices listed below. Apply the desired path selection using the **Path** toggle button. • Built-in Tone generators **Tone *n*** (-20 dBFS level tone generators with *n* being frequencies of 100, 200, 300, 400, 500, 600, 700, 800, 900, 1k, 2k, 4k, 6k, 8k, 12k, and 16k) • **LTC Path 1** / **LTC Path 2** • **Flex Bus A** thru **P** mixer sum node outputs • **Silence**
• **Channel Mute/Phase Invert/Gain Controls and Peak Level Display** 	Provides **Mute** and phase **Invert** channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.) **Gain** controls allow relative gain (in dB) control for the corresponding destination AES output channel. (-80 to +20 dB range in 1.0 dB steps; unity = 0 dB)

Table 3-2   9960-TG2-REF1 Function Menu List — continued
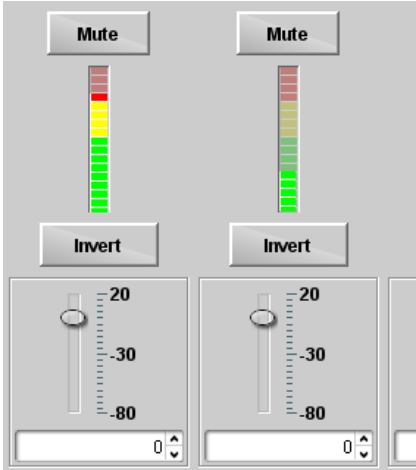
Output Audio Routing/Controls Analog Audio Out	Provides an audio crosspoint allowing the audio source selection for each analog audio output channel. Also provides Gain, Phase Invert, and Muting controls and peak level meters for each output channel.
• **Analog Output Channel Source** AN Out Ch 1 Tone 100 Hz	Using the **Source** drop-down list, selects the audio input source to be routed to the corresponding analog audio output channel from the following choices: • Built-in Tone generators **Tone** *n* (-20 dBFS level tone generators with *n* being frequencies of 100, 200, 300, 400, 500, 600, 700, 800, 900, 1k, 2k, 4k, 6k, 8k, 12k, and 16k) • **LTC Path 1** / **LTC Path 2** • **Flex Bus A** thru **P** mixer sum node outputs • **Silence**
• **Channel Mute/Phase Invert/Gain Controls and Peak Level Display** Mute Mute Invert Invert 20 20 -30 -30 -80 -80 0 0	Provides **Mute** and phase **Invert** channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.) **Gain** controls allow relative gain (in dB) control for each corresponding destination analog audio out channel. (-80 to +20 dB range in 1.0 dB steps; unity = 0 dB)

Table 3-2   9960-TG2-REF1 Function Menu List — continued

Clock	Provides controls for setting device time.
• Clock Mode / Set Controls Card Time — 02:18:04 PM Clock Mode — 12 Hour (AM/PM) Clock Source — Sync with NTP Local Timezone (NTP Only) — US Central	Allows clock time and display mode to be set as follows: • **Clock Mode** selects between 24-hour ("military") time, or time using AM and PM designations. • **Clock Source** selects user-entered arbitrary time or NTP-synced time. • **Local Timezone** provides timezone offsets for localization when using NTP time. • **Card Time** display shows the currently configured running wall-clock time (whether set as user-entered arbitrary time or NTP-synced time). **Note:** NTP syncing is only done at various intervals. To invoke resyncing, power-cycle to card to immediately sync with NTP.
• NTP Clock Setup Clock Setup NTP IP (use 0.0.0.0 for pool NTP) — 0.0.0.0 Local Timezone (NTP Only) — US-Central NTP Status — Synchronized with NTP Use Network Interface for NTP — ☑ Use Frame Network Card for NTP — ☐	Allows device NTP clock IP source and localization. This is the clock/time device will use for logs and other recorded actions. • **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.

Table 3-2   9960-TG2-REF1 Function Menu List — continued
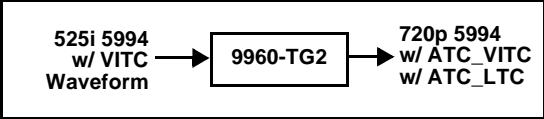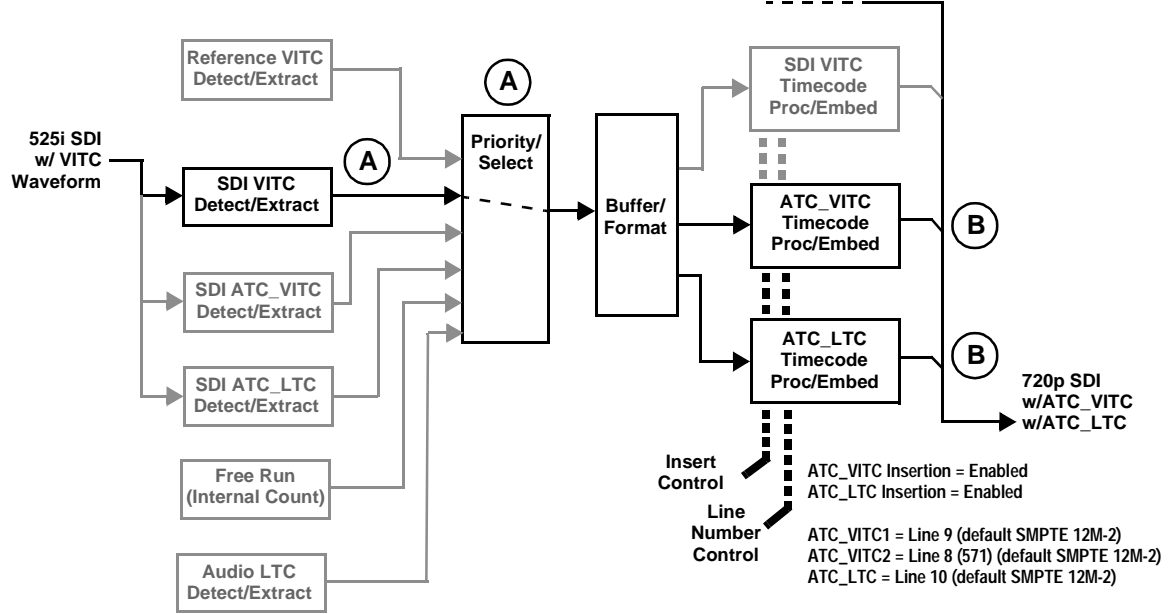
Timecode	Provides timecode data formatting and insertion controls for inserting the timecode into the output video.

Note: **Timecode** tab has identical independent controls for both Path 1 and Path 2 using the **Path 1 / Path 2** sub-tabs. Therefore, only the **Path 1** controls are shown here. Set controls for other path using the respective sub-tab.

Shown below is an example in which received 525i 5994 SDI video is being up-converted to 720p 5994. To re-format and insert the timecode data, the following can be performed using the Timecode function. Each Timecode control is fully described on the pages that follow.

(**A**) Noting that the incoming video contains VITC waveform timecode data (as shown in the status display), set the Source Priority drop-down lists to include VITC Waveform timecode data (**Input VITC**) as a choice. This extracts VITC Waveform timecode data from the incoming video.

(**B**) In this example, it is desired to provide both SDI ATC_VITC and ATC_LTC timecode data in the converted HD output video. As such, set both **HD ATC VITC Insertion** and **HD ATC LTC Insertion** to **Enabled**.

In the example here, the line numbers are set to the default SMPTE 12M-2-2008 recommended values.
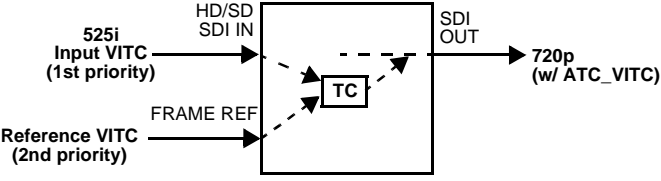
Table 3-2   9960-TG2-REF1 Function Menu List — continued
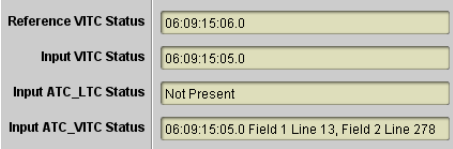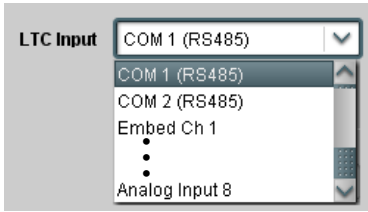
Timecode	(continued)
Audio LTC controls described below allows audio LTC from an audio channel to be used as a timecode source, with conversion to a selected SMPTE 12M format on the output video.	
• **Timecode Source Status Displays** Reference VITC Status: 06:09:15:06.0 Input VITC Status: 06:09:15:05.0 Input ATC_LTC Status: Not Present Input ATC_VITC Status: 06:09:15:05.0 Field 1 Line 13, Field 2 Line 278	Displays the current status and contents of the four supported external timecode formats shown to the left. • If a format is receiving timecode data, the current content (timecode running count and line number) is displayed. • If a format is not receiving timecode data, Not Present is displayed.
• **LTC Input Control** LTC Input: COM 1 (RS485) COM 1 (RS485) COM 2 (RS485) Embed Ch 1 • • • Analog Input 8	Selects source to be used by card to **receive** LTC as listed below. • RS-232/485 over COM1 or COM 2 • Audio LTC over Emb Ch 1 thru Ch 16 • Audio LTC over AES Ch 1 thru Ch 16 • Audio LTC over Analog audio Ch 1 thru Ch 8 **Note:** • **Audio LTC Source** must be appropriately set for card to receive and process received LTC. • If COM 1 or COM 2 is used for LTC receive, the port function must be set for LTC. See COMM Ports Setup Controls (p. 3-41) for more information. • Card audio inputs will not center inputs with DC offset. If input has DC offset, the source may need to be capacitively coupled to remove the offset.

• **Mute LTC Control**
 	
Mute LTC Audio on input loss: **Enabled**
	Allows LTC audio or RS-485 output to mute upon loss of selected timecode inputs.
	• When set to **Enabled** and input timecode is lost:
	  • RS-485 LTC output goes to frozen state.
	  • Audio LTC output mutes.
	
	• When set to **Disabled** and input timecode is lost:
	  • RS-485 LTC output keeps counting, with count value being free-run count.
	  • Audio LTC output is not muted, with count value being free-run count.
	
	Note: If muting upon loss of a particular input format is desired, set all **Source Priority 1** thru **4** to that particular input format. If this is not done, the card failover timecode selection may substitute another format choice for the format not being received.

• **Incoming ATC Packet Removal Control** Incoming ATC Packet Removal: **Disabled**	Enables or disables removal of existing input video ATC timecode packets from the output. This allows removal of undesired existing timecodes from the output, resulting in a "clean slate" where only desired timecodes are then re-inserted into the output. (For example, if both SDI ATC_VITC and ATC_LTC are present on the input video, and only ATC_LTC is desired, using the Removal control will remove both timecodes from the output. The ATC_LTC timecode by itself can then be re-inserted on the output using the other controls discussed here.) **Note:** When the Scaler is enabled, ATC packets are automatically removed. The Timecode function must be used to re-insert the timecode data into the output video.

Table 3-2   9960-TG2-REF1 Function Menu List — continued
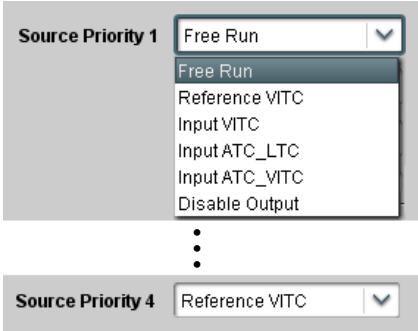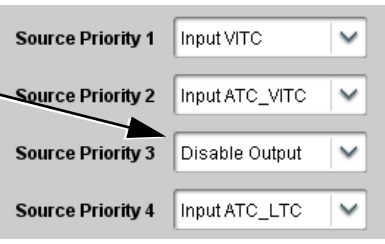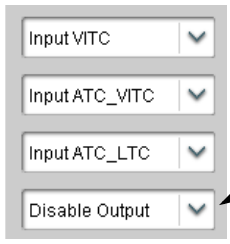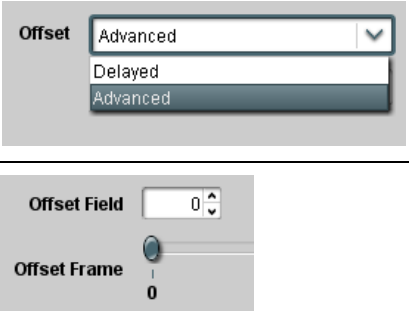
Timecode	**(continued)**

• Source Priority

Source Priority 1 [Free Run ▾]

> Free Run
> Reference VITC
> Input VITC
> Input ATC_LTC
> Input ATC_VITC
> Disable Output

Source Priority 4 [Reference VITC ▾]

Selects the priority assigned to each of the four supported external formats, and internal Free Run in the event the preferred source is unavailable.

Source Priority 1 thru **Source Priority 4** select the preferred format to be used in descending order (i.e., Source Priority 2 selects the second-most preferred format, and so on. See example below.)

```
                    HD/SD
                    SDI IN          SDI
  525i                            OUT
  Input VITC    ───────►┌──────┐──────►  720p
  (1st priority)        │   ╲ ╱ │          (w/ ATC_VITC)
                        │  ┌──┐ │
               FRAME REF│  │TC│ │
  Reference VITC────────►  └──┘ │
  (2nd priority)        └──────┘
```

In this example, **Input VITC** 1st priority selection selects SDI VITC (received on SDI input) over reference VITC (received on frame reference) regardless of video input material source to be processed by the card.

The selected timecode source is embedded on the SDI video output (in this example, 720p) using the selected line number. In this example, if the SDI VITC on the SDI input becomes unavailable, the card then uses the reference VITC data received on the frame reference.

Note: Disable Output setting should be used with care. If Disable Output is selected with alternate intended format(s) set as a lower priority, the card will indeed disable **all** timecode output should the ordinate preferred format(s) become unavailable.

Typically, choices other than Disable should be used if a timecode output is always desired, with Disable only being used to remove all timecode data.

In this example, even though and ATC_LTC could be available to substitute for ATC_VITC not being present, the card will revert to no timecode output since the choice of Disable Output "out-prioritizes" ATC_LTC with these settings.

Source Priority 1	Input VITC
Source Priority 2	Input ATC_VITC
Source Priority 3	Disable Output
Source Priority 4	Input ATC_LTC

Input VITC
Input ATC_VITC
Input ATC_LTC
Disable Output

The choices shown here will allow ATC_LTC to "out-prioritize" Disable Output if ATC_VITC is not available.

• Offset Controls

Offset [Advanced ▾]
> Delayed
> Advanced

Offset Field [0 ▴▾]

Offset Frame [━━●━━━━━] 0

Allows the current timecode count to be advanced or delayed on the output video.

• **Offset Advance** or **Delay** selects offset advance or delay.

• **Offset Field** delays or advances or delays timecode by one field.

• **Offset Frame** delays or advances or delays timecode by up to 5 frames.

Note: Default settings are null, with both controls set at zero as shown.

Table 3-2   9960-TG2-REF1 Function Menu List — continued

Timecode	**(continued)**

• **Output Status Display**
 	
Output Status `00:04:46:06.1 (Source: SDI VITC)`
	Displays the current content and source being used for the timecode data as follows:
	
	Output Status `00:04:46:06.1 (Source: SDI VITC)`
	
	• Output status OK (in this example, SDI VITC timecode received and outputted).
	
	Output Status `Insertion Disabled`
	
	• **Timecode Insertion** button set to **Disabled**; output insertion disabled.
	
	Note: • If timecode is not available from Source Priority selections performed, timecode on output reverts to Free Run (internal count) mode.
	
	• Because the 1's digit of the display Frames counter goes from 0 to 29, the fractional digit (along with the 1's digit) indicates frame count as follows:
	  0.0 Frame 0
	  0.1 Frame 1
	  1.0 Frame 2
	  1.1 Frame 3
	   •
	   •
	   •
	  29.1 Frame 59

• **Audio LTC Output**	Audio LTC output is routed to desired embedded, AES, or analog audio outputs using the Output Audio Routing/Controls (p. 3-18). Whatever timecode is displayed on the Output Status is converted to audio LTC and available as an LTC audio output.
Note: • Although the output line drop-down on the controls described below will 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. See Ancillary Data Line Number Locations and Ranges (p. 3-9) for more information. • The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data.	
• **SD VITC Waveform Insertion Controls** SD VITC Waveform Output 1 Line Number `14` SD VITC Waveform Output 2 Line Number `16` SD VITC Waveform Insertion `Enabled`	For SD output, enables or disables SD VITC waveform timecode insertion into the output video, and selects the VITC1 and VITC2 line numbers (6 thru 22) where the VITC waveform is inserted. **Note:** • If only one output line is to be used, set both controls for the same line number. • **SD VITC Waveform Insertion** control only affects VITC waveforms inserted (or copied to a new line number) by this function. An existing VITC waveform on an unscaled SD SDI stream is not affected by this control and is passed on an SDI output.
• **SD ATC Insertion Control** SD ATC_VITC Insertion `Enabled` SD ATC Insertion Line `13 - SMPTE 12M-2-2008 Recommended`	For SD output, enables or disables SD ATC_VITC timecode insertion into the output video, and selects the line number for ATC_VITC.

Table 3-2   9960-TG2-REF1 Function Menu List — continued
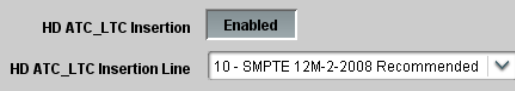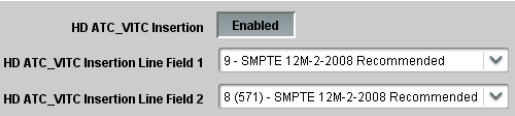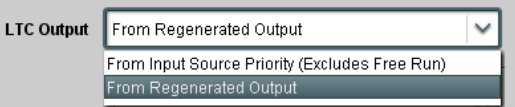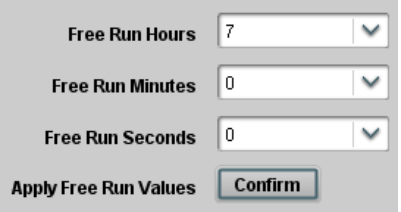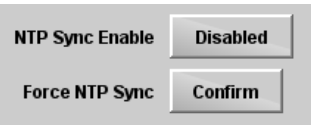
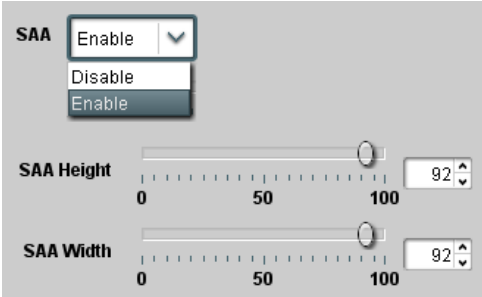|	
Timecode	**(continued)**
• HD ATC_LTC Insertion Control HD ATC_LTC Insertion Enabled HD ATC_LTC Insertion Line 10 - SMPTE 12M-2-2008 Recommended	For HD output, enables or disables ATC_LTC timecode insertion into the output video, and selects the line number for ATC_LTC timecode data.
• HD ATC_VITC Insertion Control HD ATC_VITC Insertion Enabled HD ATC_VITC Insertion Line Field 1 9 - SMPTE 12M-2-2008 Recommended HD ATC_VITC Insertion Line Field 2 8 (571) - SMPTE 12M-2-2008 Recommended	For HD output, enables or disables ATC_VITC timecode insertion into the output video, and selects the line number for ATC_VITC1 and ATC_VITC2.
• ATC_VITC Legacy Support Control ATC VITC Legacy Support Disabled	When enabled, accommodates equipment requiring ATC_VITC packet in both fields as a "field 1" packet (non-toggling). **Note:** Non-toggling VITC1 and VITC2 packets do not conform to SMPTE 12M-2-2008 preferences. As such, ATC_VITC Legacy Support should be enabled only if required by downstream equipment.
• LTC Out Source Select LTC Output From Regenerated Output From Input Source Priority (Excludes Free Run) From Regenerated Output	Selects LTC source from Input Video or from Regenerated Output.
• Free Run Timecode Controls Free Run Hours 7 Free Run Minutes 0 Free Run Seconds 0 Apply Free Run Values Confirm	Allows an initial (starting) count to be applied to output video timecode when Free Run insertion is enabled. **Note:** • Initialization can only be applied when card is outputting Free Run timecode (as shown by Output Status displaying "Free Run"). • If failover to Free Run occurs due to loss of external timecode(s), the Free Run count assumes its initial count from the last valid externally supplied count.
• NTP Sync Controls NTP Sync Enable Disabled Force NTP Sync Confirm	Allows output timecode to be synced to card NTP (received from frame). Force NTP Sync forces timecode to sync at next available instance. **Note:** Card must be using clock synced with NTP in order for NTP synced timecode. See Clock (Wall-Clock Time/LTC) Controls (p. 3-22) for more details.

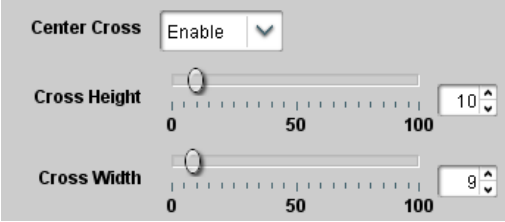*Table 3-2   9960-TG2-REF1 Function Menu List — continued*
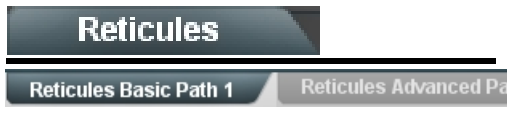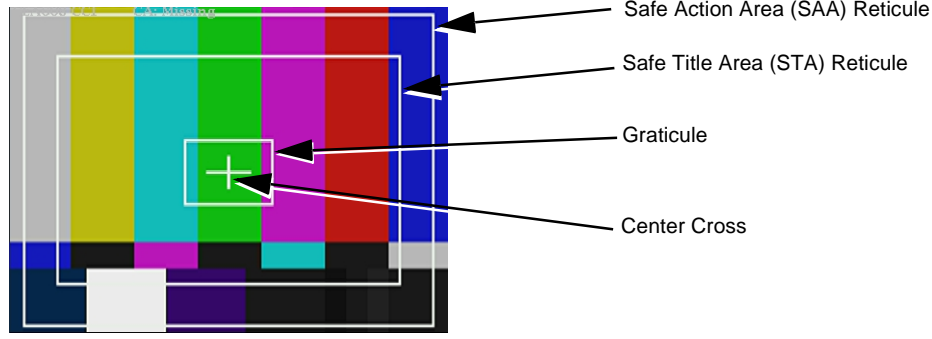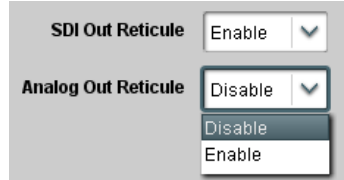
Reticules Reticules Basic Path 1 Reticules Advanced Pa	Allows Safe Action and/or Safe Title overlays and other static markers to be added to the output video image.

Note: Reticules tab has identical independent controls for both Path 1 and Path 2 using the **Path 1 / Path 2** sub-tabs. Therefore, only the **Path 1** controls are shown here. Set controls for other path using the respective sub-tab.

Typical Reticule/Overlay Marker Insertions
The 9960-TG2-REF1 allows any combination of the reticule/overlay markers to be applied to the output video. Sizing and other characteristics for each type of marker can be set as described below.

Safe Action Area (SAA) Reticule

Safe Title Area (STA) Reticule

Graticule

Center Cross

Note: • Overlay markers using this function are for setup only. When enabled, these markers are embedded in the output video and will appear in the image. Use this function **only** on preview video and not on-air video. Make certain any overlay tools are turned **off** when no longer needed.

• Multiple overlay markers described below can be simultaneously enabled as desired.

• Insertion Master Enable/Disable **SDI Out Reticule** Enable **Analog Out Reticule** Disable Disable Enable	Provides independent master enable/disable for card SDI and CVBS outputs. • When enabled, any combination of reticules or other markers described below can be inserted. • When disabled, insertion of all reticules or other markers is disabled.
• Safe Action Area (SAA) Controls **SAA** Enable Disable Enable **SAA Height** 0 50 100 92 **SAA Width** 0 50 100 92	• **SAA** provides enable/disable of safe action area graticule insertion. • **SAA Height** and **SAA Width** control height and width of insertion (from 0% to 100% of 4:3 outputted image area). **Note:** Reticule Size control is locked to Custom for this card, with safe action area size control as described above.

Table 3-2   9960-TG2-REF1 Function Menu List — continued

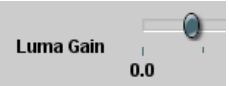|	
Reticules Reticules Basic Path 1 Reticules Advanced Pat	**(continued)**
• Safe Title Area (STA) Controls STA [Enable ⌄] Disable Enable STA Height [slider] 92 0 50 100 STA Width [slider] 92 0 50 100	• **STA** provides enable/disable of safe title area graticule insertion. • **STA Height** and **STA Width** control height and width of insertion (from 0% to 100% of 4:3 outputted image area).
• Overlay Color Controls Overlay Color [White ⌄] Inverse Color [Disable ⌄] Opacity [slider] 100 0 50 100 Thickness [slider] 2 1 6 12	• **Overlay Color** selects from white, various gray fills, or black colors. • **Inverse Color** selects inversion (negative) of current selection. • **Opacity** sets the opacity of the overlay for both white/black and inverse color modes. • **Thickness** sets the line thickness (in pixels).
[color bar image] ← White overlay color [color bar image] ← Black overlay color	
Reticules ath 1 Reticules Advanced Path 1	Provides insertion and sizing controls for custom graticules and other markers. Also provides NTSC legacy 4:3 master reticule sizing.
Note: Color attributes of markers described below are set using the master Overlay Color Controls described above.	
• Graticule Controls Graticule [Enable ⌄] Graticule Height [slider] 20 0 50 100 Graticule Width [slider] 20 0 50 100	• **Graticule** provides enable/disable of user graticule insertion. • **Graticule Height** and **Width** control height and width of insertion (from 0% to 100% of 4:3 outputted image area).

Table 3-2   9960-TG2-REF1 Function Menu List — continued

Reticules ath 1 Reticules Advanced Path 1	**(continued)**
• Center Cross Controls Center Cross Enable Cross Height � 10 0 50 100 Cross Width � 9 0 50 100	• **Center Cross** provides enable/disable of center cross insertion. • **Cross Height** and **Width** control height of vertical line and width of horizontal line (from 0% to 100% of 4:3 outputted image area).
• Horizontal Line Controls Horizontal Line Enable Hor Line Size 40 0 50 100 Hor Line Pos 50 0 50 100	• **Horizontal Line** provides enable/disable of horizontal line insertion. • **Horizontal Line Size** controls the width of the horizontal line (from 0% to 100% of 4:3 outputted image area). • **Horizontal Line Pos** controls the vertical positioning of the horizontal line (from 0% to 100% of 4:3 outputted image area).
• Vertical Line Controls Vertical Line Enable Ver Line Size 40 0 50 100 Ver Line Pos 50 0 50 100	• **Vertical Line** provides enable/disable of vertical line insertion. • **Vertical Line Size** controls the height of the vertical line (from 0% to 100% of 4:3 outputted image area). • **Vertical Line Pos** controls the horizontal positioning of the line (from 0% to 100% of 4:3 outputted image area).
• NTSC Legacy Reticule Fixed Control NTSC Legacy Enable Disable Enable	When set to enable, provides fixed-size safe action area 4:3 reticule suited for CRT-based displays.

Table 3-2   9960-TG2-REF1 Function Menu List — continued
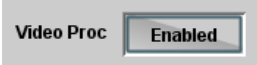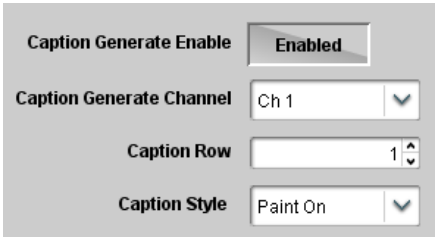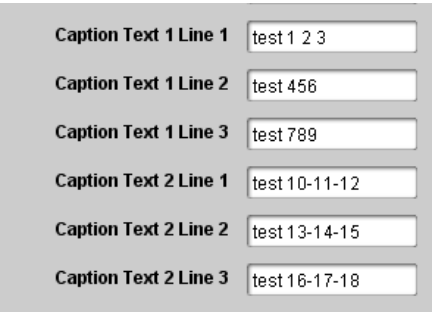
Video Proc	Provides the following Video Proc parametric controls.

Note: **Video Proc** tab has identical independent controls for both Path 1 and Path 2 using the **Path 1 / Path 2** sub-tabs. Therefore, only the **Path 1** controls are shown here. Set controls for other path using the respective sub-tab.

• **Video Proc** Video Proc Enabled	**Video Proc (Enable/Disable)** provides master on/off control of all Video Proc functions. • When set to **Disable**, Video Proc is bypassed. • When set to **Enable**, currently displayed parameter settings take effect.
• **Reset to Unity** Reset to Unity Confirm	**Reset to Unity** provides unity reset control of all Video Proc functions. When Confirm is clicked, a **Confirm?** pop-up appears, requesting confirmation. • Click **Yes** to proceed with the unity reset. • Click **No** to reject unity reset.
• **Luma Gain** Luma Gain 0.0	Adjusts gain percentage applied to Luma (Y channel). (0% to 200% range in 0.1% steps; unity = 100%)
• **Luma Lift** Luma Lift -100.0	Adjusts lift applied to Luma (Y-channel). (-100% to 100% range in 0.1% steps; null = 0.0%)
• **Color Gain** Color Gain 0.0	Adjusts gain percentage (saturation) applied to Chroma (C-channel). (0% to 200% range in 0.1% steps; unity = 100%)

Table 3-2   9960-TG2-REF1 Function Menu List — continued

Video Proc	**(continued)**
• **Color Phase** Color Phase -360.0	Adjusts phase angle applied to Chroma. (-360° to 360° range in 0.1° steps; null = 0°)
• **Gang Luma/Color Gain** Gang Luma/Color Gain On	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.

Closed Captioning	Provides support for closed captioning generator setup. Closed captioning tool inserts S334-1 CDP(708) on line 9 of output SDI video.

Note: • Closed captioning generator is intended only for test pattern or user pattern insertions, and not input video.

        • **Closed Captioning** tab has identical independent controls for both Path 1 and Path 2 using the respective **Path 1 / Path 2** sub-tabs. Therefore, only the **Path 1** controls are shown here. Set controls for other path using the respective sub-tab.

• **Closed Captioning Setup/Insertion Controls** Caption Generate Enable Enabled Caption Generate Channel Ch 1 Caption Row 1 Caption Style Paint On	Provides controls for selecting channel, scroll style and master enable/disable as follows: • **Enable** sets captioning enabled (insert packets on line 9) or disable (no CC insertion). • **Caption Generate Channel** sets the CC channel where insertion is performed (Ch 1 thru Ch 4). • **Caption Row** selects the vertical row in which the captioning starts its scroll (1 up to 15). • **Caption Style** selects the layout style of the captioning as it appears on downstream systems capable of displaying the text as user-visible text as Paint On, Pop On, or Roll Up.
• **Caption Text Insert Fields** Caption Text 1 Line 1 test 1 2 3 Caption Text 1 Line 2 test 456 Caption Text 1 Line 3 test 789 Caption Text 2 Line 1 test 10-11-12 Caption Text 2 Line 2 test 13-14-15 Caption Text 2 Line 3 test 16-17-18	Provides user entry fields for up to six text lines. **Note:** • All normal keyboard alphanumeric characters are supported, in addition to ASCII characters (Windows ALT+*nnnn*). • Up to 126 characters can be entered.

Table 3-2   9960-TG2-REF1 Function Menu List — continued
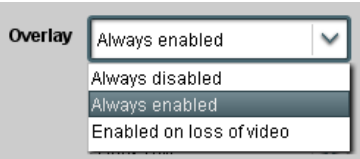
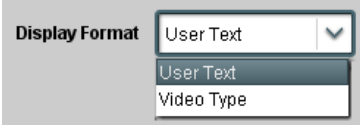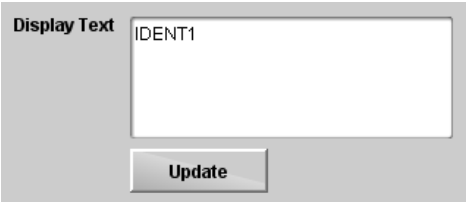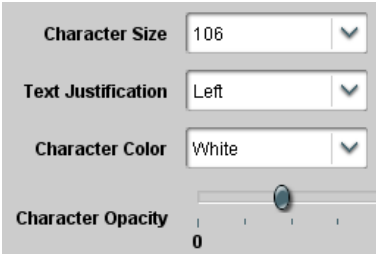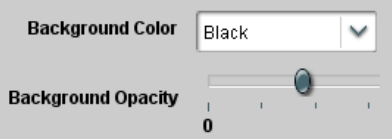|	
Character Burner Path 1 Ident 1 · Path 1 Ident 2	Provides user-configurable burn-in of up to two text strings and timecode on output video.
Note: • **Character Burner** tab has identical independent controls for both Path 1 and Path 2 using the respective **Path 1 / Path 2** sub-tabs. Therefore, only the **Path 1** controls are shown here. Set controls for other path using the respective sub-tab. • For both Path 1 and Path 2, **Ident 1** and **Ident 2** sub-tabs provide identical, independent controls for inserting two independent text (identification) burn-in overlays on each path's output video. **Ident 2** has controls identical to the controls described here for Ident 1. (Both Path 1 and Path 2 each have identical independent Ident 1 and Ident 2 insertion controls; only the Ident 1 controls are shown here.)	
• **Ident Insertion Controls** Overlay [Always enabled ▼] Always disabled Always enabled Enabled on loss of video	Selects the rules for identification text burn-in overlay insertion into output video. **Note:** If ident text insertion is desired for input LOS conditions, the card must be set to output a raster or capture to support the text insertion.
• **Display Type (Format) Select** Display Format [User Text ▼] User Text Video Type	Selects the type of data to be displayed as burn-in text from choices shown. • **User text** allows user text to be entered using field described below. • **Video type** inserts an overlay showing the video format of the input being used for processing.
• **Display (Ident) Text Entry Field** Display Text [IDENT1] [Update]	Dialog entry box that allows entry of desired ident text string. Enter desired text as click Update when done to input the text string. **Note:** • All normal keyboard alphanumeric characters are supported, in addition to ASCII characters (Windows ALT+*nnnn*). • Up to 126 characters can be entered.
• **Ident Text Attributes Controls** Character Size [106 ▼] Text Justification [Left ▼] Character Color [White ▼] Character Opacity [——0——]	Sets burn-in size/position attributes as follows: • **Character Size** sets character size (in pixels). • **Text Justification** selects from left, right, or center-aligned justification within the text box overlay. • **Character Color** selects text color. • **Character Opacity** sets text opacity from 0% (least opacity) to 100% (full opacity).
• **Ident Text Background Attributes Controls** Background Color [Black ▼] Background Opacity [——0——]	Provides independent controls for setting the color and opacity of the burn-in text and its background. • **Color** drop-down sets background color from multiple choices. • **Opacity** control sets background opacity from 0% (least opacity) to 100% (full opacity).

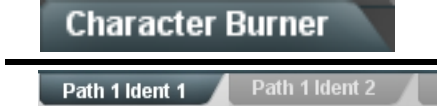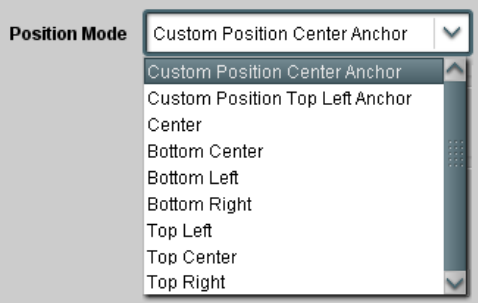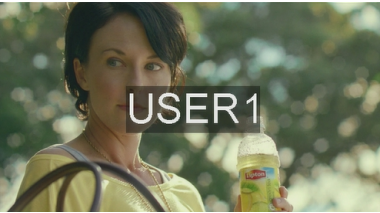***Table 3-2   9960-TG2-REF1 Function Menu List — continued***
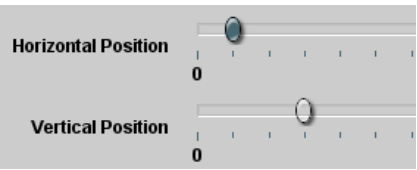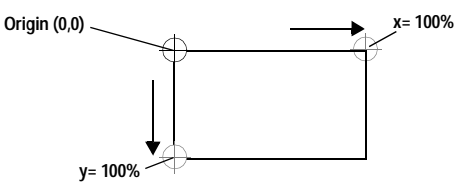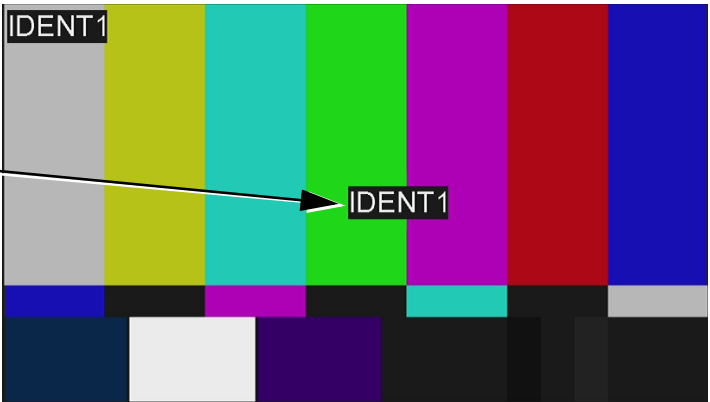
Character Burner Path 1 Ident 1 / Path 1 Ident 2	**(continued)**
• Ident Position Select Position Mode: Custom Position Center Anchor Custom Position Center Anchor Custom Position Top Left Anchor Center Bottom Center Bottom Left Bottom Right Top Left Top Center Top Right	Sets the location of the ident text insertion from choices shown or custom. (When Custom is selected, position is configured using the **Ident Text Positioning Controls** described below.) USER1 **Example:** Ident 1 text using **Top Left** position USER1 **Example:** Ident 1 text using **Center** position **Note:** For SD usage, burn-ins can impinge on and corrupt line 21 closed-captioning waveform if positioned too close to the upper right of the raster.
• Ident Text Positioning Controls Horizontal Position 0 Vertical Position 0	With Custom selected, sets burn-in position attributes as follows: • **Horizontal Position** sets horizontal position (in percentage of offset from left of image area). (Range is 0 thru 100%) • **Vertical Position** sets vertical position (in percentage of offset from top of image area, top justified). (Range is 0 thru 100%) **Note:** • Horizontal and Vertical Position controls are functional only when **Custom Position** is selected. • Character sizing and positioning for a given raster format may not be appropriate for another format (especially if transitioning from HD to SD). Set size and position for a balanced appearance (e.g., do not place text too close to margins or set larger than necessary) that accommodates both HD and SD raster formats if multiple format use is required.

Positioning with H and V controls at zero (origin) (Size = 3)

IDENT1

Positioning with H and V controls both at 50 (Size = 3)

IDENT1

Origin (0,0)   x= 100%

y= 100%

Table 3-2   9960-TG2-REF1 Function Menu List — continued

Character Burner Path 1 Ident 1 Path 1 Ident 2	**(continued)**
• **Text Box Sizing Controls** Text Box Size Auto ▾ Auto Custom Text Box Width ──●───── 0.0 Text Box Height ────●──── 0.0 Horizontal Padding ───●───── 0 Vertical Padding ────●──── 0	Provides controls for setting the size of the burn-in text background box. • **Auto** allows text box to proportionally size with selected text size. • **Custom** allows override of proportional sizing and allows text V and H dimensions to be set as desired. • **Text Box Width** and **Height** allow manual sizing when set to **Custom**. • **Custom** allows override of proportional sizing and allows text V and H dimensions to be set as desired. • **Horizontal** and **Vertical Padding** allow fine adjustment of V and H dimensions to be set when **Auto** is selected.
• **Text Box Border Enable** Border Enabled ▾ Disabled Enabled	When set to Enabled, applies a white hairline border to the text box edges.
Character Burner l Ident 2 Path 1 Timecode Burn	Provides controls for burn-in of timecode on output video.
Note: This status display mirrors the same display in the Timecode tab. Device must be set to output a timecode in order for timecode burn-in to function. See Timecode Controls (p. 3-23) for information on using timecode controls.	
• **Timecode Insertion Control** Overlay Always enabled ▾ Always disabled Always enabled Enabled on loss of video	Selects the rules for timecode burn-in overlay insertion into output video. **Note:** If timecode insertion is desired for input LOS conditions, the card must be set to provide a raster or capture to support the timecode insertion.
• **Timecode Format Display Selector** Display Format HH:MM:SS:Frame ▾ HH HH:MM HH:MM:SS HH:MM:SS:Frame HH:MM:SS:Frame:Field	Selects the format of timecode string burn-in overlay insertion into output video from choices shown.

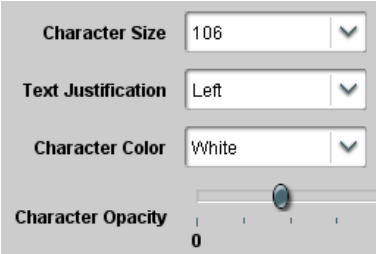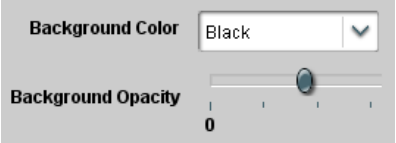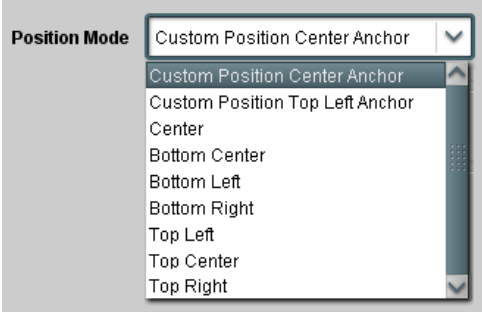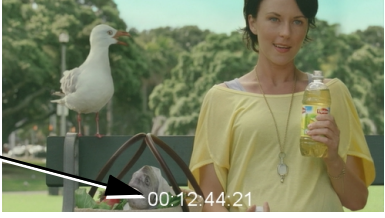***Table 3-2   9960-TG2-REF1 Function Menu List — continued***
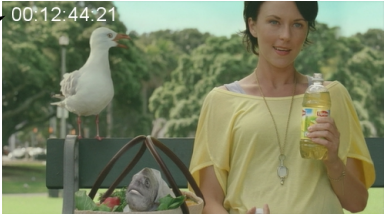
Character Burner ent 2 Path 1 Timecode Burn	**(continued)**
• **Timecode Attributes Controls** Character Size 106 Text Justification Left Character Color White Character Opacity 0	Sets burn-in size/position attributes as follows: • **Character Size** sets character size (in pixels). • **Text Justification** selects from left, right, or center-aligned justification within the text box overlay. • **Character Color** selects text color. • **Character Opacity** sets text opacity from 0% (least opacity) to 100% (full opacity).
• **Timecode Background Attributes Controls** Background Color Black Background Opacity 0	Provides independent controls for setting the color and opacity of the burn-in text and its background. • **Color** drop-down sets background color from multiple choices. • **Opacity** control sets background opacity from 0% (least opacity) to 100% (full opacity).
• **Timecode Position Select** Position Mode Custom Position Center Anchor Custom Position Center Anchor Custom Position Top Left Anchor Center Bottom Center Bottom Left Bottom Right Top Left Top Center Top Right	Sets the location of the timecode insertion from choices shown or custom. (When Custom is selected, position is configured using the **Timecode Positioning Controls** described below.) **Example:** Timecode burn-in using **Bottom Center** position 00:12:44:21 **Example:** Timecode burn-in using **Top Left** position 00:12:44:21
• **Timecode Positioning Controls** Horizontal Position 0 Vertical Position 0	With Custom selected, sets burn-in position attributes as follows: • **Horizontal Position** sets horizontal position (in percentage of offset from left of image area). (Range is 0 thru 100%) • **Vertical Position** sets vertical position (in percentage of offset from top of image area, top justified). (Range is 0 thru 100%) **Note:** • Horizontal and Vertical Position controls are functional only when **Custom Position** is selected. • Character sizing and positioning for a given raster format may not be appropriate for another format (especially if transitioning from HD to SD). Set size and position for a balanced appearance (e.g., do not place text too close to margins or set larger than necessary) that accommodates both HD and SD raster formats if multiple format use is required.

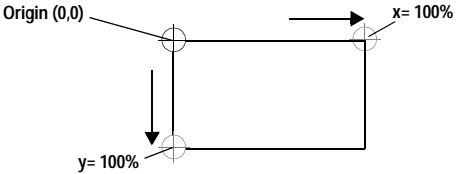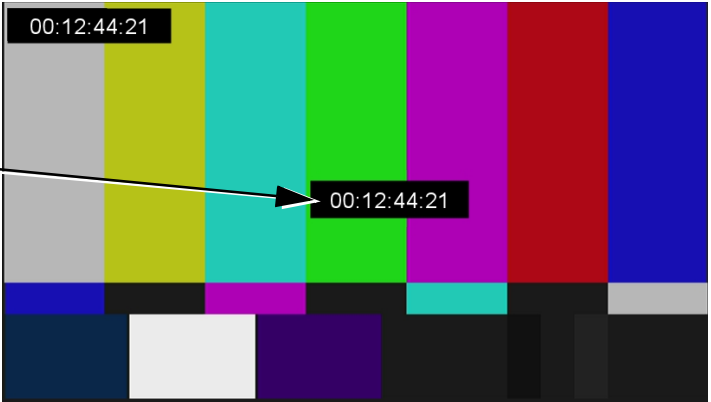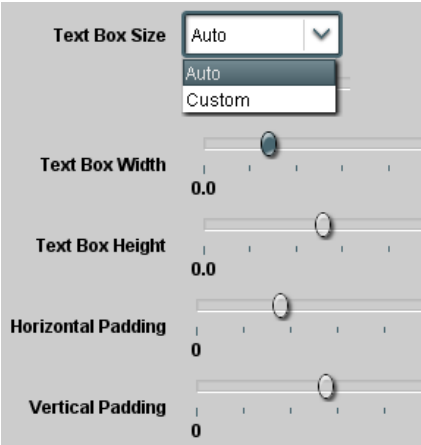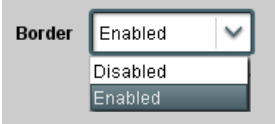*Table 3-2   9960-TG2-REF1 Function Menu List — continued*

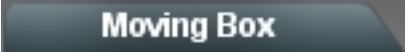| Character Burner 2 Path 1 Timecode Burn	(continued)
Positioning with H and V controls at zero (origin) (Size = 3) Positioning with H and V controls both at 50 (Size = 3) Origin (0,0) x= 100% y= 100% 00:12:44:21 00:12:44:21	
• **Text Box Sizing Controls** Text Box Size Auto Auto Custom Text Box Width 0.0 Text Box Height 0.0 Horizontal Padding 0 Vertical Padding 0	Provides controls for setting the size of the burn-in background box. • **Auto** allows text box to proportionally size with selected text size. • **Custom** allows override of proportional sizing and allows text V and H dimensions to be set as desired. • **Text Box Width** and **Height** allow manual sizing when set to **Custom**. • **Custom** allows override of proportional sizing and allows text V and H dimensions to be set as desired. • **Horizontal** and **Vertical Padding** allow fine adjustment of V and H dimensions to be set when **Auto** is selected.
• **Text Box Border Enable** Border Enabled Disabled Enabled	When set to Enabled, applies a white hairline border to the text box edges.

Table 3-2   9960-TG2-REF1 Function Menu List — continued
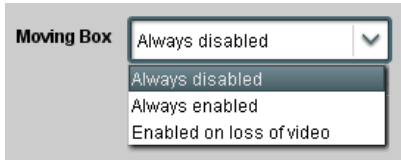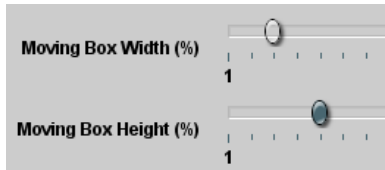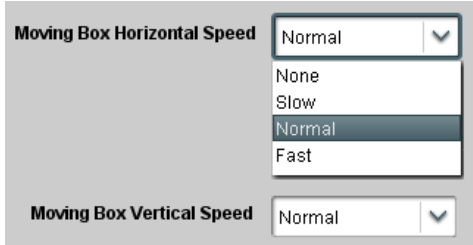
Moving Box	Provides a "moving box" graphic insertion (overlay) on the output video. Moving-box insertion can serve as a dynamic raster confidence check even in cases where the input video image is static or lost.

Note: Moving Box tab has separate independent controls for both Path 1 SDI and Path 2 SDI using the **Path 1 / Path 2** sub-tabs. Therefore, only the **Path 1** controls are shown here. Set controls for other path using the respective sub-tab.

	Moving-box insertion provides dynamic display even on static video. Attributes such as box size, color, vertical movement speed, and horizontal movement speed are all user configurable. Moving box can be set to insert continuously, or only upon loss of input.

• **Moving Box Insertion Controls** Moving Box: Always disabled / Always enabled / Enabled on loss of video	Selects the rules for moving-box overlay insertion into output video. **Note:** If moving box insertion is desired for input LOS conditions, the SDI Output > **Output Mode** control **must** be set to provide a raster (from one of the choices shown) to support the text insertion.
• **Moving Box Size Controls** Moving Box Width (%): 1 Moving Box Height (%): 1	Sets size of box image burn-in as follows: • **Moving Box Width** sets the width (as a percentage of maximum available raster width. (Range is 0% thru 40%) • **Moving Box Height** sets the height (as a percentage of maximum available raster height. (Range is 0% thru 40%) **Note:** Moving box sizing for a given raster format may not be appropriate for another format (especially if transitioning from HD to SD). Set size and position for a balanced appearance that accommodates both HD and SD raster formats if multiple format use is required.
• **Moving Box Speed Controls** Moving Box Horizontal Speed: Normal (None / Slow / Normal / Fast) Moving Box Vertical Speed: Normal	Sets speed of motion for moving box image burn-in as follows: • **Moving Box Horizontal Speed** sets the X-axis speed from choices shown. • **Moving Box Vertical Speed** sets the Y-axis speed from choices shown.

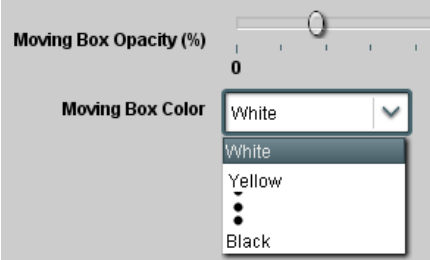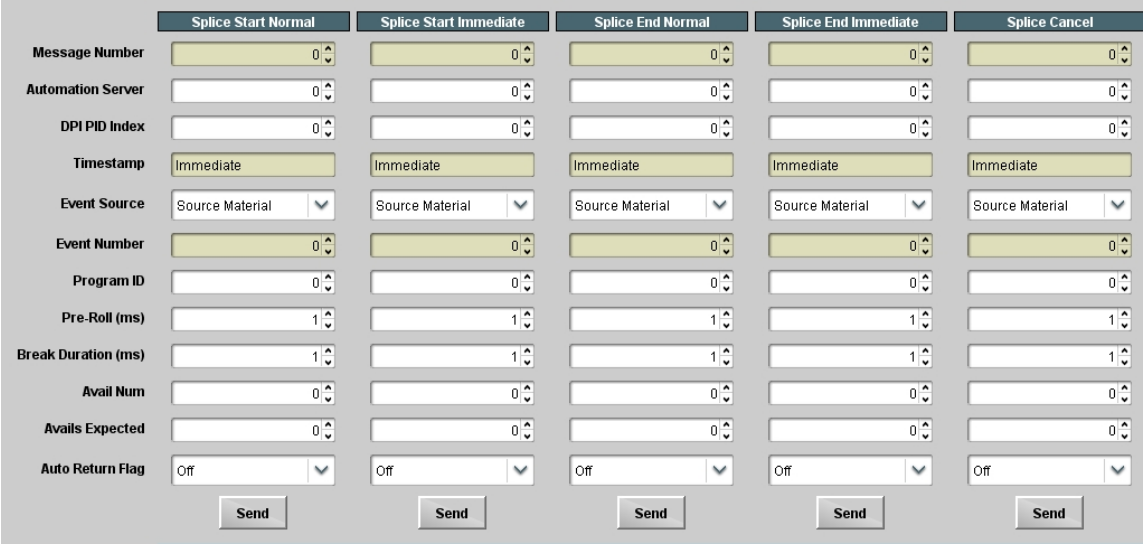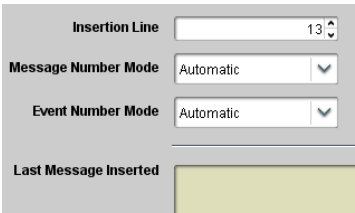***Table 3-2   9960-TG2-REF1 Function Menu List — continued***

Moving Box	**(continued)**
• **Moving Box Attributes Controls** 	Provides independent controls for setting the color and opacity of the moving-box insertion. • **Color** drop-down sets box color from multiple choices. • **Opacity** controls sets box opacity from 0% (least opacity) to 100% (full opacity).
SCTE 104 Insertion	Provides controls for inserting SCTE 104 packages into the SDI output test signal. Controls provide automation server connections, ID markers, and interstitial insertion splice padding.

Note: • Controls on this page use five columns correlating to standard SCTE 104 control protocols, with each column containing controls for each control protocol. Knowledge of using SCTE 104 protocols is assumed when using this page, as basic descriptions of SCTE 104 usage and protocol is not within the scope of this manual. SCTE 104 insertion is available only for Path 1.

• SCTE 104 actions are typically triggered using GPI commands in conjunction with the Event Setup Controls tab. See Event Setup Controls on page 3-44 for more information.

Five columns corresponding to SCTE 104 setup protocols provide setup controls for insertion of SCTE 104 ancillary data into the output SDI stream. The **Send** button for each column allows overriding any queued insertions and immediately inserting the command.

Auxiliary controls allow selecting VANC insertion line number
Message Number Mode set to Automatic allows automcatically incrementing message numbering. When set to Manual, the Event Number drop-down is enabled.
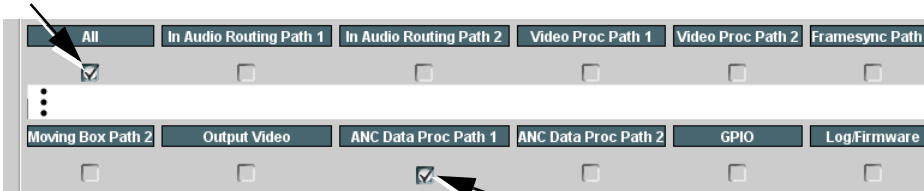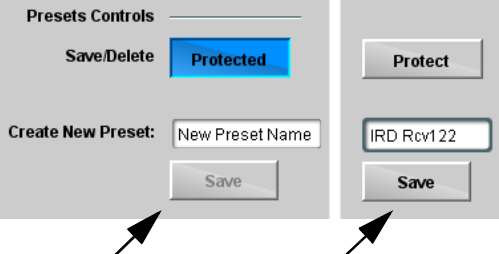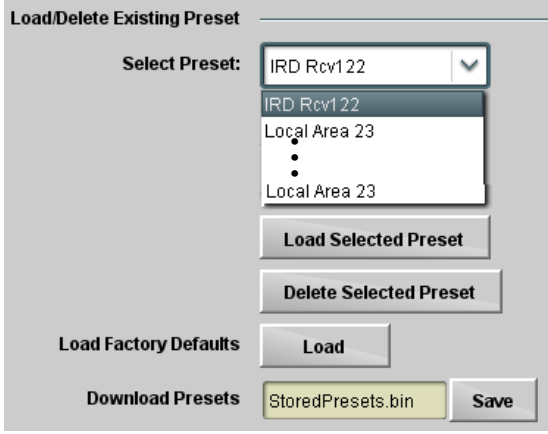
Table 3-2   9960-TG2-REF1 Function Menu List — continued

ANC Packet Insertion	Provides setup controls for inserting test packets in output SDI VANC/HANC space.

Note: **ANC Packet Insertion** tab has separate independent controls for both Path 1 SDI and Path 2 SDI using the **Path 1 / Path 2** sub-tabs. Therefore, only the **Path 1** controls are shown here. Set controls for other path using the respective sub-tab.

Insertion Mode — Single	**Insertion Mode** sets insertion instances as Single or Continuous (repetitive)
Insertion Interval (Continuous Mode Only) — 100 ms	**Insertion Interval** sets repetition rate when Continuous is selected
Insert (Single Mode Only) — **Insert**	**Insert** launches the one-time insertion when Single is selected
DID — 0x0	
SDID — 0x0	**DID/SDID/Line** sets value and line location for the ANC insertion
Line — 1	
HANC/VANC Select — Insert in VANC Space	**HANC/VANC – Y/C** sets insertion location (HANC or VANC; Y or C channel)
Y/C Channel Select — Insert in Y Channel	
Number of User Data Words — 1	**Number of User Data Words** sets number of discrete words to be inserted (up to 16 discrete words)
User Data Word 1 — 0x0	
User Data Word 2 — 0x0	**User Data Word 1 thru 16** allows setting the user-defined arbitrary value of each discrete word
• • •	
User Data Word 16 — 0x0	

Note: DashBoard versions 4.1 and earlier display and notate DID, SDID, and User Data Word numbers in decimal; newer DashBoard versions display and notate DID, SDID, and User Data Word numbers in hexadecimal. Hexadecimal notation is denoted by the "0x" preceding the value.

Table 3-2   9960-TG2-REF1 Function Menu List — continued

COM Routing **COM 1 Setup** COM 2 Setup	Provides controls for setting up the two COMM (serial) ports for LTC or ANC functions, and setting comm protocol for each port.
Note: **COM 1** and **COM 2** sub-tabs provide independent controls for COM1 and COM2. Therefore, only the **COM 1** controls are described here.	
• **COM Mode (Protocol)** **COM Mode** RS232 RS232 RS485	Selects serial comm protocol for the respective port as RS-232 or RS-485. **Note:** Protocol choices should consider the payload to be carried. Typically, LTC is sent or received using only RS-485 serial protocol.
• **COM Port Tx Routing Function** **TX Routing** LTC Encoder Path 1 LTC Encoder Path 1 LTC Encoder Path 2	Selects port function for the respective port as LTC Encoder input or output, or ANC Data Extractor input or output.
GPO Setup	Provides controls for setting up the two GPO's power-up states as well as forced manual or event action triggered.
Note: This tab has identical independent controls for **GPO 1** and **2**. Therefore, only the **GPO 1** controls are described here.	
GPO1 Current State 🟢 Closed **GPO1 Power-on State** Open Open Closed **GPO1 Control Mode** Follow Event Actions Follow Event Actions Force Open Force Closed	• **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   9960-TG2-REF1 Function Menu List — continued

Presets	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.

• Preset Layer Select

Allows selecting a functional layer (or "area of concern") that the preset is concerned with. Limiting presets to a layer or area of concern allows for highly specific presets, and masks changing card settings in areas outside of the layer or area of concern.

All	In Audio Routing Path 1	In Audio Routing Path 2	Video Proc Path 1	Video Proc Path 2	Framesync Path
☑	☐	☐	☐	☐	☐

Moving Box Path 2	Output Video	ANC Data Proc Path 1	ANC Data Proc Path 2	GPIO	Log/Firmware
☐	☐	☑	☐	☐	☐

Default **All** setting will "look" at all card settings and save all settings to the defined preset with no masking.

Selecting a layer (in the example, "ANC Data Proc Path 1") will set the preset to **only** "look at" and "touch" ANC packet insertion Path 1 settings and save these settings under the preset. When the preset is loaded (recalled), the card will only "touch" the ANC packet insertion Path 1 layer.

Example: A particular usage you need may require special custom Path 1 ANC packet insertion settings that need to be invoked regardless of other cards settings. Using a layered preset set for Path 1 ANC packet insertion only allows the special custom Path 1 ANC packet insertion settings to be invoked while not disturbing any other settings.

• Preset Enter/Save/Delete

Presets Controls
Save/Delete Protected   Protect
Create New Preset: New Preset Name   IRD Rcv122
Save   Save

Protected state – changes locked out

Ready (open) state – changes can be applied

Locks and unlocks editing of presets to prevent accidental overwrite as follows:

• **Protect (ready):** This state awaits Protected and allows preset Save/Delete button to save or delete current card settings to the selected preset. **Use this setting when writing or editing a preset.**

• **Protected:** Toggle to this setting to lock down all presets from being inadvertently re-saved or deleted. **Use this setting when all presets are as intended.**

• **Create New Preset:** Field for entering user-defined name for the preset being saved (in this example, "IRD Rcv122").

• **Save:** Saves the current card settings under the preset name defined above.

• Preset Save/Load Controls

Load/Delete Existing Preset
Select Preset: IRD Rcv122 ▼
IRD Rcv122
Local Area 23
⋮
Local Area 23
Load Selected Preset
Delete Selected Preset
Load Factory Defaults   Load
Download Presets   StoredPresets.bin   Save

• **Select Preset:** drop-down allows a preset saved above to be selected to be loaded or deleted (in this example, custom preset "IRD Rcv122").

• **Load Selected Preset** button allows loading (recalling) the selected preset. When this button is pressed, the changes called out in the preset are immediately applied.

• **Delete Selected Preset** button deletes the currently selected preset.

• **Load Factory Defaults** button allows loading (recalling) the factory default preset. When this button is pressed, the changes called out in the preset are immediately applied.

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.

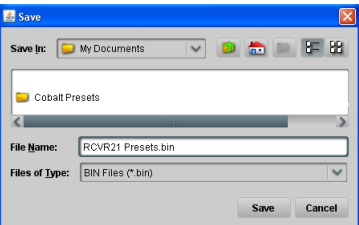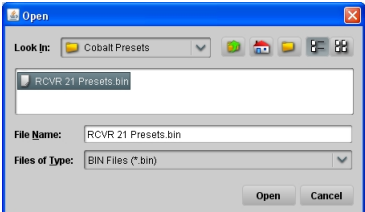***Table 3-2   9960-TG2-REF1 Function Menu List — continued***

Presets | **(continued)**

Download (save) card presets to a network computer by clicking **Download Presets – Save** at the bottom of the Presets page.

Browse to a desired save location (in this example, *My Documents\Cobalt Presets*).

The file can then be renamed if desired (*RCVR21 Presets* in this example) before committing the save.

Upload (open) card presets from a network computer by clicking **Upload** at the bottom of DashBoard.

Browse to the location where the file was saved on the computer or drive (in this example, *My Documents\Cobalt Presets*).

Select the desired file and click **Open** to load the file to the card.

Note: • 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   9960-TG2-REF1 Function Menu List — continued

Provides event-based loading allowing a defined action to be automatically engaged upon various received signal status. Actions can be "canned" control commands or user-defined by going to a user preset.

⚠ • Event based preset loading is not passive and can result in very significant and unexpected card 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 can apply card 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, although the settings are persistent across power cycles).

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.

• The **Event-Based Loading** button serves as a master enable/disable for the function.

• Go-to **Event Action:** 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. 3-47) for setting up e-mail alerts).

• Each Event (**Event 1** thru **Event 32**) can be set to screen for any or several Definer criteria as shown in the example below. Up to 32 separate events can be defined.

• Event 1 thru Event 32 are arranged with Event 1 having the highest priority, descending down to Event 32. Where multiple event screening is enabled, lower-priority events are serviced first, with the highest-priority event being the final event serviced and last action taken as well as last item logged in the Event History (see below). This helps ensure that a lower-priority event does not mask detection of higher-priority event(s).

• The **Status** indicator and message shows the activation status of each Event. Green indicator means event is currently engaged.

Event Definers
Each event can be uniquely set up for any of the condition types in these columns. Unless set to Don't Care, all defined conditions will need to be true in order for the Event to be considered active

Note: Event criteria settings in any row comprise an AND function. Where multiple criteria are selected, a true (trigger) condition is not propagated unless **all** specified criteria are true. To independently screen for multiple criteria, rows should be set up where each criteria is screened in its own Event row. Examples of this are shown on the following pages.

The **Event History** log shows any triggered events in groups of five most recent events (newest at the top).

In the example here, log shows Event 2 as the most recent event, and its user-selected action of GPO 1 Close.

Pressing the **Force Event Refresh** button updates the list.

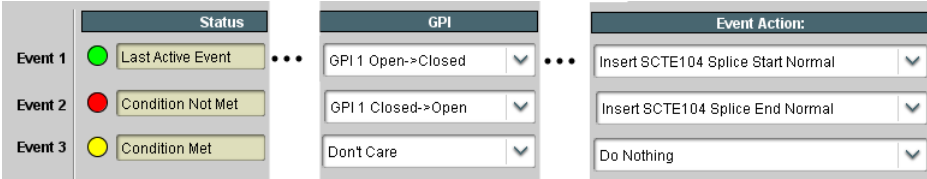*Table 3-2   9960-TG2-REF1 Function Menu List — continued*

Event Setup Event Triggers Email Alerts	**(continued)**

In the example here for Event 1, the **GPI** tab is set to screen for GPI 1 Open>Closed. When detected, this status can be used here to invoked an Insert SCTE 104 Splice Start Normal action.

Conversely, to activate a splice end, the revert GPI can be screened for detection.

	Status		GPI		Event Action:
Event 1	● Last Active Event	• • •	GPI 1 Open->Closed ▾	• • •	Insert SCTE104 Splice Start Normal ▾
Event 2	● Condition Not Met		GPI 1 Closed->Open ▾		Insert SCTE104 Splice End Normal ▾
Event 3	○ Condition Met		Don't Care ▾		Do Nothing ▾

Note: • 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.

• If a desired user preset does not appear in the Event Action drop-down, press the DashBoard **Refresh** button at the bottom of the page to update the list in the drop-down.

• 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.

• Make certain all definable event conditions that the card might be expected to "see" are defined in any of the Event 1 thru Event 32 rows. This makes certain that the card will always have a defined "go-to" action if a particular event occurs. For example, if the card 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.

• Event Actions defined using user presets must be used with care to prevent conditions that could cause looping or the removal or "override" of desired expected settings. When using presets, the Preset Layer selection should be used such that only required aspects are touched.

• Where multiple event screening is set up, the event you consider to be the highest priority should be set as higher priority than lesser events. Also, this prioritization helps ensure that all desired events are screened for before a significant change is effected.

Table 3-2 9960-TG2-REF1 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 card. 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.

GPI 1 (key) cue falling-edge sets user state 1

GPI 2 (audio) cue falling-edge sets user state 2

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

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.
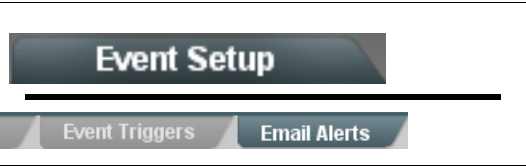
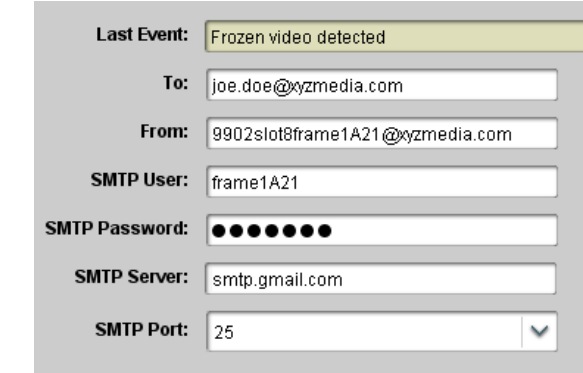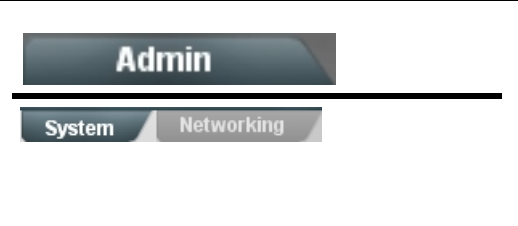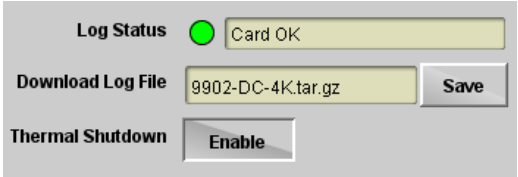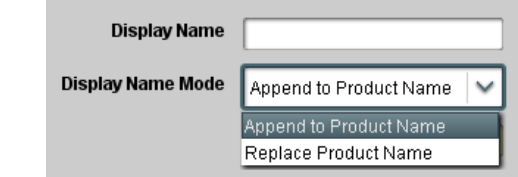***Table 3-2   9960-TG2-REF1 Function Menu List — continued***
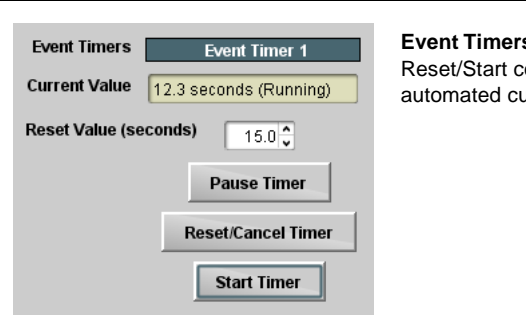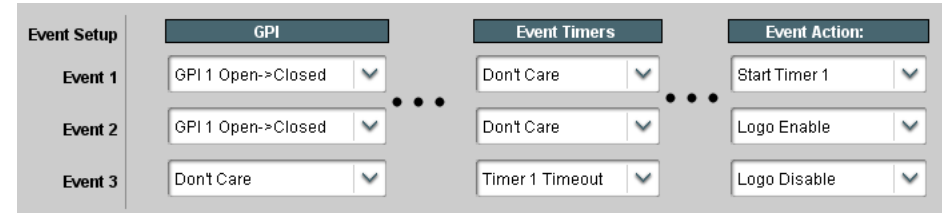
Provides three general-purpose timers that can be triggered to start, pause, reset, or stop upon event actions. The state of each timer, in turn, can also be used to invoke other actions.

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.

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.

Provides setup for automated Email alerts when an event has occurred.

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.

Note: Frame hosting the card must be accessible to email recipient's network. It is recommended to set up and generate a test event to test the email send.

When fields are filled-in to specify recipient and sender, and email alert is selected for Event Action on Event Triggers sub-tab page, recipeient receives an email alert upon event, with the triggering event shown (in this example, "frozen video detected").

Table 3-2   9960-TG2-REF1 Function Menu List — continued

Admin **System** Networking	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. Networking controls provide dedicated card networking setup in conjunction with rear module Ethernet port.
• **Log Status and Download Controls** **Log Status** ● Card OK **Download Log File** 9902-DC-4K.tar.gz **Save** **Thermal Shutdown** **Enable**	• **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). **CAUTION** **The 9960-TG2-REF1 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.**
• **Card DashBoard Name Control** **Display Name** [ ] **Display Name Mode** Append to Product Name ▼ Append to Product Name Replace Product Name	Allows card name In DashBoard to be changed as desired. Click return to engage change. • **Append to Product Name** appends (or adds to) existing OEM name (for example, "9960-TG2-REF1 *TestGen 1A*"). • **Replace Product Name** completely replaces the OEM name OEM name (for example, "*TestGen 1A*"). **Note:** DashBoard instance(s) may have to be refreshed before name change appears.

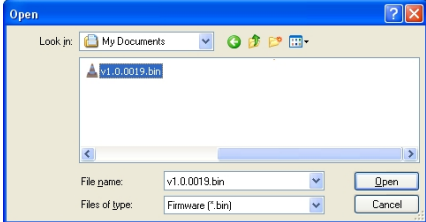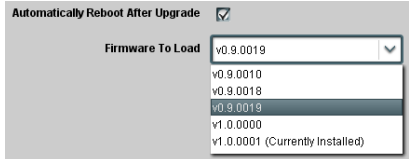*Table 3-2   9960-TG2-REF1 Function Menu List — continued*

Admin System Networking	**(continued)**
• **Firmware Upgrade Controls**	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).

> **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.

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, *My Documents\v1.0.0019.bin*).

3. Select the desired file and click **Open** to upload the file to the card.

• **Immediate firmware upload.** The card default setting of **Automatically Reboot After Upgrade** checked allow a selected firmware version to be immediately uploaded as follows:

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.

• **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).

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.

Table 3-2   9960-TG2-REF1 Function Menu List — continued
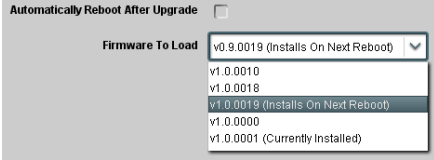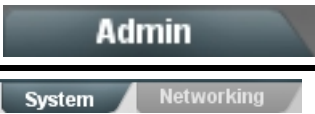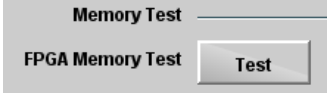
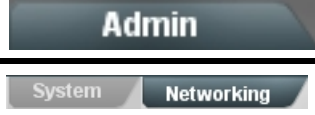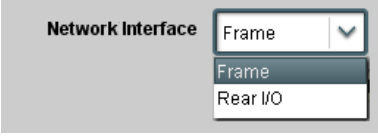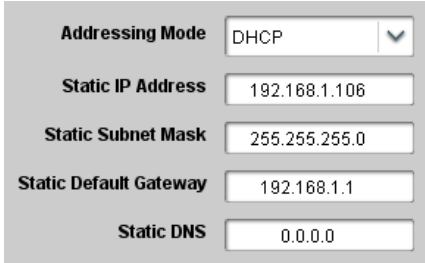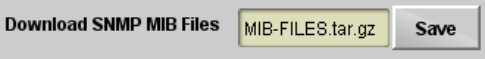|	
Admin System / Networking	**(continued)**
• Card Check and Restore Utilities Memory Test FPGA Memory Test [Test] Memory Test Status [Running Memory Test: 8.99%] Memory Test Status [Memory test completed successfully, please reboot the card] Restore From SD Card [Confirm] [Please contact support]	**Memory Test** allows all cells of the card FPGA memory to be tested. ⚠ This control should **only** be activated under direction of product support. Exercising the memory test is **not** part of normal card maintenance. **Restore from SD Card** allows card rendered inoperable to be restored using an SD memory card fitted to the card internal SD slot. ⚠ Product support must be contacted prior to performing this operation. Use of any SD card not supplied by support can corrupt the card.
Admin System / **Networking**	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.) (Dedicated card control using IP has not been fully implemented at this release. Some functions may be reserved.)
• Card IP Physical Port Select Control Network Interface [Frame ▼] Frame Rear I/O	Allows card dedicated IP interface (as set below) to use frame communications or dedicated rear I/O module Ethernet RJ-45 port. **Note:** • 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.
• Card IP Setup Controls Addressing Mode [DHCP ▼] Static IP Address [192.168.1.106] Static Subnet Mask [255.255.255.0] Static Default Gateway [192.168.1.1] Static DNS [0.0.0.0]	Provides controls for setting up card dedicated IP interface. • **Addressing Mode** selsects either DHCP or static. Where Static is selected, standard IP fields allow entry of Address, Subnet Mask, and Default Gateway.
• Card SNMP MIB Download Download SNMP MIB Files [MIB-FILES.tar.gz] [Save]	Where supported, allows card SNMP MIB files to be downloaded and saved using user-configured name.

Table 3-2　9960-TG2-REF1 Function Menu List — continued

Admin System　**Networking**	**(continued)**
• **NTP Clock Setup** Clock Setup NTP IP (use 0.0.0.0 for pool NTP)　[0.0.0.0] Local Timezone (NTP Only)　[US-Central ∨] NTP Status　[Synchronized with NTP] Use Network Interface for NTP　☑ Use Frame Network Card for NTP　☐	Allows device NTP clock IP source and localization. This is the clock/time device will use for logs and other recorded actions. 　• **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.
User Log	Provides a log of user actions and card signal input LOS conditions, with time stamp and severity level for each logged event/action.

Type categorizes the event as Info (event not propagated to card status as an error or warning message) or Warning (event consists of significant change in processing and also propagates a warning to the card state indication)

Time stamp marks the start time of the event

Event provides details of the event

Time	Type	Event
18:09:42 08/13/15	Info	SDI Input sdi_in_a Locked to 720p 59.94
18:09:41 08/13/15	Warning	SDI Input sdi_in_a Lost Lock
18:09:38 08/13/15	Info	SDI Input sdi_in_a Locked to 720p 59.94
18:09:38 08/13/15	Warning	SDI Input sdi_in_a Lost Lock
18:09:37 08/13/15	Info	SDI Input sdi_in_a Locked to 720p 59.94
18:09:02 08/13/15	Info	Log file cleared

Clear User Log　[Confirm]

Download Log File　[9960-TG2-REF1.tar.gz]　[Save]

A file of the currently displayed log can be downloaded to the host or other connected computer by clicking **Save** (which opens a browser on the connected host computer)

Troubleshooting

This section provides general troubleshooting information and specific symptom/corrective action for the 9960-TG2-REF1 card and its remote control interface. The 9960-TG2-REF1 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 9960-TG2-REF1 card itself and its remote control systems all (to varying degrees) provide error and failure indications. Depending on how the 9960-TG2-REF1 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 9960-TG2-REF1 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. 3-56)

- 9960-TG2-REF1 Processing Error Troubleshooting (p. 3-57)

- Troubleshooting Network/Remote Control Errors (p. 3-58)

9960-TG2-REF1 Card Edge Status/Error Indicators and Display

Figure 3-7 shows and describes the 9960-TG2-REF1 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.

Item	Function
Alphanumeric Display	Shows card statuses (BOOT (card booting), (9960 (card up and OK))
COM LED	Blue LED flashes when 9960-TG2-REF1 is receiving control message from remote network control (e.g., DashBoard™ or Cobalt® Remote Control Panel)
REF LED	Blue LED illuminates indicating 9960-TG2-REF1 is receiving selected reference when set up for ref locked operation.
ERR LED	This function is currently reserved.
Input Active LEDs	Blue LEDs for each SDI input (A thru D) indicate signal presence for each corresponding card SDI input. No illumination of any of the LEDs indicates the 9960-TG2-REF1 has not locked onto a valid signal on any input. **Note: IN B** thru **IN D** status is not applicable to this card model.

Figure 3-7 9960-TG2-REF1 Card Edge Status Indicators and Display

DashBoard™ Status/Error Indicators and Displays

Figure 3-8 shows and describes the DashBoard™ status indicators and displays. These indicator icons and displays show status and error conditions relating to the 9960-TG2-REF1 card itself and remote (network) communications.

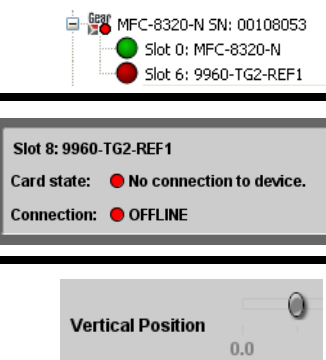| Indicator Icon or Display	Error Description
	Red indicator icon in Card Access/Navigation Tree pane shows card with Error condition (in this example, the Card Access/Navigation Tree pane shows a general error issued by the 9960-TG2-REF1 card in slot 6).
	Specific errors are displayed in the Card Info pane (in this example "No connection to device" indicating 9960-TG2-REF1 card is not connecting to frame/LAN).
	If the 9960-TG2-REF1 card is not connecting to the frame or LAN, all controls are grayed-out (as shown in the example here).
	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 9960-TG2-REF1 card in slot 6 and the MFC-8320-N Network Controller Card for its frame in slot 0 are not being seen).
	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).
	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.
	Yellow indicator icon in 9960-TG2-REF1 Card Info pane shows error alert, along with cause for alert (in this example, the 9960-TG2-REF1 is not receiving an enabled reference source).

Figure 3-8 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 3-9).

By clicking on "Slot 0: MFC-8320-N" in this example, Card Info is displayed for frame Network Controller Card

Status for selected card is shown here (in this example, connection OK and "Fan Door Open" alert)

Card general information is displayed in lower portion of Card Info pane

By clicking on "Slot 4: CDI-9960-TG2-REF1" in this example, Card Info is shown for 9960-TG2-REF1 card in slot 4

Status for selected card is shown here (in this example, all indications are OK)

Where applicable, additional status is displayed (as shown in this example)
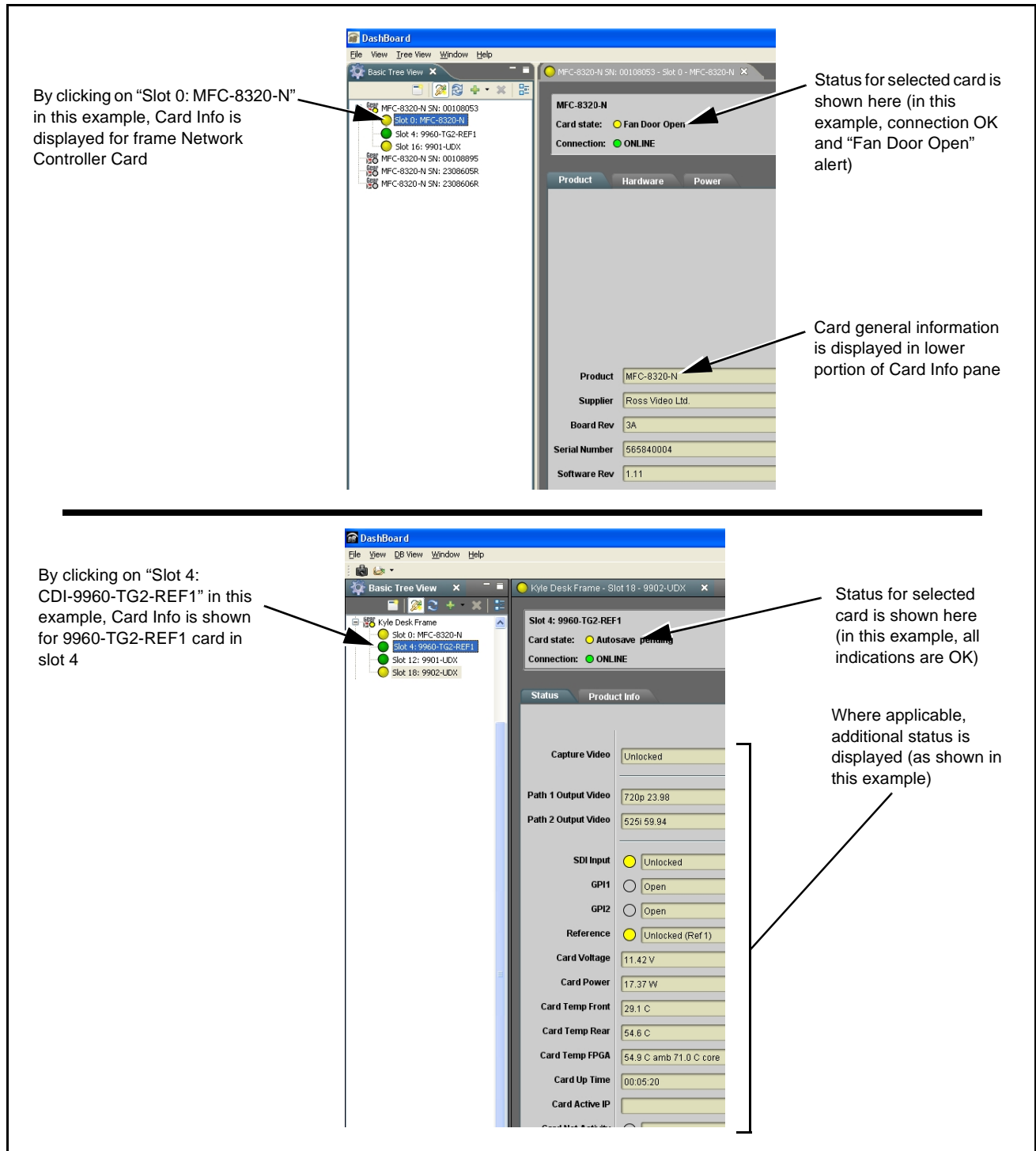
Figure 3-9 Selecting Specific Cards for Card Info Status Display

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 3-3 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 3-3   Basic Troubleshooting Checks

Item	Checks

Verify power presence and characteristics	• On both the frame Network Controller Card and the 9960-TG2-REF1, 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 9960-TG2-REF1 card. This can be observed using the DashBoard™ Card Info pane.
	  • If display shows **no** power being consumed, either the frame power supply, connections, or the 9960-TG2-REF1 card itself is defective.
	  • If display shows **excessive** power being consumed (see Technical Specifications (p. 1-15) in Chapter 1, "Introduction"), the 9960-TG2-REF1 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 9960-TG2-REF1 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.

9960-TG2-REF1 Processing Error Troubleshooting

Table 3-4 provides 9960-TG2-REF1 processing troubleshooting information. If the 9960-TG2-REF1 card exhibits any of the symptoms listed in Table 3-4, follow the troubleshooting instructions provided.

In the majority of cases, most errors are caused by simple errors where the 9960-TG2-REF1 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 9960-TG2-REF1 card edge status indicators.

Note: Where errors are displayed on both the 9960-TG2-REF1 card and network remote controls, the respective indicators and displays are individually described in this section.

Table 3-4   Troubleshooting Processing Errors by Symptom

Symptom	Error/Condition	Corrective Action
• **DashBoard™** shows **Unlocked** message in 9960-TG2-REF1 Card Info pane SDI Input A ⬤ Unlocked SDI Input B ◯ Unlocked • Card edge **Input** LED corresponding to input is not illuminated	No video input present	Make certain intended video source is connected to appropriate 9960-TG2-REF1 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 9960-TG2-REF1	• Control(s) not enabled	• Make certain respective control is set to **On** or **Enabled** (as appropriate).
	• VANC line number conflict between two or more ancillary data items	• 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).
Audio not processed or passed through card	Enable control not turned on	On **Output Audio Routing/Controls** tab, **Audio Group Enable** control for group 1 thru 4 must be turned on for sources to be embedded into respective embedded channel groups.
Selected upgrade firmware will not upload	Automatic reboot after upgrade turned off	Card **Presets** > **Automatically Reboot After Upgrade** box unchecked. Either reboot the card manually, or leave this box checked to allow automatic reboot to engage an upgrade upon selecting the upgrade.

Table 3-4   Troubleshooting Processing Errors by Symptom — continued

Symptom	Error/Condition	Corrective Action
Card does not pass video or audio as expected. Control settings spontaneously changed from expected settings.	Event-based trigger inadvertently invoked	Event-based preset loading (**Event Setup** tab > **Event Triggers** sub-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 Event Setup Controls (p. 3-44) 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 Setup** is disabled (either using master **Enable/Disable** control or through events settings. See Event Setup Controls (p. 3-44) 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.
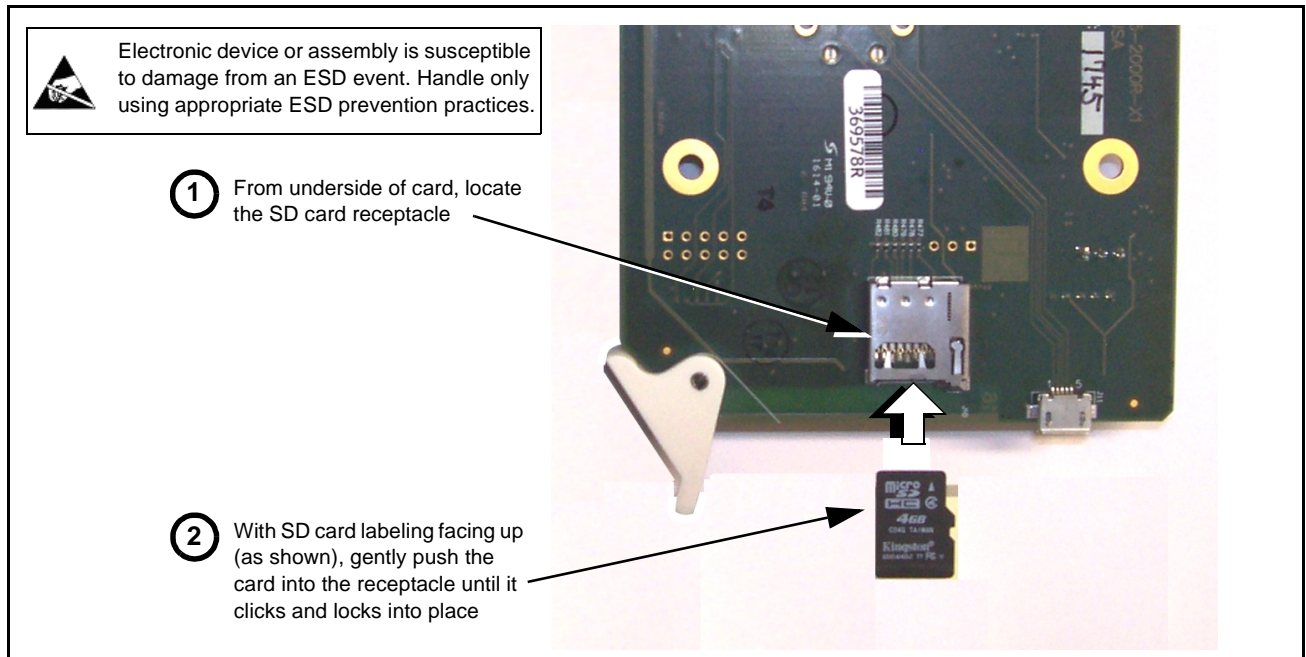
In Case of Problems

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.
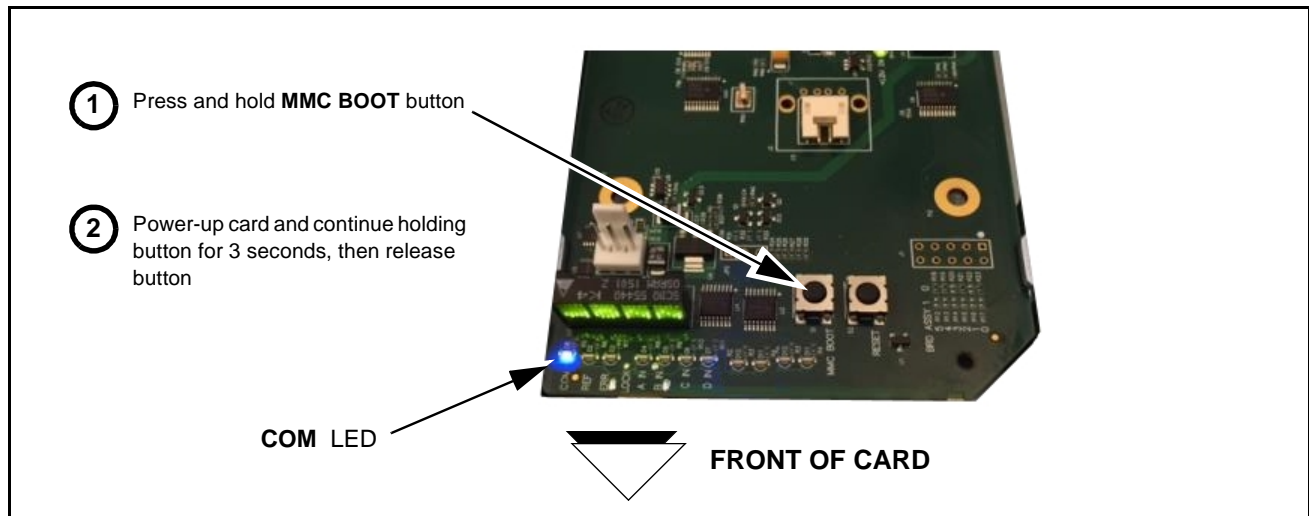
1. (See Figure 3-10.) Make certain the card has the proper SD card installed in the under-card slot. If SD card is **not** installed, contact Product Support to obtain an SD card.

Note: If unit is a BBG-1000 Series device, remove the top cover before proceeding.

Electronic device or assembly is susceptible to damage from an ESD event. Handle only using appropriate ESD prevention practices.

1 From underside of card, locate the SD card receptacle

2 With SD card labeling facing up (as shown), gently push the card into the receptacle until it clicks and locks into place

Figure 3-10 SD Card Installation

2. (See Figure 3-11.) With card powered-down, locate the **MMC BOOT** button on the card. Proceed as shown in picture.

1 Press and hold **MMC BOOT** button

2 Power-up card and continue holding button for 3 seconds, then release button

COM LED

FRONT OF CARD

Figure 3-11 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.