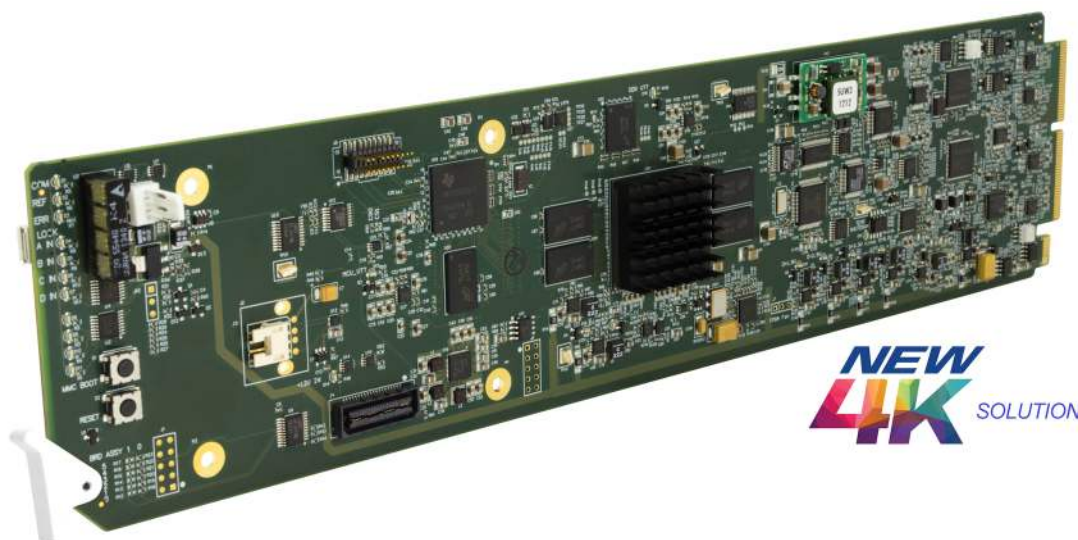

COBALT_®

9902-DC-4K



NEW
4K SOLUTION

**Quad-Input 3G/HD UHD Broadcast
Downconverter with Optional Frame Sync**

Product Manual

COBALT_®

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

Congratulations on choosing the Cobalt® 9902-DC-4K Quad-Input 3G/HD UHD Broadcast Downconverter with Optional Frame Sync. The 9902-DC-4K 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-DC-4K, please contact us at the contact information on the front cover.

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Description of product/manual changes:	- Update manual to correctly describe product as "with Optional Frame Sync". Frame sync was originally described as being available with the product. Frame sync is available as a software option using option code +FS .

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Introduction

Overview

This manual provides installation and setup instructions for the 9902-DC-4K Quad-Input 3G/HD UHD Broadcast Downconverter with Optional Frame Sync card (also referred to herein as the 9902-DC-4K).

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-DC-4K.
- **Chapter 2, “Installation”** – Provides instructions for installing the 9902-DC-4K in a frame, and connecting signal and control cabling to the 9902-DC-4K.
- **Chapter 3, “Setup Instructions”** – Provides overviews of setup operating controls and instructions for setting up the 9902-DC-4K to integrate within its signal flow environment.

This chapter contains the following information:

- **9902-DC-4K Card Software Versions and this Manual (p. 1-2)**
- **Manual Conventions (p. 1-3)**
- **Safety and Regulatory Summary (p. 1-5)**
- **9902-DC-4K Functional Description (p. 1-6)**
- **Technical Specifications (p. 1-11)**
- **Warranty and Service Information (p. 1-13)**
- **Contact Cobalt Digital Inc. (p. 1-14)**

9902-DC-4K 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-DC-4K Card Information (p. 3-7) in Chapter 3, “Operating Instructions” for more information. You can then check our website for the latest software version currently released for the card as described below.

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

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

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

Cobalt Reference Guides

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

Manual Conventions

In this manual, display messages and connectors are shown using the exact name shown on the 9902-DC-4K itself. Examples are provided below.

- Card-edge display messages are shown like this:



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

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

- **9902-DC-4K** refers to the 9902-DC-4K Quad-Input 3G/HD UHD Broadcast Downconverter with Optional Frame Sync 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-DC-4K and other cards operate.
- Functions and/or features that are available only as an option are denoted in this manual like this:



Warnings, Cautions, and Notes

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

Warnings

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




Cautions

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

Notes

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

Labeling Symbol Definitions

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

Safety and Regulatory Summary

Warnings

! WARNING !

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

Cautions

CAUTION

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

CAUTION

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

CAUTION

Heat and power distribution requirements within a frame may dictate specific slot placement of cards. Cards with many heat-producing components should be arranged to avoid areas of excess heat build-up, particularly in frames using only convection cooling. The 9902-DC-4K has a moderate power dissipation (<18 W). As such, avoiding placing the card adjacent to other cards with similar dissipation values if possible.

CAUTION

If required, make certain Rear I/O Module(s) is installed before installing the 9902-DC-4K 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-DC-4K 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-DC-4K Functional Description

Figure 1-1 shows a functional block diagram of the 9902-DC-4K. The 9902-DC-4K includes input routing to accommodate up to four 3G/HD-SDI inputs for converting 4K quadrant-division and 2SI (two-sample interleave) content into 3G-SDI. The 9902-DC-4K precisely combines four quadrant-divided or 2SI individual SDI feeds into a combined SDI image directly suitable for broadcast production usage or monitoring purposes. Frame sync is optionally available which equips each path with independent frame sync. The output is available as a 2x DA 3G/HD-SDI output or HDMI/DVI.

9902-DC-4K Program Video Input/Output Formats

The 9902-DC-4K provides the following inputs and outputs:

- **Inputs:**
 - **SDI IN A** thru **SDI IN D** – four 3G/HD-SDI video inputs (usable as quadrant-division or 2SI inputs)
- **Outputs:**
 - **3G/HD-SDI OUT** – 2x DA 3G/HD-SDI combined-image video outputs
 - **HDMI/DVI OUT** – Combined-image HDMI/DVI out with selectable audio embedding (suitable for direct connection to monitor panels)

Note: Although the inputs will receive SMPTE 424M, 292M, or 259M inputs, quadrant-combined 4K content is realized only using 3G (SMPTE 424M) inputs for all inputs.

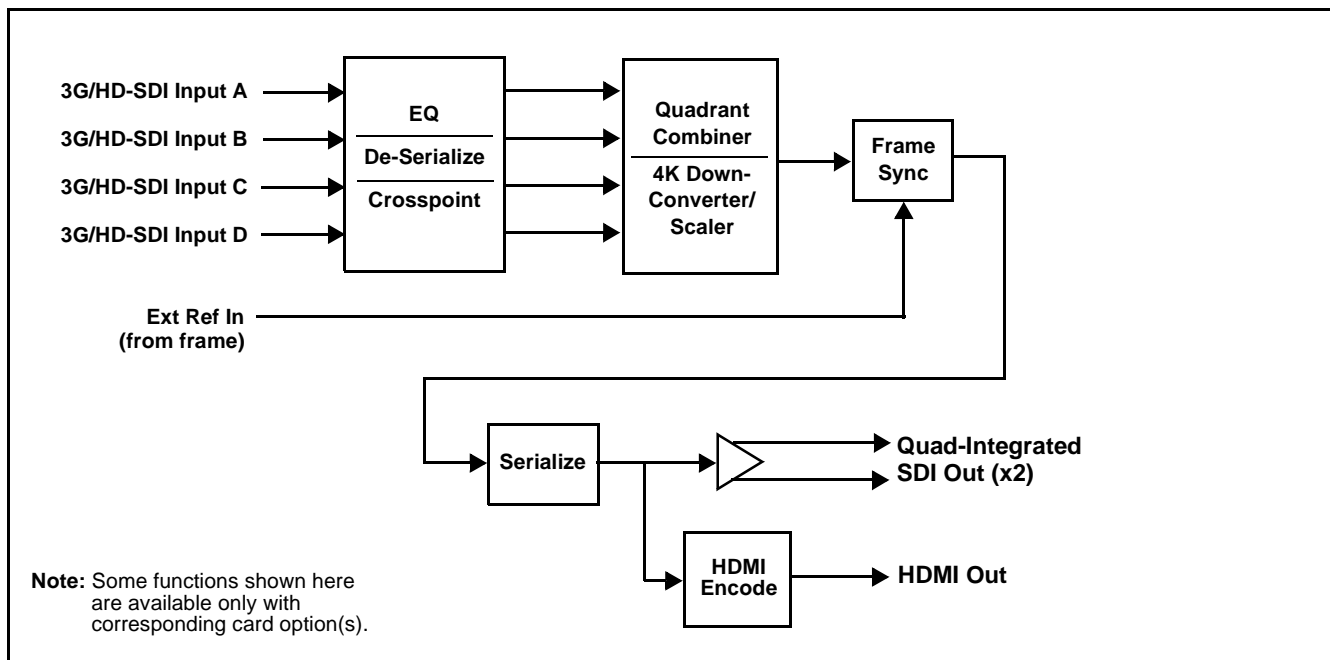


Figure 1-1 9902-DC-4K Functional Block Diagram

Video Processing Description

The 9902-DC-4K precisely combines four quadrant-divided or 2SI individual SDI feeds into a combined SDI image directly suitable for broadcast production usage or monitoring purposes. The combined SDI output can be scaled to 3G/HD-SDI. An HDMI output is also furnished which is directly usable by a monitor. The 9902-DC-4K features input select, timing alignment, and quadrant combining/scaling functions as described below.

Input Video Select Function

The input select function flexibly allows the up to four quadrant SDI inputs to be assigned to each of the four image quadrants comprising the overall combined-output raster. This function also allows setting the card for 4K quadrant-division or 2SI input modes. Using this function, the up to four inputs can be rearranged if necessary and as desired to correlate the quadrant inputs to the combined-image output.

Output Format (Scaler/Combiner) Function

This function provides conversion of each quadrant input to match a common user-selected format, resulting in images that are format-matched and suitable for combining into a single combined image. The combined output can be converted to 1080p or 1080i SDI formats, with user selection of 50, 59.94, or 60 Hz frame rates.

Quad Timing Alignment Function **Option**

Option **+FS** provides for frame alignment control of the up to four quadrant inputs using either one of two external **FRAME REF IN (1,2)** reference signals distributed with the card frame, **Input A** as a frame reference, or internal (free-run) as a reference source. As such, the card can accommodate asynchronous program video inputs.

This function also allows frame offset delay to be added between the output video and the frame sync reference.

Selectable failover allows alternate reference selection should the initial reference source become unavailable or invalid.

Timecode Processor

Note: The timecode function is tied to and considers timecode sources only received on **SDI IN A**.

(See Figure 1-2.) This function provides for extraction of timecode data from input video source, and in turn allow individual timecode strings to be embedded and/or burned into the output video. The function can monitor any of the video inputs of the card for supported timecode formats such as ATC_LTC or ATC_VITC for 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 LTC timecode formats and the VBI formats described above.

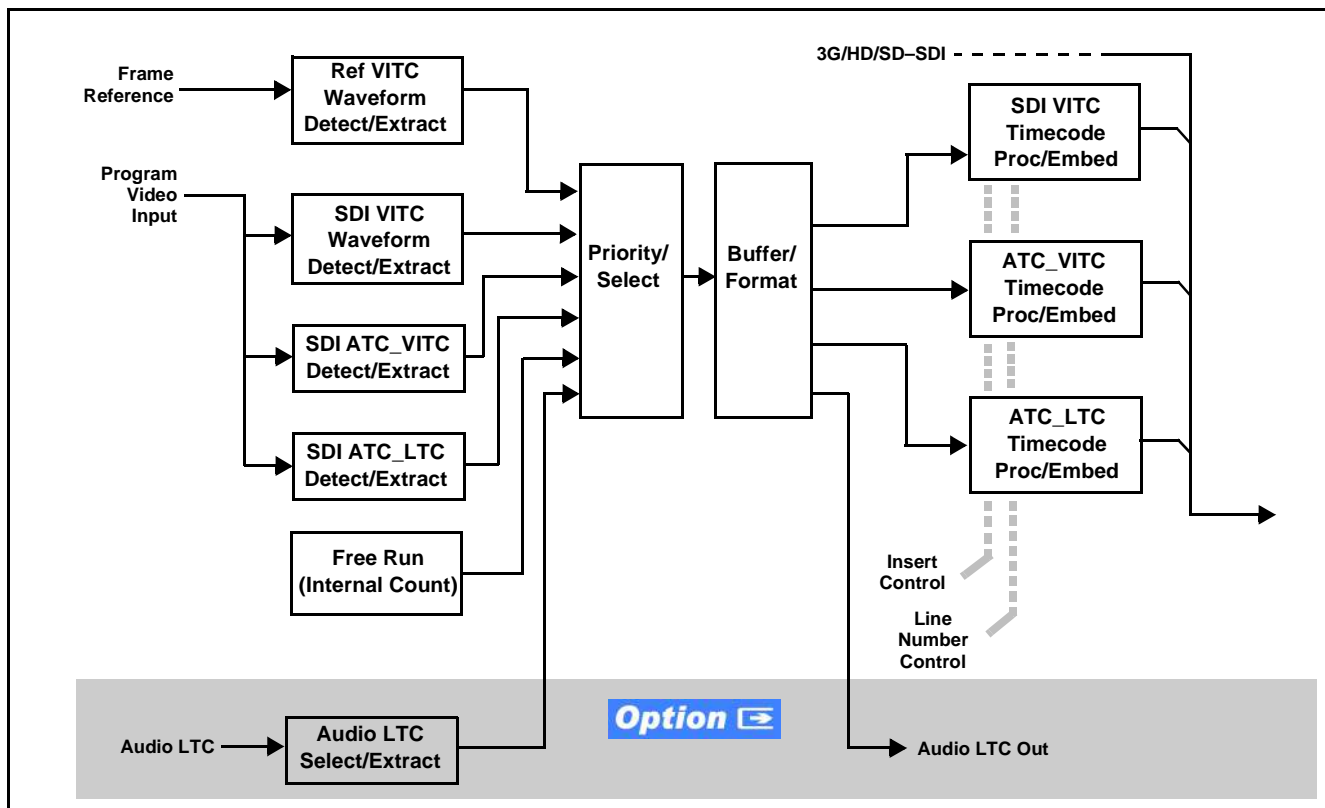


Figure 1-2 Timecode Processor

Closed Captioning Processor

Note: The closed captioning function is tied to and considers CC sources only received on **SDI IN A**.

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. The function allows closed captioning packet removal. Regenerate Closed Captioning function can be used to move the packets to a different VBI output line, if desired.

Character 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.

Audio Processor Description

Audio Select/Embed

The audio processor operates as an internal audio router for selecting quadrant-input embedded channels 1-16 as channels (as a four-group package) to be embedded into the combined SDI and HDMI video outputs. The audio processor function operates with the timing alignment function to align audio with the selected reference.

- Note:**
- Output audio always corresponds to a single particular selectable quadrant input. Various output embedded channels cannot be sourced from a mix of various quadrant input embedded channels.
 - To maintain conformance with CEA-861D HDMI audio channel line-up specifications and industry standard SDI convention, the HDMI output swaps between the C and LFE channels for the HDMI output.

User Control Interface

Figure 1-3 shows the user control interface for the 9902-DC-4K. Using DashBoard™, the 9902-DC-4K and other cards installed in openGear®¹ frames can be controlled from a computer and monitor.

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

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

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, “Setup Instructions”.

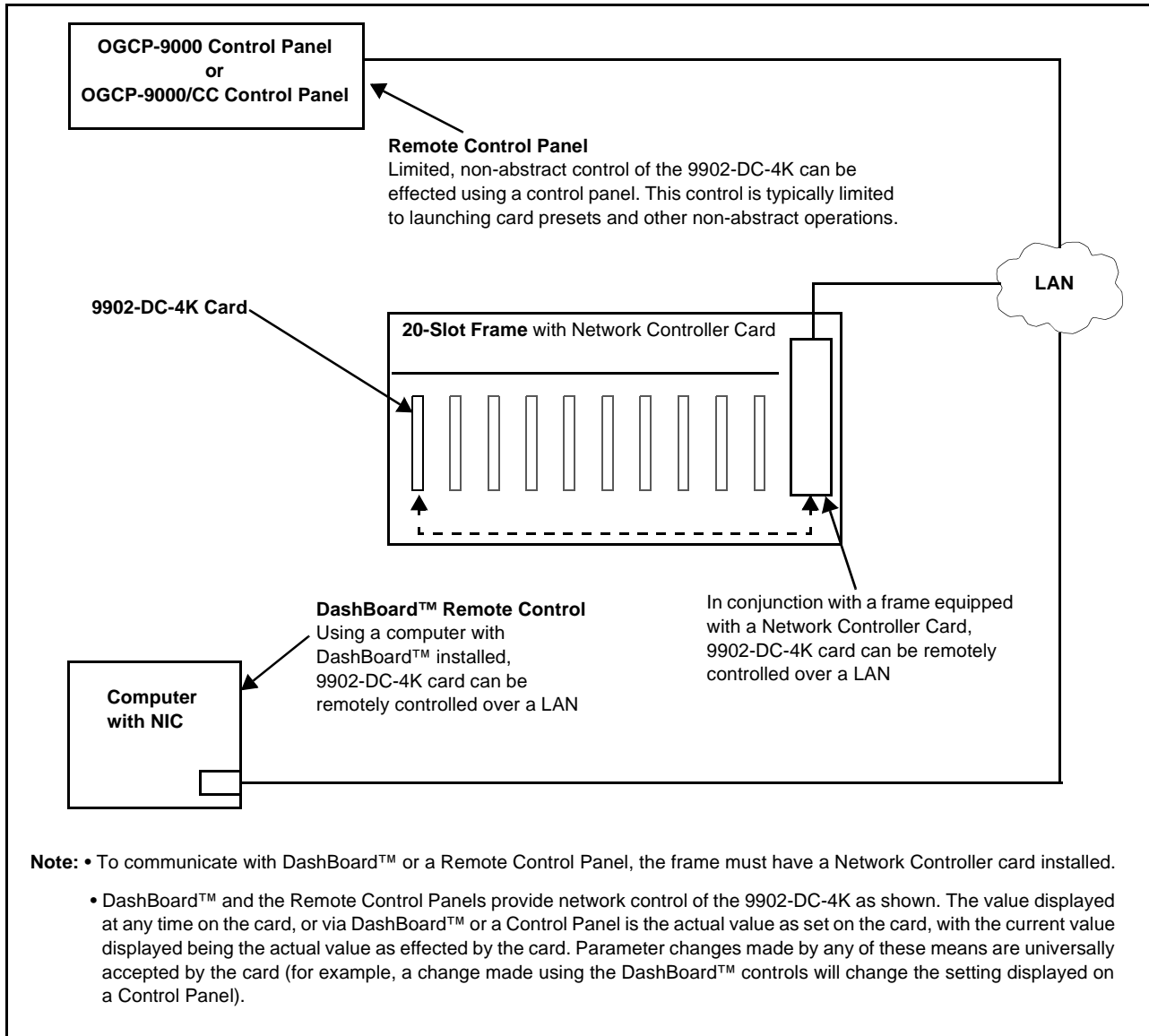


Figure 1-3 9902-DC-4K User Control Interface

Note: 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. 1-14).

9902-DC-4K Rear I/O Modules

The 9902-DC-4K 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-DC-4K 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-DC-4K card edge connections to BNC and other connectors that interface with other components and systems in the signal chain.

The full assortment of 9902-DC-4K Rear I/O Modules is shown and described in 9902-DC-4K 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-DC-4K Up/Down/Cross Format Converter, Video/Audio In with Frame Sync card.

Table 1-1 Technical Specifications

Item	Characteristic
Part number, nomenclature	9902-DC-4K Quad-Input 3G/HD UHD Broadcast Downconverter with Optional Frame Sync
Installation/usage environment	Intended for installation and usage in frame meeting openGear™ modular system definition
Power consumption	< 18 Watts maximum
Installation Density	Up to 20 cards per 20-slot frame
Environmental: Operating temperature: Relative humidity (operating or storage):	32° – 104° F (0° – 40° C) < 95%, non-condensing
Frame communication	10/100/1000 Mbps Ethernet with Auto-MDIX
Indicators	Card edge display and indicators as follows: <ul style="list-style-type: none"> • 4-character alphanumeric display • Status/Error LED indicator • Input Format LED indicator
Program (Quadrant) Video Inputs	Four 3G/HD-SDI video inputs Data Rates Supported: SMPTE 424M, 292M Impedance: 75 Ω terminating Receive Cable Length: 3G/HD-SDI: 120/180 m (Belden 1694A) Return Loss (SDI): > 15 dB up to 1.485 GHz > 10 dB up to 2.970 GHz

Table 1-1 Technical Specifications — continued

Item	Characteristic
Serial Digital Combined Video Output	Number of Outputs: Two 3G/HD-SDI BNC Impedance: 75 Ω Return Loss: > 15 dB at 5 MHz – 270 MHz Signal Level: 800 mV \pm 10% DC Offset: 0 V \pm 50 mV Jitter (3G/HD/SD): < 0.3/0.2/0.2 UI Minimum Latency (framesync 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
HDMI Combined Video Output	HDMI CEA-861D
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

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.

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Contact Cobalt Digital Inc.

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

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

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

Installation

Overview

This chapter contains the following information:

- Installing the 9902-DC-4K Into a Frame Slot (p. 2-1)
- Installing a Rear I/O Module (p. 2-3)
- Setting Up 9902-DC-4K Network Remote Control (p. 2-5)

Installing the 9902-DC-4K 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-DC-4K has a moderate power dissipation (<18 W). As such, avoiding placing the card adjacent to other cards with similar dissipation values if possible.

CAUTION



This device contains semiconductor devices which are susceptible to serious damage from Electrostatic Discharge (ESD). ESD damage may not be immediately apparent and can affect the long-term reliability of the device.

Avoid handling circuit boards in high static environments such as carpeted areas, and when wearing synthetic fiber clothing. Always use proper ESD handling precautions and equipment when working on circuit boards and related equipment.

Note: If installing the 9902-DC-4K 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-DC-4K 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-DC-4K 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-DC-4K into a frame slot as follows:

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

- Note:**
- The 9902-DC-4K 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-DC-4K Network Remote Control (p. 2-5).

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

Installing a Rear I/O Module

Note: This procedure is applicable **only if a Rear I/O Module is not currently installed** in the slot where the 9902-DC-4K is to be installed.

If installing the 9902-DC-4K 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-DC-4K 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.

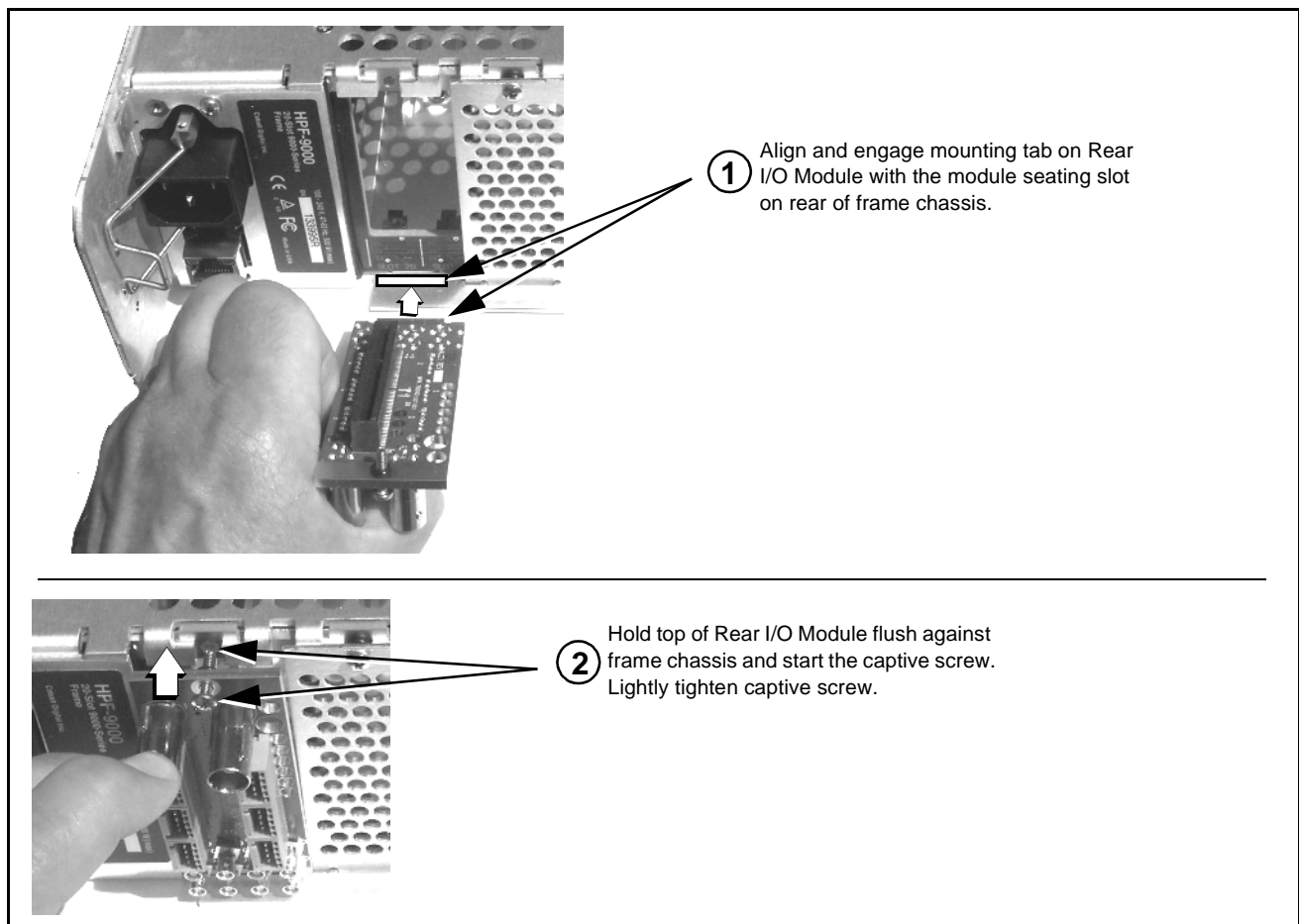
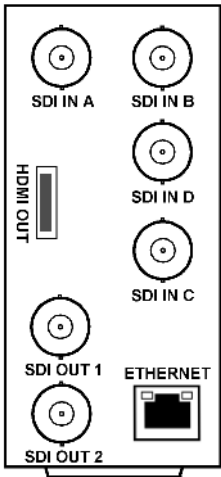
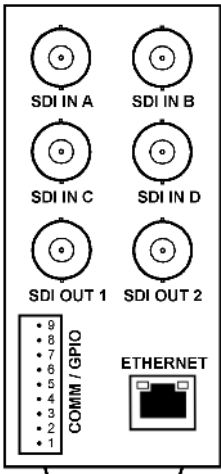


Figure 2-1 Rear I/O Module Installation

9902-DC-4K Rear I/O Modules

Table 2-1 shows and describes the full assortment of Rear I/O Modules specifically for use with the 9902-DC-4K.

Table 2-1 9902-DC-4K Rear I/O Modules

9902-DC-4K Rear I/O Module	Description
<p>RM20-9902DC4K-B</p> 	<p>Provides the following connections:</p> <ul style="list-style-type: none"> • Four SDI In BNCs (VID IN A thru VID IN D) • Two 3G/HD-SDI Combined Video Out BNCs (SDI OUT 1 and SDI OUT 2) • HDMI OUT Quadrant Combined Video/Audio Out connector • ETHERNET 100/1000 BaseT Ethernet card communications connector <p>Note: Rear module Ethernet port provides additional card communication functions separate from frame-based (i.e., DashBoard) remote control. Rear module Ethernet port is not required to be used for normal card DashBoard remote control. Ethernet port control/monitoring functions are described in Chapter 3, Setup Instructions.</p>
<p>RM20-9902DC4K-C</p> 	<p>Provides the following connections:</p> <ul style="list-style-type: none"> • Four SDI In BNCs (VID IN A thru VID IN D) • Two 3G/HD-SDI Combined Video Out BNCs (SDI OUT 1 and SDI OUT 2) • COMM/GPIO port. • ETHERNET 100/1000 BaseT Ethernet card communications connector <p>Note: Rear module Ethernet port provides additional card communication functions separate from frame-based (i.e., DashBoard) remote control. Rear module Ethernet port is not required to be used for normal card DashBoard remote control. Ethernet port control/monitoring functions are described in Chapter 3, Setup Instructions.</p>

Setting Up 9902-DC-4K 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/or OGCP-9000/CC Remote Control Panels are not recommended for use with this product.)

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. 1-14).

- 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.

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Setup Instructions

Overview

If you are already familiar with using DashBoard to control Cobalt cards, please skip to 9902-DC-4K Function Menu List and Descriptions (p. 3-8).

This chapter contains the following information:

- Control and Display Descriptions (p. 3-1)
- Accessing the 9902-DC-4K Card via Remote Control (p. 3-5)
- Checking 9902-DC-4K Card Information (p. 3-7)
- 9902-DC-4K Function Menu List and Descriptions (p. 3-8)
- Troubleshooting (p. 3-29)

Control and Display Descriptions

This section describes the user interface controls, indicators, and displays for using the 9902-DC-4K card.

Access to the 9902-DC-4K 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 Menu Overview below).

Note: When a setting is changed, settings displayed on DashBoard™ 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 Menu Overview

The functions and related parameters available on the 9902-DC-4K card are organized into function **menus**, which consist of parameter groups as shown below.

Figure 3-1 shows how the 9902-DC-4K card and its menus are organized, and also provides an overview of how navigation is performed between cards, function menus, and parameters.

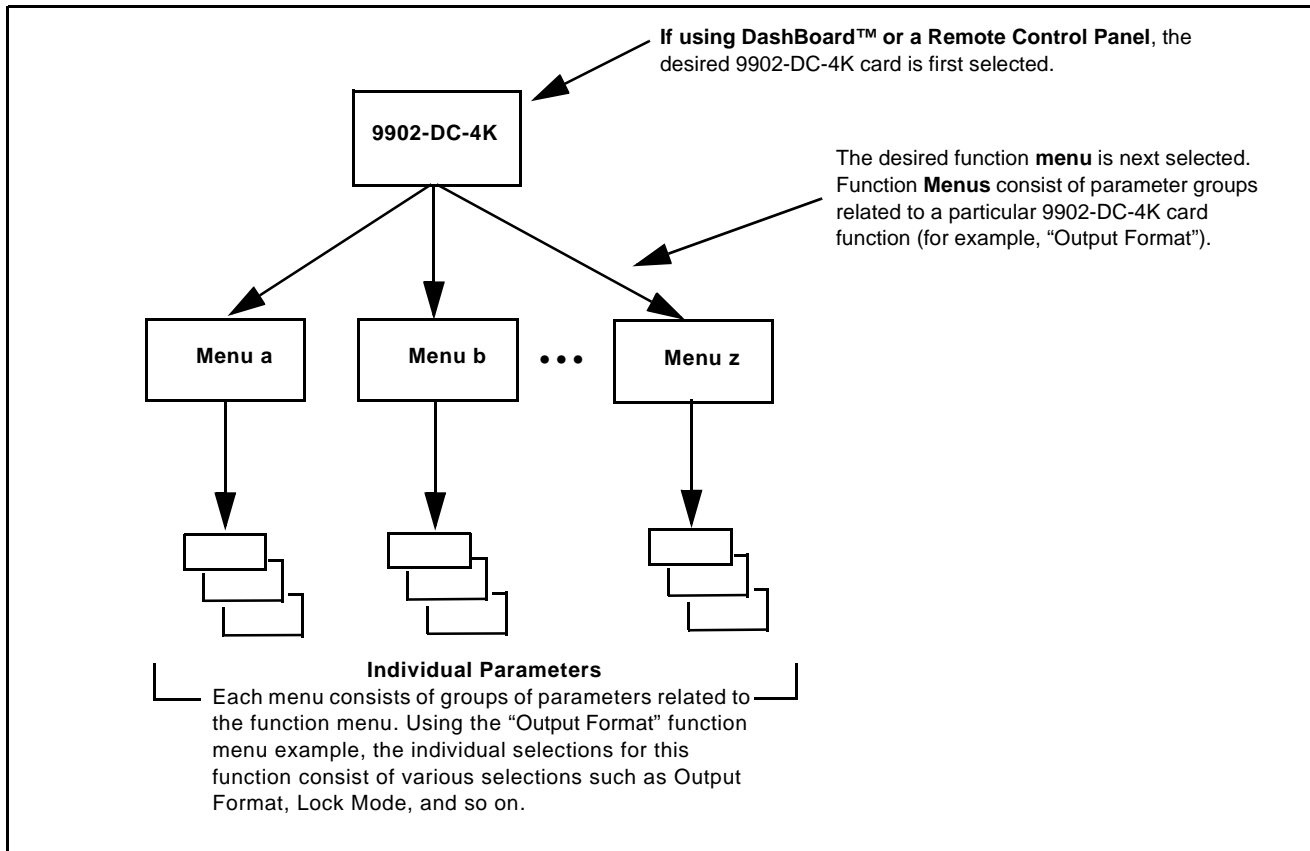


Figure 3-1 Function Menu/Parameter Menu Overview

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.

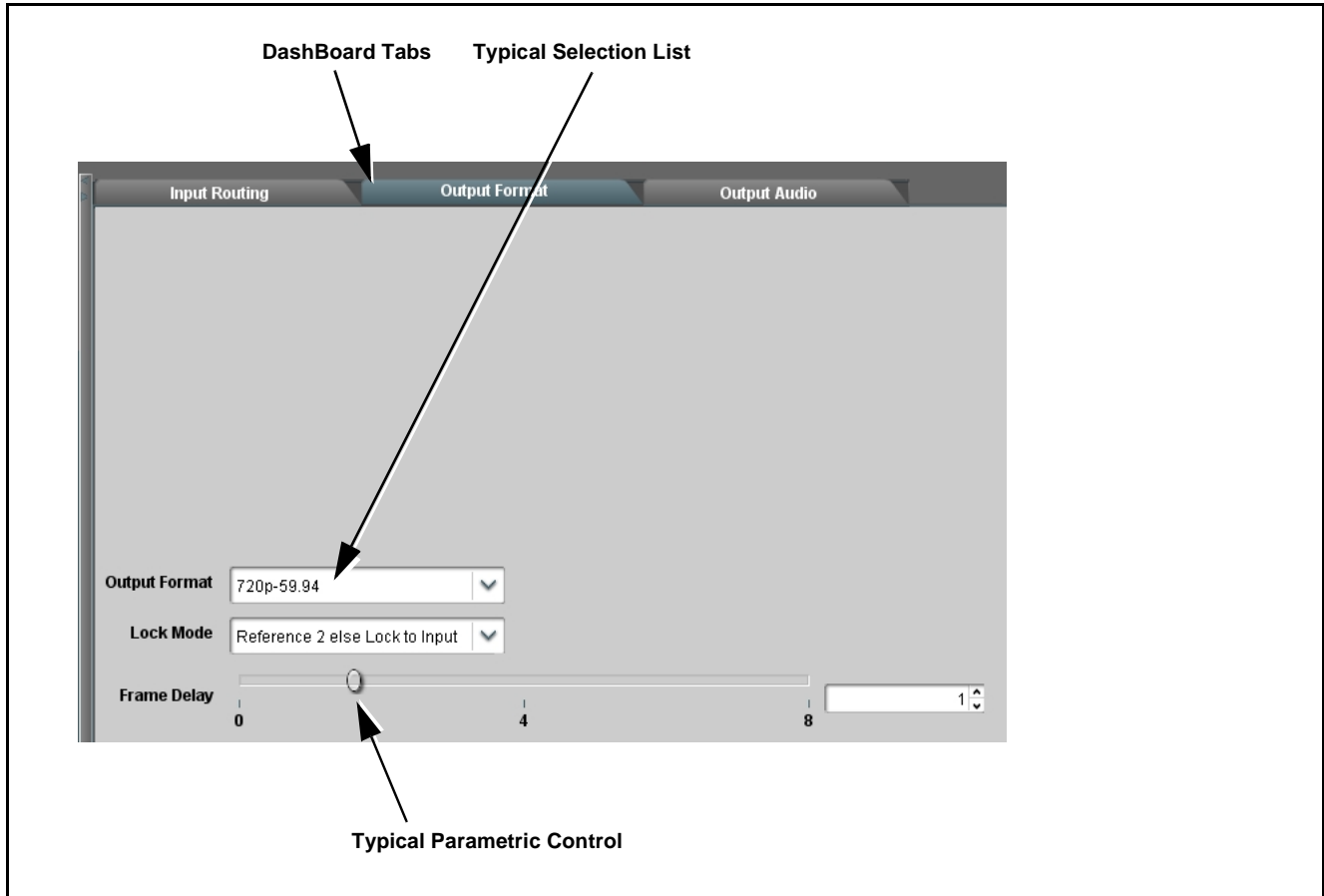


Figure 3-2 Typical DashBoard Tabs and Controls

Web HTML5 User Interface

(See Figure 3-3.) When equipped with a rear I/O module having an Ethernet port, the 9902-DC-4K 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. 3-26) 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.

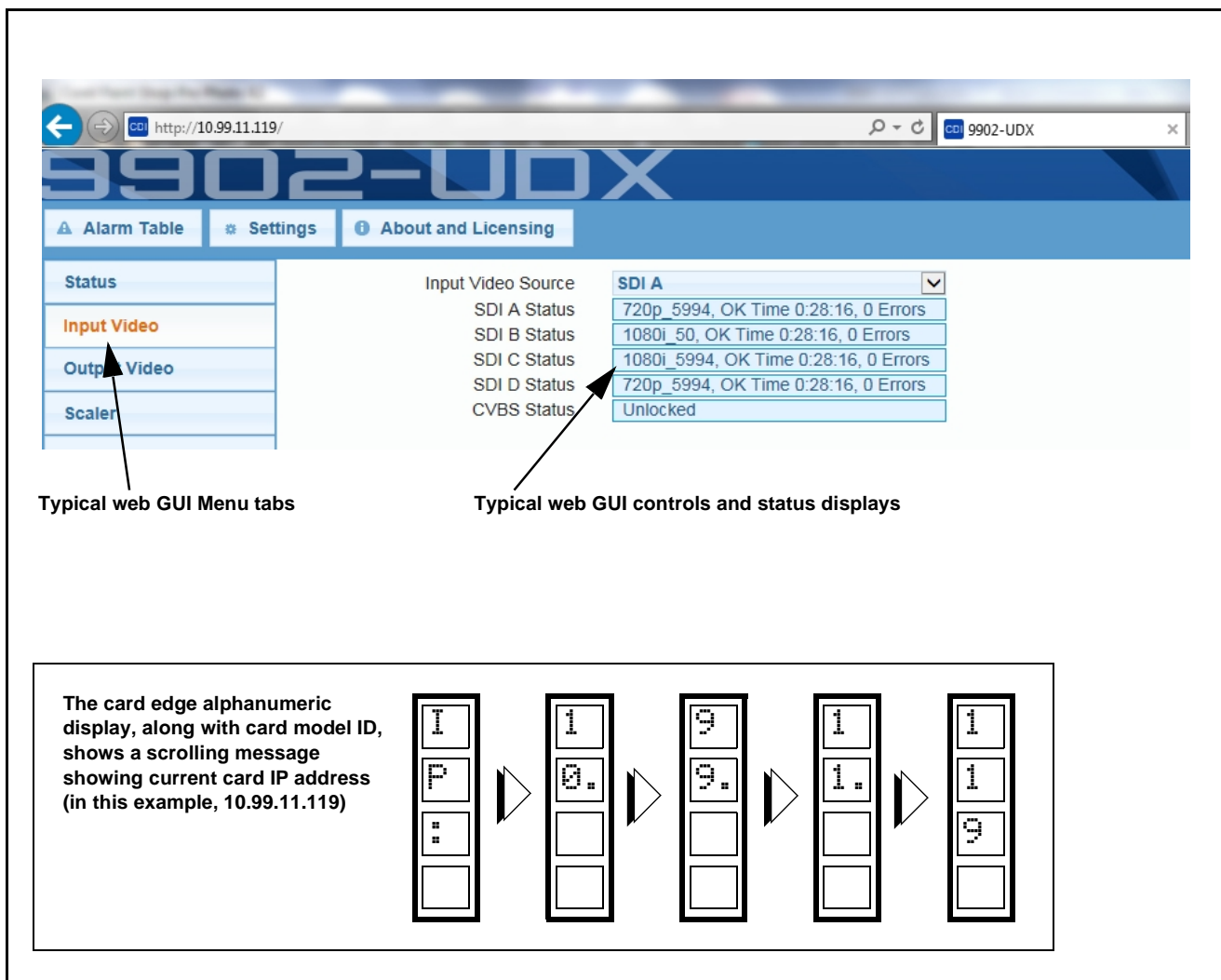


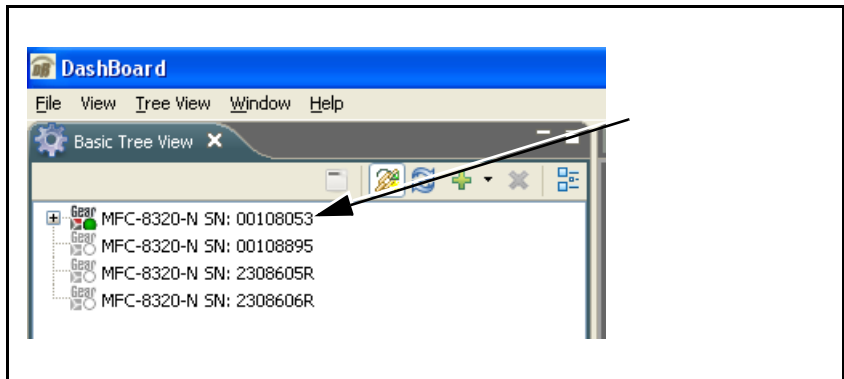
Figure 3-3 Typical Web GUI Tabs and Controls

Accessing the 9902-DC-4K Card via Remote Control

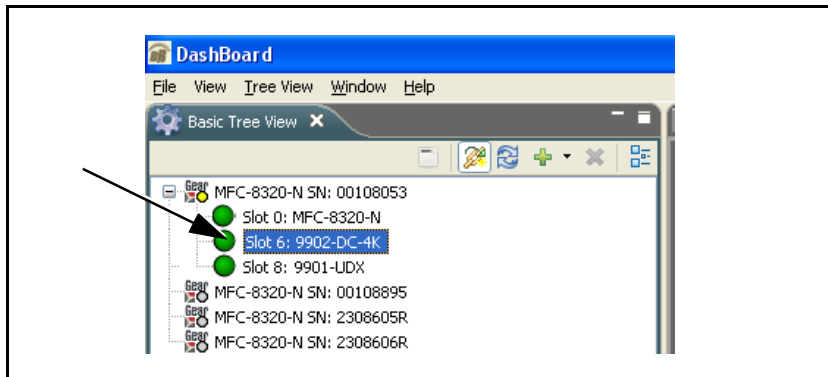
Access the 9902-DC-4K card using DashBoard™ or Cobalt® Remote Control Panel as described below.

Accessing the 9902-DC-4K Card Using DashBoard™

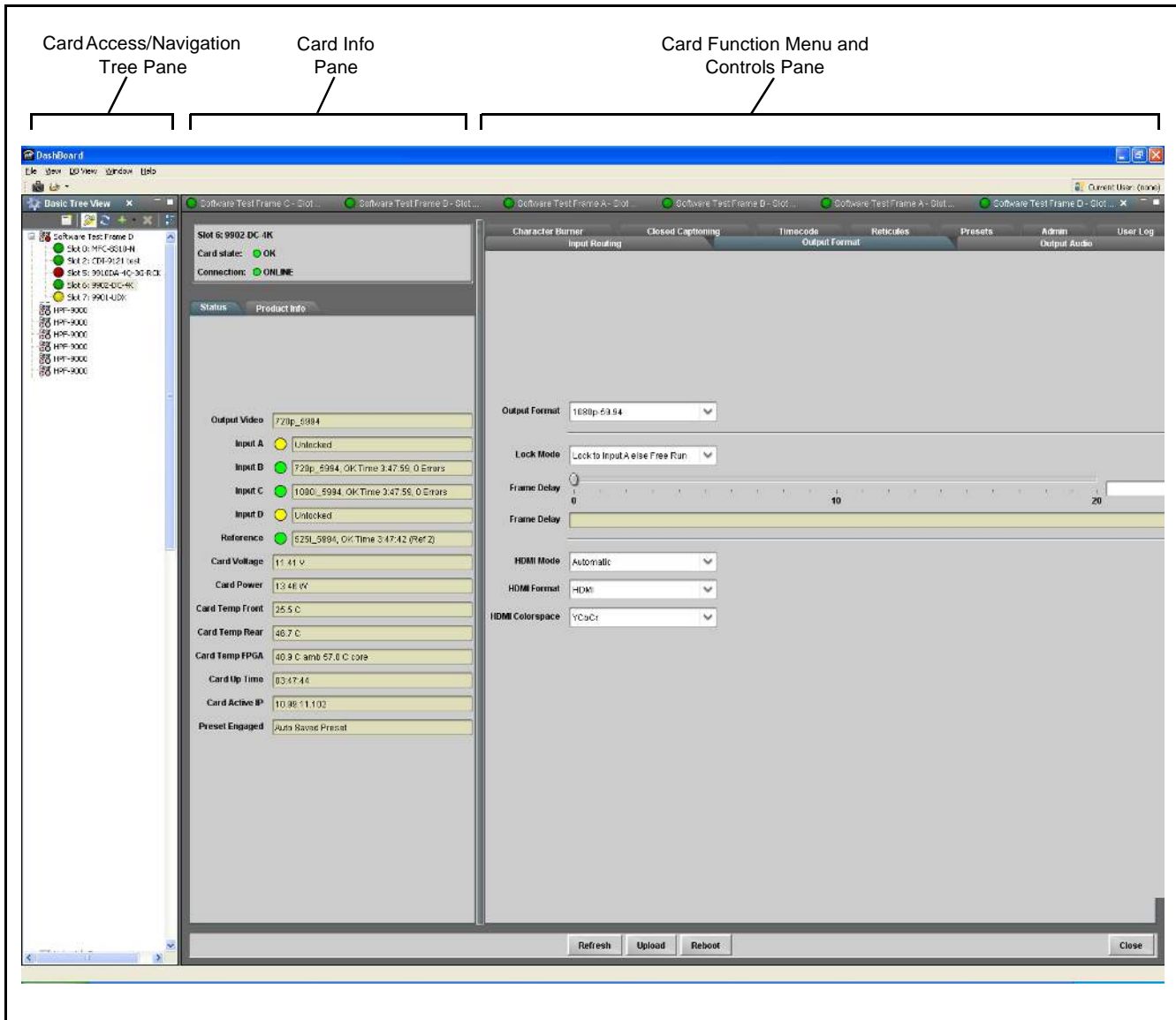
1. On the computer connected to the frame LAN, open DashBoard™.
2. As shown below, in the left side Basic View Tree locate the Network Controller Card associated with the frame containing the 9902-DC-4K card to be accessed (in this example, “MFC-8320-N SN: 00108053”).



3. As shown below, expand the tree to access the cards within the frame. Click on the card to be accessed (in this example, “Slot 6: 9902-DC-4K”).



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™).



Checking 9902-DC-4K Card Information

The operating status and software version the 9902-DC-4K card can be checked using DashBoard™. Figure 3-4 shows and describes the 9902-DC-4K card information screen using DashBoard™.

Note: Proper operating status in DashBoard™ is denoted by green icons for the status indicators shown in Figure 3-4. Yellow or red icons respectively indicate an alert or failure condition. Refer to Troubleshooting (p. 3-29) for corrective action.

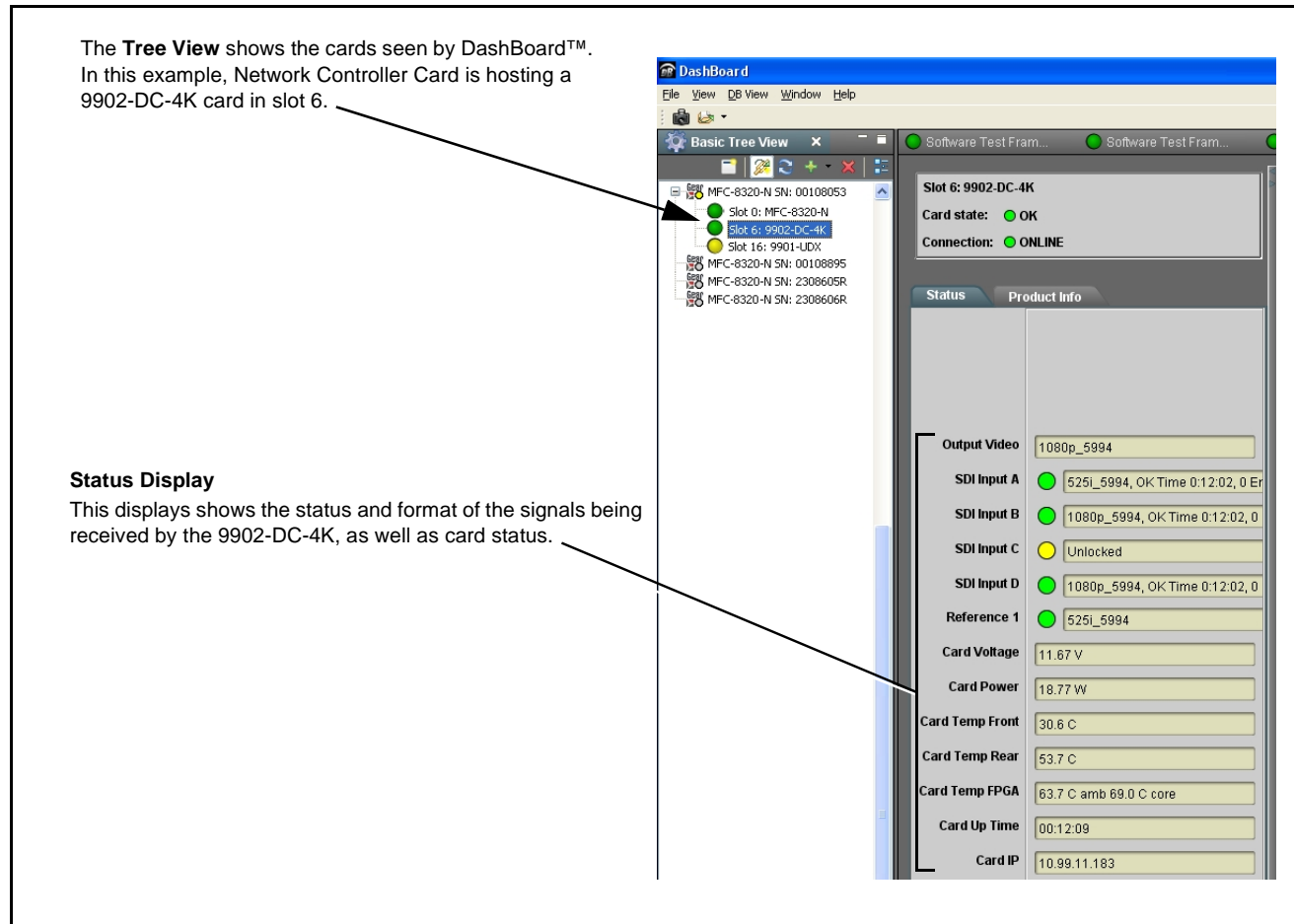



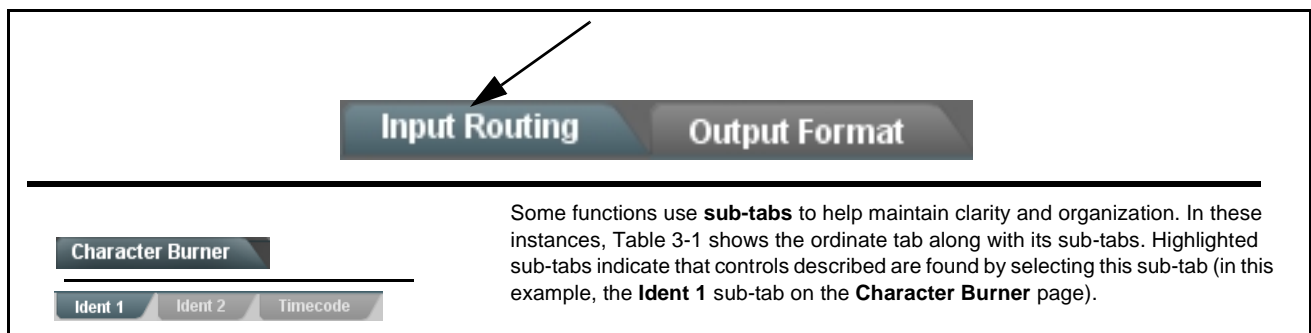
Figure 3-4 9902-DC-4K Card Info/Status Utility

9902-DC-4K Function Menu List and Descriptions

Table 3-1 individually lists and describes each 9902-DC-4K function menu and its related list selections, controls, and parameters. Where helpful, examples showing usage of a function are also provided. Table 3-1 is primarily based upon using DashBoard™ to access each function and its corresponding menus and parameters.

Note: All numeric (scalar) parameters displayed on DashBoard™ can be changed using the slider controls,  arrows, or by numeric keypad entry in the corresponding numeric field. (When using numeric keypad entry, add a return after the entry to commit the entry.)

On DashBoard™ itself and in Table 3-1, the function menu items are organized using tabs as shown below.



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

Function Menu Item	Page	Function Menu Item	Page
Input Routing Controls	3-9	Timecode	3-18
Output Format Controls	3-9	Reticules	3-22
Output Audio Routing/Controls	3-11	Presets	3-25
Character Burner	3-12	Admin	3-26
Closed Captioning	3-17	User Log	3-29

Table 3-1 9902-DC-4K Function Menu List


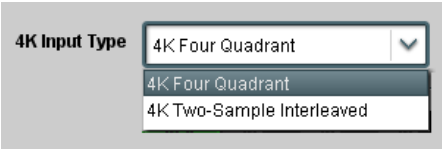
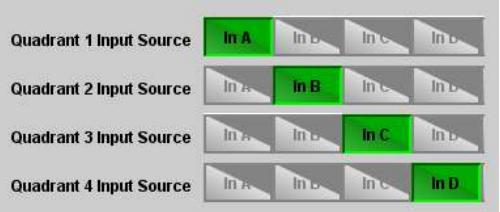
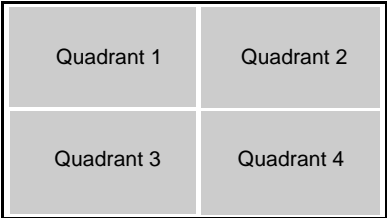

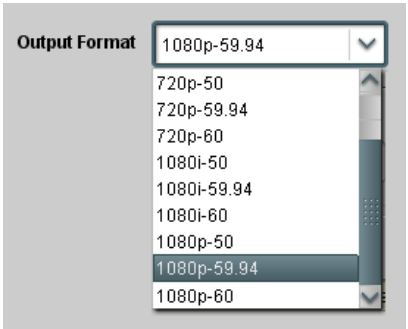
	<p>Provides controls to select input routing of card SDI inputs to the four quadrants comprising the combined image raster.</p>
<p>• 4K Input Type Select</p> 	<p>Sets the four-quadrant inputs to accept either 4K Four Quadrant or 4K Two-Sample Interleaved.</p>
<p>• Quadrant Input Source Select</p> 	<p>Routes the card SDI inputs (VID IN A thru VID IN D as In A thru In D, respectively) to the four card quadrant inputs. (In this example, VID IN A thru VID IN D are respectively routed as Quadrant 1 thru Quadrant 4 input sources.)</p> <p>Default correlation of In A thru In D and quadrant identification is as shown to the left and below:</p> 
	<p>Provides controls to set combined output format/conditioning and card global ref lock mode.</p>
<p>• Output Format Select</p> 	<p>Provides output conversions to formats as shown.</p> <p>Note: Although drop-down and card will allow output video raster/rate choices unrelated to the input rates (for example, PAL 50Hz rate for NTSC 59.94Hz input rates), cross-rate conversion choices should not be used for critical applications (frames will be dropped when performing such conversions).</p>

Table 3-1 9902-DC-4K Function Menu List — continued

Output Format	(continued)																
<div>•Video Lock Mode Select</div> <div>Option ➡</div> <div><div>Lock Mode</div><div>Reference 1 else Lock to Input</div><div>Reference 1 else Lock to Input</div><div>Reference 2 else Lock to Input</div><div>Lock to Input A else Free Run</div><div>Free Run</div></div>	<div>(Option +FS) Selects lock to reference functions from the choices shown and described below.</div> <div><div>• Lock to Reference: Quadrant inputs and output video is locked to selected external reference (Ref 1 or Ref 2) received on the frame reference bus, else input.</div><div>• Lock to Input A: Uses Input A program video input video signal as the reference standard, else free-run.</div><div>• Free Run: Quadrant inputs and output video is locked to the card's internal clock. Output video is not locked to external reference.</div></div> <div>Note: Lock to reference provides the most stable operation, and is preferred where available. In this case, source video should also be locked to the same reference.</div>																
<div>• Frame Delay Control</div> <div><div>Frame Delay</div><div>0</div></div>	<div>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.</div>																
<div>HDMI controls described below provide settings to force an HDMI or DVI output suitable for direct connection to monitors using a DVI input in case the connection is not detected by the monitor. Also provides color mode controls to match HDMI/DVI output to the color space of the monitor.</div>																	
<div>• Mode Control</div> <div><div>HDMI Mode</div><div>Automatic</div><div>Automatic</div><div>Manual Control</div></div>	<div>Sets HDMI/DVI output to use the connected monitor to inform 9902-DC-4K to automatically detect the monitor format, or to use manual (forced) control.</div> <div>Where the monitor may not be able to provide this handshake signal, it is recommended to use Manual mode and force the desired mode as described below.</div>																
<div>• Format Manual (Forced) Mode Controls</div> <div><div>HDMI Mode</div><div>Manual Control</div><div>HDMI Format</div><div>HDMI</div><div>HDMI</div><div>DVI</div><div>HDMI Colorspace</div><div>YCbCr</div><div>YCbCr</div><div>RGB</div></div>	<div>When Mode control is set to Manual, allows setting HDMI output as forced HDMI or DVI mode.</div> <div>Also when in manual mode, allows setting HDMI output colorspace as either forced YCbCr or RGB.</div>																
<div>Note: The HDMI output on this card conforms with CEA-861D HDMI audio channel line-up specifications. As such, a swap between the C and LFE channels for the HDMI output is automatically performed.</div> <div>If connecting to a device that does not meet CEA-861D HDMI, a Ch3 / Ch4 swap using the Output Audio Routing/Controls may be required to effect desired C - LFE line-up.</div> <div><table><tr><th>SDI SMPTE Convention</th><th>9902-DC-4K Conversion</th><th>Automatic Re-Line-up to CEA-861 Convention</th></tr><tr><td>L</td><td rowspan="6"></td><td>L</td></tr><tr><td>R</td><td>R</td></tr><tr><td>C</td><td>LFE</td></tr><tr><td>LFE</td><td>C</td></tr><tr><td>Ls</td><td>Ls</td></tr><tr><td>Rs</td><td>Rs</td></tr></table></div>		SDI SMPTE Convention	9902-DC-4K Conversion	Automatic Re-Line-up to CEA-861 Convention	L		L	R	R	C	LFE	LFE	C	Ls	Ls	Rs	Rs
SDI SMPTE Convention	9902-DC-4K Conversion	Automatic Re-Line-up to CEA-861 Convention															
L		L															
R		R															
C		LFE															
LFE		C															
Ls		Ls															
Rs		Rs															

Table 3-1 9902-DC-4K Function Menu List — continued




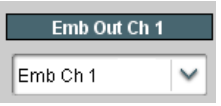
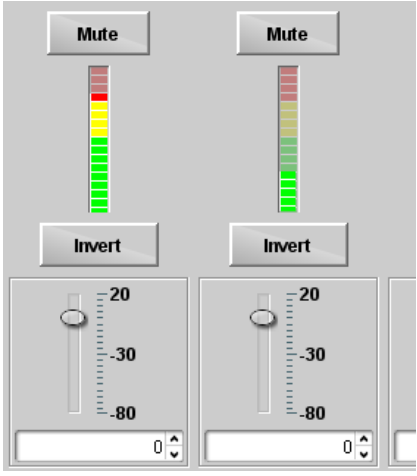
	<p>Provides an audio crosspoint allowing the audio source selection for each embedded audio output channel. Also provides Gain, Phase Invert, and Muting controls and peak level meters for each output channel.</p>
<p>Note:</p> <ul style="list-style-type: none"> • Embedded Ch 2 thru Embedded Ch 16 have controls identical to the Source, Gain, Mute, and Invert controls described here for Embedded Ch 1. Therefore, only the Embedded Ch 1 controls are shown here. • For each channel, its source and destination should be considered and appropriately set. Unused destination channels should be set to the Silence selection. 	
<p>• Embedded Audio Output Input Source</p> 	<p>Selects the four-group embedded audio to be embedded in the output embedded SDI audio (and HDMI Ch1 - Ch8 embedded audio). (In this example, In A quadrant input audio is selected as the output four-group audio.)</p>
<p>• Group Enable/Disable Controls</p> 	<p>Allows enable/disable of embedded audio groups 1 thru 4 on card program video output to accommodate some legacy downstream systems that may not support all four embedded audio groups.</p> <p>Note: Changing the setting of this control will result in a noise burst in all groups. This control should not be manipulated when carrying on-air content.</p>
<p>• Embedded Output Channel Source</p> 	<p>Using the drop-down list, selects the audio input source to be embedded in the corresponding embedded output channel from the following choices:</p> <ul style="list-style-type: none"> • Card Audio Bus (Emb) Ch 1 thru Ch 16 • Built-in Tone generators Tone 1 thru Tone 16 (all are -20 dBFS level; freq (Hz) in ascending order are 100, 200, 300, 400, 500, 600, 700, 800, 900, 1k, 2k, 4k, 6k, 8k, 12k, and 16k)
<p>• Channel Mute/Phase Invert/Gain Controls and Peak Level Display</p> 	<p>Provides Mute and phase Invert channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.)</p> <p>Gain controls allow relative gain (in dB) control for the corresponding destination Embedded Audio Group channel.</p> <p>(-80 to +20 dB range in 1.0 dB steps; unity = 0 dB)</p> <p>Note: Although this card can pass non-PCM data such as Dolby® E or AC-3, setting the gain control to any setting other than default 0 will corrupt Dolby data.</p>

Table 3-1 9902-DC-4K Function Menu List — continued

<div data-bbox="228 247 581 302" data-label="Section-Header"> <h2>Character Burner</h2> </div> <div data-bbox="228 323 634 359" data-label="Text"> <p>Ident 1 Ident 2 Timecode</p> </div>	<p>Provides user-configurable burn-in of up to two text strings and timecode on output video.</p>
<p>Note: Ident 1 and Ident 2 sub-tabs provide identical, independent controls for inserting two independent text (identification) burn-in overlays on the output video. Ident 2 has controls identical to the controls described here for Ident 1. Therefore, only the Ident 1 controls are shown here.</p>	
<p>• Ident Insertion Controls</p> <div data-bbox="248 543 612 705" data-label="Form"> <p>Overlay Always enabled ▼</p> <p>Always disabled</p> <p>Always enabled</p> <p>Enabled on loss of video</p> </div>	<p>Selects the rules for identification text burn-in overlay insertion into output video.</p>
<p>• Display Type (Format) Select</p> <div data-bbox="248 789 617 915" data-label="Form"> <p>Display Format User Text ▼</p> <p>User Text</p> <p>Video Type</p> </div>	<p>Selects the type of data to be displayed as burn-in text from choices shown.</p> <ul style="list-style-type: none"> • User text allows user text to be entered using field described below. • Video type inserts an overlay showing the video format of the input being used for processing.
<p>• Display (Ident) Text Entry Field</p> <div data-bbox="217 1001 683 1205" data-label="Form"> <p>Display Text IDENT1</p> <p>Update</p> </div>	<p>Dialog entry box that allows entry of desired ident text string. Enter desired text as click Update when done to input the text string.</p> <p>Note:</p> <ul style="list-style-type: none"> • All normal keyboard alphanumeric characters are supported, in addition to ASCII characters (Windows ALT+nnnn). • Up to 126 characters can be entered.
<p>• Ident Text Attributes Controls</p> <div data-bbox="241 1295 617 1551" data-label="Form"> <p>Character Size 106 ▼</p> <p>Text Justification Left ▼</p> <p>Character Color White ▼</p> <p>Character Opacity 0</p> </div>	<p>Sets burn-in size/position attributes as follows:</p> <ul style="list-style-type: none"> • Character Size sets character size (in pixels). • Text Justification selects from left, right, or center-aligned justification within the text box overlay. • Character Color selects text color. • Character Opacity sets text opacity from 0% (least opacity) to 100% (full opacity).
<p>• Ident Text Background Attributes Controls</p> <div data-bbox="248 1640 641 1787" data-label="Form"> <p>Background Color Black ▼</p> <p>Background Opacity 0</p> </div>	<p>Provides independent controls for setting the color and opacity of the burn-in text and its background.</p> <ul style="list-style-type: none"> • Color drop-down sets background color from multiple choices. • Opacity control sets background opacity from 0% (least opacity) to 100% (full opacity).

Table 3-1 9902-DC-4K Function Menu List — continued

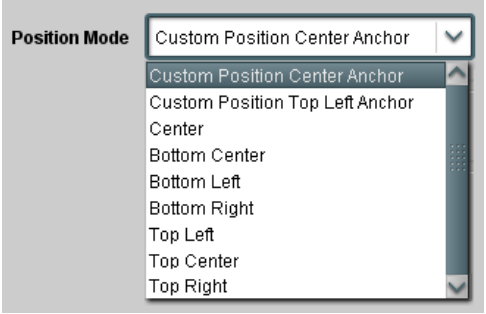
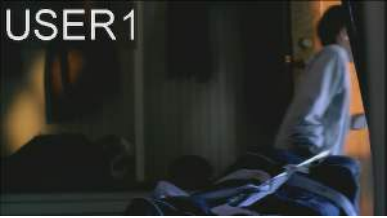

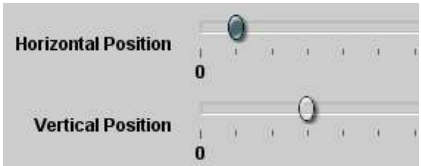
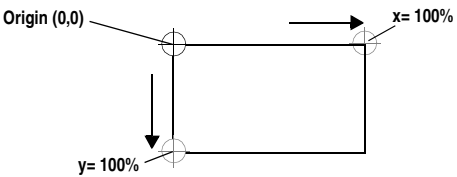
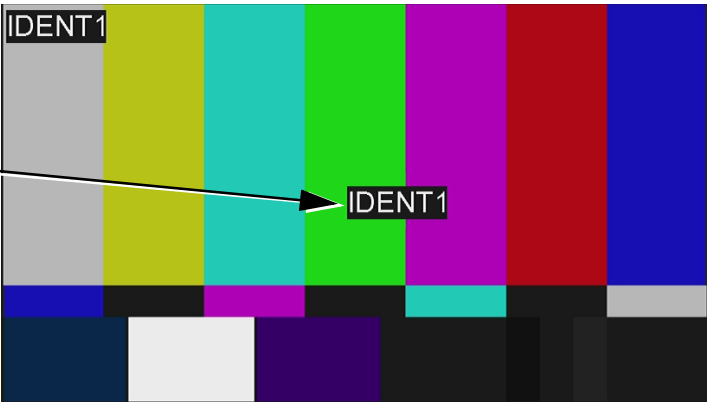
<div>Character Burner</div> <div>Ident 1 Ident 2 Timecode</div>	(continued)
<p>• Ident Position Select</p> 	<p>Sets the location of the ident text insertion from choices shown or custom. (When Custom is selected, position is configured using the Ident Text Positioning Controls described below.)</p> <p>Example: Ident 1 text using Top Left position</p>  <p>Example: Ident 1 text using Center position</p>  <p>Note: For SD usage, burn-ins can impinge on and corrupt line 21 closed-captioning waveform if positioned too close to the upper right of the raster.</p>
<p>• Ident Text Positioning Controls</p> 	<p>With Custom selected, sets burn-in position attributes as follows:</p> <ul style="list-style-type: none"> • Horizontal Position sets horizontal position (in percentage of offset from left of image area). (Range is 0 thru 100%) • Vertical Position sets vertical position (in percentage of offset from top of image area, top justified). (Range is 0 thru 100%) <p>Note:</p> <ul style="list-style-type: none"> • Horizontal and Vertical Position controls are functional only when Custom Position is selected. • Character sizing and positioning for a given raster format may not be appropriate for another format (especially if transitioning from HD to SD). Set size and position for a balanced appearance (e.g., do not place text too close to margins or set larger than necessary) that accommodates both HD and SD raster formats if multiple format use is required.
<p>Positioning with H and V controls at zero (origin) (Size = 3)</p> <p>Positioning with H and V controls both at 50 (Size = 3)</p> 	

Table 3-1 9902-DC-4K Function Menu List — continued

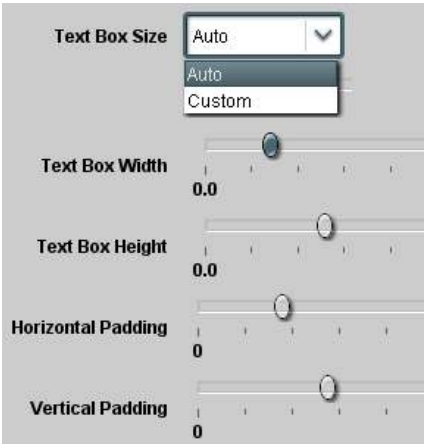
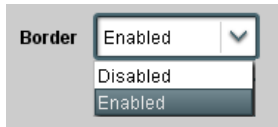
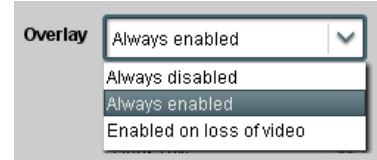
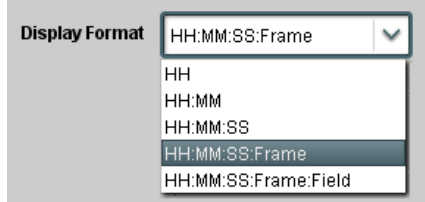
<div> <div>Character Burner</div> <div> <div>Ident 1</div> <div>Ident 2</div> <div>Timecode</div> </div> </div>	(continued)
<p>• Text Box Sizing Controls</p> 	<p>Provides controls for setting the size of the burn-in text background box.</p> <ul style="list-style-type: none"> • Auto allows text box to proportionally size with selected text size. • Custom allows override of proportional sizing and allows text V and H dimensions to be set as desired. • Text Box Width and Height allow manual sizing when set to Custom. • Custom allows override of proportional sizing and allows text V and H dimensions to be set as desired. • Horizontal and Vertical Padding allow fine adjustment of V and H dimensions to be set when Auto is selected.
<p>• Text Box Border Enable</p> 	<p>When set to Enabled, applies a white hairline border to the text box edges.</p>
<div> <div>Character Burner</div> <div> <div>Ident 1</div> <div>Ident 2</div> <div>Timecode</div> </div> </div>	<p>Provides controls for burn-in of timecode on output video.</p>
<p>Note: This status display mirrors the same display in the Timecode tab. Device must be set to output a timecode in order for timecode burn-in to function. See Timecode (p. 3-18) for information on using timecode controls.</p> <p>• Timecode Insertion Control</p> 	<p>Selects the rules for timecode burn-in overlay insertion into output video.</p>
<p>• Timecode Format Display Selector</p> 	<p>Selects the format of timecode string burn-in overlay insertion into output video from choices shown.</p>

Table 3-1 9902-DC-4K Function Menu List — continued

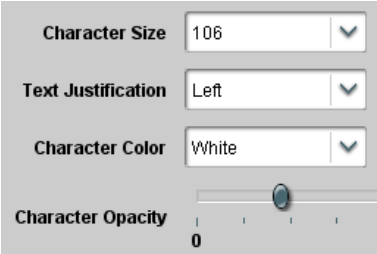
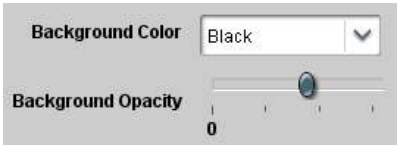
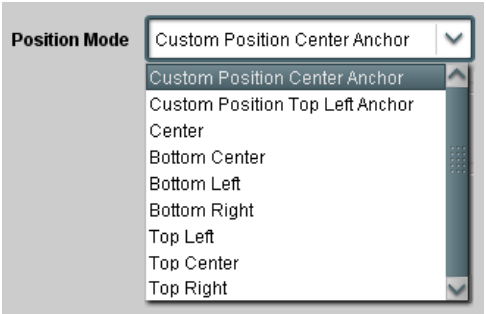


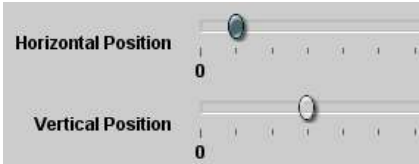
<div>Character Burner</div> <div>Ident 1 Ident 2 Timecode</div>	(continued)
<p>• Timecode Attributes Controls</p> 	<p>Sets burn-in size/position attributes as follows:</p> <ul style="list-style-type: none"> • Character Size sets character size (in pixels). • Text Justification selects from left, right, or center-aligned justification within the text box overlay. • Character Color selects text color. • Character Opacity sets text opacity from 0% (least opacity) to 100% (full opacity).
<p>• Timecode Background Attributes Controls</p> 	<p>Provides independent controls for setting the color and opacity of the burn-in text and its background.</p> <ul style="list-style-type: none"> • Color drop-down sets background color from multiple choices. • Opacity control sets background opacity from 0% (least opacity) to 100% (full opacity).
<p>• Timecode Position Select</p> 	<p>Sets the location of the timecode insertion from choices shown or custom. (When Custom is selected, position is configured using the Timecode Positioning Controls described below.)</p> <div data-bbox="771 1087 976 1171"> <p>Example: Timecode burn-in using Bottom Center position</p> </div>  <div data-bbox="771 1308 985 1392"> <p>Example: Timecode burn-in using Top Left position</p> </div> 
<p>• Timecode Positioning Controls</p> 	<p>With Custom selected, sets burn-in position attributes as follows:</p> <ul style="list-style-type: none"> • Horizontal Position sets horizontal position (in percentage of offset from left of image area). (Range is 0 thru 100%) • Vertical Position sets vertical position (in percentage of offset from top of image area, top justified). (Range is 0 thru 100%) <p>Note: • Horizontal and Vertical Position controls are functional only when Custom Position is selected.</p> <ul style="list-style-type: none"> • Character sizing and positioning for a given raster format may not be appropriate for another format (especially if transitioning from HD to SD). Set size and position for a balanced appearance (e.g., do not place text too close to margins or set larger than necessary) that accommodates both HD and SD raster formats if multiple format use is required.

Table 3-1 9902-DC-4K Function Menu List — continued

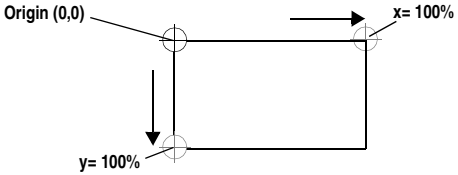
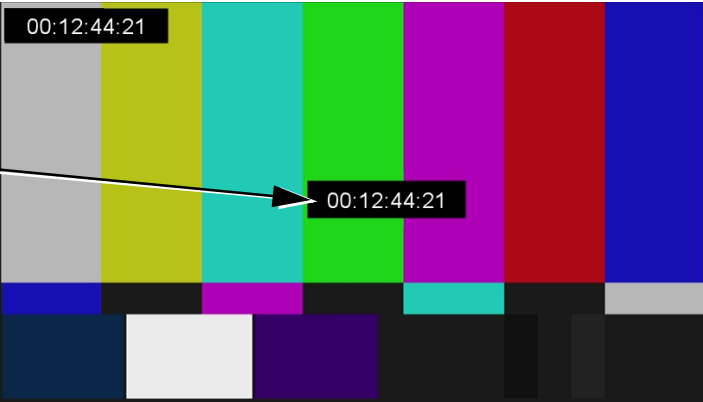
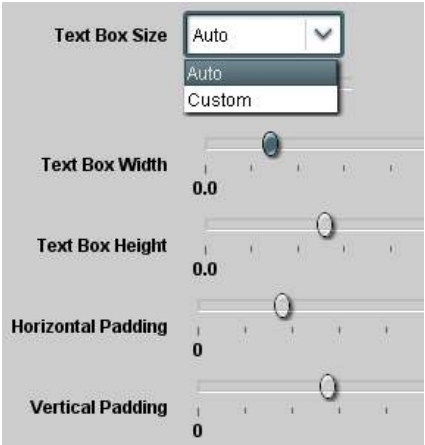
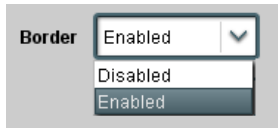
<div>Character Burner</div> <div>Ident 1 Ident 2 Timecode</div>	(continued)
<p>Positioning with H and V controls at zero (origin) (Size = 3)</p> <p>Positioning with H and V controls both at 50 (Size = 3)</p> 	
<p>• Text Box Sizing Controls</p> 	<p>Provides controls for setting the size of the burn-in background box.</p> <ul style="list-style-type: none"> • Auto allows text box to proportionally size with selected text size. • Custom allows override of proportional sizing and allows text V and H dimensions to be set as desired. • Text Box Width and Height allow manual sizing when set to Custom. • Custom allows override of proportional sizing and allows text V and H dimensions to be set as desired. • Horizontal and Vertical Padding allow fine adjustment of V and H dimensions to be set when Auto is selected.
<p>• Text Box Border Enable</p> 	<p>When set to Enabled, applies a white hairline border to the text box edges.</p>

Table 3-1 9902-DC-4K Function Menu List — continued


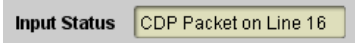
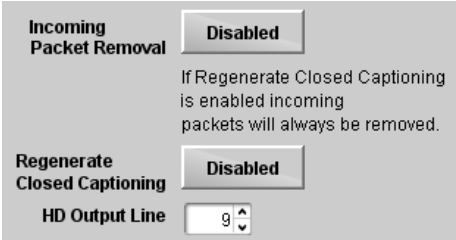
	Provides support for closed captioning setup.								
<p>Note: The closed captioning function is tied to and considers CC sources only received on SDI IN A.</p> <p>• Closed Captioning Input Status</p> 	<p>Displays incoming Closed Captioning status as follows:</p> <ul style="list-style-type: none"> • If closed captioning is present, a message similar to the example shown is displayed. • If no closed captioning is present in the video signal, Not Present or Disabled is displayed. <p>Note: • Packet closed captioning status Captioning Rejected Due To message can appear due to the items described below. The closed captioning function assesses <i>cdp_identifier</i>, <i>cdp_frame_rate</i>, <i>ccdata_present</i>, and <i>caption_service_active</i> items contained in the packet header to make the determinations listed below. Refer to CEA-708-B for more information.</p> <table border="1" data-bbox="781 697 1433 995"> <thead> <tr> <th>Message</th><th>Description</th></tr> </thead> <tbody> <tr> <td>Unsupported Frame Rate</td><td>Film rate closed-captioning (either as pass-through or up/down conversion) is not supported by the card.</td></tr> <tr> <td>Data Not Present</td><td>Packet is marked from closed captioning source external to the card that no data is present.</td></tr> <tr> <td>No Data ID</td><td>Packet from closed captioning source external to the card is not properly identified with 0x9669 as the first word of the header (unidentified packet).</td></tr> </tbody> </table> <ul style="list-style-type: none"> • caption service is marked as inactive display indicates bit in packet from upstream source may inadvertently be set as inactive. In this case, closed captioning data (if present) is still processed and passed by the card as normal. • The closed captioning function does not support PAL closed captioning standards. 	Message	Description	Unsupported Frame Rate	Film rate closed-captioning (either as pass-through or up/down conversion) is not supported by the card.	Data Not Present	Packet is marked from closed captioning source external to the card that no data is present.	No Data ID	Packet from closed captioning source external to the card is not properly identified with 0x9669 as the first word of the header (unidentified packet).
Message	Description								
Unsupported Frame Rate	Film rate closed-captioning (either as pass-through or up/down conversion) is not supported by the card.								
Data Not Present	Packet is marked from closed captioning source external to the card that no data is present.								
No Data ID	Packet from closed captioning source external to the card is not properly identified with 0x9669 as the first word of the header (unidentified packet).								
<p>• Closed Captioning Remove/Regenerate and HD Insertion Line Controls</p> 	<p>Allows removal of closed captioning packets and regeneration of packets. This is useful where closed captioning must be moved to a different line than that received on.</p> <p>Note: • Although the output line drop-down will allow any choice within the 9 thru 41 range, the actual range is automatically clamped (limited to) certain ranges to prevent inadvertent conflict with active picture area depending on video format.</p> <ul style="list-style-type: none"> • The card does not check for conflicts on a given line number. Make certain selected line is available and carrying no other data. 								

Table 3-1 9902-DC-4K Function Menu List — continued



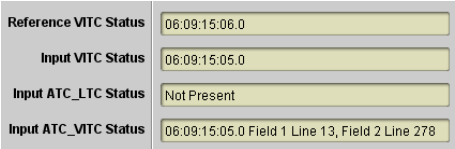
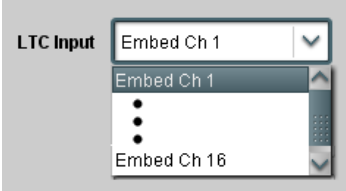


	<p>Provides timecode data extraction from various sources, and provides formatting and re-insertion controls for inserting the timecode into the output video.</p>
<p>Note: The timecode function is tied to and considers VBI timecode sources only received on SDI IN A.</p>	
<p>Option  Audio LTC controls described below only appear on cards with +LTC licensed optional feature. This feature allows audio LTC from an audio channel to be used as a timecode source, with conversion to a selected SMPTE 12M format on the output video.</p>	
<p>• Timecode Source Status Displays</p> 	<p>Displays the current status and contents of the four supported external timecode formats shown to the left.</p> <ul style="list-style-type: none"> • If a format is receiving timecode data, the current content (timecode running count and line number) is displayed. • If a format is not receiving timecode data, Not Present is displayed.
<p>• LTC Input Source Control</p> 	<p>Selects source to be used by card to receive LTC from SDI IN A embedded audio channels.</p> <p>Note: COM 1 and COM 2 choices may appear in this drop-down. These choices are currently not supported by this model.</p>
<p>• Mute LTC Control</p> 	<p>Allows LTC audio output to mute upon loss of selected timecode inputs.</p> <ul style="list-style-type: none"> • When set to Enabled and input timecode is lost audio LTC output mutes. • When set to Disabled and input timecode is lost audio LTC output is not muted, with count value being free-run count. <p>Note: If muting upon loss of a particular input format is desired, set all Source Priority 1 thru 4 to that particular input format. If this is not done, the card failover timecode selection may substitute another format choice for the format not being received.</p>
<p>• Incoming ATC Packet Removal Control</p> 	<p>Enables or disables removal of existing input video ATC timecode packets from the output. This allows removal of undesired existing timecodes from the output, resulting in a “clean slate” where only desired timecodes are then re-inserted into the output. (For example, if both SDI ATC_VITC and ATC_LTC are present on the input video, and only ATC_LTC is desired, using the Removal control will remove both timecodes from the output. The ATC_LTC timecode by itself can then be re-inserted on the output using the other controls discussed here.)</p> <p>Note: Set this control to Enabled if Free-Run timecode is to be used. If incoming packets are not removed, output embedded SMPTE timecode may alternate between free-run and embedded SMPTE timecode values.</p>

Table 3-1 9902-DC-4K Function Menu List — continued

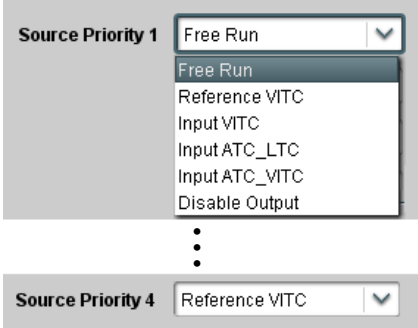
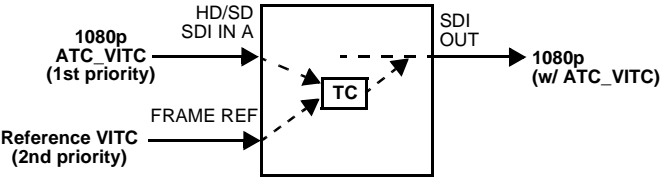
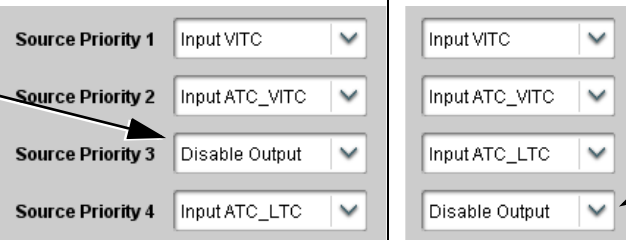
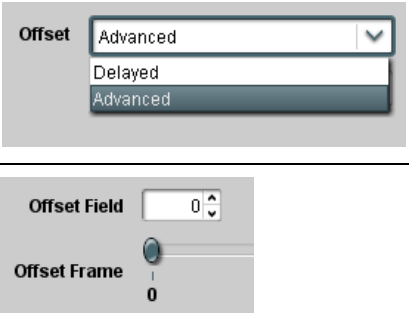
Timecode	(continued)
<p>• Source Priority</p>  <p>Source Priority 1: Free Run</p> <p>Source Priority 4: Reference VITC</p>	<p>Selects the priority assigned to each of the four supported external formats, and internal Free Run in the event the preferred source is unavailable.</p> <p>Source Priority 1 thru Source Priority 4 select the preferred format to be used in descending order (i.e., Source Priority 2 selects the second-most preferred format, and so on. See example below.)</p>  <p>In this example, ATC_VITC 1st priority selection selects ATC_VITC (received on SDI IN A) over reference VITC (received on frame reference) regardless of video input material source to be processed by the card.</p> <p>The selected timecode source is embedded on the SDI video output (in this example, 1080p) using the selected line number. In this example, if the ATC_VITC on SDI IN A input becomes unavailable, the card then uses the reference VITC data received on the frame reference.</p> <p>Note: Set Incoming ATC Packet Removal Control to Enabled if Free-Run timecode is to be used. If incoming packets are not removed, output embedded SMPTE timecode may alternate between free-run and embedded SMPTE timecode values.</p> <p>⚠ Disable Output setting should be used with care. If Disable Output is selected with alternate intended format(s) set as a lower priority, the card will indeed disable all timecode output should the ordinate preferred format(s) become unavailable. Typically, choices other than Disable should be used if a timecode output is always desired, with Disable only being used to remove all timecode data.</p> <div style="display: flex; align-items: center;"> <div style="flex: 1;"> <p>In this example, even though and ATC_LTC could be available to substitute for ATC_VITC not being present, the card will revert to no timecode output since the choice of Disable Output “out-prioritizes” ATC_LTC with these settings.</p> </div> <div style="flex: 2;">  </div> <div style="flex: 1; margin-left: 20px;"> <p>The choices shown here will allow ATC_LTC to “out-prioritize” Disable Output if ATC_VITC is not available.</p> </div> </div>
<p>• Offset Controls</p> 	<p>Allows the current timecode count to be advanced or delayed on the output video.</p> <ul style="list-style-type: none"> • Offset Advance or Delay selects offset advance or delay. • Offset Field delays or advances or delays timecode by one field. • Offset Frame delays or advances or delays timecode by up to 5 frames. <p>Note: Default settings are null, with both controls set at zero as shown.</p>

Table 3-1 9902-DC-4K Function Menu List — continued

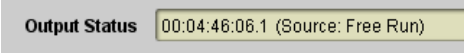
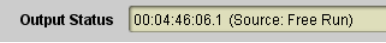
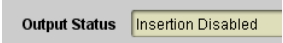

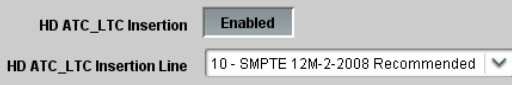
Timecode	(continued)
<ul style="list-style-type: none"> • Output Status Display 	<p>Displays the current content and source being used for the timecode data as follows:</p>  <ul style="list-style-type: none"> • Output status OK (in this example, Free Run timecode is being outputted).  <ul style="list-style-type: none"> • Timecode Insertion button set to Disabled; output insertion disabled. <p>Note:</p> <ul style="list-style-type: none"> • If timecode is not available from Source Priority selections performed, timecode on output reverts to Free Run (internal count) mode. • Because the 1's digit of the display Frames counter goes from 0 to 29, the fractional digit (along with the 1's digit) indicates frame count as follows: <ul style="list-style-type: none"> 0.0 Frame 0 0.1 Frame 1 1.0 Frame 2 1.1 Frame 3 • • • 29.1 Frame 59
<ul style="list-style-type: none"> • Audio LTC Output 	<p>Audio LTC output is routed to desired embedded audio outputs using the Output Audio Routing/Controls. Whatever timecode is displayed on the Output Status is converted to audio LTC and available as an LTC audio output.</p>
<p>Note:</p> <ul style="list-style-type: none"> • Although the output line drop-down on the controls described below will allow a particular range of choices, the actual range is automatically clamped (limited) to certain ranges to prevent inadvertent conflict with active picture area depending on video format. • The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data. 	
<ul style="list-style-type: none"> • HD ATC_LTC Insertion Control 	<p>For HD output, enables or disables ATC_LTC timecode insertion into the output video, and selects the line number for ATC_LTC timecode data.</p>

Table 3-1 9902-DC-4K Function Menu List — continued


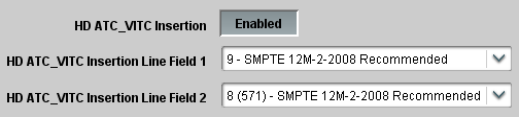

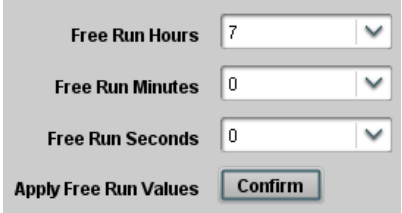
	(continued)
<p>• HD ATC_VITC Insertion Control</p> 	<p>For HD output, enables or disables ATC_VITC timecode insertion into the output video, and selects the line number for ATC_VITC1 and ATC_VITC2.</p>
<p>• ATC_VITC Legacy Support Control</p> 	<p>When enabled, accommodates equipment requiring ATC_VITC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

Table 3-1 9902-DC-4K Function Menu List — continued

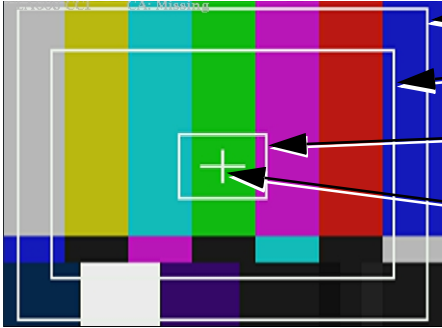
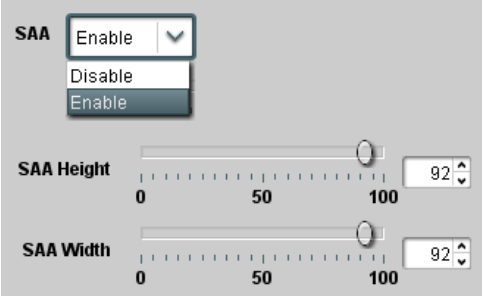
<div>Reticules</div> <div>Basic Advanced</div>	<p>Allows Safe Action and/or Safe Title overlays and other static markers to be added to the output video image.</p>
Typical Reticule/Overlay Marker Insertions	
<p>The 9902-DC-4K allows any combination of the reticule/overlay markers to be applied to the output video. Sizing and other characteristics for each type of marker can be set as described below.</p>	
	<p>Safe Action Area (SAA) Reticule</p> <p>Safe Title Area (STA) Reticule</p> <p>Graticule</p> <p>Center Cross</p>
<p>Note:</p> <ul style="list-style-type: none"> • 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. 	
<p>• Insertion Master Enable/Disable</p>	<p>Provides independent master enable/disable for card SDI outputs.</p> <ul style="list-style-type: none"> • 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.
<p>SDI Out Reticule Enable</p>	<p>• SAA provides enable/disable of safe action area graticule insertion.</p> <p>• SAA Height and SAA Width control height and width of insertion (from 0% to 100% of 4:3 outputted image area).</p> <p>Note: Reticule Size control is locked to Custom for this card, with safe action area size control as described above.</p>
<p>• Safe Action Area (SAA) Controls</p>	

Table 3-1 9902-DC-4K Function Menu List — continued

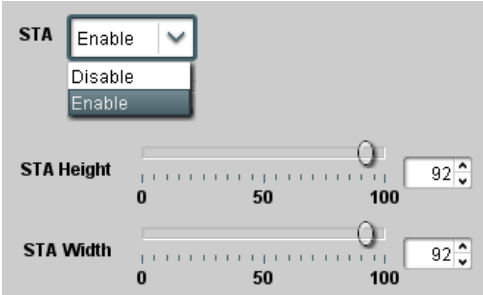


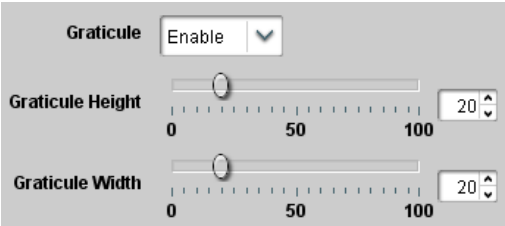
<div data-bbox="224 268 537 321" data-label="Section-Header"> <h2>Reticules</h2> </div> <div data-bbox="233 344 505 380" data-label="Text"> <p>Basic Advanced</p> </div>	(continued)
<p>• Safe Title Area (STA) Controls</p> 	<ul style="list-style-type: none"> • STA provides enable/disable of safe title area graticule insertion. • STA Height and STA Width control height and width of insertion (from 0% to 100% of 4:3 outputted image area).
<p>• Overlay Color Controls</p>  	<ul style="list-style-type: none"> • Overlay Color selects from white or black colors. • Opacity sets the opacity of the overlay for both white/black and inverse color modes.
<div data-bbox="224 1241 537 1293" data-label="Section-Header"> <h2>Reticules</h2> </div> <div data-bbox="233 1316 505 1352" data-label="Text"> <p>Basic Advanced</p> </div>	<p>Provides insertion and sizing controls for custom graticules and other markers. Also provides NTSC legacy 4:3 master reticule sizing.</p>
<p>Note: Color attributes of markers described below are set using the master Overlay Color Controls described above.</p>	
<p>• Graticule Controls</p> 	<ul style="list-style-type: none"> • Graticule provides enable/disable of user graticule insertion. • Graticule Height and Width control height and width of insertion (from 0% to 100% of 4:3 outputted image area).

Table 3-1 9902-DC-4K Function Menu List — continued

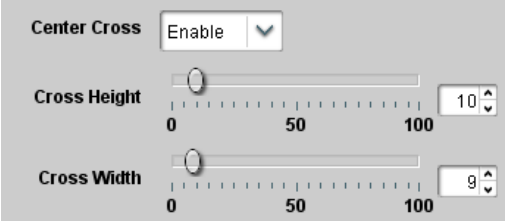
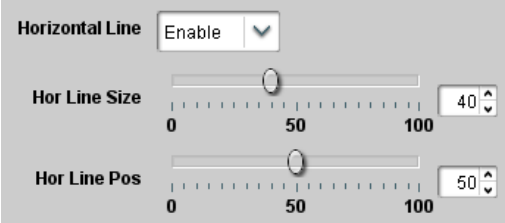
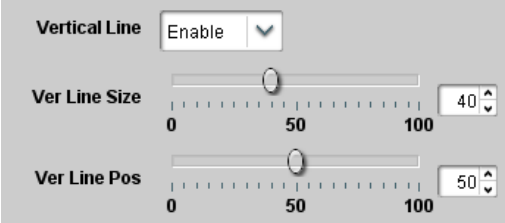
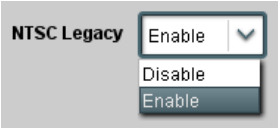
<div style="background-color: #333; color: white; padding: 5px; text-align: center; font-weight: bold;">Reticules</div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> Basic Advanced </div>	(continued)
<p>• Center Cross Controls</p> 	<ul style="list-style-type: none"> • Center 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).
<p>• Horizontal Line Controls</p> 	<ul style="list-style-type: none"> • 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).
<p>• Vertical Line Controls</p> 	<ul style="list-style-type: none"> • 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).
<p>• NTSC Legacy Reticule Fixed Control</p> 	<p>When set to enable, provides fixed-size safe action area 4:3 reticule suited for CRT-based displays.</p>

Table 3-1 9902-DC-4K Function Menu List — continued


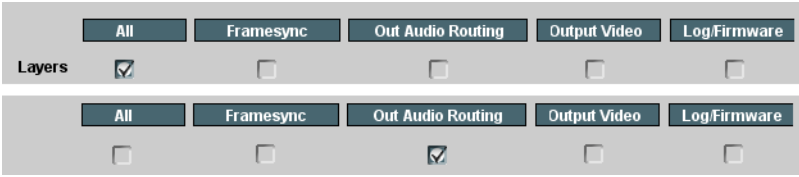

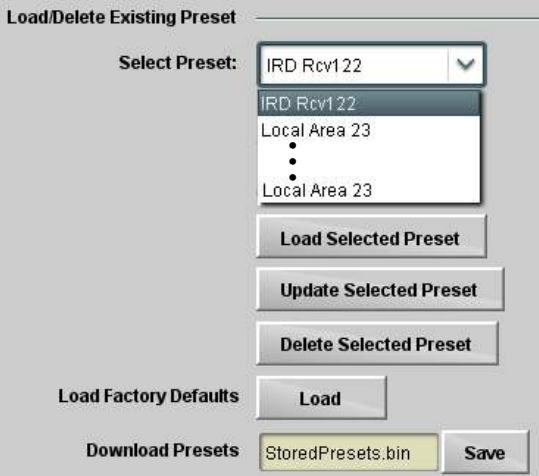
	<p>Allows user control settings to be saved in a one-button Preset and then loaded (recalled) as desired, and provides a one-button restore of factory default settings.</p>
<p>• Preset Layer Select</p> <p>Allows selecting a functional layer (or “area of concern”) that the preset is concerned with. Limiting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

Table 3-1 9902-DC-4K Function Menu List — continued


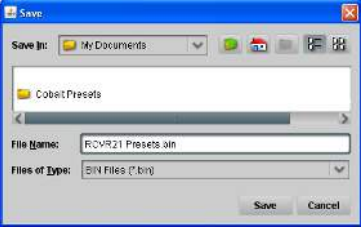

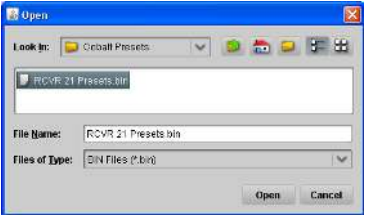

Presets	(continued)
<p>Download (save) card presets to a network computer by clicking Download Presets – Save at the bottom of the Presets page.</p>  <p>Browse to a desired save location (in this example, <i>My Documents\Cobalt Presets</i>).</p> <p>The file can then be renamed if desired (<i>RCVR21 Presets</i> in this example) before committing the save.</p> 	<p>Upload (open) card presets from a network computer by clicking Upload at the bottom of DashBoard.</p>  <p>Browse to the location where the file was saved on the computer or drive (in this example, <i>My Documents\Cobalt Presets</i>).</p> <p>Select the desired file and click Open to load the file to the card.</p>  <p>Note:</p> <ul style="list-style-type: none"> • Preset transfer between card download and file upload is on a group basis (i.e., individual presets cannot be downloaded or uploaded separately). • After uploading a presets file, engagement of a desired preset is only assured by selecting and loading a desired preset as described on the previous page.
<p>Admin</p> <p>System Networking</p> <p>• Log Status and Download Controls</p> 	<p>Provides a global card operating status and allows a log download for factory engineering support. Also provides controls for selecting and loading card firmware upgrade files.</p> <p>Networking controls provide dedicated card networking setup in conjunction with rear module Ethernet port.</p> <ul style="list-style-type: none"> • Log Status indicates overall card internal operating status. • Download Log File allows a card operational log file to be saved to a host computer. This log file can be useful in case of a card error or in the case of an operational error or condition. The file can be submitted to Cobalt engineering for further analysis. • Thermal Shutdown enable/disable allows the built-in thermal failover to be defeated. (Thermal shutdown is enabled by default). <p>CAUTION</p> <p>The 9902-DC-4K FPGA is designed for a normal-range operating temperature around 85° C core temperature. Operation in severe conditions exceeding this limit for non-sustained usage are within device operating safe parameters, and can be allowed by setting this control to Disable. However, the disable (override) setting should be avoided under normal conditions to ensure maximum card protection.</p>

Table 3-1 9902-DC-4K Function Menu List — continued

<div data-bbox="228 262 542 317">Admin</div> <div data-bbox="228 338 529 373">System Networking</div>	(continued)
<ul style="list-style-type: none"> • Firmware Upgrade Controls 	<p>Firmware upgrade controls allow a selected firmware version (where multiple versions can be uploaded to the card's internal memory) to invoke an upgrade to a selected version either instantly, or set to install on the next card reboot (thereby allowing card upgrade downtime to be controlled at a scheduled point in time).</p>
<p>Note: The page/tab here allows managing multiple firmware versions saved on the card. New upgrade firmware from our web site can always be directly uploaded to the card without using this page. Instructions for firmware downloading to your computer and uploading to the card can be found at the Support>Firmware Downloads link at www.cobaltdigital.com.</p>	
<ol style="list-style-type: none"> 1. Access a firmware upgrade file from a network computer by clicking Upload at the bottom of DashBoard. 2. Browse to the location of the firmware upgrade file (in this example, <i>My Documents\lv1.0.0019.bin</i>). 3. Select the desired file and click Open to upload the file to the card. 	<div data-bbox="1094 678 1419 768"> </div> <div data-bbox="1005 795 1430 1020"> </div>
<ul style="list-style-type: none"> • Immediate firmware upload. The card default setting of Automatically Reboot After Upgrade checked allow a selected firmware version to be immediately uploaded as follows: <ol style="list-style-type: none"> 1. Click Firmware To Load and select the desired upgrade file to be loaded (in this example, "v1.0.0019"). 2. Click Load Selected Firmware. The card now reboots and the selected firmware is loaded. 	<div data-bbox="992 1071 1398 1232"> </div>
<ul style="list-style-type: none"> • Deferred firmware upload. With Automatically Reboot After Upgrade unchecked, firmware upgrade loading is held off until the card is manually rebooted. This allows scheduling a firmware upgrade downtime event until when it is convenient to experience to downtime (uploads typically take about 60 seconds). <ol style="list-style-type: none"> 1. Click Firmware To Load and select the desired upgrade file to be loaded (in this example, "v1.0.0019"). Note now how the display shows "Installs on Next Reboot". 2. Click Load Selected Firmware. The card holds directions to proceed with the upload, and performs the upload only when the card is manually rebooted (by pressing the Reboot button). 3. To cancel a deferred upload, press Cancel Pending Upgrade. The card reverts to the default settings that allow an immediate upload/upgrade. 	<div data-bbox="987 1287 1425 1449"> </div>
<ul style="list-style-type: none"> • Card DashBoard Name Control <div data-bbox="256 1675 727 1856"> </div>	<p>Allows card name In DashBoard to be changed as desired. Click return to engage change.</p> <ul style="list-style-type: none"> • Append to Product Name appends (or adds to) existing OEM name (for example, "9902-DC-4K Processing 1A"). • Replace Product Name completely replaces the OEM name OEM name (for example, "Processing 1A"). <p>Note: Dashboard instance(s) may have to be refreshed before name change appears.</p>

Table 3-1 9902-DC-4K Function Menu List — continued

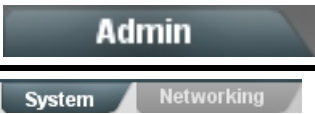
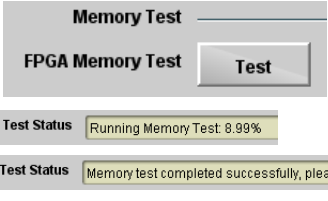



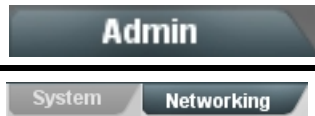
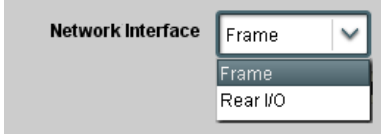
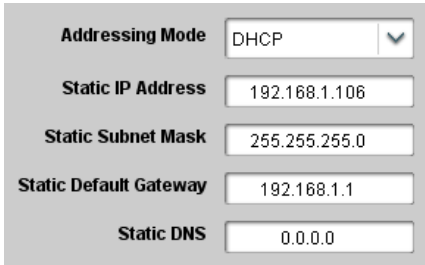
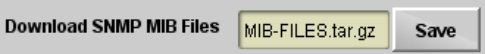
	(continued)
<p>• Card Check and Restore Utilities</p>  <p>Memory Test Status: Running Memory Test: 8.99%</p> <p>Memory Test Status: Memory test completed successfully, please reboot the card</p> 	<p>Memory Test allows all cells of the card FPGA memory to be tested.</p>  This control should only be activated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

Table 3-1 9902-DC-4K Function Menu List — continued

<div>Admin</div> <div>SystemNetworking</div>	(continued)																		
<div><div>NTP Clock Setup</div><div><div>Clock Setup</div><div>NTP IP (use 0.0.0.0 for pool NTP)<div>0.0.0.0</div></div><div>Local Timezone (NTP Only)<div>US-Central</div></div><div>NTP Status<div>Synchronized with NTP</div></div><div>Use Network Interface for NTP<input checked="" type="checkbox"/></div><div>Use Frame Network Card for NTP<input type="checkbox"/></div></div></div>	<div>Allows device NTP clock IP source and localization. This is the clock/time device will use for logs and other recorded actions.</div> <div><div><div>NTP IP</div>sets the IP address where NTP is to be obtained.</div><div><div>Local Timezone</div>sets the recorded time to the localized time.</div><div><div>NTP Status</div>shows if time is synced with NTP or if an error exists.</div><div><div>Use Network Interface</div>and <div>Use Frame Network Card</div>checkboxes allows selecting the network source that will provide NTP time.</div></div>																		
<div>User Log</div>	Automatically maintains a log of user actions and input lock status.																		
<div>User Log shows input lock and other user conditions (with most recent event at top of list).</div> <div>Clear User Log clears all entries.</div> <div>Download Log File opens a browser allowing the log file to be saved on the host machine.</div>	<div><table><thead><tr><th>Time</th><th>Type</th><th>Event</th></tr></thead><tbody><tr><td>22:40:36 12/02/15</td><td>Info</td><td>SDI Input sdi_in_c Locked to 720p 59.94</td></tr><tr><td>22:40:34 12/02/15</td><td>Info</td><td>SDI Input sdi_in_d Locked to 1080i 59.94</td></tr><tr><td>21:17:36 12/02/15</td><td>Info</td><td>SDI Input sdi_in_b Locked to 1080i 59.94</td></tr><tr><td>21:17:18 12/02/15</td><td>Info</td><td>Log file cleared</td></tr><tr><td></td><td></td><td></td></tr></tbody></table><div><div>Clear User Log</div><div>Confirm</div></div><div><div>Download Log File</div><div>9922-F8.tar.gz</div><div>Save</div></div></div>	Time	Type	Event	22:40:36 12/02/15	Info	SDI Input sdi_in_c Locked to 720p 59.94	22:40:34 12/02/15	Info	SDI Input sdi_in_d Locked to 1080i 59.94	21:17:36 12/02/15	Info	SDI Input sdi_in_b Locked to 1080i 59.94	21:17:18 12/02/15	Info	Log file cleared			
Time	Type	Event																	
22:40:36 12/02/15	Info	SDI Input sdi_in_c Locked to 720p 59.94																	
22:40:34 12/02/15	Info	SDI Input sdi_in_d Locked to 1080i 59.94																	
21:17:36 12/02/15	Info	SDI Input sdi_in_b Locked to 1080i 59.94																	
21:17:18 12/02/15	Info	Log file cleared																	

Troubleshooting

This section provides general troubleshooting information and specific symptom/corrective action for the 9902-DC-4K card and its remote control interface. The 9902-DC-4K 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-DC-4K card itself and its remote control systems all (to varying degrees) provide error and failure indications.

The various 9902-DC-4K 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. 3-33)
- 9902-DC-4K Processing Error Troubleshooting (p. 3-33)
- Troubleshooting Network/Remote Control Errors (p. 3-34)

9902-DC-4K Card Edge Status/Error Indicators and Display

Figure 3-5 shows and describes the 9902-DC-4K card edge status indicators and display. These indicators and the display show status and error conditions relating to the card itself and remote (network) communications (where applicable). Because these indicators are part of the card itself and require no external interface, the indicators are particularly useful in the event of communications problems with external devices such as network remote control devices.

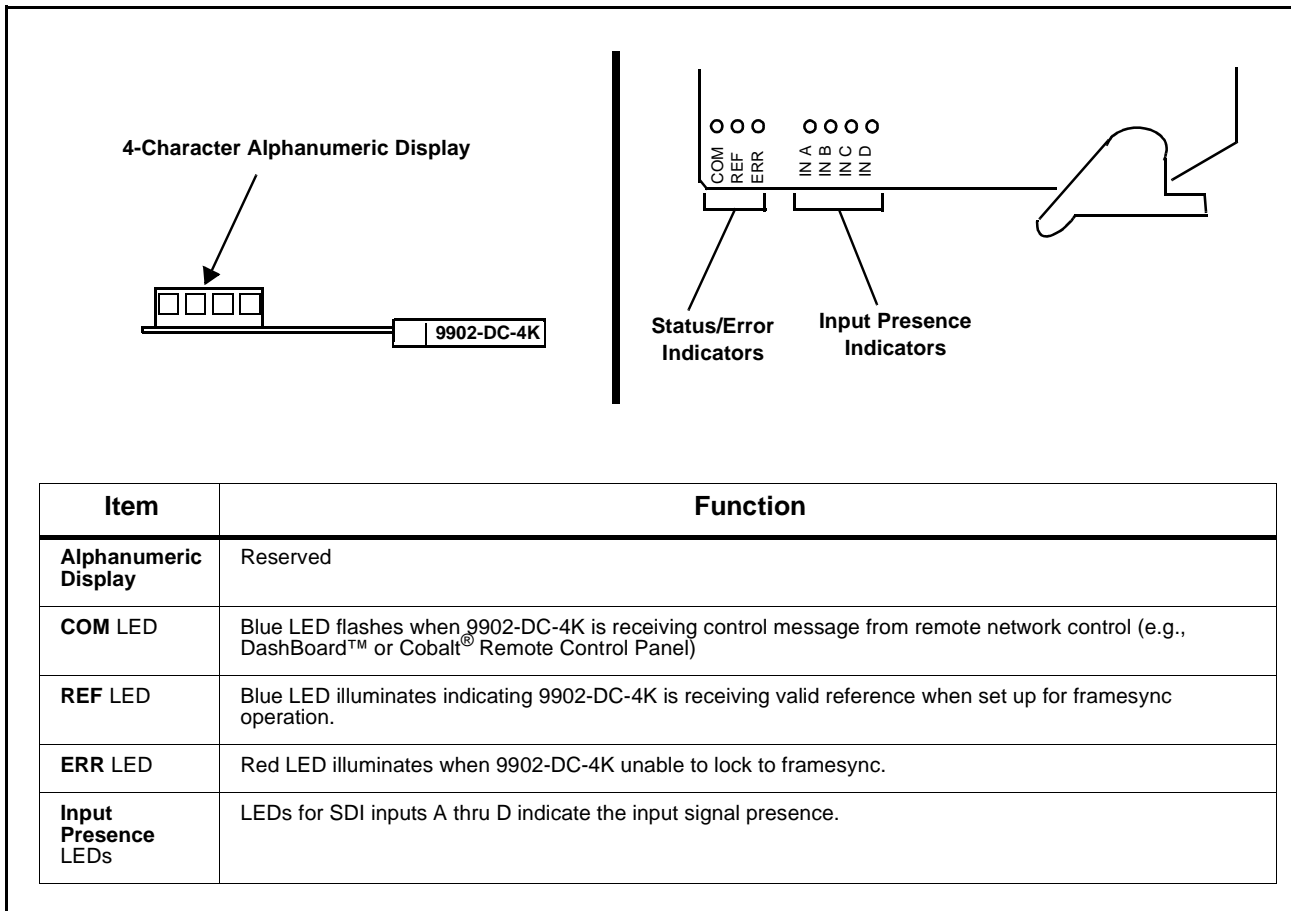


Figure 3-5 9902-DC-4K Card Edge Status Indicators and Display

DashBoard™ Status/Error Indicators and Displays

Figure 3-6 shows and describes the DashBoard™ status indicators and displays. These indicator icons and displays show status and error conditions relating to the 9902-DC-4K card itself and remote (network) communications.

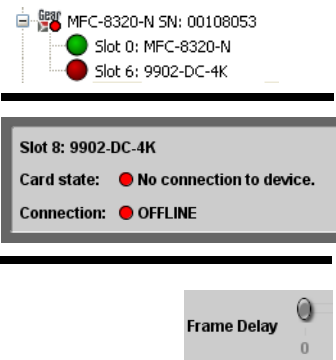
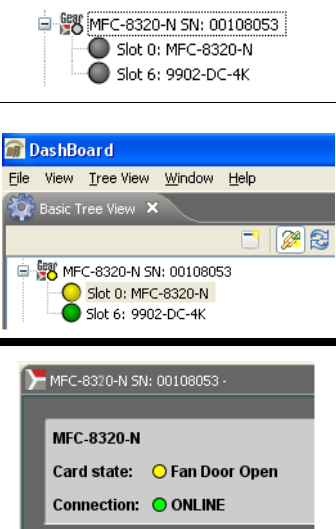
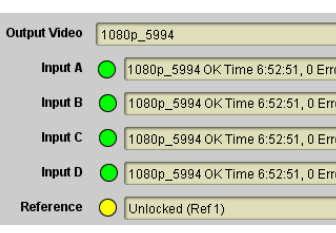
Indicator Icon or Display	Error Description
	<p>Red indicator icon in Card Access/Navigation Tree pane shows card with Error condition (in this example, the Card Access/Navigation Tree pane shows a general error issued by the 9902-DC-4K card in slot 6).</p> <p>Specific errors are displayed in the Card Info pane (in this example "No connection to device" indicating 9902-DC-4K card is not connecting to frame/LAN).</p> <p>If the 9902-DC-4K card is not connecting to the frame or LAN, all controls are grayed-out (as shown in the example here).</p>
	<p>Gray indicator icon in Card Access/Navigation Tree pane shows card(s) are not being seen by DashBoard™ due to lack of connection to frame LAN (in this example, both a 9902-DC-4K card in slot 6 and the MFC-8320-N Network Controller Card for its frame in slot 0 are not being seen).</p> <p>Yellow indicator icon in Card Access/Navigation Tree pane shows card with Alert condition (in this example, the Card Access/Navigation Tree pane shows a general alert issued by the MFC-8320-N Network Controller Card).</p> <p>Clicking the card slot position in the Card Access/Navigation Tree (in this example Network Controller Card "Slot 0: MFC-8320-N") opens the Card Info pane for the selected card. In this example, a "Fan Door Open" specific error is displayed.</p>
	<p>Yellow indicator icon in 9902-DC-4K Card Info pane shows error alert, along with cause for alert (in this example, the 9902-DC-4K is not receiving an enabled framesync source).</p>

Figure 3-6 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 3-7).

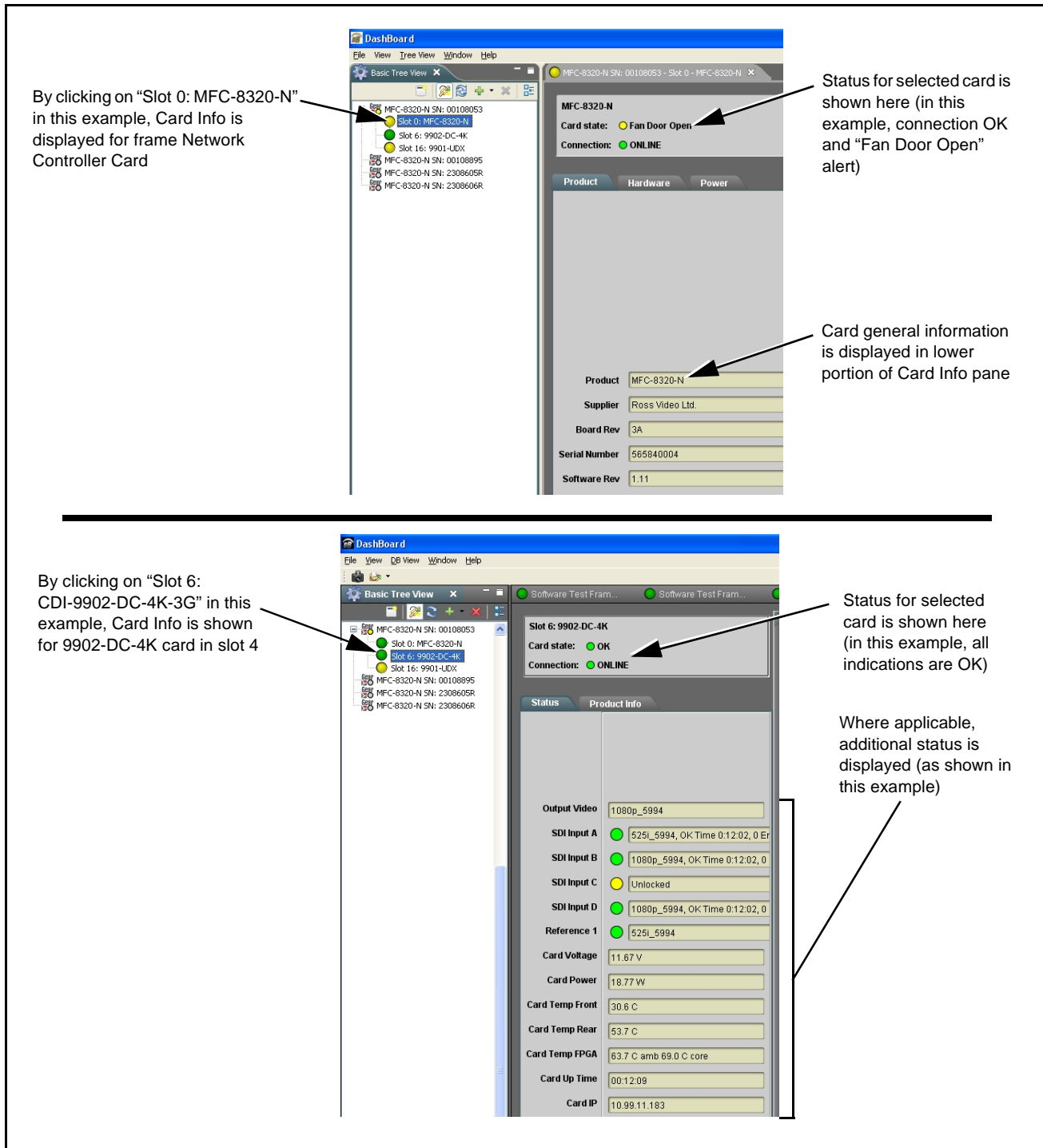


Figure 3-7 Selecting Specific Cards for Card Info Status Display

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 3-2 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 3-2 Basic Troubleshooting Checks

Item	Checks
Verify power presence and characteristics	<ul style="list-style-type: none"> On both the frame Network Controller Card and the 9902-DC-4K, 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-DC-4K card. This can be observed using the DashBoard™ Card Info pane. <ul style="list-style-type: none"> If display shows no power being consumed, either the frame power supply, connections, or the 9902-DC-4K card itself is defective. If display shows excessive power being consumed (see Technical Specifications (p. 1-11) in Chapter 1, "Introduction"), the 9902-DC-4K 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-DC-4K 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-DC-4K Processing Error Troubleshooting

Table 3-3 provides 9902-DC-4K processing troubleshooting information. If the 9902-DC-4K card exhibits any of the symptoms listed in Table 3-3, follow the troubleshooting instructions provided.

In the majority of cases, most errors are caused by simple errors where the 9902-DC-4K 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-DC-4K card edge status indicators.
 - Where errors are displayed on both the 9902-DC-4K card and network remote controls, the respective indicators and displays are individually described in this section.

Table 3-3 Troubleshooting Processing Errors by Symptom

Symptom	Error/Condition	Corrective Action
<ul style="list-style-type: none"> • DashBoard™ shows Unlocked message in 9902-DC-4K Card Info pane.  <ul style="list-style-type: none"> • Card edge Input Presence LED(s) not illuminated. 	No video input present	Make certain intended video source is connected to appropriate 9902-DC-4K card video input. Make certain BNC cable connections between frame Rear I/O Module for the card and signal source are OK.
Audio not processed or passed through card	Enable control not turned on	On Output Audio Routing/Controls tab, Audio Group Enable control for group 1 thru 4 must be turned on for sources to be embedded into respective embedded channel groups.
Selected upgrade firmware will not upload	Automatic reboot after upgrade turned off	Card Presets > Automatically Reboot After Upgrade box unchecked. Either reboot the card manually, or leave this box checked to allow automatic reboot to engage an upgrade upon selecting the upgrade.

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 3-8.) Make certain the card has the proper SD card installed in the under-card slot. If SD card is **not** installed, contact Product Support to obtain an SD card.

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

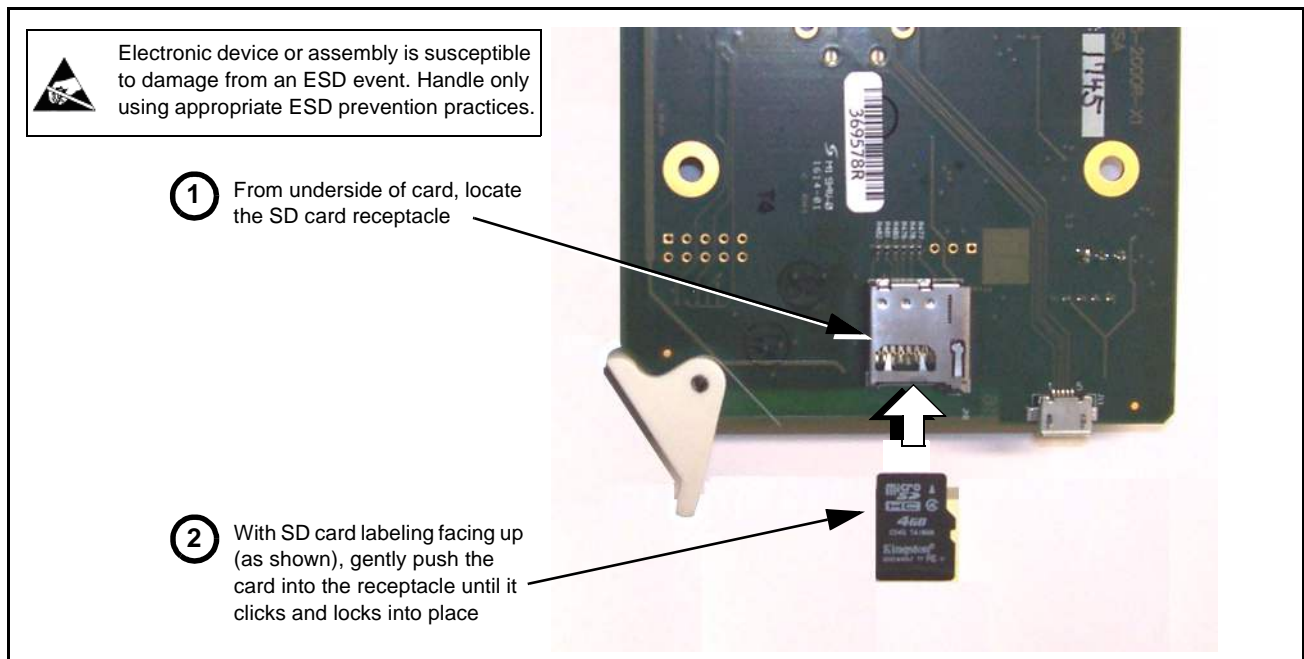


Figure 3-8 SD Card Installation

2. (See Figure 3-9.) With card powered-down, locate the **MMC BOOT** button on the card. Proceed as shown in picture.

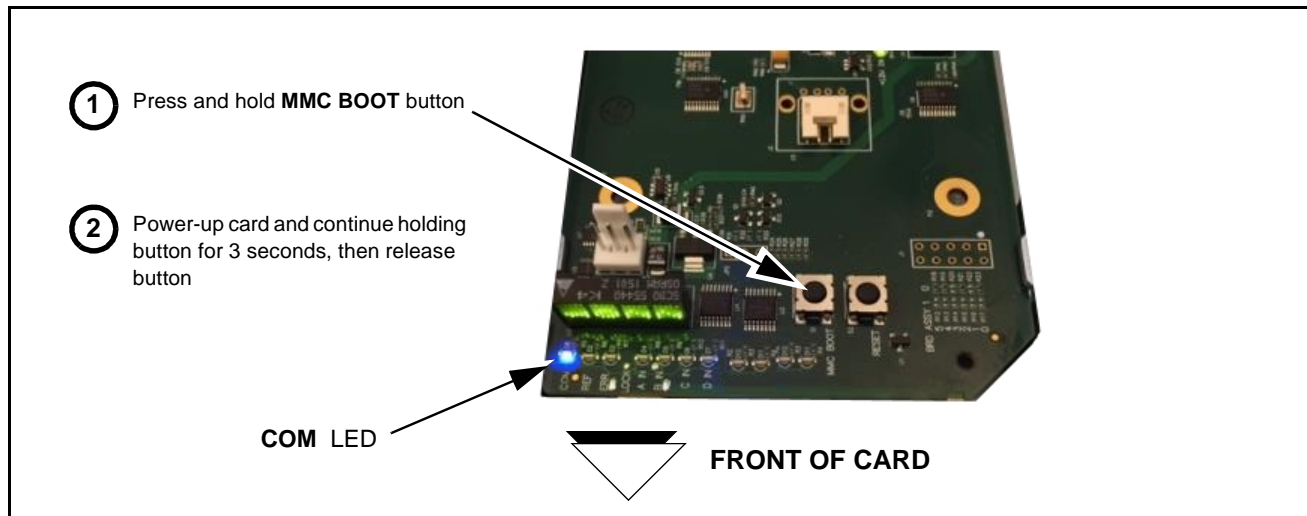


Figure 3-9 MMC Boot Button

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. 1-14) in Chapter 1, “Introduction“ for contact information.



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