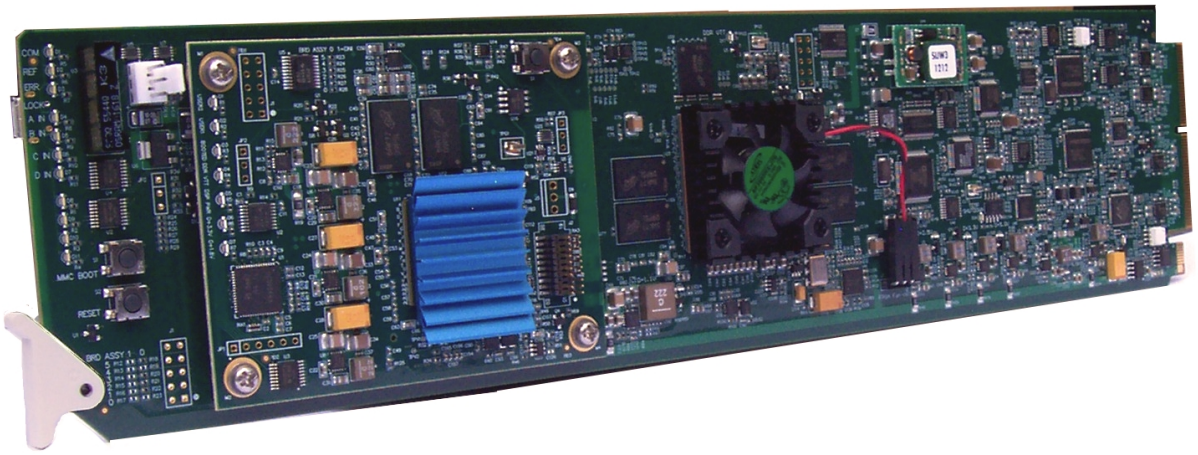
9902-UDX-DSP



3G/HD/SD-SDI Up-Down-Cross Converter / Frame Sync / Audio Embed/De-Embed
with DSP Audio Options Support

Product Manual

Cobalt Digital Inc.

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

9902-UDX-DSP-OM (V1.1)

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Congratulations on choosing the Cobalt® 9902-UDX-DSP 3G/HD/SD-SDI Up-Down-Cross Converter / Frame Sync / Audio Embed/De-Embed with DSP Audio Options Support. The 9902-UDX-DSP 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-UDX-DSP, please contact us at the contact information on the front cover.

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Chapter 1

Introduction

Overview

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

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

This chapter contains the following information:

- **9902-UDX-DSP Card Software Versions and this Manual (p. 1-2)**
- **Manual Conventions (p. 1-3)**
- **Safety and Regulatory Summary (p. 1-5)**
- **9902-UDX-DSP Functional Description (p. 1-6)**
- **Technical Specifications (p. 1-23)**
- **Warranty and Service Information (p. 1-26)**
- **Contact Cobalt Digital Inc. (p. 1-27)**

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

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

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

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

Cobalt Reference Guides

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

Manual Conventions

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

- Card-edge display messages are shown like this:

  BOOT

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

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

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

  

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

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

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: • 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-UDX-DSP has a high power dissipation (24 W at full proc capacity). 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-UDX-DSP 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-UDX-DSP 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-UDX-DSP Functional Description

Figure 1-1 shows a functional block diagram of the 9902-UDX-DSP. The 9902-UDX-DSP also includes AES/analog audio support and CVBS video I/O. In addition to a basic signal presence input failover function, a Quality Check option allows failover to alternate inputs or other actions based on user-configurable criteria such as black or frozen frame. Frame sync and full up-down-cross conversion can be added as options.

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

The 9902-UDX-DSP provides a DSP-based platform that supports multiple audio DSP options. When optioned with various diverse audio processing options, the DSP-based processing core (which supports numerous simultaneous processing engines) uses license "credits" which allows flexible tailoring of multiple proc function instances.

Note: The 9902-UDX-DSP DSP base adds support for various DSP audio options. Actual DSP user assets (such as loudness processing, upmixing, and Dolby encoders) are activated for use only when corresponding option licenses also reside on the card.

9902-UDX-DSP Input/Output Formats

The 9902-UDX-DSP provides the following inputs and outputs:

- **Inputs:**
  - **3G/HD/SD SDI IN A** thru **SDI IN D** – four 3G/HD/SD-SDI inputs. **SDI IN A** or **SDI IN B** can be set to failover to **A** or **B** in absence of opposite channel of this pair.
  - **CVBS IN –** CVBS coaxial analog video input.
  - **AES IN –** BNC (AES-3id, 75Ω) ports as AES input (number of ports dependent on rear I/O module used).
  - **AN-AUD IN –** Four balanced analog audio embed inputs.
- **Outputs:**
  - **3G/HD/SD-SDI OUT (1-4)** – four 3G/HD/SD-SDI buffered video outputs. Each output can be independently set as processed output video or selected input video reclocked.
  - **RLY BYP B** –3G/HD/SD-SDI which 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.
  - **AES OUT –** BNC (AES-3id, 75Ω) ports as AES outputs (number of ports dependent on rear I/O module used).
  - **AN-AUD OUT –** Four balanced analog audio de-embed outputs.
  - **CVBS OUT –** CVBS coaxial analog video usable with SD video streams.

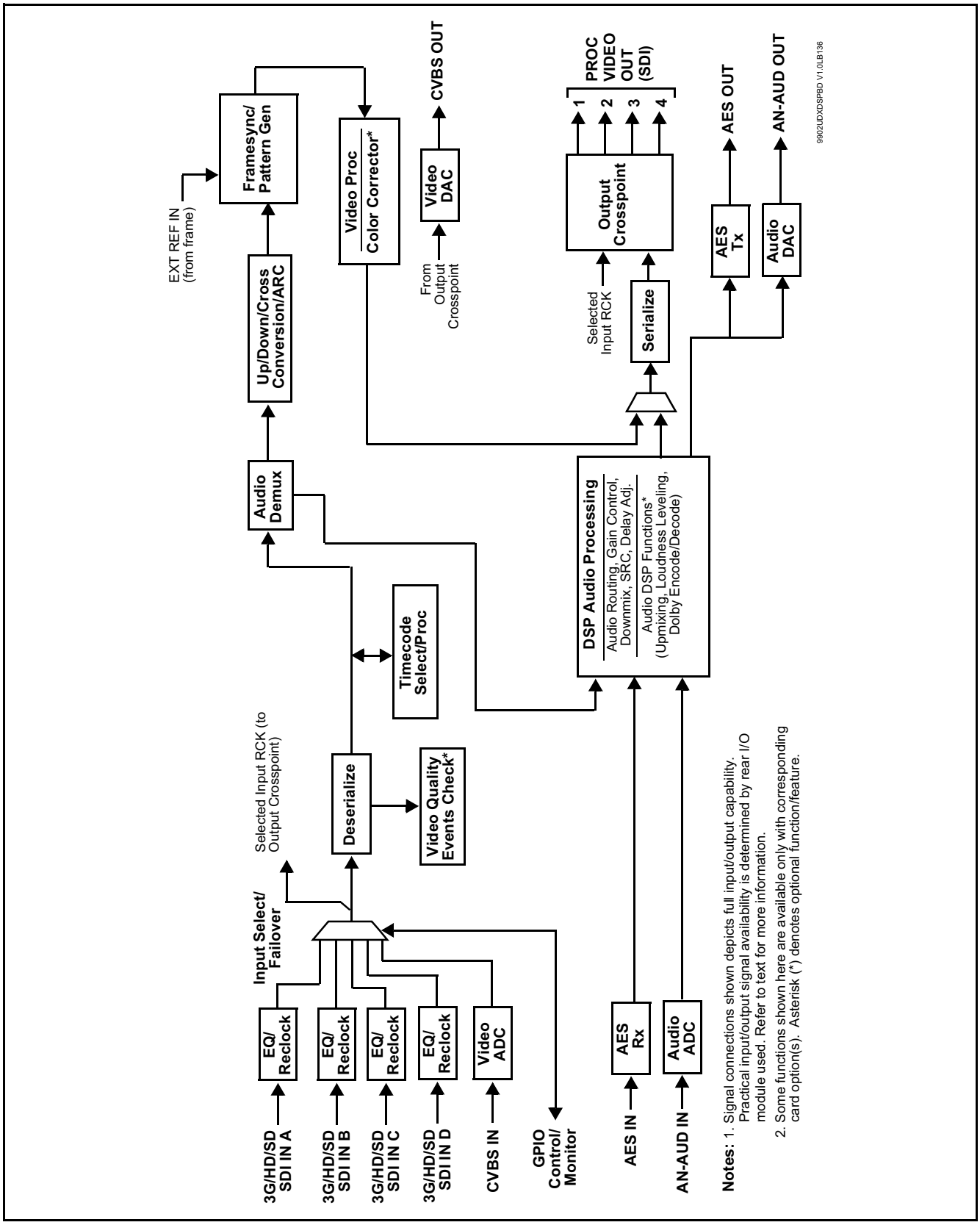

Figure 1-1 9902-UDX-DSP Functional Block Diagram

Video Processor Description

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

Input Video Select/Quality Check Functions

A GUI-based control allows the card to select from up to four 3G/HD/SD-SDI inputs, and a SD CVBS analog video input. For analog inputs, waveform-based ancillary data is preserved for extraction and usage later in the card processing chain.

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

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

Auto-Changeover Function

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

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

Note:
- The card also provides active (DA-driven) outputs **RCK/PROC 1** thru **RCK/PROC 4**. These outputs are independent of the relay failover function and will lose signal in the event of a power loss.
- The above failover uses basic signal presence as failover criteria and is limited to inputs **A** and **B**. Failover using active assessments (Quality Check) can be set to provide failovers using frozen/black frame and other criteria. See Video Quality Events Detect Function (p. 1-15) for more information.

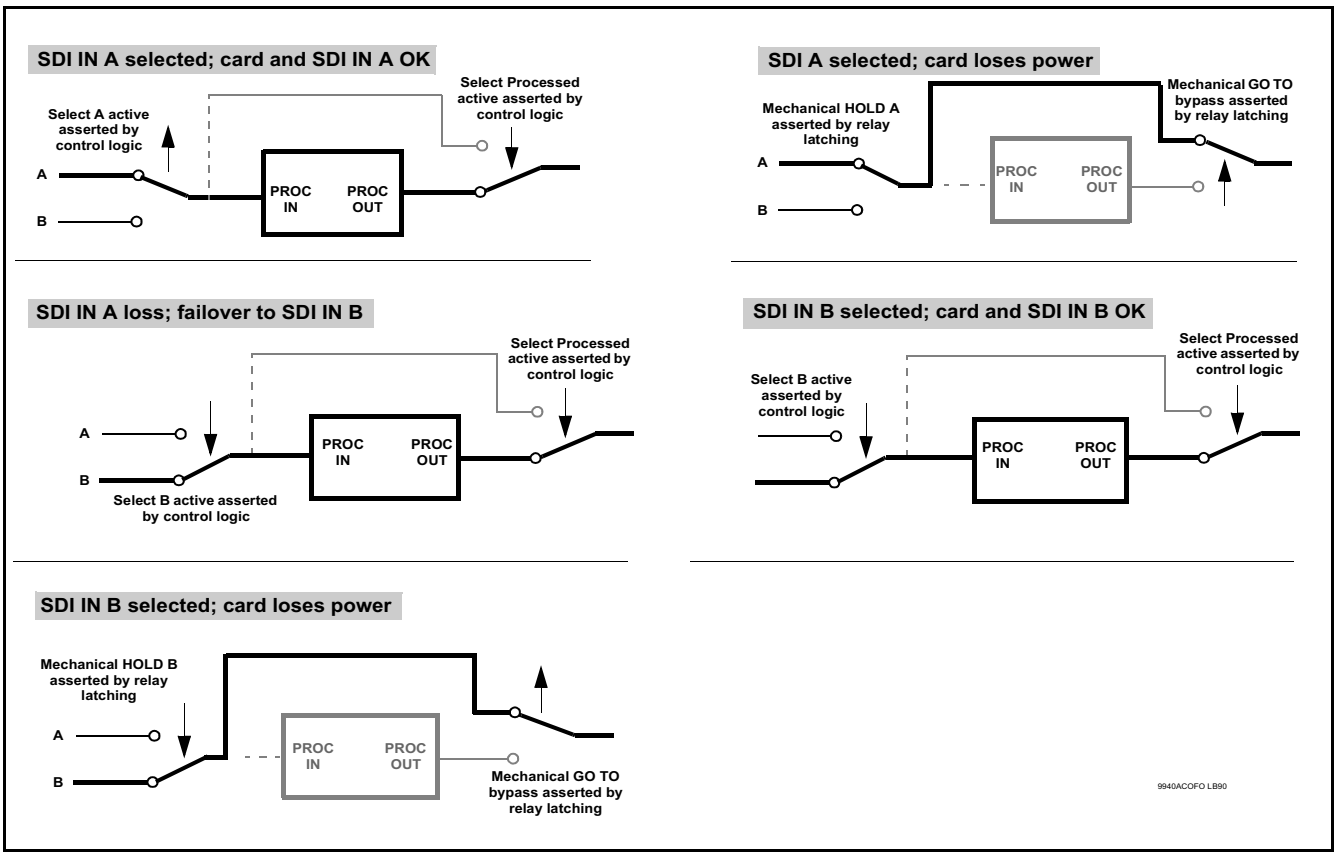

Figure 1-2 Auto-Changeover Function and Signal Flow

Video Output Crosspoint

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

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

Scaler Function

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

The scaler function also provides aspect ratio conversion that provides a choice from several standard aspect ratios. User-defined settings allow custom user-defined H and V aspect ratio control.

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

Timecode Processor

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

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

Option When licensed with option **+LTC**, this function also can receive, send and translate between audio/RS-485 LTC timecode formats and the VBI formats described above.

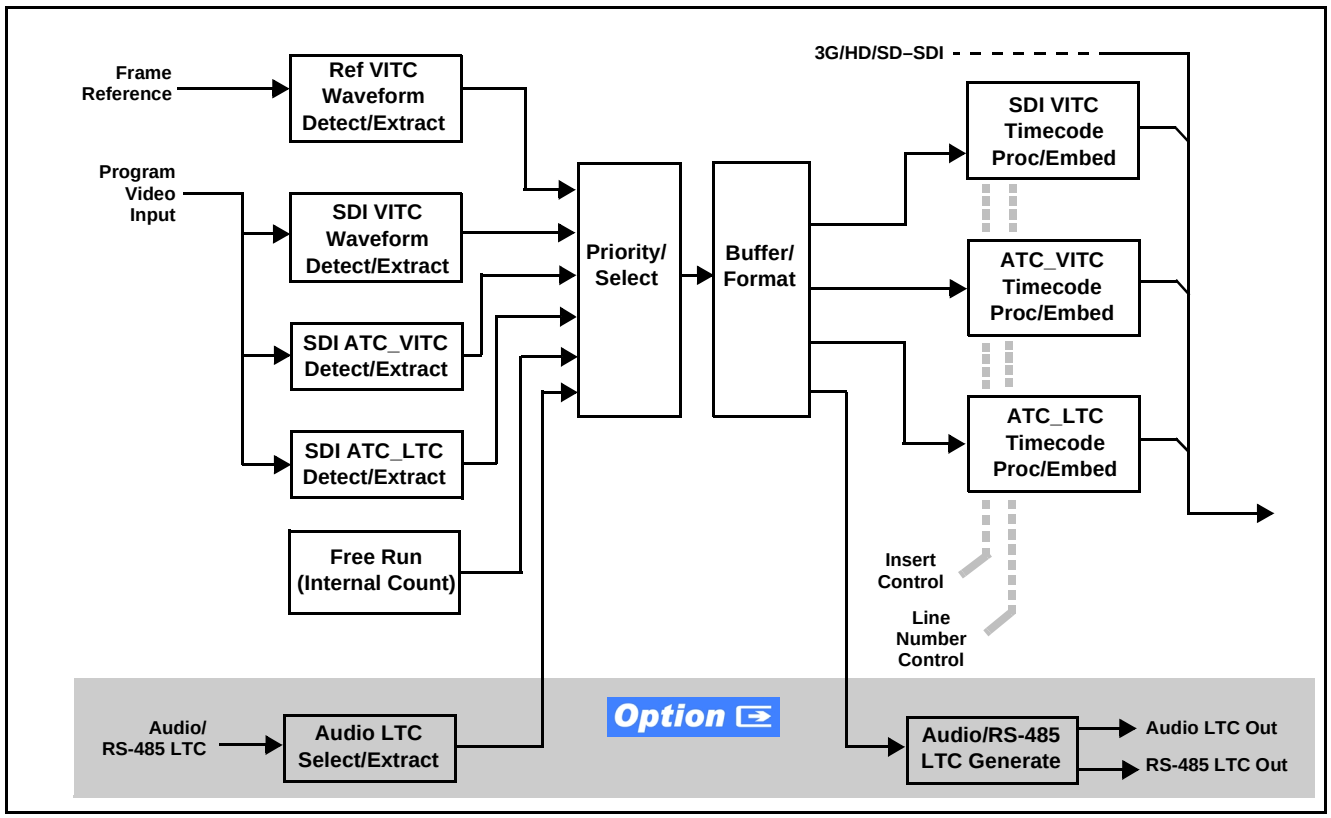

Figure 1-3 Timecode Processor

Frame Sync Function

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

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

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

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

Wings Insertion

Wings insertion allows a symmetrical L-R wings insertion to be integrated into the card program video output. Wings video is accommodated using a separate wings SDI input. The wings user interface displays wings timing relative to the card output video, allowing wings timing offset to be adjusted such that wings can be properly framed. (This function does not provide timing offset control of the wings video; offset must be provided by a external frame sync card or device controlling the wings video feed.)

The wings L/R insertion width can be manually configured, or can be set to automatically track with aspect ratio as set by the card.

Key/Fill Insertion Option

Option **+KEYER** provides for three of the card SDI video inputs to be used as respective program video, key, and fill inputs. Providing back-end (post scaler) keying, this function provides chroma keying using the **KEY VID IN** signal. The **FILL VID IN** signal provides the fill video that is inserted in the area "cleared out" by the key. The keying user interface displays key and fill timing relative to the card output video, allowing timing offset to be adjusted such that key and fill can be properly framed. (The option and its host card does not provide timing offset control of the key/fill video; offset must be provided by external frame sync cards or devices controlling the key and fill video feed.) The program video input when using keying accommodates either an SDI or an analog video input; key and fill inputs are SDI only.

Alpha threshold keyer modes allow full-color key/fill from cost-effective generic sources such as a standard PC (with appropriate HDMI-to-SDI output conversion) hosting simple .bmp, .jpeg, or .png graphic files. In these modes, a common key/fill SDI input provides both the key and fill input.

EAS Text Crawl Generation Option

Option **+EAS** provides for automated keying Emergency Alert System (EAS) text crawls in the active program video output. The function receives its text stream via a card serial data input. The EAS crawl start can be set to trigger upon receiving the serial data message, or be set to use a GPI to trigger start of the EAS crawl.

Embedded in the received serial data are commands which set the message severity to be shown by the keyed crawl (severity is correlated to user-specified text color and background color for the crawl). User controls allow control of the crawl speed and repeat of the crawl burn-in (if desired).

Refer to +TTS Manual Supplement OPT-SW-PHXEAS-MS for detailed information and installation/setup instructions. This supplement is furnished with the option.

Closed Captioning Processor

This function provides support for closed captioning setup. The function allows the selection of the ancillary data line number where the ancillary closed caption data is outputted when the output is HD. When receiving HD-SDI, both CEA 608 and CEA 708 are supported. Line 21 CEA 608 waveform-based SD closed-captioning is also supported.

Color Corrector Option

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

Ancillary Data Processor Option

This function provides full VANC/HANC ancillary data de-embedding and embedding for 3G/HD/SD-SDI streams. Direct access to DID and SDID locations allows extraction or insertion of user data such as camera PTZ, SCTE 104, closed-captioning read/insert, GPI/GPO via ANC, or other specialized user payloads. Data can be extracted and inserted within the card, bypassing the scaler (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.

AFD ARC Processor Option

(See Figure 1-4.) Option **+AFD** allows extracted Aspect Ratio Control (ARC) data from the input video (in either AFD, WSS, or VI formats) and provides:

- Format translation between AFD, WSS, and VI ARC formats.
- H/V cross-conversion matrix in which a received code directs a same or other user-selectable alternate H/V ratio on the output for any of several H/V ratios.
- Directs scaler automatic active ARC in response to received and/or converted ARC code (Scaler Follows ARC).

The input video is checked for ARC formats and can be set to provide a trigger upon when a selected ARC format is received, the code associated with the received format can be applied to the output as a translated format (for, example, from WSS to AFD). Received H/V codes can also be applied through an H/V conversion matrix that allows alternate H/V ratios for a given received input code. The ARC code format priority works in that AFD has highest priority, with WSS or VI selectable as the next priority. In conjunction with a user-accessible cross-matrix table, the received code then in turn directs any of several user-selectable H/V settings to be inserted on the output video as AFD, WSS, and/or VI codes. AFD, WSS and/or VI can be rejected for input consideration. On cards equipped with a scaler, the selected output H/V ratio can be set to automatically apply this aspect ratio to the program video.

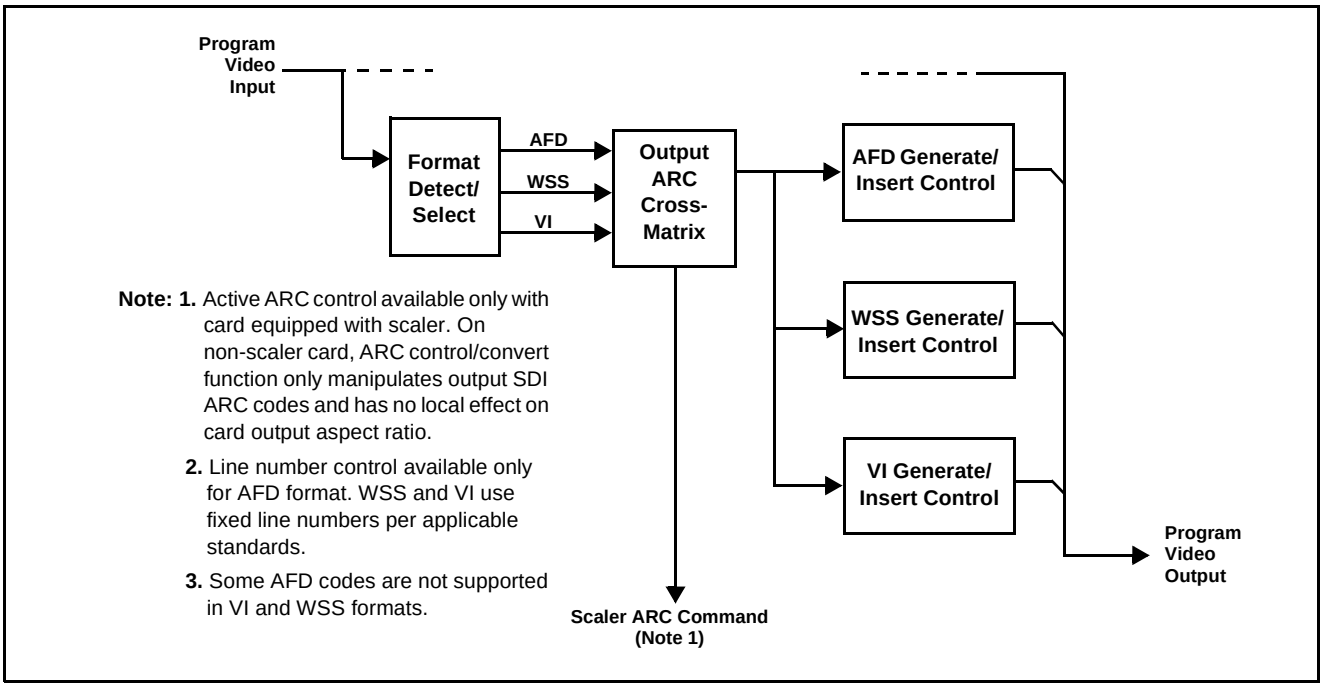

Figure 1-4 AFD ARC Processor

Character/Image Burn-in Functions

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

Trouble Slate Insertion Function Option

Option **+T-SLATE** provides for graphic insertion onto the SDI processed output raster. The function allows for uploading a .png image graphic file to the card/device memory. (png files are converted to a special format using a web tool before uploading to the host card/device; this is described in the setup/operating instructions later in this supplement.)

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

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

Video Quality Events Detect Function Option

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

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

Ancillary Data Processor Option

Option **+ANC** 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.

This option also provides SMPTE 337 embed/de-embed, which allows serial user data to be embedded and de-embedded over unused embedded audio pairs.

Audio Processor Description

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

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

(See Figure 1-5.) The audio processing subsection is built around a card internal 16-channel audio bus. This 16-channel bus receives inputs from an input routing crosspoint that routes de-embedded, and discrete AES and analog audio inputs, over the 16-channel card bus. Correspondingly, at the output end of the 16-channel bus is an output routing crosspoint that in turn distributes the 16-channel bus signals to embedded, and discrete AES and analog audio outputs.

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

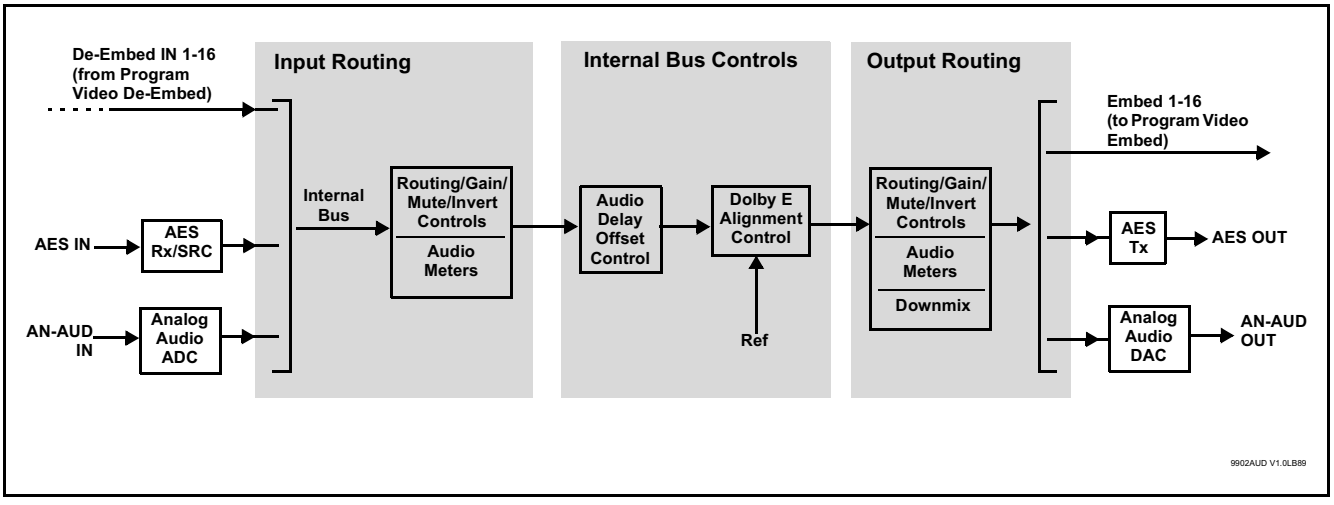

Figure 1-5 Basic Audio Processing Block Diagram

1. Discrete audio I/O channel count is dependent on rear I/O module used. Not all rear I/O modules may not support maximum number of available discrete channels.

Option Clean and Quiet Switching option **+CQS** 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, 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.

Audio Down Mix Function

(See Figure 1-6.) 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).

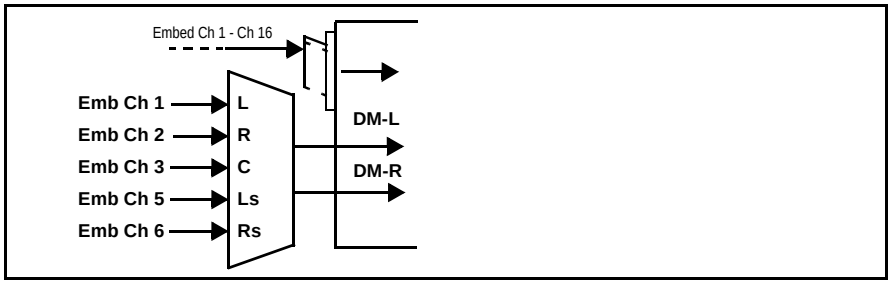

Figure 1-6 Audio Down Mix Functional Block Diagram with Example Sources

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.

Audio DSP Function

The Audio DSP Function provides a DSP-based platform that supports multiple audio DSP options. When optioned with various diverse audio processing options, the DSP-based processing core (which supports numerous simultaneous processing engines) uses license “credits” which allows flexible tailoring of multiple proc function instances. Audio proc options include Dolby® Real-Time Loudness Leveling automatic loudness processing, Dolby® D/D+ encode/decode, and Linear Acoustic® UPMAX™ automatic upmixing.

(See Figure 1-7) The Audio DSP block is positioned between all card audio inputs (input mixer positioning) as well as audio outputs (output mixer positioning). Actual audio DSP proc functions are facilitated using licenses for these options. When any audio option is licensed (activated), the processing can be positioned at the input or output mixer as desired.

- **Input Mixer** path positioning locates the DSP pipeline to receive basic external inputs coming into the card, and then allows DSP processed output channels to be directed to the card internal Audio Bus channels by selecting Audio DSP channels as sources for destination Audio Bus channels via the Input Audio Routing/Controls
- **Output Mixer** path positioning locates the DSP pipeline to receive card Audio Bus channels and then place the DSP processed output channels directly at the card audio outputs as sources for destination Embedded Output or AES Output channels via the Output Audio Routing/Controls.

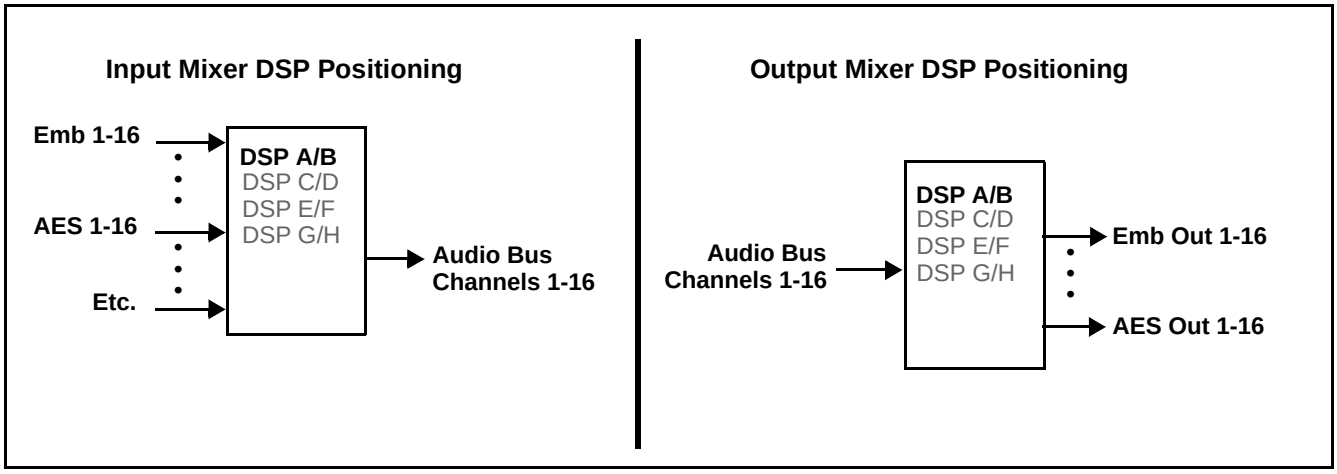

Figure 1-7 DSP Pipelines and Input/Output Mixer Positioning

Option **+DSP Options**. Option licenses provide the user-exposed DSP functions. Available DSP options are as follows. Multiple licenses for the same or different options can be installed and used simultaneously.

- **+DSP-RTLL-5.1** Dolby® Real-Time Loudness Leveling™ 5.1-Channel Loudness Processor Option
- **+DSP-RTLL-2.0** Dolby® Real-Time Loudness Leveling™ 2.0-Channel Loudness Processor Option
- **+DSP-ENCD-5.1** Dolby® Digital/Digital Plus 5.1 Encoder
- **+DSP-ENCD-2.0** Dolby® Digital/Digital Plus 2.0 Encoder
- **+DSP-DEC** Dolby® Decoder
- **+DSP-UPMIX-LA** Linear Acoustic® UPMAX™ 2.0-to-5.1 Upmixer

Chapter 3 – Operating Instructions shows various examples of setting up and using the Audio DSP Proc functions.

Text-To-Speech Option

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

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

Audio Events Detect Function Option

Option **+QC** provides a **Audio Detect Events** user interface and an **Event Triggers** user interface for checking user-selected channels to detect audio silence conditions. The **Event Triggers** user interface in turn allows instructing the card as to the action to take upon an event (such as go to a changed signal routing, activate a GPO, send an automated email, or go to a user-defined preset).

Control and Data Input/Output Interfaces

GPI Interface

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

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

+SCTE104 Insertion Option

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

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

Alarm Function

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

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

User Control Interface

Figure 1-8 shows the user control interface options for the 9902-UDX-DSP. 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-UDX-DSP and other cards installed in openGear®[1] frames can be controlled from a computer and monitor.

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

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-UDX-DSP 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".

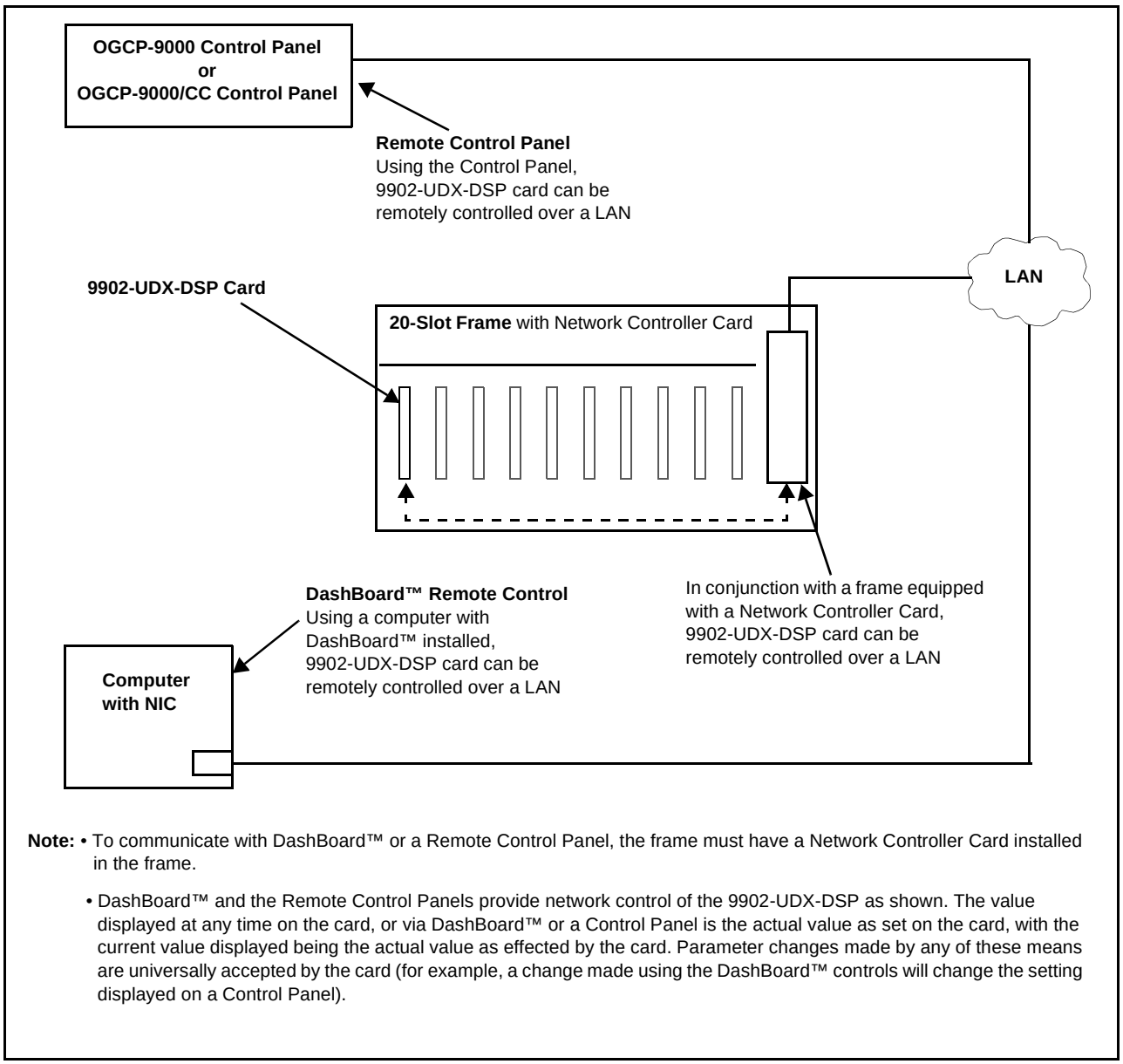

Figure 1-8 9902-UDX-DSP User Control Interface

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. 1-27).

9902-UDX-DSP Rear I/O Modules

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

The full assortment of 9902-UDX-DSP Rear I/O Modules is shown and described in 9902-UDX-DSP 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-UDX-DSP 3G/HD/SD-SDI Up-Down-Cross Converter / Frame Sync / Audio Embed/De-Embed with DSP Audio Options Support card.

Table 1-1 Technical Specifications

Item	Characteristic
Part number, nomenclature	9902-UDX-DSP 3G/HD/SD-SDI Up-Down-Cross Converter / Frame Sync / Audio Embed/De-Embed with DSP Audio Options Support
Installation/usage environment	Intended for installation and usage in frame meeting openGear™ modular system definition
Power consumption	24 Watts (includes +DSP options)
Installation Density	Up to 20 cards per 20-slot frame
Environmental: Operating temperature: Relative humidity (operating or storage):	 32° – 104° F (0° – 40° C) < 95%, non-condensing
Frame communication	10/100/1000 Mbps Ethernet with Auto-MDIX
Indicators	Card edge display and indicators as follows: • 4-character alphanumeric display • Status/Error LED indicator • Input Presence LED indicators
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
Analog Video Input	Number of Inputs: One SD analog CVBS Impedance: 75 Ω
AES Audio Inputs	Standard: SMPTE 276M Number of Inputs: Up to 16 unbalanced; AES-3id Impedance: 75 Ω
Analog Audio Inputs	Number of Inputs: Up to four balanced using 3-wire removable Phoenix connectors; 0 dBFS => +24 dBu
Input Select/Auto-Changeover Failover (option +QC)	Failover to alternate input on loss of target input. Failover invoked upon LOS and/or (with option +QC) user configurable parametric criteria such as black/frozen frame or audio silence. - Black frame trigger configurable for black intensity threshold and persistence time. - Frozen frame trigger configurable for frozen percentage difference and persistence time.
Post-Processor Serial Digital Video Outputs	Number of Outputs: Up to four 3G/HD/SD-SDI BNC Impedance: 75 Ω Return Loss: > 15 dB at 5 MHz – 270 MHz Signal Level: 800 mV ± 10% DC Offset: 0 V ± 50 mV Jitter (3G/HD/SD): < 0.3/0.2/0.2 UI

Table 1-1 Technical Specifications — continued

Item	Characteristic
Post-Processor Serial Digital Video Outputs (Cont)	Minimum Latency (frame sync and scaler disabled): SD: 127 pixels; 9.4 us 720p: 330 pixels; 4.45 us 1080i: 271 pixels; 3.65 us 1080p: 361 pixels; 2.43 us
Analog Video Output	Number of Outputs: One SD analog CVBS Impedance: 75 Ω
Embedded Audio Output	16-ch embedded. User crosspoint allows routing of any embedded channel to any embedded channel output. Multi-frequency tone generator for each audio output. Master delay control; range of -33 msec to +3000 msec.
AES Audio Outputs	Standard: SMPTE 276M Number of Outputs: Up to 16 unbalanced; AES-3id Impedance: 75 Ω
Analog Audio Outputs	Number of Outputs: Up to four balanced using 3-wire removable Phoenix connectors; 0 dBFS => +24 dBu
Frame Reference Input	Number of Inputs: Two, REF 1 and REF 2 from frame with selectable failover Standards Supported: SMPTE 170M/318M (“black burst”) SMPTE 274M/296M (“tri-level”) Return Loss: > 35 dB up to 5.75 MHz
GPIO	(2) GPI; (2) GPO; opto-isolated GPO Specifications: Max I: 120 mA Max V: 30 V Max P: 120 mW GPI Specifications: GPI LO @ Vin < 1.5 V GPI HI @ Vin > 2.3 V Max Vin: 9 V

Warranty and Service Information

Cobalt Digital Inc. Limited Warranty

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

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

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

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

Cobalt Digital Inc. Factory Service Center

2506 Galen Drive	Office: (217) 344-1243
Champaign, IL 61821 USA	Fax: (217) 344-1245
www.cobaltdigital.com	Email: info@cobaltdigital.com

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

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Chapter 2

Installation and Setup

Overview

This chapter contains the following information:

- Installing the 9902-UDX-DSP Into a Frame Slot (p. 2-1)
- Installing a Rear I/O Module (p. 2-3)
- Setting Up 9902-UDX-DSP Network Remote Control (p. 2-10)

Installing the 9902-UDX-DSP 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-UDX-DSP has a high power dissipation (24 W at full proc capacity). 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-UDX-DSP 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-UDX-DSP 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-UDX-DSP 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-UDX-DSP into a frame slot as follows:

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

Note:
- The 9902-UDX-DSP 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-UDX-DSP Network Remote Control (p. 2-10).

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-UDX-DSP is to be installed.

If installing the 9902-UDX-DSP 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-UDX-DSP 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.

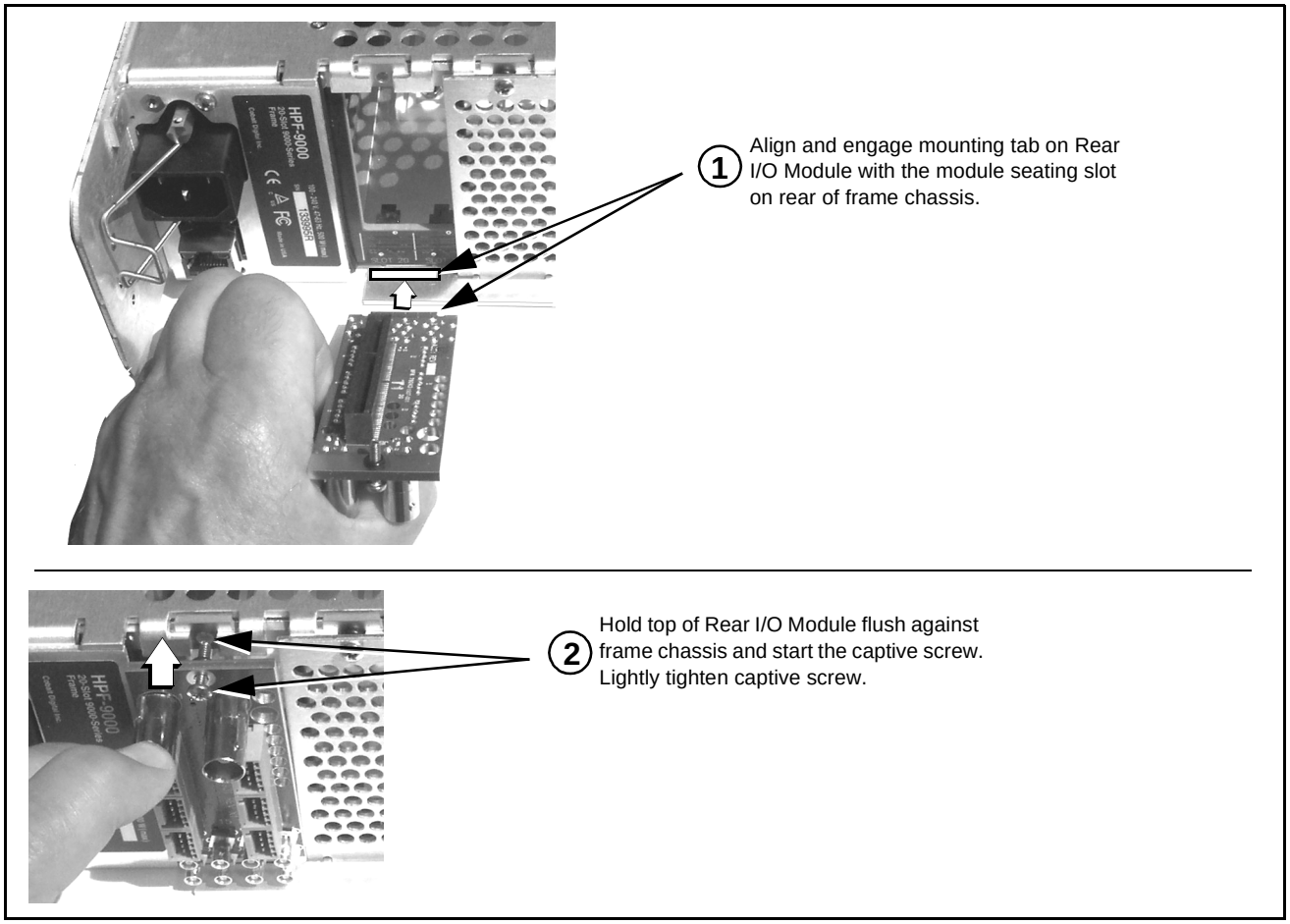


Figure 2-1 Rear I/O Module Installation

9902-UDX-DSP Rear I/O Modules

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

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-UDX-DSP Rear I/O Modules

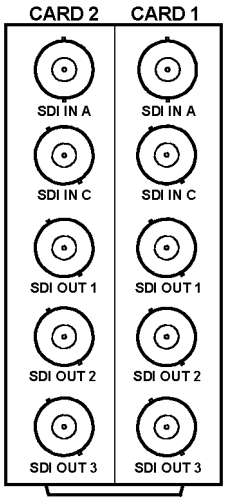
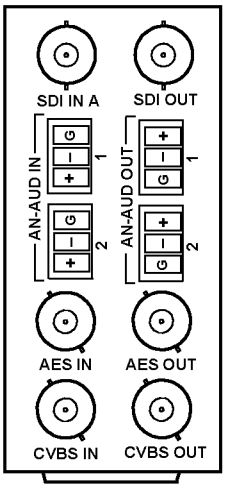
9902-UDX-DSP Rear I/O Module	Description
RM20-9902-A/S 	Split Rear Module. Provides **each** of the following connections for two 9902-UDX-DSP cards: • Two 3G/HD/SD-SDI coaxial input BNCs (**SDI IN A** and **SDI IN C**) • Three 3G/HD/SD-SDI Video Out BNCs (**SDI OUT 1** thru **SDI OUT 3**)
RM20-9902-B 	Provides the following connections: • One 3G/HD/SD-SDI coaxial input BNC (**SDI IN A**) • One analog video CVBS coaxial input BNC (**CVBS IN**) • Two analog balanced audio inputs (**AN-AUD IN 1** and **AN-AUD IN 2**) • One AES input BNC (**AES IN**) • One processed coaxial output BNC (**SDI OUT**) • One analog video CVBS coaxial output BNC (**CVBS OUT**) • Two analog balanced audio outputs (**AN-AUD OUT 1** and **AN-AUD OUT 2**) • One AES output BNC (**AES OUT**)

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

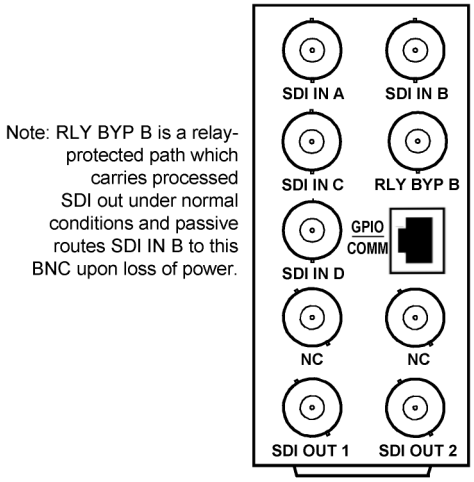
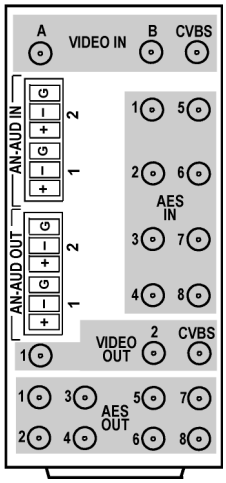
9902-UDX-DSP Rear I/O Module	Description
RM20-9902-C  Note: RLY BYP B is a relay-protected path which carries processed SDI out under normal conditions and passive routes SDI IN B to this BNC upon loss of power.	Provides the following connections: • Four 3G/HD/SD-SDI video input BNCs (**SDI IN A** thru **SDI IN D**) • Four 3G/HD/SD-SDI video output BNCs (**RCK/PROC 1** thru **RCK/PROC 4**; each GUI selectable as processed out, selected-input reclocked, or wings/key-fill preview where available) • One relay-protected SDI processed output BNC (**RLY BYP B**; outputs a copy of **SDI OUT 1** under normal conditions, or passive outputs the SDI input on **SDI IN B** as a relay failover if card power is lost) • **COMM/GPIO** RJ-45 connector **Note:** Refer to GPIO, Serial (COMM), and Analog Audio Connections (p. 2-10) for connector pinouts and important information regarding GPO electrical limits.
RM20-9902-D  	Provides the following connections: • Two 3G/HD/SD-SDI video inputs (**VIDEO IN A** and **VIDEO IN B**) • One CVBS video input (**CVBS IN**) • Two analog balanced audio inputs (**AN-AUD IN 1** and **AN-AUD IN 2**) • Eight AES audio inputs (**AES IN 1** thru **AES IN 8**) • Two 3G/HD/SD-SDI video outputs (**VIDEO OUT 1** and **VIDEO OUT 2**) • One CVBS video output (**CVBS OUT**) • Two analog balanced audio outputs (**AN-AUD OUT 1** and **AN-AUD OUT 2**) • Eight AES audio outputs (**AES OUT 1** thru **AES OUT 8**) **Note:** Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9902-D-HDBNC or RM20-9902-D-DIN, respectively.
COBALT RM20-9001-B/S-DIN **SAMPLE-NOT FOR USE**	Due to the density of connector placement on Rear Modules using high-density connectors (e.g., RM20-9001-B/S-DIN), these modules use a QR barcode label instead a regular label. Simply scan the image with a smart phone and a link to the rear module label (as shown in our catalog) will appear. (Smart phone must have a QR reader app such as QuickMark QR Code Reader or equivalent.) Not all devices may be able to acquire the image. If this occurs, use the device to access the web page for card/rear module to view the diagram.

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

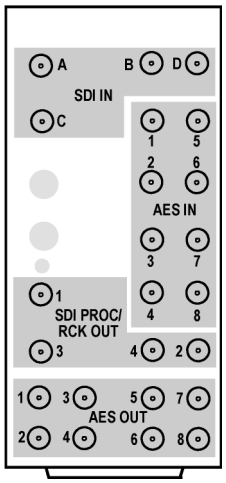
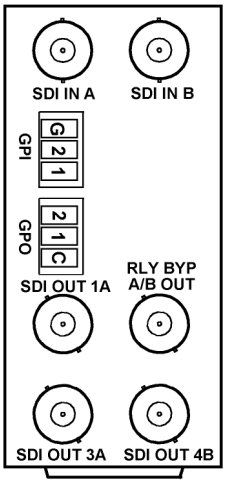
9902-UDX-DSP Rear I/O Module	Description
RM20-9902-E 	Provides the following connections: • Four 3G/HD/SD-SDI video inputs (**SDI IN A** thru **SDI IN D**) • Eight AES audio inputs (**AES IN 1** thru **AES IN 8**) • Four 3G/HD/SD-SDI video outputs; selectable as processed or input reclocked out (**SDI PROC/RCK OUT 1** thru **SDI PROC/RCK OUT 4**) • Eight AES audio outputs (**AES OUT 1** thru **AES OUT 8**) **Note:** Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9902-E-HDBNC or RM20-9902-E-DIN, respectively.
RM20-9902-F 	Provides the following connections: • 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**) **Note:** Refer to GPIO, Serial (COMM), and Analog Audio Connections (p. 2-10) for connector pinouts and important information regarding GPO electrical limits.

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

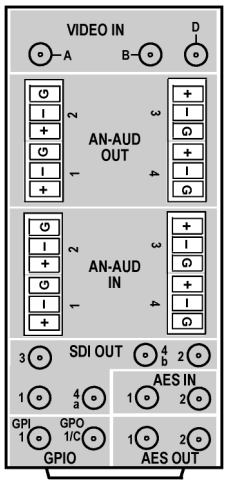
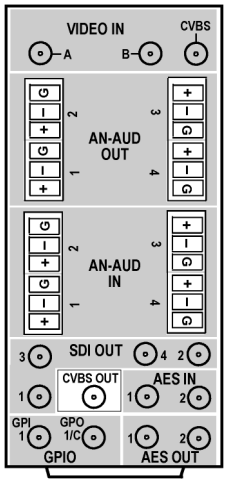
9902-UDX-DSP Rear I/O Module	Description
RM20-9902-H  **Note:** Refer to GPIO, Serial (COMM), and Analog Audio Connections (p. 2-10) for connector pinouts and important information regarding GPO electrical limits.	Provides the following connections: • Two 3G/HD/SD-SDI video input BNCs (**SDI IN A** and **SDI IN B**) • One SDI/CVBS video input; selectable as 3G/HD/SD-SDI or CVBS (**D/CVBS IN**) • Four analog balanced audio inputs (**AN-AUD IN 1** thru **AN-AUD IN 4**) • Two AES audio inputs (**AES IN 1** and **AES IN 2**) • Three 3G/HD/SD-SDI video outputs, selectable as processed or reclocked input (**SDI OUT 1** thru **SDI OUT 3**) • 3G/HD/SD-SDI video output pair, selectable as processed or reclocked input as a pair (**SDI OUT 4a** and **SDI OUT 4b**) • Four analog balanced audio outputs (**AN-AUD OUT 1** thru **AN-AUD OUT 4**) • Two AES audio outputs (**AES OUT 1** and **AES OUT 2**) • One GPI / 6Hz coaxial input (**GPI 1**) • One coaxial GPO with isolated return (**GPO 1**) **Note:** Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9902-H-HDBNC or RM20-9902-H-DIN, respectively.
RM20-9902-J  **Note:** Refer to GPIO, Serial (COMM), and Analog Audio Connections (p. 2-10) for connector pinouts and important information regarding GPO electrical limits.	Provides the following connections: • Two 3G/HD/SD-SDI video input BNCs (**SDI IN A** and **SDI IN B**) • One SDI/CVBS video input; selectable as 3G/HD/SD-SDI or CVBS (**D/CVBS IN**) • Four analog balanced audio inputs (**AN-AUD IN 1** thru **AN-AUD IN 4**) • Two AES audio inputs (**AES IN 1** and **AES IN 2**) • Four 3G/HD/SD-SDI video outputs, selectable as processed or reclocked input (**SDI OUT 1** thru **SDI OUT 4**) • One CVBS video output (**CVBS OUT**) • Four analog balanced audio outputs (**AN-AUD OUT 1** thru **AN-AUD OUT 4**) • Two AES audio outputs (**AES OUT 1** and **AES OUT 2**) • One GPI / 6Hz coaxial input (**GPI 1**) • One coaxial GPO with isolated return (**GPO 1**) **Note:** Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9902-J-HDBNC or RM20-9902-J-DIN, respectively.

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

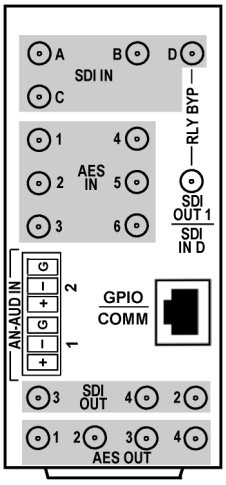
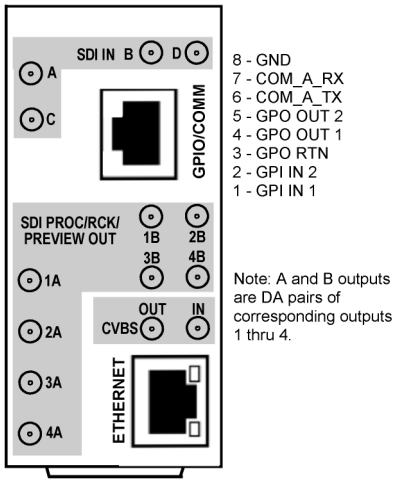
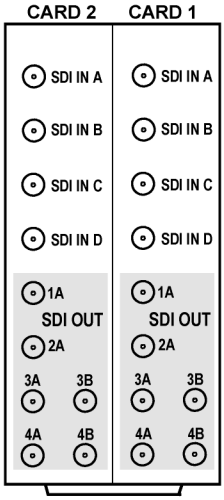
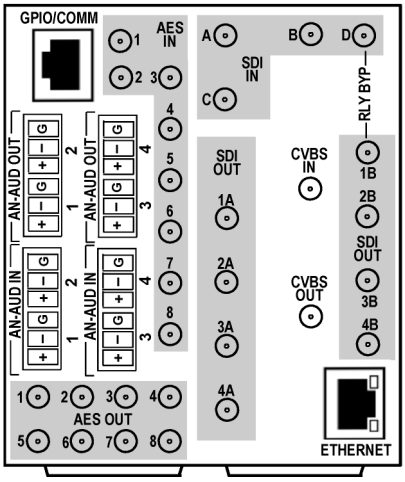
9902-UDX-DSP Rear I/O Module	Description
RM20-9902-K 	Provides the following connections: • Four 3G/HD/SD-SDI video inputs (**SDI IN A** thru **SDI IN D**; IN D-to-OUT 1 as passive RLY bypass) • SIx AES audio inputs (**AES IN 1** thru **AES IN 6**) • Two analog balanced audio inputs (**AN-AUD IN 1** and **AN-AUD IN 2**) • 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 **Note:** • Refer to GPIO, Serial (COMM), and Analog Audio Connections (p. 2-10) 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-K-HDBNC or RM20-9902-K-DIN, respectively.
RM20-9902-L 	Provides the following connections: • Four 3G/HD/SD-SDI video inputs (**SDI IN A** thru **SDI IN D** • CVBS video input (**CVBS IN**) • Eight 3G/HD/SD-SDI video outputs (**SDI OUT 1A** thru **SDI OUT 4B**; 1x2 DA output of each crosspoint output) • CVBS video output (**CVBS OUT**) • **COMM/GPIO** RJ-45 connector • **ETHERNET** 100/1000 BaseT Ethernet connector **Note:** Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9902-L-HDBNC or RM20-9902-L-DIN, respectively.

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

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

GPIO, Serial (COMM), and Analog Audio Connections

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

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

Setting Up 9902-UDX-DSP Network Remote Control

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

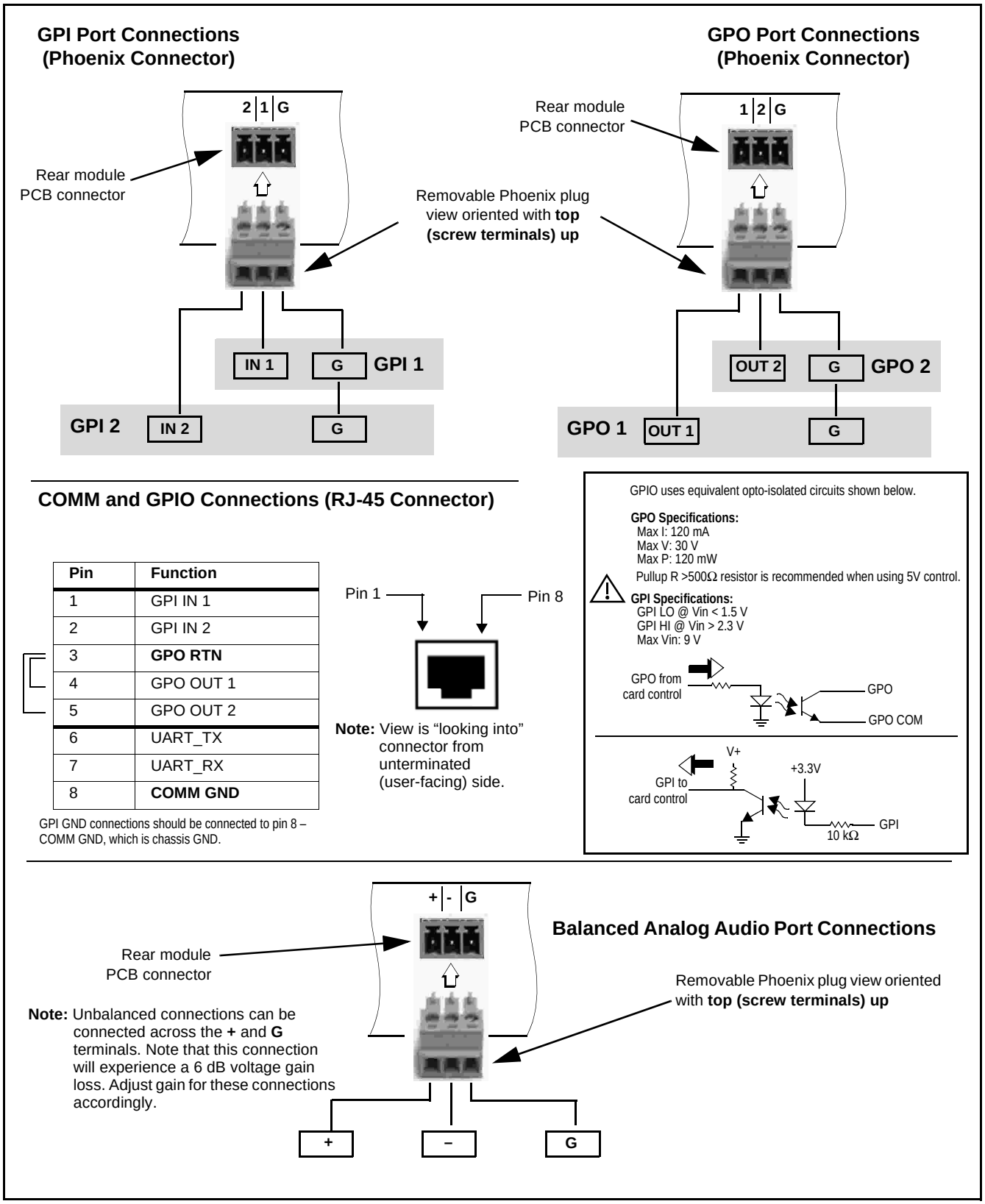
Note:

- 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. 1-27).

- 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.

- This card requires DashBoard™ version 8.0 or greater. This is due to the added user interface controls which can only be accommodated with DashBoard version 8.0 or greater. While the card will appear in the frame Basic Tree View in earlier DashBoard versions, many card controls will not be accessible. For a free download of the latest DashBoard version, please go to www.cobaltdigital.com, and select **Products** > **Software Control** > **DashBoard™**, and then select the version applicable to your computer.



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

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

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Chapter 3

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-UDX-DSP Function Menu List and Descriptions (p. 3-10).

This chapter contains the following information:

- Control and Display Descriptions (p. 3-1)
- Accessing the 9902-UDX-DSP Card via Remote Control (p. 3-6)
- Checking 9902-UDX-DSP Card Information (p. 3-8)
- Ancillary Data Line Number Locations and Ranges (p. 3-9)
- 9902-UDX-DSP Function Menu List and Descriptions (p. 3-10)
- Troubleshooting (p. 3-92)

Control and Display Descriptions

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

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

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

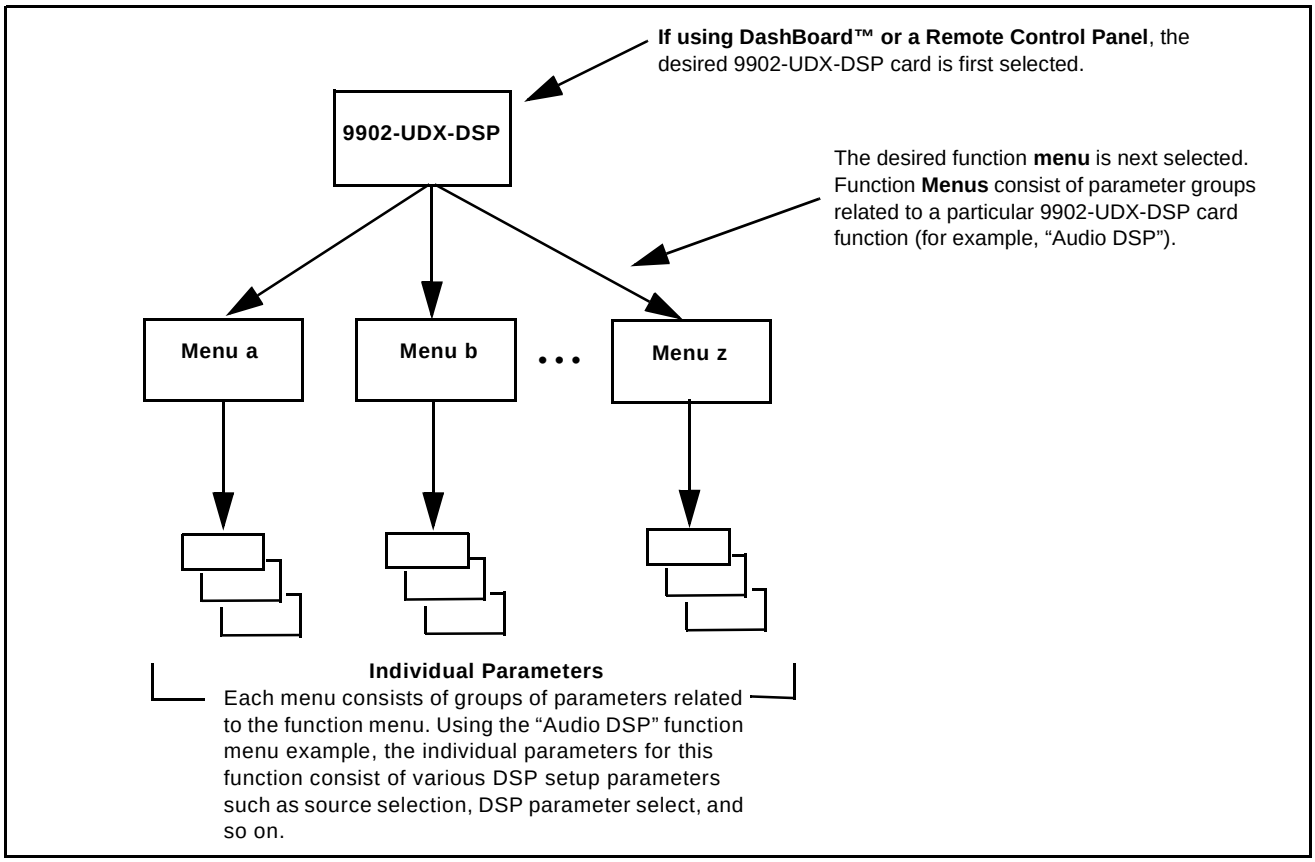


Figure 3-1 Function Menu/Parameter Overview

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.

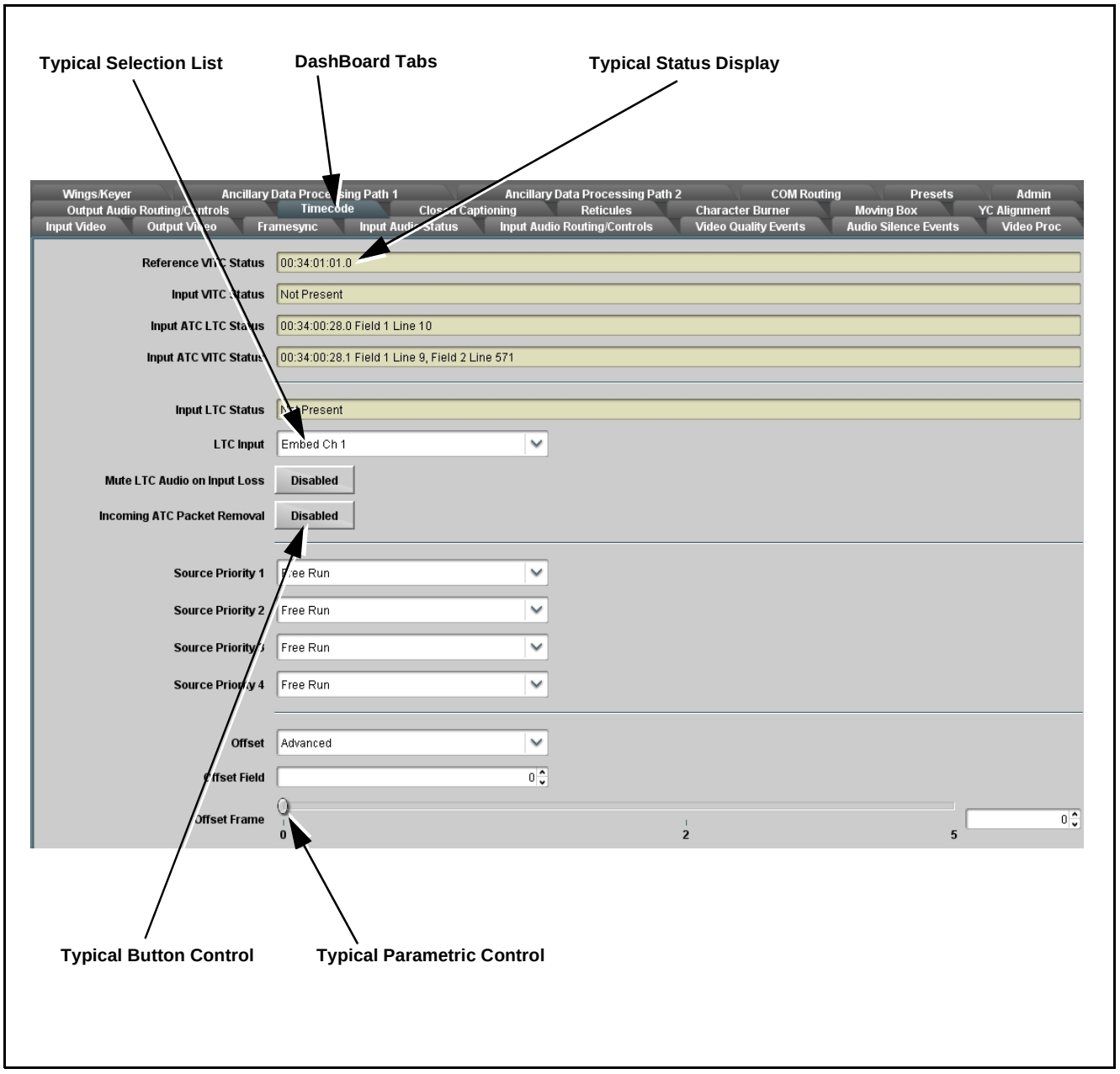


Figure 3-2 Typical DashBoard Tabs and Controls

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-UDX-DSP 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. 3-84) for more information.)

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

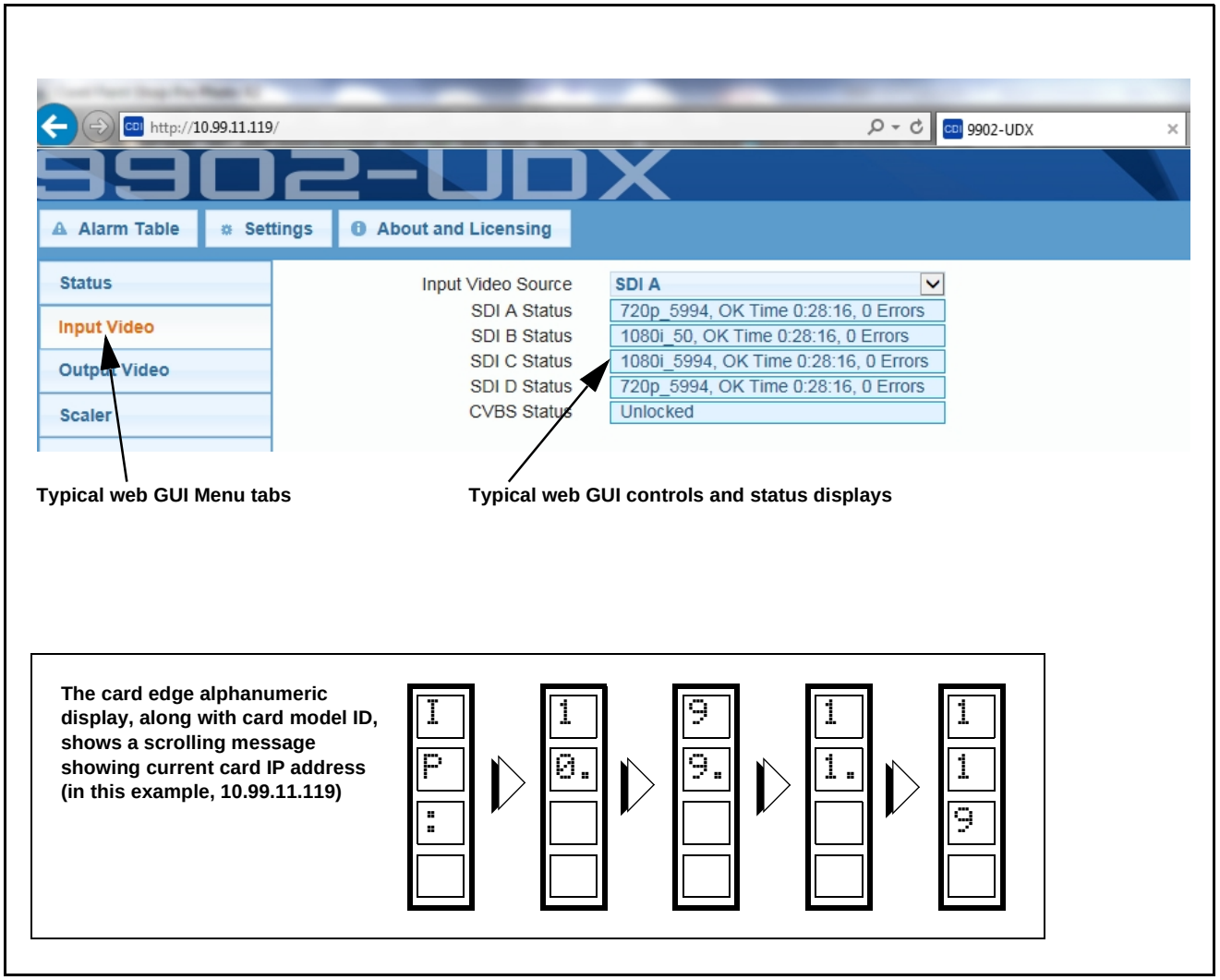


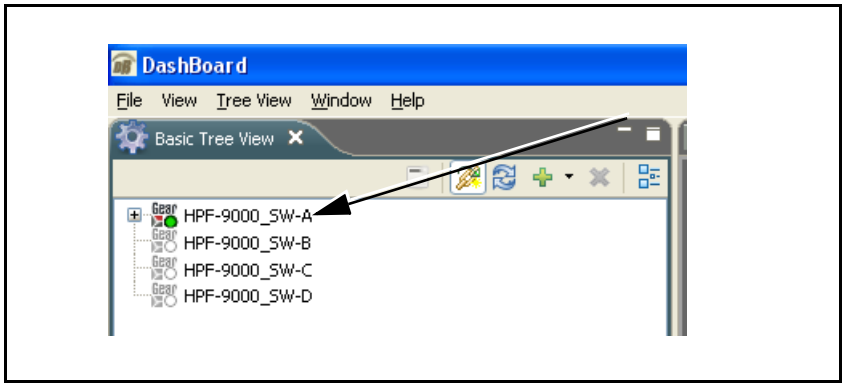
Figure 3-4 Typical Web GUI Tabs and Controls

Accessing the 9902-UDX-DSP Card via Remote Control

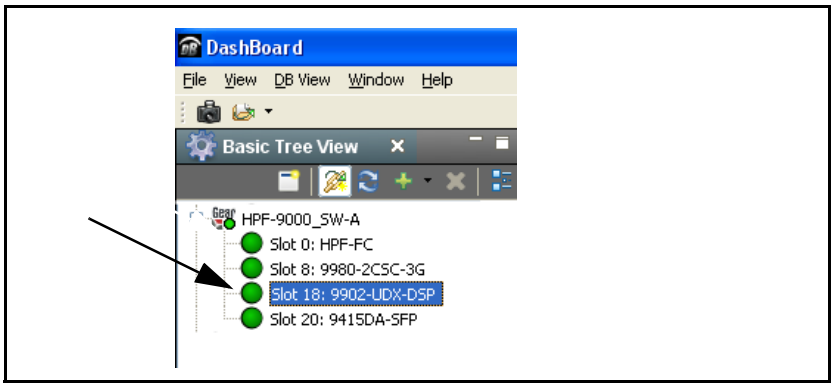
Access the 9902-UDX-DSP card using DashBoard™ or Cobalt® Remote Control Panel as described below.

Accessing the 9902-UDX-DSP Card Using DashBoard™

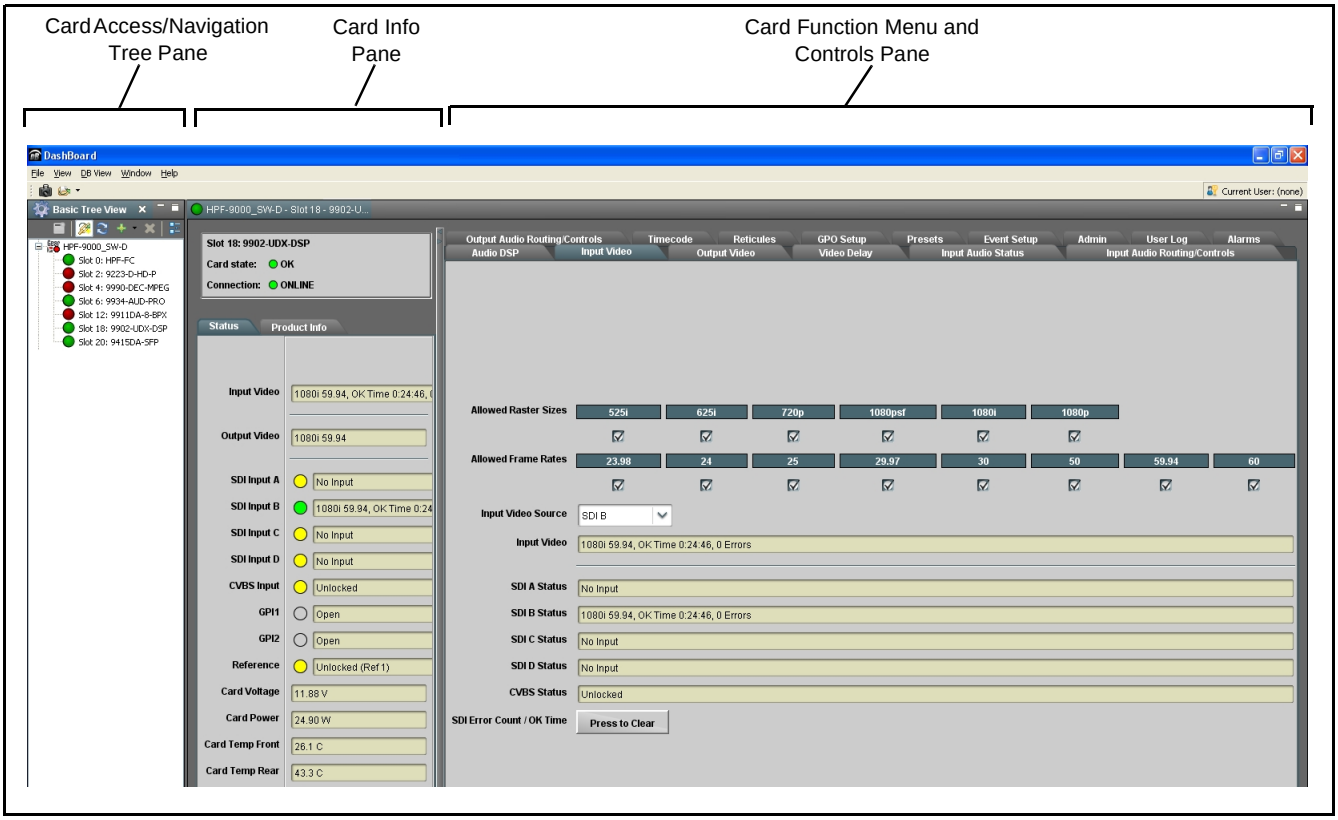
1. On the computer connected to the frame LAN, open DashBoard™.
2. As shown below, in the left side Basic View Tree locate the Network Controller Card associated with the frame containing the 9902-UDX-DSP card to be accessed (in this example, “HPF-9000_SW-A”).



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 18: 9902-UDX-DSP”).



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-UDX-DSP Card Using a Cobalt® Remote Control Panel

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

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

This display shows the devices assigned to the Control Panel.

- Rotate any knob to select from the list of devices. The device selected using a knob is displayed with a reversed background (in this example, “1 9902 - Receiver 21 Input Processing”).
- Directly enter a device by entering its list number using the numeric keypad, and then pressing **Enter** or pressing in any knob).

Checking 9902-UDX-DSP Card Information

The operating status and software version the 9902-UDX-DSP card can be checked using DashBoard™ or the card edge control user interface. Figure 3-5 shows and describes the 9902-UDX-DSP 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. 3-92) for corrective action.

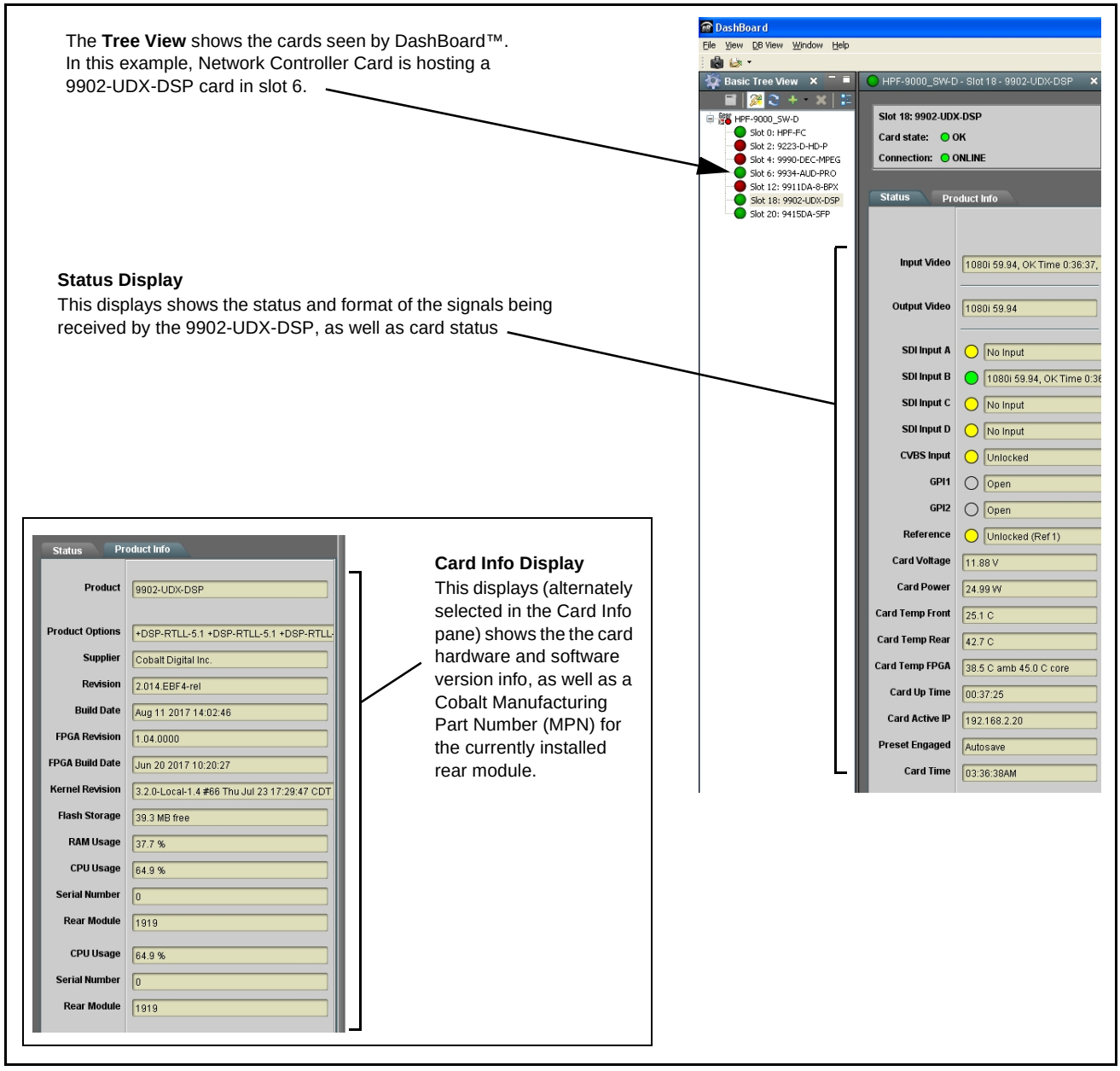


Figure 3-5 9902-UDX-DSP Card Info/Status Utility

Ancillary Data Line Number Locations and Ranges

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

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

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

Notes:

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

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

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

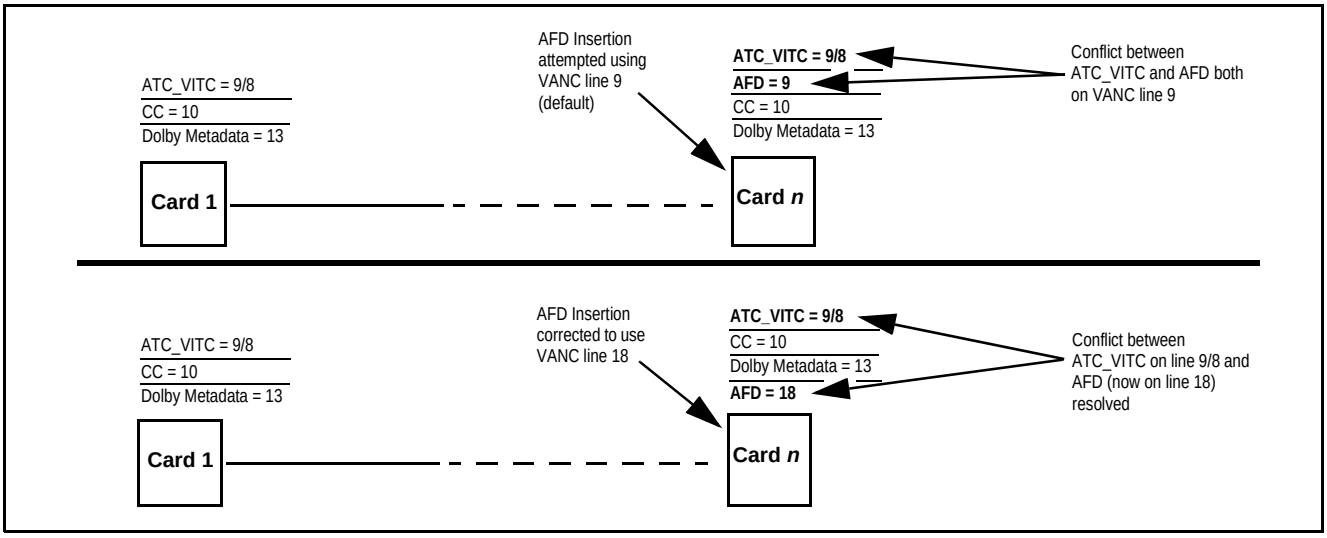


Figure 3-6 Example VANC Line Number Allocation Example

9902-UDX-DSP Function Menu List and Descriptions

Table 3-2 individually lists and describes each 9902-UDX-DSP 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: **Option** For any DashBoard tabs on card not appearing in this manual, this indicates the function is an option and covered in a separate Manual Supplement. Please refer to card web page Product Downloads for pdf Manual Supplements covering these options.

On 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 SDI **Output Routing** sub-tab on the **Output Video** page).

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

Function Menu Item	Page	Function Menu Item	Page
Audio DSP Setup Controls	3-11	AFD/WSS/VI Code Insertion Controls	3-57
Input Video Controls	3-24	Character Burner	3-63
Output Video Mode Controls	3-25	Moving Box Insertion	3-68
Scaler	3-26	Wings Insertion	3-69
Framesync	3-29	Keyer	3-70
Input Audio Status	3-32	Ancillary Data Proc Controls	3-73
Input Audio Routing/Controls	3-33	COMM Ports Setup Controls	3-76
Output Audio Routing/Controls	3-38	Presets	3-78
Timecode	3-43	GPO Setup Controls	3-79
Reticules	3-48	Event Setup Controls	3-80
Video Proc/Color Correction	3-51	Admin	3-84
Video Quality Events	3-54	User Log	3-87
Audio Detect Events Setup Controls	3-55	Alarms Setup Controls	3-88
Closed Captioning	3-56		

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

Audio DSP	Provides controls for enabling licensed DSP functions, routing inputs and outputs to and from the DSP functions, and setting individual parametric settings for each DSP function.

⚠ Read and understand the overview shown below before proceeding to specific DSP detailed control settings. The overview shows basic setup (with examples) to select and enable various DSP functional blocks, and shows how to route inputs and outputs to and from individual DSP blocks.

Input Mixer and Output Mixer DSP Positioning

Each pair of the eight DSP pipelines (**DSP A/B** thru **DSP G/H**) can be independently positioned either at the card **input** mixer (**Input Audio Routing/Controls**) location or at the card **output** mixer (**Output Audio Routing/Controls**) location.

Path positioning is set for each DSP pipeline pair in the upper pane of the **Audio DSP** page by selecting **Input Miixer** or **Output Mixer** button for each DSP pair (**DSP A / DSP B** thru **DSP G / DSP H**).

In this example, **DSP A/B** pair is set to work with the **input** mixer, and **DSP E/F** pair is set to work with the **output** mixer. Any DSP process can be set to use the input or output path as desired.

In each DSP function row, the **licenses available** displays shows whether or not the DSP function is licensed for the card, and if so the number of licenses available. As DSP functions are enabled for use, the available licenses is correspondingly decremented.

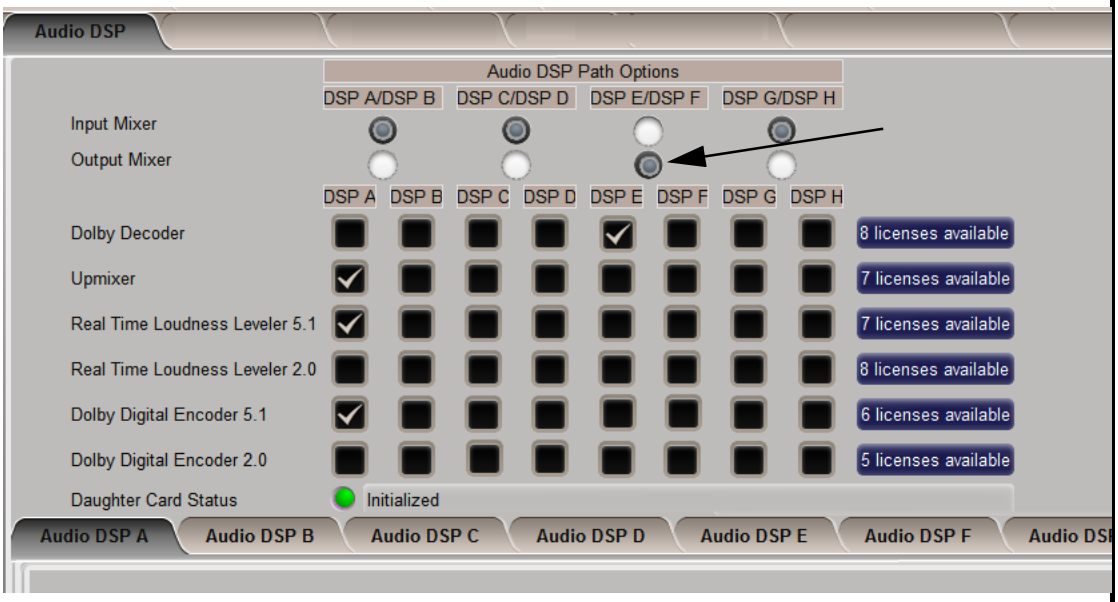
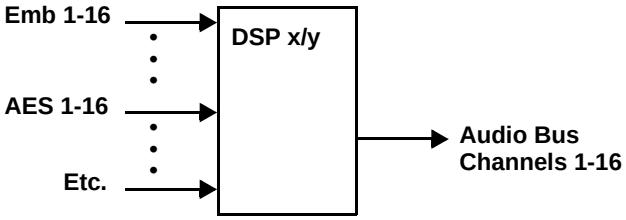
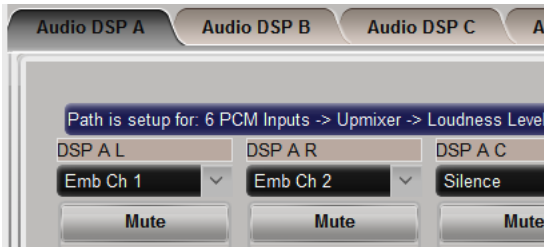


Table 3-2 9902-UDX-DSP Function Menu List — continued

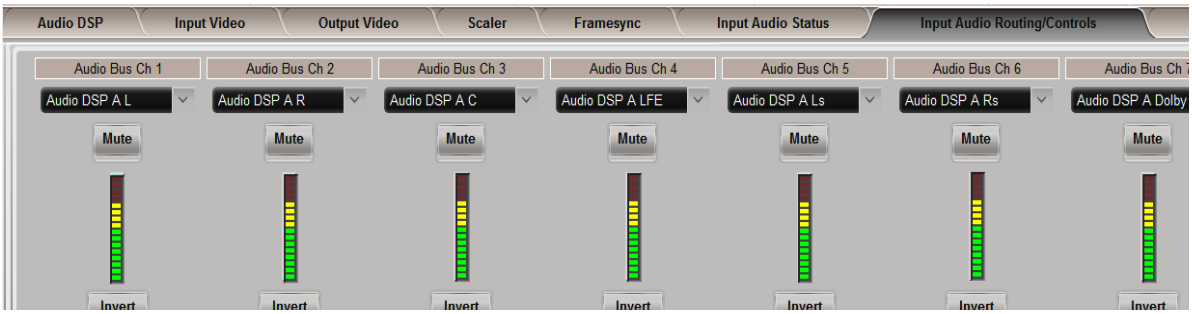
Audio DSP	(continued)

Input Mixer path positioning locates the DSP pipeline to receive basic external inputs coming into the card (in this example, Emb Ch 1 and Ch 2 feeding DSP A L and DSP A R), and then allows DSP processed output channels to be directed to the card internal Audio Bus channels by selecting Audio DSP channels as sources for destination Audio Bus channels via the Input Audio Routing/Controls.

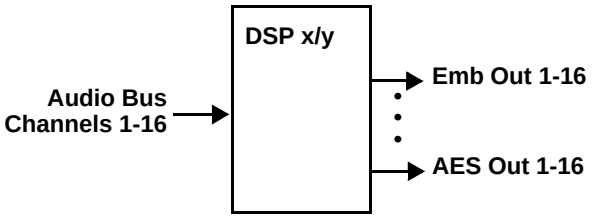




The DSP outputs are then routed to card Audio Bus Channels as desired (in this example, Audio DSP A L thru Audio DSP A Rs serving as sources for card audio bus channels Audio Bus Ch 1 thru Ch 6).



Output Mixer path positioning locates the DSP pipeline to receive card Audio Bus channels (in this example, DSP E L and DSP E R receiving card Audio Bus Channels 9 and 10) and then place the DSP processed output channels directly at the card audio outputs as sources for destination Embedded Output or AES Output channels via the Output Audio Routing/Controls.



The DSP outputs are then routed to card external outputs as desired (in this example, Audio DSP E Dolby L and Dolby R serving as sources for card outputs AES Out Ch 1 and Ch 2).

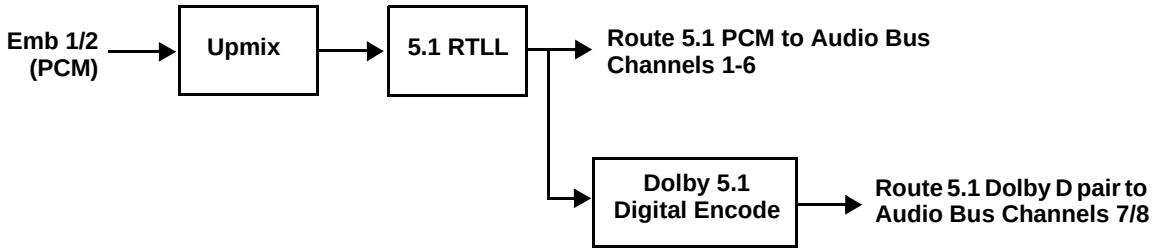
Table 3-2 9902-UDX-DSP Function Menu List — continued

Audio DSP	(continued)

Example Multiple DSP Process Audio Routing and DSP Setup

In this example, single DSP pipeline **DSP A** is setup to:

- Receive an embedded PCM pair from the basic card input audio (input mixer positioning).
- Upmix the PCM stereo pair to 5.1 audio.
- Perform Real-Time Loudness Leveler (RTLL) loudness processing.
- Output the processed 5.1 complement as PCM and as a separate Dolby Digital 5.1 Encoded pair.
- Provide a separate additional Dolby 2.0 Encoder (on DSP E) for a SAP stereo PCM pair.



The upper pane on the Audio DSP tab allows enabling DSP processes for each of the eight DSP pipelines. In this example, DSP A is set to provide Upmixer, 5.1 RTLL, and Dolby Digital 5.1 Encode by checking the corresponding boxes. In this example, all processing is positioned at the **Input** mixer.

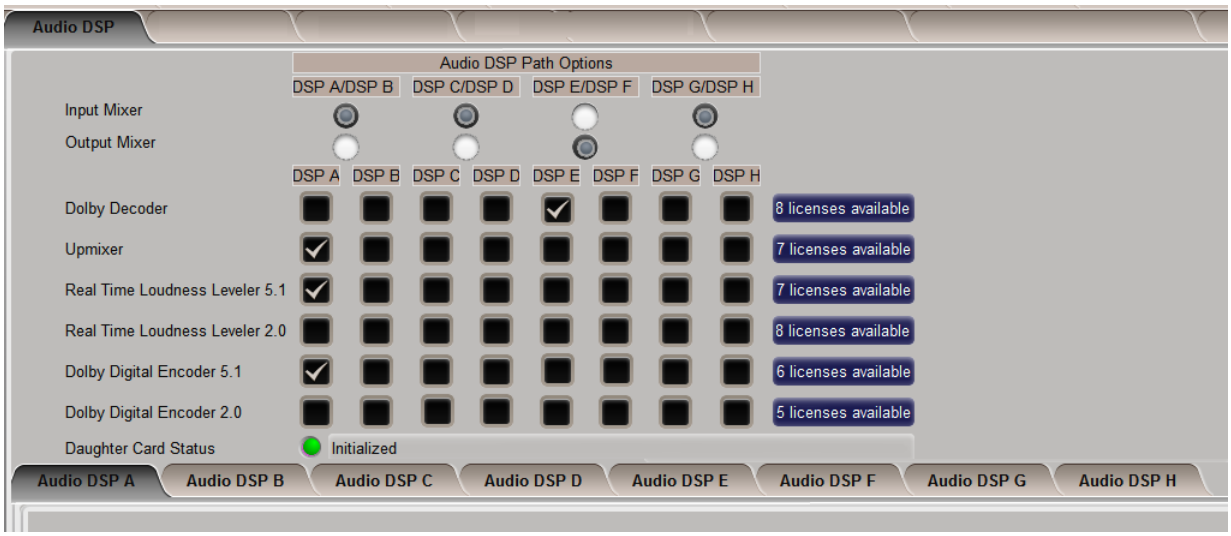


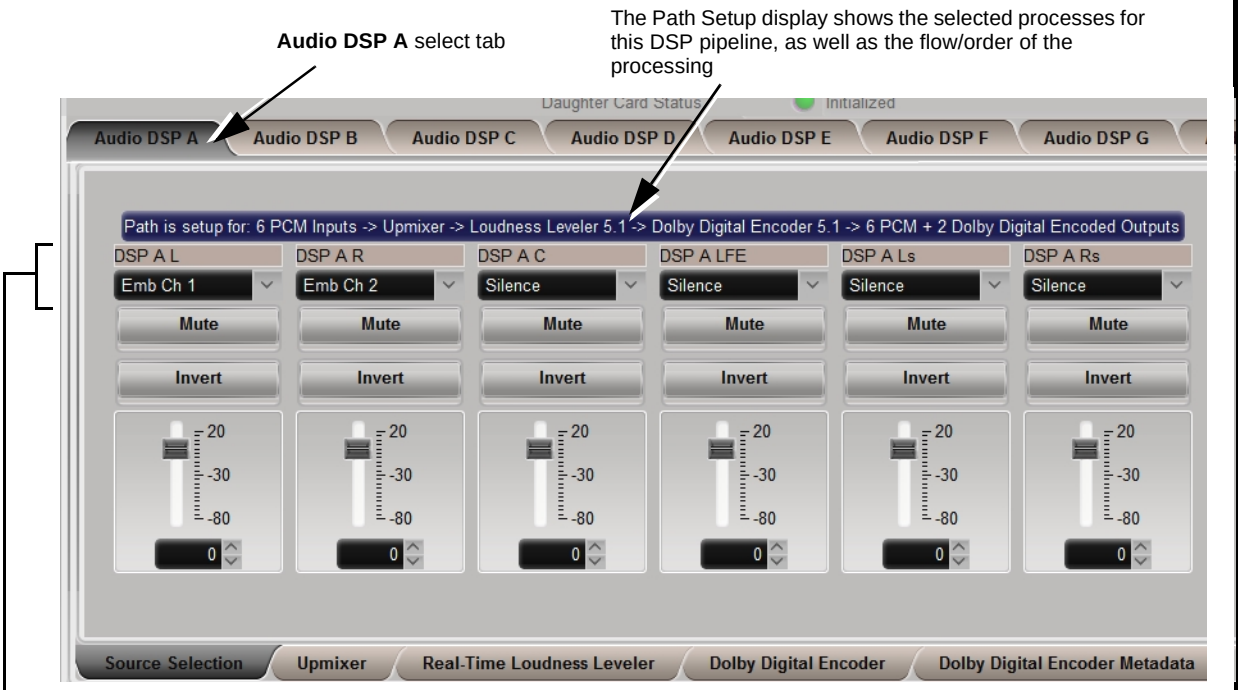
Table 3-2 9902-UDX-DSP Function Menu List — continued

Audio DSP	**(continued)**

When a DSP pipeline is enabled for any function by checking any checkbox like that shown above, the sub-tabs for the related DSP in the lower pane expose all the setup functions required for the selected processes. In this example, we'll start with the **Source Selection** function since this is the first step in setting up a DSP.

After checkboxes enabling the desired processes are checked in the Audio DSP page upper pane, selecting the respective DSP tab (**Audio DSP A** thru **Audio DSP H**) shows the pertinent setup tabs for the functions that are selected.

In this example, we've selected DSP processes using DSP pipeline Audio DSP A. Clicking the **Audio DSP A** tab exposes the setup functions sub-tabs for the pipeline. Here, we will start with telling the DSP what inputs it will receive using the **Source Selection** sub-tab.



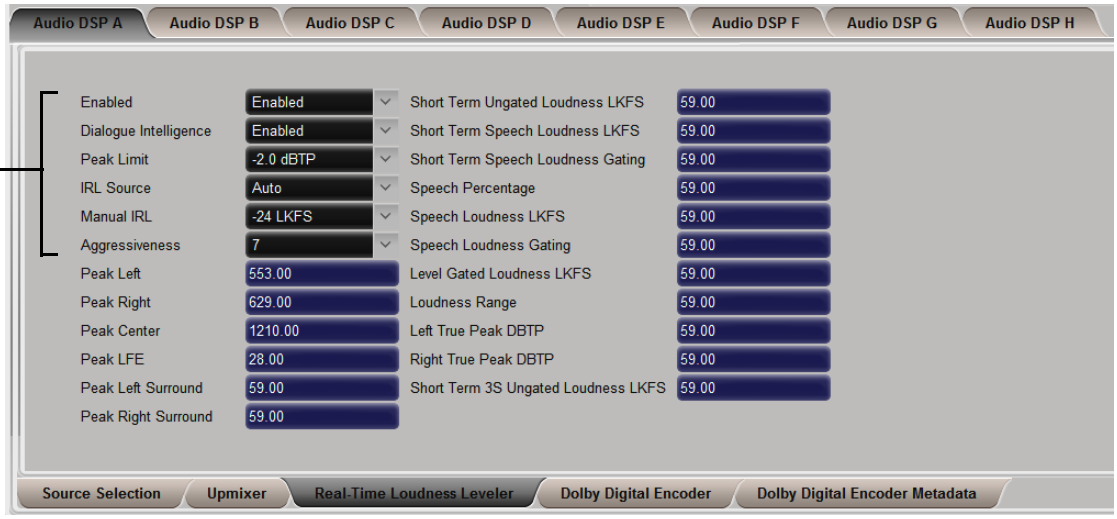
With the **Source Selection** sub-tab opened, we now assign the card basic input channels that the processing chain will use (in this example, sourcing from card basic inputs Emb Ch 1/2). Since all of the processes selected here reside in DSP A, each process will forward its processed signal to the next enabled process in the DSP pipeline.

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

Audio DSP	(continued)

With source selection having been set, now we proceed to setting up the Upmixer. In our example we are sourcing from a stereo PCM pair, so Crossfade does not need to be considered (Mode can be set to Auto or Always Upmix). For cases where 5.1-channel PCM is used as an input, and may already carry 5.1 content, the Threshold and Auto Crossfade controls can make for smoother transitions between existing and Upmixer-developed 5.1 content. Default settings are recommended in most cases.

Now that the Upmixer is set up, the 5.1 Upmix content in our example is fed to the **Real Time Loudness Leveler 5.1** function (since we also have that checkbox checked for the **DSP A** pipeline).

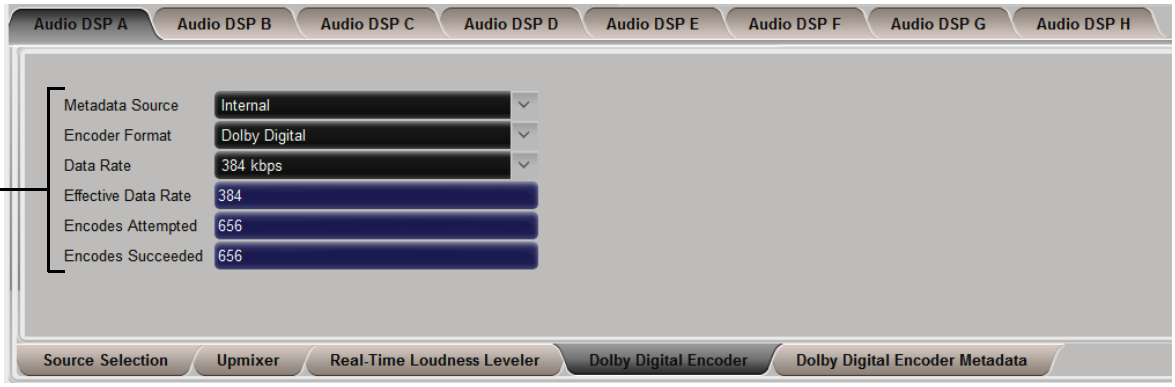


The RTLL blocks offer parametric controls for loudness leveling. Basic setup is setting RTLL to Enabled, and choosing a Manual IRL level (typically same as the desired loudness level). Other settings can typically be left at the default settings provided.

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

Audio DSP	(continued)

Our final processing step in this example is setting DSP A to also provide a Dolby 5.1 encoded pair. When a Dolby encoder is checked (enabled), the **Dolby Digital Encoder** and **Dolby Digital Encoder Metadata** sub-tabs appear, which allow setup of the Dolby encoded pair.



The first step in setting up an encoder is selecting the Encoder Format (which selects between Dolby Digital and Dolby Digital Plus formats). In this example, Dolby Digital is used, with the default data rate being used. The status displays below the setup drop-downs show data rate actually being used, as well as encode success.

Note: Although the Metadata Source drop-down allows choices other than encoder internal metadata, only internal metadata is currently supported.

With the encoder format and data rate basics set up above, now the bitstream mode, metadata, and other particulars related to the selected mode can be set. In this example, standard 5.1 is selected (3/2L) with a dialnorm of -24 (conforming to ATSC A/85). The encoded stream is now ready to be placed on an audio bus channel pair for eventual output from the card.

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

Audio DSP	(continued)

Routing the DSP Audio Outputs On the Card

Again, depending on whether the DSP is positioned at the card **input** or **output** mixer, Audio DSP processed outputs are available as follows:

- DSP positioned at the **Input Mixer** makes its outputs available to the card **Audio Bus Channels** (as choices on each card Audio Bus Ch 1 thru Audio Bus Ch 16 drop-down using the **Input Audio Routing** tab).
- DSP positioned at the **Output Mixer** makes its outputs available to the card **Embedded**, **AES**, and **Analog Audio** channels (as choices on each card output drop-downs using the **Output Audio Routing** tab).

Note: Dolby encoded audio can only be outputted on digital audio channels such as embedded or AES. However, DSP audio processed to provide PCM outputs can also be outputted on analog audio output channels. These outputs will be processed just like any other PCM handled by the card, and converted to analog by the card on-board audio DAC.

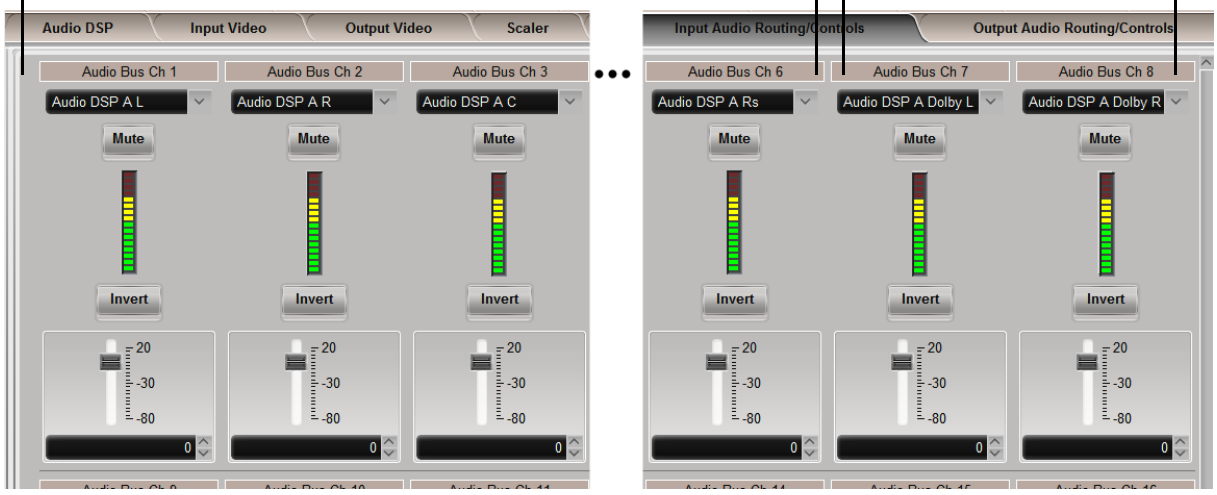
In the example here, since DSP A was set up to be positioned at the input mixer, its DSP outputs are routed to the card Audio Bus channels as shown below.

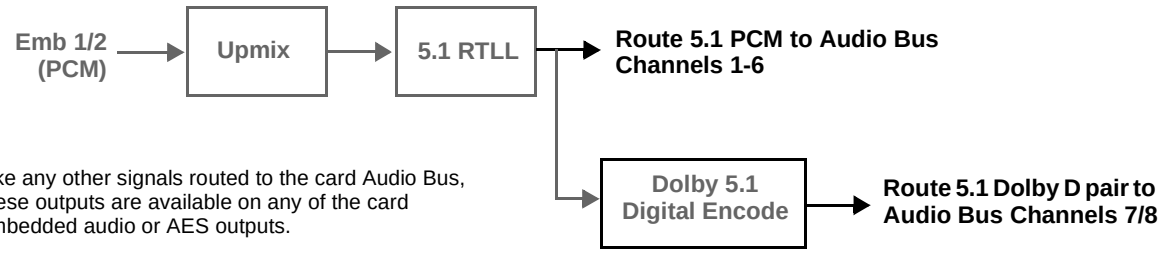
DSP A Upmix > RTLL 5.1 > 6 PCM **Audio DSP A L** thru **Audio DSP A Rs** routed to card input Audio Bus Channels Ch1 thru Ch 6, respectively.

The DSP outputs can be used for other internal card routing or processes, or be available as PCM outputs from the card via the card Audio Bus.

DSP A Upmix > RTLL 5.1 > 6 PCM + 2 Dolby Digital Encoded Outputs **Audio DSP A Dolby L** and **Audio DSP A Dolby R** routed to card input Audio Bus Channels Ch 7 and Ch 8, respectively.

The DSP outputs can be used for other internal card routing or processes, or be available as outputs from the card via the card Audio Bus.



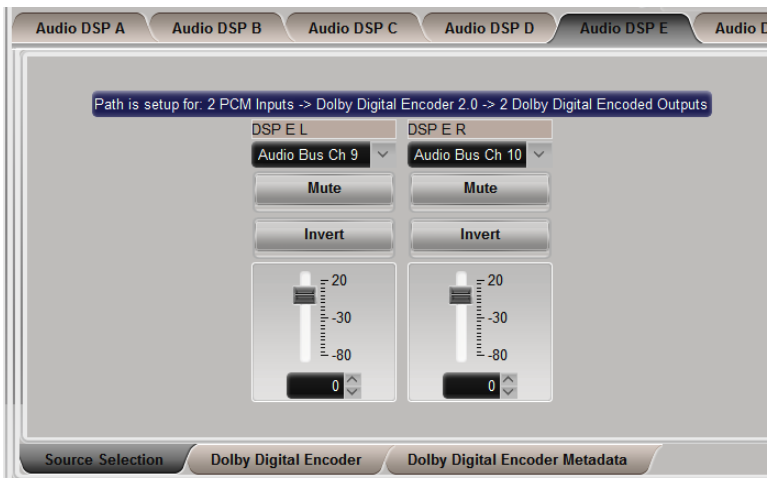


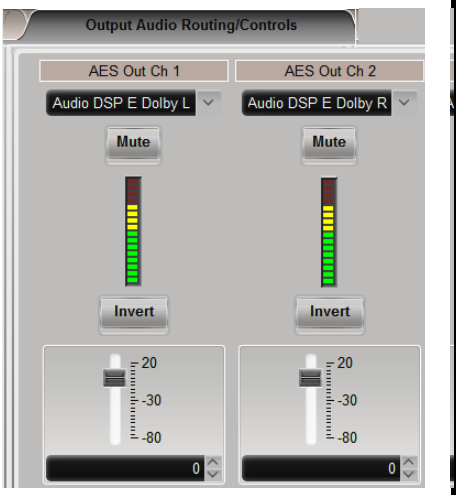
Like any other signals routed to the card Audio Bus, these outputs are available on any of the card embedded audio or AES outputs.

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

Audio DSP	(continued)

As mentioned earlier, a separate DSP pipeline (DSP E) has been set up in this example to provide a SAP Dolby 2.0 pair, with this DSP being positioned at the **output** mixer in this example. Shown below is the routing that provides this.





Emb 9/10 > Audio Bus 9/10

Route Audio Bus Ch 9/10 to DSP E L/R

DSP E Dolby 2.0 Digital Encode → **Route 2.0 Dolby D pair to AES Out Ch 1/2**

Tips for Using Audio DSP

- Determine what positioning (input or output mixer) is best for the task being set up. Placement at the input mixer provides the most flexibility (especially if the processed output may be needed for other processes).
- When performing significant changes like unchecking or checking (enabling) new DSP functions, always press the DashBoard **Refresh** button to make sure the change is taken in on DashBoard and sub-tabs correspondingly displayed are refreshed with the drop-downs that correlate with the DSP setup. If DashBoard changes (such as channel routing) are done before refresh, the intended routing settings may not actually take place and engage.
- Where possible where a compound setup (like that shown in this example for DSP A) is being set up, it's a good idea to confine the processes to a single DSP pipeline. In this manner, the intermediate processed signals will always be routed to the next function selected, without requiring any manual routing setup in DashBoard.
- Audio lag (delay) will occur when RTLL is used. Using the card **Frame Sync** controls and **Input Audio Routing > Audio Delay** controls, it is recommended to provide a 200 msec video delay (or 200 msec audio advance) to restore lip sync. As with all Dolby Encoders, restoring lip sync for a Dolby encode/decode chain must also be considered.

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

Audio DSP	**(continued)**
Note: This subsection of the Audio DSP presentation covers the specific controls and settings of the DSP enable setup pane, signal routing to and from DSP blocks, and the specific DSP blocks themselves. Reading and understanding the overview on the preceding pages is **strongly** recommended before proceeding to the descriptions below.	
• **Audio DSP Basic Setup Pane (Upper Pane)**	When the Audio DSP tab is opened, the upper pane allows basic, primary setup of the card DSP functions (blocks) such as selecting (enabling) available DSP functions for each DSP pipeline. **These settings must be performed first**, as these settings will enable desired DSP functions and position the DSP assets at either the input mixer or output mixer as desired. DSP-specific controls appear **only** when the corresponding DSP function is enabled here.

Clicking the Audio DSP tab opens the upper and lower panes of the Audio DSP page. In the upper pane, select desired pairs **A/B** thru **G/H** of DSP pipelines as desired to facilitate DSP functions as needed.

- In each DSP function row (Dolby Decoder thru Dolby Digital Encoder 2.0), enable DSP function and apply it to a DSP pipeline pair as desired by clicking the corresponding checkbox.
- When DSP functions are enabled In a DSP pipeline column, now position the DSP pipeline to be at the input or output mixer as desired by checking the **Input Mixer** or **Output Mixer** button.

In this example, **DSP A** is set to enable **Upmixer**, **Real Time Loudness Leveler 5.1**, and **Dolby Digital Encoder 5.1**, with all set to be positioned at the **Input Mixer**.

In this example **DSP E** is set to enable **Dolby Decoder**, with this set to be positioned at the **Output Mixer**.

- Unused DSP asset rows/columns can be left as-is with mixer selection being ignored.
- **licenses available** displays shows whether or not the DSP function is licensed for the card, and if so the number of licenses available. As DSP functions are enabled, the available licenses is correspondingly decremented.

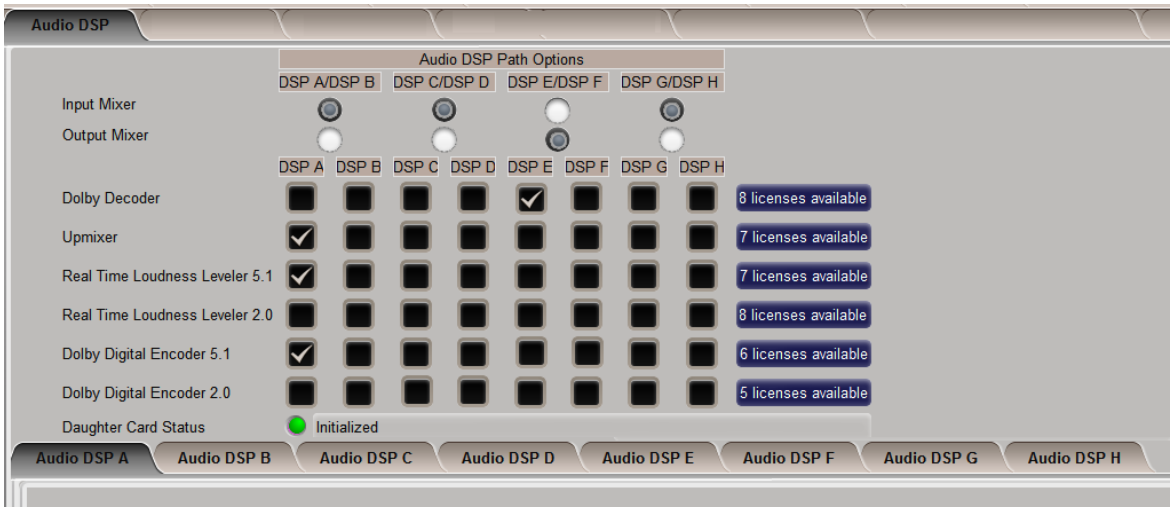
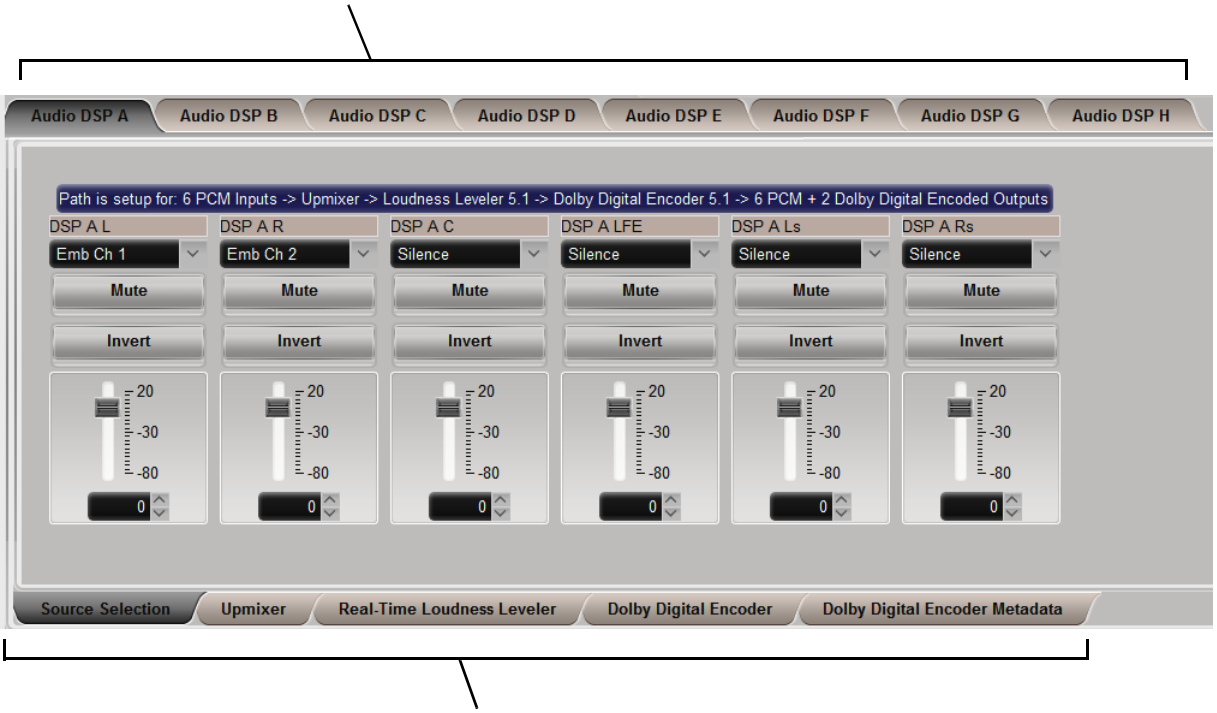


Table 3-2 9902-UDX-DSP Function Menu List — continued

Audio DSP	(continued)
• **Audio DSP Pipeline Select/Setup Pane (Lower Pane)**	The lower pane that displays when the Audio DSP tab is opened allows "going into" each enabled DSP pipeline, and setting up attributes for the pipeline such as signal routing and function-specific settings for the DSP functions that are enabled.

Sub-tabs for each DSP pipeline allow selecting a specific pipeline to "go into" and access other settings specific to the enabled functions. In the running example here with **DSP A** having Upmixer, RTLL5.1, and Dolby Digital Encoder 5.1 enabled, when DSP A sub-tab is clicked, a series of applicable lower sub-tabs appear which allow specific setup of the enabled functions. The processing path to be applied is also shown in the Path Setup window.

If a DSP pipeline has no functions enabled, "Path is disabled" is displayed and no lower sub-tabs appear.



The lower sub-tabs that appear correspond to the setup required for the enabled functions (in the example here, Source Selection to route PCM inputs to the DSP functions, Upmixer setup, RTLL setup, and finally Dolby Encoder setup).

The tabs that appear are a dynamic function of enabled DSP functions (for example, if Upmixer was not enabled, the Upmixer sub-tab shown here would not appear).

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

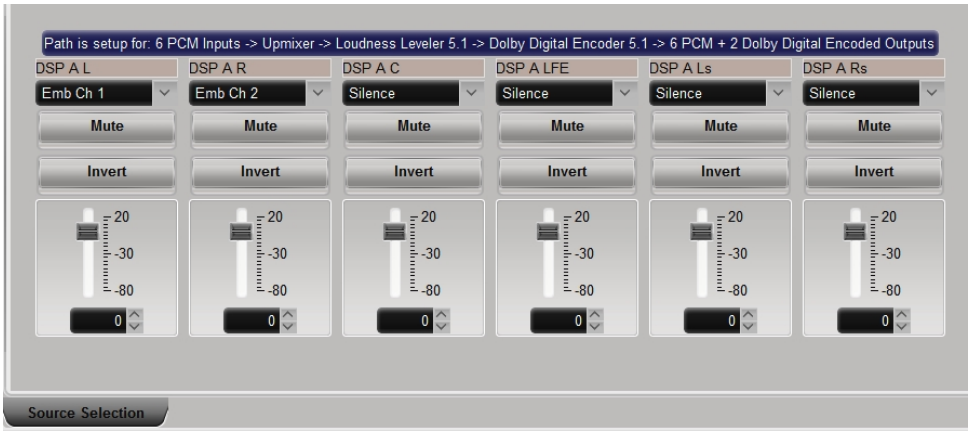
Audio DSP	**(continued)**

Note: As noted earlier, appearance of lower sub-tabs shown here depend on DSP function(s) selected. Sub-tabs only appear where required in setting up a selected DSP function(s).

• Source Selection Sub-Tab

Allows selecting audio channels to be inputted to any pipeline DSP function(s). Also provides Gain, Mute, and Invert controls for each input channel.

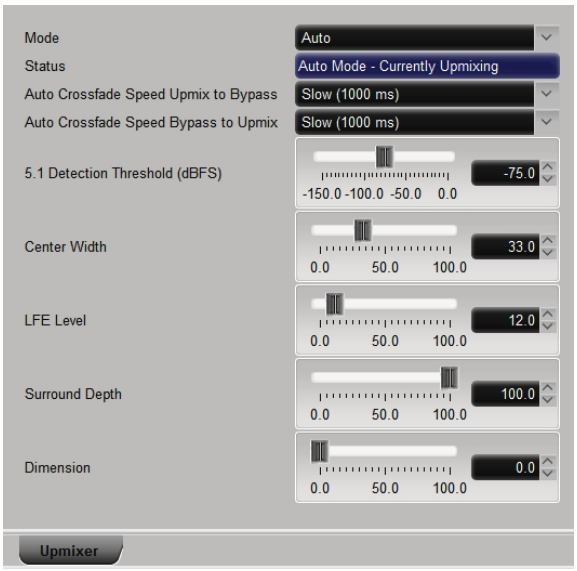
Note: Drop-down source choices depend upon whether input mixer or output mixer positioning is selected. Input mixer choices are primarily basic card input audio sources; output mixer choices are primarily card audio bus channels.



• Upmixer Setup Sub-Tab

Option

(Option **+DSP-UPMIX-LA** only) Provides controls for setting up upmixing of any normal PCM stereo pair into 5.1 surround sound audio which in turn can be applied to six user-selectable channels or further DSP processing.



- **Mode** selects from Auto (detect content on surround, else force upmix), Bypass, or Always Upmix.
- **5.1 Detection Threshold** adjusts the threshold at which selected channels designated as C, LFE, Ls, and Rs are considered to have viable content, or at which signal levels can be considered insignificant when upmixer enable is set to **Auto**. Setting affects automatic enable/bypass of 5.1 upmix function.
- **Center Width** adjusts center channel content (in terms of percentage) applied to L and R channels.
  - Minimum setting keeps all L+R (mono) content confined to center (C) channel, with any center channel content removed from L and R channels.
  - Higher settings progressively blend respective L and R mono content back into L and R channels, with 100% setting resulting in center channel level going to zero and L/R channels becoming normal L/R channels containing some mono content.
- **LFE Level** allows gain to be added to derived LFE channel.
- **Surround Depth** adjusts surround channel content (in terms of percentage) applied to Ls and Rs channels.
  - Maximum setting results in greatest surround channel levels.
  - Lower settings progressively diminish surround channel levels, with 0% setting resulting in no Ls or Rs level, with Ls and Rs content progressively folded back into L and R, respectively.
- **Dimension** adjusts the perceptual spacial image in the surround channels to be accentuated or diminished.

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

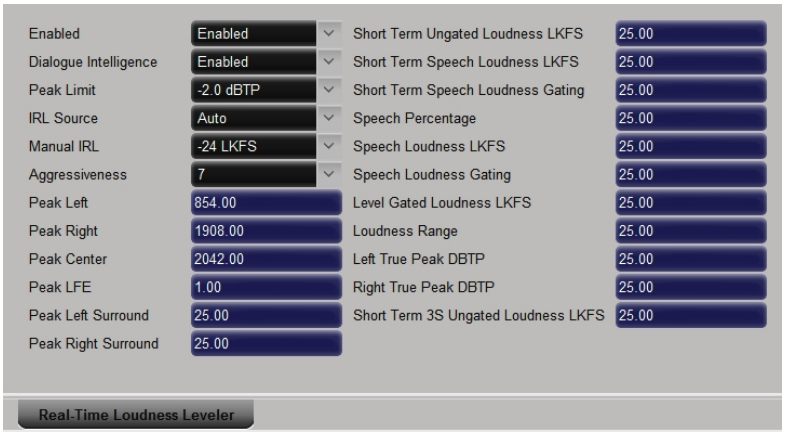
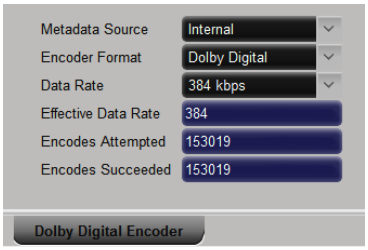
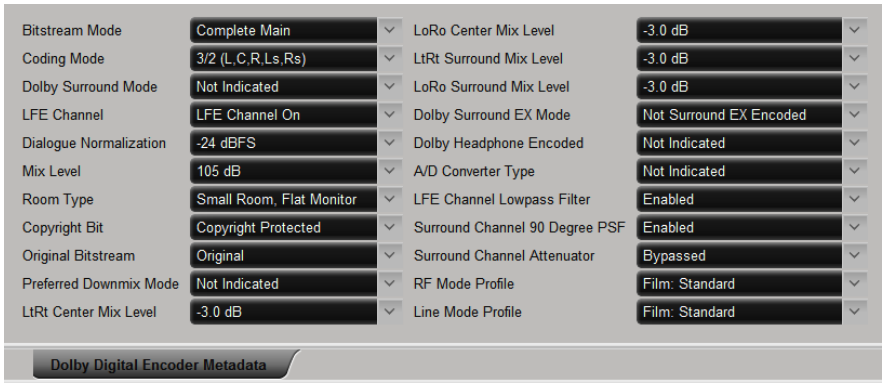
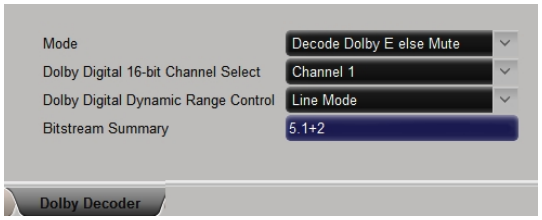
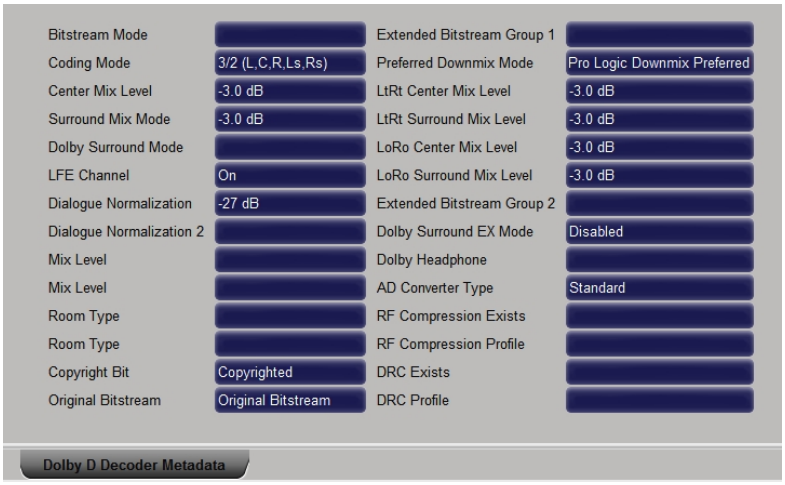
Audio DSP	(continued)
• **Real-Time Loudness Leveler Setup Sub-Tab** Option	(Option **+DSP-RTLL** only) Provides controls for setting up Real Time Loudness Leveler loudness processing.
	• **Enable** sets RTLL to enabled or bypassed. • **Dialogue Intelligence**, when enabled, allows loudness processing speech-gating that measures and adjusts loudness only during segments that contain dialog. • **Peak Limit** applies a peak compressor/ limiter if the selected threshold is exceeded. • **IRL Source; Manual IRL** allows IRL from Auto, Dialnorm, or Manual. • **Aggressiveness** adjusts how fast and deep loudness leveling is engaged. **Note:** Default settings are recommended and conform to ATSC A/85. **Note:** The level displays that appear are not user-facing units such as dBFS or percent. **Note:** Parametric controls described here apply to -5.1 and -2.0 RTLL versions.
• **Dolby® Digital Encoder Mode Setup Sub-Tab** Option	(Option **+DSP-ENCD** only) Provides controls for setting up Dolby Digital Encoder mode and bit rate.
	• **Metadata Source** (currently, only Internal is supported). • **Encoder Format** selects from Dolby Digital or Dolby Digital Plus modes. • **Data Rate** selects max bit rate allowed. • **Effective Data Rate** display shows bit rate being used. • **Encodes Attempted** display shows number of encode frames attempted. • **Encodes Succeeded** display shows running number of encode frames successfully generated. **Note:** Parametric controls described here apply to -5.1 and -2.0 ENCD versions.
• **Dolby Digital Encoder Metadata Setup Sub-Tab**	
	Contains conventional suite of Dolby Digital metadata setup controls and drop-downs. **Note:** Parametric controls described here apply to -5.1 and -2.0 ENCD versions.

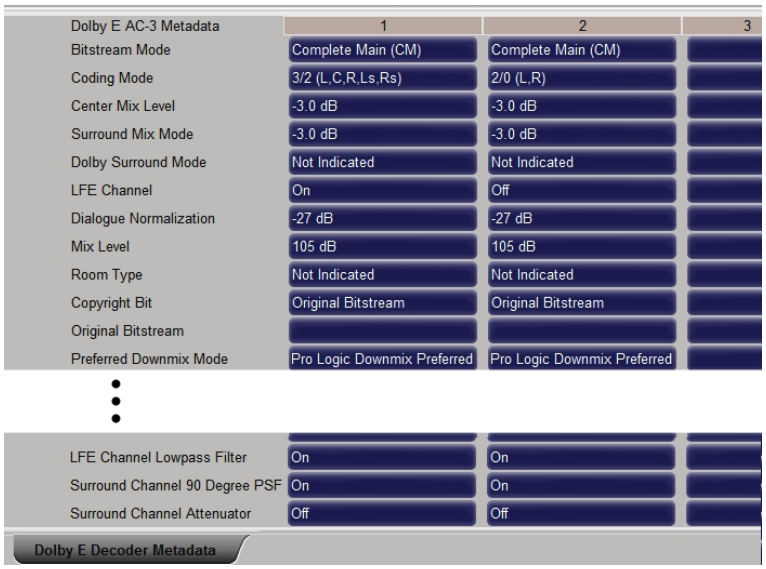
Table 3-2 9902-UDX-DSP Function Menu List — continued

Audio DSP	(continued)
• **Dolby Decoder Setup Sub-Tab** Option	(Option **+DSP-DEC** only) Provides controls for setting up Dolby Decoder. **Note:** See Source Selection Sub-Tab (p. 3-21) for routing desired Dolby pair to decoder input.



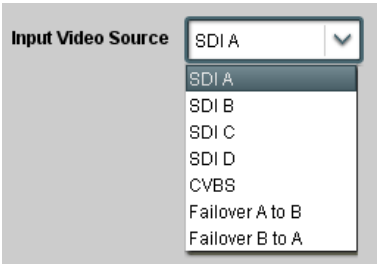
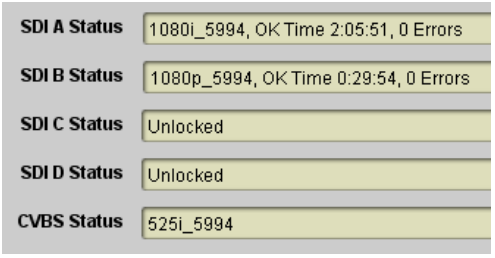
- **Mode** sets decoder to disabled, decode Dolby D/D+ else mute, or decode Dolby E, else mute.
- **Dolby Digital 16-bit Channel Select** selects from Ch1 or Ch2 selections.
- **Dolby Digital Dynamic Range Control** selects from Dolby convention choices of Line mode, RF mode, Custom, or Bypass.
- **Bitstream Summary** display shows currently-received Dolby bitstream format.





- **Dolby D Decoder Metadata** and **Dolby E Decoder Metadata** sub-tabs show currently-received Dolby metadata for respective format (as applicable) using Dolby conventions.

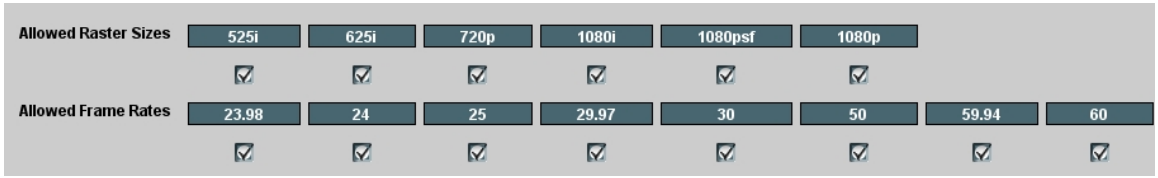
Table 3-2 9902-UDX-DSP Function Menu List — continued

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** 	Selects the input video source to be applied to the card's program video input. • **SDI A** and **SDI B** choices allow forced manual selection of correspondingly **SDI IN A** or **SDI IN B**. • **Failover A to B** sets main path preference of **SDI IN A.** - If **SDI IN A** goes invalid, then **SDI IN B** is selected. - If **SDI IN A** goes valid again, failover automatically reverts to **SDI IN A**. • **Failover B to A** sets main path preference of **SDI IN B.** - If **SDI IN B** goes invalid, then **SDI IN A** is selected. - If **SDI IN B** goes valid again, failover automatically reverts to **SDI IN B**. • **SDI C** and **SDI D** choices allow forced manual selection of correspondingly **SDI IN C** or **SDI IN D** without failover choices. • **CVBS** – select CVBS input as the program video input. **Note:** Failover criteria via this control is simple signal presence.
• **Input Video Status** 	Displays input status of each video input, along with elapsed time of signal acquire. **SDI A** thru **SDI D** and **CVBS 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.

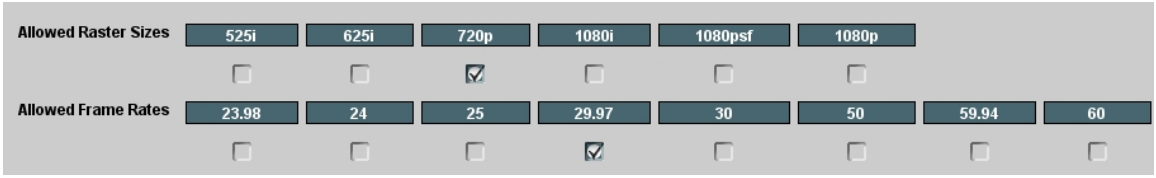
Input SDI Raster Size / Frame Rate Filtering

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

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



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



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

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

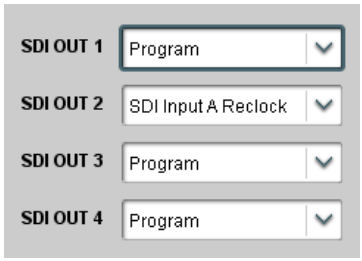
	Allows selection of each of the four video output coaxial connectors as processed SDI out or reclocked SDI out. Also provides CVBS parameter controls and test pattern output controls for card CVBS output.
• **Output Video Crosspoint** 	For each SDI output port supported by the card, provides a crosspoint for routing program processed video or selected-input reclocked to an SDI output. In this example, **SDI OUT 1. SDI OUT 3**, and **SDI OUT 3** are outputting Program (procesed) video out, with **SDI OUT 2** providing SDI IN A reclocked input video. **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.
	Provides CVBS output parameter controls and test pattern output controls
• **CVBS Oversampling and Color Controls** 	• **Oversampling** enables or disables video DAC oversampling. Oversampling can improve rendering of motion for down-conversions to the CVBS SD analog output. • **Color** enables or disables chroma content in the CVBS output.
• **CVBS Test Pattern Generator Control** 	Enables manual insertion (replacement) of CVBS output video to instead output 75% color bars.

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

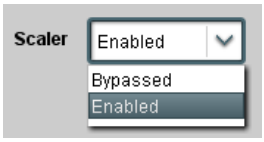
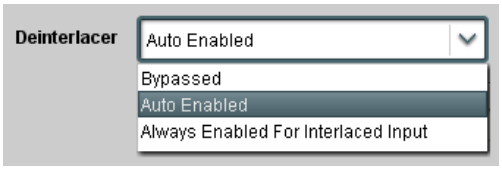
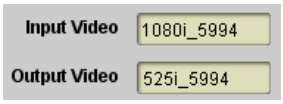
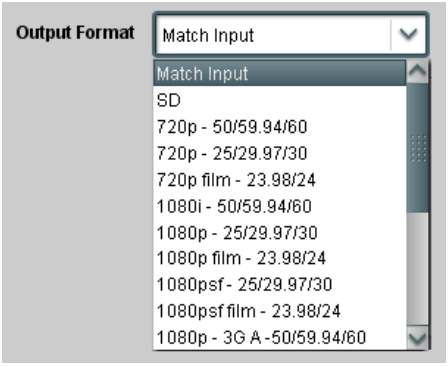
Scaler	Provides up/down/cross-converter, aspect ratio controls, and user H/V controls.
• **Scaler Enable Control** 	Enables or disables Scaler function. **Note:** When scaler is disabled, all ancillary data is passed from input to output intact. If the scaler is enabled, ancillary data such as timecode and closed captioning must be set for re-insertion as desired. See Timecode (p. 3-43) and Closed Captioning (p. 3-56) for more information about insertion into scaled output video.
• **De-Interlacer Control** 	Allows de-interlacer to be bypassed to reduce processing latency. • **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. **Note:** De-interlacer is always bypassed when converting from a progressive format to a progressive format.
• **Input/Output Video Status** 	Displays signal format/status sent to scaler and output format/status. If invalid or no signal is present, **none** is displayed.
• **Output Format Selector** 	Provides conversions to formats as shown.

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

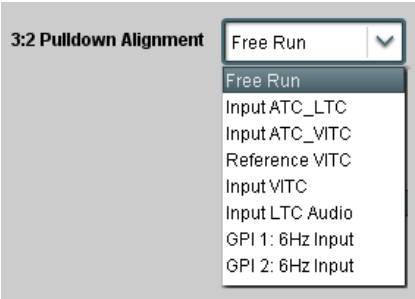
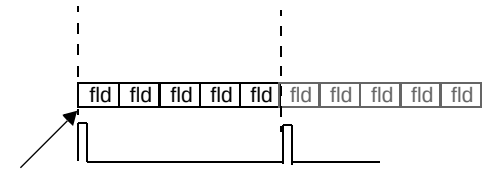
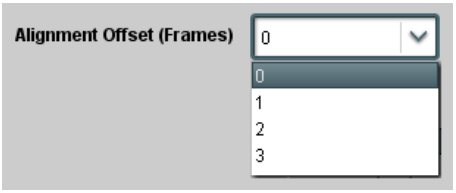
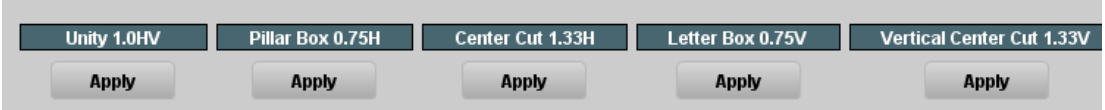
Scaler	**(continued)**
• 3:2 Alignment Optimization Selector 	Provides selection to optimize 3:2 pulldown conversion where timecode or other selections shown are to be relied upon to indicate frame transitions. In the example below, A-frame is aligned using 6Hz pulse imported via GPI.  A-Frame alignment to 6Hz pulse via GPI **Note:** If input video timecode or other marker cannot be relied upon for accurate and precise frame marking, leave control set to Free Run.
• Alignment Offset Selector 	Based on alignment selection selected above, offsets A-frame by amount selected.
• Low-Latency PSF to Interlaced Control 	Allows PsF to Interlaced conversions bypassing Scaler **ARC** and **Pan** controls to enhance processing latency performance over that available in normal mode. • **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. **Note:** When either low latency mode is enabled, image ARC scaling and/or panning is locked out.
• Standard Quick Set Aspect Ratio Conversion Selectors	Selects between the standard preset Aspect Ratio Conversions (ARC) shown below.
	

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

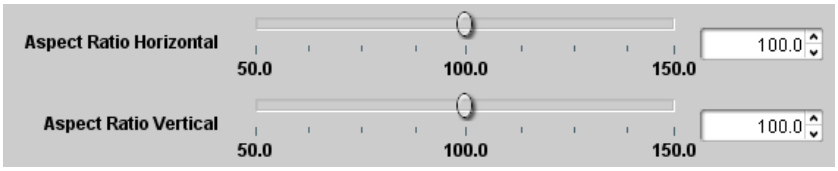
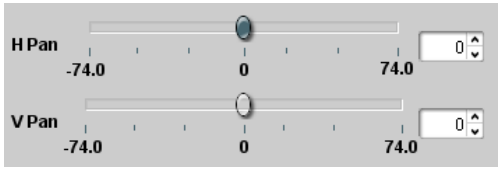
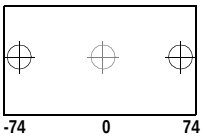
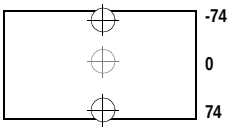
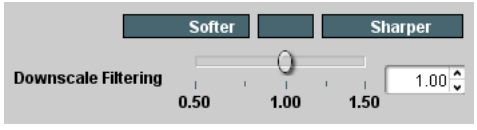
Scaler	(continued)
• **User-defined Aspect Ratio Controls**	**Aspect Ratio Horizontal** and **Aspect Ratio Vertical** controls adjust horizontal and vertical zoom percentage. Settings less than (<) 100% provide zoom-out; settings greater than (>) 100% provide zoom-in. (50% to 150% range in 0.1% steps; null = 100.0)
	Buttons allow standard ARC presets to be applied to output video. For any setting, using the **Horizontal** or **Vertical** controls allow user custom settings. Pressing any of the preset buttons restores the ARC to the selected setting and overrides any previous custom settings.
• **H Pan and V Pan Controls** 	**H Pan** control shifts horizontal center of image left (negative settings) or right (positive settings) (-74% to 74% range in 0.1% steps; null = 0.0)  **V Pan** control shifts vertical center of image down (negative settings) or up (positive settings) (-74% to 74% range in 0.1% steps; null = 0.0) 
• **Downscale Filtering Control** 	Provides edge enhancement of downscaled image which can sharpen image or suppress noise/artifacts. (0.5 to 1.5 range; null = 1.0)

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

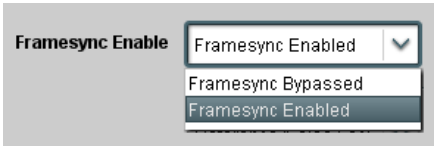
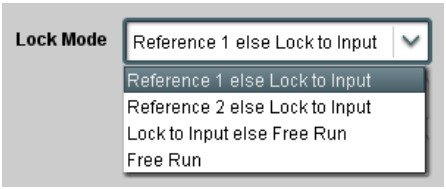
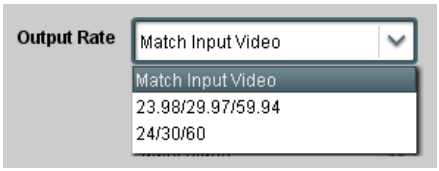
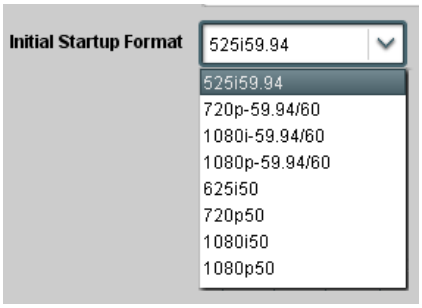
Framesync	Provides video frame sync/delay offset control and output control/loss of program video failover selection controls.
• **Framesync Enable/Disable Control** 	Provides master enable/disable of all card framesync functions/controls.
• **Lock Mode Select** 	Selects Frame Sync functions from the choices shown to the left and described below. • **Lock to Reference:** Output video is locked to selected external reference received on the frame reference bus. (External reference signal Ref 1 / Ref 2 are distributed to the card and other cards via the Ref 1 / Ref 2 buses on the frame.) **Note:** If valid reference is not received, the Card state: Reference Invalid indication appears in the Card Info status portion of DashBoard™, indicating invalid frame sync reference error. • **Lock to Input:** Uses the program video input video signal as the reference standard. **Note:** If **Lock to Input** is used for framesync, any timing instability on the input video will result in corresponding instability on the output video. • **Free Run:** Output video is locked to the card's internal clock. Output video is **not** locked to external reference.
• **Output Rate Select** 	Allows frame rate to be outputted same as input video, or converted to from the choices shown to the left and described below. • **Match 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.
• **Initial Startup Format Select** 	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. Set this control to that of the intended external reference to help ensure smoothest frame sync locking. This control also sets the card test pattern format where the card's initial output at power-up is the internal pattern instead of program video.

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

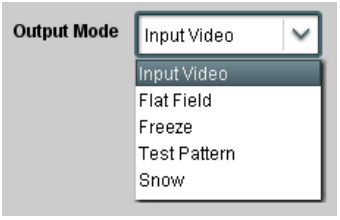
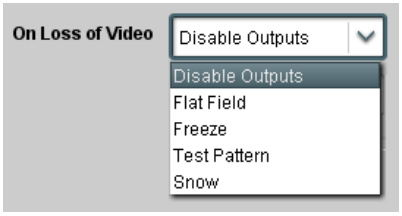
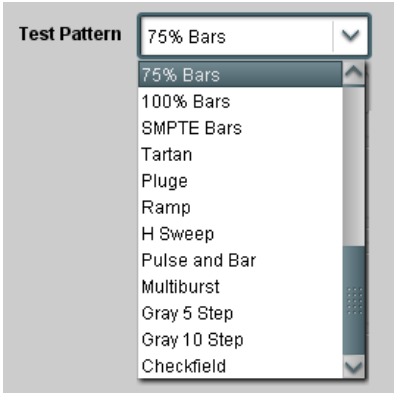
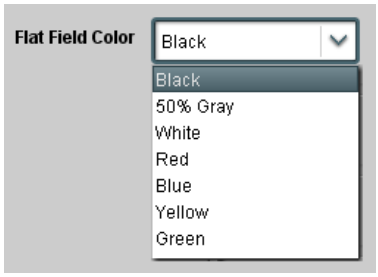
Framesync	(continued)
• **Program Video Output Mode Select** 	Provides a convenient location to select between card program video output and other technical outputs from the choices shown to the left and described below. • **Input Video** – card outputs input program video (or loss of signal choices described below). • **Flat Field** – card outputs flat field. • **Freeze** – card outputs last frame having valid SAV and EAV codes. • **Test Pattern** – card outputs standard technical test pattern (pattern is selected using the Pattern drop-down described below). • **Snow** – card outputs snow multi-color pattern.
• **Loss of Input Signal Selection** 	In the event of program input video Loss of Signal (LOS), determines action to be taken as follows: • **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.
• **Test Pattern Select** 	Provides a choice of standard technical patterns when **Test Pattern** is invoked (either by LOS failover or directly by selecting Test Pattern on the Program Video Output Mode Select control).
• **Flat Field Color Select** 	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).

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

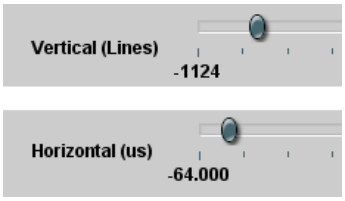
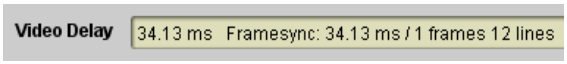
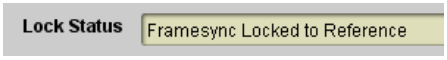
Framesync	**(continued)**
• Output Video Reference Offset Controls 	With framesync enabled, provides the following controls for offsetting the output video from the reference: • **Vertical (Lines)** – sets vertical delay (in number of lines of **output video**) between the output video and the frame sync reference. (Positive values provide delay; negative values provide advance) (Range is -1124 thru 1124 lines; null = 0 lines.) • **Horizontal (µs)** – sets horizontal delay (in µs of **output video**) between the output video and the frame sync reference. (Positive values provide delay; negative values provide advance) (Range is -64 thru 64 µsec; null = 0.000 µsec.) **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.
• Frame Delay Control 	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).** **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.
• Video Delay Display 	Displays the current input-to-output video delay (in msec units) as well as in terms of Frames/fractional frame (in number of lines). Status display shows total input-to-output video delay, along with any framesync delay.
• Framesync Lock Status Display 	Displays the current framesync status and reference source.
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. 3-33) for these controls.	

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

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

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

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

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

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

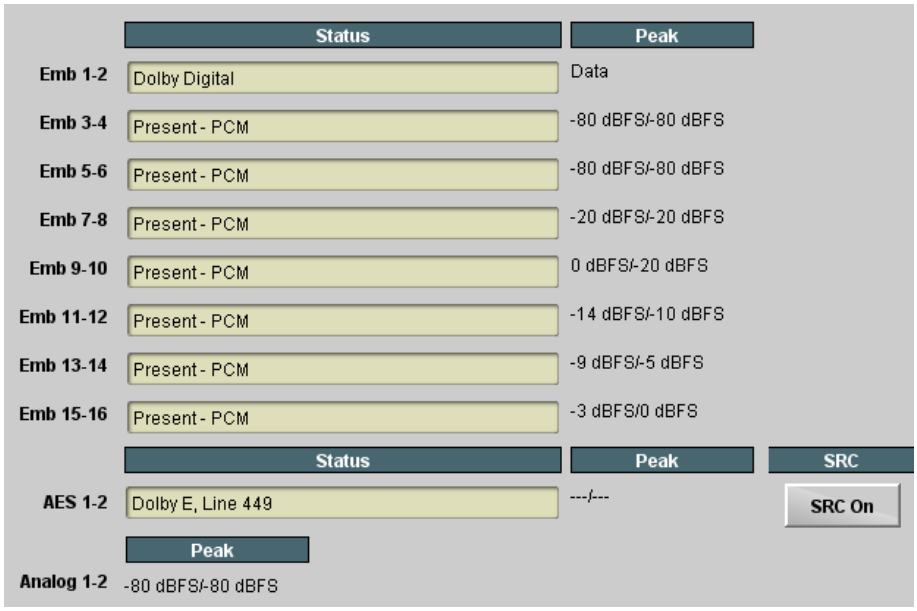
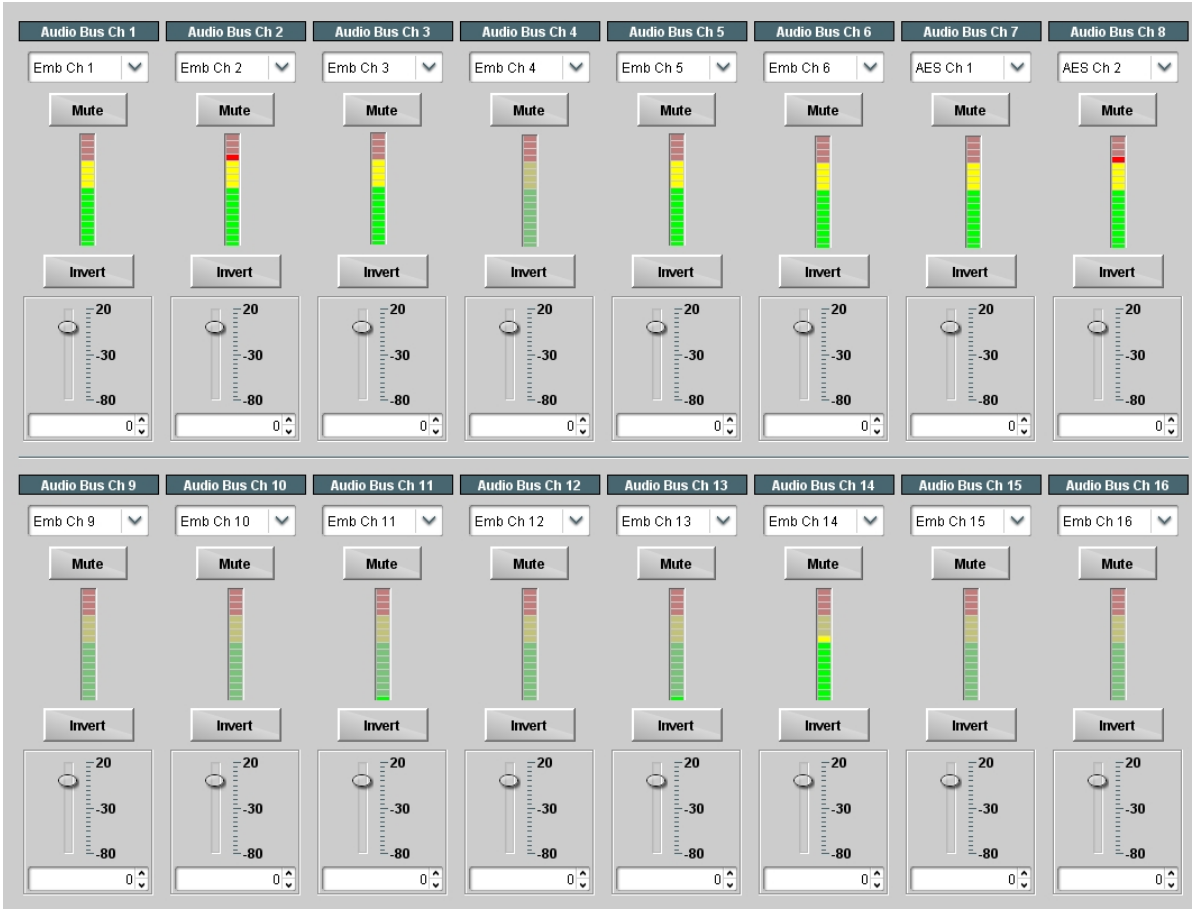
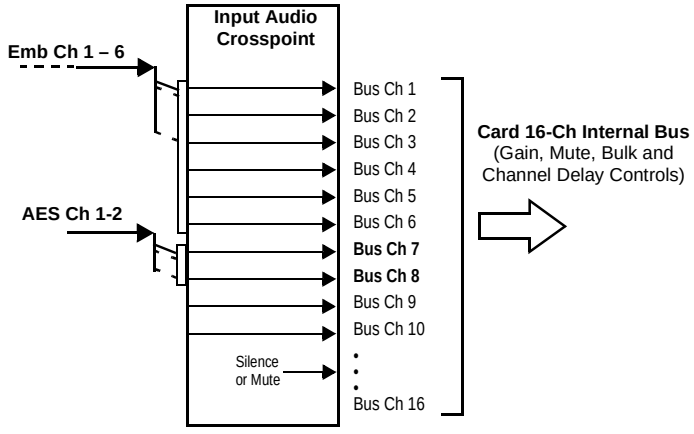


Table 3-2 9902-UDX-DSP Function Menu List — continued

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).





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

The example above shows various Source selections that direct Emb Ch 1 thru Ch 6 and AES Ch 1 and Ch 2 onto the card internal bus (unused bus channels can be set to Silence or Mute).

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

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

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

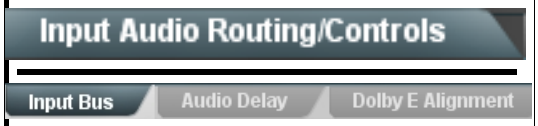
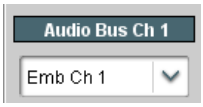
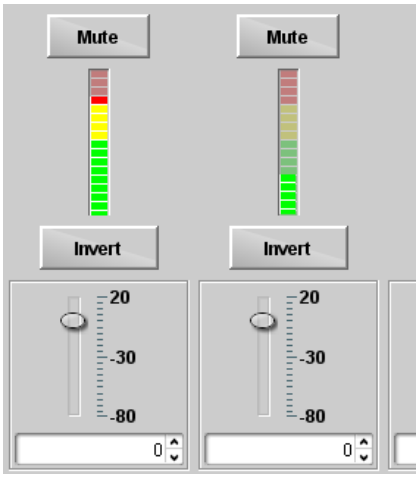
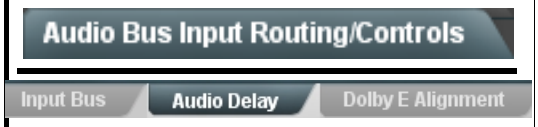
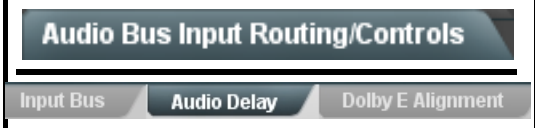
	**(continued)**
Note: • Default factory preset routing routes embedded Ch 1 thru Ch 16 to bus channels Audio Bus Ch 1 thru Ch 16. • **Bus Ch 2** thru **Bus Ch 16** have controls identical to the controls described here for **Bus Ch 1**. Therefore, only the **Bus Ch 1** controls are shown here.	
• **Bus Channel Source** 	Using the **Source** drop-down list, selects the audio input source to be routed to the card bus channel from the following choices: • Embedded input channel 1 thru 16 (**Emb Ch 1** thru **Emb Ch 16**) • AES input channel 1 thru 16 (**AES Ch 1** thru **AES Ch 16)** • Analog input channel 1 thru 16 (**Analog Ch 1** thru **Analog Ch 4**) • Input flex mix summed mix output nodes **Flex Bus A** thru **P** • **Audio DSP ---** sources (route DSP output to card audio bus) **Note:** • Audio DSP source choices depend on Audio DSP asset(s) being enabled and position at input mixer (see Audio DSP Setup Controls (p. 3-11) for more information). • AES pair and analog channel count are dependent on rear I/O module used. Current rear modules may not support full input complement.
• **Channel Mute/Phase Invert/Gain Controls and Peak Level Display** 	Provides **Mute** and phase **Invert** channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.) **Gain** controls allow relative gain (in dB) control for the corresponding destination Embedded Audio Group channel. (-80 to +20 dB range in 1.0 dB steps; unity = 0 dB) **Note:** Although the 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.
	**Audio Delay** – Provides bulk (all four groups/master) and individual card audio bus channel delay offset controls and delay parametric displays.
• **Bulk (Master) Audio/Video Delay Control** 	**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). ⚠ Large rapid changes in bulk delay (> 500 msec) can result in momentary full-scale noise burst on output processed audio. This burst can damage monitors or other equipment if not considered. Gain on output should be reduced if performing large adjustments to delay.

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



(continued)

• Per-Channel Audio/Video Delay Offset Controls

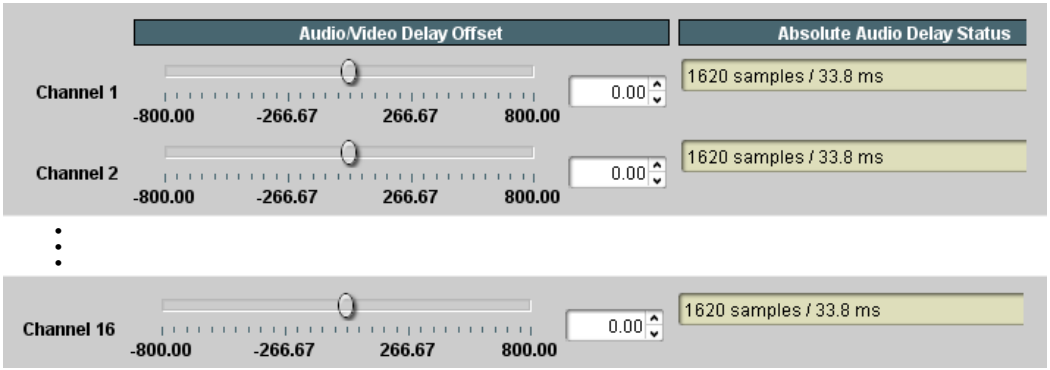
Offset control adds or reduces (offsets) channel audio delay from the matching video delay (audio delay offset setting adds or removes delay in addition to any delay included by other actions). This control is useful for correcting lip sync problems when video and audio paths in the chain experience differing overall delays.

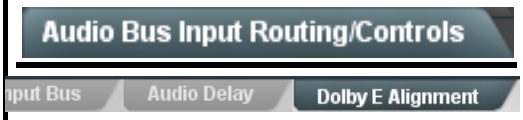
(-800.0 to +800.0 msec range in 0.02 msec steps; null = 0.0 msec)

Delay Status shows current delay from video for the corresponding audio channel.

Note: • Maximum advance/delay offset is dependent on video format.

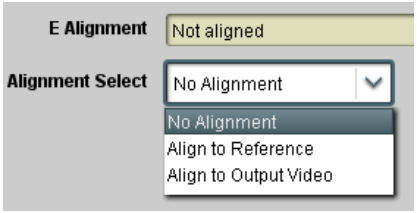
• Where a Dolby pair is present, adjustment of either channel control results in a matching delay setting for the other channel in the pair.





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.

• Dolby E Embedding Alignment Control



For incoming Dolby E data routed to the audio bus (either over embedded channels or via AES embedding to the bus), aligns the embedded Dolby data corresponding to selection. Alignment line as a result of selection is shown in **E Alignment** status display.

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.

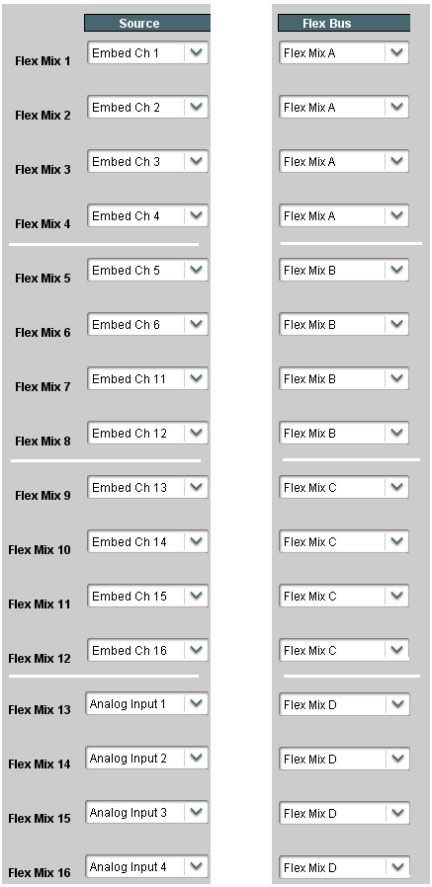
Refer to "Preferred Alignment for Dolby E in HD Systems" (http://www.dolby.com/about/news-events/newsletters-dtvaudio-dolby-e-alignment.html) for more information regarding Dolby E alignment.

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

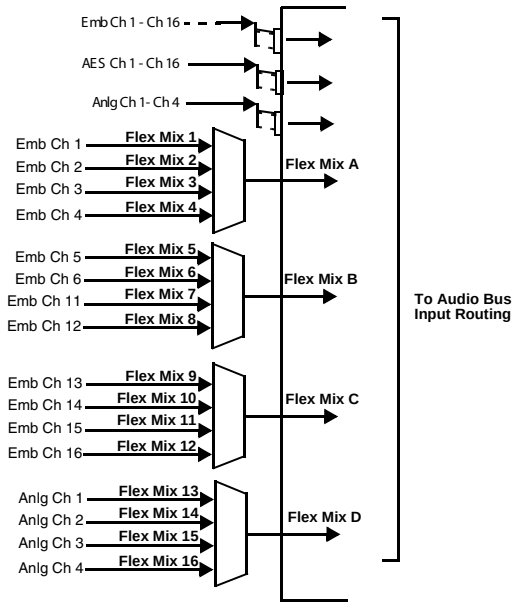
Audio Bus Input Routing/Controls

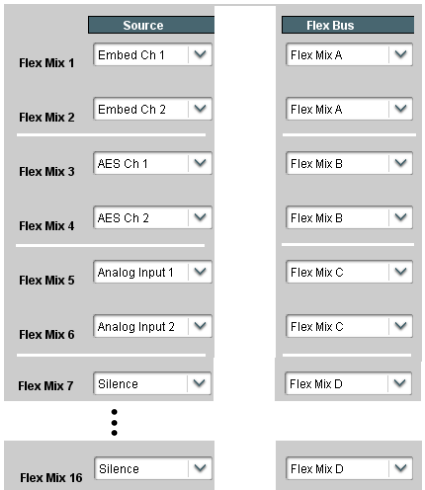
Flex Mix

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.



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





In this example three, 2-input mono mixers are provided by selecting **Flex Mixer Bus A** for the Flex Mix 1 and Flex Mix 2 inputs, and **Flex Mixer Bus B** for the next two inputs, and so on as shown.

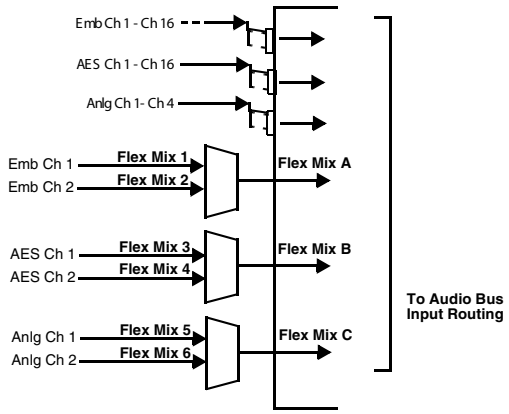


Table 3-2 9902-UDX-DSP Function Menu List — continued

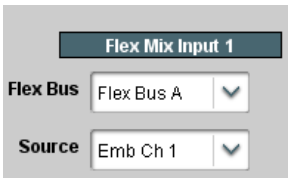
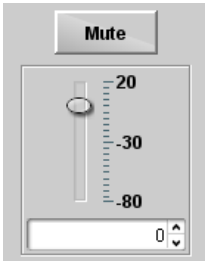
<table>
<tr><td>Audio Bus Input Routing/Controls
Flex Mix</td><td>(continued)</td></tr>
<tr><td colspan="2">Note: • Flex Mix input channels Flex Mix 2 thru Flex Mix 16 have controls identical to that described here for Flex Mix 1. Therefore, only the Flex Mix 1 controls are shown here.
• For each Flex Mix input channel, its source should be considered and appropriately set. Unused input channels should be set to the Silence selection.</td></tr>
<tr><td>• Flex Mix Input Channel Source/Bus Assignment
 
</td><td>Using the Source drop-down list, selects the audio input source to be directed to the corresponding bus channel from the choices listed below.
• Silence
• Embed Ch 1 thru Embed Ch 16
• AES Ch 1 thru AES Ch 16
• Analog Ch 1 thru Analog Ch 4
The Flex Bus drop-down selects the bus (A thru P) to which the input is assigned to.
Note: See the examples on the previous page showing various types of mixers using multiple flex buses.</td></tr>
<tr><td>• Gain / Mute Control
 
</td><td>Provides relative gain (in dB) control and a channel Mute checkbox.
(-80 to +20 dB range in 0.1 dB steps; unity = 0.0 dB)</td></tr>
<tr><td>Audio Bus Input Routing/Controls
Clean and Quiet Switching Option</td><td>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.</td></tr>
<tr><td colspan="2">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, 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.</td></tr>
<tr><td colspan="2">Switching Enabled check box enables Clean and Quiet Switching.
Duration sets the attack and decay ramp intervals (300 msec is recommended for typical use).
 
</td></tr>
</table>

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

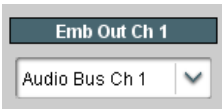
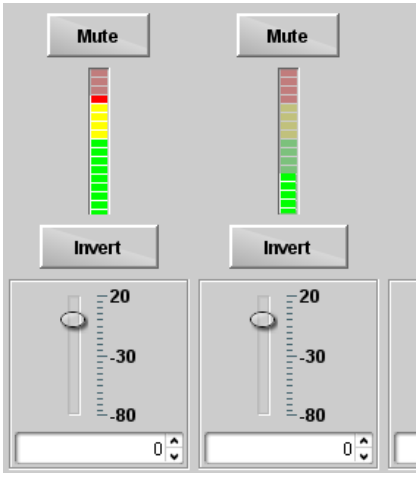
<table>
<tr><td> 
</td><td>Provides an audio crosspoint allowing the audio source selection for each embedded audio output channel. Also provides Gain, Phase Invert, and Muting controls and peak level meters for each output channel.</td></tr>
<tr><td colspan="2">Note: • Embedded Ch 2 thru Embedded Ch 16 have controls identical to the Source, Gain, Mute, and Invert controls described here for Embedded Ch 1. Therefore, only the Embedded Ch 1 controls are shown here.
• For each channel, its source and destination should be considered and appropriately set. Unused destination channels should be set to the Silence selection.</td></tr>
<tr><td>• Group Enable/Disable Controls
 
</td><td>Allows enable/disable of embedded audio groups 1 thru 4 on card program video output to accommodate some legacy downstream systems that may not support all four embedded audio groups.
Note: Changing the setting of this control will result in a noise burst in all groups. This control should not be manipulated when carrying on-air content.</td></tr>
<tr><td>• Embedded Output Channel Source
 
</td><td>Using the drop-down list, selects the audio input source to be embedded in the corresponding embedded output channel from the following choices:
• Card Audio Bus Ch 1 thru Ch 16
• Built-in Tone generators Tone n
(-20 dBFS level tone generators with n being frequencies of 100, 200, 300, 400, 500, 600, 700, 800, 900, 1k, 2k, 4k, 6k, 8k, 12k, and 16k)
• Flex Bus A thru P mixer sum node outputs
• Option Audio LTC
• Downmixer L
• Downmixer R
• Option Embedded Data L and R (SMPTE 337 non-PCM data embedding with option +ANC)
• Audio DSP n sources (route DSP output to card embedded output)
Note: Audio DSP source choices depend on Audio DSP asset(s) being enabled and position at output mixer (see Audio DSP Setup Controls (p. 3-11) for more information).</td></tr>
<tr><td>• Channel Mute/Phase Invert/Gain Controls and Peak Level Display
 
</td><td>Provides Mute and phase Invert channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.)
Gain controls allow relative gain (in dB) control for the corresponding destination Embedded Audio Group channel.
(-80 to +20 dB range in 1.0 dB steps; unity = 0 dB)
Note: Although the 9902-UDX-DSP 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.</td></tr>
</table>

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

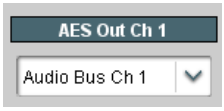
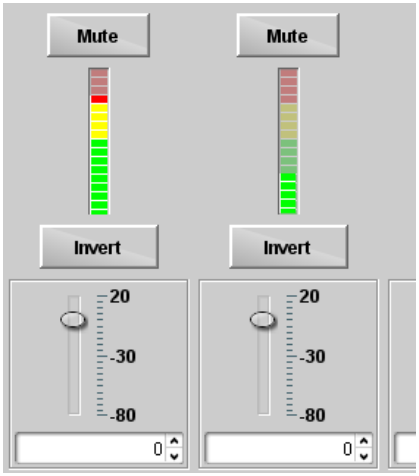
	Provides an audio crosspoint allowing the audio source selection for each AES audio output channel. Also provides Gain, Phase Invert, and Muting controls and peak level meters for each output channel.
Note: • **AES Out Ch 2** has controls identical to the **Source**, **Gain**, **Mute**, and **Invert** controls described here for **AES Out Ch 1**. Therefore, only the **AES Out Ch 1** controls are shown here. • For each channel, its source and destination should be considered and appropriately set. Unused destination channels should be set to the **Silence** selection.	
• **AES Output Channel Source** 	Using the **Source** drop-down list, selects the audio input source to be routed to the corresponding AES output channel from the following choices: • Card **Audio Bus Ch 1** thru **Ch 16** • Built-in Tone generators **Tone *n*** (-20 dBFS level tone generators with *n* being frequencies of 100, 200, 300, 400, 500, 600, 700, 800, 900, 1k, 2k, 4k, 6k, 8k, 12k, and 16k) • **Flex Bus A** thru **P** mixer sum node outputs • ***Option*** Audio **LTC** • **Downmixer L** • **Downmixer R** • ***Option*** **Embedded Data L** and **R** (SMPTE 337 non-PCM data embedding with option **+ANC**) • **Audio DSP *n*** sources (route DSP output to card AES output) **Note:** • Audio DSP source choices depend on Audio DSP asset(s) being enabled and position at output mixer (see Audio DSP Setup Controls (p. 3-11) for more information). • AES pair channel count are dependent on rear I/O module used. Current rear modules may not support full output complement.
• **Channel Mute/Phase Invert/Gain Controls and Peak Level Display** 	Provides **Mute** and phase **Invert** channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.) **Gain** controls allow relative gain (in dB) control for the corresponding destination AES output channel. (-80 to +20 dB range in 1.0 dB steps; unity = 0 dB) **Note:** Although the 9902-UDX-DSP 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.

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

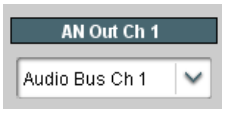
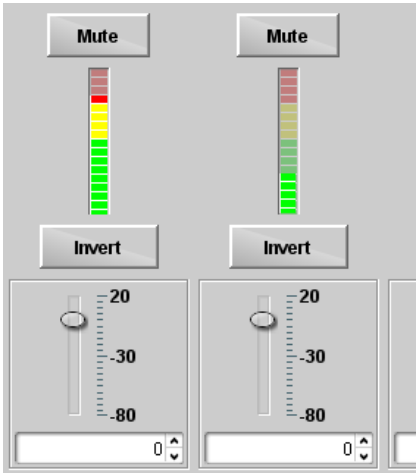
Output Audio Routing/Controls Analog Audio Out | Downmixer	Provides an audio crosspoint allowing the audio source selection for each analog audio output channel. Also provides Gain, Phase Invert, and Muting controls and peak level meters for each output channel.
• **Analog Output Channel Source** 	Using the **Source** drop-down list, selects the audio input source to be routed to the corresponding analog audio output channel from the following choices: • Card **Audio Bus Ch 1** thru **Ch 16** • Built-in Tone generators **Tone *n*** (-20 dBFS level tone generators with *n* being frequencies of 100, 200, 300, 400, 500, 600, 700, 800, 900, 1k, 2k, 4k, 6k, 8k, 12k, and 16k) • **Flex Bus A** thru **P** mixer sum node outputs • *Option* Audio **LTC** • **Downmixer L** • **Downmixer R** • **Audio DSP *n*** sources (route DSP output to card analog output) **Note:** • Audio DSP source choices depend on Audio DSP asset(s) being enabled and position at output mixer (see Audio DSP Setup Controls (p. 3-11) for more information). • Audio DSP choices that provide a PCM output are suitable for use as an analog output source. Use care to avoid routing non-PCM signals (such as Dolby pairs) to an analog output.
• **Channel Mute/Phase Invert/Gain Controls and Peak Level Display** 	Provides **Mute** and phase **Invert** channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.) **Gain** controls allow relative gain (in dB) control for each corresponding destination analog audio out channel. (-80 to +20 dB range in 1.0 dB steps; unity = 0 dB)

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

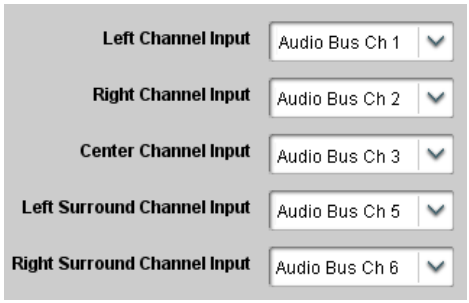
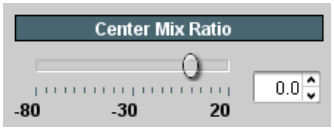
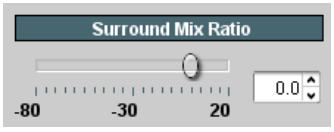
	Provides audio down-mix audio routing selections that multiplexes any five audio channel sources into a stereo pair.
• **Downmixer Source Controls** 	**Left Channel Input** thru **Right Surround Channel Input** select the five audio bus source channels to be used for the downmix. Downmix channels **Downmixer L** and **Downmixer R** are available as sources for embedded, AES, or analog audio outputs using the Channel Source controls described above.
• **Center Mix Ratio Control** 	Adjusts the attenuation ratio of center-channel content from 5-channel source that is re-applied as Lt and Rt content to the DM-L and DM-R stereo mix. • 0 dB setting applies no ratiometric reduction. Center channel content is restored as in-phase center-channel content with no attenuation, making center-channel content more predominate in the overall mix. • Maximum attenuation setting (-80 dB) applies a -80 dB ratiometric reduction of center-channel content. Center-channel content is restored as in-phase center-channel content at a -80 dB ratio relative to overall level, making center-channel content less predominate in the overall mix. (20 dB to -80 dB range in 0 dB steps; default = 0 dB) **Note:** Default setting is recommended to maintain center-channel predominance in downmix representative to that of the original source 5-channel mix.
• **Surround Mix Ratio Control** 	Adjusts the attenuation ratio of surround-channel content from 5-channel source that is re-applied as Lo and Ro content to the DM-L and DM-R stereo mix. • 0 dB setting applies no ratiometric reduction. Surround-channel content is restored with no attenuation, making Lo and Ro content more predominate in the overall mix. • Maximum attenuation setting (-80 dB) applies a -80 dB ratiometric reduction of surround-channel content. Surround-channel content is restored at a -80 dB ratio relative to overall level, making surround-channel content less predominate in the overall mix. (20 dB to -80 dB range in 0 dB steps; default = 0 dB) **Note:** Default setting is recommended to maintain surround-channel predominance in downmix representative to that of the original source 5-channel mix.

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

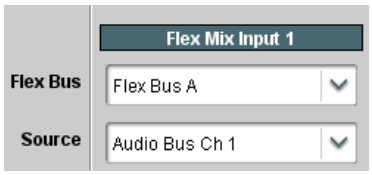
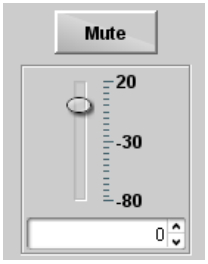
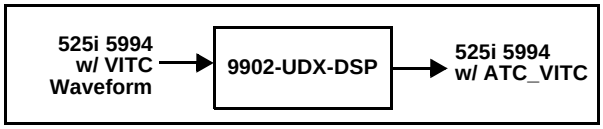
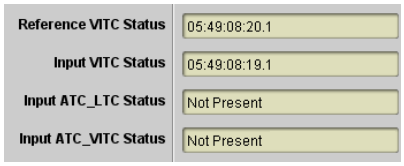
	**Output Flex Mix** – Provides a 16-channel mixer in which each of the inputs can be mixed onto up to 16 independent output summing nodes. The input sources are the card processed audio bus channels. Each input channel has independent gain and mute controls.
Note: For each Flex Mix input channel, its source should be considered and appropriately set. Unused input channels should be set to the **Silence** selection.	
• **Flex Bus Input Channel Source/Bus Assignment** 	Using the **Source** drop-down list, selects the audio input source to be directed to the corresponding bus channel from the choices listed below. • **Silence** • **Audio Bus Ch 1** thru **Ch 16** • **Tones** (100 Hz thru 16 kHz) • **Downmix L** or **Downmix R** The **Flex Bus** drop-down selects the bus (A thru P) to which the input is assigned to.
• **Gain / Mute Control** 	Provides relative gain (in dB) control and a channel **Mute** checkbox. (-80 to +20 dB range in 0.1 dB steps; unity = 0.0 dB)

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

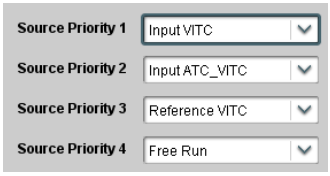
Timecode	Provides timecode data extraction from various sources, and provides formatting and re-insertion controls for inserting the timecode into the output video.

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.



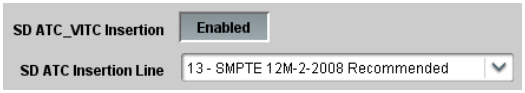


A Noting that the incoming video contains VITC waveform timecode data (as shown in the status display), set the Source Priority drop-down lists to include VITC Waveform timecode data (**SDI VITC**) as a choice. This extracts VITC Waveform timecode data from the incoming video.



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**.

In the example here, the line numbers are set to the default SMPTE 12M-2-2008 recommended values.



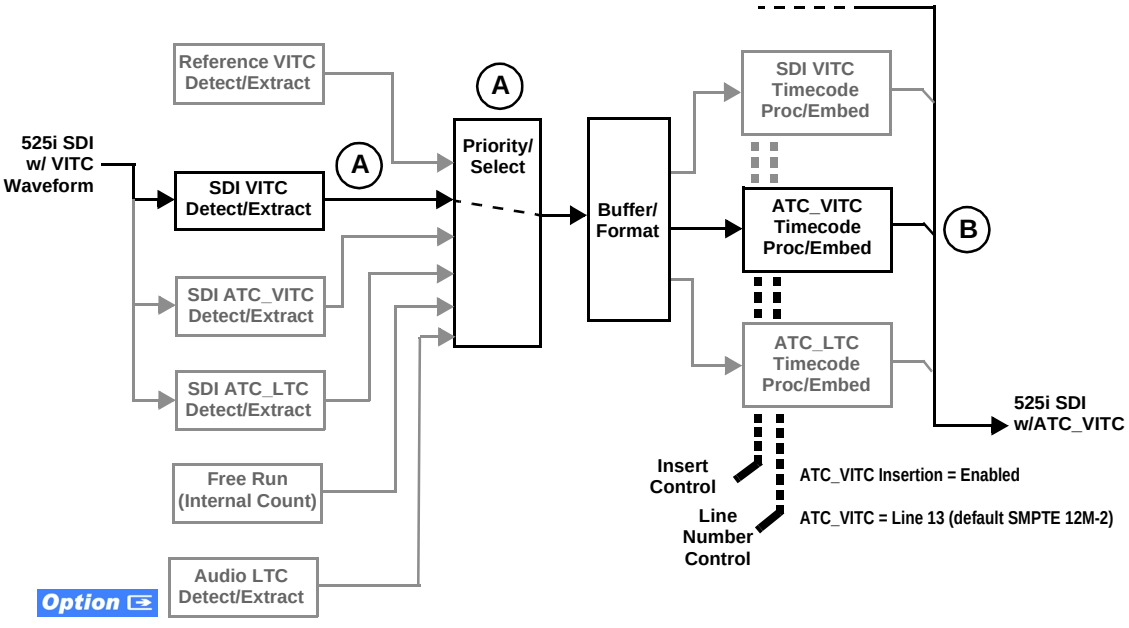


Table 3-2 9902-UDX-DSP Function Menu List — continued

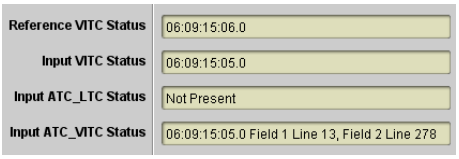
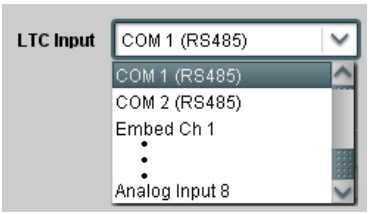
Timecode	**(continued)**
Option **Audio LTC** controls described below only appear on cards with **+LTC** licensed optional feature. This feature allows audio LTC from an audio channel to be used as a timecode source, with conversion to a selected SMPTE 12M format on the output video.	
• **Timecode Source Status Displays** 	Displays the current status and contents of the four supported external timecode formats shown to the left. • If a format is receiving timecode data, the current content (timecode running count and line number) is displayed. • If a format is not receiving timecode data, Not Present is displayed.
• **LTC Input Control** 	Selects source to be used by card to **receive** LTC as listed below. • RS-485 over COM1 or COM 2 • Audio LTC over Emb Ch 1 thru Ch 16 • Audio LTC over AES Ch 1 thru Ch 16 • Audio LTC over Analog audio Ch 1 thru Ch 4 **Note:** • **Audio LTC Source** must be appropriately set for card to receive and process received LTC. • If COM 1 or COM 2 is used for LTC receive, the port function must be set for LTC. See COMM Ports Setup Controls (p. 3-76) for more information. • Card audio inputs will not center inputs with DC offset. If input has DC offset, the source may need to be capacitively coupled to remove the offset.
• **Mute LTC Control** 	Allows LTC audio or RS-485 output to mute upon loss of selected timecode inputs. • When set to **Enabled** and input timecode is lost: • RS-485 LTC output goes to frozen state. • Audio LTC output mutes. • When set to **Disabled** and input timecode is lost: • RS-485 LTC output keeps counting, with count value being free-run count. • Audio LTC output is not muted, with count value being free-run count. **Note:** If muting upon loss of a particular input format is desired, set all **Source Priority 1** thru **4** to that particular input format. If this is not done, the card failover timecode selection may substitute another format choice for the format not being received.
• **Incoming ATC Packet Removal Control** 	Enables or disables removal of existing input video ATC timecode packets from the output. This allows removal of undesired existing timecodes from the output, resulting in a “clean slate” where only desired timecodes are then re-inserted into the output. (For example, if both SDI ATC_VITC and ATC_LTC are present on the input video, and only ATC_LTC is desired, using the Removal control will remove both timecodes from the output. The ATC_LTC timecode by itself can then be re-inserted on the output using the other controls discussed here.) **Note:** 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.

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

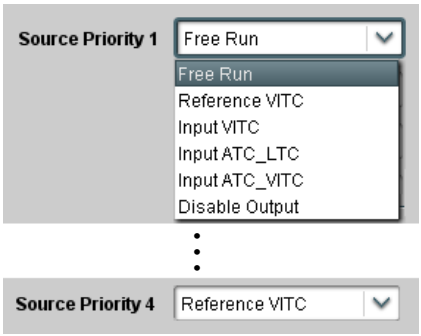
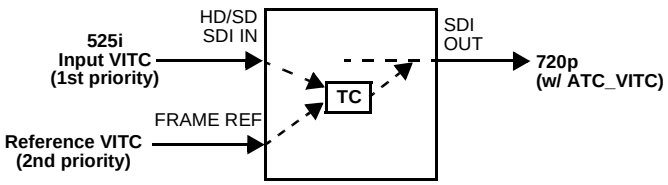
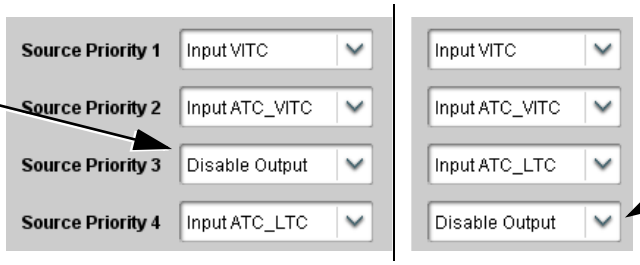
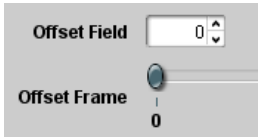
Timecode	(continued)
• **Source Priority** 	Selects the priority assigned to each of the four supported external formats, and internal Free Run in the event the preferred source is unavailable. **Source Priority 1** thru **Source Priority 4** select the preferred format to be used in descending order (i.e., Source Priority 2 selects the second-most preferred format, and so on. See example below.)  In this example, **Input VITC** 1st priority selection selects SDI VITC (received on SDI input) over reference VITC (received on frame reference) regardless of video input material source to be processed by the card. The selected timecode source is embedded on the SDI video output (in this example, 720p) using the selected line number. In this example, if the SDI VITC on the SDI input becomes unavailable, the card then uses the reference VITC data received on the frame reference. **Note:** 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.
⚠ Disable Output setting should be used with care. If Disable Output is selected with alternate intended format(s) set as a lower priority, the card will indeed disable **all** timecode output should the ordinate preferred format(s) become unavailable. Typically, choices other than Disable should be used if a timecode output is always desired, with Disable only being used to remove all timecode data.	
In this example, even though and ATC_LTC could be available to substitute for ATC_VITC not being present, the card will revert to no timecode output since the choice of Disable Output "out-prioritizes" ATC_LTC with these settings.  The choices shown here will allow ATC_LTC to "out-prioritize" Disable Output if ATC_VITC is not available.	
• **Offset Controls**  	Allows the current timecode count to be advanced or delayed on the output video. • **Offset Advance** or **Delay** selects offset advance or delay. • **Offset Field** delays or advances or delays timecode by one field. • **Offset Frame** delays or advances or delays timecode by up to 5 frames. **Note:** Default settings are null, with both controls set at zero as shown.

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

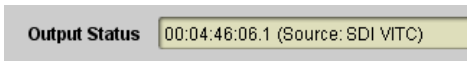
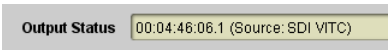
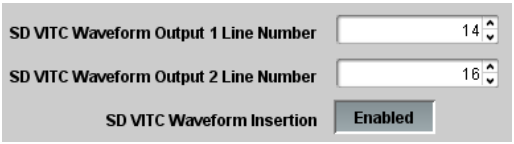
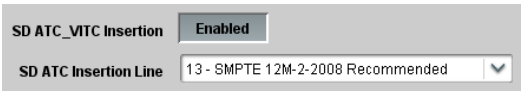
Timecode	**(continued)**
• **Output Status Display** 	Displays the current content and source being used for the timecode data as follows:  • Output status OK (in this example, SDI VITC timecode received and outputted).  • **Timecode Insertion** button set to **Disabled**; output insertion disabled. **Note:** • If timecode is not available from Source Priority selections performed, timecode on output reverts to Free Run (internal count) mode. • Because the 1's digit of the display Frames counter goes from 0 to 29, the fractional digit (along with the 1's digit) indicates frame count as follows: 0.0 Frame 0 0.1 Frame 1 1.0 Frame 2 1.1 Frame 3 • • • 29.1 Frame 59
• **Audio LTC Output** Option	Audio LTC output is routed to desired embedded, AES, or analog audio outputs using the Output Audio Routing/Controls (p. 3-28). Whatever timecode is displayed on the Output Status is converted to audio LTC and available as an LTC audio output.
Note: • Although the output line drop-down on the controls described below will allow a particular range of choices, the actual range is automatically clamped (limited) to certain ranges to prevent inadvertent conflict with active picture area depending on video format. See Ancillary Data Line Number Locations and Ranges (p. 3-9) for more information. • The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data.	
• **SD VITC Waveform Insertion Controls** 	For SD output, enables or disables SD VITC waveform timecode insertion into the output video, and selects the VITC1 and VITC2 line numbers (6 thru 22) where the VITC waveform is inserted. **Note:** • If only one output line is to be used, set both controls for the same line number. • **SD VITC Waveform Insertion** control only affects VITC waveforms inserted (or copied to a new line number) by this function. An existing VITC waveform on an unscaled SD SDI stream is not affected by this control and is passed on an SDI output.
• **SD ATC Insertion Control** 	For SD output, enables or disables SD ATC_VITC timecode insertion into the output video, and selects the line number for ATC_VITC.

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

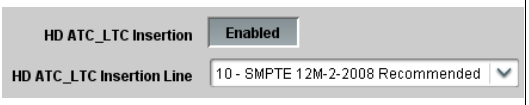
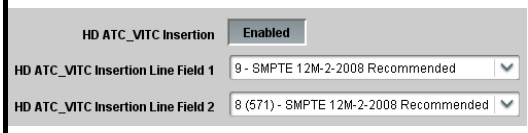
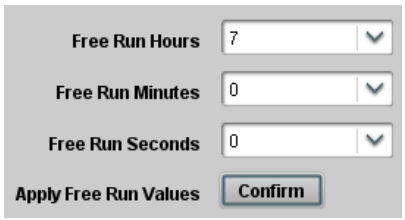
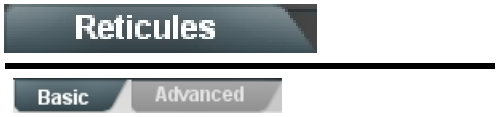
Timecode	(continued)
• **HD ATC_LTC Insertion Control** 	For HD output, enables or disables ATC_LTC timecode insertion into the output video, and selects the line number for ATC_LTC timecode data.
• **HD ATC_VITC Insertion Control** 	For HD output, enables or disables ATC_VITC timecode insertion into the output video, and selects the line number for ATC_VITC1 and ATC_VITC2.
• **ATC_VITC Legacy Support Control** 	When enabled, accommodates equipment requiring ATC_VITC packet in both fields as a “field 1” packet (non-toggling). **Note:** Non-toggling VITC1 and VITC2 packets do not conform to SMPTE 12M-2-2008 preferences. As such, ATC_VITC Legacy Support should be enabled only if required by downstream equipment.
• **Free Run Timecode Controls** 	Allows an initial (starting) count to be applied to output video timecode when Free Run insertion is enabled. **Note:** • Initialization can only be applied when card is outputting Free Run timecode (as shown by Output Status displaying “Free Run”). • If failover to Free Run occurs due to loss of external timecode(s), the Free Run count assumes its initial count from the last valid externally supplied count.

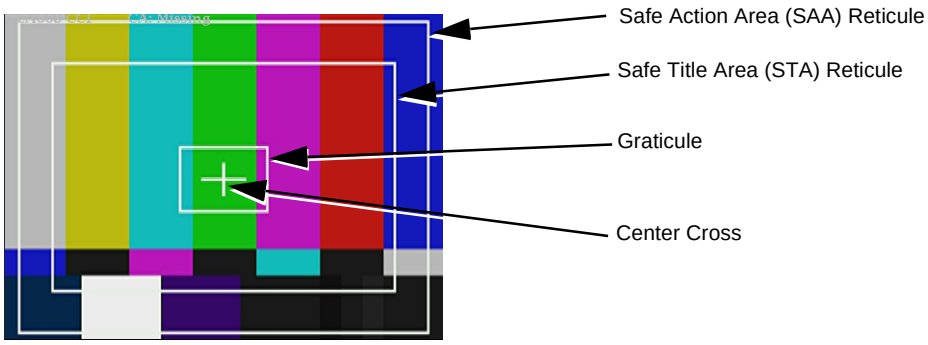
Table 3-2 9902-UDX-DSP Function Menu List — continued



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

Typical Reticule/Overlay Marker Insertions

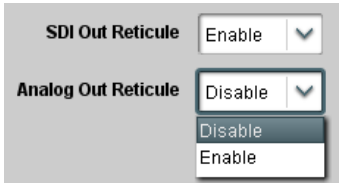
The 9902-UDX-DSP allows any combination of the reticule/overlay markers to be applied to the output video. Sizing and other characteristics for each type of marker can be set as described below.



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

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

• Insertion Master Enable/Disable

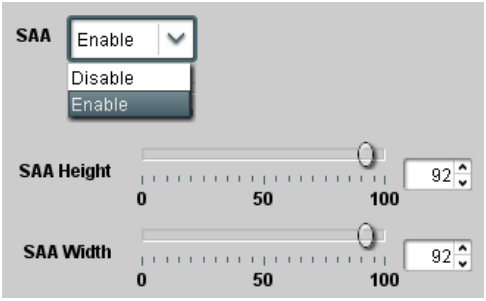


Provides independent master enable/disable for card SDI and CVBS outputs.

• When enabled, any combination of reticules or other markers described below can be inserted.

• When disabled, insertion of all reticules or other markers is disabled.

• Safe Action Area (SAA) Controls

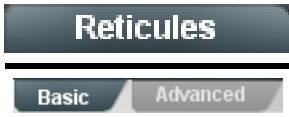
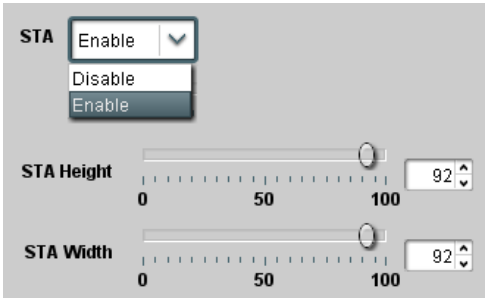


• **SAA** provides enable/disable of safe action area graticule insertion.

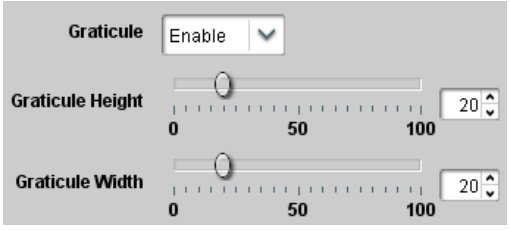
• **SAA Height** and **SAA Width** control height and width of insertion (from 0% to 100% of 4:3 outputted image area).

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

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

<table>
<tr><td> 
</td><td>(continued)</td></tr>
<tr><td>• Safe Title Area (STA) Controls
 
</td><td>• STA provides enable/disable of safe title area graticule insertion.

• STA Height and STA Width control height and width of insertion (from 0% to 100% of 4:3 outputted image area).</td></tr>
<tr><td>• Overlay Color Controls
 
</td><td>• Overlay Color selects from white or black colors.

• Opacity sets the opacity of the overlay for both white/black and inverse color modes.</td></tr>
<tr><td> 
</td><td></td></tr>
<tr><td> 
</td><td>Provides insertion and sizing controls for custom graticules and other markers. Also provides NTSC legacy 4:3 master reticule sizing.</td></tr>
<tr><td colspan="2">Note: Color attributes of markers described below are set using the master Overlay Color Controls described above.</td></tr>
<tr><td>• Graticule Controls
 
</td><td>• Graticule provides enable/disable of user graticule insertion.

• Graticule Height and Width control height and width of insertion (from 0% to 100% of 4:3 outputted image area).</td></tr>
</table>

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

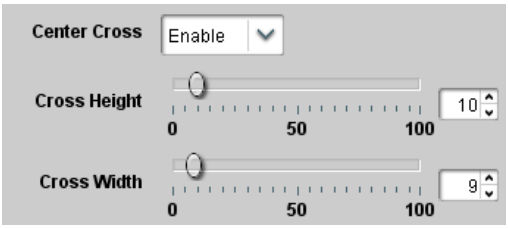
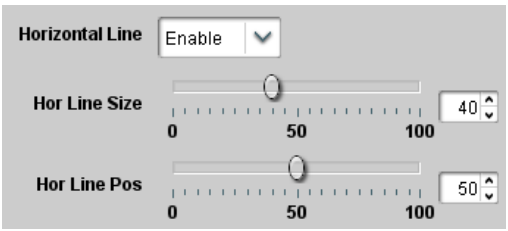
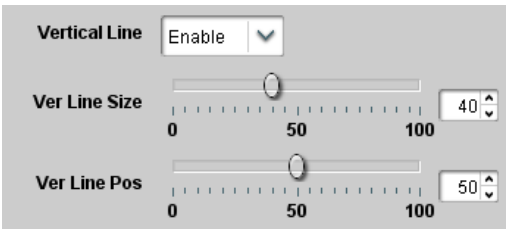
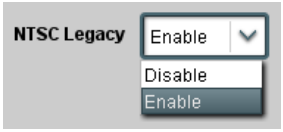
	**(continued)**
• Center Cross Controls 	• **Center Cross** provides enable/disable of center cross insertion. • **Cross Height** and **Width** control height of vertical line and width of horizontal line (from 0% to 100% of 4:3 outputted image area).
• Horizontal Line Controls 	• **Horizontal Line**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

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

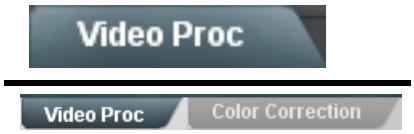
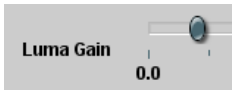
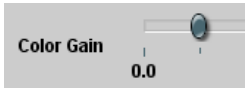
	Provides the following Video Proc and Color Correction parametric controls.
• **Video Proc** 	**Video Proc (Enable/Disable)** provides master on/off control of all Video Proc functions. • When set to **Disable**, Video Proc is bypassed. • When set to **Enable**, currently displayed parameter settings take effect.
• **Reset to Unity** 	**Reset to Unity** provides unity reset control of all Video Proc functions. When Confirm is clicked, a **Confirm?** pop-up appears, requesting confirmation. • Click **Yes** to proceed with the unity reset. • Click **No** to reject unity reset.
• **Luma Gain** 	Adjusts gain percentage applied to Luma (Y channel). (0% to 200% range in 0.1% steps; unity = 100%)
• **Luma Lift** 	Adjusts lift applied to Luma (Y-channel). (-100% to 100% range in 0.1% steps; null = 0.0%)
• **Color Gain** 	Adjusts gain percentage (saturation) applied to Chroma (C-channel). (0% to 200% range in 0.1% steps; unity = 100%)
• **Color Phase** 	Adjusts phase angle applied to Chroma. (-360° to 360° range in 0.1° steps; null = 0°)
• **Gang Luma/Color Gain** 	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.

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

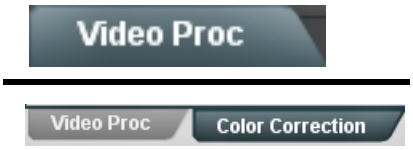
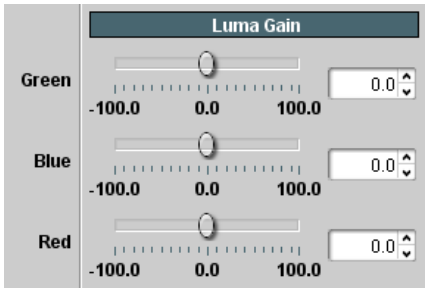
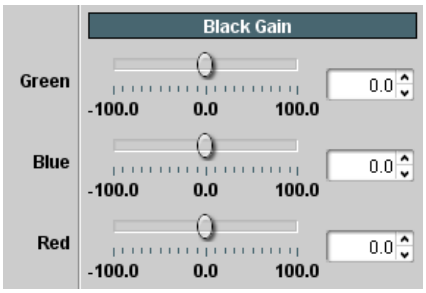
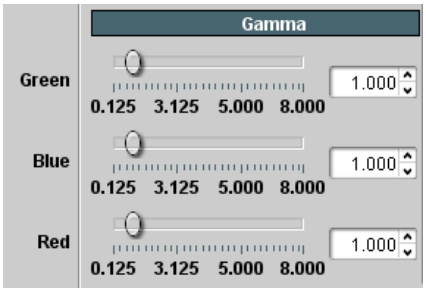
	**Option** Provides color corrector functions for the individual RGB channels for the card program video path (option **+COLOR**).
• **Color Corrector** 	**Color Corrector (On/Off)** provides master on/off control of all Color Corrector functions. • When set to **Off**, all processing is bypassed. • When set to **On**, currently displayed parameters settings take effect.
• **Reset to Unity** 	**Reset to Unity** provides unity reset control of all Color Corrector functions. When Confirm is clicked, a **Confirm?** pop-up appears, requesting confirmation. • Click **Yes** to proceed with the unity reset. • Click **No** to reject unity reset.
• **Luma Gain R-G-B controls**  • **Black Gain R-G-B controls**  • **Gamma Factor R-G-B controls** 	Separate red, green, and blue channels controls for Luma Gain, Black Gain, and Gamma curve adjustment. Gain controls provide gain adjustment from 0.0 to 200.0% range in 0.1% steps (unity = 100.0) Gamma controls apply gamma curve adjustment in 0.125 to 8.000 range in thousandths steps (unity = 1.000) 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.

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

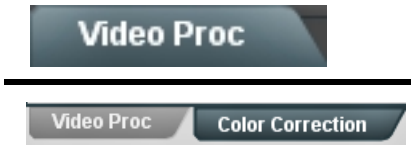
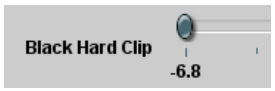
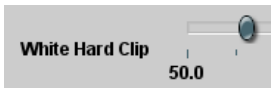
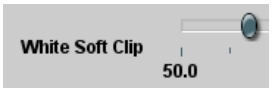
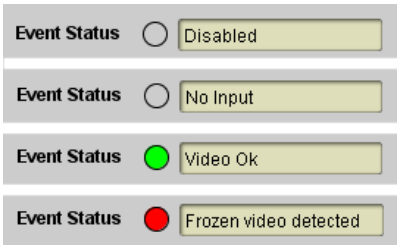
	**(continued)**
• Black Hard Clip 	Applies black hard clip (limiting) at specified percentage. (-6.8% to 50.0%; null = -6.8%)
• White Hard Clip 	Applies white hard clip (limiting) at specified percentage. (50.0% to 109.1%; null = 109.1%)
• White Soft Clip 	Applies white soft clip (limiting) at specified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

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

(Option **+QC** only) Sets quality check screening and thresholds for video quality event alerts. When a quality events occur, the event(s) can be used by the Presets function to invoke input routing or other changes.

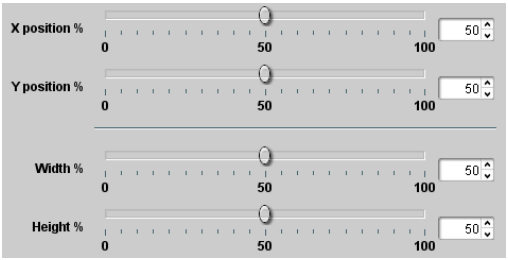
Note: **Inputs B** thru **Input D** have controls identical to the controls described here for **Input A** sub-tab. Therefore, only the **Input A** controls are shown here. Set controls for other inputs using the respective sub-tab.

• Event Status Indicator



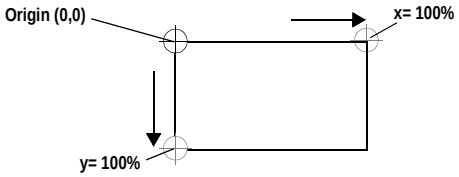
Displays event status (based on criteria set below) for signal condition to be considered OK (green), or signal condition considered to be a quality alert event (red) due the condition exceeding the criteria threshold(s) set below.

• Position and Width Controls

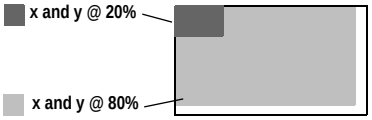


Position and Width controls set the area of concern to be screened by the Quality Event function.

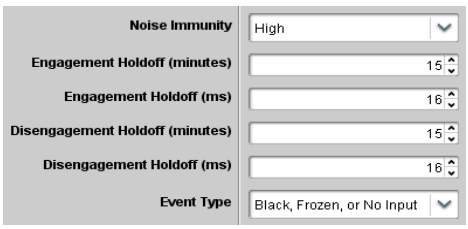
X and Y Position controls set the origin point for the area of concern



X and Y Width controls set the size for the area of concern



• Threshold and Event Type Controls



Sets the thresholds for black frame and event type to be considered. Also provides holdoff controls for event trigger engagement and disengagement.

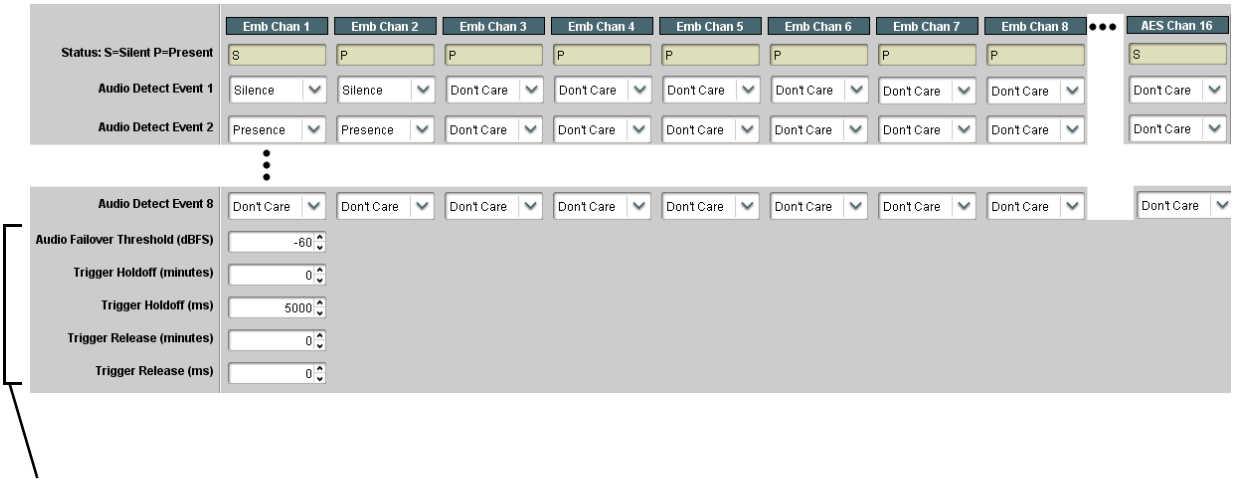
- **Noise Immunity** sets the relative noise levels that are rejected in the course of black event assessment (Low, Medium, or High).
- **Engagement Holdoff** sets the time (in msec) where, when time is exceeded, an event is to be considered a valid alert event.
- **Disengagement Holdoff** sets the time (in msec) where, when event time is has ceased, an alert event is cleared.
- **Event Type** sets the type of event(s) to be considered by the event screening (Disabled, Frozen frame, Black frame, or either Black or Frozen frame).

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

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

Any combination of embedded and AES input channels can be selected to be screened for silence or presence. In the example here, **Audio Detect Event 1** is set to trigger if audio on **any** of channels Emb Ch 1 thru Ch 6 fall below the selected threshold for an interval exceeding the selected threshold. Status indicators for each channel show silence (S) / presence (P) status based on the configured thresholds.

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



- **Audio Failover Threshold** sets the dBFS level at which channel content is considered to be silent, and correspondingly also a transition back to an untriggered condition with resumption of audio for the selected embedded channels. If the selected channels maintain levels above the selected **Audio Failover Threshold**, no triggering is invoked.
- **Trigger Holdoff** sets the period of time in which selected channel silence must occur before an Audio Silence Event trigger goes true.
- **Release Holdoff** control sets the time in which the trigger is revoked upon an event false condition.

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

- "Don't Care" setting may be labeled as **Don't Care**, **DC**, or **DSBL** (disabled). All notations mean ignoring the channel from event triggering.
- Selections other than Don't Care work as an AND function. Where multiple selections are set, a true (trigger) condition is not propagated unless **all** selected channels experience the configured criteria. (In the example shown above, **both** channels Emb Ch 1 and Emb Ch 2 need to experience a Silence event for a trigger to be propagated.)

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

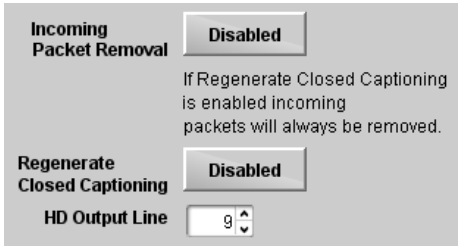
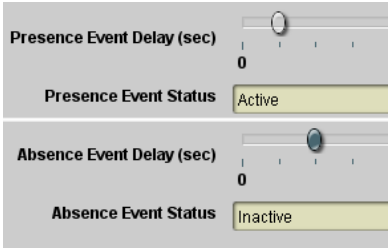
<table>
<tr><td>Closed Captioning</td><td>Provides support for closed captioning setup. Also provides controls for setting closed captioning absence and presence detection thresholds.</td></tr>
<tr><td>• Closed Captioning Input Status
 
</td><td>Displays incoming Closed Captioning status as follows:
• If closed captioning is present, a message similar to the example shown is displayed.
• If no closed captioning is present in the video signal, Not Present or Disabled is displayed.
Note: • Packet closed captioning status Captioning Rejected Due To message can appear due to the items described below. The closed captioning function assesses cdp_identifier, cdp_frame_rate, ccdata_present, and caption_service_active items contained in the packet header to make the determinations listed below. Refer to CEA-708-B for more information.
<table>
<tr><th>Message</th><th>Description</th></tr>
<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>
</table>
• 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.</td></tr>
<tr><td>• Closed Captioning Remove/Regenerate and HD Insertion Line Controls
 
</td><td>Allows removal of closed captioning packets and regeneration of packets. This is useful where closed captioning must be moved to a different line than that received on.
Note: • Although the output line drop-down will allow any choice within the 9 thru 41 range, the actual range is automatically clamped (limited to) certain ranges to prevent inadvertent conflict with active picture area depending on video format. See Ancillary Data Line Number Locations and Ranges (p. 3-9) for more information.
• The card does not check for conflicts on a given line number. Make certain selected line is available and carrying no other data.</td></tr>
<tr><td>• Presence/Absence Check Controls
 
</td><td>Displays CC presence and/or absence event status. This status can be propagated to the Presets > Event Triggers tab controls to issue a card GPO or other command when CC presence/absence events are detected.
Controls for both presence and absence provide for a holdoff time (in seconds) where, when time is exceeded, an event is to be considered a valid alert event.</td></tr>
</table>

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

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.

Provides active ARC re-aspecting, resulting in a properly scaled and cropped image area.

Without AFD

NTSC-Coded (4:3) up-converted 1080i Video Signal → **Re-Aspect to 16:9** → **1080i Video Signal with 16:9 uncorrected ARC**

NTSC-Coded image on 16:9 display shows letterbox cropping

Uncompensated up-conversion results in “postage stamp” effect with both letterbox and sidebars visible on 16:9 display

With AFD

NTSC-Coded (4:3) 1080i Video Signal with 1010 AFD Code → **1010 AFD Code Received and Applied to Scaler** → **Re-Aspect to 16:9** → **1080i Video Signal with 16:9 corrected ARC**

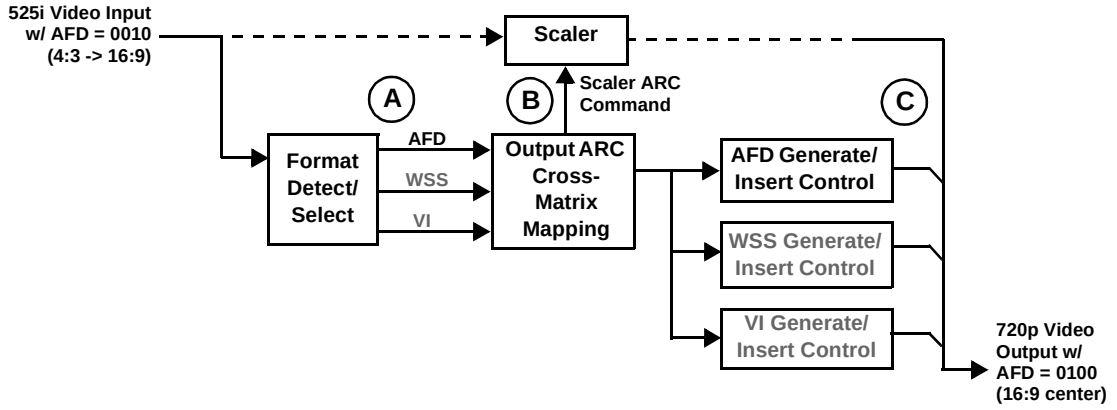
NTSC-Coded image on 16:9 display shows letterbox cropping

AFD Corrected up-conversion/ re-aspect results in intended image area properly visible on 16:9 display

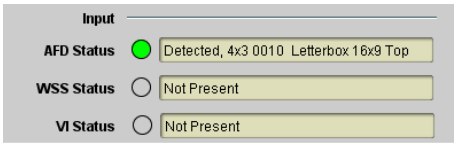
Table 3-2 9902-UDX-DSP Function Menu List — continued

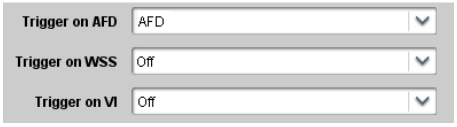
AFD/WSS/VI AFD/WSS/VI AFD Map	**(continued)**

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.



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.





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.

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**.

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**.

AFD Status shows AFD code now being outputted.

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).

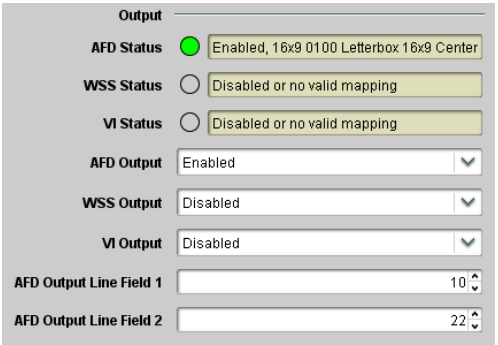


Table 3-2 9902-UDX-DSP Function Menu List — continued

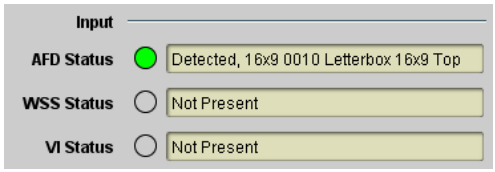
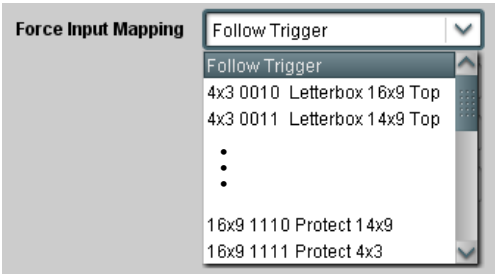
	**AFD/WSS/VI** sub-tab provides prioritized and gated input monitoring for AFD, WSS and/or VI formats. Also provides translation between input and output AFD, WSS, and VI ARC formats.
Note: • Line number control available only for AFD format. WSS and VI use fixed line numbers per applicable standards. • Some AFD codes are not supported in WSS and VI formats. Refer to AFD/WSS/VI Translation Matrix on page 3-61 for more information.	
• **Input Format Status Displays** 	Displays the current status and contents of the three supported ARC formats shown to the left. • 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.
• **Scaler AFD Enable** 	Enables scaler to apply ARC settings provided by ARC controls in this function. • **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. **Note:** • 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.
• **Input Mapping** 	When received ARC code is received, applies H/V coding as follows: • **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. **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 3-61 for more information and coding descriptions.

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

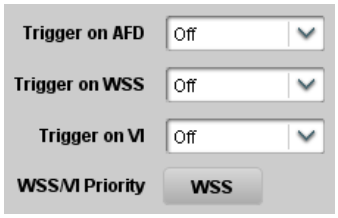
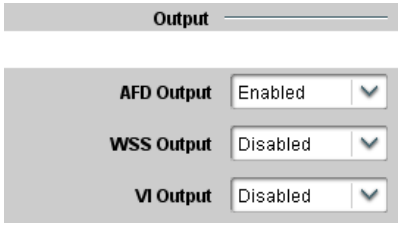
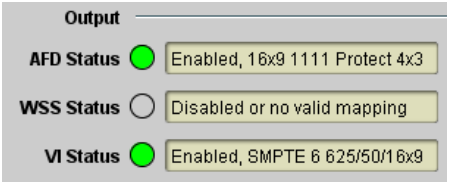
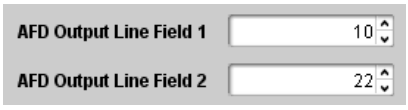
	**(continued)**
• Input Triggering Controls 	Individual ARC format input controls allow accepting or rejecting received ARC formats as follows: • **Trigger on AFD:** • **Off** rejects AFD-coded triggering. • **On** allows trigger on AFD. • **Trigger on WSS:** • **Off** rejects WSS-coded triggering. • **AFD** allows triggering on AFD-coded WSS. • **ETSI** allows triggering on ETSI-coded WSS. • **Trigger on VI:** • **Off** rejects VI-coded triggering. • **AFD** allows triggering on AFD-coded WSS. • **SMPTE** allows triggering on SMPTE-coded WSS. **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).
• Output Enable Controls 	Individual ARC format input controls allow accepting or rejecting received ARC formats as follows: • **AFD Output:** • **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:** • **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:** • **Disable** turns off WSS format on output. • **AFD Enabled** inserts AFD-coded VI on output. • **SMPTE Enabled** inserts SMPTE-coded VI on output.
• Output Status Displays 	Displays the current output status, coding, and H/V ratio for AFD, WSS, and VI formats. • 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. **Note:** • 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.
• AFD Output Line Control 	Allows selecting the line location of the AFD data within the video signal Ancillary Data space. **Note:** • 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-UDX-DSP Function Menu List — continued

(continued)

AFD/WSS/VI Translation Matrix

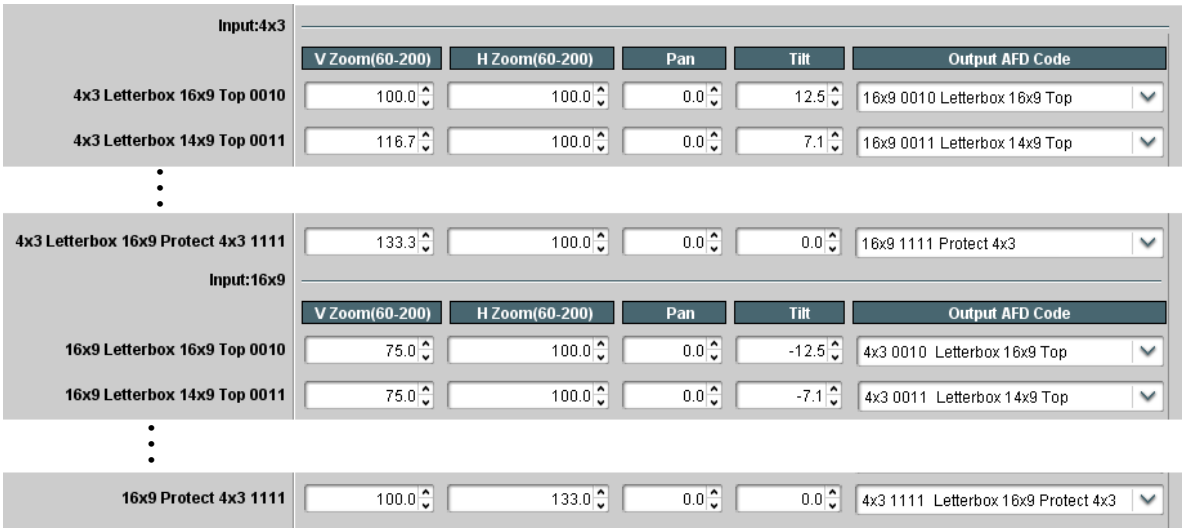
The table below lists valid translations between WSS, VI, and SMPTE 2016 AFD codes for both 4x3 and 16x9-coded frames.

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

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

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

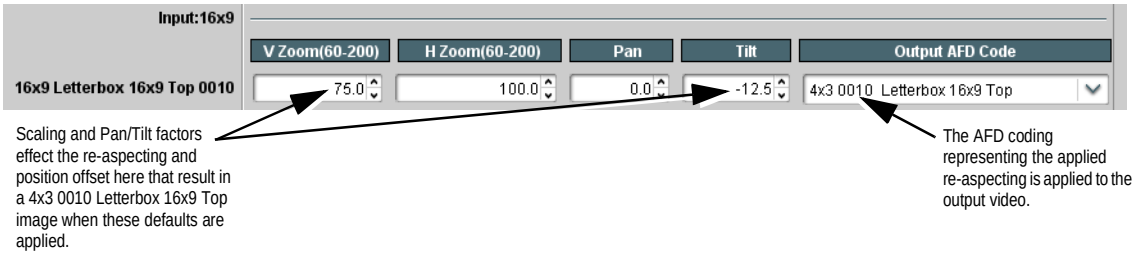
AFD Map sub-tab allows bidirectionally re-aspecting from 4x3 frames to companion 16x9 frames, and allows customizing aspect ratio settings for the AFD codes (and the corresponding WSS and VI translation equivalents) supported by the card.



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.



- 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”).

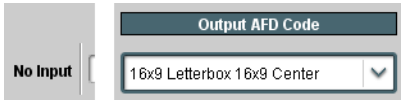


Table 3-2 9902-UDX-DSP Function Menu List — continued

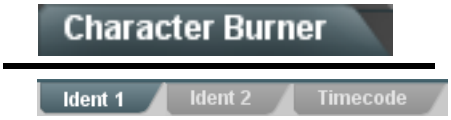
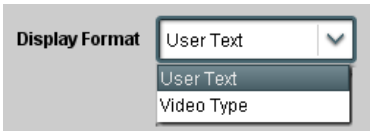
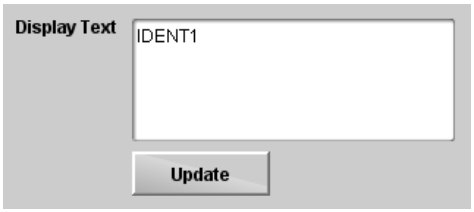
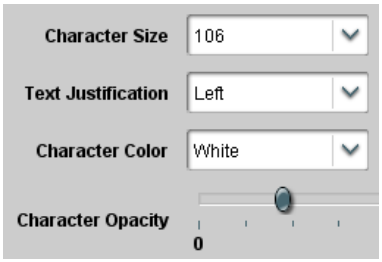
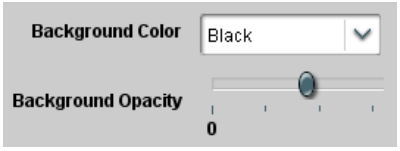
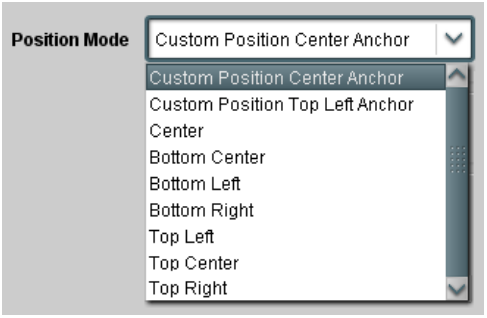
	Provides user-configurable burn-in of up to two text strings and timecode on output video.
Note: Ident 1 and **Ident 2** sub-tabs provide identical, independent controls for inserting two independent text (identification) burn-in overlays on the output video. **Ident 2** has controls identical to the controls described here for Ident 1. Therefore, only the Ident 1 controls are shown here.	
• **Ident Insertion Controls** 	Selects the rules for identification text burn-in overlay insertion into output video. **Note:** If ident text insertion is desired for input LOS conditions, the Framesync **On Loss of Video** control **must** be set to provide a raster (from one of the choices shown) to support the text insertion. If this control is set to "Disable Outputs", no raster or text insertion will be present on the output video under input LOS conditions. See Framesync (p. 3-29) for more information.
• **Display Type (Format) Select** 	Selects the type of data to be displayed as burn-in text from choices shown. • **User text** allows user text to be entered using field described below. • **Video type** inserts an overlay showing the video format of the input being used for processing.
• **Display (Ident) Text Entry Field** 	Dialog entry box that allows entry of desired ident text string. Enter desired text as click Update when done to input the text string. **Note:** • All normal keyboard alphanumeric characters are supported, in addition to ASCII characters (Windows ALT+*nnnn*). • Up to 126 characters can be entered.
• **Ident Text Attributes Controls** 	Sets burn-in size/position attributes as follows: • **Character Size** sets character size (in pixels). • **Text Justification** selects from left, right, or center-aligned justification within the text box overlay. • **Character Color** selects text color. • **Character Opacity** sets text opacity from 0% (least opacity) to 100% (full opacity).
• **Ident Text Background Attributes Controls** 	Provides independent controls for setting the color and opacity of the burn-in text and its background. • **Color** drop-down sets background color from multiple choices. • **Opacity** control sets background opacity from 0% (least opacity) to 100% (full opacity).

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

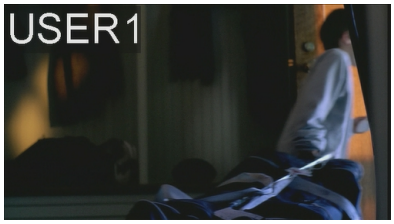
(continued)

• Ident Position Select

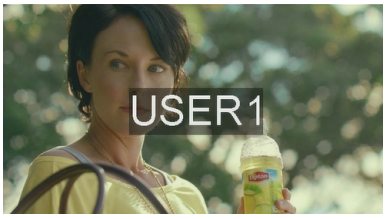


Sets the location of the ident text insertion from choices shown or custom. (When Custom is selected, position is configured using the **Ident Text Positioning Controls** described below.)

Example: Ident 1 text using **Top Left** position

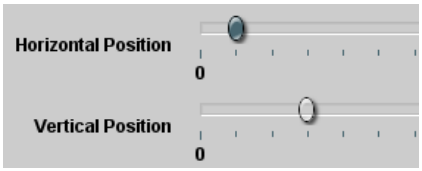


Example: Ident 1 text using **Center** position



Note: For SD usage, burn-ins can impinge on and corrupt line 21 closed-captioning waveform if positioned too close to the upper right of the raster.

• Ident Text Positioning Controls



With Custom selected, sets burn-in position attributes as follows:

- **Horizontal Position** sets horizontal position (in percentage of offset from left of image area). (Range is 0 thru 100%)
- **Vertical Position** sets vertical position (in percentage of offset from top of image area, top justified). (Range is 0 thru 100%)

Note:
- Horizontal and Vertical Position controls are functional only when **Custom Position** is selected.
- Character sizing and positioning for a given raster format may not be appropriate for another format (especially if transitioning from HD to SD). Set size and position for a balanced appearance (e.g., do not place text too close to margins or set larger than necessary) that accommodates both HD and SD raster formats if multiple format use is required.

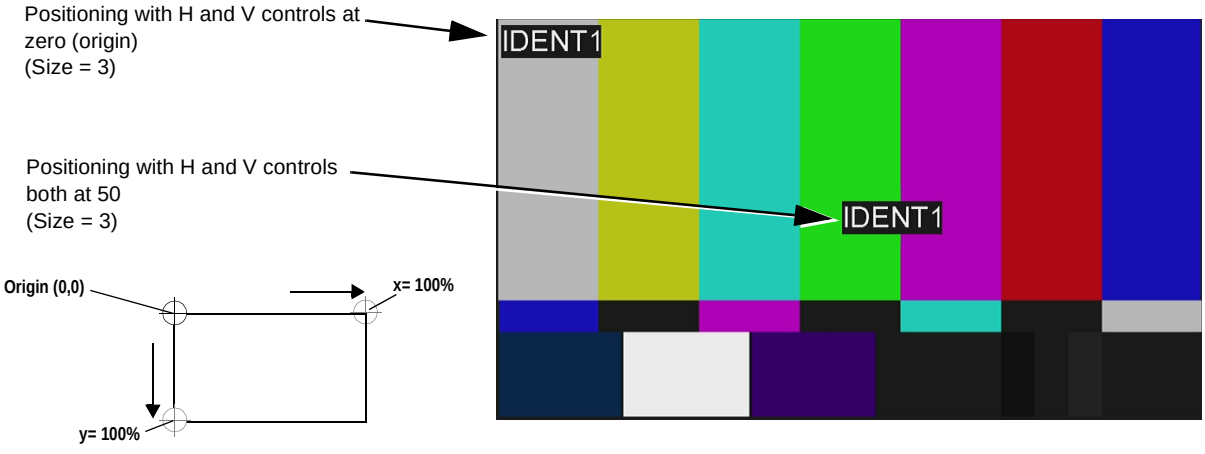


Table 3-2 9902-UDX-DSP Function Menu List — continued

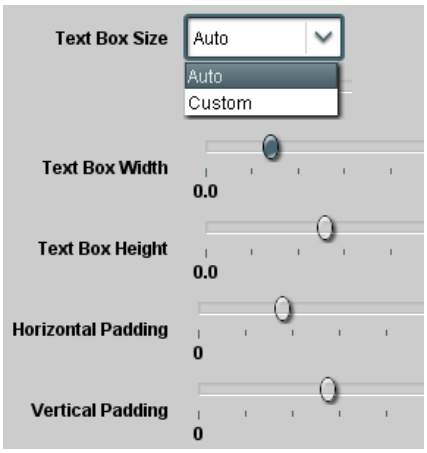
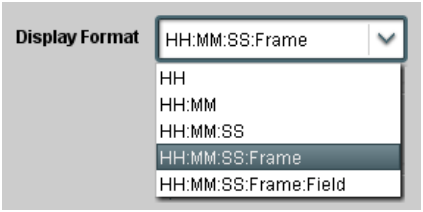
<table>
<tr><td> 
</td><td>(continued)</td></tr>
<tr><td>• Text Box Sizing Controls
 
</td><td>Provides controls for setting the size of the burn-in text background box.
• Auto allows text box to proportionally size with selected text size.
• Custom allows override of proportional sizing and allows text V and H dimensions to be set as desired.
• Text Box Width and Height allow manual sizing when set to Custom.
• Custom allows override of proportional sizing and allows text V and H dimensions to be set as desired.
• Horizontal and Vertical Padding allow fine adjustment of V and H dimensions to be set when Auto is selected.</td></tr>
<tr><td>• Text Box Border Enable
 
</td><td>When set to Enabled, applies a white hairline border to the text box edges.</td></tr>
<tr><td> 
</td><td>Provides controls for burn-in of timecode on output video.</td></tr>
<tr><td colspan="2">Note: This status display mirrors the same display in the Timecode tab. Device must be set to output a timecode in order for timecode burn-in to function. See Timecode (p. 3-43) for information on using timecode controls.</td></tr>
<tr><td>• Timecode Insertion Control
 
</td><td>Selects the rules for timecode burn-in overlay insertion into output video.
Note: If timecode insertion is desired for input LOS conditions, the Framesync On Loss of Video control must be set to provide a raster (from one of the choices shown) to support the timecode insertion.
If this control is set to “Disable Outputs”, no raster or timecode insertion will be present on the output video under input LOS conditions. See Framesync (p. 3-29) for more information.</td></tr>
<tr><td>• Timecode Format Display Selector
 
</td><td>Selects the format of timecode string burn-in overlay insertion into output video from choices shown.</td></tr>
</table>

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

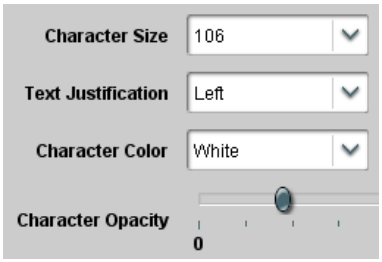
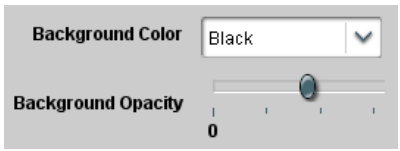
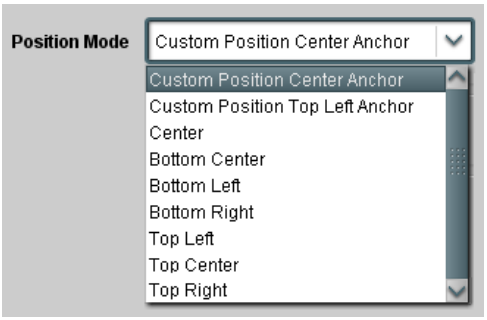
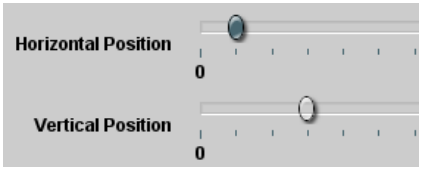
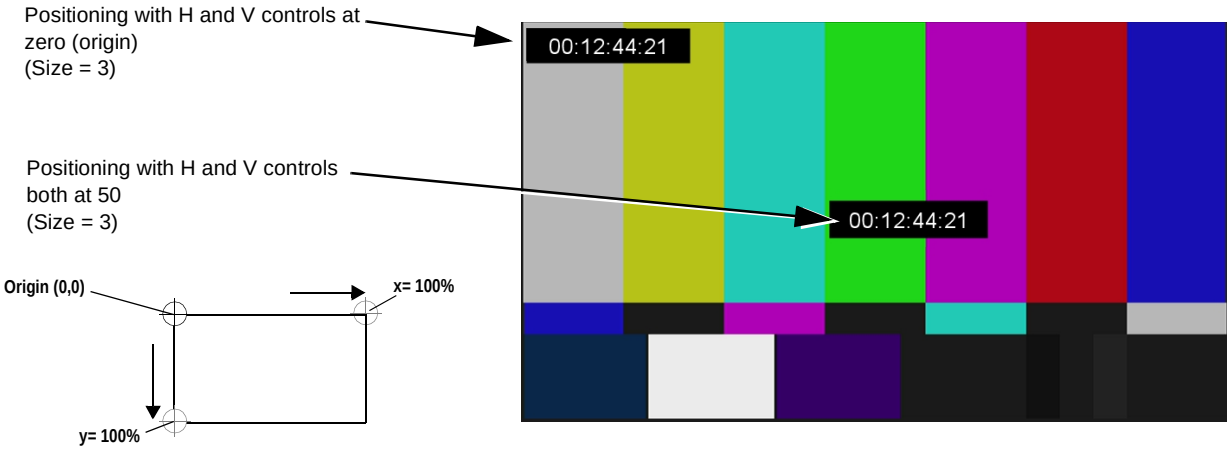
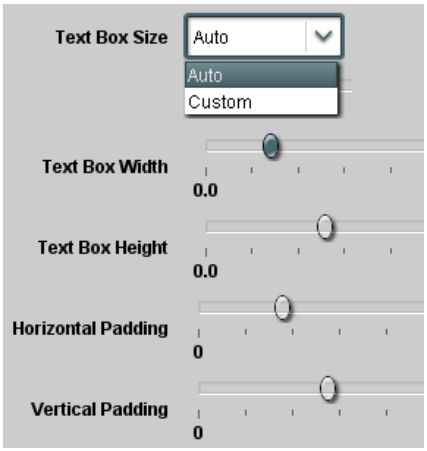
	**(continued)**
• Timecode Attributes Controls 	Sets burn-in size/position attributes as follows: • **Character Size** sets character size (in pixels). • **Text Justification** selects from left, right, or center-aligned justification within the text box overlay. • **Character Color** selects text color.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

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

(continued)



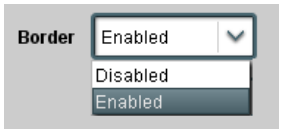
• Text Box Sizing Controls



Provides controls for setting the size of the burn-in background box.

- **Auto** allows text box to proportionally size with selected text size.
- **Custom** allows override of proportional sizing and allows text V and H dimensions to be set as desired.
- **Text Box Width** and **Height** allow manual sizing when set to **Custom**.
- **Custom** allows override of proportional sizing and allows text V and H dimensions to be set as desired.
- **Horizontal** and **Vertical Padding** allow fine adjustment of V and H dimensions to be set when **Auto** is selected.

• Text Box Border Enable



When set to Enabled, applies a white hairline border to the text box edges.

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

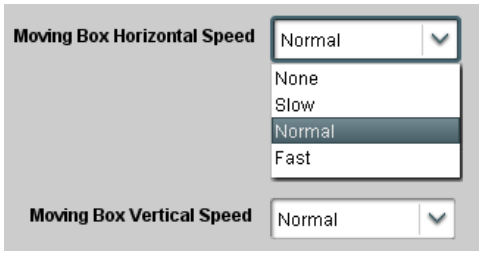
Moving Box	Provides a “moving box” graphic insertion (overlay) on the output video. Moving-box insertion can serve as a dynamic raster confidence check even in cases where the input video image is static or lost.
	Moving-box insertion provides dynamic display even on static video. Attributes such as box size, color, vertical movement speed, and horizontal movement speed are all user configurable. Moving box can be set to insert continuously, or only upon loss of input.
• **Moving Box Insertion Controls** 	Selects the rules for moving-box overlay insertion into output video. **Note:** If moving-box insertion is desired for input LOS conditions, the Framesync **On Loss of Video** control **must** be set to provide a raster (from one of the choices shown) to support the moving-box insertion. If this control is set to “Disable Outputs”, no raster or moving-box insertion will be present on the output video under input LOS conditions. See Framesync (p. 3-29) for more information.
• **Moving Box Size Controls** 	Sets size of box image burn-in as follows: • **Moving Box Width** sets the width (as a percentage of maximum available raster width. (Range is 0% thru 40%) • **Moving Box Height** sets the height (as a percentage of maximum available raster height. (Range is 0% thru 40%) **Note:** • Moving box sizing for a given raster format may not be appropriate for another format (especially if transitioning from HD to SD). Set size and position for a balanced appearance that accommodates both HD and SD raster formats if multiple format use is required. • For SD usage, moving box can impinge on and corrupt line 21 closed-captioning waveform if positioned too close to the upper right of the raster.
• **Moving Box Speed Controls** 	Sets speed of motion for moving box image burn-in as follows: • **Moving Box Horizontal Speed** sets the X-axis speed from choices shown. • **Moving Box Vertical Speed** sets the Y-axis speed from choices shown.

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

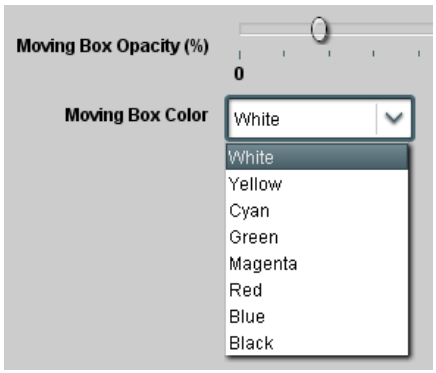
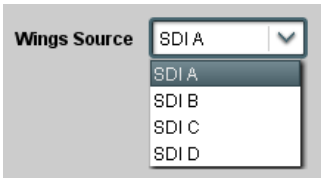
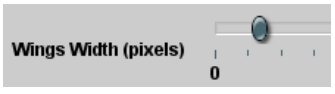
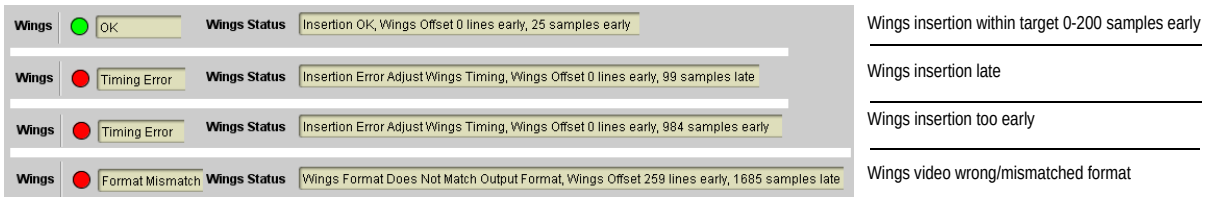
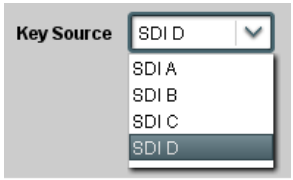
Moving Box	**(continued)**
• **Moving Box Attributes Controls** 	Provides independent controls for setting the color and opacity of the moving-box insertion. • **Color** drop-down sets box color from multiple choices shown. • **Opacity** controls sets box opacity from 0% (least opacity) to 100% (full opacity).
Wings	Provides wings insertion/width controls and displays insertion status.
• **Wings Source Control** 	Selects the card SDI input video port to serve as the card's wings source. **Note:** SDI inputs selected must be used with Rear I/O Module correspondingly equipped with intended input ports. ⚠ If FRC is being used by the scaler, wings source must be of same frame-rate/raster format as scaled-to output. (For example, if 720p5994 is being converted to 720p50, a 720p50 wings source must be used.)
• **Wings Insertion Enable Control** 	Enables or disables wings insertion into the output video. **Note:** For conditions where wings is not intended to be inserted, make certain this control is set to Disabled.
• **Wings Width Mode Control** 	Selects wings width control from the choices shown to the left and described below. • **Manual:** Wings L/R width is set using Wings Width manual control (see below). • **Follow Scaler:** Wings width automatically tracks with Scaler aspect ratio control settings (as configured on wings host card). **Note:** This function only tracks ARC settings applied locally on the host card Scaler tab. Incoming AFD (if any) or custom ARC performed on an upstream card/device is not recognized by this function.
• **Wings Manual Width Control** 	When **Manual** is selected above, allows symmetrical L/R wings insertion width, from none to widths extending into active image area if desired. (0 to 300 pixel range; null = 0)

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

Wings	**(continued)**
• **Wings Status Displays**	Displays wings timing status (on both Wings tab and Card Status displays) as described below. **Note:** • Wings timing is a function of the wings frame sync card/ device. Ideal wings timing is **within 0 to 200 samples early** of output video timing. Wings timing cannot be controlled on host card wings inserter. • Error in wings timing will result in loss of wings (however, program video image will not be corrupted).



Keyer	Provides key/fill insertion controls and displays insertion status.
Option **Key/fill** controls described below only appear on cards with **+KEYER** licensed optional feature. This feature requires a Rear Module that accommodates separate key/fill video inputs. Note that on cards also licensed with +KEYER, Wings and Keyer controls appear on the same tab.	
• **Key/Fill Source Controls**	Selects the card SDI input video ports to serve as the card's key and fill sources. **Note:** SDI inputs selected must be used on Rear I/O Module correspondingly equipped with intended input ports. If FRC is being used by the scaler, key/fill sources must be of same frame-rate/raster format as scaled-to output. (For example, if 720p5994 is being converted to 720p50, key/fill sources of 720p50 must be used.)
• **Key Mode Control**	Selects key mode as follows: • **Alpha Ramp** setting is used when typical key/fill is provided by key/fill generator with separate key and fill outputs. • **Alpha Threshold** or **Reverse Alpha Threshold** setting is used to provide keying using a combined key/fill signal derived from a simple graphic source.
• **Key/Fill Insertion Enable Control**	**Key Enable** control sets up key/fill for insertion. When enabled, key preview is available on Key Preview output. When key preview shows desired results, **Apply Key To Program** can be enabled to apply the key/fill to the program video output.



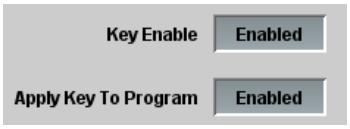
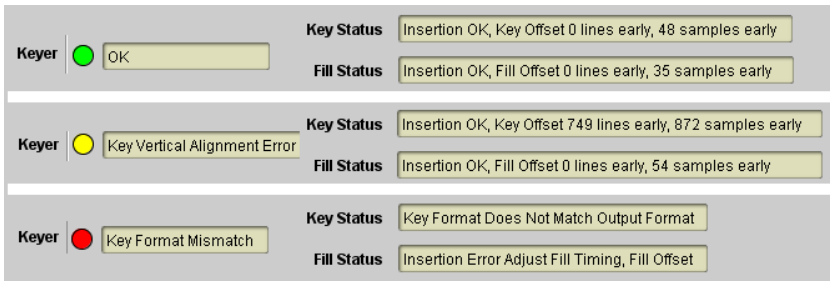


Table 3-2 9902-UDX-DSP Function Menu List — continued

Keyer	(continued)
• **Key/Fill Status Displays**	Displays keyer timing status (on both Keyer tab and Card Status displays) as described below. **Note:** • Key/fill timing is a function of the respective key and fill signal frame sync card/device(s). Ideal timing is within 0 to 200 samples early of output video timing. Key/fill timing cannot be controlled on +KEYER host card. • Error in key/fill timing will result in loss of keying (however, program video image will not be corrupted).

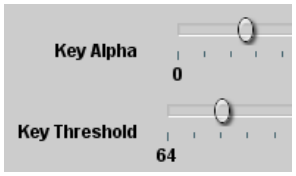


Key/fill insertion OK, within target 0-200 samples early

Key or fill insertion late error (in this example, late key video as shown by "wrap-around" line 749 lines early offset)

Key or fill video missing/mismatched format

• **Key Alpha/Threshold Controls**



When keying is set to Alpha Threshold or Reverse Alpha Threshold mode sets luma thresholds, when crossed, allow key/fill onto program video image.

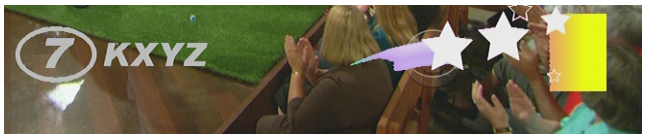
Key Alpha setting, when increased, increases the opacity of the key/fill.

Key Threshold setting, when reduced, more readily allows the key/fill input to assert itself over more variations of program video luma levels.

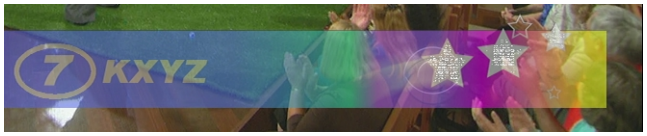
Table 3-2 9902-UDX-DSP Function Menu List — continued

Alpha Threshold keying allows cost-effective luminance keying from low-cost generic file-based graphic sources. With the graphic source applied to both the card **Key** and **Fill** inputs, the card **Key Alpha** and **Key Threshold** controls can be set to easily optimize the key/fill as shown below.

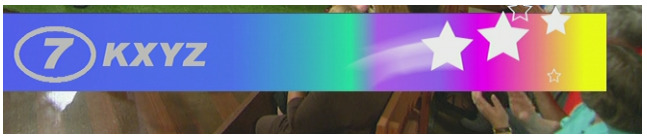
Key Threshold setting, when reduced, more readily allows the key/fill input to assert itself over more variations of program video luma levels. In the example to the right, progressively reducing the threshold setting allows more of the key/fill to assert iteslf over the program video.



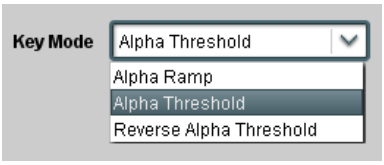
Key Alpha setting, when increased, increases the opacity of the key/fill. In the example to the right, progressively increasing the alpha setting increases the key/fill opacity.



When both settings are optimized, the key/fill appears consistent in opacity and free from edge distortions or graphic bleed lines appearing in the image.



Alpha Threshold mode setting is suited for graphic sources using black backgrounds. **Reverse Alpha Threshold** mode setting is suited for graphic sources using white backgrounds.



When using either alpha threshold modes, set the **Key Source** and **Fill Source** to use the same source (in this example, SDI input D).

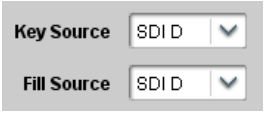


Table 3-2 9902-UDX-DSP Function Menu List — continued

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.

Eight individual Ancillary Data Processors (ADPs) provide for insertion, extraction, or bridging ancillary data to and from the card program video SDI stream.

Mode controls select the type of ANC processing:

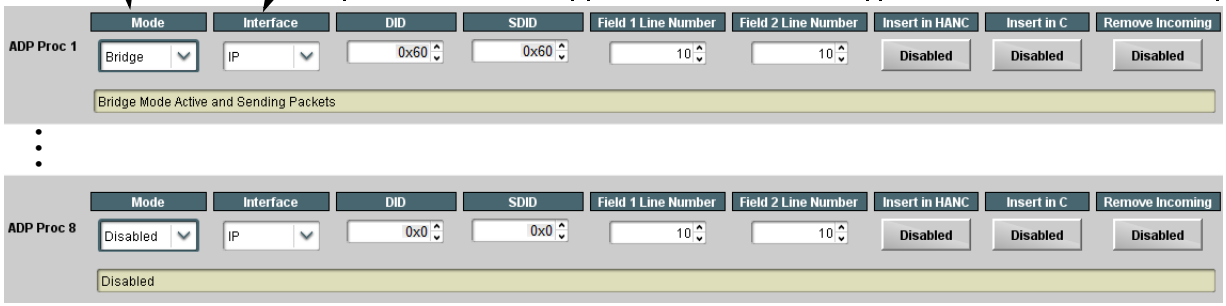
- **Bridge** extracts ANC from the deserialized input video and re-inserts in the output video, thereby allowing full control of specialized ANC packets
- **Insert** and **Extract** modes respectively allow insertion to the output stream or extraction from the input stream between external interfaces

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.

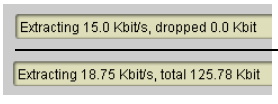
DID and **SDID** controls select the desired packet to be handled by the corresponding ANC Data Processor

Line Number controls select the VANC location of packet insertion/extraction

Insertion controls allow special insertions in HANC or the C-channel, as well as removal of incoming packets



In the example above, **ADP Proc 1** is set to extract ATC timecode at DID60_h / SDID 60_h. Depending on the interface used to carry the extraction (COM or IP), status is displayed as shown below.



When set to extract to **COM** interface, displays rate and dropped data (if any)

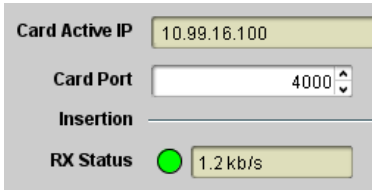
When set to extract to **IP** interface, displays rate and total amount transferred

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.

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

IP Port Setup sub-tab provides IP setup for card UDP IP communications.

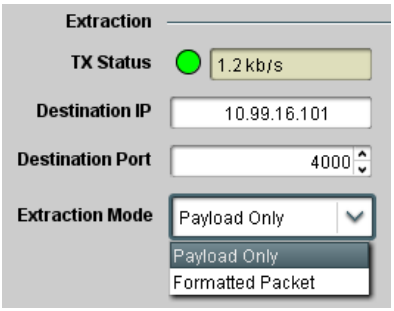
- **Card IP Receive Setup/Status**



Shows card receiving IP address/status and sets port as follows:

- **Card Active IP:** Shows the card IP address. (IP address is set using **Admin** tab Networking settings; see Admin (Log Status/ Firmware Update - Card IP Address) on page 3-61).
- **Card Port:** Sets card IP receive port.
- **Insertion / Rx Status:** Shows card IP receive/Rx insertion status.
  - Stopped (with yellow indicator) means no data is being received.
  - Green indicator means data is being received and inserted. Data rate is also shown.

- **Card IP Transmit Setup/Status**



Provides setup for destination IP address and shows card transmit status as follows:

- **Extraction / Tx Status:** Shows card extraction from stream to Tx status.
  - 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.

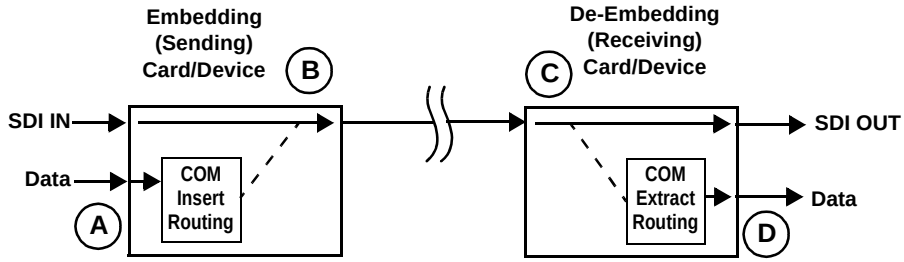
Notes:
- Packets received must be sized to fit in a native ancillary data packet (i.e., payloads that span multiple ancillary packets need to be broken down by the sending controller before they are sent to the device).
- Device can be configured to send back ACK packets each time data is inserted. The ACK packet is sent immediately after the data is actually inserted. Packets need to be broken down by the sending controller before they are sent to the device. Device can also be configured to send out "heartbeat" packets every two seconds as an additional safeguard.
- Packet formatting for insertion/extraction, ACK, and heartbeat is as follows:

Packet formatting used for insertion/extraction:		ACK Packet Format		Heartbeat Packets	
Bytes	**Field**	**Bytes**	**Field**	**Bytes**	**Field**
3:0	Packet Type (0xF5AB02ED)	3:0	Packet Type (0xAC73B938)	3:0	Packet Type (0x20120831)
5:4	Packet size	5:4	Received packet size	31:4	Reserved
6	DID	6	Received DID		
7	SDID	7	Received SDID		
9:8	Line number for Insertion. If set to 0, use the line number set by software.	9:8	Line number on which the received packet was inserted		
11:10	Payload size	11:10	Received payload size		
15:12	User packet ID	15:12	Received user packet ID		
N:16	Payload	31:16	Reserved		

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

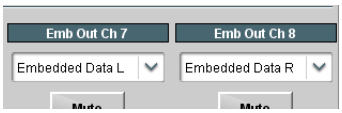
Data-Over-Audio sub-tab provides controls that allow SMPTE 337/338/339 non-PCM data to be embedded and de-embedded on embedded audio pairs, offering a very convenient self-contained transport within the program stream physical media.

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

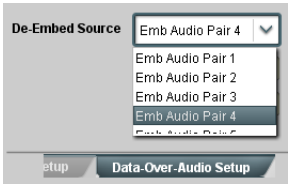


A The **COM Routing** tab and appropriate sub-tab is set to receive serial data, noting bit rate and parity settings to conform to the received serial data. (See COMM Ports Setup Controls (p. 3-76))

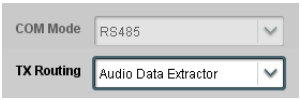
B The received serial data is then directed to an embedded audio output channel pair by setting a pair to Embedded Data using the **Output Audio Routing/Controls** tab (in this example, Emb pair 7/8).



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).



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. 3-76))



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

Notes:
- Embedded channel pair selected must be a standard boundary pair (e.g., 1/2, 3/4 and so on).
- SMPTE 337/338/339 embedded pair carrying non-PCM data here is marked as “Non-PCM Data Unknown”. Any intermediate devices between the Cobalt sending card/device and the Cobalt receiving card/device will transfer this data intact, as long as these devices can transfer in a bit-accurate manner. Most devices capable of carrying Dolby® streams are capable of this. However, any intermediate devices must have functions such as PCM level controls and SRC disabled.

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

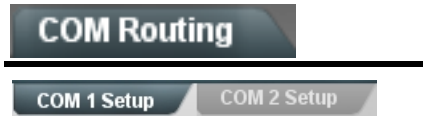
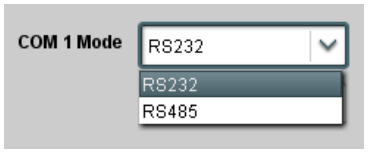
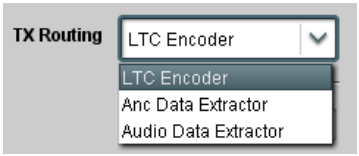
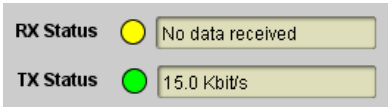
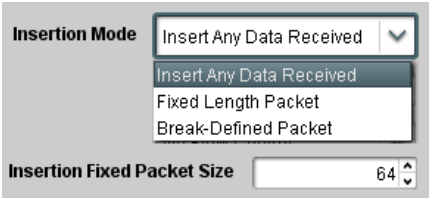
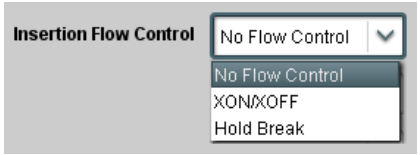
	Provides controls for setting up the two COMM (serial) ports for LTC or ANC functions, and setting comm protocol for each port.
Note: • **COM 1** and **COM 2** sub-tabs provide independent controls for COM1 and COM2. Therefore, only the **COM 1** controls are described here. • Controls provided here 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. 3-76).	
• **COM Mode (Protocol)** 	Selects serial comm protocol for the respective port as RS-232 or RS-485. **Note:** Protocol choices should consider the payload to be carried. Typically, LTC is sent or received using only RS-485 serial protocol.
• **COM Port Tx Routing Function** 	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.
• **Rx/Tx Status Display** 	Shows either no data received/sent, or where transfer is present shows data rate (in kbit/sec).
• **Insertion Mode Control** 	Where data is being inserted (received), sets the insertion as follows: • **Insert Any Data Received:** Insert all received data with no regard for packet size. • **Fixed Length Packet:** Sets receive to wait and accumulate *n*-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.
• **Insertion Flow Control** 	Allows communication between card receive and sending source to regulate data receive as follows: • **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-UDX-DSP Function Menu List — continued

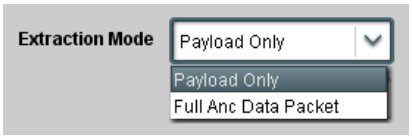
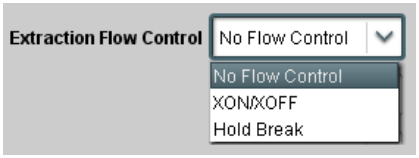
	**(continued)**
• **Insertion Sync Byte Control** 	Allows use of a sync byte from card receiver back to sending source to synchronize communication between card receive and sending source as follows: • **Disabled:** No special synchronization. • **Field Number at SOF:** The card sends a single byte telling 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.
• **Extraction Mode Control** 	Where data is being extracted from input video, sets the data to be sent as follows: • **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.
• **Extraction Flow Control** 	Allows communication between card transmit and receiving destinations to regulate data receive as follows: • **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.
• **Bit Rate/ Parity Gen Control** 	For both Rx and Tx, sets UART for bit rate and parity as follows: • **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-UDX-DSP Function Menu List — continued

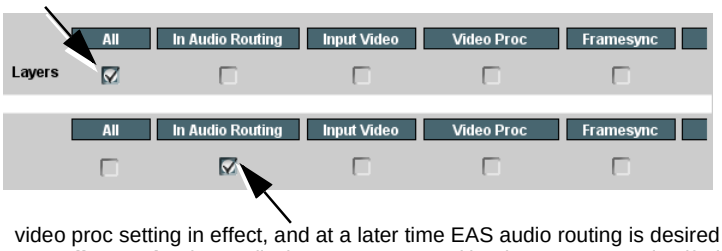
Presets

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

• Preset Layer Select

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

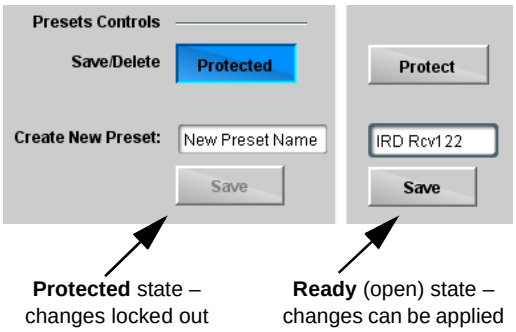
Default **All** setting will "look" at all card settings and save all settings to the defined preset with no masking.



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

Example: Since EAS audio routing can be considered independent of video proc settings, if normal audio routing was set up with a particular video proc setting in effect, and at a later time EAS audio routing is desired to be saved and invoked as a preset, selecting **In Audio Routing** here tells the preset save and load to not concern itself with video proc settings. In this manner, any video proc settings in effect when the EAS preset is invoked will not affect any video proc settings that might be currently in effect.

• Preset Enter/Save/Delete



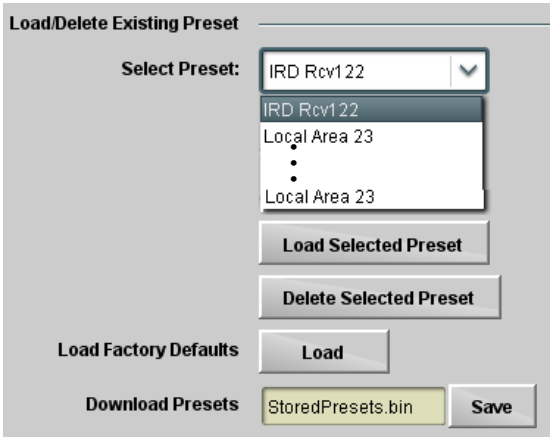
Protected state – changes locked out

Ready (open) state – changes can be applied

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

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

• Preset Save/Load Controls



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

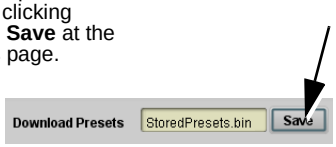
Note: Load Factory Defaults functions with no masking. The Preset Layer Select controls have no effect on this control and will reset **all** layers to factory default.

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

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

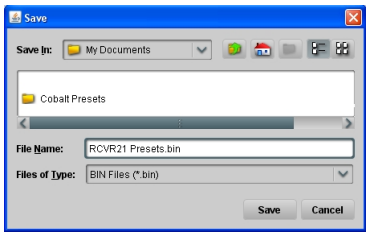
(continued)

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



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

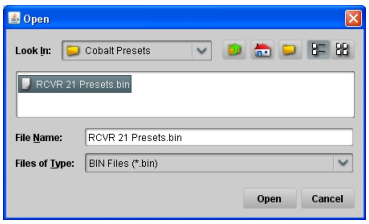
The file can then be renamed if desired (*RCVR21 Presets* in this example) before committing the save.



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

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

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

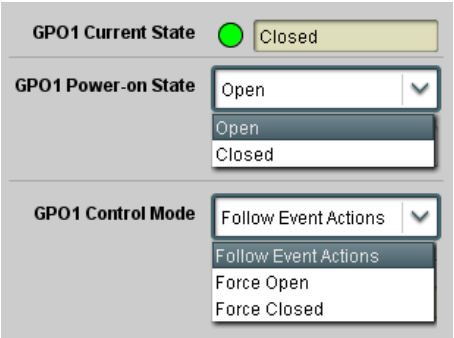


Note: • Preset transfer between card download and file upload is on a **group** basis (i.e., individual presets cannot be downloaded or uploaded separately).

• After uploading a presets file, engagement of a desired preset is only assured by selecting and loading a desired preset as described on the previous page.

Provides controls for setting up the two GPO's power-up states as well as forced manual or event action triggered.

Note: This tab has identical independent controls for **GPO 1** and **2**. Therefore, only the **GPO 1** controls are described here.

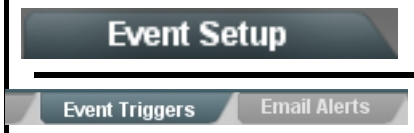


• **Current State** indicates GPO status regardless of any pre-setup.

• **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-UDX-DSP Function Menu List — continued



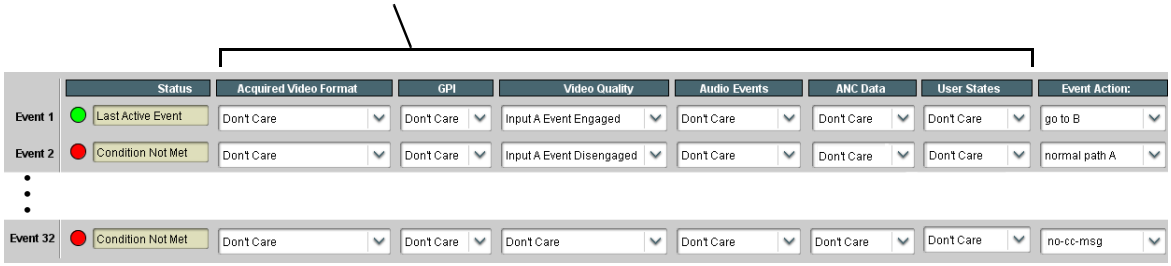
Provides event-based loading allowing a defined action to be automatically engaged upon various received signal status. Actions can be “canned” control commands or user-defined by going to a user preset.

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

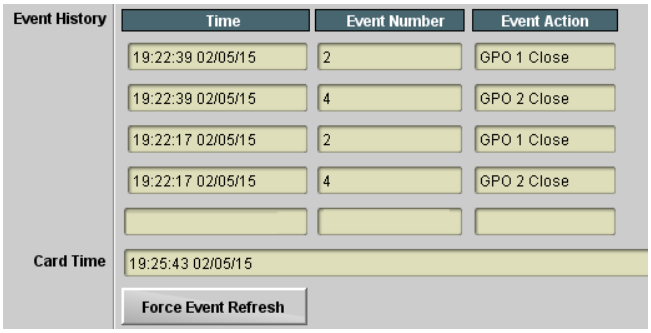
Event triggers allow a variety of event screening criteria, and in turn provide an Event Action “go to” in response to the detected event(s). For each screened criteria, categories can be set as “Don’t Care” or set to specific criteria to broaden or concentrate on various areas of concern.

- The **Event based loading** button serves as a master enable/disable for the function.
- Go-to **Event Actions** can be user-defined presets, “canned” (hard-coded) selections (such as GPO triggers or routing changes), or automated E-mail alert to a respondent (see Email Alerts (p. 3-83) for setting up e-mail alerts).
- Each Event (**Event 1** thru **Event 32**) can be set to screen for any or several Definer criteria as shown in the example below. Up to 32 separate events can be defined.
- Event 1 thru Event 32 are arranged with Event 1 having the highest priority, descending down to Event 32. Where multiple event screening is enabled, lower-priority events are serviced first, with the highest-priority event being the final event serviced and last action taken as well as last item logged in the Event History (see below). This helps ensure that a lower-priority event does not mask detection of higher-priority event(s).
- The **Status** indicator and message shows the activation status of each Event. Green indicator means event is currently engaged.
- Some columns in the DashBoard Event Setup table are present only when certain options are installed (for example, Video Quality column appears only with option **+QC**).

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



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



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

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

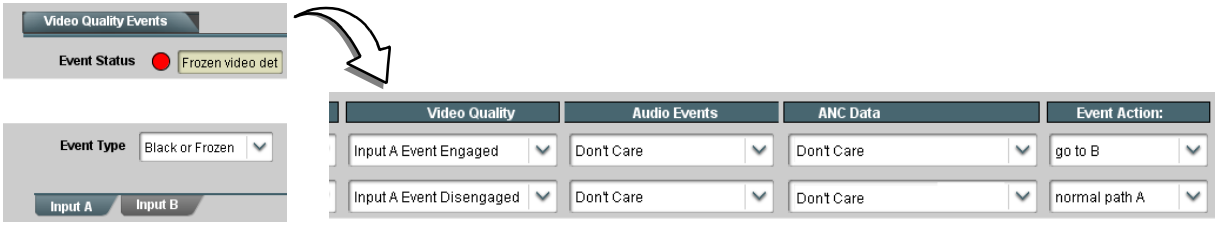
Pressing the **Force Event Refresh** button updates the list.

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

(continued)

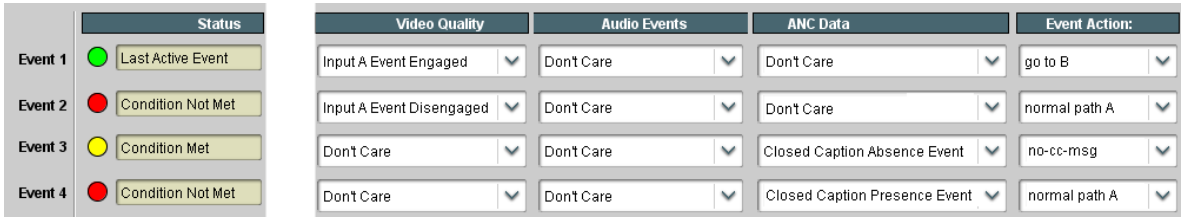
In the example here for Event 1, the **Video Quality Events** tab is set to screen for frozen video on Input A. When detected, this status can be used here (Video Quality set to "Input A Event Engaged" indicating black or frozen video detected). Using the Event Action selector, go-to action of "**go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

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



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

In this example, frozen video calls a preset using an input video routing change, while loss of closed captioning calls a preset to send a GPO. Both Events 1 and 3 have corresponding go-to actions to resume normal operation when the event ceases (in this example, a preset "normal path A").



Note: • Screened conditions are triggered upon start of event. Any event-based setup must be done in advance of the triggering event in order for event to be detected.

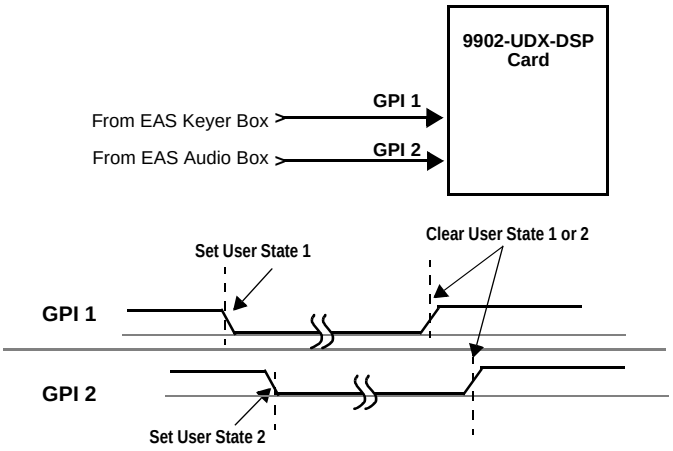
- If a desired user preset does not appear in the Event Action drop-down, press the DashBoard **Refresh** button at the bottom of the page to update the list in the drop-down.
- Loss of true conditions does not disengage an event-based triggering. A new set of true conditions must be defined and then occur to transition from one event-based trigger to another.
- Time required to engage an event-based trigger depends upon complexity of the called preset. (For example, a preset that invokes a video change will take longer to engage than a preset involving only an audio routing change.)
- Make certain all definable event conditions that the card might be expected to "see" are defined in any of the Event 1 thru Event 32 rows. This makes certain that the card will always have a defined "go-to" action if a particular event occurs. For example, if the card is expected to "see" a 720p5994 stream or as an alternate, a 525i5994 stream, make certain both of these conditions are defined (with your desired go-to presets) in any two of the Event 1 thru Event 32 condition definition rows.
- Event Actions defined using user presets must be used with care to prevent conditions that could cause looping or the removal or "override" of desired expected settings. When using presets, the Preset Layer selection should be used such that only required aspects are touched (for the example above, the preset "no-cc-msg" should be set to only send a GPO).
- 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.

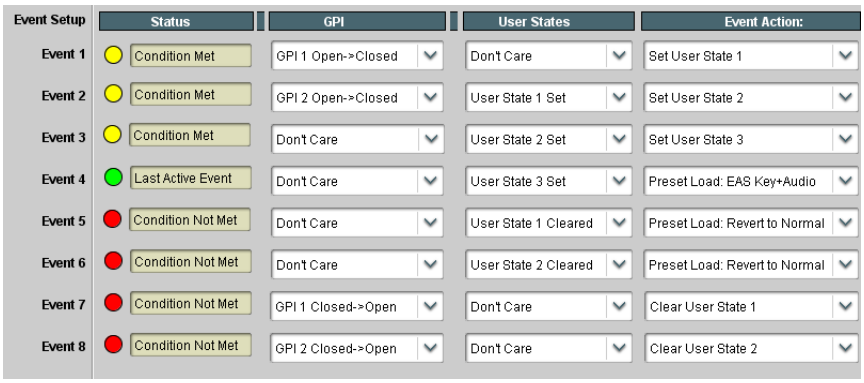
Table 3-2 9902-UDX-DSP Function Menu List — continued

(continued)

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

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





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

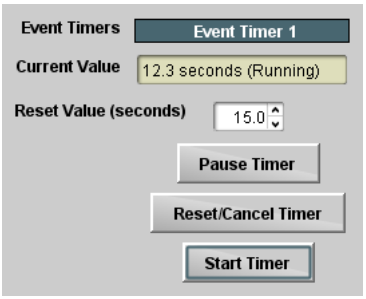
GPI 2 (audio) cue falling-edge sets user state 2

User state 2 (which requires user state 1 being true first) sets state 3, which then invokes a preset to load settings to route EAS key and audio

When either GPI 1 or GPI 2 has a rising-edge trigger (cease EAS), user states 1 or 2 are cleared, thereby clearing user state 3. Either state change calls a preset to revert to normal operation.

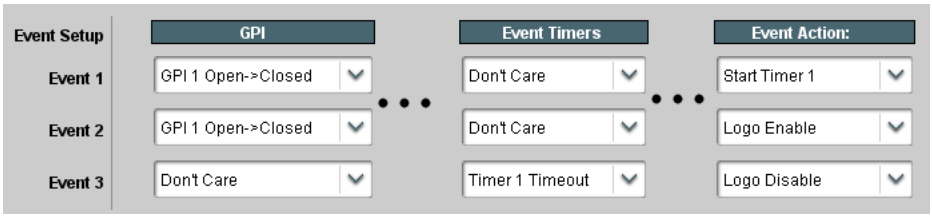
Table 3-2 9902-UDX-DSP Function Menu List — continued

Provides three general-purpose timers that can be triggered to start, pause, reset, or stop upon event actions. The state of each timer, in turn, can also be used to invoke other actions.



Event Timers 1 thru **3** (Timer 1 shown) can be set with count-down values. The Pause/Reset/Start control here are manual controls. The timers are typically used with automated cues to start and stop the timer(s), as shown below.

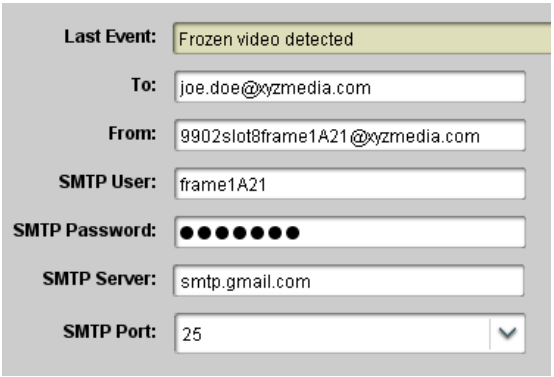
in the example here, **Event Timer 1** is used to set a logo insertion disable after a specific amount of elapsed time. A GPI inserts the logo, along with a time started at that time. Upon the timer timeout, a separate action sets logo insertion to Disabled.



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

As an Event Action choice on the Events Triggers sub-tab, an Email alert can be sent as a response. Set up email fields as shown in the example below.

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



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

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

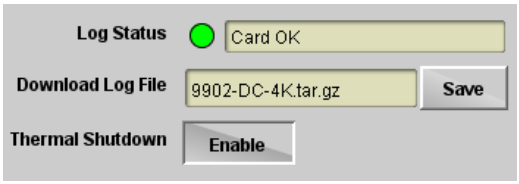
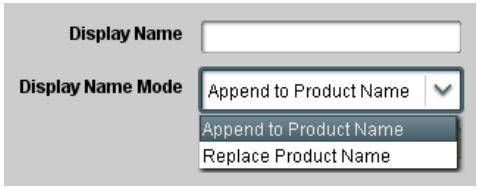
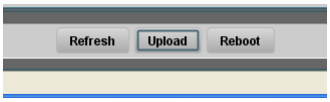
	Provides a global card operating status and allows a log download for factory engineering support. Also provides controls for selecting and loading card firmware upgrade files. Networking controls provide dedicated card networking setup in conjunction with rear module Ethernet port.
• **Log Status and Download Controls** 	• **Log Status** indicates overall card internal operating status. • **Download Log File** allows a card operational log file to be saved to a host computer. This log file can be useful in case of a card error or in the case of an operational error or condition. The file can be submitted to Cobalt engineering for further analysis. • **Thermal Shutdown** enable/disable allows the built-in thermal failover to be defeated. (Thermal shutdown is enabled by default). **CAUTION** **The 9902-UDX-DSP FPGA is designed for a normal-range operating temperature around 85° C core temperature. Operation in severe conditions exceeding this limit for non-sustained usage are within device operating safe parameters, and can be allowed by setting this control to Disable. However, the disable (override) setting should be avoided under normal conditions to ensure maximum card protection.**
• **Card DashBoard Name Control** 	Allows card name In DashBoard to be changed as desired. Click return to engage change. • **Append to Product Name** appends (or adds to) existing OEM name (for example, “9902-UDX-DSP *Processing 1A*”). • **Replace Product Name** completely replaces the OEM name OEM name (for example, “*Processing 1A*”). **Note:** DashBoard instance(s) may have to be refreshed before name change appears.

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

Admin / System / Networking	**(continued)**
• **Firmware Upgrade Controls**	Firmware upgrade controls allow a selected firmware version (where multiple versions can be uploaded to the card's internal memory) to invoke an upgrade to a selected version either instantly, or set to install on the next card reboot (thereby allowing card upgrade downtime to be controlled at a scheduled point in time).

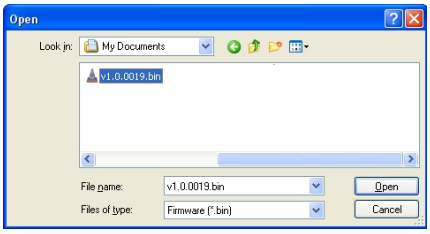
Note: The page/tab here allows managing multiple firmware versions saved on the card. New upgrade firmware from our web site can always be directly uploaded to the card without using this page. Instructions for firmware downloading to your computer and uploading to the card can be found at the **Support>Firmware Downloads** link at www.cobaltdigital.com.

1. Access a firmware upgrade file from a network computer by clicking **Upload** at the bottom of DashBoard.



2. Browse to the location of the firmware upgrade file (in this example, *My Documents\v1.0.0019.bin*).

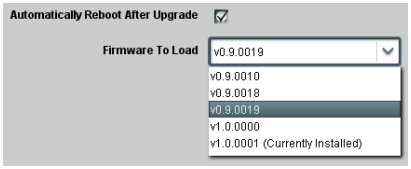
3. Select the desired file and click **Open** to upload the file to the card.



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

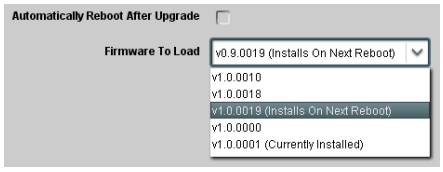
1. Click **Firmware To Load** and select the desired upgrade file to be loaded (in this example, "v1.0.0019").

2. Click **Load Selected Firmware**. The card now reboots and the selected firmware is loaded.



• **Deferred firmware upload.** With **Automatically Reboot After Upgrade** unchecked, firmware upgrade loading is held off until the card is manually rebooted. This allows scheduling a firmware upgrade downtime event until when it is convenient to experience to downtime (uploads typically take about 60 seconds).

1. Click **Firmware To Load** and select the desired upgrade file to be loaded (in this example, "v1.0.0019"). Note now how the display shows "Installs on Next Reboot".



2. Click **Load Selected Firmware**. The card holds directions to proceed with the upload, and performs the upload only when the card is manually rebooted (by pressing the **Reboot** button).

3. To cancel a deferred upload, press **Cancel Pending Upgrade**. The card reverts to the default settings that allow an immediate upload/upgrade.

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

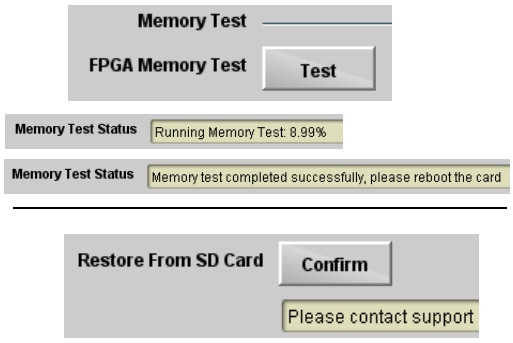
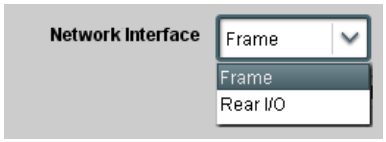
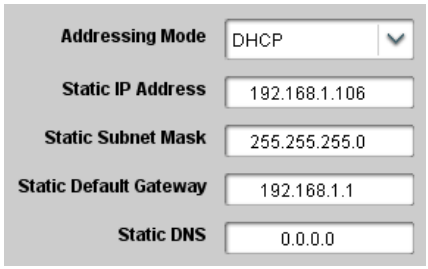
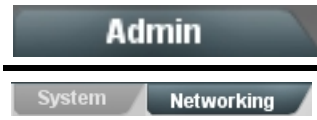
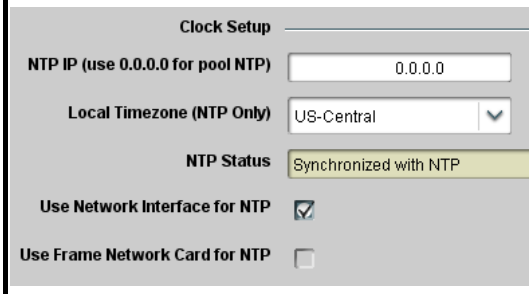
	**(continued)**
• **Card Check and Restore Utilities** 	**Memory Test** allows all cells of the card FPGA memory to be tested. This control should **only** be activated under direction of product support. Exercising the memory test is **not** part of normal card maintenance. **Restore from SD Card** allows card rendered inoperable to be restored using an SD memory card fitted to the card internal SD slot. Product support must be contacted prior to performing this operation. Use of any SD card not supplied by support can corrupt the card.
	The **Networking** sub-tab provides a dedicated Ethernet connection to card control and monitoring via a rear module Ethernet port. (This IP interface is entirely independent and separate from the card's DashBoard frame-based remote control/monitoring interface.) (Dedicated card control using IP has not been fully implemented at this release. Some functions may be reserved.)
• **Card IP Physical Port Select Control** 	Allows card dedicated IP interface (as set below) to use frame communications or dedicated rear I/O module Ethernet RJ-45 port. **Note:** • Frame net connection allows cards with per-card Ethernet connection to connect with network via a shared frame Ethernet port instead of per-card dedicated Ethernet connectors on the card's rear module. Frame net connection is available only on certain frame models. • Card slot must be fitted with a rear I/O module equipped with an Ethernet connector in order to use **Rear I/O** selection.
• **Card IP Setup Controls** 	Provides controls for setting up card dedicated IP interface. • **Addressing Mode** selsects either DHCP or static. Where Static is selected, standard IP fields allow entry of Address, Subnet Mask, and Default Gateway.
• **Card SNMP MIB Download** 	Where supported, allows card SNMP MIB files to be downloaded and saved using user-configured name.

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

<table>
<tr><td> 
</td><td>(continued)</td></tr>
<tr><td>• NTP Clock Setup
 
</td><td>Allows device NTP clock IP source and localization. This is the clock/time device will use for logs and other recorded actions.
• NTP IP sets the IP address where NTP is to be obtained.
• Local Timezone sets the recorded time to the localized time.
• NTP Status shows if time is synced with NTP or if an error exists.
• Use Network Interface and User Frame Network Card checkboxes allows selecting the network source that will provide NTP time.</td></tr>
<tr><td> 
</td><td>Automatically maintains a log of user actions and input lock status.</td></tr>
<tr><td>User Log shows input lock and other user conditions (with most recent event at top of list).

Clear User Log clears all entries.

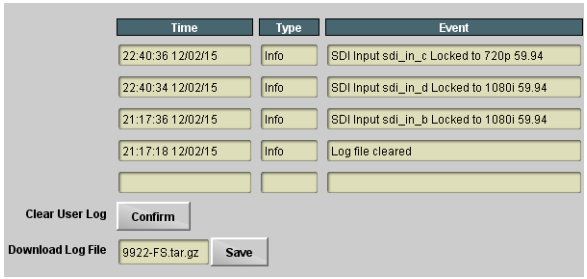
Download Log File opens a browser allowing the log file to be saved on the host machine.</td><td> 
</td></tr>
</table>

Table 3-2 9902-UDX-DSP 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)

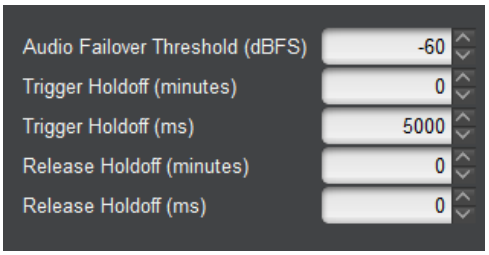
Video Alarm Setup

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 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).

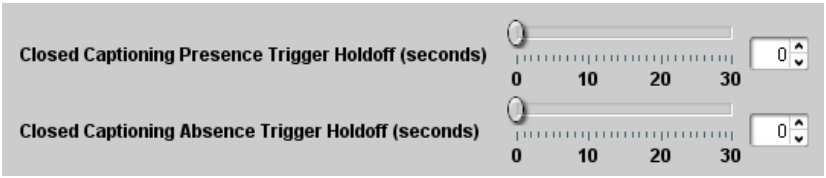
Factory default holdoff and threshold settings shown here are recommended for at least initial settings. If holdoff periods are too brief (or threshold set too high), nuisance alarms may be generated during transitions to and from programs and interstitials, as well as during certain content.

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

Alarms	(continued)

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.



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 sub-tab independently shows for all four SDI inputs any LOS (loss of signal), frozen, or black conditions triggered for any of the SDI IN A thru SDI IN D inputs.

Condition/Status has LOS, Frozen, and Black status fields for all 4 SDI inputs. Illuminated "LED" indicates that condition is presently occurring. Color of LED is determined by user-set Severity level.

- **Log** (when checked) propagates the alarm to a log file.
- **Alarm** (when checked) propagates the alarm to the Card State and frame-level DashBoard tree-view "LEDs".
- **Severity** selects from Ignore/OK (green "LED"), Warning (yellow "LED"), and Error (red "LED") alarm escalation states.
- **Duration** and **Last Occurence** shows details for each triggered alarm event.

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

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

Alarms	(continued)

Audio sub-tabs independently show for all 16 embedded channels any missing audio (whether absent due to low level, mute or unlocked status).

Note: Audio screened is the audio associated with the selected card SDI program inputs.

Unused audio channels should, at the minimum, have Severity set to Ignore/OK. If this is not done, nuisance alarms may occur.

Independent rows are present for each of the program path 16 embedded audio channels. Log, Alarm, Severity and Duration/ Last Occurrence controls and status function as described in Video (p. 3-89).

Ancillary Data sub-tab shows loss of closed captioning packet presence for program video path.

Note: • 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.

Row showing program path ANC status. Log, Alarm, Severity and Duration/Last Occurrence controls and status function as described in Video (p. 3-89).

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

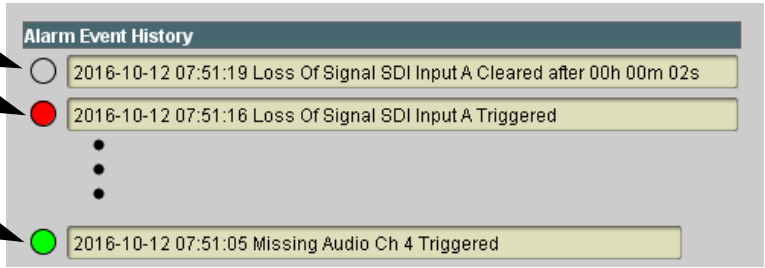
Alarms	**(continued)**

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).

Cleared alarms appear as an "open" LED

Alarms configured as **Error** or **Warning** correspondingly appear here as a red "LED" or yellow "LED"

Detected alarms event configured as **Ignore/OK** appear here as a green "LED"

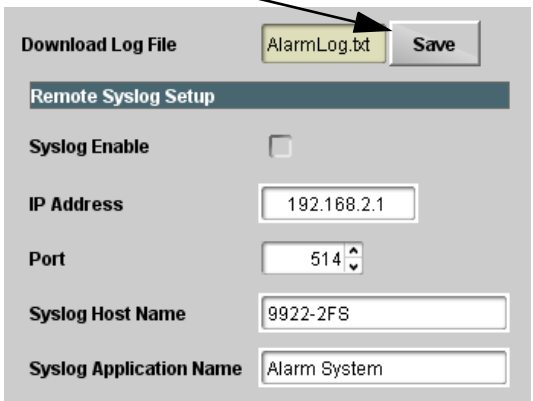


Logging

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).

Clicking **Save** opens a dialog to save the AlarmLog.txt file to a host computer.

Setup controls and fields for Syslog



Note: • 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-UDX-DSP-L) in order to use Syslog.

Troubleshooting

This section provides general troubleshooting information and specific symptom/corrective action for the 9902-UDX-DSP card and its remote control interface. The 9902-UDX-DSP 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-UDX-DSP card itself and its remote control systems all (to varying degrees) provide error and failure indications. Depending on how the 9902-UDX-DSP 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.

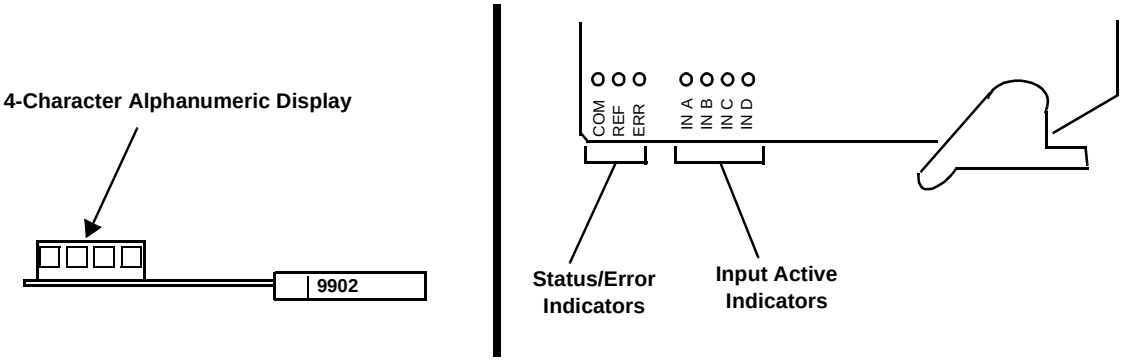
The various 9902-UDX-DSP card and remote control error and failure indicators are individually described below.

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. 3-96)
- 9902-UDX-DSP Processing Error Troubleshooting (p. 3-96)
- Troubleshooting Network/Remote Control Errors (p. 3-98)

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

Figure 3-7 shows and describes the 9902-UDX-DSP card edge status indicators and display. These indicators and the display show status and error conditions relating to the card itself and remote (network) communications (where applicable). Because these indicators are part of the card itself and require no external interface, the indicators are particularly useful in the event of communications problems with external devices such as network remote control devices.



Item	Function
Alphanumeric Display	Shows card statuses (`BOOT` (card booting), (`9902-UDX-DSP` (card up and OK))
COM LED	Blue LED flashes when 9902-UDX-DSP is receiving control message from remote network control (e.g., DashBoard™ or Cobalt® Remote Control Panel)
REF LED	Blue LED illuminates indicating 9902-UDX-DSP is receiving selected reference when set up for framesync operation.
ERR LED	This function is currently reserved.
Input Active LEDs	Blue LEDs for each SDI input (A thru D) indicate signal presence for each corresponding card SDI input. No illumination of any of the LEDs indicates the 9902-UDX-DSP has not locked onto a valid signal on any input.

Figure 3-7 9902-UDX-DSP 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-UDX-DSP card itself and remote (network) communications.

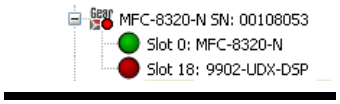
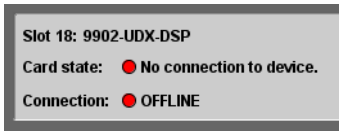
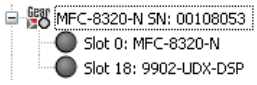
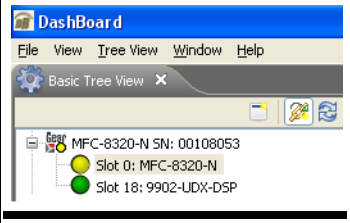
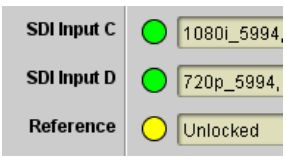
Indicator Icon or Display	Error Description
	Red indicator icon in Card Access/Navigation Tree pane shows card with Error condition (in this example, the Card Access/Navigation Tree pane shows a general error issued by the 9902-UDX-DSP card in slot 18).
	Specific errors are displayed in the Card Info pane (in this example “No connection to device” indicating 9902-UDX-DSP card is not connecting to frame/LAN).
	If the 9902-UDX-DSP card is not connecting to the frame or LAN, all controls are grayed-out (as shown in the example here).
	Gray indicator icon in Card Access/Navigation Tree pane shows card(s) are not being seen by DashBoard™ due to lack of connection to frame LAN (in this example, both a 9902-UDX-DSP card in slot 18 and the MFC-8320-N Network Controller Card for its frame in slot 0 are not being seen).
	Yellow indicator icon in Card Access/Navigation Tree pane shows card with Alert condition (in this example, the Card Access/Navigation Tree pane shows a general alert issued by the MFC-8320-N Network Controller Card).
	Clicking the card slot position in the Card Access/Navigation Tree (in this example Network Controller Card “Slot 0: MFC-8320-N”) opens the Card Info pane for the selected card. In this example, a “Fan Door Open” specific error is displayed.
	Yellow indicator icon in 9902-UDX-DSP Card Info pane shows error alert, along with cause for alert (in this example, the 9902-UDX-DSP is not receiving an enabled framesync source).

Figure 3-8 DashBoard™ Status Indicator Icons and Displays

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

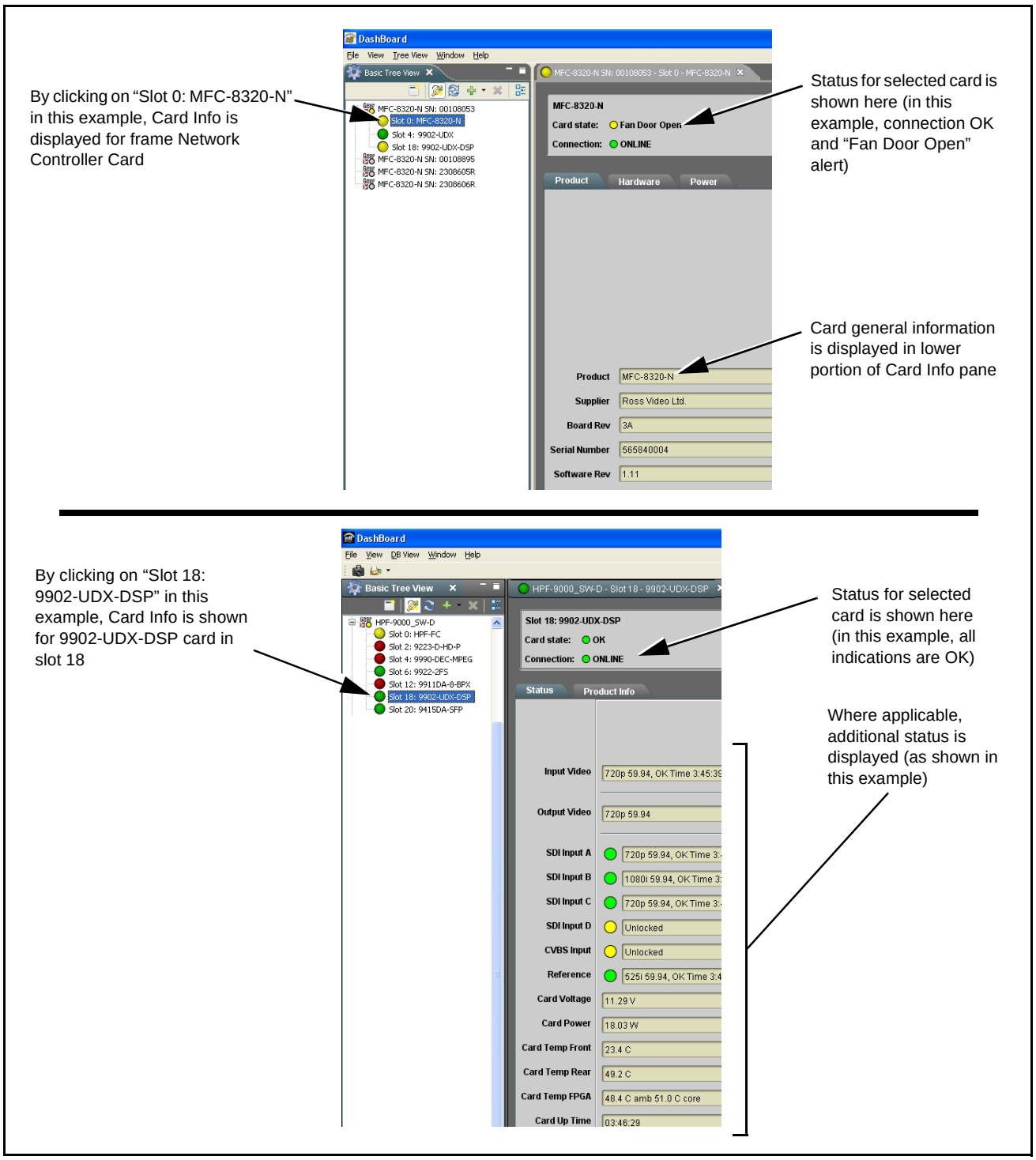


Figure 3-9 Selecting Specific Cards for Card Info Status Display

Basic Troubleshooting Checks

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

Table 3-3 Basic Troubleshooting Checks

Item	Checks

Verify power presence and characteristics	• On both the frame Network Controller Card and the 9902-UDX-DSP, 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-UDX-DSP card. This can be observed using the DashBoard™ Card Info pane.
	  • If display shows **no** power being consumed, either the frame power supply, connections, or the 9902-UDX-DSP card itself is defective.
	  • If display shows **excessive** power being consumed (see Technical Specifications (p. 1-23) in Chapter 1, “Introduction”), the 9902-UDX-DSP 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-UDX-DSP 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-UDX-DSP Processing Error Troubleshooting

Table 3-4 provides 9902-UDX-DSP processing troubleshooting information. If the 9902-UDX-DSP 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-UDX-DSP 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-UDX-DSP card edge status indicators.
- Where errors are displayed on both the 9902-UDX-DSP card and network remote controls, the respective indicators and displays are individually described in this section.

Table 3-4 Troubleshooting Processing Errors by Symptom

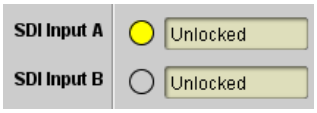
Symptom	Error/Condition	Corrective Action
• **DashBoard™** shows **Unlocked** message in 9902-UDX-DSP Card Info pane  • Card edge **Input** LED corresponding to input is not illuminated	No video input present	Make certain intended video source is connected to appropriate 9902-UDX-DSP card video input. 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-UDX-DSP	• Control(s) not enabled	• Make certain respective control is set to **On** or **Enabled** (as appropriate).
	• VANC line number conflict between two or more ancillary data items	• Make certain each ancillary data item to be passed is assigned a unique line number (see Ancillary Data Line Number Locations and Ranges (p. 3-9).
Audio not processed or passed through card	Enable control not turned on	On **Output Audio Routing/Controls** tab, **Audio Group Enable** control for group 1 thru 4 must be turned on for sources to be embedded into respective embedded channel groups.
Audio DSP routing or other settings show in DashBoard but are not carried out.	Card DashBoard UI is stale and not dynamically taking in and engaging changed settings.	When performing significant changes like unchecking or checking (enabling) new DSP functions, always press the DashBoard **Refresh** button to make sure the change is taken in on DashBoard and sub-tabs correspondingly displayed are refreshed with the drop-downs that correlate with the DSP setup. If DashBoard changes (such as channel routing) are done before refresh, the intended routing settings may not actually take place and engage
Excessive or nuisance input signal quality events in log or Card State status display	Holdoff periods are too brief (or threshold set too high)	If holdoff periods are too brief (or threshold set too sensitive), nuisance alarms may be generated during transitions to and from programs and interstitials, as well as during certain content.
(Option +QC only) Audio silence event not detected or triggered on	Holdoff set too long to detect condition	The **Trigger Holdoff** controls on the **Audio Detect Events** tab allow ignoring silence events unless the event duration exceeds the holdoff setting. Make certain holdoff is set sufficiently low to detect events as desired.

Table 3-4 Troubleshooting Processing Errors by Symptom — continued

Symptom	Error/Condition	Corrective Action
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.
Not all card controls properly appear or render in DashBoard	DashBoard version too old and not compatible with card	This card requires DashBoard™ version 8.0 or greater. This is due to the added user interface controls which can only be accommodated with DashBoard version 8.0 or greater. While the card will appear in the frame Basic Tree View in earlier DashBoard versions, many card controls will not be accessible.
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. 3-78) 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. 3-78) 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.

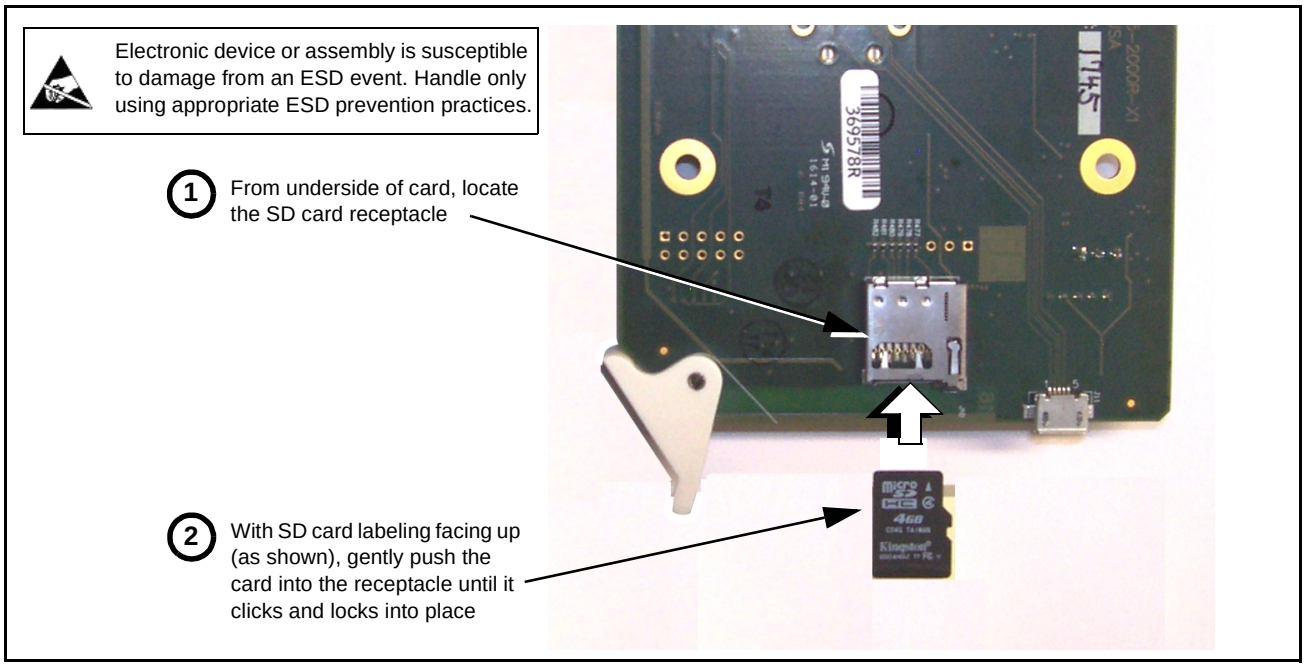


Figure 3-10 SD Card Installation

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

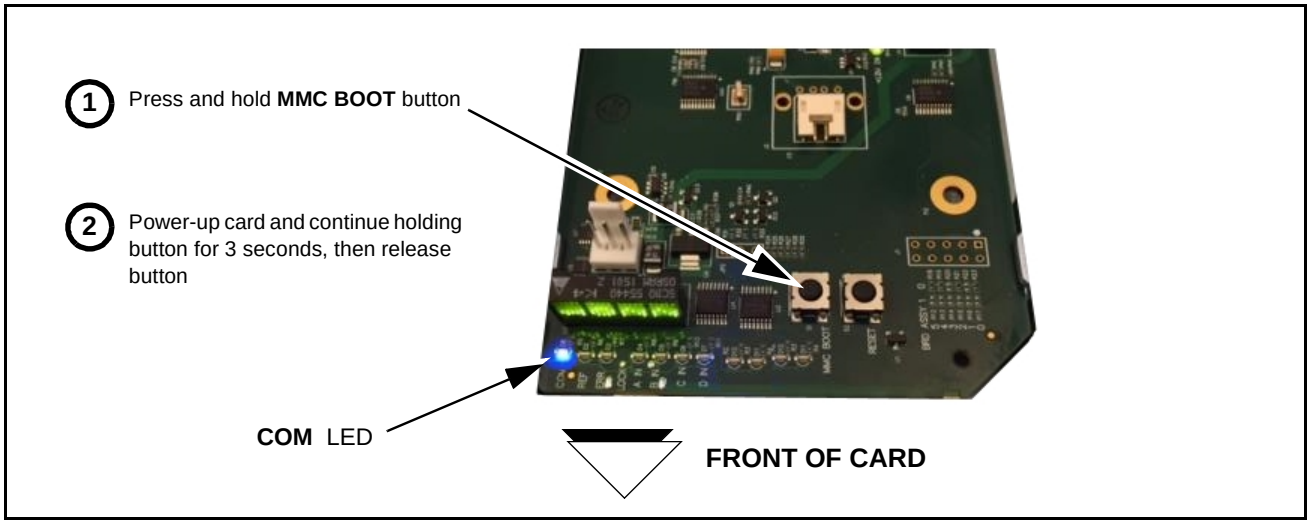


Figure 3-11 MMC Boot Button

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. 1-27) in Chapter 1, "Introduction" for contact information.

Cobalt Digital Inc.

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

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