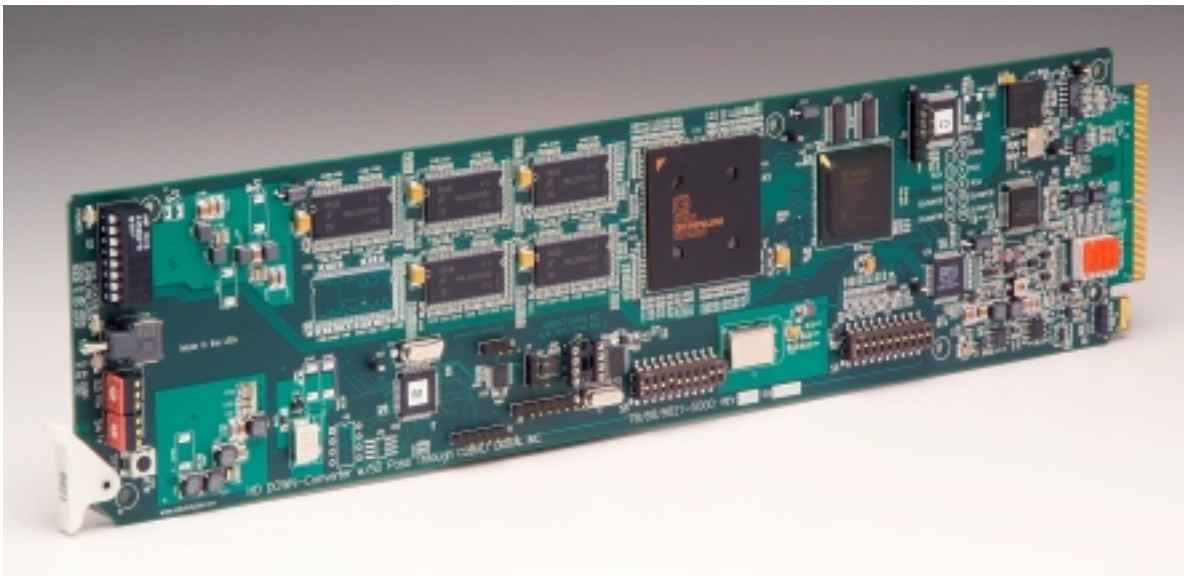
Cobalt Digital Inc.

9821

HD-Downconverter / DA with SD ARC

User Manual



9821-UM
Version: 1.0.3

9821 • Downconverter / DA with SD ARC User Manual

- Cobalt Part Number: **9821-UM**
- Document Version: **1.0.3**
- Printed in the United States.
- Last Author: SJK
- Printing Date: 10/26/07 10:13 AM

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Notice

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Trademarks

Important Regulatory and Safety Notices

Before using this product and any associated equipment, refer to the "Important Safety Instructions" listed below so as to avoid personal injury and to prevent product damage.

Products may require specific equipment, and /or installation procedures be carried out to satisfy certain regulatory compliance requirements. Notices have been included in this publication to call attention to these Specific requirements.

Symbol Meanings

This symbol on the equipment refers you to important operating and maintenance (servicing) instructions within the Product Manual Documentation. Failure to heed this information may present a major risk of damage or injury to persons or equipment.

Warning

The symbol with the word **"Warning"** within the equipment manual indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury.

Caution

The symbol with the word "**Caution**" within the equipment manual indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Notice

The symbol with the word "**Notice**" within the equipment manual indicates a situation, which if not avoided, may result in major or minor equipment damage or a situation which could place the equipment in a non-compliant operating state.

ESD Susceptibility

This symbol is used to alert the user that an electrical or electronic device or assembly is susceptible to damage from an ESD event.

Important Safety Instructions

Caution

This product is intended to be a component product of the openGear™ 8310 series frame. Refer to the openGear™ 8310 series frame User Manual for important safety instructions regarding the proper installation and safe operation of the frame as well as it's component products.

Warning

Certain parts of this equipment namely the power supply area still present a safety hazard, with the power switch in the OFF position. To avoid electrical shock, disconnect all A/C power cords from the chassis' rear appliance connectors before servicing this area.

Warning

Service barriers within this product are intended to protect the operator and service personnel from hazardous voltages. For continued safety, replace all barriers after any servicing.

This product contains safety critical parts, which if incorrectly replaced may present a risk of fire or electrical shock. Components contained within the product's power supplies and power supply area, are not intended to be customer serviced and should be returned to the factory for repair.

To reduce the risk of fire, replacement fuses must be the same type and rating.

Only use attachments/accessories specified by the manufacturer.

EMC Notices

US FCC Part 15

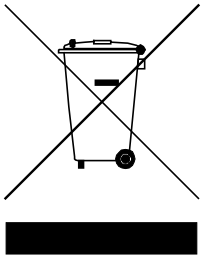
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case users will be required to correct the interference at their own expense.

Environmental Information

The equipment that you purchased required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, Cobalt Digital Inc. encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.

The crossed-out wheeled bin symbol invites you to use these systems.



If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.

You can also contact Cobalt Digital Inc. for more information on the environmental performances of our products.

openGear Contents

Introduction

In This Chapter

This chapter includes the following sections:

- A Word of Thanks
- Overview
- Functional Block Diagram
- Features
- Documentation Terms

A Word of Thanks

Congratulations on choosing the openGear™ **9821 HD/SD Down Converter with SD ARC and Analog Outputs**. The 9821 is part of a full line of modular conversion gear for broadcast TV environments. The Cobalt Digital Inc. openGear™ line includes video decoders and encoders, audio embeders and de-embeders, distribution amplifiers, format converters, and much more. Cobalt openGear modular conversion gear will meet your signal conversion needs now and in the future.

Should you have questions pertaining to the installation or operation of your 9821, please contact us at the numbers listed on the back cover of this manual. We are happy to help with any questions regarding this or any other openGear™ card.

Overview

The 9821 is a high quality 10-bit, HD down-converter with SD pass-through and individual aspect ratio converter (ARC) controls for HD and SD inputs. The 9821 bridges SMPTE 292 high definition (HD) and 259M-C standard definition (SD) signal formats; allowing high density and low power conversion of HD signals.

The 9821 will down-convert HD to SD serial component digital and analog composite video. This unit can re-aspect the image with separate rules for HD vs. SD inputs and adds 3:2 pull-down to 23.98 p/sF or i inputs. In addition, reticule overlays, for full aperture and safe area, in both 16x9 and 4x4 shapes can be enabled, as well as a center cross. Reticules can be separately enabled on the SD-SDI and composite outputs.

The image processing is full 10-bit using a 24-tap spatial filter. Down-conversions of HD to SD signals are de-jittered to reduce chroma phase jitter of SD analog signals. The analog output is encoded at 12-bits (video plus sync) to preserve the 10-bit 4:2:2 component encoded video signal.

The 9821 also preserves several key non video signals across a downconversion or ARC. Embedded audio is de-embedded at the input, delayed appropriately, and then embedded at the output in the new format. Timecode signals (as VITC or as in SMPTE RP-188) are extracted, delayed the appropriate amount, and then embedded in the output video. Standard definition closed captioning data (NTSC Line 21) is decoded, delayed, and embedded in the output video, regardless of aspect ratio correction.

The product also provides full color proc control of the output video, with separate controls for Gain, Lift, Saturation and Color Phase.

The input and outputs of the 9821 are the following:

Input:

- One dual-rate HD/SD-SDI.

Outputs:

- Four reclocked HD/SD-SDI copies of the input.
- Four user selectable (SD-SDI or Composite) down-converted HD or SD ARC'd outputs.

Functional Block Diagram

The 9821 has a very flexible signal flow path and feature set that combines several products into one compact package. To understand its capabilities, this section reviews the basic structure of the 9821.

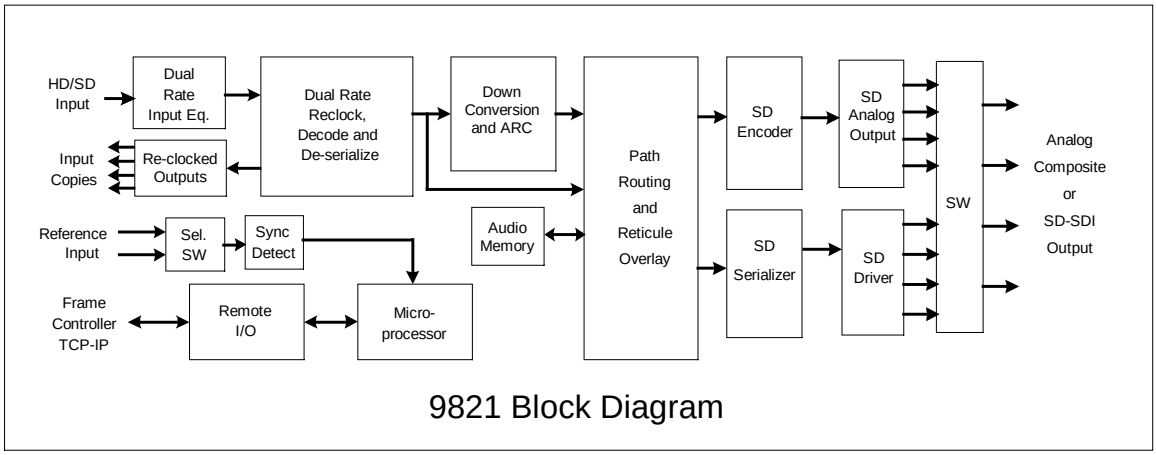


Figure 1. Simplified Block Diagram of 9821 Functions

Starting in the upper left of the block diagram, the dual-rate (HD/SD) serial digital signal is equalized, reclocked and then deserialized. A reclocked copy of the input is driven out of four BNCs (3, 4, 5, and 6). Once deserialized, the video standard and frame rate is determined.

Coming out of the deserializer, the parallel video data path goes to the image scalar circuitry, where it is down, aspect and/or frame rate converted depending on the signal input and user settings. After conversion audio, timecode, and closed captioning signals are embedded. Finally the reticule overlays (if any) are applied, and the signal passes through circuitry to reduce output clock jitter.

Four copies of SD analog composite and SD-SDI are generated and sent to four, 2x1 switches (S7, S8, S9, S10) that allow the user to select either analog composite or SDI for the outputs (BNCs 7, 8, 9, 10).

Available Format Conversions

The 9821 has extensive re-format and down conversion capabilities. It can act as a downconverter, ARC and frame rate converter. The format conversions are listed in the chart below.

Table 1. Supported format conversions

From → To	SD
1080 sF 23.98	486 i 29.97
1080 p 23.98	486 i 29.97
1080 sF 24	---- none
1080 p 24	---- none
1080 i 25	575 i 25
1080 p 25	575 i 25
1080 i 29.97	486 i 29.97
1080 p 29.97	486 i 29.97
1080 i 30	---- none
1080 p 30	---- none
720 p 25	575 i 25
720 p 29.97	486 i 29.97
720 p 30	---- none
720 p 50	575 i 25
720 p 59.94	486 i 29.97
720 p 60	---- none
486 i 29.97	486 i 29.97
575 i 25	575 i 25

Notes:

1. All rates translated to effective frame rates, interlaced rates " i " are two times the number shown. For example, i 29.97 is 59.94 fields per second (two fields per frame thus the interlaced frame rate is 29.97); but progressive " p " 29.97 is 29.97 frames per second.

2. SD active line rates are PAL (575) and NTSC (486).

3. The 9821 cannot accept native 720 p23.98 or sF23.98, however it can convert those signals if they are delivered inside a p59.94 transportation wrapper (as typically done with this format) and processed as p59.94.

Documentation Terms

The following terms are used throughout this guide:

- "**Frame**" refers to the **8310** frame that houses the **9821** card.
- "**Operator**" and "**User**" both refer to the person who uses the **9821**.
- "**Board**" and "**Card**" all refer to the **9821** card itself, including all components and switches.
- "**System**" and "**Video system**" refers to the mix of interconnected production and terminal equipment in which the **9821** operates.

Installation and Setup

In This Chapter

This chapter includes the following sections:

- Static Discharge
- Unpacking
- Rear Module Installation (Optional)
- Board Installation
- BNC Labels
- Cable Connections
- LEDs and Buttons
- Switch 3 and 4 – Rotary Switch Settings and LED reporting

Static Discharge

Whenever handling the card and other related equipment, please observe all static discharge precautions as described in the following note:

ESD Susceptibility

Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling circuit boards in high static environments such as carpeted areas, and when wearing synthetic fiber clothing. Always exercise proper grounding precautions when working on circuit boards and related equipment.

Unpacking

Unpack each card you received from the shipping container, and check the contents against the packing list to ensure that all items are included. If any items are missing or damaged, contact your sales representative or Cobalt Digital Inc. directly.

Rear Module Installation (Optional)

If you are installing the card in a 8310-C-BNC or 8310-BNC frame (one with a 100 BNC rear module installed across the entire back plane), skip this section.

If you are installing the card into a slot with no rear module, you should have ordered and received a 8310-RM-A Rear Module with your card. You will need to install it in your 8310 frame before you can connect cables.

Use the following steps to install the 8310-RM-A in an 8310 openGear™ frame:

1. Refer to the openGear™ 8310 frame User Manual, to ensure that the frame is properly installed according to instructions.
2. On the rear of the 8310, locate the card frame slot.
3. As shown in Figure 2, seat the bottom of the 8310-RM-A in the seating slot at the base of the frame's back plane.

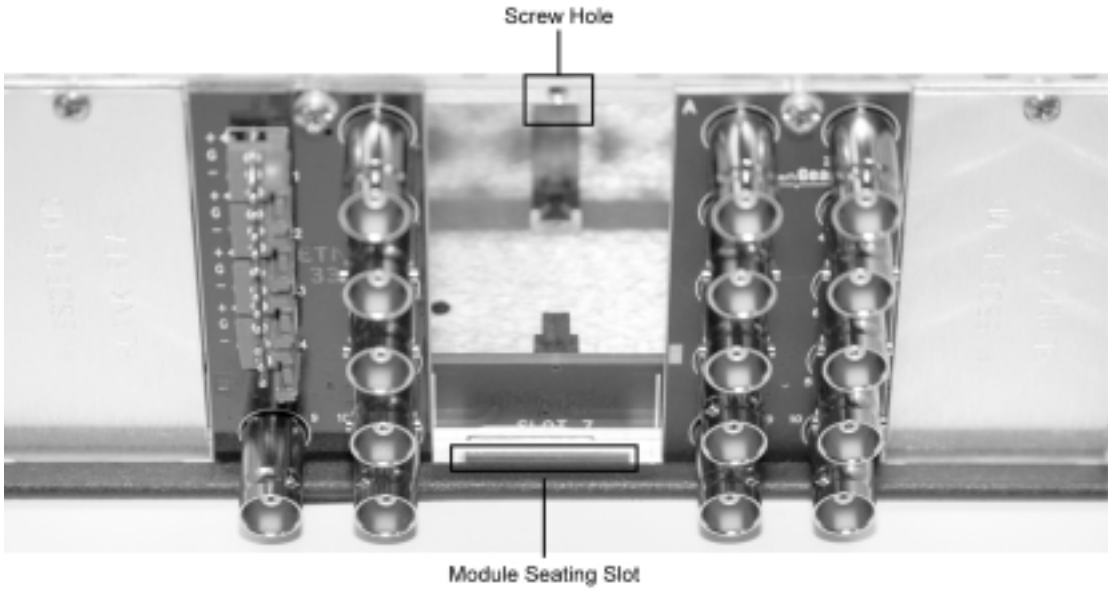


Figure 2. Rear Module Installation

4. Align the top hole of the 8310-RM-A with the screw hole on the top edge of the 8310 back plane.
5. Using a Phillips driver and the supplied screw, fasten the 8310-RM-A panel to the 8310 back plane. Do not over tighten.

This completes the procedure for installing the 8310-RM-A in an 8310 openGear™ frame.

Board Installation

Use the following steps to install the card in the openGear™ 8310 frame:

1. Refer to the User Manual of the openGear™ 8310 frame to ensure that the frame is properly installed according to instructions.

Warning

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 convection cooling.

2. After selecting the desired frame installation slot, hold the card card by the edges and carefully align the card edges with the slots in the frame. Then, fully insert the card into the frame until the rear connection plugs are properly seated on the midplane and rear modules.

This completes the procedure for installing the card in the openGear™ 8310 frame.

Cable Connections

This section provides instructions for connecting cables to the installed BNC rear modules on the 8310 series frame backplane. Connect the input and output cables according to the following diagram. The input is internally terminated with 75 ohms. It is not necessary to terminate unused outputs.

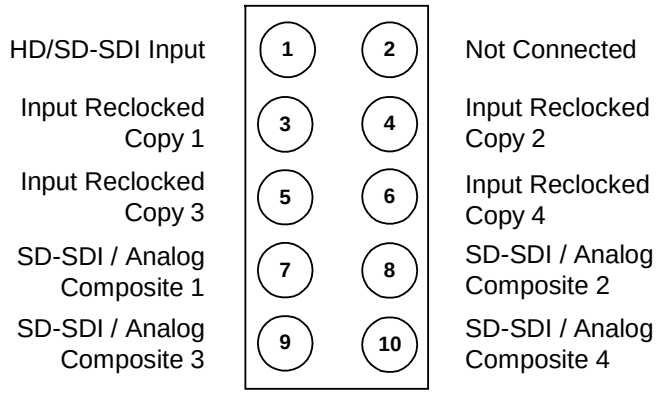


Figure 3. BNC Designations for the Card Rear Module

Card Control and Status

The card can be configured and monitored in two ways:

1) Via DashBoard remote control software. Dashboard remote control software is the subject of chapter 3.

2) Via LEDs and switches on the front edge of the card

Switch S1, located on the upper card edge, controls the primary functions of the card. ON is defined as the switch in the "UP" position, away from the board. OFF is defined as the switch in its "DOWN" position, towards the board.

Switch S1

Switch S1 is located on the upper card edge and controls the primary functions of the card. ON is defined as the switch in the "UP" position, away from the board. OFF is defined as the switch in its "DOWN" position, towards the board.

S1.1 -- Remote Control Enable

S1.1 enables the remote control interface. If S1.1 is set to ON the user can control the 9821 card using Dashboard remote control software. Setting S1.1 to ON, disables switches S1.2 through S2.8. Control can be either from remote operators, or these card edge switches, but not both.

If S1.1 is set to OFF, the remote control cannot set any card parameters, but can still monitor the status of the card.

S1.2 through S1.5 – Aspect Ratio Control

These switches will control aspect ratio for both HD and SD inputs separately. See Table 2 for the positions to select various preset or user defined aspect ratios.

S1.6 – Underscan

S1.6 will activate an "underscan" feature, further reducing a selected aspect ratio by 10 percent.

S1.7 – Analog Composite Color

S1.7 will enable or disable color on the SD analog output.

S1.8 – Field Lock

S1.8 will enable or disable the field locking feature on the card. Field lock is used to ensure that the output SD signals have the correct field polarity when 720p59.94 and 720p50 signals are used as the input. There is no information in the 720p signal that indicates which frames should be made into even fields and which should be made into odd fields. The Field Lock feature looks at the frame reference bus and makes sure that the output field polarity matches that of the reference bus.

Table 2. Switch 1 on card edge

1	2	3	4	5	6	7	8	*SETTINGS*
ON								Remote Software Control Enable
OFF								Remote Software Control Disable
	ON	ON						SD to SD User Settings (default: No aspect change)
	ON	OFF						SD to SD 0.75 Vert Reduction (letter box)
	OFF	ON						SD to SD 1.33 Horz Expansion (center cut)
	OFF	OFF						SD to SD No Aspect Change.
			ON	ON				HD to SD User settings (default: 1.33H center cut)
			ON	OFF				HD to SD 0.75 Vert Reduction (letter box)
			OFF	ON				HD to SD 1.33 Horz Expansion (center cut)
			OFF	OFF				HD to SD No Aspect Change
					ON			Underscan ON (10% overall)
					OFF			Underscan OFF (10% overall)
						ON		SD Analog Color ON
						OFF		SD Analog Color OFF (B&W)
							ON	Enable Field Locking (for 720p downconvert)
							OFF	Disable Field Locking (for 720p downconvert)

v

- If aspect ratio has been adjusted off of the default setting, then do a factory restore (page 17 or page 22) to correct.

Switches 3 and 4 – Rotary Switch Settings

The card has additional parameters which will need to be accessed less frequently. These are controlled via the rotary switches (S3 & S4) and the up/down thumb switch (S2) located on the card edge.

The parameter number in question (00 through 99) is selected with the rotary switches. S3 selects the "10s" digit, and S4 selects the "1s" digit. For example, setting S3 equal to 3 and S4 equal to 1 selects parameter 31 (Y channel lift). The thumb switch S2 will increase or decrease the value of the parameter when pressed up or down. Some parameters have only a binary state. Press S2 up to turn them on, and down to turn them off.

See Table 3 for a complete list of parameters settable through the rotary switches

Switches 7, 8, 9 and 10

Switches S7, S8, S9 and S10 are used to select SD-SDI or SD analog output on the BNC corresponding to the switch number. If the switch is UP the output will be SD analog if the switch is DOWN the output will be SD-SDI.

Status Reporting via LEDs

When the switches S3 and S4 are set to "00" the card is in normal mode. In normal mode the "Lock Status" LED will blink when there is no signal present, turn solid orange for SD lock and solid green for HD lock. The "Input Standard" LED will be off if there is an SD signal present, orange if the input standard is 720 and green for an input standard of 1080.

When adjusting the parameters, the three LEDs on the front card edge will report to the user the value of the setting. While viewing the card in its vertical position in the frame the top (POWER) LED will flash the number of 100s, the middle (LOCK STATUS) LED will flash the number of 10s, and the bottom (INPUT STANDARD) LED will flash the number of 1s. At the start of a numerical report all the LEDs will blink simultaneously.

Example: the card is reporting a value of 275. The sequence is this: a blink of all LEDs->2 blinks of the 100s LED->7 blinks of the 10s LED->5 blinks of the 1s LED->repeat.

For parameters that have only a binary state the "1s" LED (D14) will turn on for enabled and off for disabled.

Table 3. Parameters controlled through front edge switches

S3S4	Parameter Description
00	Report Signal Lock Status Restore to 00 prior to device use
	Composite Output
01	Composite output oversampling
02	Composite output color bars
	Software Information
08	Software release number
09	Software build number
	Ancillary Data
10	24-bit audio processing
11	Audio group 1 enable
12	Audio group 2 enable
13	Audio group 3 enable
14	Audio group 4 enable
15	Audio delay matches video delay (Up: enforce Down: allow different audio delay)
16	Audio delay Audio delay is reported in hundredths of a second.
17	Closed caption preservation enable
18	Time code preservation enable
19	Time code output line
	Proc Control
30	Gain
31	Lift
32	Saturation
33	Phase
34	Background color hue
35	Background color saturation
36	Background color value
	Scalar
40	H & V aspect zoom
41	H aspect zoom
42	V aspect zoom
43	H aspect pan
44	V aspect pan
45	Prefilter type: 1) Better Frequency Response 2) Better Edge Response 3) Disable Prefilter
46	Prefilter Aggressiveness: Up) attenuate more high frequency components Down) attenuate less
47	HD to SD color matrix: Up) Enable Down) Disable

	Reticules (Overlays)
60	SDI reticule output enable
61	Analog reticule output enable
62	4x3 full aperture (vert bars)
63	4x3 full aperture (vert bars) size
64	4x3 full aperture (vert bars) thickness
65	4x3 safe area enable
66	4x3 safe area horz size
67	4x3 safe area vert size
68	4x3 safe area horz thickness
69	4x3 safe area vert thickness
70	16x9 safe area enable
71	16x9 safe area horz size
72	16x9 safe area vert size
73	16x9 safe area horz thickness
74	16x9 safe area vert thickness
75	Center cross enable
76	Center cross horz size
77	Center cross vert size
78	Center cross horz thickness
79	Center cross vert thickness
80	Reticule(s) follow ARC
81	Reticule Color: 1) White 2) Black 3) Blue 4) Red
82	Reticule shadow
83	Shadow luma
84	Shadow chroma
	Miscellaneous
92	Reference input select: Down) Reference 1 Up) Reference 2
93	Vbit correction
95	Equalizer status error - if lit there is a bit error detected
	Save/Load
97	Load factory defaults. Loading factory defaults will replace current saved settings
98	Load saved settings
99	Save current setting

Remote Control

In This Chapter

This section provides a detailed explanation on using remote control functions with your card.

DashBoard Control System Software

The DashBoard Control System enables you to monitor and control openGear™ frames and controller cards from a computer. The DashBoard software and manual can be downloaded from the Cobalt Digital Inc. website.

Using the Menus

You must first install the DashBoard Control System software on your computer. Refer to the ***DashBoard User Manual*** for software installation procedures and for using the DashBoard interface.

The Menu System

The following table and sections describe the menus, items, and parameters available from the DashBoard Control System software for the card.

Table 3. DashBoard Menus

Menu	Item	Parameters	Description
Card Info (Read-only)	Product	CDI-9821	
	Manufacturer	Cobalt Digital Inc.	
	Temperature	##.## °C/##.## °F	Current temperature of card at scalar IC.
	+12 Rail Current	### mA	Supply Voltage
	Power	#.# W	Current power consumption of card
Software (Read-only)	Software Release Number	#	
	Software Build Number	#	

Menu	Item	Parameters	Description
Switch Settings (Read-only)	S3 and S4	Rotary Edge Switch	Reports which parameter is selected by edge switch
	Remote Software	Switch S1-1	Reports if remote software is enabled or disabled. When enabled remote software can modify card parameters when disabled card parameters can only be changed through the card edge switches
Signal Status (Read-only)	Input Format	Input signal	Reports the current input format.
	Equalizer	Input signal	Reports any detected bit errors
Ancillary Data	24-bit Audio Processing	Enable	SD embedded audio will be 24 bits deep, with extended data packets.
		Disable	SD embedded audio will be 20 bits deep, with no extended data packets.
	Group 1	On	Turn on/off audio group 1
		Off	
	Group 2	On	Turn on/off audio group 2
		Off	
	Group 3	On	Turn on/off audio group 3
		Off	
	Group 4	On	Turn on/off audio group 4
		Off	
	Audio Delay ms	Range 0-2700ms	Amount of audio delay from input to output
	Closed Caption	Enable	Enable/Disable closed caption passthrough.
		Disable	
	Time Code	Enable	Enable/Disable time code passthrough. Auto searches for first line with time code and passes it through. If more then one time code signal only the first time code line detected will pass through
		Disable	
	Time Code Output Line	Range 6-22	Selects which output line to embed VITC on

Menu	Item	Parameters	Description
Scalar	HD to SD ARC	No Aspect Change	
		0.75 V Letter Box	
		1.33 V	
		0.75 H Pillar Box	
		1.33H Center Cut	
		User Setting	User can save custom aspect ratio controls by using the save settings on the engineering tab
	SD to SD ARC	No Aspect Change	
		0.75 V Letter Box	
		1.33 V	
		0.75 H Pillar Box	
		1.33H Center Cut	
		User Setting	User can save custom aspect ratio controls by using the save settings on the engineering tab
	Underscan	Enable	10% H & V reduction
		Disable	
	H Zoom Percent	Range 20-1000%	Horizontal zooming
	V Zoom Percent	Range 20-1000%	Vertical zooming
	H Pan	Range 0-100	Horizontal panning
	V Pan	Range 0-100	Vertical panning
	Filter Type	Better Frequency Response	
		Better Edge Response	
		Disable Filter	
	Filter Aggressiveness	Range 0-20	Higher value filters more of the signal
	HD to SD color matrix	Enable	
		Disable	

Menu	Item	Parameters	Description
Reticules (Overlays)	SDI	Enable	Enable/Disable reticules on SDI output
		Disable	
	Analog	Enable	Enable/Disable reticules on analog/composite output
		Disable	
	4x3 Safe Area	Enable	
		Disable	
	4x3 Full Aperture	Enable	
		Disable	
	16x9 Safe Area	Enable	
		Disable	
	Center Cross	Enable	
		Disable	
	Reticules Follow Arc	Enable	Reticules scale with video when scaled image when scaled image size is less then the active video size
		Disable	
	Reticule Color	White	Color of the reticules
		Black	
		Blue	
		Red	
	Modify	4x3 Safe Area	Which reticule the following four items effect: Horizontal Size, Vertical Size, Horizontal Thickness, and Vertical Thickness
		4x3 Full Aperture	
		16x9 Safe Area	
		Center Cross	
	Horizontal Size	Range 0-100	
	Vertical Size	Range 0-100	
	Horizontal Thickness	Range 0-100	
	Vertical Thickness	Range 0-100	
	Shadow	Enable	Enable/Disable shadowing outside of the reticule boxes
		Disable	
	Shadow Luma	Range 0-100	Percent of signal to pass
	Shadow Chroma	Range 0-100	Percent of signal to pass

Menu	Item	Parameters	Description
Proc Control	Gain	Range 0-200	As a percentage
	Lift	Range 0-200	As a percentage
	Saturation	Range 0-200	As a percentage
	Phase	Range 0-360	In degrees
	Background Color Hue	Range 0-360	Adjusts background hue when scaled image size is less then the active video size
	Background Color Saturation	Range 0-100	Adjusts background color when scaled image size is less then the active video size
	Background Color Value	Range 0-255	Adjusts background value when scaled image size is less then the active video size
Composite Output	Oversampling	On	Turn on/off encoder oversampling of the composite output video
		Off	
	Color	On	Turn on/off color on the analog/composite output channels
		Off	
	Color Bars	On	Turn on/off color bars on the analog/composite output channels
		Off	
Miscellaneous	Reference	Off	Turn off reference or select which reference to use
		Reference 1	
		Reference 2	
	Reference Alignment Percent	Input signal and reference signal	Reports the alignment percentage of the input video and reference input
	SD Vbit Correction	Enable	If enable V-bit will always be on line 20
		Disable	
	Save Settings	Save	Save the current device configuration
	Load Settings	Same as listed above	Load the previously saved device configuration
	Load Factory Defaults	Same as listed above	Load factory defaults. Note this will replace any saved settings with the factory defaults

Specifications

Technical Specifications

Table 4. Card - Technical Specifications

Category	Parameter	Specification
Serial Digital Video Inputs	Number of Inputs	1
	Data Rates Supported	SMPTE 292 HD-SDI: 1.485 Gbps or 1.485/M Gbps SMPTE 259M-C SD-SDI: 270 Mbps
	Frame Rates Supported	HD: 720p 25/29.97/50/59.94 1080i 25/29.97, 1080p 23.98/25/29.97 1080psF 23.98 SD: 486i 29.97 NTSC, 575i 25 PAL
	Impedance	75Ω terminating
	Equalization	HD: 250ft (76 meters) Belden 1505A 200ft (61 meters) Gepco VDM-230 SD: 1000ft (300 meters) Belden 1505A
	Return Loss	>15dB to 1.485GHz
Video Outputs	Number of Outputs	8 Outputs: 4: SDI Reclocked copies of the input signal 4: User configurable SD-SDI/Analog composite
	Impedance	75Ω
	Return Loss	SD > 17 dB
	Signal Level	714mV ±10%
	DC Offset	0 Volts ±50 mV
Other	Total Power Consumption	<8W
	Warranty	Five Year Transferable

Specifications are subject to change without notice.

Service Information

In This Chapter

This chapter includes the following sections:

- Troubleshooting Checklist
- Power LED Conditions
- Software Upgrades
- Warranty and Repair Policy

Troubleshooting Checklist

Routine maintenance to this openGear™ product is not required. In the event of problems with your card, the following basic troubleshooting checklist may help identify the source of the problem. If the module still does not appear to be working properly after checking all possible causes, please contact your openGear™ products distributor, or the Technical Support department at the numbers listed under the "Contact Us" section at the end of this manual.

1. **Visual Review —** Performing a quick visual check may reveal many problems, such as connectors not properly seated or loose cables. Check the module, the frame, and any associated peripheral equipment for signs of trouble.
2. **Power Check —** Check the power indicator LED on the distribution frame front panel for the presence of power. If the power LED is not illuminated, verify that the power cable is connected to a power source and that power is available at the power main. Confirm that the power supplies are fully seated in their slots. If the power LED is still not illuminated, replace the power supply with one that is verified to work.
3. **Reseat the Card in the Frame** — Eject the card and reinsert it in the frame.
4. **Check Control Settings —** Refer to the Installation and Operation sections of the manual and verify all user-adjustable component settings.
5. **Input Signal Status —** Verify that source equipment is operating correctly and that a valid signal is being supplied.
6. **Output Signal Path —** Verify that destination equipment is operating correctly and receiving a valid signal.
7. **Module Exchange** — Exchanging a suspect module with a module that is known to be working correctly is an efficient method for localizing problems to individual modules.

Power LED Conditions

The top front edge of the module has a Power LED which indicates card status. The Power LED displays the following conditions:

- **Off —** no power to the card.
- **Amber —** the card is running internal diagnostics while powering up.
- **Green —** normal operation.

Software Upgrades

Software loads can be sent to the card using the MFC-8310-N Frame Controller with Networking.

Software loads can also be sent to the card using a small eight pin ROM inserted in a dedicated upgrade socket. When the upgrade is complete, the ROM can be removed. Contact Cobalt Digital Inc. to acquire these upgrade ROMs.

Warranty and Repair Policy

The openGear™ card is warranted to be free of any defect with respect to performance, quality, reliability, and workmanship for a period of FIVE (5) years from the date of shipment from our factory. In the event that your Cobalt Digital Inc. card proves to be defective in any way during this warranty period, Cobalt Digital Inc. reserves the right to repair or replace this piece of equipment with a unit of equal or superior performance characteristics.

Should you find that this openGear™ card has failed after your warranty period has expired, we will repair your defective product should suitable replacement components be available. You, the owner, will bear any labor and/or part costs incurred in the repair or refurbishment of said equipment beyond the FIVE (5) year warranty period.

In no event shall Cobalt Digital Inc. be liable for direct, indirect, special, incidental, or consequential damages (including loss of profits) incurred by the use of this product. Implied warranties are expressly limited to the duration of this warranty.

This openGear™ card User Manual provides all pertinent information for the safe installation and operation of your Cobalt Digital Inc. Product. Cobalt Digital Inc. policy dictates that all repairs to the openGear™ card are to be conducted only by an authorized Cobalt Digital Inc. factory representative. Therefore, any unauthorized attempt to repair this product, by anyone other than an authorized Cobalt Digital Inc. factory representative, will automatically void the warranty. Please contact Cobalt Digital Inc. Technical Support for more information.

In Case of Problems

Should any problem arise with your openGear™ card, please contact the Cobalt Digital Inc. Technical Support Department. A Return Material Authorization number (RMA) will be issued to you, as well as specific shipping instructions, should you wish our factory to repair your openGear™ card. If required, a temporary replacement module will be made available at a nominal charge. Any shipping costs incurred will be the responsibility of you, the customer. 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 equipment.

Ordering Information

9821 and Related Products

Your **9821 HD/SD Down Converter with SD Pass Through and Analog Outputs** is a part of the openGear™ family of products. Cobalt Digital Inc. offers a full line of openGear™ terminal equipment including distribution, conversion, monitoring, synchronizers, encoders, decoders, embedders, and de-embedders, as well as analog audio and video products.

Standard Equipment

- **9821** HD/SD Down Converter
- **9821-UM** HD/SD Down Converter User Manual

Optional Equipment

- **9821-UM** HD/SD Down Converter User Manual (additional User Manual)
- **8300-RM-A** openGear™ Rear Module compatible with 9821 (10 BNC connector)
- **8310-C** Digital Products Frame and Power Supply with Cooling Fans (2RU, holds 10 cards)
- **8310-C-BNC** Digital Products Frame and Power Supply with fixed 100-BNC Rear Module and Cooling Fans. (2RU, holds 10 cards)
- **8310-N-BNC** Digital Products Frame and Power Supply with cooling fans, 100-BNC Rear Module, and MFC-8310-N card. (2RU, holds 10 cards)
- **MFC-8310-N** Network Controller Card (Additional)

Notes:

Contact Us

Contact Cobalt Digital Inc.

PHONE	**General Business Office and Technical Support**	217.344.1243
	Fax	217.344.1245
E-MAIL	**General Information**	Info@cobaltdigital.com
	Sales Information	Sales@cobaltdigital.com
POSTAL SERVICE	**Cobalt Digital Inc.**	2406 East University Avenue Urbana, IL 61802 USA

Visit us at the Cobalt Digital Inc. website.

http://www.cobaltdigital.com/

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