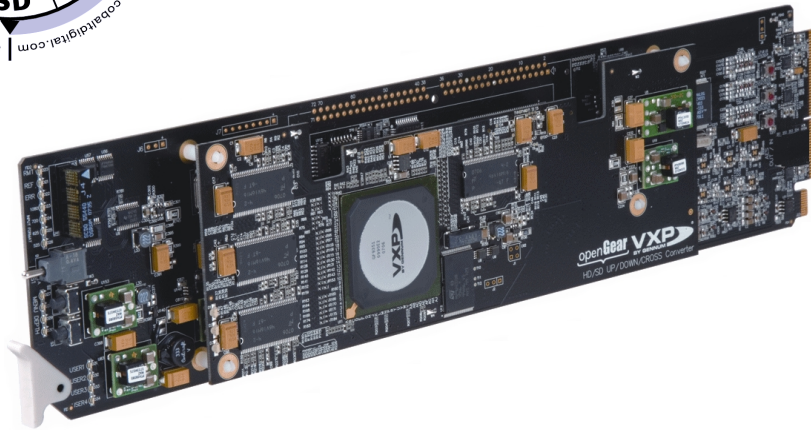


9064



Up/Down/Cross Converter

with HD/SD-SDI Input, RGB Color Corrector, and Frame Sync

Product Manual



Cobalt Digital Inc.

2406 E. University Ave.
Urbana, IL 61802
Voice 217.344.1243 • Fax 217.344.1245
www.cobaltdigital.com

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Congratulations on choosing the Cobalt[®] 9064 Up/Down/Cross Converter with HD/SD-SDI Input, RGB Color Corrector, and Frame Sync. The 9064 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 9064, please contact us at the contact information on the front cover.

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Introduction

Overview

This manual provides installation and operating instructions for the 9064 Up/Down/Cross Converter with HD/SD-SDI Input, RGB Color Corrector, and Frame Sync card (also referred to herein as the 9064).

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 9064.
- **Chapter 2, “Installation and Setup”** – Provides instructions for installing the 9064 in a frame, and optionally installing 9064 Rear I/O Modules.
- **Chapter 3, “Operating Instructions”** – Provides overviews of operating controls and instructions for using the 9064.

This chapter contains the following information:

- **9064 Card Software Versions and this Manual (p. 1-2)**
- **Manual Conventions (p. 1-3)**
- **Safety Summary (p. 1-4)**
- **9064 Functional Description (p. 1-5)**
- **Technical Specifications (p. 1-15)**
- **Warranty and Service Information (p. 1-18)**
- **Contact Cobalt Digital Inc. (p. 1-19)**

9064 Card Software Versions and this Manual

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

The Software Version of your card can be checked by viewing the **Card Info** menu in DashBoard™. See Checking 9064 Card Information (p. 3-7) in Chapter 3, “Operating Instructions” for more information. You can then check our website for the latest software version currently released for the card as described below.

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

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

Cobalt Reference Guides

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

Manual Conventions

In this manual, display messages and connectors are shown using the exact name shown on the 9064 itself. Examples are provided below.

- Card-edge display messages are shown like this:



HDIn

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

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

- **9064** refers to the 9064 Up/Down/Cross Converter with HD/SD-SDI Input, RGB Color Corrector, and Frame Sync card.
- **Frame** refers to the 8321 (or similar) frame that houses the Cobalt® COMPASS® cards.
- **Device** and/or **Card** refers to a COMPASS® card.
- **System** and/or **Video System** refers to the mix of interconnected production and terminal equipment in which the 9064 and other COMPASS® cards operate.

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

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

Safety Summary

Warnings

! WARNING !

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

Cautions

CAUTION

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

CAUTION

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

CAUTION

Heat and power distribution requirements within a frame may dictate specific slot placement of cards. Cards with many heat-producing components should be arranged to avoid areas of excess heat build-up, particularly in frames using only convection cooling. The 9064 has a moderate power dissipation (17 W max.). As such, avoiding placing the card adjacent to other cards with similar dissipation values if possible.

CAUTION

If required, make certain Rear I/O Module(s) is installed before installing the 9064 into the frame slot. Damage to card and/or Rear I/O Module can occur if module installation is attempted with card already installed in slot.

CAUTION

If card resists fully engaging in rear I/O module mating connector, check for alignment and proper insertion in slot tracks. Damage to card and/or rear I/O module may occur if improper card insertion is attempted.

9064 Functional Description

Figure 1-1 shows a functional block diagram of the 9064. The 9064 up/down/cross-format converter also includes an RGB color corrector and a full video frame synchronizer. The 9064 also handles AFD code detection/insertion and processing, timecode support, and closed captioning support. Aspect ratio can be corrected to provide proper output aspect.

Note: Some of the functions described below are available only when using the DashBoard™, or Cobalt® OGCP-9000 or OGCP-9000/CC Control Panels user interfaces. Refer to User Control Interface (p. 1-12) for user interface descriptions.

9064 Input/Output Formats

The 9064 provides the following inputs and outputs:

- **Inputs:**
 - **HD/SD SDI IN** – dual-rate HD/SD-SDI input
- **Outputs:**
 - **SDI OUT** – four SD-SDI buffered video outputs
 - **RCK OUT**– four SD-SDI reclocked buffered video outputs

Video Processor Description

The 9064 features a scaler that provides up, down, and cross-conversion using de-interlacing and motion adaptation for high quality up-conversions. The scaler also provides user-adjustable aspect ratio control and zoom control. Separate controls are provided for SD and HD inputs that allow the card to flexibly and independently handle mixed input formats.

The 9064 video subsystem also provides the functions described below.

Video Processor

The 9064 provides full color processing control (luma gain and lift, chroma saturation, and color phase) of the output video. The 9064 video processor also provides white, black, and chroma clip control. Clipping can be applied with either a hard or soft white clip and also a chroma saturation clip. Luma and chroma gain controls can be ganged to provide adjustment for both gain controls.

Color Corrector

The 9064 color corrector converts the YCbCr SDI input video to the 4:4:4 RGB color space (where the color correction is applied), and then back to YCbCr SDI on the output. Controls are available to adjust each RGB level independently for both white levels (gain) and black levels (offset). Gamma can also be independently adjusted for each RGB channels. Various controls can be ganged to provide adjustment for all three color channels simultaneously.

Frame Sync Function

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

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

A Reset Framesync function resets the frame sync following any horizontal or vertical offset changes, clearing any buffered video and re-establishing the frame sync.

In the event of input video loss of signal, this function provides for disabling the video, going to a desired color raster, or freezing to the last intact frame (frame having valid SAV and EAV codes).

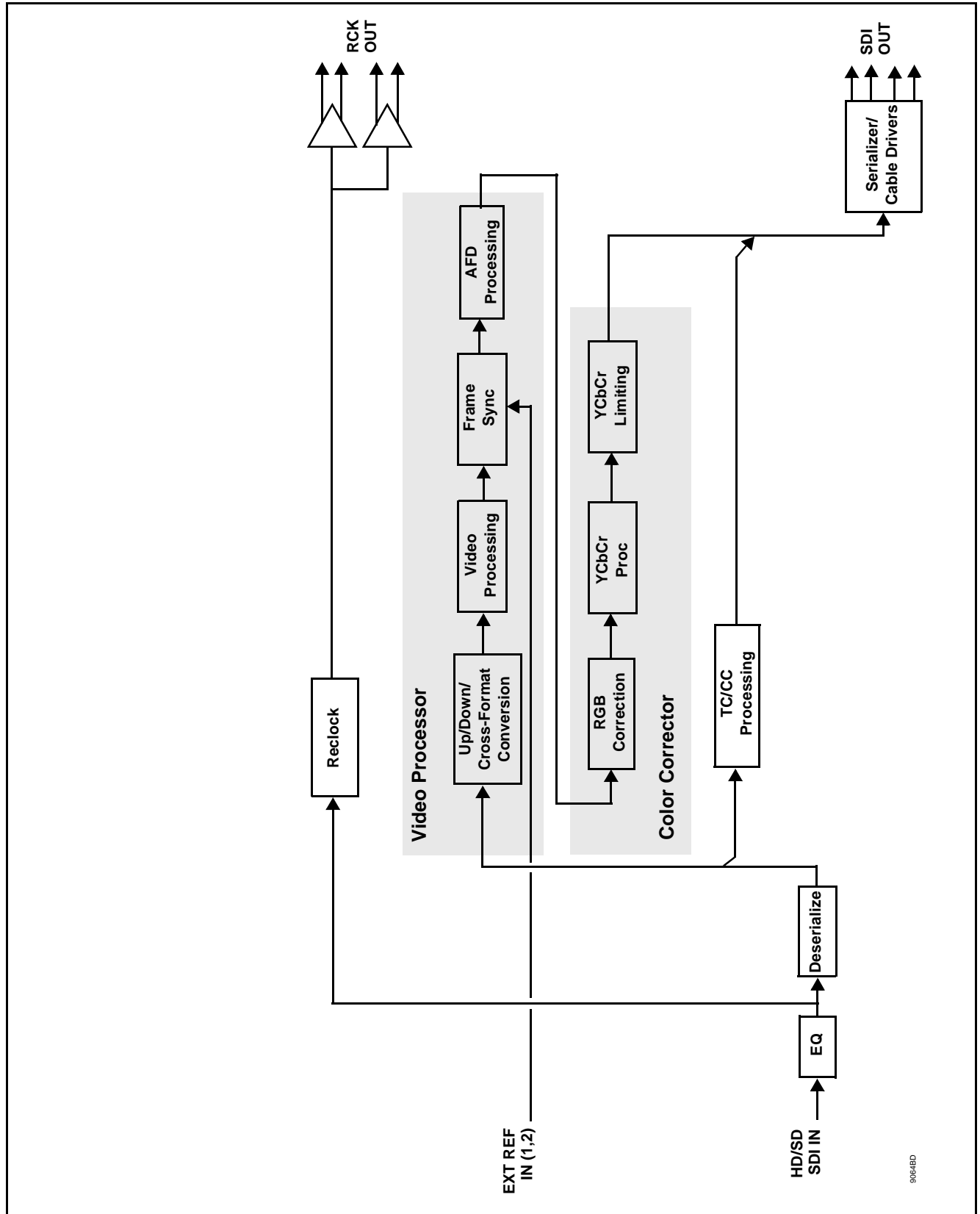


Figure 1-1 9064 Functional Block Diagram

Scaler Function

The scaler function provides up, down, and cross-conversions between multiple standard SD and HD video formats, multiple frame rates, film frame rates, and cross-conversion between interlaced and progressive formats. Table 1-1 lists the 9064 conversion choices available for various input formats and frame rates.

Table 1-1 Scaler Function Conversions

Input Format	SD (NTSC/PAL)	720p	720p half-rate	720p (film rates)	1080i	1080p	1080p (film rates)	1080PsF (film rates)
525i 59.94	525i 59.94	720p 59.94	720p 29.97	720p 23.98 ₍₄₎	1080i 59.94	1080p 29.97	1080p 23.98 ₍₄₎	1080PsF 23.98 ₍₄₎
625i 50	625i 50	720p 50	720p 25	X	1080i 50	1080p 25	X	X
720p 60	X	720p 60	720p 30	720p 24 ₍₄₎	1080i 60	1080p 30	1080p 24 ₍₄₎	1080PsF 24 ₍₄₎
720p 59.94	525i 59.94	720p 59.94	720p 29.97	720p 23.98 ₍₄₎	1080i 59.94	1080p 29.97	1080p 23.98 ₍₄₎	1080PsF 23.98 ₍₄₎
720p 50	625i 50	720p 50	720p 25	X	1080i 50	1080p 25	X	X
720p 30	X	720p 60	720p 30	720p 24 ₍₅₎	1080i 60	1080p 30	1080p 24 ₍₅₎	1080PsF 24 ₍₅₎
720p 29.97	525i 59.94	720p 59.94	720p 29.97	720p 23.98 ₍₅₎	1080i 59.94	1080p 29.97	1080p 23.98 ₍₅₎	1080PsF 23.98 ₍₅₎
720p 25	625i 50	720p 50	720p 25	X	1080i 50	1080p 25	X	X
720p 24	X	720p 60	720p 30	720p 24	1080i 60	1080p 30	1080p 24	1080PsF 24
720p 23.98	525i 59.94	720p 59.94	720p 29.97	720p 23.98	1080i 59.94	1080p 29.97	1080p 23.98	1080PsF 23.98
1080i 60	X	720p 60	720p 30	720p 24 ₍₄₎	1080i 60	1080p 30	1080p 24 ₍₄₎	1080PsF 24 ₍₄₎
1080i 59.94	525i 59.94	720p 59.94	720p 29.97	720p 23.98 ₍₄₎	1080i 59.94	1080p 29.97	1080p 23.98 ₍₄₎	1080PsF 23.98 ₍₄₎
1080i 50	625i 50	720p 50	720p 25	X	1080i 50	1080p 25	X	X
1080p 30	X	720p 60	720p 30	720p 24 ₍₅₎	1080i 60	1080p 30	1080p 24 ₍₅₎	1080PsF 24 ₍₅₎
1080p 29.97	525i 59.94	720p 59.94	720p 29.97	720p 23.98 ₍₅₎	1080i 59.94	1080p 29.97	1080p 23.98 ₍₅₎	1080PsF 23.98 ₍₅₎
1080p 25	625i 50	720p 50	720p 25	X	1080i 50	1080p 25	X	X
1080p 24	X	720p 60	720p 30	720p 24	1080i 60	1080p 30	1080p 24	1080PsF 24
1080p 23.98	525i 59.94	720p 59.94	720p 29.97	720p 23.98	1080i 59.94	1080p 29.97	1080p 23.98	1080PsF 23.98
1080PsF 24	X	720p 60	720p 30	720p 24	1080i 60	1080p 30	1080p 24	1080PsF 24
1080PsF 23.98	525i 59.94	720p 59.94	720p 29.97	720p 23.98	1080i 59.94	1080p 29.97	1080p 23.98	1080PsF 23.98

- Notes:**
1. The drop-down list choice of "Same as Input" is used when no conversion is desired. For clarity, it is not redundantly listed here.
 2. "X" denotes conversions not available or invalid conversions.
 3. Interlaced formats rates listed are field rates. Progressive format rates listed are frame rates.
 4. If the original material does not have a proper 3-2 cadence suitable for conversion to film rates, the conversion reverts to standard de-interlacing. While this video can be converted to film rates, the resulting image motion will lack smoothness. Therefore, make certain interlaced video is appropriately constructed for 3-2 reverse pulldown when converting video to film rates. See 3-2 Pulldown Conversion and Considerations (p. 1-11).
 5. Formats using a 30/29.97 Hz progressive frame rate can be converted to a 24/23.98 Hz progressive frame rate, however some image motion irregularity will appear in the converted output.
 6. "NTSC" and "PAL" in this manual informally denote 486i5994 and 575i50 SD-SDI video formats.

When output video is set to 720p for either SD or HD video, the 720p output can be converted to 720p half-rate formats as listed in Table 1-1. When output video is set to 1080 film (1080p23.98) for either SD or HD inputs, the 9064 can convert the output to 1080PsF23.98 (segmented frame progressive). Both of these functions can be independently applied to either SD and/or HD video inputs.

The scaler function also provides aspect ratio conversion that provides a choice from several standard aspect ratios. Additionally, user defined and “Follow AFD Settings” conversion can be applied. User defined settings allow custom user-defined H and V aspect ratio control. “Follow AFD Settings” sets the output aspect ratio to track with AFD (Active Format Description) settings embedded in the video signal.

Timecode Processor

(See Figure 1-2.) This function provides for extraction of timecode data from the input video, and in turn re-insertion of timecode data into the output SDI. In this manner, timecode data can be preserved, even after format conversion. The function can monitor the SDI video input of the card for supported timecode formats, and then select and prioritize among SDI VITC, SDI ATC_VITC, and SDI ATC_LTC timecode sources. If the preferred format is detected, the preferred format is used by the card; if the preferred format is not detected, the card uses other formats (where available) as desired.

The function also provides conversion between various received timecode formats and provides insertion, line number control, and re-formatting to SDI VITC, ATC_VITC, and/or ATC_LTC timecode output formats.

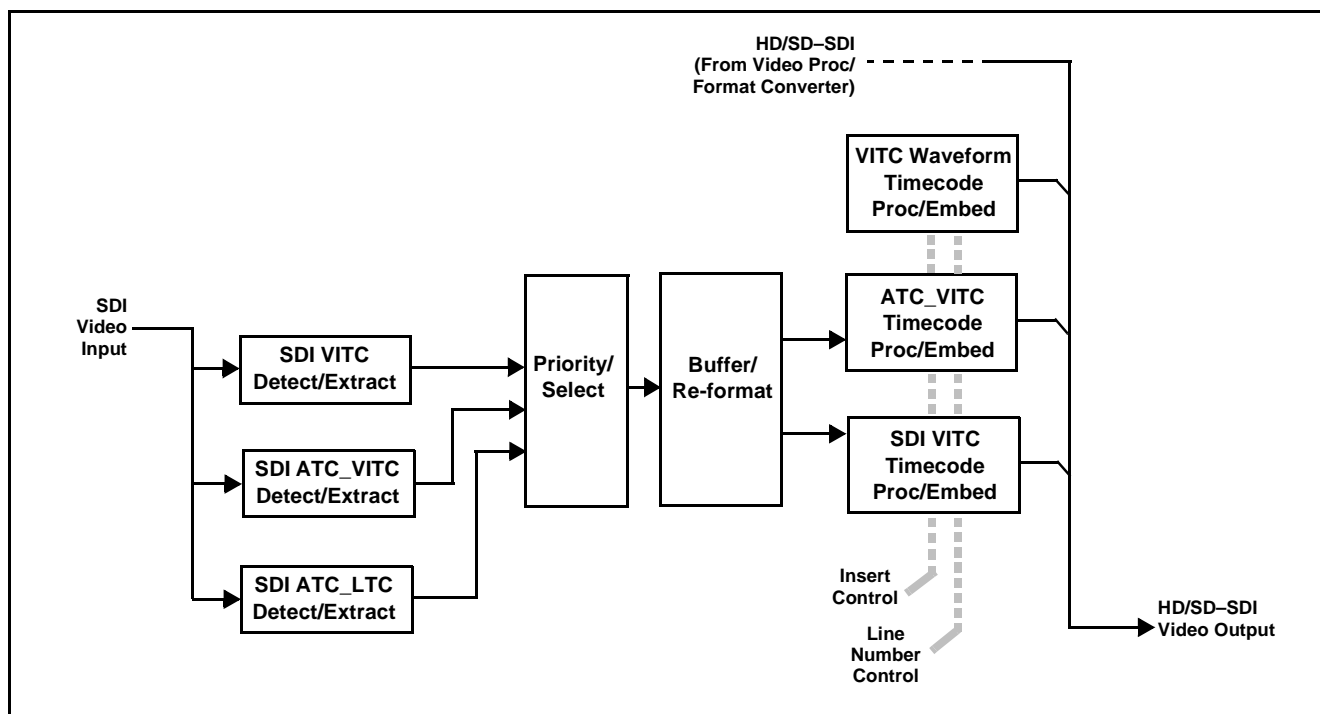


Figure 1-2 Timecode Processor

Closed Captioning Processor

This function provides support for closed captioning setup. The function receives closed captioning data from the incoming SDI stream and outputs closed captioning on a selectable VANC line number when the output is HD (for an SD output, the line number is fixed at line 21).

AFD Processor

This function provides aspect ratio controls and assignment of AFD codes to the SDI output video.

Using this function, aspect ratios in accordance with the standard 4-bit AFD codes can be applied to the output video. Additionally, custom aspect ratios can be independently defined for any of the AFD codes.

Separate, independent AFD controls are provided for both 16:9 coded and 4:3 coded frames.

This function also provides AFD-controlled ARC by checking for any existing AFD code within the received video input. If a code is present, the code is displayed. With the Scaler function **Aspect Ratio Conversion** set to **Follow AFD Settings**, the H and V settings corresponding to the received code are applied to the video by the 9064. The default, standard aspect ratio described by the AFD code can be applied, or custom horizontal/vertical scaling can be applied for a given code.

The function also allows the selection/changing of the AFD code ancillary data line number for the outputted AFD code.

3-2 Pulldown Conversion and Considerations

Figure 1-3 depicts the 3-2 pulldown process used for conversions between progressive film video formats and interlaced video formats. (Although the term “3-2” is used here per convention, it is more accurately described as 2-3 per the diagram here and SMPTE definitions which stipulate that first film frame **A** be represented exclusively by 2 fields from the same frame). As shown in Figure 1-3, the term 2-3 is derived from the pattern, or *cadence*, in which four consecutive film video frames are converted into five consecutive interlaced video frames (i.e., 10 interlaced video fields). Odd and even interlaced fields are denoted in Figure 1-3 by “**O**” and “**E**” (for example, “**A_O**” and “**A_E**”). Note the considerations described in Figure 1-3 for converting to film rates.

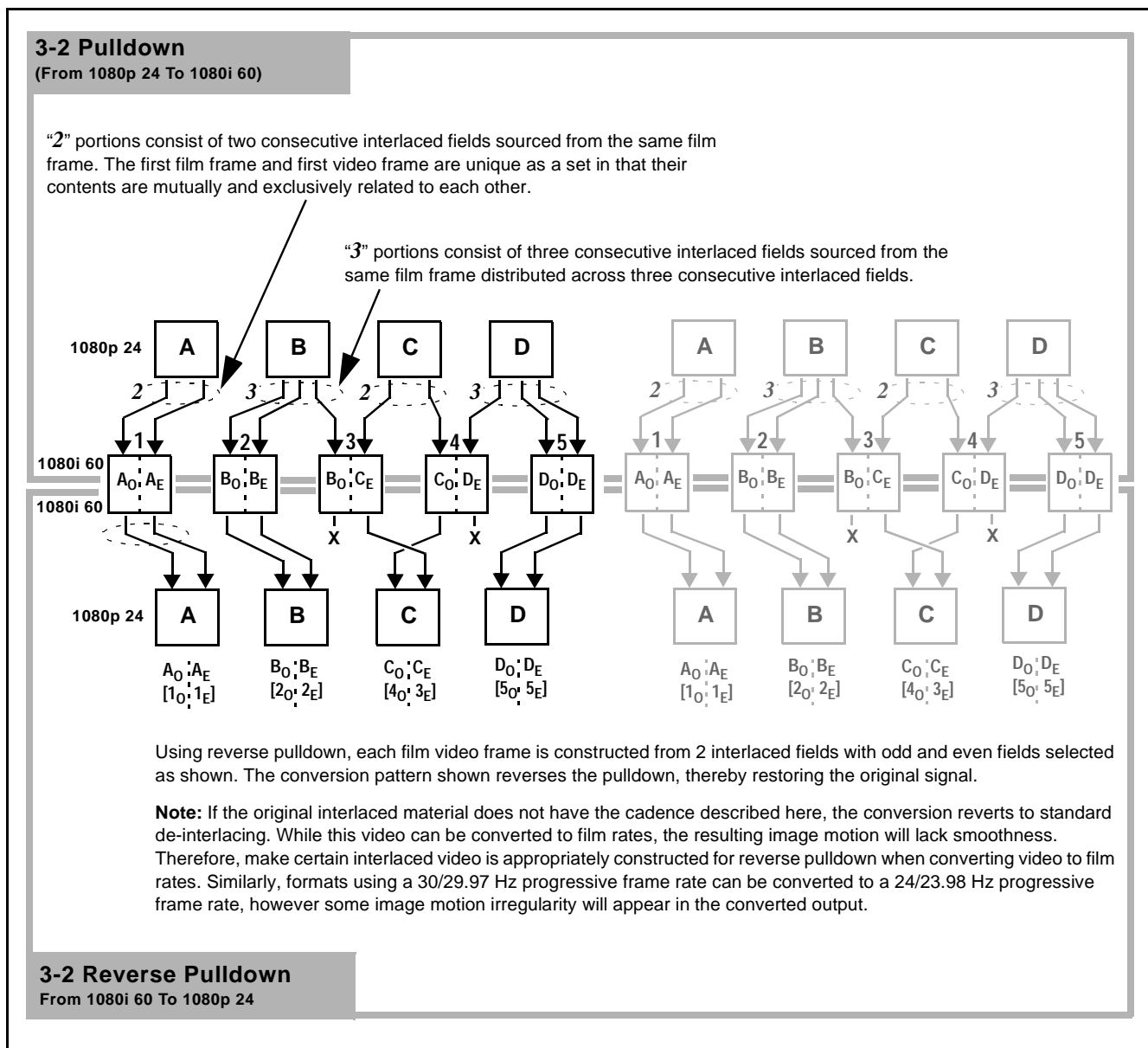


Figure 1-3 3-2 Pulldown and Reverse Pulldown

User Control Interface

Figure 1-4 shows the user control interface options for the 9064. These options are individually described below.

Note: All user control interfaces described here are cross-compatible and can operate together as desired. Where applicable, any control setting change made using a particular user interface is reflected on any other connected interface.

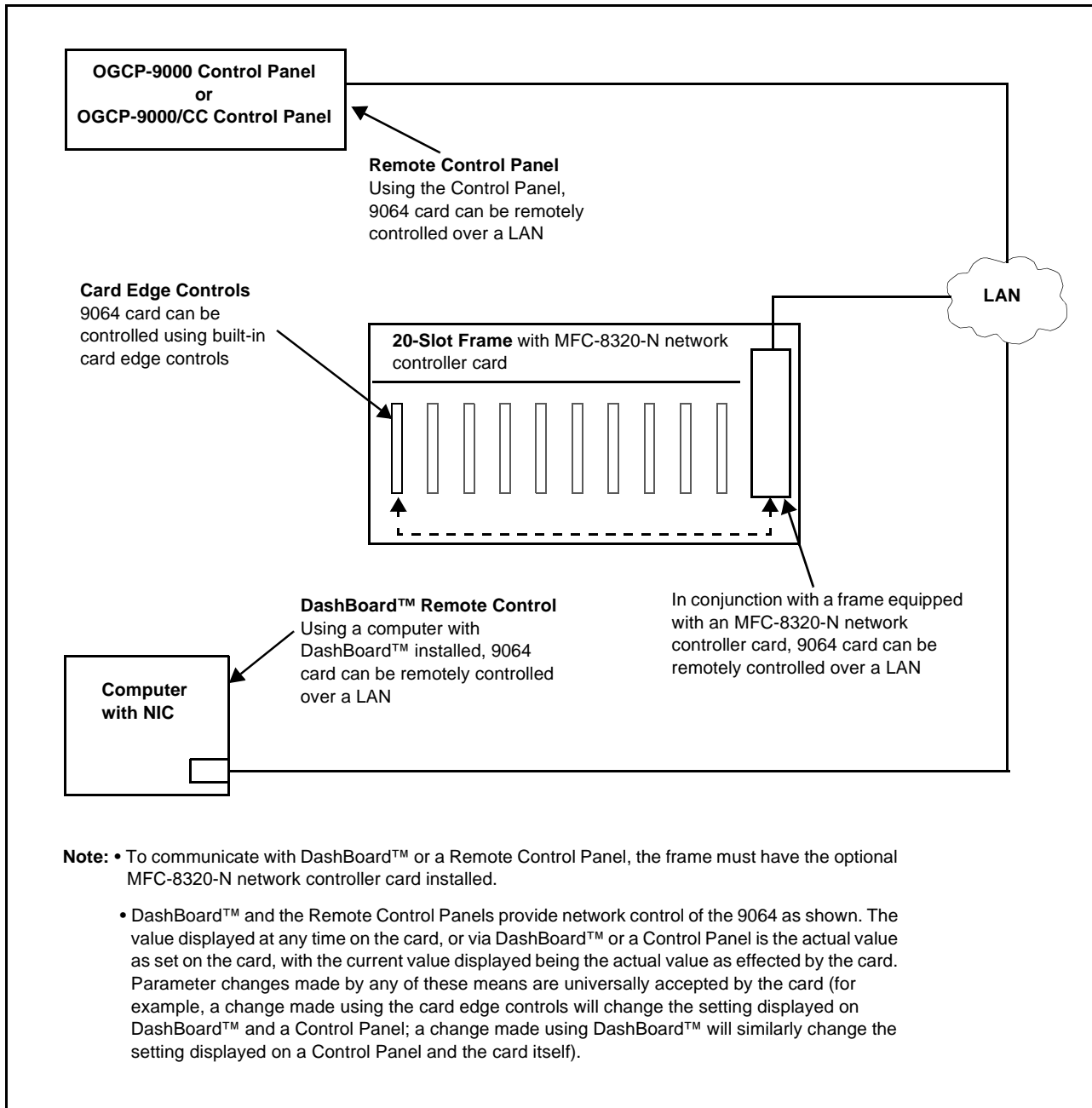


Figure 1-4 9064 User Control Interface

- **Built-in Card Edge User Interface** – Using the built-in card edge controls and display, card control settings can be set using a front panel menu which is described in Chapter 3, “Operating Instructions”.

Note: Some of the 9064 functions described in this manual are available only when using the DashBoard™, or Cobalt® OGCP-9000 or OGCP-9000/CC Remote Control Panel user interfaces.

- **DashBoard™ User Interface** – Using DashBoard™, the 9064 and other cards installed in openGear®¹ frames such as the Cobalt® HPF-9000 or 8321 Frame can be controlled from a computer and monitor.

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

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

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

Download a copy of this guide by clicking on the **Support>Downloads** link at www.cobaltdigital.com and then select DashBoard Remote Control Setup Guide as a download, or contact Cobalt® as listed in Contact Cobalt Digital Inc. (p. 1-19).

- **Cobalt® OGCP-9000 and OGCP-9000/CC Remote Control Panels** – The OGCP-9000 and OGCP-9000/CC Remote Control Panels conveniently and intuitively provide parameter monitor and control of the 9064 and other video and audio processing terminal equipment meeting the open-architecture Cobalt COMPASS® cards for openGear™ standard.

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

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

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

9064 Rear I/O Modules

The 9064 physically interfaces to system video connections at the rear of its frame using a Rear I/O Module.

All inputs and outputs shown in the 9064 Functional Block Diagram (Figure 1-1) enter and exit the card via the card edge backplane connector. The Rear I/O Module breaks out the 9064 card edge connections to BNC connectors that interface with other components and systems in the signal chain.

These required BNC connections are provided by either an 8310-BNC or 8310-C-BNC frame (which both have a built-in BNC connector backplane module), or by using an optional RM20-9064-A Rear I/O Module.

Video Formats Supported by the 9064

The 9064 supports all current SMPTE standard SD and HD video formats. Table 1-2 lists and provides details regarding the video formats supported by the 9064.

Table 1-2 Supported Video Formats

Item	Description/Specification	
Input / Output Video	Raster Structure:	Frame Rate:
	1080PsF	23.98; 24
	1080p	23.98; 24
	1080i ⁽¹⁾	25; 29.97; 30
	720p	23.98; 24; 25; 29.97; 30; 50; 59.94; 60
	486i ⁽¹⁾	29.97
	575i ⁽¹⁾	25
(1) All rates displayed as frame rates; interlaced ("i") field rates are two times the rate value shown.		

Technical Specifications

Table 1-3 lists the technical specifications for the 9064 Up/Down/Cross Converter with HD/SD-SDI Input, RGB Color Corrector, and Frame Sync card.

Table 1-3 Technical Specifications

Item	Characteristic
Part number, nomenclature	9064 Up/Down/Cross Converter with HD/SD-SDI Input, RGB Color Corrector, and Frame Sync
Installation/usage environment	Intended for installation and usage in frame meeting openGear® modular system definition.
Power consumption	< 17 Watts maximum
Environmental: Operating temperature: Relative humidity (operating or storage):	32° – 104° F (0° – 40° C) < 95%, non-condensing
Frame communication	10/100 Mbps Ethernet with Auto-MDIX.
Indicators	Card edge display and indicators as follows: <ul style="list-style-type: none"> • 4-character alphanumeric display • Status/Error LED indicator • Input Format LED indicator
Controls	Card edge switches as follows: <ul style="list-style-type: none"> • Menu Enter pushbutton switch • Menu Exit pushbutton switch • Up/down selection toggle switch
Resolution:	10-bit video data path
Serial Digital Video Input	Data Rates Supported: SMPTE 292 HD-SDI: 1.485 Gbps or 1.485/1.001 Gbps SMPTE 259M-C SD-SDI: 270 Mbps Impedance: 75 Ω terminating Equalization (HD): 260 ft (79 m) Belden 1694A Equalization (SD): 1000 ft (305 m) Belden 1694A Return Loss: > 15 dB at 5 MHz – 1.485 GHz

Table 1-3 Technical Specifications — continued

Item	Characteristic
Post-Processor Serial Digital Video Outputs	Number of Outputs: Four SD-SDI BNC per IEC 60169-8 Amendment 2 Impedance: 75 Ω Return Loss: > 15 dB at 5 MHz – 270 MHz Signal Level: 800 mV \pm 10% DC Offset: 0 V \pm 50 mV Jitter (HD): < 0.15 UI (all outputs) Jitter (SD): < 0.10 UI (all outputs) Overshoot: < 0.2% of amplitude
Pre-Processor (Reclocked) Serial Digital Video Outputs	Number of Outputs: Four SD-SDI BNC per IEC 60169-8 Amendment 2 Impedance: 75 Ω

Table 1-3 Technical Specifications — continued

Item	Characteristic
Reference Video Input	Number of Inputs: Two non-terminating (looping) Frame Reference inputs Standards Supported (HD): 720p 25; 29.97; 50; 59.94 1080i 25; 29.97 1080p 23.98; 25; 29.97 1080p/sF 23.98 Standards Supported (SD): 486i 29.97 (NTSC) 575i 25 (PAL) Signal Level: 1 Vp-p nominal Signal Type: Analog video sync (black burst or tri-level) Impedance: 75 Ω Return Loss: > 30 dB to 30 MHz Allowable Maximum DC on Ref Input: ± 1.0 V

Warranty and Service Information

Cobalt Digital Inc. Limited Warranty

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

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

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

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

Cobalt Digital Inc. Factory Service Center

2406 E. University Avenue
Urbana, IL 61802 USA
www.cobaltdigital.com

Office: (217) 344-1243
Fax: (217) 344-1245
Email: info@cobaltdigital.com

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Contact Cobalt Digital Inc.

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

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

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Installation and Setup

Overview

This chapter contains the following information:

- Installing the 9064 Into a Frame Slot (p. 2-1)
- Installing a Rear I/O Module (p. 2-4)
- Setting Up 9064 Network Remote Control (p. 2-5)

Installing the 9064 Into a Frame Slot

CAUTION

Heat and power distribution requirements within a frame may dictate specific slot placement of cards. Cards with many heat-producing components should be arranged to avoid areas of excess heat build-up, particularly in frames using only convection cooling. The 9064 has a moderate power dissipation (17 W max.). As such, avoiding placing the card adjacent to other cards with similar dissipation values if possible.

CAUTION



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

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

- Note:**
- **If installing the 9064 in an 8310-C-BNC or 8310-BNC frame** (which is pre-equipped with a 100-BNC rear I/O module installed across the entire backplane) or a slot already equipped with a suitable I/O module, proceed to card installation steps below.
 - **If installing the 9064 in a slot with no rear I/O module, a Rear I/O Module is required** before cabling can be connected. Refer to Installing a Rear I/O Module (p. 2-4) for rear I/O module installation procedure.

CAUTION

If required, make certain Rear I/O Module(s) is installed before installing the 9064 into the frame slot. Damage to card and/or Rear I/O Module can occur if module installation is attempted with card already installed in slot.

- Note:** Check the packaging in which the 9064 was shipped for any extra items such as a Rear I/O Module connection label. In some cases, this label is shipped with the card and to be installed on the Rear I/O connector bank corresponding to the slot location of the card.

Install the 9064 into a frame slot as follows:

1. Determine the slot in which the 9064 is to be installed.
2. Open the frame front access panel.
3. While holding the card by the card edges, align the card such that the plastic ejector tab is on the bottom.
4. Align the card with the top and bottom guides of the slot in which the card is being installed.
5. Gradually slide the card into the slot. When resistance is noticed, gently continue pushing the card until its rear printed circuit edge terminals engage fully into the rear I/O module mating connector.

CAUTION

If card resists fully engaging in rear I/O module mating connector, check for alignment and proper insertion in slot tracks. Damage to card and/or rear I/O module may occur if improper card insertion is attempted.

6. Verify that the card is fully engaged in rear I/O module mating connector.
7. Close the frame front access panel.
8. Connect the input and output cables as shown in Figure 2-1.
9. Repeat steps 1 through 8 for other 9064 cards.

Note: The 9064 BNC inputs are internally 75-ohm terminated. It is not necessary to terminate unused BNC inputs or outputs.

Note: External frame sync reference signals are received by the card over a reference bus on the card frame, and not on any card rear I/O module connectors. The frame has BNC connectors labeled **REF 1** and **REF 2** which receive the reference signal from an external source such as a house distribution.

Note: To remove a card, press down on the ejector tab to unseat the card from the rear I/O module mating connector. Evenly draw the card from its slot.

10. If network remote control is to be used for the frame and the frame has not yet been set up for remote control, perform setup in accordance with Setting Up 9064 Network Remote Control (p. 2-5).

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

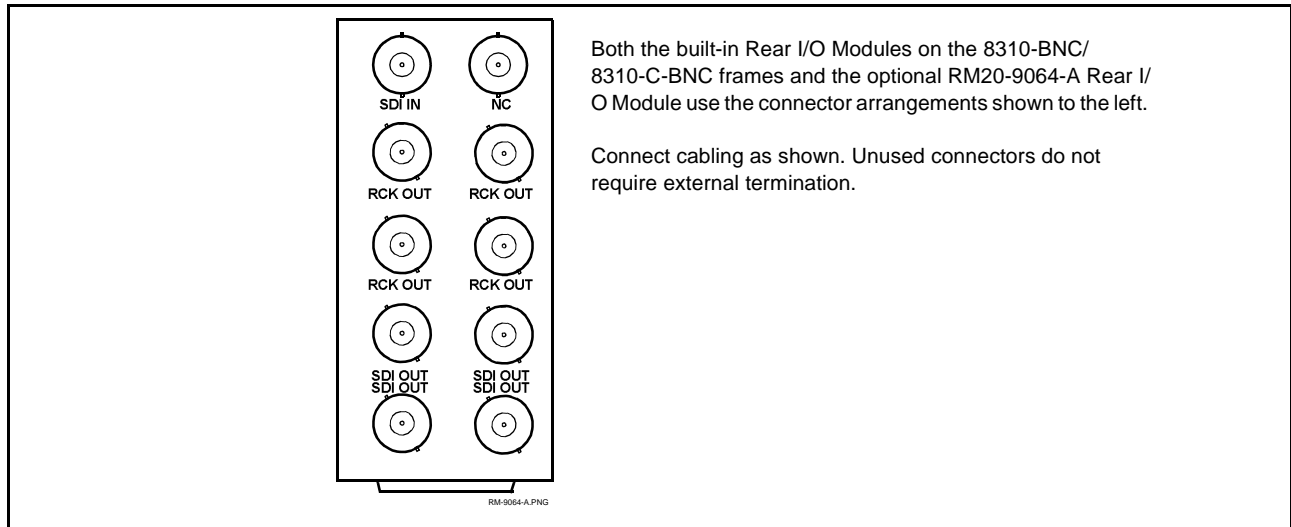


Figure 2-1 9064 Rear I/O Module Connections

Installing a Rear I/O Module

Note: This procedure is applicable **only if a Rear I/O Module is not currently installed** in the slot where the 9064 is to be installed.

If installing the 9064 in a 8310-C-BNC or 8310-BNC frame (which is pre-equipped with a 100-BNC rear I/O module installed across the entire backplane) or a slot already equipped with a suitable I/O module, omit this procedure.

Install a Rear I/O Module as follows:

1. On the frame, determine the slot in which the 9064 is to be installed.
2. In the mounting area corresponding to the slot location, install Rear I/O Module as shown in Figure 2-2.

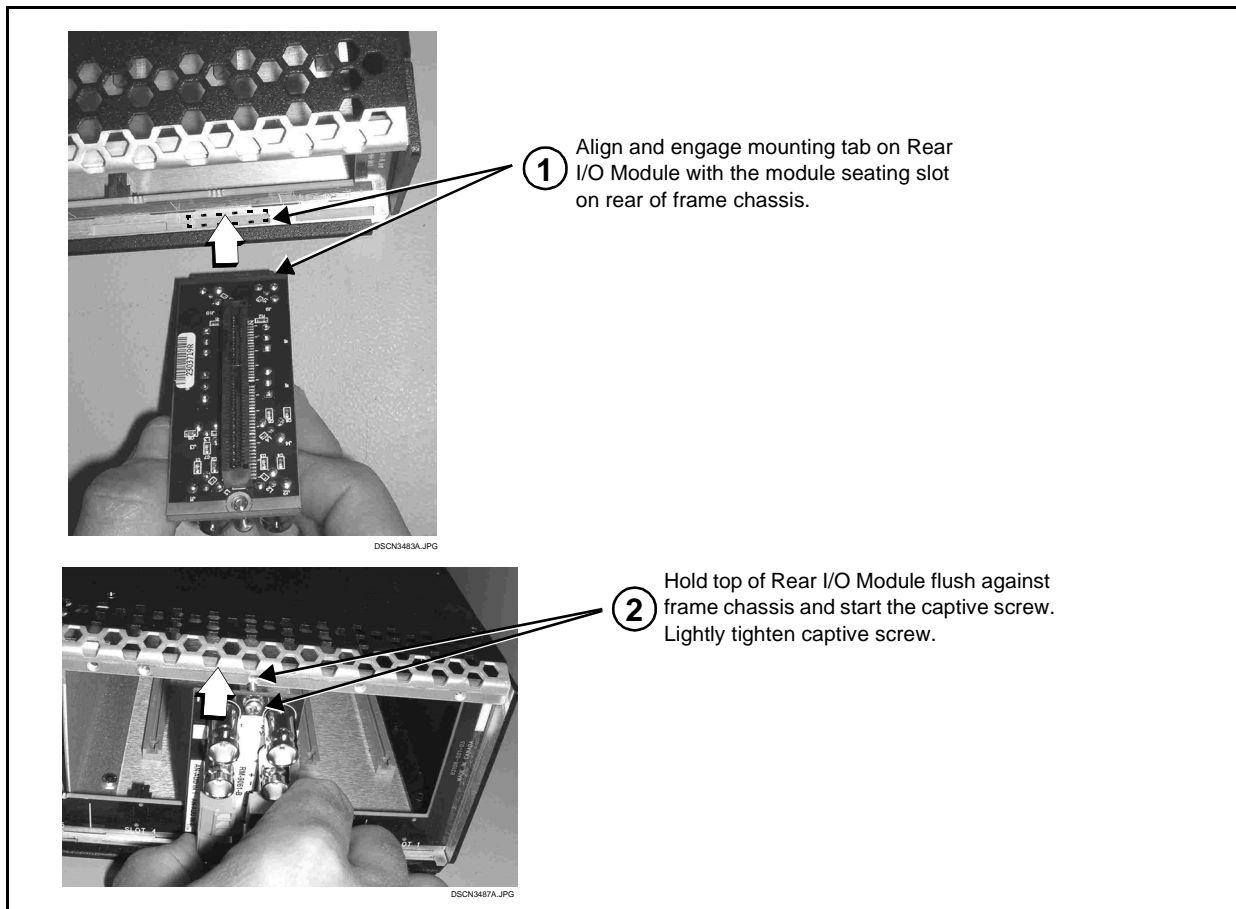


Figure 2-2 Rear I/O Module Installation

Setting Up 9064 Network Remote Control

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

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

Download a copy of this guide by clicking on the **Support>Downloads** link at www.cobaltdigital.com and then select DashBoard Remote Control Setup Guide as a download, or contact Cobalt® as listed in Contact Cobalt Digital Inc. (p. 1-19).

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

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Operating Instructions

Overview

If you are already familiar with using DashBoard or a Cobalt Remote Control Panel to control Cobalt cards, please skip to 9064 Function Submenu List and Descriptions (p. 3-9).

This chapter contains the following information:

- Control and Display Descriptions (p. 3-1)
- Accessing the 9064 Card via Remote Control (p. 3-5)
- Checking 9064 Card Information (p. 3-7)
- Ancillary Data Line Number Locations and Ranges (p. 3-8)
- 9064 Function Submenu List and Descriptions (p. 3-9)
- Color and Video Correction Examples Using the 9064 (p. 3-37)
- Troubleshooting (p. 3-44)

Control and Display Descriptions

This section describes the user interface controls, indicators, and displays for using the 9064 card. The 9064 functions can be accessed and controlled using any of the user interfaces described here.

The format in which the 9064 functional controls, indicators, and displays appear and are used varies depending on the user interface being used. Regardless of the user interface being used, access to the 9064 functions (and the controls, indicators, and displays related to a particular function) follows a general arrangement of Function Submenus under which related controls can be accessed (as described in Function Submenu/Parameter Submenu Overview below).

Note: DashBoard™ and the Remote Control Panel provide greatly simplified user interfaces as compared to using the card edge controls. For this reason, **it is strongly recommended** that DashBoard™ or a Remote Control Panel be used for all card applications other than the most basic cases. Card edge control codes are not included in this manual. If card-edge control is to be used, obtain a copy of “Manual Supplement – Card-Edge Control Reference Master List and Instructions for Using Compass® Card-edge (Local) Control Codes” (989CEC-MS.pdf) at www.cobaltdigital.com>Support>Documents>Reference Guides.

Note: When a setting is changed, settings displayed on DashBoard™ (or a Remote Control Panel) are the settings as effected by the 9064 card itself and reported back to the remote control; the value displayed at any time is the actual value as set on the card.

Function Submenu/Parameter Submenu Overview

The functions and related parameters available on the 9064 card are organized into function **submenus**, which consist of parameter groups as shown below.

Figure 3-1 shows how the 9064 card and its submenus are organized, and also provides an overview of how navigation is performed between cards, function submenus, and parameters.

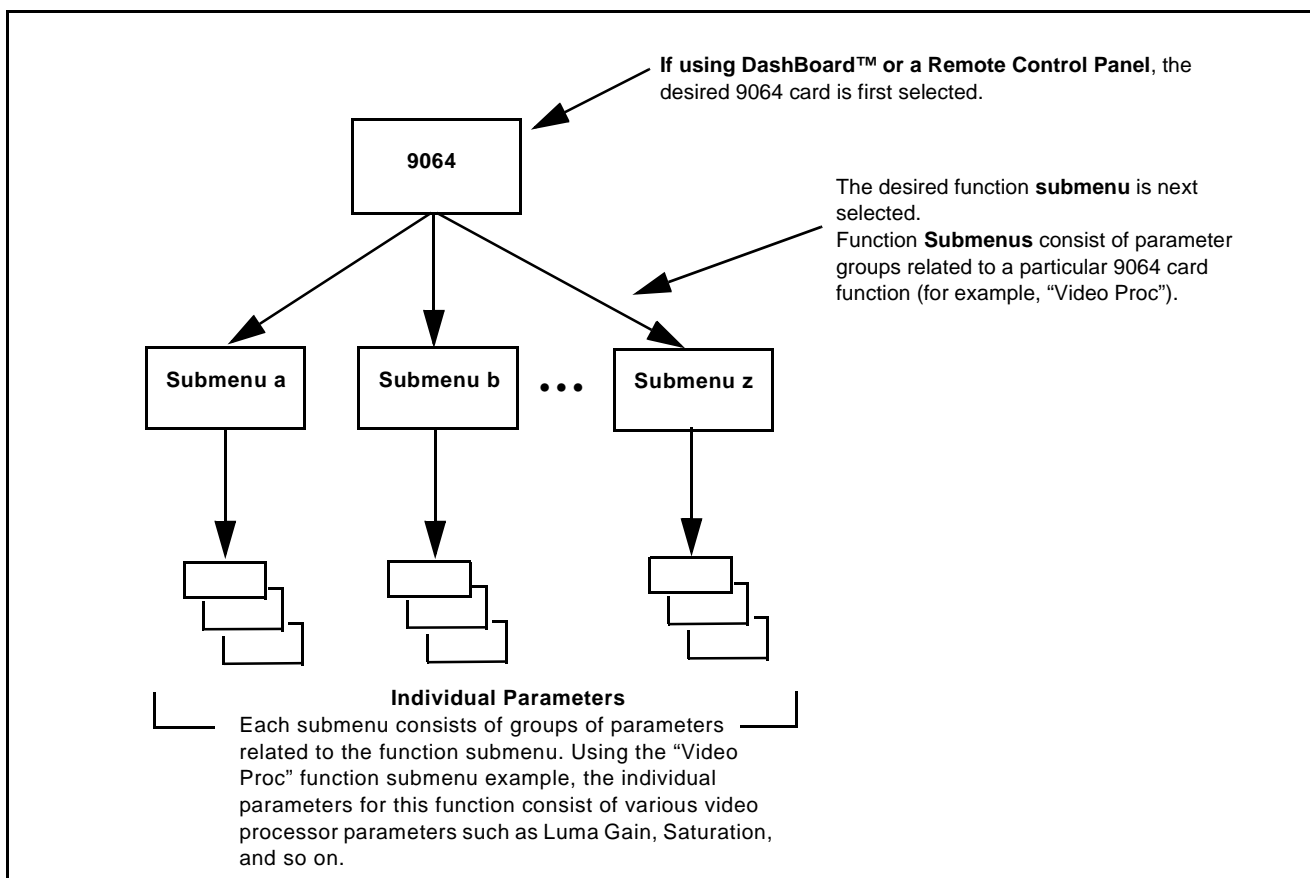


Figure 3-1 Function Submenu/Parameter Submenu Overview

DashBoard™ User Interface

(See Figure 3-2.) The 9064 function submenus are organized in DashBoard™ using tabs. When a tab is selected, each parametric control or selection list item associated with the function is displayed. Scalar (numeric) parametric values can then be adjusted as desired using the GUI slider controls. Items in a list can then be selected using GUI drop-down lists. (In this manner, the setting effected using controls and selection lists displayed in DashBoard™ are comparable to the submenu items accessed and committed using the 9064 card edge controls.)

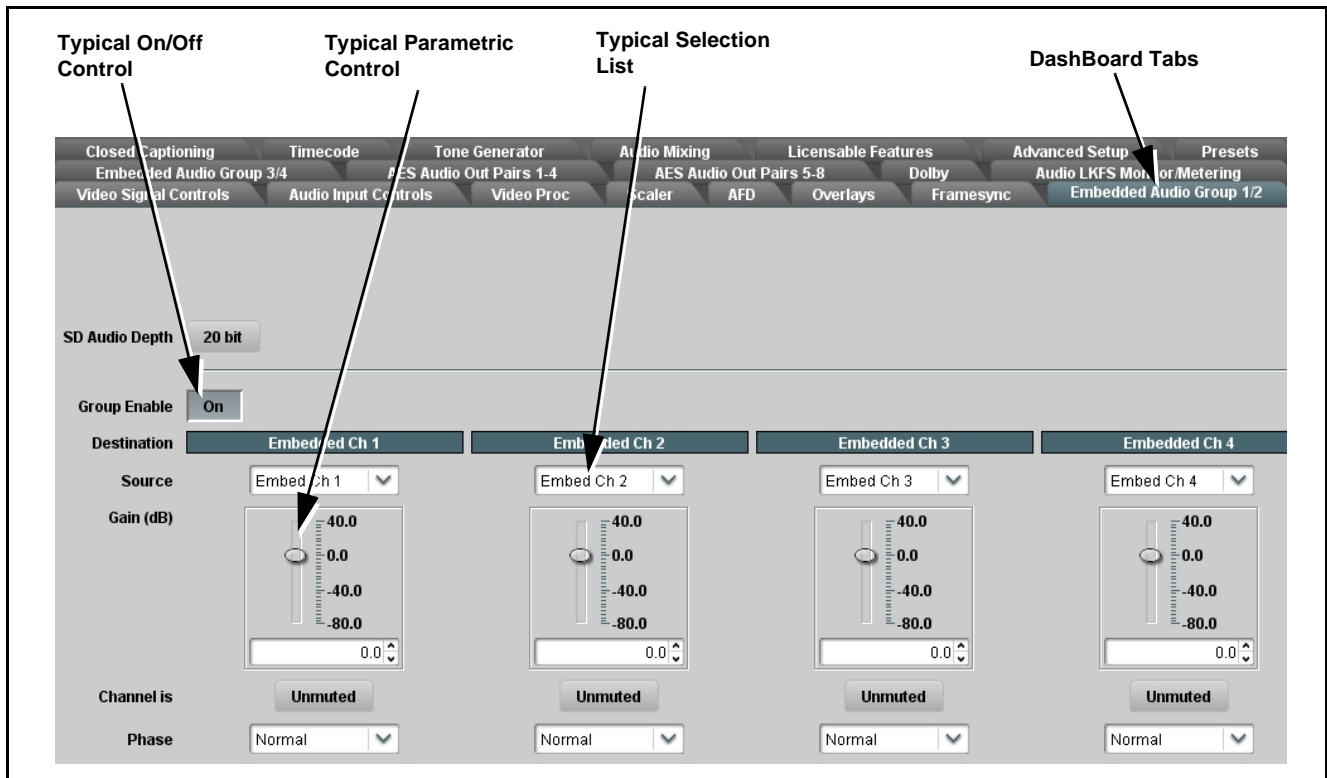


Figure 3-2 Typical DashBoard Tabs and Controls

Cobalt® Remote Control Panel User Interfaces

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

When the desired function submenu is selected, each parametric control or selection list item associated with the function is displayed. Scalar (numeric) parametric values can then be adjusted as desired using the control knobs, which act like potentiometers. Items in a list can then be selected using the control knobs which correspondingly act like rotary switches. (In this manner, the setting effected using controls and selection lists displayed on the Control Panel are comparable to the submenu items accessed and committed using the 9064 card edge controls.)

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

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

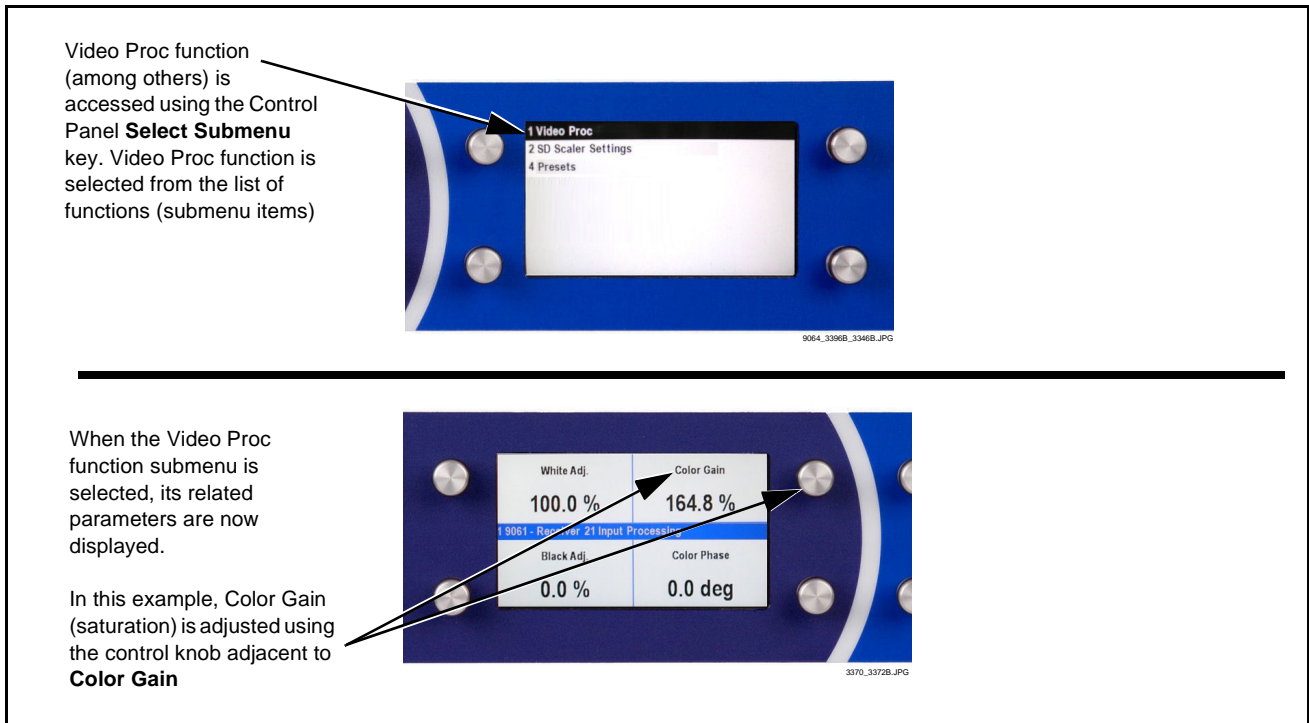


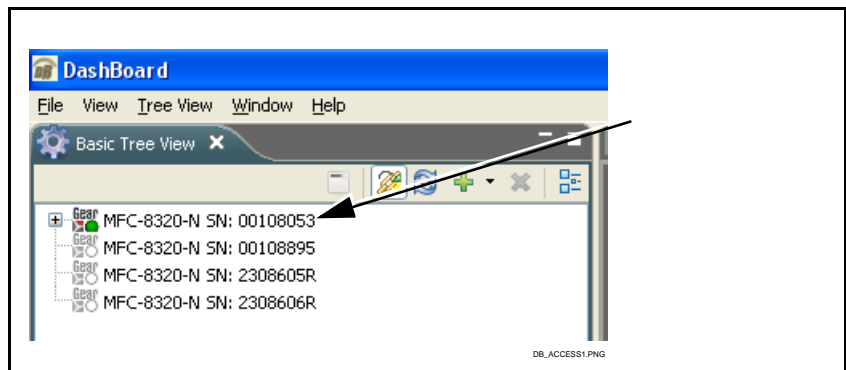
Figure 3-3 Remote Control Panel Setup of Example Video Proc Function Setup

Accessing the 9064 Card via Remote Control

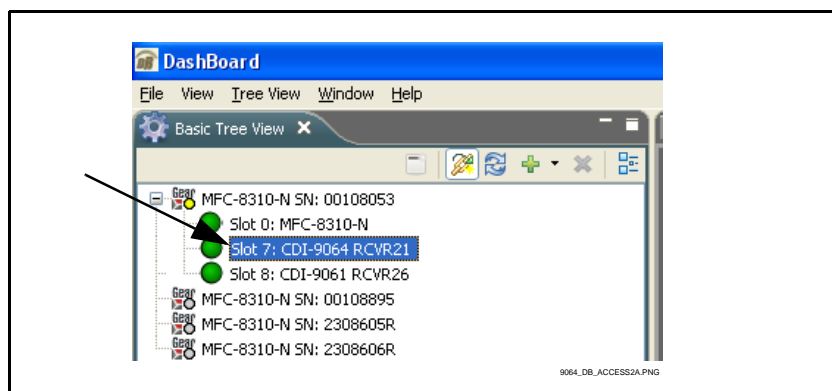
Access the 9064 card using DashBoard™ or Cobalt® Remote Control Panel as described below.

Accessing the 9064 Card Using DashBoard™

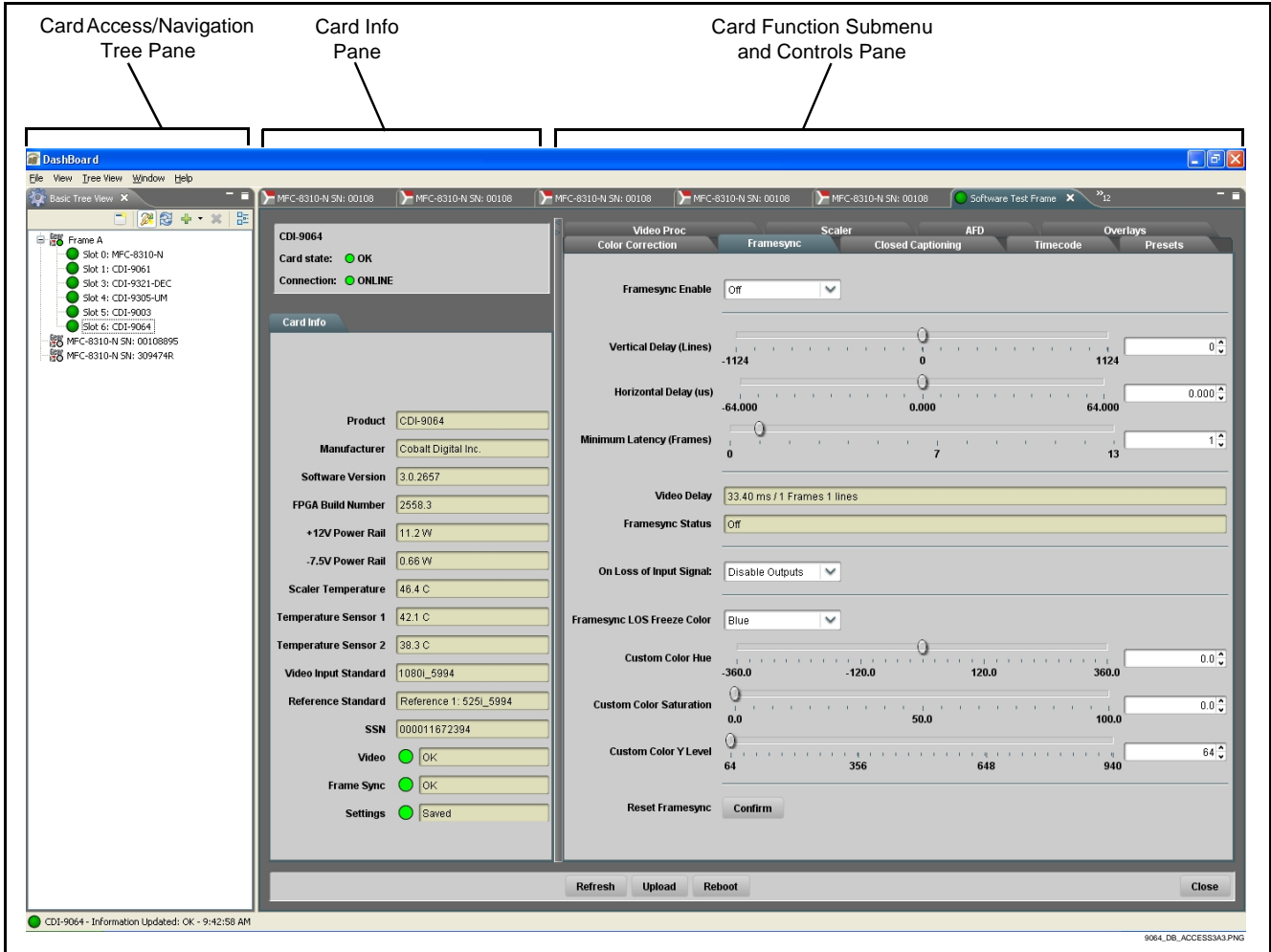
1. On the computer connected to the frame LAN, open DashBoard™.
2. As shown below, in the left side Basic View Tree locate the Network Controller Card associated with the frame containing the 9064 card to be accessed (in this example, “MFC-8320-N SN: 00108053”).



3. As shown below, expand the tree to access the cards within the frame. Click on the card to be accessed (in this example, “Slot 7: CDI-9064 RCVR21”).

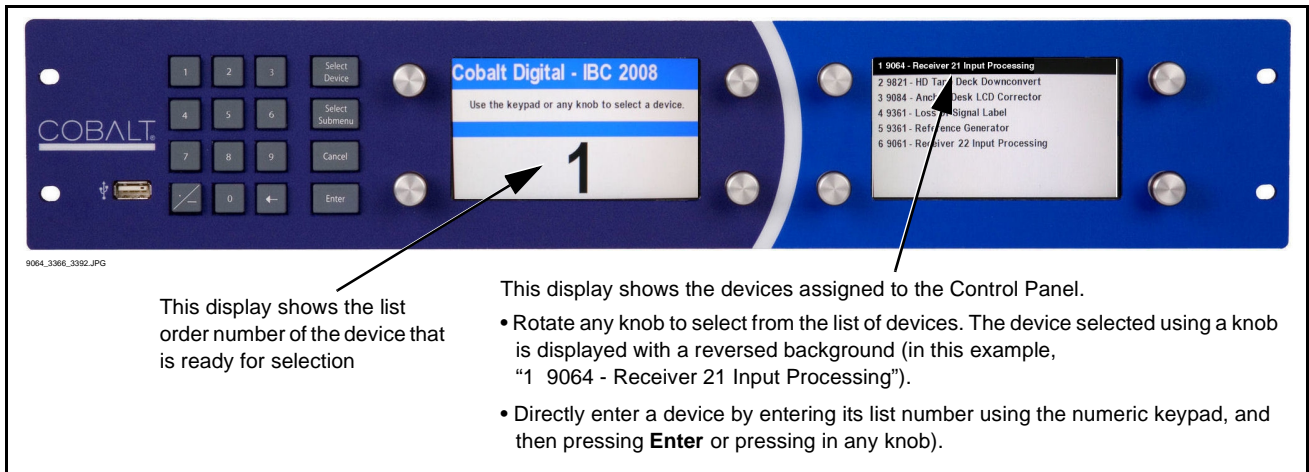


As shown on the next page, when the card is accessed a DashBoard™ its function submenu screen showing tabs for each function is displayed. (The particular submenu screen displayed is the previously displayed screen from the last time the card was accessed by DashBoard™).



Accessing the 9064 Card Using a Cobalt® Remote Control Panel

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



Checking 9064 Card Information

The operating status and software version the 9064 card can be checked using DashBoard™ or the card edge control user interface. Figure 3-4 shows and describes the 9064 card information screen using DashBoard™ and accessing card information using the card edge control user interface.

Note: Proper operating status in DashBoard™ is denoted by green icons for the status indicators shown in Figure 3-4. Yellow or red icons respectively indicate an alert or failure condition. Refer to Troubleshooting (p. 3-44) for corrective action.

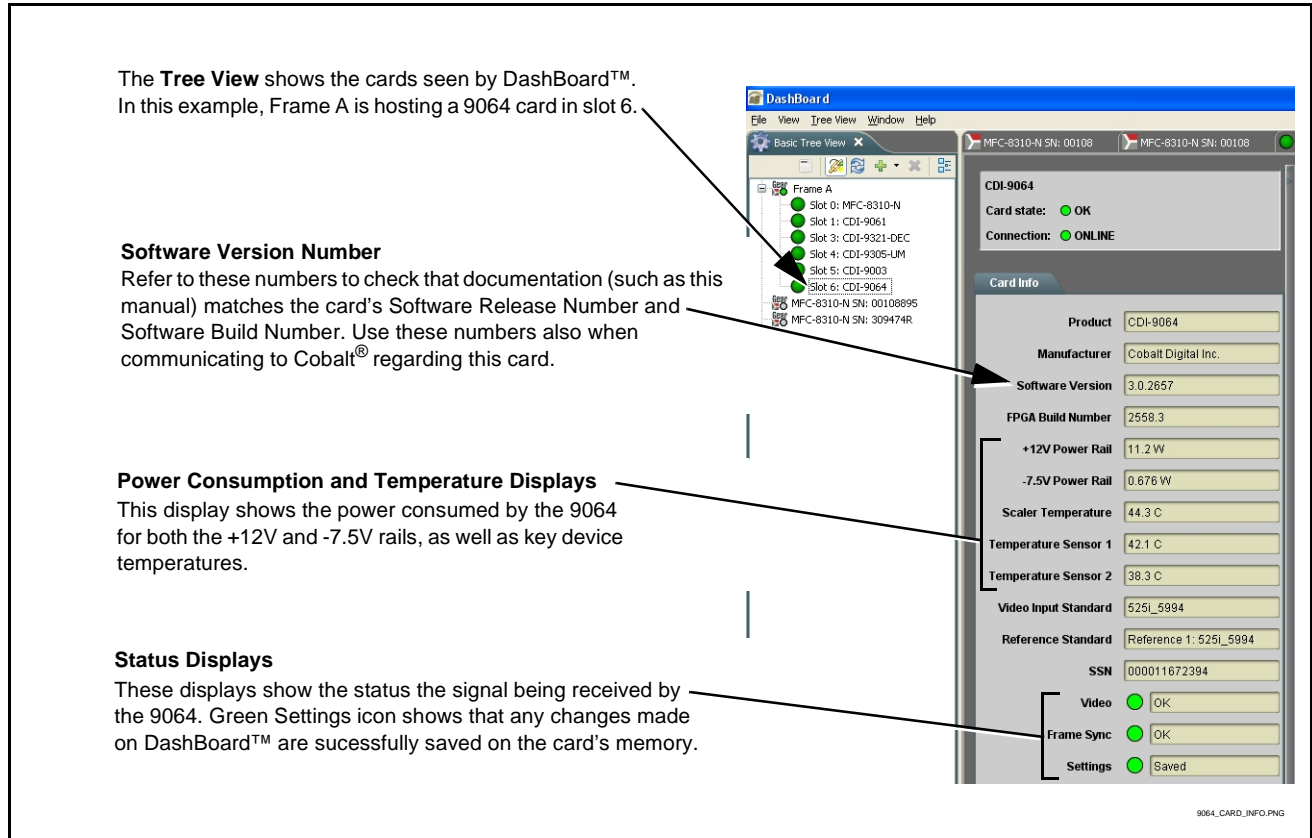


Figure 3-4 9064 Card Info Utility

Ancillary Data Line Number Locations and Ranges

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

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

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

Notes:

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

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

Because line number allocation is not standardized for all ancillary items, consideration should be given to all items when performing set-ups. Figure 3-5 shows an example of improper and corrected VANC allocation within an HD-SDI stream.

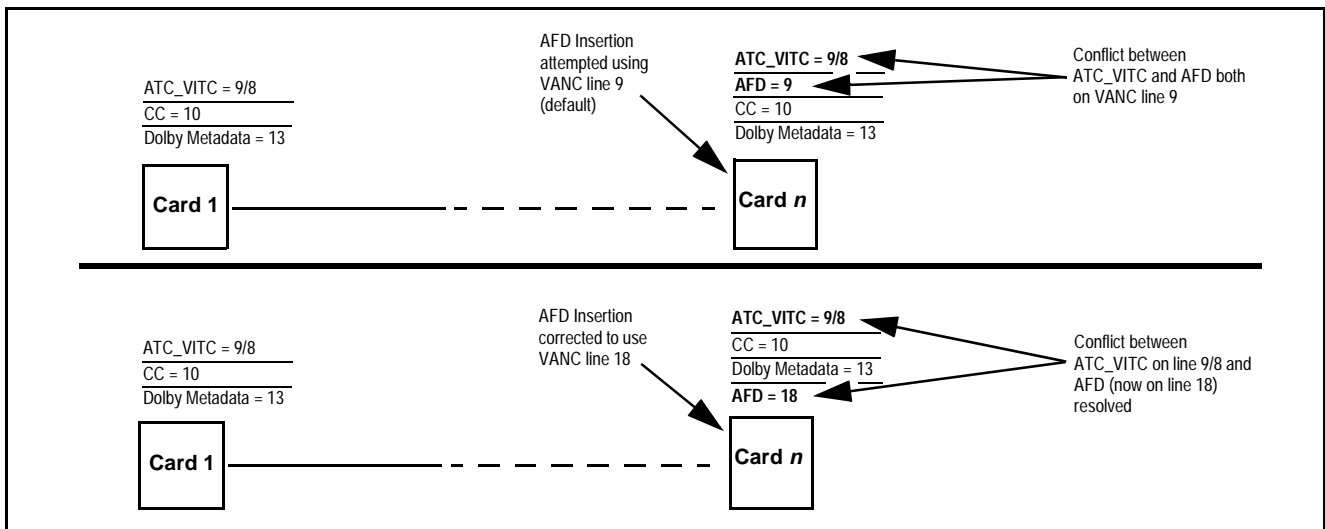



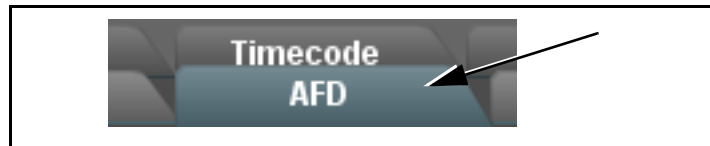
Figure 3-5 Example VANC Line Number Allocation Conflict and Resolution

9064 Function Submenu List and Descriptions

Table 3-2 individually lists and describes each 9064 function submenu (“tab”) and its related list selections, controls, and parameters. Where helpful, examples showing usage of a function are also provided. Table 3-2 is primarily based upon using DashBoard™ to access each function and its corresponding submenus and parameters.

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

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



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

Function Submenu Item	Page	Function Submenu Item	Page
Video Proc	3-10	Framesync	3-27
Scaler	3-12	Closed Captioning	3-30
AFD	3-17	Timecode	3-31
Overlays	3-21	Presets	3-35
Color Correction	3-25		

Table 3-2 9064 Function Submenu List




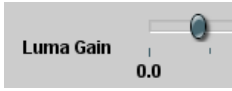

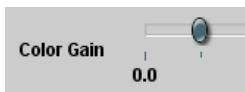
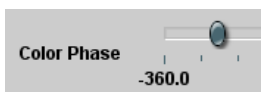

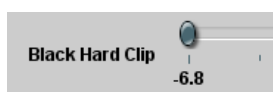
	Provides the following Video Proc parametric controls.
<ul style="list-style-type: none"> • Video Proc 	<p>Video Proc (On/Off) provides master on/off control of all Video Proc functions.</p> <ul style="list-style-type: none"> • When set to Off, Video Proc is bypassed. • When set to On, currently displayed parameter settings take effect.
<ul style="list-style-type: none"> • Reset to Unity 	<p>Reset to Unity provides unity reset control of all Video Proc functions. When Confirm is clicked, a Confirm? pop-up appears, requesting confirmation.</p> <ul style="list-style-type: none"> • Click Yes to proceed with the unity reset. • Click No to reject unity reset.
<ul style="list-style-type: none"> • Luma Gain 	Adjusts gain percentage applied to Luma (Y channel). (0% to 200% range in 0.1% steps; unity = 100%)
<ul style="list-style-type: none"> • Luma Lift 	Adjusts lift applied to Luma (Y-channel). (-100% to 100% range in 0.1% steps; null = 0.0%)
<ul style="list-style-type: none"> • Color Gain 	Adjusts gain percentage (saturation) applied to Chroma (C-channel). (0% to 200% range in 0.1% steps; unity = 100%)
<ul style="list-style-type: none"> • Color Phase 	Adjusts phase angle applied to Chroma. (-360° to 360° range in 0.1° steps; null = 0°)
<ul style="list-style-type: none"> • Gang Luma and Color Gain 	When set to On , changing either the Color Gain or Luma Gain controls increases or decreases both the Video and Chroma levels by equal amounts.
<ul style="list-style-type: none"> • Black Hard Clip 	Applies black hard clip (limiting) at specified percentage. (-6.8% to 50.0%; null = -6.8%)

Table 3-2 9064 Function Submenu List — continued


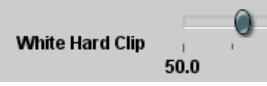
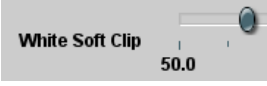

	(continued)
<ul style="list-style-type: none"> • White Hard Clip 	<p>Applies white hard clip (limiting) at specified percentage. (50.0% to 109.1%; null = 109.1%)</p>
<ul style="list-style-type: none"> • White Soft Clip 	<p>Applies white soft clip (limiting) at specified percentage. (50.0% to 109.1%;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

Table 3-2 9064 Function Submenu List — continued


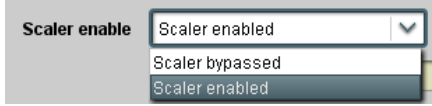


	<p>Provides video format down-conversions and aspect ratio controls.</p>
<p>Note: Scaling and/or format conversion removes ATC packets (if present). If ATC packets are present, use the AFD, Timecode, and Closed Captioning functions described in this manual to preserve and re-apply packets on the output SDI.</p>	
<p>• Scaler enable</p> 	<p>Enables or bypasses Scaler function as follows:</p> <ul style="list-style-type: none"> • Enabled: Provides Scaler functions for the received video input. • Bypassed: Received video input bypasses the Scaler functions.
<p>• Current Input Format</p> 	<p>Displays the input format of the video currently being received by the 9064 (for example, 1080p at 29.97 Hz frame rate as shown here).</p> <p>Note: Rates displayed for progressive formats are frame rates; rates displayed for interlaced formats are field rates.</p>
<p>• Current Output Format</p> 	<p>Displays the currently selected output format of the video currently being processed by the 9064 (for example, 1080p at 29.97 Hz frame rate as shown here). The output format displayed is the output present on the card's SDI OUT BNC connectors.</p> <p>Note: Output format shown in this display tracks with selection made in HD: Convert to or SD: Convert to drop-down lists. Output Format display only tracks with changes applicable to the currently received input format (for example, when currently receiving HD video, changes made in the SD: Convert to drop-down list have no effect on the Output Format display). Output format also tracks with any applicable Scaler functions that affect output format.</p> <p>Note: Rates displayed for progressive formats are frame rates; rates displayed for interlaced formats are field rates.</p>

Table 3-2 9064 Function Submenu List — continued

Scaler		(continued)						
Scaler Video Format Conversions								
<p>The Scaler HD: Convert to: and SD: Convert to: drop-down lists (as shown and described in the following pages) allows selection of up/down/cross-conversion (or no conversion) for various input formats. The table below lists the conversion choices available for various input formats and frame rates provided by the Scaler Convert to: function. Also shown are the resulting frame rates for the converted outputs.</p>								
Input Format	SD (NTSC/PAL)	720p	720p half-rate	720p (film rates)	1080i	1080p	1080p (film rates)	1080PsF (film rates)
525i 59.94	525i 59.94	720p 59.94	720p 29.97	720p 23.98 ₍₄₎	1080i 59.94	1080p 29.97	1080p 23.98 ₍₄₎	1080PsF 23.98 ₍₄₎
625i 50	625i 50	720p 50	720p 25	X	1080i 50	1080p 25	X	X
720p 60	X	720p 60	720p 30	720p 24 ₍₄₎	1080i 60	1080p 30	1080p 24 ₍₄₎	1080PsF 24 ₍₄₎
720p 59.94	525i 59.94	720p 59.94	720p 29.97	720p 23.98 ₍₄₎	1080i 59.94	1080p 29.97	1080p 23.98 ₍₄₎	1080PsF 23.98 ₍₄₎
720p 50	625i 50	720p 50	720p 25	X	1080i 50	1080p 25	X	X
720p 30	X	720p 60	720p 30	720p 24 ₍₅₎	1080i 60	1080p 30	1080p 24 ₍₅₎	1080PsF 24 ₍₅₎
720p 29.97	525i 59.94	720p 59.94	720p 29.97	720p 23.98 ₍₅₎	1080i 59.94	1080p 29.97	1080p 23.98 ₍₅₎	1080PsF 23.98 ₍₅₎
720p 25	625i 50	720p 50	720p 25	X	1080i 50	1080p 25	X	X
720p 24	X	720p 60	720p 30	720p 24	1080i 60	1080p 30	1080p 24	1080PsF 24
720p 23.98	525i 59.94	720p 59.94	720p 29.97	720p 23.98	1080i 59.94	1080p 29.97	1080p 23.98	1080PsF 23.98
1080i 60	X	720p 60	720p 30	720p 24 ₍₄₎	1080i 60	1080p 30	1080p 24 ₍₄₎	1080PsF 24 ₍₄₎
1080i 59.94	525i 59.94	720p 59.94	720p 29.97	720p 23.98 ₍₄₎	1080i 59.94	1080p 29.97	1080p 23.98 ₍₄₎	1080PsF 23.98 ₍₄₎
1080i 50	625i 50	720p 50	720p 25	X	1080i 50	1080p 25	X	X
1080p 30	X	720p 60	720p 30	720p 24 ₍₅₎	1080i 60	1080p 30	1080p 24 ₍₅₎	1080PsF 24 ₍₅₎
1080p 29.97	525i 59.94	720p 59.94	720p 29.97	720p 23.98 ₍₅₎	1080i 59.94	1080p 29.97	1080p 23.98 ₍₅₎	1080PsF 23.98 ₍₅₎
1080p 25	625i 50	720p 50	720p 25	X	1080i 50	1080p 25	X	X
1080p 24	X	720p 60	720p 30	720p 24	1080i 60	1080p 30	1080p 24	1080PsF 24
1080p 23.98	525i 59.94	720p 59.94	720p 29.97	720p 23.98	1080i 59.94	1080p 29.97	1080p 23.98	1080PsF 23.98
1080PsF 24	X	720p 60	720p 30	720p 24	1080i 60	1080p 30	1080p 24	1080PsF 24
1080PsF 23.98	525i 59.94	720p 59.94	720p 29.97	720p 23.98	1080i 59.94	1080p 29.97	1080p 23.98	1080PsF 23.98
<p>Notes: 1. The drop-down list choice of "Same as Input" is used when no conversion is desired. For clarity, it is not redundantly listed here.</p> <p>2. "X" denotes conversions not available or invalid conversions.</p> <p>3. Interlaced formats rates listed are field rates. Progressive format rates listed are frame rates.</p> <p>4. If the original material does not have a proper 3-2 cadence suitable for conversion to film rates, the conversion reverts to standard de-interlacing. While this video can be converted to film rates, the resulting image motion will lack smoothness. Therefore, make certain interlaced video is appropriately constructed for 3-2 reverse pull-down when converting video to film rates. (See 3-2 Pull-down Conversion and Considerations (p. 1-11) for more information.)</p> <p>5. Formats using a 30/29.97 Hz progressive frame rate can be converted to a 24/23.98 Hz progressive frame rate, however some image motion irregularity will appear in the converted output.</p>								

Table 3-2 9064 Function Submenu List — continued

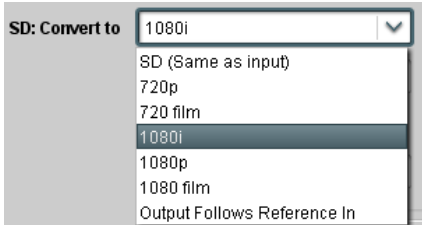
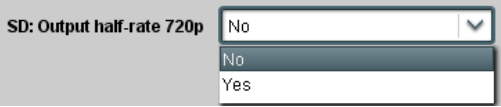

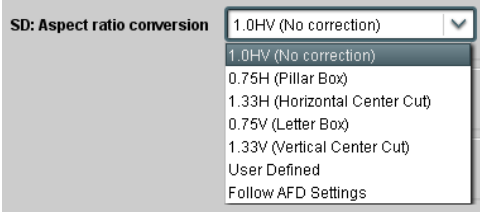
Scaler	(continued)
<p>Note: SD: controls described below affect SD inputs; HD: controls described below affect HD inputs.</p>	
<p>• SD: Convert To</p> 	<p>When SD video input is received by the 9064, provides output format conversions, or re-aspecting to SD when SD is the detected input format as described below.</p> <ul style="list-style-type: none"> • SD (Same as input): Output follows currently received video input format, with Current Input Format and Current Output Format displaying same selection. • 720p: Output is converted to 720p • 720 film: Output is converted to corresponding 720p film frame rate • 1080i: Output is converted to 1080i • 1080p: Output is converted to 1080p • 1080 film: Output is converted to corresponding 1080i film frame rate • Output Follows Reference In: Output tracks with format set in Reference Video Input <p>Note: Output Follows Reference In selection automatically sets the output format to that of the received reference signal input (this signal is distributed to the 9064 and other cards via an 8320 frame bus). In addition to extracting a frame sync and rate, this function determines the type of black burst (i.e., black burst or tri-level) and sets the output format to match.</p>
<p>• SD: Output Half-rate 720p</p> 	<p>When SD: Convert to drop-down list is set to 720p, converts output to 720p half-rate.</p> <p>Yes/No control functions as follows:</p> <ul style="list-style-type: none"> • No: Do not apply half-rate; leave output at standard frame rate • Yes: Output set at half- rate <p>Note: Half-rate outputs are available for the 720p frame rates listed under “720p” in the “Scaler Video Format Conversions” table on the previous page.</p>
<p>• SD: Output PsF</p> 	<p>When enabled (and with the output video is set to 1080 film), converts the output to 1080PsF (segmented frame progressive).</p>
<p>• SD: Aspect Ratio Conversion</p> 	<p>Selects between the standard preset Aspect Ratio Conversions (ARC) shown here, as well as User Defined and Follow AFD Settings.</p> <ul style="list-style-type: none"> • User Defined settings allow custom user-defined H and V aspect ratio control. • Follow AFD Settings sets the output aspect ratio to track with AFD settings performed in AFD (p. 3-17). <p>Note: This function is intended for aspect ratio adjustment of a particular signal without AFD considerations.</p> <ul style="list-style-type: none"> • If ARC is being used on a case-by-case basis for a particular signal, it is easier to use the Scaler ARC tools described here. • If AFD is to be used to set and apply a standard AFD code label for ARC, use Follow AFD Settings. Do not perform ARC here; instead, perform ARC as described in the AFD function description on page 3-17.

Table 3-2 9064 Function Submenu List — continued


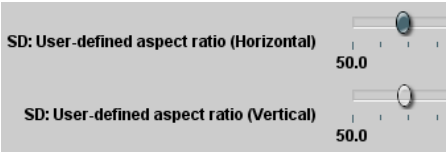

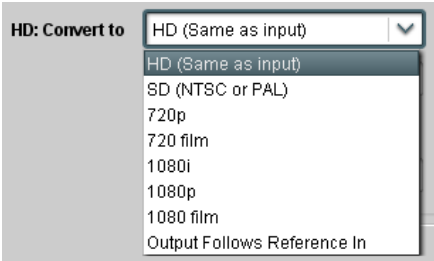
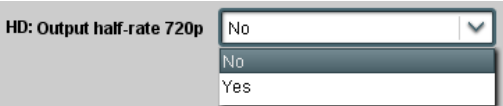

	(continued)
<p>• SD: User-defined aspect ratio</p> 	<p>(Horizontal) and (Vertical) controls adjust horizontal and vertical zoom percentage. Settings less than (<) 100% provide zoom-out; settings greater than (>) 100% provide zoom-in.</p> <p>(50% to 200% range in 0.1% steps; null = 100.0)</p>
<p>• SD: Top line suppression</p> 	<p>Selects the number of lines suppressed at the beginning of video. In this manner, the image is scaled proportionally to replace the top few lines suppressed using this control. Using this control can hide unwanted closed caption or timecode data.</p> <p>(Range is 0 thru 10 lines.)</p>
<p>• HD: Convert To</p> 	<p>When HD video input is received by the 9064, provides output format conversions listed below.</p> <ul style="list-style-type: none"> • HD (Same as input): Output follows currently received video input format, with Current Input Format and Current Output Format displays showing same selection. • SD (NTSC or PAL): Output is converted to 525i at 59.94 Hz frame rate or 625i at 50 Hz rate, as applicable. • 720p: Output is converted to 720p • 720 film: Output is converted to corresponding 720p film frame rate • 1080i: Output is converted to 1080i • 1080p: Output is converted to 1080p • 1080 film: Output is converted to corresponding 1080i film frame rate • Output Follows Reference In: Output tracks with format set in Reference Video Input <p>Note: Output Follows Reference In selection automatically sets the output format to that of the received reference signal input (this signal is distributed to the 9064 and other cards via an 8320 frame bus). In addition to extracting a frame sync and rate, this function determines the type of black burst (i.e., black burst or tri-level) and sets the output format to match.</p>
<p>• HD: Output Half-rate 720p</p> 	<p>When HD: Convert to drop-down list is set to 720p, converts output to 720p half-rate.</p> <p>Yes/No control functions as follows:</p> <ul style="list-style-type: none"> • No: Do not apply half-rate; leave output at standard frame rate • Yes: Output set at half-rate <p>Note: Half-rate outputs are available for the 720p frame rates listed under "720p" in the "Scaler Video Format Conversions" table on page 3-13.</p>
<p>• HD: Output PsF</p> 	<p>When enabled (and with the output video is set to 1080 film) converts output to 1080PsF (segmented frame progressive).</p>

Table 3-2 9064 Function Submenu List — continued


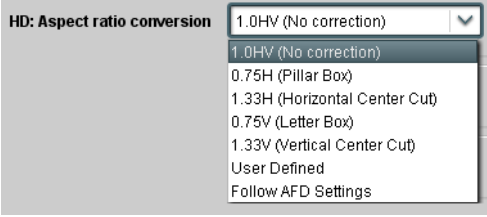
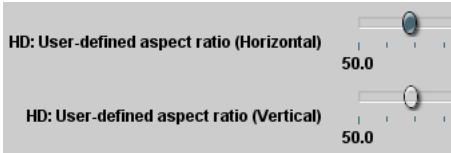




	(continued)
<p>• HD: Aspect Ratio Conversion</p> 	<p>Selects between the standard preset Aspect Ratio Conversions (ARC) shown here, as well as User Defined and Follow AFD Settings.</p> <ul style="list-style-type: none"> • User Defined settings allow custom user-defined H and V aspect ratio control. • Follow AFD Settings sets the output aspect ratio to track with AFD settings performed in AFD (p. 3-17). <p>Note: This function is intended for aspect ratio adjustment of a particular signal without AFD considerations.</p> <ul style="list-style-type: none"> • If ARC is being used on a case-by-case basis for a particular signal, it is easier to use the Scaler ARC tools described here. • If AFD is to be used to set and apply a standard AFD code label for ARC, use Follow AFD Settings. Do not perform ARC here; instead, perform ARC as described in the AFD function description on page 3-17.
<p>• HD: User-defined aspect ratio</p> 	<p>(Horizontal) and (Vertical) controls adjust horizontal and vertical zoom percentage. Settings less than (<) 100% provide zoom-out; settings greater than (>) 100% provide zoom-in.</p> <p>(50% to 200% range in 0.1% steps; null = 100.0)</p>
<p>• HD: Top line suppression</p> 	<p>Selects the number of lines suppressed at the beginning of video. In this manner, the image is scaled proportionally to replace the top few lines suppressed using this control. Using this control can hide unwanted closed caption or timecode data.</p> <p>(Range is 0 thru 10 lines.)</p>
<p>• Detail Enhancement Controls</p>	<p>Sharpness Level, Threshold, and Noise Reduction controls (individually described below) which can be used to tailor output video sharpness per program material and aesthetic preferences.</p> <p>Note: Detail enhancement controls apply to both SD and HD inputs.</p>
<p>• Sharpness Level Control</p> 	<p>Adjusts the aggressiveness of sharpening applied to MPEG video. Optimum setting results in overall perception of increased sharpness, while avoiding pattern noise artifacts.</p> <p>(Range is 0 thru 255)</p>
<p>• Sharpness Threshold Control</p> 	<p>Adjusts the point at which sharpening rules become active. Data below the threshold setting is passed unaffected.</p> <p>Higher settings allow for a more subtle sharpness enhancement (especially with content showing motion). Lower settings allow more content in general to be acted upon by the enhancement process.</p> <p>(Range is 0 thru 255)</p>
<p>• Noise Reduction Control</p> 	<p>Adjusts the amount of statistical low-pass filtering applied to the data. Using this control, regular pattern noise artifacts from the sharpening process can be reduced, resulting in subjectively smoother raster backgrounds and detail boundaries.</p> <p>(Range is 0 thru 63)</p>

Table 3-2 9064 Function Submenu List — continued






	<p>Allows assignment of AFD (Active Format Description) codes to the SDI output video, and allows unique ARC settings to be applied for each AFD code.</p> <p>When an appropriate AFD code is received by this card, this function can be used to apply the AFD-directed re-aspecting, resulting in a properly scaled and cropped image area.</p>
<div style="border: 1px solid black; padding: 10px;"> <p>Without AFD</p> <p>NTSC-Coded (4:3) 1080i Video Signal → Up-Conversion to 16:9 → 1080i Video Signal with 16:9 uncorrected signal</p> <p>NTSC-Coded image on 16:9 display shows letterbox cropping</p>  <p>Uncorrected up-conversion results in "postage stamp" effect with both letterbox and sidebars visible on 16:9 display</p>  </div> <div style="border: 1px solid black; padding: 10px;"> <p>With AFD</p> <p>NTSC-Coded (4:3) 1080i Video Signal with 1010 AFD Code → 9064 with 1010 AFD Code Received and Applied → Up-Conversion to 16:9 → 1080i Video Signal with 16:9 corrected signal</p> <p>NTSC-Coded image on 16:9 display shows letterbox cropping</p>  <p>AFD Corrected up-conversion results in intended image area properly visible on 16:9 display</p>  </div>	

Table 3-2 9064 Function Submenu List — continued

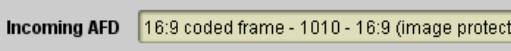
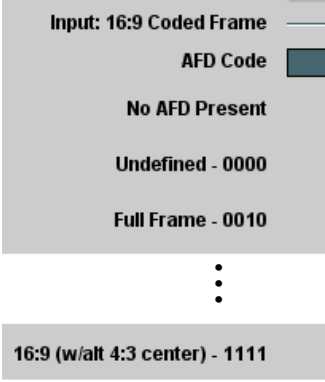
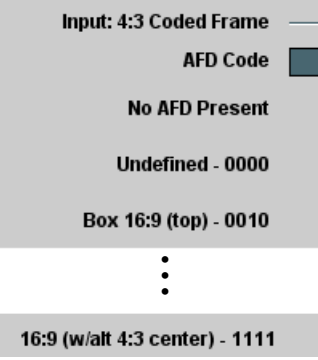
AFD	(continued)																												
<p>• Incoming AFD</p> 	<p>Displays incoming AFD setting as follows:</p> <ul style="list-style-type: none"> • If AFD code is present, one of the 11, four-bit AFD codes is displayed (as shown in the example to the left). Also displayed is the VANC line number of the incoming AFD code. • If no AFD setting is present in the video signal, No AFD Present is displayed. 																												
<p>• 16:9 Controls</p> 	<p>Individual user (custom) H Zoom, V Zoom, and AFD Output Code tools for the following 12 AFD codes/formats suited for 16:9 sources:</p> <table border="1" data-bbox="740 680 1385 1014"> <thead> <tr> <th>AFD Code⁽¹⁾</th> <th>Description</th> <th>AFD Code⁽¹⁾</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>–</td> <td>No code present</td> <td>1001</td> <td>4:3 (center)</td> </tr> <tr> <td>0000</td> <td>Undefined</td> <td>1010</td> <td>16:9 (image protected)⁽²⁾</td> </tr> <tr> <td>0010</td> <td>Full frame</td> <td>1011</td> <td>14:9 (center)</td> </tr> <tr> <td>0011</td> <td>4:3 (center)</td> <td>1101</td> <td>4:3 (with alternate 14:9 center)</td> </tr> <tr> <td>0100</td> <td>Box > 16:9 (center)</td> <td>1110</td> <td>16:9 (with alternate 14:9 center)⁽²⁾</td> </tr> <tr> <td>1000</td> <td>Full frame</td> <td>1111</td> <td>16:9 (with alternate 4:3 center)⁽²⁾</td> </tr> </tbody> </table> <p>1: AFD codes numbering and definitions conform to SMPTE 2016-1-2007. 2: Image Protected implies picture content that must not be cropped by conversion processes or display devices. Alternate center formats may have protected center areas, with areas outside of the protected area not containing mandatory content. Refer to SMPTE 2016-1-2007 for more information if needed.</p>	AFD Code ⁽¹⁾	Description	AFD Code ⁽¹⁾	Description	–	No code present	1001	4:3 (center)	0000	Undefined	1010	16:9 (image protected) ⁽²⁾	0010	Full frame	1011	14:9 (center)	0011	4:3 (center)	1101	4:3 (with alternate 14:9 center)	0100	Box > 16:9 (center)	1110	16:9 (with alternate 14:9 center) ⁽²⁾	1000	Full frame	1111	16:9 (with alternate 4:3 center) ⁽²⁾
AFD Code ⁽¹⁾	Description	AFD Code ⁽¹⁾	Description																										
–	No code present	1001	4:3 (center)																										
0000	Undefined	1010	16:9 (image protected) ⁽²⁾																										
0010	Full frame	1011	14:9 (center)																										
0011	4:3 (center)	1101	4:3 (with alternate 14:9 center)																										
0100	Box > 16:9 (center)	1110	16:9 (with alternate 14:9 center) ⁽²⁾																										
1000	Full frame	1111	16:9 (with alternate 4:3 center) ⁽²⁾																										
<p>• 4:3 Controls</p> 	<p>Individual user (custom) H Zoom, V Zoom, and AFD Output Code tools for the following 12 AFD codes/formats suited for 4:3 sources:</p> <table border="1" data-bbox="740 1283 1385 1596"> <thead> <tr> <th>AFD Code⁽¹⁾</th> <th>Description</th> <th>AFD Code⁽¹⁾</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>–</td> <td>No code present</td> <td>1001</td> <td>Full frame</td> </tr> <tr> <td>0000</td> <td>Undefined</td> <td>1010</td> <td>16:9 (center)</td> </tr> <tr> <td>0010</td> <td>Box 16:9 (top)</td> <td>1011</td> <td>14:9 (center)</td> </tr> <tr> <td>0011</td> <td>Box 14:9 (top)</td> <td>1101</td> <td>4:3 (with alternate 14:9 center)</td> </tr> <tr> <td>0100</td> <td>Box > 16:9 (center)</td> <td>1110</td> <td>16:9 (with alternate 14:9 center)⁽²⁾</td> </tr> <tr> <td>1000</td> <td>Full frame</td> <td>1111</td> <td>16:9 (with alternate 4:3 center)⁽²⁾</td> </tr> </tbody> </table> <p>1: AFD codes numbering and definitions conform to SMPTE 2016-1-2007. 2: Image Protected implies picture content that must not be cropped by conversion processes or display devices. Alternate center formats may have protected center areas, with areas outside of the protected area not containing mandatory content. Refer to SMPTE 2016-1-2007 for more information if needed.</p>	AFD Code ⁽¹⁾	Description	AFD Code ⁽¹⁾	Description	–	No code present	1001	Full frame	0000	Undefined	1010	16:9 (center)	0010	Box 16:9 (top)	1011	14:9 (center)	0011	Box 14:9 (top)	1101	4:3 (with alternate 14:9 center)	0100	Box > 16:9 (center)	1110	16:9 (with alternate 14:9 center) ⁽²⁾	1000	Full frame	1111	16:9 (with alternate 4:3 center) ⁽²⁾
AFD Code ⁽¹⁾	Description	AFD Code ⁽¹⁾	Description																										
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0000	Undefined	1010	16:9 (center)																										
0010	Box 16:9 (top)	1011	14:9 (center)																										
0011	Box 14:9 (top)	1101	4:3 (with alternate 14:9 center)																										
0100	Box > 16:9 (center)	1110	16:9 (with alternate 14:9 center) ⁽²⁾																										
1000	Full frame	1111	16:9 (with alternate 4:3 center) ⁽²⁾																										

Table 3-2 9064 Function Submenu List — continued

<div style="text-align: center; background-color: #333; color: white; padding: 5px; width: 100px; margin: 0 auto;">AFD</div>	<p>(continued)</p>																				
<p style="text-align: center;">• H Zoom and V Zoom Controls</p> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;"> <div style="background-color: #333; color: white; padding: 2px; text-align: center; font-weight: bold;">H Zoom (50.0-200.0)</div> <div style="text-align: center; margin-top: 5px;"> <input style="width: 60px;" type="text" value="100.0"/> </div> </div> <hr style="border: 1px solid black;"/> <div style="border: 1px solid #ccc; padding: 5px;"> <div style="background-color: #333; color: white; padding: 2px; text-align: center; font-weight: bold;">V Zoom (50.0-200.0)</div> <div style="text-align: center; margin-top: 5px;"> <input style="width: 60px;" type="text" value="75.0"/> </div> </div>	<p>Individual H Zoom and V Zoom controls for each of the 12 AFD code choices for both 4:3 and 16:9 coded input frames described above allow adjustment of horizontal and vertical zoom percentage for each AFD code.</p> <p>(50% to 200% range in 0.1% steps)</p> <p>Note: To apply H and V settings for a given AFD code using this card, Scaler Aspect Ratio Conversion must be set to Follow AFD Settings.</p> <p>Note: Default zoom percentages use the following rules:</p> <ul style="list-style-type: none"> • The default zoom percentages displayed when this function is accessed are the default percentages corresponding to the respective AFD standard ratio definitions (for example, default horizontal and vertical zoom percentages for 4:3 ratios are correspondingly 133% and 100%, yielding a 4:3 aspect ratio). In these cases, the null values for this definition are the default values shown. • In cases where a different aspect ratio is to be used for a given received aspect ratio, the default ratio displayed is the null value that results (assuming no H or V zoom modification). For example, for a 16:9 signal and settings set for a 1111 (15) AFD code (“16:9 with 4:3 protected image”), the respective displayed default H and V zoom settings of 100% and 75% protect the Protected Image Area. 																				
<p style="text-align: center;">• AFD Output Code</p> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;"> <div style="background-color: #333; color: white; padding: 2px; text-align: center; font-weight: bold;">AFD Output Code</div> <div style="margin-top: 5px;"> <input style="width: 60px;" type="text" value="No AFD"/> </div> <div style="margin-top: 5px;"> <input style="width: 60px;" type="text" value="0000"/> </div> <div style="margin-top: 5px;"> <input style="width: 60px;" type="text" value="1010"/> </div> <div style="text-align: center; margin-top: 10px;"> ⋮ </div> <div style="margin-top: 10px;"> <input style="width: 60px;" type="text" value="1111"/> </div> </div>	<p>Twelve drop-down lists that allow assignment of AFD codes to the 12 individual H Zoom and V Zoom tools described above.</p> <p>Note:</p> <ul style="list-style-type: none"> • The default AFD codes displayed when this function is accessed show the SMPTE AFD code most closely reflecting the aspect ratio when the corresponding default settings are applied. • An AFD Output Code setting has no effect on aspect on ARC performed by this card; it merely applies a selected AFD code to the output video. 																				
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #333; color: white;"> <th style="padding: 5px;">AFD Code</th> <th style="padding: 5px;">H Zoom (50.0-200.0)</th> <th style="padding: 5px;">V Zoom (50.0-200.0)</th> <th style="padding: 5px;">AFD Output Code</th> </tr> </thead> <tbody> <tr> <td style="text-align: left; padding: 5px;">No AFD Present</td> <td style="padding: 5px;"><input style="width: 60px;" type="text" value="100.0"/></td> <td style="padding: 5px;"><input style="width: 60px;" type="text" value="75.0"/></td> <td style="padding: 5px;"><input style="width: 60px;" type="text" value="No AFD"/></td> </tr> <tr> <td style="text-align: left; padding: 5px;">Undefined - 0000</td> <td style="padding: 5px;"><input style="width: 60px;" type="text" value="100.0"/></td> <td style="padding: 5px;"><input style="width: 60px;" type="text" value="75.0"/></td> <td style="padding: 5px;"><input style="width: 60px;" type="text" value="0000"/></td> </tr> <tr> <td style="text-align: left; padding: 5px;">Full Frame - 0010</td> <td style="padding: 5px;"><input style="width: 60px;" type="text" value="100.0"/></td> <td style="padding: 5px;"><input style="width: 60px;" type="text" value="75.0"/></td> <td style="padding: 5px;"><input style="width: 60px;" type="text" value="1010"/></td> </tr> <tr> <td style="text-align: left; padding: 5px;">4:3 (center) - 0011</td> <td style="padding: 5px;"><input style="width: 60px;" type="text" value="133.0"/></td> <td style="padding: 5px;"><input style="width: 60px;" type="text" value="100.0"/></td> <td style="padding: 5px;"><input style="width: 60px;" type="text" value="1000"/></td> </tr> </tbody> </table> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div data-bbox="256 1686 860 1871" style="width: 45%;"> <p>In this example, if a “0011” AFD code is received, the entered H Zoom and V Zoom values corresponding to AFD code 0011 are applied to the image (133.0% and 100.0%, respectively, in this example). The H Zoom and V Zoom values for any AFD code can be changed as desired. When the card Scaler Aspect Ratio Conversion is set to Follow AFD Settings, the H and V zoom values set here are applied to the output video.</p> </div> <div data-bbox="938 1686 1396 1820" style="width: 45%;"> <p>In this example, with the AFD Output Code drop-down set to 1000, if a 0011 code is received on the input, an AFD code of 1000 is outputted by the card. (Note that the assigned output code has no effect on ARC performed within this card.)</p> </div> </div>		AFD Code	H Zoom (50.0-200.0)	V Zoom (50.0-200.0)	AFD Output Code	No AFD Present	<input style="width: 60px;" type="text" value="100.0"/>	<input style="width: 60px;" type="text" value="75.0"/>	<input style="width: 60px;" type="text" value="No AFD"/>	Undefined - 0000	<input style="width: 60px;" type="text" value="100.0"/>	<input style="width: 60px;" type="text" value="75.0"/>	<input style="width: 60px;" type="text" value="0000"/>	Full Frame - 0010	<input style="width: 60px;" type="text" value="100.0"/>	<input style="width: 60px;" type="text" value="75.0"/>	<input style="width: 60px;" type="text" value="1010"/>	4:3 (center) - 0011	<input style="width: 60px;" type="text" value="133.0"/>	<input style="width: 60px;" type="text" value="100.0"/>	<input style="width: 60px;" type="text" value="1000"/>
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Table 3-2 9064 Function Submenu List — continued




	(continued)
<ul style="list-style-type: none"> • Output Line 	<p>Allows selecting the line location of the AFD data within the video signal Ancillary Data space.</p> <p>(Range is 9 thru 41)</p> <p>Note:</p> <ul style="list-style-type: none"> • Although the output line drop-down will allow any choice within the 9 thru 41 range, the actual range is automatically clamped (limited) to certain ranges to prevent inadvertent conflict with active picture area depending on video format. See Ancillary Data Line Number Locations and Ranges (p. 3-8) for more information. • The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data.
<ul style="list-style-type: none"> • Restore Defaults 	<p>Restore Defaults provides default restore of all user settings described in the remainder of the AFD function description.</p> <p>When Confirm is clicked, a Confirm? pop-up appears, requesting confirmation.</p> <ul style="list-style-type: none"> • Click Yes to proceed with restore defaults. • Click No to reject restore defaults.

Table 3-2 9064 Function Submenu List — continued

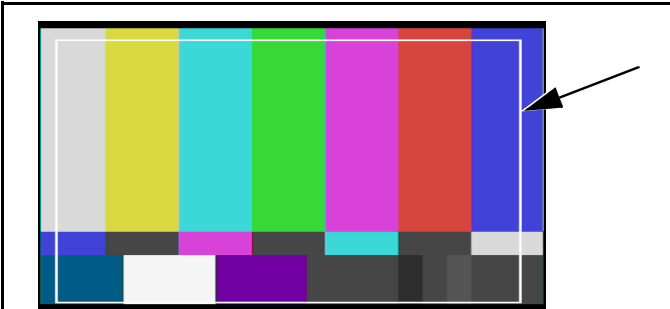

<div style="background-color: #333; color: white; padding: 10px; text-align: center; font-weight: bold; font-size: 1.2em;">Overlays</div>	<p>Allows Safe Action and/or Safe Title overlays to be added to the image. The overlays can be used to identify safe action and safe title areas within the image.</p>
<p>Note: Overlay markers using this function are for setup only. When enabled, these markers are embedded in the SDI video output signal and may 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 done.</p> <p>Note: Multiple overlay markers described below can be simultaneously enabled as desired.</p>	
<p>• Safe Action Area</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> Safe Action Area On </div>	<p>When enabled (On), turns on the Safe Action Area overlay.</p> <div style="text-align: center; margin: 10px 0;">  </div> <p>When enabled (On), outline shows Safe Action Area boundary. Color of boundary is selected using Color drop-down list.</p>
<p>• Safe Title Area</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> Safe Title Area On </div>	<p>When enabled (On), turns on the Safe Title Area overlay.</p> <div style="text-align: center; margin: 10px 0;">  </div> <p>When enabled (On), outline shows Safe Title Area boundary. Color of boundary is selected using Color drop-down list.</p>

Table 3-2 9064 Function Submenu List — continued


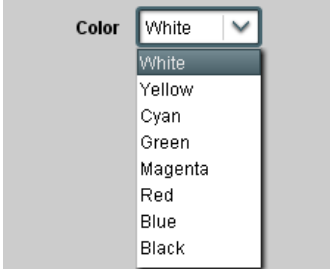

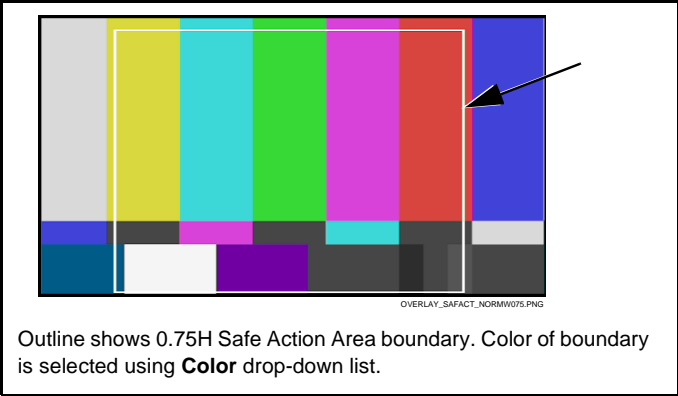
	(continued)
<p>• Safe Action/Title Area Color</p> 	<p>Selects the Safe Action and Safe Title overlay color from choices shown to the left.</p>
<p>• 0.75H Safe Action Area</p> 	<p>When enabled (On), turns on the 0.75H Safe Action Area overlay that shows the 4:3 safe area on a 16:9 image (i.e., the resulting safe area when the image is converted to 4:3).</p>  <p>Outline shows 0.75H Safe Action Area boundary. Color of boundary is selected using Color drop-down list.</p> <p>Note: If 0.75H (Pillar Box) is selected using the Aspect Ratio Conversion tool in the Scaler function, and Overlays Follow ARC is selected for this function, the overlays will be additionally reduced 0.75H beyond the standard 4:3 safe areas</p>

Table 3-2 9064 Function Submenu List — continued

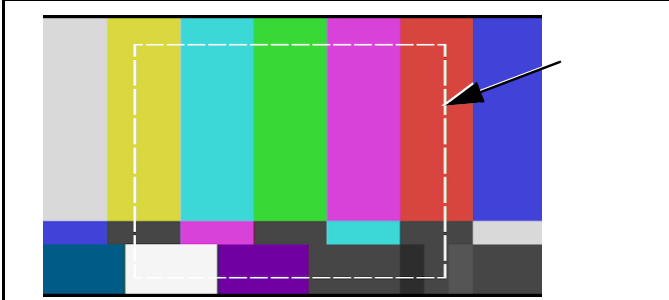
<div style="background-color: #333; color: white; padding: 5px; text-align: center; font-weight: bold;">Overlays</div>	<p>(continued)</p>
<p>• 0.75H Safe Title Area</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>0.75H Safe Title Area <input type="checkbox" value="On"/></p> </div>	<p>When enabled (On), turns on the 0.75H Safe Title Area overlay that shows the 4:3 safe title area on a 16:9 image (i.e., resulting safe title area when the image is converted to 4:3).</p> <div style="text-align: center; margin: 10px 0;">  <p style="font-size: small; margin: 0;">OVERLAY_SAFTLENORMW075.PNG</p> </div> <p>Outline shows 0.75H Safe Title Area boundary. Color of boundary is selected using Color drop-down list.</p> <p>Note: If 0.75H (Pillar Box) is selected using the Aspect Ratio Conversion tool in the Scaler function, and Overlays Follow ARC is selected for this function, the overlays will be additionally reduced 0.75H beyond the standard 4:3 safe areas</p>
<p>• 0.75H Safe Action/Title Area Color</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Color White ▼</p> <ul style="list-style-type: none"> <li style="padding: 2px;">White <li style="padding: 2px;">Yellow <li style="padding: 2px;">Cyan <li style="padding: 2px;">Green <li style="padding: 2px;">Magenta <li style="padding: 2px;">Red <li style="padding: 2px;">Blue <li style="padding: 2px;">Black </div>	<p>Selects the 0.75H Safe Action and 0.75H Safe Title overlay color from choices shown to the left.</p>

Table 3-2 9064 Function Submenu List — continued

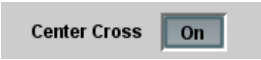
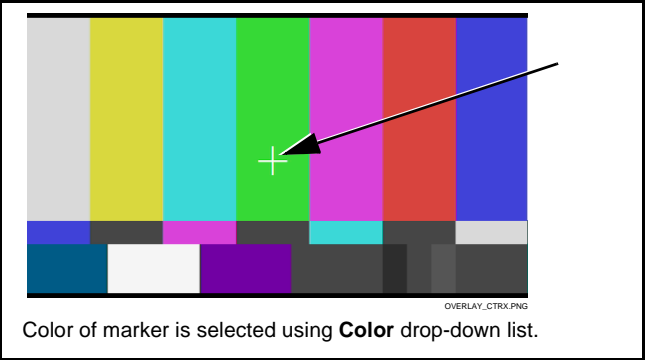
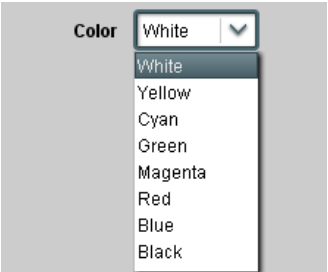

Overlays	(continued)
<p>• Center Cross</p> 	<p>When enabled (On), turns on the Center Cross overlay.</p>  <p>Color of marker is selected using Color drop-down list.</p>
<p>• Center Cross Color</p> 	<p>Selects the Center Cross overlay color from choices shown to the left.</p>
<p>• Overlays Follow ARC</p> 	<p>When enabled (On), overlays are resized along with the image in accordance with any ARC settings.</p> <p>Note: This choice functions only when a zoom-out is applied (settings less than 100%).</p>

Table 3-2 9064 Function Submenu List — continued




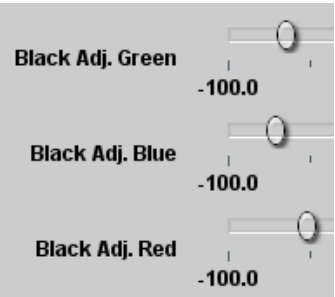

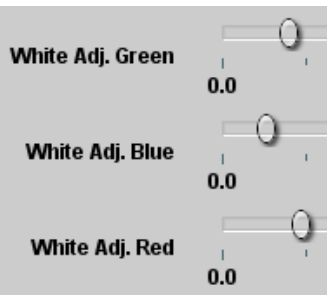

	<p>Provides color corrector functions for the individual RGB channels of the received SD/HD SDI signal.</p>
<p>• Color Corrector</p> 	<p>Color Corrector (On/Off) provides master on/off control of all Color Corrector functions.</p> <ul style="list-style-type: none"> • When set to Off, all processing is bypassed. • When set to On, currently displayed parameters settings take effect.
<p>• Reset to Unity</p> 	<p>Reset to Unity provides unity reset control of all Color Corrector functions.</p> <p>When Confirm is clicked, a Confirm? pop-up appears, requesting confirmation.</p> <ul style="list-style-type: none"> • Click Yes to proceed with the unity reset. • Click No to reject unity reset.
<p>• Black Adj. (Green – Red – Blue)</p> 	<p>Separate red, green, and blue black level controls respectively apply lift value for R, G, and B channels.</p> <p>(-100.0 to 100.0% range in 0.1% steps; null = 0.0)</p>
<p>• Gang Black Level Controls</p> 	<p>When set to On, changing any of the Black Adj. controls increases or decreases R, G, and B black levels by equal amounts.</p>
<p>• White Adj. (Green – Red – Blue)</p> 	<p>Separate red, green, and blue gain controls respectively apply gain percentage for R, G, and B channels.</p> <p>(0.0 to 200.0% range in 0.1% steps; unity = 100.0)</p>
<p>• Gang White Level Controls</p> 	<p>When set to On, changing any of the White Adj. (gain) controls increases or decreases R, G, and B white gain levels by equal amounts.</p>

Table 3-2 9064 Function Submenu List — continued


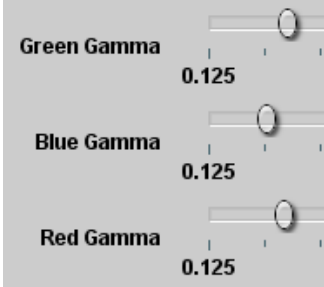

	(continued)
<ul style="list-style-type: none"> • Gamma (Green – Red – Blue) 	<p>Separate red, green, and blue gamma controls respectively apply gamma curve adjustment for R, G, and B channels. (0.125 to 8.000 range in thousandths steps; unity = 1.000)</p>
<ul style="list-style-type: none"> • Gang Gamma Controls 	<p>When set to On, changing any of the Gamma controls increases or decreases all Gamma settings by equal amounts.</p>

Table 3-2 9064 Function Submenu List — continued


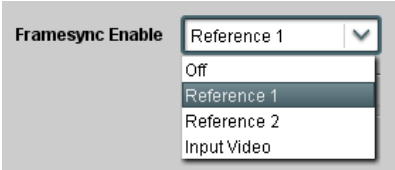

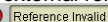

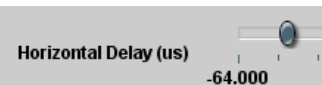
	<p>Provides video Frame Sync and delay control tools.</p>
<p>• Framesync Enable</p> 	<p>Disables the Frame Sync function, or selects from choices below.</p> <ul style="list-style-type: none"> • Off: Video path bypasses frame sync entirely; output video timing tracks with input video timing. • Reference 1: Allows Frame Sync function to use external Reference 1 as the reference ("house") standard. • Reference 2: Allows Frame Sync function to use external Reference 2 as the reference ("house") standard. <p>Note: If Reference 1 or Reference 2 is selected and an appropriate external reference is not received, the   indication appears in the Card Info status portion of DashBoard™, indicating invalid frame sync reference error. (Additionally, the card edge ERR indicator illuminates indicating the same.) External reference signals Reference 1 and Reference 2 are distributed to the card and other cards via a frame bus.</p> <ul style="list-style-type: none"> • Input Video: Allows full framesync functionality (such as delay offset), but instead uses the input video signal as the reference standard. <p>Note: If Input Video is used for framesync, any timing instability on the input video will result in corresponding instability on the output video. This setting should only be used where syncing to input video is known to be reliable.</p>
<p>• Vertical Delay Control</p> 	<p>When Framesync is enabled, sets vertical delay (in number of lines of output video/format) between the output video and the frame sync reference.</p> <p>(Range is -1124 thru 1124 lines.)</p> <p>Note: Lines refer to lines in the output video format, and not to the reference format.</p>
<p>• Horizontal Delay Control</p> 	<p>When Framesync is enabled, sets (in usec of output video timing) horizontal delay between the output video and the frame sync reference.</p> <p>(Range is -64.000 thru 64.000 μsec)</p> <p>Note: When an external framesync reference is used, the card will not produce a framesync reset until the variance between framesync reference and output video exceeds ± 2 clock periods. Therefore, a framesync reset will not result if offsets within this window are applied.</p> <p>To apply an offset/framesync reset within this window, first apply a relatively large offset, then apply the target smaller offset.</p> <p>Example: To apply a 1-period offset, first apply a 10-period positive offset and then apply a 9-period negative offset. This results in the target 1-period offset being applied to the output video.</p>

Table 3-2 9064 Function Submenu List — continued

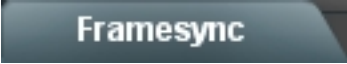


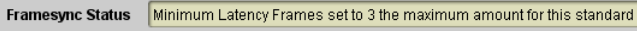
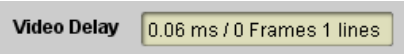



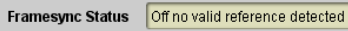
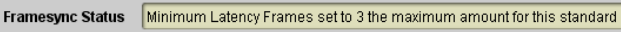
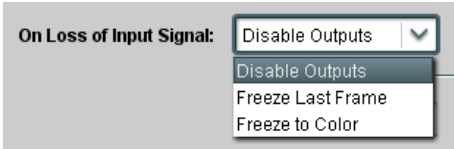
	(continued)
<p>• Minimum Latency Frames Control</p> 	<p>When Framesync is enabled, specifies the smallest amount of latency allowed by the frame sync (latency measurement in output video frames). The frame sync will not output a frame unless the specified number of frames are captured in the buffer. The operational latency of the frame sync is always between the specified minimum latency and minimum latency plus one frame (not one field). (Maximum range is 0 to 13.)</p> <p>Note: Due to card memory limits, the maximum available Minimum Latency Frames is related to the output video format selected. For example, with a 1080i59.94 output, the maximum allowed setting is 5. For a 1080i film (23.98) output, the maximum allowed setting is 3. Conversely, greater maximum settings are allowed for SD formats such as 525i59.94, where the practical maximum limit is 13.</p> <p>When using this control, be sure to check the Framesync Status display as follows:</p>  <ul style="list-style-type: none"> • Latency frames selection within limits.  <ul style="list-style-type: none"> • Latency frames selection exceeds limits.
<p>• Video Delay Display</p> 	<p>Displays the current input-to-output video delay (in msec units) as well as in terms of Frames/fractional frame (in number of lines).</p>
<p>• Framesync Status Display</p> 	<p>Displays the current framesync status as follows:</p>  <ul style="list-style-type: none"> • Framesync status OK.  <ul style="list-style-type: none"> • Framesync Enable set to Off.  <ul style="list-style-type: none"> • Improper or missing framesync reference.  <ul style="list-style-type: none"> • Latency frames selection exceeds limits. <p>Note: See Minimum Latency Frames Control (p. 3-28) for more information about this message.</p>
<p>• Loss of Input Signal Selection</p> 	<p>In the event of input video Loss of Signal (LOS), determines action to be taken as follows:</p> <ul style="list-style-type: none"> • Disable Outputs: Disable all outputs. • Freeze Last Frame: Freeze image to last good frame (last frame having valid SAV and EAV codes). • Freeze to Color: Freeze image to a color raster (as selected using Framesync LOS Freeze Color control). <p>Note: If LOS is set to Freeze to Last Frame, there will be audio noise of last audio packet also frozen. If card is to handle any audio, be aware of this if LOC is anticipated in OTA chain.</p>

Table 3-2 9064 Function Submenu List — continued

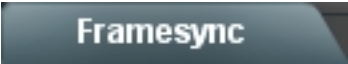
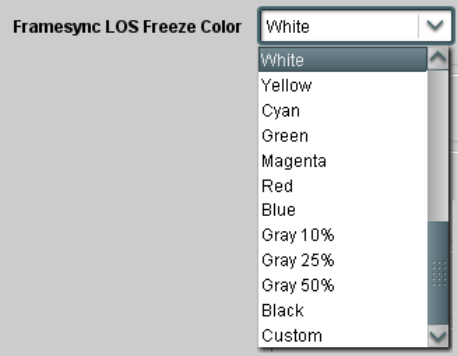




	(continued)
<p>• Framesync LOS Freeze Color</p> 	<p>In the event of LOS with Freeze to Color enabled above, sets the image raster color from choices shown to the left.</p>
<p>• Custom Color Hue</p> 	<p>Adjusts raster hue (phase angle) for custom LOS color. (-360° to 360° range in 0.1° steps; null = 0°)</p>
<p>• Custom Color Saturation</p> 	<p>Adjusts raster saturation level for custom LOS color. (0% to 100% range in 0.1% steps)</p>
<p>• Custom Color Y Level</p> 	<p>Adjusts raster luma level for custom LOS color. (64 to 940 range)</p>
<p>• Reset Framesync</p> 	<p>Resets the frame sync, clearing any buffered video. When Confirm is clicked, a Confirm? pop-up appears, requesting confirmation.</p> <ul style="list-style-type: none"> • Click Yes to reset the frame sync. • Click No to reject reset.

Table 3-2 9064 Function Submenu List — continued



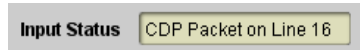

	<p>Provides support for closed captioning setup.</p>								
<p>Note: When receiving HD-SDI, both CEA 608 and CEA 708 are supported, with CEA 608 and CEA 708 (containing CEA 608 packets) converted to line 21 closed captioning on outputs down-converted to SD (on up-convert of SD, only CEA 608 closed captioning is generated).</p>									
<p>• Closed Captioning On/Off</p> 	<p>Turns on or turns off the Closed Captioning output.</p> <p>Note:</p> <ul style="list-style-type: none"> • When set to On, closed captioning is set to standard default line number. See Ancillary Data Line Number Locations and Ranges (p. 3-8). • The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data. • Closed captioning line may contain active unintended data even if closed captioning is set to Off. If closed captioning is not to be used, it is recommended to use the Top Line Suppression control to eliminate the possibility of this unintended data from appearing in the active video area. (See Scaler tab (p. 3-12) Top line suppression control for more details.) 								
<p>• Closed Captioning Input Status</p> 	<p>Displays incoming Closed Captioning status as follows:</p> <ul style="list-style-type: none"> • If closed captioning is present, a message similar to the example shown left is displayed. Also displayed is the VANC line number of the incoming closed captioning packet (or SD waveform-based VANC line number). • If no closed captioning is present in the video signal, Not Present or Disabled is displayed. <p>Note: • Packet closed captioning status Captioning Rejected Due To message can appear due to the items described below. The closed captioning function assesses <i>cdp_identifier</i>, <i>cdp_frame_rate</i>, <i>ccdata_present</i>, and <i>caption_service_active</i> items contained in the packet header to make the determinations listed below. Refer to CEA-708-B for more information.</p> <table border="1" data-bbox="748 1167 1398 1503"> <thead> <tr> <th>Message</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Unsupported Frame Rate</td> <td>Film rate closed-captioning (either as pass-through or up/down conversion) is not supported by the card.</td> </tr> <tr> <td>Data Not Present</td> <td>Packet is marked from closed captioning source external to the card that no data is present.</td> </tr> <tr> <td>No Data ID</td> <td>Packet from closed captioning source external to the card is not properly identified with 0x9669 as the first word of the header (unidentified packet).</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • caption service is marked as inactive display indicates bit in packet from upstream source may inadvertently be set as inactive. In this case, closed captioning data (if present) is still processed and passed by the card as normal. • The closed captioning function does not support PAL closed captioning standards. 	Message	Description	Unsupported Frame Rate	Film rate closed-captioning (either as pass-through or up/down conversion) is not supported by the card.	Data Not Present	Packet is marked from closed captioning source external to the card that no data is present.	No Data ID	Packet from closed captioning source external to the card is not properly identified with 0x9669 as the first word of the header (unidentified packet).
Message	Description								
Unsupported Frame Rate	Film rate closed-captioning (either as pass-through or up/down conversion) is not supported by the card.								
Data Not Present	Packet is marked from closed captioning source external to the card that no data is present.								
No Data ID	Packet from closed captioning source external to the card is not properly identified with 0x9669 as the first word of the header (unidentified packet).								
<p>• Closed Captioning HD Output Line</p> 	<p>Selects the VANC line number (9 thru 41) for the closed caption data when the output is HD.</p> <p>Note: Although the output line drop-down will allow any choice within the 9 thru 41 range, the actual range is automatically clamped (limited to) certain ranges to prevent inadvertent conflict with active picture area depending on video format. See Ancillary Data Line Number Locations and Ranges (p. 3-8) for more information.</p>								

Table 3-2 9064 Function Submenu List — continued

<div style="background-color: #333; color: white; padding: 10px; display: inline-block; border-radius: 5px;"> <h2 style="margin: 0;">Timecode</h2> </div>	<p>Provides timecode data extraction from various sources, and provides formatting and re-insertion controls for inserting the timecode into the output video.</p>										
<p>Shown below is an example in which received 525i 5994 SDI video is being converted to 720p 5994. To preserve and re-insert the timecode data, the following can be performed using the Timecode function. Each Timecode control is fully described on the pages that follow.</p>											
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p>525i 5994 w/ VITC Waveform → 9064 → 720p 5994 w/ ATC_VITC w/ ATC_LTC</p> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>SDI VITC Waveform Status</td> <td>21:41:29:17.0</td> </tr> <tr> <td>SDI ATC_LTC Status</td> <td>Unlocked</td> </tr> <tr> <td>SDI ATC_VITC Status</td> <td>Unlocked</td> </tr> </table>	SDI VITC Waveform Status	21:41:29:17.0	SDI ATC_LTC Status	Unlocked	SDI ATC_VITC Status	Unlocked				
SDI VITC Waveform Status	21:41:29:17.0										
SDI ATC_LTC Status	Unlocked										
SDI ATC_VITC Status	Unlocked										
<p>A Noting that the incoming video contains VITC waveform timecode data (as shown in the status display), set the Source Priority drop-down lists to include VITC Waveform timecode data (SDI VITC) as a choice. This extracts VITC Waveform timecode data from the incoming video.</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Source Priority 1</td> <td>SDI_VITC</td> </tr> <tr> <td>Source Priority 2</td> <td>ATC_VITC</td> </tr> <tr> <td>Source Priority 3</td> <td>None</td> </tr> <tr> <td>Source Priority 4</td> <td>None</td> </tr> </table>	Source Priority 1	SDI_VITC	Source Priority 2	ATC_VITC	Source Priority 3	None	Source Priority 4	None		
Source Priority 1	SDI_VITC										
Source Priority 2	ATC_VITC										
Source Priority 3	None										
Source Priority 4	None										
<hr/>											
<p>B In this example, it is desired to provide both SDI ATC_VITC and ATC_LTC timecode data in the converted HD output video. As such, set both HD ATC VITC Insertion and HD ATC LTC Insertion to Enabled.</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>HD ATC VITC Insertion</td> <td>Enabled</td> </tr> <tr> <td>HD ATC VITC Insertion Line Field 1</td> <td>9 - SMPTE 12M-2-2008 Recommended</td> </tr> <tr> <td>HD ATC VITC Insertion Line Field 2</td> <td>8 (571) - SMPTE 12M-2-2008 Recommended</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>HD ATC LTC Insertion</td> <td>Enabled</td> </tr> <tr> <td>HD ATC LTC Insertion Line</td> <td>10 - SMPTE 12M-2-2008 Recommended</td> </tr> </table>	HD ATC VITC Insertion	Enabled	HD ATC VITC Insertion Line Field 1	9 - SMPTE 12M-2-2008 Recommended	HD ATC VITC Insertion Line Field 2	8 (571) - SMPTE 12M-2-2008 Recommended	HD ATC LTC Insertion	Enabled	HD ATC LTC Insertion Line	10 - SMPTE 12M-2-2008 Recommended
HD ATC VITC Insertion	Enabled										
HD ATC VITC Insertion Line Field 1	9 - SMPTE 12M-2-2008 Recommended										
HD ATC VITC Insertion Line Field 2	8 (571) - SMPTE 12M-2-2008 Recommended										
HD ATC LTC Insertion	Enabled										
HD ATC LTC Insertion Line	10 - SMPTE 12M-2-2008 Recommended										
<p>In the example here, the line numbers are set to the default SMPTE 12M-2-2008 recommended values.</p>											

Table 3-2 9064 Function Submenu List — continued


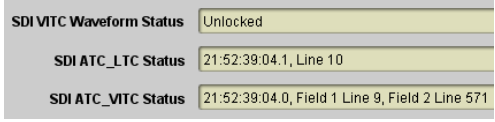

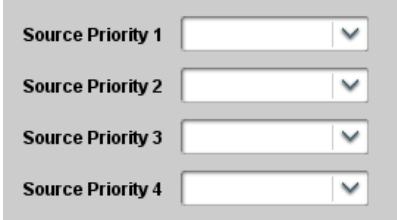
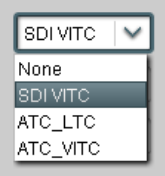
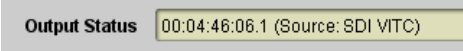
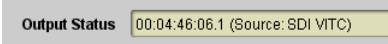
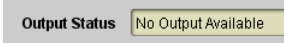
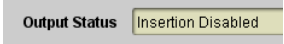
	(continued)
<p>• Timecode Source Status Displays</p> 	<p>Displays the current status and contents of the four supported timecode formats shown to the left.</p> <ul style="list-style-type: none"> • If a format is receiving timecode data, the current content (timecode running count and line number) is displayed. • If a format is not receiving timecode data, Unlocked is displayed.
<p>• Incoming ATC Packet Removal Control</p> 	<p>Enables or disables removal of existing input video ATC timecode packets from the output. This allows removal of undesired existing timecodes from the output, resulting in a “clean slate” where only desired timecodes are then re-inserted into the output. (For example, if both SDI ATC_VITC and ATC_LTC are present on the input video, and only ATC_LTC is desired, using the Removal control will remove both timecodes from the output. The ATC_LTC timecode by itself can then be re-inserted on the output using the other controls discussed here.)</p> <p>Note: When the Scaler is enabled, ATC packets are automatically removed. The Timecode function must be used to re-insert the timecode data into the output video.</p>
<p>• Source Priority</p> 	<p>As described here, selects the priority assigned to each of the four supported formats in the event the preferred source is unavailable. Each of the four Source Priority selection lists allows assignment of source priority from the following choices:</p>  <p>Source Priority 1 thru Source Priority 4 select the preferred format to be used in descending order (i.e., Source Priority 2 selects the second-most preferred format, and so on).</p>
<p>• Output Status Display</p> 	<p>Displays the current content and source being used for the timecode data as follows:</p>  <ul style="list-style-type: none"> • Output status OK (in this example, running SDI VITC timecode received and outputted).  <ul style="list-style-type: none"> • Timecode not available due to lack of appropriate input timecode data on enabled formats. <p>Note: Timecode output requires that source and priority are appropriately selected (as described above in Source Priority). Also, video input must contain appropriate timecode data.</p>  <ul style="list-style-type: none"> • Timecode Insertion button set to Disabled; output insertion disabled.

Table 3-2 9064 Function Submenu List — continued

<div style="background-color: #333; color: white; padding: 5px; text-align: center; font-weight: bold;">Timecode</div>	(continued)
<p>• VITC Waveform Output Line</p> <p>VITC Waveform Output 1 Line Number <input type="text" value="14"/></p> <p>VITC Waveform Output 2 Line Number <input type="text" value="16"/></p>	<p>Selects the VITC1 and VITC2 line numbers (6 thru 22) where the VITC data is inserted.</p> <p>Note:</p> <ul style="list-style-type: none"> • Although the output line drop-down will allow any choice within the 6 thru 22 range, the actual range is automatically clamped (limited) to certain ranges to prevent inadvertent conflict with active picture area depending on video format. See Ancillary Data Line Number Locations and Ranges (p. 3-8) for more information. • The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data. • If only one output line is to be used, set both controls for the same line number.
<p>• SD VITC Waveform Insertion Control</p> <p>SD VITC Waveform Insertion <input type="button" value="Disabled"/></p>	<p>Enables or disables VITC waveform timecode insertion into the SD-SDI output stream.</p>
<p>• SD ATC Insertion Control</p> <p>SD ATC Insertion <input type="button" value="Disabled"/></p>	<p>For SD output, enables or disables ATC_VITC timecode insertion into the video stream.</p> <p>Note: SD ATC_VITC is locked to line 12. The card does not check for conflicts on a given line number. Make certain this line is available if SD ATC_VITC is to be used. See Ancillary Data Line Number Locations and Ranges (p. 3-8) for more information.</p>
<p>• HD ATC_VITC Insertion Control</p> <p>HD ATC VITC Insertion <input type="button" value="Disabled"/></p>	<p>For HD output, enables or disables ATC_VITC timecode insertion into the video stream.</p>
<p>• HD ATC_VITC Line Insertion Controls</p> <p>HD ATC_VITC Insertion Line Field 1 <input type="text" value="9 - SMPTE 12M-2-2008 Recommended"/></p> <p>HD ATC_VITC Insertion Line Field 2 <input type="text" value="8 (571) - SMPTE 12M-2-2008 Recommended"/></p>	<p>For HD ATC_VITC timecode output, selects the line number for ATC_VITC1 and ATC_VITC2.</p> <p>Note:</p> <ul style="list-style-type: none"> • Although the output line drop-down will allow any choice within the 8 thru 20 range, the actual range is automatically clamped (limited) to certain ranges to prevent inadvertent conflict with active picture area depending on video format. See Ancillary Data Line Number Locations and Ranges (p. 3-8) for more information. • The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data. • If only one output line is to be used, set both controls for the same line number.
<p>• HD ATC_LTC Insertion Control</p> <p>HD ATC LTC Insertion <input type="button" value="Disabled"/></p>	<p>For HD output, enables or disables ATC_LTC timecode insertion into the video stream.</p>

Table 3-2 9064 Function Submenu List — continued




	(continued)
<p>• HD ATC_LTC Line Insertion Control</p> 	<p>For HD timecode output, selects the line number for ATC_LTC timecode data.</p> <p>Note:</p> <ul style="list-style-type: none"> • Although the output line drop-down will allow any choice within the 9 thru 20 range, the actual range is automatically clamped (limited) to certain ranges to prevent inadvertent conflict with active picture area depending on video format. See Ancillary Data Line Number Locations and Ranges (p. 3-8) for more information. • The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data.
<p>• ATC_VITC Legacy Support Control</p> 	<p>When enabled, accommodates equipment requiring ATC_VITC packet in both fields as a "field 1" packet (non-toggling).</p> <p>Note: Non-toggling VITC1 and VITC2 packets do not conform to SMPTE 12M-2-2008 preferences. As such, ATC_VITC Legacy Support should be enabled only if required by downstream equipment.</p>

Table 3-2 9064 Function Submenu List — continued


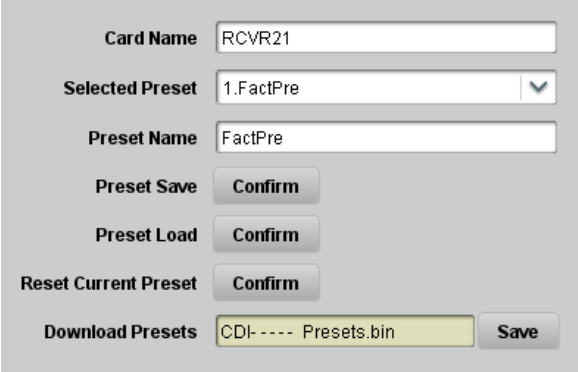
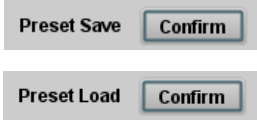
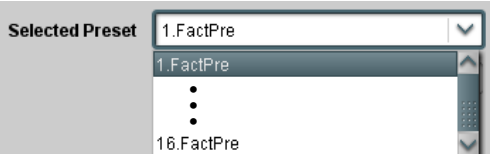




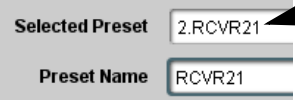
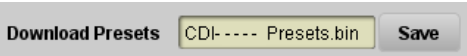
	<p>Allows up to 16 card user settings configuration presets to be saved in a Preset and then recalled (loaded) as desired. All current settings (including list selections and scalar (numeric) control settings such as Gain, etc.) are saved when a Preset Save is invoked.</p>
	<p>The Preset Name field and Preset Save button allow custom user setting configurations to be labeled and saved to a Preset for future use.</p> <p>The Preset Load button and the Selected Preset drop-down list allow saved presets to be selected and loaded as desired. When a preset is loaded, it immediately becomes active with all user settings now automatically set as directed by the preset.</p> <p>Saved presets can be uploaded to a computer for use with other same-model COMPASS™ cards.</p> <p>Each of the items to the left are described in detail on the following pages.</p>
<p>• Preset Save and Load</p> 	<ul style="list-style-type: none"> • Preset Save stores all current card control settings to the currently selected preset. (For example, if Preset 1 is selected in the Selected Preset drop-down list, clicking and confirming Preset Save will then save all current card control settings to Preset 1) • Preset Load loads (applies) all card control settings defined by whatever preset (Preset 1 thru Preset 16) is currently selected in the Selected Preset drop-down list. (For example, if Preset 3 is selected in the Selected Preset drop-down list, clicking and confirming Preset Load will then apply all card control settings defined in Preset 3) <p>The above buttons have a Confirm? pop-up that appears, requesting confirmation.</p> <p>Note: Applying a change to a preset using the buttons described above rewrites the previous preset contents with the invoked contents. Make certain change is desired before confirming preset change.</p>
<p>• Selected Preset</p> 	<p>Selected Preset 1 thru Selected Preset 16 range in drop-down list selects one of 16 stored presets as ready for Save (being written to) or for Load (being applied to the card).</p> <p>Note: The preset names shown to the left are the default (unnamed) preset names. All 16 presets in this case are loaded identically with the factory default settings.</p>
<p>• Card Name</p> 	<p>Text entry field provides for optional entry of card name, function, etc. (as shown in this example).</p> <p>Note: Card name can be 31 ASCII characters maximum.</p>

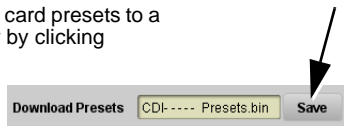
Table 3-2 9064 Function Submenu List — continued

	(continued)
<ul style="list-style-type: none"> • Reset Current Preset 	<ul style="list-style-type: none"> • Reset Current Preset resets all parameters (including preset custom name entered) of the currently selected Preset (as displayed in the Selected Preset field) to factory default settings. <p>The button has a Confirm? pop-up that appears, requesting confirmation.</p>
<ul style="list-style-type: none"> • Preset Name 	<p>With one of 16 presets selected, provides for entry of custom name for the preset (as shown in example below).</p>  <p>Entering text in Preset Name field (in this example, "RCVR21") applies custom name to selected Preset (in this example, Preset 2)</p> <p>Note:</p> <ul style="list-style-type: none"> • Preset name can be seven ASCII characters maximum. • The Preset ID number does not need to be entered; it is added automatically.
<ul style="list-style-type: none"> • Download Presets 	<p>Download Presets allows all 16 presets to be stored to a specified location on a network computer for use with other same-model COMPASS™ cards.</p>

Download a presets file to a computer on the card's DashBoard network to save presets. Preset files stored on a computer can then be uploaded back to the card.

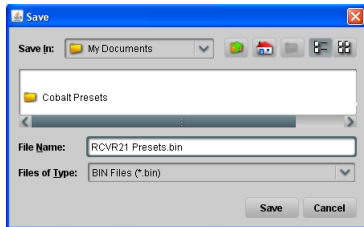
Note also that a presets file can **also be uploaded to other same-model COMPASS® cards**. In this manner, presets built up using a single card can be easily applied to other same-model cards without repeating the setup work on the other cards.

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



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

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



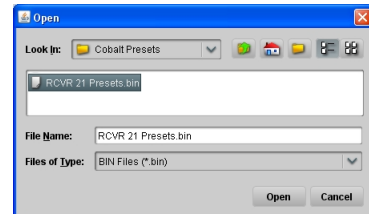
Upload (open) card presets from a network computer by clicking **Upload** at the bottom of the DashBoard.



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

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

To upload presets saved from one card to another same-model card, simply click **Upload** on the other same-model card's DashBoard page and repeat the same steps here.



Note:

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

- After uploading a presets file, engagement of a desired preset is only assured by pressing the Preset Load button for a desired preset.

Color and Video Correction Examples Using the 9064

Shown below are examples of using the 9064 to provide parametric color and video correction.

On-Set Monitor Color Correction Example

A typical use for the 9064 Color Corrector function is to provide color correction for a monitor when an anchor desk set includes a monitor, as shown in Figure 3-6.

In the example setup shown in Figure 3-6, a monitor is located behind the anchor desk. When the camera includes the monitor in its shot, typically the color balance of the monitor will appear to be incorrect due to the characteristics of the camera responding differently to the spectral light emissions from the monitor as compared to the natural light spectra emissions that exist across the set overall. This monitor color balance problem is a function of the camera(s), and can vary with different camera models.

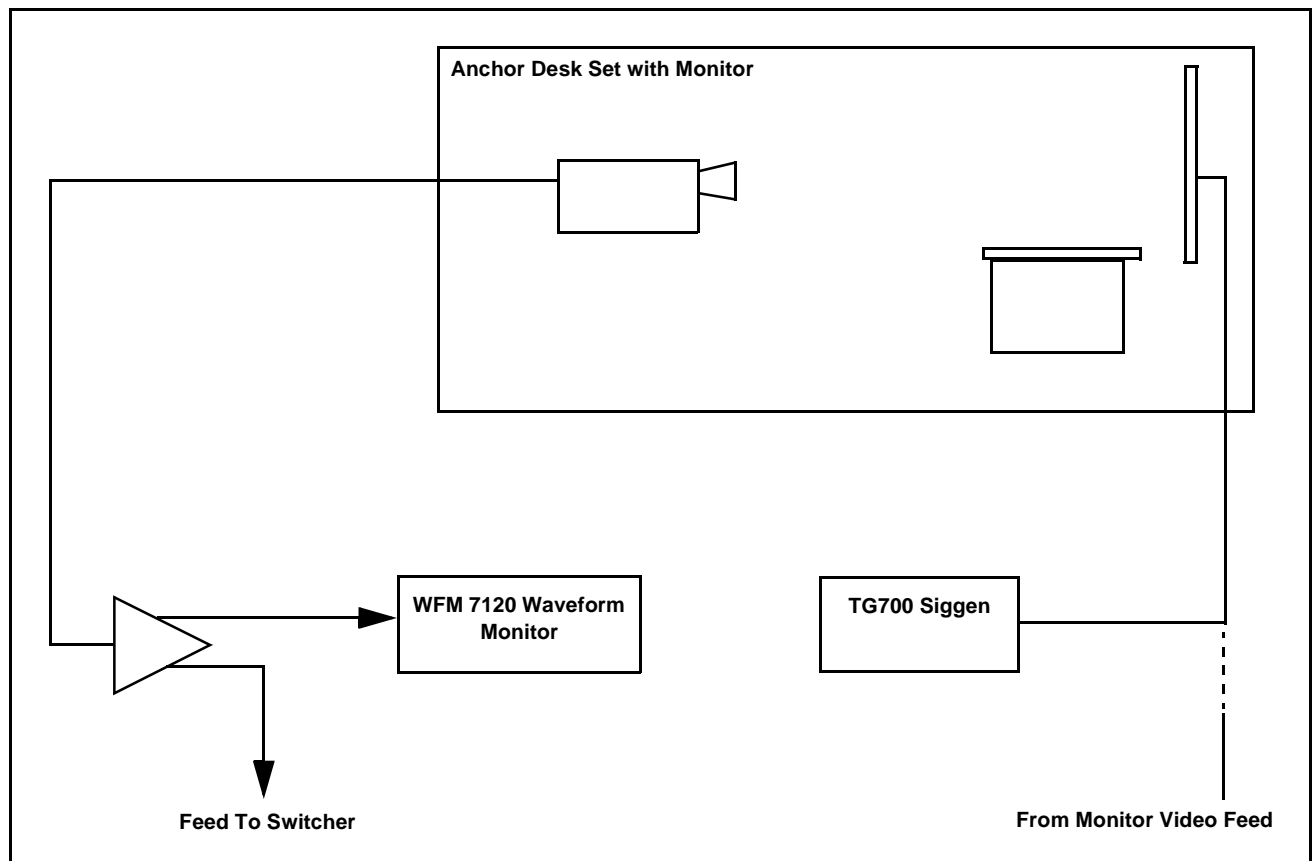


Figure 3-6 Example Uncompensated Setup

Figure 3-8 shows the same setup using the 9064 Color Corrector function, along with the appropriate signal source standard and a video waveform monitor to assess and determine the color correction required. In the calibration setup shown in Figure 3-8 the feed to the switcher is monitored by a WFM 7120 Waveform Monitor, with the set monitor being fed a monochrome linear limit ramp by a TG700 siggen.

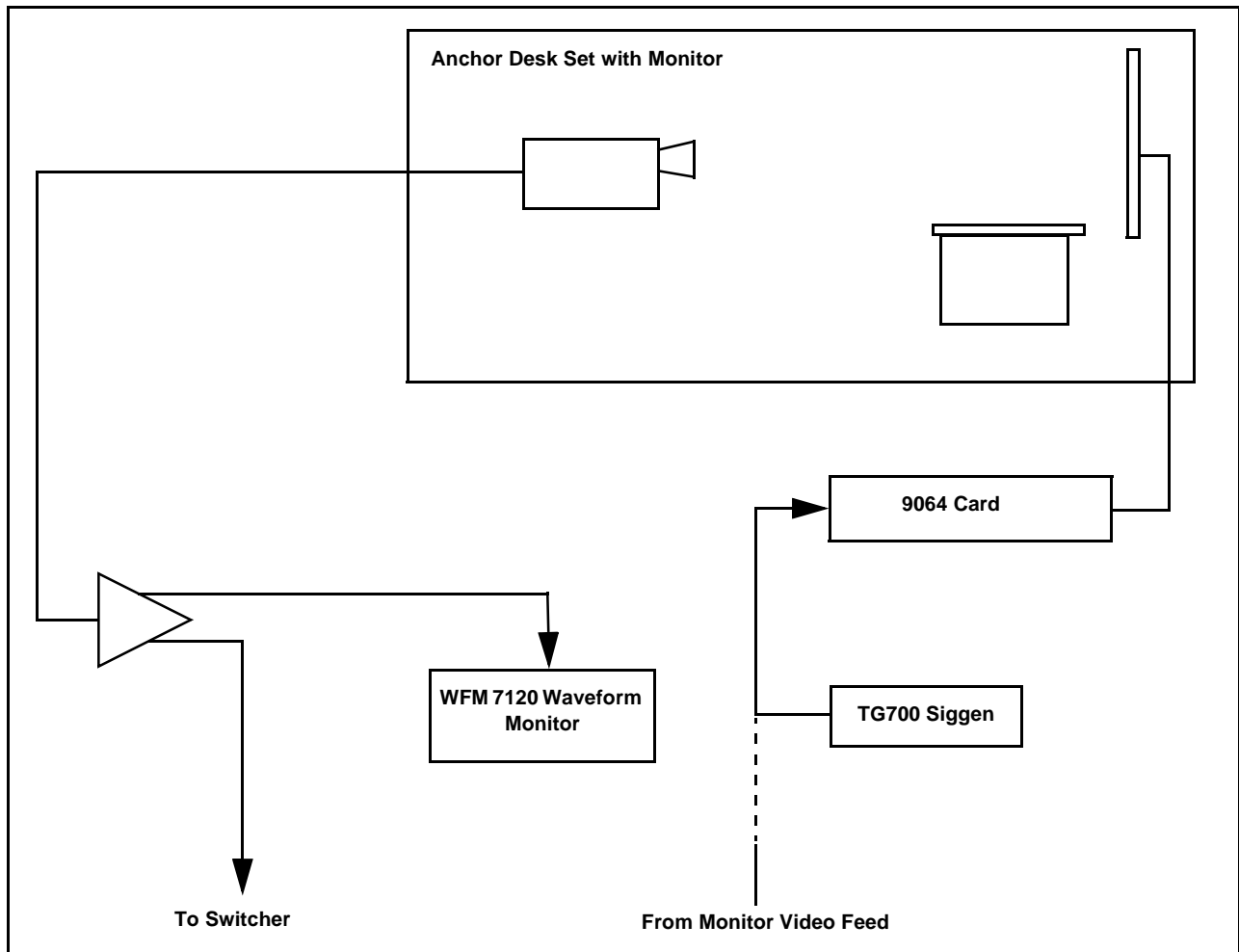
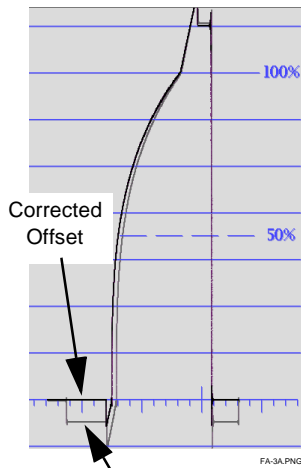


Figure 3-8 Example Setup Using Control Panel Color Corrector Function

Using the 9064 Color Corrector function and setup shown in Figure 3-8, this condition can be corrected through compensation using the 9064 Color Corrector function as shown in Figure 3-9.

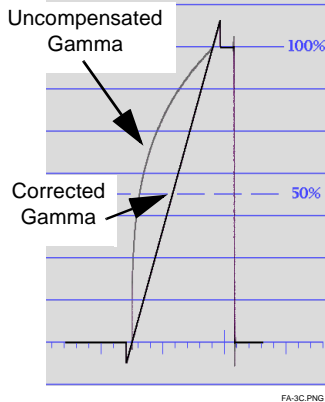
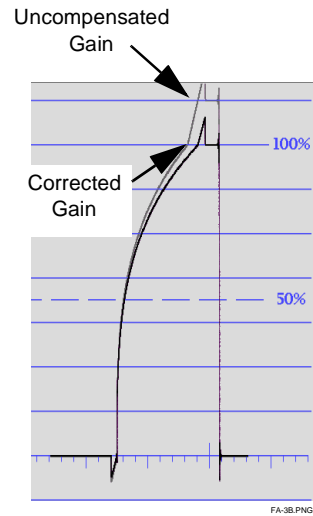
Note: As shown in Figure 3-9, a recommended approach to performing color corrections is to first apply offset correction, then gain correction, and finally gamma correction.



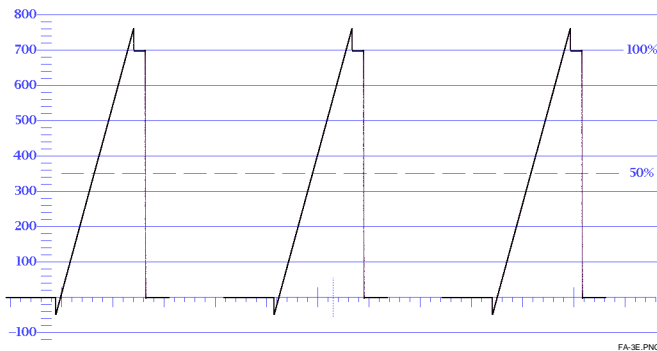
Uncompensated black Offset

(Left) Noting that the uncompensated black offset for the blue channel is negative, a correspondingly equivalent positive setting is applied using the blue channel **Black** offset control (in this example, adjusting the Black offset from unity to 5.0 provides compensation).

(Right) Noting that the uncompensated blue Gain exceeds ideal 100% level, a correspondingly smaller gain percentage setting is applied using the blue channel **Gain** control until the gain is observed as 100% (in this example, adjusting blue **Gain** from unity to 87.5% provides compensation).



(Left) Noting that the uncompensated blue Gamma curve indicates gamma factor is less than ideal 1.000, a correspondingly greater numeric gamma factor is applied using the blue channel **Gamma** control until the blue gamma function is observed as linear (in this example, adjusting blue **Gamma** from unity to 3.333 provides compensation).



(Left) Compensated Offset, Gain, and Gamma are now symmetrical across all three color channels, resulting in proper monitor appearance in the OTA feed.

Figure 3-9 Applying Correction to Example Monitor Waveform Signal

Miscellaneous Color and Video Correction Examples

Table 3-3 provides examples showing and describing various color and video condition corrections using the 9064.

Note: Signal generator and waveform monitor used in these examples are Tektronix® models TG700 and WFM 7120, respectively.

Table 3-3 Color and Video Corrections Using the 9064

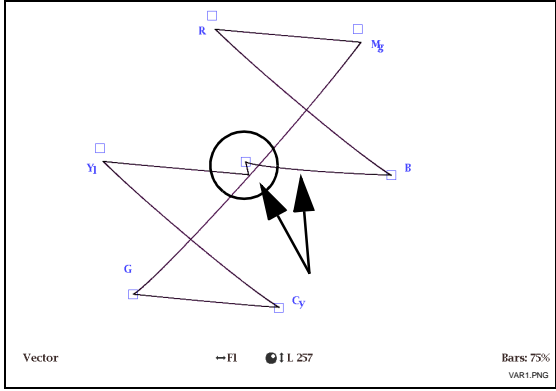
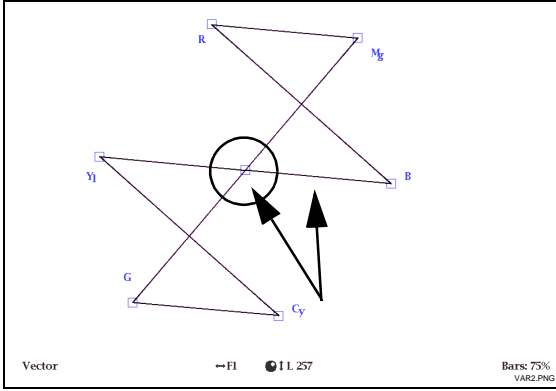
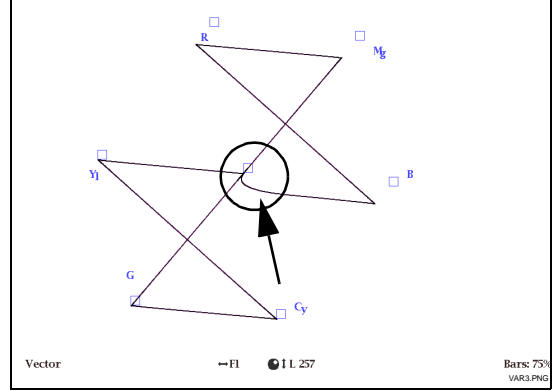
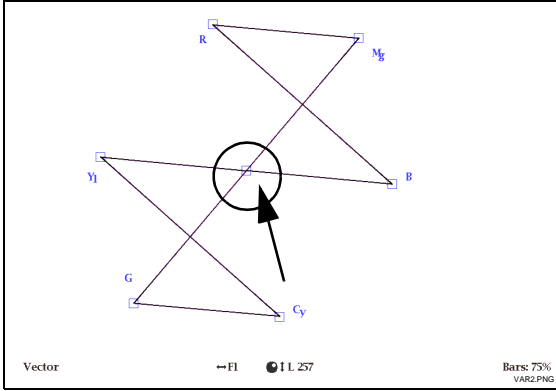
Condition Observed On Waveform Monitor	Correction Using 9064
<p>Excessive red channel Gamma (as shown below for SMPTE color bars on vectorscope display)</p>  <p>Vector →Fl ● 1 L 257 Bars: 75% VAR1.PNG</p>	<p>Using the red channel Gamma control to reduce Gamma factor, vectorscope display now shows correction with no knee or curvature at intersection of axes.</p>  <p>Vector →Fl ● 1 L 257 Bars: 75% VAR2.PNG</p>
<p>Excessive green channel lift/offset (as shown below for SMPTE color bars on vectorscope display)</p>  <p>Vector →Fl ● 1 L 257 Bars: 75% VAR3.PNG</p>	<p>Using the green channel Black Adj control to reduce green channel lift/offset, vectorscope display now shows no droop along axis.</p>  <p>Vector →Fl ● 1 L 257 Bars: 75% VAR4.PNG</p>

Table 3-3 Color and Video Corrections Using the 9064 — continued

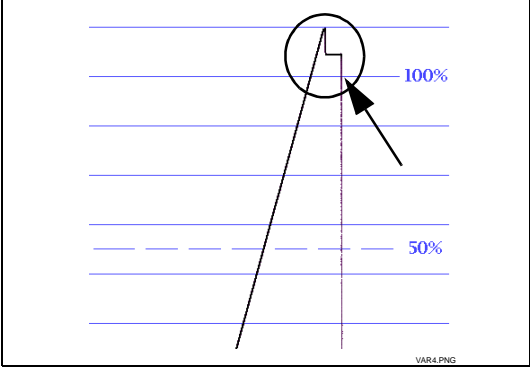
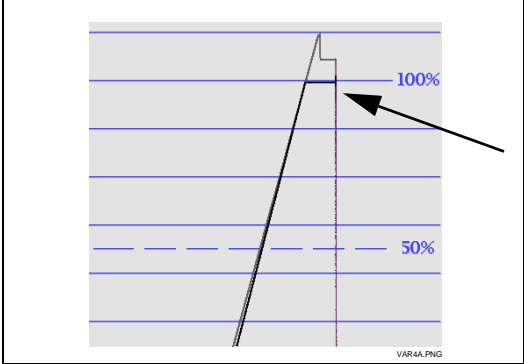
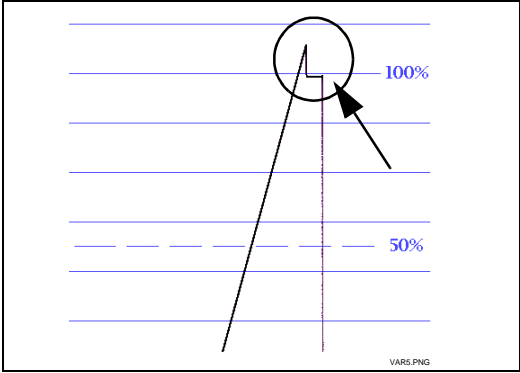
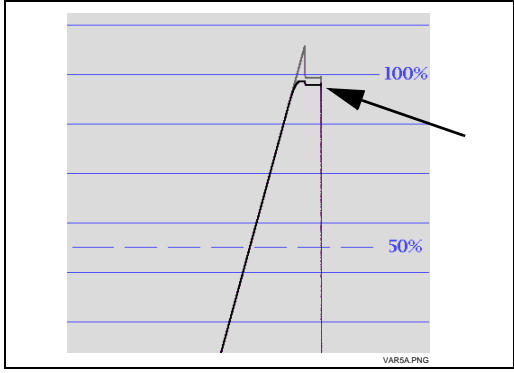
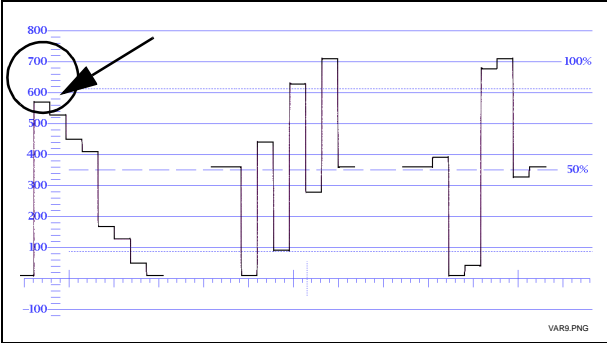
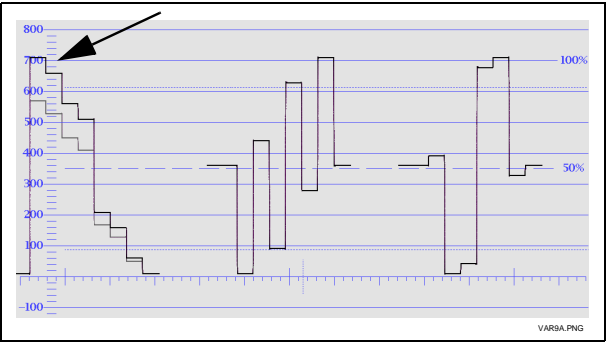
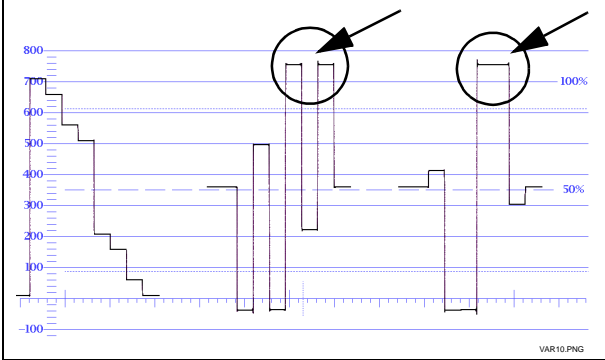
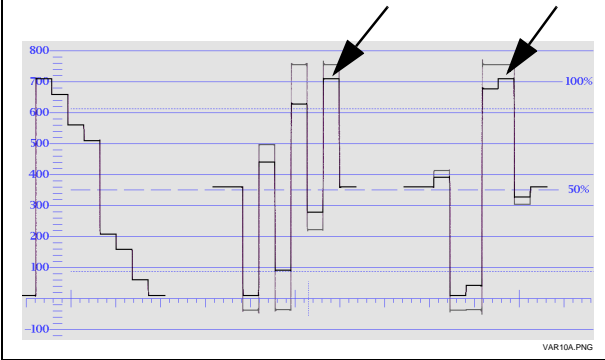
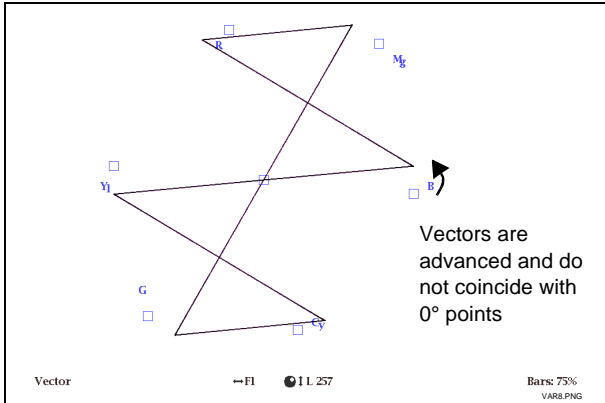
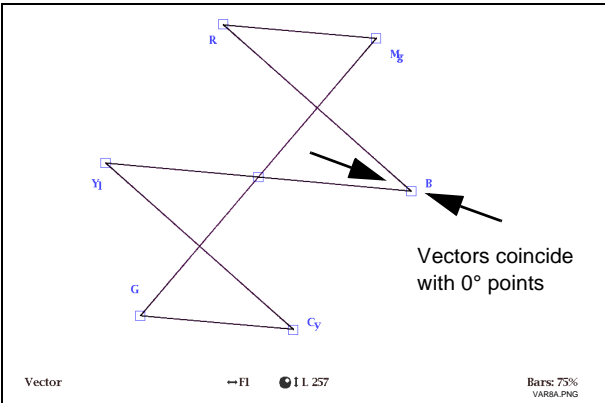
Condition Observed On Waveform Monitor	Correction Using 9064
<p>White (luma) level exceeding 100% level (as shown below for limit ramp monochrome bars on waveform monitor display)</p>  <p>The waveform monitor shows a ramp of monochrome bars. The top of the ramp is circled in black, and an arrow points to it. The 100% level is marked with a horizontal line, and the 50% level is marked with a dashed horizontal line. The signal level goes above the 100% line.</p>	<p>Using the White Hard Clip control, a lowered white hard clipping threshold is applied to now limit the level to 100%.</p>  <p>The waveform monitor shows the same ramp of monochrome bars. The top of the ramp is now flat at the 100% level, indicated by an arrow. The 100% and 50% levels are marked with horizontal lines.</p>
<p>White (luma) level exceeding 100% level (as shown below for limit ramp monochrome bars on waveform monitor display)</p>  <p>The waveform monitor shows a ramp of monochrome bars. The top of the ramp is circled in black, and an arrow points to it. The 100% level is marked with a horizontal line, and the 50% level is marked with a dashed horizontal line. The signal level goes above the 100% line.</p>	<p>Using the White Soft Clip control, a lowered white soft clipping threshold is applied to now limit the level to 100%.</p>  <p>The waveform monitor shows the same ramp of monochrome bars. The top of the ramp is now rounded and flat at the 100% level, indicated by an arrow. The 100% and 50% levels are marked with horizontal lines.</p>
<p>Luma gain less than 100% level (as shown below for 100% color bars on YPbPr waveform monitor display)</p>  <p>The waveform monitor shows a series of color bars. The top of the first bar is circled in black, and an arrow points to it. The 100% level is marked with a horizontal line, and the 50% level is marked with a dashed horizontal line. The signal level is below the 100% line.</p>	<p>Using the Luma Gain control to increase luma gain, luma gain is now restored to 100%.</p>  <p>The waveform monitor shows the same series of color bars. The top of the first bar is now at the 100% level, indicated by an arrow. The 100% and 50% levels are marked with horizontal lines.</p>

Table 3-3 Color and Video Corrections Using the 9064 — continued

Condition Observed On Waveform Monitor	Correction Using 9064
<p>Chroma gain exceeds 100% level (as shown below for 100% color bars on YPbPr waveform monitor display)</p>  <p style="text-align: right; font-size: small;">VAR10.PNG</p>	<p>Using the Color Gain control to reduce chroma gain, chroma gain is now restored to 100% level.</p>  <p style="text-align: right; font-size: small;">VAR10A.PNG</p>
<p>Leading color phase condition (as shown below for SMPTE color bars on vector display)</p>  <p style="text-align: right;">Vectors are advanced and do not coincide with 0° points</p> <p style="font-size: x-small;">Vector →FI ● I L 257 Bars: 75% VAR6.PNG</p>	<p>Using the Color Phase control to provide phase lag, Color Phase condition is now corrected.</p>  <p style="text-align: right;">Vectors coincide with 0° points</p> <p style="font-size: x-small;">Vector →FI ● I L 257 Bars: 75% VAR8A.PNG</p>

Troubleshooting

This section provides general troubleshooting information and specific symptom/corrective action for the 9064 card and its remote control interface. The 9064 card requires no periodic maintenance in its normal operation; if any error indication (as described in this section) occurs, use this section to correct the condition.

Error and Failure Indicator Overview

The 9064 card itself and its remote control systems all (to varying degrees) provide error and failure indications. Depending on how the 9064 card is being used (i.e, standalone or network controlled through DashBoard™ or a Remote Control Panel), check all available indications in the event of an error or failure condition.

The various 9064 card and remote control error and failure indicators are individually described below.

Note: The descriptions below provide general information for the various status and error indicators. For specific failures, also use the appropriate subsection listed below.

- Basic Troubleshooting Checks (p. 3-48)
- 9064 Processing Error Troubleshooting (p. 3-49)
- Troubleshooting Network/Remote Control Errors (p. 3-50)

9064 Card Edge Status/Error Indicators and Display

Figure 3-10 shows and describes the 9064 card edge status indicators and display. These indicators and the display show status and error conditions relating to the card itself and remote (network) communications (where applicable). Because these indicators are part of the card itself and require no external interface, the indicators are particularly useful in the event of communications problems with external devices such as network remote control devices.

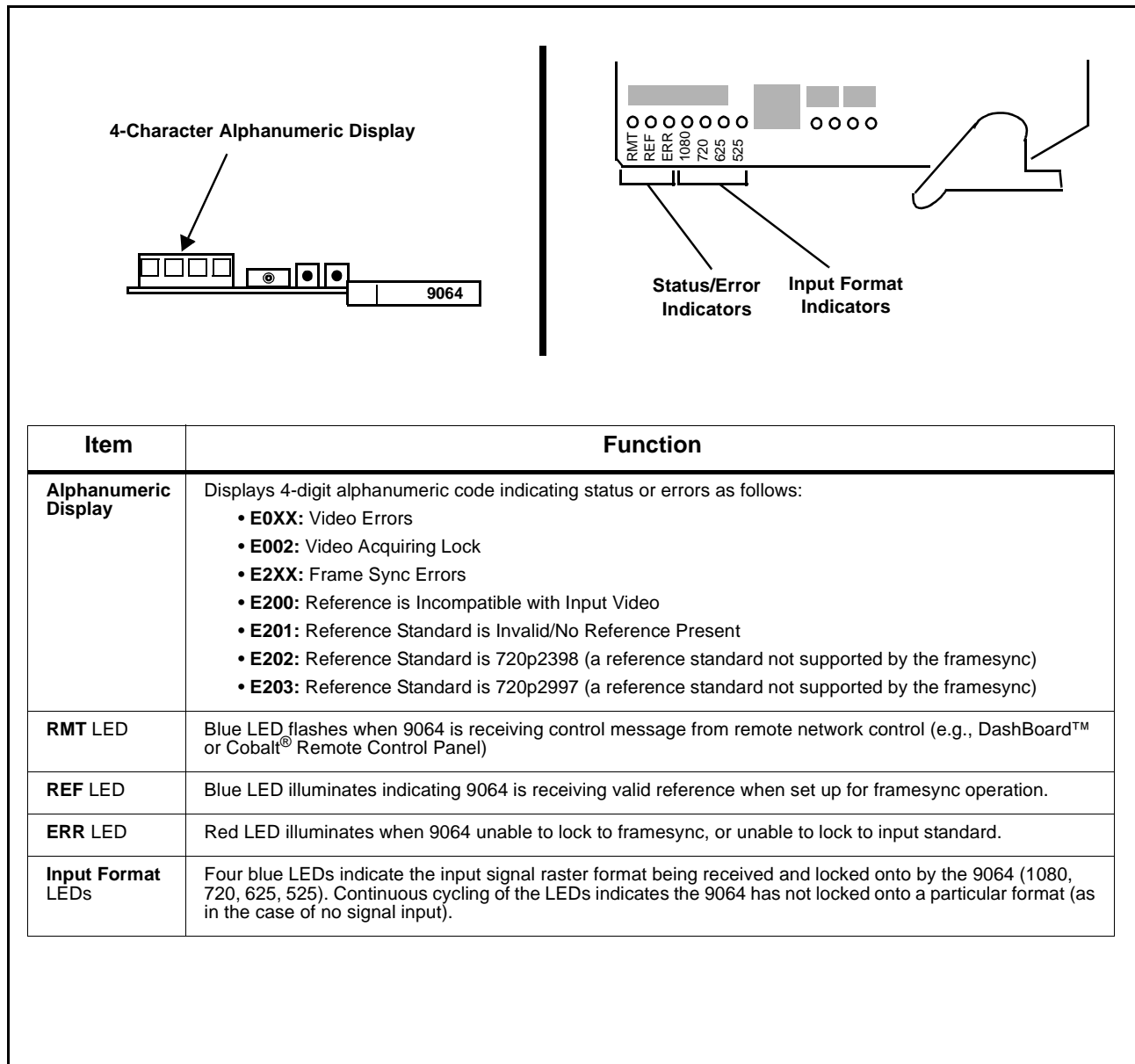


Figure 3-10 9064 Card Edge Status Indicators and Display

DashBoard™ Status/Error Indicators and Displays

Figure 3-11 shows and describes the DashBoard™ status indicators and displays. These indicator icons and displays show status and error conditions relating to the 9064 card itself and remote (network) communications.

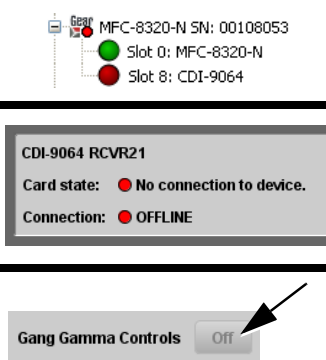
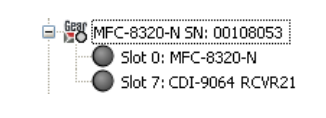
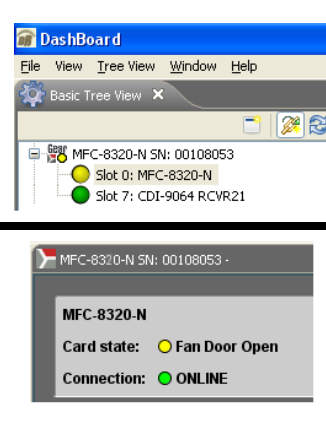
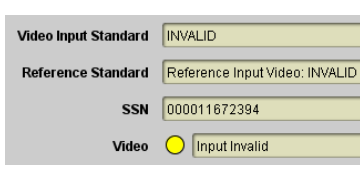
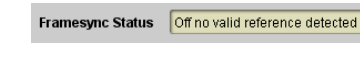
Indicator Icon or Display	Error Description
	<p>Red indicator icon in Card Access/Navigation Tree pane shows card with Error condition (in this example, the Card Access/Navigation Tree pane shows a general error issued by the 9064 card in slot 8).</p> <p>Specific errors are displayed in the Card Info pane (in this example “No connection to device” indicating 9064 card is not connecting to frame/LAN).</p> <p>If the 9064 card is not connecting to the frame or LAN, all controls are grayed-out (as shown in the example here).</p>
	<p>Gray indicator icon in Card Access/Navigation Tree pane shows card(s) are not being seen by DashBoard™ due to lack of connection to frame LAN (in this example, both a 9064 card in slot 7 and the MFC-8320-N Network Controller Card for its frame in slot 0 are not being seen).</p>
	<p>Yellow indicator icon in Card Access/Navigation Tree pane shows card with Alert condition (in this example, the Card Access/Navigation Tree pane shows a general alert issued by the MFC-8320-N Network Controller Card).</p> <p>Clicking the card slot position in the Card Access/Navigation Tree (in this example Network Controller Card “Slot 0: MFC-8320-N”) opens the Card Info pane for the selected card. In this example, a “Fan Door Open” specific error is displayed.</p>
	<p>Yellow indicator icon in 9064 Card Info pane shows error alert, along with cause for alert (in this example, the 9064 is receiving no video input, or a video input that is invalid for the card and/or its current settings).</p>
	<p>Where available, error messages within a function submenu pane show highly specific information relating to detected errors (in this example, message shows an invalid or missing Framesync Enable reference selection).</p>

Figure 3-11 DashBoard™ Status Indicator Icons and Displays

Access the Card Info pane for a specific card by clicking the card slot position in the Card Access/Navigation Tree pane (as shown in the example in Figure 3-12).

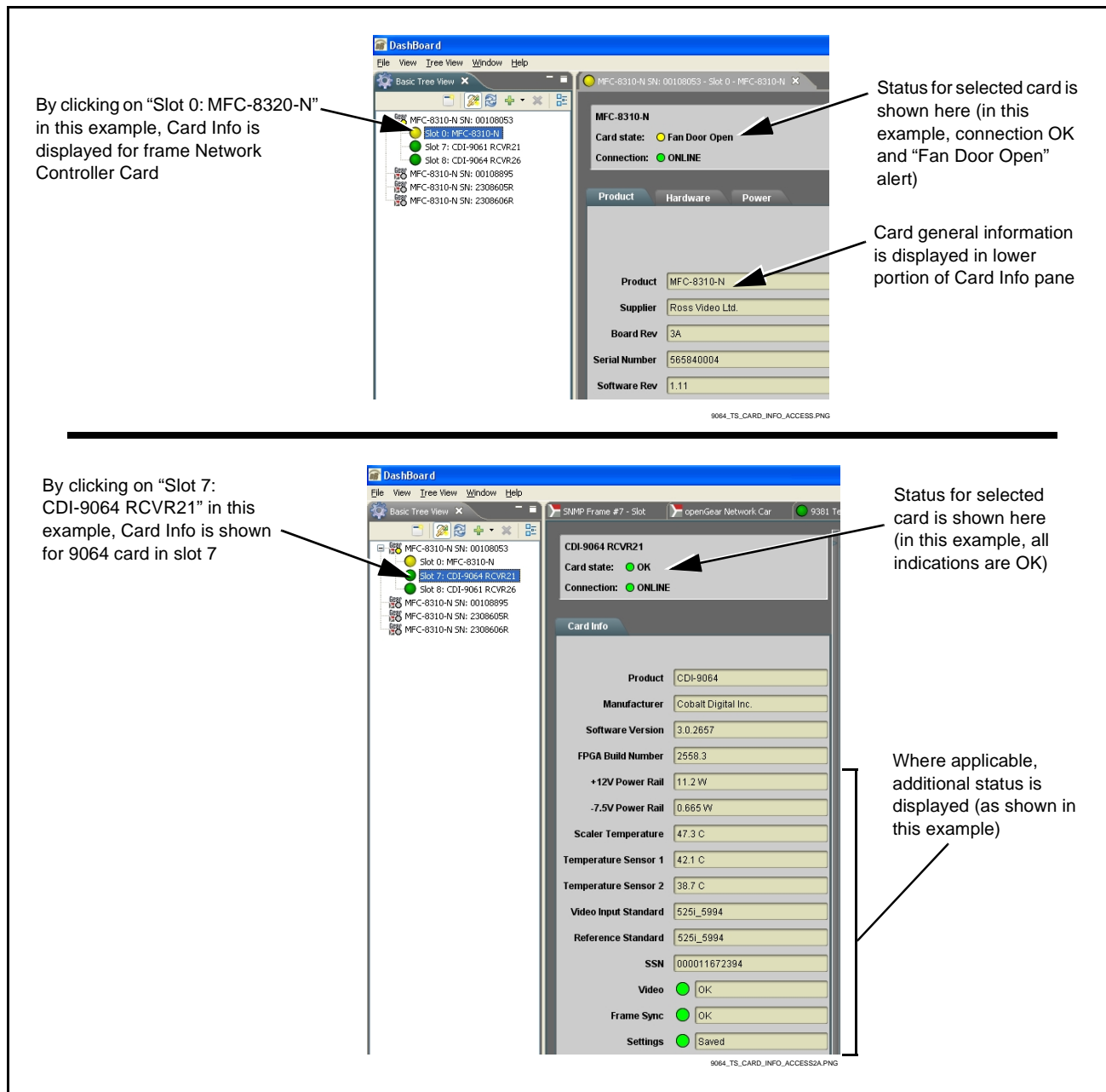


Figure 3-12 Selecting Specific Cards for Card Info Status Display

Basic Troubleshooting Checks

Failures of a general nature (affecting many cards and/or functions simultaneously), or gross inoperability errors are best addressed first by performing basic checks before proceeding further. Table 3-4 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 3-4 Basic Troubleshooting Checks

Item	Checks
Verify power presence and characteristics	<ul style="list-style-type: none"> • On both the frame Network Controller Card and the 9064, in all cases when power is being properly supplied there is always at least one indicator illuminated. Any card showing no illuminated indicators should be cause for concern. • Check the Power Consumed indications for both the +12 V and -7.5 V supply rails for the 9064 card. This can be observed using the DashBoard™ Card Info pane, or using the card edge controls and indicators as shown in Figure 3-4 on page 3-7. <ul style="list-style-type: none"> • If either of the rail supplies show no power being consumed, either the frame power supply, connections, or the 9064 card itself is defective. • If either of the rail supplies show excessive power being consumed (see Technical Specifications (p. 1-15) in Chapter 1, "Introduction"), the 9064 card may be defective.
Check Cable connection secureness and connecting points	<p>Make certain all cable connections are fully secure (including coaxial cable attachment to cable ferrules on BNC connectors). Also, make certain all connecting points are as intended. Make certain the selected connecting points correlate to the intended card inputs and/or outputs. Cabling mistakes are especially easy to make when working with large I/O modules.</p>
Card seating within slots	<p>Make certain all cards are properly seated within its frame slot. (It is best to assure proper seating by ejecting the card and reseating it again.)</p>
Check status indicators and displays	<p>On both DashBoard™ and the 9064 card edge indicators, red indications signify an error condition. If a status indicator signifies an error, proceed to the following tables in this section for further action.</p>
Troubleshoot by substitution	<p>All cards within the frame can be hot-swapped, replacing a suspect card or module with a known-good item.</p>

9064 Processing Error Troubleshooting

Table 3-5 provides 9064 processing troubleshooting information. If the 9064 card exhibits any of the symptoms listed in Table 3-5, follow the troubleshooting instructions provided.

In the majority of cases, most errors are caused by simple errors where the 9064 is not appropriately set for the type of signal being received by the card.

Note: The error indications shown below are typical for the corresponding error conditions listed. Other error indications not specified here may also be displayed on DashBoard™ and/or the 9064 card edge status indicators.

Note: Where errors are displayed on both the 9064 card and network remote controls, the respective indicators and displays are individually described in this section.

Table 3-5 Troubleshooting Processing Errors by Symptom




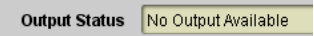
Symptom	Error/Condition	Corrective Action
<ul style="list-style-type: none"> DashBoard™ shows Video yellow icon and Input Invalid message in 9064 Card Info pane.  <ul style="list-style-type: none"> Card edge Input Format LEDs show continuous cycling. 	No video input present	Make certain intended video source is connected to appropriate 9064 card video input. Make certain BNC cable connections between frame Rear I/O Module for the card and signal source are OK.
<ul style="list-style-type: none"> DashBoard™ shows Frame Sync red icon and Reference Invalid message in 9064 Card Info pane.  <ul style="list-style-type: none"> Card edge red ERR indicator illuminated. 	Frame sync reference not properly selected or not being received	<ul style="list-style-type: none"> If external frame sync reference is not intended to be used, make certain the Framesync Enable selection list is set to Off or Input Video as desired. If external frame sync reference is intended to be used, make certain selected external frame sync reference is active on frame sync 8320 frame bus. (External reference signals Reference 1 and Reference 2 are distributed to the 9064 and other cards via an 8320 frame bus.) Refer to Framesync function submenu tab on page 3-27 for more information.

Table 3-5 Troubleshooting Processing Errors by Symptom — continued

Symptom	Error/Condition	Corrective Action
<p>DashBoard™ shows Framesync Status error message in 9064 Framesync function submenu screen.</p> 	Specified Minimum Latency Frames setting exceeds 9064 card buffer space for the selected output video format	<ul style="list-style-type: none"> Reduce the Minimum Latency Frames setting as specified in the error message to correct the error. <p>Note: Due to card memory limits, the maximum available Minimum Latency Frames is related to the output video format. For example, with a 1080i59.94 output, the maximum allowed setting is 5. For a 1080i film (23.98) output, the maximum allowed setting is 3. Conversely, greater maximum settings are allowed for SD formats such as 525i59.94, where the practical maximum limit is 13.</p>
<p>DashBoard™ shows Output Status error message in 9064 Timecode function submenu screen.</p> 	Timecode not available due to lack of appropriate input timecode data	<ul style="list-style-type: none"> Timecode output requires that source and priority are appropriately selected. Also, video input must contain appropriate timecode data and framesync reference. <p>Refer to Timecode function submenu tab on page 3-31 for more information.</p>
Ancillary data (closed captioning, timecode, AFD, etc.) not transferred through 9064.	<ul style="list-style-type: none"> Control(s) not enabled 	<ul style="list-style-type: none"> Make certain respective control is set to On or Enabled (as appropriate).
	<ul style="list-style-type: none"> VANC line number conflict between two or more ancillary data items 	<ul style="list-style-type: none"> Make certain each ancillary data item to be passed is assigned a unique line number (see Ancillary Data Line Number Locations and Ranges on page 3-8).

Troubleshooting Network/Remote Control Errors

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

In Case of Problems

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. 1-19) in Chapter 1, “Introduction“ for contact information.



Cobalt Digital Inc.

2406 E. University Ave.
Urbana, IL 61802
Voice 217.344.1243 • Fax 217.344.1245
www.cobaltdigital.com