BBG-1002-DC-4K

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

Product Manual

Cobalt Digital Inc.

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

BBG1002DC4K-OM (V1.5)

Copyright

©Copyright 2020, Cobalt Digital Inc. All Rights Reserved.
Duplication or distribution of this manual and any information contained within is strictly prohibited without the express written permission of Cobalt Digital Inc. This manual and any information contained within, may not be reproduced, distributed, or transmitted in any form, or by any means, for any purpose, without the express written permission of Cobalt Digital Inc. Reproduction or reverse engineering of software used in this device is prohibited.

Disclaimer

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

Trademark Information

Cobalt® is a registered trademark of Cobalt Digital Inc.

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

Congratulations on choosing the Cobalt® BBG-1002-DC-4K UHDTV Standalone Quad-Input 3G/HD UHD Broadcast Downconverter with Optional Frame Sync. The BBG-1002-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 BBG-1002-DC-4K, please contact us at the contact information on the front cover.

Manual No.:	BBG1002DC4K-OM
Document Version:	V1.5
Release Date:	May 29, 2020
Applicable for Firmware Version (or greater):	2.055 or greater
Description of product/manual changes:	- Update manual for latest device functionality. (The current firmware version has some new features/ controls user interface changes versus prior firmware versions.) - Update manual for minor consistency updates.

Table of Contents

Chapter 1 Introduction 1-1

Overview 1-1
BBG-1002-DC-4K Software Versions and this Manual 1-2
Cobalt Reference Guides 1-2
Manual Conventions 1-3
Warnings, Cautions, and Notes 1-4
Labeling Symbol Definitions 1-4
Safety and Regulatory Summary 1-5
Warnings 1-5
Cautions 1-5
EMC Compliance Per Market 1-5
BBG-1002-DC-4K Functional Description 1-6
BBG-1002-DC-4K Program Video Input/Output Formats 1-6
Video Processing Description 1-7
Audio Processor Description 1-9
User Control Interface 1-9
Technical Specifications 1-10
Warranty and Service Information 1-12
Cobalt Digital Inc. Limited Warranty 1-12
Contact Cobalt Digital Inc. 1-13

Chapter 2 Installation 2-1

Overview 2-1
Installing the BBG-1002-DC-4K 2-1
Installing Using BBG-1000-TRAY Optional Mounting Tray 2-1
BBG-1002-DC-4K Unit Dimensions 2-2
Rear Panel Connections 2-2

Chapter 3 Setup Instructions. 3-1

Overview 3-1
BBG-1002 Front Panel Display and Menu-Accessed Control 3-1
Connecting BBG-1002 To Your Network 3-3
Finding a BBG-1002 Device in DashBoard 3-4
Control and Display Descriptions 3-5
Function Submenu/Parameter Submenu Overview 3-5
Web User Interface 3-6
Display Theme 3-7
Checking BBG-1002-DC-4K Device Information 3-8

BBG-1002-DC-4K Function Menu List and Descriptions 3-9
Input Routing Controls 3-10
Output Format Controls 3-10
Output Audio Routing/Controls 3-12
Character Burner 3-13
Closed Captioning 3-18
Timecode 3-19
Reticules 3-23
Presets 3-26
Admin 3-27
User Log 3-29
Uploading Firmware Using Web Interface and GUI 3-30
Troubleshooting 3-31
Error and Failure Indicator Overview 3-31
Basic Troubleshooting Checks 3-33
BBG-1002-DC-4K Processing Error Troubleshooting 3-33
In Case of Problems 3-34

Chapter 1

Introduction

Overview

This manual provides installation and setup instructions for the BBG-1002-DC-4K Standalone Quad SDI/2SI-Input UHD Broadcast Downconverter with Optional Frame Sync (also referred to herein as the BBG-1002-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 BBG-1002-DC-4K.
- **Chapter 2, "Installation"** – Provides instructions for installing the BBG-1002-DC-4K in a frame, and connecting signal and control cabling to the BBG-1002-DC-4K.
- **Chapter 3, "Setup Instructions"** – Provides overviews of setup operating controls and instructions for setting up the BBG-1002-DC-4K to integrate within its signal flow environment.

This chapter contains the following information:

- **BBG-1002-DC-4K Software Versions and this Manual (p. 1-2)**
- **Manual Conventions (p. 1-3)**
- **Safety and Regulatory Summary (p. 1-5)**
- **BBG-1002-DC-4K Functional Description (p. 1-6)**
- **Technical Specifications (p. 1-10)**
- **Warranty and Service Information (p. 1-12)**
- **Contact Cobalt Digital Inc. (p. 1-13)**

BBG-1002-DC-4K 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 devices loaded with a particular software build.

The Software Version can be checked by viewing the **Card Info** menu in DashBoard™. See Checking BBG-1002-DC-4K Device Information (p. 3-8) in Chapter 3, “Operating Instructions” for more information. You can then check our website for the latest software version currently released for the device as described below.

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

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

Software **earlier** than latest version	Device is not loaded with the latest software. Not all functions and/or specified performance described in this manual may be available. You can update your device 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 device onto your computer, and then uploading it to your device through DashBoard™. **Software updates are field-installed without any need to remove the device from its installed state.**
Software **newer** than version in manual	A new manual is expediently released whenever 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 device’s software version may not completely or accurately describe all functions available for your device. If your device shows features not described in this manual, you can check for the latest manual (if applicable) and download it by going to the device’s web page on www.cobaltdigital.com.

Cobalt Reference Guides

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

Manual Conventions

In this manual, display messages and connectors are shown using the exact name shown on the BBG-1002-DC-4K itself. Examples are provided below.

- Device display messages are shown like this:

  BBG-1002-DC-4K

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

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

- **BBG-1002-DC-4K** refers to the BBG-1002-DC-4K Standalone Quad SDI/2SI-Input UHD Broadcast Downconverter with Optional Frame Sync unit.
- **Frame** refers to the HPF-9000, oGx, OG3-FR, 8321, or similar 20-slot frame that houses Cobalt® or other cards.
- **Device** and/or **Card** refers to a Cobalt® or other card.
- **System** and/or **Video System** refers to the mix of interconnected production and terminal equipment in which the BBG-1002-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 only by edges and avoid contact with any connectors or components.
	Symbol (WEEE 2002/96/EC) For product disposal, ensure the following: • Do not dispose of this product as unsorted municipal waste. • Collect this product separately. • Use collection and return systems available to you.

Safety and Regulatory Summary

Warnings

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

Cautions

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

CAUTION **This device contains no user-serviceable components. Refer servicing to authorized personnel.**

CAUTION **This device is intended for use ONLY with specified power supplies. Power connection to unauthorized sources may cause product damage, unreliable operation, and invalidate warranty.**

CAUTION **The BBG-1002-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 device 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

BBG-1002-DC-4K Functional Description

Figure 1-1 shows a functional block diagram of the BBG-1002-DC-4K. The BBG-1002-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/HD-SDI. The BBG-1002-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. Each path is equipped with independent frame sync. The output is available as a 2x DA 3G/HD-SDI output or HDMI/DVI.

BBG-1002-DC-4K Program Video Input/Output Formats

The BBG-1002-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.

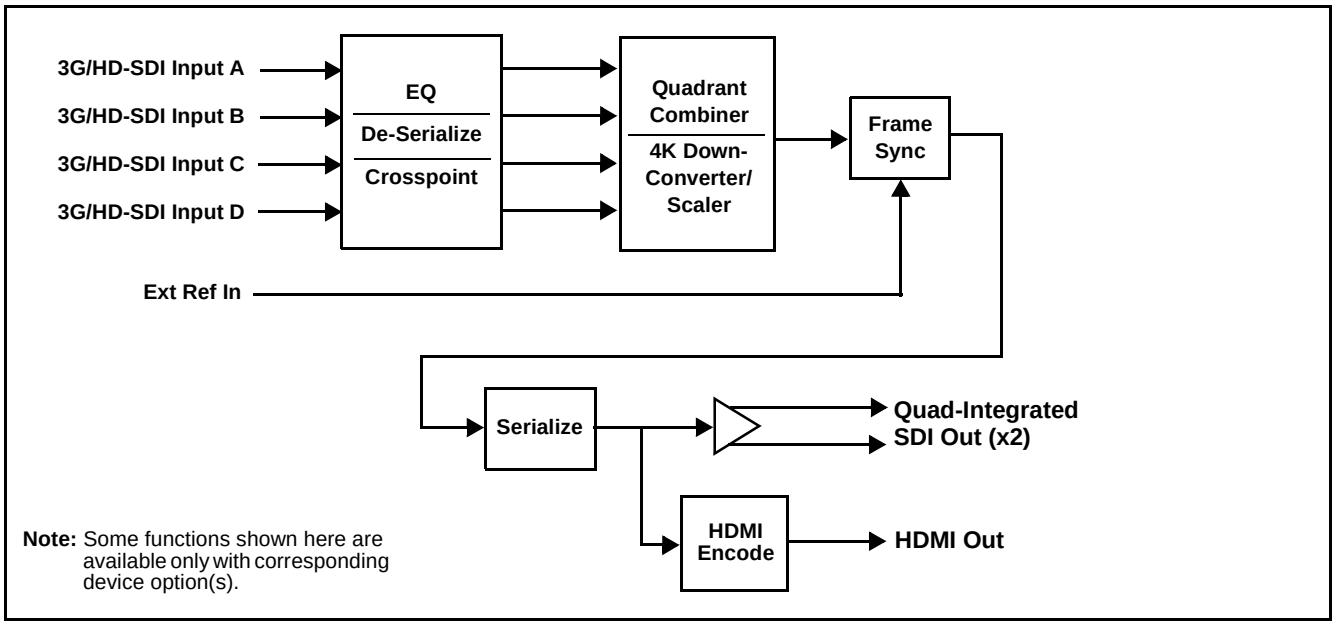


Figure 1-1 BBG-1002-DC-4K Functional Block Diagram

Video Processing Description

The BBG-1002-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 BBG-1002-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 device 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 external reference, SDI **Input A** as a frame reference, or internal (free-run) as a reference source. As such, the device 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 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 device; if the preferred format is not detected, the device 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.

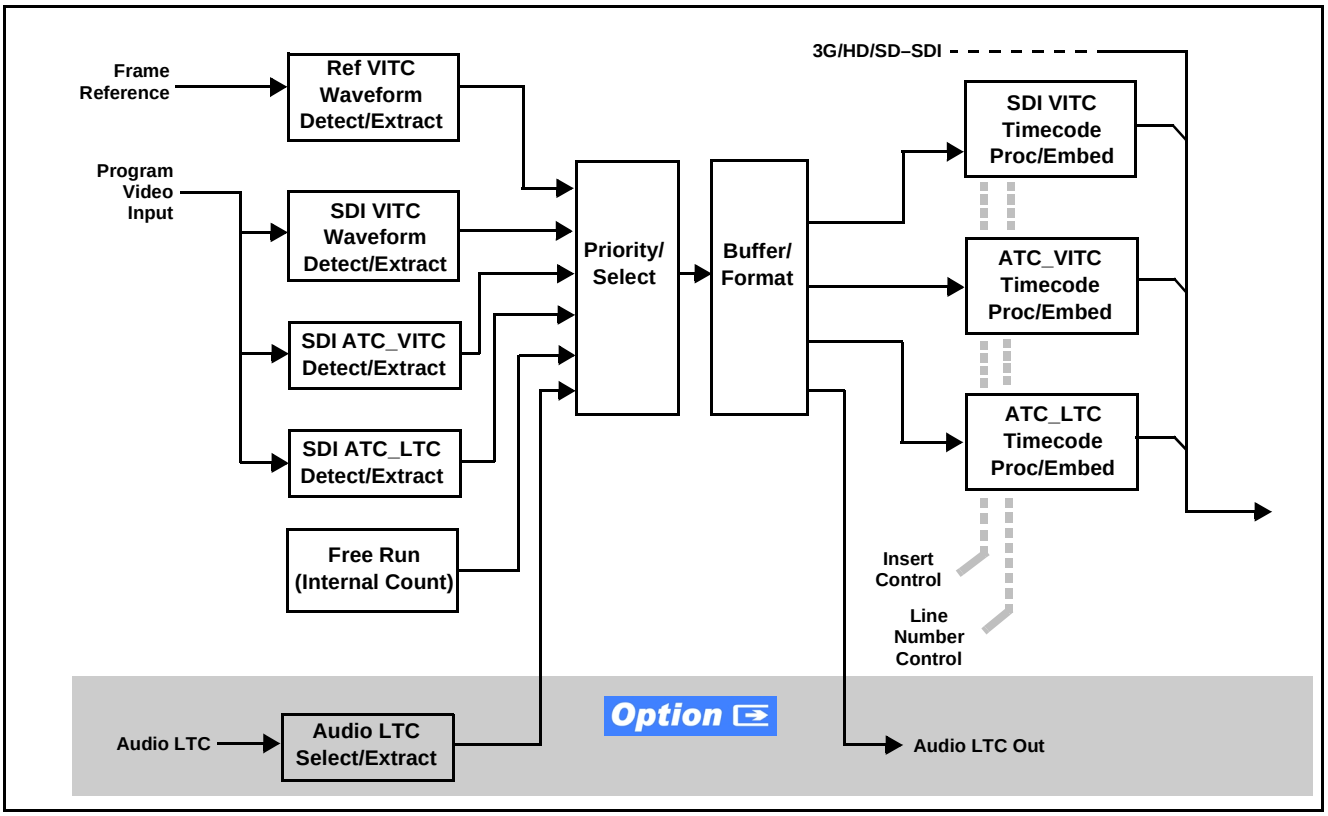


Figure 1-2 Timecode Processor

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

BBG-1002-DC-4K uses an HTML5 internal web server for control/ monitoring communication, which allows control via a web interface with no special or unique application on the client device. Connection to the device to the network media connection is via a standard 10/100/1000 RJ-45 Ethernet connection. The device can also be controlled using DashBoard™ remote control, where it appears as a frame connection.

Technical Specifications

Table 1-1 lists the technical specifications for the BBG-1002-DC-4K Up/ Down/Cross Format Converter, Video/Audio In with Frame Sync device.

Table 1-1 Technical Specifications

Item	Characteristic
Part number, nomenclature	BBG-1002-DC-4K Standalone Quad SDI/2SI-Input UHD Broadcast Downconverter with Optional Frame Sync
Power consumption	< 18 Watts maximum. Power provided by included AC adapter; 100-240 VAC, 50/60 Hz. Second DC power connection allows power redundancy using second (optional) AC adapter.
Installation Density	Up to 3 units per 1RU space
Environmental: Operating temperature: Relative humidity (operating or storage): Dimensions (WxHxD): Weight:	 32° – 104° F (0° – 40° C) < 95%, non-condensing 5.7 x 1.4 x 14.7 in (14.5 x 3.5 x 37.3 cm) Dimensions include connector projections. 6 lb (2.8 kg)
Ethernet communication	10/100/1000 Mbps Ethernet with Auto-MDIX via HTML5 web interface
Front-Panel Controls and Indicators	Backlit LCD display and menu navigation keys. Display and controls provide unit status display and full control as an alternate to web GUI control.
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 SDI BNC Impedance: 75 Ω Signal Level: 800 mV ± 10% DC Offset: 0 V ± 50 mV
HDMI Combined Video Output	HDMI CEA-861D
Frame Reference Input	Looping 2-BNC connection. SMPTE 170M/318M “Black Burst”, SMPTE 274M/296M “Tri-Level” Return Loss: >35 dB up to 5.75 MHz
Redundant (or spare) AC power supply	BBG-1000-PS

Warranty and Service Information

Cobalt Digital Inc. Limited Warranty

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

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

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

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

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

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

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

Contact Cobalt Digital Inc.

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

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

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

This page intentionally blank

Chapter 2

Installation

Overview

This chapter contains the following information:

- Installing the BBG-1002-DC-4K (p. 2-1)
- Rear Panel Connections (p. 2-2)
- BBG-1002-DC-4K Rear Panel Connectors (p. 2-4)

Installing the BBG-1002-DC-4K

Note:
- Where BBG-1002-DC-4K is to be installed on a mounting plate (or regular table or desk surface) **without** optional frame Mounting Tray BBG-1000-TRAY, affix four adhesive-backed rubber feet (supplied) to the bottom of BBG-1002-DC-4K in locations marked with stamped “x”. If feet are not affixed, chassis bottom cooling vents will be obscured.
- Where BBG-1002-DC-4K is to be installed **with** optional frame Mounting Tray BBG-1000-TRAY, **do not** affix adhesive-backed feet.

Installing Using BBG-1000-TRAY Optional Mounting Tray

BBG-1000-TRAY allows up to three BBG-1002-DC-4K to be mounted and securely attached to a 1 RU tray that fits into a standard EIA 19” rack mounting location. Install BBG-1002-DC-4K unit into tray as described and shown here.

1. If installing BBG-1002-DC-4K using optional frame Mounting Tray BBG-1000-TRAY, install BBG-1002-DC-4K in tray as shown in Figure 2-1.

2. Connect the input and output cables as shown in Figure 2-3.

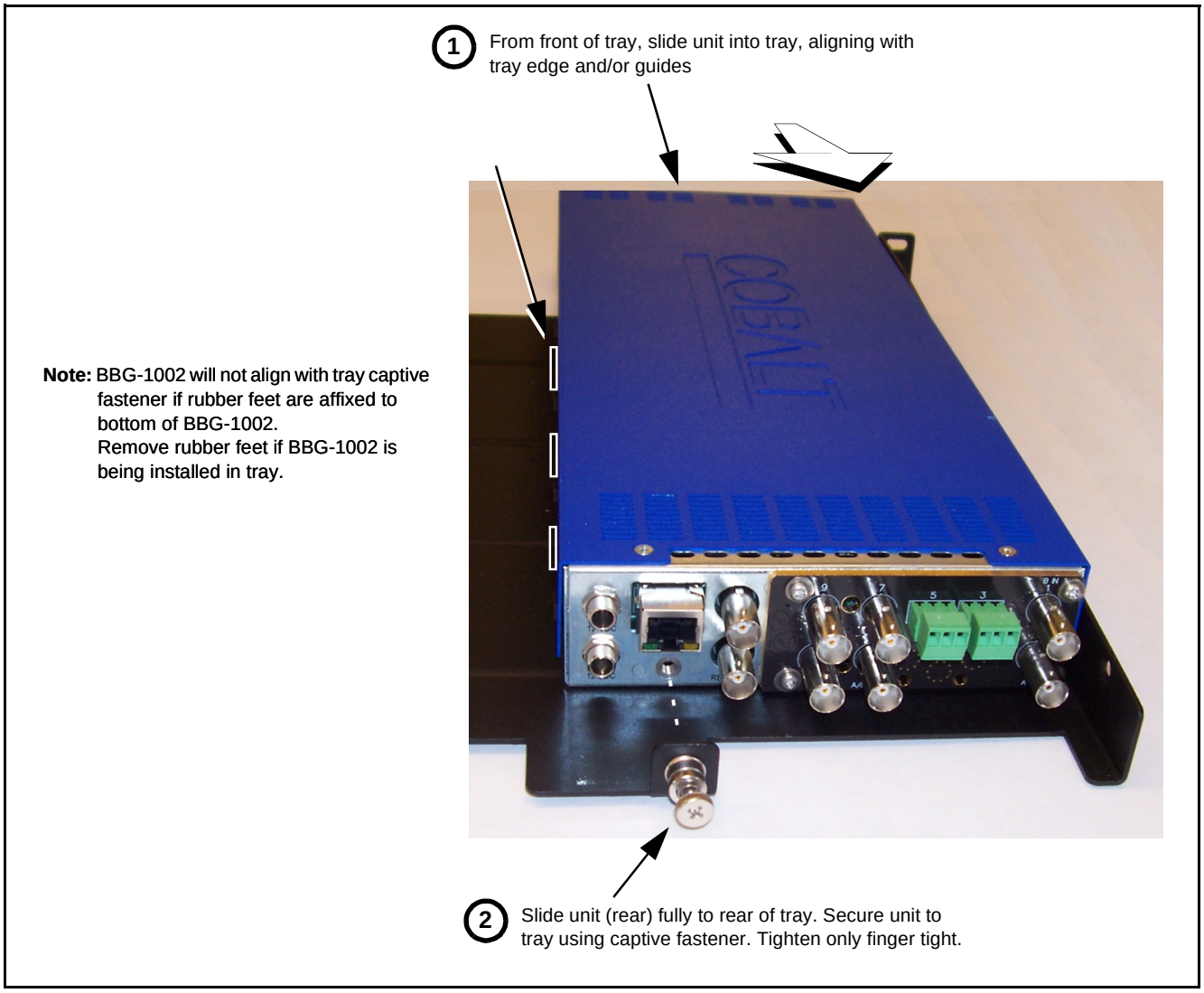


Figure 2-1 Mounting BBG-1002-DC-4K Using Frame Mounting Tray

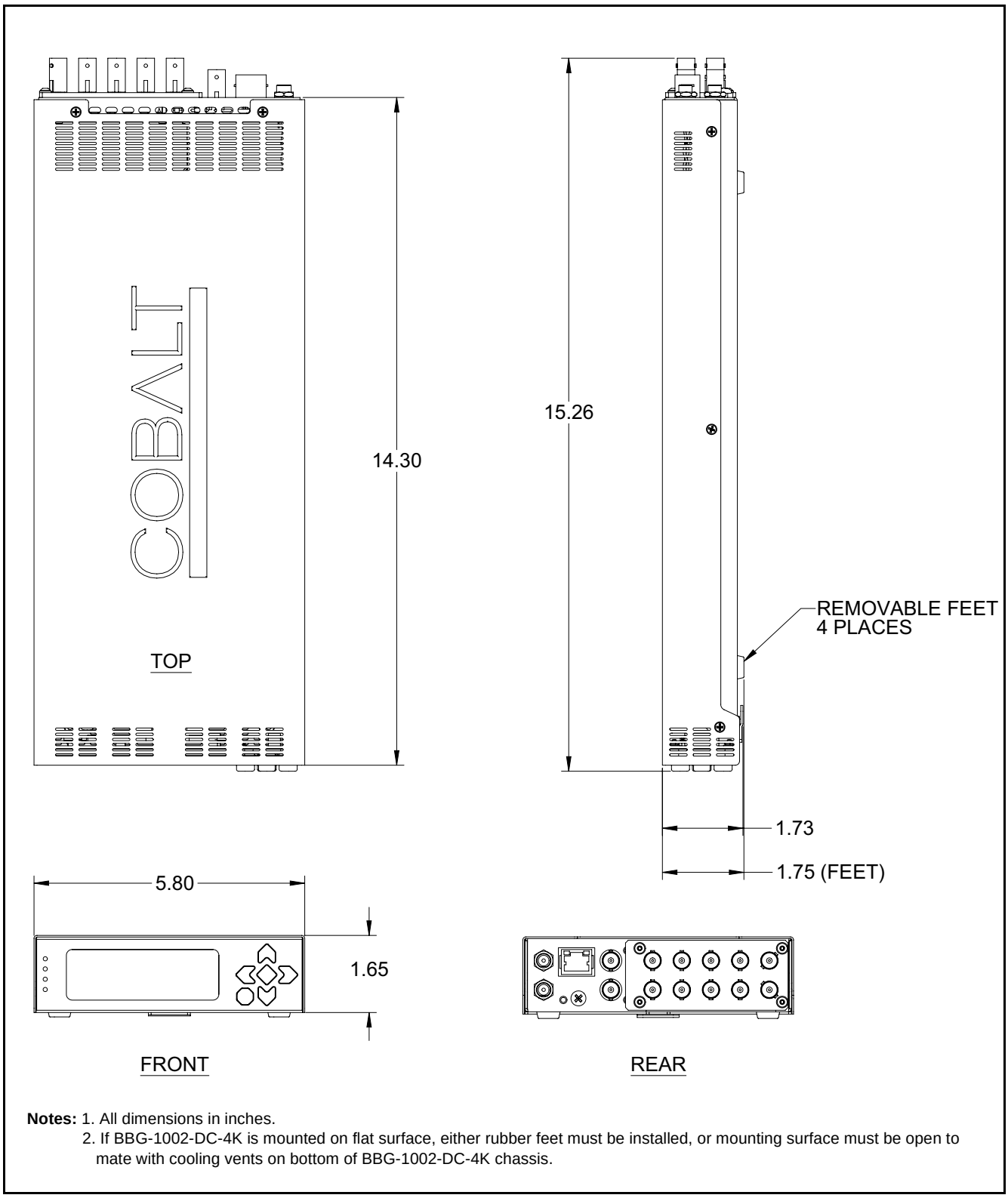
BBG-1002-DC-4K Unit Dimensions

Figure 2-2 shows the BBG-1002-DC-4K physical dimensions and mounting details for cases where BBG-1002-DC-4K will be installed in a location not using the optional **BBG-1000-TRAY** mounting tray.

Rear Panel Connections

Perform rear panel cable connections as shown in Figure 2-3.

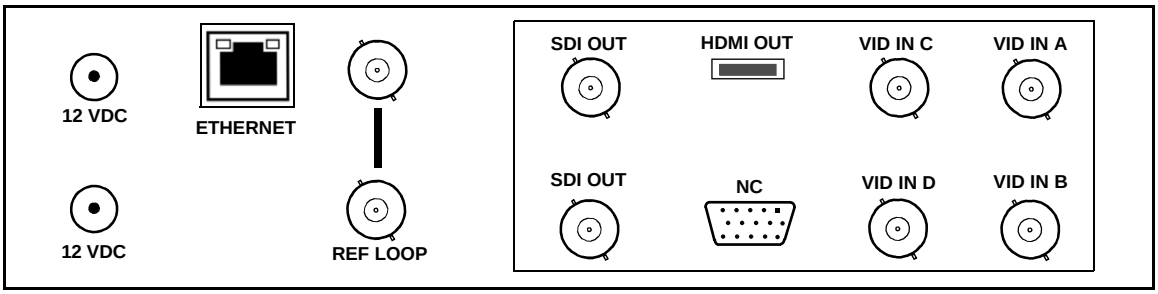
Note:
- The BBG-1002-DC-4K BNC inputs are internally 75-ohm terminated. It is not necessary to terminate unused BNC video inputs or outputs.
- External frame sync reference signal (if used) must be terminated if a looping (daisy-chain) connection is not used. Unterminated reference connection may result in unstable reference operation.



Notes: 1. All dimensions in inches.
2. If BBG-1002-DC-4K is mounted on flat surface, either rubber feet must be installed, or mounting surface must be open to mate with cooling vents on bottom of BBG-1002-DC-4K chassis.

Figure 2-2 BBG-1002-DC-4K Dimensional Details

BBG-1002-DC-4K Rear Panel



Connector	Function
12 VDC − ⊂ +	Dual DC power IN connectors (diode-isolated). Single AC adapter (supplied) can be connected to either connector. Dual adapters can be connected to provide power redundancy.
10/100/1000 ETHERNET	Gigabit Ethernet control/monitoring connection. Communication activity status is shown by integral status LEDs.
REF LOOP	Looping 75Ω reference connection for connection to house black burst or tri-level reference connections
VID IN A thru **VID IN D**	(4) Video In BNCs (**VID IN A** thru **VID IN D**)
SDI OUT	(2) 3G/HD-SDI Quadrant Combined Video Out BNCs (**SDI OUT**)
HDMI OUT	Quadrant Combined Video/Audio HDMI Out connector

Figure 2-3 BBG-1002-DC-4K Rear Panel Connectors

Chapter 3

Setup Instructions

Overview

If you are already familiar with using DashBoard, please skip to BBG-1002-DC-4K Function Menu List and Descriptions (p. 3-9).

This chapter contains the following information:

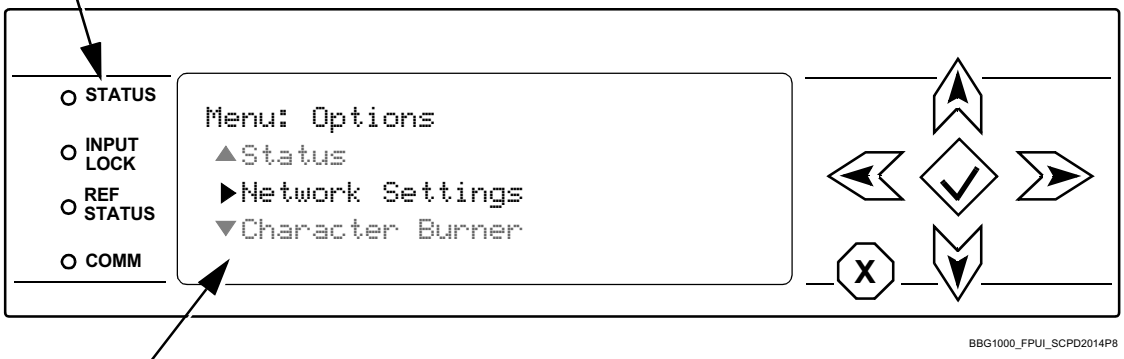
- BBG-1002 Front Panel Display and Menu-Accessed Control (p. 3-1)
- Connecting BBG-1002 To Your Network (p. 3-3)
- Control and Display Descriptions (p. 3-5)
- Checking BBG-1002-DC-4K Device Information (p. 3-8)
- BBG-1002-DC-4K Function Menu List and Descriptions (p. 3-9)
- Uploading Firmware Using Web Interface and GUI (p. 3-30)
- Troubleshooting (p. 3-31)

Note: All instructions here assume BBG-1002 is physically connected to the control physical network as described in Chapter 2. Installation.

BBG-1002 Front Panel Display and Menu-Accessed Control

Figure 3-1 shows and describes the BBG-1002 front panel displays and menu-accessed user interface controls. Initial network setup is performed using these controls.

- **STATUS** LED illuminated green shows unit power is OK and unit is functional.
- **INPUT LOCK** LED illuminated green shows at least one video input is locked to video.
- **REF STATUS** LED illuminated green shows valid reference is being received.
- **COMM** LED illuminated green shows Ethernet connection is OK.



BBG1000_FPUI_SCPD2014P8

Alphanumeric display shows configuration items, and shows and allows changes of settings when a menu item is accessed.

▲ and ▼ arrows denote scroll up or down to access the menu item.

▶ arrows denotes a menu item is accessed to be selected (in the example above, **Network Settings**).

Press the ✓ button to now access and enter the menu item. When this button is pressed, the selected menu item is displayed, along with its sub-menus.

In this example showing the Network Settings menu, `Menu: Network Settings` as menu item is displayed (indicating this is the actively selected menu item) and its sub-menus are now displayed:

```
Menu: Network Settings
▶ IP: 10.99.11.162
▼ Netmask: 255.255.255.0
▼ Gateway: 10.99.11.1
```

In this example, with ▶ pre-selecting the IP: sub-menu, pressing the ✓ button again opens the IP: sub-menu.

```
IP
 ▲
010.099.011.162
 ▼
```

The carets above and below a character indicate this character is ready for editing. Use the ▼ and ▲ buttons to decrement or increment the value.

Use the ≪ and ≫ buttons to navigate to other characters.

To exit a sub-menu or a menu, press the X button. This locks in any changes and proceeds to the last-selected sub-menu or menu item. Repeatedly press the button to step up through sub-menus and then to other menus. Access other menu items using the ▼ and ▲ buttons.

The display backlight automatically brightens with any navigation arrow activity, and then goes dim after a few moments.

Figure 3-1 BBG-1002 Front Panel Display and Menu Controls

Connecting BBG-1002 To Your Network

BBG-1002 ships with network protocol set to DHCP and populates its address with an addressed allocated by your DHCP server. If your network does not have a DHCP server, the BBG-1002 address field will be blank, and a static address must then be assigned. All initial network settings are performed using the Front Panel Display menu-accessed control (as described on the previous page). Refer to this page for instructions of using the front-panel menu navigation.

Access the Network Settings menu and configure network settings as follows:

Connecting BBG-1002 To Network

1. Power-up BBG-1002 and connect Ethernet cable connection to media. Wait for BBG-1002 to complete booting. When **`Product: BBG-1002`** ... is displayed, device is ready for configuration.

2. Press ✓ and access the **`Network Settings`** menu. Current network settings are displayed (as configured by host DHCP server).
Note: It is recommended to now change the settings to use a static IP address of your choice. The following steps describe using a static IP address.

3. In **`Network Settings > Mode`**, change setting to **`Mode: Static`**.

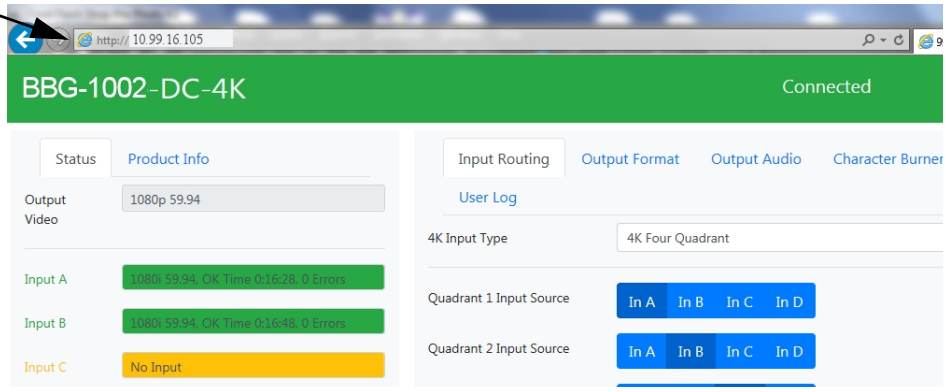
4. Configure the following fields as desired and appropriate for your network connection (examples shown below).

```
Menu: Network Settings
  IP: 10.99.16.105
  Netmask: 255.255.255.0
  Gateway: 10.99.16.1
  Mode: Static
```

5. Press X to commit changes and exit the setup menu.
Note: Current IP address of BBG-1002 can now be checked from the front panel by accessing this at any point.

6. At this point, BBG-1002 can now be accessed with a web browser pointing to the configured address. Browse to the configured address and check connectivity.

Web browser pointing to configured address displays BBG-1002



Finding a BBG-1002 Device in DashBoard

(See Figure 3-2) If BBG-1002 is configured with an address within a network also available via DashBoard, a BBG-1002 device appears as a frame entity in the DashBoard Basic Tree View.

Note: BBG-1002 DashBoard remote control is also available by opening the device in DashBoard similar to opening an openGear® card.

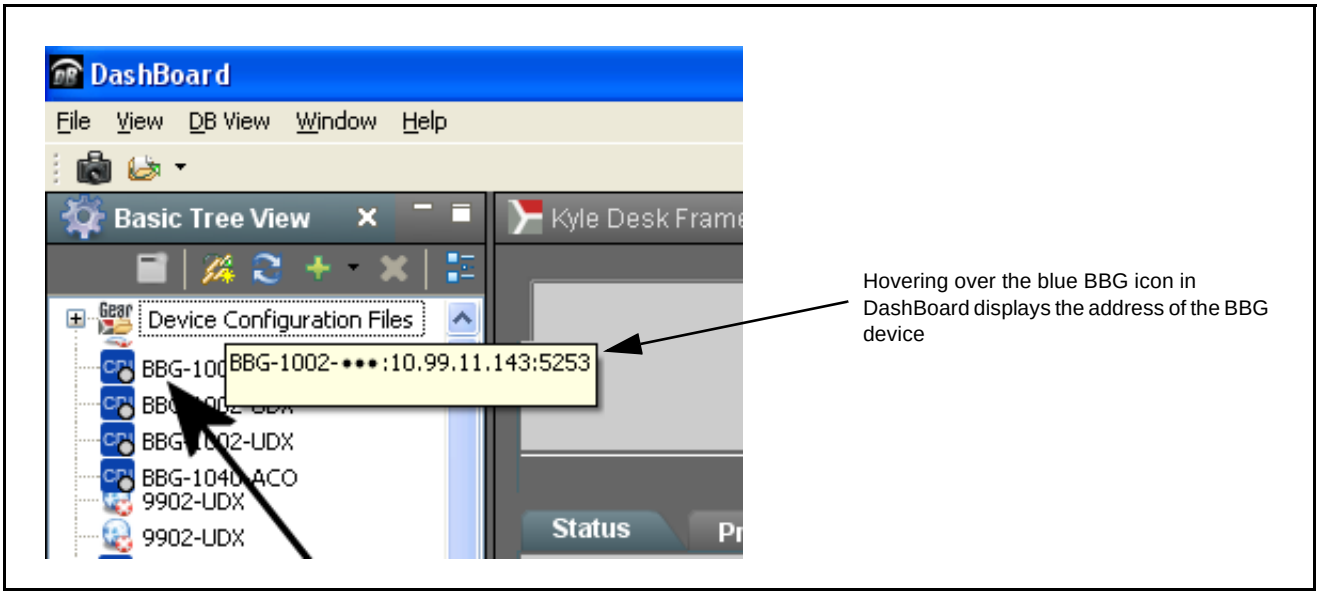


Figure 3-2 Finding BBG-1002 Using DashBoard

Control and Display Descriptions

This section describes the web user interface controls for using the BBG-1002-DC-4K.

The format in which the BBG-1002-DC-4K functional controls appear follows a general arrangement of Function Submenus under which related controls can be accessed (as described in Function Submenu/Parameter Submenu Overview below).

Function Submenu/Parameter Submenu Overview

The functions and related parameters available on the BBG-1002-DC-4K device are organized into function **menus**, which consist of parameter groups as shown below.

Figure 3-3 shows how the BBG-1002-DC-4K device and its menus are organized, and also provides an overview of how navigation is performed between devices, function menus, and parameters.

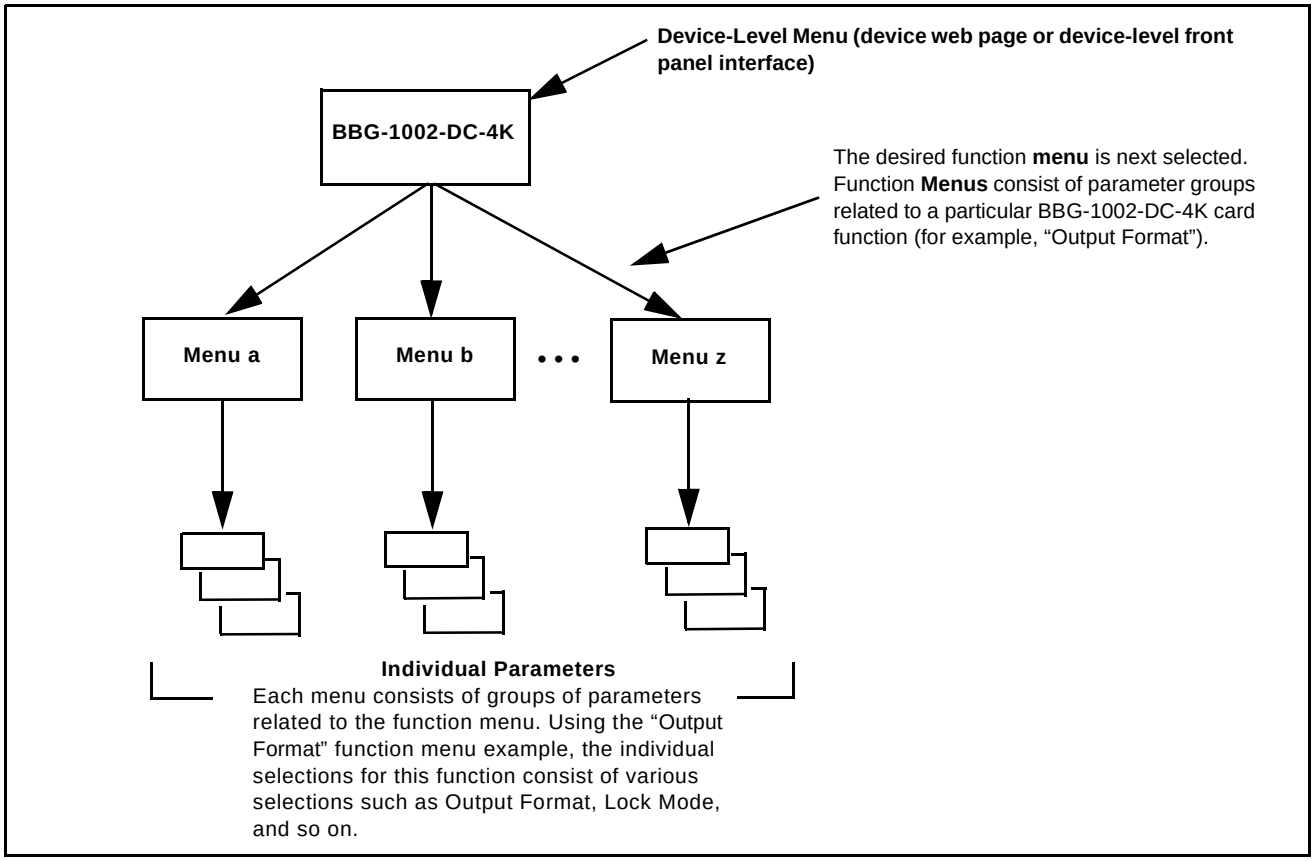
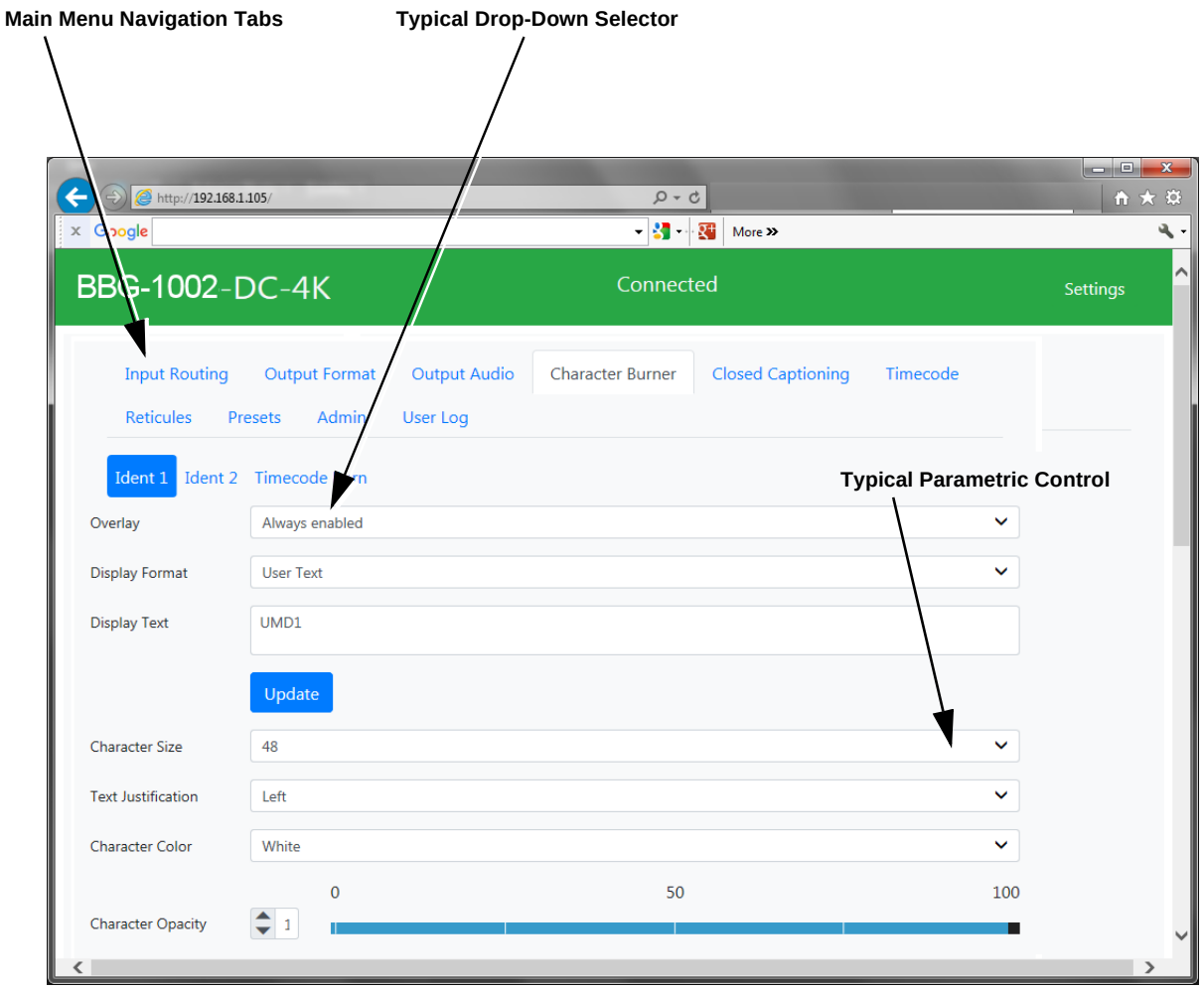


Figure 3-3 Function Submenu/Parameter Submenu Overview

Web User Interface

(See Figure 3-4.) The device function menu is organized using main menu navigation tabs which appear on the left side of any pane regardless of the currently displayed pane. When a menu 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.



In this example, the **Character Burner** main menu tab is selected, with the overall pane now showing all sub-menu items related to this function.

Clicking another main menu tab immediately displays the pane related to the selected main menu tab.

Figure 3-4 Typical Web UI Display and Controls

Display Theme

(See Figure 3-5.) The BBG-1002 user interface theme selection offers light and dark themes suited for various users and environments.

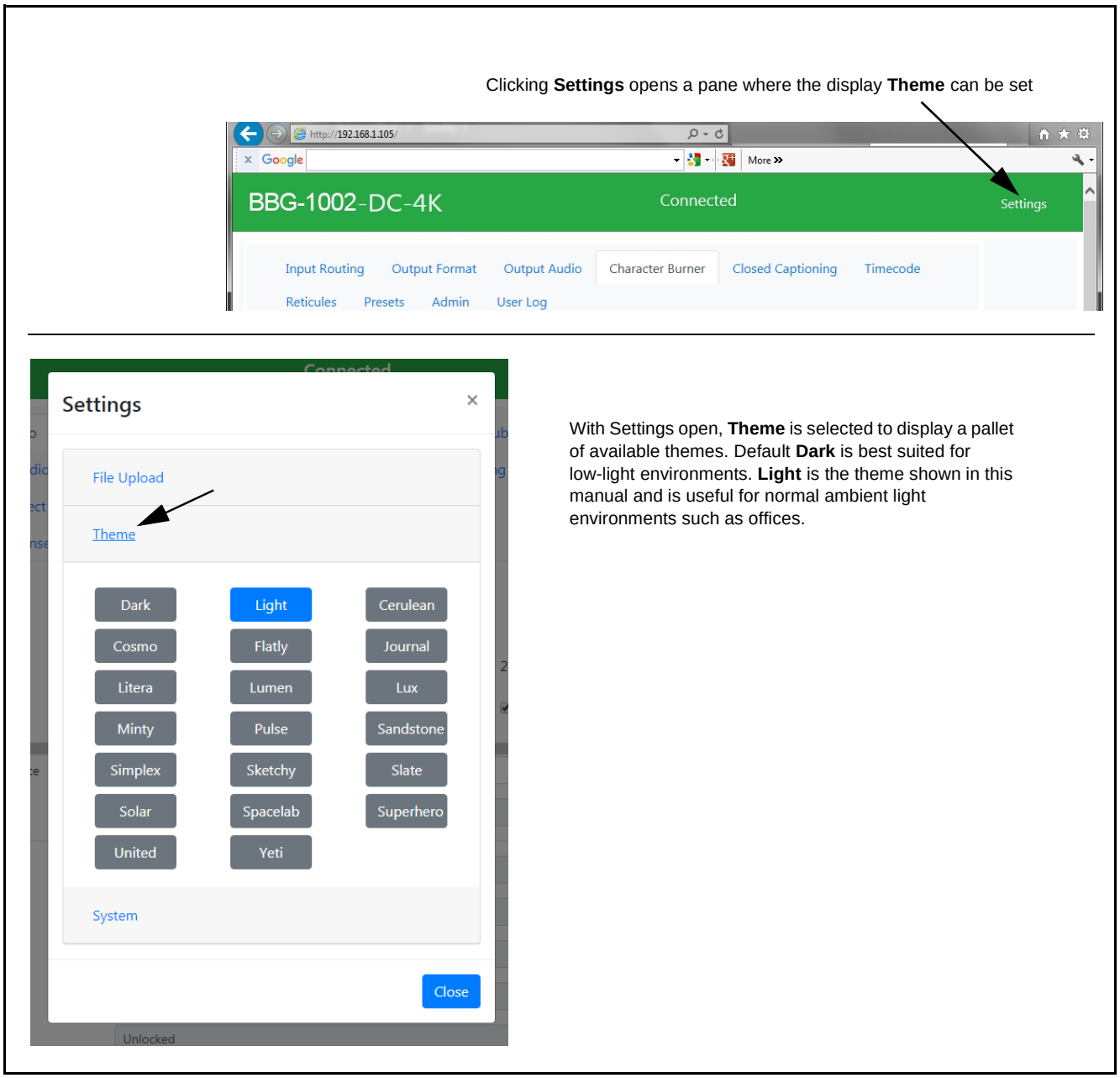


Figure 3-5 Web UI Display Themes

Checking BBG-1002-DC-4K Device Information

The operating status and software version the BBG-1002-DC-4K device can be checked by clicking the **Status** main menu tab. Figure 3-6 shows and describes the BBG-1002-DC-4K device information status display.

Note: Proper operating status is denoted by green icons for the status indicators shown in Figure 3-6. Yellow or red icons respectively indicate an alert or failure condition. Refer to Troubleshooting (p. 3-31) for corrective action.

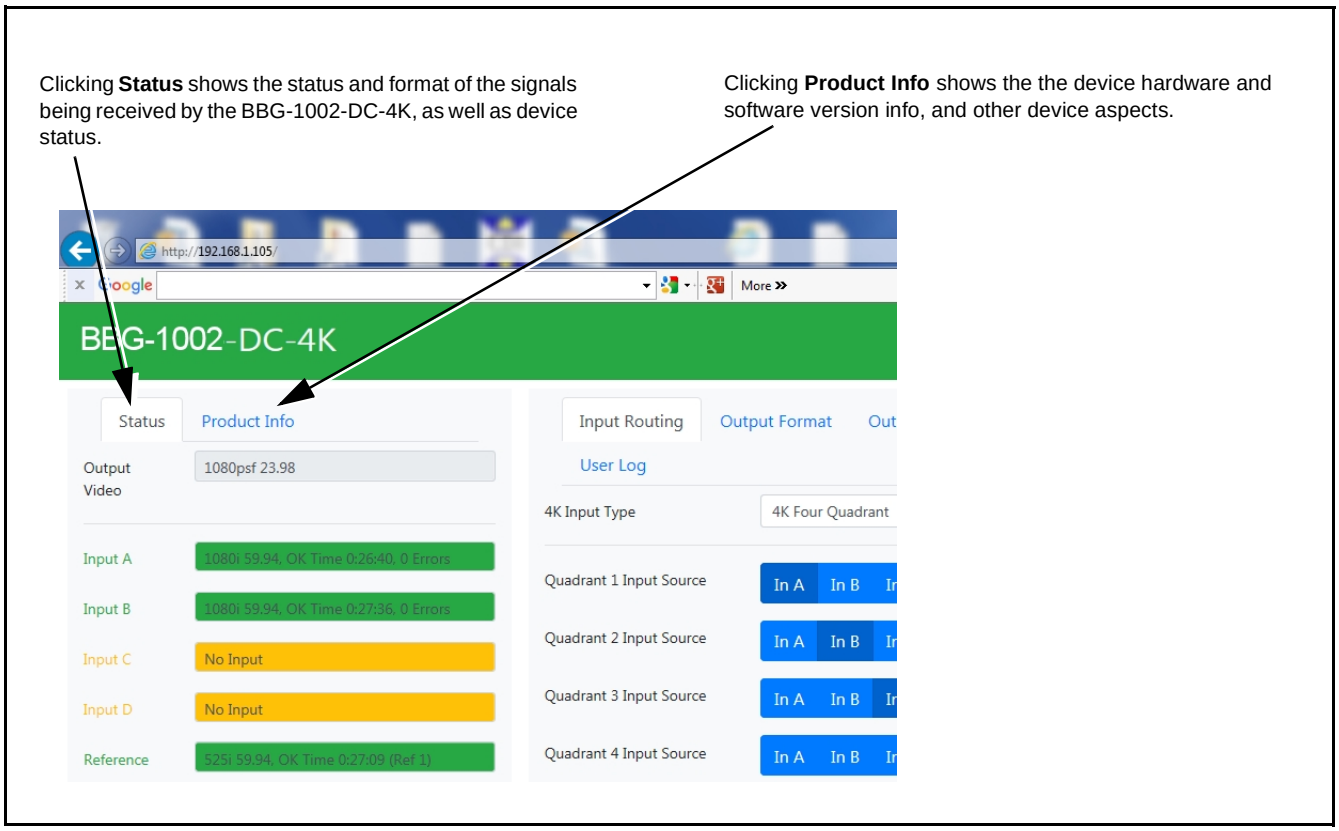


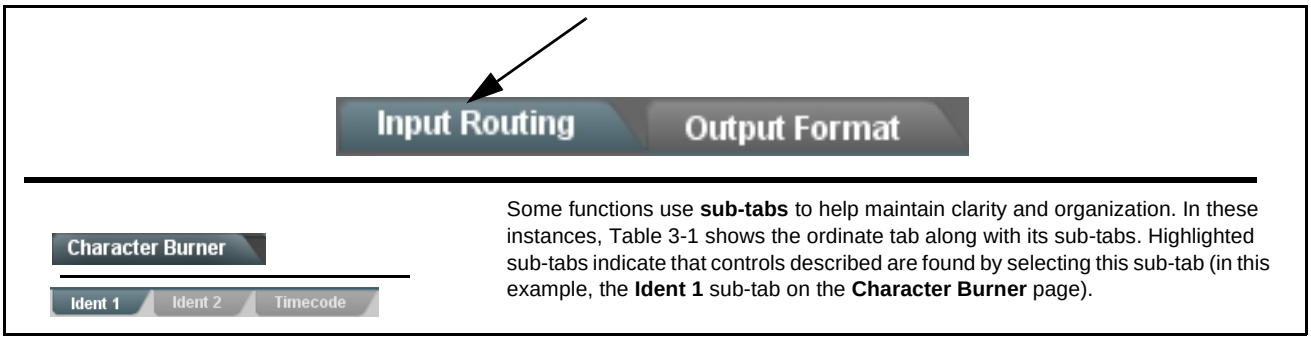
Figure 3-6 BBG-1002-DC-4K Device Info/Status Utility

BBG-1002-DC-4K Function Menu List and Descriptions

Table 3-1 individually lists and describes each BBG-1002-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.)
- User interface depictions here show DashBoard user interface. Web user interface is similar.

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	3-10	Timecode	3-19
Output Format Controls	3-10	Reticules	3-23
Output Audio Routing/Controls	3-12	Presets	3-26
Character Burner	3-13	Admin	3-27
Closed Captioning	3-18	User Log	3-29

Table 3-1 BBG-1002-DC-4K Function Menu List

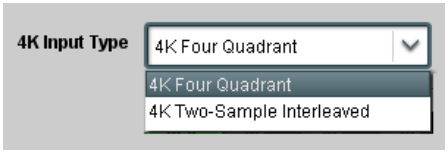
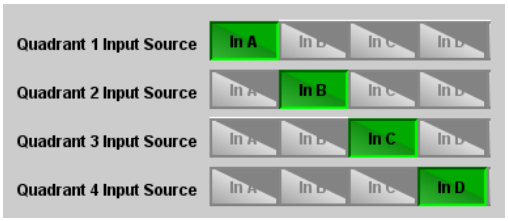
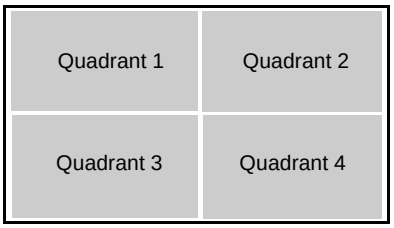
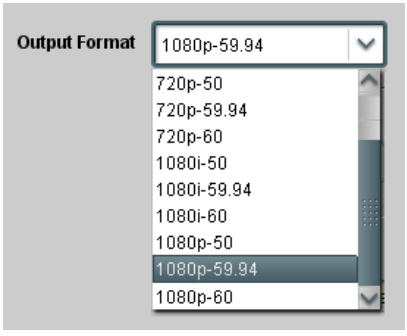
Input Routing	Provides controls to select input routing of device SDI inputs to the four quadrants comprising the combined image raster.
• 4K Input Type Select 	Sets the four-quadrant inputs to accept either 4K Four Quadrant or 4K Two-Sample Interleaved.
• Quadrant Input Source Select 	Routes the SDI inputs (VID IN A thru VID IN D as **In A** thru **In D**, respectively) to the four quadrant inputs. (In this example, VID IN A thru VID IN D are respectively routed as Quadrant 1 thru Quadrant 4 input sources.) Default correlation of **In A** thru **In D** and quadrant identification is as shown to the left and below: 
Output Format	Provides controls to set combined output format/ conditioning and device global ref lock mode.
• Output Format Select 	Provides output conversions to formats as shown. **Note:** Although drop-down 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).

Table 3-1 BBG-1002-DC-4K Function Menu List — continued

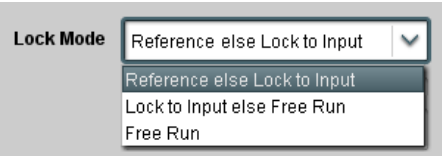
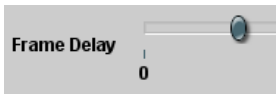
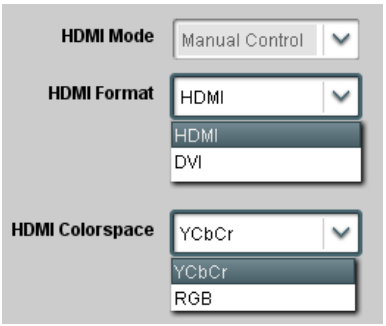
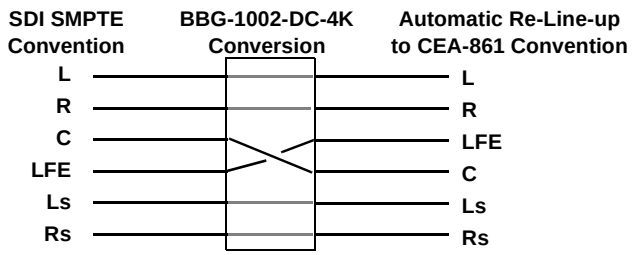
Output Format	**(continued)**
• **Video Lock Mode Select** **Option** 	(Option **+FS**) Selects lock to reference functions from the choices shown and described below. • **Lock to Reference:** Output video is locked to external reference received on the device **REF LOOP** input, else input. • **Lock to Input A:** Uses Input A program video input video signal as the reference standard, else free-run. • **Free Run:** Quadrant inputs and output video is locked to the card's internal clock. Output video is **not** locked to external reference. **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.
• **Frame Delay Control** 	When Framesync is enabled, specifies the smallest amount of latency delay (frames held in buffer) allowed by the frame sync.
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.	
• **Mode Control** 	Sets HDMI/DVI output to use the connected monitor to inform the device to automatically detect the monitor format, or to use manual (forced) control. 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.
• **Format Manual (Forced) Mode Controls** 	When **Mode** control is set to Manual, allows setting HDMI output as forced HDMI or DVI mode. Also when in manual mode, allows setting HDMI output colorspace as either forced YCbCr or RGB.
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. 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. 	

Table 3-1 BBG-1002-DC-4K Function Menu List — continued

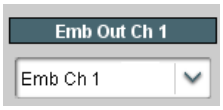
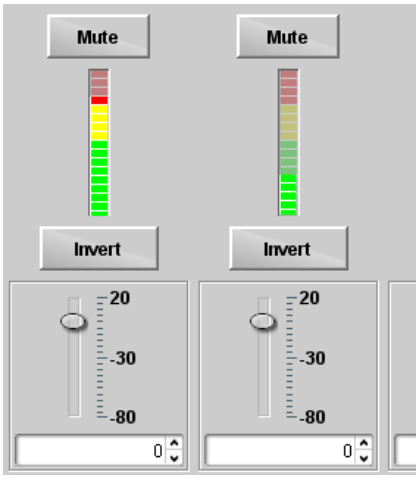
	Provides an audio crosspoint allowing the audio source selection for each embedded audio output channel. Also provides Gain, Phase Invert, and Muting controls and peak level meters for each output channel.
Note: • **Embedded Ch 2** thru **Embedded Ch 16** have controls identical to the **Source**, **Gain**, **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.	
• **Embedded Audio Output Input Source** 	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.)
• **Group Enable/Disable Controls** 	Allows enable/disable of embedded audio groups 1 thru 4 on program video output to accommodate some legacy downstream systems that may not support all four embedded audio groups. **Note:** Changing the setting of this control will result in a noise burst in all groups. This control should not be manipulated when carrying on-air content.
• **Embedded Output Channel Source** 	Using the drop-down list, selects the audio input source to be embedded in the corresponding embedded output channel from the following choices: • 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)
• **Channel Mute/Phase Invert/Gain Controls and Peak Level Display** 	Provides **Mute** and phase **Invert** channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.) **Gain** controls allow relative gain (in dB) control for the corresponding destination Embedded Audio Group channel. (-80 to +20 dB range in 1.0 dB steps; unity = 0 dB) **Note:** Although this device can pass non-PCM data such as Dolby® E or AC-3, setting the gain control to any setting other than default 0 will corrupt Dolby data.

Table 3-1 BBG-1002-DC-4K Function Menu List — continued

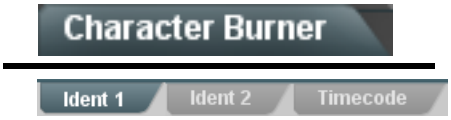
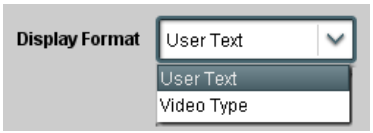
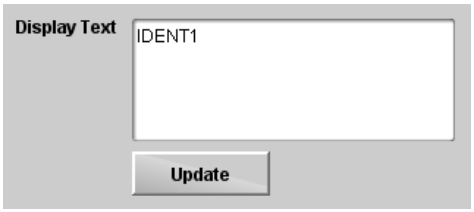
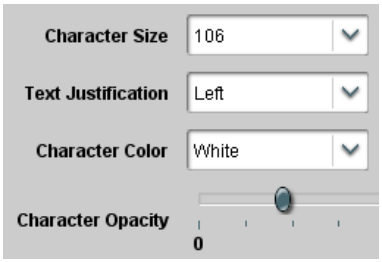
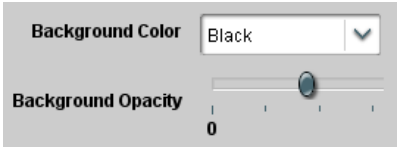
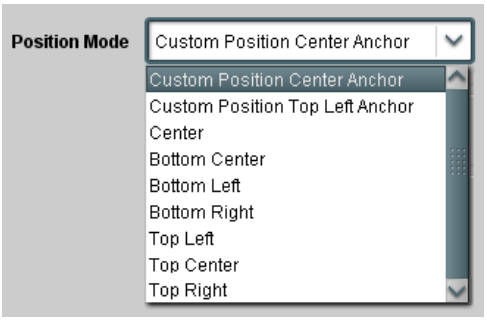
	Provides user-configurable burn-in of up to two text strings and timecode on output video.
Note: Ident 1 and **Ident 2** sub-tabs provide identical, independent controls for inserting two independent text (identification) burn-in overlays on the output video. **Ident 2** has controls identical to the controls described here for Ident 1. Therefore, only the Ident 1 controls are shown here.	
• **Ident Insertion Controls** 	Selects the rules for identification text burn-in overlay insertion into output video.
• **Display Type (Format) Select** 	Selects the type of data to be displayed as burn-in text from choices shown. • **User text** allows user text to be entered using field described below. • **Video type** inserts an overlay showing the video format of the input being used for processing.
• **Display (Ident) Text Entry Field** 	Dialog entry box that allows entry of desired ident text string. Enter desired text as click Update when done to input the text string. **Note:** • All normal keyboard alphanumeric characters are supported, in addition to ASCII characters (Windows ALT+*nnnn*). • Up to 126 characters can be entered.
• **Ident Text Attributes Controls** 	Sets burn-in size/position attributes as follows: • **Character Size** sets character size (in pixels). • **Text Justification** selects from left, right, or center-aligned justification within the text box overlay. • **Character Color** selects text color. • **Character Opacity** sets text opacity from 0% (least opacity) to 100% (full opacity).
• **Ident Text Background Attributes Controls** 	Provides independent controls for setting the color and opacity of the burn-in text and its background. • **Color** drop-down sets background color from multiple choices. • **Opacity** control sets background opacity from 0% (least opacity) to 100% (full opacity).

Table 3-1 BBG-1002-DC-4K Function Menu List — continued

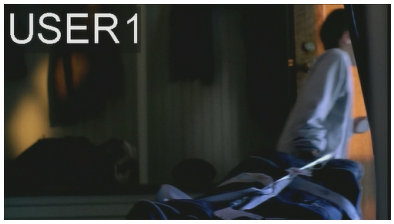
(continued)

• Ident Position Select

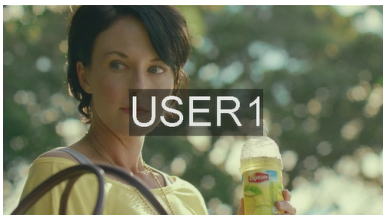


Sets the location of the ident text insertion from choices shown or custom. (When Custom is selected, position is configured using the **Ident Text Positioning Controls** described below.)

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

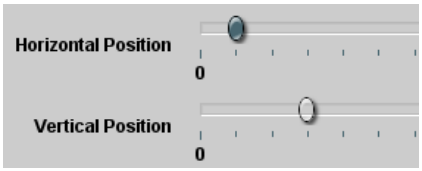


Example: Ident 1 text using **Center** position



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

• Ident Text Positioning Controls



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

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

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

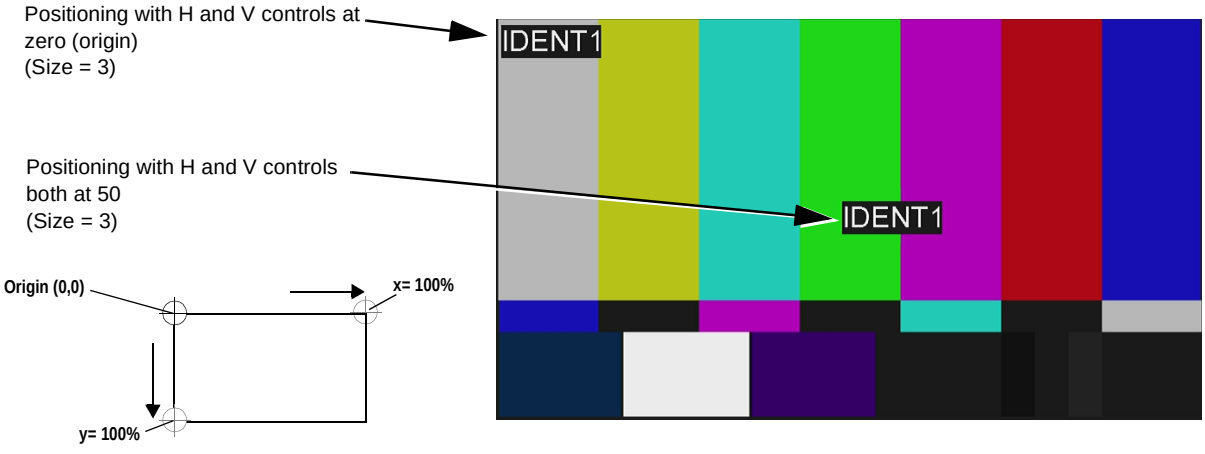


Table 3-1 BBG-1002-DC-4K Function Menu List — continued

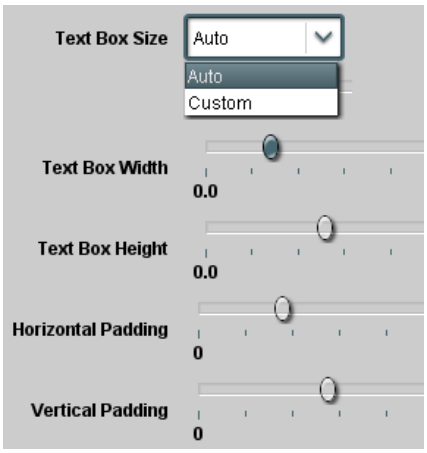
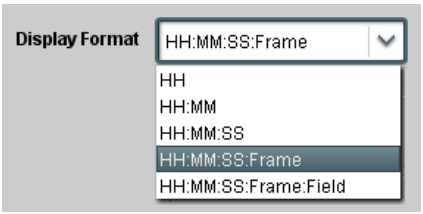
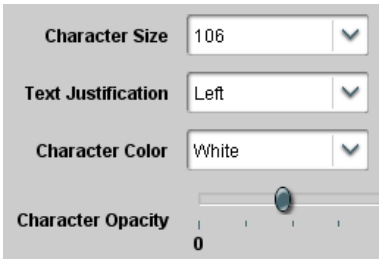
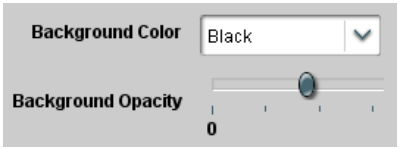
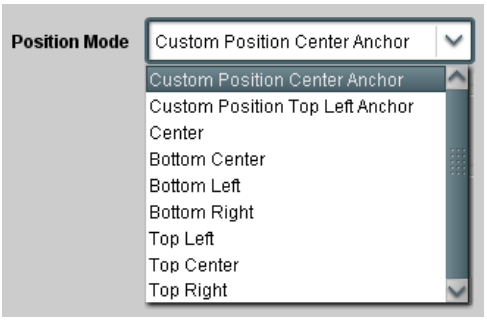
	(continued)
• **Text Box Sizing Controls** 	Provides controls for setting the size of the burn-in text background box. • **Auto** allows text box to proportionally size with selected text size. • **Custom** allows override of proportional sizing and allows text V and H dimensions to be set as desired. • **Text Box Width** and **Height** allow manual sizing when set to **Custom**. • **Custom** allows override of proportional sizing and allows text V and H dimensions to be set as desired. • **Horizontal** and **Vertical Padding** allow fine adjustment of V and H dimensions to be set when **Auto** is selected.
• **Text Box Border Enable** 	When set to Enabled, applies a white hairline border to the text box edges.
	Provides controls for burn-in of timecode on output video.
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. 3-19) for information on using timecode controls.	
• **Timecode Insertion Control** 	Selects the rules for timecode burn-in overlay insertion into output video.
• **Timecode Format Display Selector** 	Selects the format of timecode string burn-in overlay insertion into output video from choices shown.

Table 3-1 BBG-1002-DC-4K Function Menu List — continued

<table>
<tr><td>
</td><td>(continued)</td></tr>
<tr><td>• Timecode Attributes Controls
 
</td><td>Sets burn-in size/position attributes as follows:
• Character Size sets character size (in pixels).
• Text Justification selects from left, right, or center-aligned justification within the text box overlay.
• Character Color selects text color.
• Character Opacity sets text opacity from 0% (least opacity) to 100% (full opacity).</td></tr>
<tr><td>• Timecode Background Attributes Controls
 
</td><td>Provides independent controls for setting the color and opacity of the burn-in text and its background.
• Color drop-down sets background color from multiple choices.
• Opacity control sets background opacity from 0% (least opacity) to 100% (full opacity).</td></tr>
<tr><td>• Timecode Position Select
 
</td><td>Sets the location of the timecode insertion from choices shown or custom. (When Custom is selected, position is configured using the Timecode Positioning Controls described below.)
Example: Timecode burn-in using Bottom Center position

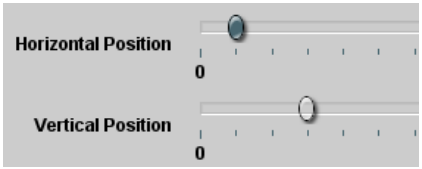
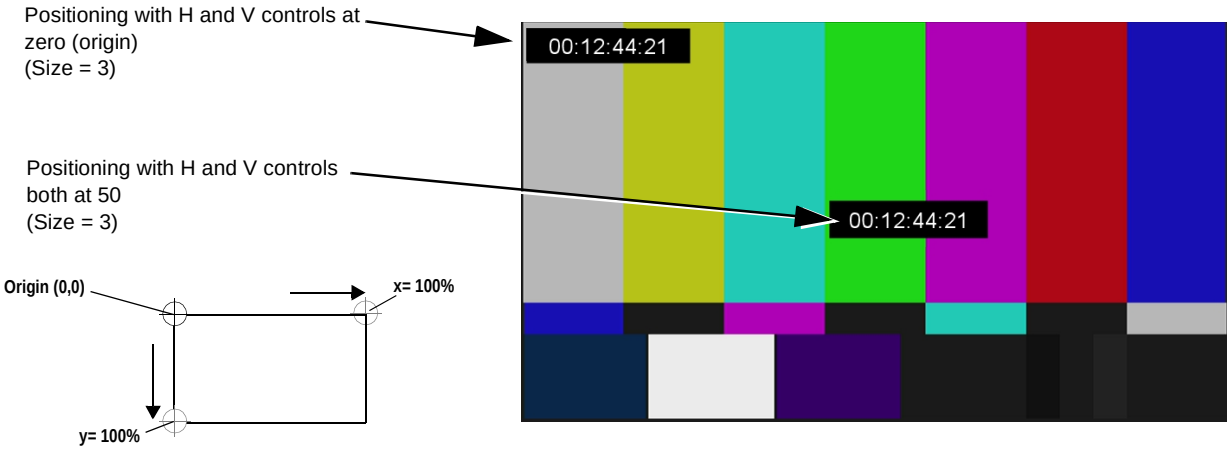
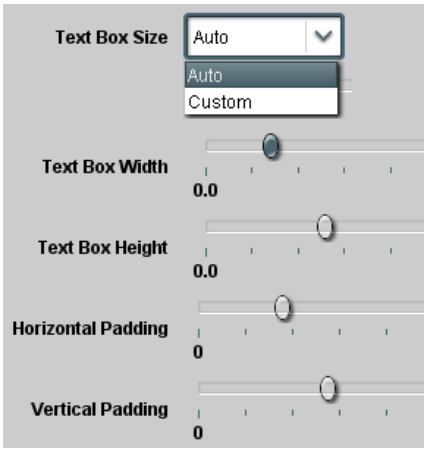
Example: Timecode burn-in using Top Left position
</td></tr>
<tr><td>• Timecode Positioning Controls
 
</td><td>With Custom selected, sets burn-in position attributes as follows:
• Horizontal Position sets horizontal position (in percentage of offset from left of image area). (Range is 0 thru 100%)
• Vertical Position sets vertical position (in percentage of offset from top of image area, top justified). (Range is 0 thru 100%)
Note: • Horizontal and Vertical Position controls are functional only when Custom Position is selected.
• Character sizing and positioning for a given raster format may not be appropriate for another format (especially if transitioning from HD to SD). Set size and position for a balanced appearance (e.g., do not place text too close to margins or set larger than necessary) that accommodates both HD and SD raster formats if multiple format use is required.</td></tr>
</table>

Table 3-1 BBG-1002-DC-4K Function Menu List — continued

(continued)



- **Text Box Sizing Controls**



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

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

- **Text Box Border Enable**

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

Table 3-1 BBG-1002-DC-4K Function Menu List — continued

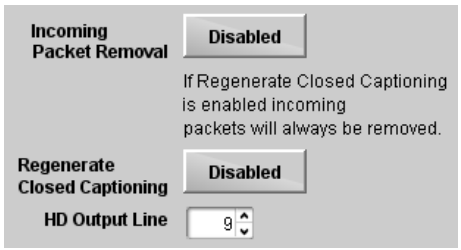
<table>
<tr><td>Closed Captioning</td><td>Provides support for closed captioning setup.</td></tr>
<tr><td colspan="2">Note: The closed captioning function is tied to and considers CC sources only received on SDI IN A.</td></tr>
<tr><td>• Closed Captioning Input Status
 </td><td>Displays incoming Closed Captioning status as follows:
• If closed captioning is present, a message similar to the example shown is displayed.
• If no closed captioning is present in the video signal, Not Present or Disabled is displayed.
Note: • Packet closed captioning status Captioning Rejected Due To message can appear due to the items described below. The closed captioning function assesses cdp_identifier, cdp_frame_rate, ccdata_present, and caption_service_active items contained in the packet header to make the determinations listed below. Refer to CEA-708-B for more information.
<table>
<tr><th>Message</th><th>Description</th></tr>
<tr><td>Unsupported Frame Rate</td><td>Film rate closed-captioning (either as pass-through or up/down conversion) is not supported by the card.</td></tr>
<tr><td>Data Not Present</td><td>Packet is marked from closed captioning source external to the card that no data is present.</td></tr>
<tr><td>No Data ID</td><td>Packet from closed captioning source external to the card is not properly identified with 0x9669 as the first word of the header (unidentified packet).</td></tr>
</table>
• caption service is marked as inactive display indicates bit in packet from upstream source may inadvertently be set as inactive. In this case, closed captioning data (if present) is still processed and passed by the device as normal.
• The closed captioning function does not support PAL closed captioning standards.</td></tr>
<tr><td>• Closed Captioning Remove/Regenerate and HD Insertion Line Controls
  </td><td>Allows removal of closed captioning packets and regeneration of packets. This is useful where closed captioning must be moved to a different line than that received on.
Note: • Although the output line drop-down will allow any choice within the 9 thru 41 range, the actual range is automatically clamped (limited to) certain ranges to prevent inadvertent conflict with active picture area depending on video format.
• The device does not check for conflicts on a given line number. Make certain selected line is available and carrying no other data.</td></tr>
</table>

Table 3-1 BBG-1002-DC-4K Function Menu List — continued

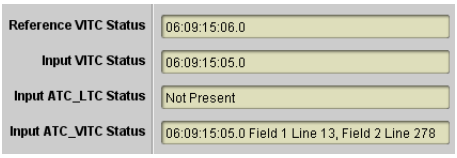
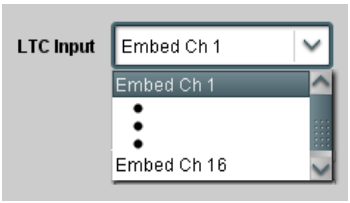
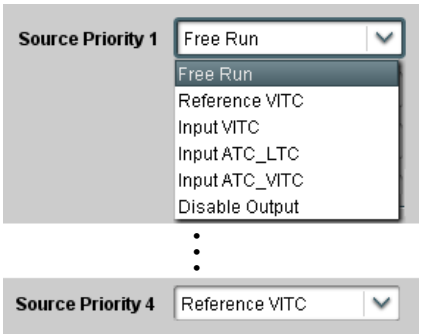
Timecode	Provides timecode data extraction from various sources, and provides formatting and re-insertion controls for inserting the timecode into the output video.
Note: The timecode function is tied to and considers VBI timecode sources only received on SDI IN A.	
Option **Audio LTC** controls described below only appear with **+LTC** licensed optional feature. This feature allows audio LTC from an audio channel to be used as a timecode source, with conversion to a selected SMPTE 12M format on the output video.	
• **Timecode Source Status Displays** 	Displays the current status and contents of the four supported external timecode formats shown to the left. • If a format is receiving timecode data, the current content (timecode running count and line number) is displayed. • If a format is not receiving timecode data, Not Present is displayed.
• **LTC Input Source Control** 	Selects source to be used by device to **receive** LTC from SDI IN A embedded audio channels. **Note:** COM 1 and COM 2 choices may appear in this drop-down. These choices are currently not supported by this model.
• **Mute LTC Control** 	Allows LTC audio output to mute upon loss of selected timecode inputs. • 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. **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 device failover timecode selection may substitute another format choice for the format not being received.
• **Incoming ATC Packet Removal Control** 	Enables or disables removal of existing input video ATC timecode packets from the output. This allows removal of undesired existing timecodes from the output, resulting in a “clean slate” where only desired timecodes are then re-inserted into the output. (For example, if both SDI ATC_VITC and ATC_LTC are present on the input video, and only ATC_LTC is desired, using the Removal control will remove both timecodes from the output. The ATC_LTC timecode by itself can then be re-inserted on the output using the other controls discussed here.) **Note:** Set this control to **Enabled** if Free-Run timecode is to be used. If incoming packets are not removed, output embedded SMPTE timecode may alternate between free-run and embedded SMPTE timecode values.

Table 3-1 BBG-1002-DC-4K Function Menu List — continued

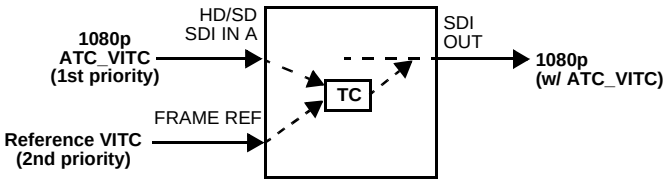
Timecode **(continued)**

• **Source Priority**



Selects the priority assigned to each of the four supported external formats, and internal Free Run in the event the preferred source is unavailable.

Source Priority 1 thru **Source Priority 4** select the preferred format to be used in descending order (i.e., Source Priority 2 selects the second-most preferred format, and so on. See example below.)



In this example, **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.

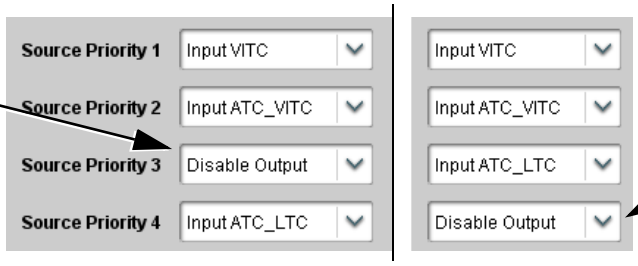
The selected timecode source is embedded on the SDI video output (in this example, 1080p) using the selected line number. In this example, if the ATC_VITC on SDI IN A input becomes unavailable, the card then uses the reference VITC data received on the frame reference.

Note: Set Incoming ATC Packet Removal Control to **Enabled** if Free-Run timecode is to be used. If incoming packets are not removed, output embedded SMPTE timecode may alternate between free-run and embedded SMPTE timecode values.

⚠ Disable Output setting should be used with care. If Disable Output is selected with alternate intended format(s) set as a lower priority, the device will disable **all** timecode output should the ordinate preferred format(s) become unavailable.

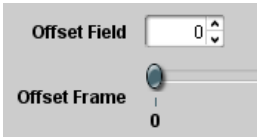
Typically, choices other than Disable should be used if a timecode output is always desired, with Disable only being used to remove all timecode data.

In this example, even though and ATC_LTC could be available to substitute for ATC_VITC not being present, the card will revert to no timecode output since the choice of Disable Output "out-prioritizes" ATC_LTC with these settings.



The choices shown here will allow ATC_LTC to "out-prioritize" Disable Output if ATC_VITC is not available.

• **Offset Controls**



Allows the current timecode count to be advanced or delayed on the output video.

- **Offset Advance** or **Delay** selects offset advance or delay.
- **Offset Field** delays or advances or delays timecode by one field.
- **Offset Frame** delays or advances or delays timecode by up to 5 frames.

Note: Default settings are null, with both controls set at zero as shown.

Table 3-1 BBG-1002-DC-4K Function Menu List — continued

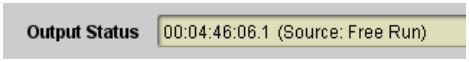
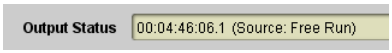
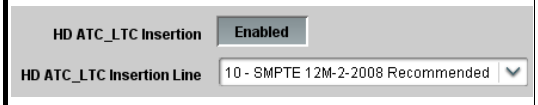
Timecode	**(continued)**
• **Output Status Display** 	Displays the current content and source being used for the timecode data as follows:  • Output status OK (in this example, Free Run timecode is being outputted). • **Timecode Insertion** button set to **Disabled**; output insertion disabled. **Note:** • If timecode is not available from Source Priority selections performed, timecode on output reverts to Free Run (internal count) mode. • Because the 1's digit of the display Frames counter goes from 0 to 29, the fractional digit (along with the 1's digit) indicates frame count as follows: 0.0 Frame 0 0.1 Frame 1 1.0 Frame 2 1.1 Frame 3 • • • 29.1 Frame 59
• **Audio LTC Output** Option	Audio LTC output is routed to desired embedded 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.
Note: • Although the output line drop-down on the controls described below will allow a particular range of choices, the actual range is automatically clamped (limited) to certain ranges to prevent inadvertent conflict with active picture area depending on video format. • The device does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data.	
• **HD ATC_LTC Insertion Control** 	For HD output, enables or disables ATC_LTC timecode insertion into the output video, and selects the line number for ATC_LTC timecode data.

Table 3-1 BBG-1002-DC-4K Function Menu List — continued

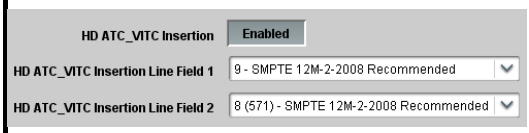
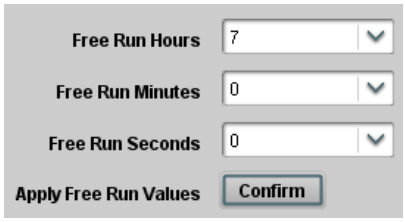
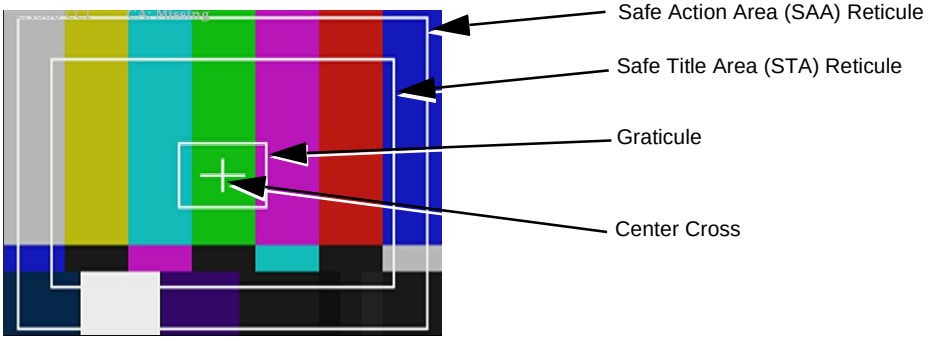
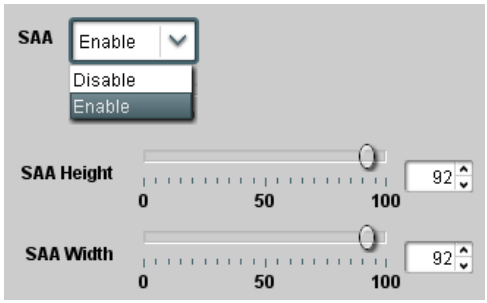
Timecode	(continued)
• **HD ATC_VITC Insertion Control** 	For HD output, enables or disables ATC_VITC timecode insertion into the output video, and selects the line number for ATC_VITC1 and ATC_VITC2.
• **ATC_VITC Legacy Support Control** 	When enabled, accommodates equipment requiring ATC_VITC packet in both fields as a “field 1” packet (non-toggling). **Note:** Non-toggling VITC1 and VITC2 packets do not conform to SMPTE 12M-2-2008 preferences. As such, ATC_VITC Legacy Support should be enabled only if required by downstream equipment.
• **Free Run Timecode Controls** 	Allows an initial (starting) count to be applied to output video timecode when Free Run insertion is enabled. **Note:** • Initialization can only be applied when device 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 BBG-1002-DC-4K Function Menu List — continued

<table>
<tr><td>
</td><td>Allows Safe Action and/or Safe Title overlays and other static markers to be added to the output video image.</td></tr>
<tr><td colspan="2">Typical Reticule/Overlay Marker Insertions
The BBG-1002-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.

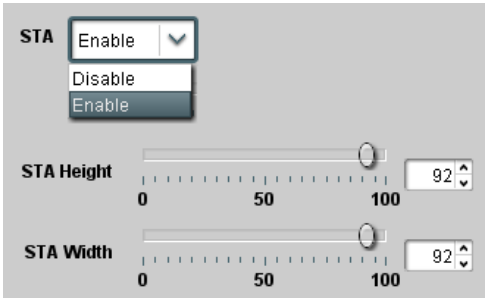
 

Note: • Overlay markers using this function are for setup only. When enabled, these markers are embedded in the output video and will appear in the image. Use this function only on preview video and not on-air video. Make certain any overlay tools are turned off when no longer needed.
• Multiple overlay markers described below can be simultaneously enabled as desired.</td></tr>
<tr><td>• Insertion Master Enable/Disable
</td><td>Provides independent master enable/disable for device SDI outputs.
• When enabled, any combination of reticules or other markers described below can be inserted.
• When disabled, insertion of all reticules or other markers is disabled.</td></tr>
<tr><td>• Safe Action Area (SAA) Controls
 
</td><td>• SAA provides enable/disable of safe action area graticule insertion.

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

Note: Reticule Size control is locked to Custom for this device, with safe action area size control as described above.</td></tr>
</table>

Table 3-1 BBG-1002-DC-4K Function Menu List — continued

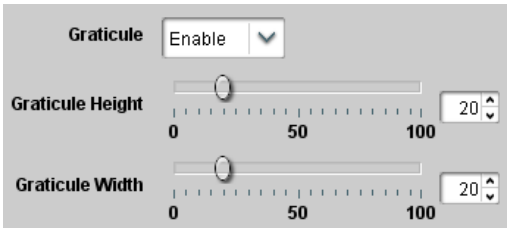
<table>
<tr><td>
</td><td>(continued)</td></tr>
<tr><td>• Safe Title Area (STA) Controls
 
</td><td>• STA provides enable/disable of safe title area graticule insertion.

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

</td><td>• Overlay Color selects from white, various gray fills, or black colors.

• Inverse Color selects inversion (negative) of current selection.

• Opacity sets the opacity of the overlay for both white/black and inverse color modes.

• Thickness sets the line thickness (in pixels).</td></tr>
<tr><td>
</td><td>Provides insertion and sizing controls for custom graticules and other markers. Also provides NTSC legacy 4:3 master reticule sizing.</td></tr>
<tr><td colspan="2">Note: Color attributes of markers described below are set using the master Overlay Color Controls described above.</td></tr>
<tr><td>• Graticule Controls
 
</td><td>• Graticule provides enable/disable of user graticule insertion.

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

Table 3-1 BBG-1002-DC-4K Function Menu List — continued

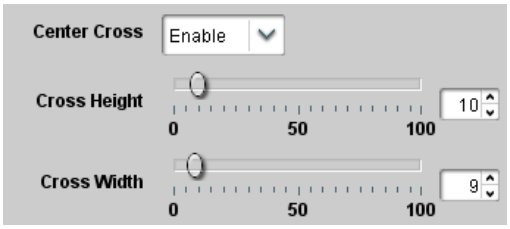
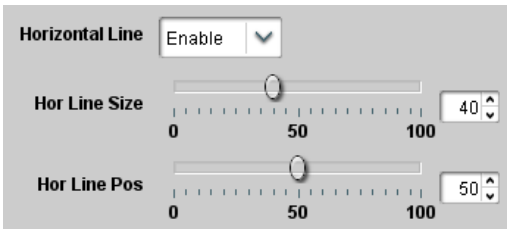
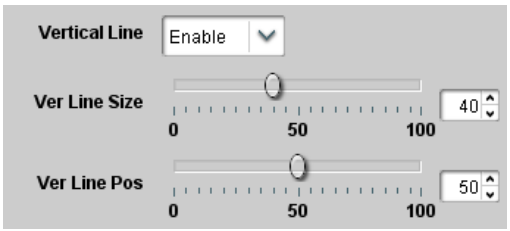
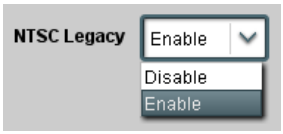
	(continued)
• **Center Cross Controls** 	• **Center Cross** provides enable/disable of center cross insertion. • **Cross Height** and **Width** control height of vertical line and width of horizontal line (from 0% to 100% of 4:3 outputted image area).
• **Horizontal Line Controls** 	• **Horizontal Line**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

Table 3-1 BBG-1002-DC-4K Function Menu List — continued

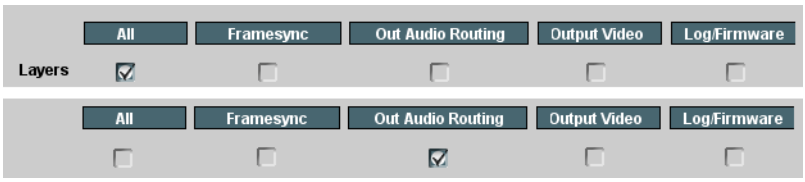
Presets

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.

• Preset Layer Select

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

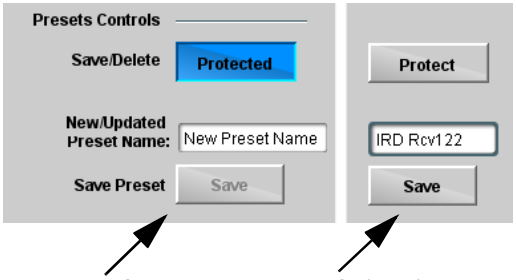
Default **All** setting will "look" at all device settings, and save and invoke **all** settings when the preset is invoked (loaded).



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".

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.

• Preset Enter/Save/Delete



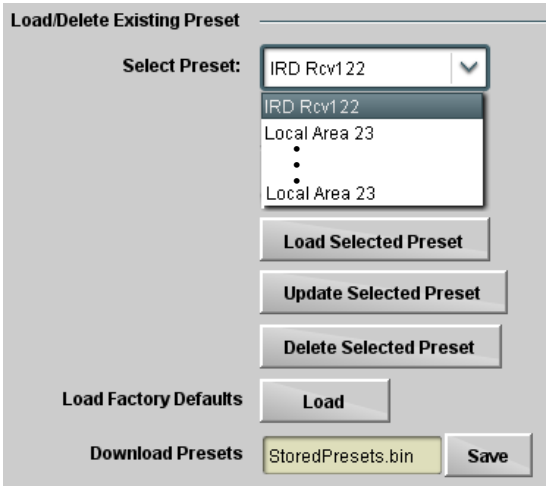
Protected state – changes locked out

Ready (open) state – changes can be applied

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

- **Protect (ready):** This state awaits Protected and allows preset Save/Delete button to save or delete current 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 device settings under the preset name defined above.

• Preset Save/Load Controls



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

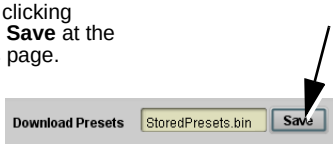
Note: Load Factory Defaults functions with no masking. The Preset Layer Select controls have no effect on this control and will reset **all** layers to factory default.

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

Table 3-1 BBG-1002-DC-4K Function Menu List — continued

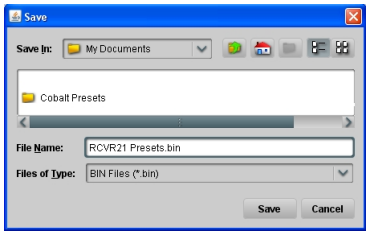
Presets	**(continued)**

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



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

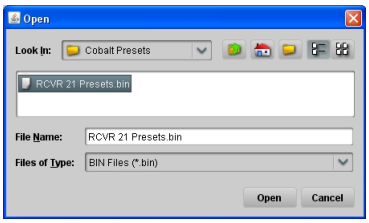
The file can then be renamed if desired (*RCVR21 Presets* in this example) before committing the save.



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

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

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



Note: • Preset transfer between 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.

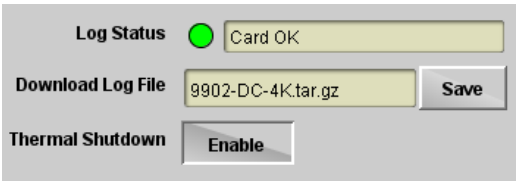
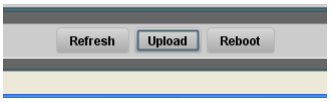
Admin **System** Networking	Provides a global device operating status and allows a log download for factory engineering support. Also provides controls for selecting and loading device firmware upgrade files. Networking controls provide dedicated networking setup for various device admin functions.
• **Log Status and Download Controls** 	• **Log Status** indicates overall device internal operating status. • **Download Log File** allows a device operational log file to be saved to a host computer. This log file can be useful in case of a device error or in the case of an operational error or condition. The file can be submitted to Cobalt engineering for further analysis. • **Thermal Shutdown** enable/disable allows the built-in thermal failover to be defeated. (Thermal shutdown is enabled by default). **CAUTION** **The BBG-1002-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 device protection.**

Table 3-1 BBG-1002-DC-4K Function Menu List — continued

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

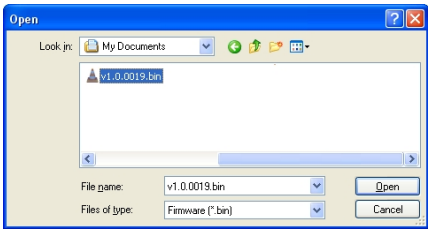
Note: The page/tab here allows managing multiple firmware versions saved on the device. New upgrade firmware from our web site can always be directly uploaded to the device without using this page. Instructions for firmware downloading to your computer and uploading to the device can be found at the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

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



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

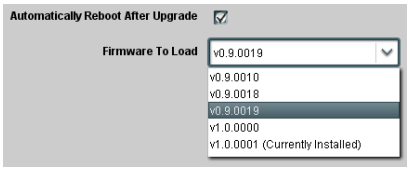
3. Select the desired file and click **Open** to upload the file to the card.



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

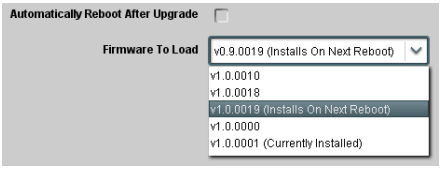
1. Click **Firmware To Load** and select the desired upgrade file to be loaded (in this example, "v1.0.0019").

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



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

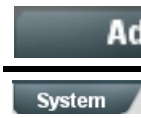
1. Click **Firmware To Load** and select the desired upgrade file to be loaded (in this example, "v1.0.0019"). Note now how the display shows "Installs on Next Reboot".



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

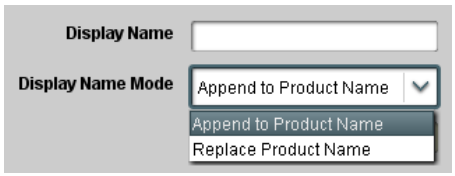
3. To cancel a deferred upload, press **Cancel Pending Upgrade**. The card reverts to the default settings that allow an immediate upload/upgrade.

Table 3-1 BBG-1002-DC-4K Function Menu List — continued



(continued)

- **Card DashBoard Name Control**

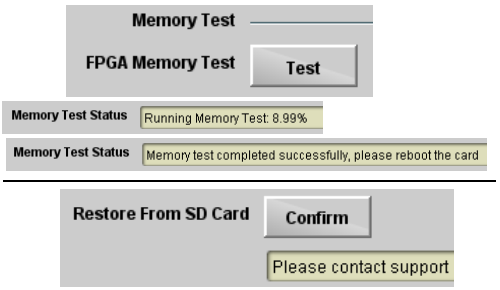


Allows card name In DashBoard to be changed as desired. Click return to engage change.

- **Append to Product Name** appends (or adds to) existing OEM name (for example, "BBG-1002-DC-4K *Processing 1A*").
- **Replace Product Name** completely replaces the OEM name OEM name (for example, "*Processing 1A*").

Note: DashBoard instance(s) may have to be refreshed before name change appears.

- **Card Check and Restore Utilities**

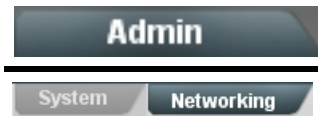


Memory Test allows all cells of the card FPGA memory to be tested.

This control should **only** be activated under direction of product support. Exercising the memory test is **not** part of normal card maintenance.

Restore from SD Card allows card rendered inoperable to be restored using an SD memory card fitted to the card internal SD slot.

Product support must be contacted prior to performing this operation. Use of any SD card not supplied by support can corrupt the card.

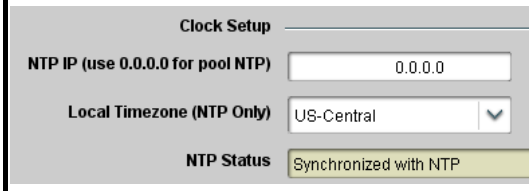


The **Networking** sub-tab provides a dedicated Ethernet connection to device control and monitoring (This IP interface is entirely independent and separate from the device's DashBoard frame-based remote control/ monitoring interface.) (Dedicated device control using IP has not been fully implemented at this release. Some functions may be reserved.)

- **Device SNMP MIB Download**

Where supported, allows device SNMP MIB files to be downloaded and saved using user-configured name.

- **NTP Clock Setup**



Allows device NTP clock IP source and localization. This is the clock/time device will use for logs and other recorded actions.

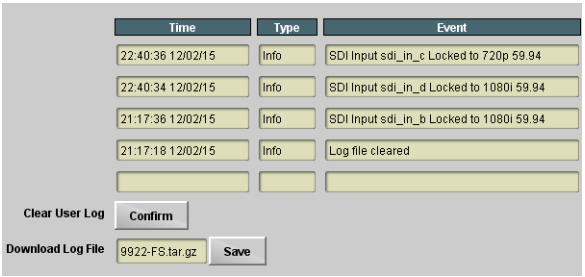
- **NTP IP** sets the IP address where NTP is to be obtained.
- **Local Timezone** sets the recorded time to the localized time.
- **NTP Status** shows if time is synced with NTP or if an error exists.

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

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

Clear User Log clears all entries.

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



Uploading Firmware Using Web Interface and GUI

Firmware (such as upgrades, option keys, and presets .bin files) can be uploaded to BBG-1002-DC-4K directly via the web html5 interface without going through DashBoard (see Figure 3-7). In addition to allowing uploads without needing a DashBoard connection, this method transfers files typically much faster than using DashBoard.

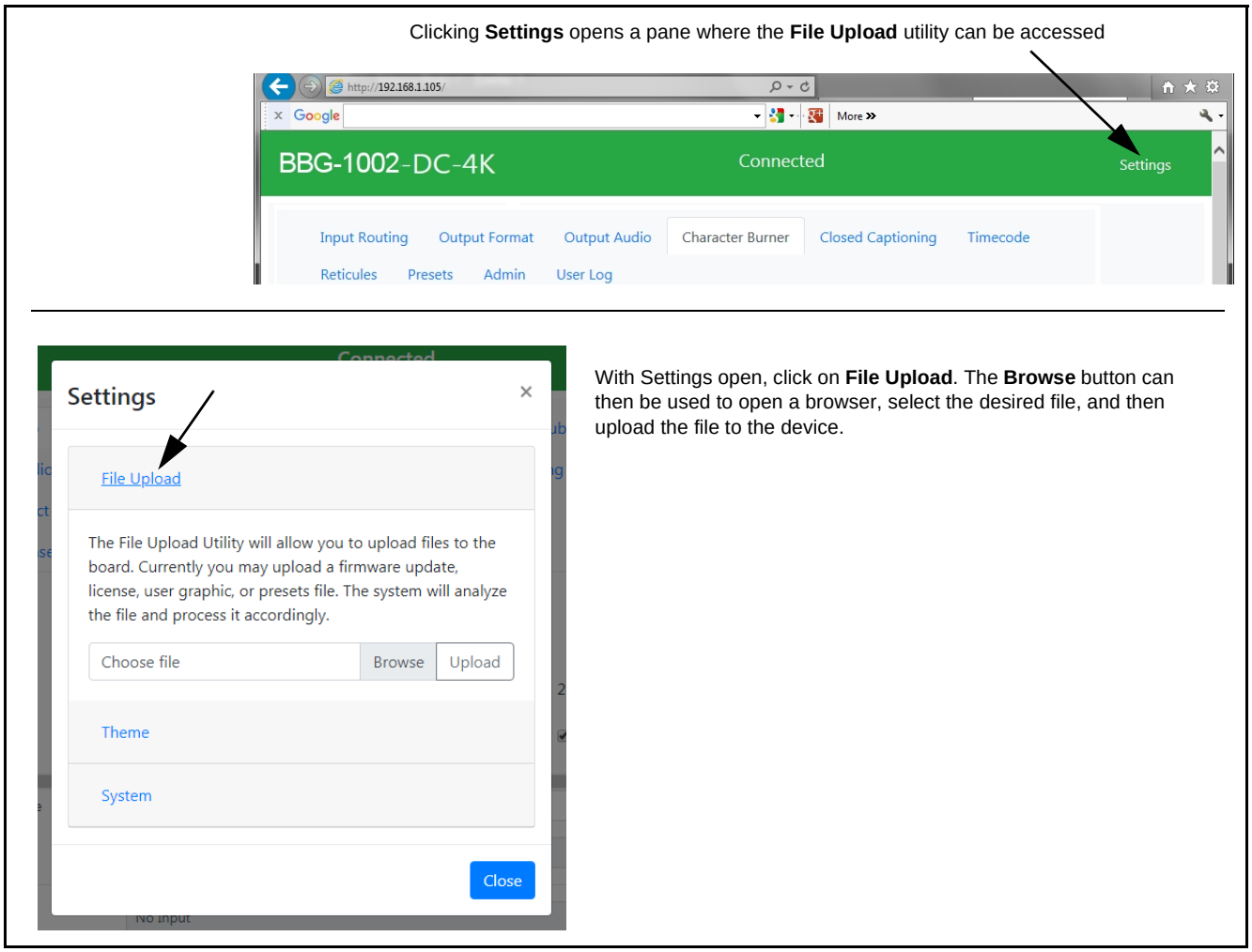


Figure 3-7 Uploads Using Web Interface/GUI

Troubleshooting

This section provides general troubleshooting information and specific symptom/corrective action for the BBG-1002-DC-4K and its remote control interface. The BBG-1002-DC-4K 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 BBG-1002-DC-4K itself and its remote control provide error and failure indications. Depending on how the BBG-1002-DC-4K is being used (i.e, standalone or network controlled through DashBoard™ or a Remote Control Panel), check all available indications in the event of an error or failure condition.

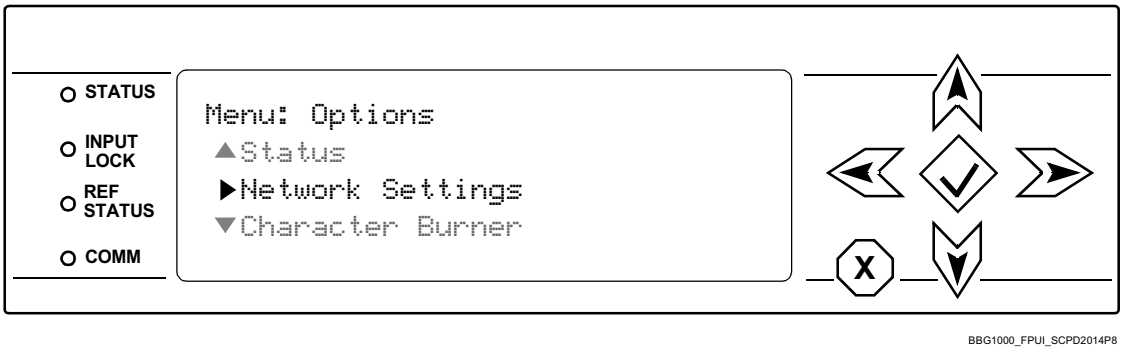
The various BBG-1002-DC-4K device and remote control error and failure indicators are individually described below.

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)
- BBG-1002-DC-4K Processing Error Troubleshooting (p. 3-33)

BBG-1002-DC-4K Front Panel Status/Error Indicators and Display

Figure 3-8 shows and describes the BBG-1002-DC-4K front panel indicators and display. These indicators and the display show status and error conditions relating to the device itself and remote (network) communications (where applicable). Because these indicators are part of the device itself and require no external interface, the indicators are particularly useful in the event of communications problems with external devices such as network remote control devices.



Item	Function
Alphanumeric Display	Shows device statuses
STATUS LED	Illuminates GREEN indicating BBG-1002-DC-4K has successfully powered-up and passed self-tests.
INPUT LOCK LED	Illuminates GREEN indicating signal presence for currently-selected input video path. Illuminates ORANGE if input video is lost.
REF STATUS LED	Illuminates GREEN indicating BBG-1002-DC-4K is receiving valid reference when set up for framesync operation. Illuminates ORANGE if reference is lost or incompatible with input video.
COMM LED	Illuminates GREEN when device is communicating with network connection. Illuminates ORANGE if connection is lost.
Note: The LEDs listed above are always illuminated under normal conditions. An LED that is not lit indicates an error with the device.	

Figure 3-8 BBG-1002-DC-4K Device Edge Status Indicators and Display

Basic Troubleshooting Checks

Failures of a general nature (affecting many devices 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	• On the BBG-1002-DC-4K, in all cases when power is being properly supplied all indicators should be illuminated. Any device showing no illuminated indicators should be cause for concern.
	• Check the Power Consumed indication for the BBG-1002-DC-4K. This can be observed using the Status front-panel or web UI pane.
	  • If display shows **no** power being consumed, either the frame power supply, connections, or the BBG-1002-DC-4K itself is defective.
	  • If display shows **excessive** power being consumed (see Technical Specifications (p. 1-10) in Chapter 1, “Introduction”), the BBG-1002-DC-4K 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 device inputs and/or outputs. Cabling mistakes are especially easy to make when working with large I/O modules.
Check status indicators and displays	On BBG-1002-DC-4K front panel and web interface 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 devices can be hot-swapped, replacing a suspect device with a known-good item.

BBG-1002-DC-4K Processing Error Troubleshooting

Table 3-3 provides BBG-1002-DC-4K processing troubleshooting information. If the BBG-1002-DC-4K 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 BBG-1002-DC-4K is not appropriately set for the type of signal being received by the device.

Note: Where errors are displayed on both the BBG-1002-DC-4K 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
BBG-1002 shows **Unlocked** message in BBG-1002-DC-4K Info pane.	No video input present	Make certain intended video source is connected to appropriate BBG-1002-DC-4K video input. Make certain BNC cable connections are OK.
Audio not processed or passed through device	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	Device **Presets** > **Automatically Reboot After Upgrade** box unchecked. Either reboot the device manually, or leave this box checked to allow automatic reboot to engage an upgrade upon selecting the upgrade.

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 3-9.) 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.

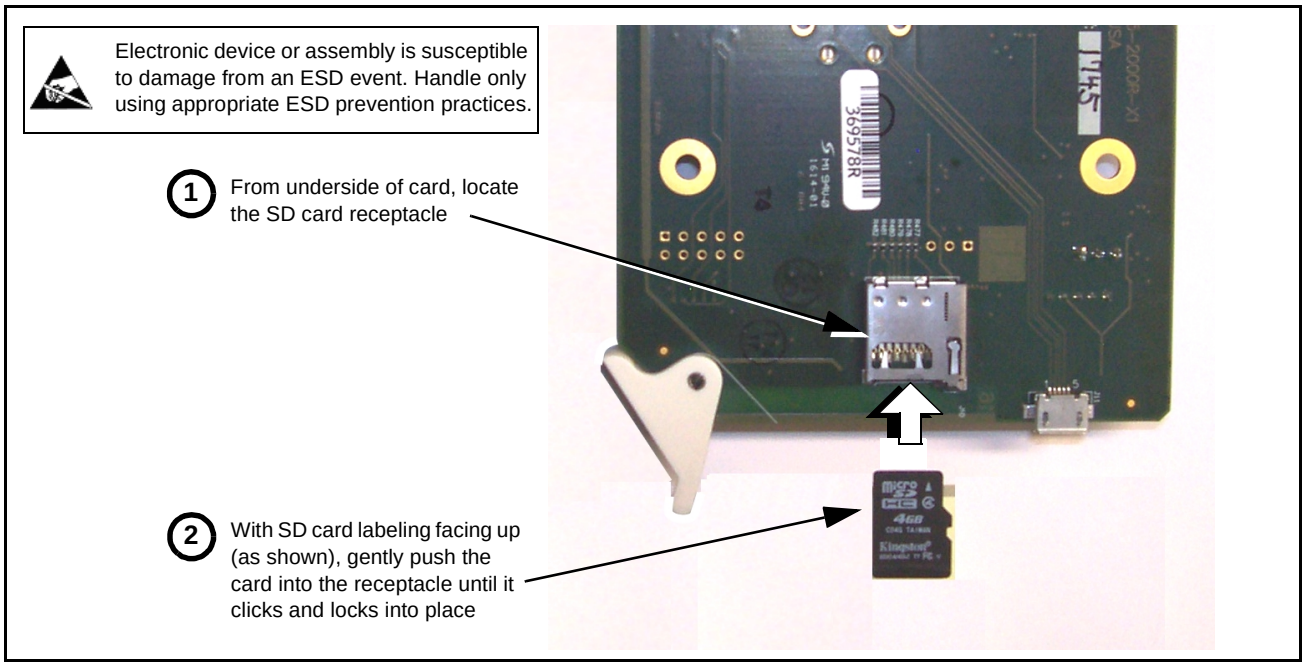


Figure 3-9 SD Card Installation

2. (See Figure 3-10.) With card powered-down, locate the **MMC BOOT** button on the card. Proceed as shown in picture.

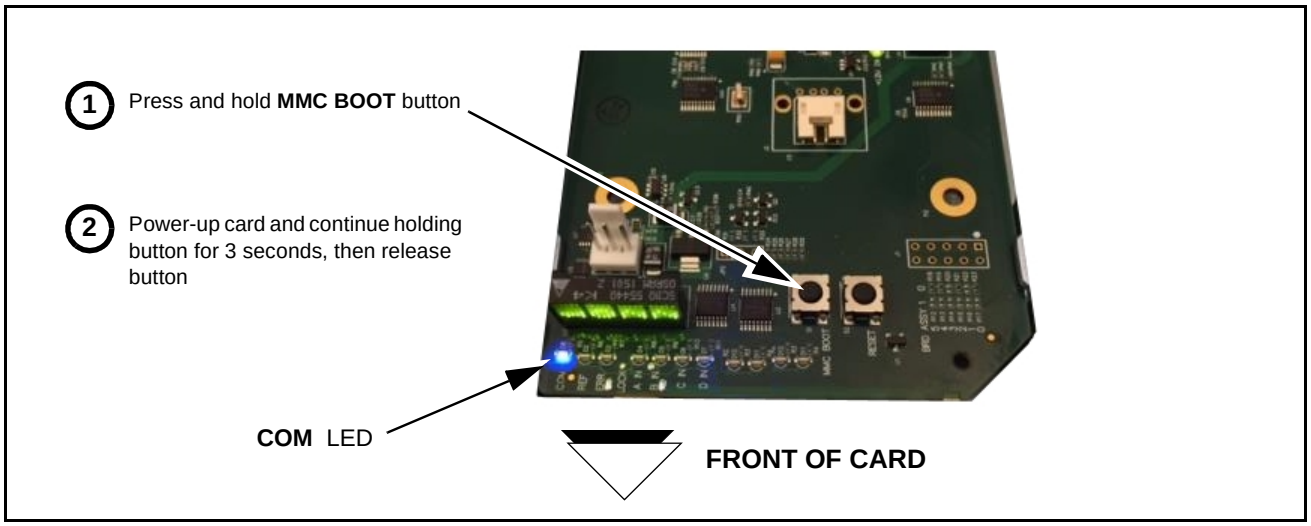


Figure 3-10 MMC Boot Button

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. 1-13) in Chapter 1, "Introduction" for contact information.

Cobalt Digital Inc.

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