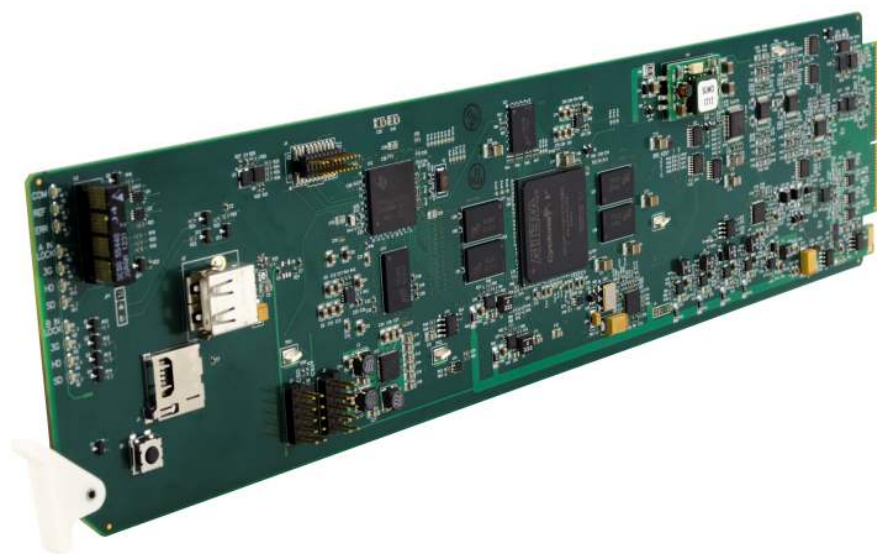

COBALT[®]

9940-ACO



**3G/HD/SD-SDI Multi-Input Intelligent Auto-Changeover
Switch with Optional Trouble Slate Inserter**

Product Manual

COBALT[®]

Cobalt Digital Inc.

2506 Galen Drive
Champaign, IL 61821
Voice 217.344.1243 • Fax 217.344.1245
www.cobaltdigital.com

Copyright

©Copyright 2021, Cobalt Digital Inc. All Rights Reserved.

Duplication or distribution of this manual and any information contained within is strictly prohibited without the express written permission of Cobalt Digital Inc. This manual and any information contained within, may not be reproduced, distributed, or transmitted in any form, or by any means, for any purpose, without the express written permission of Cobalt Digital Inc. Reproduction or reverse engineering of software used in this device is prohibited.

Disclaimer

The information in this document has been carefully examined and is believed to be entirely reliable. However, no responsibility is assumed for inaccuracies. Furthermore, Cobalt Digital Inc. reserves the right to make changes to any products herein to improve readability, function, or design. Cobalt Digital Inc. does not assume any liability arising out of the application or use of any product or circuit described herein.

Trademark Information

Cobalt® is a registered trademark of Cobalt Digital Inc.

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

Dolby® is a registered trademark of Dolby Laboratories, Inc. Other product names or trademarks appearing in this manual are the property of their respective owners.

Congratulations on choosing the Cobalt® 9940-ACO 3G/HD/SD-SDI Multi-Input Intelligent Auto-Changeover Switch with Optional Trouble Slate Inserter. The 9940-ACO 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 9940-ACO, please contact us at the contact information on the front cover.

Manual No.:	9940ACO-OM
Document Version:	V1.6
Release Date:	July 13, 2021
Applicable for Firmware Version (or greater):	V2.108 or greater
Description of product/manual changes:	<ul style="list-style-type: none">- Update manual for latest card functionality, including new standard features and available options. (This firmware version has significant user interface changes versus prior firmware versions and the use of this new Product Manual is strongly recommended.)- Corrections of minor manual errata.

Table of Contents

Chapter 1	Introduction	1-1
	Overview	1-1
	9940-ACO Card Software Versions and this Manual	1-2
	Cobalt Reference Guides	1-2
	Manual Conventions	1-3
	Warnings, Cautions, and Notes	1-4
	Labeling Symbol Definitions.....	1-4
	Safety and Regulatory Summary	1-5
	Warnings.....	1-5
	Cautions	1-5
	EMC Compliance Per Market	1-5
	9940-ACO Functional Description.....	1-6
	9940-ACO Input/Output Formats.....	1-6
	Video Processor Description	1-8
	Audio Processor Description	1-12
	Control and Data Input/Output Interfaces	1-14
	Alarm Function.....	1-14
	User Control Interface	1-15
	9940-ACO Rear I/O Modules.....	1-17
	Technical Specifications.....	1-17
	Warranty and Service Information	1-19
	Cobalt Digital Inc. Limited Warranty.....	1-19
	Contact Cobalt Digital Inc.....	1-20
 Chapter 2	 Installation and Setup	 2-1
	Overview	2-1
	Installing the 9940-ACO Into a Frame Slot.....	2-1
	Installing a Rear I/O Module	2-3
	9940-ACO Rear I/O Modules.....	2-4
	GPIO/COMM Connections	2-6
	Setting Up 9940-ACO Network Remote Control.....	2-6
 Chapter 3	 Operating Instructions.....	 3-1
	Overview	3-1

Control and Display Descriptions	3-1
Function Menu/Parameter Overview	3-2
DashBoard™ User Interface	3-3
Cobalt® Remote Control Panel User Interfaces	3-4
Web HTML5 User Interface	3-5
Accessing the 9940-ACO Card via Remote Control	3-6
Accessing the 9940-ACO Card Using DashBoard™	3-6
Accessing the 9940-ACO Card Using a Cobalt® Remote Control Panel....	3-7
Checking 9940-ACO Card Information.....	3-8
Ancillary Data Line Number Locations and Ranges	3-9
9940-ACO Function Menu List and Descriptions	3-10
Input Video Controls	3-11
Output Video Mode Controls	3-12
Timecode	3-13
Framesync	3-18
Input Audio Status	3-21
Input Audio Routing/Controls	3-22
Video Quality Events Setup Controls	3-27
Audio Detect Events Setup Controls	3-28
Closed Captioning	3-29
Video Proc/Color Correction	3-30
Output Audio Routing/Controls	3-33
Character Burner	3-36
Moving Box Insertion	3-41
Y/C Alignment Controls	3-42
Presets	3-43
Event Setup Controls	3-46
Admin	3-52
GPO Setup Controls	3-55
Alarms Setup Controls	3-56
User Log	3-60
Troubleshooting	3-60
Error and Failure Indicator Overview	3-60
Basic Troubleshooting Checks.....	3-64
9940-ACO Processing Error Troubleshooting.....	3-65
Troubleshooting Network/Remote Control Errors.....	3-68
In Case of Problems	3-68

Introduction

Overview

This manual provides installation and operating instructions for the 9940-ACO 3G/HD/SD-SDI Multi-Input Intelligent Auto-Changeover Switch with Optional Trouble Slate Inserter card (also referred to herein as the 9940-ACO).

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 9940-ACO.
- **Chapter 2, “Installation and Setup”** – Provides instructions for installing the 9940-ACO in a frame, and optionally installing a 9940-ACO Rear I/O Module.
- **Chapter 3, “Operating Instructions”** – Provides overviews of operating controls and instructions for using the 9940-ACO.

This chapter contains the following information:

- **9940-ACO Card Software Versions and this Manual (p. 1-2)**
- **Manual Conventions (p. 1-3)**
- **Safety and Regulatory Summary (p. 1-5)**
- **9940-ACO Functional Description (p. 1-6)**
- **Technical Specifications (p. 1-17)**
- **Warranty and Service Information (p. 1-19)**
- **Contact Cobalt Digital Inc. (p. 1-20)**

9940-ACO 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 9940-ACO Card Information (p. 3-8) in Chapter 3, “Operating Instructions” for more information. You can then check our website for the latest software version currently released for the card as described below.

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

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

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

Cobalt Reference Guides

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

Manual Conventions

In this manual, display messages and connectors are shown using the exact name shown on the 9940-ACO 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:

- **9940-ACO** refers to the 9940-ACO 3G/HD/SD-SDI Multi-Input Intelligent Auto-Changeover Switch with Optional Trouble Slate Inserter card.
- **Frame** refers to the HPF-9000, oGx, OG3-FR, 8321, or similar 20-slot frame that houses Cobalt® or other cards.
- **Device** and/or **Card** refers to a Cobalt® or other card.
- **System** and/or **Video System** refers to the mix of interconnected production and terminal equipment in which the 9940-ACO and other cards operate.
- Functions and/or features that are available only as an option are denoted in this manual like this:

Option ➞

Most options are covered in this manual. However, if your card has DashBoard tabs that are not described in this manual it indicates that the optional function/feature is covered in a separate Manual Supplement.

You can download a pdf of the option supplement by entering the option code on the Cobalt web page search window (for example, **+T-SLATE**) and then clicking on **Product Downloads** to view or download the supplement pdf.

Warnings, Cautions, and Notes

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

Warnings

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




Cautions

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

Notes

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

Labeling Symbol Definitions

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

Safety and Regulatory Summary

Warnings

! WARNING !

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

Cautions

CAUTION

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

CAUTION

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

CAUTION

Heat and power distribution requirements within a frame may dictate specific slot placement of cards. Cards with many heat-producing components should be arranged to avoid areas of excess heat build-up, particularly in frames using only convection cooling. The 9940-ACO 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 9940-ACO 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 9940-ACO 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

9940-ACO Functional Description

Figure 1-1 shows a functional block diagram of the 9940-ACO. In addition to a basic signal presence input failover function, a Quality Check function allows failover to alternate inputs based on user-configurable subjective criteria such as black/frozen frame or audio silence. 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 even in cases where the input video image is static or lost.

9940-ACO Input/Output Formats

The 9940-ACO provides the following inputs and outputs:

- **Inputs:**
 - **3G/HD/SD SDI IN A** thru **SDI IN D** – four 3G/HD/SD-SDI inputs. **SDI IN A** or **SDI IN B** can be set to failover to **A** or **B** in absence of opposite channel of this pair.
- **Outputs:**
 - **3G/HD/SD-SDI OUT (1-4)** – four 3G/HD/SD-SDI buffered video outputs. Each output can be independently set as processed output video or selected input video reclocked.
 - **RLY BYP B** –3G/HD/SD-SDI which outputs a copy of **SDI OUT 1** under normal conditions, or passive outputs the SDI input as a relay failover if card power is lost.

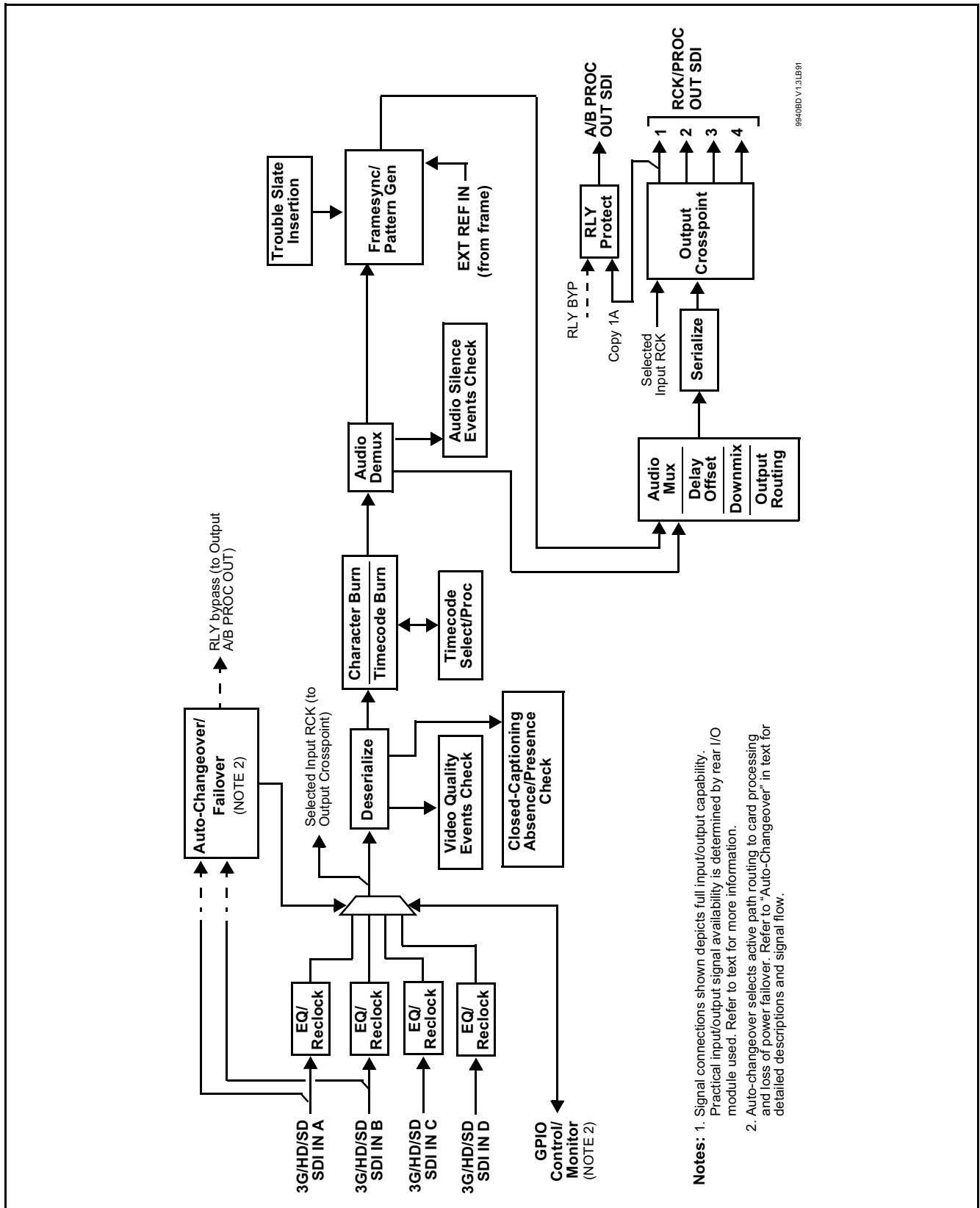


Figure 1-1 9940-ACO Functional Block Diagram

Video Processor Description

The 9940-ACO features a frame sync, character burner, and pattern generator. The 9940-ACO video subsystem also provides the functions described below.

Input Video Select/Quality Check Functions

A GUI-based control allows selection of one of four SDI inputs as the card processed video input.

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

A user-configurable Quality Check function allows subjective criteria such as black/frozen or no video frame events to propagate an event alert. This alert can be used by the card Presets function to invoke video routing changes, GPO, and other actions.

Auto-Changeover (Relay Bypass) Function

(See Figure 1-2.) This function allows the card logic assert of input select and routing to the **RLY BYP OUT** card processed output under normal conditions, while providing latching relays at both the input and output nodes to provide input failover to select an alternate input, and also provides output failover which can passively relay-route the currently selected input directly to the output if the card loses power or is removed from the frame. (Both relays are located on the card rear module.)

The **RLY BYP OUT** SDI output retains selected routing regardless of whether a selection was manually invoked or by a unit-detected failover (such as loss of power). For example, prior to a power loss event if a changeover from **SDI IN A** to **SDI IN B** was active at the time, this selection is retained by the latching relays. In a power-loss event, **SDI IN B** would be directly routed to output **RLY BYP OUT**, and the card automatically removed from the signal path until normal operation again commences. In normal operation, the output relay always maintains routing from the card processed output to output **RLY BYP OUT**.

- Note:**
- The card also provides active (DA-driven) outputs **RCK/PROC 1** thru **RCK/PROC 4**. These outputs are independent of the relay failover function and will lose signal in the event of a power loss.
 - The above failover uses basic signal presence as failover criteria and is limited to inputs **A** and **B**. Failover using active assessments (Quality Check) can be set to provide failovers using frozen/black frame and other criteria. See Video Quality Events Detect Function (p. 1-12) and Closed Captioning Events Detect Function (p. 1-12) for more information.

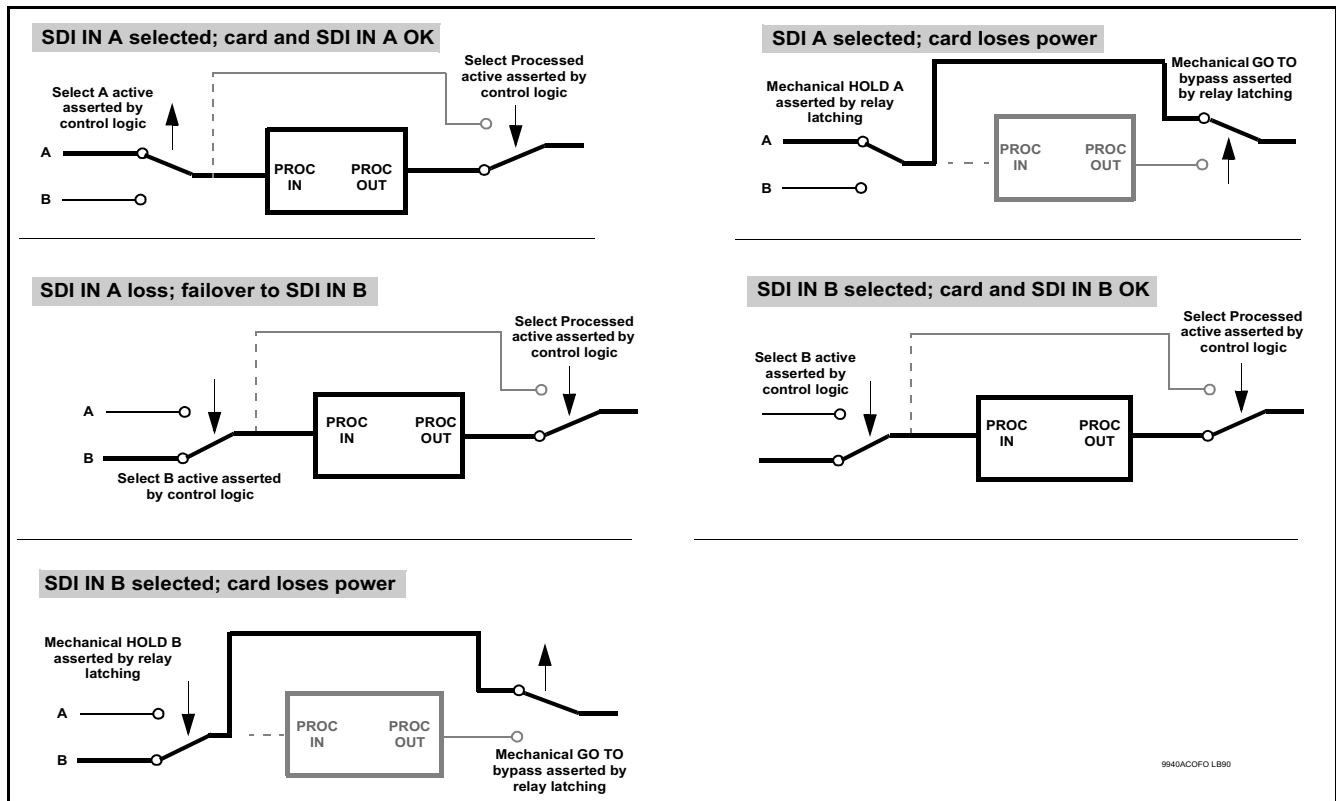


Figure 1-2 Auto-Changeover Function and Signal Flow

Active Auto-Changeover Function

This function provides active video/audio OK screening tools and allows active failover from primary program input (**SDI IN A**) to weighted (prioritized) alternate inputs **SDI IN B** thru **SDI IN D**. As such, this functionality screens all four available card inputs for alternates to be used in cases of primary program input experiencing video and/or audio loss event(s).

In addition to accommodating up to three failover sources (**SDI IN B**, **SDI IN C**, and **SDI IN D** as failover sources for primary **SDI IN A**), this function applies a weighting/priority to the failovers to be invoked.

- Failover will attempt to use next-highest weighted input source, and progressively use lower-weighted sources if higher-weighted sources are not available.
- If higher-weighted inputs again become viable, the highest-weighted source will be used.
(For example, if primary **SDI IN A** experiences a screened event and failover **SDI IN C** is screened as OK and is invoked as next-available input, higher-weighted alternate **SDI IN B** will be used should it become available even if **SDI IN C** is OK and present. In any case, if primary **SDI IN A** becomes available, it will be invoked over all other inputs, since it's the highest weighted/priority input.)

Timecode Processor

(See Figure 1-3.) This function provides for extraction of timecode data from input video source, and in turn allow individual timecode strings to be embedded and/or burned into the output video. The function can monitor any of the video inputs of the card for supported timecode formats such as ATC_LTC or ATC_VITC for HD, and ATC_VITC or VITC waveform (with selectable odd/even field line number control) for SD SDI inputs. Waveform VITC timecode can also be extracted from a reference input and used as the output timecode value. If the preferred format is detected, the preferred format is used by the card; if the preferred format is not detected, the card uses other formats (where available) as desired. An internally-generated free-run timecode can be also be embedded on output video if desired.

The function also provides conversion between various timecode formats and provides independent insertion and line number controls for each SDI timecode output format.

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

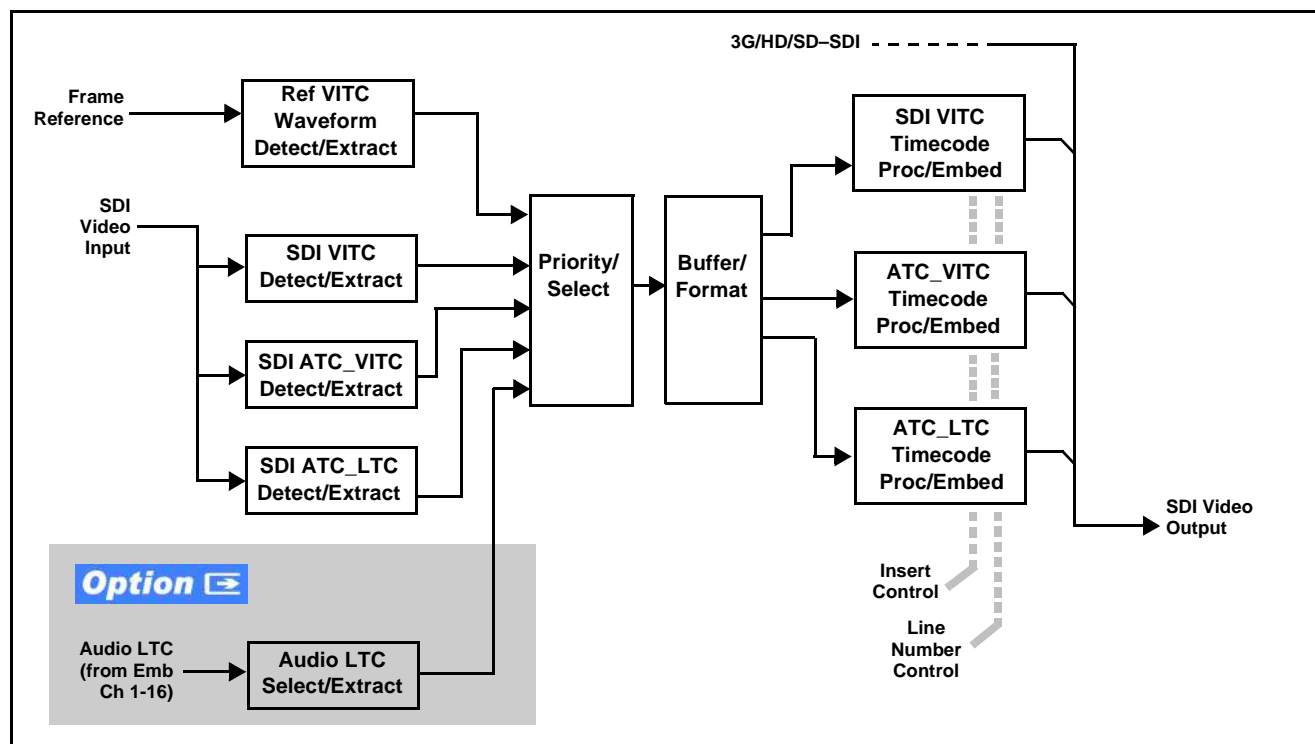


Figure 1-3 Timecode Processor

Frame Sync Function

This function provides for frame sync control using either one of two external **FRAME REF IN (1,2)** reference signals distributed with the card frame, or the input video as a frame sync reference. This function also allows horizontal and/or vertical offset to be added between the output video and the frame sync reference.

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

An internal test signal generator provides a selection of various standard patterns such as color bars, sweep patterns, and other technical patterns. The test patterns can be applied to the output video upon loss of input or manually inserted at any time.

Color Corrector **Option**

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

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 even in cases where the input video image is static or lost.

Trouble Slate Insertion Function **Option**

Option **+T-SLATE** provides for 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 special format using a web tool before uploading to the host card/device; this is described in the setup/operating instructions later in this supplement.)

When the image file(s) is uploaded to the card, its insertion can be enabled via DashBoard Event Setup controls that enable the graphic insertion only under certain conditions as desired. (For example, a trouble slate graphic can be set to insert upon detected input Loss of Signal (LOS)).

The trouble slate function allows for positioning the image within the active video using DashBoard controls. Refer to +LOGO / +T-SLATE Manual Supplement OPT-SW-PHXLTS-MS for detailed information and installation/setup instructions.

Video Quality Events Detect Function

A **Video Quality Events** user interface and an **Event Triggers** user interface provide for setting an area of concern across the program raster which can be monitored for frozen or black video events. Threshold controls allow setting the sensitivity of the function, while engage and disengage threshold timing controls allow setting how fast the event detection engages and releases when triggered. The **Event Triggers** user interface allows instructing the card as to the action to take upon an event (such as go to a changed signal routing, activate a GPO, send an automated email, or go to a user-defined preset).

Closed Captioning Events Detect Function

An **Event Triggers** user interface can detect Closed Caption Absence and Closed Caption Presence events. The **Event Triggers** user interface in turn allows instructing the card as to the action to take upon an event (such as go to a changed signal routing, activate a GPO, send an automated email, or go to a user-defined preset).

Video Output Crosspoint

A four-output video matrix crosspoint allows independently applying the card processed video output, reclocked input, or wings/key-fill previews 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.

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

Audio Processor Description

The audio processor operates as an internal audio router. An Input Audio Status display shows the presence and peak level of each input audio channel received by the card. For digital audio inputs, payload is identified (PCM or data such as Dolby® Digital or E). As such, the audio subsection provides a full crosspoint between all supported audio inputs and output formats. Bulk and per-channel audio delay controls are provided.

Option

(**Option +CQS**). Clean and Quiet Switching allows SDI input selection to be changed from one source to another while ducking audio during controlled input video switching transitions to provide silence between input switches. The cross-fade is queued for the next available RP168 switch line following the switch command.

- Note:**
- Clean audio switching is assured only for intentional, controlled switches via user control. Clean audio switching cannot be assured for failover switches.
 - Clean switching requires that both SDI signals (switch from and switch to) be stable and present.
 - Clean audio switching function is designed for PCM audio. This function does not assure clean decoded audio when switching from/to Dolby or other non-PCM audio.

Audio Down Mix Function

(See Figure 1-4.) The Audio Down Mixer function provides for the selection of any five embedded channels serving as Left (**L**), Right (**R**), Center (**C**), Left Surround (**Ls**), and Right Surround (**Rs**) individual signals to be multiplexed into stereo pair Down Mix Left (**DM-L**) and Down Mix Right (**DM-R**). The resulting stereo pair **DM-L** and **DM-R** can in turn be routed to any embedded audio pair as desired.

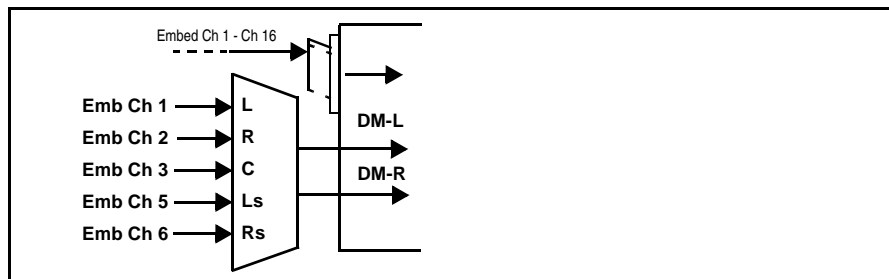


Figure 1-4 Audio Down Mix Functional Block Diagram with Example Sources

Audio Silence Events Detect Function

An **Audio Silence Events** user interface and an **Event Triggers** user interface provide for setting audio level screening and thresholds for audio silence event alerts. When a silence events occur, the event(s) can be used by the Presets function to invoke input routing or other changes.

An Audio Failover Threshold control allows setting the level at which channel content is considered to be silent, and correspondingly also a transition back to an untriggered condition with resumption of audio for the selected embedded channels. Trigger holdoff sets the period of time in which selected channel silence must occur before an Audio Silence Event trigger goes true. Release holdoff sets the time in which the trigger is revoked upon an event false condition. The **Event Triggers** user interface allows instructing the card as to the action to take upon an event (such as go to a changed signal routing, activate a GPO, send an automated email, or go to a user-defined preset).

Control and Data Input/Output Interfaces

GPI Interface

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

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

GPO Interface

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

Alarm Function

The card can be set to monitor input video/audio for input errors such as input LOS, frozen or black frame, loss of reference, closed captioning ancillary data loss, and/or per-channel audio absences. These alarms can be propagated as a card general error or warning message, and can be downloaded as basic .txt logs or via a Syslog function.

User setup tables configure the alarm severity escalation as well as trigger holdoff/release and other thresholds as applicable.

User Control Interface

Figure 1-5 shows the user control interface options for the 9940-ACO. These options are individually described below.

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

- **DashBoard™ User Interface** – Using DashBoard™, the 9940-ACO 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 9940-ACO and other video and audio processing terminal equipment meeting the open-architecture Cobalt® cards for openGear™ standard.

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

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

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

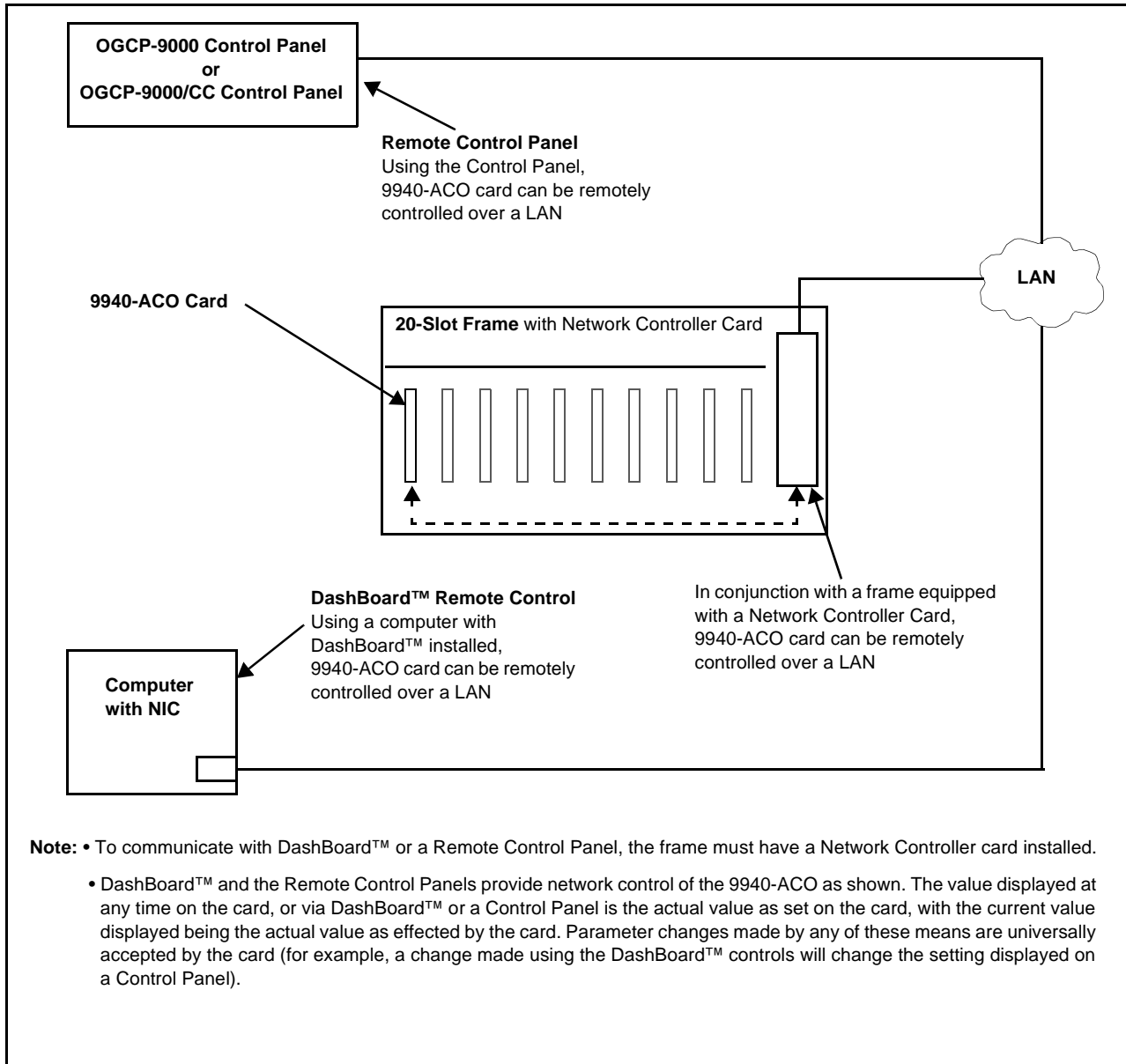


Figure 1-5 9940-ACO User Control Interface

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. 1-20).

9940-ACO Rear I/O Modules

The 9940-ACO 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 9940-ACO 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 9940-ACO card edge connections to coaxial and other connectors that interface with other components and systems in the signal chain. The full assortment of 9940-ACO Rear I/O Modules is shown and described in 9940-ACO Rear I/O Modules (p. 2-4) in Chapter 2, “Installation and Setup”.

Technical Specifications

Table 1-1 lists the technical specifications for the 9940-ACO 3G/HD/SD-SDI Multi-Input Intelligent Auto-Changeover Switch with Optional Trouble Slate Inserter card.

Table 1-1 Technical Specifications

Item	Characteristic
Part number, nomenclature	9940-ACO 3G/HD/SD-SDI Multi-Input Intelligent Auto-Changeover Switch with Optional Trouble Slate Inserter
Installation/usage environment	Intended for installation and usage in frame meeting openGear™ modular system definition
Power consumption	< 18 Watts maximum
Installation Density	Up to 20 cards per 20-slot frame
Environmental: Operating temperature: Relative humidity (operating or storage):	32° – 104° F (0° – 40° C) < 95%, non-condensing
Frame communication	10/100/1000 Mbps Ethernet with Auto-MDIX
Indicators	Card edge display and indicators as follows: <ul style="list-style-type: none"> • 4-character alphanumeric display • Status/Error LED indicator • Input Presence LED indicators
Serial Digital Video Input	Number of inputs: Four, with manual select or failover to alternate input. Data Rates Supported: SMPTE 424M, 292M, SMPTE 259M-C Impedance: 75 Ω terminating Return Loss: > 15 dB up to 1.485 GHz > 10 dB up to 2.970 GHz
Input Select/Auto-Changeover Failover	Failover to alternate input on loss of target input. Failover invoked upon LOS and/or user configurable parametric criteria such as black/frozen frame or audio silence.

Table 1-1 Technical Specifications — continued

Item	Characteristic
Post-Processor Serial Digital Video Outputs	Number of Outputs: One 3G/HD/SD-SDI BNC, relay-protected Four 3G/HD/SD-SDI BNC, selectable as processed or input reclocked output Impedance: 75 Ω Return Loss: > 15 dB at 5 MHz – 270 MHz Signal Level: 800 mV \pm 10% DC Offset: 0 V \pm 50 mV Jitter (3G/HD/SD): < 0.3/0.2/0.2 UI Minimum Latency (frame sync disabled): SD: 127 pixels; 9.4 us 720p: 330 pixels; 4.45 us 1080i: 271 pixels; 3.65 us 1080p: 361 pixels; 2.43 us
Embedded Audio Output	16-ch embedded. User crosspoint allows routing of any embedded channel to any embedded channel output. Multi-frequency tone generator for each audio output. Master delay control; range of -33 msec to +3000 msec.
Frame Reference Input	Number of Inputs: Two, REF 1 and REF 2 from frame with selectable failover Standards Supported: SMPTE 170M/318M ("black burst") SMPTE 274M/296M ("tri-level") Return Loss: > 35 dB up to 5.75 MHz
GPIO	(2) GPI; (2) GPO; opto-isolated GPO Specifications: Max I: 120 mA Max V: 30 V Max P: 120 mW GPI Specifications: GPI LO @ $V_{in} < 1.5$ V GPI HI @ $V_{in} > 2.3$ V Max V_{in} : 9 V

Warranty and Service Information

Cobalt Digital Inc. Limited Warranty

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

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

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

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

Cobalt Digital Inc. Factory Service Center

2506 Galen Drive
Champaign, IL 61821 USA
www.cobaltdigital.com

Office: (217) 344-1243
Fax: (217) 344-1245
Email: info@cobaltdigital.com

THIS LIMITED WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND OF ALL OTHER OBLIGATIONS OR LIABILITIES ON COBALT'S PART. ANY SOFTWARE PROVIDED WITH, OR FOR USE WITH, THE PRODUCT IS PROVIDED "AS IS." THE BUYER OF THE PRODUCT ACKNOWLEDGES THAT NO OTHER REPRESENTATIONS WERE MADE OR RELIED UPON WITH RESPECT TO THE QUALITY AND FUNCTION OF THE GOODS HEREIN SOLD. COBALT PRODUCTS ARE NOT AUTHORIZED FOR USE IN LIFE SUPPORT APPLICATIONS.

COBALT'S LIABILITY, WHETHER IN CONTRACT, TORT, WARRANTY, OR OTHERWISE, IS LIMITED TO THE REPAIR OR REPLACEMENT, AT ITS OPTION, OF ANY DEFECTIVE PRODUCT, AND SHALL IN NO EVENT INCLUDE SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES (INCLUDING LOST PROFITS), EVEN IF IT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Contact Cobalt Digital Inc.

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

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

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

Installation and Setup

Overview

This chapter contains the following information:

- Installing the 9940-ACO Into a Frame Slot (p. 2-1)
- Installing a Rear I/O Module (p. 2-3)
- Setting Up 9940-ACO Network Remote Control (p. 2-6)

Installing the 9940-ACO 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 9940-ACO 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 9940-ACO 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 9940-ACO 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 9940-ACO 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 9940-ACO into a frame slot as follows:

1. Determine the slot in which the 9940-ACO 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 9940-ACO Rear I/O Modules (p. 2-4).
9. Repeat steps 1 through 8 for other 9940-ACO cards.

- Note:**
- The 9940-ACO 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 9940-ACO Network Remote Control (p. 2-6).

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

Installing a Rear I/O Module

Note: This procedure is applicable **only if a Rear I/O Module is not currently installed** in the slot where the 9940-ACO is to be installed.

If installing the 9940-ACO 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 9940-ACO is to be installed.
2. In the mounting area corresponding to the slot location, install Rear I/O Module as shown in Figure 2-1.

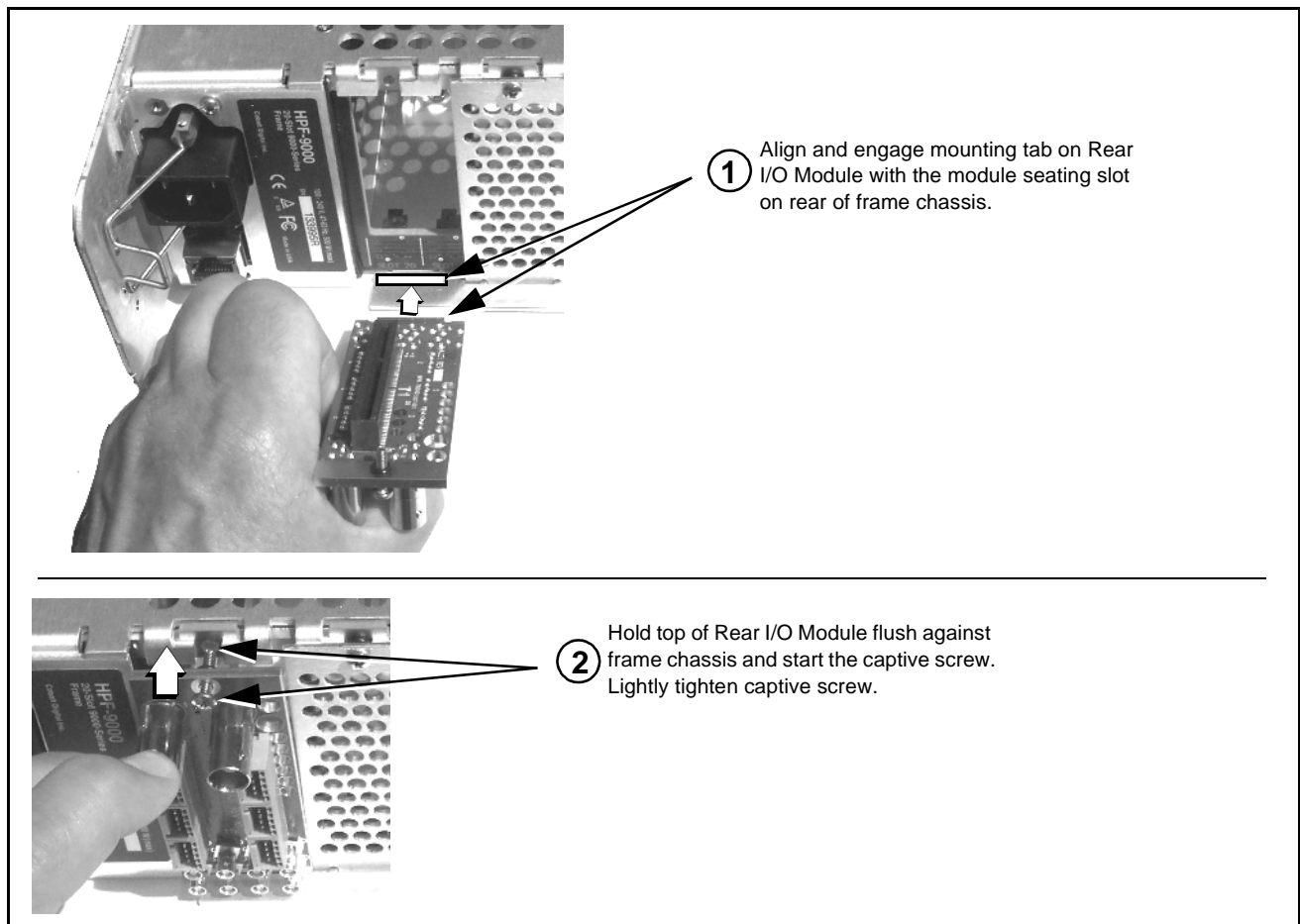


Figure 2-1 Rear I/O Module Installation

9940-ACO Rear I/O Modules

Table 2-1 shows and describes the full assortment of Rear I/O Modules specifically for use with the 9940-ACO.

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 9940-ACO Rear I/O Modules

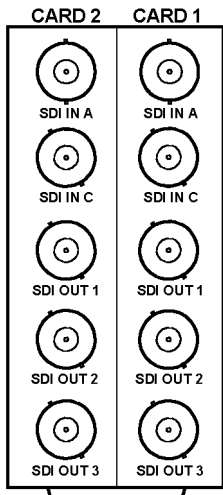
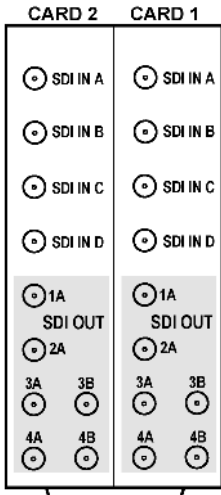
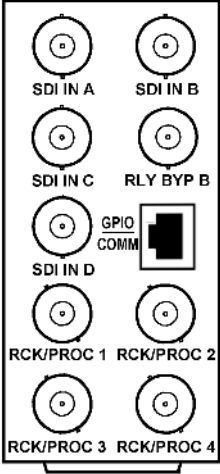
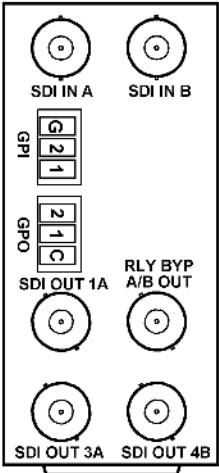
9940-ACO Rear I/O Module	Description
<p>Note: On certain rear modules below, RLY BYP is the card processed output which uses either input SDI IN A or SDI IN B. This output uses relay latching to retain selected routing in the event of power loss regardless of whether a selection was manually invoked or by a unit-detected failover. Other outputs (which can be individually set as reclocked or processed outputs) are not relay-equipped and will lose signal in the event of power loss.</p>	
<p>RM20-9940-A/S</p> 	<p>Split Rear Module. Provides each of the following connections for two 9940 cards:</p> <ul style="list-style-type: none"> • Two 3G/HD/SD-SDI coaxial input BNCs (SDI IN A and SDI IN C) • Three 3G/HD/SD-SDI Video Out BNCs (SDI OUT 1 thru SDI OUT 3)
<p>RM20-9940-B/S</p> 	<p>Split Rear Module. Provides each of the following connections for two 9940 cards:</p> <ul style="list-style-type: none"> • Four 3G/HD/SD-SDI coaxial input BNCs (SDI IN A and SDI IN D) • Six 3G/HD/SD-SDI Video Out BNCs (SDI OUT 1A thru SDI OUT 4B) <p>Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9940-B/S-HDBNC or RM20-9940-B/S-DIN, respectively.</p>

Table 2-1 9940-ACO Rear I/O Modules — continued

9940-ACO Rear I/O Module	Description
<p>RM20-9940-C</p>  <p>Note: RCK/PROC 1 thru RCK/PROC 4 are DA outputs which can be individually set as reclocked or processed outputs of the currently-selected input.</p> <p>RLY BYP B is a relay-protected path which carries processed SDI out under normal conditions and passive routes SDI IN B to this BNC upon loss of power.</p>	<p>Provides the following connections:</p> <ul style="list-style-type: none"> • Four 3G/HD/SD-SDI video input BNCs (SDI IN A thru SDI IN D) • Four 3G/HD/SD-SDI video output BNCs (RCK/PROC 1 thru RCK/PROC 4; each GUI selectable as processed out, selected-input reclocked, or wings/key-fill preview where available) • One relay-protected SDI processed output BNC (RLY BYP B; outputs a copy of SDI OUT 1 under normal conditions, or passive outputs the SDI input on SDI IN B as a relay failover if card power is lost) • COMM/GPIO RJ-45 connector <p>Note: Refer to GPIO/COMM Connections (p. 2-6) for connector pinouts and important information regarding GPO electrical limits.</p>
<p>RM20-9940-F</p> 	<p>Provides the following connections:</p> <ul style="list-style-type: none"> • Two 3G/HD/SD-SDI video input BNCs (SDI IN A and SDI IN B) • Three 3G/HD/SD-SDI video output BNCs (RCK/PROC 1A thru RCK/PROC 4B; each GUI selectable as processed out or selected-input reclocked) • One relay-protected SDI processed output BNC (RLY BYP A/B OUT; outputs a copy of SDI OUT 1 under normal conditions, or passive outputs the SDI input on SDI IN B as a relay failover if card power is lost) • Two opto-isolated GPI inputs (terminals GPI 1-G and GPI 2-G) • Two NO GPO (terminals GPO 1/G and GPO 2/G) <p>Note: Refer to GPIO/COMM Connections (p. 2-6) for connector pinouts and important information regarding GPO electrical limits.</p>

GPIO/COMM Connections

Figure 2-2 shows connections to the 3-pin Phoenix™ terminal block connectors (where used) GPIO connections and the RJ-45 connector GPIO/COMM connections (where used).

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

Setting Up 9940-ACO 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. 1-20).
 - If installing a card in a frame already equipped for, and connected to DashBoard™, no network setup is required for the card. The card will be discovered by DashBoard™ and be ready for use.

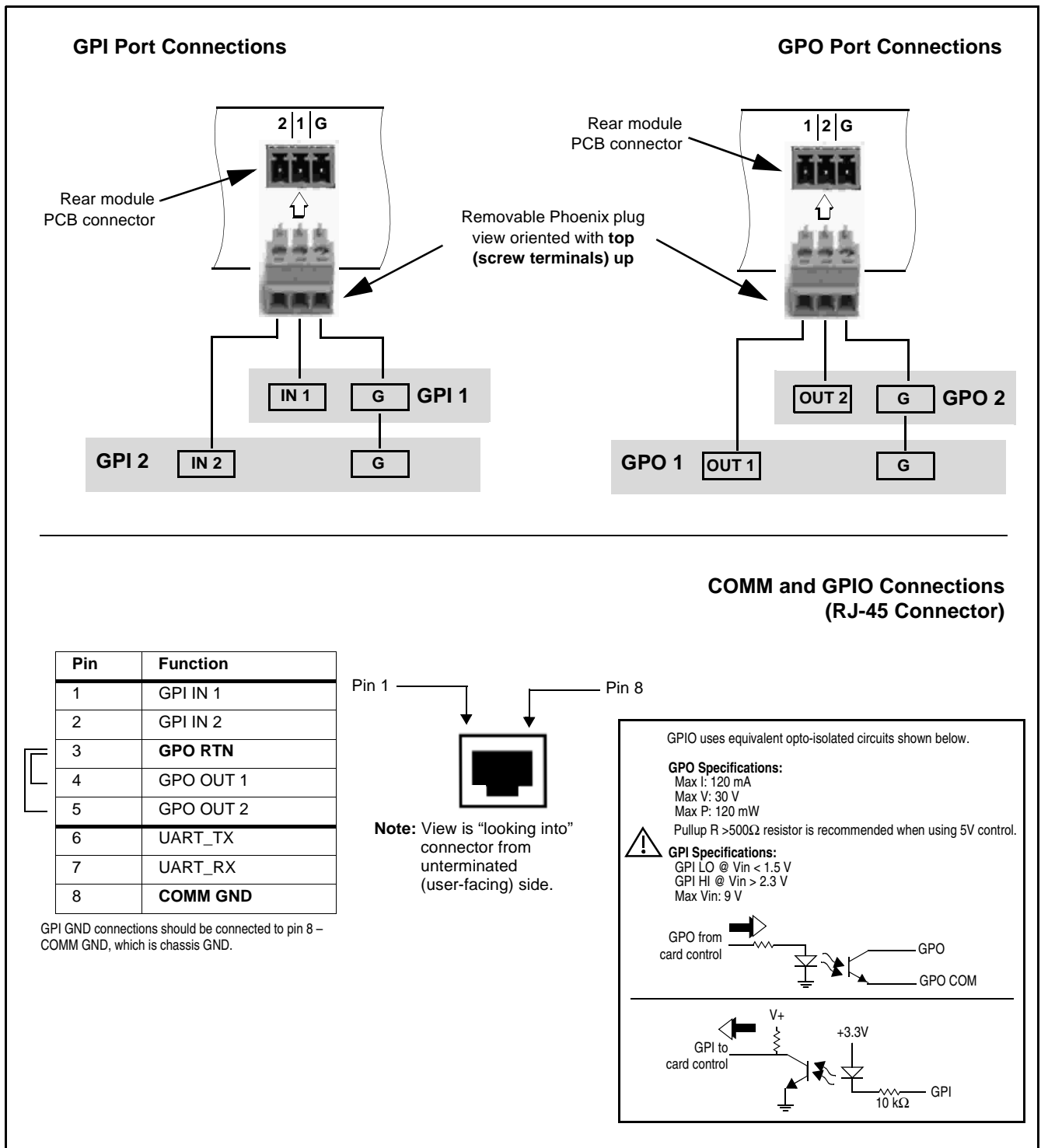


Figure 2-2 GPIO/COMM Connector Pinouts

This page intentionally blank

Operating Instructions

Overview

If you are already familiar with using DashBoard or a Cobalt Remote Control Panel to control Cobalt cards, please skip to 9940-ACO Function Menu List and Descriptions (p. 3-10).

This chapter contains the following information:

- Control and Display Descriptions (p. 3-1)
- Accessing the 9940-ACO Card via Remote Control (p. 3-6)
- Checking 9940-ACO Card Information (p. 3-8)
- Ancillary Data Line Number Locations and Ranges (p. 3-9)
- 9940-ACO Function Menu List and Descriptions (p. 3-10)
- Troubleshooting (p. 3-60)

Control and Display Descriptions

This section describes the user interface controls, indicators, and displays for using the 9940-ACO card. The 9940-ACO functions can be accessed and controlled using any of the user interfaces described here.

The format in which the 9940-ACO 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 9940-ACO 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 9940-ACO card are organized into function **menus**, which consist of parameter groups as shown below.

Figure 3-1 shows how the 9940-ACO card and its menus are organized, and also provides an overview of how navigation is performed between cards, function menus, and parameters.

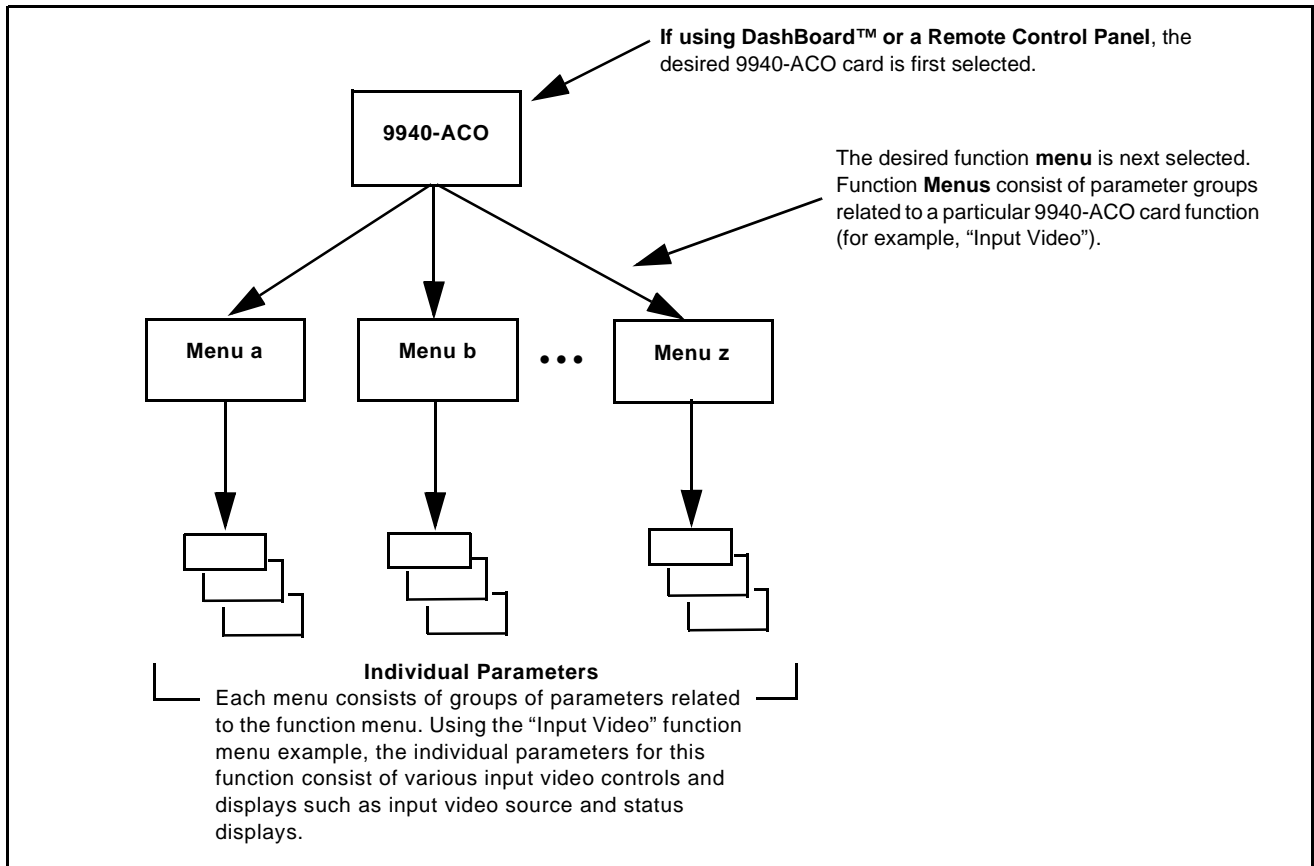


Figure 3-1 Function Menu/Parameter Overview

DashBoard™ User Interface

(See Figure 3-2.) The card function menus are organized in DashBoard™ using tabs. When a tab is selected, each parametric control or selection list item associated with the function is displayed. Scalar (numeric) parametric values can then be adjusted as desired using the GUI slider controls. Items in a list can then be selected using GUI drop-down lists.

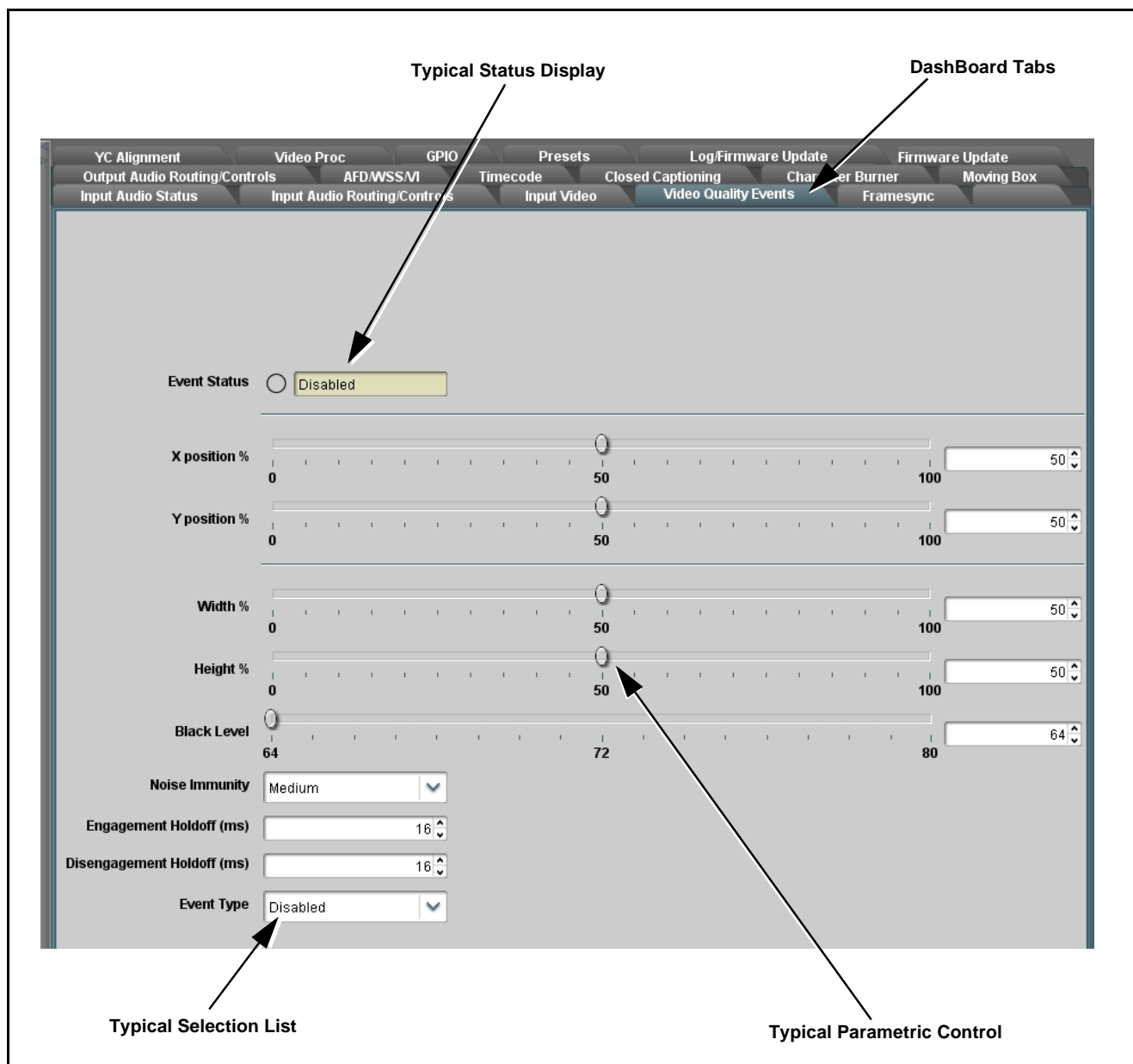


Figure 3-2 Typical DashBoard Tabs and Controls

Cobalt® Remote Control Panel User Interfaces

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

When the desired function submenu is selected, each parametric control or selection list item associated with the function is displayed. Scalar (numeric) parametric values can then be adjusted as desired using the control knobs, which act like a potentiometer. Items in a list can then be selected using the control knobs which correspondingly act like a rotary switch.

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

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.

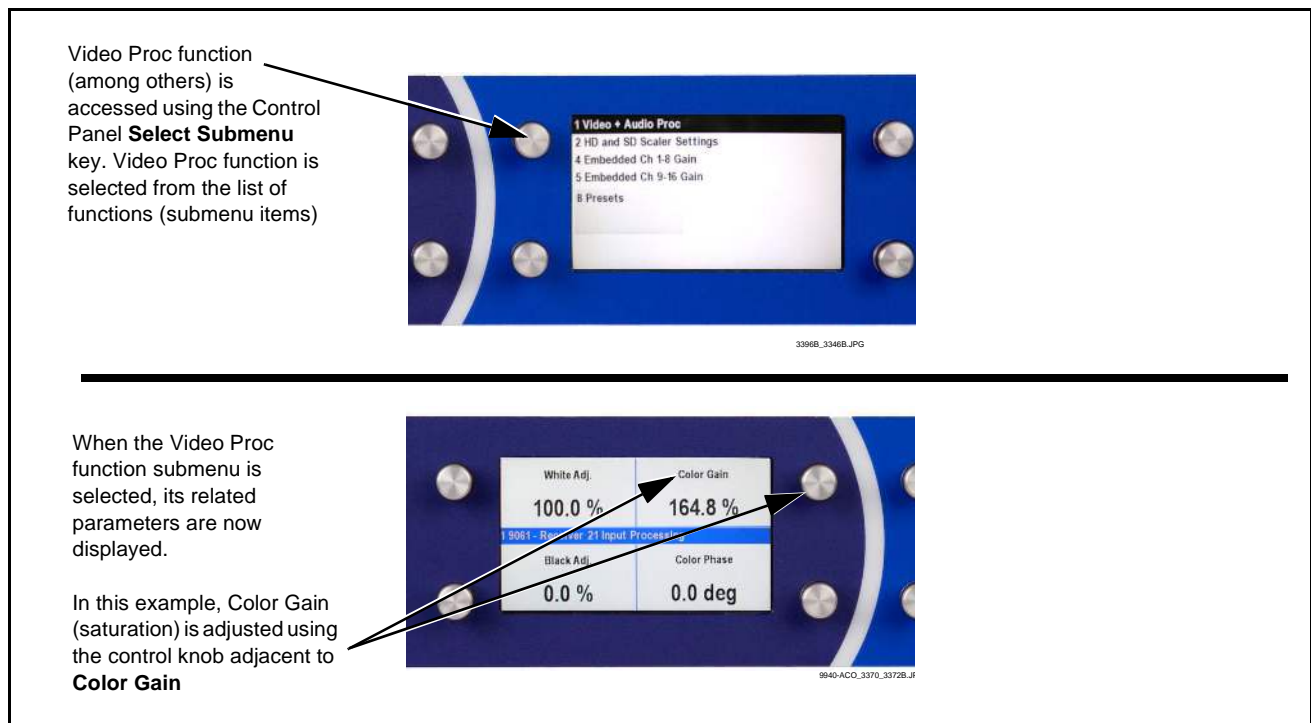


Figure 3-3 Remote Control Panel Setup of Example Video Proc Function Setup

Web HTML5 User Interface

(See Figure 3-4.) When equipped with a rear I/O module having an Ethernet port or if card is installed in a “smart” frame with per-slot Ethernet connectivity, the card 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. 3-52) for more information.)

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

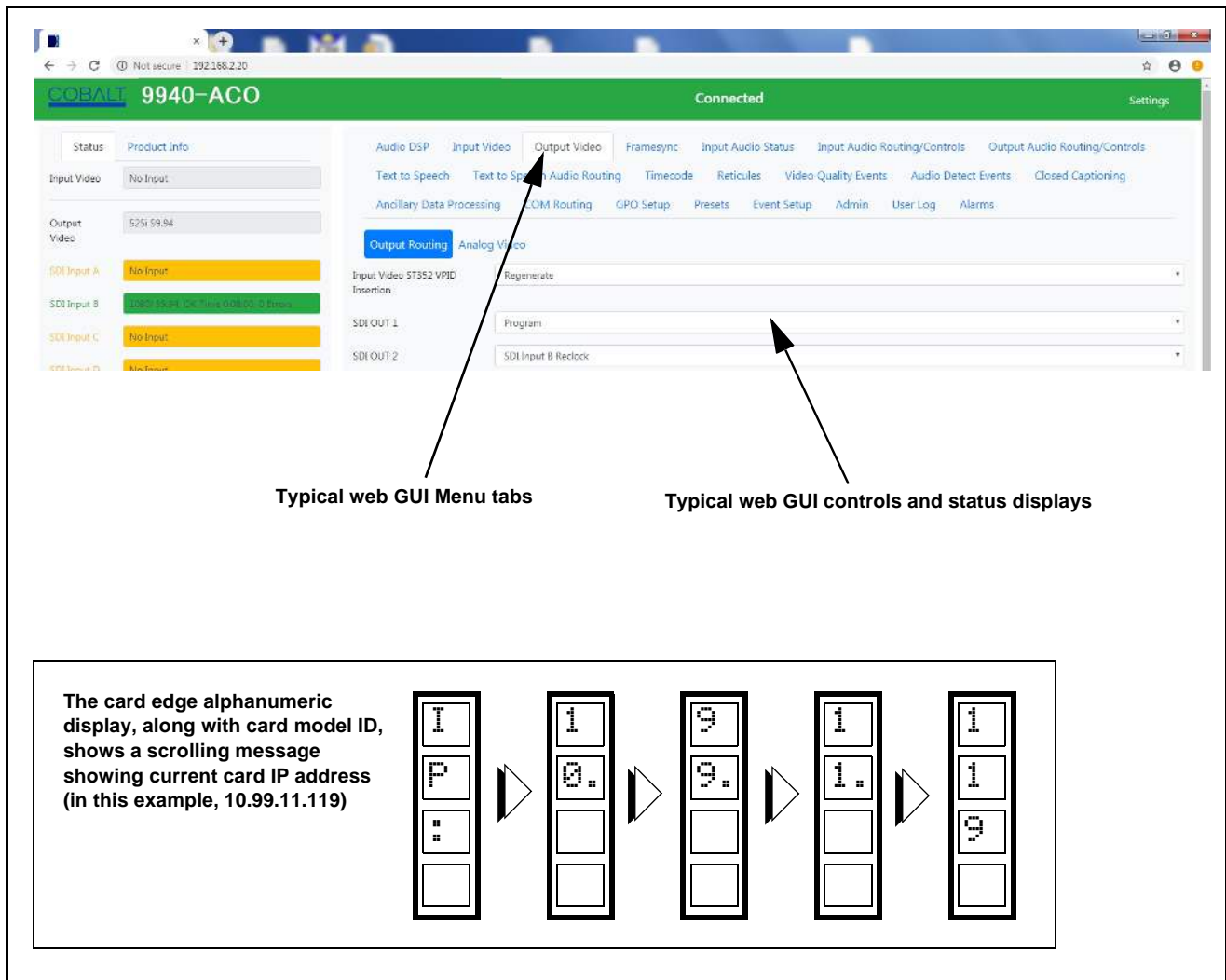


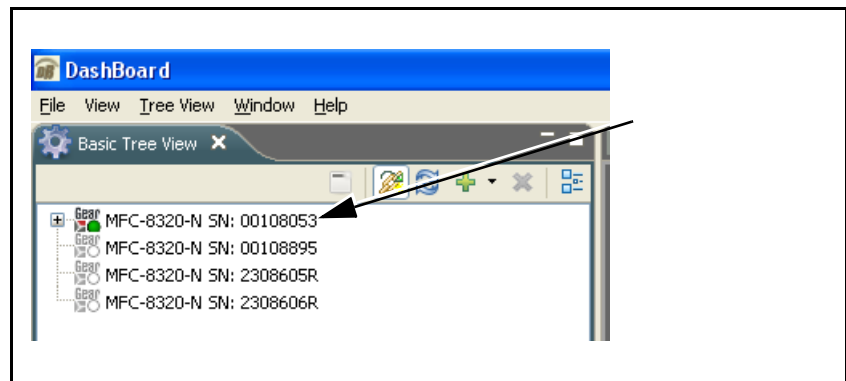
Figure 3-4 Typical Web GUI Tabs and Controls

Accessing the 9940-ACO Card via Remote Control

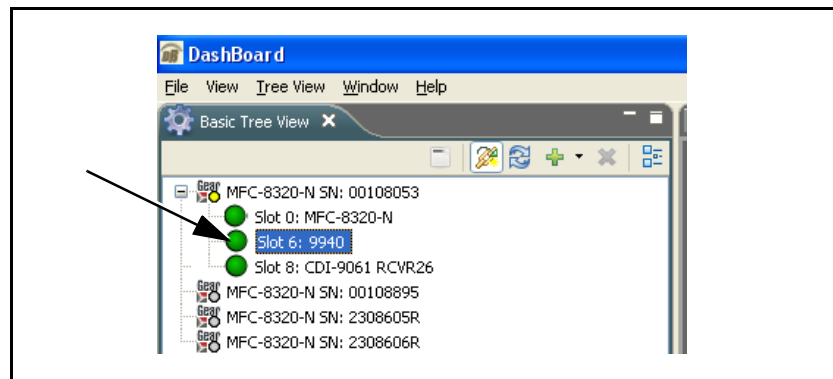
Access the 9940-ACO card using DashBoard™ or Cobalt® Remote Control Panel as described below.

Accessing the 9940-ACO Card Using DashBoard™

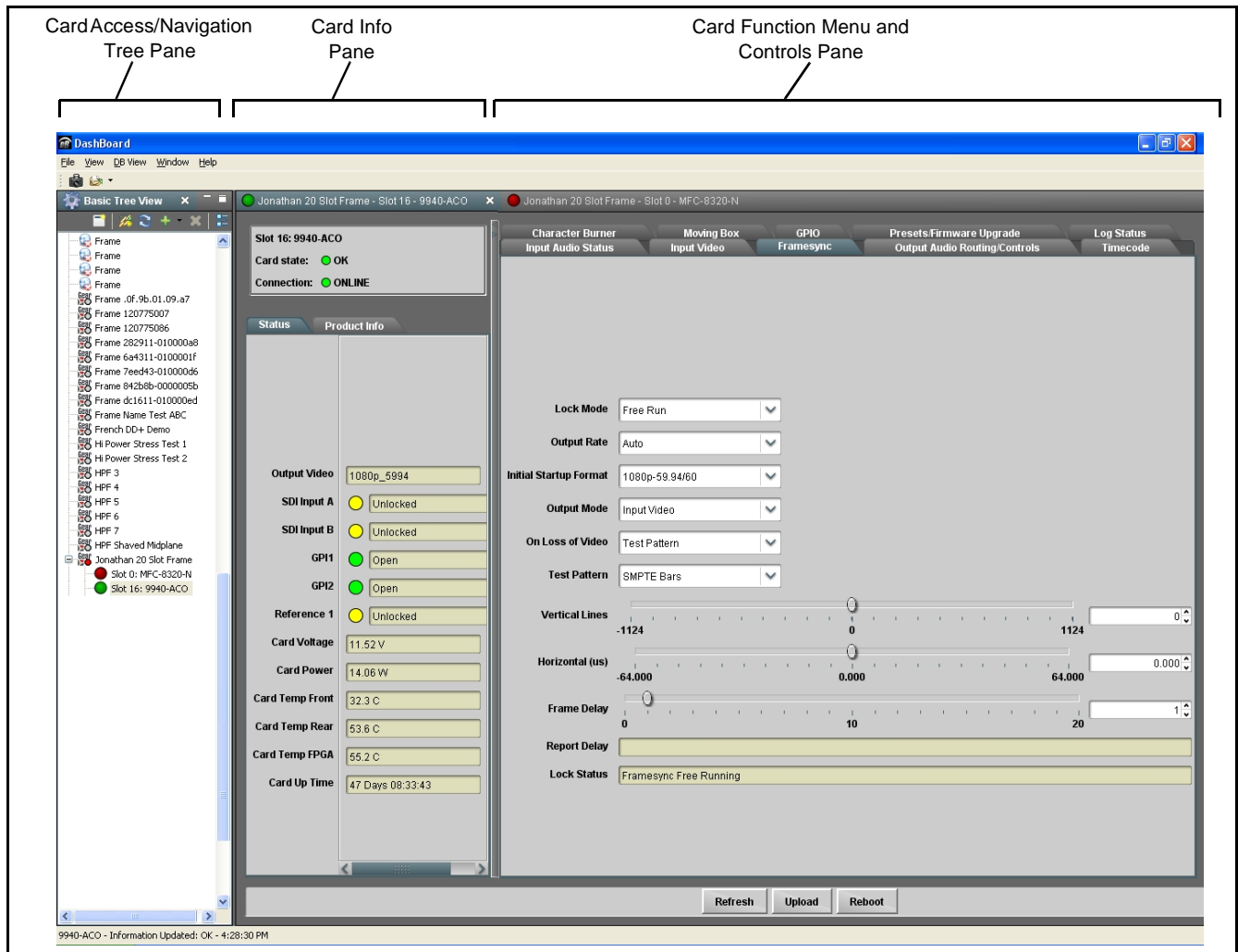
1. On the computer connected to the frame LAN, open DashBoard™.
2. As shown below, in the left side Basic View Tree locate the Network Controller Card associated with the frame containing the 9940-ACO card to be accessed (in this example, “MFC-8320-N SN: 00108053”).



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: 9940”).

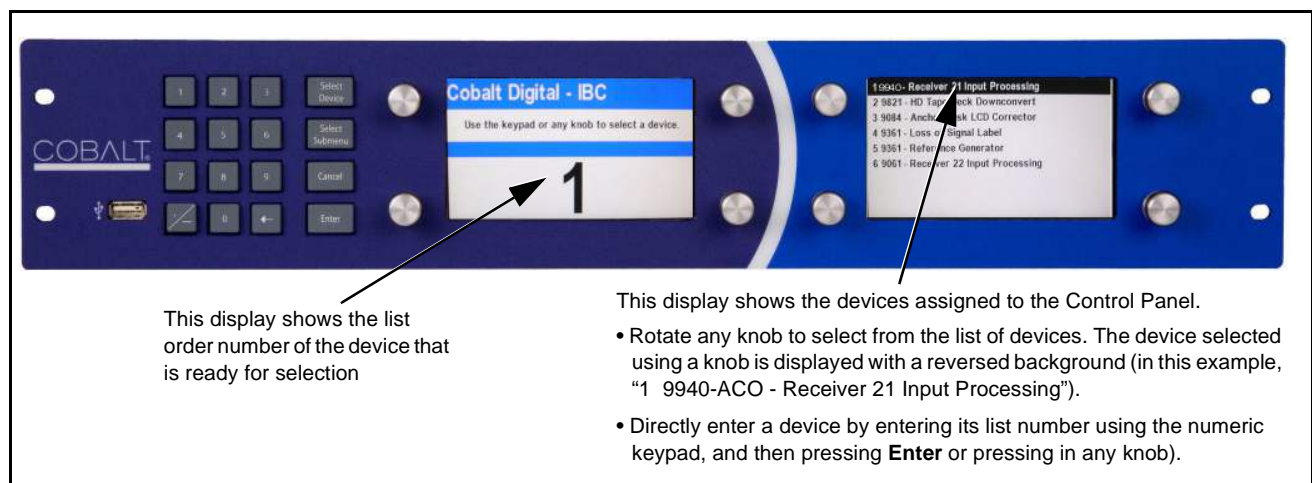


As shown on the next page, when the card is accessed in DashBoard™ its function menu screen showing tabs for each function is displayed. (The particular menu screen displayed is the previously displayed screen from the last time the card was accessed by DashBoard™).



Accessing the 9940-ACO Card Using a Cobalt® Remote Control Panel

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



Checking 9940-ACO Card Information

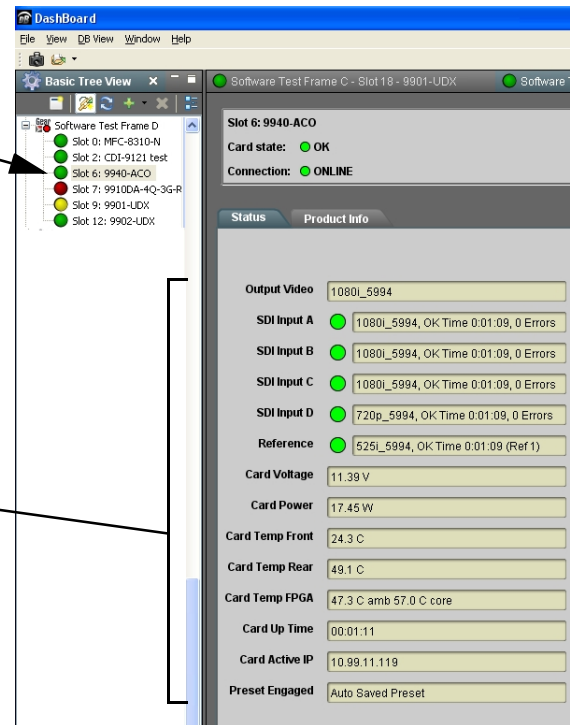
The operating status and software version the 9940-ACO card can be checked using DashBoard™. Figure 3-5 shows and describes the 9940-ACO card information screen using DashBoard™.

Note: Proper operating status in DashBoard™ is denoted by green icons for the status indicators shown in Figure 3-5. Yellow or red icons respectively indicate an alert or failure condition. Refer to Troubleshooting (p. 3-60) for corrective action.

The **Tree View** shows the cards seen by DashBoard™. In this example, Network Controller Card is hosting a 9940-ACO card in slot 6.

Status Display

This displays shows the status and format of the signals being received by the 9940-ACO, as well as card status.



Card Info Display

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

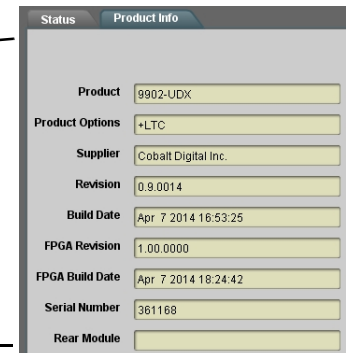


Figure 3-5 9940-ACO Card Info/Status Utility

Ancillary Data Line Number Locations and Ranges

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

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

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

Notes:

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

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

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

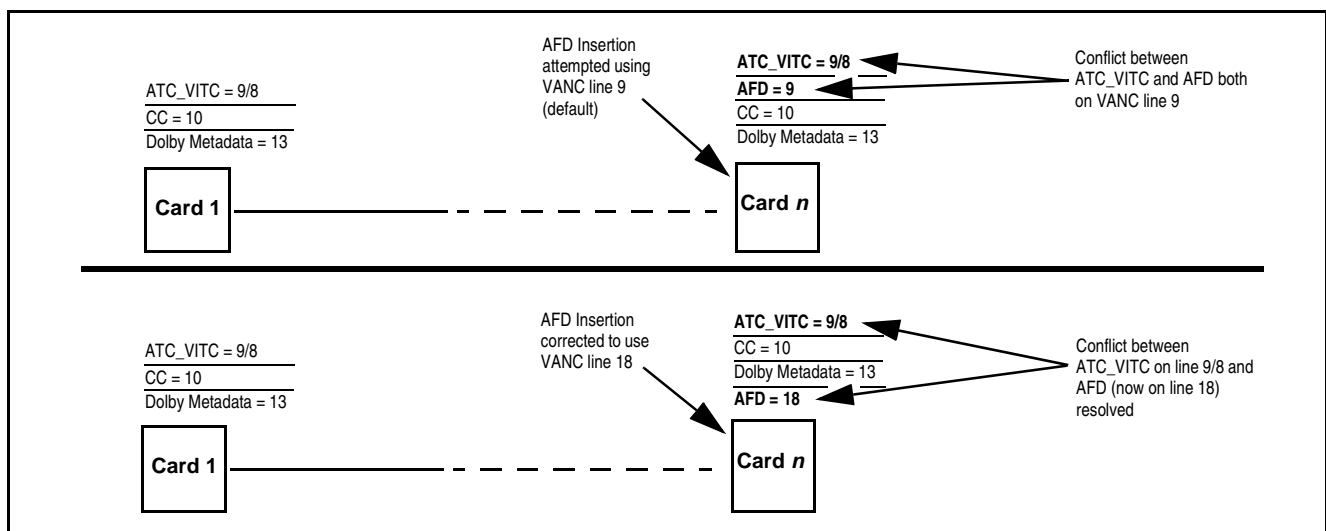



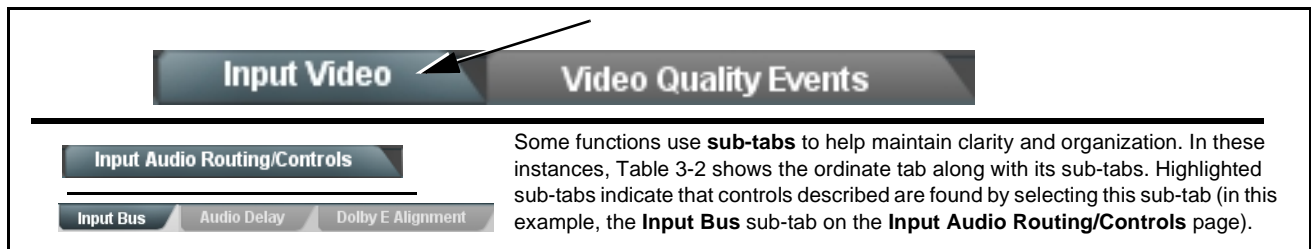
Figure 3-6 Example VANC Line Number Allocation Example

9940-ACO Function Menu List and Descriptions

Table 3-2 individually lists and describes each 9940-ACO 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:  For any DashBoard tabs on card not appearing in this manual, this indicates the function is an option and covered in a separate Manual Supplement. Please refer to product or option web page Product Downloads for pdf Manual Supplements covering these options.

On DashBoard™ itself and in Table 3-2, the function menu items are organized using tabs as shown below.



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

Function Menu Item	Page	Function Menu Item	Page
Input Video Controls	3-11	Output Audio Routing/Controls	3-33
Output Video Mode Controls	3-12	Character Burner	3-36
Timecode	3-13	Moving Box Insertion	3-41
Framesync	3-18	Y/C Alignment Controls	3-42
Input Audio Status	3-21	Presets	3-43
Input Audio Routing/Controls	3-22	GPO Setup Controls	3-55
Video Quality Events Setup Controls	3-27	Event Setup Controls	3-46
Audio Detect Events Setup Controls	3-28	Admin	3-52
Closed Captioning	3-29	Alarms Setup Controls	3-56
Video Proc/Color Correction	3-30	User Log	3-60

Table 3-2 9940-ACO Function Menu List


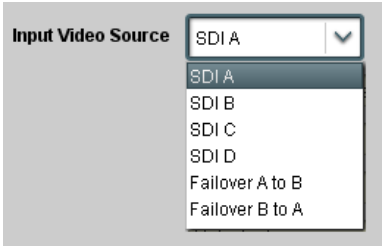
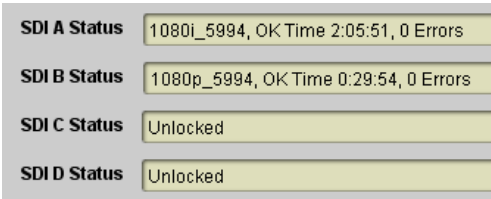
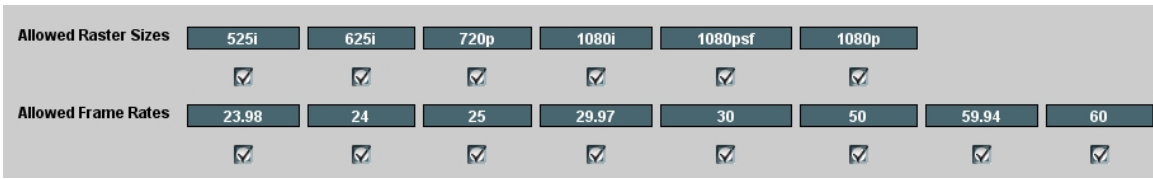
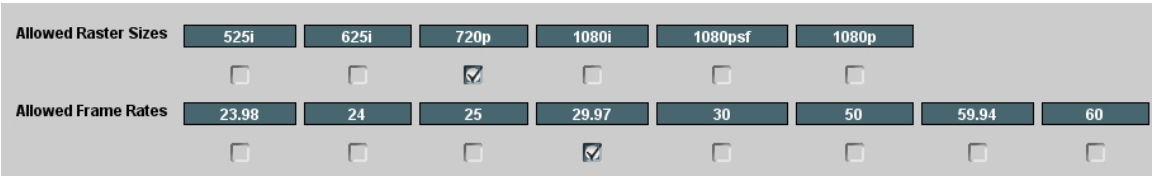
	<p>Allows manual or failover selection of card SDI program video inputs and displays status and raster format of received SDI video.</p>
<p>• Input Video Source</p> 	<p>Selects the input video source to be applied to the card's program video input.</p> <ul style="list-style-type: none"> • SDI A and SDI B choices allow forced manual selection of correspondingly SDI IN A or SDI IN B. • Failover A to B sets main path preference of SDI IN A. <ul style="list-style-type: none"> - If SDI IN A goes invalid, then SDI IN B is selected. - If SDI IN A goes valid again, failover automatically reverts to SDI IN A. • Failover B to A sets main path preference of SDI IN B. <ul style="list-style-type: none"> - If SDI IN B goes invalid, then SDI IN A is selected. - If SDI IN B goes valid again, failover automatically reverts to SDI IN B. • SDI C and SDI D choices allow forced manual selection of correspondingly SDI IN C or SDI IN D without failover choices. <p>Note: Failover criteria via this control is simple signal presence.</p>
<p>• Input Video Status</p> 	<p>Displays input status of each video input, along with elapsed time of signal acquire.</p> <p>SDI A thru SDI D show raster/format for all card inputs. If signal is not present or is invalid, Unlocked is displayed. (These status indications are also propagated to the Card Info pane.)</p> <p>Note: Status display shows maximum card input complement. Input complement is determined by rear I/O module used.</p>
<p>Input SDI Raster Size / Frame Rate Filtering</p> <p>The controls shown below allow user filtering to exclude selected raster or rate formats from being received by a card input.</p> <p>Default settings have all raster sizes and frame rates “checked”, thereby providing no filtering (exclusion.)</p>  <p>In the example below, only 720p and 29.97 are checked, filtering allowed input to only be 720p 29.97 (“720p half-rate”).</p>  <p>Note: Rates shown in selector are frame rates and not field rates.</p>	

Table 3-2 9940-ACO Function Menu List — continued


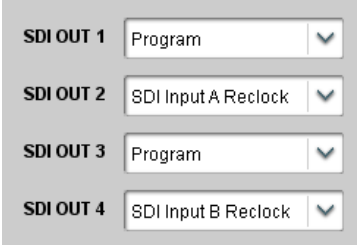
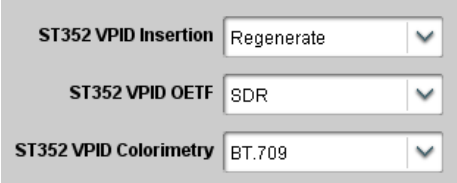

	<p>Allows selection of each of the four video output coaxial connectors as processed SDI or reclocked SDI out.</p>
<p>• Output Video Crosspoint</p> 	<p>For each SDI output port supported by the card, provides a crosspoint for routing program processed video or selected-input reclocked to an SDI output.</p> <p>Note: Outputs set to Input Reclocked will pass input SDI regardless of Input SDI Raster Size / Frame Rate Filtering. Input filtering applies only to the card program video path.</p>
<p>• ST352 VPID Insertion/Pass-Thru Select / Colorimetry Mark Select</p> 	<p>• ST 352 VPID Insertion selects from default Regenerate mode and special Pass-Through mode (see below for important usage notes).</p> <ul style="list-style-type: none"> - Regenerate makes certain ST352 is marked for whatever the card is passing, or if the payload is being modified by the card. (An example of where ST352 would have to be modified would be if the card Framesync is user-set to change the frame rate from 59.94 to 60.) - Pass-Through will extract and preserve the ST352 information from input SDI, and re-insert it on the output regardless of any changes the card has locally done to identifying characteristics carried in the ST352 metadata. <p> In all normal usages, it is recommended to leave this control set to default Regenerate setting. This ensures that downstream devices will “see” ST352 that represents the payload being provided by the card. Pass-Through is only used in highly specialized cases where special ST352 data must be preserved (even if the data may not match the payload).</p> <ul style="list-style-type: none"> • ST 352 VPID OETF selects from SDR, HLG, PQ, or unspecified marking. • ST 352 VPID Colorimetry selects from BT.709 or BT.2020 colorimetry marking.

Table 3-2 9940-ACO Function Menu List — continued

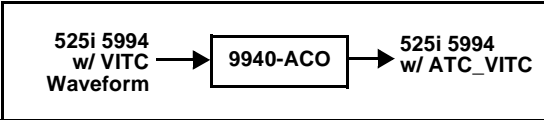
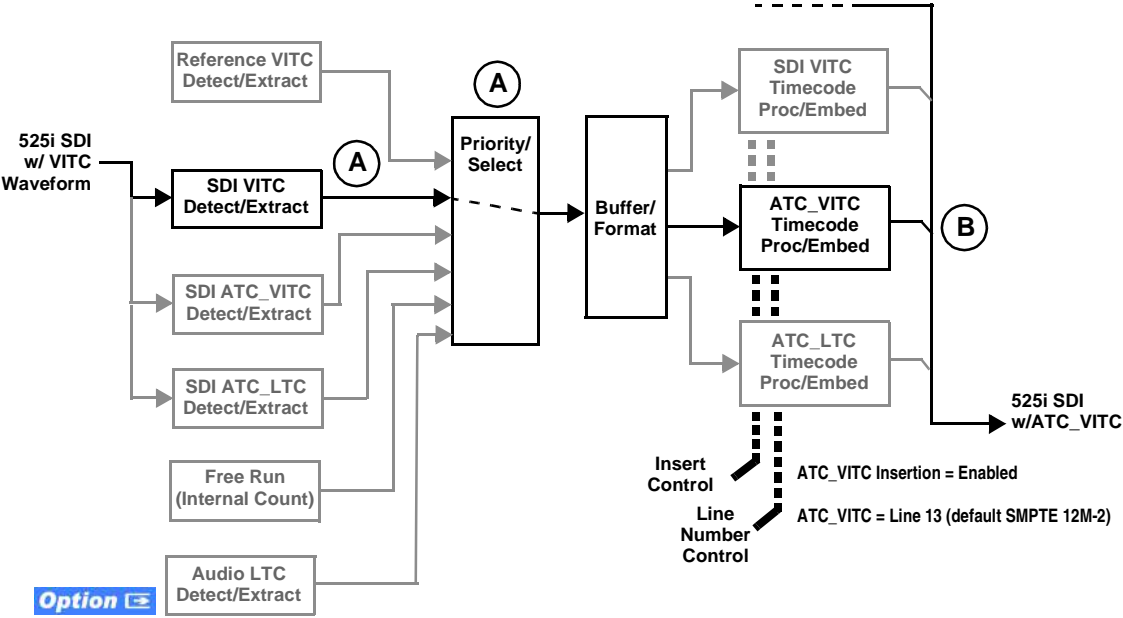
Timecode	Provides timecode data extraction from various sources, and provides formatting and re-insertion controls for inserting the timecode into the output video.								
<p>Shown below is an example in which received 525i 5994 SDI video with VITC waveform timecode is being processed to output ATC_VITC timecode. 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.</p>									
	<table border="1"> <tr><td>Reference VITC Status</td><td>05:49:08:20.1</td></tr> <tr><td>Input VITC Status</td><td>05:49:08:19.1</td></tr> <tr><td>Input ATC_LTC Status</td><td>Not Present</td></tr> <tr><td>Input ATC_VITC Status</td><td>Not Present</td></tr> </table>	Reference VITC Status	05:49:08:20.1	Input VITC Status	05:49:08:19.1	Input ATC_LTC Status	Not Present	Input ATC_VITC Status	Not Present
Reference VITC Status	05:49:08:20.1								
Input VITC Status	05:49:08:19.1								
Input ATC_LTC Status	Not Present								
Input ATC_VITC Status	Not Present								
<p>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 (SDI VITC) as a choice. This extracts VITC Waveform timecode data from the incoming video.</p>	<table border="1"> <tr><td>Source Priority 1</td><td>Input VITC</td></tr> <tr><td>Source Priority 2</td><td>Input ATC_VITC</td></tr> <tr><td>Source Priority 3</td><td>Reference VITC</td></tr> <tr><td>Source Priority 4</td><td>Free Run</td></tr> </table>	Source Priority 1	Input VITC	Source Priority 2	Input ATC_VITC	Source Priority 3	Reference VITC	Source Priority 4	Free Run
Source Priority 1	Input VITC								
Source Priority 2	Input ATC_VITC								
Source Priority 3	Reference VITC								
Source Priority 4	Free Run								
<p>B In this example, it is desired to provide SDI ATC_VITC timecode data in the processed output video. As such, set SD ATC VITC Insertion to Enabled.</p>	<table border="1"> <tr><td>SD ATC_VITC Insertion</td><td>Enabled</td></tr> <tr><td>SD ATC Insertion Line</td><td>13 - SMPTE 12M-2-2008 Recommended</td></tr> </table>	SD ATC_VITC Insertion	Enabled	SD ATC Insertion Line	13 - SMPTE 12M-2-2008 Recommended				
SD ATC_VITC Insertion	Enabled								
SD ATC Insertion Line	13 - SMPTE 12M-2-2008 Recommended								
<p>In the example here, the line numbers are set to the default SMPTE 12M-2-2008 recommended values.</p>									
									

Table 3-2 9940-ACO Function Menu List — continued



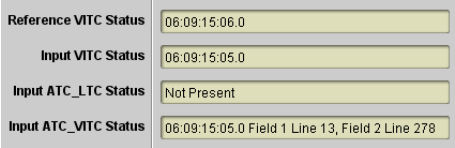
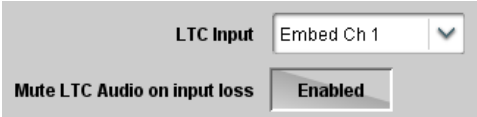


	(continued)
<p>Option  Audio LTC controls described below only appear on cards with +LTC licensed optional feature. This feature allows audio LTC from an audio channel to be used as a timecode source, with conversion to a selected SMPTE 12M format on the output video.</p>	
<p>• Timecode Source Status Displays</p> 	<p>Displays the current status and contents of the four supported external timecode formats shown to the left.</p> <ul style="list-style-type: none"> • 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.
<p>• Audio LTC Source and Mute Controls</p>  <p>Option </p>	<p>(+LTC option only)</p> <p>LTC Input control selects an input audio channel when audio LTC is to be used as a source.</p> <p>Mute LTC Audio control allows timecode using LTC audio sources to freeze as follows:</p> <ul style="list-style-type: none"> • When set to Enabled and input timecode is lost, timecode insertion is disabled. • When set to Disabled and input timecode is lost, timecode output reverts to next priority selection. <p>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.</p>
<p>• Incoming ATC Packet Removal Control</p> 	<p>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.)</p> <p>Note: Set this control to Enabled if Free-Run timecode is to be used. If incoming packets are not removed, output embedded SMPTE timecode may alternate between free-run and embedded SMPTE timecode values.</p>

Table 3-2 9940-ACO Function Menu List — continued

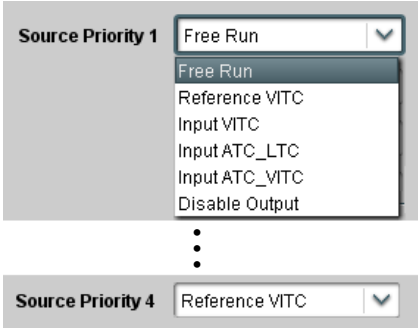
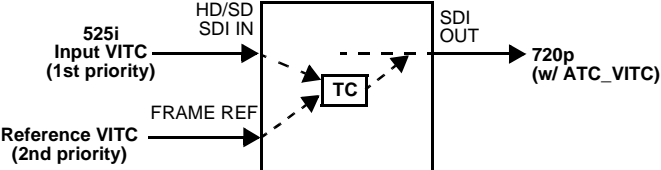
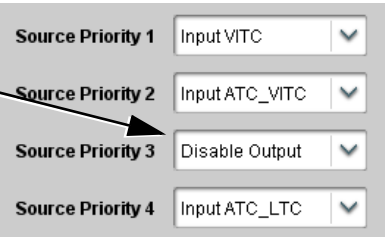
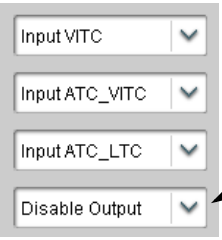
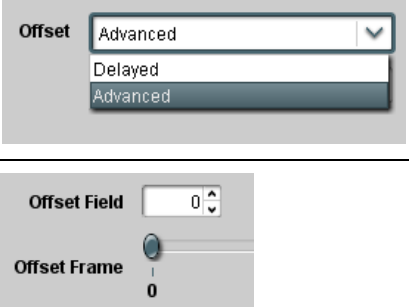
<div>Timecode</div>	(continued)
<p>• Source Priority</p>  <p>Source Priority 1: Free Run</p> <p>Source Priority 4: Reference VITC</p>	<p>Selects the priority assigned to each of the four supported external formats, and internal Free Run in the event the preferred source is unavailable.</p> <p>Source 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.)</p>  <p>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.</p> <p>The selected timecode 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.</p> <p>Note: Set Incoming ATC Packet Removal Control to Enabled if Free-Run timecode is to be used. If incoming packets are not removed, output embedded SMPTE timecode may alternate between free-run and embedded SMPTE timecode values.</p> <p>⚠ 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.</p> <div> <div> <p>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.</p>  </div> <div> <p>The choices shown here will allow ATC_LTC to “out-prioritize” Disable Output if ATC_VITC is not available.</p>  </div> </div>
<p>• Offset Controls</p> 	<p>Allows the current timecode count to be advanced or delayed on the output video.</p> <ul style="list-style-type: none"> • 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. <p>Note: Default settings are null, with both controls set at zero as shown.</p>

Table 3-2 9940-ACO Function Menu List — continued


<div>Timecode</div>	(continued)																
<ul style="list-style-type: none"> Output Status Display <div data-bbox="207 420 669 472"> Output Status 00:04:46:06.1 (Source: SDI VITC) </div>	<p>Displays the current content and source being used for the timecode data as follows:</p> <div data-bbox="734 430 1117 472"> Output Status 00:04:46:06.1 (Source: SDI VITC) </div> <ul style="list-style-type: none"> Output status OK (in this example, SDI VITC timecode received and outputted). <div data-bbox="734 556 1003 598"> Output Status Insertion Disabled </div> <ul style="list-style-type: none"> Timecode Insertion button set to Disabled; output insertion disabled. <p>Note:</p> <ul style="list-style-type: none"> 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: <table data-bbox="820 766 966 955"> <tr><td>0.0</td><td>Frame 0</td></tr> <tr><td>0.1</td><td>Frame 1</td></tr> <tr><td>1.0</td><td>Frame 2</td></tr> <tr><td>1.1</td><td>Frame 3</td></tr> <tr><td>•</td><td></td></tr> <tr><td>•</td><td></td></tr> <tr><td>•</td><td></td></tr> <tr><td>29.1</td><td>Frame 59</td></tr> </table> 	0.0	Frame 0	0.1	Frame 1	1.0	Frame 2	1.1	Frame 3	•		•		•		29.1	Frame 59
0.0	Frame 0																
0.1	Frame 1																
1.0	Frame 2																
1.1	Frame 3																
•																	
•																	
•																	
29.1	Frame 59																
<ul style="list-style-type: none"> Option  Audio LTC Output 	<p>Audio LTC output is routed to desired embedded audio outputs using the Output Audio Routing/Controls (p. 3-33). Whatever timecode is displayed on the Output Status is converted to audio LTC and available as an LTC audio output.</p>																
<p>Note:</p> <ul style="list-style-type: none"> 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. 																	
<ul style="list-style-type: none"> SD VITC Waveform Insertion Controls <div data-bbox="186 1333 695 1470"> <div>SD VITC Waveform Output 1 Line Number <input type="text" value="14"/></div> <div>SD VITC Waveform Output 2 Line Number <input type="text" value="16"/></div> <div>SD VITC Waveform Insertion <input checked="" type="button" value="Enabled"/></div> </div>	<p>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.</p> <p>Note:</p> <ul style="list-style-type: none"> 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. 																
<ul style="list-style-type: none"> SD ATC Insertion Control <div data-bbox="186 1617 695 1701"> <div>SD ATC_VITC Insertion <input checked="" type="button" value="Enabled"/></div> <div>SD ATC Insertion Line <input type="text" value="13 - SMPTE 12M-2-2008 Recommended"/></div> </div>	<p>For SD output, enables or disables SD ATC_VITC timecode insertion into the output video, and selects the line number for ATC_VITC.</p>																

Table 3-2 9940-ACO Function Menu List — continued


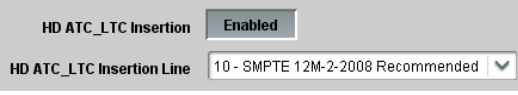
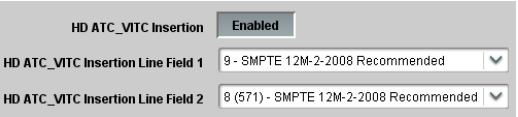

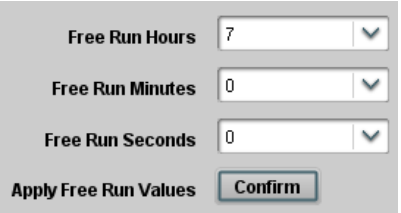
	(continued)
<p>• HD ATC_LTC Insertion Control</p> 	<p>For HD output, enables or disables ATC_LTC timecode insertion into the output video, and selects the line number for ATC_LTC timecode data.</p>
<p>• HD ATC_VITC Insertion Control</p> 	<p>For HD output, enables or disables ATC_VITC timecode insertion into the output video, and selects the line number for ATC_VITC1 and ATC_VITC2.</p>
<p>• ATC_VITC Legacy Support Control</p> 	<p>When enabled, accommodates equipment requiring ATC_VITC packet in both fields as a “field 1” packet (non-toggling).</p> <p>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.</p>
<p>• Free Run Timecode Controls</p> 	<p>Allows an initial (starting) count to be applied to output video timecode when Free Run insertion is enabled.</p> <p>Note:</p> <ul style="list-style-type: none"> 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.

Table 3-2 9940-ACO Function Menu List — continued


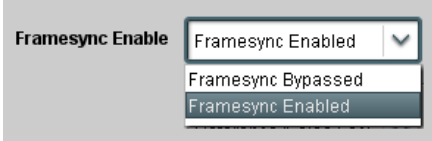
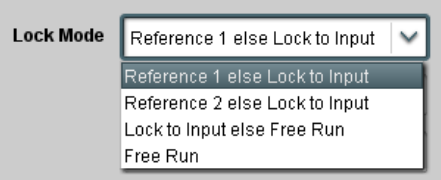

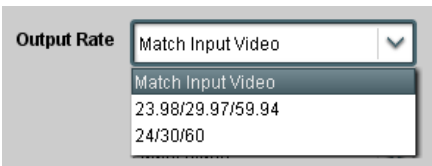
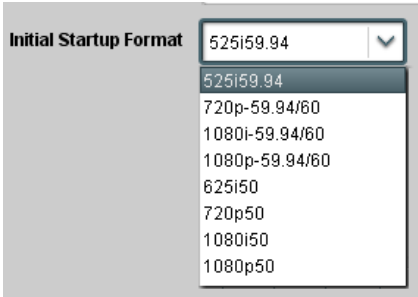
	<p>Provides video frame sync/delay offset control and output control/loss of program video failover selection controls.</p>
<p>• Framesync Enable/Disable Control</p> 	<p>Provides master enable/disable of all card framesync functions/controls.</p>
<p>• Lock Mode Select</p> 	<p>Selects Frame Sync functions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

Table 3-2 9940-ACO Function Menu List — continued

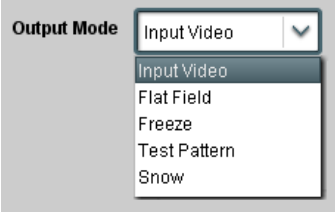
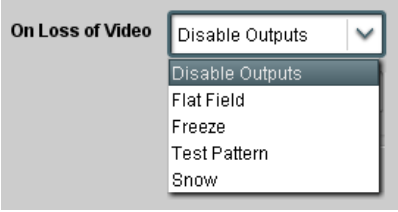
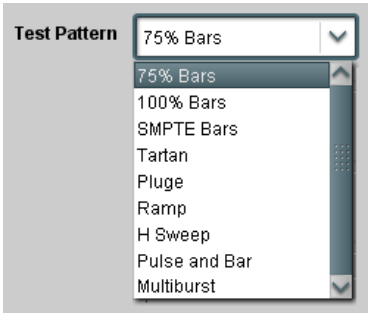
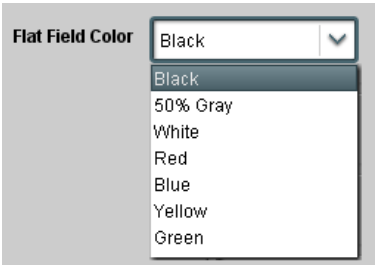
<div data-bbox="297 262 644 325" style="background-color: #333; color: white; padding: 5px; text-align: center; font-weight: bold;">Framesync</div>	(continued)
<p>• Program Video Output Mode Select</p> 	<p>Provides a convenient location to select between card program video output and other technical outputs from the choices shown to the left and described below.</p> <ul style="list-style-type: none"> • Input Video – card outputs input program video (or loss of signal choices described below). • Flat Field – card outputs flat field. • Freeze – card outputs last 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 snow multi-color pattern.
<p>• Loss of Input Signal Selection</p> 	<p>In the event of program input video Loss of Signal (LOS), determines action to be taken as follows:</p> <ul style="list-style-type: none"> • Disable Outputs: Disable program video SDI outputs. • Flat Field (Black) – go to black flat field on program video output. • Freeze – go to last frame having valid SAV and EAV codes on program video output. • Test Pattern – go to standard technical test pattern on program video output (pattern is selected using the Pattern drop-down described below). • Snow – output snow multi-color pattern.
<p>• Test Pattern Select</p> 	<p>Provides a choice of standard technical patterns (shown to the left) when Test Pattern is invoked (either by LOS failover or directly by selecting Test Pattern on the Program Video Output Mode Select control).</p>
<p>• Flat Field Color Select</p> 	<p>Provides a choice of flat field colors when Flat Field is invoked (either by LOS failover or directly by selecting Flat Field on the Program Video Output Mode Select control).</p>

Table 3-2 9940-ACO Function Menu List — continued

Framesync	(continued)
<ul style="list-style-type: none">• Output Video Reference Offset Controls <div><div>Vertical (Lines) -1124</div><div>Horizontal (us) -64.000</div></div>	<p>With framesync enabled, provides the following controls for offsetting the output video from the reference:</p> <ul style="list-style-type: none">• Vertical (Lines) – sets vertical delay (in number of lines of output video) between the output video and the frame sync reference. (Positive values provide delay; negative values provide advance) <p>(Range is -1124 thru 1124 lines; null = 0 lines.)</p> <ul style="list-style-type: none">• 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) <p>(Range is -64 thru 64 μsec; null = 0.000 μsec.)</p> <p>Note: Offset advance is accomplished by hold-off of the reference-directed release of the frame, thereby effectively advancing the program video relative to the reference.</p>
<ul style="list-style-type: none">• Frame Delay Control <div><div>Frame Delay 0</div></div>	<p>When Framesync is enabled, specifies the smallest amount of latency delay (frames held in buffer) allowed by the frame sync. The frame sync will not output a frame unless the specified number of frames are captured in the buffer. The operational latency of the frame sync is always between the specified minimum latency and minimum latency plus one frame (not one field).</p> <p>Note: Due to card memory limits, the maximum available Minimum Latency Frames is related to the output video format selected.</p> <p>When using this control, be sure to check the Report Delay display to kame certain desired amount of frames are delayed.</p>
<ul style="list-style-type: none">• Video Delay Display <div><div>Video Delay</div><div>34.13 ms Framesync: 34.13 ms / 1 frames 12 lines</div></div>	<p>Displays the current input-to-output video delay (in msec units) as well as in terms of Frames/fractional frame (in number of lines).</p> <p>Status display shows total input-to-output video delay, including any framesync delays.</p>
<ul style="list-style-type: none">• Framesync Lock Status Display <div><div>Lock Status</div><div>Framesync Locked to Reference</div></div>	<p>Displays the current framesync status and reference source.</p>
<p>Note: Audio timing offset from video is performed using the delay controls on the Input Audio Routing/Controls tab. Refer to Input Audio Routing/Controls (p. 3-22) for these controls.</p>	

Table 3-2 9940-ACO Function Menu List — continued

Input Audio Status

Displays signal status and payload for embedded and discrete audio received by the card.

Individual signal status and peak level displays for embedded audio input pairs as described below.

- **Absent:** Indicates embedded channel pair does not contain recognized audio PCM data.
- **Present - PCM:** Indicates embedded channel pair contains recognized audio PCM data.
- **Dolby E:** Indicates embedded channel pair contains Dolby® E encoded data.
- **Dolby Digital:** Indicates embedded channel pair contains Dolby® Digital encoded data.

Note: Dolby status displays occur only for valid Dolby® signals meeting SMPTE 337M standard.

	Status	Peak
Emb 1-2	Dolby Digital	Data
Emb 3-4	Present - PCM	-80 dBFS/-80 dBFS
Emb 5-6	Present - PCM	-80 dBFS/-80 dBFS
Emb 7-8	Present - PCM	-20 dBFS/-20 dBFS
Emb 9-10	Present - PCM	0 dBFS/-20 dBFS
Emb 11-12	Present - PCM	-14 dBFS/-10 dBFS
Emb 13-14	Present - PCM	-9 dBFS/-5 dBFS
Emb 15-16	Present - PCM	-3 dBFS/0 dBFS

Table 3-2 9940-ACO Function Menu List — continued

Input Audio Routing/Controls

Input Bus

Audio Delay

Dolby E Alignment

Provides audio routing, gain, per-channel/bulk audio delay controls, and audio meters. These controls route selected audio sources onto the card 16-channel internal bus (which is used for all audio processing).

The screenshot displays a 16-channel audio routing and control interface. The channels are organized into two rows of eight. Each channel is labeled 'Audio Bus Ch' followed by a number from 1 to 16. Below each label is a dropdown menu for 'Emb Ch' (Emb Ch 1 to Emb Ch 16). Each channel also features a 'Mute' button, a level meter (0 to -80), an 'Invert' button, and a gain slider (0 to -80). The interface is designed for configuring audio routing, gain, and mute controls for each of the 16 internal bus channels.

All audio inputs are transferred through the card via the 16-channel Internal Bus (**Bus Ch 1** thru **Bus Ch 16**).

Each bus channel provides Gain, Mute, and Invert controls.

The source-to-destination correlation shown here is only an example; **any** of the sources described on the following pages can route to **any** of the internal bus channels.

Audio Bus Ch 5

Emb Ch 5

Mute

Invert

20

-30

-80

0

Audio Bus Ch 6

Emb Ch 6

Mute

Invert

20

-30

-80

0

Audio Bus Ch 7

Emb Ch 7

Mute

Invert

20

-30

-80

0

Audio Bus Ch 8

Emb Ch 8

Mute

Invert

20

-30

-80

0

Audio Bus Ch 9

Emb Ch 9

Mute

Invert

20

-30

-80

0

Audio Bus Ch 10

Emb Ch 10

Mute

Invert

20

-30

-80

0

Audio Bus Ch 11

Emb Ch 11

Mute

Invert

20

-30

-80

0

Audio Bus Ch 12

Emb Ch 12

Mute

Invert

20

-30

-80

0

Audio Bus Ch 13

Emb Ch 13

Mute

Invert

20

-30

-80

0

Audio Bus Ch 14

Emb Ch 14

Mute

Invert

20

-30

-80

0

Audio Bus Ch 15

Emb Ch 15

Mute

Invert

20

-30

-80

0

Audio Bus Ch 16

Emb Ch 16

Mute

Invert

20

-30

-80

0

Table 3-2 9940-ACO Function Menu List — continued

<div data-bbox="240 268 649 310">Input Audio Routing/Controls</div> <div data-bbox="228 348 721 375"> <div>Input Bus</div> <div>Audio Delay</div> <div>Dolby E Alignment</div> </div>	(continued)
<p>Note:</p> <ul style="list-style-type: none"> • Default factory preset routing routes embedded Ch 1 thru Ch 16 to bus channels Audio Bus Ch 1 thru Ch 16. • Bus Ch 2 thru Bus Ch 16 have controls identical to the controls described here for Bus Ch 1. Therefore, only the Bus Ch 1 controls are shown here. 	
<p>• Bus Channel Source</p> <div data-bbox="284 583 482 680"> <div>Audio Bus Ch 1</div> <div>Emb Ch 1 ▾</div> </div>	<p>Using the Source drop-down list, selects the audio input source to be routed to the card bus channel from the following choices:</p> <ul style="list-style-type: none"> • Embedded input channel 1 thru 16 (Emb Ch 1 thru Emb Ch 16)
<p>• Channel Mute/Phase Invert/Gain Controls and Peak Level Display</p> <div data-bbox="272 802 685 1270"> <div> <div>Mute</div> <div></div> <div>Invert</div> <div></div> <div>0</div> </div> <div> <div>Mute</div> <div></div> <div>Invert</div> <div></div> <div>0</div> </div> </div>	<p>Provides Mute and phase Invert channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.)</p> <p>Gain controls allow relative gain (in dB) control for the corresponding destination Embedded Audio Group channel.</p> <p>(-80 to +20 dB range in 1.0 dB steps; unity = 0 dB)</p> <p>Note: Although the card can pass non-PCM data such as Dolby® E or AC-3, setting the gain control to any setting other than default 0 will corrupt Dolby data.</p>
<div data-bbox="240 1339 649 1381">Input Audio Routing/Controls</div> <div data-bbox="219 1417 716 1444"> <div>Input Bus</div> <div>Audio Delay</div> <div>Dolby E Alignment</div> </div>	<p>Audio Delay – Provides bulk (all four groups/master) and individual card audio bus channel delay offset controls and delay parametric displays.</p>
<p>• Bulk (Master) Audio/Video Delay Control</p> <div data-bbox="228 1528 721 1600"> <div>Audio Bulk Delay (msec)</div> <div></div> <div>...</div> <div></div> <div>-33</div> <div>3000</div> <div>219</div> </div>	<p>Bulk Delay control adds bulk (all four groups) audio delay from any video delay (net audio delay offset setting adds delay in addition to any delay included by other actions). This control is useful for correcting lip sync problems when video and audio paths in the chain experience differing overall delays. (-33 to +3000 msec range in 0.01-msec steps; null = 0 msec).</p> <p> Large rapid changes in bulk delay (> 500 msec) can result in momentary full-scale noise burst on output processed audio. This burst can damage monitors or other equipment if not considered. Gain on output should be reduced if performing large adjustments to delay.</p>

Table 3-2 9940-ACO Function Menu List — continued

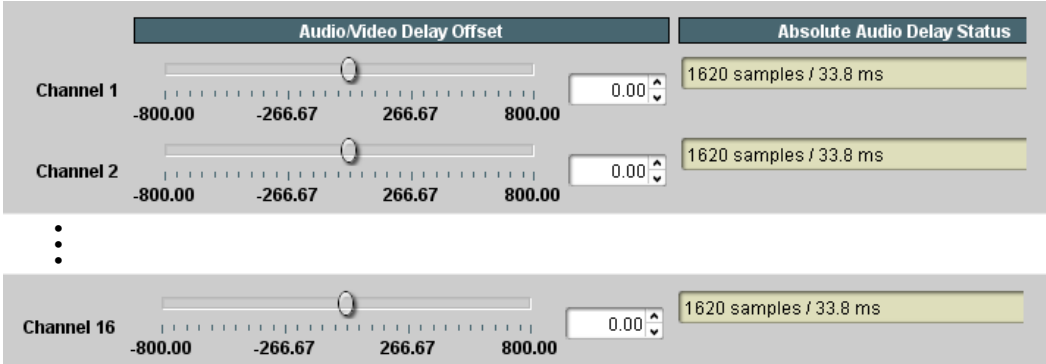
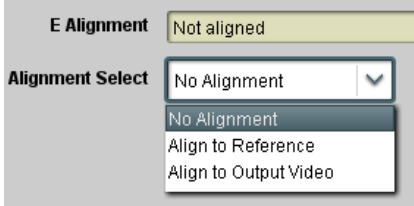
<div>Input Audio Routing/Controls</div> <div>Input Bus Audio Delay Dolby E Alignment</div>	(continued)
<p>• Per-Channel Audio/Video Delay Offset Controls</p> <p>Offset control adds or reduces (offsets) channel audio delay from the matching video delay (audio delay offset setting adds or removes delay in addition to any delay included by other actions). This control is useful for correcting lip sync problems when video and audio paths in the chain experience differing overall delays.</p> <p>(-800.0 to +800.0 msec range in 0.02 msec steps; null = 0.0 msec)</p> <p>Delay Status shows current delay from video for the corresponding audio channel.</p> <p>Note:</p> <ul style="list-style-type: none"> • Maximum advance/delay offset is dependent on video format. • Where a Dolby pair is present, adjustment of either channel control results in a matching delay setting for the other channel in the pair. 	
<div>Input Audio Routing/Controls</div> <div>Input Bus Audio Delay Dolby E Alignment</div> <p>• Dolby E Embedding Alignment Control</p> 	<p>Dolby E Alignment – Provides selectable Dolby E alignment for embedded Dolby E to position the bitstream utilizing the Dolby E “guard band”. This helps prevent frame errors that may occur in a bitstream upon switching or editing.</p> <p>For incoming Dolby E data routed to the card audio bus, aligns the embedded Dolby data corresponding to selection. Alignment line as a result of selection is shown in Status display.</p> <p>Note:</p> <ul style="list-style-type: none"> • Where a frame reference is available, it is recommended to use the Align to Reference selection. This helps ensure that the correct alignment is achieved even if the video is user delayed or output format (scaling) is changed. <p>Refer to “Preferred Alignment for Dolby E in HD Systems” (http://www.dolby.com/about/news-events/newsletters-dtvaudio-dolby-e-alignment.html) for more information regarding Dolby E alignment.</p> <ul style="list-style-type: none"> • This control applies only to externally received Dolby E data streams.

Table 3-2 9940-ACO Function Menu List — continued

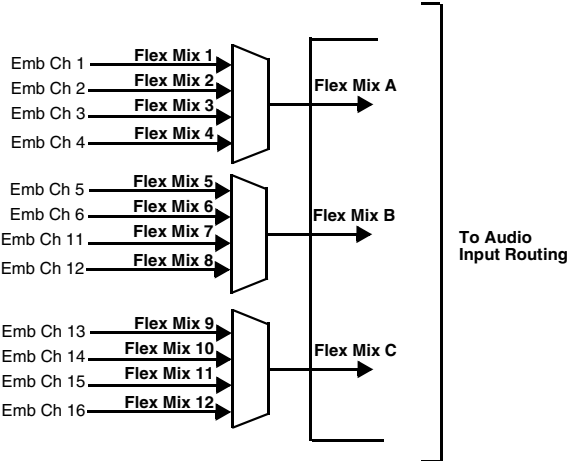
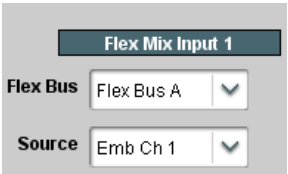
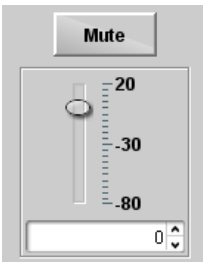
Input Audio Routing/Controls	Input Flex Mix – Provides a 16-channel mixer in which each of the inputs can be mixed onto up to 16 independent output summing nodes. Each input channel has independent gain and mute controls.																										
<div data-bbox="233 348 410 380">Flex Mix</div> <div data-bbox="233 438 662 1102"> <table border="1"> <thead> <tr> <th>Source</th><th>Flex Bus</th></tr> </thead> <tbody> <tr><td>Flex Mix 1</td><td>Embed Ch 1</td></tr> <tr><td>Flex Mix 2</td><td>Embed Ch 2</td></tr> <tr><td>Flex Mix 3</td><td>Embed Ch 3</td></tr> <tr><td>Flex Mix 4</td><td>Embed Ch 4</td></tr> <tr><td>Flex Mix 5</td><td>Embed Ch 5</td></tr> <tr><td>Flex Mix 6</td><td>Embed Ch 6</td></tr> <tr><td>Flex Mix 7</td><td>Embed Ch 11</td></tr> <tr><td>Flex Mix 8</td><td>Embed Ch 12</td></tr> <tr><td>Flex Mix 9</td><td>Embed Ch 13</td></tr> <tr><td>Flex Mix 10</td><td>Embed Ch 14</td></tr> <tr><td>Flex Mix 11</td><td>Embed Ch 15</td></tr> <tr><td>Flex Mix 12</td><td>Embed Ch 16</td></tr> </tbody> </table> </div>	Source	Flex Bus	Flex Mix 1	Embed Ch 1	Flex Mix 2	Embed Ch 2	Flex Mix 3	Embed Ch 3	Flex Mix 4	Embed Ch 4	Flex Mix 5	Embed Ch 5	Flex Mix 6	Embed Ch 6	Flex Mix 7	Embed Ch 11	Flex Mix 8	Embed Ch 12	Flex Mix 9	Embed Ch 13	Flex Mix 10	Embed Ch 14	Flex Mix 11	Embed Ch 15	Flex Mix 12	Embed Ch 16	<p>In this example four, 4-input mono mixers are provided by selecting Flex Mixer Bus A for the Flex Mix 1 thru Flex Mix 4 inputs, and Flex Mixer Bus B for the next four inputs, and so on as shown.</p> 
Source	Flex Bus																										
Flex Mix 1	Embed Ch 1																										
Flex Mix 2	Embed Ch 2																										
Flex Mix 3	Embed Ch 3																										
Flex Mix 4	Embed Ch 4																										
Flex Mix 5	Embed Ch 5																										
Flex Mix 6	Embed Ch 6																										
Flex Mix 7	Embed Ch 11																										
Flex Mix 8	Embed Ch 12																										
Flex Mix 9	Embed Ch 13																										
Flex Mix 10	Embed Ch 14																										
Flex Mix 11	Embed Ch 15																										
Flex Mix 12	Embed Ch 16																										
<p>Note:</p> <ul style="list-style-type: none"> Flex Mix input channels Flex Mix 2 thru Flex Mix 16 have controls identical to that described here for Flex Mix 1. Therefore, only the Flex Mix 1 controls are shown here. For each Flex Mix input channel, its source should be considered and appropriately set. Unused input channels should be set to the Silence selection. 																											
<p>• Flex Mix Input Channel Source/Bus Assignment</p> 	<p>Using the Source drop-down list, selects the audio input source to be directed to the corresponding bus channel from the choices listed below.</p> <ul style="list-style-type: none"> Silence Embed Ch 1 thru Embed Ch 16 <p>The Flex Bus drop-down selects the bus (A thru P) to which the input is assigned to.</p> <p>Note: See the examples on the previous page showing various types of mixers using multiple flex buses.</p>																										
<p>• Gain / Mute Control</p> 	<p>Provides relative gain (in dB) control and a channel Mute checkbox.</p> <p>(-80 to +20 dB range in 0.1 dB steps; unity = 0.0 dB)</p>																										

Table 3-2 9940-ACO Function Menu List — continued

<div>Input Audio Routing/Controls</div>	
<div>Clean and Quiet Switching</div>	<div>Option</div>
<p>Clean and Quiet Switching (option +CQS only) – Allows SDI input selection to be changed from one source to another while ducking audio during controlled input video switching transitions to provide silence between input switches.</p>	
<p>Note:</p> <ul style="list-style-type: none">• Clean audio switching is assured only for intentional, controlled switches via user control. Clean audio switching cannot be assured for failover switches.• Clean switching requires that both SDI signals (switch from and switch to) be stable and present, and of the same SDI format and rate.• Clean audio switching function is designed for PCM audio. This function does not assure clean decoded audio when switching from/to Dolby or other non-PCM audio.	
<p>Switching Enabled check box enables Clean and Quiet Switching.</p> <p>Duration sets the attack and decay ramp intervals (300 msec is recommended for typical use).</p>	
<div><div>Clean and Quiet Switching Enabled<input checked="" type="checkbox"/></div><div><div>Ramp Time Duration (ms)</div><div><div></div><div>025005000</div><div>300</div></div></div></div>	

Table 3-2 9940-ACO Function Menu List — continued


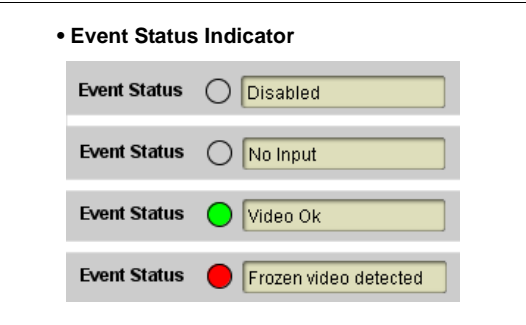
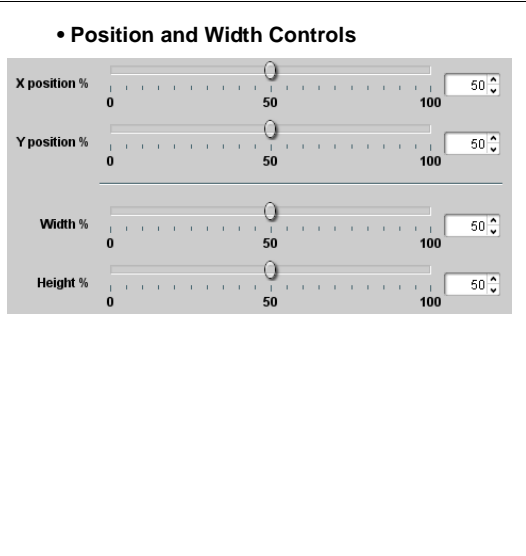
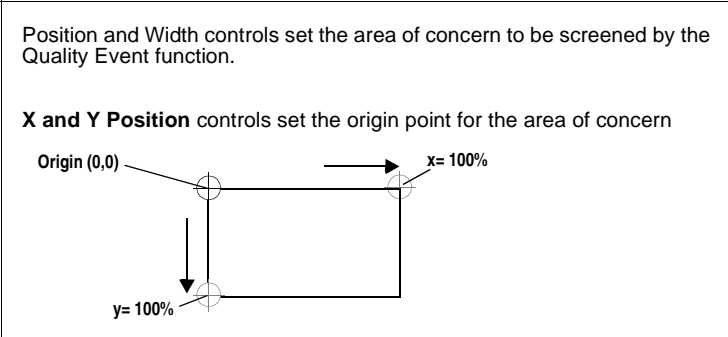
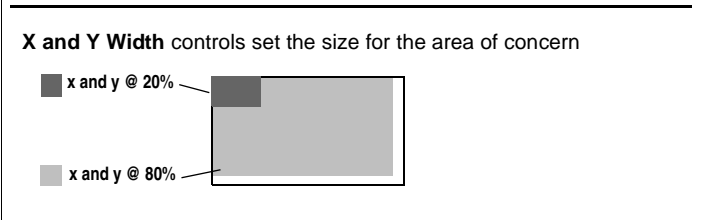
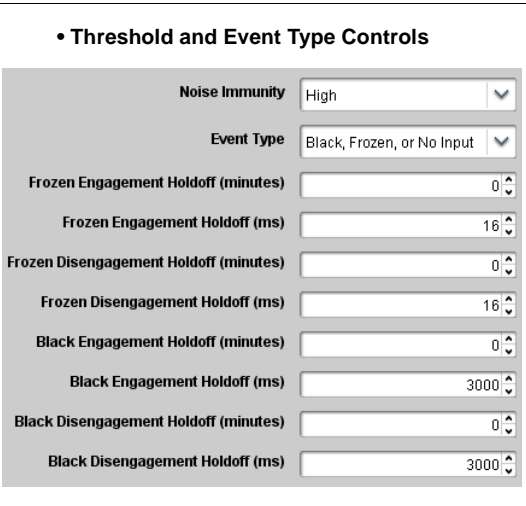
	<p>Sets quality check screening and thresholds for video quality event alerts. When a quality events occur, the event(s) can be used by the Events Setup function to invoke input routing or other changes.</p>
<p>Note: Inputs B thru Input D have controls identical to the controls described here for Input A sub-tab. Therefore, only the Input A controls are shown here. Set controls for other inputs using the respective sub-tab.</p>	
<p>• Event Status Indicator</p> 	<p>Displays event status (based on criteria set below) for signal condition to be considered OK (green), or signal condition considered to be a quality alert event (red) due the condition exceeding the criteria threshold(s) set below. This status can be propagated to the Event Setup Controls to issue a card GPO or other command when video quality events are detected.</p>
<p>• Position and Width Controls</p> 	<p>Position and Width controls set the area of concern to be screened by the Quality Event function.</p> <p>X and Y Position controls set the origin point for the area of concern</p>  <p>X and Y Width controls set the size for the area of concern</p> 
<p>• Threshold and Event Type Controls</p> 	<p>Sets the thresholds for black, frozen, and/or no video event type to be considered. Also provides holdoff controls for event trigger engagement and disengagement.</p> <ul style="list-style-type: none"> • Noise Immunity sets the relative noise levels that are rejected in the course of black event assessment (Low, Medium, or High). • Event Type selects the error events (black, frozen, or no input) to be screened. • Engagement and Disengagement Holdoff controls set the time (in msec) where, when time is exceeded, an event is to be considered a valid alert event, and when event time is has ceased, an alert event is cleared. • Disengagement Holdoff sets the time (in msec) where, when event time is has ceased, an alert event is cleared.

Table 3-2 9940-ACO Function Menu List — continued

Audio Detect Events

Sets audio level screening and thresholds for audio silence/presence event alerts on embedded audio in. When an audio events occur, the event(s) can be used by the Events Setup function to invoke input routing or other changes.

Any combination of embedded input channels can be selected to be screened for silence or presence. In the example here, **Audio Detect Event 1** is set to trigger if audio on **both** channels Emb Ch 1 and Ch 2 fall below the selected threshold for an interval exceeding the selected threshold. Status indicators for each channel show silence (S) / presence (P) status based on the configured thresholds.

Up to eight independent audio silence/presence events can be set to be screened (with descending priority of consideration from Event 1 down to Event 8). This status here can be propagated to the **Events Setup** tab controls to issue a GPO, preset engage, or other command when audio silence events are detected.

	Emb Chan 1	Emb Chan 2	Emb Chan 3	Emb Chan 4	Emb Chan 5	Emb Chan 6	Emb Chan 7	Emb Chan 8	...	Emb Ch 16
Status: S-Silent P-Present	S	P	P	P	P	P	P	P		S
Audio Detect Event 1	S	S	DC	DC	DC	DC	DC	DC		DC
Audio Detect Event 2	P	P	DC	DC	DC	DC	DC	DC		DC
...										
Audio Detect Event 8	DC	DC	DC	DC	DC	DC	DC	DC		DC
Audio Failover Threshold (dBFS)	-60									
Trigger Holdoff (minutes)	0									
Trigger Holdoff (ms)	5000									
Trigger Release (minutes)	0									
Trigger Release (ms)	0									

• **Audio Failover Threshold** sets the dBFS level at which channel content is considered to be silent, and correspondingly also a transition back to an untriggered condition with resumption of audio for the selected embedded channels. If the selected channels maintain levels above the selected **Audio Failover Threshold**, no triggering is invoked.

• **Trigger Holdoff** sets the period of time in which selected channel silence must occur before an Audio Silence Event trigger goes true.

• **Release Holdoff** control sets the time in which the trigger is revoked upon an event false condition.

Note: • Default threshold and holdoff settings shown here are recommended for typical use.

• “Don’t Care” is labeled as **DC**; “Presence” is labeled as **P**; “Silence” is labeled as **S**.

• Selections other than Don’t Care work as an AND function. Where multiple selections are set, a true (trigger) condition is not propagated unless **all** selected channels experience the configured criteria.

(In the example shown above, **both** channels Emb Ch 1 and Emb Ch 2 need to experience a Silence event for a trigger to be propagated.)

ACO Audio Setup Tabs

The lower portion of the page is specifically related to setup of audio screening for **SDI IN A** thru **SDI IN D** as related to the active failover that assesses audio presence for the four SDI inputs. Selected embedded channels for each SDI input can be simultaneously screened for Silence (**S**), or set to Don’t Care (**DC**) for channels not to be screened.

SDI Input A Status	Emb Ch 1
	S
SDI Input A Audio Event	S
	DC
	S

	Emb Ch 1	Emb Ch 2	Emb Ch 3	...	Emb Ch 16
SDI Input A Status	S	S	S		S
SDI Input A Audio Event	S	S	DC		DC
SDI Input B Status	P	P	P		S
SDI Input B Audio Event	S	S	DC		DC
SDI Input C Status	S	S	S		S
SDI Input C Audio Event	S	S	DC		DC
SDI Input D Status	S	S	S		S
SDI Input D Audio Event	S	S	DC		DC

In this example, Emb Ch 1/2 pairs for inputs **SDI IN A** thru **SDI IN D** are to be set up for audio screening in conjunction with the **Event Setup > ACO Setup** sub-tab page. For inputs that will not be considered, DC should be selected here.

Use these controls when setting up **Event Setup > ACO Setup** (p3-49) to screen for audio Silence events.

Table 3-2 9940-ACO Function Menu List — continued


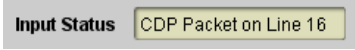
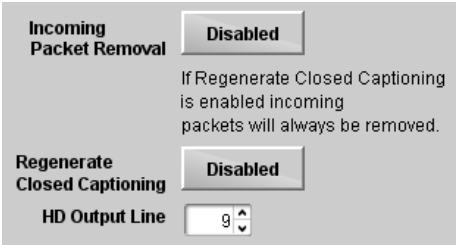
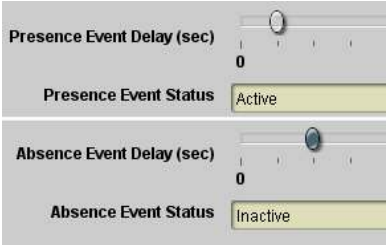
	<p>Provides support for closed captioning setup. Also provides controls for setting closed captioning absence and presence detection thresholds.</p>								
<p>• Closed Captioning Input Status</p> 	<p>Displays incoming Closed Captioning status as follows:</p> <ul style="list-style-type: none"> • If closed captioning is present, a message similar to the example shown is displayed. • If no closed captioning is present in the video signal, Not Present or Disabled is displayed. <p>Note: • Packet closed captioning status Captioning Rejected Due To message can appear due to the items described below. The closed captioning function assesses <i>cdp_identifier</i>, <i>cdp_frame_rate</i>, <i>ccdata_present</i>, and <i>caption_service_active</i> items contained in the packet header to make the determinations listed below. Refer to CEA-708-B for more information.</p> <table border="1" data-bbox="781 651 1433 947"> <thead> <tr> <th>Message</th><th>Description</th></tr> </thead> <tbody> <tr> <td>Unsupported Frame Rate</td><td>Film rate closed-captioning (either as pass-through or up/down conversion) is not supported by the card.</td></tr> <tr> <td>Data Not Present</td><td>Packet is marked from closed captioning source external to the card that no data is present.</td></tr> <tr> <td>No Data ID</td><td>Packet from closed captioning source external to the card is not properly identified with 0x9669 as the first word of the header (unidentified packet).</td></tr> </tbody> </table> <ul style="list-style-type: none"> • caption service is marked as inactive display indicates bit in packet from upstream source may inadvertently be set as inactive. In this case, closed captioning data (if present) is still processed and passed by the card as normal. • The closed captioning function does not support PAL closed captioning standards. 	Message	Description	Unsupported Frame Rate	Film rate closed-captioning (either as pass-through or up/down conversion) is not supported by the card.	Data Not Present	Packet is marked from closed captioning source external to the card that no data is present.	No Data ID	Packet from closed captioning source external to the card is not properly identified with 0x9669 as the first word of the header (unidentified packet).
Message	Description								
Unsupported Frame Rate	Film rate closed-captioning (either as pass-through or up/down conversion) is not supported by the card.								
Data Not Present	Packet is marked from closed captioning source external to the card that no data is present.								
No Data ID	Packet from closed captioning source external to the card is not properly identified with 0x9669 as the first word of the header (unidentified packet).								
<p>• Closed Captioning Remove/Regenerate and HD Insertion Line Controls</p> 	<p>Allows removal of closed captioning packets and regeneration of packets. This is useful where closed captioning must be moved to a different line than that received on.</p> <p>Note: • Although the output line drop-down will allow any choice within the 9 thru 41 range, 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.</p> <ul style="list-style-type: none"> • The card does not check for conflicts on a given line number. Make certain selected line is available and carrying no other data. 								
<p>• Presence/Absence Check Controls</p> 	<p>Displays CC presence and/or absence event status. This status can be propagated to the Events Setup tab controls to issue a card GPO or other command when CC presence/absence events are detected.</p> <p>Controls for both presence and absence provide for a holdoff time (in seconds) where, when time is exceeded, an event is to be considered a valid alert event.</p>								

Table 3-2 9940-ACO Function Menu List — continued

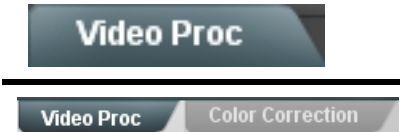


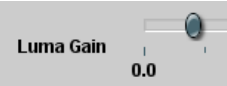




	<p>Provides the following Video Proc and Color Correction parametric controls.</p>
<p>• Video Proc</p> 	<p>Video Proc (Enable/Disable) provides master on/off control of all Video Proc functions.</p> <ul style="list-style-type: none"> • When set to Disable, Video Proc is bypassed. • When set to Enable,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

Table 3-2 9940-ACO Function Menu List — continued





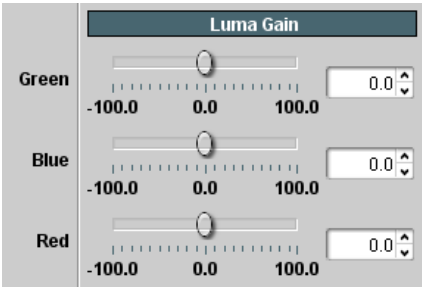
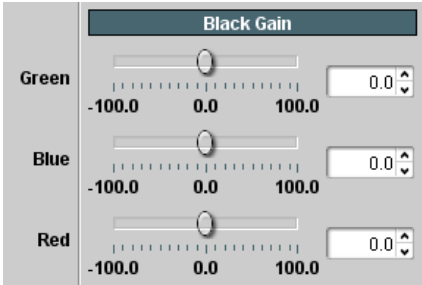
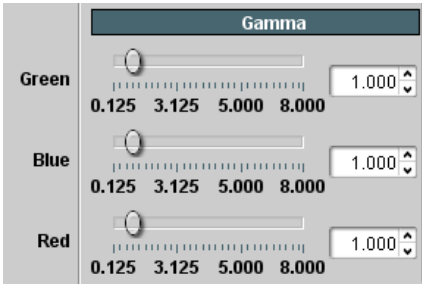
	 <p>Provides color corrector functions for the individual RGB channels for the card program video path (option +COLOR).</p>
<p>• Color Corrector</p> 	<p>Color Corrector (On/Off) provides master on/off control of all Color Corrector functions.</p> <ul style="list-style-type: none"> • When set to Off, all processing is bypassed. • When set to On, currently displayed parameters settings take effect.
<p>• Reset to Unity</p> 	<p>Reset to Unity provides unity reset control of all Color Corrector functions.</p> <p>When Confirm is clicked, a Confirm? pop-up appears, requesting confirmation.</p> <ul style="list-style-type: none"> • Click Yes to proceed with the unity reset. • Click No to reject unity reset.
<p>• Luma Gain R-G-B controls</p>  <p>• Black Gain R-G-B controls</p>  <p>• Gamma Factor R-G-B controls</p> 	<p>Separate red, green, and blue channels controls for Luma Gain, Black Gain, and Gamma curve adjustment.</p> <p>Gain controls provide gain adjustment from 0.0 to 200.0% range in 0.1% steps (unity = 100.0)</p> <p>Gamma controls apply gamma curve adjustment in 0.125 to 8.000 range in thousandths steps (unity = 1.000)</p> <p>Each of the three control groups (Luma, Black, and Gamma have a Gang Column button which allows settings to be proportionally changed across a control group by changing any of the group's controls.</p>

Table 3-2 9940-ACO Function Menu List — continued

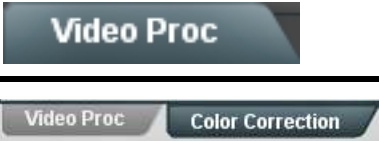




	(continued)
<ul style="list-style-type: none"> • Black Hard Clip 	<p>Applies black hard clip (limiting) at specified percentage. (-6.8% to 50.0%; null = -6.8%)</p>
<ul style="list-style-type: none"> • White Hard Clip 	<p>Applies white hard clip (limiting) at specified percentage. (50.0% to 109.1%; null = 109.1%)</p>
<ul style="list-style-type: none"> • White Soft Clip 	<p>Applies white soft clip (limiting) at specified percentage. (50.0% to 109.1%; null = 109.1%)</p>
<ul style="list-style-type: none"> • Chroma Saturation Clip 	<p>Applies chroma saturation clip (limiting) chroma saturation at specified percentage. (50.0% to 160.0%; null = 160.0%)</p>

Table 3-2 9940-ACO Function Menu List — continued



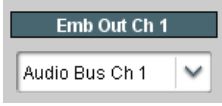

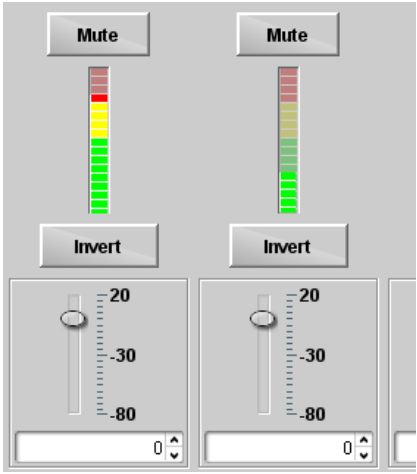
	<p>Provides an audio crosspoint allowing the audio source selection for each embedded audio output channel. Also provides Gain, Phase Invert, and Muting controls and peak level meters for each output channel.</p>
<p>Note:</p> <ul style="list-style-type: none"> • Embedded Ch 2 thru Embedded Ch 16 have controls identical to the Source, Gain, Mute, and Invert controls described here for Embedded Ch 1. Therefore, only the Embedded Ch 1 controls are shown here. • For each channel, its source and destination should be considered and appropriately set. Unused destination channels should be set to the Silence selection. 	
<p>• Group Enable/Disable Controls</p> 	<p>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.</p> <p>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.</p>
<p>• Embedded Output Channel Source</p> 	<p>Using the drop-down list, selects the audio input source to be embedded in the corresponding embedded output channel from the following choices:</p> <ul style="list-style-type: none"> • Card Audio Bus Ch 1 thru Ch 16 • Built-in Tone generators Tone <i>n</i> (-20 dBFS level tone generators with <i>n</i> being frequencies of 100, 200, 300, 400, 500, 600, 700, 800, 900, 1k, 2k, 4k, 6k, 8k, 12k, and 16k) • Flex Bus A thru P mixer sum node outputs • Option  Audio LTC • Downmixer L • Downmixer R
<p>• Channel Mute/Phase Invert/Gain Controls and Peak Level Display</p> 	<p>Provides Mute and phase Invert channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.)</p> <p>Gain controls allow relative gain (in dB) control for the corresponding destination Embedded Audio Group channel.</p> <p>(-80 to +20 dB range in 1.0 dB steps; unity = 0 dB)</p> <p>Note: Although the 9940 can pass non-PCM data such as Dolby® E or AC-3, setting the gain control to any setting other than default 0 will corrupt Dolby data.</p>

Table 3-2 9940-ACO Function Menu List — continued


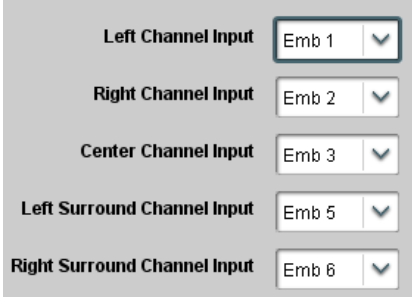
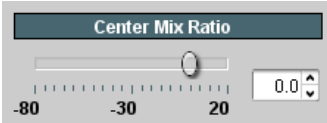
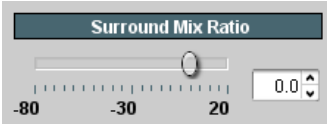
	<p>Provides audio down-mix audio routing selections that multiplexes any five audio channel sources into a stereo pair.</p>
<p>• Downmixer Source Controls</p> 	<p>Left Channel Input thru Right Surround Channel Input select the five audio bus source channels to be used for the downmix.</p> <p>Downmix channels Downmixer L and Downmixer R are available as sources for embedded audio outputs using the Channel Source controls described above.</p>
<p>• Center Mix Ratio Control</p> 	<p>Adjusts the attenuation ratio of center-channel content from 5-channel source that is re-applied as Lt and Rt content to the DM-L and DM-R stereo mix.</p> <ul style="list-style-type: none"> • -0 dB setting applies no ratiometric reduction. Center channel content is restored as in-phase center-channel content with no attenuation, making center-channel content more predominate in the overall mix. • Maximum attenuation setting (-80 dB) applies a -80 dB ratiometric reduction of center-channel content. Center-channel content is restored as in-phase center-channel content at a -80 dB ratio relative to overall level, making center-channel content less predominate in the overall mix. <p>(20 dB to -80 dB range in 0 dB steps; default = -3 dB)</p> <p>Note: Default setting is recommended to maintain center-channel predominance in downmix representative to that of the original source 5-channel mix.</p>
<p>• Surround Mix Ratio Control</p> 	<p>Adjusts the attenuation ratio of surround-channel content from 5-channel source that is re-applied as Lo and Ro content to the DM-L and DM-R stereo mix.</p> <ul style="list-style-type: none"> • -0 dB setting applies no ratiometric reduction. Surround-channel content is restored with no attenuation, making Lo and Ro content more predominate in the overall mix. • Maximum attenuation setting (-80 dB) applies a -80 dB ratiometric reduction of surround-channel content. Surround-channel content is restored at a -80 dB ratio relative to overall level, making surround-channel content less predominate in the overall mix. <p>(20 dB to -80 dB range in 0 dB steps; default = -3 dB)</p> <p>Note: Default setting is recommended to maintain surround-channel predominance in downmix representative to that of the original source 5-channel mix.</p>

Table 3-2 9940-ACO Function Menu List — continued

<div data-bbox="212 262 727 317">Output Audio Routing/Controls</div> <div data-bbox="212 331 399 373">Flex Mix</div>	<p>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 are the card processed audio bus channels. Each input channel has independent gain and mute controls.</p>
<p>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.</p>	
<p>• Flex Bus Input Channel Source/Bus Assignment</p> <div data-bbox="282 571 647 737"> <div data-bbox="282 571 647 625">Flex Mix Input 1</div> <div data-bbox="282 625 647 680"> <div data-bbox="282 636 363 659">Flex Bus</div> <div data-bbox="388 636 647 659">Flex Bus A</div> </div> <div data-bbox="282 680 647 737"> <div data-bbox="282 690 363 714">Source</div> <div data-bbox="388 690 647 714">Audio Bus Ch 1</div> </div> </div>	<p>Using the Source drop-down list, selects the audio input source to be directed to the corresponding bus channel from the choices listed below.</p> <ul style="list-style-type: none"> • Silence • Audio Bus Ch 1 thru Ch 16 • Tones (100 Hz thru 16 kHz) • Downmix L or Downmix R <p>The Flex Bus drop-down selects the bus (A thru P) to which the input is assigned to.</p>
<p>• Gain / Mute Control</p> <div data-bbox="277 831 480 1087"> <div data-bbox="277 831 480 886">Mute</div> <div data-bbox="277 886 480 1087"> <div data-bbox="277 886 480 1087"> <div data-bbox="277 886 480 1087">20</div> <div data-bbox="277 886 480 1087">-30</div> <div data-bbox="277 886 480 1087">-80</div> <div data-bbox="277 886 480 1087">0</div> </div> </div> </div>	<p>Provides relative gain (in dB) control and a channel Mute checkbox.</p> <p>(-80 to +20 dB range in 0.1 dB steps; unity = 0.0 dB)</p>

Table 3-2 9940-ACO Function Menu List — continued

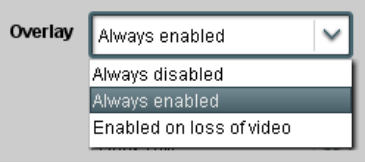
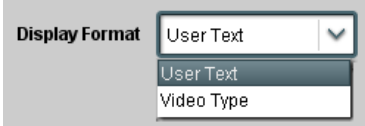
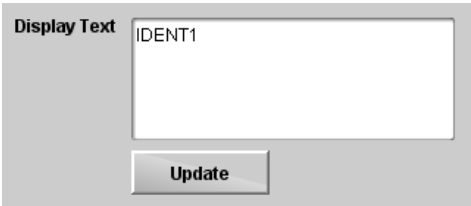
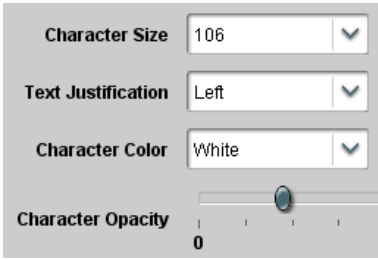
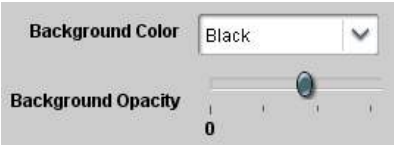
<div>Character Burner</div> <div>Ident 1 Ident 2 Timecode</div>	Provides user-configurable burn-in of up to two text strings and timecode on output video.
<p>Note: Ident 1 and Ident 2 sub-tabs provide identical, independent controls for inserting two independent text (identification) burn-in overlays on the output video. Ident 2 has controls identical to the controls described here for Ident 1. Therefore, only the Ident 1 controls are shown here.</p>	
<p>• Ident Insertion Controls</p> 	<p>Selects the rules for identification text burn-in overlay insertion into output video.</p> <p>Note: If ident text insertion is desired for input LOS conditions, the Framesync On Loss of Video control must be set to provide a raster (from one of the choices shown) to support the text insertion. If this control is set to "Disable Outputs", no raster or text insertion will be present on the output video under input LOS conditions. See Framesync (p. 3-18) for more information.</p>
<p>• Display Type (Format) Select</p> 	<p>Selects the type of data to be displayed as burn-in text from choices shown.</p> <ul style="list-style-type: none"> • User text allows user text to be entered using field described below. • Video type inserts an overlay showing the video format of the input being used for processing.
<p>• Display (Ident) Text Entry Field</p> 	<p>Dialog entry box that allows entry of desired ident text string. Enter desired text as click Update when done to input the text string.</p> <p>Note:</p> <ul style="list-style-type: none"> • All normal keyboard alphanumeric characters are supported, in addition to ASCII characters (Windows ALT+nnnn). • Up to 126 characters can be entered.
<p>• Ident Text Attributes Controls</p> 	<p>Sets burn-in size/position attributes as follows:</p> <ul style="list-style-type: none"> • 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).
<p>• Ident Text Background Attributes Controls</p> 	<p>Provides independent controls for setting the color and opacity of the burn-in text and its background.</p> <ul style="list-style-type: none"> • 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 9940-ACO Function Menu List — continued

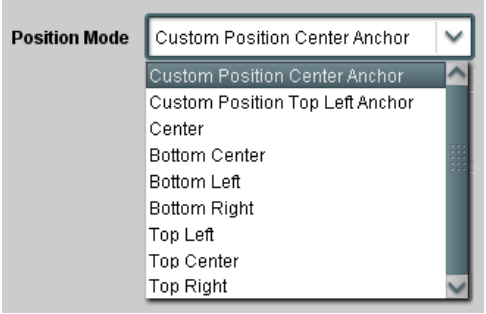
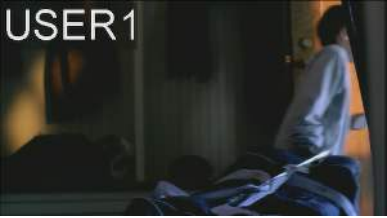

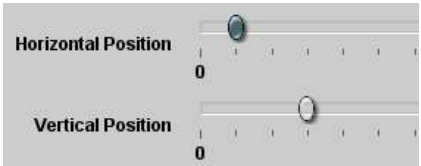
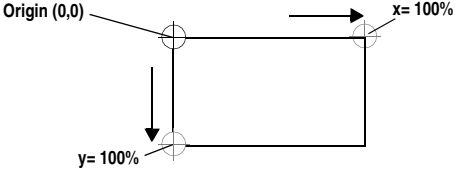
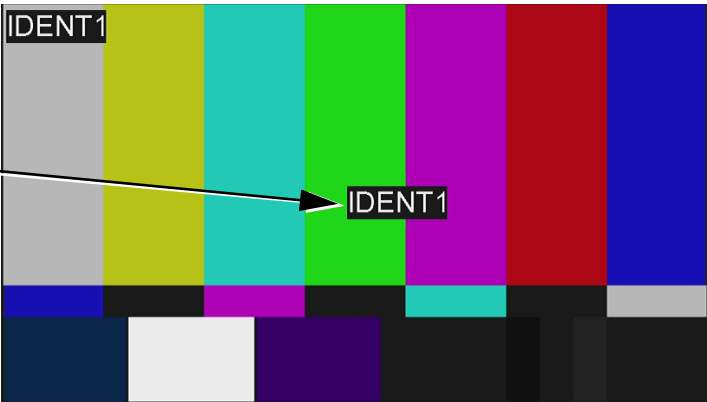
<div>Character Burner</div> <div>Ident 1 Ident 2 Timecode</div>	(continued)
<p>• Ident Position Select</p> 	<p>Sets the location of the ident text insertion from choices shown or custom. (When Custom is selected, position is configured using the Ident Text Positioning Controls described below.)</p> <p>Example: Ident 1 text using Top Left position</p>  <p>Example: Ident 1 text using Center position</p>  <p>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.</p>
<p>• Ident Text Positioning Controls</p> 	<p>With Custom selected, sets burn-in position attributes as follows:</p> <ul style="list-style-type: none"> • 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%) <p>Note:</p> <ul style="list-style-type: none"> • 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.
<p>Positioning with H and V controls at zero (origin) (Size = 3)</p> <p>Positioning with H and V controls both at 50 (Size = 3)</p> 	

Table 3-2 9940-ACO Function Menu List — continued

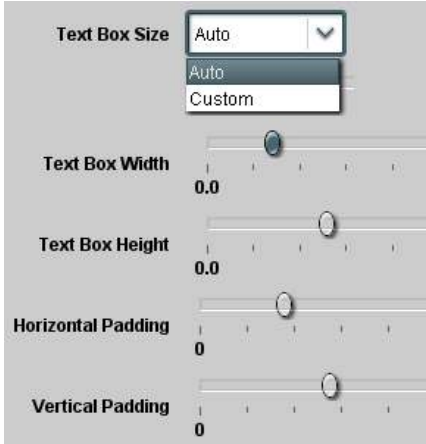
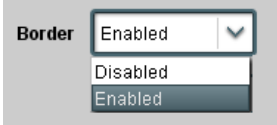
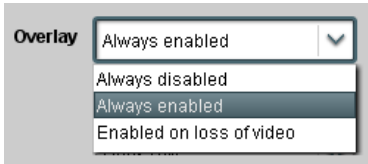
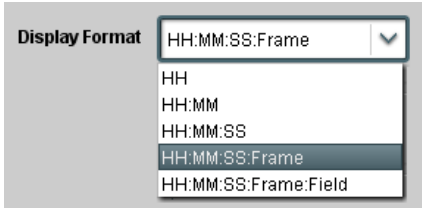
<div>Character Burner</div> <div>Ident 1 Ident 2 Timecode</div>	(continued)
<p>• Text Box Sizing Controls</p> 	<p>Provides controls for setting the size of the burn-in text background box.</p> <ul style="list-style-type: none"> • Auto allows text box to proportionally size with selected text size. • 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.
<p>• Text Box Border Enable</p> 	<p>When set to Enabled, applies a white hairline border to the text box edges.</p>
<div>Character Burner</div> <div>Ident 1 Ident 2 Timecode</div>	Provides controls for burn-in of timecode on output video.
<p>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 (p. 3-13) for information on using timecode controls.</p> <p>• Timecode Insertion Control</p> 	<p>Selects the rules for timecode burn-in overlay insertion into output video.</p> <p>Note: If timecode insertion is desired for input LOS conditions, the Framesync On Loss of Video control must be set to provide a raster (from one of the choices shown) to support the timecode insertion.</p> <p>If this control is set to "Disable Outputs", no raster or timecode insertion will be present on the output video under input LOS conditions. See Framesync (p. 3-18) for more information.</p>
<p>• Timecode Format Display Selector</p> 	<p>Selects the format of timecode string burn-in overlay insertion into output video from choices shown.</p>

Table 3-2 9940-ACO Function Menu List — continued

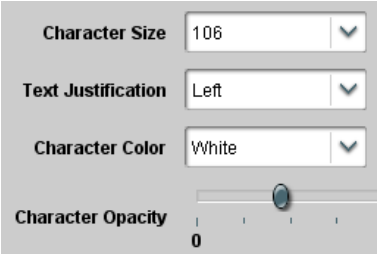
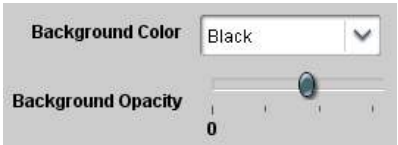
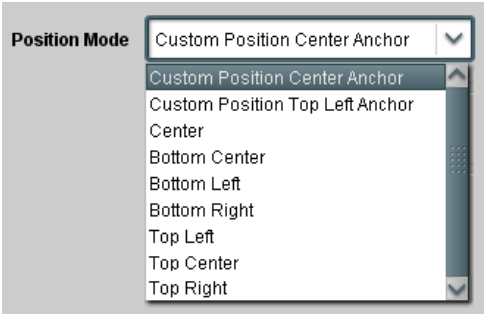


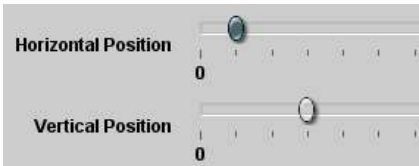
<div>Character Burner</div> <div>Ident 1 Ident 2 Timecode</div>	(continued)
<p>• Timecode Attributes Controls</p> 	<p>Sets burn-in size/position attributes as follows:</p> <ul style="list-style-type: none"> • Character Size sets character size (in pixels). • Text Justification selects from left, right, 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).
<p>• Timecode Background Attributes Controls</p> 	<p>Provides independent controls for setting the color and opacity of the burn-in text and its background.</p> <ul style="list-style-type: none"> • Color drop-down sets background color from multiple choices. • Opacity control sets background opacity from 0% (least opacity) to 100% (full opacity).
<p>• Timecode Position Select</p> 	<p>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.)</p> <div data-bbox="768 1087 976 1171"> <p>Example: Timecode burn-in using Bottom Center position</p> </div>  <div data-bbox="768 1308 985 1392"> <p>Example: Timecode burn-in using Top Left position</p> </div> 
<p>• Timecode Positioning Controls</p> 	<p>With Custom selected, sets burn-in position attributes as follows:</p> <ul style="list-style-type: none"> • 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%) <p>Note: • Horizontal and Vertical Position controls are functional only when Custom Position is selected.</p> <ul style="list-style-type: none"> • 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 9940-ACO Function Menu List — continued

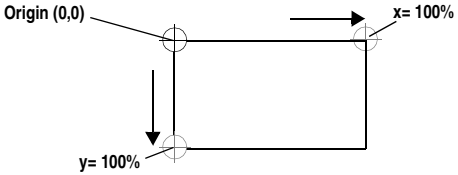
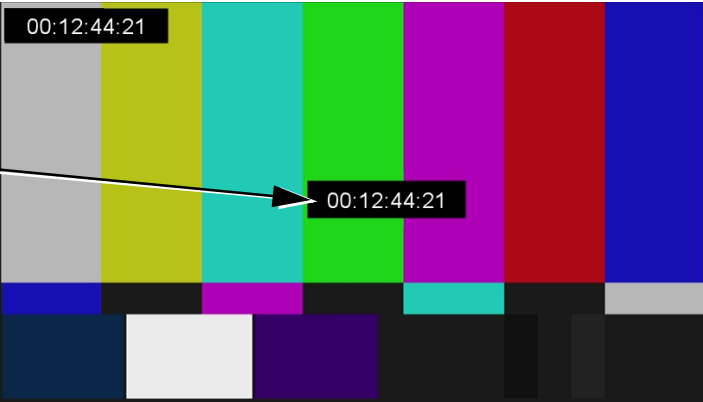
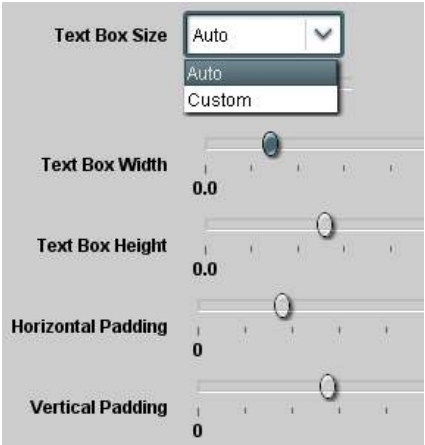
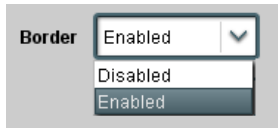
<div>Character Burner</div> <div>Ident 1 Ident 2 Timecode</div>	(continued)
<p>Positioning with H and V controls at zero (origin) (Size = 3)</p> <p>Positioning with H and V controls both at 50 (Size = 3)</p> 	
<p>• Text Box Sizing Controls</p> 	<p>Provides controls for setting the size of the burn-in background box.</p> <ul style="list-style-type: none"> • 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.
<p>• Text Box Border Enable</p> 	<p>When set to Enabled, applies a white hairline border to the text box edges.</p>

Table 3-2 9940-ACO Function Menu List — continued





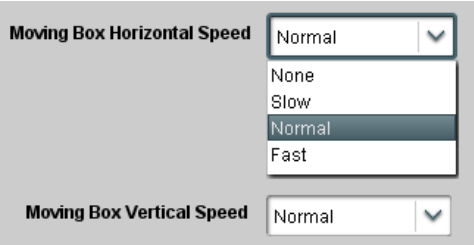
	<p>Provides a “moving box” graphic insertion (overlay) on the output video.</p> <p>Moving-box insertion can serve as a dynamic raster confidence check even in cases where the input video image is static or lost.</p>
	<p>Moving-box insertion provides dynamic display even on static video. Attributes such as box size, color, vertical movement speed, and horizontal movement speed are all user configurable.</p> <p>Moving box can be set to insert continuously, or only upon loss of input.</p>
<p>• Moving Box Insertion Controls</p> 	<p>Selects the rules for moving-box overlay insertion into output video.</p> <p>Note: If moving-box insertion is desired for input LOS conditions, the Framesync On Loss of Video control must be set to provide a raster (from one of the choices shown) to support the moving-box insertion.</p> <p>If this control is set to “Disable Outputs”, no raster or moving-box insertion will be present on the output video under input LOS conditions. See Framesync (p. 3-18) for more information.</p>
<p>• Moving Box Size Controls</p> 	<p>Sets size of box image burn-in as follows:</p> <ul style="list-style-type: none"> • 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%) <p>Note:</p> <ul style="list-style-type: none"> • 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. • For SD usage, moving box can impinge on and corrupt line 21 closed-captioning waveform if positioned too close to the upper right of the raster.
<p>• Moving Box Speed Controls</p> 	<p>Sets speed of motion for moving box image burn-in as follows:</p> <ul style="list-style-type: none"> • 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 9940-ACO Function Menu List — continued

<div data-bbox="228 258 633 312" data-label="Section-Header"> <h3>Moving Box</h3> </div>	(continued)
<div data-bbox="228 352 570 382" data-label="Section-Header"> <h4>• Moving Box Attributes Controls</h4> </div> <div data-bbox="240 394 670 758" data-label="Image"> </div>	<p>Provides independent controls for setting the color and opacity of the moving-box insertion.</p> <ul style="list-style-type: none"> • Color drop-down sets box color from multiple choices shown. • Opacity controls sets box opacity from 0% (least opacity) to 100% (full opacity).
<div data-bbox="188 816 628 871" data-label="Section-Header"> <h3>YC Alignment</h3> </div>	<p>Provides controls for correcting upstream misalignment of Y and C phase.</p>
<div data-bbox="235 976 711 1031" data-label="Text"> <p>SMPTE color bars showing Y/C misalignment (as evidenced by poor transitions at the color borders)</p> </div> <div data-bbox="212 1045 755 1354" data-label="Image"> </div> <div data-bbox="847 976 1351 1031" data-label="Text"> <p>SMPTE color bars showing proper Y/C alignment (as evidenced by crisp transitions at the color borders)</p> </div> <div data-bbox="846 1045 1388 1354" data-label="Image"> </div> <div data-bbox="261 1369 1370 1423" data-label="Text"> <p>Y/C misalignment is typically introduced by upstream analog-to-digital conversion, especially where the Y and chroma paths may experience differing characteristics.</p> </div>	
<div data-bbox="228 1474 488 1503" data-label="Section-Header"> <h4>• Y/C Alignment Controls</h4> </div> <div data-bbox="240 1514 690 1816" data-label="Image"> </div>	<p>Provides the following Y/C alignment controls:</p> <ul style="list-style-type: none"> • Enable control turns on alignment. • C Phase Adjustment Relative to Y provides a -8° to $+7^{\circ}$ phase offset of C phase from Y phase.

Table 3-2 9940-ACO Function Menu List — continued


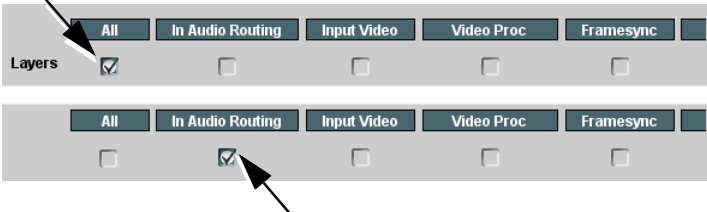

	<p>Allows user control settings to be saved in a Preset and then loaded (recalled) as desired, and provides a one-button restore of factory default settings.</p>
<p>• Preset Layer Select</p> <p>Allows selecting a functional layer (or “area of concern”) that the preset is concerned with. Limiting presets to a layer or area of concern allows for highly specific presets, and masks changing card settings in areas outside of the layer or area of concern.</p> <p>Default All setting will “look” at all card settings and save all settings to the defined preset with no masking.</p>  <p>video proc setting in effect, and at a later time EAS audio routing is desired to be saved and invoked as a preset, selecting In Audio Routing here tells the preset save and load to not concern itself with video proc settings. In this manner, any video proc settings in effect when the EAS preset is invoked will not affect any video proc settings that might be currently in effect.</p>	<p>Selecting a layer (in the example, “In Audio Routing”) will set the preset to only “look at” and “touch” audio routing settings and save these settings under the preset. When the preset is loaded (recalled), the card will only “touch” the audio routing layer.</p> <p>Example: Since EAS audio routing can be considered independent of video proc settings, if normal audio routing was set up with a particular</p>
<p>• Preset Enter/Save/Delete</p>  <p>Protected state – changes locked out</p> <p>Ready (open) state – changes can be applied</p>	<p>Locks and unlocks editing of presets to prevent accidental overwrite as follows:</p> <ul style="list-style-type: none"> • Protect (ready): This state awaits Protected and allows preset Save/Delete button to save or delete current card settings to the selected preset. Use this setting when writing or editing a preset. • Protected: Toggle to this setting to lock down all presets from being inadvertently modified or deleted. Use this setting when all presets are as intended. • New/Updated Preset Name: Field for entering user-defined name for the preset being saved (in this example, “IRD Rcv122”). • Save: Saves the current card settings under the preset name defined above.

Table 3-2 9940-ACO Function Menu List — continued

Presets	(continued)
<p>• Preset Save/Load Controls</p> <p>Load/Delete Existing Preset</p> <p>Select Preset: <input type="text" value="IRD Rcv1 22"/></p> <p>Load Selected Preset <input type="button" value="Confirm"/></p> <p>Update Selected Preset <input type="button" value="Confirm"/></p> <p>Rename Selected Preset <input type="button" value="Confirm"/></p> <p>Delete Selected Preset <input type="button" value="Confirm"/></p> <p>Delete All Presets <input type="button" value="Confirm"/></p> <p>Load Factory Defaults <input type="button" value="Confirm"/></p> <p>Download Presets <input type="text" value="StoredPresets.bin"/> <input type="button" value="Save"/></p>	<ul style="list-style-type: none"> • Select Preset: drop-down allows a preset saved above to be selected to be loaded or deleted (in this example, custom preset "IRD Rcv122"). • Load Selected Preset button allows loading (engaging) the selected preset. When this button is pressed, the changes called out in the preset are immediately applied. Note: Controls below that modify or delete presets are grayed-out (inactive) when Save/Delete button is in Protected mode. To use these controls, make certain Protected is not enabled. • Update - Rename - Delete Selected Preset buttons allow selected preset to be updated (take in current custom settings), be renamed, or be deleted. A Confirm prompt appears in all cases. • Delete All Presets button allows a delete of all stored presets. (This is useful if all presets are to be replaced by a new Presets .bin file.) • Load Factory Defaults button allows loading (recalling) the factory default preset. When this button is pressed, the changes called out in the preset are immediately applied. Note: Load Factory Defaults functions with no masking. The Preset Layer Select controls have no effect on this control and will reset all layers to factory default. • Download Presets saving the preset files to a folder on the connected computer.
<p>Upload Options</p> <p>Delete All Presets on Upload <input type="checkbox"/></p> <p>Delete Duplicate Presets on Upload <input type="checkbox"/></p> <p>Load Saved Settings on Preset Upload <input checked="" type="checkbox"/></p>	<ul style="list-style-type: none"> • Upload Options checkboxes function as follows: <ul style="list-style-type: none"> • Delete All Presets on Upload clears all stored presets, and then replaces or adds any presets as defined in the uploaded Presets .bin file. (This is useful to establish a "clean slate" and remove any presets that may no longer be desired.) • Delete Duplicate Presets on Upload clears stored presets bearing the same name as currently stored presets. (This avoids dual iterations of same preset name (plain and duplicate using "*" marking), and avoids possibility of "stale" presets no longer desired from appearing as a choice.) • Load Saved Settings on Preset Upload makes certain any local card settings card state is retained following a preset upload. When checked, a preset within the upload is invoked only when specifically selected and invoked. Note: Any combination of checkboxes can be checked or unchecked (enabled or disabled) as desired.

Table 3-2 9940-ACO Function Menu List — continued

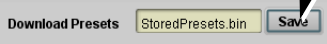

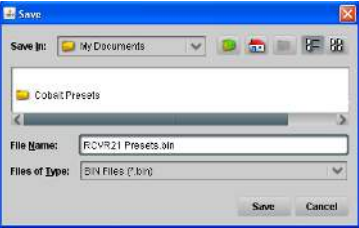
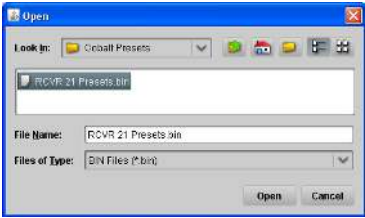
Presets	(continued)
<p>Download (save) card presets to a network computer by clicking Download Presets – Save at the bottom of the Presets page.</p>	<p>Upload (open) card presets from a network computer by clicking Upload at the bottom of DashBoard.</p>
	
<p>Browse to a desired save location (in this example, <i>My Documents\Cobalt Presets</i>).</p>	<p>Browse to the location where the file was saved on the computer or drive (in this example, <i>My Documents\Cobalt Presets</i>).</p>
	
<p>The file can then be renamed if desired (<i>RCVR21 Presets</i> in this example) before committing the save.</p>	<p>Select the desired file and click Open to load the file to the card.</p>
<p>Note:</p> <ul style="list-style-type: none"> • Preset transfer between card download and file upload is on a group basis (i.e., individual presets cannot be downloaded or uploaded separately). • After uploading a presets file, engagement of a desired preset is only assured by selecting and loading a desired preset as described on the previous page. 	

Table 3-2 9940-ACO Function Menu List — continued

Event Setup

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 Triggers Email Alerts

- 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 Actions** can be user-defined presets, “canned” (hard-coded) selections (such as GPO triggers or routing changes), or automated E-mail alert to a respondent (see ACO Setup (p. 3-49) 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

	Status	Acquired Video Format	GPI	Video Quality	Audio Events	ANC Data	User States	Event Action:
Event 1	Last Active Event	Don't Care	Don't Care	Input A Event Engaged	Don't Care	Don't Care	Don't Care	go to B
Event 2	Condition Not Met	Don't Care	Don't Care	Input A Event Disengaged	Don't Care	Don't Care	Don't Care	normal path A
...								
Event 32	Condition Not Met	Don't Care	Don't Care	Don't Care	Don't Care	Don't Care	Don't Care	no-cc-msg

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.

Event History	Time	Event Number	Event Action
	19:22:39 02/05/15	2	GPO 1 Close
	19:22:39 02/05/15	4	GPO 2 Close
	19:22:17 02/05/15	2	GPO 1 Close
	19:22:17 02/05/15	4	GPO 2 Close
Card Time	19:25:43 02/05/15		
Force Event Refresh			

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 9940-ACO Function Menu List — continued

Event Setup

(continued)

Event Triggers

Email Alerts

In the example here for Event 1, the **Video Quality Events** tab is set to screen for frozen video on Input A. When detected, this status can be used here (Video Quality set to "Input A Event Engaged" indicating black or frozen video detected). Using the Event Action selector, go-to action of "**go to B**" can be invoked (which in this example is a user preset that changes card routing to use an alternate input source).

Conversely, to go back to the original source, an event could be set up with Video Quality here looking for "Input A Event Disengaged" and in turn invoke an event action returning routing to the original video source (in this example, user preset "**normal path A**").

Video Quality Events

Event Status

Frozen video det

Video Quality	Audio Events	ANC Data	Event Action:
Input A Event Engaged	Don't Care	Don't Care	go to B
Input A Event Disengaged	Don't Care	Don't Care	normal path A

In the example here, **Event 1** and **Event 3** are respectively set for frozen video and closed captioning absence detection. Using separate Event rows for Video Quality and ANC Data (closed-captioning absence) screening allows these conditions to be independently detected and acted upon with user actions tailored to the event (when either of the conditions are detected, different actions can be taken as selected).

In this example, frozen video calls a preset using an input video routing change, while loss of closed captioning calls a preset to burn a "no CC" message on the raster. Both Events 1 and 3 have corresponding go-to actions to resume normal operation when the event ceases (in this example, a preset "normal path A").

	Status
Event 1	● Last Active Event
Event 2	● Condition Not Met
Event 3	● Condition Met
Event 4	● Condition Not Met

Video Quality	Audio Events	ANC Data	Event Action:
Input A Event Engaged	Don't Care	Don't Care	go to B
Input A Event Disengaged	Don't Care	Don't Care	normal path A
Don't Care	Don't Care	Closed Caption Absence Event	no-cc-msg
Don't Care	Don't Care	Closed Caption Presence Event	normal path A

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. (For example, a preset that invokes a video change will take longer to engage than a preset involving only an audio routing change.)
- 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 (for the example above, the preset "no-cc-msg" should be set to only touch the character burner layer to invoke a character burn).
- 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 (as shown in the example above where Video Quality screening trumps CC absence). Also, this prioritization helps ensure that all desired events are screened for before a significant change (such as input video source change) is effected.

Table 3-2 9940-ACO Function Menu List — continued

Event Setup

(continued)

Event Triggers

Email Alerts

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 successively 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.

The diagram illustrates the hardware and timing for the EAS alert input. At the top, a box labeled '9940-ACO Card' has two inputs: 'GPI 1' and 'GPI 2'. 'GPI 1' is connected to 'From EAS Keyer Box' and 'GPI 2' is connected to 'From EAS Audio Box'. Below this, a timing diagram shows the signals for GPI 1 and GPI 2. GPI 1 starts at a high level, then falls (labeled 'Set User State 1'), and later rises (labeled 'Clear User State 1 or 2'). GPI 2 starts at a low level, then falls (labeled 'Set User State 2'), and later rises (labeled 'Clear User State 1 or 2').

Event Setup	Status	GPI	User States	Event Action:
Event 1	Condition Met	GPI 1 Open->Closed	Don't Care	Set User State 1
Event 2	Condition Met	GPI 2 Open->Closed	User State 1 Set	Set User State 2
Event 3	Condition Met	Don't Care	User State 2 Set	Set User State 3
Event 4	Last Active Event	Don't Care	User State 3 Set	Preset Load: EAS Key+Audio
Event 5	Condition Not Met	Don't Care	User State 1 Cleared	Preset Load: Revert to Normal
Event 6	Condition Not Met	Don't Care	User State 2 Cleared	Preset Load: Revert to Normal
Event 7	Condition Not Met	GPI 1 Closed->Open	Don't Care	Clear User State 1
Event 8	Condition Not Met	GPI 2 Closed->Open	Don't Care	Clear User State 2

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 9940-ACO Function Menu List — continued

Event Setup

Event Timer Setup

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.

Event Setup	GPI	Event Timers	Event Action:
Event 1	GPI 1 Open->Closed	Don't Care	Start Timer 1
Event 2	GPI 1 Open->Closed	Don't Care	Logo Enable
Event 3	Don't Care	Timer 1 Timeout	Logo Disable

Event Setup

ACO Setup

Provides Auto-Changeover (ACO) setup for screening up to all four available card SDI inputs for automatically-invoked alternates to be used in cases of primary program input experiencing loss error event(s).

ACO Overview

In addition to accommodating up to three failover sources (SDI IN B, SDI IN C, and SDI IN D) as failover sources for primary SDI IN A, this function applies a weighting/priority to the failovers to be invoked.

- SDI IN A is the highest-weighted/priority source, with SDI IN B thru SDI IN D as progressively lesser-weighted sources (SDI IN D is lowest-weighted source).
- Failover will attempt to use next-highest weighted input source, and progressively use lower-weighted sources if higher-weighted sources are not available.
- If higher-weighted inputs again become viable, the highest-weighted source will be used.

(For example, if primary **SDI IN A** experiences a screened event and failover SDI IN C is screened as OK and is invoked, highest-weighted SDI IN A will be again used should it again become available even if SDI IN B is OK and present.)

If ACO Setup functionality described here on the **ACO Setup** sub-tab is used, the Event Triggers sub-tab should **not** also be set to invoke event failovers to alternate inputs. This could cause a conflict and instability if both screening mechanisms are used simultaneously.

Table 3-2 9940-ACO Function Menu List — continued

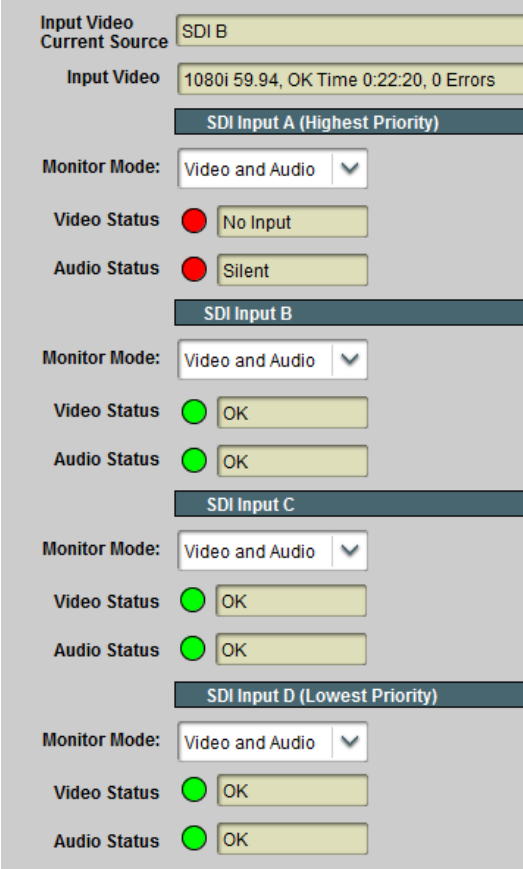
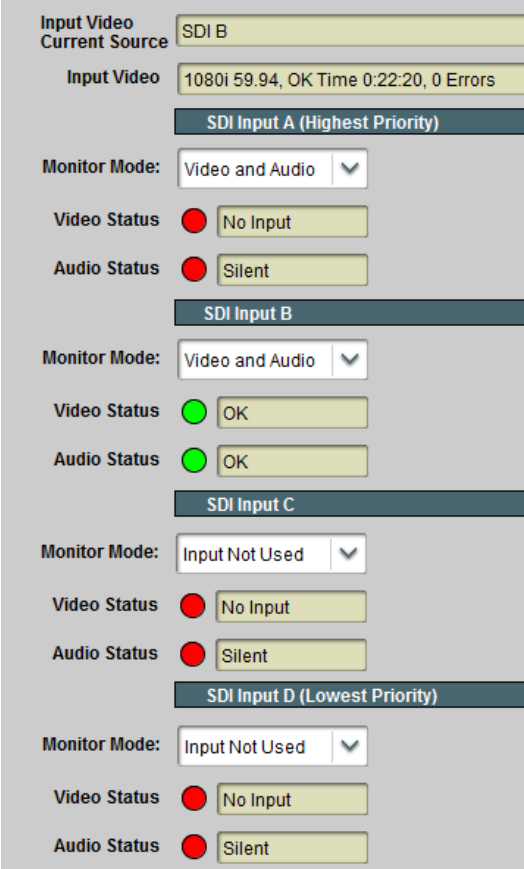
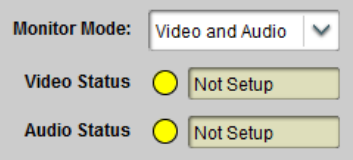
Event Setup	(continued)
ACO Setup	
<p>In the example below, Monitor Mode is set to screen all four SDI Inputs for Video and Audio (accepted video not exhibiting loss of video or frozen/black frame, and audio presence exceeding silence threshold).</p> <p>In the example, primary program SDI IN A is showing an LOS condition, and next-priority weighted SDI IN B is being used as the failover.</p>	<p>In the example below, Monitor Mode is set to screen only SDI IN A and SDI IN B. As such, unused inputs SDI IN C and SDI IN D are here set to Input Not Used.</p>
	
	<p>If Not Setup is displayed for Video or Audio Status, this indicates that respective controls in the Video Quality Events Setup Controls (p. 3-27) and/or Audio Detect Events Setup Controls (p. 3-28) are not set to screen conditions (for example, master control set to Disabled, or audio channels set to DC (don't care)).</p>
<p>Note: For ACO to operate as intended, various controls on this sub-tab as well as Video Quality Events Setup Controls (p. 3-27) and Audio Detect Events Setup Controls (p. 3-28) must also be set to screen for desired error event conditions. See the full control descriptions on the following pages of this sub-tab as well as referenced sections.</p>	

Table 3-2 9940-ACO Function Menu List — continued

<div>Event Setup</div> <div>ACO Setup</div>	(continued)
<ul style="list-style-type: none"> • ACO Switching Master Enable <div>ACO Switching <input checked="" type="radio"/> Enabled <input type="radio"/> Disabled</div>	<p>When set to Enabled, activates ACO function to screen and changeover to alternate SDI inputs as per other settings performed in this tab (and as described in examples on previous page).</p>
<ul style="list-style-type: none"> • ACO Active Video Source and Format <div>Input Video Current Source SDI B</div> <div>Input Video 1080i 59.94, OK Time 0:12:20, 0 Errors</div>	<p>Shows the current card input video sourced being used as the processed program video, as well as format and OK time of associated video source. (In this example, the display is showing a changeover/failover to SDI IN B is currently being used in lieu of primary program input SDI IN A.)</p>
<ul style="list-style-type: none"> • ACO Monitor Mode Select <div>Monitor Mode: Video and Audio <input type="button" value="v"/> Input Not Used Video and Audio Video Only Audio Only</div>	<p>Sets the monitoring mode for each input from choices shown. Independent monitoring select controls are provided for primary input SDI IN A as well as failover inputs SDI IN B thru SDI IN D.</p> <p>Note:</p> <ul style="list-style-type: none"> • Where Video and/or Audio are selected, corresponding controls in Video Quality Events Setup Controls (p. 3-27) and Audio Detect Events Setup Controls (p. 3-28) must be set up to screen for error conditions as desired. • Where SDI input(s) are not desired to be screen, set these inputs to Input Not Used.
<div>Event Setup</div> <div>Event Triggers Email Alerts</div>	<p>Provides setup for automated Email alerts when an event has occurred.</p>
<p>As an Event Action choice on the Events Triggers sub-tab, an Email alert can be sent as a response. Set up email fields as shown in the example below.</p> <p>Note: Frame hosting the 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.</p> <div> <div> Last Event: Frozen video detected To: joe.doe@xyzmedia.com From: 9902slot8frame1A21@xyzmedia.com SMTP User: frame1A21 SMTP Password: ●●●●●●●● SMTP Server: smtp.gmail.com SMTP Port: 25 </div> <div> <p>When fields are filled-in to specify recipient and sender, and email alert is selected for Event Action on Event Triggers sub-tab page, recipient receives an email alert upon event, with the triggering event shown (in this example, "frozen video detected").</p> </div> </div>	

Table 3-2 9940-ACO Function Menu List — continued

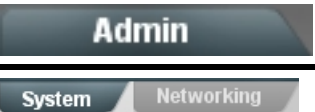

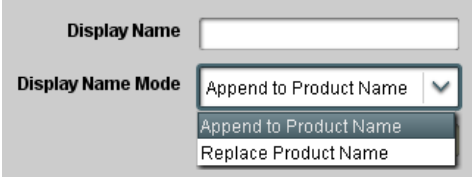

	<p>Provides a global card operating status and allows a log download for factory engineering support. Also provides controls for selecting and loading card firmware upgrade files.</p> <p>Networking controls provide dedicated card networking setup in conjunction with rear module Ethernet port.</p>
<p>• Log Status and Download Controls</p> 	<ul style="list-style-type: none"> • Log Status indicates overall card internal operating status. • Download Log File allows a card operational log file to be saved to a host computer. This log file can be useful in case of a card error or in the case of an operational error or condition. The file can be submitted to Cobalt engineering for further analysis. • Thermal Shutdown enable/disable allows the built-in thermal failover to be defeated. (Thermal shutdown is enabled by default). <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>CAUTION</p> <p>The 9940-ACO FPGA is designed for a normal-range operating temperature around 85° C core temperature. Operation in severe conditions exceeding this limit for non-sustained usage are within device operating safe parameters, and can be allowed by setting this control to Disable. However, the disable (override) setting should be avoided under normal conditions to ensure maximum card protection.</p> </div>
<p>• Card DashBoard Name Control</p> 	<p>Allows card name In DashBoard to be changed as desired. Click return to engage change.</p> <ul style="list-style-type: none"> • Append to Product Name appends (or adds to) existing OEM name (for example, "9940-ACO Processing 1A"). • Replace Product Name completely replaces the OEM name OEM name (for example, "Processing 1A"). <p>Note: DashBoard instance(s) may have to be refreshed before name change appears.</p>
<p>• Parameter Blast</p> 	<p>When enabled, Parameter Blast can reduce the time it takes for the card to appear and populate in DashBoard (this is especially relevant where high-latency connections are present). This is facilitated by reducing some handshakes on initial DashBoard setup where control settings are static (not being manipulated) while the card is first appearing.</p> <p>Note: The frame network card is the arbiter of all frame/card communications and in some cases may not accept full extent of parameter blast under some conditions.</p>
<p>• Firmware Upgrade Controls</p>	<p>Firmware upgrade controls allow a selected firmware version (where multiple versions can be uploaded to the card's internal memory) to invoke an upgrade to a selected version either instantly, or set to install on the next card reboot (thereby allowing card upgrade downtime to be controlled at a scheduled point in time).</p>

Table 3-2 9940-ACO Function Menu List — continued


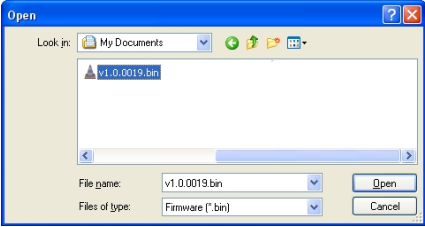
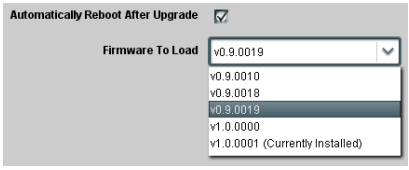
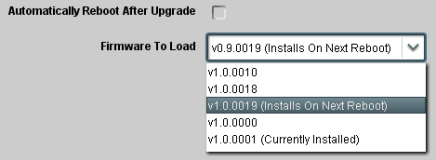
<div data-bbox="228 262 542 317" data-label="Text">Admin</div> <div data-bbox="228 338 527 373" data-label="Text">System Networking</div>	(continued)
<p>Note: The page/tab here allows managing multiple firmware versions saved on the card. New upgrade firmware from our web site can always be directly uploaded to the card without using this page. Instructions for firmware downloading to your computer and uploading to the card can be found at the Support>Firmware Downloads link at www.cobaltdigital.com.</p>	
<ol style="list-style-type: none"> 1. Access a firmware upgrade file from a network computer by clicking Upload at the bottom of DashBoard. 2. Browse to the location of the firmware upgrade file (in this example, <i>My Documents\lv1.0.0019.bin</i>). 3. Select the desired file and click Open to upload the file to the card. 	 
<ul style="list-style-type: none"> • Immediate firmware upload. The card default setting of Automatically Reboot After Upgrade checked allow a selected firmware version to be immediately uploaded as follows: <ol style="list-style-type: none"> 1. Click Firmware To Load and select the desired upgrade file to be loaded (in this example, “v1.0.0019”). 2. Click Load Selected Firmware. The card now reboots and the selected firmware is loaded. 	
<ul style="list-style-type: none"> • Deferred firmware upload. With Automatically Reboot After Upgrade unchecked, firmware upgrade loading is held off until the card is manually rebooted. This allows scheduling a firmware upgrade downtime event until when it is convenient to experience to downtime (uploads typically take about 60 seconds). <ol style="list-style-type: none"> 1. Click Firmware To Load and select the desired upgrade file to be loaded (in this example, “v1.0.0019”). Note now how the display shows “Installs on Next Reboot”. 2. Click Load Selected Firmware. The card holds directions to proceed with the upload, and performs the upload only when the card is manually rebooted (by pressing the Reboot button). 3. To cancel a deferred upload, press Cancel Pending Upgrade. The card reverts to the default settings that allow an immediate upload/upgrade. 	

Table 3-2 9940-ACO Function Menu List — continued

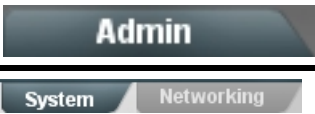
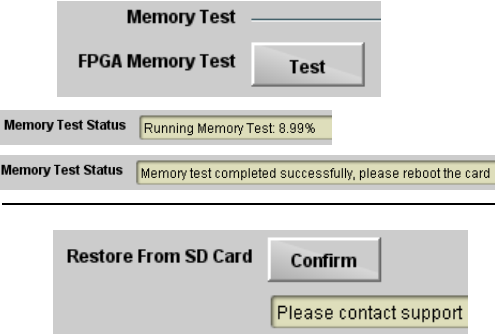


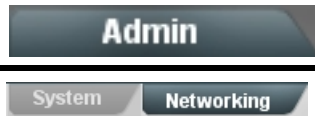
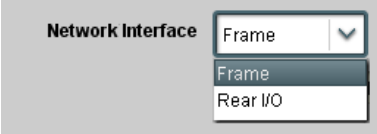
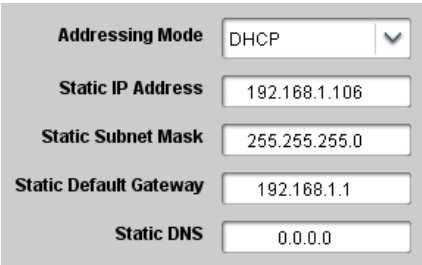
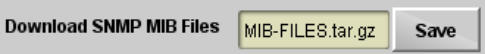
	(continued)
<p>• Card Check and Restore Utilities</p> 	<p>Memory Test allows all cells of the card FPGA memory to be tested.</p>  <p>This control should only be activated under direction of product support. Exercising the memory test is not part of normal card maintenance.</p> <p>Restore from SD Card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

Table 3-2 9940-ACO Function Menu List — continued

<div data-bbox="235 262 548 315">Admin</div> <div data-bbox="235 336 535 373">System Networking</div>	(continued)
<div data-bbox="264 415 459 445">• NTP Clock Setup</div> <div data-bbox="211 462 730 745"> <div data-bbox="378 472 475 495">Clock Setup</div> <div data-bbox="228 510 711 537">NTP IP (use 0.0.0.0 for pool NTP) 0.0.0.0</div> <div data-bbox="269 558 711 585">Local Timezone (NTP Only) US-Central</div> <div data-bbox="386 606 665 632">NTP Status Synchronized with NTP</div> <div data-bbox="240 653 516 678">Use Network Interface for NTP <input checked="" type="checkbox"/></div> <div data-bbox="220 699 516 724">Use Frame Network Card for NTP <input type="checkbox"/></div> </div>	<p>Allows device NTP clock IP source and localization. This is the clock/time device will use for logs and other recorded actions.</p> <ul style="list-style-type: none"> • NTP IP sets the IP address where NTP is to be obtained. • Local Timezone sets the recorded time to the localized time. • NTP Status shows if time is synced with NTP or if an error exists. • Use Network Interface and User Frame Network Card checkboxes allows selecting the network source that will provide NTP time.
<div data-bbox="316 798 620 850">GPO Setup</div>	<p>Provides controls for setting up the two GPO's power-up states as well as forced manual or event action triggered.</p>
<p>Note: This tab has identical independent controls for GPO 1 and 2. Therefore, only the GPO 1 controls are described here.</p>	
<div data-bbox="264 982 714 1318"> <div data-bbox="297 1003 703 1031">GPO1 Current State ● Closed</div> <div data-bbox="280 1052 703 1150">GPO1 Power-on State Open</div> <div data-bbox="297 1182 703 1308">GPO1 Control Mode Follow Event Actions</div> </div>	<ul style="list-style-type: none"> • Current State indicates GPO status regardless of any pre-setup. • Power-on State allows the power-up GPO state to be set (initialized) upon power-up • Control Mode allows GPO manual asserted open or closed states, or hands over control to Event Action triggering.

Table 3-2 9940-ACO Function Menu List — continued

Alarms

Provides controls for setting up controls which screen for and propagate input program video alarms for video, audio, and ancillary data error conditions.

Conditions and alarm status can be propagated as DashBoard tree-view frame alarms, downloadable .txt files and/or Syslog IP-based alarms.

The **Alarms** tab has several sub-tabs which allow setting up detection and alarm severity/propagation for input program video alarms for video, audio, and ancillary data error conditions (as described and shown below)

Video Alarm Setup

Video

Audio Alarm Setup

Path 1 Audio

Ancillary Data Alarm Setup

Path 2 Audio

Logging

Ancillary Data

Video Alarm Setup

Video Alarm Setup sub-tab allows setting up screening engagement and disengagement holdoff for frozen and/or black video detection on the card's four SDI inputs (independent for each SDI input). In the default example settings shown here, engagement and disengagement of alarm generation occurs 3000 msec after event detect.

Factory default holdoff settings shown here are recommended for at least initial settings. If holdoff periods are too brief, nuisance alarms may be generated during transitions to and from programs and interstitials.

Frozen Video Detection Setup				
	Engagement Holdoff (minutes)	Engagement Holdoff (ms)	Disengagement Holdoff (minutes)	Disengagement Holdoff (ms)
SDI Input A	0	3000	0	3000
SDI Input B	0	3000	0	3000
SDI Input C	0	3000	0	3000
SDI Input D	0	3000	0	3000

Black Video Detection Setup				
	Engagement Holdoff (minutes)	Engagement Holdoff (ms)	Disengagement Holdoff (minutes)	Disengagement Holdoff (ms)
SDI Input A	0	3000	0	3000
SDI Input B	0	3000	0	3000
SDI Input C	0	3000	0	3000
SDI Input D	0	3000	0	3000

Audio Alarm Setup

Audio Failover Threshold (dBFS)	-60
Trigger Holdoff (minutes)	0
Trigger Holdoff (ms)	5000
Release Holdoff (minutes)	0
Release Holdoff (ms)	0

Audio Alarm Setup sub-tab allows setting up screening trigger threshold, engagement and disengagement holdoff for low or missing audio levels on the card's embedded audio input channels.

- Levels **above** the Failover Threshold are considered normal.
- Levels **below** the Failover Threshold (and exceeding the holdoff) are considered below normal.

Note: Audio channels screened are from the card SDI that is selected for the program video/audio path (for example, if SDI A is selected as the input source on the **Input Video** tab, the 16 embedded channels comprising this video/audio input are screened).

Factory default holdoff and threshold settings shown here are recommended for at least initial settings. If holdoff periods are too brief (or threshold set too high), nuisance alarms may be generated during transitions to and from programs and interstitials, as well as during certain content.

Table 3-2 9940-ACO Function Menu List — continued

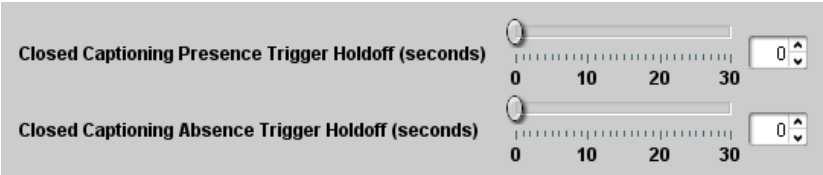

Alarms	(continued)
Ancillary Data Alarm Setup	<p>Ancillary Data Alarm Setup sub-tab allows setting up screening engagement and disengagement holdoff for absence of closed captioning packets.</p> <p>Note:</p> <ul style="list-style-type: none"> • Video screened is the card SDI that is selected for the program video/audio path. • Ancillary data condition detection is functional only for CEA608/708 packet-based closed captioning. This feature does not function for SD line 21 “waveform-based” closed captioning. 
Alarm Propagation Tabs Video, Audio, and Ancillary Data sub-tabs set alarm propagation attributes, including: <ul style="list-style-type: none"> • Logging of alarms and conditions • Propagation of alarms to the card general Card State/DashBoard frame-based tree-view pane • Ignore alarm, or set severity as Warning (yellow “LED”) or Error (red “LED”) Each of these sub-tabs is described below.	
Video	<p>Video sub-tab independently shows for all four SDI inputs any LOS (loss of signal), frozen, or black conditions triggered for any of the SDI IN A thru SDI IN D inputs.</p>
<p>Condition/Status has LOS, Frozen, and Black status fields for all 4 SDI inputs. Illuminated “LED” indicates that condition is presently occurring. Color of LED is determined by user-set Severity level.</p>	<ul style="list-style-type: none"> • Log (when checked) propagates the alarm to a log file. • Alarm (when checked) propagates the alarm to the Card State and frame-level DashBoard tree-view “LEDs”. • Severity selects from Ignore/OK (green “LED”), Warning (yellow “LED”), and Error (red “LED”) alarm escalation states. • Duration and Last Occurrence shows details for each triggered alarm event.
	
<p>Note: The Log, Alarm, Severity, and Duration/Last Occurrence columns appear on the other alarm sub-tabs and function identically as described here.</p>	

Table 3-2 9940-ACO Function Menu List — continued




Alarms	(continued)
Path 1 Audio	<p>Audio sub-tabs independently show for all 16 embedded channels (per path) any missing audio (whether absent due to low level, mute or unlocked status).</p> <p>Note:</p> <ul style="list-style-type: none"> • Audio screened is the audio associated with the selected card SDI program inputs. • Path 1 Audio sub-tab is shown. An identical control sub-tab is present for Path 2 Audio (not shown here). <p> Unused audio channels should, at the minimum, have Severity set to Ignore/OK. If this is not done, nuisance alarms may occur.</p> 
Independent rows are present for each of the program path 16 embedded audio channels. Log, Alarm, Severity and Duration/Last Occurrence controls and status function as described in Video (p. 3-57).	
Ancillary Data	<p>Ancillary Data sub-tab independently shows loss of closed captioning packet presence for both program video paths.</p> <p>Note:</p> <ul style="list-style-type: none"> • Closed captioning screened are the CC packet presence associated with the selected card SDI program inputs. • Ancillary data condition detection is functional only for CEA608/708 packet-based closed captioning. This feature does not function for SD line 21 “waveform-based” closed captioning. 
Independent rows are present for both program paths. Log, Alarm, Severity and Duration/Last Occurrence controls and status function as described in Video (p. 3-57).	

Table 3-2 9940-ACO Function Menu List — continued

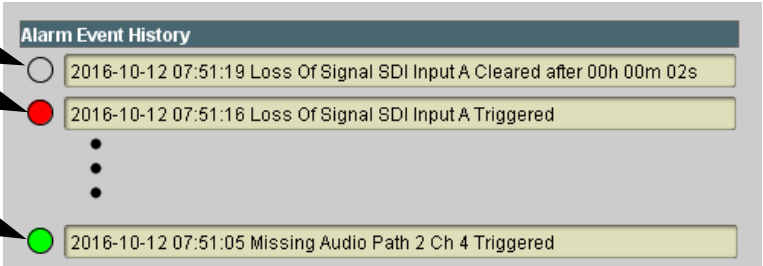
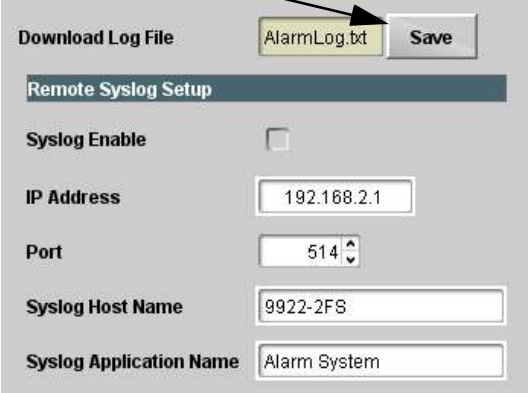
Alarms	(continued)
<p>Alarm Event History shows the eight most-recent alarm events that have been detected (with most-recent at top of list). The alarm severity (as set using the Severity drop-down for each alarm type) sets the “LED” color shown here. In addition to alarms directly affecting performance, status such as cleared alarms are also displayed, as well as any actions related to enabling alarm propagation (such as “Logging Enabled” and “Logging Disabled”). All display rows shown here are retained in the overall log and can be downloaded as a .txt file (see Logging below).</p>	
<p>Cleared alarms appear as an “open” LED</p>	
<p>Alarms configured as Error or Warning correspondingly appear here as a red “LED” or yellow “LED”</p>	
<p>Detected alarms event configured as Ignore/OK appear here as a green “LED”</p>	
	
Logging	<p>Logging sub-tab allows downloading of an overall running AlarmLog.txt file via DashBoard to a host computer. This sub-tab also has setup controls for using Syslog IP connection of alarm log data (Linux and Unix).</p>
<p>Setup controls and fields for Syslog</p>	
<p>Clicking Save opens a dialog to save the AlarmLog.txt file to a host computer.</p>	
	
<p>Note:</p> <ul style="list-style-type: none"> • Download Log File is performed via DashBoard connection; no external connection is required. • For Syslog usage, default 514 port assignment is recommended. • Syslog usage , is available only on certain frame models offering per-card dedicated Ethernet connection. 	

Table 3-2 9940-ACO Function Menu List — continued

User Log

Automatically maintains a log of user actions and input lock status.

User Log shows input lock and other user conditions (with most recent event at top of list).

Clear User Log clears all entries.

Download Log File opens a browser allowing the log file to be saved on the host machine.

Time	Type	Event
22:40:36 12/02/15	Info	SDI Input sdi_in_c Locked to 720p 59.94
22:40:34 12/02/15	Info	SDI Input sdi_in_d Locked to 1080i 59.94
21:17:36 12/02/15	Info	SDI Input sdi_in_b Locked to 1080i 59.94
21:17:18 12/02/15	Info	Log file cleared

Clear User Log

Confirm

Download Log File

9922-FS.tar.gz

Save

Troubleshooting

This section provides general troubleshooting information and specific symptom/corrective action for the 9940-ACO card and its remote control interface. The 9940-ACO 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 9940-ACO card itself and its remote control systems all (to varying degrees) provide error and failure indications. Depending on how the 9940-ACO 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 9940-ACO 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. 3-64)
- 9940-ACO Processing Error Troubleshooting (p. 3-65)
- Troubleshooting Network/Remote Control Errors (p. 3-68)

9940-ACO Card Edge Status/Error Indicators and Display

Figure 3-7 shows and describes the 9940-ACO card edge status indicators and display. These indicators and the display show status and error conditions relating to the card itself and remote (network) communications (where applicable). Because these indicators are part of the card itself and require no external interface, the indicators are particularly useful in the event of communications problems with external devices such as network remote control devices.

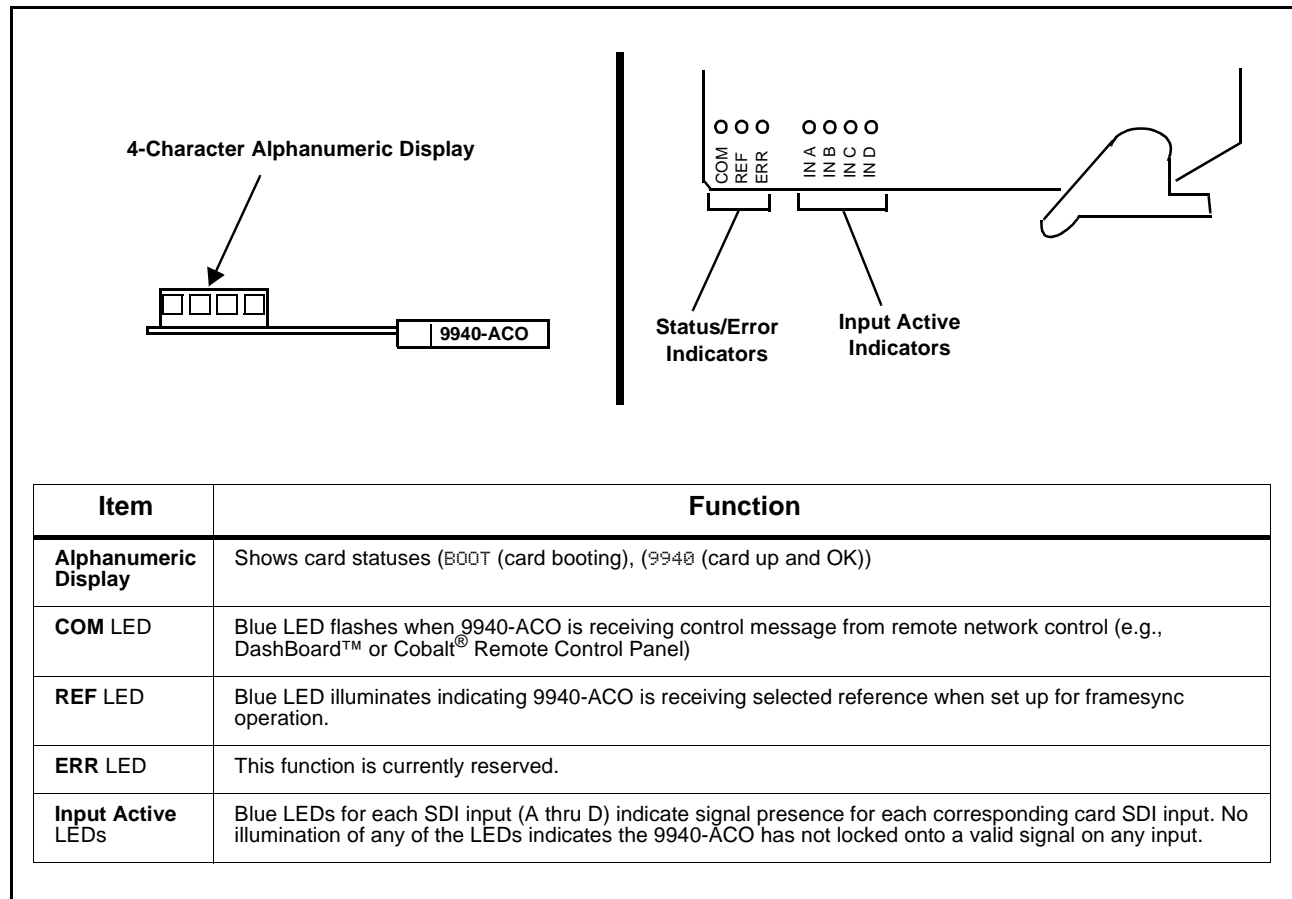


Figure 3-7 9940-ACO Card Edge Status Indicators and Display

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 9940-ACO card itself and remote (network) communications.

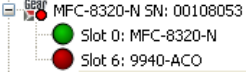

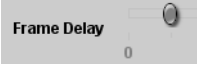
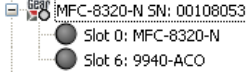

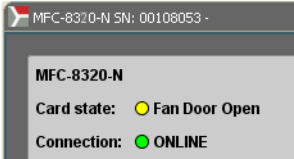
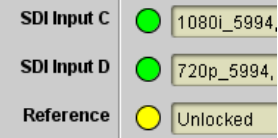
Indicator Icon or Display	Error Description
  	<p>Red indicator icon in Card Access/Navigation Tree pane shows card with Error condition (in this example, the Card Access/Navigation Tree pane shows a general error issued by the 9940-ACO card in slot 6).</p> <p>Specific errors are displayed in the Card Info pane (in this example “No connection to device” indicating 9940-ACO card is not connecting to frame/LAN).</p> <p>If the 9940-ACO card is not connecting to the frame or LAN, all controls are grayed-out (as shown in the example here).</p>
	<p>Gray indicator icon in Card Access/Navigation Tree pane shows card(s) are not being seen by DashBoard™ due to lack of connection to frame LAN (in this example, both a 9940-ACO card in slot 6 and the MFC-8320-N Network Controller Card for its frame in slot 0 are not being seen).</p>
 	<p>Yellow indicator icon in Card Access/Navigation Tree pane shows card with Alert condition (in this example, the Card Access/Navigation Tree pane shows a general alert issued by the MFC-8320-N Network Controller Card).</p> <p>Clicking the card slot position in the Card Access/Navigation Tree (in this example Network Controller Card “Slot 0: MFC-8320-N”) opens the Card Info pane for the selected card. In this example, a “Fan Door Open” specific error is displayed.</p>
	<p>Yellow indicator icon in 9940-ACO Card Info pane shows error alert, along with cause for alert (in this example, the 9940-ACO is not receiving an enabled framesync source).</p>

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).

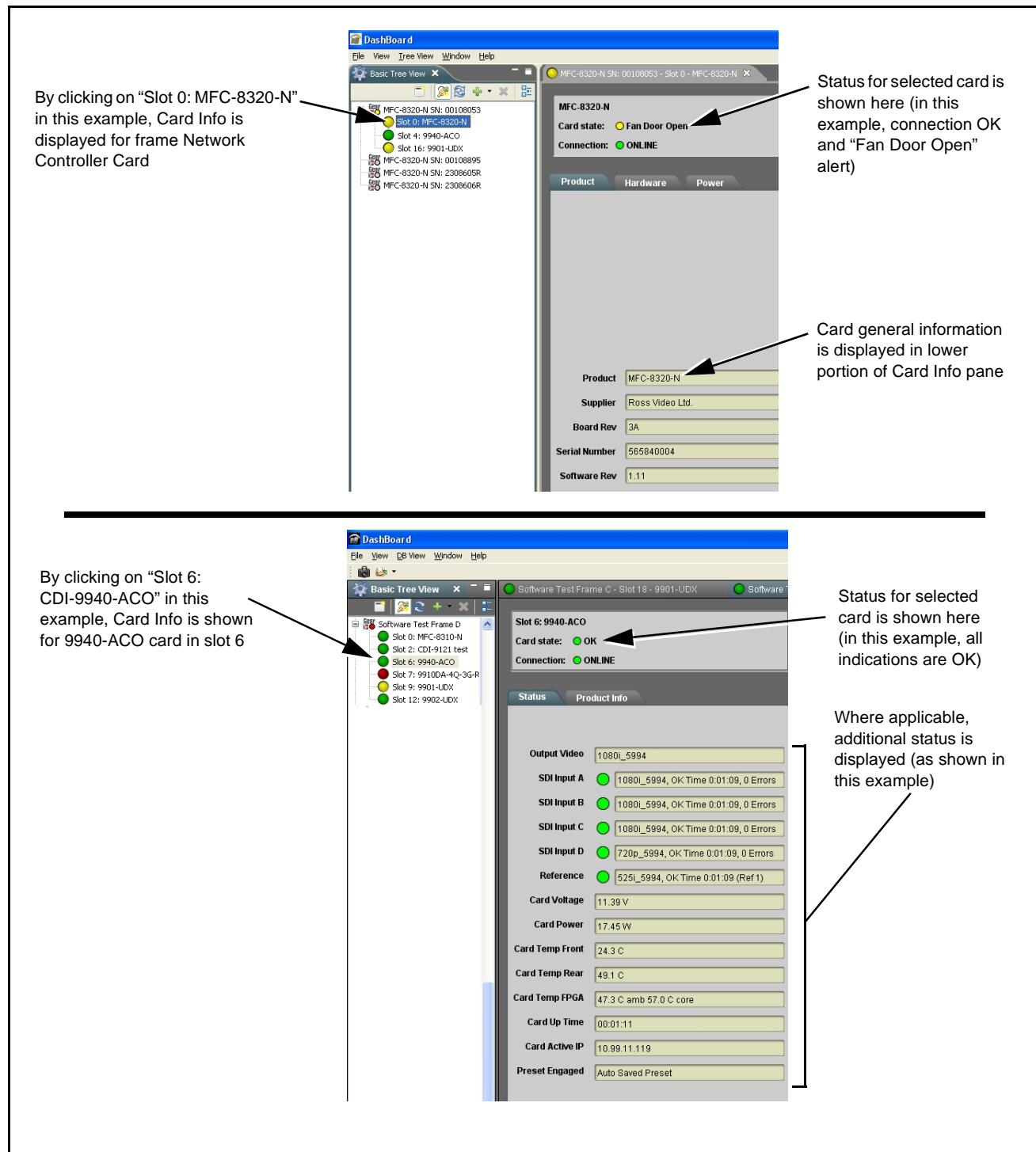


Figure 3-9 Selecting Specific Cards for Card Info Status Display

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	<ul style="list-style-type: none"> On both the frame Network Controller Card and the 9940-ACO, 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 9940-ACO card. This can be observed using the DashBoard™ Card Info pane. <ul style="list-style-type: none"> If display shows no power being consumed, either the frame power supply, connections, or the 9940-ACO card itself is defective. If display shows excessive power being consumed (see Technical Specifications (p. 1-17) in Chapter 1, “Introduction”), the 9940-ACO 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 9940-ACO 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.

9940-ACO Processing Error Troubleshooting

Table 3-4 provides 9940-ACO processing troubleshooting information. If the 9940-ACO 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 9940-ACO 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 9940-ACO card edge status indicators.

Note: Where errors are displayed on both the 9940-ACO card and network remote controls, the respective indicators and displays are individually described in this section.

Table 3-4 Troubleshooting Processing Errors by Symptom


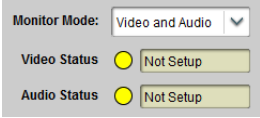
Symptom	Error/Condition	Corrective Action
<ul style="list-style-type: none"> DashBoard™ shows Unlocked message in 9940-ACO Card Info pane  <ul style="list-style-type: none"> Card edge Input LED corresponding to input is not illuminated 	No video input present	Make certain intended video source is connected to appropriate 9940-ACO 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 9940-ACO	<ul style="list-style-type: none"> Control(s) not enabled 	<ul style="list-style-type: none"> Make certain respective control is set to On or Enabled (as appropriate).
	<ul style="list-style-type: none"> VANC line number conflict between two or more ancillary data items 	<ul style="list-style-type: none"> Make certain each ancillary data item to be passed is assigned a unique line number (see Ancillary Data Line Number Locations and Ranges on page 3-9).
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.
Audio silence event not detected or triggered on	Holdoff set too long to detect condition	The Trigger Holdoff controls on the Audio Detect Events tab allow ignoring silence events unless the event duration exceeds the holdoff setting. Make certain holdoff is set sufficiently low to detect events as desired.

Table 3-4 Troubleshooting Processing Errors by Symptom — continued

Symptom	Error/Condition	Corrective Action
Excessive or nuisance input signal quality events in log or Card State status display	Holdoff periods are too brief (or threshold set too high)	If holdoff periods are too brief (or threshold set too sensitive), nuisance alarms may be generated during transitions to and from programs and interstitials, as well as during certain content.
SD closed captioning waveform or character rendering is corrupted	Character burner and/or moving box insertions running into line 21	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. Typically, character burn and/or moving box insertions are not intended for content (such as OTA) where CC is required. If CC is present and must be retained, make certain to check CC content if burn-in insertions are enabled and reposition burn-ins to avoid line 21 interference.
Selected upgrade firmware will not upload	Automatic reboot after upgrade turned off	Card Presets > Automatically Reboot After Upgrade box unchecked. Either reboot the card manually, or leave this box checked to allow automatic reboot to engage an upgrade upon selecting the upgrade.
Card does not pass video or audio as expected. Control settings spontaneously changed from expected settings.	Event-based preset inadvertently invoked	Event-based preset loading (Event Setup tab > 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. 3-46) for more information.
Card will not retain user settings, or setting changes or presets spontaneously invoke.	Event Triggers sub-tab inadvertently set to trigger on event	If event based loading is not to be used, make certain event-based Event Triggers is disabled (either using master Enable/Disable control or through events settings. See Event Setup Controls (p. 3-46) for more information.
Event triggering results in unexpected or unrelated processing changes.	Event Action selected (or processing change embedded in a called preset) touches aspects not intended as action.	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 (for example, if a go-to preset for closed captioning absence is only to put up a “no cc” message on the raster, this preset should be set to only touch the character burner layer to invoke a character burn).

Table 3-4 Troubleshooting Processing Errors by Symptom — continued

Symptom	Error/Condition	Corrective Action
Event Setup > ACO Setup function (p.3-49) does not failover to expected alternate inputs source upon primary input event.	ACO functions not enabled or not set up to screen as intended. ACO status shows: 	Make certain Video Quality Events Setup Controls (p. 3-27) and Audio Detect Events Setup Controls (p. 3-28) are enabled and set to screen for desired conditions on desired SDI input and (for audio) embedded channels.
Card toggles between multiple inputs upon a video or audio error event.	Event Setup > Event Triggers and Event Setup > ACO Setup (Event Setup Controls (p. 3-46) both set to go to alternate inputs upon error events.	Although Event Triggers sub-tab provides Event Action of Switch To an alternate input, these settings should not be used if ACO Setup is enabled. The two functions will conflict with each other. ACO Setup functions is the preferred function for screening for input video/audio errors and changing over to an alternate input(s).

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.

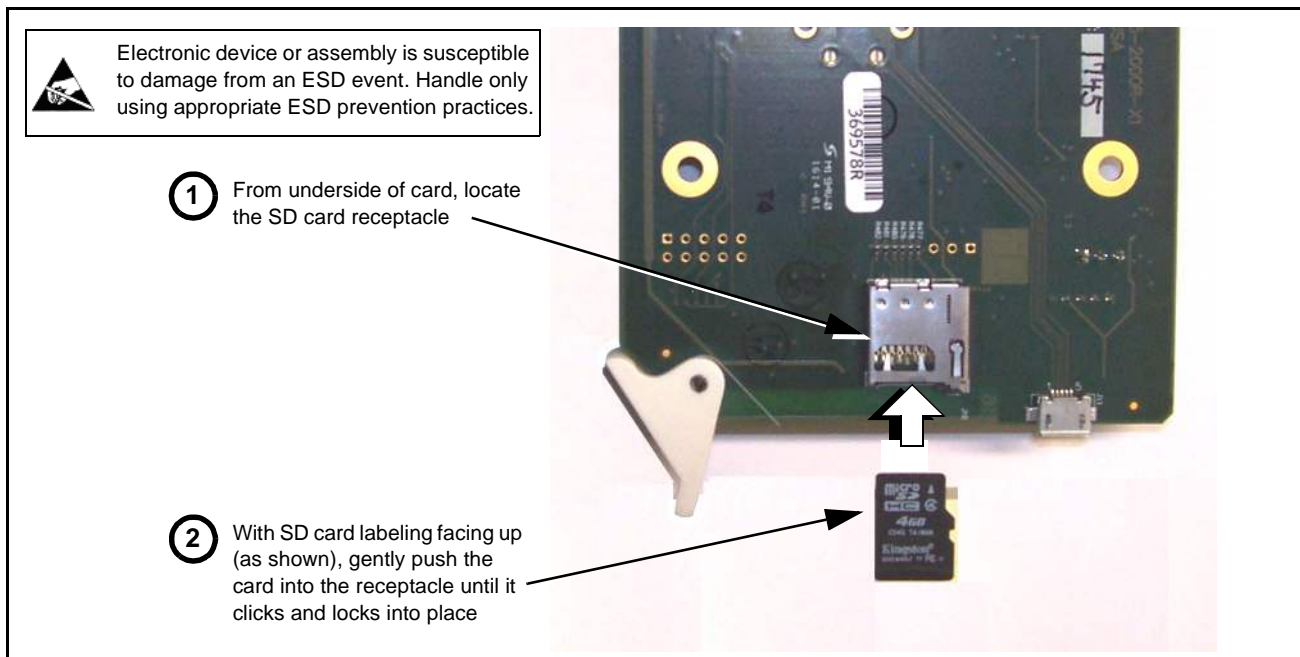


Figure 3-10 SD Card Installation

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

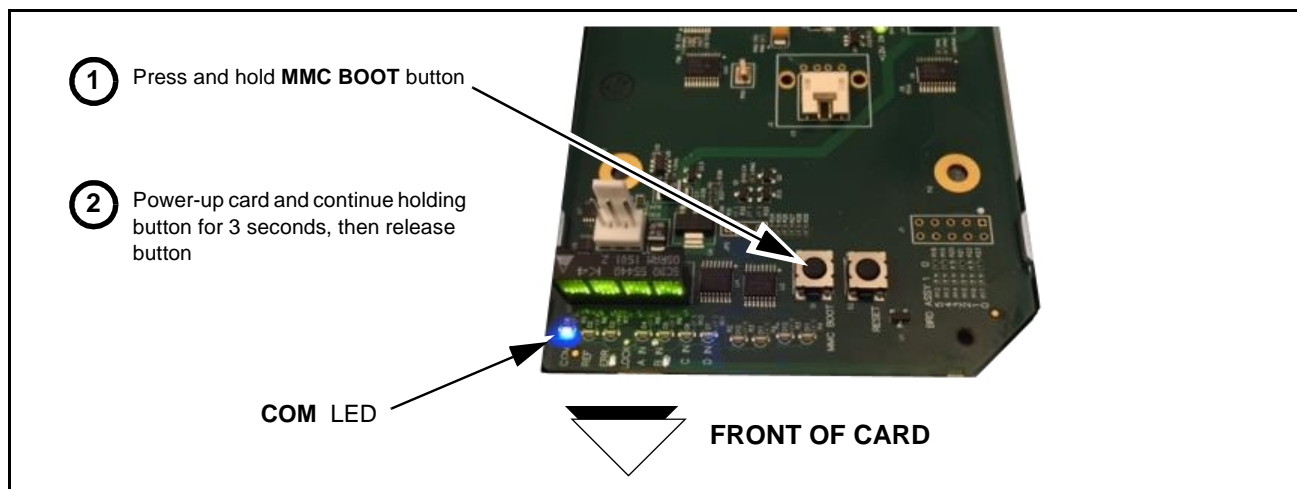


Figure 3-11 MMC Boot Button

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. 1-20) in Chapter 1, “Introduction” for contact information.

This page intentionally blank



Cobalt Digital Inc.

2506 Galen Drive
Champaign, IL 61821
Voice 217.344.1243 • Fax 217.344.1245
www.cobaltdigital.com