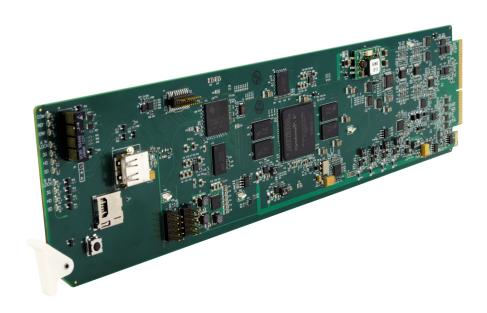
COBALT.

9902-2UDX



3G/HD/SD-SDI Dual-Channel Up-Down-Cross Converter / Frame Sync / Audio Embed/De-Embed

Product Manual



Cobalt Digital Inc.

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

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Congratulations on choosing the Cobalt[®] 9902-2UDX 3G/HD/SD-SDI Dual-Channel Up-Down-Cross Converter / Frame Sync / Audio Embed/De-Embed. The 9902-2UDX 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 9902-2UDX, please contact us at the contact information on the front cover.

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	- Adds description/usage for option +CQS (Clean&Quiet Switching)	

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Introduction

Overview

This manual provides installation and operating instructions for the 9902-2UDX 3G/HD/SD-SDI 3G/HD/SD-SDI Dual-Channel Up-Down-Cross Converter / Frame Sync / Audio Embed/De-Embed card (also referred to herein as the 9902-2UDX).

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 9902-2UDX.
- Chapter 2, "Installation and Setup" Provides instructions for installing the 9902-2UDX in a frame, and optionally installing a 9902-2UDX Rear I/O Module.
- Chapter 3, "Operating Instructions" Provides overviews of operating controls and instructions for using the 9902-2UDX.

This chapter contains the following information:

- 9902-2UDX Card Software Versions and this Manual (p. 1-2)
- Manual Conventions (p. 1-3)
- Safety and Regulatory Summary (p. 1-5)
- 9902-2UDX Functional Description (p. 1-6)
- Technical Specifications (p. 1-18)
- Warranty and Service Information (p. 1-21)
- Contact Cobalt Digital Inc. (p. 1-22)

9902-2UDX 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 DashBoardTM. See Checking 9902-2UDX Card Information (p. 3-8) in Chapter 3, "Operating Instructions" for more information. You can then check our website for the latest software version currently released for the card as described below.

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

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

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

Cobalt Reference Guides

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

Introduction Manual Conventions

Manual Conventions

In this manual, display messages and connectors are shown using the exact name shown on the 9902-2UDX itself. Examples are provided below.

• Card-edge display messages are shown like this:



Connector names are shown like this: SDI IN A

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

- 9902-2UDX refers to the 9902-2UDX 3G/HD/SD-SDI Dual-Channel Up-Down-Cross Converter / Frame Sync / Audio Embed/De-Embed card
- **Frame** refers to the HPF-9000, OG3-FR, 8321, or similar 20-slot frame that houses Cobalt® or other cards.
- **Device** and/or **Card** refers to a Cobalt[®] or other card.
- System and/or Video System refers to the mix of interconnected production and terminal equipment in which the 9902-2UDX and other cards operate.
- Functions and/or features that are available only as an option are denoted in this manual like this:



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.

If your have not received a Manual Supplement for options on your card, you can download a pdf for the option by going to the card's web page and clicking on **Product Downloads**, where you can select from any available option Manual Supplements for the card.

1 Manual Conventions

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.

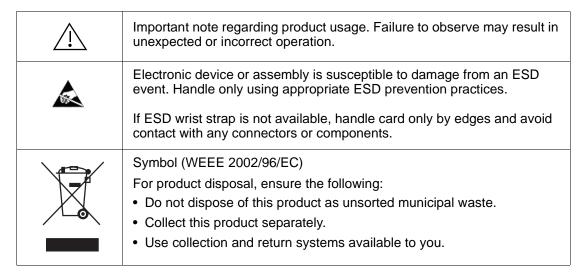
Cautions

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



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 9902-2UDX 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 9902-2UDX 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 9902-2UDX 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	

9902-2UDX Functional Description

Figure 1-1 shows a functional block diagram of the 9902-2UDX. The 9902-2UDX dual-channel card provides two independent signal paths (Path 1 and Path 2) of UDX conversion, frame sync, and audio embedding and de-embedding on a single card. The two paths share an input and output SDI crosspoint to receive and send two discrete SDI inputs and outputs. The 9902-2UDX also includes AES/analog audio support and CVBS video I/O. In addition to a basic signal presence input failover function, a Quality Check option allows failover to alternate inputs based on user-configurable subjective criteria such as black or frozen frame. 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.

The 9902-2UDX also provides timecode/closed-captioning conversion from packet-based timecode formats and CEA608/708 HD formats to HD ATC, SD_ATC, and SD VITC waveform-based timecode.

9902-2UDX Input/Output Formats

The 9902-2UDX provides the following inputs and outputs (which can be independently used for Path 1 and/or Path 2:

• 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.
- CVBS IN CVBS coaxial analog video input.
- **AES IN** BNC (AES-3id, 75Ω) ports as AES input (number of ports dependent on rear I/O module used).
- AN-AUD IN Four balanced analog audio embed inputs.

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.
- **AES OUT** BNC (AES-3id, 75Ω) ports as AES outputs (number of ports dependent on rear I/O module used).
- AN-AUD OUT Four balanced analog audio de-embed outputs.
- CVBS OUT CVBS coaxial analog video usable with SD video streams.

Note: Input select also allows internal connection from one processing path output to the opposite processing path input. This allows "serial" processing connections without requiring external jumpering on the card rear I/O module.

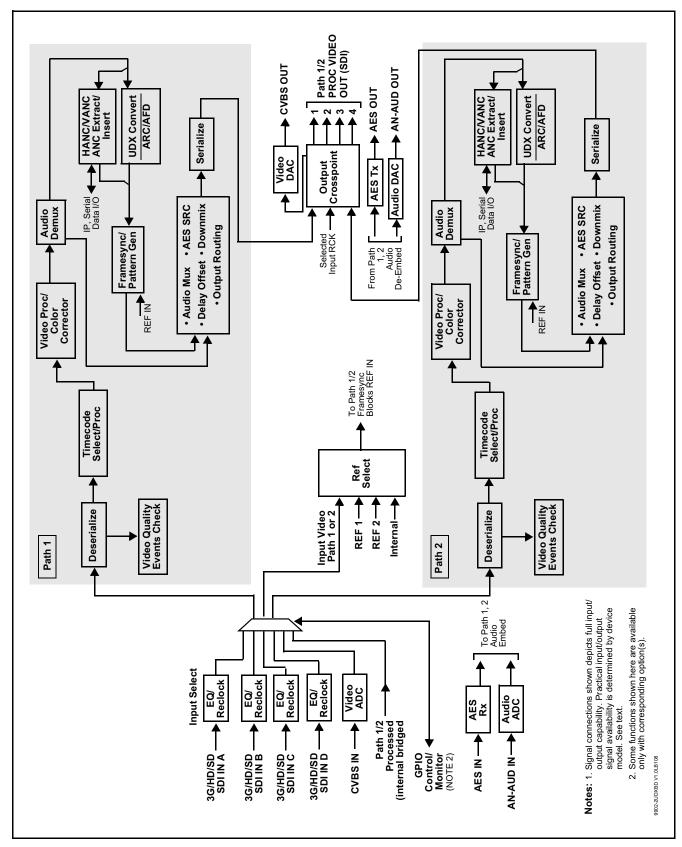


Figure 1-1 9902-2UDX Functional Block Diagram

Video Processor Description

Note:

Unless otherwise noted, the following functions are independently available for Path 1 and Path 2 processing paths.

The 9902-2UDX video subsystem provides the functions described below.

Input Video Select/Quality Check Functions

Used in common as a routing source for both Path 1/Path 2 is a GUI-based control that allows the card to select from up to four 3G/HD/SD-SDI inputs, and a SD CVBS analog video input. This function also allows processed outputs from one path to be routed to the alternate path input. For analog inputs, waveform-based ancillary data is preserved for extraction and usage later in the card processing chain.

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.

Option (Option +QC). Quality Check allows criteria such as black/ frozen frame events to propagate an event alert. This alert can be used by the card Presets function to invoke input video routing changes, GPO, and other actions.

Timecode Processor

(See Figure 1-2.) This function provides for extraction of timecode data from input video source, and in turn allow individual timecode strings to be embedded 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 down-conversions to HD, and ATC_VITC or VITC waveform (with selectable odd/even field line number control) for SD SDI or CVBS inputs. Waveform VITC timecode can also be extracted from a reference input and used as the output timecode value. 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, send and translate between audio/RS-485 LTC timecode formats and the VBI formats described above.

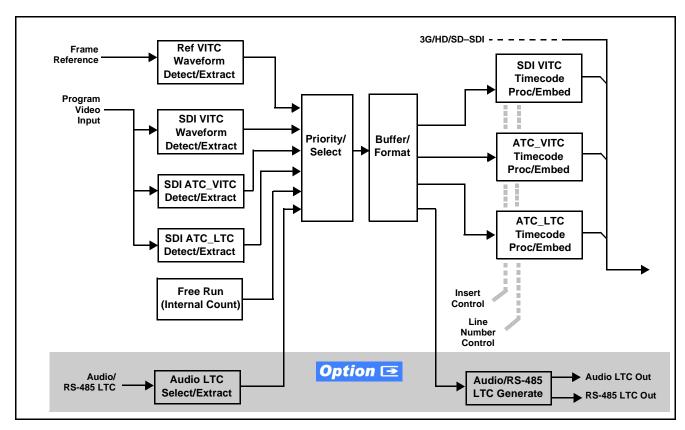


Figure 1-2 Timecode Processor

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, selected input video, or internal timing as a frame sync reference.

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

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

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

Scaler Function

The scaler function provides path 1/2 independent up/down/cross-conversion to 3G/HD/SD from multiple SD and 3G/HD video formats and multiple frame rates, and cross-conversion between interlaced and progressive formats, with auto-format detect/down-conversion of SMPTE 424M/292M/259M formats.

The scaler function also provides aspect ratio conversion that provides a choice from several standard aspect ratios. User-defined settings allow custom user-defined H and V aspect ratio control. Reticule insertion provides safe action area marking as well as other reticule functions and patterns.

The scaler provides special modes that allow de-interlacing to be bypassed in certain cases to reduce processing latency. Also provided are selections to optimize 3:2 pulldown conversion where timecode or other timing references can be relied upon to indicate frame transitions.

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. Color correction can be independently applied to either path.

Option +QC provides a Video Quality Events user interface and an Event Triggers user interface 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).

An **Event Triggers** user interface can detect Closed Caption Presence and Closed Caption Absence 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).

Ancillary Data Processor Option Option

This function provides full VANC/HANC ancillary data de-embedding and embedding for 3G/HD/SD-SDI streams. Direct access to DID and SDID locations allows extraction or insertion of user data such as camera PTZ, SCTE 104, closed-captioning read/insert, GPI/GPO via ANC, or other specialized user payloads. Data can be extracted and inserted within the card (Bridge mode), or inserted and/or extracted to and from the card via serial or IP interfaces connecting to external devices/systems. A rear I/O module with a dedicated IP port can be used with the ancillary data processor function for data insertion or extraction via IP.

Video Output Crosspoint

Used in common as a routing source for both Path 1/Path 2 is a four-output video matrix crosspoint that 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.

Audio Processor Description

Note: Path 1 and Path 2 have individual independent digital audio embed and de-embed banks for each of the processing path's 16-channels of embedded audio. The card's 16 channels of AES embed/de-embed can be allocated individually to any or either path's embed or de-embed nodes. Similarly, four-channel analog audio can be individually allocated across any or either path's embed or de-embed nodes.

The audio processor operates as an internal audio router. This function chooses from the following inputs:

- 16 channels of embedded audio from the SDI video input (default 1-to-1 routing to SDI output)
- Up to 16 channels (8 pairs) of discrete AES input¹
- Up to 4 channels of balanced analog audio input

(See Figure 1-3.) The audio processing subsection is built around a card internal 16-channel audio bus. This 16-channel bus receives inputs from an input routing crosspoint that routes de-embedded, and discrete AES and analog audio inputs, over the 16-channel card bus. Correspondingly, at the output end of the 16-channel bus is an output routing crosspoint that in turn distributes the 16-channel bus signals to embedded, and discrete AES and analog audio outputs.

 $^{1.\} Discrete\ audio\ I/O\ channel\ count\ is\ dependent\ on\ rear\ I/O\ module\ used.$

An Input Audio Status display shows the presence and peak level of each input audio channel received by the card. In addition to SDI embedded audio channel sources, analog and coaxial AES inputs are available as input audio choices. For AES audio inputs, payload is identified (PCM or data such as Dolby® Digital or E). Each AES input pair has independent sample rate converters to align each input pair with video timing to accommodate cases where AES audio is not synchronous with input video (SRC automatically bypassed for non-PCM payloads). As such, the audio subsection provides a full crosspoint between all supported audio inputs and output types.

The audio output crosspoint for each path's embedded output allows embedded channel selection from the respective path's own channels, or channels from the alternate processing path.

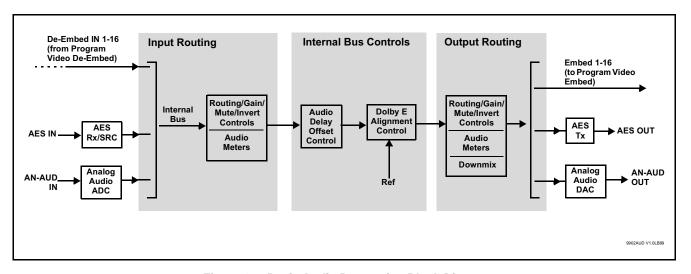


Figure 1-3 Basic Audio Processing Block Diagram

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 (or de-embedded to an AES or analog audio output).

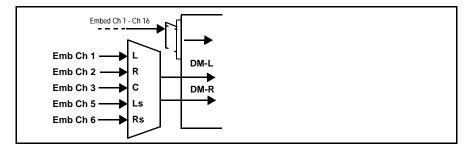


Figure 1-4 Audio Down Mix Functional Block Diagram with Example Sources

Flex Buses

For both input and output nodes before and after the card internal buses, flex buses provide flexible-structure mixer in which any of 16 summing nodes (Flex Mix Bus A thru Flex Mix Bus P) can receive any card audio input, thereby allowing several customizable mixing schemes. Similarly, any of the 16 card internal bus signals can be applied to an output flex bus mixer. The output flex bus allows cross-sourcing from both Path 1 and Path 2 embedded internal Audio Bus sources to the Path 1 and Path 2 discrete output audio crosspoints.

Text-To-Speech Option **⊡**

Cobalt Digital **+TTS** is a complete 21CVAA digital text-to-speech generation / audio insertion solution for embedded and discrete audio systems.

+TTS interfaces with industry standard Windows Share folder systems to receive non-proprietary text, XML, or similar plain text files, and converts and inserts realistic human-voice audio into user-configured audio channels (typically an SAP channel pair intended for this playout). +TTS allows for prioritization based on the organization's discretion (for example, severe weather alerts out-prioritizing school closings). Alert tones are inserted over the main program channels to alert the visually impaired that emergency content is to occur on the SAP channel. Alerts can be played a configurable number of times, and alerts with higher priority can interrupt current lists for breaking news. Once the interrupt message is broadcast, +TTS automatically reverts to normal audio programming. Refer to +TTS Manual Supplement OPT-TTS-MS for detailed information and installation/setup instructions. This supplement is furnished with the option.

Audio Events Detect Function Option

Option +QC provides a Audio Detect Events user interface and an Event **Triggers** user interface for checking user-selected channels to detect audio silence conditions. 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).

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.

Serial (COMM) Ports

The 9902-2UDX is equipped with two, 3-wire serial ports (COM 1 - Serial Port 1, COM 2 - Serial Port 2). The ports provide for SMPTE 2020 de-embedding to an output port, and provide RS-485 LTC I/O (when licensed with option +LTC). Either port can be configured as RS-232 Tx/Rx or RS-4585 non-duplexed Tx or Rx.

+SCTE104 Insertion Option **⊡**



Note: Option +SCTE104 is available only for Path1.

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

The user interface is based on common SCTE 104 operations: Splice Start Normal, Splice Start Intermediate, Splice End Normal, Splice End Intermediate, and Splice Cancel (splice_request_data variants), offering full control of splice start, end, and cancel as well as pre-roll and break duration offsets. (A Manual Supplement is planned for this option. Please check product web page.)

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 9902-2UDX. 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 9902-2UDX and other cards installed in openGear®¹ frames can be controlled from a computer and monitor.

DashBoardTM 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 DashBoardTM, 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 9902-2UDX and other video and audio processing terminal equipment meeting the open-architecture Cobalt® cards for openGearTM 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 openGearTM control software DashBoardTM; 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 $^{\text{TM}}$ is a trademark of Ross Video Limited.

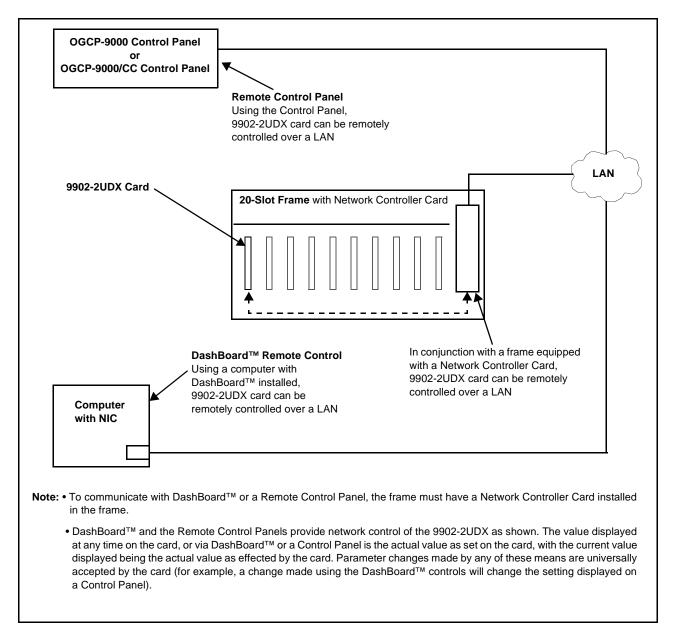


Figure 1-5 9902-2UDX User Control Interface

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. 1-22).

9902-2UDX Rear I/O Modules

The 9902-2UDX 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 9902-2UDX 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 9902-2UDX card edge connections to BNC and other connectors that interface with other components and systems in the signal chain.

The full assortment of 9902-2UDX Rear I/O Modules is shown and described in 9902-2UDX Rear I/O Modules (p. 2-4) in Chapter 2, "Installation and Setup".

Technical Specifications

Table 1-1 lists the technical specifications for the 9902-2UDX 3G/HD/SD-SDI Dual-Channel Up-Down-Cross Converter / Frame Sync / Audio Embed/De-Embed card.

Table 1-1 Technical Specifications

Item	Characteristic
Part number, nomenclature	9902-2UDX 3G/HD/SD-SDI Dual-Channel Up-Down-Cross Converter / Frame Sync / Audio Embed/De-Embed
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 Mbps Ethernet with Auto-MDIX
Indicators	Card edge display and indicators as follows: • 4-character alphanumeric display
	Status/Error LED indicator
	Input Presence LED indicators
Serial Digital Video Input	Number of Inputs: Up to (4), with manual select or failover to alternate input Data Rates Supported: SMPTE 424M, 292M, SMPTE 259M-C

Introduction Technical Specifications

Table 1-1 Technical Specifications — continued

Item	Characteristic
Serial Digital Video Input (cont.)	Impedance:
	75 Ω terminating
	Return Loss:
	> 15 dB up to 1.485 GHz
	> 10 dB up to 2.970 GHz
Analog Video Input	Number of Inputs:
	One SD analog CVBS
	Impedance:
	75 Ω
AES Audio Inputs	Standard:
	SMPTE 276M
	Number of Inputs:
	Up to 16 unbalanced; AES-3id
	Impedance:
	75 Ω
Analog Audio Inputs	Number of Inputs:
	Up to four balanced using 3-wire removable Phoenix connectors; 0 dBFS => +24 dBu
Input Select/Auto-Changeover Failover (option +QC)	Failover to alternate input on loss of target input. Failover invoked upon LOS and/or (with option +QC) user configurable parametric criteria such as black/frozen frame or audio silence.
	- Black frame trigger configurable for black intensity threshold and persistence time.
	 Frozen frame trigger configurable for frozen percentage difference and persistence time.
Post-Processor Serial Digital Video	Number of Outputs:
Outputs	Four 3G/HD/SD-SDI BNC
	Impedance:
	75 Ω
	Return Loss:
	> 15 dB at 5 MHz – 270 MHz
	Signal Level:
	800 mV ± 10%
	DC Offset:
	0 V ± 50 mV

Table 1-1 Technical Specifications — continued

Item	Characteristic
Post-Processor Serial Digital Video Outputs (cont.)	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
Analog Video Output	Number of Outputs: One SD analog CVBS Impedance: 75Ω
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.
AES Audio Outputs	Standard: SMPTE 276M Number of Outputs: Up to 16 unbalanced; AES-3id Impedance: 75 Ω
Analog Audio Outputs	Number of Outputs: Up to four balanced using 3-wire removable Phoenix connectors; 0 dBFS => +24 dBu
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 @ Vin < 1.5 V GPI HI @ Vin > 2.3 V Max Vin: 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 Office: (217) 344-1243 Champaign, IL 61821 USA Fax: (217) 344-1245 www.cobaltdigital.com Email: info@cobaltdigital.com

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Contact Cobalt Digital Inc.

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

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

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

Installation and Setup

Overview

This chapter contains the following information:

- Installing the 9902-2UDX Into a Frame Slot (p. 2-1)
- Installing a Rear I/O Module (p. 2-3)
- Setting Up 9902-2UDX Network Remote Control (p. 2-11)

Installing the 9902-2UDX 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 9902-2UDX 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 9902-2UDX 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 9902-2UDX 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 9902-2UDX 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 9902-2UDX into a frame slot as follows:

- 1. Determine the slot in which the 9902-2UDX 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 9902-2UDX Rear I/O Modules (p. 2-4).
- **9.** Repeat steps 1 through 8 for other 9902-2UDX cards.

essary to terminate unused BNC inputs or outputs.

Note: • The 9902-2UDX BNC inputs are internally 75-ohm terminated. It is not nec-

- 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 9902-2UDX Network Remote Control (p. 2-11).

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 9902-2UDX is to be installed.

If installing the 9902-2UDX 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 9902-2UDX 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.

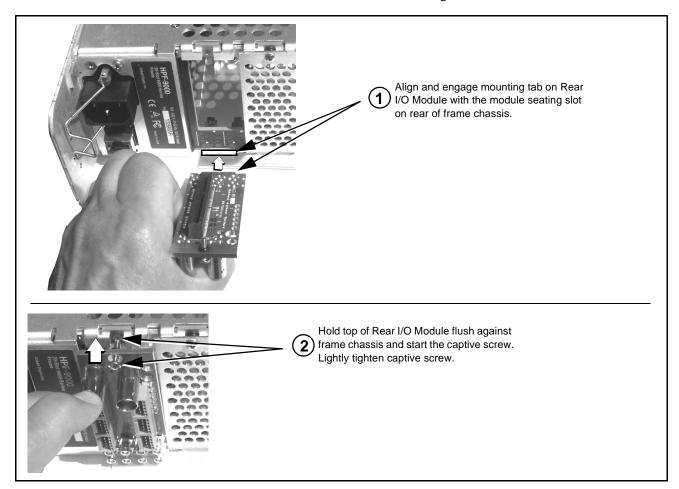


Figure 2-1 Rear I/O Module Installation

9902-2UDX Rear I/O Modules

Table 2-1 shows and describes the full assortment of Rear I/O Modules specifically for use with the 9902-2UDX.

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 9902-2UDX Rear I/O Modules

9902-2UDX Rear I/O Module	Description
CARD 2 CARD 1 CARD 2 CARD 1 SDI IN A SDI IN A SDI IN C SDI IN C SDI OUT 1 SDI OUT 1 SDI OUT 2 SDI OUT 2 SDI OUT 3 SDI OUT 3	Split Rear Module. Provides each of the following connections for two 9902-2UDX cards: • 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)
RM20-9902-2UDX-C 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. 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.	 Provides the following connections: 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 Note: Refer to GPIO, Serial (COMM), and Analog Audio Connections (p. 2-11) for connector pinouts and important information regarding GPO electrical limits.

Table 2-1 9902-2UDX Rear I/O Modules — continued

9902-2UDX Rear I/O N	Module	Description
RM20-9902-2UDX-D		Provides the following connections:
	A VIDEO IN B CVBS	 Two 3G/HD/SD-SDI video inputs (VIDEO IN A and VIDEO IN B)
		One CVBS video input (CVBS IN)
	N 10 50	 Two analog balanced audio inputs (AN-AUD IN 1 and AN-AUD IN 2)
	P 20 60	• Eight AES audio inputs (AES IN 1 thru AES IN 8)
	AES IN 3 7 0	 Two 3G/HD/SD-SDI video outputs (VIDEO OUT 1 and VIDEO OUT 2)
	40. 40 € € € € € € € € € € € € € € € € € €	One CVBS video output (CVBS OUT)
	1 VIDEO 2 CVBS	 Two analog balanced audio outputs (AN-AUD OUT 1 and AN-AUD OUT 2)
	1 3 AES 5 7 7 10 10 10 10 10 10 10 10	 Eight AES audio outputs (AES OUT 1 thru AES OUT 8)
		Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9902-2UDX-D-HDBNC or RM20-9902-2UDX-D-DIN, respectively.
RM20-9902-2UDX-E		Provides the following connections:
		 Four 3G/HD/SD-SDI video inputs (SDI IN A thru SDI IN D)
	⊙ A B ⊙ D ⊙	• Eight AES audio inputs (AES IN 1 thru AES IN 8)
	SDI IN O C S S S S AES IN	 Four 3G/HD/SD-SDI video outputs; selectable as processed or input reclocked out (SDI PROC/RCK OUT 1 thru SDI PROC/RCK OUT 4)
	$ \begin{array}{c c} $	 Eight AES audio outputs (AES OUT 1 thru AES OUT 8)
	SDI PROC/ RCK OUT 3 4 8 4 2 2 0 1 3 5 7 0 AES OUT 2 4 6 6 8 0	Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9902-2UDX-E-HDBNC or RM20-9902-2UDX-E-DIN, respectively.

Table 2-1 9902-2UDX Rear I/O Modules — continued

9902-2UDX Rear I/O Module **Description** RM20-9902-2UDX-F Provides the following connections: Two 3G/HD/SD-SDI video input BNCs (SDI IN A and SDI IN B) \odot • Three 3G/HD/SD-SDI video output BNCs SDI IN A (SDI OUT 1A thru SDI OUT 4B: each GUI selectable as selected-input reclocked or processed out) One relay-protected SDI processed output BNC (RLY BYP A/B OUT) RLY BYP A/B OUT SDI OUT 1A • Two opto-isolated GPI inputs (terminals GPI 1-G and GPI 2-G) • Two opto-coupled GPO (GPO 1/G and GPO 2/G) Note: Refer to GPIO, Serial (COMM), and Analog Audio Connections (p. 2-11) for connector pinouts SDI OUT 4B and important information regarding GPO electrical limits. Due to the density of connector placement on Rear Modules COBALT using high-density connectors (e.g., RM20-9001-B/S-DIN), these modules use a QR barcode label instead a regular label. RM20-9001-B/S-DIN Simply scan the image with a smart phone and a link to the rear module label (as shown in our catalog) will appear. (Smart

*SAMPLE-NOT FOR USE**

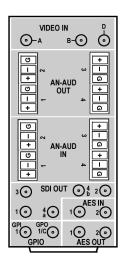
phone must have a QR reader app such as QuickMark QR Code Reader or equivalent.)

Not all devices may be able to acquire the image. If this occurs, use the device to access the web page for card/rear module to view the diagram.

Table 2-1 9902-2UDX Rear I/O Modules — continued

9902-2UDX Rear I/O Module

RM20-9902-2UDX-H



Note: Refer to GPIO, Serial (COMM), and Analog Audio Connections (p. 2-11) for connector pinouts and important information regarding GPO electrical limits.

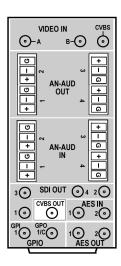
Description

Provides the following connections:

- Two 3G/HD/SD-SDI video input BNCs (SDI IN A and SDI IN B)
- One SDI/CVBS video input; selectable as 3G/HD/ SD-SDI or CVBS (D/CVBS IN)
- Four analog balanced audio inputs (AN-AUD IN 1 thru AN-AUD IN 4)
- Two AES audio inputs (AES IN 1 and AES IN 2)
- Three 3G/HD/SD-SDI video outputs, selectable as processed or reclocked input (SDI OUT 1 thru SDI OUT 3)
- 3G/HD/SD-SDI video output pair, selectable as processed or reclocked input as a pair (SDI OUT 4a and SDI OUT 4b)
- Four analog balanced audio outputs (AN-AUD OUT 1 thru AN-AUD OUT 4)
- Two AES audio outputs (AES OUT 1 and AES OUT 2)
- One GPI / 6Hz coaxial input (GPI 1)
- One coaxial GPO with isolated return (GPO 1)

Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9902-2UDX-H-HDBNC or RM20-9902-2UDX-H-DIN, respectively.

RM20-9902-2UDX-J



Note: Refer to GPIO, Serial (COMM), and Analog Audio Connections (p. 2-11) for connector pinouts and important information regarding GPO electrical limits.

Provides the following connections:

- Two 3G/HD/SD-SDI video input BNCs (SDI IN A and SDI IN B)
- One SDI/CVBS video input; selectable as 3G/HD/ SD-SDI or CVBS (D/CVBS IN)
- Four analog balanced audio inputs (AN-AUD IN 1 thru AN-AUD IN 4)
- Two AES audio inputs (AES IN 1 and AES IN 2)
- Four 3G/HD/SD-SDI video outputs, selectable as processed or reclocked input (SDI OUT 1 thru SDI OUT 4)
- One CVBS video output (CVBS OUT)
- Four analog balanced audio outputs (AN-AUD OUT 1 thru AN-AUD OUT 4)
- Two AES audio outputs (AES OUT 1 and AES OUT 2)
- One GPI / 6Hz coaxial input (GPI 1)
- One coaxial GPO with isolated return (GPO 1)

Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9902-2UDX-J-HDBNC or RM20-9902-2UDX-J-DIN, respectively.

Table 2-1 9902-2UDX Rear I/O Modules — continued

9902-2UDX Rear I/O Module Description RM20-9902-2UDX-K Provides the following connections: • Four 3G/HD/SD-SDI video inputs (SDI IN A thru **SDI IN D**; IN D-to-OUT 1 as passive RLY bypass) В⊙ D⊙ • SIx AES audio inputs (AES IN 1 thru AES IN 6) SDLIN **⊙**c Two analog balanced audio inputs (AN-AUD IN 1 **⊙**1 40 and AN-AUD IN 2) O 2 AES 5O • Four 3G/HD/SD-SDI video outputs (SDI OUT 1 thru SDI OUT 4) ⊙ 3 6(0) • Four AES audio outputs (AES OUT 1 thru AES OUT 4) GPIO сомм • COMM/GPIO RJ-45 connector Note: • Refer to GPIO, Serial (COMM), and Analog SII 4⊙ 2⊙ ⊙₃ Audio Connections (p. 2-11) for connector pinouts and important information regarding O1 2O 3O 4O GPO electrical limits. Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9902-2UDX-K-HDBNC or RM20-9902-2UDX-K-DIN, respectively. RM20-9902-2UDX-L Provides the following connections: • Four 3G/HD/SD-SDI video inputs (SDI IN A thru SDI IN D SDI IN B O DO 8 - GND ① A • CVBS video input (CVBS IN) 7 - COM_A_RX 6 - COM_A_TX 5 - GPO OUT 2 • Eight 3G/HD/SD-SDI video outputs (SDI OUT 1A **⊙**¢ 4 - GPO OUT 1 3 - GPO RTN thru SDI OUT 4B; 1x2 DA output of each crosspoint 2 - GPI IN 2 output) 1 - GPI IN 1 **⊙** 2B SDI PROC/RCK/ PREVIEW OUT CVBS video output (CVBS OUT) 4B **⊙** ^{3B} COMM/GPIO RJ-45 connector ①1A Note: A and B outputs are DA pairs of • ETHERNET 100/1000 BaseT Ethernet connector OUT CVBS corresponding outputs 1 thru 4. ①2A Note: Available equipped with High-Density BNC ⊙3A (HDBNC) or DIN1.0/2.3 connectors as: RM20-9902-2UDX-K-HDBNC or ① 4A RM20-9902-2UDX-K-DIN, respectively.

Table 2-1 9902-2UDX Rear I/O Modules — continued

9902-2UDX Rear I/O Module	Description
CARD 2 CARD 1 SDI IN A SDI IN A SDI IN C SDI IN C SDI IN D SDI IN D 1A SDI OUT 2A SDI OUT 2A 3A 3B 3A 3B 2A 3B 3A 3B 2A 4A 4B 4A 4B 2A 4A 4B 3A 4B 4A 4B 3A 4B 4A 4B 3A 5A 5A 5A 5A 3A 5B 6A 6A 6A 6A 3B 6A	 Split Rear Module. Provides each of the following connections for two 9902-2UDX cards: 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) Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9902-2UDX-M/S-HDBNC or RM20-9902-2UDX-M/S-DIN, respectively.
RM20-9902-2UDX-N GPIO/COMM O1 AES A	Double-width rear modules provides the following connections: • Four 3G/HD/SD-SDI video inputs (SDI IN A thru SDI IN D • CVBS video input (CVBS IN) • Four analog balanced audio inputs (AN-AUD IN 1 thru AN-AUD IN 4) • Eight AES audio inputs (AES IN 1 thru AES IN 8) • Four 3G/HD/SD-SDI video outputs (SDI OUT 1B thru SDI OUT 4B (OUT 1B with relay bypass protect) • CVBS video output (CVBS OUT) • Four analog balanced audio outputs (AN-AUD OUT 1 thru AN-AUD OUT 4) • Eight AES audio outputs (AES OUT 1 thru AES OUT 8) • COMM/GPIO RJ-45 connector • ETHERNET 100/1000 BaseT Ethernet connector Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9902-2UDX-N-HDBNC or RM20-9902-2UDX-N-DIN, respectively.

Table 2-1 9902-2UDX Rear I/O Modules — continued

9902-2UDX Rear I/O Module	Description
RM20-9902-2UDX-P	Provides the following connections:
SDI IN A SDI IN B OUT 2B SDI IN C SDI IN D OUT 3B SDI OUT 1B SDI IN D OUT 3B SDI OUT 1RLYBYPJ 1A SPO ON 1A SPO ON 1A SPO ON 1RLYBYPJ 1A SPO ON	 Two 3G/HD/SD-SDI video input BNCs (SDI IN A and SDI IN C)
	 Six 3G/HD/SD-SDI video output BNCs (SDI OUT 1A thru SDI OUT 4B; each GUI selectable as selected-input reclocked or processed out)
	 Two relay-protected SDI processed output BNC (RLY BYP SDI IN B > SDI OUT 2B and RLY BYP SDI IN D > SDI OUT 3B)
	 Two opto-isolated GPI inputs (terminals GPI 1-G and GPI 2-G)
	 Two opto-coupled GPO (GPO OUT 1 and GPO OUT 2)
	Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9902-2UDX-P-HDBNC or RM20-9902-2UDX-P-DIN, respectively.
	Note: Refer to GPIO, Serial (COMM), and Analog Audio Connections (p. 2-11) for connector pinouts and important information regarding GPO electrical limits.

GPIO, Serial (COMM), and Analog Audio Connections

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

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

Setting Up 9902-2UDX Network Remote Control

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

• 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. 1-22).

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

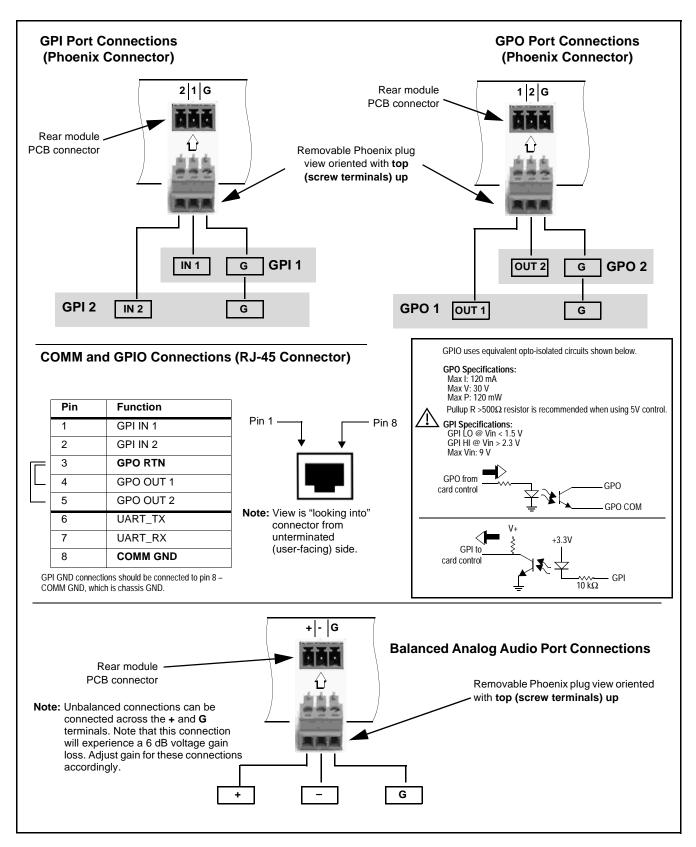


Figure 2-2 COMM, GPIO, and Analog Audio Connector Pinouts

Operating Instructions

Overview

If you are already familiar with using DashBoard or a Cobalt Remote Control Panel to control Cobalt cards, please skip to 9902-2UDX Function Menu List and Descriptions (p. 3-10).

This chapter contains the following information:

- Control and Display Descriptions (p. 3-1)
- Accessing the 9902-2UDX Card via Remote Control (p. 3-6)
- Checking 9902-2UDX Card Information (p. 3-8)
- Ancillary Data Line Number Locations and Ranges (p. 3-9)
- 9902-2UDX Function Menu List and Descriptions (p. 3-10)
- Troubleshooting (p. 3-73)

Control and Display Descriptions

This section describes the user interface controls, indicators, and displays for using the 9902-2UDX card. The 9902-2UDX functions can be accessed and controlled using any of the user interfaces described here.

The format in which the 9902-2UDX 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 9902-2UDX 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 9902-2UDX card are organized into function **menus**, which consist of parameter groups as shown below.

Figure 3-1 shows how the 9902-2UDX card and its menus are organized, and also provides an overview of how navigation is performed between cards, function menus, and parameters.

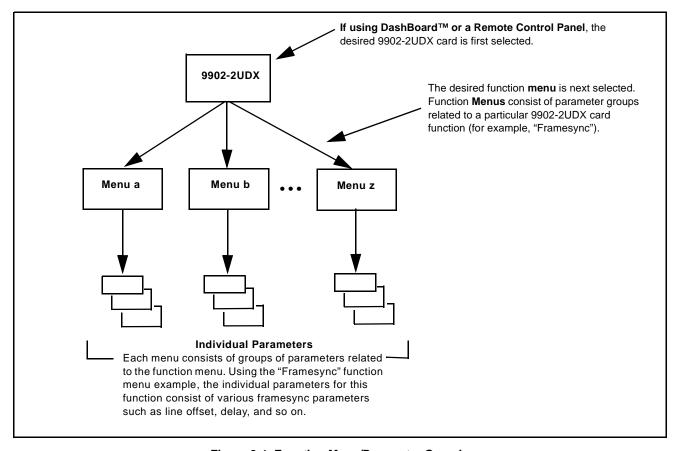


Figure 3-1 Function Menu/Parameter Overview

DashBoard™ User Interface

(See Figure 3-2.) The card function menus are organized in DashBoardTM 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.

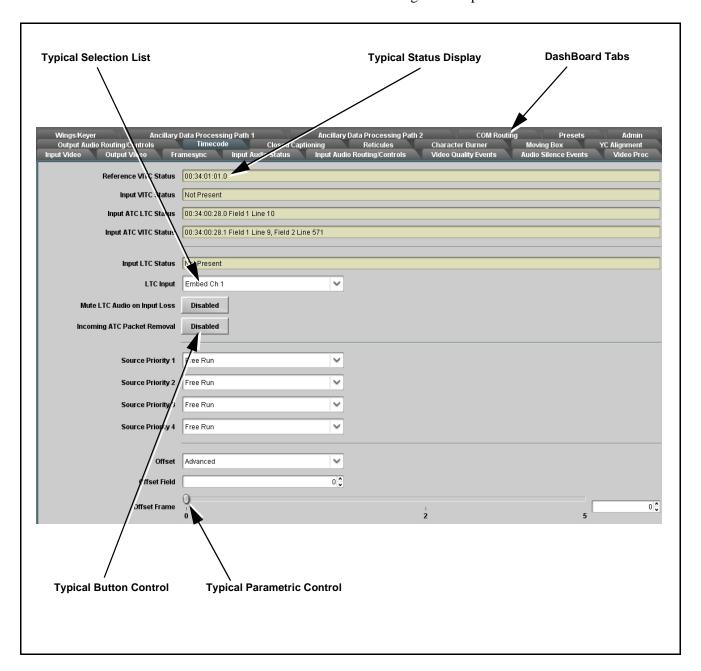


Figure 3-2 Typical DashBoard Tabs and Controls

Cobalt® Remote Control Panel User Interfaces

(See Figure 3-3.) Similar to the function menu tabs using DashBoardTM, 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. (In this manner, the setting effected using controls and selection lists displayed on the Control Panel are comparable to the submenu items accessed and committed using the 9902-2UDX card edge controls.)

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

Note:

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

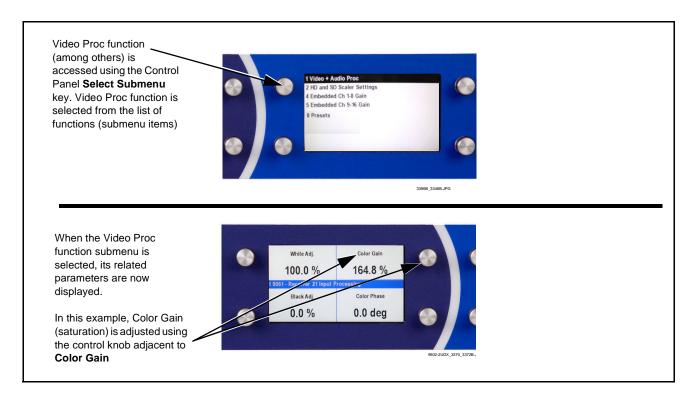


Figure 3-3 Remote Control Panel Setup of Example Video Proc Function Setup

Web HTML5 User Interface

(See Figure 3-4.) When equipped with a rear I/O module having an Ethernet port, the 9902-2UDX 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 DashBoardTM. 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 (Log Status/Firmware Update - Card IP Address) (p. 3-66) for more information.)

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

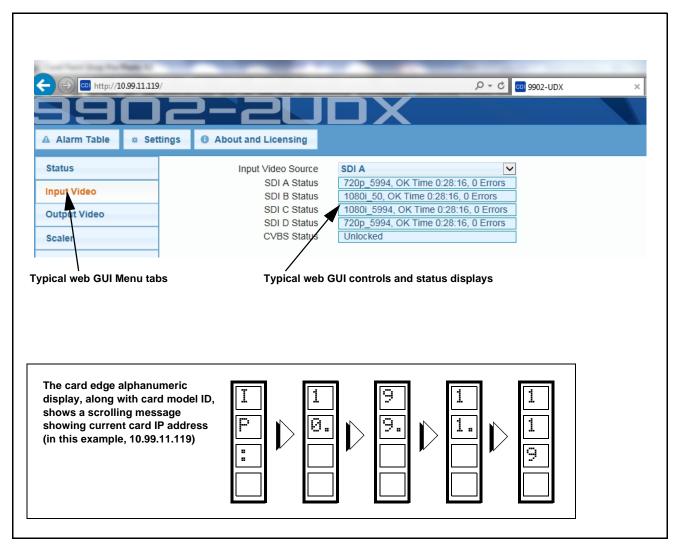


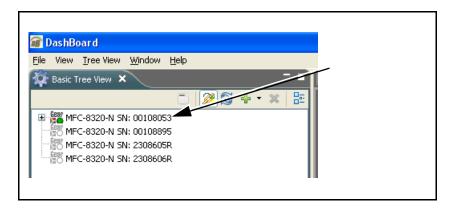
Figure 3-4 Typical Web GUI Tabs and Controls

Accessing the 9902-2UDX Card via Remote Control

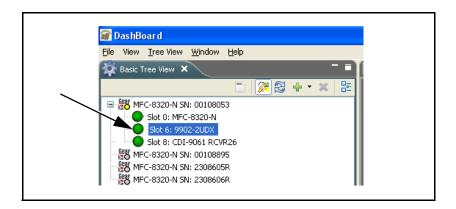
Access the 9902-2UDX card using DashBoardTM or Cobalt[®] Remote Control Panel as described below.

Accessing the 9902-2UDX Card Using DashBoard™

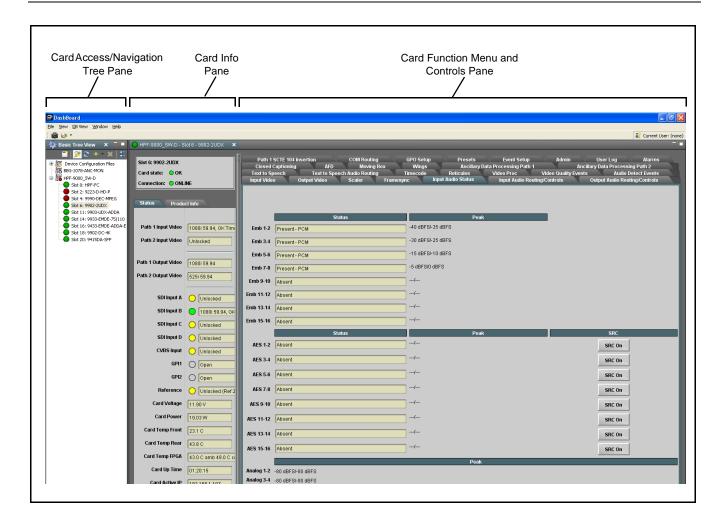
- 1. On the computer connected to the frame LAN, open DashBoardTM.
- 2. As shown below, in the left side Basic View Tree locate the Network Controller Card associated with the frame containing the 9902-2UDX card to be accessed (in this example, "MFC-8320-N SN: 00108053").



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: 9902-2UDX").

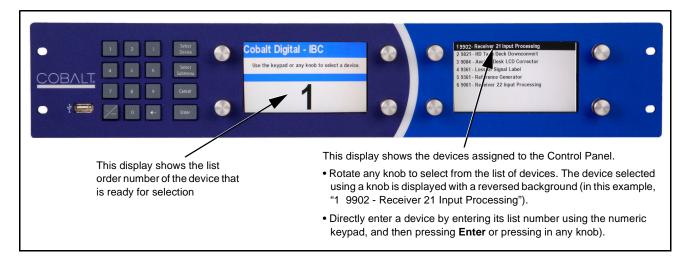


As shown on the next page, when the card is accessed in DashBoardTM its function menu screen showing tabs for each function is displayed. (The particular menu screen displayed is the previously displayed screen from the last time the card was accessed by DashBoardTM).



Accessing the 9902-2UDX Card Using a Cobalt® Remote Control Panel

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



Checking 9902-2UDX Card Information

The operating status and software version the 9902-2UDX card can be checked using DashBoardTM or the card edge control user interface. Figure 3-5 shows and describes the 9902-2UDX card information screen using DashBoardTM and accessing card information using the card edge control user interface.

Note:

Proper operating status in DashBoard[™] is denoted by green icons for the status indicators shown in Figure 3-5. Yellow or red icons respectively indicate an alert or failure condition. Refer to Troubleshooting (p. 3-73) for corrective action.

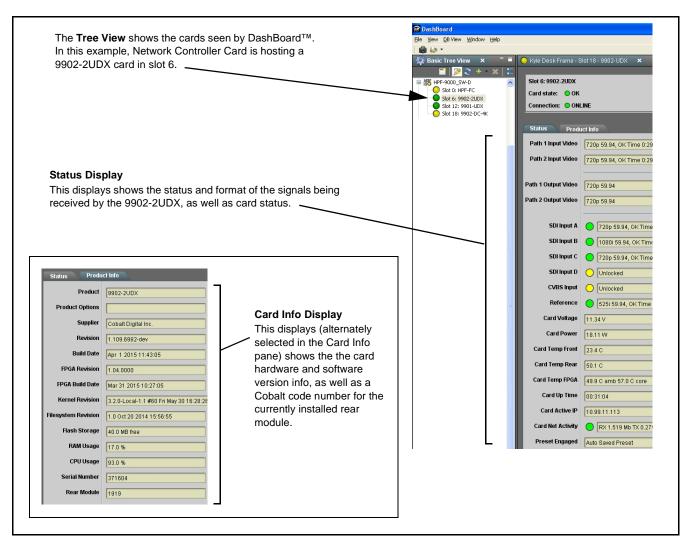


Figure 3-5 9902-2UDX Card Info/Status Utility

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 Ancillar	y Data Line Number	Locations/Ranges
-----------	------------------	--------------------	------------------

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

Notes:

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

For	mat	Line No. Limiting	Format	Line No. Limiting	Format	Line No. Limiting
525	i i	12-19	720p	9-25	1080p	9-41
625	ii	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.

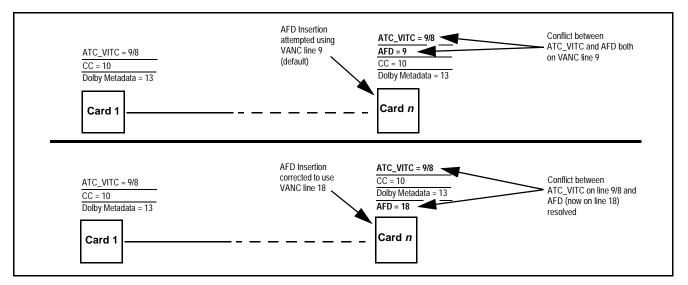


Figure 3-6 Example VANC Line Number Allocation Example

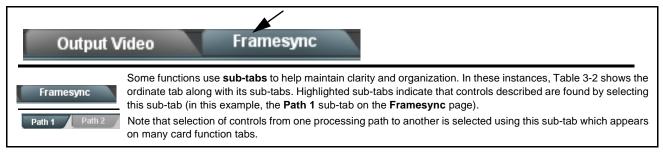
9902-2UDX Function Menu List and Descriptions

Table 3-2 individually lists and describes each 9902-2UDX 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 DashBoardTM to access each function and its corresponding menus and parameters.

Note:

Option 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 card web page Product Downloads for pdf Manual Supplements covering these options.

On DashBoardTM 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	Reticules	3-43
Output Video Mode Controls	3-12	Wings Insertion	3-46
Scaler	3-13	AFD/WSS/VI Code Insertion Controls	3-47
Framesync	3-16	Moving Box Insertion	3-53
Input Audio Status	3-19	Ancillary Data Proc Controls	3-55
Input Audio Routing/Controls	3-20	COMM Ports Setup Controls	3-58
Video Quality Events	3-25	Presets	3-60
Audio Detect Events Setup Controls	3-26	GPO Setup Controls	3-61
Closed Captioning	3-27	Event Setup Controls	3-62
Video Proc/Color Correction	3-28	Admin (Log Status/Firmware Update - Card IP Address)	3-66
Output Audio Routing/Controls	3-31	User Log	3-68
Text-To-Speech Setup Controls	3-37	Alarms Setup Controls	3-69
Timecode	3-38		

Table 3-2 9902-2UDX Function Menu List

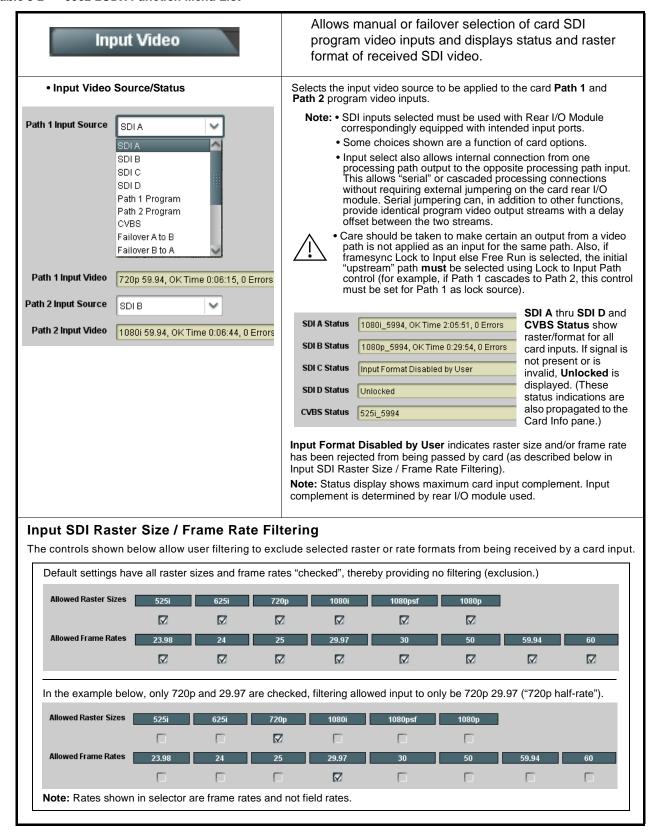


Table 3-2 9902-2UDX Function Menu List — continued

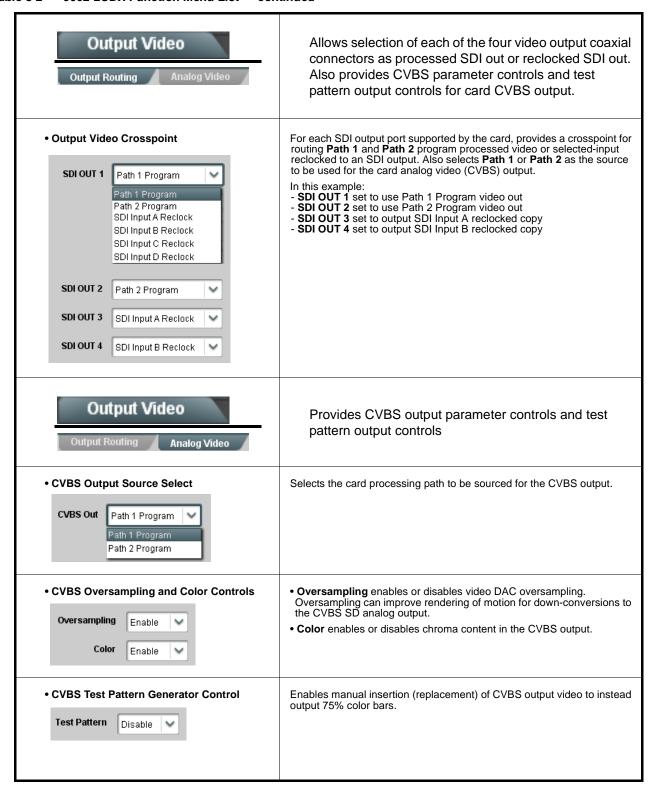


Table 3-2 9902-2UDX Function Menu List — continued

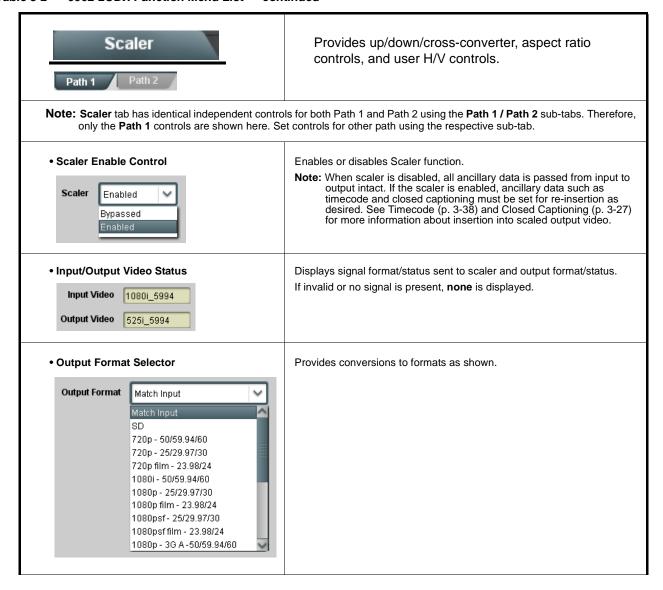


Table 3-2 9902-2UDX Function Menu List — continued

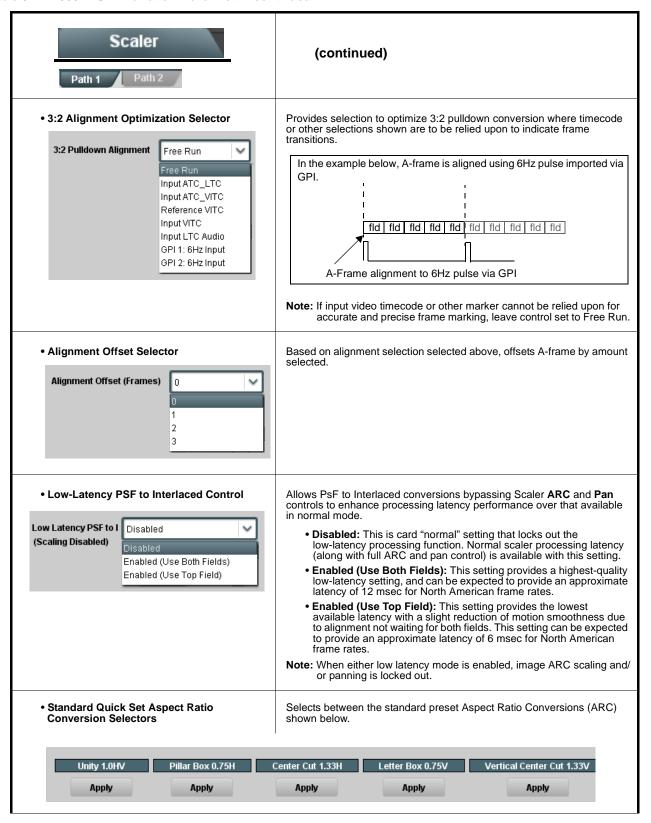
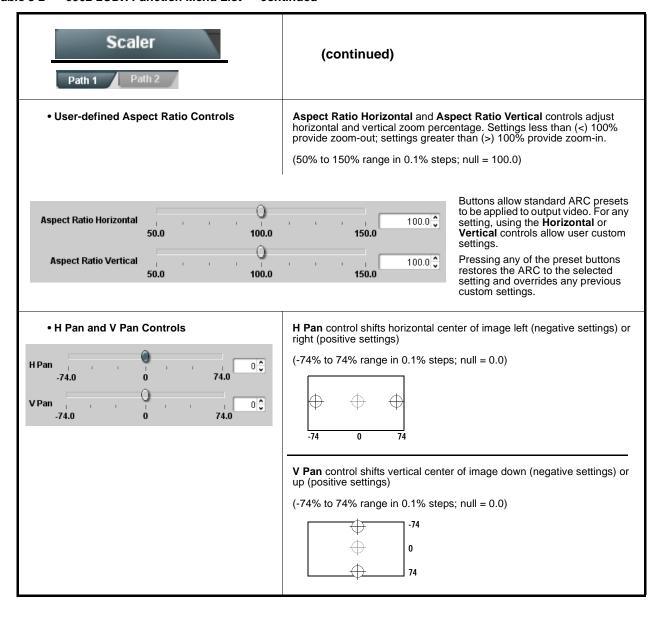


Table 3-2 9902-2UDX Function Menu List — continued



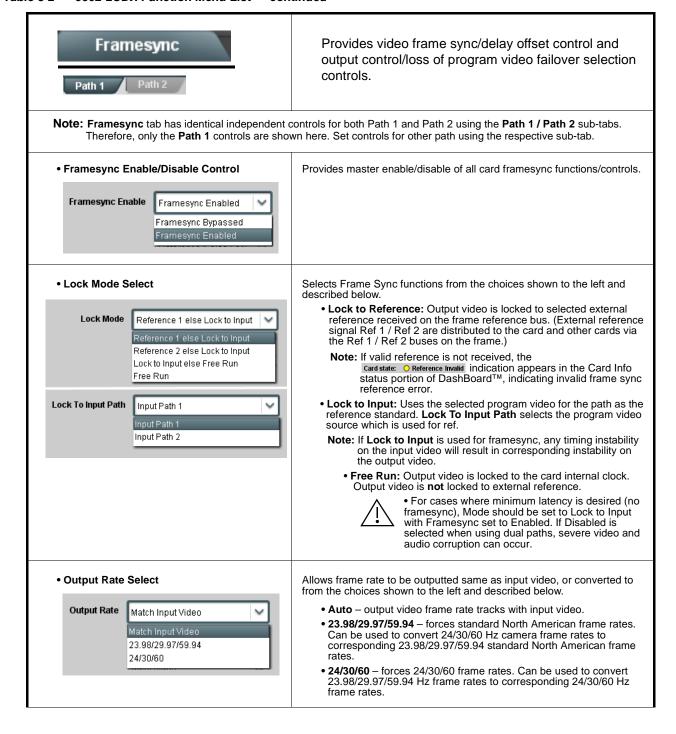


Table 3-2 9902-2UDX Function Menu List — continued

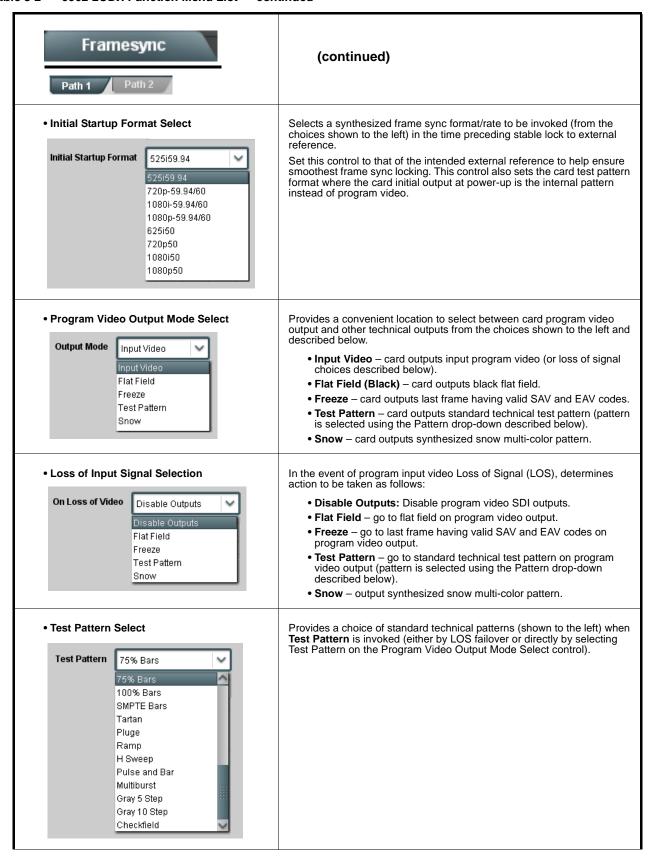


Table 3-2 9902-2UDX Function Menu List — continued

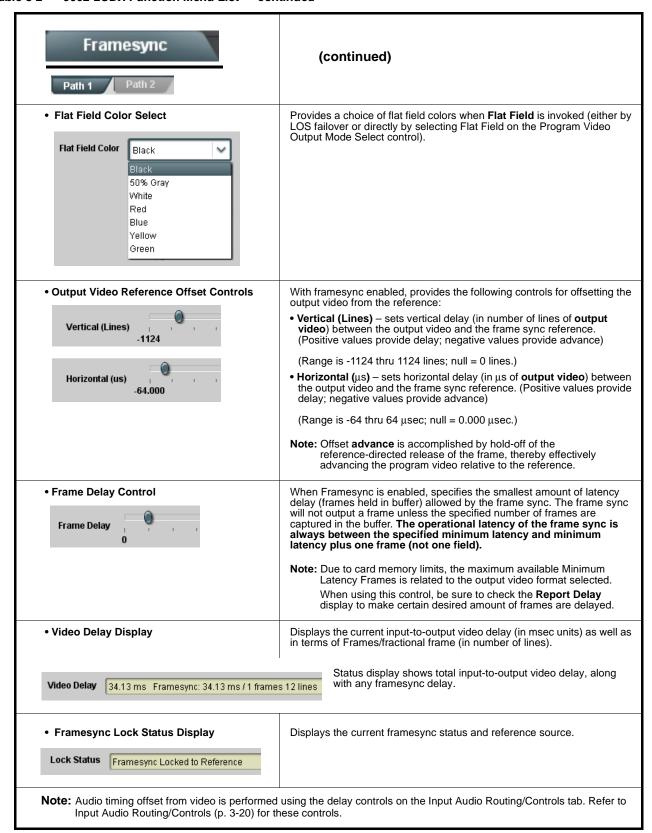


Table 3-2 9902-2UDX Function Menu List — continued



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

Note: Input Audio Status tab has identical independent controls/status displays for both Path 1 and Path 2 using the Path 1 / Path 2 sub-tabs. Therefore, only the Path 1 controls are shown here. Access controls and status for other path using the respective sub-tab.

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

- Absent: Indicates embedded channel or AES pair does not contain recognized audio PCM data.
- Present PCM: Indicates AES pair or embedded channel contains recognized audio PCM data.
- ullet Dolby ullet: Indicates embedded channel or AES pair contains $\hbox{Dolby}^{\hbox{\it le}}$ $\hbox{\it E}$ encoded data.
- Dolby Digital: Indicates embedded channel or AES pair contains Dolby® Digital encoded data.

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

 AES Dolby-encoded inputs that are routed directly to card are directed via a special path that automatically bypasses SRC. However, AES inputs to other destinations (e.g., AES embedding) are first applied through SRC. These paths disable SRC if Dolby-encoded data is detected. To avoid a possible "Dolby noise burst" if an input on these paths changes from PCM to Dolby, it is recommended to set the AES SRC control for the pair to SCR Off for an AES input that is expected to carry a Dolby signal.

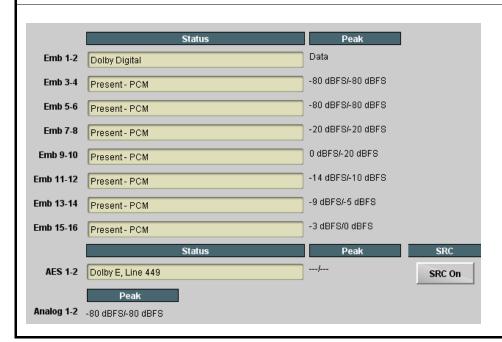


Table 3-2 9902-2UDX Function Menu List — continued

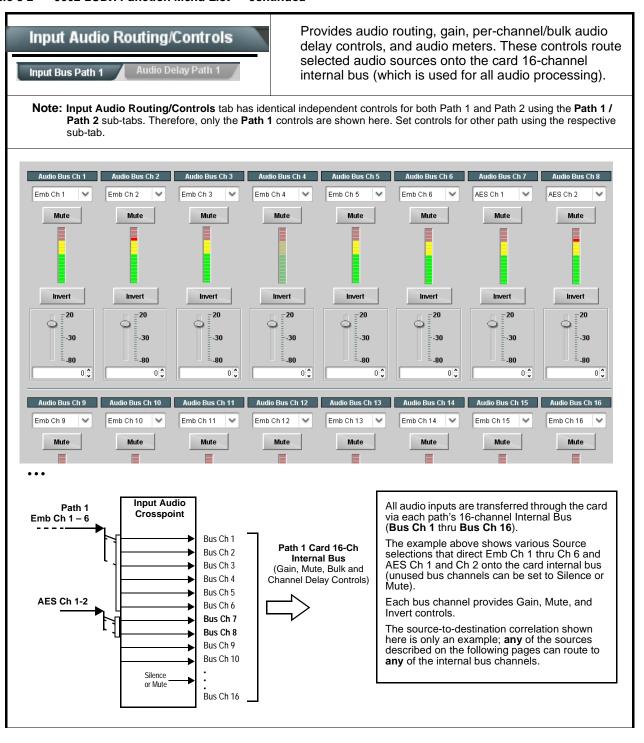


Table 3-2 9902-2UDX Function Menu List — continued

Input Audio Routing/Controls (continued) Input Bus Path 1 Note: • 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. • Bus Channel Source Using the **Source** drop-down list, selects the audio input source to be routed to the card bus channel from the following choices: • Embedded input channel 1 thru 16 (Emb Ch 1 thru Emb Ch 16) Audio Bus Ch 1 • AES input channel 1 thru 16 (AES Ch 1 thru AES Ch 16) Emb Ch 1 • Analog input channel 1 thru 4 (Analog Ch 1 thru Analog Ch 4) • Input Flex Bus summed mix output nodes A thru P (see Input Flex Mix (p. 3-23) Note: • AES pair and analog channel count are dependent on rear I/O module used. Current rear modules may not support full input complement. • Embedded channel sources are only the embedded channels associated with the respective path. Channel Mute/Phase Invert/Gain Controls Provides **Mute** and phase **Invert** channel controls, as well as peak level and Peak Level Display meter for each output channel. (Meter shows level as affected by Level control.) Gain controls allow relative gain (in dB) control for the corresponding Mute Mute destination Embedded Audio Group channel. (-80 to +20 dB range in 1.0 dB steps; unity = 0 dB) 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. Invert Invert -30 -30 -80 0 0 0 3 Audio Delay - Provides bulk (all four groups/master) and individual Audio Bus Input Routing/Controls card audio bus channel delay offset controls and delay parametric displays. Audio Delay Path 1 **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 • Bulk (Master) Audio/Video Delay Control included by other actions). This control is useful for correcting lip sync problems when video and audio paths in the chain experience differing Audio Bulk Delay (msec) 219 🗘 overall delays. (-33 to +3000 msec range in 0.01-msec steps; null = 0 msec).

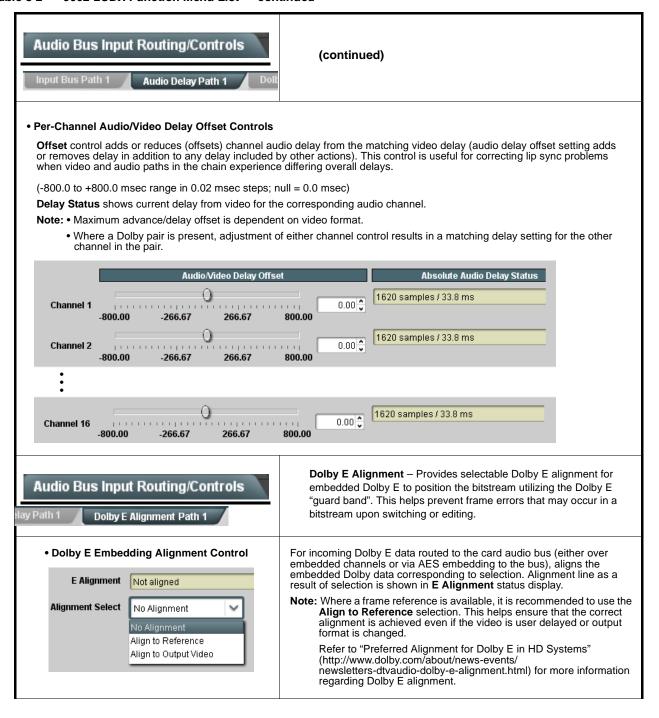
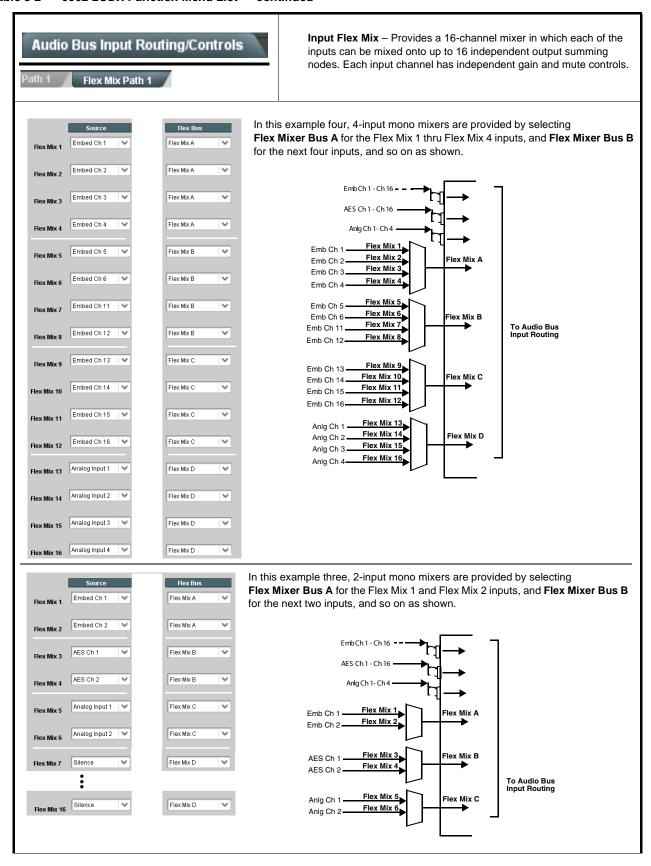


Table 3-2 9902-2UDX Function Menu List — continued



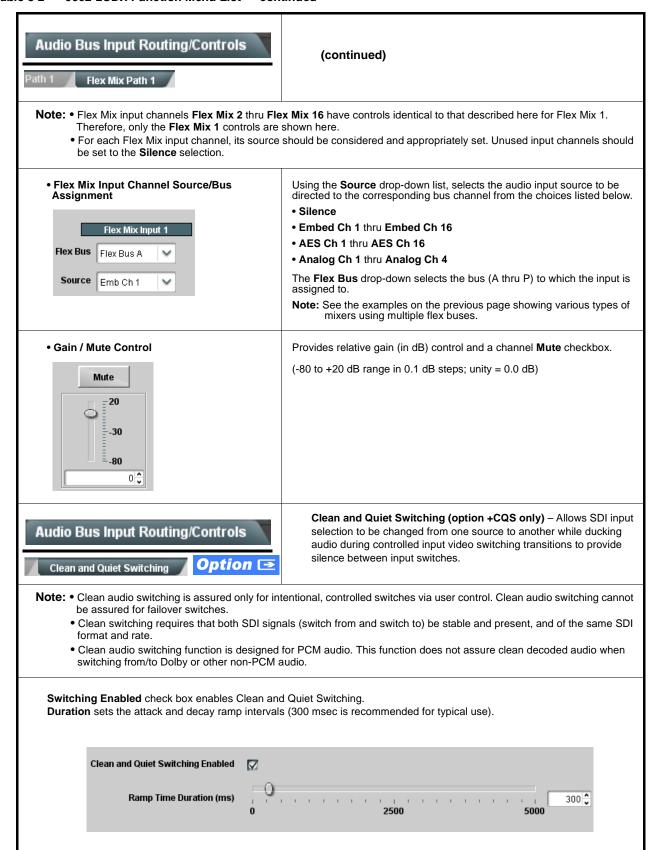
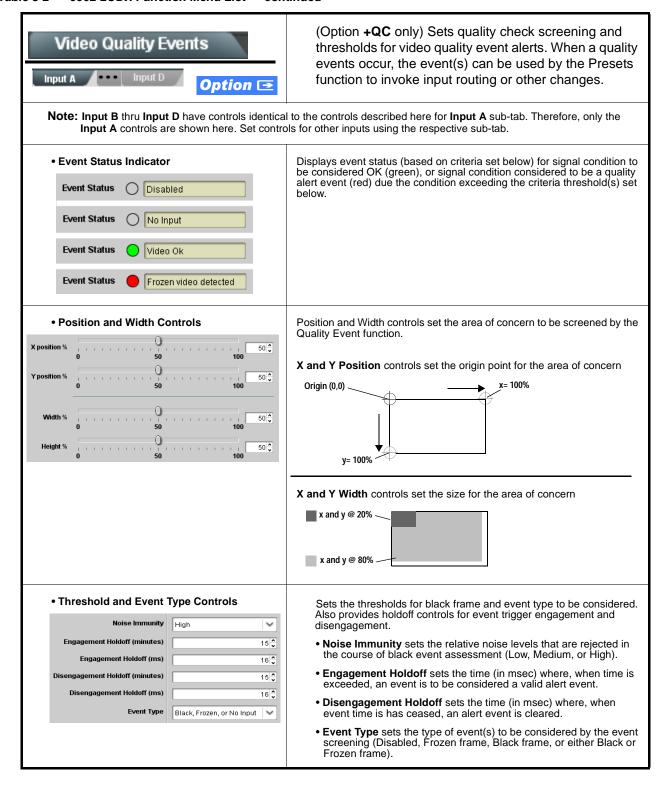


Table 3-2 9902-2UDX Function Menu List — continued



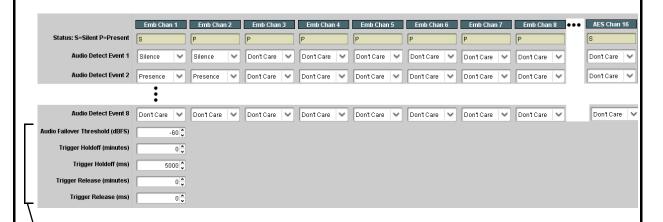


(Option **+QC** only) Sets audio level screening and thresholds for audio silence/presence event alerts on embedded and/or AES discrete audio in. When an audio events occur, the event(s) can be used by the Presets function to invoke input routing or other changes.

Note: Currently, Audio Detect is available only for Path 1 embedded audio and AES input audio.

Any combination of embedded and AES 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 **any** of channels Emb Ch 1 thru Ch 6 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 **Presets > Event Triggers** sub-tab controls to issue a GPO, preset engage, or other command when audio silence events are detected.



- 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" setting may be labeled as **Don't Care**, **DC**, or **DSBL** (disabled). All notations mean ignoring the channel from event triggering.
 - 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.)

Table 3-2 9902-2UDX Function Menu List — continued



Provides support for closed captioning setup. Also provides controls for setting closed captioning absence and presence detection thresholds.

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

• SMPTE embedded CC controls and processing are correlated only to the path selected. CC data cannot be transferred from one path stream to another.

• Closed Captioning Input Status

Input Status CDP Packet on Line 16

Displays incoming Closed Captioning status as follows:

- 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.

Note: • Packet closed captioning status Captioning Rejected Due To message can appear due to the items described below. The closed captioning function assesses cdp_identifier, cdp_frame_rate, ccdata_present, and caption_service_active items contained in the packet header to make the determinations listed below. Refer to CEA-708-B for more information.

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).

- 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.
- Closed Captioning Remove/Regenerate and HD Insertion Line Controls

Incoming
Packet Removal

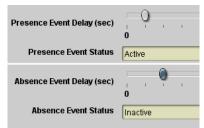
If Regenerate Closed Captioning is enabled incoming packets will always be removed.

Regenerate
Closed Captioning
HD Output Line

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.

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

• Presence/Absence Check Controls



Displays CC presence and/or absence event status. This status can be propagated to the **Presets > Event Triggers** tab controls to issue a card GPO or other command when CC presence/absence events are detected.

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.

Table 3-2 9902-2UDX Function Menu List — continued

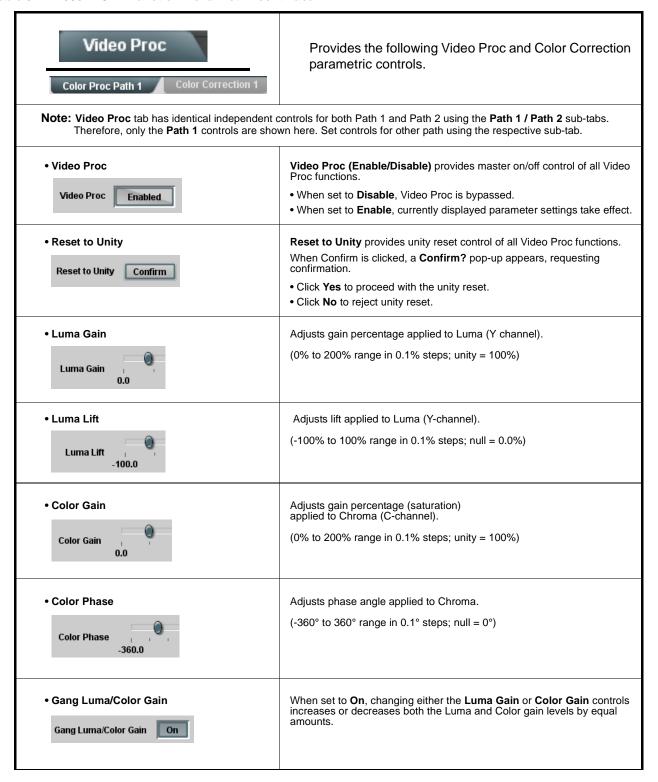


Table 3-2 9902-2UDX Function Menu List — continued

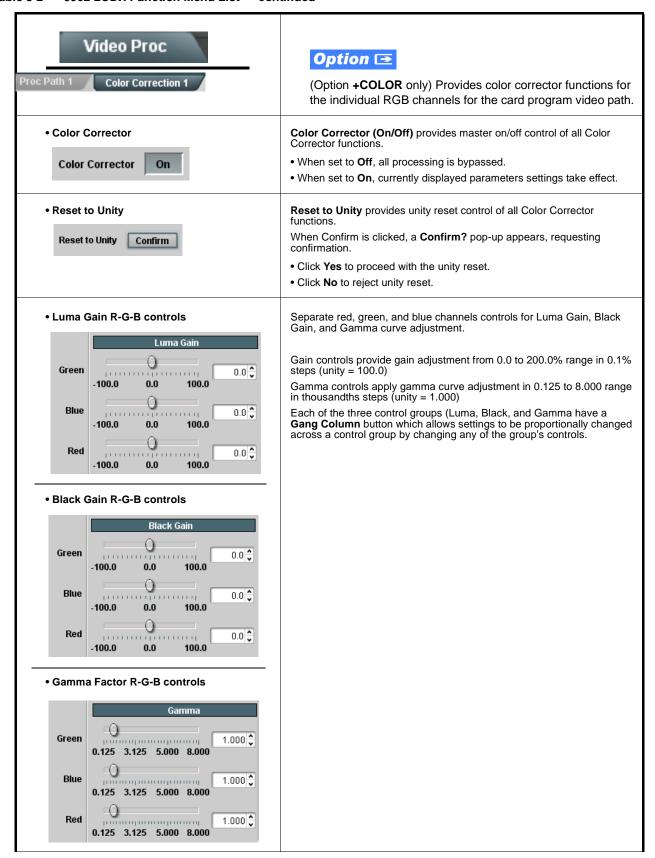


Table 3-2 9902-2UDX Function Menu List — continued

Video Proc Proc Path 1 Color Correction 1	(continued)
Black Hard Clip Black Hard Clip -6.8	Applies black hard clip (limiting) at specified percentage. (-6.8% to 50.0%; null = -6.8%)
White Hard Clip White Hard Clip 50.0	Applies white hard clip (limiting) at specified percentage. (50.0% to 109.1%; null = 109.1%)
White Soft Clip White Soft Clip 50.0	Applies white soft clip (limiting) at specified percentage. (50.0% to 109.1%; null = 109.1%)
Chroma Saturation Clip Chroma Saturation Clip 50.0	Applies chroma saturation clip (limiting) chroma saturation at specified percentage. (50.0% to 160.0%; null = 160.0%)

Table 3-2 9902-2UDX Function Menu List — continued



Provides an audio crosspoint allowing the audio source selection for each embedded audio output channel. Also provides Gain. Phase Invert. and Muting controls and peak level meters for each output channel.

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

- Embedded Ch 2 thru Embedded Ch 16 have controls identical to the Source, Gain, Mute, and Invert controls described here for Embedded Ch 1. Therefore, only the Embedded Ch 1 controls are shown here.
- · Although either path can embed from, and de-embed to, discrete audio interfaces, the embedded channels within a path can only be cross-routed embedded within the respective path's 4-group embedded audio (e.g., Path 1 Emb Ch 1 can not be sourced from Path 2 Emb Ch 1).

Group Enable/Disable Controls



Allows enable/disable of embedded audio groups 1 thru 4 on card program video output to accommodate some legacy downstream systems that may not support all four embedded audio groups.

Note: Changing the setting of this control will result in a noise burst in all groups. This control should not be manipulated when carrying on-air content.

Embedded Output Channel Source

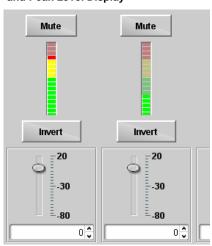


Using the drop-down list, selects the audio input source to be embedded in the corresponding embedded output channel from the following

- Card Audio Bus Ch 1 thru Ch 16
- Built-in Tone generators Tone n (-20 dBFS level tone generators with *n* being frequencies of 100, 200, 300, 400, 500, 600, 700, 800, 900, 1k, 2k, 4k, 6k, 8k, 12k, and 16k)
- Flex Bus A thru P mixer sum node outputs
- Option **I** Audio LTC
- Downmixer L
- Downmixer R
- embedding with option +ANC) Note: Embedded data pair is pair associated with

selected path only.

• Channel Mute/Phase Invert/Gain Controls and Peak Level Display



Provides Mute and phase Invert channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.)

Gain controls allow relative gain (in dB) control for the corresponding destination Embedded Audio Group channel.

(-80 to +20 dB range in 1.0 dB steps; unity = 0 dB)

Note: Although the 9902-2UDX 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.

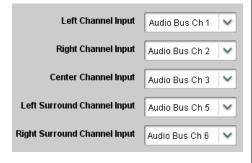


Provides audio down-mix audio routing selections that multiplexes any five audio channel sources into a stereo pair.

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

• Downmix L/R channel pair sources are available only within a respective path (e.g., Path 1 downmixed channels can only be sourced from Path 1).

Downmixer Source Controls



Left Channel Input thru **Right Surround Channel Input** select the five audio bus source channels to be used for the downmix.

Downmix channels **Downmixer L** and **Downmixer R** are available as sources for embedded, AES, or analog audio outputs using the Channel Source controls described above.

Center Mix Ratio Control



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.

- 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

(20 dB to -80 dB range in 0 dB steps; default = 0 dB)

Note: Default setting is recommended to maintain center-channel predominance in downmix representative to that of the original source 5-channel mix.

• Surround Mix Ratio Control



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.

- 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.

(20 dB to -80 dB range in 0 dB steps; default = 0 dB)

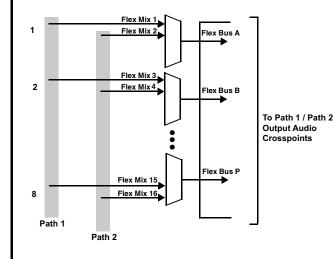
Note: Default setting is recommended to maintain surround-channel predominance in downmix representative to that of the original source 5-channel mix.

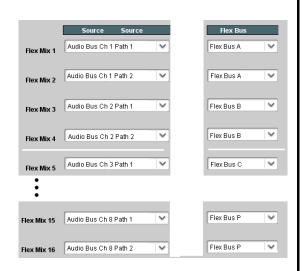
Table 3-2 9902-2UDX Function Menu List — continued



Output Flex Mix – Provides a 16-channel mixer in which each of the inputs can be mixed onto up to 16 independent output summing nodes. The input sources include audio bus channels from the card two embedded audio paths. Each input channel has independent gain and mute controls.

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





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

• Flex Bus Input Channel Source/Bus Assignment

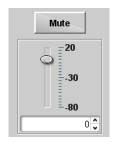
Flex Bus Flex Bus A Audio Bus Ch 1 Path 1

Using the **Source** drop-down list, selects the audio input source to be directed to the corresponding bus channel from the choices listed below.

- Silence
- Audio Bus Ch 1 thru Ch 16
- Tones (100 Hz thru 16 kHz)
- Downmix L or Downmix R

The ${\bf Flex}\ {\bf Bus}\ {\bf drop\text{-}down}\ {\bf selects}\ {\bf the}\ {\bf bus}\ ({\bf A}\ {\bf thru}\ {\bf P})\ {\bf to}\ {\bf which}\ {\bf the}\ {\bf input}\ {\bf is}\ {\bf assigned}\ {\bf to}.$

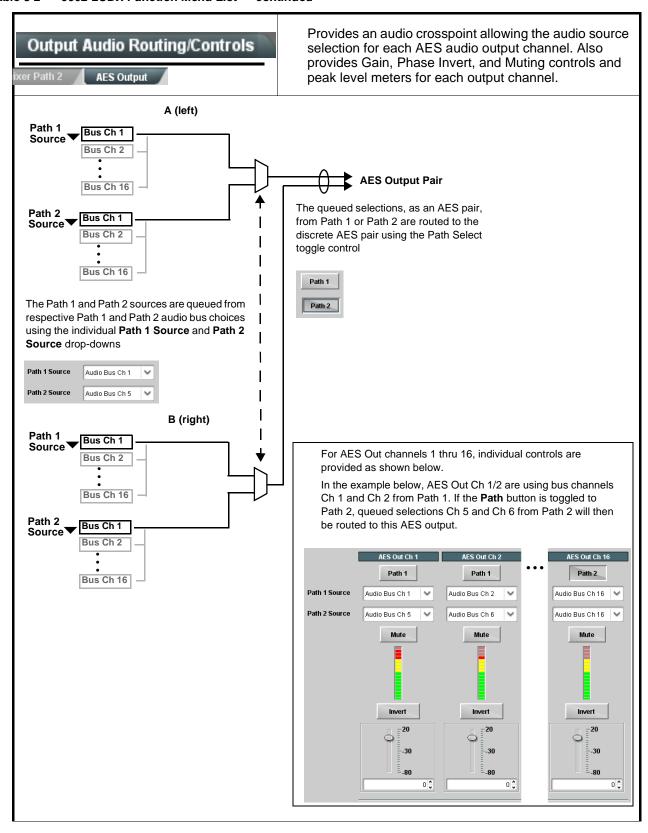
• Gain / Mute Control



Provides relative gain (in dB) control and a channel **Mute** checkbox.

(-80 to +20 dB range in 0.1 dB steps; unity = 0.0 dB)

Table 3-2 9902-2UDX Function Menu List — continued

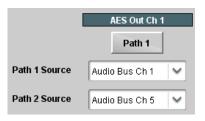


Output Audio Routing/Controls ixer Path 2 AES Output

(continued)

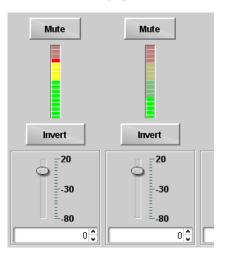
Note: • AES Out Ch 2 has controls identical to the Source, Gain, Mute, and Invert controls described here for AES Out Ch 1. Therefore, only the AES Out Ch 1 controls are shown here.

- For each channel, its source and destination should be considered and appropriately set. Unused destination channels should be set to the **Silence** selection.
- AES Output Channel Source



Using the **Source** drop-down list, selects the audio input source to be routed to the corresponding AES output channel from the following choices:

- Card Audio Bus Ch 1 thru Ch 16
- Built-in Tone generators Tone n
 (-20 dBFS level tone generators with n being frequencies of 100, 200, 300, 400, 500, 600, 700, 800, 900, 1k, 2k, 4k, 6k, 8k, 12k, and 16k)
- Flex Bus A thru P mixer sum node outputs
- Option **I** Audio LTC
- Downmixer L
- Downmixer R
- Channel Mute/Phase Invert/Gain Controls and Peak Level Display



Provides **Mute** and phase **Invert** channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.)

Gain controls allow relative gain (in dB) control for the corresponding destination AES output channel.

(-80 to +20 dB range in 1.0 dB steps; unity = 0 dB)

Note: Although the 9902-2UDX can pass non-PCM data such as Dolby $^{\mathbb{B}}$ E or AC-3, setting the gain control to any setting other than default 0 will corrupt Dolby data.

Table 3-2 9902-2UDX Function Menu List — continued

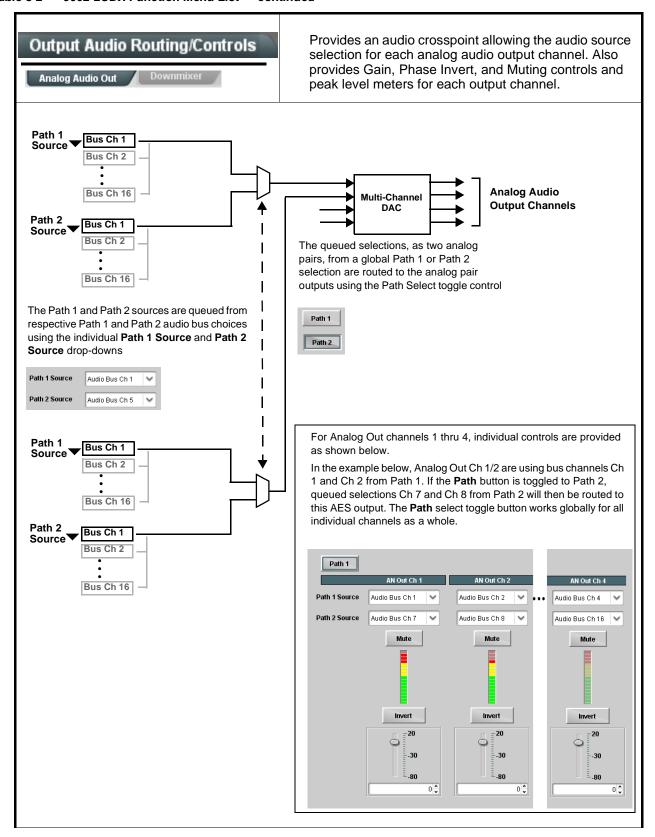


Table 3-2 9902-2UDX Function Menu List — continued

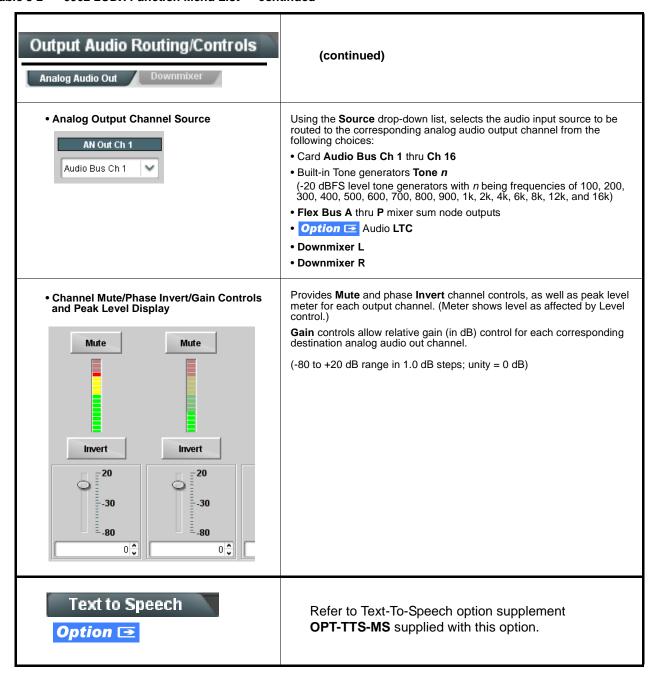


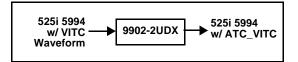
Table 3-2 9902-2UDX Function Menu List — continued



Provides timecode data extraction from various sources, and provides formatting and re-insertion controls for inserting the timecode into the output video.

- Note: Timecode tab has identical independent controls for both Path 1 and Path 2 using the Path 1 / Path 2 sub-tabs. Therefore, only the Path 1 controls are shown here. Set controls for other path using the respective sub-tab.
 - SMPTE embedded timecode controls and processing are correlated only to the path selected. Timecode data cannot be transferred from one path stream to another.

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.





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.



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.

In the example here, the line numbers are set to the

SD ATC VITC Insertion 13 - SMPTE 12M-2-2008 Recommended

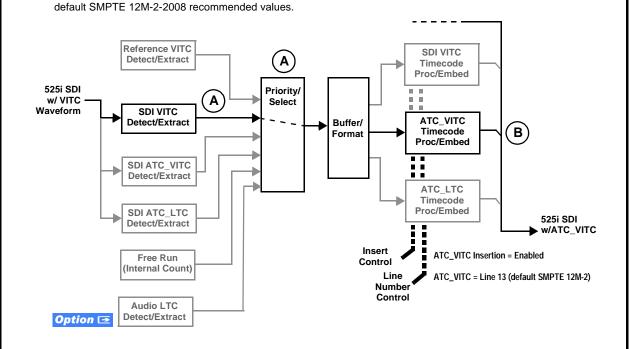


Table 3-2 9902-2UDX Function Menu List — continued

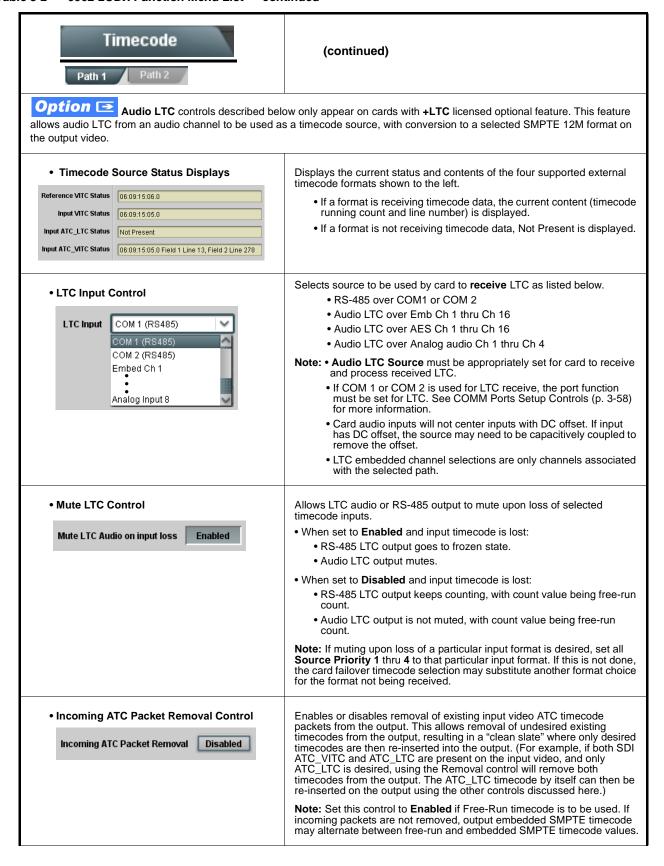


Table 3-2 9902-2UDX Function Menu List — continued

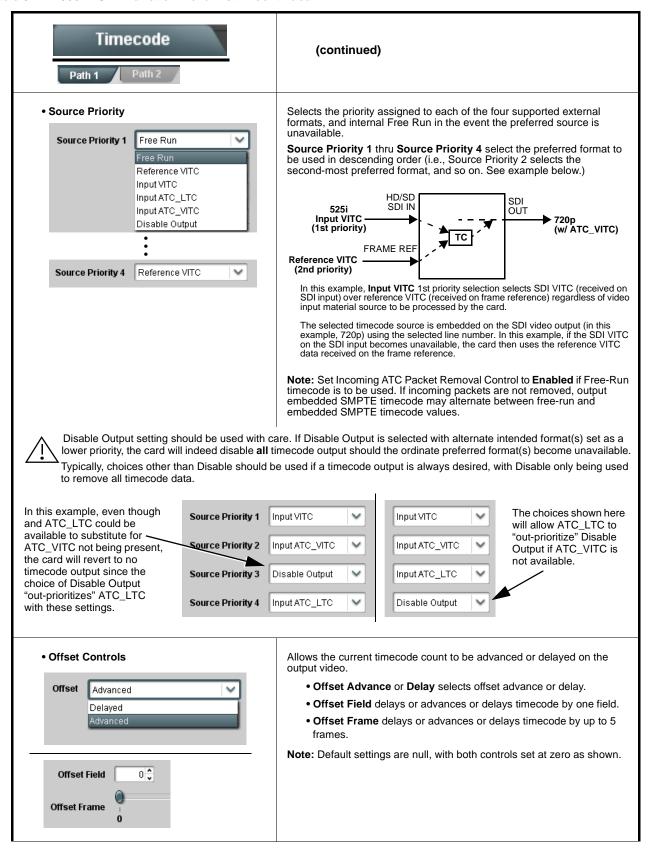


Table 3-2 9902-2UDX Function Menu List — continued

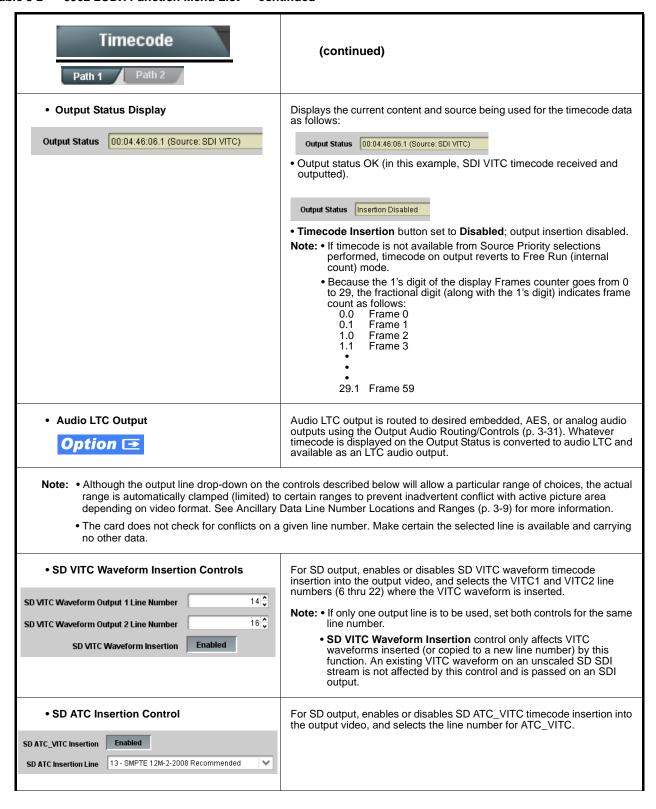
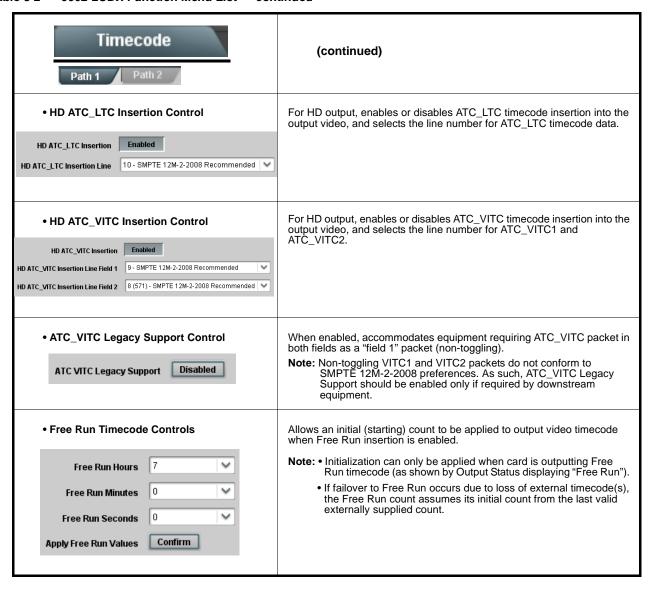


Table 3-2 9902-2UDX Function Menu List — continued



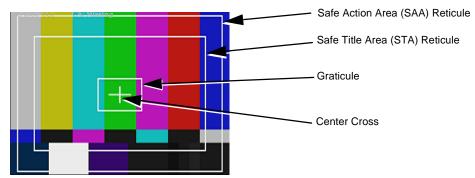


Allows Safe Action and/or Safe Title overlays and other static markers to be added to the output video image.

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

Typical Reticule/Overlay Marker Insertions

The 9902-2UDX allows any combination of the reticule/overlay markers to be applied to the output video. Sizing and other characteristics for each type of marker can be set as described below.



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

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

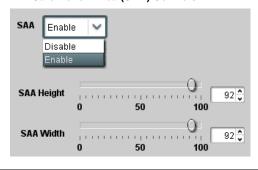
• Insertion Master Enable/Disable



Provides independent master enable/disable for card SDI and CVBS outputs.

- When enabled, any combination of reticules or other markers described below can be inserted.
- When disabled, insertion of all reticules or other markers is disabled.

• Safe Action Area (SAA) Controls



- SAA provides enable/disable of safe action area graticule insertion.
- SAA Height and SAA Width control height and width of insertion (from 0% to 100% of 4:3 outputted image area).

Note: Reticule Size control is locked to Custom for this card, with safe action area size control as described above.

Table 3-2 9902-2UDX Function Menu List — continued

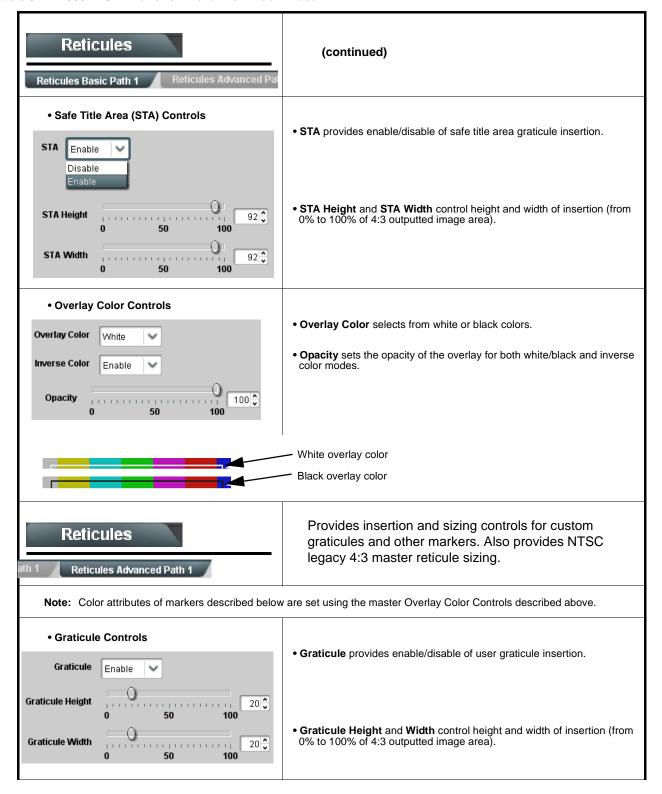


Table 3-2 9902-2UDX Function Menu List — continued

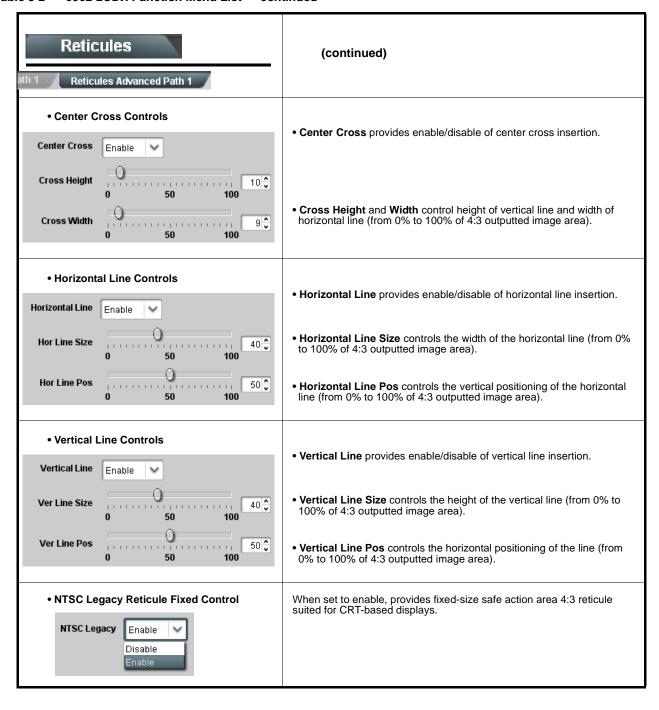


Table 3-2 9902-2UDX Function Menu List — continued

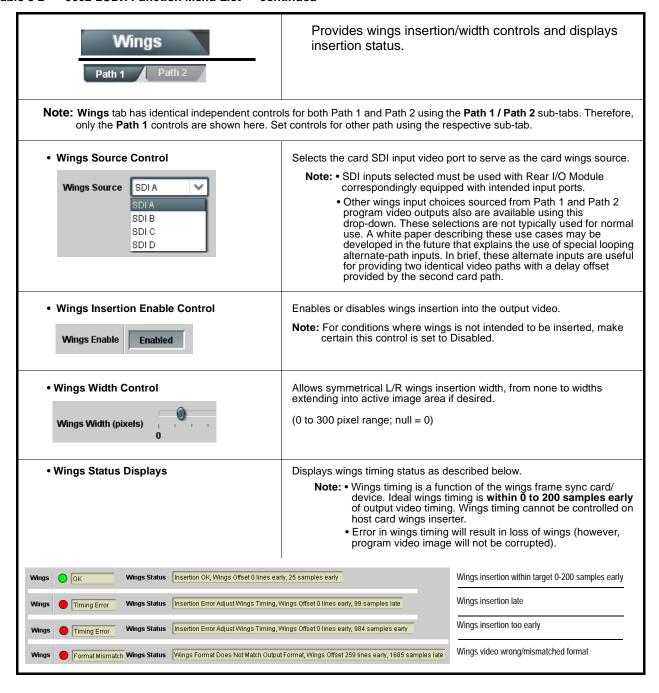


Table 3-2 9902-2UDX Function Menu List — continued

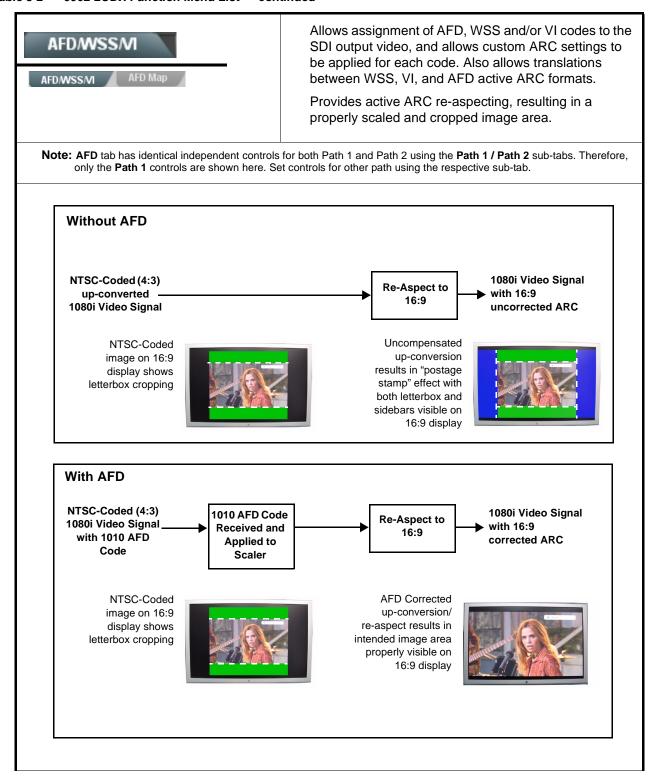


Table 3-2 9902-2UDX Function Menu List — continued

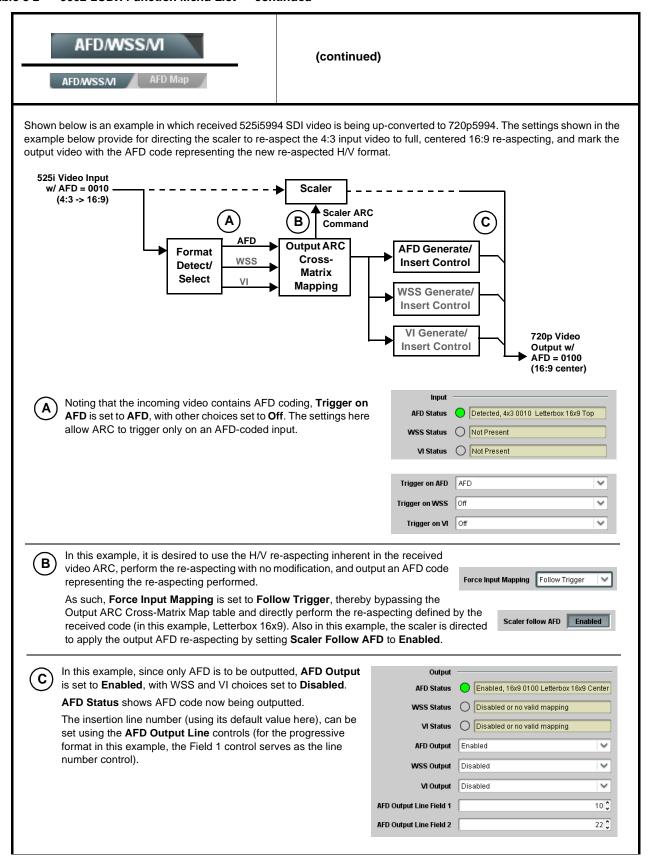


Table 3-2 9902-2UDX Function Menu List — continued

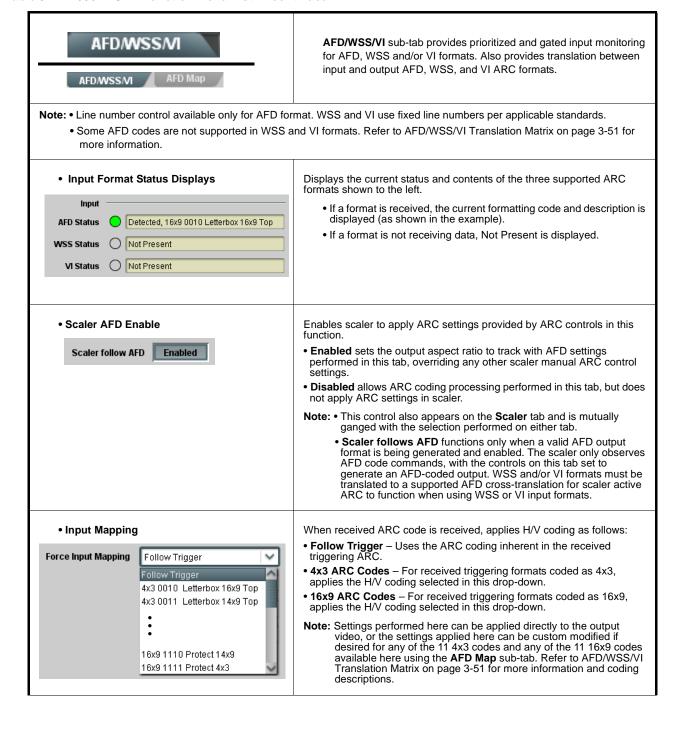


Table 3-2 9902-2UDX Function Menu List — continued

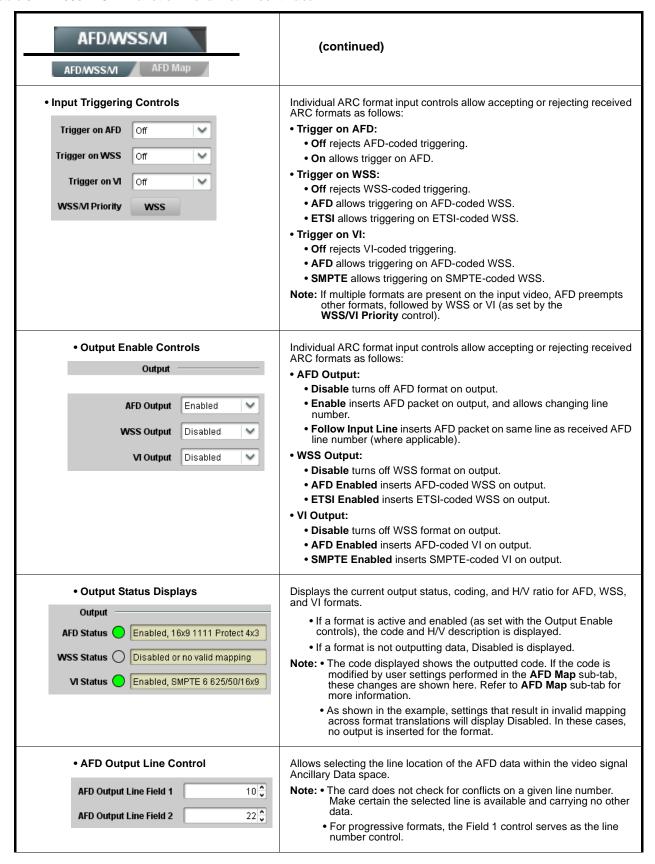


Table 3-2 9902-2UDX Function Menu List — continued



(continued)

AFD/WSS/VI Translation Matrix

The table below lists valid translations between WSS, VI, and SMPTE 2016 AFD codes for both 4x3 and 16x9-coded frames.

Input						Output				
	AFD	WSS ETSI 625	WSS ETSI 525	VI	Description	AFD	WSS ETSI 625	WSS ETSI 525	VI	Description
4:3 Coded	0010	4			4x3 Letterbox 16x9 Top	0010	4	0	1 (NTSC) 2 (PAL)	4x3 Letterbox 16x9 Top
	0011	2			4x3 Letterbox 14x9 Top	0011	2	0	1 (NTSC) 2 (PAL)	4x3 Letterbox 14x9 Top
	0100	5	2		4x3 Letterbox 16x9 Center	0100	5	2	1 (NTSC) 2 (PAL)	4x3 Letterbox 16x9 Center
	0101, 0110, 0111				Undefined					
	1000	0	0	0 1 (NTSC) 2 (PAL)	4x3 Coded Frame	1000	0	0	1 (NTSC) 2 (PAL)	4x3 Coded Frame
	1001				4x3 Center	1001	0	0	1 (NTSC) 2 (PAL)	4x3 Center
	1010	3			4x3 16x9 Center	1010	3	2	1 (NTSC) 2 (PAL)	4x3 16x9 Center
	1011	1			4x3 14x9 Center	1011	1	0	1 (NTSC) 2 (PAL)	4x3 14x9 Center
	1100			3, 4, 7	Reserved	1100		0	1 (NTSC) 2 (PAL)	Reserved
	1101	6			4x3 Protect 14x9	1101	6	0	1 (NTSC) 2 (PAL)	4x3 Protect 14x9
	1110				4x3 Letterbox 16x9; Protect 14x9 Center	1110		2	1 (NTSC) 2 (PAL)	4x3 Letterbox 16x9; Protect 14x9 Center
	1111				4x3 Letterbox 16x9; Protect 4x3 Center	1111		2	1 (NTSC) 2 (PAL)	4x3 Letterbox 16x9; Protect 4x3 Center
16:9 Coded	0010				16x9 Letterbox 16x9 Top	0010		1	5 (NTSC) 6 (PAL)	16x9 Letterbox 16x9 Top
	0011				16x9 Letterbox 14x9 Top	0011		1	5 (NTSC) 6 (PAL)	16x9 Letterbox 14x9 Top
	0100				16x9 Letterbox 16x9 Center	0100		1	5 (NTSC) 6 (PAL)	16x9 Letterbox 16x9 Center
	0101, 0110, 0111				Undefined					
	1000	7	1	0 5 (NTSC) 6 (PAL)	16x9 Coded Frame	1000	7	11	5 (NTSC) 6 (PAL)	16x9 Coded Frame
	1001				16x9 4x3 Center	1001		1	5 (NTSC) 6 (PAL)	16x9 4x3 Center
	1010				16x9 Center Protect 16x9	1010	7	1	5 (NTSC) 6 (PAL)	16x9 Center Protect 16x9
	1100				Reserved	1100		1	5 (NTSC) 6 (PAL)	Reserved
	1101				16x9 4x3 Protect 14x9	1101		1	5 (NTSC) 6 (PAL)	16x9 4x3 Protect 14x9
	1110				16x9 Protect 14x9	1110		1	5 (NTSC) 6 (PAL)	16x9 Protect 14x9
	1111				16x9 Protect 4x3	1111		1	5 (NTSC) 6 (PAL)	16x9 Protect 4x3

Note: Shaded cells indicate invalid translation which cannot be used.

Table 3-2 9902-2UDX Function Menu List — continued

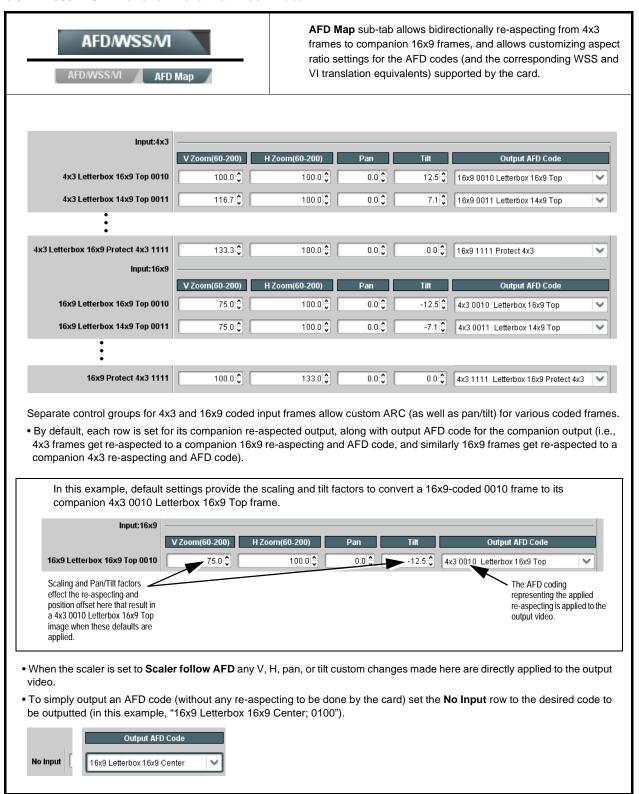


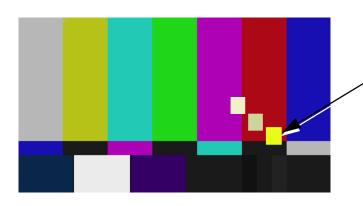
Table 3-2 9902-2UDX Function Menu List — continued



Provides a "moving box" graphic insertion (overlay) on the output video.

Moving-box insertion can serve as a dynamic raster confidence check even in cases where the input video image is static or lost.

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



Moving-box insertion provides dynamic display even on static video. Attributes such as box size, color, vertical movement speed, and horizontal movement speed are all user configurable.

Moving box can be set to insert continuously, or only upon loss of input.

Moving Box Insertion Controls

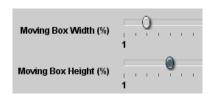


Selects the rules for moving-box overlay insertion into output video.

Note: If moving-box insertion is desired for input LOS conditions, the Framesync On Loss of Video control for the selected path must be set to provide a raster (from one of the choices shown) to support the moving-box insertion.

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. 3-16) for more information.

• Moving Box Size Controls



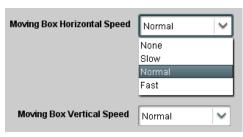
Sets size of box image burn-in as follows:

- Moving Box Width sets the width (as a percentage of maximum available raster width. (Range is 0% thru 40%)
- Moving Box Height sets the height (as a percentage of maximum available raster height. (Range is 0% thru 40%)

Note: • Moving box sizing for a given raster format may not be appropriate for another format (especially if transitioning from HD to SD). Set size and position for a balanced appearance that accommodates both HD and SD raster formats if multiple format use is required.

 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.

Moving Box Speed Controls



Sets speed of motion for moving box image burn-in as follows:

- Moving Box Horizontal Speed sets the X-axis speed from choices shown.
- Moving Box Vertical Speed sets the Y-axis speed from choices shown.

Table 3-2 9902-2UDX Function Menu List — continued

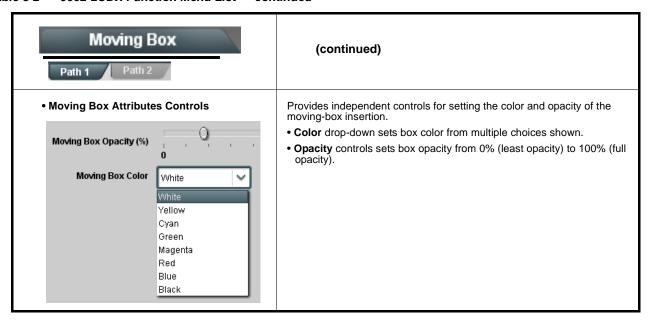


Table 3-2 9902-2UDX Function Menu List — continued

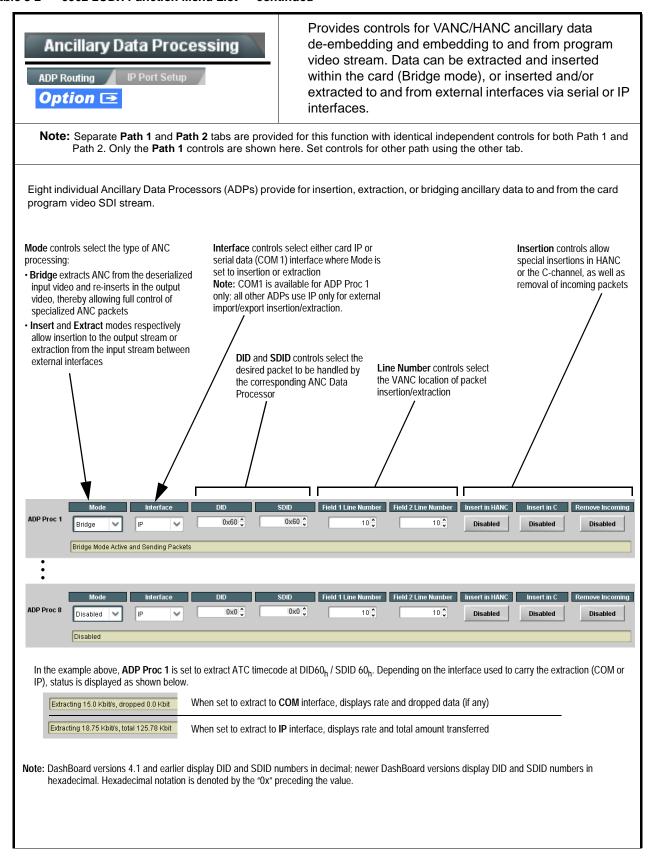


Table 3-2 9902-2UDX Function Menu List — continued

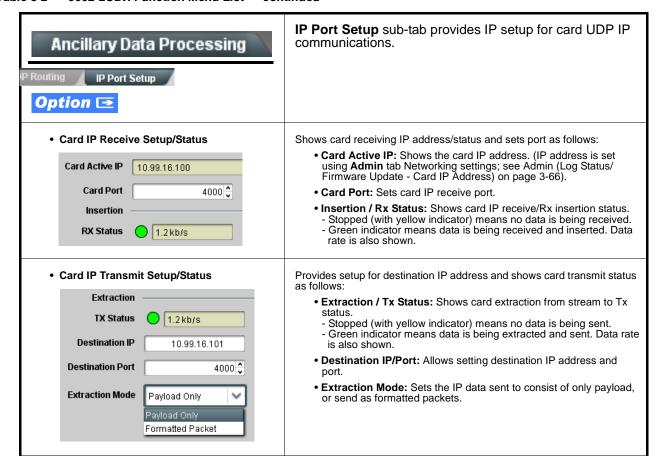
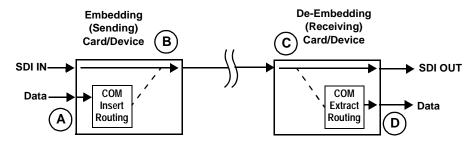


Table 3-2 9902-2UDX Function Menu List — continued



Data-Over-Audio sub-tab provides controls that allow SMPTE 337/338/339 non-PCM data to be embedded and de-embedded on embedded audio pairs, offering a very convenient self-contained transport within the program stream physical media.

Shown below is an example setup where serial data is embedded as SMPTE 337 non-PCM data on a sending embedded pair, and then extracted on a receiving pair and converted back to serial data using two cards/devices with the **+ANC** option.



- A The COM Routing tab and appropriate sub-tab is set to receive serial data, noting bit rate and parity settings to conform to the received serial data. (See COMM Ports Setup Controls (p. 3-58))
- B The received serial data is then directed to an embedded audio output channel pair by setting a pair to Embedded Data using the Output Audio Routing/Controls tab (in this example, Emb pair 7/8).



The embedded data pair on the receiving end is then selected using the De-Embed Source select drop-down on the **Data-Over-Audio Setup** sub-tab (in this example, Emb Pair 4 (channels 7/8) as correspondingly set on the sending card).



D On the **COM Routing** tab, select Audio Data Extractor to extract and route the received SMPTE 337 data to the desired COM port, noting bit rate, protocol, and parity settings. (See COMM Ports Setup Controls (p. 3-58))



When data is successfully being de-embedded, the status display shows green and indicates the bit rate (bit rate is bit rate configured on sending end; typically SMPTE 337 data transfer is much faster than serial)



Notes: • Embedded channel pair selected must be a standard boundary pair (e.g., 1/2, 3/4 and so on).

SMPTE 337/338/339 embedded pair carrying non-PCM data here is marked as "Non-PCM Data Unknown". Any intermediate devices between
the Cobalt sending card/device and the Cobalt receiving card/device will transfer this data intact, as long as these devices can transfer in a
bit-accurate manner. Most devices capable of carrying Dolby® streams are capable of this. However, any intermediate devices must have
functions such as PCM level controls and SRC disabled.

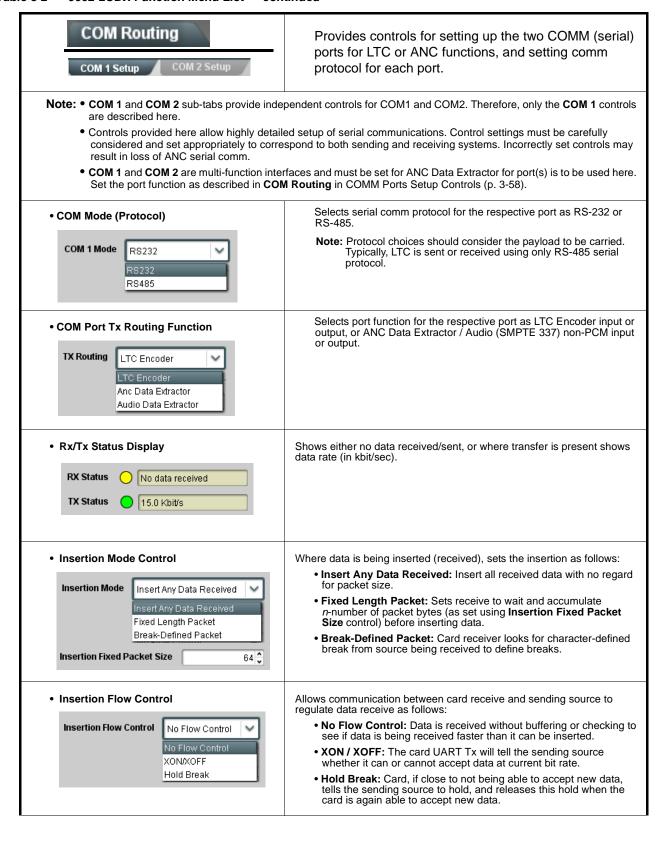
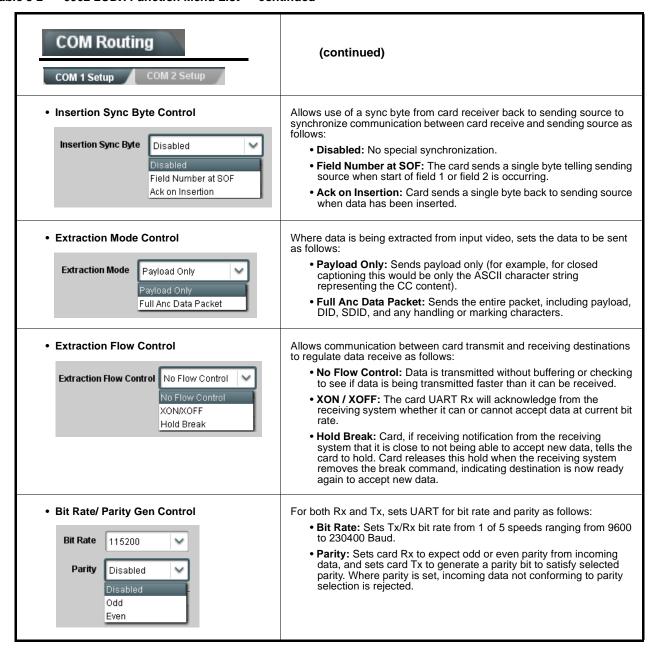


Table 3-2 9902-2UDX Function Menu List — continued



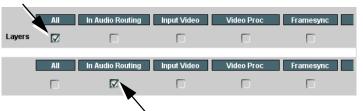
Presets

Allows user control settings to be saved in a Preset and then loaded (recalled) as desired, and provides a one-button restore of factory default settings.

Preset Layer Select

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

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

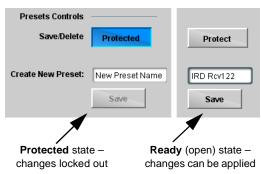


Selecting a layer (in the example, "In Audio Routing") will set the preset to **only** "look at" and "touch" audio routing settings and save these settings under the preset. When the preset is loaded (recalled), the card will only "touch" the audio routing layer.

Example: Since EAS audio routing can be considered independent of video proc settings, if normal audio routing was set up with a particular

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.

Preset Enter/Save/Delete



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

- Protect (ready): This state awaits Protected and allows preset Save/ Delete button to save or delete current card settings to the selected preset. Use this setting when writing or editing a preset.
- Protected: Toggle to this setting to lock down all presets from being inadvertently re-saved or deleted. Use this setting when all presets are as intended.
- Create New Preset: Field for entering user-defined name for the preset being saved (in this example, "IRD Rcv122").
- Save: Saves the current card settings under the preset name defined above.

Preset Save/Load Controls



- Select Preset: drop-down allows a preset saved above to be selected to be loaded or deleted (in this example, custom preset "IRD Rcv122").
- Load Selected Preset button allows loading (recalling) the selected preset. When this button is pressed, the changes called out in the preset are immediately applied.
- Delete Selected Preset button deletes the currently selected preset.
- Load Factory Defaults button allows loading (recalling) the factory default preset. When this button is pressed, the changes called out in the preset are immediately applied.

Note: Load Factory Defaults functions with no masking. The Preset Layer Select controls have no effect on this control and will reset all layers to factory default.

 Download Presets saving the preset files to a folder on the connected computer.

Table 3-2 9902-2UDX Function Menu List — continued

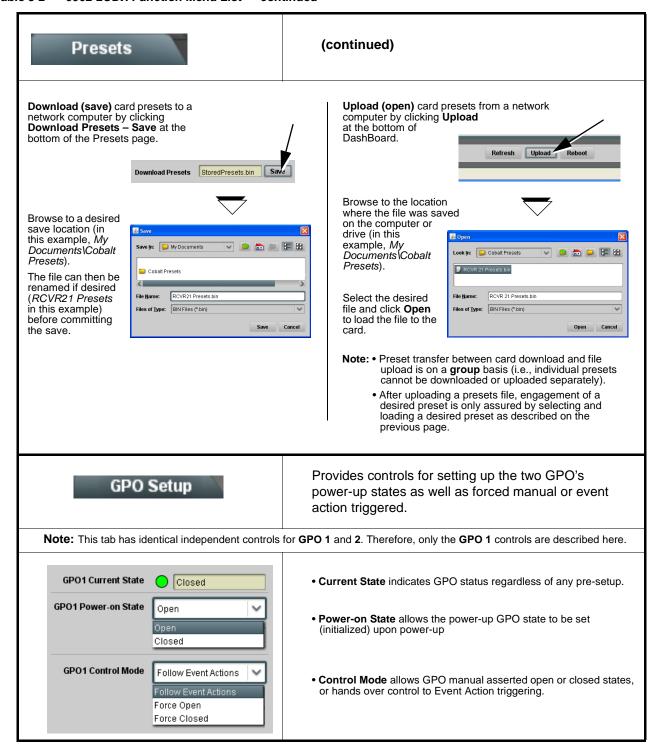


Table 3-2 9902-2UDX Function Menu List — continued



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



- Event based preset loading is not passive and can result in very significant and unexpected card control and signal processing changes if not properly used. If event based presets are not to be used, make certain the **Event Based Loading** button is set to **Disabled**.
- Because event based preset loading can apply card control changes by invoking presets, loading conditions cannot be
 nested within a called preset (event-based loading settings performed here cannot be saved to presets, although the
 settings are persistent across power cycles).

Event triggers allow a variety of event screening criteria, and in turn provide an Event Action "go to" in response to the detected event(s). For each screened criteria, categories can be set as "Don't Care" or set to specific criteria to broaden or concentrate on various areas of concern.

- The Event-Based Loading button serves as a master enable/disable for the function.
- Go-to **Event Action:** can be user-defined presets, "canned" (hard-coded) selections (such as GPO triggers or routing changes), or automated E-mail alert to a respondent (see Email Alerts (p. 3-65) 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. In addition to events screened for and triggered here, each Event can be set to trigger from Alarms detected on the Alarms page (see Alarms Setup Controls (p. 3-69)). Engage Mode (True/False) allows triggering on an inverse of a condition.
- 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.
- Some columns in the DashBoard Event Setup table are present only when certain options are installed (for example, Video Quality column appears only with option +QC).

Event Definers

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



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



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

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

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



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").



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 invokes a GPO event. Both Events 1 and 3 have corresponding go-to actions to resume normal operation when the event ceases.



- **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.
 - 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 9902-2UDX Function Menu List — continued

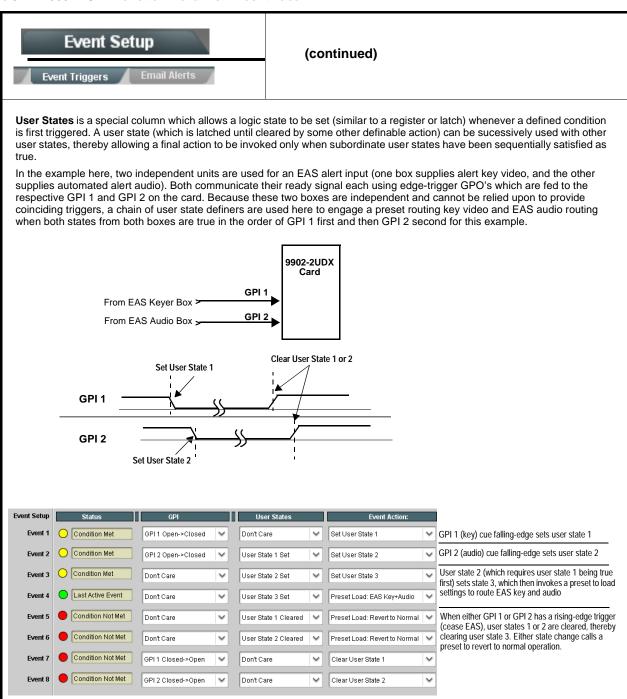


Table 3-2 9902-2UDX Function Menu List — continued

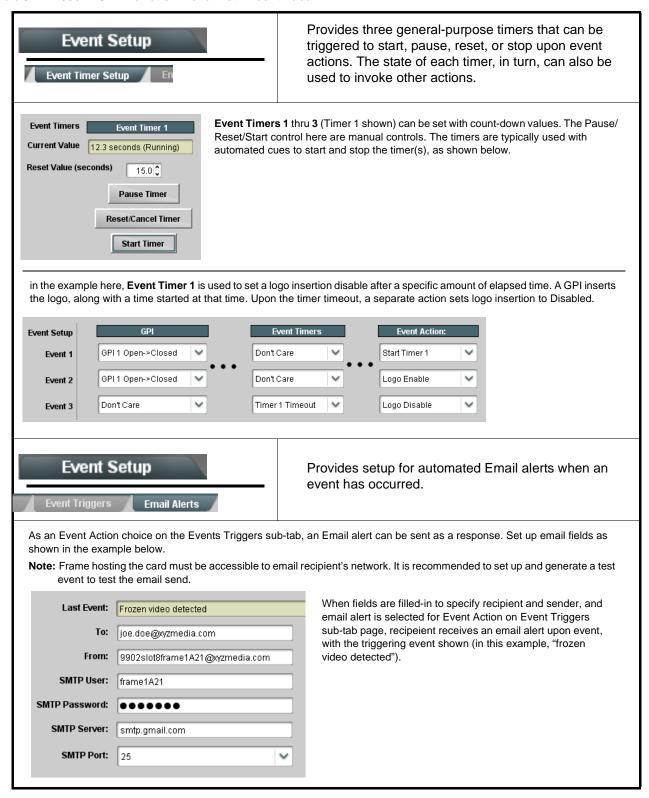


Table 3-2 9902-2UDX Function Menu List — continued

Provides a global card operating status and allows a Admin log download for factory engineering support. Also provides controls for selecting and loading card firmware upgrade files, and for setting the card comm IP address. Card DashBoard Name Control Allows card name In DashBoard to be changed as desired. Click return to engage change. Append to Product Name appends (or adds to) existing OEM **Display Name** name (for example, "9902-2UDX Processing 1A"). • Replace Product Name completely replaces the OEM name OEM Display Name Mode Append to Product Name name (for example, "Processing 1A"). Append to Product Name Note: DashBoard instance(s) may have to be refreshed before Replace Product Name name change appears. • Log Status and Download Controls • Log Status indicates overall card internal operating status. • Download Log File allows a card operational log file to be saved to Log Status Card OK 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. **Download Log File** 9902-UDX.tar.gz Save • Delete Log File deletes the currently displayed log file. A second confirmation dialog is displayed to back out of the delete if desired. **Delete Log File** Confirm • Thermal Shutdown enable/disable allows the built-in thermal failover to be defeated. (Thermal shutdown is enabled by default). Thermal Shutdown Disable CAUTION The 9902-2UDX 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.

Table 3-2 9902-2UDX Function Menu List — continued

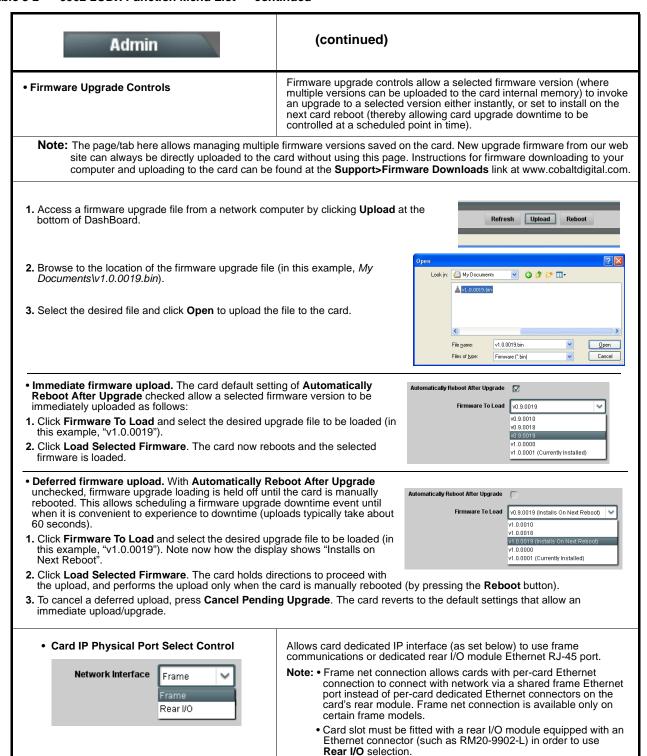


Table 3-2 9902-2UDX Function Menu List — continued

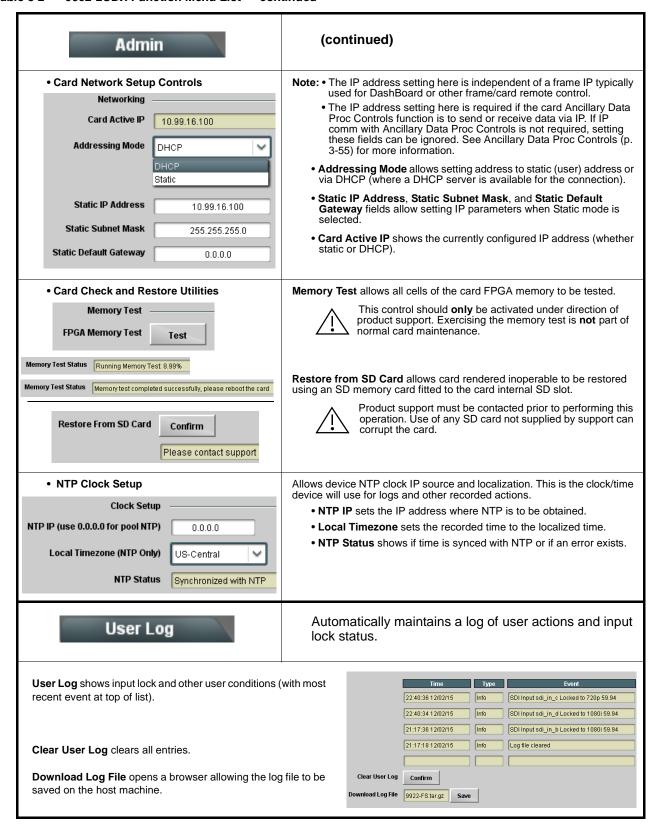


Table 3-2 9902-2UDX Function Menu List — continued

Alarms

Provides controls for setting up controls which screen for and propagate input program video alarms for video, audio, and ancillary data defect 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 defect conditions (as described and shown below)

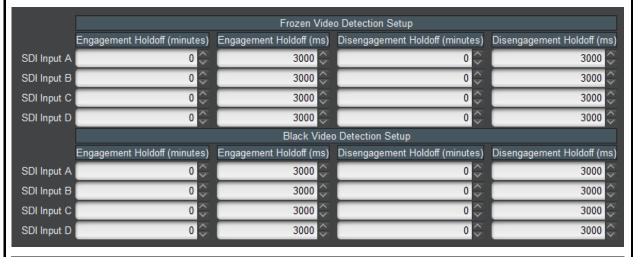
Video Alarm Setup Ancillary Data Alarm Setup Logging
Video Path 1 Audio Path 2 Audio Ancillary Data

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.



Audio Alarm Setup



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.

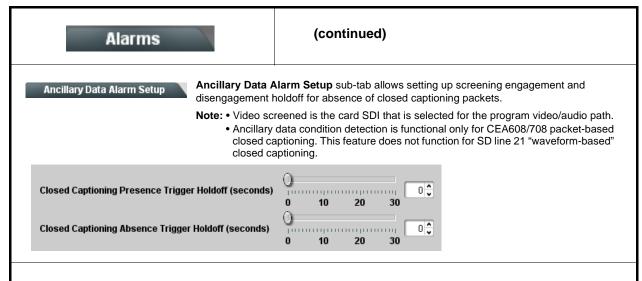
- Levels above the Failover Threshold are considered normal.
- Levels **below** the Failover Threshold (and exceeding the holdoff) are considered below normal.

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 9902-2UDX Function Menu List — continued



Alarm Propagation Tabs

Video, Audio, and Ancillary Data sub-tabs set alarm propagation attributes, including:

- · 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

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.

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.

- 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 Occurence shows details for each triggered alarm event.



Note: The Log, Alarm, Severity, and Duration/Last Occurrence columns appear on the other alarm sub-tabs and function identically as described here.

Table 3-2 9902-2UDX Function Menu List — continued

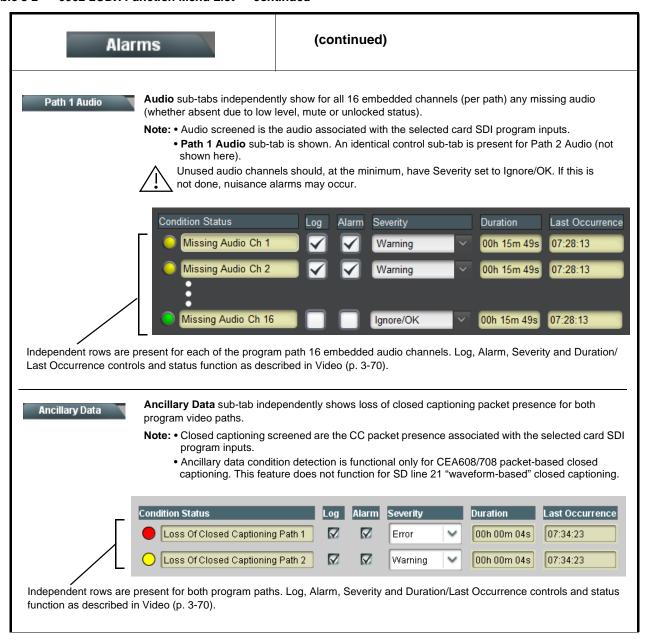
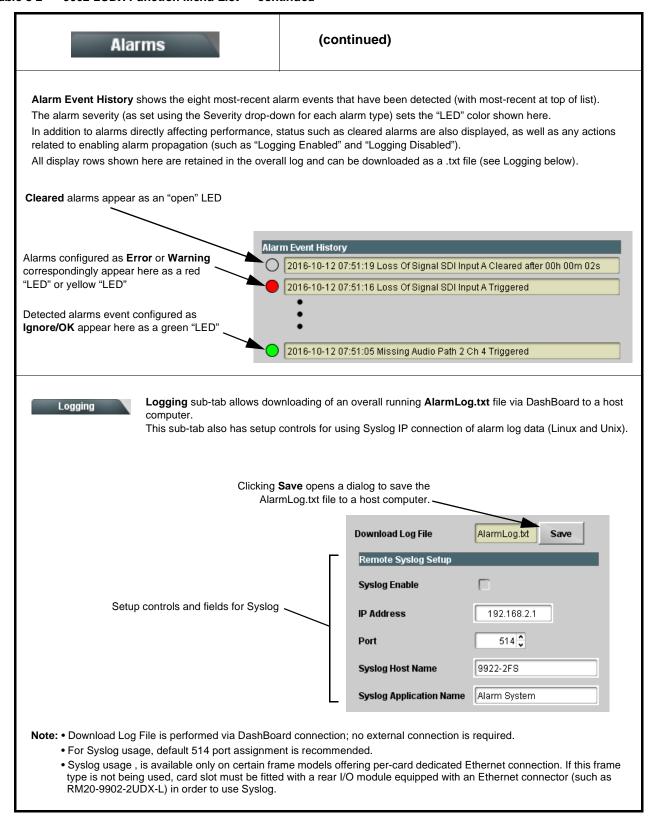


Table 3-2 9902-2UDX Function Menu List — continued



This section provides general troubleshooting information and specific symptom/corrective action for the 9902-2UDX card and its remote control interface. The 9902-2UDX 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 9902-2UDX card itself and its remote control systems all (to varying degrees) provide error and failure indications. Depending on how the 9902-2UDX card is being used (i.e, standalone or network controlled through DashBoardTM or a Remote Control Panel), check all available indications in the event of an error or failure condition.

The various 9902-2UDX 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. 3-77)
- 9902-2UDX Processing Error Troubleshooting (p. 3-78)
- Troubleshooting Network/Remote Control Errors (p. 3-79)

9902-2UDX Card Edge Status/Error Indicators and Display

Figure 3-7 shows and describes the 9902-2UDX 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.

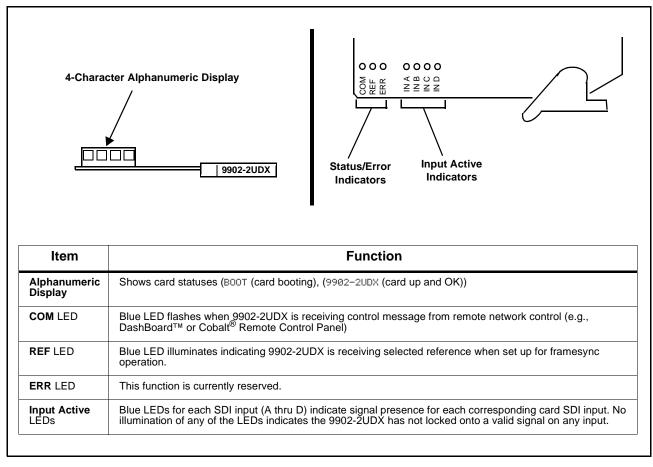


Figure 3-7 9902-2UDX Card Edge Status Indicators and Display

DashBoard™ Status/Error Indicators and Displays

Figure 3-8 shows and describes the DashBoardTM status indicators and displays. These indicator icons and displays show status and error conditions relating to the 9902-2UDX card itself and remote (network) communications.

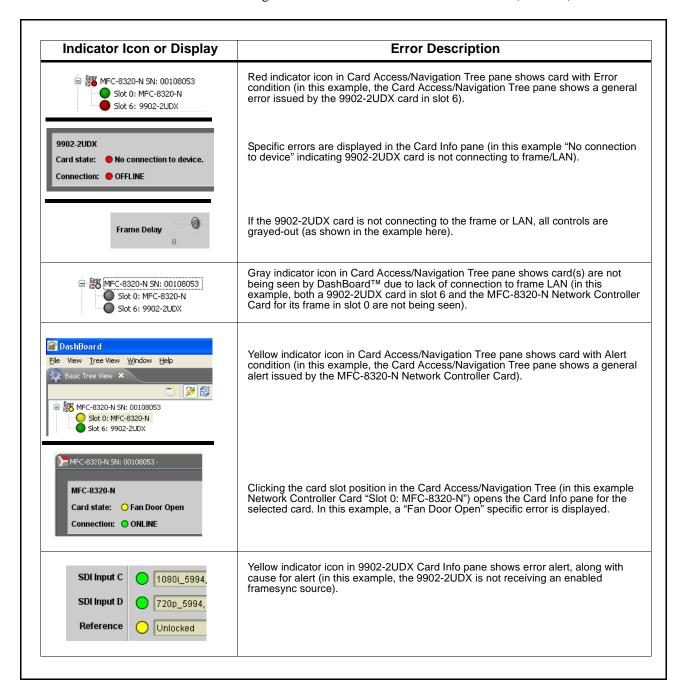


Figure 3-8 DashBoard™ Status Indicator Icons and Displays

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).

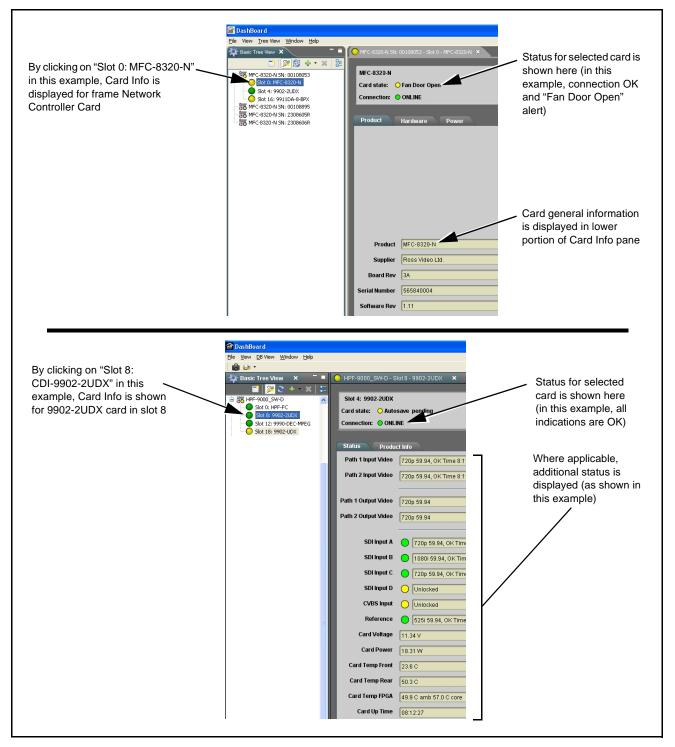


Figure 3-9 Selecting Specific Cards for Card Info Status Display

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	 On both the frame Network Controller Card and the 9902-2UDX, 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 9902-2UDX card. This can be observed using the DashBoard™ Card Info pane. If display shows no power being consumed, either the frame power supply, connections, or the 9902-2UDX card itself is defective. 		
	 If display shows excessive power being consumed (see Technical Specifications (p. 1-15) in Chapter 1, "Introduction"), the 9902-2UDX 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 9902-2UDX 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.		

9902-2UDX Processing Error Troubleshooting

Table 3-4 provides 9902-2UDX processing troubleshooting information. If the 9902-2UDX 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 9902-2UDX 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 9902-2UDX card edge status indicators.

Note:

Where errors are displayed on both the 9902-2UDX card and network remote controls, the respective indicators and displays are individually described in this section.

Table 3-4 Troubleshooting Processing Errors by Symptom

Symptom	Error/Condition	Corrective Action	
DashBoard™ shows Unlocked message in 9902-2UDX Card Info pane SDI Input A Unlocked SDI Input B Unlocked Card edge Input LED corresponding to input is not illuminated	No video input present	Make certain intended video source is connected to appropriate 9902-2UDX 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	Control(s) not enabled	Make certain respective control is set to On or Enabled (as appropriate).	
through 9902-2UDX	VANC line number conflict between two or more ancillary data items	Make certain each ancillary data item to be passed is assigned a unique line number (see Ancillary Data Line Number Locations and Ranges on page 3-9).	
(Option +QC only) 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.	
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.	

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.	
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.	
SD closed captioning waveform or character rendering is corrupted	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, 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.	
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 (Presets 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 Presets (p. 3-60) for more information.	
Card will not retain user settings, or setting changes or presets spontaneously invoke.	Event Based Loading sub-tab inadvertently set to trigger on event	If event based loading is not to be used, make certain Event Based Presets is disabled (either using master Enable/Disable control or through events settings. See Presets (p. 3-60) for more information.	

Troubleshooting Network/Remote Control Errors

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

In Case of Problems

Recovering Card From SD Memory Card

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

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

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

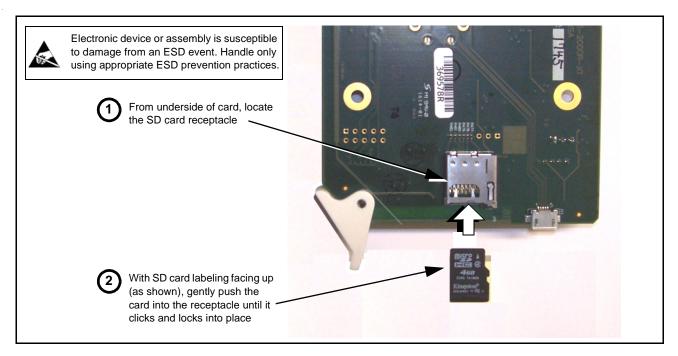


Figure 3-10 SD Card Installation

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

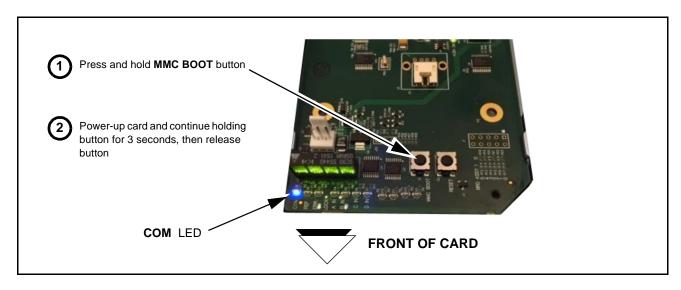


Figure 3-11 MMC Boot Button

- **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. 1-22) in Chapter 1, "Introduction" for contact information.

Cobalt Digital Inc.



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

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