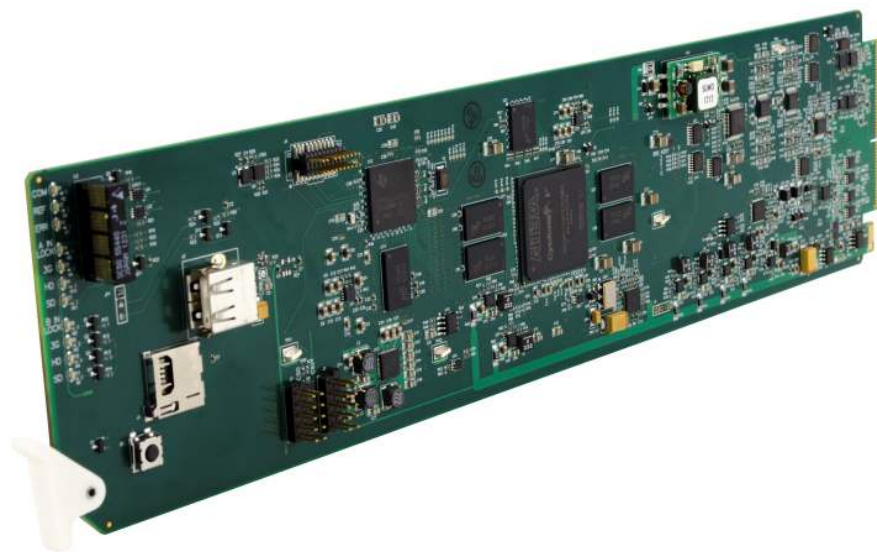

COBALT[®]

9902-2UDX-DI



**3G/HD/SD-SDI Dual-Channel De-interlacing
Up-Down-Cross Converter / Frame Sync**
Product Manual

COBALT[®]

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

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Introduction

Overview

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

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

This chapter contains the following information:

- **9902-2UDX-DI Card Software Versions and this Manual (p. 1-2)**
- **Manual Conventions (p. 1-3)**
- **Safety and Regulatory Summary (p. 1-5)**
- **9902-2UDX-DI Functional Description (p. 1-6)**
- **Technical Specifications (p. 1-16)**
- **Warranty and Service Information (p. 1-19)**
- **Contact Cobalt Digital Inc. (p. 1-20)**

9902-2UDX-DI Card Software Versions and this Manual

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

The Software Version of your card can be checked by viewing the **Card Info** menu in DashBoard™. See Checking 9902-2UDX-DI Card Information (p. 3-8) in Chapter 3, “Operating Instructions” for more information. You can then check our website for the latest software version currently released for the card as described below.

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

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

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

Cobalt Reference Guides

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

Manual Conventions

In this manual, display messages and connectors are shown using the exact name shown on the 9902-2UDX-DI 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-DI** refers to the 9902-2UDX-DI 3G/HD/SD-SDI Dual-Channel De-interlacing Up-Down-Cross Converter / Frame Sync card.
- **Frame** refers to the HPF-9000, oGx, OG3-FR, 8321, or similar 20-slot frame that houses Cobalt® or other cards.
- **Device** and/or **Card** refers to a Cobalt® or other card.
- **System** and/or **Video System** refers to the mix of interconnected production and terminal equipment in which the 9902-2UDX-DI 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.

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.

Warnings, Cautions, and Notes

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

Warnings

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




Cautions

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

Notes

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

Labeling Symbol Definitions

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

Safety and Regulatory Summary

Warnings

! WARNING !

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

Cautions

CAUTION

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

CAUTION

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

CAUTION

Heat and power distribution requirements within a frame may dictate specific slot placement of cards. Cards with many heat-producing components should be arranged to avoid areas of excess heat build-up, particularly in frames using only convection cooling. The 9902-2UDX-DI 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-DI 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-DI 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-DI Functional Description

Figure 1-1 shows a functional block diagram of the 9902-2UDX-DI. The 9902-2UDX-DI 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-DI also includes AES de-embedding. Using a basic signal presence input failover function, the card inputs can be set to failover to an alternate input source in cases of signal loss. Frame sync function can provide test patterns that can be enabled to serve as a confidence check even in cases where the input video image is lost.

The 9902-2UDX-DI 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-DI Input/Output Formats

The 9902-2UDX-DI 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.
- **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).

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.

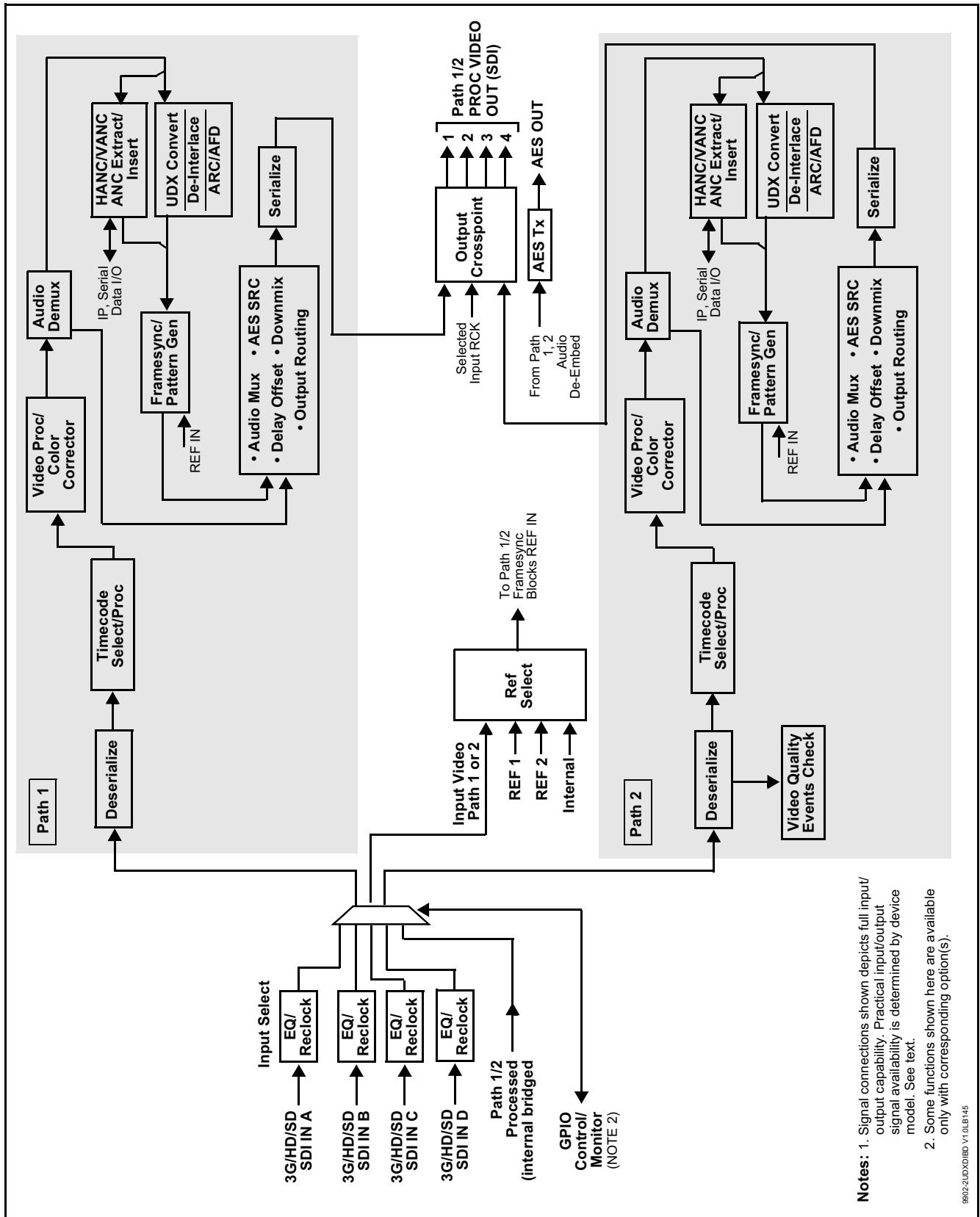


Figure 1-1 9902-2UDX-DI Functional Block Diagram

Video Processor Description

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

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

Input Video Select

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. This function also allows processed outputs from one path to be routed to the alternate path input.

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

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 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.

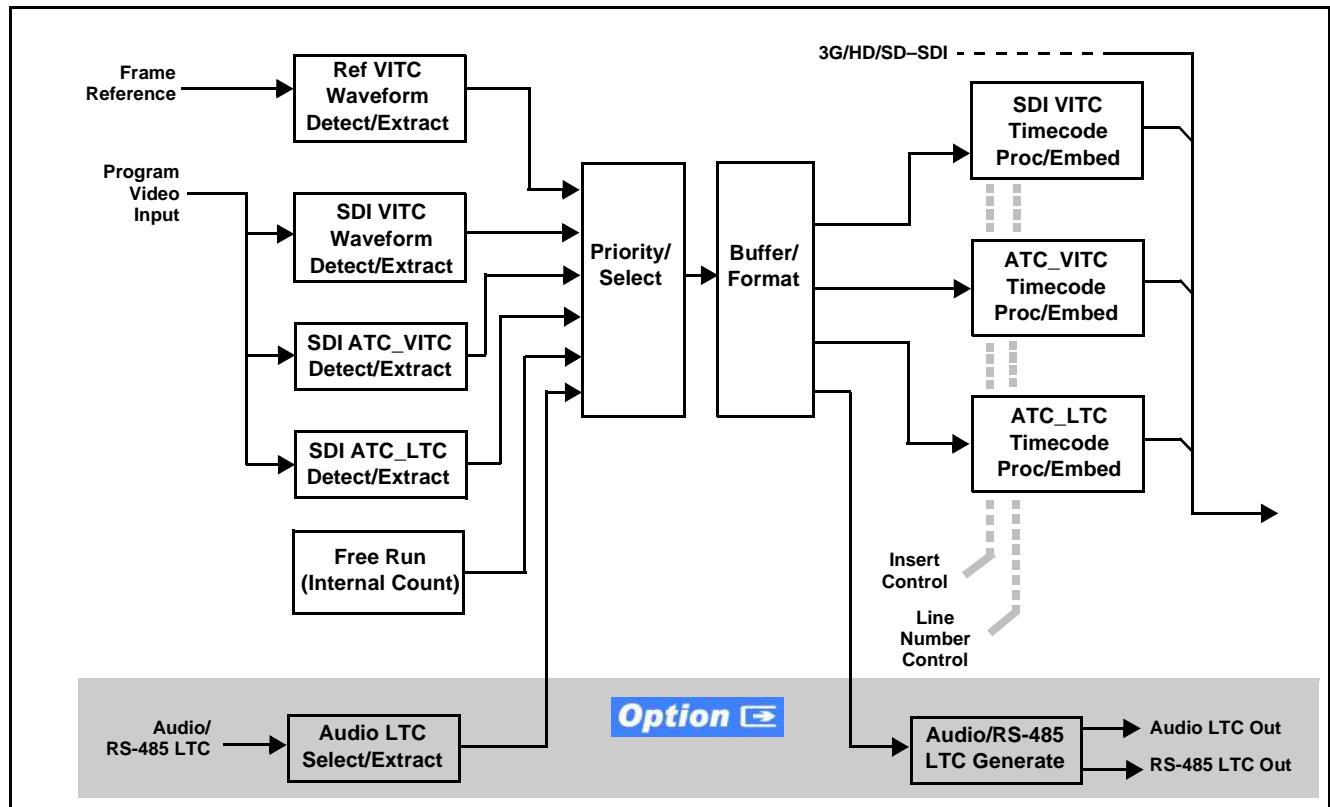


Figure 1-2 Timecode Processor

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. Both paths have independent de-interlacers which can for auto or manual enable. De-interlacing, when converting an interlaced input to a progressive output, can reduce the chance of artifacts or jittering when, for example, content consists of fast-motion paused scenes.

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.

The scaler provides special modes that allow de-interlacing to be bypassed in certain cases to reduce processing latency (default mode auto-detects interlaced program and performs de-interlace). Also provided are selections to optimize 3:2 pulldown conversion where timecode or other timing references can be relied upon to indicate frame transitions.

Color Corrector

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.

Ancillary Data Processor

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**).

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 de-embed can be allocated individually to any or either path's embed or de-embed nodes.

The audio processor operates as an internal audio router. This function chooses from 16 channels of embedded audio from the SDI video input from either path (default 1-to-1 routing to SDI output)

The audio processing subsection is built around a card internal 16-channel audio bus for each path. This 16-channel bus receives inputs from an input routing crosspoint that routes de-embedded 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 audio outputs.

An Input Audio Status display shows the presence and peak level of each input audio channel received by the card. Payload is identified (PCM or data such as Dolby® Digital or E). As such, the audio subsection provides a full crosspoint between all supported audio inputs and output 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.

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 1-3.) 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).

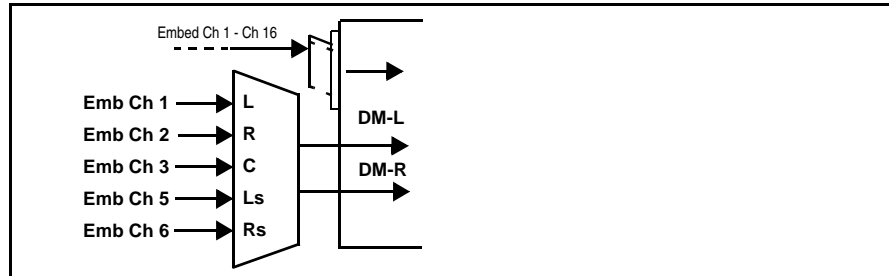


Figure 1-3 Audio Down Mix Functional Block Diagram with Example Sources

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.

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-DI 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-422 non-duplexed Tx or Rx.

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, and closed captioning ancillary data loss. 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 1-4 shows the user control interface options for the 9902-2UDX-DI. 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-DI and other cards installed in openGear®¹ frames can be controlled from a computer and monitor.

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

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

- **Cobalt® OGCP-9000 and OGCP-9000/CC Remote Control Panels** – The OGCP-9000 and OGCP-9000/CC Remote Control Panels conveniently and intuitively provide parameter monitor and control of the 9902-2UDX-DI and other video and audio processing terminal equipment meeting the open-architecture Cobalt® cards for openGear™ standard.

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

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

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

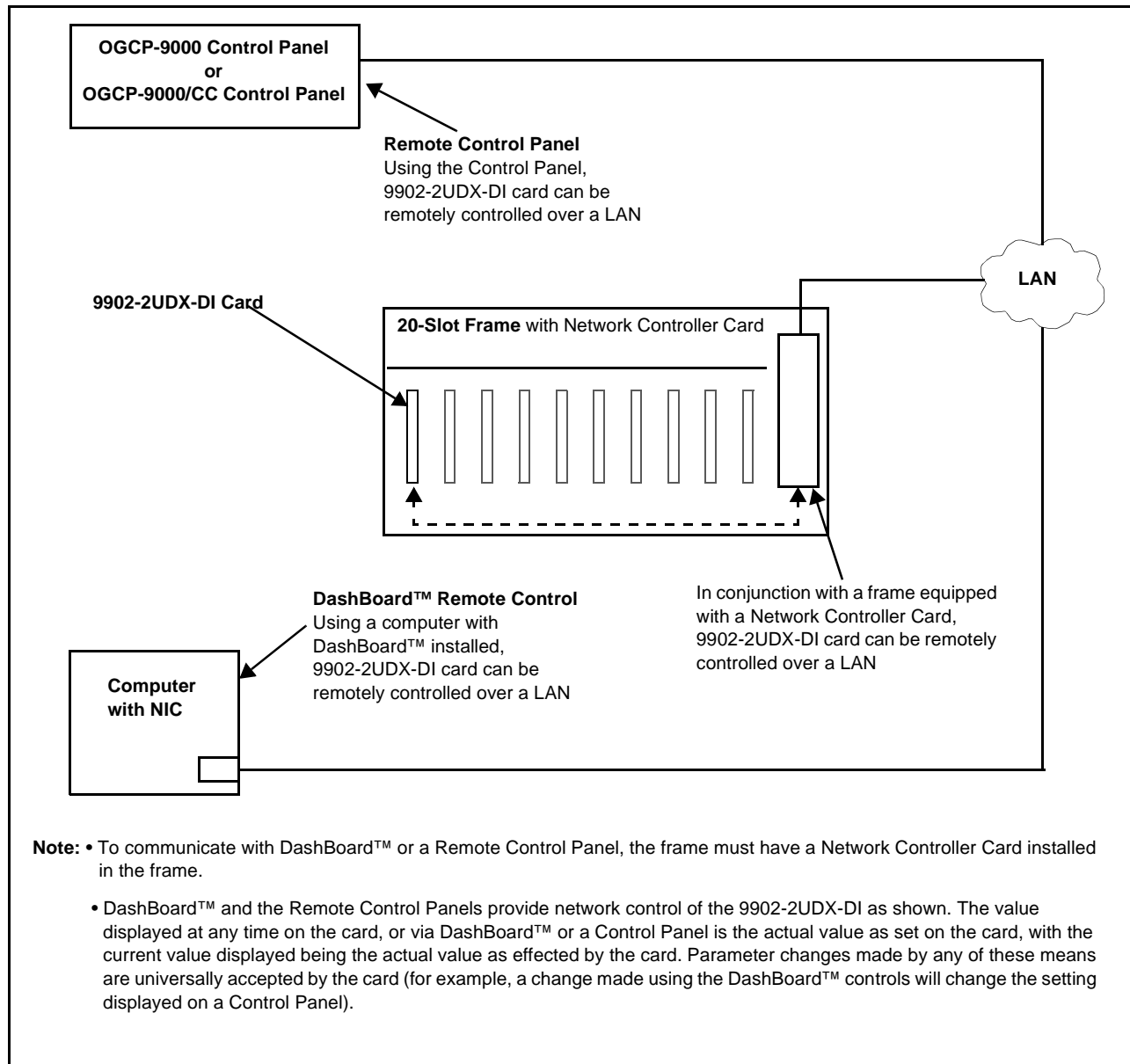


Figure 1-4 9902-2UDX-DI User Control Interface

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

Download a copy of this guide by clicking on the **Support>Reference Documents** link at www.cobaltdigital.com and then select Dashboard Remote Control Setup Guide as a download, or contact Cobalt® as listed in Contact Cobalt Digital Inc. (p. 1-20).

9902-2UDX-DI Rear I/O Modules

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

The full assortment of 9902-2UDX-DI Rear I/O Modules is shown and described in 9902-2UDX-DI 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-DI 3G/HD/SD-SDI Dual-Channel De-interlacing Up-Down-Cross Converter / Frame Sync card.

Table 1-1 Technical Specifications

Item	Characteristic
Part number, nomenclature	9902-2UDX-DI 3G/HD/SD-SDI Dual-Channel De-interlacing Up-Down-Cross Converter / Frame Sync
Installation/usage environment	Intended for installation and usage in frame meeting openGear™ modular system definition
Power consumption	< 18 Watts maximum
Installation Density	Up to 20 cards per 20-slot frame
Environmental: Operating temperature: Relative humidity (operating or storage):	32° – 104° F (0° – 40° C) < 95%, non-condensing
Frame communication	10/100/1000 Mbps Ethernet with Auto-MDIX
Indicators	Card edge display and indicators as follows: <ul style="list-style-type: none"> • 4-character alphanumeric display • Status/Error LED indicator • Input Presence LED indicators
Serial Digital Video Input	Number of Inputs: Up to (4), with manual select or failover to alternate input Data Rates Supported: SMPTE 424M, 292M, SMPTE 259M-C

Table 1-1 Technical Specifications — continued

Item	Characteristic
Serial Digital Video Input (cont.)	Impedance: 75 Ω terminating Return Loss: > 15 dB up to 1.485 GHz > 10 dB up to 2.970 GHz
Post-Processor Serial Digital Video Outputs	Number of Outputs: Four 3G/HD/SD-SDI BNC Impedance: 75 Ω Return Loss: > 15 dB at 5 MHz – 270 MHz Signal Level: 800 mV \pm 10% DC Offset: 0 V \pm 50 mV Jitter (3G/HD/SD): < 0.3/0.2/0.2 UI Minimum Latency (frame sync disabled): SD: 127 pixels; 9.4 μ s 720p: 330 pixels; 4.45 μ s 1080i: 271 pixels; 3.65 μ s 1080p: 361 pixels; 2.43 μ s
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

Table 1-1 Technical Specifications — continued

Item	Characteristic
Frame Reference Input	Number of Inputs: Two, REF 1 and REF 2 from frame with selectable failover Standards Supported: SMPTE 170M/318M (“black burst”) SMPTE 274M/296M (“tri-level”) Return Loss: > 35 dB up to 5.75 MHz
GPIO	(2) GPI; (2) GPO; opto-isolated GPO Specifications: Max I: 120 mA Max V: 30 V Max P: 120 mW GPI Specifications: GPI LO @ $V_{in} < 1.5\text{ V}$ GPI HI @ $V_{in} > 2.3\text{ V}$ Max V_{in} : 9 V

Warranty and Service Information

Cobalt Digital Inc. Limited Warranty

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

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

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

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Installation and Setup

Overview

This chapter contains the following information:

- Installing the 9902-2UDX-DI Into a Frame Slot (p. 2-1)
- Installing a Rear I/O Module (p. 2-3)
- Setting Up 9902-2UDX-DI Network Remote Control (p. 2-9)

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

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

- Note:**
- The 9902-2UDX-DI BNC inputs are internally 75-ohm terminated. It is not necessary to terminate unused BNC inputs or outputs.
 - External frame sync reference signals are received by the card over a reference bus on the card frame, and not on any card rear I/O module connectors. The frame has BNC connectors labeled **REF 1** and **REF 2** which receive the reference signal from an external source such as a house distribution.
 - To remove a card, press down on the ejector tab to unseat the card from the rear I/O module mating connector. Evenly draw the card from its slot.
10. If network remote control is to be used for the frame and the frame has not yet been set up for remote control, perform setup in accordance with Setting Up 9902-2UDX-DI Network Remote Control (p. 2-9).

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-DI is to be installed.
If installing the 9902-2UDX-DI 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-DI 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.

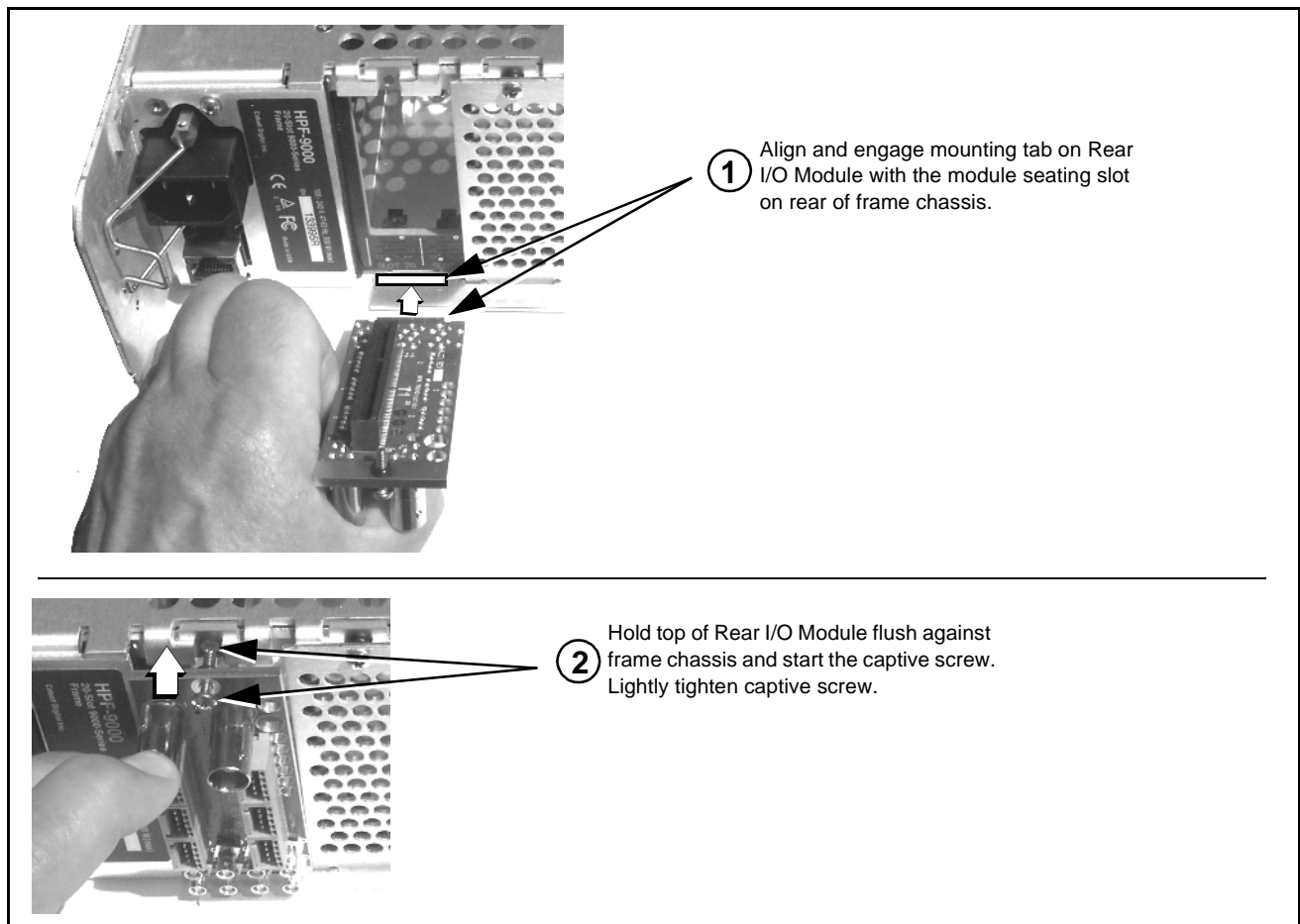


Figure 2-1 Rear I/O Module Installation

9902-2UDX-DI 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-DI.

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-DI Rear I/O Modules

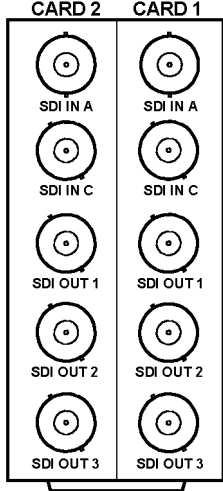
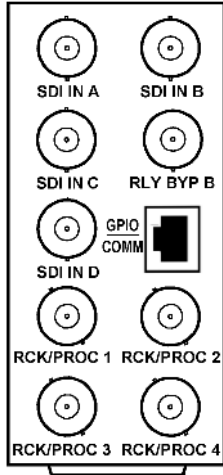
9902-2UDX-DI Rear I/O Module	Description
<p>Note: Some Rear I/O Modules shown below are equipped with connectors for signals not supported by this card (such as multi-wire balanced audio connections, CVBS I/O, and AES IN). These Rear I/O Modules can be used with the card, however unsupported connections are N/C when used with this card.</p>	
<p>RM20-9902-2UDX-A/S</p> 	<p>Split Rear Module. Provides each of the following connections for two 9902-2UDX cards:</p> <ul style="list-style-type: none"> • Two 3G/HD/SD-SDI coaxial input BNCs (SDI IN A and SDI IN C) • Three 3G/HD/SD-SDI Video Out BNCs (SDI OUT 1 thru SDI OUT 3)
<p>RM20-9902-2UDX-C</p>  <p>Note: RCK/PROC 1 thru RCK/PROC 4 are DA outputs which can be individually set as reclocked or processed outputs of the currently-selected input.</p> <p>RLY BYP B is a relay-protected path which carries processed SDI out under normal conditions and passive routes SDI IN B to this BNC upon loss of power.</p>	<p>Provides the following connections:</p> <ul style="list-style-type: none"> • Four 3G/HD/SD-SDI video input BNCs (SDI IN A thru SDI IN D) • Four 3G/HD/SD-SDI video output BNCs (RCK/PROC 1 thru RCK/PROC 4; each GUI selectable as processed out, selected-input reclocked, or wings/key-fill preview where available) • One relay-protected SDI processed output BNC (RLY BYP B; outputs a copy of SDI OUT 1 under normal conditions, or passive outputs the SDI input on SDI IN B as a relay failover if card power is lost) • COMM/GPIO RJ-45 connector <p>Note: Refer to GPIO, Serial (COMM) Connections (p. 2-9) for connector pinouts and important information regarding GPO electrical limits.</p>

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

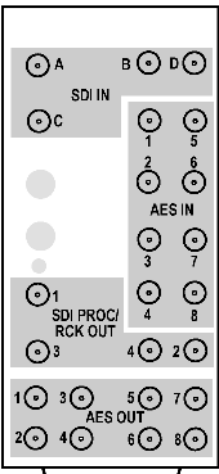
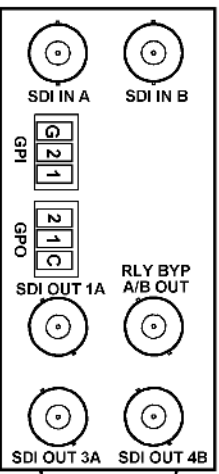
9902-2UDX-DI Rear I/O Module	Description
<p>RM20-9902-2UDX-E</p> 	<p>Provides the following connections:</p> <ul style="list-style-type: none"> • Four 3G/HD/SD-SDI video inputs (SDI IN A thru SDI IN D)• • Four 3G/HD/SD-SDI video outputs; selectable as processed or input reclocked out (SDI PROC/RCK OUT 1 thru SDI PROC/RCK OUT 4) • Eight AES audio outputs (AES OUT 1 thru AES OUT 8) • (AES IN 1 thru AES IN 8 are N/C) <p>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.</p>
<p>RM20-9902-2UDX-F</p> 	<p>Provides the following connections:</p> <ul style="list-style-type: none"> • Two 3G/HD/SD-SDI video input BNCs (SDI IN A and SDI IN B) • Three 3G/HD/SD-SDI video output BNCs (SDI OUT 1A thru SDI OUT 4B; each GUI selectable as selected-input reclocked or processed out) • One relay-protected SDI processed output BNC (RLY BYP A/B OUT) • Two opto-isolated GPI inputs (terminals GPI 1-G and GPI 2-G) • Two opto-coupled GPO (GPO 1/G and GPO 2/G) <p>Note: Refer to GPIO, Serial (COMM) Connections (p. 2-9) for connector pinouts and important information regarding GPO electrical limits.</p>

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

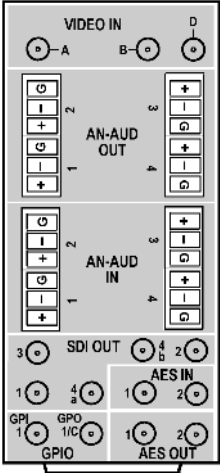
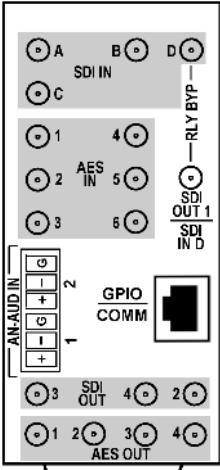
9902-2UDX-DI Rear I/O Module	Description
<p>RM20-9902-2UDX-H</p>  <p>Note: Refer to GPIO, Serial (COMM) Connections (p. 2-9) for connector pinouts and important information regarding GPO electrical limits.</p>	<p>Provides the following connections:</p> <ul style="list-style-type: none"> • Two 3G/HD/SD-SDI video input BNCs (SDI IN A, SDI IN B, and SDI IN D) • 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) • 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) <p>• (AES IN 1 and AES IN 2 are N/C) • (AN-AUD IN 1 thru AN-AUD IN 4 are N/C) • (AN-AUD OUT 1 thru AN-AUD OUT 4 are N/C)</p> <p>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.</p>
<p>RM20-9902-2UDX-K</p> 	<p>Provides the following connections:</p> <ul style="list-style-type: none"> • Four 3G/HD/SD-SDI video inputs (SDI IN A thru SDI IN D; IN D-to-OUT 1 as passive RLY bypass) • Four 3G/HD/SD-SDI video outputs (SDI OUT 1 thru SDI OUT 4) • Four AES audio outputs (AES OUT 1 thru AES OUT 4) • COMM/GPIO RJ-45 connector <p>• (AES IN 1 thru AES IN 6 are N/C) • (AN-AUD IN 1 and AN-AUD IN 2 are N/C)</p> <p>Note: • Refer to GPIO, Serial (COMM) Connections (p. 2-9) for connector pinouts and important information regarding 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.</p>

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

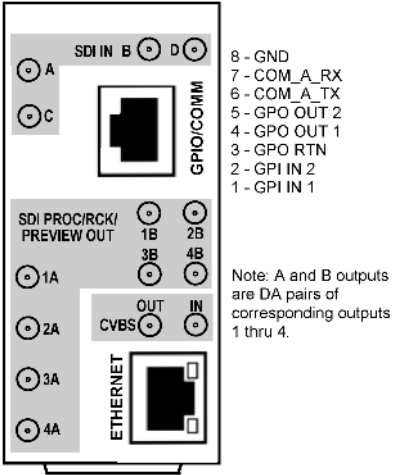
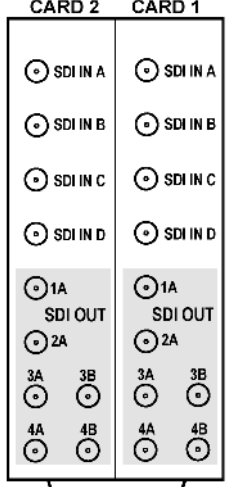
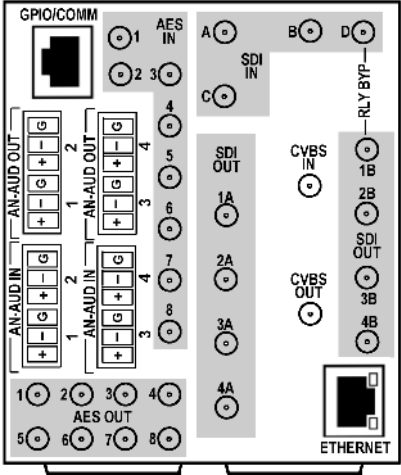
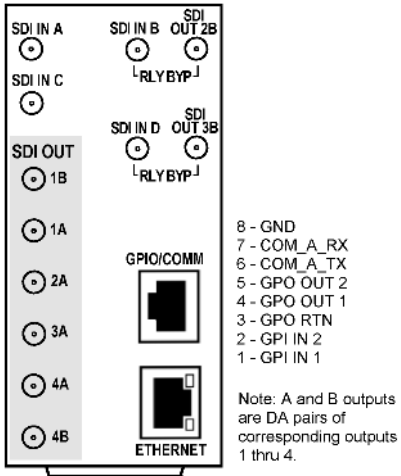
9902-2UDX-DI Rear I/O Module	Description
<p>RM20-9902-2UDX-L</p>  <p>8 - GND 7 - COM_A_RX 6 - COM_A_TX 5 - GPO OUT 2 4 - GPO OUT 1 3 - GPO RTN 2 - GPI IN 2 1 - GPI IN 1</p> <p>Note: A and B outputs are DA pairs of corresponding outputs 1 thru 4.</p>	<p>Provides the following connections:</p> <ul style="list-style-type: none"> • Four 3G/HD/SD-SDI video inputs (SDI IN A thru SDI IN D) • Eight 3G/HD/SD-SDI video outputs (SDI OUT 1A thru SDI OUT 4B; 1x2 DA output of each crosspoint output) • COMM/GPIO RJ-45 connector • ETHERNET 100/1000 BaseT Ethernet connector • (CVBS IN is N/C) • (CVBS OUT is N/C) <p>Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9902-2UDX-L-HDBNC or RM20-9902-2UDX-L-DIN, respectively.</p>
<p>RM20-9902-2UDX-M/S</p>  <p>CARD 2 CARD 1</p>	<p>Split Rear Module. Provides each of the following connections for two 9902-2UDX cards:</p> <ul style="list-style-type: none"> • Four 3G/HD/SD-SDI coaxial input BNCs (SDI IN A and SDI IN D) • Six 3G/HD/SD-SDI Video Out BNCs (SDI OUT 1A thru SDI OUT 4B) <p>Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9902-2UDX-M/S-HDBNC or RM20-9902-2UDX-M/S-DIN, respectively.</p>

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

9902-2UDX-DI Rear I/O Module	Description
<p>RM20-9902-2UDX-N</p> 	<p>Double-width rear modules provides the following connections:</p> <ul style="list-style-type: none"> • Four 3G/HD/SD-SDI video inputs (SDI IN A thru SDI IN D) • Four 3G/HD/SD-SDI video outputs (SDI OUT 1B thru SDI OUT 4B (OUT 1B with relay bypass protect)) • Eight AES audio outputs (AES OUT 1 thru AES OUT 8) • COMM/GPIO RJ-45 connector • ETHERNET 100/1000 BaseT Ethernet connector <ul style="list-style-type: none"> • (CVBS IN is N/C) • (AN-AUD IN 1 thru AN-AUD IN 4 are N/C) • (AES IN 1 thru AES IN 8 are N/C) • (CVBS OUT is N/C) • (AN-AUD OUT 1 thru AN-AUD OUT 4 are N/C) <p>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.</p>
<p>RM20-9902-2UDX-P</p>  <p>8 - GND 7 - COM_A_RX 6 - COM_A_TX 5 - GPO OUT 2 4 - GPO OUT 1 3 - GPO RTN 2 - GPI IN 2 1 - GPI IN 1</p> <p>Note: A and B outputs are DA pairs of corresponding outputs 1 thru 4.</p>	<p>Provides the following connections:</p> <ul style="list-style-type: none"> • Two 3G/HD/SD-SDI video input BNCs (SDI IN A and SDI IN 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) <p>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.</p> <p>Note: Refer to GPIO, Serial (COMM) Connections (p. 2-9) for connector pinouts and important information regarding GPO electrical limits.</p>

GPIO, Serial (COMM) Connections

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

Note: It is preferable to wire connections to plugs oriented as shown in Figure 2-2 rather than assessing orientation on rear module connectors. Note that the orientation of rear module 3-wire 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-DI Network Remote Control

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

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

Download a copy of this guide by clicking on the **Support>Reference Documents** link at www.cobaltdigital.com and then select DashBoard Remote Control Setup Guide as a download, or contact Cobalt® as listed in Contact Cobalt Digital Inc. (p. 1-20).

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

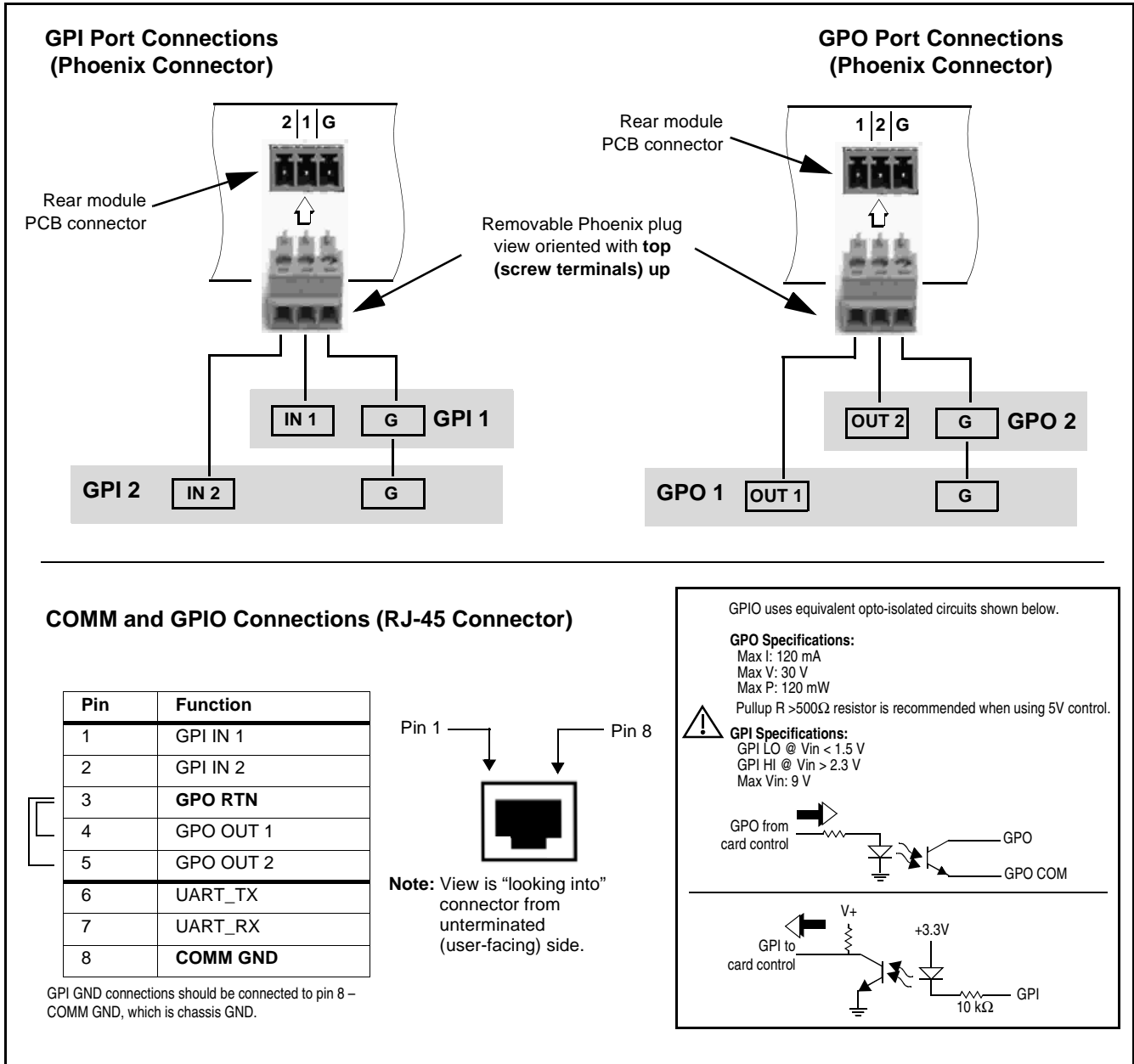


Figure 2-2 COMM and GPIO Connector Pinouts

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-DI 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-DI Card via Remote Control (p. 3-6)
- Checking 9902-2UDX-DI Card Information (p. 3-8)
- Ancillary Data Line Number Locations and Ranges (p. 3-9)
- 9902-2UDX-DI Function Menu List and Descriptions (p. 3-10)
- Troubleshooting (p. 3-64)

Control and Display Descriptions

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

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

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

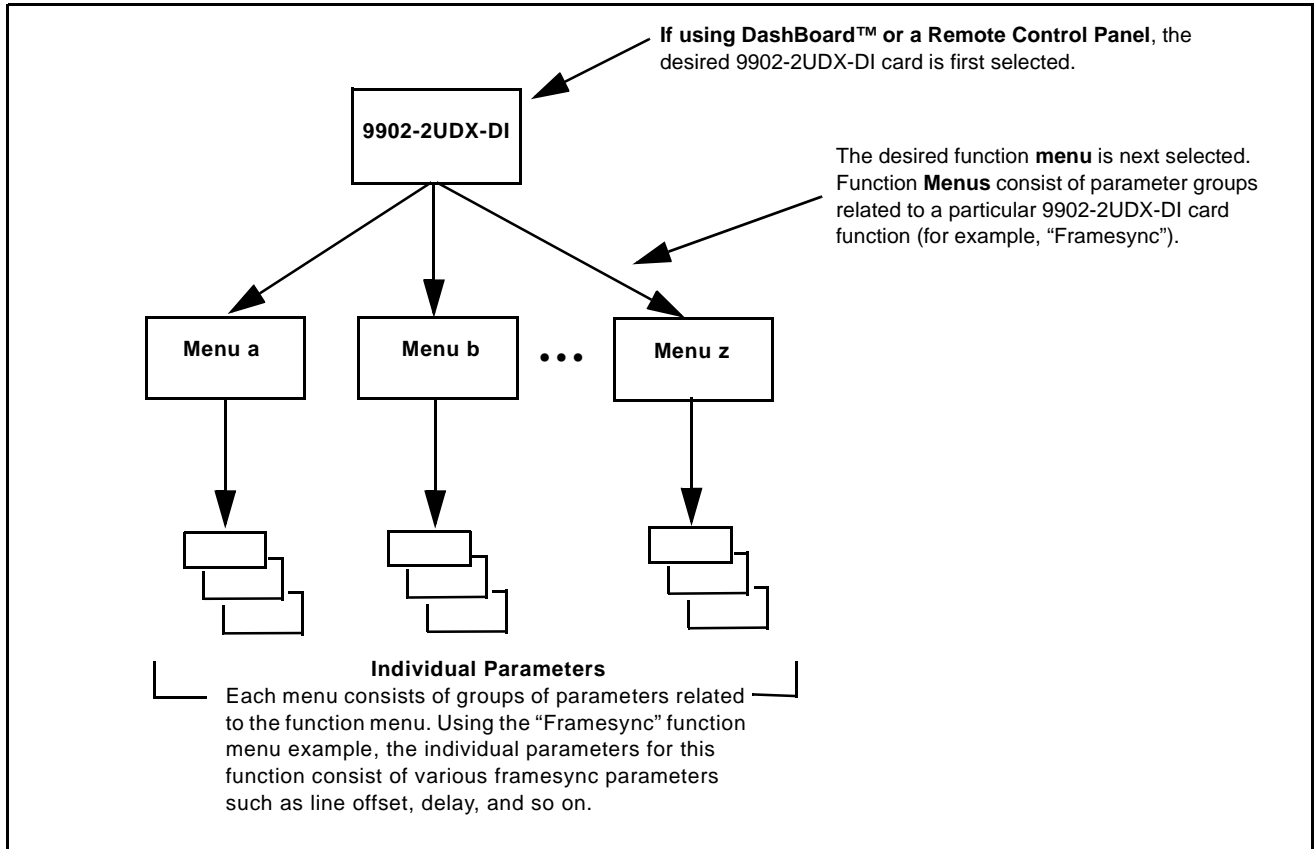


Figure 3-1 Function Menu/Parameter Overview

DashBoard™ User Interface

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

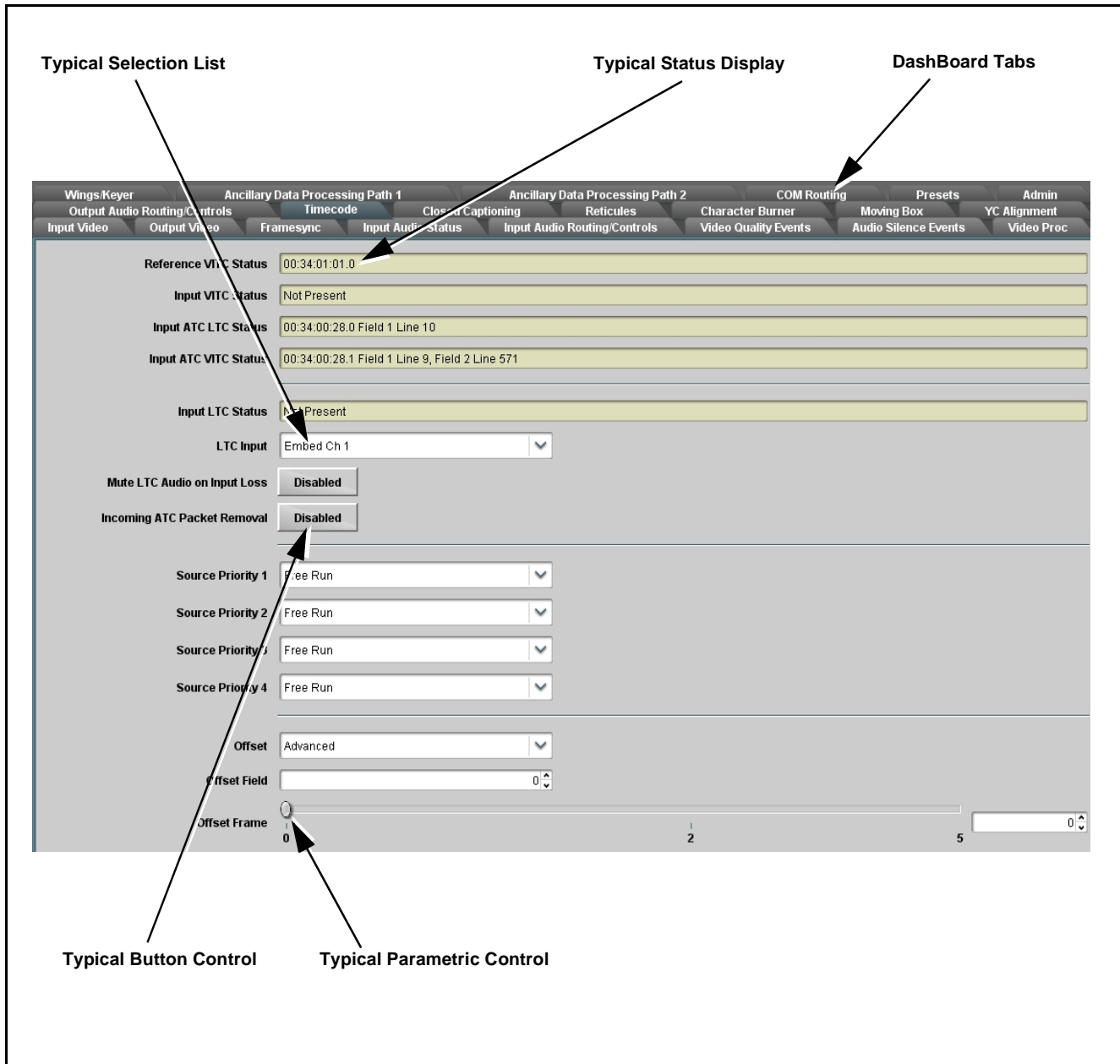


Figure 3-2 Typical DashBoard Tabs and Controls

Cobalt® Remote Control Panel User Interfaces

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

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

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

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

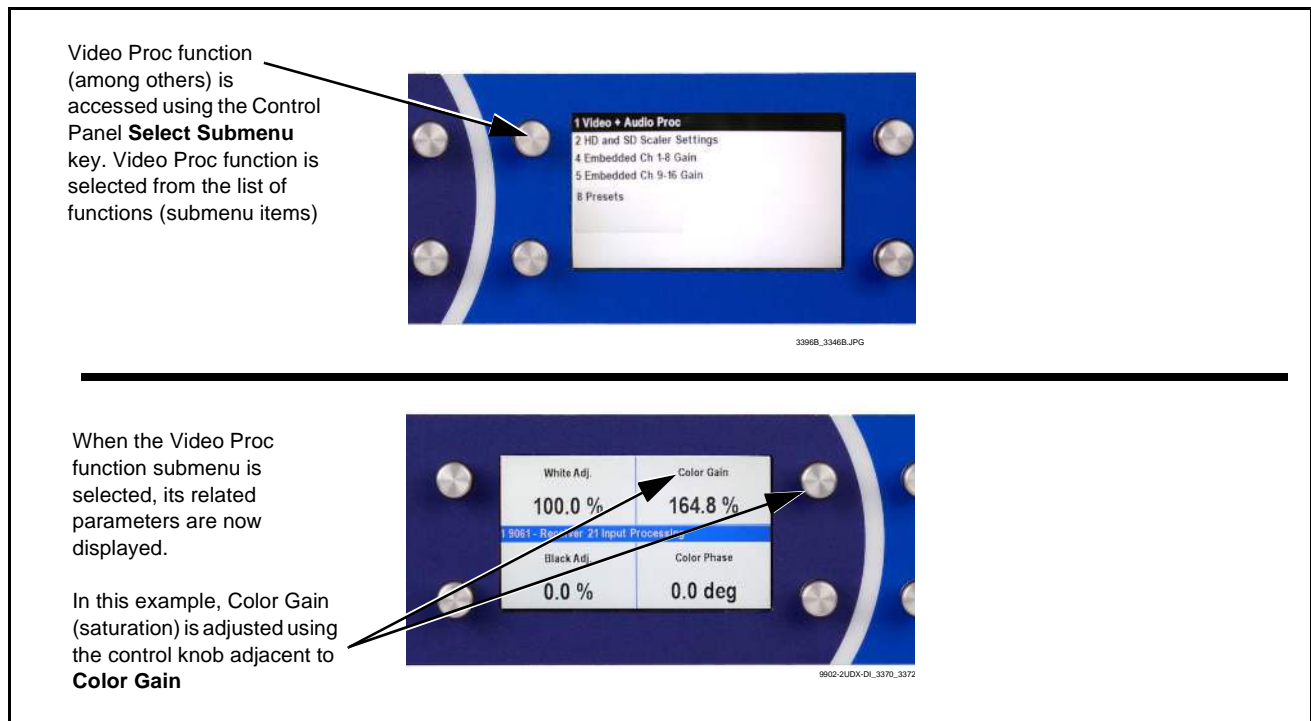


Figure 3-3 Remote Control Panel Setup of Example Video Proc Function Setup

Web HTML5 User Interface

(See Figure 3-4.) When equipped with a rear I/O module having an Ethernet port, the 9902-2UDX-DI controls can be accessed via a web network connection with no additional remote control software needed. The web GUI shows the same tabs, controls and status displays as those accessed using DashBoard™. This allows very convenient control access to the card, even if using a computer without DashBoard remote control or in case the frame network connection is down.

The card can be accessed in a web browser by entering the card IP address as set in the card **Admin** tab. (See Admin (p. 3-56) for more information.)

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

The screenshot displays the 9902-2UDX-DI web GUI. The top status bar indicates 'Connected'. The left sidebar shows 'Status' and 'Product Info' tabs. The main content area features a grid of tabs: 'Input Video', 'Output Video', 'Scaler', 'Framesync', 'Input Audio Status', 'Input Audio Routing/Controls', 'Output Audio Routing/Controls', 'Timecode', 'Video Proc', 'Closed Captioning', 'AFD', 'Ancillary Data Processing Path 1', 'Ancillary Data Processing Path 2', 'COM Routing', 'GPO Setup', 'Presets', 'Event Setup', 'Admin', 'User Log', and 'Alarms'. Below these tabs is a table of settings for various video and audio parameters. At the bottom, there are dropdown menus for 'Path 1 Input Source' and 'Path 2 Input Source', both set to 'SDE A'. A separate section shows 'Path 1 Input Video' set to 'No Input'.

Typical web GUI Menu tabs

Typical web GUI controls and status displays

The card edge alphanumeric display, along with card model ID, shows a scrolling message showing current card IP address (in this example, 10.99.11.119)

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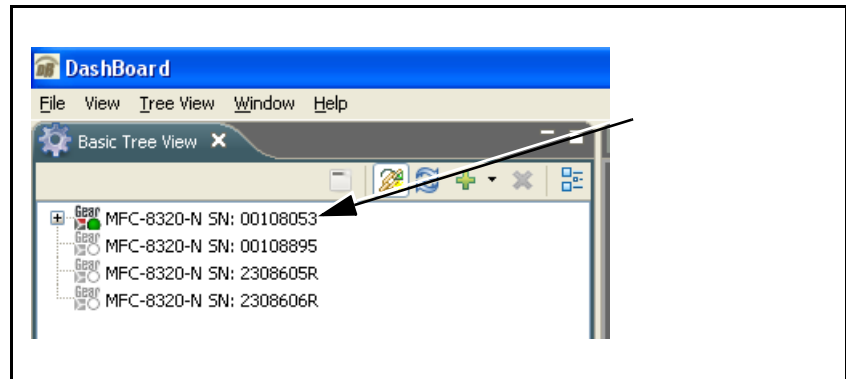
Figure 3-4 Typical Web GUI Tabs and Controls

Accessing the 9902-2UDX-DI Card via Remote Control

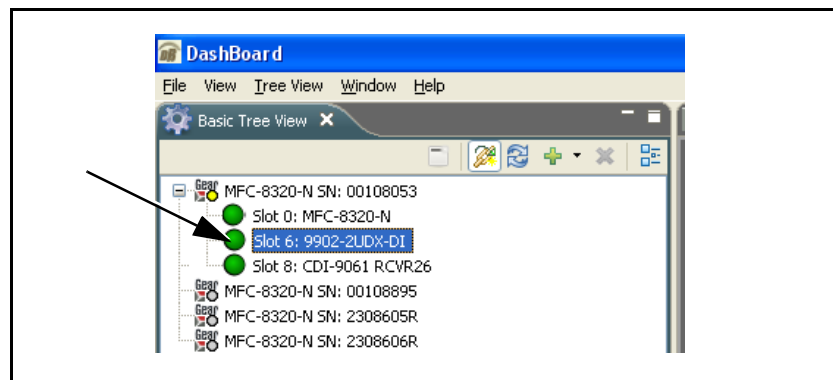
Access the 9902-2UDX-DI card using DashBoard™ or Cobalt® Remote Control Panel as described below.

Accessing the 9902-2UDX-DI Card Using DashBoard™

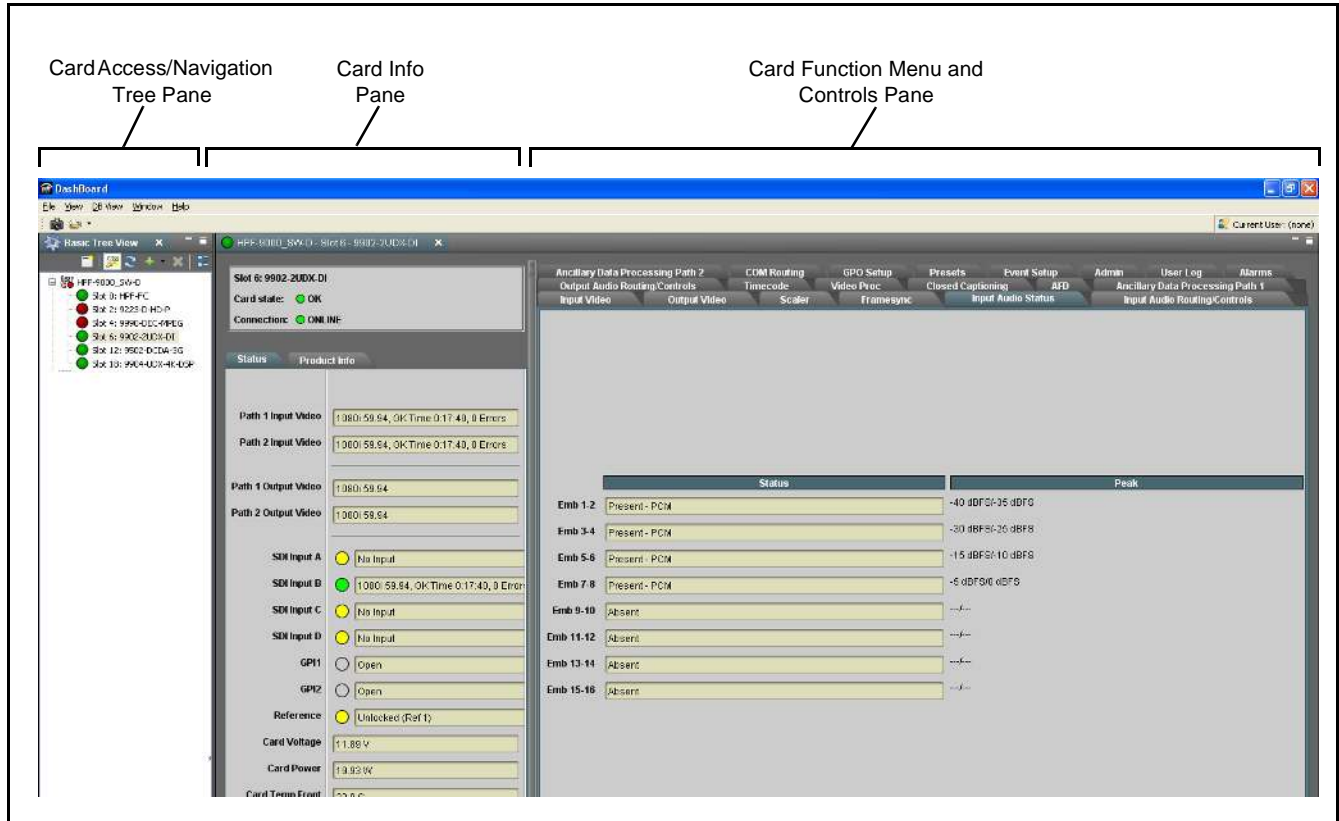
1. On the computer connected to the frame LAN, open DashBoard™.
2. As shown below, in the left side Basic View Tree locate the Network Controller Card associated with the frame containing the 9902-2UDX-DI card to be accessed (in this example, “MFC-8320-N SN: 00108053”).



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-DI”).

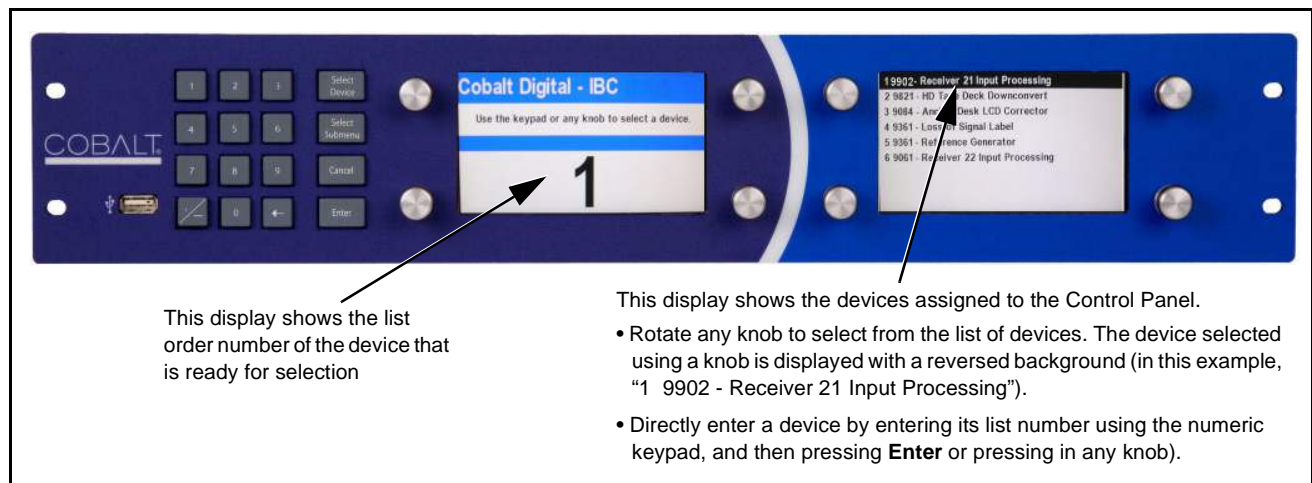


As shown on the next page, when the card is accessed in DashBoard™ its function menu screen showing tabs for each function is displayed. (The particular menu screen displayed is the previously displayed screen from the last time the card was accessed by DashBoard™).



Accessing the 9902-2UDX-DI 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-DI Card Information

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

Note: Proper operating status in DashBoard™ is denoted by green icons for the status indicators shown in Figure 3-5. Yellow or red icons respectively indicate an alert or failure condition. Refer to Troubleshooting (p. 3-64) for corrective action.

The **Tree View** shows the cards seen by DashBoard™. In this example, Network Controller Card is hosting a 9902-2UDX-DI card in slot 6.

Status Display
This displays shows the status and format of the signals being received by the 9902-2UDX-DI, as well as card status.

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

Basic Tree View

- HPF-9000_SW-D
 - Slot 0: HPF-FC
 - Slot 2: 9223-D-HD-P
 - Slot 4: 9990-DEC-MPEG
 - Slot 6: 9902-2UDX-DI
 - Slot 12: 9502-DCDA-3G
 - Slot 18: 9904-UDX-4K-DSP

Status

Slot 6: 9902-2UDX-DI

Card state: ● OK

Connection: ● ONLINE

Product Info

Path 1 Input Video: 1080i 59.94, OK Time 0:22:52, 0 Errors

Path 2 Input Video: 1080i 59.94, OK Time 0:22:52, 0 Errors

Path 1 Output Video: 1080i 59.94

Path 2 Output Video: 1080i 59.94

SDI Input A: ● No Input

SDI Input B: ● 1080i 59.94, OK Time 0:22:52, 0 Errors

SDI Input C: ● No Input

SDI Input D: ● No Input

GPI1: ☐ Open

GPI2: ☐ Open

Reference: ● Unlocked (Ref 1)

Card Voltage: 11.89 V

Card Power: 19.92 W

Card Temp Front: 21.2 C

Card Temp Rear: 41.2 C

Card Temp FPGA: 35.8 C amb 39.0 C core

Card Up Time: 00:23:15

Card Active IP: 192.168.1.105

Preset Engaged: Autosave

Card Time: 12:22:25PM

Card Info

Product: 9902-2UDX-DI

Product Options: +ANC +COLOR +LTC

Supplier: Cobalt Digital Inc.

Revision: 2.073.96F6-rel

Build Date: Sep 19 2018 17:19:47

FPGA Revision: 1.04.0000

FPGA Build Date: Sep 14 2018 22:53:13

Kernel Revision: 3.2.0-Local-1.4 #66 Thu Jul 23 17:29:47 CDT 2

Flash Storage: 43.2 MB free

RAM Usage: 39.6 %

CPU Usage: 74.7 %

Serial Number: 371804

Rear Module: 1919

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

Ancillary Data Line Number Locations and Ranges

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

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

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

Notes:

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

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

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

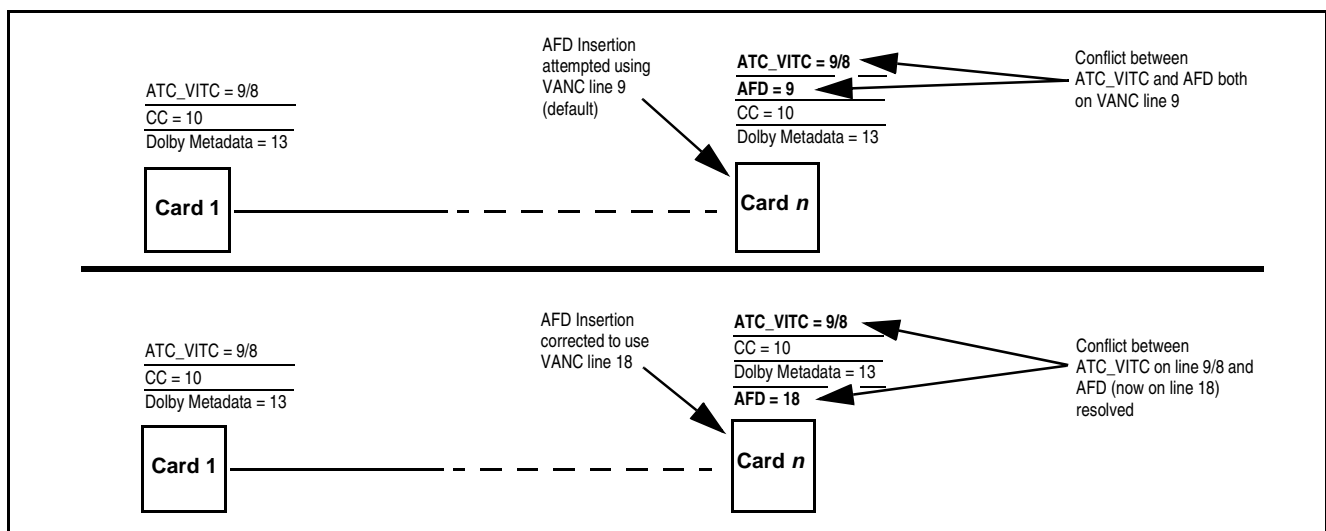



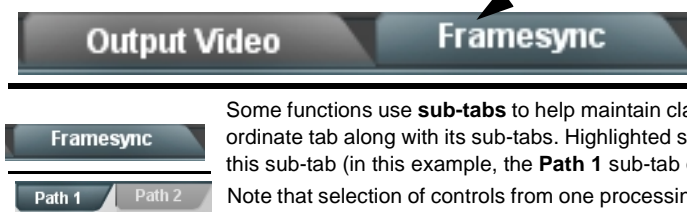
Figure 3-6 Example VANC Line Number Allocation Example

9902-2UDX-DI Function Menu List and Descriptions

Table 3-2 individually lists and describes each 9902-2UDX-DI function menu and its related list selections, controls, and parameters. Where helpful, examples showing usage of a function are also provided. Table 3-2 is primarily based upon using DashBoard™ to access each function and its corresponding menus and parameters.

Note:  For any DashBoard tabs on card not appearing in this manual, this indicates the function is an option and covered in a separate Manual Supplement. Please refer to card web page Product Downloads for pdf Manual Supplements covering these options.

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



Some functions use **sub-tabs** to help maintain clarity and organization. In these instances, Table 3-2 shows the ordinate tab along with its sub-tabs. Highlighted sub-tabs indicate that controls described are found by selecting this sub-tab (in this example, the **Path 1** sub-tab on the **Framesync** page).

Note that selection of controls from one processing path to another is selected using this sub-tab which appears on many card function tabs.

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	AFD/WSS/VI Code Insertion Controls	3-39
Output Video Mode Controls	3-12	Ancillary Data Proc Controls	3-45
Scaler	3-13	COMM Ports Setup Controls	3-48
Framesync	3-16	Presets	3-50
Input Audio Status	3-19	GPO Setup Controls	3-51
Input Audio Routing/Controls	3-20	Event Setup Controls	3-52
Closed Captioning	3-25	Admin	3-56
Video Proc/Color Correction	3-26	User Log	3-59
Output Audio Routing/Controls	3-29	Alarms Setup Controls	3-60
Timecode	3-34		

Table 3-2 9902-2UDX-DI Function Menu List

Input Video

Allows manual or failover selection of card SDI program video inputs and displays status and raster format of received SDI video.

• Input Video Source/Status

Path 1 Input Source SDI A

Path 1 Input Video 720p 59.94, OK Time 0:06:15, 0 Errors

Path 2 Input Source SDI B

Path 2 Input Video 1080i 59.94, OK Time 0:06:44, 0 Errors

Selects the input video source to be applied to the card **Path 1** and **Path 2** program video inputs.

Note:

- SDI inputs selected must be used with Rear I/O Module correspondingly equipped with intended input ports.
- Some choices shown are a function of card options.
- Input select also allows internal connection from one processing path output to the opposite processing path input. This allows "serial" or cascaded processing connections without requiring external jumpering on the card rear I/O module. Serial jumpering can, in addition to other functions, provide identical program video output streams with a delay offset between the two streams.
- Care should be taken to make certain an output from a video path is not applied as an input for the same path. Also, if framesync Lock to Input else Free Run is selected, the initial "upstream" path **must** be selected using Lock to Input Path control (for example, if Path 1 cascades to Path 2, this control must be set for Path 1 as lock source).

SDI A Status	1080i_5994, OK Time 2:05:51, 0 Errors
SDI B Status	1080p_5994, OK Time 0:29:54, 0 Errors
SDI C Status	Input Format Disabled by User
SDI D Status	Unlocked

SDI A thru SDI D Status show raster/format for all card inputs. If signal is not present or is invalid, **Unlocked** is displayed. (These status indications are also propagated to the Card Info pane.)

Input Format Disabled by User indicates raster size and/or frame rate has been rejected from being passed by card (as described below in Input SDI Raster Size / Frame Rate Filtering).

Note: Status display shows maximum card input complement. Input complement is determined by rear I/O module used.

Input SDI Raster Size / Frame Rate Filtering

The controls shown below allow user filtering to exclude selected raster or rate formats from being received by a card input.

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

Allowed Raster Sizes	525i	625i	720p	1080i	1080psf	1080p		
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Allowed Frame Rates	23.98	24	25	29.97	30	50	59.94	60
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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

Allowed Raster Sizes	525i	625i	720p	1080i	1080psf	1080p		
	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Allowed Frame Rates	23.98	24	25	29.97	30	50	59.94	60
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

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


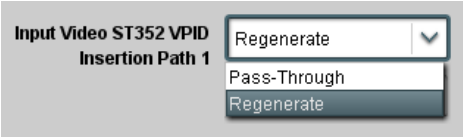

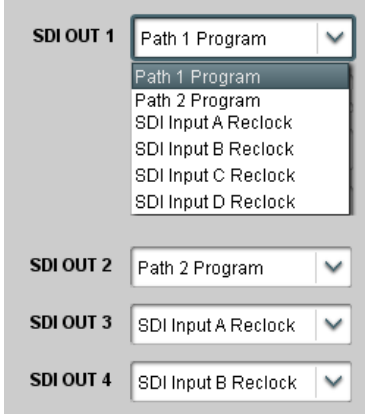
	<p>Allows selection of each of the four video output coaxial connectors as processed SDI out or reclocked SDI out.</p>
<p>• ST352 VPID Insertion/Pass-Thru Select</p> 	<p>Selects from default Regenerate mode and special Pass-Through mode (see below for important usage notes).</p> <ul style="list-style-type: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

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

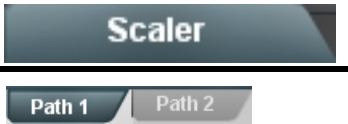
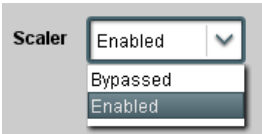
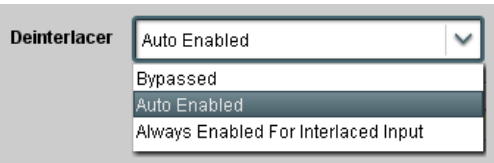
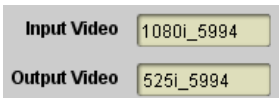
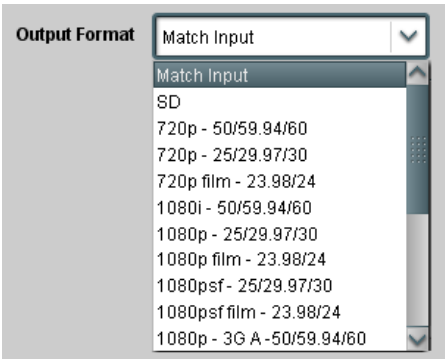
	<p>Provides up/down/cross-converter, aspect ratio controls, and user H/V controls.</p>
<p>Note: Scaler tab has identical independent controls for both Path 1 and Path 2 using the Path 1 / Path 2 sub-tabs. Therefore, only the Path 1 controls are shown here. Set controls for other path using the respective sub-tab.</p>	
<p>• Scaler Enable Control</p> 	<p>Enables or disables Scaler function.</p> <p>Note: When scaler is disabled, all ancillary data is passed from input to output intact. If the scaler is enabled, ancillary data such as timecode and closed captioning must be set for re-insertion as desired. See Timecode (p. 3-34) and Closed Captioning (p. 3-25) for more information about insertion into scaled output video.</p>
<p>• De-Interlacer Control</p> 	<p>Allows de-interlacer to be bypassed to reduce processing latency.</p> <ul style="list-style-type: none"> • Bypassed: De-interlacer is bypassed regardless of conversion being performed. When converting from interlaced to progressive, this results in reduced latency at the expense of fast-motion smoothness. • Auto-Enable: Applies de-interlacing for interlaced-to-interlaced conversions where useful (such as 1080i to 525i conversions). This is the default normal mode which also disables de-interlacing where not required (e.g., conversions within progressive formats). • Always Enabled For Interlaced Input: This setting enables de-interlacing always when an interlaced input format is being converted by the scaler. <p>Note: De-interlacer is always bypassed when converting from a progressive format to a progressive format.</p>
<p>• Input/Output Video Status</p> 	<p>Displays signal format/status sent to scaler and output format/status. If invalid or no signal is present, none is displayed.</p>
<p>• Output Format Selector</p> 	<p>Provides conversions to formats as shown.</p>

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


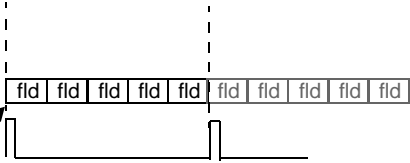
<div style="text-align: center;">  </div> <div style="display: flex; justify-content: center; gap: 10px;"> <div style="border: 1px solid black; padding: 2px 5px;">Path 1</div> <div style="border: 1px solid black; padding: 2px 5px;">Path 2</div> </div>	<p>(continued)</p>
<p>• 3:2 Alignment Optimization Selector</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>3:2 Pulldown Alignment Free Run ▼</p> <div style="border: 1px solid black; padding: 2px;"> <p>Free Run</p> <p>Input ATC_LTC</p> <p>Input ATC_VITC</p> <p>Reference VITC</p> <p>Input VITC</p> <p>Input LTC Audio</p> <p>GPI 1: 6Hz Input</p> <p>GPI 2: 6Hz Input</p> </div> </div>	<p>Provides selection to optimize 3:2 pulldown conversion where timecode or other selections shown are to be relied upon to indicate frame transitions.</p> <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p>In the example below, A-frame is aligned using 6Hz pulse imported via GPI.</p>  <p style="text-align: center;">A-Frame alignment to 6Hz pulse via GPI</p> </div> <p>Note: If input video timecode or other marker cannot be relied upon for accurate and precise frame marking, leave control set to Free Run.</p>
<p>• Alignment Offset Selector</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Alignment Offset (Frames) 0 ▼</p> <div style="border: 1px solid black; padding: 2px;"> <p>0</p> <p>1</p> <p>2</p> <p>3</p> </div> </div>	<p>Based on alignment selection selected above, offsets A-frame by amount selected.</p>
<p>• Low-Latency PSF to Interlaced Control</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Low Latency PSF to I (Scaling Disabled) Disabled ▼</p> <div style="border: 1px solid black; padding: 2px;"> <p>Disabled</p> <p>Enabled (Use Both Fields)</p> <p>Enabled (Use Top Field)</p> </div> </div>	<p>Allows PsF to Interlaced conversions bypassing Scaler ARC and Pan controls to enhance processing latency performance over that available in normal mode.</p> <ul style="list-style-type: none"> • Disabled: This is card “normal” setting that locks out the low-latency processing function. Normal scaler processing latency (along with full ARC and pan control) is available with this setting. • Enabled (Use Both Fields): This setting provides a highest-quality low-latency setting, and can be expected to provide an approximate latency of 12 msec for North American frame rates. • Enabled (Use Top Field): This setting provides the lowest available latency with a slight reduction of motion smoothness due to alignment not waiting for both fields. This setting can be expected to provide an approximate latency of 6 msec for North American frame rates. <p>Note: When either low latency mode is enabled, image ARC scaling and/or panning is locked out.</p>
<p>• Standard Quick Set Aspect Ratio Conversion Selectors</p>	<p>Selects between the standard preset Aspect Ratio Conversions (ARC) shown below.</p> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>Unity 1.0HV</p> <p>Apply</p> </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>Pillar Box 0.75H</p> <p>Apply</p> </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>Center Cut 1.33H</p> <p>Apply</p> </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>Letter Box 0.75V</p> <p>Apply</p> </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>Vertical Center Cut 1.33V</p> <p>Apply</p> </div> </div>

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

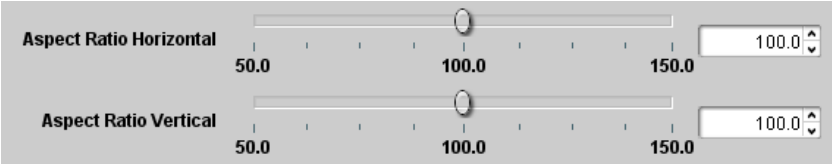

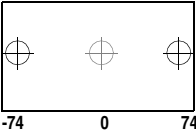
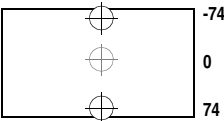
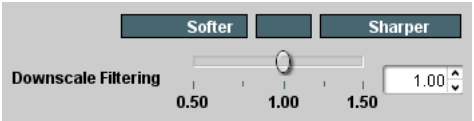
<div style="background-color: #333; color: white; padding: 5px; text-align: center; font-weight: bold;">Scaler</div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> Path 1 Path 2 </div>	(continued)
<p>• User-defined Aspect Ratio Controls</p>	<p>Aspect Ratio Horizontal and Aspect Ratio Vertical controls adjust horizontal and vertical zoom percentage. Settings less than (<) 100% provide zoom-out; settings greater than (>) 100% provide zoom-in.</p> <p>(50% to 150% range in 0.1% steps; null = 100.0)</p> <div style="display: flex; align-items: center; margin-top: 10px;">  <div style="margin-left: 10px;"> <p>Buttons allow standard ARC presets to be applied to output video. For any setting, using the Horizontal or Vertical controls allow user custom settings.</p> <p>Pressing any of the preset buttons restores the ARC to the selected setting and overrides any previous custom settings.</p> </div> </div>
<p>• H Pan and V Pan Controls</p> <div style="margin-top: 10px;">  </div>	<p>H Pan control shifts horizontal center of image left (negative settings) or right (positive settings)</p> <p>(-74% to 74% range in 0.1% steps; null = 0.0)</p> <div style="text-align: center; margin-top: 10px;">  </div> <hr/> <p>V Pan control shifts vertical center of image down (negative settings) or up (positive settings)</p> <p>(-74% to 74% range in 0.1% steps; null = 0.0)</p> <div style="text-align: center; margin-top: 10px;">  </div>
<p>• Downscale Filtering Control</p> <div style="margin-top: 10px;">  </div>	<p>Provides edge enhancement of downscaled image which can sharpen image or suppress noise/artifacts.</p> <p>(0.5 to 1.5 range; null = 1.0)</p>

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


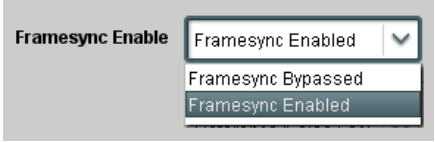
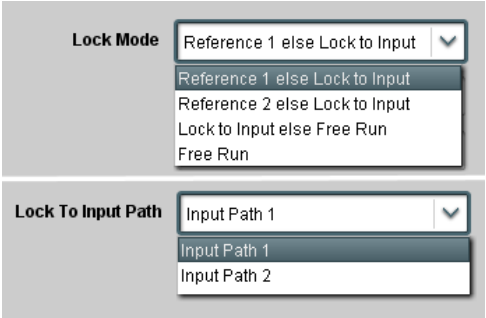

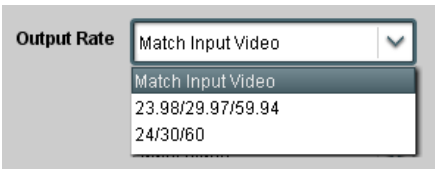
	<p>Provides video frame sync/delay offset control and output control/loss of program video failover selection controls.</p>
<p>Note: Framesync tab has identical independent controls for both Path 1 and Path 2 using the Path 1 / Path 2 sub-tabs. Therefore, only the Path 1 controls are shown here. Set controls for other path using the respective sub-tab.</p>	
<p>• Framesync Enable/Disable Control</p> 	<p>Provides master enable/disable of all card framesync functions/controls.</p>
<p>• Lock Mode Select</p> 	<p>Selects Frame Sync functions from the choices shown to the left and described below.</p> <ul style="list-style-type: none"> • Lock to Reference: Output video is locked to selected external reference received on the frame reference bus. (External reference signal Ref 1 / Ref 2 are distributed to the card and other cards via the Ref 1 / Ref 2 buses on the frame.) <ul style="list-style-type: none"> Note: If valid reference is not received, the  Reference Invalid indication appears in the Card Info status portion of DashBoard™, indicating invalid frame sync reference error. • Lock to Input: Uses the selected program video for the path as the reference standard. Lock To Input Path selects the program video source which is used for ref. <ul style="list-style-type: none"> Note: If Lock to Input is used for framesync, any timing instability on the input video will result in corresponding instability on the output video. • Free Run: Output video is locked to the card internal clock. Output video is not locked to external reference. <ul style="list-style-type: none"> • For cases where minimum latency is desired (no framesync), Mode should be set to Lock to Input with Framesync set to Enabled. If Disabled is selected when using dual paths, severe video and audio corruption can occur.
<p>• Output Rate Select</p> 	<p>Allows frame rate to be outputted same as input video, or converted to from the choices shown to the left and described below.</p> <ul style="list-style-type: none"> • Auto – output video frame rate tracks with input video. • 23.98/29.97/59.94 – forces standard North American frame rates. Can be used to convert 24/30/60 Hz camera frame rates to corresponding 23.98/29.97/59.94 standard North American frame rates. • 24/30/60 – forces 24/30/60 frame rates. Can be used to convert 23.98/29.97/59.94 Hz frame rates to corresponding 24/30/60 Hz frame rates.

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

<div><div>Framesync</div><div>Path 1Path 2</div></div>	(continued)
<div><div>Initial Startup Format Select</div><div><div>Initial Startup Format</div><div>525i59.94</div><div>525i59.94</div><div>720p-59.94/60</div><div>1080i-59.94/60</div><div>1080p-59.94/60</div><div>625i50</div><div>720p50</div><div>1080i50</div><div>1080p50</div></div></div>	<p>Selects a frame sync format/rate to be invoked (from the choices shown to the left) in the time preceding stable lock to external reference.</p> <p>Set this control to that of the intended external reference to help ensure smoothest frame sync locking. This control also sets the card test pattern format where the card initial output at power-up is the internal pattern instead of program video.</p>
<div><div>Program Video Output Mode Select</div><div><div>Output Mode</div><div>Input Video</div><div>Input Video</div><div>Flat Field</div><div>Freeze</div><div>Test Pattern</div><div>Snow</div></div></div>	<p>Provides a convenient location to select between card program video output and other technical outputs from the choices shown to the left and described below.</p> <ul style="list-style-type: none">• Input Video – card outputs input program video (or loss of signal choices described below).• Flat Field (Black) – card outputs black flat field.• Freeze – card outputs last frame having valid SAV and EAV codes.• Test Pattern – card outputs standard technical test pattern (pattern is selected using the Pattern drop-down described below).• Snow – card outputs snow multi-color pattern.
<div><div>Loss of Input Signal Selection</div><div><div>On Loss of Video</div><div>Disable Outputs</div><div>Disable Outputs</div><div>Flat Field</div><div>Freeze</div><div>Test Pattern</div><div>Snow</div></div></div>	<p>In the event of program input video Loss of Signal (LOS), determines action to be taken as follows:</p> <ul style="list-style-type: none">• Disable Outputs: Disable program video SDI outputs.• Flat Field – go to flat field on program video output.• Freeze – go to last frame having valid SAV and EAV codes on program video output.• Test Pattern – go to standard technical test pattern on program video output (pattern is selected using the Pattern drop-down described below).• Snow – output snow multi-color pattern.
<div><div>Test Pattern Select</div><div><div>Test Pattern</div><div>75% Bars</div><div>75% Bars</div><div>100% Bars</div><div>SMPTE Bars</div><div>Tartan</div><div>Pluge</div><div>Ramp</div><div>H Sweep</div><div>Pulse and Bar</div><div>Multiburst</div><div>Gray 5 Step</div><div>Gray 10 Step</div><div>Checkfield</div></div></div>	<p>Provides a choice of standard technical patterns (shown to the left) when Test Pattern is invoked (either by LOS failover or directly by selecting Test Pattern on the Program Video Output Mode Select control).</p>

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


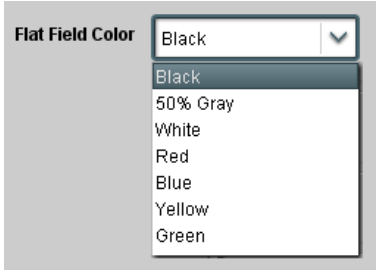
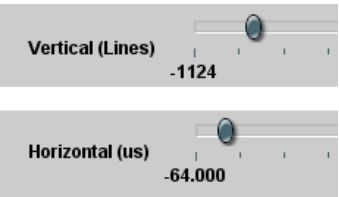

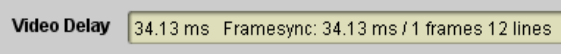
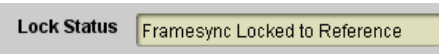
	(continued)
<ul style="list-style-type: none"> • Flat Field Color Select 	<p>Provides a choice of flat field colors when Flat Field is invoked (either by LOS failover or directly by selecting Flat Field on the Program Video Output Mode Select control).</p>
<ul style="list-style-type: none"> • Output Video Reference Offset Controls 	<p>With framesync enabled, provides the following controls for offsetting the output video from the reference:</p> <ul style="list-style-type: none"> • Vertical (Lines) – sets vertical delay (in number of lines of output video) between the output video and the frame sync reference. (Positive values provide delay; negative values provide advance) (Range is -1124 thru 1124 lines; null = 0 lines.) • Horizontal (μs) – sets horizontal delay (in μs of output video) between the output video and the frame sync reference. (Positive values provide delay; negative values provide advance) (Range is -64 thru 64 μsec; null = 0.000 μsec.) <p>Note: Offset advance is accomplished by hold-off of the reference-directed release of the frame, thereby effectively advancing the program video relative to the reference.</p>
<ul style="list-style-type: none"> • Frame Delay Control 	<p>When Framesync is enabled, specifies the smallest amount of latency delay (frames held in buffer) allowed by the frame sync. The frame sync will not output a frame unless the specified number of frames are captured in the buffer. The operational latency of the frame sync is always between the specified minimum latency and minimum latency plus one frame (not one field).</p> <p>Note: Due to card memory limits, the maximum available Minimum Latency Frames is related to the output video format selected. When using this control, be sure to check the Report Delay display to make certain desired amount of frames are delayed.</p>
<ul style="list-style-type: none"> • Video Delay Display 	<p>Displays the current input-to-output video delay (in msec units) as well as in terms of Frames/fractional frame (in number of lines).</p> <p>Status display shows total input-to-output video delay, along with any framesync delay.</p>
<ul style="list-style-type: none"> • Framesync Lock Status Display 	<p>Displays the current framesync status and reference source.</p>
<p>Note: Audio timing offset from video is performed using the delay controls on the Input Audio Routing/Controls tab. Refer to Input Audio Routing/Controls (p. 3-20) for these controls.</p>	

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

Input Audio Status

Path 1

Path 2

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 as described below.

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

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

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

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

<div>Input Audio Routing/Controls</div> <div>Input Bus Path 1 Audio Delay Path 1</div>	<p>Provides audio routing, gain, per-channel/bulk audio delay controls, and audio meters. These controls route selected audio sources onto the card 16-channel internal bus (which is used for all audio processing).</p>
<p>Note: Input Audio Routing/Controls 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.</p>	
<div data-bbox="207 527 1390 1129"> </div> <div data-bbox="219 1136 256 1157">...</div> <div data-bbox="219 1186 901 1612"> </div> <div data-bbox="912 1180 1393 1562" style="border: 1px solid black; padding: 10px;"> <p>All audio inputs are transferred through the card via each path's 16-channel Internal Bus (Bus Ch 1 thru Bus Ch 16).</p> <p>The example above shows various Source selections that direct Emb Ch 1 thru Ch 6 and Emb Ch 1 and Ch 2 duped onto the card internal bus (unused bus channels can be set to Silence or Mute).</p> <p>Each bus channel provides Gain, Mute, and Invert controls.</p> <p>The source-to-destination correlation shown here is only an example; any of the sources described on the following pages can route to any of the internal bus channels.</p> </div>	

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

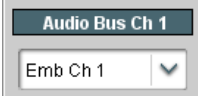
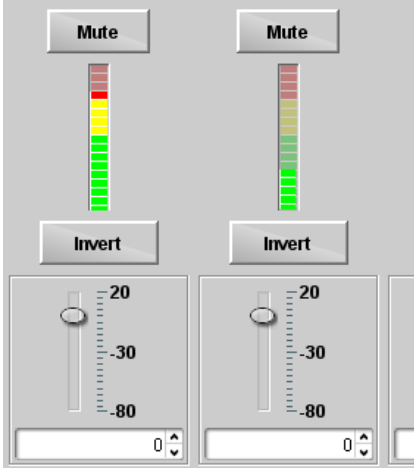

Input Audio Routing/Controls	
Input Bus Path 1	Audio Delay Path 1
<p>(continued)</p>	
<p>Note: • Default factory preset routing routes embedded Ch 1 thru Ch 16 to bus channels Audio Bus Ch 1 thru Ch 16.</p> <p>• Bus Ch 2 thru Bus Ch 16 have controls identical to the controls described here for Bus Ch 1. Therefore, only the Bus Ch 1 controls are shown here.</p>	
<p>• Bus Channel Source</p> 	<p>Using the Source drop-down list, selects the audio input source to be routed to the card bus channel from the following choices:</p> <ul style="list-style-type: none"> • Embedded input channel 1 thru 16 (Emb Ch 1 thru Emb Ch 16) • Input Flex Bus summed mix output nodes A thru P (see Input Flex Mix (p. 3-23)) <p>Note: Embedded channel sources are only the embedded channels associated with the respective path.</p>
<p>• Channel Mute/Phase Invert/Gain Controls and Peak Level Display</p> 	<p>Provides Mute and phase Invert channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.)</p> <p>Gain controls allow relative gain (in dB) control for the corresponding destination Embedded Audio Group channel.</p> <p>(-80 to +20 dB range in 1.0 dB steps; unity = 0 dB)</p> <p>Note: Although the card can pass non-PCM data such as Dolby® E or AC-3, setting the gain control to any setting other than default 0 will corrupt Dolby data.</p>
Input Audio Routing/Controls	
Input Bus Path 1	Audio Delay Path 1
<p>Audio Delay – Provides bulk (all four groups/master) and individual card audio bus channel delay offset controls and delay parametric displays.</p>	
<p>• Bulk (Master) Audio/Video Delay Control</p> 	<p>Bulk Delay control adds bulk (all four groups) audio delay from any video delay (net audio delay offset setting adds delay in addition to any delay included by other actions). This control is useful for correcting lip sync problems when video and audio paths in the chain experience differing overall delays. (-33 to +3000 msec range in 0.01-msec steps; null = 0 msec).</p>

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

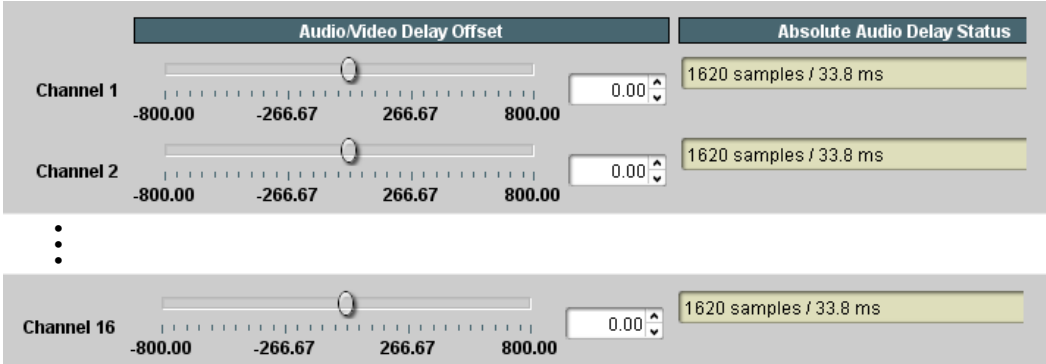
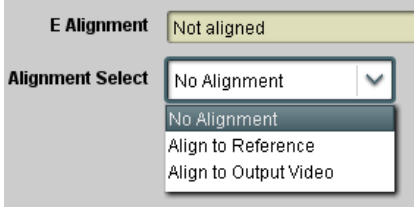
<div>Input Audio Routing/Controls</div> <div>Input Bus Path 1 Audio Delay Path 1 Dolb</div>	(continued)
<p>• Per-Channel Audio/Video Delay Offset Controls</p> <p>Offset control adds or reduces (offsets) channel audio delay from the matching video delay (audio delay offset setting adds or removes delay in addition to any delay included by other actions). This control is useful for correcting lip sync problems when video and audio paths in the chain experience differing overall delays.</p> <p>(-800.0 to +800.0 msec range in 0.02 msec steps; null = 0.0 msec)</p> <p>Delay Status shows current delay from video for the corresponding audio channel.</p> <p>Note:</p> <ul style="list-style-type: none"> Maximum advance/delay offset is dependent on video format. Where a Dolby pair is present, adjustment of either channel control results in a matching delay setting for the other channel in the pair. 	
<div>Audio Delay Path 1 Dolby E Alignment Path 1</div>	<p>Dolby E Alignment – Provides selectable Dolby E alignment for embedded Dolby E to position the bitstream utilizing the Dolby E “guard band”. This helps prevent frame errors that may occur in a bitstream upon switching or editing.</p>
<p>• Dolby E Embedding Alignment Control</p> 	<p>For incoming Dolby E data routed to the card audio bus, aligns the embedded Dolby data corresponding to selection. Alignment line as a result of selection is shown in E Alignment status display.</p> <p>Note: Where a frame reference is available, it is recommended to use the Align to Reference selection. This helps ensure that the correct alignment is achieved even if the video is user delayed or output format is changed.</p> <p>Refer to “Preferred Alignment for Dolby E in HD Systems” (http://www.dolby.com/about/news-events/newsletters-dtvaudio-dolby-e-alignment.html) for more information regarding Dolby E alignment.</p>

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

Input Audio Routing/Controls		Input Flex Mix – Provides a 16-channel mixer in which each of the inputs can be mixed onto up to 16 independent output summing nodes. Each input channel has independent gain and mute controls.
Path 1	Flex Mix Path 1	

Source	Flex Bus
Flex Mix 1 Embed Ch 1	Flex Mix A
Flex Mix 2 Embed Ch 2	Flex Mix A
Flex Mix 3 Embed Ch 3	Flex Mix A
Flex Mix 4 Embed Ch 4	Flex Mix A
Flex Mix 5 Embed Ch 5	Flex Mix B
Flex Mix 6 Embed Ch 6	Flex Mix B
Flex Mix 7 Embed Ch 11	Flex Mix B
Flex Mix 8 Embed Ch 12	Flex Mix B
Flex Mix 9 Embed Ch 13	Flex Mix C
Flex Mix 10 Embed Ch 14	Flex Mix C
Flex Mix 11 Embed Ch 15	Flex Mix C
Flex Mix 12 Embed Ch 16	Flex Mix C

In this example three, 4-input mono mixers are provided by selecting **Flex Mixer Bus A** for the Flex Mix 1 thru Flex Mix 4 inputs, and **Flex Mixer Bus B** for the next four inputs, and so on as shown.

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

Flex Mix A
Flex Mix B
Flex Mix C

To Audio Bus Input Routing

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

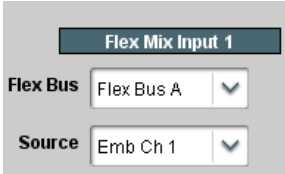
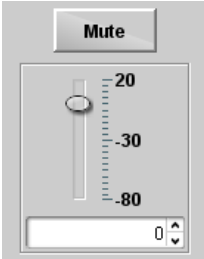

<div>Input Audio Routing/Controls</div> <div>Path 1 Flex Mix Path 1</div>	(continued)
<p>Note:</p> <ul style="list-style-type: none"> Flex Mix input channels Flex Mix 2 thru Flex Mix 16 have controls identical to that described here for Flex Mix 1. Therefore, only the Flex Mix 1 controls are shown here. For each Flex Mix input channel, its source should be considered and appropriately set. Unused input channels should be set to the Silence selection. 	
<p>• Flex Mix Input Channel Source/Bus Assignment</p> 	<p>Using the Source drop-down list, selects the audio input source to be directed to the corresponding bus channel from the choices listed below.</p> <ul style="list-style-type: none"> Silence Embed Ch 1 thru Embed Ch 16 <p>The Flex Bus drop-down selects the bus (A thru P) to which the input is assigned to.</p> <p>Note: See the examples on the previous page showing various types of mixers using multiple flex buses.</p>
<p>• Gain / Mute Control</p> 	<p>Provides relative gain (in dB) control and a channel Mute checkbox.</p> <p>(-80 to +20 dB range in 0.1 dB steps; unity = 0.0 dB)</p>
<div>Input Audio Routing/Controls</div> <div>Clean and Quiet Switching Option</div>	<p>Clean and Quiet Switching (option +CQS only) – Allows SDI input selection to be changed from one source to another while ducking audio during controlled input video switching transitions to provide silence between input switches.</p>
<p>Note:</p> <ul style="list-style-type: none"> Clean audio switching is assured only for intentional, controlled switches via user control. Clean audio switching cannot be assured for failover switches. Clean switching requires that both SDI signals (switch from and switch to) be stable and present, and of the same SDI format and rate. Clean audio switching function is designed for PCM audio. This function does not assure clean decoded audio when switching from/to Dolby or other non-PCM audio. 	
<p>Switching Enabled check box enables Clean and Quiet Switching.</p> <p>Duration sets the attack and decay ramp intervals (300 msec is recommended for typical use).</p> 	

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


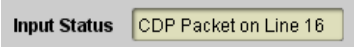
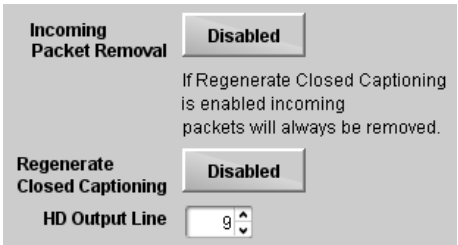
	<p>Provides support for closed captioning setup. Also provides controls for setting closed captioning absence and presence detection thresholds.</p>								
<p>Note:</p> <ul style="list-style-type: none"> • Closed Captioning tab has identical independent controls for both Path 1 and Path 2 using the 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. 									
<p>• Closed Captioning Input Status</p> 	<p>Displays incoming Closed Captioning status as follows:</p> <ul style="list-style-type: none"> • If closed captioning is present, a message similar to the example shown is displayed. • If no closed captioning is present in the video signal, Not Present or Disabled is displayed. <p>Note:</p> <ul style="list-style-type: none"> • Packet closed captioning status Captioning Rejected Due To message can appear due to the items described below. The closed captioning function assesses <i>cdp_identifier</i>, <i>cdp_frame_rate</i>, <i>ccdata_present</i>, and <i>caption_service_active</i> items contained in the packet header to make the determinations listed below. Refer to CEA-708-B for more information. <table border="1" data-bbox="779 808 1430 1104"> <thead> <tr> <th>Message</th><th>Description</th></tr> </thead> <tbody> <tr> <td>Unsupported Frame Rate</td><td>Film rate closed-captioning (either as pass-through or up/down conversion) is not supported by the card.</td></tr> <tr> <td>Data Not Present</td><td>Packet is marked from closed captioning source external to the card that no data is present.</td></tr> <tr> <td>No Data ID</td><td>Packet from closed captioning source external to the card is not properly identified with 0x9669 as the first word of the header (unidentified packet).</td></tr> </tbody> </table> <ul style="list-style-type: none"> • caption service is marked as inactive display indicates bit in packet from upstream source may inadvertently be set as inactive. In this case, closed captioning data (if present) is still processed and passed by the card as normal. • The closed captioning function does not support PAL closed captioning standards. 	Message	Description	Unsupported Frame Rate	Film rate closed-captioning (either as pass-through or up/down conversion) is not supported by the card.	Data Not Present	Packet is marked from closed captioning source external to the card that no data is present.	No Data ID	Packet from closed captioning source external to the card is not properly identified with 0x9669 as the first word of the header (unidentified packet).
Message	Description								
Unsupported Frame Rate	Film rate closed-captioning (either as pass-through or up/down conversion) is not supported by the card.								
Data Not Present	Packet is marked from closed captioning source external to the card that no data is present.								
No Data ID	Packet from closed captioning source external to the card is not properly identified with 0x9669 as the first word of the header (unidentified packet).								
<p>• Closed Captioning Remove/Regenerate and HD Insertion Line Controls</p> 	<p>Allows removal of closed captioning packets and regeneration of packets. This is useful where closed captioning must be moved to a different line than that received on.</p> <p>Note:</p> <ul style="list-style-type: none"> • 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. 								

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

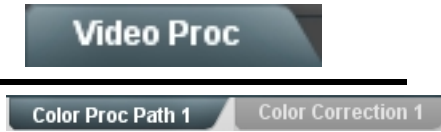
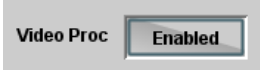

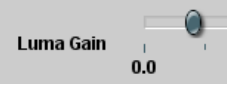

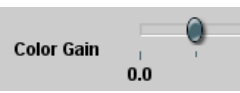


	<p>Provides the following Video Proc and Color Correction parametric controls.</p>
<p>Note: Video Proc tab has identical independent controls for both Path 1 and Path 2 using the Path 1 / Path 2 sub-tabs. Therefore, only the Path 1 controls are shown here. Set controls for other path using the respective sub-tab.</p>	
<p>• Video Proc</p> 	<p>Video Proc (Enable/Disable) provides master on/off control of all Video Proc functions.</p> <ul style="list-style-type: none"> • When set to Disable, Video Proc is bypassed. • When set to Enable, currently displayed parameter settings take effect.
<p>• Reset to Unity</p> 	<p>Reset to Unity provides unity reset control of all Video Proc functions. When Confirm is clicked, a Confirm? pop-up appears, requesting confirmation.</p> <ul style="list-style-type: none"> • Click Yes to proceed with the unity reset. • Click No to reject unity reset.
<p>• Luma Gain</p> 	<p>Adjusts gain percentage applied to Luma (Y channel). (0% to 200% range in 0.1% steps; unity = 100%)</p>
<p>• Luma Lift</p> 	<p>Adjusts lift applied to Luma (Y-channel). (-100% to 100% range in 0.1% steps; null = 0.0%)</p>
<p>• Color Gain</p> 	<p>Adjusts gain percentage (saturation) applied to Chroma (C-channel). (0% to 200% range in 0.1% steps; unity = 100%)</p>
<p>• Color Phase</p> 	<p>Adjusts phase angle applied to Chroma. (-360° to 360° range in 0.1° steps; null = 0°)</p>
<p>• Gang Luma/Color Gain</p> 	<p>When set to On, changing either the Luma Gain or Color Gain controls increases or decreases both the Luma and Color gain levels by equal amounts.</p>

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


<div data-bbox="293 264 592 331" data-label="Section-Header"> <h3>Video Proc</h3> </div> <div data-bbox="212 352 586 386" data-label="Text"> <p>Proc Path 1 Color Correction 1</p> </div>	<div data-bbox="792 302 966 342" data-label="Section-Header"> <h3>Option </h3> </div> <p>(Option +COLOR only) Provides color corrector functions for the individual RGB channels for the card program video path.</p>
<p>• Color Corrector</p> <div data-bbox="280 497 553 564" data-label="Form"> <p>Color Corrector <input type="button" value="On"/></p> </div>	<p>Color Corrector (On/Off) provides master on/off control of all Color Corrector functions.</p> <ul style="list-style-type: none"> When set to Off, all processing is bypassed. When set to On, currently displayed parameters settings take effect.
<p>• Reset to Unity</p> <div data-bbox="280 648 540 711" data-label="Form"> <p>Reset to Unity <input type="button" value="Confirm"/></p> </div>	<p>Reset to Unity provides unity reset control of all Color Corrector functions.</p> <p>When Confirm is clicked, a Confirm? pop-up appears, requesting confirmation.</p> <ul style="list-style-type: none"> Click Yes to proceed with the unity reset. Click No to reject unity reset.
<p>• Luma Gain R-G-B controls</p> <div data-bbox="276 863 695 1146" data-label="Form"> <p>Luma Gain</p> <p>Green <input type="text" value="0.0"/> -100.0 0.0 100.0</p> <p>Blue <input type="text" value="0.0"/> -100.0 0.0 100.0</p> <p>Red <input type="text" value="0.0"/> -100.0 0.0 100.0</p> </div> <p>• Black Gain R-G-B controls</p> <div data-bbox="272 1228 691 1509" data-label="Form"> <p>Black Gain</p> <p>Green <input type="text" value="0.0"/> -100.0 0.0 100.0</p> <p>Blue <input type="text" value="0.0"/> -100.0 0.0 100.0</p> <p>Red <input type="text" value="0.0"/> -100.0 0.0 100.0</p> </div> <p>• Gamma Factor R-G-B controls</p> <div data-bbox="272 1596 691 1877" data-label="Form"> <p>Gamma</p> <p>Green <input type="text" value="1.000"/> 0.125 3.125 5.000 8.000</p> <p>Blue <input type="text" value="1.000"/> 0.125 3.125 5.000 8.000</p> <p>Red <input type="text" value="1.000"/> 0.125 3.125 5.000 8.000</p> </div>	<p>Separate red, green, and blue channels controls for Luma Gain, Black Gain, and Gamma curve adjustment.</p> <p>Gain controls provide gain adjustment from 0.0 to 200.0% range in 0.1% steps (unity = 100.0)</p> <p>Gamma controls apply gamma curve adjustment in 0.125 to 8.000 range in thousandths steps (unity = 1.000)</p> <p>Each of the three control groups (Luma, Black, and Gamma) have a Gang Column button which allows settings to be proportionally changed across a control group by changing any of the group's controls.</p>

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





<div>Video Proc</div> <div>Proc Path 1 Color Correction 1</div>	(continued)
<ul style="list-style-type: none"> • Black Hard Clip 	<p>Applies black hard clip (limiting) at specified percentage. (-6.8% to 50.0%; null = -6.8%)</p>
<ul style="list-style-type: none"> • White Hard Clip 	<p>Applies white hard clip (limiting) at specified percentage. (50.0% to 109.1%; null = 109.1%)</p>
<ul style="list-style-type: none"> • White Soft Clip 	<p>Applies white soft clip (limiting) at specified percentage. (50.0% to 109.1%; null = 109.1%)</p>
<ul style="list-style-type: none"> • Chroma Saturation Clip 	<p>Applies chroma saturation clip (limiting) chroma saturation at specified percentage. (50.0% to 160.0%; null = 160.0%)</p>

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



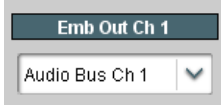


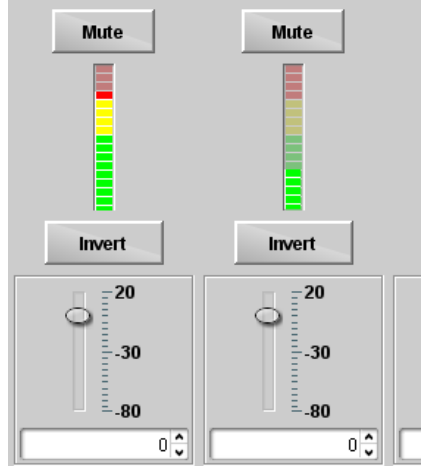
	<p>Provides an audio crosspoint allowing the audio source selection for each embedded audio output channel. Also provides Gain, Phase Invert, and Muting controls and peak level meters for each output channel.</p>
<p>Note:</p> <ul style="list-style-type: none"> • Output Audio tab has identical independent 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). 	
<p>• Group Enable/Disable Controls</p> 	<p>Allows enable/disable of embedded audio groups 1 thru 4 on card program video output to accommodate some legacy downstream systems that may not support all four embedded audio groups.</p> <p>Note: Changing the setting of this control will result in a noise burst in all groups. This control should not be manipulated when carrying on-air content.</p>
<p>• Embedded Output Channel Source</p> 	<p>Using the drop-down list, selects the audio input source to be embedded in the corresponding embedded output channel from the following choices:</p> <ul style="list-style-type: none"> • Card Audio Bus Ch 1 thru Ch 16 (Path1 or 2) • Built-in Tone generators Tone n (-20 dBFS level tone generators with <i>n</i> being frequencies of 100, 200, 300, 400, 500, 600, 700, 800, 900, 1k, 2k, 4k, 6k, 8k, 12k, and 16k) • Flex Bus A thru P mixer sum node outputs • Silence • Option  Audio LTC • Downmixer L • Downmixer R • Option  Embedded Data L and R (SMPTE 337 non-PCM data embedding with option +ANC) Note: Embedded data pair is pair associated with selected path only.
<p>• Channel Mute/Phase Invert/Gain Controls and Peak Level Display</p> 	<p>Provides Mute and phase Invert channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.)</p> <p>Gain controls allow relative gain (in dB) control for the corresponding destination Embedded Audio Group channel.</p> <p>(-80 to +20 dB range in 1.0 dB steps; unity = 0 dB)</p> <p>Note: Although the 9902-2UDX-DI can pass non-PCM data such as Dolby® E or AC-3, setting the gain control to any setting other than default 0 will corrupt Dolby data.</p>

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


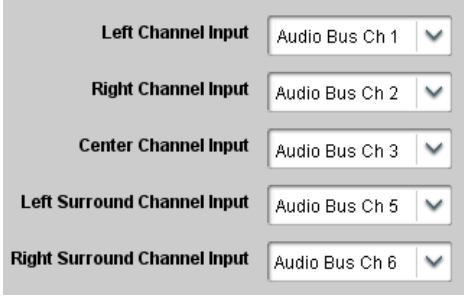
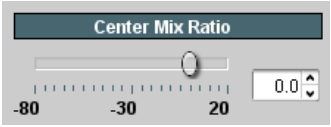
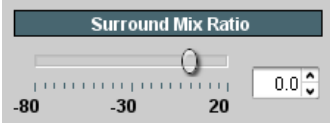
	<p>Provides audio down-mix audio routing selections that multiplexes any five audio channel sources into a stereo pair.</p>
<p>Note:</p> <ul style="list-style-type: none"> • Downmixer sub-tabs offer identical independent controls for both Embedded Path 1 and Path 2. Therefore, only the Path 1 controls 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). 	
<p>• Downmixer Source Controls</p> 	<p>Left Channel Input thru Right Surround Channel Input select the five audio bus source channels to be used for the downmix.</p> <p>Downmix channels Downmixer L and Downmixer R are available as sources for embedded audio outputs using the Channel Source controls described above.</p>
<p>• Center Mix Ratio Control</p> 	<p>Adjusts the attenuation ratio of center-channel content from 5-channel source that is re-applied as Lt and Rt content to the DM-L and DM-R stereo mix.</p> <ul style="list-style-type: none"> • 0 dB setting applies no ratiometric reduction. Center channel content is restored as in-phase center-channel content with no attenuation, making center-channel content more predominate in the overall mix. • Maximum attenuation setting (-80 dB) applies a -80 dB ratiometric reduction of center-channel content. Center-channel content is restored as in-phase center-channel content at a -80 dB ratio relative to overall level, making center-channel content less predominate in the overall mix. <p>(20 dB to -80 dB range in 0 dB steps; default = 0 dB)</p> <p>Note: Default setting is recommended to maintain center-channel predominance in downmix representative to that of the original source 5-channel mix.</p>
<p>• Surround Mix Ratio Control</p> 	<p>Adjusts the attenuation ratio of surround-channel content from 5-channel source that is re-applied as Lo and Ro content to the DM-L and DM-R stereo mix.</p> <ul style="list-style-type: none"> • 0 dB setting applies no ratiometric reduction. Surround-channel content is restored with no attenuation, making Lo and Ro content more predominate in the overall mix. • Maximum attenuation setting (-80 dB) applies a -80 dB ratiometric reduction of surround-channel content. Surround-channel content is restored at a -80 dB ratio relative to overall level, making surround-channel content less predominate in the overall mix. <p>(20 dB to -80 dB range in 0 dB steps; default = 0 dB)</p> <p>Note: Default setting is recommended to maintain surround-channel predominance in downmix representative to that of the original source 5-channel mix.</p>

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

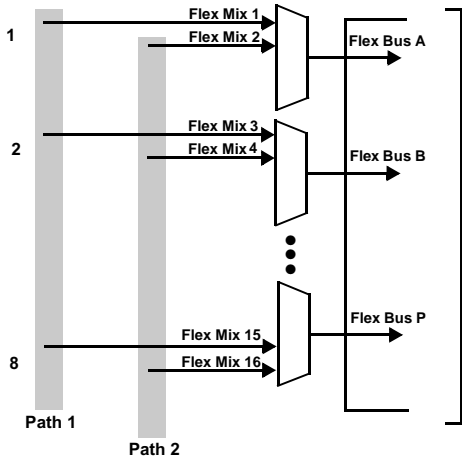
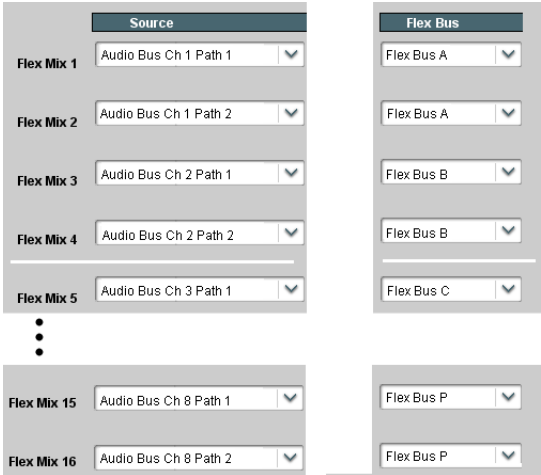

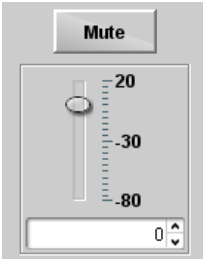
<div>Output Audio Routing/Controls</div> <div>Flex Mix</div>	<p>Output Flex Mix – Provides a 16-channel mixer in which each of the inputs can be mixed onto up to 16 independent output summing nodes. The input sources include audio bus channels from the card two embedded audio paths. Each input channel has independent gain and mute controls.</p>
<p>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.</p> 	
<p>Note: For each Flex Mix input channel, its source should be considered and appropriately set. Unused input channels should be set to the Silence selection.</p>	
<p>• Flex Bus Input Channel Source/Bus Assignment</p> 	<p>Using the Source drop-down list, selects the audio input source to be directed to the corresponding bus channel from the choices listed below.</p> <ul style="list-style-type: none"> • Silence • Audio Bus Ch 1 thru Ch 16 • Tones (100 Hz thru 16 kHz) • Downmix L or Downmix R <p>The Flex Bus drop-down selects the bus (A thru P) to which the input is assigned to.</p>
<p>• Gain / Mute Control</p> 	<p>Provides relative gain (in dB) control and a channel Mute checkbox.</p> <p>(-80 to +20 dB range in 0.1 dB steps; unity = 0.0 dB)</p>

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

<div>Output Audio Routing/Controls</div> <div> <div>Path 1 Source</div> <div>AES Output</div> </div>	<div>Provides an audio crosspoint allowing the audio source selection for each AES audio output channel. Also provides Gain, Phase Invert, and Muting controls and peak level meters for each output channel.</div>
<div> <div>A (left)</div> <div> <div>Path 1 Source</div> <div>Bus Ch 1</div> <div>Bus Ch 2</div> <div>...</div> <div>Bus Ch 16</div> </div> <div> <div>Path 2 Source</div> <div>Bus Ch 1</div> <div>Bus Ch 2</div> <div>...</div> <div>Bus Ch 16</div> </div> <div> <div>The Path 1 and Path 2 sources are queued from respective Path 1 and Path 2 audio bus choices using the individual Path 1 Source and Path 2 Source drop-downs</div> <div> <div>Path 1 Source</div> <div>Audio Bus Ch 1</div> <div>Path 2 Source</div> <div>Audio Bus Ch 5</div> </div> </div> <div> <div>B (right)</div> <div> <div>Path 1 Source</div> <div>Bus Ch 1</div> <div>Bus Ch 2</div> <div>...</div> <div>Bus Ch 16</div> </div> <div> <div>Path 2 Source</div> <div>Bus Ch 1</div> <div>Bus Ch 2</div> <div>...</div> <div>Bus Ch 16</div> </div> </div> </div>	<div> <div>AES Output Pair</div> <div> <div>The queued selections, as an AES pair, from Path 1 or Path 2 are routed to the discrete AES pair using the Path Select toggle control</div> <div> <div>Path 1</div> <div>Path 2</div> </div> </div> <div> <div>For AES Out channels 1 thru 16, individual controls are provided as shown below.</div> <div> <div>In the example below, AES Out Ch 1/2 are using bus channels Ch 1 and Ch 2 from Path 1. If the Path button is toggled to Path 2, queued selections Ch 5 and Ch 6 from Path 2 will then be routed to this AES output.</div> <div> <div> <div>AES Out Ch 1</div> <div>AES Out Ch 2</div> <div>...</div> <div>AES Out Ch 16</div> </div> <div> <div>Path 1</div> <div>Path 1</div> <div>...</div> <div>Path 2</div> </div> <div> <div>Path 1 Source</div> <div>Audio Bus Ch 1</div> <div>Path 2 Source</div> <div>Audio Bus Ch 5</div> <div>Mute</div> <div> <div>20</div> <div>30</div> <div>80</div> <div>0</div> </div> <div>Invert</div> </div> <div> <div>Path 1 Source</div> <div>Audio Bus Ch 2</div> <div>Path 2 Source</div> <div>Audio Bus Ch 6</div> <div>Mute</div> <div> <div>20</div> <div>30</div> <div>80</div> <div>0</div> </div> <div>Invert</div> </div> <div> <div>Path 1 Source</div> <div>Audio Bus Ch 16</div> <div>Path 2 Source</div> <div>Audio Bus Ch 16</div> <div>Mute</div> <div> <div>20</div> <div>30</div> <div>80</div> <div>0</div> </div> <div>Invert</div> </div> </div> </div> </div> </div>

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



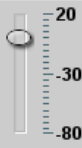




Output Audio Routing/Controls	(continued)
<div> <div>Mixer Path 2</div> <div>AES Output</div> </div>	
<p>Note:</p> <ul style="list-style-type: none"> • AES Out Ch 2 and other channels have controls identical to the Source, Gain, Mute, and Invert controls described here for AES Out Ch 1. Therefore, only 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. 	
<p>• AES Output Channel Source</p> <div data-bbox="280 590 570 690"> <div>AES Out Ch 1</div> <div>Audio Bus Ch 1 Path 1</div> </div>	<p>Using the Source drop-down list, selects the audio input source to be routed to the corresponding AES output channel from the following choices:</p> <ul style="list-style-type: none"> • Card Audio Bus Ch 1 thru Ch 16 (Path 1 or 2) • Built-in Tone generators Tone <i>n</i> (-20 dBFS level tone generators with <i>n</i> being frequencies of 100, 200, 300, 400, 500, 600, 700, 800, 900, 1k, 2k, 4k, 6k, 8k, 12k, and 16k) • Flex Bus A thru P mixer sum node outputs • Silence • Option  Audio LTC (Path1 or 2) • Downmixer L (Path1 or 2) • Downmixer R (Path1 or 2)
<p>• Channel Mute/Phase Invert/Gain Controls and Peak Level Display</p> <div data-bbox="272 1003 683 1472"> <div> <div>Mute</div> <div></div> <div>Invert</div> <div></div> <div></div> </div> <div> <div>Mute</div> <div></div> <div>Invert</div> <div></div> <div></div> </div> </div>	<p>Provides Mute and phase Invert channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.)</p> <p>Gain controls allow relative gain (in dB) control for the corresponding destination AES output channel.</p> <p>(-80 to +20 dB range in 1.0 dB steps; unity = 0 dB)</p> <p>Note: Although the 9902-2UDX-DI can pass non-PCM data such as Dolby® E or AC-3, setting the gain control to any setting other than default 0 will corrupt Dolby data.</p>

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

<div data-bbox="256 254 607 327" style="background-color: #333; color: white; text-align: center; padding: 5px;">Timecode</div> <div data-bbox="264 338 511 373" style="display: flex; border: 1px solid #ccc; padding: 2px;"> <div data-bbox="264 338 386 373" style="background-color: #ccc; padding: 2px 5px;">Path 1</div> <div data-bbox="386 338 511 373" style="padding: 2px 5px;">Path 2</div> </div>	<p>Provides timecode data extraction from various sources, and provides formatting and re-insertion controls for inserting the timecode into the output video.</p>																
<p>Note:</p> <ul style="list-style-type: none"> • 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. 																	
<p>Shown below is an example in which received 525i 5994 SDI video with VITC waveform timecode is being processed to output ATC_VITC timecode. To re-format and insert the timecode data, the following can be performed using the Timecode function. Each Timecode control is fully described on the pages that follow.</p> <div data-bbox="228 669 771 791" style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <div style="display: flex; align-items: center; justify-content: space-between;"> <div>525i 5994 w/ VITC Waveform</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">9902-2UDX-DI</div> <div>525i 5994 w/ ATC_VITC</div> </div> </div> <div data-bbox="805 655 1198 812" style="border: 1px solid #ccc; padding: 5px; margin: 10px 0;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;">Reference VITC Status</td> <td>05:49:08:20.1</td> </tr> <tr> <td>Input VITC Status</td> <td>05:49:08:19.1</td> </tr> <tr> <td>Input ATC_LTC Status</td> <td>Not Present</td> </tr> <tr> <td>Input ATC_VITC Status</td> <td>Not Present</td> </tr> </table> </div> <div data-bbox="224 831 771 997" style="margin: 10px 0;"> <p>A Noting that the incoming video contains VITC waveform timecode data (as shown in the status display), set the Source Priority drop-down lists to include VITC Waveform timecode data (SDI VITC) as a choice. This extracts VITC Waveform timecode data from the incoming video.</p> </div> <div data-bbox="805 842 1127 1010" style="border: 1px solid #ccc; padding: 5px; margin: 10px 0;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;">Source Priority 1</td> <td>Input VITC</td> </tr> <tr> <td>Source Priority 2</td> <td>Input ATC_VITC</td> </tr> <tr> <td>Source Priority 3</td> <td>Reference VITC</td> </tr> <tr> <td>Source Priority 4</td> <td>Free Run</td> </tr> </table> </div>		Reference VITC Status	05:49:08:20.1	Input VITC Status	05:49:08:19.1	Input ATC_LTC Status	Not Present	Input ATC_VITC Status	Not Present	Source Priority 1	Input VITC	Source Priority 2	Input ATC_VITC	Source Priority 3	Reference VITC	Source Priority 4	Free Run
Reference VITC Status	05:49:08:20.1																
Input VITC Status	05:49:08:19.1																
Input ATC_LTC Status	Not Present																
Input ATC_VITC Status	Not Present																
Source Priority 1	Input VITC																
Source Priority 2	Input ATC_VITC																
Source Priority 3	Reference VITC																
Source Priority 4	Free Run																
<div data-bbox="224 1041 771 1125" style="margin: 10px 0;"> <p>B In this example, it is desired to provide SDI ATC_VITC timecode data in the processed output video. As such, set SD ATC VITC Insertion to Enabled.</p> </div> <div data-bbox="841 1058 1354 1146" style="border: 1px solid #ccc; padding: 5px; margin: 10px 0;"> <div style="display: flex; align-items: center;"> <div style="width: 40%;">SD ATC_VITC Insertion</div> <div>Enabled</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="width: 40%;">SD ATC Insertion Line</div> <div>13 - SMPTE 12M-2-2008 Recommended</div> </div> </div> <div data-bbox="284 1157 771 1205" style="margin: 10px 0;"> <p>In the example here, the line numbers are set to the default SMPTE 12M-2-2008 recommended values.</p> </div> <div data-bbox="240 1220 1365 1829" style="margin: 10px 0;"> </div>																	

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



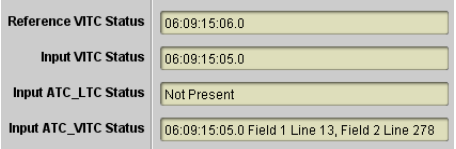
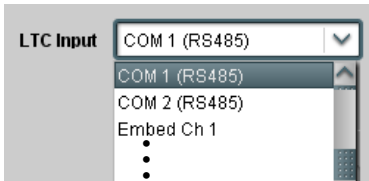


	(continued)
<p>Option  Audio LTC controls described below only appear on cards with +LTC licensed optional feature. This feature allows audio LTC from an audio channel to be used as a timecode source, with conversion to a selected SMPTE 12M format on the output video.</p>	
<p>• Timecode Source Status Displays</p> 	<p>Displays the current status and contents of the four supported external timecode formats shown to the left.</p> <ul style="list-style-type: none"> • If a format is receiving timecode data, the current content (timecode running count and line number) is displayed. • If a format is not receiving timecode data, Not Present is displayed.
<p>• LTC Input Control</p> 	<p>Selects source to be used by card to receive LTC as listed below.</p> <ul style="list-style-type: none"> • RS-485 over COM1 or COM 2 • Audio LTC over Emb Ch 1 thru Ch 16 <p>Note: • Audio LTC Source must be appropriately set for card to receive and process received LTC.</p> <ul style="list-style-type: none"> • If COM 1 or COM 2 is used for LTC receive, the port function must be set for LTC. See COMM Ports Setup Controls (p. 3-48) for more information. • Card audio inputs will not center inputs with DC offset. If input has DC offset, the source may need to be capacitively coupled to remove the offset. • LTC embedded channel selections are only channels associated with the selected path.
<p>• Mute LTC Control</p> 	<p>Allows LTC audio or RS-485 output to mute upon loss of selected timecode inputs.</p> <ul style="list-style-type: none"> • When set to Enabled and input timecode is lost: <ul style="list-style-type: none"> • RS-485 LTC output goes to frozen state. • Audio LTC output mutes. • When set to Disabled and input timecode is lost: <ul style="list-style-type: none"> • RS-485 LTC output keeps counting, with count value being free-run count. • Audio LTC output is not muted, with count value being free-run count. <p>Note: If muting upon loss of a particular input format is desired, set all Source Priority 1 thru 4 to that particular input format. If this is not done, the card failover timecode selection may substitute another format choice for the format not being received.</p>
<p>• Incoming ATC Packet Removal Control</p> 	<p>Enables or disables removal of existing input video ATC timecode packets from the output. This allows removal of undesired existing timecodes from the output, resulting in a “clean slate” where only desired timecodes are then re-inserted into the output. (For example, if both SDI ATC_VITC and ATC_LTC are present on the input video, and only ATC_LTC is desired, using the Removal control will remove both timecodes from the output. The ATC_LTC timecode by itself can then be re-inserted on the output using the other controls discussed here.)</p> <p>Note: Set this control to Enabled if Free-Run timecode is to be used. If incoming packets are not removed, output embedded SMPTE timecode may alternate between free-run and embedded SMPTE timecode values.</p>

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

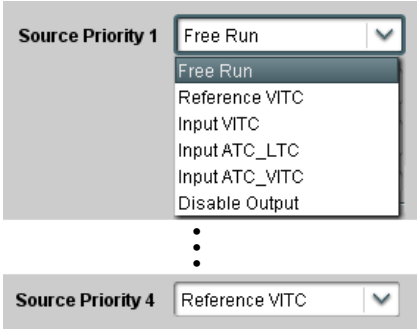
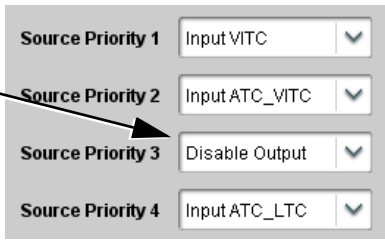
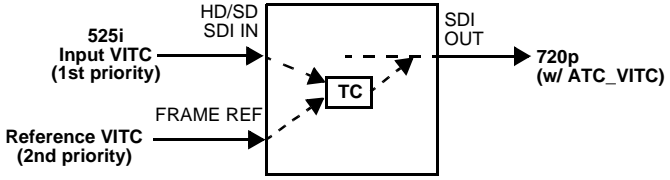
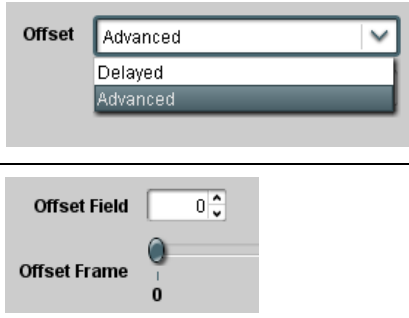
<div>Timecode</div> <div>Path 1 Path 2</div>	(continued)
<p>• Source Priority</p>  <p>Source Priority 1: Free Run</p> <p>Source Priority 4: Reference VITC</p> <p>! Disable Output setting should be used with care. If Disable Output is selected with alternate intended format(s) set as a lower priority, the card will indeed disable all timecode output should the ordinate preferred format(s) become unavailable. Typically, choices other than Disable should be used if a timecode output is always desired, with Disable only being used to remove all timecode data.</p> <p>In this example, even though and ATC_LTC could be available to substitute for ATC_VITC not being present, the card will revert to no timecode output since the choice of Disable Output “out-prioritizes” ATC_LTC with these settings.</p> 	<p>Selects the priority assigned to each of the four supported external formats, and internal Free Run in the event the preferred source is unavailable.</p> <p>Source Priority 1 thru Source Priority 4 select the preferred format to be used in descending order (i.e., Source Priority 2 selects the second-most preferred format, and so on. See example below.)</p>  <p>In this example, Input VITC 1st priority selection selects SDI VITC (received on SDI input) over reference VITC (received on frame reference) regardless of video input material source to be processed by the card.</p> <p>The selected timecode source is embedded on the SDI video output (in this example, 720p) using the selected line number. In this example, if the SDI VITC on the SDI input becomes unavailable, the card then uses the reference VITC data received on the frame reference.</p> <p>Note: Set Incoming ATC Packet Removal Control to Enabled if Free-Run timecode is to be used. If incoming packets are not removed, output embedded SMPTE timecode may alternate between free-run and embedded SMPTE timecode values.</p> <p>The choices shown here will allow ATC_LTC to “out-prioritize” Disable Output if ATC_VITC is not available.</p>
<p>• Offset Controls</p> 	<p>Allows the current timecode count to be advanced or delayed on the output video.</p> <ul style="list-style-type: none"> • Offset Advance or Delay selects offset advance or delay. • Offset Field delays or advances or delays timecode by one field. • Offset Frame delays or advances or delays timecode by up to 5 frames. <p>Note: Default settings are null, with both controls set at zero as shown.</p>

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

<div> <div>Timecode</div> <div> <div>Path 1</div> <div>Path 2</div> </div> </div>	(continued)
<ul style="list-style-type: none"> • Output Status Display <div> <div>Output Status</div> <div>00:04:46:06.1 (Source: SDI VITC)</div> </div>	<p>Displays the current content and source being used for the timecode data as follows:</p> <div> <div>Output Status</div> <div>00:04:46:06.1 (Source: SDI VITC)</div> </div> <ul style="list-style-type: none"> • Output status OK (in this example, SDI VITC timecode received and outputted). <div> <div>Output Status</div> <div>Insertion Disabled</div> </div> <ul style="list-style-type: none"> • Timecode Insertion button set to Disabled; output insertion disabled. <p>Note:</p> <ul style="list-style-type: none"> • If timecode is not available from Source Priority selections performed, timecode on output reverts to Free Run (internal count) mode. • Because the 1's digit of the display Frames counter goes from 0 to 29, the fractional digit (along with the 1's digit) indicates frame count as follows: <ul style="list-style-type: none"> 0.0 Frame 0 0.1 Frame 1 1.0 Frame 2 1.1 Frame 3 • • • 29.1 Frame 59
<ul style="list-style-type: none"> • Audio LTC Output <div> <div>Option</div> <div></div> </div>	<p>Audio LTC output is routed to desired embedded audio outputs using the Output Audio Routing/Controls (p. 3-29). Whatever timecode is displayed on the Output Status is converted to audio LTC and available as an LTC audio output.</p>
<p>Note:</p> <ul style="list-style-type: none"> • Although the output line drop-down on the controls described below will allow a particular range of choices, the actual range is automatically clamped (limited) to certain ranges to prevent inadvertent conflict with active picture area depending on video format. See Ancillary Data Line Number Locations and Ranges (p. 3-9) for more information. • The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data. 	
<ul style="list-style-type: none"> • SD VITC Waveform Insertion Controls <div> <div>SD VITC Waveform Output 1 Line Number</div> <div>14</div> <div>SD VITC Waveform Output 2 Line Number</div> <div>16</div> <div>SD VITC Waveform Insertion</div> <div>Enabled</div> </div>	<p>For SD output, enables or disables SD VITC waveform timecode insertion into the output video, and selects the VITC1 and VITC2 line numbers (6 thru 22) where the VITC waveform is inserted.</p> <p>Note:</p> <ul style="list-style-type: none"> • If only one output line is to be used, set both controls for the same line number. • SD VITC Waveform Insertion control only affects VITC waveforms inserted (or copied to a new line number) by this function. An existing VITC waveform on an unscaled SD SDI stream is not affected by this control and is passed on an SDI output.
<ul style="list-style-type: none"> • SD ATC Insertion Control <div> <div>SD ATC_VITC Insertion</div> <div>Enabled</div> <div>SD ATC Insertion Line</div> <div>13 - SMPTE 12M-2-2008 Recommended</div> </div>	<p>For SD output, enables or disables SD ATC_VITC timecode insertion into the output video, and selects the line number for ATC_VITC.</p>

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


	(continued)
<p>• HD ATC_LTC Insertion Control</p> <p>HD ATC_LTC Insertion <input checked="" type="checkbox"/> Enabled</p> <p>HD ATC_LTC Insertion Line 10 - SMPTE 12M-2-2008 Recommended ▼</p>	<p>For HD output, enables or disables ATC_LTC timecode insertion into the output video, and selects the line number for ATC_LTC timecode data.</p>
<p>• HD ATC_VITC Insertion Control</p> <p>HD ATC_VITC Insertion <input checked="" type="checkbox"/> Enabled</p> <p>HD ATC_VITC Insertion Line Field 1 9 - SMPTE 12M-2-2008 Recommended ▼</p> <p>HD ATC_VITC Insertion Line Field 2 8 (571) - SMPTE 12M-2-2008 Recommended ▼</p>	<p>For HD output, enables or disables ATC_VITC timecode insertion into the output video, and selects the line number for ATC_VITC1 and ATC_VITC2.</p>
<p>• ATC_VITC Legacy Support Control</p> <p>ATC_VITC Legacy Support <input checked="" type="checkbox"/> Disabled</p>	<p>When enabled, accommodates equipment requiring ATC_VITC packet in both fields as a "field 1" packet (non-toggling).</p> <p>Note: Non-toggling VITC1 and VITC2 packets do not conform to SMPTE 12M-2-2008 preferences. As such, ATC_VITC Legacy Support should be enabled only if required by downstream equipment.</p>
<p>• Free Run Timecode Controls</p> <p>Free Run Hours 7 ▼</p> <p>Free Run Minutes 0 ▼</p> <p>Free Run Seconds 0 ▼</p> <p>Apply Free Run Values <input type="button" value="Confirm"/></p>	<p>Allows an initial (starting) count to be applied to output video timecode when Free Run insertion is enabled.</p> <p>Note:</p> <ul style="list-style-type: none"> • Initialization can only be applied when card is outputting Free Run timecode (as shown by Output Status displaying "Free Run"). • If failover to Free Run occurs due to loss of external timecode(s), the Free Run count assumes its initial count from the last valid externally supplied count.

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





<div data-bbox="235 262 503 325">AFD</div> <div data-bbox="235 346 548 378">AFD/WSS/VI AFD Map</div>	<p>Allows assignment of AFD, WSS and/or VI codes to the SDI output video, and allows custom ARC settings to be applied for each code. Also allows translations between WSS, VI, and AFD active ARC formats.</p> <p>Provides active ARC re-aspecting, resulting in a properly scaled and cropped image area.</p>
<p>Note: AFD 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.</p>	
<div data-bbox="305 625 470 655">Without AFD</div> <div data-bbox="311 745 500 823">NTSC-Coded (4:3) up-converted 1080i Video Signal</div> <div data-bbox="349 877 527 982">NTSC-Coded image on 16:9 display shows letterbox cropping</div> <div data-bbox="548 892 799 1054"></div> <div data-bbox="938 766 1075 814">Re-Aspect to 16:9</div> <div data-bbox="1149 745 1344 823">1080i Video Signal with 16:9 uncorrected ARC</div> <div data-bbox="922 877 1101 1054">Uncompensated up-conversion results in "postage stamp" effect with both letterbox and sidebars visible on 16:9 display</div> <div data-bbox="1117 892 1367 1054"></div>	
<div data-bbox="305 1136 425 1165">With AFD</div> <div data-bbox="305 1207 500 1306">NTSC-Coded (4:3) 1080i Video Signal with 1010 AFD Code</div> <div data-bbox="349 1381 527 1486">NTSC-Coded image on 16:9 display shows letterbox cropping</div> <div data-bbox="548 1396 799 1558"></div> <div data-bbox="597 1207 760 1318">1010 AFD Code Received and Applied to Scaler</div> <div data-bbox="938 1228 1075 1276">Re-Aspect to 16:9</div> <div data-bbox="1149 1207 1344 1285">1080i Video Signal with 16:9 corrected ARC</div> <div data-bbox="880 1381 1084 1537">AFD Corrected up-conversion/ re-aspect results in intended image area properly visible on 16:9 display</div> <div data-bbox="1101 1396 1351 1558"></div>	

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

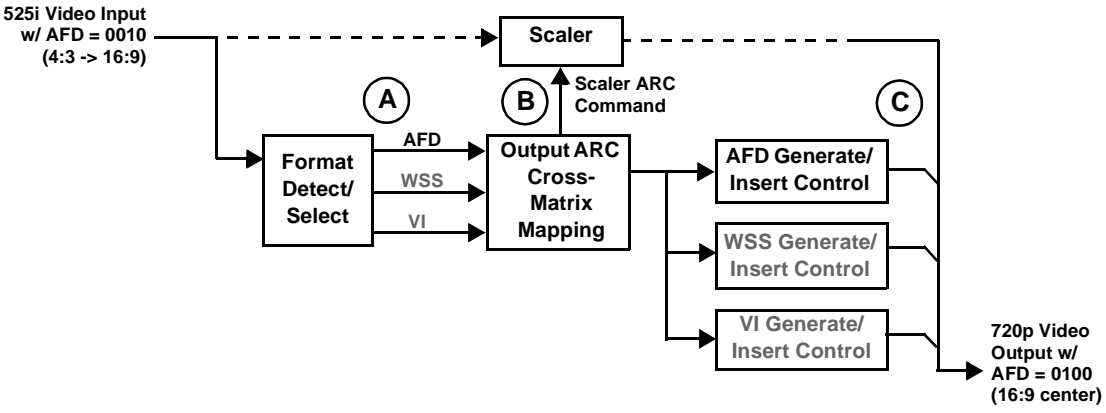
<div style="background-color: #333; color: white; padding: 5px; text-align: center; font-weight: bold;">AFD</div> <div style="display: flex; justify-content: space-between; padding: 5px;"> AFD/WSS/VI AFD Map </div>	(continued)
<p>Shown below is an example in which received 525i5994 SDI video is being up-converted to 720p5994. The settings shown in the example below provide for directing the scaler to re-aspect the 4:3 input video to full, centered 16:9 re-aspecting, and mark the output video with the AFD code representing the new re-aspected H/V format.</p>  <p>(A) Noting that the incoming video contains AFD coding, Trigger on AFD is set to AFD, with other choices set to Off. The settings here allow ARC to trigger only on an AFD-coded input.</p> <p>(B) In this example, it is desired to use the H/V re-aspecting inherent in the received video ARC, perform the re-aspecting with no modification, and output an AFD code representing the re-aspecting performed.</p> <p>As such, Force Input Mapping is set to Follow Trigger, thereby bypassing the Output ARC Cross-Matrix Map table and directly perform the re-aspecting defined by the received code (in this example, Letterbox 16x9). Also in this example, the scaler is directed to apply the output AFD re-aspecting by setting Scaler Follow AFD to Enabled.</p> <p>(C) In this example, since only AFD is to be outputted, AFD Output is set to Enabled, with WSS and VI choices set to Disabled.</p> <p>AFD Status shows AFD code now being outputted.</p> <p>The insertion line number (using its default value here), can be set using the AFD Output Line controls (for the progressive format in this example, the Field 1 control serves as the line number control).</p>	<div data-bbox="928 982 1380 1266"> <p>Input</p> <p>AFD Status <input checked="" type="radio"/> Detected, 4x3 0010 Letterbox 16x9 Top</p> <p>WSS Status <input type="radio"/> Not Present</p> <p>VI Status <input type="radio"/> Not Present</p> <p>Trigger on AFD AFD</p> <p>Trigger on WSS Off</p> <p>Trigger on VI Off</p> </div> <div data-bbox="1068 1333 1380 1459"> <p>Force Input Mapping Follow Trigger</p> <p>Scaler follow AFD Enabled</p> </div> <div data-bbox="893 1528 1380 1869"> <p>Output</p> <p>AFD Status <input checked="" type="radio"/> Enabled, 16x9 0100 Letterbox 16x9 Center</p> <p>WSS Status <input type="radio"/> Disabled or no valid mapping</p> <p>VI Status <input type="radio"/> Disabled or no valid mapping</p> <p>AFD Output Enabled</p> <p>WSS Output Disabled</p> <p>VI Output Disabled</p> <p>AFD Output Line Field 1 10</p> <p>AFD Output Line Field 2 22</p> </div>

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

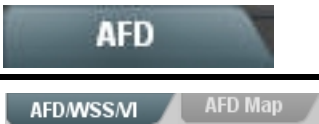
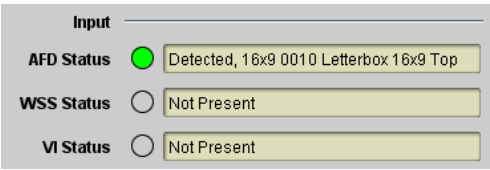

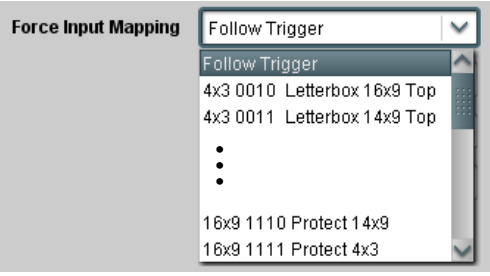
	<p>AFD/WSS/VI sub-tab provides prioritized and gated input monitoring for AFD, WSS and/or VI formats. Also provides translation between input and output AFD, WSS, and VI ARC formats.</p>
<p>Note:</p> <ul style="list-style-type: none"> Line number control available only for AFD format. WSS and VI use fixed line numbers per applicable standards. Some AFD codes are not supported in WSS and VI formats. Refer to AFD/WSS/VI Translation Matrix on page 3-43 for more information. 	
<p>• Input Format Status Displays</p> 	<p>Displays the current status and contents of the three supported ARC formats shown to the left.</p> <ul style="list-style-type: none"> If a format is received, the current formatting code and description is displayed (as shown in the example). If a format is not receiving data, Not Present is displayed.
<p>• Scaler AFD Enable</p> 	<p>Enables scaler to apply ARC settings provided by ARC controls in this function.</p> <ul style="list-style-type: none"> Enabled sets the output aspect ratio to track with AFD settings performed in this tab, overriding any other scaler manual ARC control settings. Disabled allows ARC coding processing performed in this tab, but does not apply ARC settings in scaler. <p>Note:</p> <ul style="list-style-type: none"> This control also appears on the Scaler tab and is mutually ganged with the selection performed on either tab. Scaler follows AFD functions only when a valid AFD output format is being generated and enabled. The scaler only observes AFD code commands, with the controls on this tab set to generate an AFD-coded output. WSS and/or VI formats must be translated to a supported AFD cross-translation for scaler active ARC to function when using WSS or VI input formats.
<p>• Input Mapping</p> 	<p>When received ARC code is received, applies H/V coding as follows:</p> <ul style="list-style-type: none"> Follow Trigger – Uses the ARC coding inherent in the received triggering ARC. 4x3 ARC Codes – For received triggering formats coded as 4x3, applies the H/V coding selected in this drop-down. 16x9 ARC Codes – For received triggering formats coded as 16x9, applies the H/V coding selected in this drop-down. <p>Note: Settings performed here can be applied directly to the output video, or the settings applied here can be custom modified if desired for any of the 11 4x3 codes and any of the 11 16x9 codes available here using the AFD Map sub-tab. Refer to AFD/WSS/VI Translation Matrix on page 3-43 for more information and coding descriptions.</p>

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

<div style="background-color: #333; color: white; padding: 5px; text-align: center; font-weight: bold;">AFD</div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> AFD/WSS/VI AFD Map </div>	(continued)
<p>• Input Triggering Controls</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p>Trigger on AFD Off ▼</p> <p>Trigger on WSS Off ▼</p> <p>Trigger on VI Off ▼</p> <p>WSS/VI Priority WSS</p> </div>	<p>Individual ARC format input controls allow accepting or rejecting received ARC formats as follows:</p> <ul style="list-style-type: none"> • Trigger on AFD: <ul style="list-style-type: none"> • Off rejects AFD-coded triggering. • On allows trigger on AFD. • Trigger on WSS: <ul style="list-style-type: none"> • Off rejects WSS-coded triggering. • AFD allows triggering on AFD-coded WSS. • ETSI allows triggering on ETSI-coded WSS. • Trigger on VI: <ul style="list-style-type: none"> • Off rejects VI-coded triggering. • AFD allows triggering on AFD-coded WSS. • SMPTE allows triggering on SMPTE-coded WSS. <p>Note: If multiple formats are present on the input video, AFD preempts other formats, followed by WSS or VI (as set by the WSS/VI Priority control).</p>
<p>• Output Enable Controls</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">Output </p> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div>AFD Output</div> <div>Enabled ▼</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div>WSS Output</div> <div>Disabled ▼</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div>VI Output</div> <div>Disabled ▼</div> </div> </div>	<p>Individual ARC format input controls allow accepting or rejecting received ARC formats as follows:</p> <ul style="list-style-type: none"> • AFD Output: <ul style="list-style-type: none"> • Disable turns off AFD format on output. • Enable inserts AFD packet on output, and allows changing line number. • Follow Input Line inserts AFD packet on same line as received AFD line number (where applicable). • WSS Output: <ul style="list-style-type: none"> • Disable turns off WSS format on output. • AFD Enabled inserts AFD-coded WSS on output. • ETSI Enabled inserts ETSI-coded WSS on output. • VI Output: <ul style="list-style-type: none"> • Disable turns off WSS format on output. • AFD Enabled inserts AFD-coded VI on output. • SMPTE Enabled inserts SMPTE-coded VI on output.
<p>• Output Status Displays</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">Output </p> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div>AFD Status ●</div> <div style="border: 1px solid #ccc; padding: 2px 10px;">Enabled, 16x9 1111 Protect 4x3</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div>WSS Status ○</div> <div style="border: 1px solid #ccc; padding: 2px 10px;">Disabled or no valid mapping</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div>VI Status ●</div> <div style="border: 1px solid #ccc; padding: 2px 10px;">Enabled, SMPTE 6 625/50/16x9</div> </div> </div>	<p>Displays the current output status, coding, and H/V ratio for AFD, WSS, and VI formats.</p> <ul style="list-style-type: none"> • If a format is active and enabled (as set with the Output Enable controls), the code and H/V description is displayed. • If a format is not outputting data, Disabled is displayed. <p>Note:</p> <ul style="list-style-type: none"> • The code displayed shows the outputted code. If the code is modified by user settings performed in the AFD Map sub-tab, these changes are shown here. Refer to AFD Map sub-tab for more information. • As shown in the example, settings that result in invalid mapping across format translations will display Disabled. In these cases, no output is inserted for the format.
<p>• AFD Output Line Control</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p>AFD Output Line Field 1 10 ▲▼</p> <p>AFD Output Line Field 2 22 ▲▼</p> </div>	<p>Allows selecting the line location of the AFD data within the video signal Ancillary Data space.</p> <p>Note:</p> <ul style="list-style-type: none"> • The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data. • For progressive formats, the Field 1 control serves as the line number control.

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

AFD

AFD/WSS/VI

AFD Map

(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-DI Function Menu List — continued

AFD		AFD Map sub-tab allows bidirectionally re-aspecting from 4x3 frames to companion 16x9 frames, and allows customizing aspect ratio settings for the AFD codes (and the corresponding WSS and VI translation equivalents) supported by the card.				
AFD/WSS/VI		AFD Map				
Input: 4x3						
		V Zoom(60-200)	H Zoom(60-200)	Pan	Tilt	Output AFD Code
4x3 Letterbox 16x9 Top 0010		100.0	100.0	0.0	12.5	16x9 0010 Letterbox 16x9 Top
4x3 Letterbox 14x9 Top 0011		116.7	100.0	0.0	7.1	16x9 0011 Letterbox 14x9 Top
⋮						
4x3 Letterbox 16x9 Protect 4x3 1111		133.3	100.0	0.0	0.0	16x9 1111 Protect 4x3
Input: 16x9						
		V Zoom(60-200)	H Zoom(60-200)	Pan	Tilt	Output AFD Code
16x9 Letterbox 16x9 Top 0010		75.0	100.0	0.0	-12.5	4x3 0010 Letterbox 16x9 Top
16x9 Letterbox 14x9 Top 0011		75.0	100.0	0.0	-7.1	4x3 0011 Letterbox 14x9 Top
⋮						
16x9 Protect 4x3 1111		100.0	133.0	0.0	0.0	4x3 1111 Letterbox 16x9 Protect 4x3

Separate control groups for 4x3 and 16x9 coded input frames allow custom ARC (as well as pan/tilt) for various coded frames.

- By default, each row is set for its companion re-aspected output, along with output AFD code for the companion output (i.e., 4x3 frames get re-aspected to a companion 16x9 re-aspecting and AFD code, and similarly 16x9 frames get re-aspected to a companion 4x3 re-aspecting and AFD code).

In this example, default settings provide the scaling and tilt factors to convert a 16x9-coded 0010 frame to its companion 4x3 0010 Letterbox 16x9 Top frame.

Input: 16x9						
		V Zoom(60-200)	H Zoom(60-200)	Pan	Tilt	Output AFD Code
16x9 Letterbox 16x9 Top 0010		75.0	100.0	0.0	-12.5	4x3 0010 Letterbox 16x9 Top

Scaling and Pan/Tilt factors effect the re-aspecting and position offset here that result in a 4x3 0010 Letterbox 16x9 Top image when these defaults are applied.

The AFD coding representing the applied re-aspecting is applied to the output video.

- When the scaler is set to **Scaler follow AFD** any V, H, pan, or tilt custom changes made here are directly applied to the output video.
- To simply output an AFD code (without any re-aspecting to be done by the card) set the **No Input** row to the desired code to be outputted (in this example, "16x9 Letterbox 16x9 Center; 0100").

Output AFD Code	
No Input	16x9 Letterbox 16x9 Center

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

<div style="background-color: #333; color: white; padding: 5px; text-align: center; font-weight: bold;">Ancillary Data Processing</div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> <div style="background-color: #ccc; padding: 2px 5px;">ADP Routing</div> <div style="background-color: #ccc; padding: 2px 5px;">IP Port Setup</div> </div> <div style="background-color: #007bff; color: white; padding: 5px; margin-top: 5px; display: flex; align-items: center;"> Option ➡ </div>	<p>Provides controls for VANC/HANC ancillary data de-embedding and embedding to and from program video stream. Data can be extracted and inserted within the card (Bridge mode), or inserted and/or extracted to and from external interfaces via serial or IP interfaces.</p>
<p>Note: Separate Path 1 and Path 2 tabs are provided for this function with identical independent controls for both Path 1 and Path 2. Only the Path 1 controls are shown here. Set controls for other path using the other tab.</p>	
<p>Eight individual Ancillary Data Processors (ADPs) provide for insertion, extraction, or bridging ancillary data to and from the card program video SDI stream.</p>	
<p>Mode controls select the type of ANC processing:</p> <ul style="list-style-type: none"> • Bridge extracts ANC from the deserialized input video and re-inserts in the output video, thereby allowing full control of specialized ANC packets • Insert and Extract modes respectively allow insertion to the output stream or extraction from the input stream between external interfaces 	<p>Interface controls select either card IP or serial data (COM 1) interface where Mode is set to insertion or extraction Note: COM1 is available for ADP Proc 1 only; all other ADPs use IP only for external import/export insertion/extraction.</p> <p>DID and SDID controls select the desired packet to be handled by the corresponding ANC Data Processor</p> <p>Line Number controls select the VANC location of packet insertion/extraction</p> <p>Insertion controls allow special insertions in HANC or the C-channel, as well as removal of incoming packets</p>
<p>The screenshot displays the configuration interface for Ancillary Data Processors. For ADP Proc 1, the Mode is set to 'Bridge', Interface to 'IP', DID to '0x60', SDID to '0x60', Field 1 Line Number to '10', and Field 2 Line Number to '10'. The status bar indicates 'Bridge Mode Active and Sending Packets'. For ADP Proc 8, the Mode is 'Disabled', Interface is 'IP', DID is '0x0', SDID is '0x0', Field 1 Line Number is '10', and Field 2 Line Number is '10'. The status bar indicates 'Disabled'.</p>	
<p>In the example above, ADP Proc 1 is set to extract ATC timecode at DID60_n / SDID 60_n. Depending on the interface used to carry the extraction (COM or IP), status is displayed as shown below.</p>	
<div style="background-color: #f0f0f0; padding: 2px; border: 1px solid #ccc;">Extracting 15.0 Kbit/s, dropped 0.0 Kbit</div>	<p>When set to extract to COM interface, displays rate and dropped data (if any)</p>
<div style="background-color: #f0f0f0; padding: 2px; border: 1px solid #ccc;">Extracting 18.75 Kbit/s, total 125.78 Kbit</div>	<p>When set to extract to IP interface, displays rate and total amount transferred</p>
<p>Note: DashBoard versions 4.1 and earlier display DID and SDID numbers in decimal; newer DashBoard versions display DID and SDID numbers in hexadecimal. Hexadecimal notation is denoted by the "0x" preceding the value.</p>	

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

<div data-bbox="196 264 678 327">Ancillary Data Processing</div> <div data-bbox="175 342 483 373">IP Routing IP Port Setup</div> <div data-bbox="196 390 370 428">Option ➞</div>	<p>IP Port Setup sub-tab provides IP setup for card UDP IP communications.</p>
<ul style="list-style-type: none"> • Card IP Receive Setup/Status <div data-bbox="253 510 618 695"> <div>Card Active IP 10.99.16.100</div> <div>Card Port 4000</div> <div>Insertion</div> <div>RX Status ● 1.2 kb/s</div> </div>	<p>Shows card receiving IP address/status and sets port as follows:</p> <ul style="list-style-type: none"> • Card Active IP: Shows the card IP address. (IP address is set using Admin tab Networking settings; see Admin on page 3-56). • Card Port: Sets card IP receive port. • Insertion / Rx Status: Shows card IP receive/Rx insertion status. <ul style="list-style-type: none"> - Stopped (with yellow indicator) means no data is being received. - Green indicator means data is being received and inserted. Data rate is also shown.
<ul style="list-style-type: none"> • Card IP Transmit Setup/Status <div data-bbox="253 779 643 1083"> <div>Extraction</div> <div>TX Status ● 1.2 kb/s</div> <div>Destination IP 10.99.16.101</div> <div>Destination Port 4000</div> <div>Extraction Mode Payload Only</div> <div>Payload Only</div> <div>Formatted Packet</div> </div>	<p>Provides setup for destination IP address and shows card transmit status as follows:</p> <ul style="list-style-type: none"> • Extraction / Tx Status: Shows card extraction from stream to Tx status. <ul style="list-style-type: none"> - Stopped (with yellow indicator) means no data is being sent. - Green indicator means data is being extracted and sent. Data rate is also shown. • Destination IP/Port: Allows setting destination IP address and port. • Extraction Mode: Sets the IP data sent to consist of only payload, or send as formatted packets.

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

Ancillary Data Processing	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.
<div> <div>Port Setup</div> <div>Data-Over-Audio Setup</div> <div>Option </div> </div>	
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.	
<p>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. 3-48))</p>	<p>C 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).</p>
<p>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).</p>	
	<p>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. 3-48))</p>
<p>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)</p>	
<p>Notes:</p> <ul style="list-style-type: none"> • 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-DI Function Menu List — continued

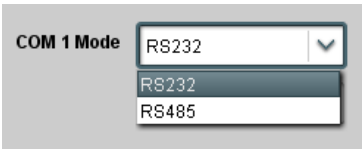
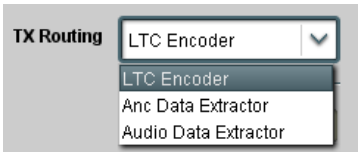

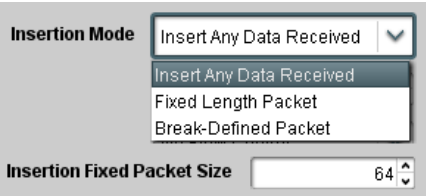

<div> <div>COM Routing</div> <div> <div>COM 1 Setup</div> <div>COM 2 Setup</div> </div> </div>	<p>Provides controls for setting up the two COMM (serial) ports for LTC or ANC functions, and setting comm protocol for each port.</p>
<p>Note:</p> <ul style="list-style-type: none"> • COM 1 and COM 2 sub-tabs provide independent controls for COM1 and COM2. Therefore, only the COM 1 controls are described here. • Controls provided here allow highly detailed setup of serial communications. Control settings must be carefully considered and set appropriately to correspond to both sending and receiving systems. Incorrectly set controls may result in loss of ANC serial comm. • COM 1 and COM 2 are multi-function interfaces and must be set for ANC Data Extractor for port(s) is to be used here. Set the port function as described in COM Routing in COMM Ports Setup Controls (p. 3-48). 	
<p>• COM Mode (Protocol)</p> 	<p>Selects serial comm protocol for the respective port as RS-232 or RS-485.</p> <p>Note: Protocol choices should consider the payload to be carried. Typically, LTC is sent or received using only RS-485 serial protocol.</p>
<p>• COM Port Tx Routing Function</p> 	<p>Selects port function for the respective port as LTC Encoder input or output, or ANC Data Extractor / Audio (SMPTE 337) non-PCM input or output.</p>
<p>• Rx/Tx Status Display</p> 	<p>Shows either no data received/sent, or where transfer is present shows data rate (in kbit/sec).</p>
<p>• Insertion Mode Control</p> 	<p>Where data is being inserted (received), sets the insertion as follows:</p> <ul style="list-style-type: none"> • Insert Any Data Received: Insert all received data with no regard for packet size. • Fixed Length Packet: Sets receive to wait and accumulate <i>n</i>-number of packet bytes (as set using Insertion Fixed Packet Size control) before inserting data. • Break-Defined Packet: Card receiver looks for character-defined break from source being received to define breaks.
<p>• Insertion Flow Control</p> 	<p>Allows communication between card receive and sending source to regulate data receive as follows:</p> <ul style="list-style-type: none"> • No Flow Control: Data is received without buffering or checking to see if data is being received faster than it can be inserted. • XON / XOFF: The card UART Tx will tell the sending source whether it can or cannot accept data at current bit rate. • Hold Break: Card, if close to not being able to accept new data, tells the sending source to hold, and releases this hold when the card is again able to accept new data.

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

<div> <div>COM Routing</div> <div> <div>COM 1 Setup</div> <div>COM 2 Setup</div> </div> </div>	(continued)
<ul style="list-style-type: none"> • Insertion Sync Byte Control <div> <div>Insertion Sync Byte</div> <div> <div>Disabled</div> <div>Disabled</div> <div>Field Number at SOF</div> <div>Ack on Insertion</div> </div> </div>	<p>Allows use of a sync byte from card receiver back to sending source to synchronize communication between card receive and sending source as follows:</p> <ul style="list-style-type: none"> • Disabled: No special synchronization. • Field Number at SOF: The card sends a single byte telling sending source when start of field 1 or field 2 is occurring. • Ack on Insertion: Card sends a single byte back to sending source when data has been inserted.
<ul style="list-style-type: none"> • Extraction Mode Control <div> <div>Extraction Mode</div> <div> <div>Payload Only</div> <div>Payload Only</div> <div>Full Anc Data Packet</div> </div> </div>	<p>Where data is being extracted from input video, sets the data to be sent as follows:</p> <ul style="list-style-type: none"> • Payload Only: Sends payload only (for example, for closed captioning this would be only the ASCII character string representing the CC content). • Full Anc Data Packet: Sends the entire packet, including payload, DID, SDID, and any handling or marking characters.
<ul style="list-style-type: none"> • Extraction Flow Control <div> <div>Extraction Flow Control</div> <div> <div>No Flow Control</div> <div>No Flow Control</div> <div>XON/XOFF</div> <div>Hold Break</div> </div> </div>	<p>Allows communication between card transmit and receiving destinations to regulate data receive as follows:</p> <ul style="list-style-type: none"> • No Flow Control: Data is transmitted without buffering or checking to see if data is being transmitted faster than it can be received. • XON / XOFF: The card UART Rx will acknowledge from the receiving system whether it can or cannot accept data at current bit rate. • Hold Break: Card, if receiving notification from the receiving system that it is close to not being able to accept new data, tells the card to hold. Card releases this hold when the receiving system removes the break command, indicating destination is now ready again to accept new data.
<ul style="list-style-type: none"> • Bit Rate/ Parity Gen Control <div> <div>Bit Rate</div> <div>115200</div> <div>Parity</div> <div> <div>Disabled</div> <div>Disabled</div> <div>Odd</div> <div>Even</div> </div> </div>	<p>For both Rx and Tx, sets UART for bit rate and parity as follows:</p> <ul style="list-style-type: none"> • Bit Rate: Sets Tx/Rx bit rate from 1 of 5 speeds ranging from 9600 to 230400 Baud. • Parity: Sets card Rx to expect odd or even parity from incoming data, and sets card Tx to generate a parity bit to satisfy selected parity. Where parity is set, incoming data not conforming to parity selection is rejected.

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


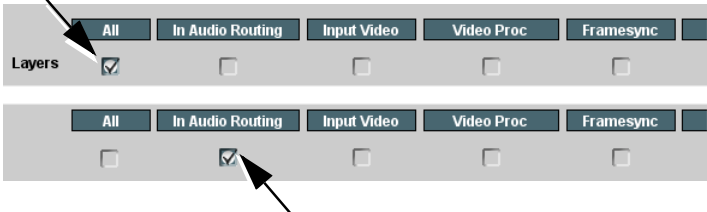


	<p>Allows user control settings to be saved in a Preset and then loaded (recalled) as desired, and provides a one-button restore of factory default settings.</p>
<p>• Preset Layer Select</p> <p>Allows selecting a functional layer (or “area of concern”) that the preset is concerned with. Limiting presets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

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

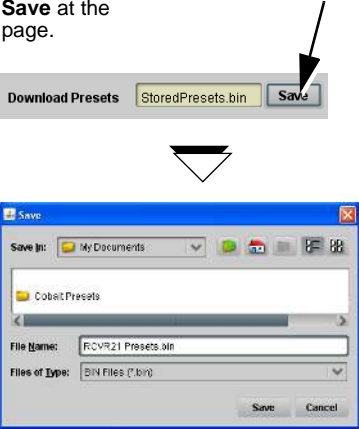
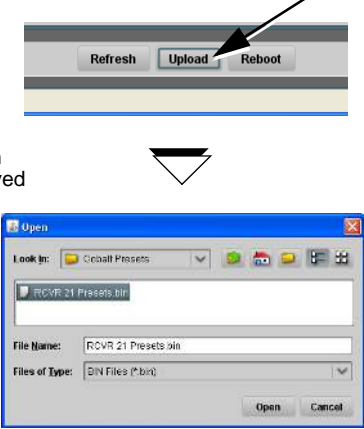
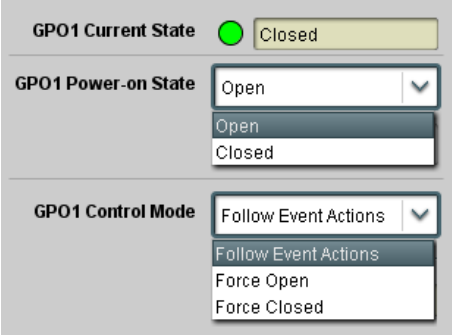
Presets	(continued)
<p>Download (save) card presets to a network computer by clicking Download Presets – Save at the bottom of the Presets page.</p>  <p>Browse to a desired save location (in this example, <i>My Documents\Cobalt Presets</i>).</p> <p>The file can then be renamed if desired (<i>RCVR21 Presets</i> in this example) before committing the save.</p>	<p>Upload (open) card presets from a network computer by clicking Upload at the bottom of Dashboard.</p>  <p>Browse to the location where the file was saved on the computer or drive (in this example, <i>My Documents\Cobalt Presets</i>).</p> <p>Select the desired file and click Open to load the file to the card.</p> <p>Note:</p> <ul style="list-style-type: none"> • Preset transfer between card download and file upload is on a group basis (i.e., individual presets cannot be downloaded or uploaded separately). • After uploading a presets file, engagement of a desired preset is only assured by selecting and loading a desired preset as described on the previous page.
GPO Setup	Provides controls for setting up the two GPO's power-up states as well as forced manual or event action triggered.
<p>Note: This tab has identical independent controls for GPO 1 and 2. Therefore, only the GPO 1 controls are described here.</p>	
	<ul style="list-style-type: none"> • Current State indicates GPO status regardless of any pre-setup. • Power-on State allows the power-up GPO state to be set (initialized) upon power-up • Control Mode allows GPO manual asserted open or closed states, or hands over control to Event Action triggering.

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

Event Setup

Event TriggersEmail Alerts

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

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

- The **Event-Based Loading** button serves as a master enable/disable for the function.
- Go-to **Event 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. 3-55) 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. 3-60)). **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

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

Note:

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

Event History

Time	Event Number	Event Action
19:22:39 02/05/15	2	GPO 1 Close
19:22:39 02/05/15	4	GPO 2 Close
19:22:17 02/05/15	2	GPO 1 Close
19:22:17 02/05/15	4	GPO 2 Close

Card Time

19:25:43 02/05/15

Force Event Refresh

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

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

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

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

Event Setup

Event Triggers

Email Alerts

(continued)

In the example here for Event 1 and Event 2, the device is set to invoke a preset that applies custom color correction settings nested in preset "Colorimetry 2A" whenever GPI 1 goes LO. When this GPI goes HI, corresponding action in preset "Normal" invokes another preset to revert the device to default settings.

Event-Based Loading

Enabled

Force Event Refresh

Refresh

Event Setup	Status	Acquired Video Format	GPI	User States	Event Action:
Event 1	<div></div> Condition Not Met	Don't Care	GPI 1 Closed->Open	Don't Care	Preset Load: Normal
Event 2	<div></div> Condition Met	Don't Care	GPI 1 Open->Closed	Don't Care	Preset Load: Colorimetry 2A

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-DI Function Menu List — continued

Event Setup

Event Triggers

Email Alerts

(continued)

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

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

9902-2UDX-DI Card

GPI 1

GPI 2

From EAS Keyer Box

From EAS Audio Box

Set User State 1

Clear User State 1 or 2

GPI 1

GPI 2

Set User State 2

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

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


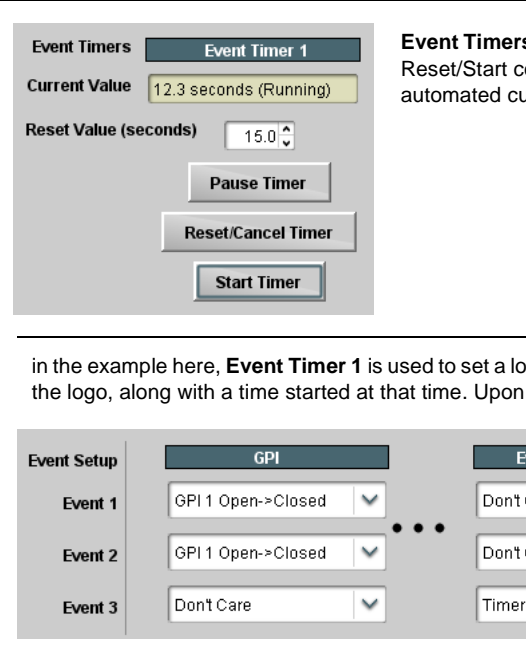
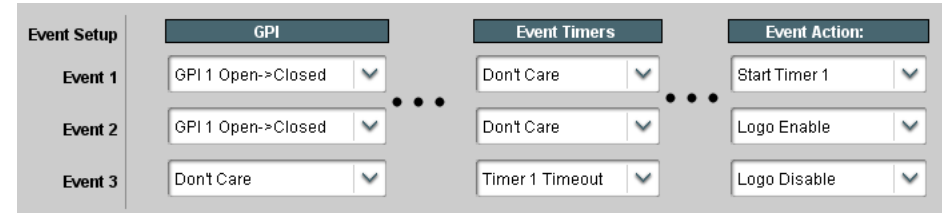
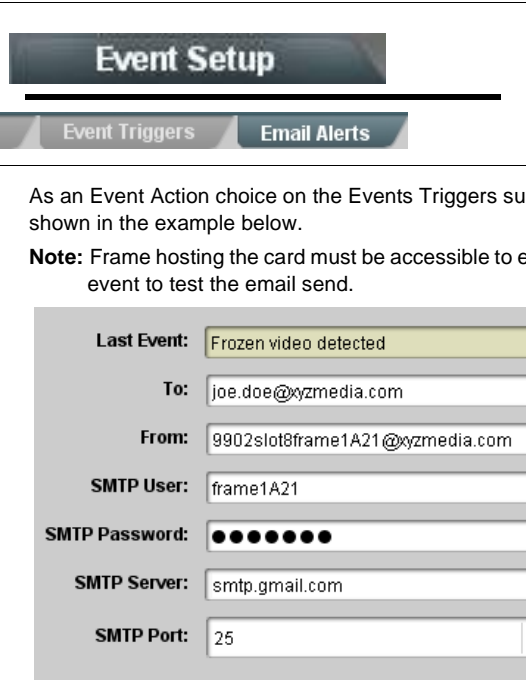
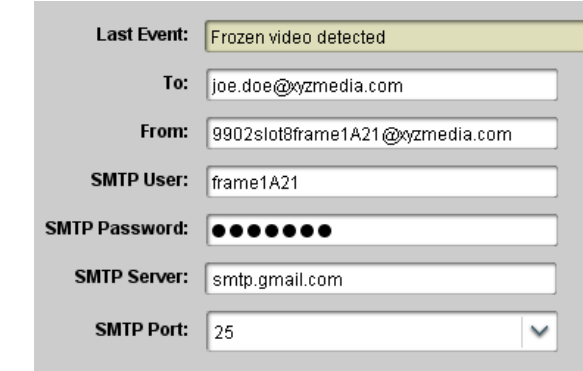
	<p>Provides three general-purpose timers that can be triggered to start, pause, reset, or stop upon event actions. The state of each timer, in turn, can also be used to invoke other actions.</p>
	<p>Event Timers 1 thru 3 (Timer 1 shown) can be set with count-down values. The Pause/Reset/Start control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

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

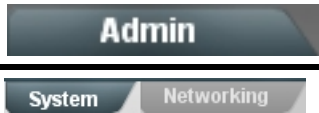

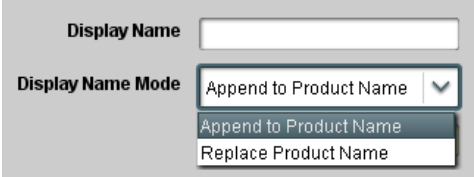
	<p>Provides a global card operating status and allows a log download for factory engineering support. Also provides controls for selecting and loading card firmware upgrade files.</p> <p>Networking controls provide dedicated card networking setup in conjunction with rear module Ethernet port.</p>
<p>• Log Status and Download Controls</p> 	<ul style="list-style-type: none"> • Log Status indicates overall card internal operating status. • Download Log File allows a card operational log file to be saved to a host computer. This log file can be useful in case of a card error or in the case of an operational error or condition. The file can be submitted to Cobalt engineering for further analysis. • Thermal Shutdown enable/disable allows the built-in thermal failover to be defeated. (Thermal shutdown is enabled by default). <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>CAUTION</p> <p>The 9940-ACO FPGA is designed for a normal-range operating temperature around 85° C core temperature. Operation in severe conditions exceeding this limit for non-sustained usage are within device operating safe parameters, and can be allowed by setting this control to Disable. However, the disable (override) setting should be avoided under normal conditions to ensure maximum card protection.</p> </div>
<p>• Card DashBoard Name Control</p> 	<p>Allows card name In DashBoard to be changed as desired. Click return to engage change.</p> <ul style="list-style-type: none"> • Append to Product Name appends (or adds to) existing OEM name (for example, "9940-ACO Processing 1A"). • Replace Product Name completely replaces the OEM name OEM name (for example, "Processing 1A"). <p>Note: DashBoard instance(s) may have to be refreshed before name change appears.</p>
<p>• Firmware Upgrade Controls</p>	<p>Firmware upgrade controls allow a selected firmware version (where multiple versions can be uploaded to the card's internal memory) to invoke an upgrade to a selected version either instantly, or set to install on the next card reboot (thereby allowing card upgrade downtime to be controlled at a scheduled point in time).</p>

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

<div data-bbox="228 264 542 317" data-label="Text"> <p>Admin</p> </div> <div data-bbox="228 338 527 373" data-label="Text"> <p>System Networking</p> </div>	<p>(continued)</p>
<p>Note: The page/tab here allows managing multiple firmware versions saved on the card. New upgrade firmware from our web site can always be directly uploaded to the card without using this page. Instructions for firmware downloading to your computer and uploading to the card can be found at the Support>Firmware Downloads link at www.cobaltdigital.com.</p>	
<ol style="list-style-type: none"> 1. Access a firmware upgrade file from a network computer by clicking Upload at the bottom of DashBoard. 2. Browse to the location of the firmware upgrade file (in this example, <i>My Documents\lv1.0.0019.bin</i>). 3. Select the desired file and click Open to upload the file to the card. 	<div data-bbox="1094 541 1419 632" data-label="Image"> </div> <div data-bbox="1005 659 1429 884" data-label="Image"> </div>
<ul style="list-style-type: none"> • Immediate firmware upload. The card default setting of Automatically Reboot After Upgrade checked allow a selected firmware version to be immediately uploaded as follows: <ol style="list-style-type: none"> 1. Click Firmware To Load and select the desired upgrade file to be loaded (in this example, “v1.0.0019”). 2. Click Load Selected Firmware. The card now reboots and the selected firmware is loaded. 	<div data-bbox="992 932 1396 1094" data-label="Image"> </div>
<ul style="list-style-type: none"> • Deferred firmware upload. With Automatically Reboot After Upgrade unchecked, firmware upgrade loading is held off until the card is manually rebooted. This allows scheduling a firmware upgrade downtime event until when it is convenient to experience to downtime (uploads typically take about 60 seconds). <ol style="list-style-type: none"> 1. Click Firmware To Load and select the desired upgrade file to be loaded (in this example, “v1.0.0019”). Note now how the display shows “Installs on Next Reboot”. 2. Click Load Selected Firmware. The card holds directions to proceed with the upload, and performs the upload only when the card is manually rebooted (by pressing the Reboot button). 3. To cancel a deferred upload, press Cancel Pending Upgrade. The card reverts to the default settings that allow an immediate upload/upgrade. 	<div data-bbox="992 1150 1424 1312" data-label="Image"> </div>

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

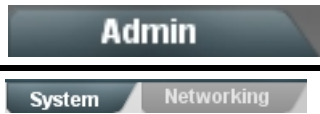


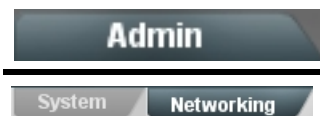
	(continued)
<p>• Card Check and Restore Utilities</p> <p>Memory Test</p> <p>FPGA Memory Test <input type="button" value="Test"/></p> <p>Memory Test Status Running Memory Test: 8.99%</p> <p>Memory Test Status Memory test completed successfully, please reboot the card</p> <p>Restore From SD Card <input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

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

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

Table 3-2 9902-2UDX-DI 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

Audio Alarm Setup

Ancillary Data Alarm Setup

Logging

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.

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

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

Audio Alarm Setup

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

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

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

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

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

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

Alarms

(continued)

Ancillary Data Alarm Setup

Ancillary Data Alarm Setup sub-tab allows setting up screening engagement and disengagement holdoff for absence of closed captioning packets.

Note:

- Video screened is the card SDI that is selected for the program video/audio path.
- Ancillary data condition detection is functional only for CEA608/708 packet-based closed captioning. This feature does not function for SD line 21 “waveform-based” closed captioning.

Closed Captioning Presence Trigger Holdoff (seconds)

Closed Captioning Absence Trigger Holdoff (seconds)

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 Occurrence** shows details for each triggered alarm event.

Condition Status	Log	Alarm	Severity	Duration	Last Occurrence
 Loss Of Signal SDI Input A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Error	00h 00m 23s	07:28:13
⋮					
 Frozen Video SDI Input A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Warning	00h 00m 16s	07:23:57
⋮					
 Black Video SDI Input A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Warning	Never Triggered	Never Triggered
⋮					
 Loss Of Reference	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Error	01h 52m 00s	03:37:57

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-DI Function Menu List — continued




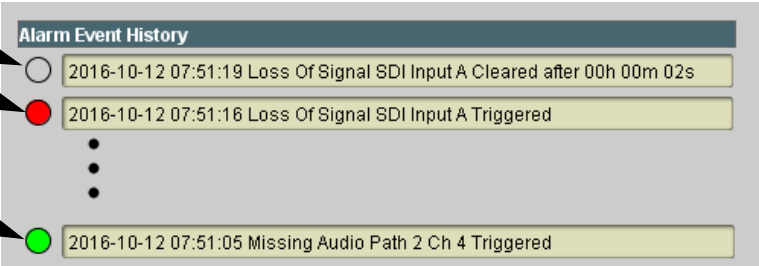
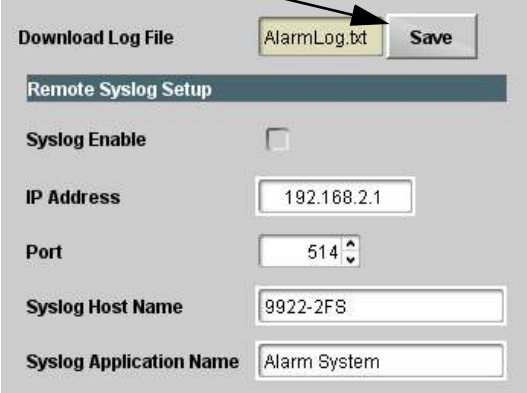
Alarms	(continued)
Path 1 Audio	<p>Audio sub-tabs independently show for all 16 embedded channels (per path) any missing audio (whether absent due to low level, mute or unlocked status).</p> <p>Note:</p> <ul style="list-style-type: none"> • Audio screened is the audio associated with the selected card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

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

Alarms	(continued)
<p>Alarm Event History shows the eight most-recent alarm events that have been detected (with most-recent at top of list). The alarm severity (as set using the Severity drop-down for each alarm type) sets the “LED” color shown here. In addition to alarms directly affecting performance, status such as cleared alarms are also displayed, as well as any actions related to enabling alarm propagation (such as “Logging Enabled” and “Logging Disabled”). All display rows shown here are retained in the overall log and can be downloaded as a .txt file (see Logging below).</p>	
<p>Cleared alarms appear as an “open” LED</p>	
<p>Alarms configured as Error or Warning correspondingly appear here as a red “LED” or yellow “LED”</p>	
<p>Detected alarms event configured as Ignore/OK appear here as a green “LED”</p>	
	
<p>Logging</p>	
<p>Logging sub-tab allows downloading of an overall running AlarmLog.txt file via DashBoard to a host computer. This sub-tab also has setup controls for using Syslog IP connection of alarm log data (Linux and Unix).</p>	
<p>Setup controls and fields for Syslog</p>	
<p>Clicking Save opens a dialog to save the AlarmLog.txt file to a host computer.</p>	
	
<p>Note:</p> <ul style="list-style-type: none"> • Download Log File is performed via DashBoard connection; no external connection is required. • For Syslog usage, default 514 port assignment is recommended. • Syslog usage , is available only on certain frame models offering per-card dedicated Ethernet connection. If this frame type is not being used, card slot must be fitted with a rear I/O module equipped with an Ethernet connector (such as RM20-9902-2UDX-DI-L) in order to use Syslog. 	

Troubleshooting

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

The various 9902-2UDX-DI 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. 3-68)
- 9902-2UDX-DI Processing Error Troubleshooting (p. 3-69)
- Troubleshooting Network/Remote Control Errors (p. 3-70)

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

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

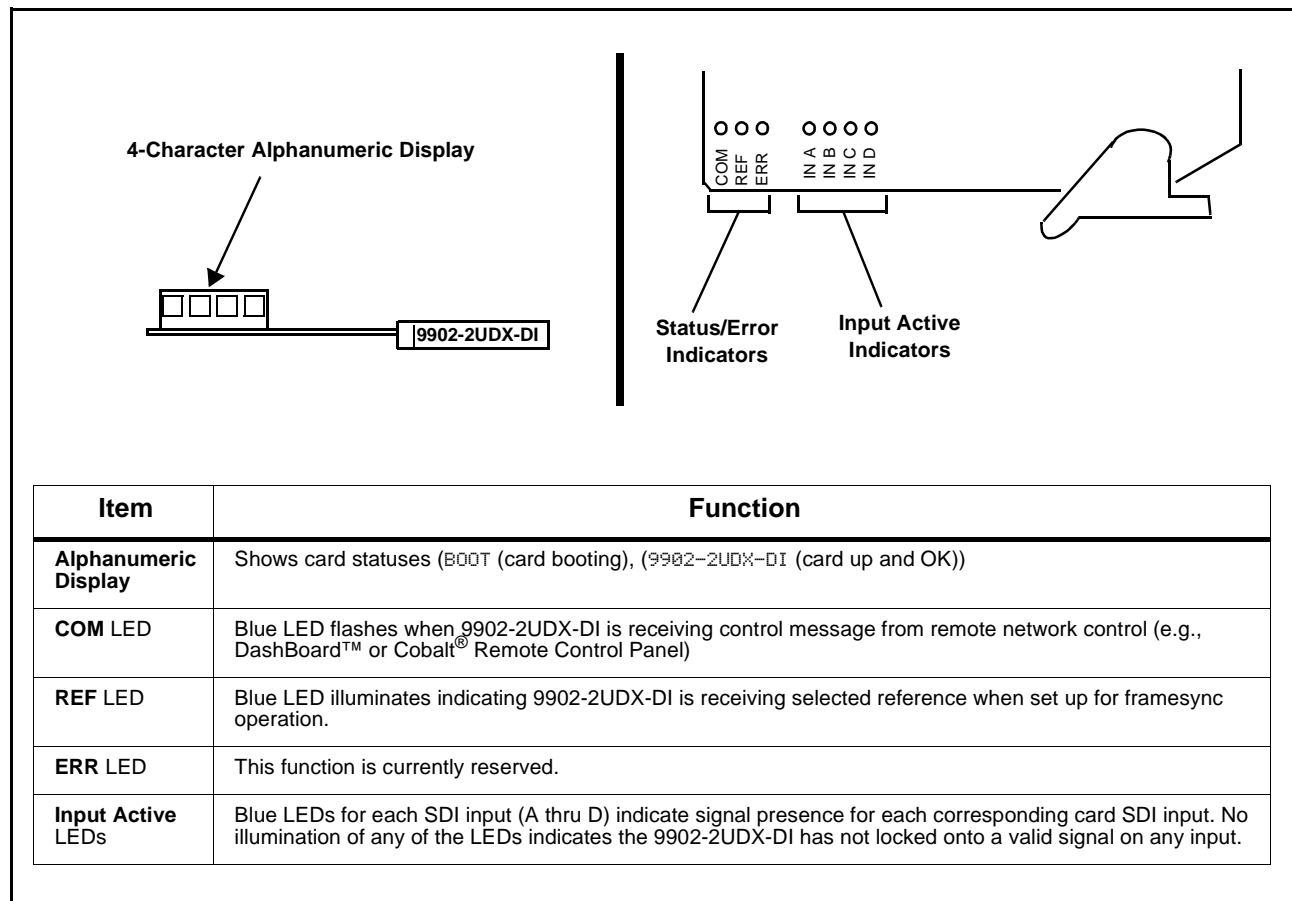


Figure 3-7 9902-2UDX-DI Card Edge Status Indicators and Display

DashBoard™ Status/Error Indicators and Displays

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

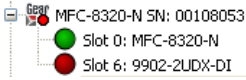
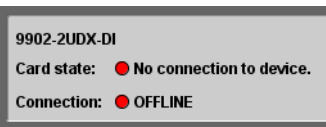
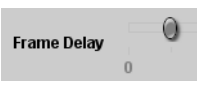
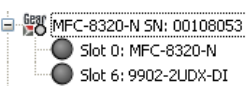
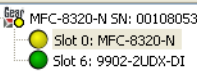

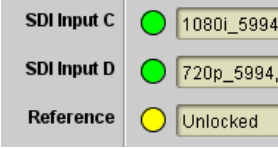
Indicator Icon or Display	Error Description
  	<p>Red indicator icon in Card Access/Navigation Tree pane shows card with Error condition (in this example, the Card Access/Navigation Tree pane shows a general error issued by the 9902-2UDX-DI card in slot 6).</p> <p>Specific errors are displayed in the Card Info pane (in this example “No connection to device” indicating 9902-2UDX-DI card is not connecting to frame/LAN).</p> <p>If the 9902-2UDX-DI card is not connecting to the frame or LAN, all controls are grayed-out (as shown in the example here).</p>
	<p>Gray indicator icon in Card Access/Navigation Tree pane shows card(s) are not being seen by DashBoard™ due to lack of connection to frame LAN (in this example, both a 9902-2UDX-DI card in slot 6 and the MFC-8320-N Network Controller Card for its frame in slot 0 are not being seen).</p>
 	<p>Yellow indicator icon in Card Access/Navigation Tree pane shows card with Alert condition (in this example, the Card Access/Navigation Tree pane shows a general alert issued by the MFC-8320-N Network Controller Card).</p> <p>Clicking the card slot position in the Card Access/Navigation Tree (in this example Network Controller Card “Slot 0: MFC-8320-N”) opens the Card Info pane for the selected card. In this example, a “Fan Door Open” specific error is displayed.</p>
	<p>Yellow indicator icon in 9902-2UDX-DI Card Info pane shows error alert, along with cause for alert (in this example, the 9902-2UDX-DI is not receiving an enabled framesync source).</p>

Figure 3-8 DashBoard™ Status Indicator Icons and Displays

Access Card Info panes for specific cards by clicking the card slot position in the Card Access/Navigation Tree pane (as shown in the example in Figure 3-9).

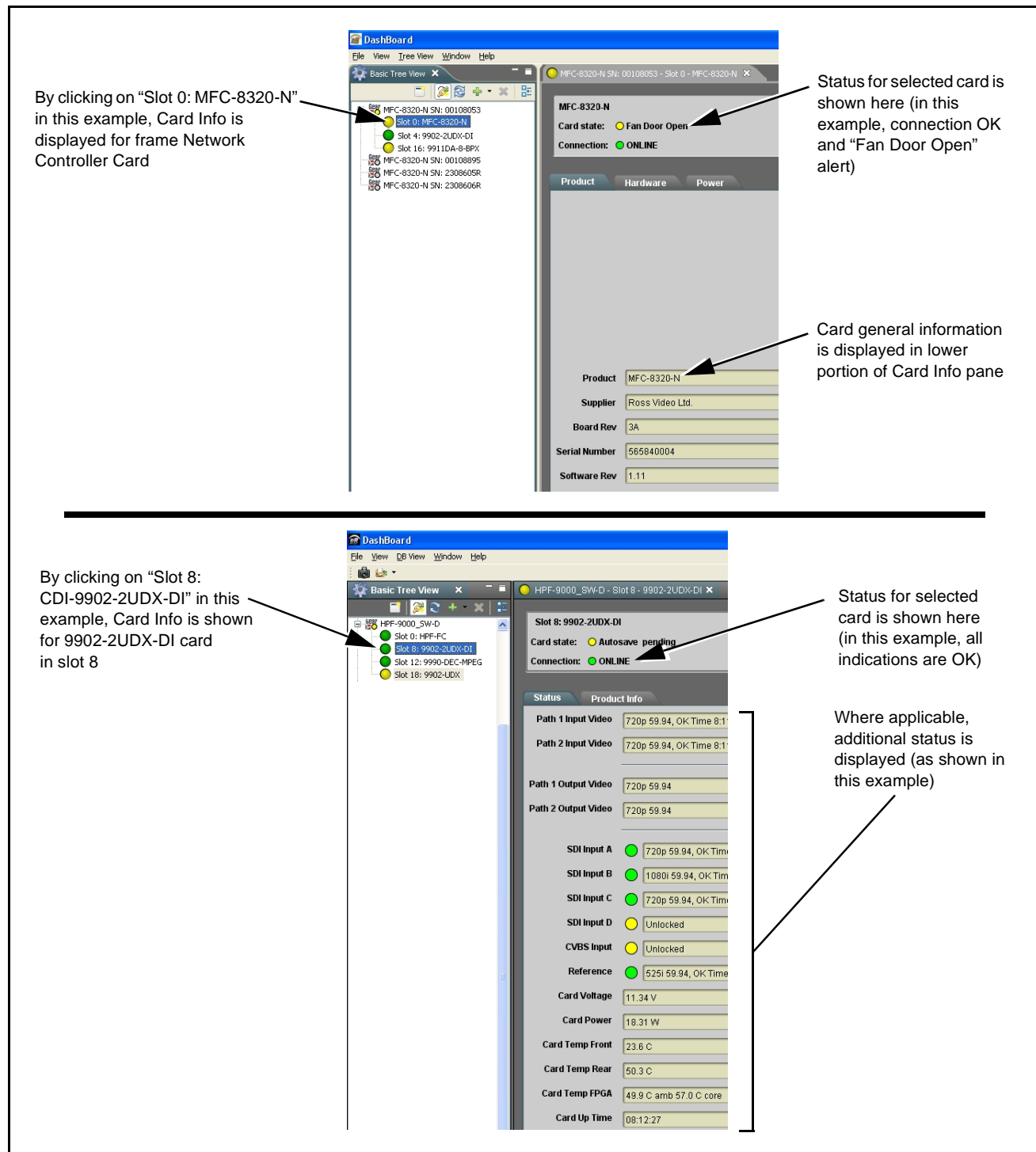


Figure 3-9 Selecting Specific Cards for Card Info Status Display

Basic Troubleshooting Checks

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

Table 3-3 Basic Troubleshooting Checks

Item	Checks
Verify power presence and characteristics	<ul style="list-style-type: none"> On both the frame Network Controller Card and the 9902-2UDX-DI, 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-DI card. This can be observed using the DashBoard™ Card Info pane. <ul style="list-style-type: none"> If display shows no power being consumed, either the frame power supply, connections, or the 9902-2UDX-DI card itself is defective. If display shows excessive power being consumed (see Technical Specifications (p. 1-15) in Chapter 1, "Introduction"), the 9902-2UDX-DI 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-DI 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-DI Processing Error Troubleshooting

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

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

Table 3-4 Troubleshooting Processing Errors by Symptom


Symptom	Error/Condition	Corrective Action
<ul style="list-style-type: none"> DashBoard™ shows Unlocked message in 9902-2UDX-DI Card Info pane  <ul style="list-style-type: none"> Card edge Input LED corresponding to input is not illuminated 	No video input present	Make certain intended video source is connected to appropriate 9902-2UDX-DI card video input. Make certain BNC cable connections between frame Rear I/O Module for the card and signal source are OK.
Ancillary data (closed captioning, timecode) not transferred through 9902-2UDX-DI	<ul style="list-style-type: none"> Control(s) not enabled 	<ul style="list-style-type: none"> Make certain respective control is set to On or Enabled (as appropriate).
	<ul style="list-style-type: none"> VANC line number conflict between two or more ancillary data items 	<ul style="list-style-type: none"> Make certain each ancillary data item to be passed is assigned a unique line number (see Ancillary Data Line Number Locations and Ranges on page 3-9).
Audio not processed or passed through card	Enable control not turned on	On Output Audio Routing/Controls tab, Audio Group Enable control for group 1 thru 4 must be turned on for sources to be embedded into respective embedded channel groups.
Selected upgrade firmware will not upload	Automatic reboot after upgrade turned off	Card Presets > Automatically Reboot After Upgrade box unchecked. Either reboot the card manually, or leave this box checked to allow automatic reboot to engage an upgrade upon selecting the upgrade.

Table 3-4 Troubleshooting Processing Errors by Symptom — continued

Symptom	Error/Condition	Corrective Action
Card does not pass video or audio as expected. Control settings spontaneously changed from expected settings.	Event-based 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. 3-50) 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. 3-50) 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.

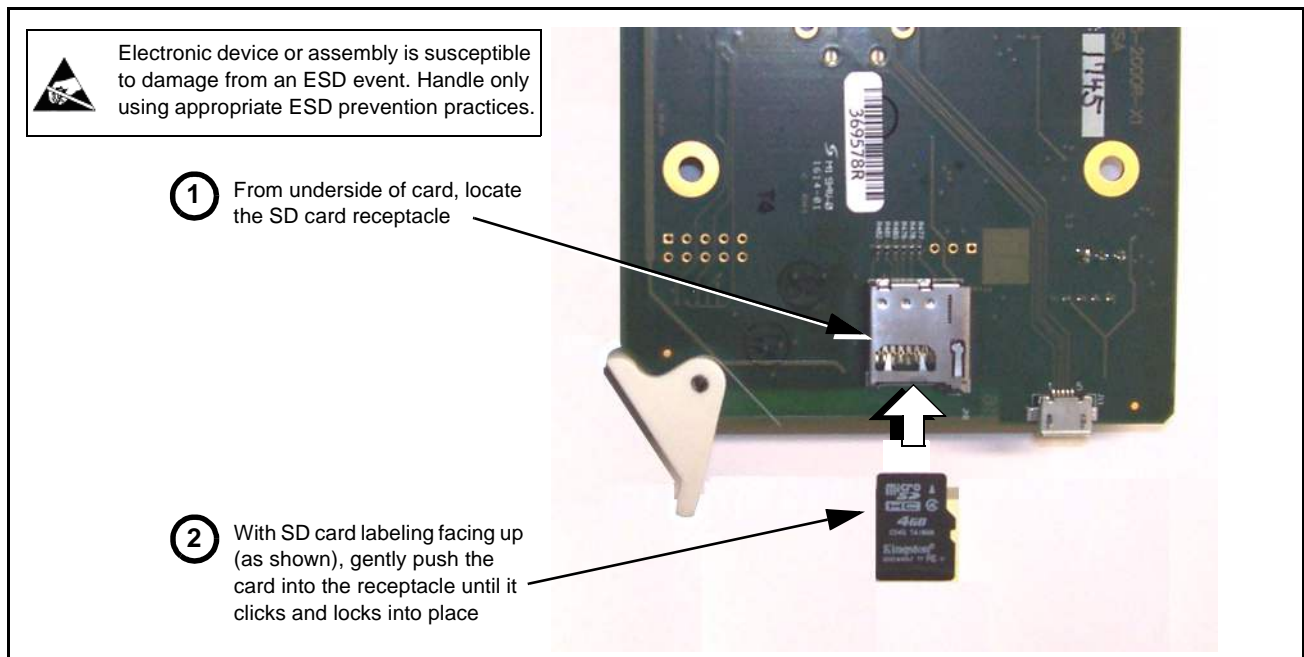


Figure 3-10 SD Card Installation

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

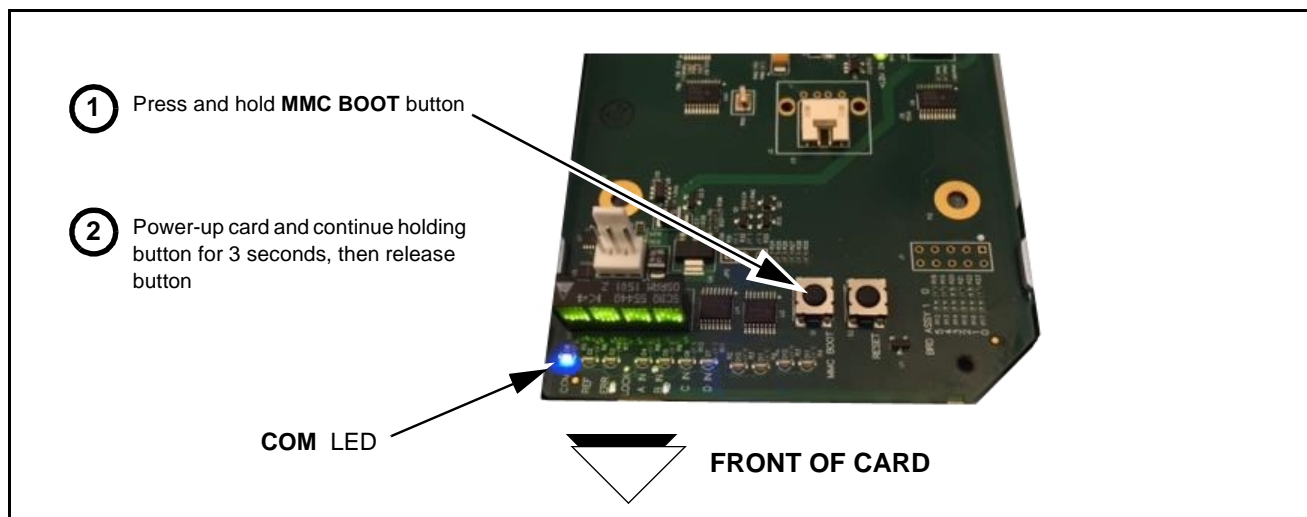


Figure 3-11 MMC Boot Button

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



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