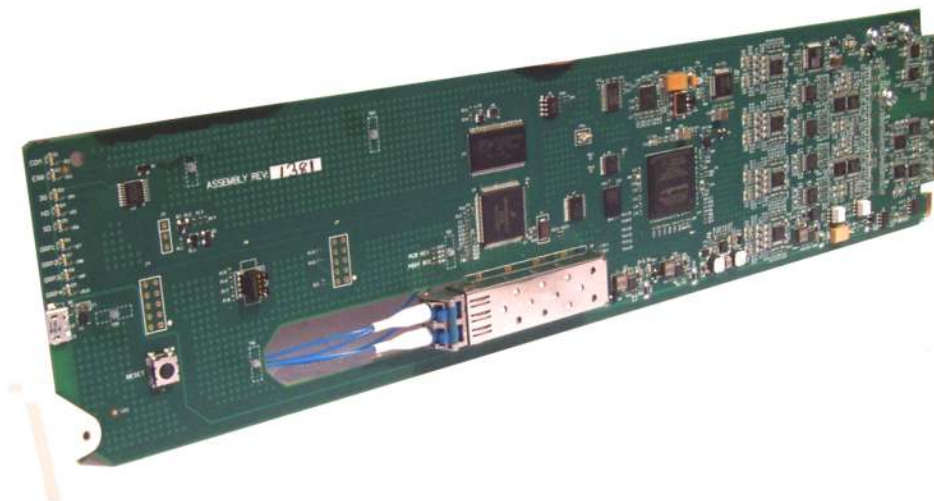




3G/HD/SD-SDI / ASI / MADI Fiber Transport/Distribution Amplifiers with Full-Flexibility Crosspoint

- 9410DA-EO
- 9410DA-2OE
- 9410DA-OE
- 9410DA-EOOE
- 9410DA-2EO

Product Manual

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Congratulations on choosing Cobalt® 9410DA 3G/HD/SD-SDI / ASI / MADI Fiber Transport/Distribution Amplifier with Full-Flexibility Crosspoint. The 9410DA models are 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 9410DA card, please contact us at the contact information on the front cover.

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Introduction

Overview

Note: This manual is applicable for models:

- 9410DA-EO (Fiber Tx)
- 9410DA-2OE (Dual Fiber Rx)
- 9410DA-OE (Fiber Rx)
- 9410DA-EOOE (Fiber Tx/Rx)

All models function identically except for fiber I/O interface differences. Differences between these models are noted where applicable. In all other aspects, all versions function identically as described in this manual.

This manual provides installation and operating instructions for 9410DA group of 3G/HD/SD-SDI / ASI / MADI Fiber Transport/Distribution Amplifiers with Full-Flexibility Crosspoint cards noted above (with all models collectively referred to herein as 9410DA).

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 9410DA.
- **Chapter 2, “Installation and Setup”** – Provides instructions for installing the 9410DA in a frame, and optionally installing a Rear I/O Module(s).
- **Chapter 3, “Operating Instructions”** – Provides overviews of operating controls and instructions for using the 9410DA.

This chapter contains the following information:

- **9410DA Card Software Versions and this Manual (p. 1-2)**
- **Manual Conventions (p. 1-3)**
- **Safety and Regulatory Summary (p. 1-5)**
- **9410DA Functional Description (p. 1-6)**
- **Technical Specifications (p. 1-10)**
- **Warranty and Service Information (p. 1-12)**
- **Contact Cobalt Digital Inc. (p. 1-13)**

9410DA 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 9410DA Card Information (p. 3-6) in Chapter 3, “Operating Instructions” for more information. You can then check our website for the latest software version currently released for the card as described below.

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

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

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

Cobalt Reference Guides

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

Manual Conventions

In this manual, display messages and connectors are shown using the exact name shown on the 9410DA itself. Examples are provided below.

- Connector names are shown like this: **COAX A I/O**

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

- **9410DA** refers to the 9410DA 3G/HD/SD-SDI / ASI / MADI Fiber Transport/Distribution Amplifiers with Full-Flexibility Crosspoint cards.
- **Frame** refers to the HPF-9000, oGx, OG3-FR, 8321, or similar 20-slot frame that houses Cobalt® or other cards.
- **Device** and/or **Card** refers to a Cobalt® or other card.
- **System** and/or **Video System** refers to the mix of interconnected production and terminal equipment in which the 9410DA and other cards operate.
- Functions and/or features that are available only as an option are denoted in this manual like this:

Option ➞

Warnings, Cautions, and Notes

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

Warnings

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

Cautions

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

Notes

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

Labeling Symbol Definitions

	Important note regarding product usage. Failure to observe may result in unexpected or incorrect operation.
	Electronic device or assembly is susceptible to damage from an ESD event. Handle only using appropriate ESD prevention practices. If ESD wrist strap is not available, handle card only by edges and avoid contact with any connectors or components.
	CLASS 1 LASER PRODUCT IEC 60825-1:2007 Caution - INVISIBLE LASER RADIATION WHEN OPEN. AVOID EXPOSURE TO THE BEAM.
	Symbol (WEEE 2002/96/EC) For product disposal, ensure the following: • Do not dispose of this product as unsorted municipal waste. • Collect this product separately. • Use collection and return systems available to you.

Safety and Regulatory Summary

Warnings

! WARNING !

- Do not stare at, or into, broken, or damaged, fibers.
- Do not stare at, or into, optical connectors.
- Only properly trained and authorized personnel should be permitted to perform laser/ fiber optic operations.
- Ensure that appropriate labels are displayed in plain view and in close proximity to the optical port on the protective housing/access panel of the terminal equipment.

! 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 card has a low power dissipation (<10 W).

CAUTION

If required, make certain Rear I/O Module(s) is installed before installing the card 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.

EMC Compliance Per Market

Market	Regulatory Standard or Code
United States of America	FCC "Code of Federal Regulations" Title 47 Part 15, Subpart B, Class A
Canada	ICES-003
International/CE	CISPR 24:2010 IEC 61000-4-2:2008 IEC 61000-4-3:2006 with A1:2007 and A2:2010 IEC 61000-4-4:2004 IEC 61000-4-6:2008 CISPR 22:2008

9410DA Functional Description

Figure 1-1 shows functional block diagrams of the 9410DA models. The cards are multi-rate, and support SDI and ASI/DVB on all inputs and outputs with non-inverting outputs. The card provides automatic format detect and reclock at 2.970, 1.485, and 0.270 Gb/s, with reclocking for unrecognized formats automatically set to disabled.

A crosspoint (which is user-configurable via DashBoard™) allows the card to apply any of the card inputs to various coax DA outputs as well as up to two independent fiber output channels (where available per model type). The flexibly-sourced coaxial DA outputs are available for any input on the card. Where applicable, up to two independent fiber inputs can serve as input sources for any of the coax or fiber card outputs.

The 9410DA-EO and 9410DA-EOOE models are available with discrete CWDM fiber E-O modules providing fully error-free pathological pattern operation, offering full compatibility with professional fiber video interfaces with numerous CWDM wavelengths that allow the card to be used with CWDM systems.

9410DA Input/Output Formats

The 9410DA provides the following inputs and outputs:

- **Coax-A I/O** – 3G/HD/SD-SDI / ASI / MADI coaxial bidirectional input (user set as input or output)
- **Coax-B I/O** – 3G/HD/SD-SDI / ASI / MADI coaxial bidirectional input (user set as input or output)
- **Fiber In-A** – 3G/HD/SD-SDI / ASI / MADI fiber input (-EOOE and -OE only).
- **Fiber In-B** – 3G/HD/SD-SDI / ASI / MADI fiber input (-2OE only).
- **Fiber Out-1** – 3G/HD/SD-SDI / ASI / MADI fiber output (-EOOE and -EO only).
- **Fiber Out-2** – 3G/HD/SD-SDI / ASI / MADI fiber output (-2EO only).
- **DA Coax Outputs 1-1 thru 4-2** – eight 3G/HD/SD-SDI / ASI / MADI coax outputs; non-inverting. Each output pair can be sourced from any card input

The card DashBoard UI has an SFP tab which shows the installed SFP type as well as dynamic parameters such as receive and transmit power (as applicable).

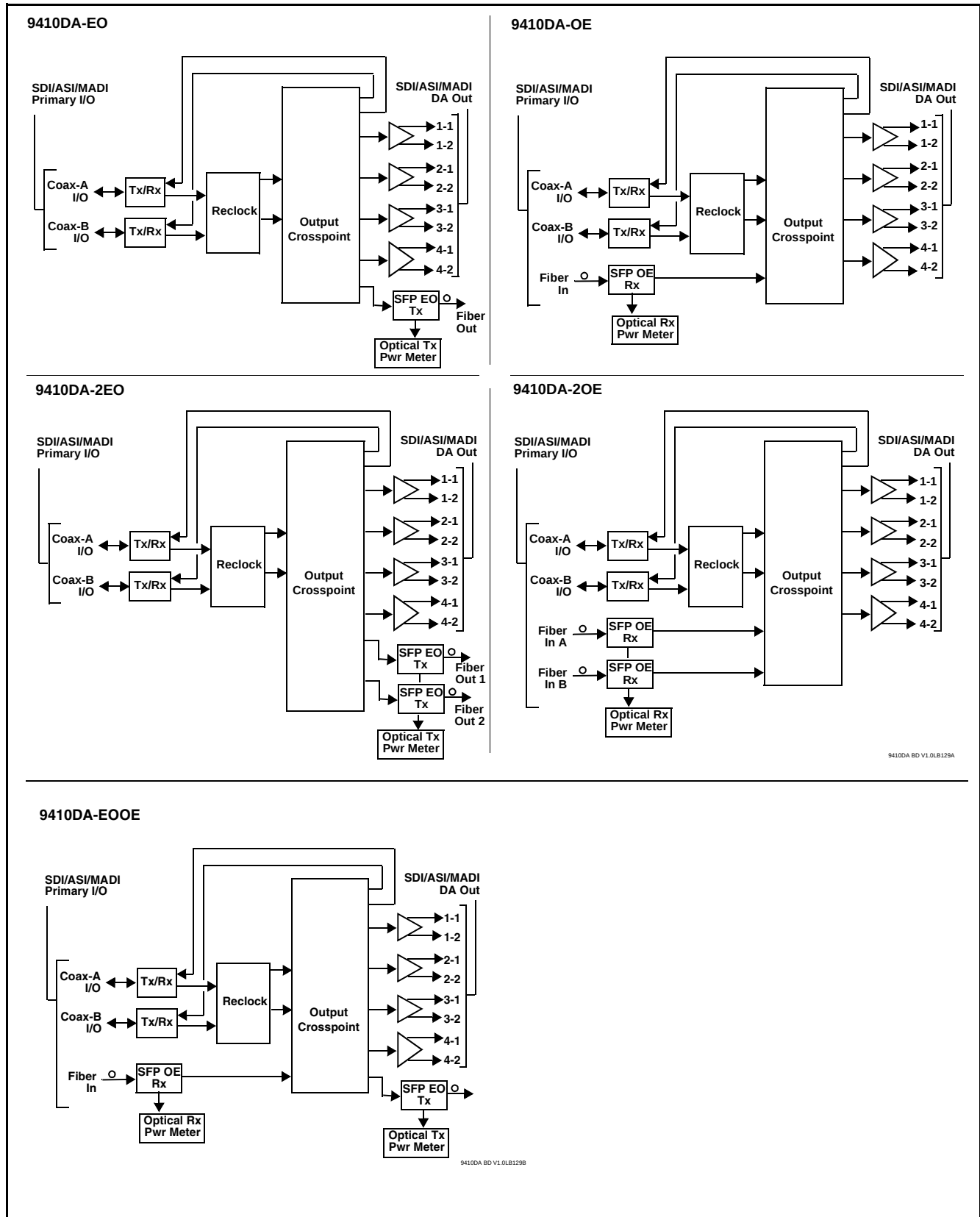


Figure 1-1 9410DA Functional Block Diagrams

User Control Interface

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

- **DashBoard™ User Interface** – Using DashBoard™, the 9410DA and other cards installed in openGear®¹ frames can be controlled from a computer and monitor.

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

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

- **Cobalt® OGCP-9000 and OGCP-9000/CC Remote Control Panels** – The OGCP-9000 and OGCP-9000/CC Remote Control Panels conveniently and intuitively provide parameter monitor and control of the 9410DA and other video and audio processing terminal equipment meeting the open-architecture Cobalt® cards for openGear™ standard.

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

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

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

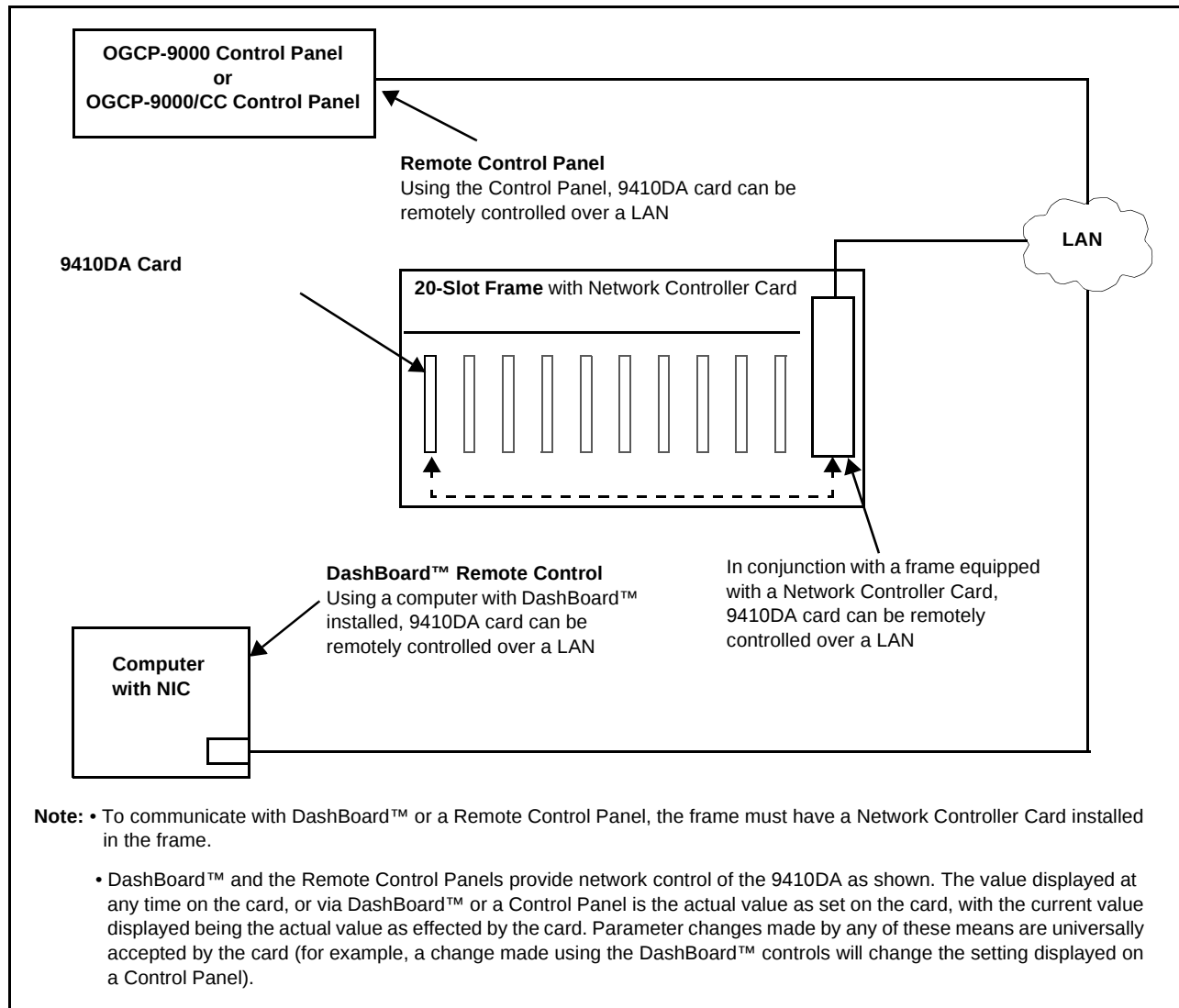


Figure 1-2 9410DA User Control Interface

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

Download a copy of this guide by clicking on the **Support>Reference Documents** link at www.cobaltdigital.com and then select DashBoard Remote Control Setup Guide as a download, or contact Cobalt® as listed in Contact Cobalt Digital Inc. (p. 1-13).

9410DA Rear I/O Modules

The 9410DA 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 9410DA Functional Block Diagrams (Figure 1-1) enter and exit the card via the card edge backplane connector. The Rear I/O Module breaks out the 9410DA card edge connections to coaxial and other connectors that interface with other components and systems in the signal chain.

The full assortment of 9410DA Rear I/O Modules is shown and described in 9410DA Rear I/O Modules (p. 2-4) in Chapter 2, “Installation and Setup”.

Technical Specifications

Table 1-1 lists the technical specifications for the 9410DA group of 3G/HD/SD-SDI / ASI / MADI Fiber Transport/Distribution Amplifiers with Full-Flexibility Crosspoint cards.

Table 1-1 Technical Specifications

Item	Characteristic
Part number, nomenclature	• 9410DA-EO 3G/HD/SD-SDI / ASI / MADI Fiber EO Transport/Distribution Amplifier with Full-Flexibility Crosspoint (Fiber Tx) • 9410DA-EO-CWDM-WX 3G/HD/SD-SDI / ASI / MADI Fiber EO Transport/Distribution Amplifier with Full-Flexibility Crosspoint (Fiber Tx; CWDM) • 9410DA-OE 3G/HD/SD-SDI / ASI / MADI Fiber EO Transport/Distribution Amplifier with Full-Flexibility Crosspoint (Fiber Rx) • 9410DA-2EO 3G/HD/SD-SDI / ASI / MADI Fiber EO Transport/Distribution Amplifier with Full-Flexibility Crosspoint (Dual Fiber Tx) • 9410DA-2EO-CWDM-WX 3G/HD/SD-SDI / ASI / MADI Fiber EO Transport/Distribution Amplifier with Full-Flexibility Crosspoint (Dual Fiber Tx; CWDM) • 9410DA-2OE 3G/HD/SD-SDI / ASI / MADI Fiber EO Transport/Distribution Amplifier with Full-Flexibility Crosspoint (Dual Fiber Rx) • 9410DA-EOOE 3G/HD/SD-SDI / ASI / MADI Fiber EO Transport/Distribution Amplifier with Full-Flexibility Crosspoint (Fiber Tx/Rx)
Installation/usage environment	Intended for installation and usage in frame meeting openGear™ modular system definition
Power consumption	< 10 Watts maximum
Installation Density	Up to 20 cards per 20-slot frame

Table 1-1 Technical Specifications — continued

Item	Characteristic
Environmental: Operating temperature: Relative humidity (operating or storage):	32° – 104° F (0° – 40° C) < 95%, non-condensing
Frame communication	10/100/1000 Mbps Ethernet with Auto-MDIX
Indicators	Card edge indicators as follows: • Frame COMM LED indicator • Status/Error LED indicator • Input Presence LED indicators
3G/HD/SD-SDI / ASI / MADI Inputs/ Outputs Note: Fiber Tx and Rx specifications are as applicable per model)	(2) 75Ω coaxial input/outputs max (I/O A and I/O B) SDI Receive Cable Length (1694A): 110m/180m/360m (3G/HD/ SD) SDI Return Loss: >15 dB up to 1.485 GHz; >10 dB up to 2.970 GHz Note: SDI Return loss and receive cable length are affected by rear I/O module used. Specifications represent typical performance. Alignment Jitter: 3G/HD/SD: < 0.3/0.2/0.2 UI Timing Jitter: 3G/HD/SD: < 2.0/1.0/0.2 UI Fiber input; LC connector Fiber output; LC connector Fiber Wavelength, Tx: 1310 nm Fiber Rx Sensitivity: -23 dBm; 1260 to 1620 nm Fiber Tx Power: -5.0 dBm (min) SDI Formats Supported: SMPTE 259M, SMPTE 292M, SMPTE 424M
Models -EO-CWDM-WX and -2EO-CWDM-WX (CWDM) Transmit Wavelengths and Codes	Available wavelengths (in nm) are as follows: 1270, 1290, 1310, 1330, 1350, 1410, 1430, 1450, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610. In “WX” places in part number, code for wavelengths in each place as listed below: -27: 1270nm -29: 1290nm -31: 1310nm -33: 1330nm -35: 1350nm -41: 1410nm -43: 1430nm -45: 1450nm -47: 1470nm -49: 1490nm -51: 1510nm -53: 1530nm -55: 1550nm -57: 1570nm -59: 1590nm -61: 1610nm
3G/HD/SD-SDI / ASI / MADI Outputs (DA Outputs)	(4) 1x2 75Ω coaxial outputs (8 total, max). Signal Level: 800 mV nominal Alignment Jitter: 3G/HD/SD: < 0.3/0.2/0.2 UI Timing Jitter: 3G/HD/SD: < 2.0/1.0/0.2 UI

Warranty and Service Information

Cobalt Digital Inc. Limited Warranty

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

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

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

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

Cobalt Digital Inc. Factory Service Center

2506 Galen Drive
Champaign, IL 61821 USA
www.cobaltdigital.com

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

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Contact Cobalt Digital Inc.

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

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

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

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Installation and Setup

Overview

This chapter contains the following information:

- Installing the 9410DA Into a Frame Slot (p. 2-1)
- Installing a Rear I/O Module (p. 2-3)
- Setting Up 9410DA Network Remote Control (p. 2-11)

Installing the 9410DA 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 card has a low power dissipation (<10 W).

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 card in a slot with no rear I/O module, a Rear I/O Module is required before cabling can be connected. Refer to Installing a Rear I/O Module (p. 2-3) for rear I/O module installation procedure.

CAUTION

If required, make certain Rear I/O Module(s) is installed before installing the card 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 card 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 card into a frame slot as follows:

1. Determine the slot in which the card 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 9410DA Rear I/O Modules (p. 2-4).
9. Repeat steps 1 through 8 for other cards.

Note:

- The card BNC inputs are internally 75-ohm terminated. It is not necessary to terminate unused BNC inputs or outputs.
- 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 9410DA Network Remote Control (p. 2-11).

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

Installing a Rear I/O Module

Note: This procedure is applicable **only if a Rear I/O Module is not currently installed** in the slot where the card is to be installed. If installing the card in a slot already equipped with a suitable I/O module, omit this procedure.

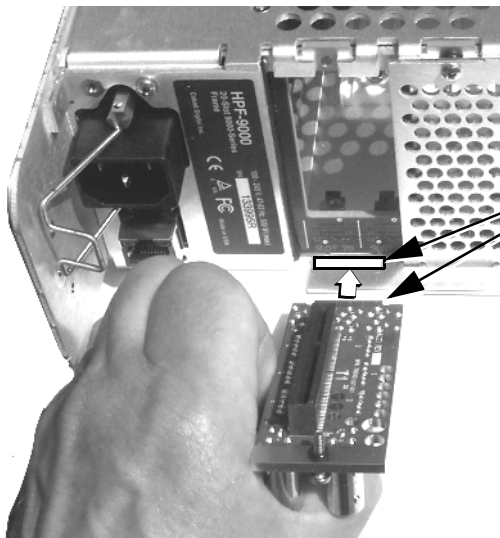
Install a Rear I/O Module as follows:

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

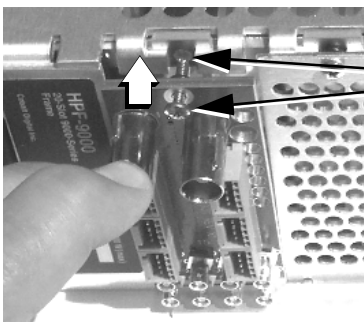


Top of rear module **must** first be inserted in mounting position before attempting to align and engage lower mounting tab with slot on frame.

Start rear module insertion with the **top** of the module inserted, and then swing the bottom into position. Then align the mounting tab with the slot in the frame. Drawing the attaching screw all the way back (while leaving screw still captive) more easily allows the mounting tab to engage with slot.



- ① Align and engage mounting tab on Rear I/O Module with the module seating slot on rear of frame chassis.



- ② Hold top of Rear I/O Module flush against frame chassis and start the captive screw. Lightly tighten captive screw.

Figure 2-1 Rear I/O Module Installation

9410DA Rear I/O Modules

Table 2-1 shows and describes the full assortment of Rear I/O Modules specifically for use with the 9410DA.

Table 2-1 9410DA Rear I/O Modules

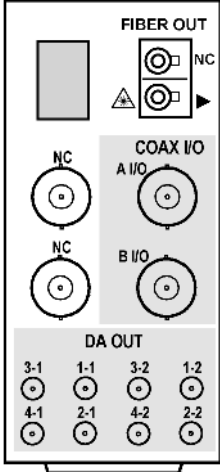
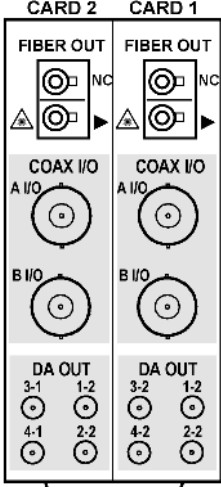
9410DA Rear I/O Module	Description
 CLASS 1 LASER PRODUCT - IEC 60825-1:2007. Never look into fiber connector or cable end of device transmitting an optical signal. The transmitted light is not visible and can cause permanent eye damage. Do not perform connection/disconnection with sending or receiving device powered.	
Note: DA output pairs are denoted by same group number (e.g., “1-1” and “1-2”). These pairs are driven by a shared DA. Ports within a given pair (in this example, DA 1-1 / 1-2) cannot be sourced from different signals.	
RM20-9410DA-EO-D 	Provides the following connections: - Two 3G/HD/SD-SDI / ASI / MADI coaxial input/output BNCs (COAX A I/O and COAX B I/O) - One 3G/HD/SD-SDI / ASI / MADI fiber LC output (FIBER OUT) - Eight 3G/HD/SD-SDI / ASI / MADI coax outputs (DA OUT) Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9410DA-EO-D-HDBNC or RM20-9410DA-EO-D-DIN, respectively. Note: Mates to card in odd slot. Note: This rear module supersedes -B model (which is discontinued).
RM20-9410DA-EO-D/S 	Split Rear Module. Provides each of the following connections for two 9410DA cards: - Two 3G/HD/SD-SDI / ASI / MADI coaxial input/output BNCs (COAX A I/O and COAX B I/O) - One 3G/HD/SD-SDI / ASI / MADI fiber LC output (FIBER OUT) - Four 3G/HD/SD-SDI / ASI / MADI coax outputs (DA OUT) Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9410DA-EO-D/S-HDBNC or RM20-9410DA-EO-D/S-DIN, respectively. Note: This rear module supersedes -B/S model (which is discontinued).

Table 2-1 9410DA Rear I/O Modules — continued

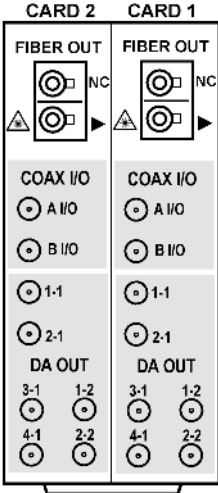
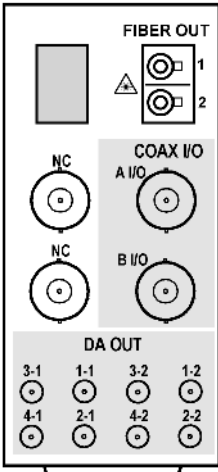
9410DA Rear I/O Module	Description
RM20-9410DA-EO-E/S 	Split Rear Module. Provides each of the following connections for two 9410DA cards: - Two 3G/HD/SD-SDI / ASI / MADI coaxial input/ outputs (COAX A I/O and COAX B I/O) - One 3G/HD/SD-SDI / ASI / MADI fiber LC output (FIBER OUT) - Six 3G/HD/SD-SDI / ASI / MADI coax outputs (DA OUT) Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9410DA-EO-E/S-HDBNC or RM20-9410DA-EO-E/S-DIN, respectively. Note: This rear module supersedes -C/S model (which is discontinued).
RM20-9410DA-2EO-D 	Provides the following connections: - Two 3G/HD/SD-SDI / ASI / MADI coaxial input/ output BNCs (COAX A I/O and COAX B I/O) - Two 3G/HD/SD-SDI / ASI / MADI fiber LC outputs (FIBER OUT 1 and 2) - Eight 3G/HD/SD-SDI / ASI / MADI coax outputs (DA OUT) Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9410DA-2EO-D-HDBNC or RM20-9410DA-2EO-D-DIN, respectively. Note: Mates to card in odd slot. Note: This rear module supersedes -B model (which is discontinued).

Table 2-1 9410DA Rear I/O Modules — continued

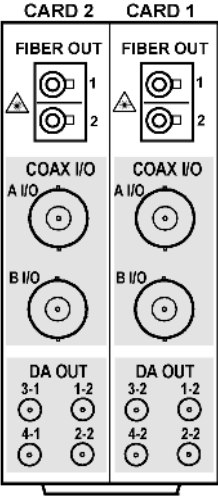
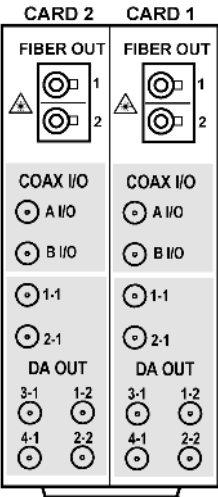
9410DA Rear I/O Module	Description
RM20-9410DA-2EO-D/S 	Split Rear Module. Provides each of the following connections for two 9410DA cards: • Two 3G/HD/SD-SDI / ASI / MADI coaxial input/output BNCs (COAX A I/O and COAX B I/O) • Two 3G/HD/SD-SDI / ASI / MADI fiber LC outputs (FIBER OUT 1 and 2) • Four 3G/HD/SD-SDI / ASI / MADI coax outputs (DA OUT) Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9410DA-2EO-D/S-HDBNC or RM20-9410DA-2EO-D/S-DIN, respectively. Note: This rear module supersedes -B/S model (which is discontinued).
RM20-9410DA-2EO-E/S 	Split Rear Module. Provides each of the following connections for two 9410DA cards: • Two 3G/HD/SD-SDI / ASI / MADI coaxial input/outputs (COAX A I/O and COAX B I/O) • Two 3G/HD/SD-SDI / ASI / MADI fiber LC outputs (FIBER OUT 1 and 2) • Six 3G/HD/SD-SDI / ASI / MADI coax outputs (DA OUT) Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9410DA-2EO-E/S-HDBNC or RM20-9410DA-2EO-E/S-DIN, respectively. Note: This rear module supersedes -C/S model (which is discontinued).

Table 2-1 9410DA Rear I/O Modules — continued

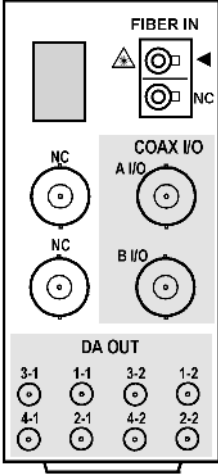
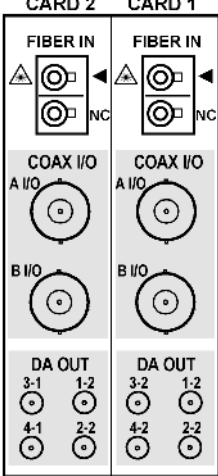
9410DA Rear I/O Module	Description
RM20-9410DA-OE-D 	Provides the following connections: • Two 3G/HD/SD-SDI / ASI / MADI coaxial input/output BNCs (COAX A I/O and COAX B I/O) • One 3G/HD/SD-SDI / ASI / MADI fiber LC input (FIBER IN) • Eight 3G/HD/SD-SDI / ASI / MADI coax outputs (DA OUT) Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9410DA-OE-D-HDBNC or RM20-9410DA-OE-D-DIN, respectively. Note: Mates to card in odd slot. Note: This rear module supersedes -B model (which is discontinued).
RM20-9410DA-OE-D/S 	Split Rear Module. Provides each of the following connections for two 9410DA cards: • Two 3G/HD/SD-SDI / ASI / MADI coaxial input/output BNCs (COAX A I/O and COAX B I/O) • One 3G/HD/SD-SDI / ASI / MADI fiber LC input (FIBER IN) • Four 3G/HD/SD-SDI / ASI / MADI coax outputs (DA OUT) Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9410DA-OE-D/S-HDBNC or RM20-9410DA-OE-D/S-DIN, respectively. Note: This rear module supersedes -B/S model (which is discontinued).

Table 2-1 9410DA Rear I/O Modules — continued

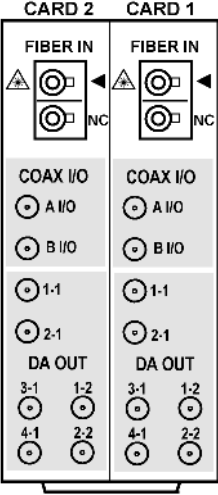
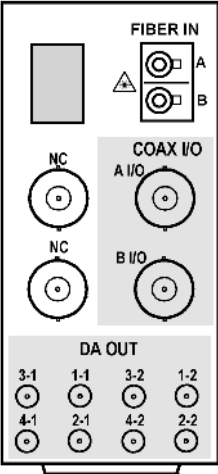
9410DA Rear I/O Module	Description
RM20-9410DA-OE-E/S 	Split Rear Module. Provides each of the following connections for two 9410DA cards: • Two 3G/HD/SD-SDI / ASI / MADI coaxial input/ outputs (COAX A I/O and COAX B I/O) • One 3G/HD/SD-SDI / ASI / MADI fiber LC input (FIBER IN) • Six 3G/HD/SD-SDI / ASI / MADI coax outputs (DA OUT) Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9410DA-OE-E/S-HDBNC or RM20-9410DA-OE-E/S-DIN, respectively. Note: This rear module supersedes -C/S model (which is discontinued).
RM20-9410DA-2OE-D 	Provides the following connections: • Two 3G/HD/SD-SDI / ASI / MADI coaxial input/ output BNCs (COAX A I/O and COAX B I/O) • Two 3G/HD/SD-SDI / ASI / MADI fiber LC input (FIBER IN A and B) • Eight 3G/HD/SD-SDI / ASI / MADI coax outputs (DA OUT) Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9410DA-2OE-D-HDBNC or RM20-9410DA-2OE-D-DIN, respectively. Note: Mates to card in odd slot. Note: This rear module supersedes -B model (which is discontinued).

Table 2-1 9410DA Rear I/O Modules — continued

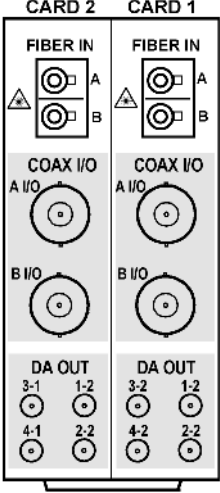
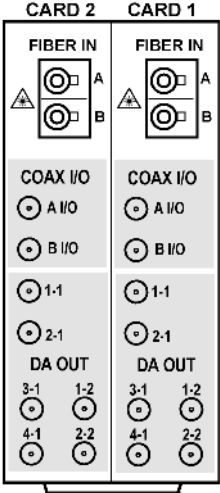
9410DA Rear I/O Module	Description
RM20-9410DA-2OE-D/S  The diagram shows a rear module with two cards, CARD 2 and CARD 1. Each card has the following ports: FIBER IN (A and B), COAX I/O (A I/O and B I/O), and DA OUT (3-1, 1-2, 4-1, 2-2).	Split Rear Module. Provides each of the following connections for two 9410DA cards: - Two 3G/HD/SD-SDI / ASI / MADI coaxial input/output BNCs (COAX A I/O and COAX B I/O) - Two 3G/HD/SD-SDI / ASI / MADI fiber LC input (FIBER IN A and B) - Four 3G/HD/SD-SDI / ASI / MADI coax outputs (DA OUT) Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9410DA-2OE-D/S-HDBNC or RM20-9410DA-2OE-D/S-DIN, respectively. Note: This rear module supersedes -B/S model (which is discontinued).
RM20-9410DA-2OE-E/S  The diagram shows a rear module with two cards, CARD 2 and CARD 1. Each card has the following ports: FIBER IN (A and B), COAX I/O (A I/O and B I/O), and DA OUT (1-1, 2-1, 3-1, 1-2, 4-1, 2-2).	Split Rear Module. Provides each of the following connections for two 9410DA cards: - Two 3G/HD/SD-SDI / ASI / MADI coaxial input/outputs (COAX A I/O and COAX B I/O) - Two 3G/HD/SD-SDI / ASI / MADI fiber LC input (FIBER IN A and B) - Six 3G/HD/SD-SDI / ASI / MADI coax outputs (DA OUT) Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9410DA-2OE-E/S-HDBNC or RM20-9410DA-2OE-E/S-DIN, respectively. Note: This rear module supersedes -C/S model (which is discontinued).

Table 2-1 9410DA Rear I/O Modules — continued

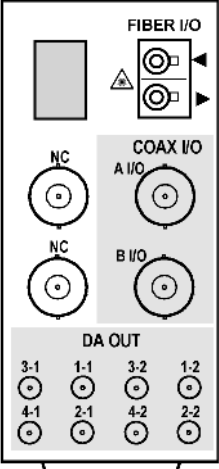
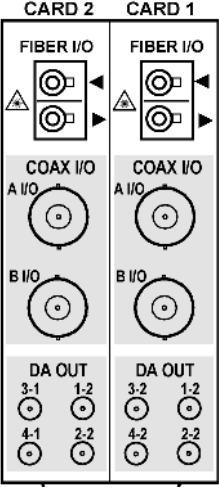
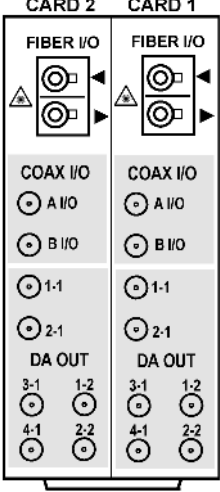
9410DA Rear I/O Module	Description
RM20-9410DA-EOOE-D 	Provides the following connections: • Two 3G/HD/SD-SDI / ASI / MADI coaxial input/output BNCs (COAX A I/O and COAX B I/O) • One 3G/HD/SD-SDI / ASI / MADI fiber LC input (FIBER IN <) • One 3G/HD/SD-SDI / ASI / MADI fiber LC output (FIBER OUT >) • Eight 3G/HD/SD-SDI / ASI / MADI coax outputs (DA OUT) Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9410DA-EOOE-D-HDBNC or RM20-9410DA-EOOE-D-DIN, respectively. Note: Mates to card in odd slot. Note: This rear module supersedes -B model (which is discontinued).
RM20-9410DA-EOOE-D/S 	Split Rear Module. Provides each of the following connections for two 9410DA cards: • Two 3G/HD/SD-SDI / ASI / MADI coaxial input/output BNCs (COAX A I/O and COAX B I/O) • One 3G/HD/SD-SDI / ASI / MADI fiber LC input (FIBER IN <) • One 3G/HD/SD-SDI / ASI / MADI fiber LC output (FIBER OUT >) • Four 3G/HD/SD-SDI / ASI / MADI coax outputs (DA OUT) Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9410DA-EOOE-D/S-HDBNC or RM20-9410DA-EOOE-D/S-DIN, respectively. Note: This rear module supersedes -B/S model (which is discontinued).

Table 2-1 9410DA Rear I/O Modules — continued

9410DA Rear I/O Module	Description
RM20-9410DA-EOOE-E/S 	Split Rear Module. Provides each of the following connections for two 9410DA cards: • Two 3G/HD/SD-SDI / ASI / MADI coaxial input/ outputs (COAX A I/O and COAX B I/O) • One 3G/HD/SD-SDI / ASI / MADI fiber LC input (FIBER IN <) • One 3G/HD/SD-SDI / ASI / MADI fiber LC output (FIBER OUT >) • Six 3G/HD/SD-SDI / ASI / MADI coax outputs (DA OUT) Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9410DA-EOOE-E/S-HDBNC or RM20-9410DA-EOOE-E/S-DIN, respectively. Note: This rear module supersedes -C/S model (which is discontinued).

Setting Up 9410DA Network Remote Control

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

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

Download a copy of this guide by clicking on the **Support>Reference Documents** link at www.cobaltdigital.com and then select DashBoard Remote Control Setup Guide as a download, or contact Cobalt® as listed in Contact Cobalt Digital Inc. (p. 1-13).

- 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 9410DA Function Menu List and Descriptions (p. 3-7).

This chapter contains the following information:

- Control and Display Descriptions (p. 3-1)
- Accessing the 9410DA Card via Remote Control (p. 3-4)
- Checking 9410DA Card Information (p. 3-6)
- 9410DA Function Menu List and Descriptions (p. 3-7)
- Troubleshooting (p. 3-10)

Control and Display Descriptions

This section describes the user interface controls, indicators, and displays for using the 9410DA card.

The format in which the 9410DA 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 9410DA functions (and the controls, indicators, and displays related to a particular function) follows a general arrangement of Function Menus under which related controls can be accessed (as described in Function Menu/Parameter Overview below).



DashBoard 7.0.0 (or later) is recommended for use with this card. Earlier versions, while functional with the card, may not properly display dynamic control settings (such as green highlighting of an engaged crosspoint selection).

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

Function Menu/Parameter Overview

The functions and related parameters available on the 9410DA card are organized into function **menus**, which consist of parameter groups as shown below.

Figure 3-1 shows how the 9410DA card and its menus are organized, and also provides an overview of how navigation is performed between cards, function menus, and parameters.

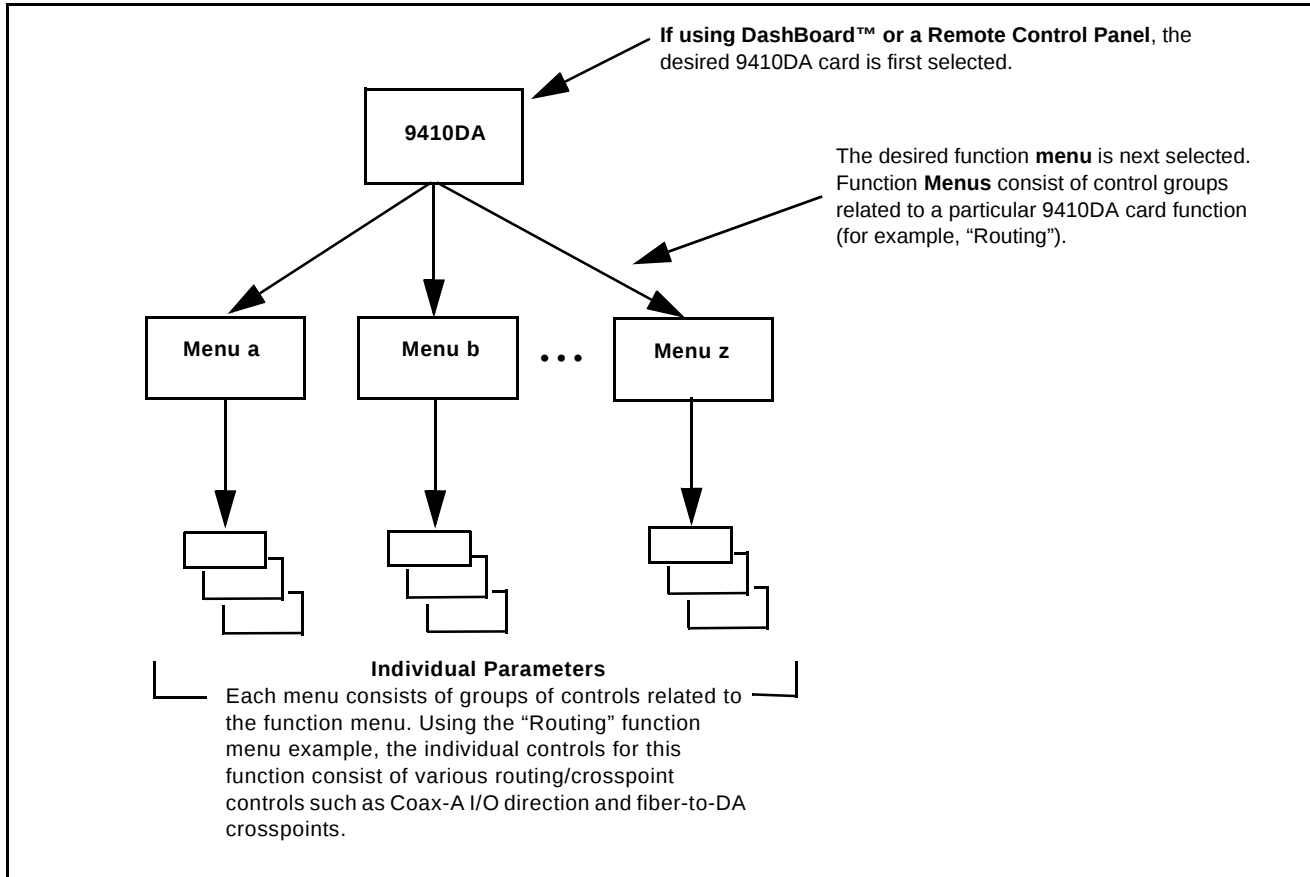


Figure 3-1 Function Menu/Parameter Overview

DashBoard™ User Interface

(See Figure 3-2.) The card function menus are organized in DashBoard™ using tabs. When a tab is selected, each selection list item associated with the function is displayed. Items in a list can then be selected using GUI drop-down lists.

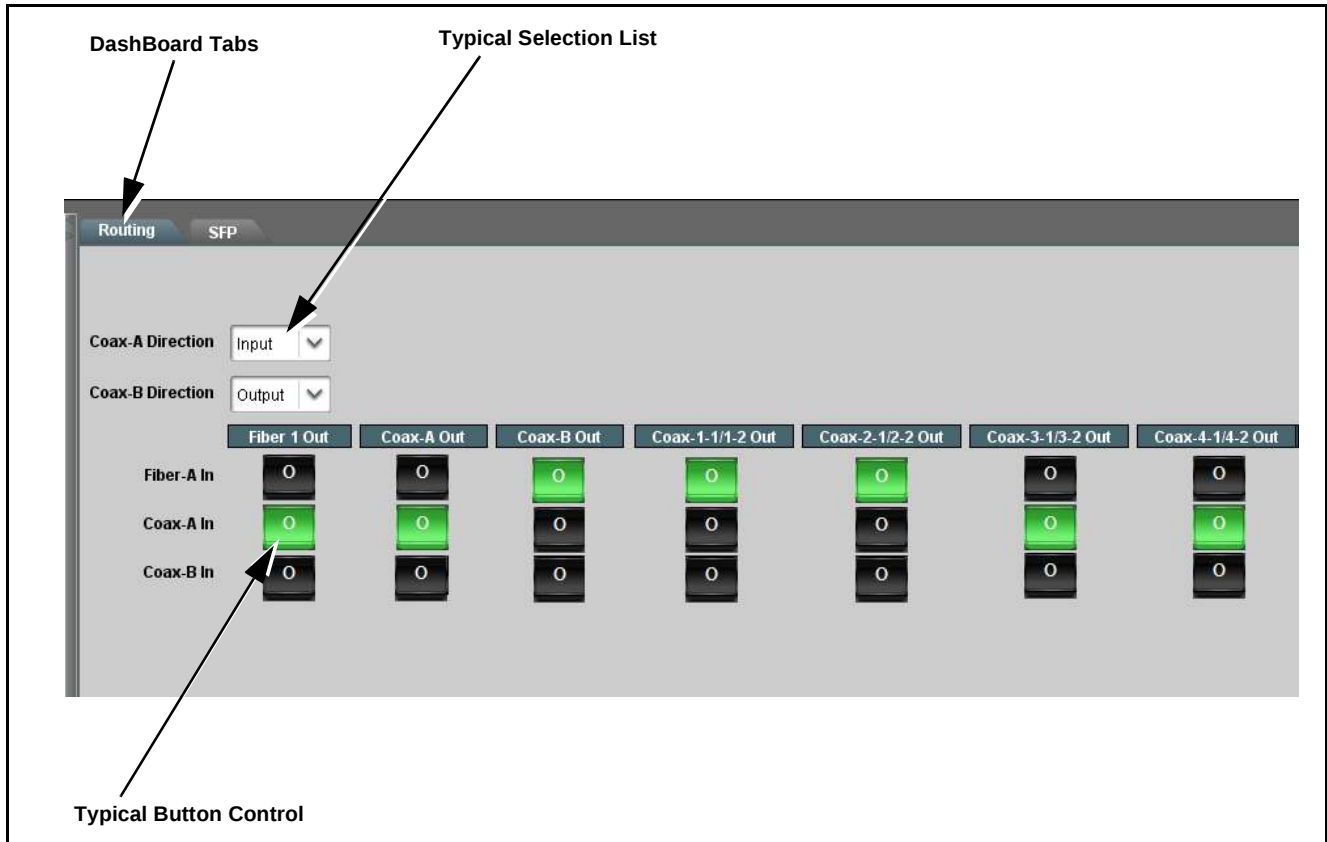


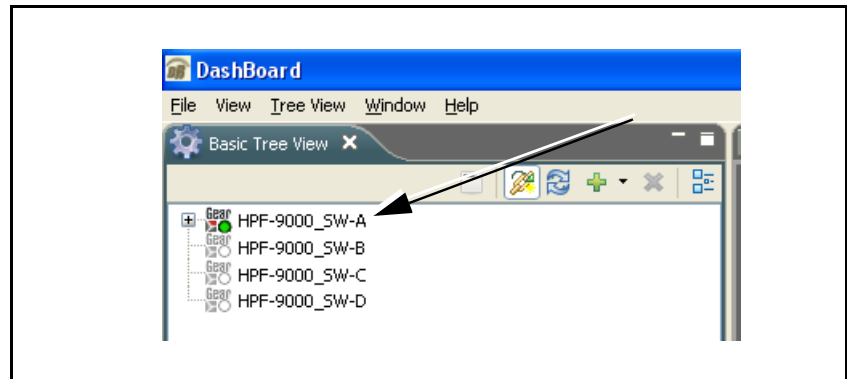
Figure 3-2 Typical DashBoard Tabs and Controls

Accessing the 9410DA Card via Remote Control

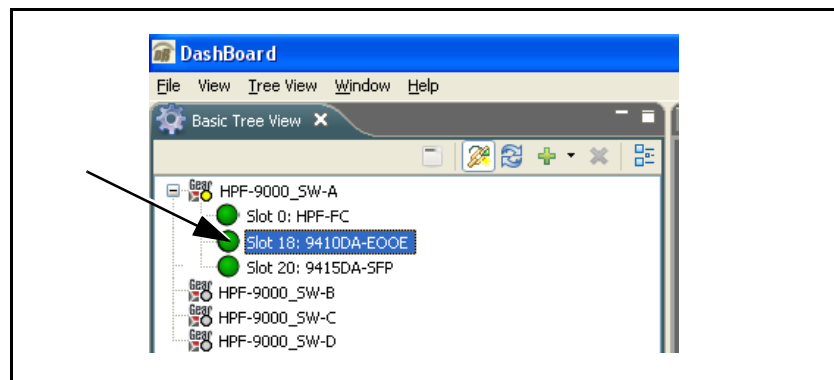
Access the 9410DA card using DashBoard™ or Cobalt® Remote Control Panel as described below.

Accessing the 9410DA Card Using DashBoard™

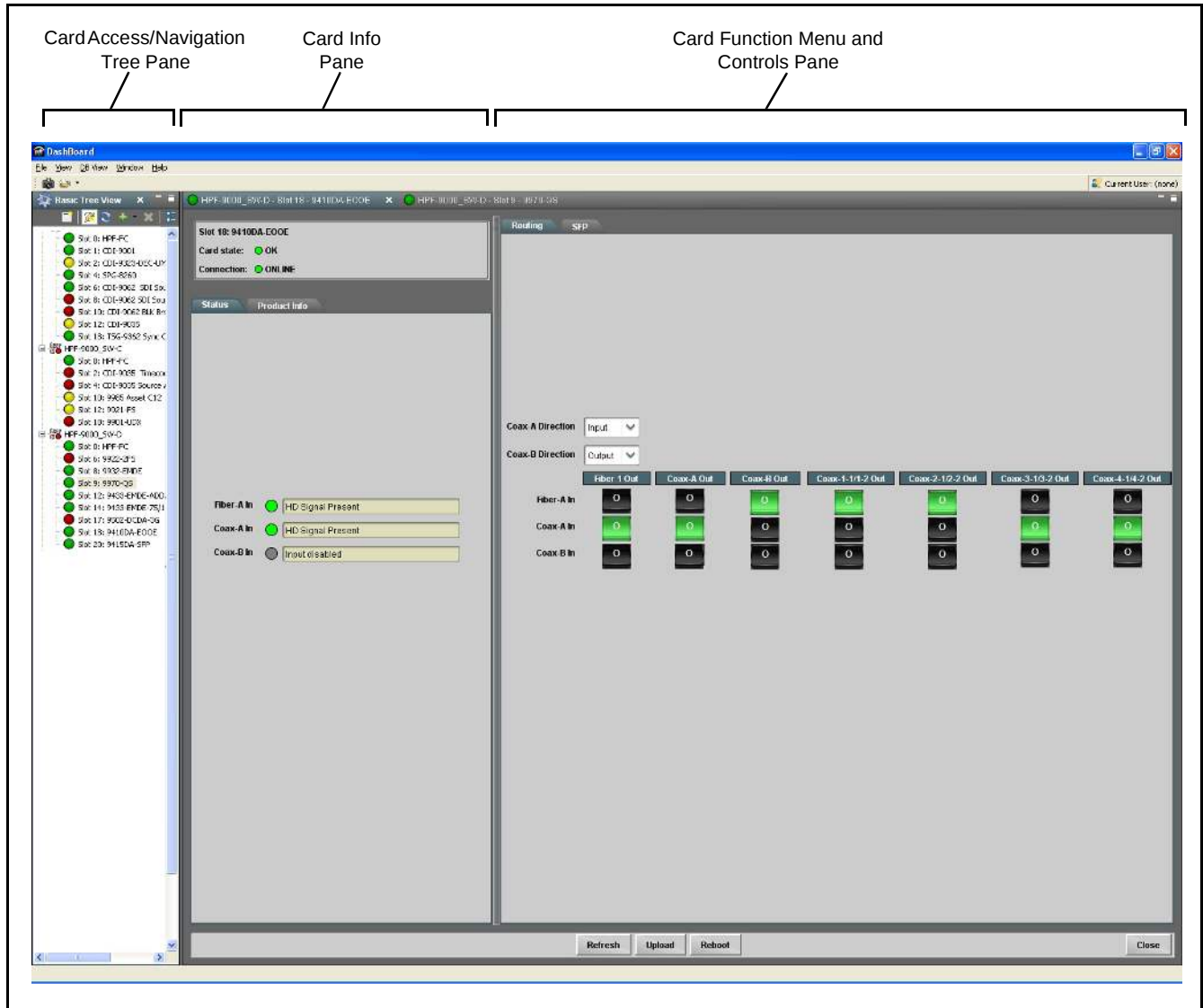
1. On the computer connected to the frame LAN, open DashBoard™.
2. As shown below, in the left side Basic View Tree locate the Network Controller Card associated with the frame containing the 9410DA card to be accessed (in this example, “HFP-9000_SW-A”).



3. As shown below, expand the tree to access the cards within the frame. Click on the card to be accessed (in this example, “Slot 18: 9410DA-EOOE”).



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



Checking 9410DA Card Information

The operating status and software version the 9410DA card can be checked using DashBoard™ or the card edge control user interface. Figure 3-3 shows and describes the 9410DA card information screen using DashBoard™.

Note: Proper operating status in DashBoard™ is denoted by green icons for the status indicators shown in Figure 3-3. Yellow or red icons respectively indicate an alert or failure condition. Refer to Troubleshooting (p. 3-10) for corrective action.

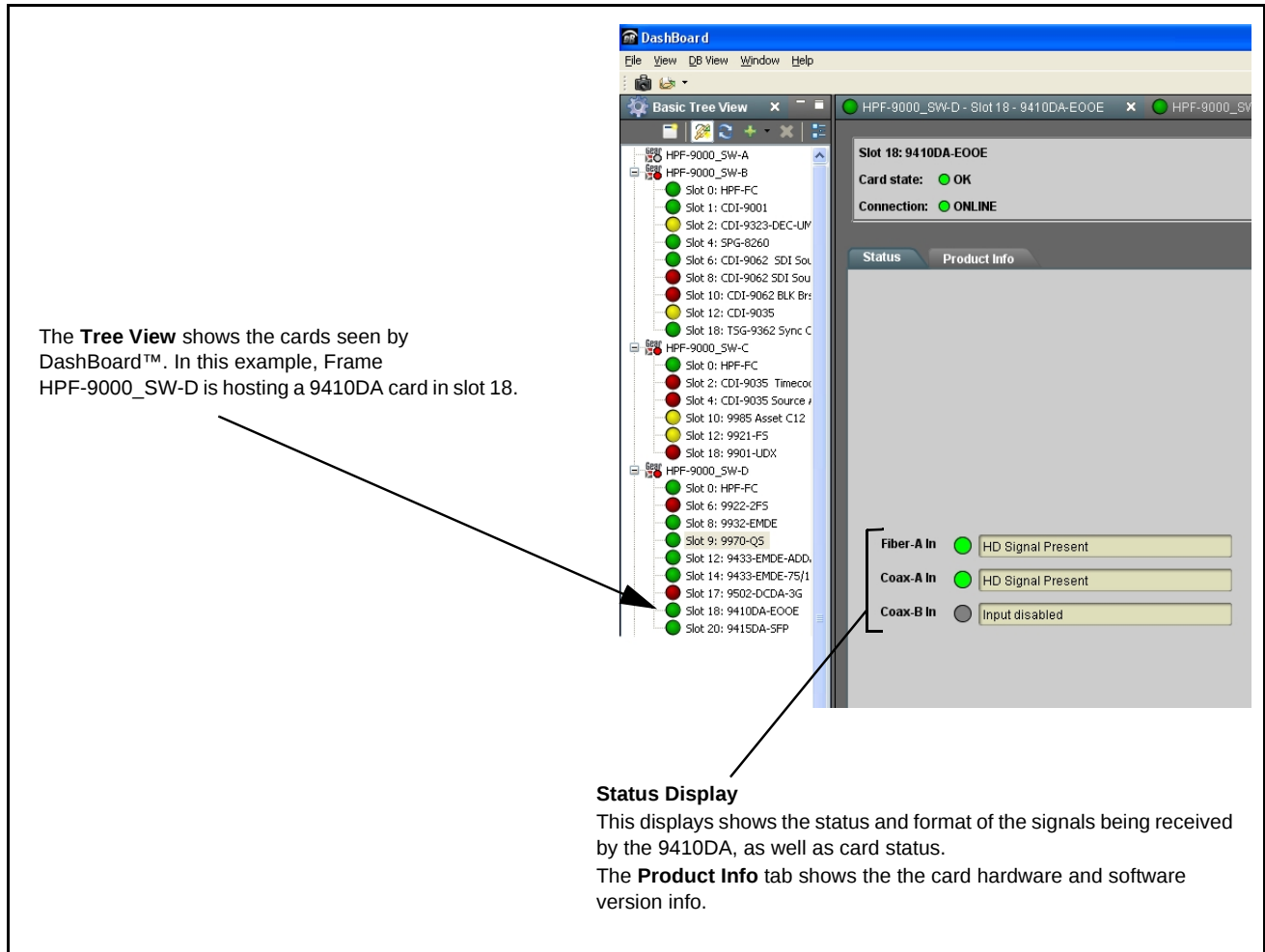
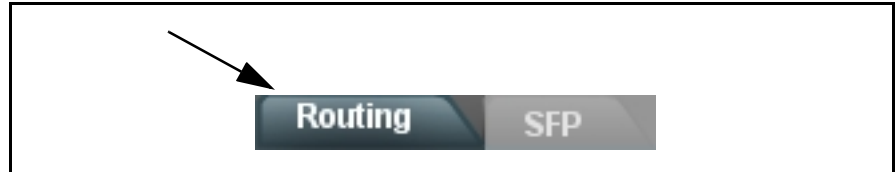


Figure 3-3 9410DA Card Info/Status Utility

9410DA Function Menu List and Descriptions

Table 3-1 individually lists and describes each 9410DA function menu and its related list selections, controls, and parameters. Where helpful, examples showing usage of a function are also provided. Table 3-1 is primarily based upon using DashBoard™ to access each function and its corresponding menus and parameters.

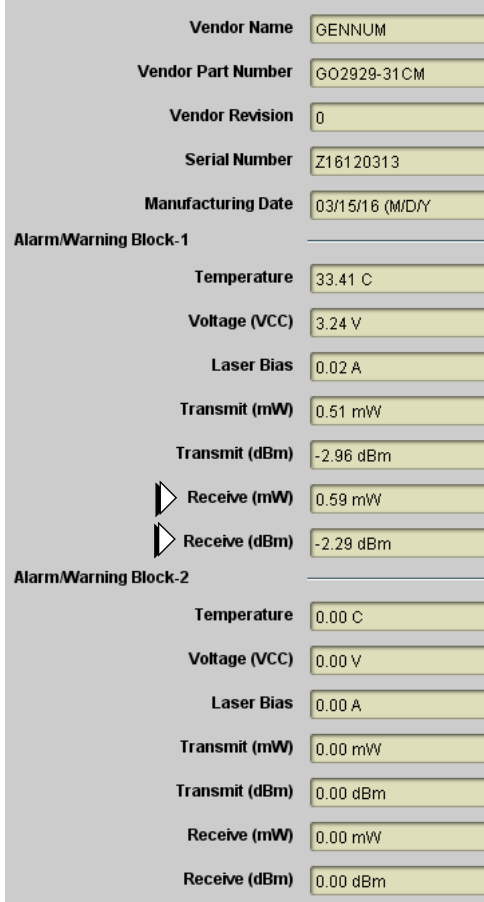
On DashBoard™ itself and in Table 3-1, the function menu items are organized using tabs as shown below.



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

Function Menu Item	Page
Routing Crosspoint Controls	3-8
SFP Status Display	3-9

Table 3-1 9410DA Function Menu List — continued

	Provides a status display showing SFP Vendor/model, as well as dynamic optical and physical operating parameters.
SFP tab shows SFP OEM identification as well as dynamic parametric data relating to operating conditions. The display is useful in assessing fiber receive and transmit status conditions (such as indications of a bad upstream optical connection). In the example here, a Gennum/Embrionix 2929 (E00E) SFP is installed on the Cobalt 9410DA-E00E card model. Note: The Block-1 and Block-2 fields are both populated only when a dual-path SFP is installed (e.g., 2EO or 2OE). For single-path devices/card (e.g., E00E, EO, or OE) only Block-1 fields are populated (with null data shown for the unused block).	
	OEM Vendor Information These fields show SFP vendor part information. If fields are blank, this indicates SFP may not be installed on card. Operating Parametric Status For typical user purposes, the Receive (dBm) field is useful for diagnosing connection or routing issues. Receive (dBm) showing very low or null values (-0.00 dBm along with 0.00 Receive (mW)) typically indicates a fiber connection carrying no signal ("open" connection or damaged fiber cable/connection).

Troubleshooting

This section provides general troubleshooting information and specific symptom/corrective action for the 9410DA card and its remote control interface. The 9410DA 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 9410DA card itself and its remote control systems all (to varying degrees) provide error and failure indications. Depending on how the 9410DA card is being used (i.e, non-networked 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 9410DA 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. 3-11)
- 9410DA Processing Error Troubleshooting (p. 3-11)
- Troubleshooting Network/Remote Control Errors (p. 3-12)

9410DA Card Edge Status/Error Indicators

Figure 3-4 shows and describes the 9410DA card edge status indicators. These indicators 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 or inaccessability with external devices such as network remote control devices.

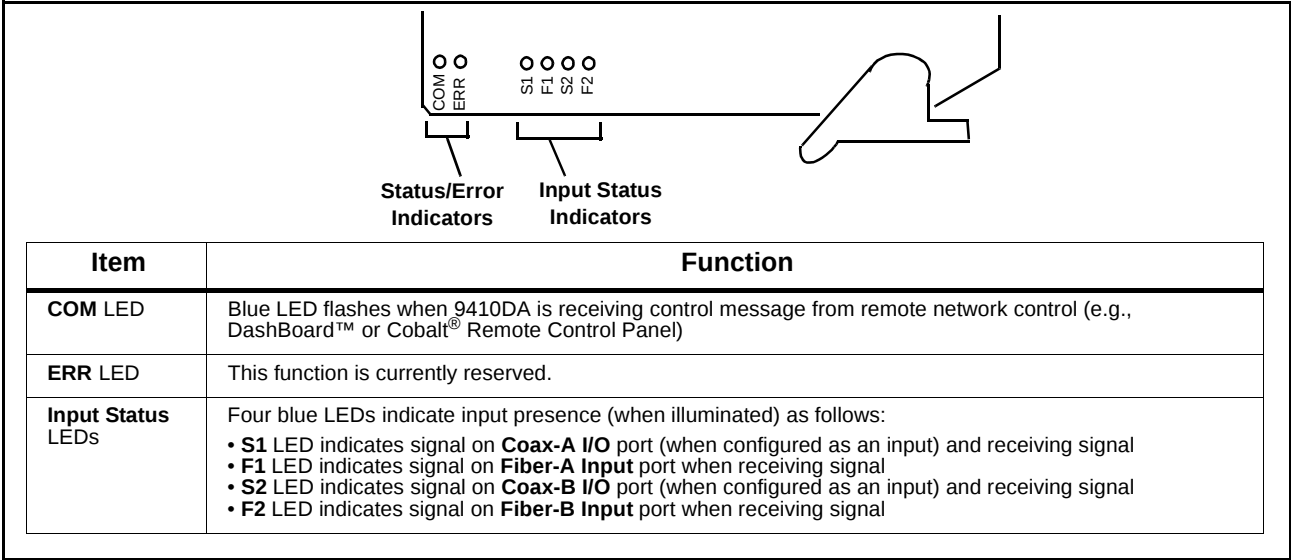


Figure 3-4 9410DA Card Edge Status Indicators

Basic Troubleshooting Checks

Failures of a general nature (affecting many cards and/or functions simultaneously), or gross inoperability errors are best addressed first by performing basic checks before proceeding further. Table 3-2 provides basic system checks that typically locate the source of most general problems. If required and applicable, perform further troubleshooting in accordance with the other troubleshooting tables in this section.

Table 3-2 Basic Troubleshooting Checks

Item	Checks
Verify power presence and characteristics	On both the frame Network Controller Card and the 9410DA, 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 Cable connection secureness and connecting points	Make certain all cable connections are fully secure (including coaxial cable attachment to cable ferrules on BNC connectors). Also, make certain all connecting points are as intended. Make certain the selected connecting points correlate to the intended card inputs and/or outputs. Cabling mistakes are especially easy to make when working with large I/O modules.
Card seating within slots	Make certain all cards are properly seated within its frame slot. (It is best to assure proper seating by ejecting the card and reseating it again.)
Check status indicators and displays	On both DashBoard™ and the 9410DA card edge indicators, red indications signify an error condition. If a status indicator signifies an error, proceed to the following tables in this section for further action.
Troubleshoot by substitution	All cards within the frame can be hot-swapped, replacing a suspect card or module with a known-good item.

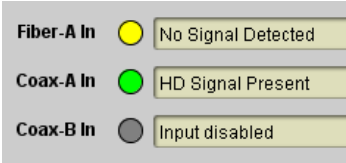
9410DA Processing Error Troubleshooting

Table 3-3 provides 9410DA processing troubleshooting information. If the 9410DA card exhibits any of the symptoms listed in Table 3-3, follow the troubleshooting instructions provided.

In the majority of cases, most errors are caused by simple errors where the 9410DA 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 9410DA card edge status indicators.
 - Where errors are displayed on both the 9410DA card and network remote controls, the respective indicators and displays are individually described in this section.

Table 3-3 Troubleshooting Processing Errors by Symptom

Symptom	Error/Condition	Corrective Action
DashBoard™ shows No Signal Detected message in 9410DA Status pane  - Card edge Input LED corresponding to input is not illuminated	No video input present or bad physical connection	- Make certain intended video source is connected to appropriate 9410DA card video input. Make certain BNC cable connections between frame Rear I/O Module for the card and signal source are OK. - On fiber connections to card rear module, make certain fiber cable is plugged into appropriate input port. - On fiber connections, after verifying cable connection(s), SFP tab showing no receive signal may indicate upstream bad connection or damaged cable. (See SFP Status Display (p. 3-9) for more information.)
Expected input on Coax-A I/O or Coax-B I/O is not present.	Port not set as input	On Routing tab, make certain Coax-A Direction and/or Coax-B Direction port direction setting matches desired direction.
Corrupted output over Coax-1-1/1-2 thru Coax-4-1/4-2 output(s)	Coax-A I/O or Coax-B I/O is set as an output while being used as a source for other outputs	If Coax-A and/or Coax-B direction is set as Output, port(s) set as output should not be used as input sources for other ports. This is an unsupported mode and may result in signal corruption on the crosspoint destination(s).

Troubleshooting Network/Remote Control Errors

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

In Case of Problems

Should any problem arise with this product that was not solved by the information in this section, please contact the Cobalt Digital Inc. Technical Support Department.

If required, a Return Material Authorization number (RMA) will be issued to you, as well as specific shipping instructions. If required, a temporary replacement item will be made available at a nominal charge. Any shipping costs incurred are the customer’s responsibility. All products shipped to you from Cobalt Digital Inc. will be shipped collect.

The Cobalt Digital Inc. Technical Support Department will continue to provide advice on any product manufactured by Cobalt Digital Inc., beyond the warranty period without charge, for the life of the product.

See Contact Cobalt Digital Inc. (p. 1-13) in Chapter 1, “Introduction“ for contact information.



Cobalt Digital Inc.

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