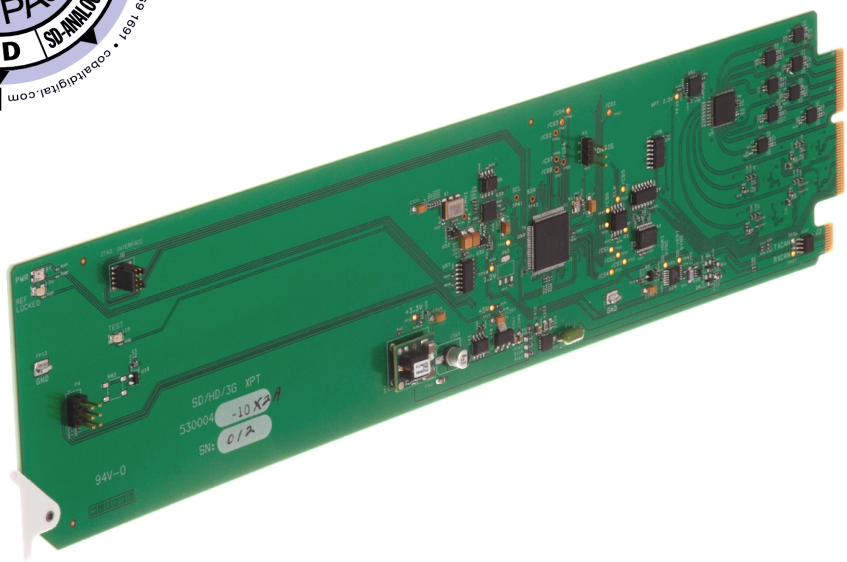
9284



3G/HD/SD-SDI 8x4
Video Routing Switch

Product Manual

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9284-OM (V1.3)

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Congratulations on choosing the Cobalt® 3G/HD/SD-SDI Video Routing Switch. The 9284 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 card, please contact us at the contact information on the front cover.

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Chapter 1

Introduction

Overview

This manual provides installation and operating instructions for the 9284 3G/HD/SD-SDI 8x4 Video Routing Switch card (also referred to herein as the 9284).

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 9284.
- **Chapter 2, "Installation and Setup"** – Provides instructions for installing the 9284 in a frame, and optionally installing 9284 Rear I/O Modules.
- **Chapter 3, "Operating Instructions"** – Provides overviews of operating controls and instructions for using the 9284.

This chapter contains the following information:

- **9284 Card Software Versions and this Manual (p. 1-2)**
- **Cobalt Reference Guides (p. 1-2)**
- **Manual Conventions (p. 1-3)**
- **Safety Summary (p. 1-4)**
- **9284 Functional Description (p. 1-5)**
- **Technical Specifications (p. 1-22)**
- **Warranty and Service Information (p. 1-25)**
- **Contact Cobalt Digital Inc. (p. 1-26)**

9284 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 9284 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:

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 **Support>Documents>Product Information and Manuals** link at 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 9284 itself. Examples are provided below.

- Connector and control names are shown like this: **IN 1**

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

- **9284** refers to the 3G/HD/SD-SDI 8x4 Video Routing Switch card.
- **Frame** refers to the 20-slot 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 9284 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.
	Electronic device or assembly is susceptible to damage from an ESD event. Handle only using appropriate ESD prevention practices. If ESD wrist strap is not available, handle card only by edges and avoid contact with any connectors or components.
	Symbol (WEEE 2002/96/EC) For product disposal, ensure the following: • 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 **If required, make certain Rear I/O Module(s) is installed before installing the 9284 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.**

9284 Functional Description

Figure 1-1 shows a functional block diagram of the 9284. The 9284 video routing switch accepts up to eight SDI inputs and routes these inputs to up to four SDI outputs using DashBoard™ network remote control. All inputs are equipped with cable equalizers (which can be enabled or disabled as desired). All outputs are equipped with reclocking, which can independently be set for auto reclock, format-specific reclock, or reclock turned off.
Source-to-destination routing is non-inverting, thereby allowing the card to pass DVB-ASI signals.

The card switches on the correct line in the vertical blanking interval if a color black reference is present at one of the two reference inputs on the rear of the frame. (The reference and video formats must have the same frame rate or have frame rates between the reference and video that have a ratio of either 1:2 or 2:1, i.e. 29.97 Hz frame rate reference with a video frame of 59.94 Hz.) The switch point defaults to the mid line (50%) point and can be adjusted for ±2 lines or 1%-99% of the line.

Setup of routing and invoke of switching can be performed using DashBoard™ remote control or via RS-232 commands from an external router via Command String Protocol (see Serial Control Interface (p. 1-8) for more information and command string definitions).

The 9284 provides the following inputs and outputs:

- **Inputs:**
  - **IN 1** thru **IN 8** – eight 3G/HD/SD-SDI BNC router source inputs
- **Outputs:**
  - **(9284 only) OUT 1** thru **OUT 4** – four 3G/HD/SD-SDI BNC router destination outputs

A reference control interface allows selection of one of two external reference signals **EXT REF 1, 2** from the frame-distributed reference bus. This interface additionally allows selection of the frame rate and video format to ensure that switching occurs during the proper point during the vertical blanking interval. The VBI line at which switching occurs is user selectable.

Note: The reference is used by the 9284 to indicate the VBI point at which to perform switching (VBI portion as indicated by the reference signal). As such, the SDI program material inputs are expected to be frame synchronized with the reference.

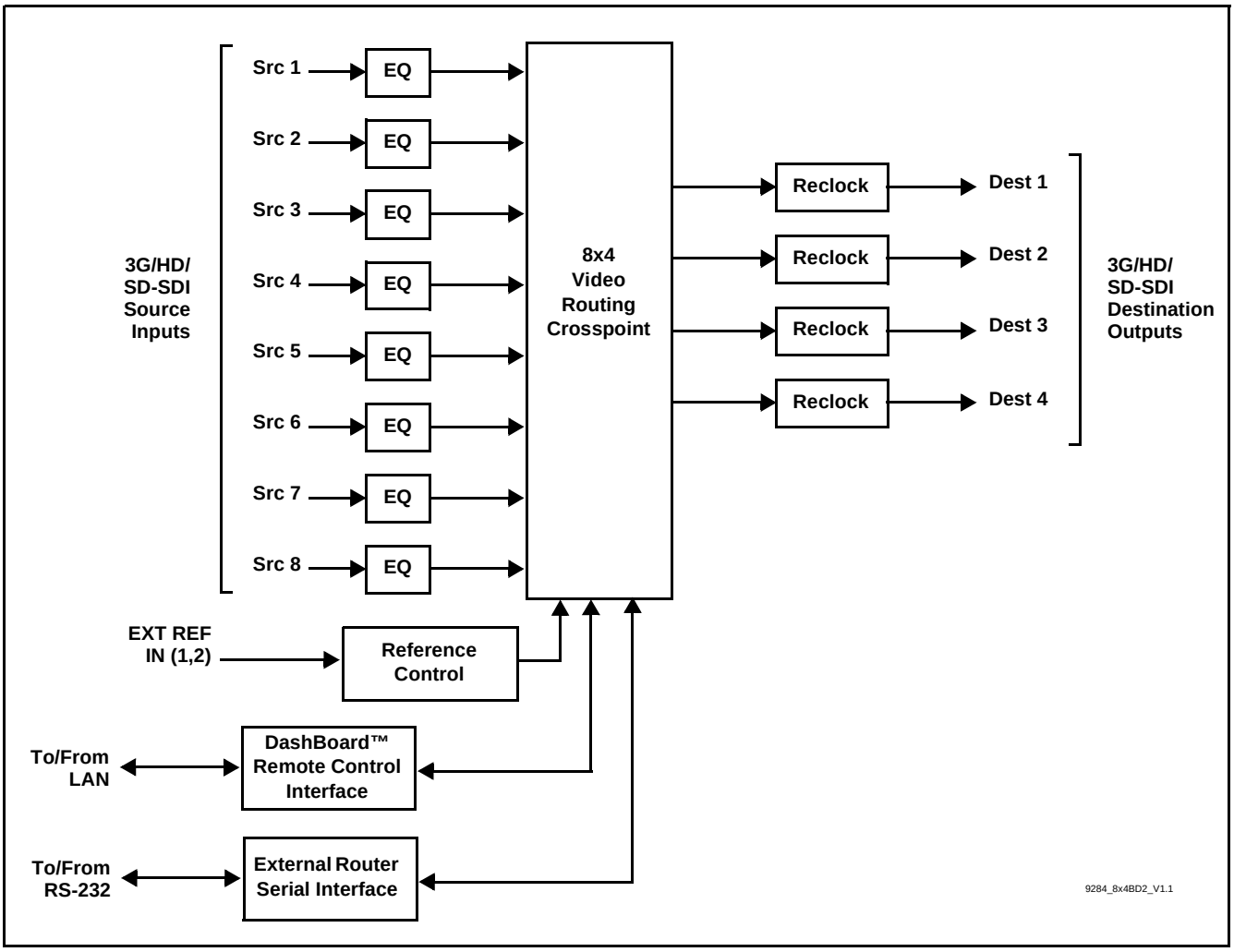

Figure 1-1 9284 Functional Block Diagram

DashBoard™ User Control Interface

Figure 1-2 shows the DashBoard™ user control interface for the 9284.

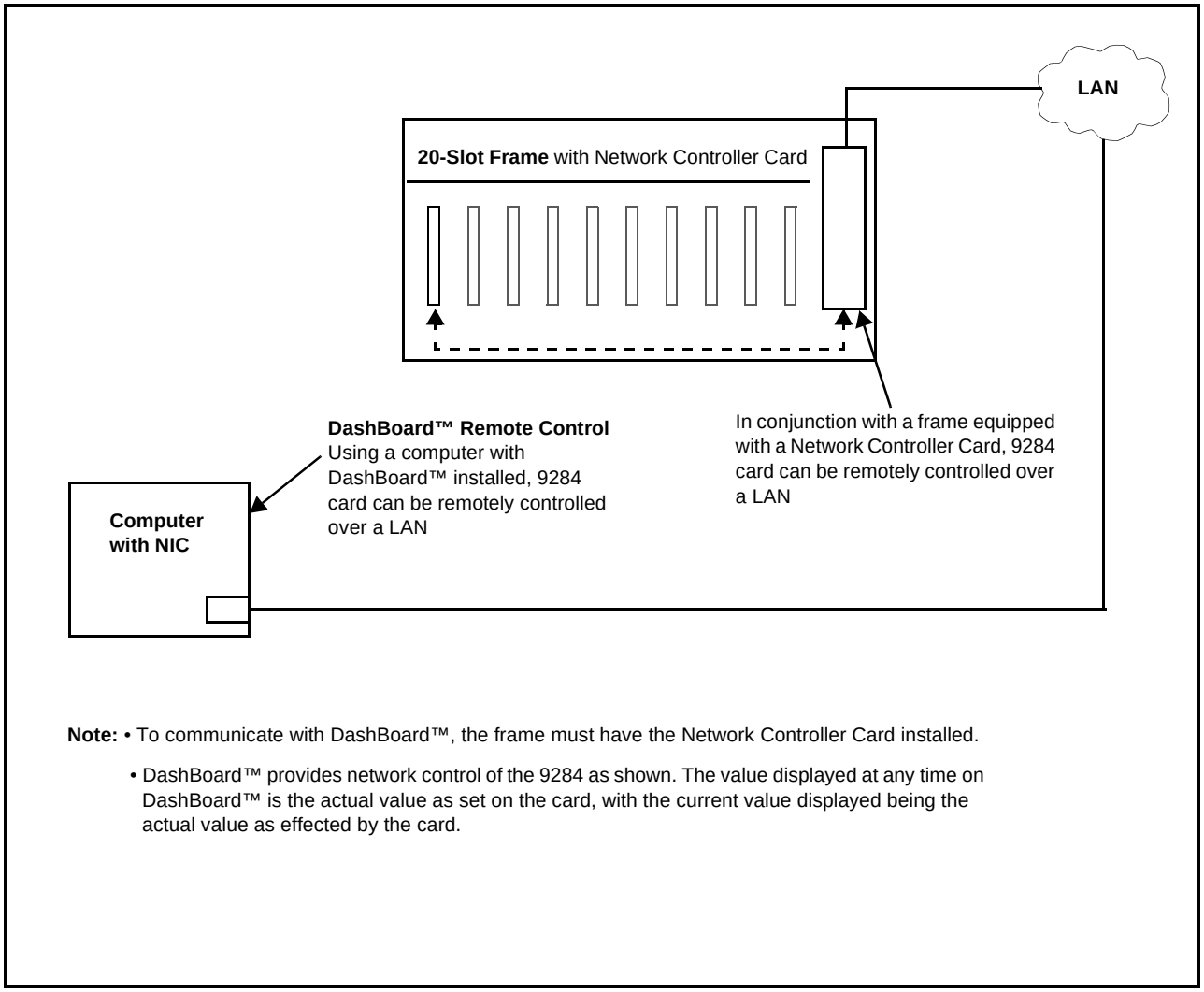

Figure 1-2 9284 User Control Interface

Using DashBoard™, the 9284 and other cards installed in openGear®[1] compatible 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.

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

The DashBoard™ software can be downloaded from the Cobalt Digital Inc. website: www.cobaltdigital.com (enter “DashBoard” in the search window). The DashBoard™ user interface is described in Chapter 3,“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 **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>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. 1-26).

Serial Control Interface

The 9284 rear module is equipped with an RS-232 serial control connector which provides a generic Command String Protocol interface between this card and external control systems. The RS-232 serial control port supports baud rates of 9600, 38400, and 115200.

RS-232 pinout is as follows:

- Pin 2…….TX
- Pin 3…….RX
- Pin 5…….GND

Generic Protocol

Commands are sent to a routing switcher in a group called a command string. A command string can contain zero or more commands, limited only by the size of the receive buffer of the router, whose size depends on the particular router model. A command string consists of a leader string of asterisk characters, zero or more commands, and a trailer string of exclamation marks. Larger Routing Switchers require two leader (******) and trailer (**!!**) characters, while small Routing Switchers require only one, in order to make the protocol compact for those Routing Switchers. The remainder of this document gives examples using doubled characters. Note that two leader/trailer characters may be sent to small Routing Switchers even when only one is required, and they will still work fine.

If a leader character (******) is encountered within a command string being processed by a router, the string up to that point is discarded and a new command string is expected. This ensures that a router will always act on a complete command string sent to it, even if the previous one was never completely received.

When a command string is received, it is not acted upon (but rather, is merely buffered up) until the final trailer character (**!**) character of the command string is received. At that time, the routing switcher begins to execute the commands within the string.

The protocol uses only 7-bit ASCII characters. The 8th bit of received characters is treated as if it is 0. Within the command string, certain ASCII characters may be present and are ignored: any ASCII character whose code is less than the SPACE character (includes all control characters and the SPACE character) and the DEL (ASCII 7F) character. Alphabetic characters within the command string may be in either upper-case or lower-case letters. The router always sends upper case characters, except for character strings such as input, output, and level names, which may have lower case characters in them.

When sending commands to the router, SPACE characters are optional, but if used may only appear before and after each individual command and **not** embedded within an individual command. Within command strings sent from the router, a single SPACE character appears before and after each individual command. SPACES may also appear in character strings.

After the command string has been executed, the routing switcher returns the string " **OK** " (with a single space character before and after the word "**OK**"), followed by a string of trailer characters (exclamation marks) and a CR (carriage return, ASCII 0D) character, to the host. This indicates that the command has executed successfully. If an error occurs within any command of a command string, the remainder of the command string is ignored and the router returns the string " **ERROR** ", followed by an optional descriptive string followed by a string of trailer characters and a CR character, to the host. An error can be caused by an unknown command name or bad arguments to a command.

The simplest possible command string would be:

****!!**

which consists of the leader and trailer characters but no commands between them. This command string would generate the response:

**** OK !!<CR>**

This can be useful for verifying that the serial link to the router is operational. In Routing Switchers requiring only one leader/trailer character, the simplest command string would be:

***!**

which would generate the response:
*** OK !<CR>**

(To determine whether a particular router uses one or two leader/trailer characters, send it "**!!**" and check the response to see which of the above two responses it is. It won't hurt to always use two even if only one is required.) The simplest error response is one with no optional descriptive string. For example, this command string:

**** XXX !!**

might generate this response from the router:

**** ERROR !!**

Beginning with version 5.01 of the Tahoe/Sierra/Yosemite router software, a descriptive text string was added following the word "ERROR", to help with diagnosing the error. For example, the above command string might generate this response from a router running this newer software:

**** ERROR Syntax:No Number:XX !!**

The descriptive string always ends with a colon and up to three characters from the command string that caused the error. Generally, the error can be assumed to have occurred just before these characters.

The following commands are supported:

Syntax	Example	Response Command	Function
I	**I!!	I	Command capabilities
Q	**Q!!	Q	Model name and version
L	**L!!	L	Matrix size and level names
S	**S!!	V, Y, or X commands	Matrix status
O out	**O3	V, Y, or X commands	Output status
N in	**N2!!	V, Y, or X commands	Input status
CLEAR	**CLEAR!!	V, Y, or X commands	Set all outputs to input 1
V out, in,in...	**V3,1,2,2!!	V, Y, or X commands	Connect specified inputs on each level
X out,in,lvl	**X12,9,2!!	V, Y, or X commands	Connect specified input to output on level
Y out,in	**Y1,7!!	V, Y, or X commands	Connect specified input to output on all levels
T reg	**TB!!	V, Y, or X commands	Trigger a salvo connect sequence

"I": Capabilities Inquiry

From	Syntax	Description
Host	I	Ask router to send a list of commands that are available
Router	![B][C][D][F][G][H][K][L][M][N][O][P][Q][R][S][T][U][V][W][X][W][Z]–	Available commands (contents in brackets is optional depending on router)

The command "**I**" requests that command capability information be returned to the host. The information is sent as a string of characters. The first characters are a space followed by "**I**", the next characters are the letters of the commands that are implemented and available in this router, and the last character is "**~**" (tilde). Do not count on the characters being in any specific order. Search all characters for a particular one.

All routing switchers implement the **I, L, S, Q,** and **X** commands.

For example, the command:

****I!!**

might return the following string:

**** ILSX~ OK !!<CR>**

indicating that the router supports the **I, L, S,** and **X** commands from the host.

"Q": Model Name and Software Version Inquiry

From	Syntax	Description
Host	Q	Ask router to send the model name string and software version number string.
Router	Qmodel~version~	Router Model name string and software version number string.

The command "**Q**" requests that the router model name and software version number string be returned to the host. The information is sent as a string of characters. The first characters are a space followed by "**Q**", the next characters are the router model name, terminated by a "**~**" (tilde).

Following this are the characters of the software version number string, again terminated by a "**~**" (tilde).

For example, the command:

****Q!!**

might return the following string:

**** QSmall~V2.1~ OK !!<CR>**

indicating that the router model name is “Small” and the software version number is “V2.1”.

“L”: Matrix Size and Level Names Inquiry

From	Syntax	Description
Host	L	Ask router to send router matrix size, level names, and level information.
Router	L[O[(#,#...)]][S[(#,#...)]][P[(#[=#][M][L],...)]]Nout,Nlvl,Nin,lvl1~lvl2~... lvlN~~	Matrix size, level names, and level information.

The command “**L**” requests that matrix size (Nout, Nlvl, Nin) and level name information (lvl1, lvl2, etc.) be returned to the host. The information is sent as a string of characters. The first characters are a space followed by “**L**”, some optional values described below, then the number of outputs (Nout), a comma, the number of levels (Nlvl), a comma, the number of inputs (Nin), a comma, and then the level names, each terminated by a “**~**” (tilde), and the last followed by two tildes.

Routers can provide names for inputs, outputs, and levels. The number of characters in a name can vary depending on the router model. The “**L**” command provides access only to level names, and furthermore, it truncates any level name that is longer than 6 characters to only 6 characters, in order to retain compatibility with older routers and controlling devices that limited level names OG-RTR 15 to 6 characters. Refer to the “**G**” command for accessing input and output names and full-length untruncated level names.

The number of level names in the “**L**” command will be the same as the number of levels that was given in the response (Nlvl). Valid characters for level names are any printable (i.e. non-control) ASCII character (including SPACE) except “*****” (asterisk), “**~**” (tilde), and “**!**” (exclamation mark). The number of characters reported by the “**L**” command in level names may be no more than 6 (longer names are truncated when reporting them with “**L**”). In systems that do not support naming of levels, the level names will be fixed number strings, e.g. “1”, “2”, etc.

For example, the command:

****L!!**

might return the following string:

**** L64,3,32,VIDEO~AudioL~AudioR~~ OK !!<CR>**

indicating that the router has 64 outputs, 3 levels, and 32 inputs, and the levels are named “VIDEO”, “AudioL”, and “AudioR”.

Some routers can have different sized matrices on each level. However, the "L" command always reports what is referred to as the "basic router size". This is the size of the largest levels in the router. For example, a 2-level router with level 1 being 16x32 and level 2 being 32x16 would report a basic router size of 32x32 in the "L" command. In these kinds of routers, it is not considered an error to send a crosspoint command that specifies an all-levels take using an input or output number that is beyond the range of some of the levels, as long those numbers lie within the basic router size. Levels which are smaller than the specified numbers will not be affected by such a take command. On the other hand, it is an error to send a crosspoint command that specifies a take on a specific level with an input or output number that is beyond the range of that level. To find out the actual physical size of each level, use the "G LEVEL_INFO" command.

Routers that do not support the "**G**" command or "**G LEVEL_INFO**" subcommand always have the same-size crosspoint matrix on each level. Some routers support virtual-to-physical mapping. These virtual-mapped routers use the same virtual matrix size for each level, and it will be that size that is reported in the "**L**" command for Nout and Nin. The physical crosspoint matrices can still be different sizes, and the "**G LEVEL_INFO**" command can be used to find out what these sizes are, but they are of less importance in a virtual-mapped router, because take commands are specified using virtual source and destination numbers rather than physical input and output numbers.

"S": Status Inquiry

From	Syntax	Description
Host	S	Ask router to send source status of all router outputs.
Router	Y out,in or V out,in,in... or X out,in,lvl	Status of all outputs connected on one or more levels to the specified input.

The command "S" requests that matrix status information be returned to the host. The status information is sent as a sequence of "Y" and/or "V" and/or "X" commands. The order of the commands is not significant, and different models of routers may send the status of their outputs 16 in different orders. Each command string contains the output number and either a level number or data for all levels, so the order in which the status data is sent is not really important.

For example, the SVS Tahoe Series routers first send one or more commands that give the status for all levels of output 1, then send commands giving status for all levels of output 2, etc. Other routers may send commands in a different order: first for all outputs of level 1, then for all outputs of level 2, etc.

The "**Y**", "**V**", and "**X**" commands are formatted exactly as with the "**O**" command.

Refer to the "O" command description for information about whether the router sends status using only "X" commands, or "Y", "V", and "X" commands.

A 2-level 16-output router could generate as many as 2 x 16 = 32 "X" commands of status output. For example, the command:

****S!!**

might have the following four "X" commands at the beginning of its Response:

**** X1,23,1 X1,3,2 X2,-,1 X2,0,2**

This indicates that output 1 is connected to input 23 on level 1, output 1 is connected to input 3 on level 2, output 2 is unconnected on level 1 (as indicated by the dash for the input number), and output 2 either does not exist or is not available on level 2 or its connection is unknown (as indicated by the zero input number). Or, the router might instead use the V command. For example:

**** V1,23,3 V2,-,0**

Indicating the same as the previous example.

If the router has only one level, or if all levels are connected the same, it might instead use the Y command. For example:

**** Y1,23 Y2,-**

This indicates that output 1 is connected to input 23 and output 2 is unconnected.

Routers that are unmapped port units will produce symmetrical status output, (i.e. if there is a Y01,23 command, there will also be a Y23,01 command).

"O": Output Status Inquiry

From	Syntax	Description
Host	O Out	Ask router to send source status for all levels of specified output.
Router	Y out,in or V out,in,in... or X out,in,lvl	Source status of the specified output.

The command "**O**" requests that matrix status information for a single output be returned to the host. The status information is sent as a "Y" command or a "V" command or as a sequence of L "X" commands, where L=number of levels. Whether a "Y", "V", or "X" command is sent depends on several factors:

• Very old routers only supported the “X” command.

• Routers with pre-version-10 software supported all three commands, “Y”, “V”, and “X”, but usually provided a DIP switch that could be set to force the router to only send “X” commands.

• Routers with version 10 or later software use the setting of the “U” command (described below) to determine whether to send only “X” commands, or “Y”, “V”, and “X” commands.

A 6-level router using only “X” commands could generate as many as 6 “X” commands of status output. The first command is for level 1, the next for level 2, etc. until the last level is reached. (However, each “X” command contains the level number, so the sequence in which the data is sent is not really important.)

When a router is able to send “Y”, “V”, and “X” commands, a “Y” command will typically be sent if the router has only one level, and may also be sent if the output has all of its levels connected the same, although this is not required and some routers may instead send a “V” command or a series of “X” commands in that situation. A “V” command will be sent when an output has different connections on different levels, which is a more compact representation of the status than a series of “X” commands.

The length of a “Y” or “V” or “X” command depends on the size of the particular router involved. Larger routers use longer numbers for inputs, outputs, and levels.

A space character precedes each “Y” or “V” or “X” command (spaces should be ignored by the command parser, however). Each command begins with the command letter, a Y or V or X, followed by the output number and a comma character. Following that, the “Y” command has the input number connected to the output, the “V” command has L input numbers separated by commas (**L**=number of levels) in order by level number, and the “X” command has the level number at which the input-output pair is connected.

The input number may be a dash ('-') if no connection exists (for routers that are capable of having their inputs disconnected). The input number may be 0 if the output doesn't exist at that level in the router (or isn't mapped to a physical output, in virtual-mapped routers), or if the connection is not known by the controller, as may be the case for some control panels immediately after they are powered up.

For example, the command:

****O5!!**

to a 3-level router might have the following three commands as its Response:

**** X65,23,1 X5,-,2 X5,0,3 !!**

Note the dash, indicating that on level 2, output 65 is not connected to an input. Also note the 0, indicating that the connection on level 3 is either unknown or that output 65 doesn't exist or isn't mapped on level 3.

Or, a 3-level router might have the following single command as its Response:

**** V65,23,-,0 !!**

which has the same information as the three X commands in the previous example.

If the router has only one level, or if all levels are connected the same, the router might instead use the Y command. For example:

**** Y65,23 !!**

The number of digits used for each number depends on the router. Newer routers use the minimum number of digits necessary, i.e. there are no unnecessary leading zeroes in a number. Older routers use the maximum number of digits ever required for an input or output number on that particular router (e.g. a router with between 10 and 99 inputs would use two digits for the input number).

"N": Input Status Inquiry

From	Syntax	Description
Host	N In	Ask router to send status of outputs connected on one or more levels to the specified input.
Router	Y out,in or X out,in,lvl	Status of all outputs connected on one or more levels to the specified input.

The command "**N**" requests that matrix status information for a single input be returned to the host. The status information is sent as one or more "Y" and/or "X" commands. This command works by identifying all outputs that connect to the specified input on any level, and then generating "Y" and "X" status commands to report the status of those outputs. The "Y" and "X" commands are formatted exactly as with the "O" command. For any given output connected to the input, a "Y" command is used if the output is connected to the input on all levels, else "X" commands are used on all levels on which the input is connected to that output.

Prior to version 10 software, this command was only useful on those router levels that allow an input to be connected to at most one output, and status commands were only sent for such levels. Beginning with version 10 software, a response is generated for all outputs connected to the specified input on any level, regardless of how many outputs that might be, and regardless of whether the level allows only one output connection or many output connections.

For example, the command:

****N4!!**

to a router might have the following commands as its Response:

**** X12,4,1 X12,4,2 X12,4,3 X13,4,4 Y23,4 !!**

showing that input 4 connects to outputs (12,12,12,13) on levels 1-4, and to output 23 on levels 1- 4.

Note that a “V” command is never used in the response, unlike an “O” request described above. This is because the “V” command specifies inputs connected to an output, not outputs connected to an input.

“CLEAR”: Clear Matrix

From	Syntax	Description
Host	CLEAR	Ask router to clear all router outputs.
Router	(None)	All outputs are unlocked, input secures are unsecured, and all outputs are either disconnected or connected to input 1.

The command “CLEAR” requests that the switch matrix be cleared so that all outputs are disconnected from inputs (in routers where this is possible) or else all outputs at all levels have input #1 as their source (when disconnecting is not possible). If output locks are supported, all output locks are removed by this command. If input security is supported, all input secures are removed by this command. This command can take several seconds to execute (depending on the size of the switch matrix), and therefore the OK response at the end of the command string could be quite late. In order to help ensure that this command isn't accidentally executed, it requires four additional characters following the “C” character, to spell out the word “CLEAR” in full.

For example, the command:

****CLEAR!!**

would clear the matrix, and when finished, the following response would be generated:

**** OK !!<CR>**

“V”: Connect Levels

From	Syntax	Description
Host	V out,in,in...	Make a connection to an output on each level.
Router	(None or V/Y/X command, depending on which “U” command argument is in effect, see “U” command description.)	Optional status response.

The command “V” is used to request that a connection be made. It must be followed by an output number, a comma, and a comma-separated list of input numbers, one for each level, up to the number of levels in the router. Fewer than the number of levels may be specified if desired, and the remaining levels will be left unchanged.

For example, the command:

****V12,7,8,9!!**

says that connections are to be made to output 12: from input 7 on level 1, input 8 on level 2, and input 9 on level 3.

An input number of 0 means the output connection is to be left unchanged.

An input number of '-' (dash) means the output is to be disconnected. If the router does not support disconnected outputs, the output connection will be left unchanged. Unless otherwise noted in the documentation for a specific switcher, it can be assumed that the switcher software guarantees to send all level changes associated with the “V” command's output to the crosspoint matrix within the SAME vertical interval.

If the requested connection has an output number that does not exist on one or more levels, those levels are simply not changed. It is an error to request connection of an input that doesn't exist on that level, even if the input does exist on some other level. If the requested connection has an output or input number that isn't mapped to a physical connector (on virtual-mapped routers) on one or more levels, those levels are simply not changed.

If “U2” is in effect (see “U” command), the response will include one or more V, Y, or X commands to report the new status of the output. The response will be the same as if an “O” command were issued for the output immediately following the “V” command. No response is generated if this command is being used to define a salvo.

“X”: Connect Crosspoint

From	Syntax	Description
Host	X out,in,lvl	Make a connection to an output on a level.
Router	(None or V/Y/X command, depending on which "U" command argument is in effect, see “U” command description.)	Optional status response.

The command “X” is used to request that a connection be made. It must be followed by an output number, a comma, an input number, a comma, and a level number.

For example, the command:

****X24,13,2!!**

says that a connection is to be made between output 24 and input 13 on level 2. If the level number is specified as “0”, this means that the connection is to be made on all levels (AFV).

For example, the command:

****X8,3,0!!**

says that a connection is to be made between output 8 and input 3 on all levels.

An input number of 0 means the output connection is to be left unchanged, not very useful in an “X” command.

An input number of '-' (dash) means the output is to be disconnected. If the router does not support disconnected outputs, the output connection will be left unchanged. When a level number of 0 is used with the “X” command, it can be assumed that the switcher software guarantees to send all level changes for the output to the crosspoint matrix within the **same** vertical interval, unless otherwise noted in the documentation for a specific switcher.

It is an error to request connection of an input or output that doesn't exist on the specified level, even if it does exist on some other level. However, if the level number is “0”, any input or output number may be specified as long as it exists on at least one level, and in that case no connection will be made on any level on which the input or output does not exist. If the requested connection has an output or input number that isn't mapped to a physical connector (on virtual-mapped routers) on one or more levels, those levels are simply not changed.

If “U2” is in effect (see “U” command), the response will include one or more V, Y, or X commands to report the new status of the output. The response will be the same as if an “O” command were issued for the output immediately following the “X” command. No response is generated if this command is being used to define a salvo.

“Y”: Connect AFV

From	Syntax	Description
Host	Y out,in	Make a connection to an output on all levels.
Router	(None or V/Y/X command, depending on which “U” command argument is in effect, see “U” command description.)	Optional status response.

The command “Y” is used to request that a connection be made. It must be followed by an output number, a comma, and an input number. The connection is made on all levels (AFV).

For example, the command:

****Y2,29!!**

says that input 29 is to be connected to output 2 on all levels.

An input number of 0 means the output connection is to be left unchanged, not very useful in a “Y” command.

An input number of '-' (dash) means the output is to be disconnected. If the router does not support disconnected outputs, the output connection will be left unchanged.

Unless otherwise noted in the documentation for a specific switcher, it can be assumed that the switcher software guarantees to send all level changes for the “Y” command's output to the crosspoint matrix within the SAME vertical interval.

Any input or output number may be specified as long as it exists on at least one level. No connection will be made on any level on which the input or output does not exist. If the requested connection has an output or input number that isn't mapped to a physical connector (on virtual mapped routers) on one or more levels, those levels are simply not changed.

If “U2” is in effect (see “U” command), the response will include one or more V, Y, or X commands to report the new status of the output. The response will be the same as if an “O” command were issued for the output immediately following the “Y” command. No response is generated if this command is being used to define a salvo.

"T": Trigger a Salvo Connect Sequence

From	Syntax	Description
Host	T reg	Trigger a list of connect commands stored in a salvo register.
Router	(None)	

The command "T" is used to trigger a previously set up salvo (set using the "P" command above). It must be followed by a register letter from A to Z or a register number from 1 to 256 giving the register to be triggered.

For example, the command:

**** TB D180 TC !!**

says to trigger salvo register B (same as 2), delay 180 sync intervals, then trigger salvo register C (same as 3). When the register is triggered, this means that the connect commands stored in it take effect.

If a salvo is triggered and it attempts to connect a locked output or port, or a disallowed input/output pair, or a port to itself, the salvo trigger operation is aborted, no crosspoint changes are performed, and an error is reported: "ERROR Salvo Has Locked Xpts".

9284 Rear I/O Modules

The 9284 physically interfaces to system video connections at the rear of its frame using a Rear I/O Module.

All signal inputs and outputs shown in the 9284 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 card edge connections to BNC connectors that interface with other components and systems in the signal chain.

Video Formats Supported by the 9284

The 9284 supports all current SMPTE 292M, 259, and 424 standard SD and HD video formats. Table 1-1 lists and provides details regarding the video formats supported by the card.

Table 1-1 Supported Video Formats

Item	Description/Specification	
Input / Output Video	Raster Structure:	Frame Rate:
	1080PsF	23.98; 24
	1080p	23.98; 24; 50; 59.94
	1080i (1)	25; 29.97; 30
	720p	23.98 (2); 24 (2); 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 1-2 lists the technical specifications for the 9284 3G/HD/SD-SDI 8x4 Video Routing Switch card.

Table 1-2 Technical Specifications

Item	Characteristic
Part number, nomenclature	9284 3G/HD/SD-SDI 8x4 Video Routing Switch
Installation/usage environment	Intended for installation and usage in frame meeting openGear modular system definition.
Power consumption	< 10 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.
Switch Panel communication	Serial; RS-232 and/or RS-485 (reserved)
Indicators	Card edge indicators as follows: • Power indicator • Ref lock indicator
Serial Digital Video Input	Number of Inputs: Eight 3G/HD/SD-SDI BNC Source Inputs Data Rates Supported: SMPTE 424 HD-SDI: 2.97 Gbps 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 (3G, HD): 328 ft (100 m) Belden 1694A for SMPTE 292-2008, 424M-2006 Equalization (SD): 1000 ft (305 m) Belden 1694A for SMPTE 259M-2008 Return Loss: > 15 dB at 5 MHz – 1.485 GHz > 10 dB at 1.5 GHz – 3.0 GHz

Table 1-2 Technical Specifications — continued

Item	Characteristic
Serial Digital Video Outputs	Number of Outputs: Four 3G/HD/SD-SDI BNC Destination Outputs Impedance: 75 Ω
Serial Digital Video Outputs (cont.)	Level: 800 mVp-p ±10% Return Loss: > 15 dB at 5 MHz – 1.5 GHz > 10 dB at 1.5 GHz – 3.0 GHz Alignment Jitter: < 0.2 UI (max; coupled through 100 kHz high-pass filter)
Reference Video Input	Number of Inputs: Two non-terminating (looping) Frame Reference inputs Standards Supported (HD): 720p 24; 25; 29.97; 30; 50; 59.94 1080i 25; 29.97 1080p 23.98; 24; 25; 29.97; 30; 50; 59.94 1080p/sF 23.98; 24 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

Warranty and Service Information

Cobalt Digital Inc. Limited Warranty

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

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

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

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

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Chapter 2

Installation and Setup

Overview

This chapter contains the following information:

- Installing the 9284 Into a Frame Slot (p. 2-1)
- Installing a Rear I/O Module (p. 2-3)
- Setting Up 9284 Network Remote Control (p. 2-4)

Installing the 9284 Into a Frame Slot

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.**

CAUTION

If required, make certain Rear I/O Module(s) is installed before installing the 9284 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 9284 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 9284 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 Figure 2-1.
9. Repeat steps 1 through 8 for other 9284 cards.

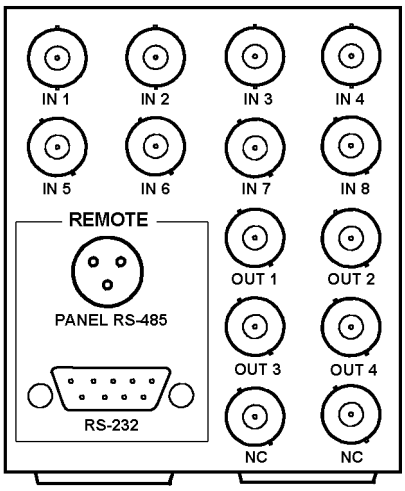
Note: External frame sync reference signals are received by the card over a reference bus on the card frame, and not on any card rear I/O module connectors. The frame has BNC connectors labeled **REF 1** and **REF 2** which receive the reference signal from an external source such as a house distribution.

Note: The 9284 BNC inputs are internally 75-ohm terminated. It is not necessary to terminate unused BNC inputs or outputs.

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 9284 Network Remote Control (p. 2-4).

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.



Connect cabling as shown. Unused connectors do not require external termination.

Serial **RS-232** control port pinout is as follows:
Pin 2 TX
Pin 3 RX
Pin 5 GND

PANEL RS-485 port is reserved.

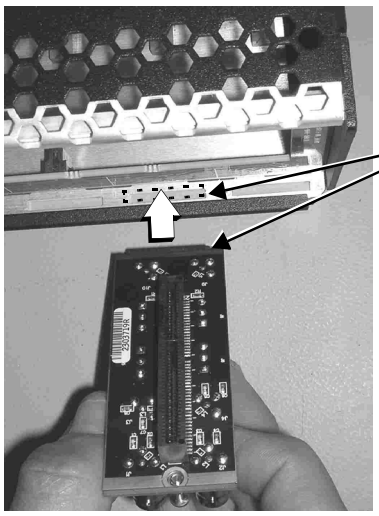
Figure 2-1 9284 Rear I/O Module Connections

Installing a Rear I/O Module

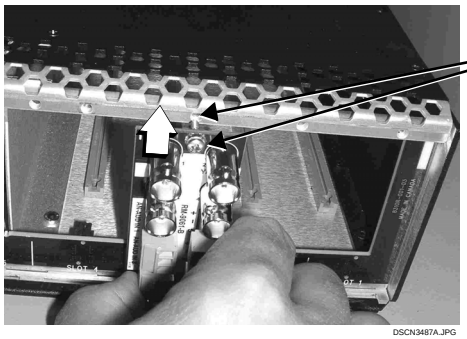
Note: This procedure is applicable **only if a Rear I/O Module is not currently installed** in the slot where the 9284 is to be installed.

Install a Rear I/O Module as follows:

1. On the frame, determine the slot in which the 9284 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.



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 2-2 Rear I/O Module Installation

Setting Up 9284 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 COMPASS™ cards using DashBoard™.

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. 1-26).

• 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.

Chapter 3

Operating Instructions

Overview

If you are already familiar with using DashBoard or a Cobalt Remote Control Panel to control Cobalt cards, please skip to 9284 Function Submenu List and Descriptions (p. 3-9).

This chapter contains the following information:

- Control and Display Descriptions (p. 3-1)
- Accessing the 9284 Card via DashBoard™ (p. 3-5)
- Checking 9284 Card Information (p. 3-7)
- Operating Controls Overview (p. 3-8)
- 9284 Function Submenu List and Descriptions (p. 3-9)
- Troubleshooting (p. 3-17)

Control and Display Descriptions

This section describes the user interface controls and indicators, and displays (both on-card and remote controls) for using the 9284 card.

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

Function Submenu/Parameter Submenu Overview

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

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

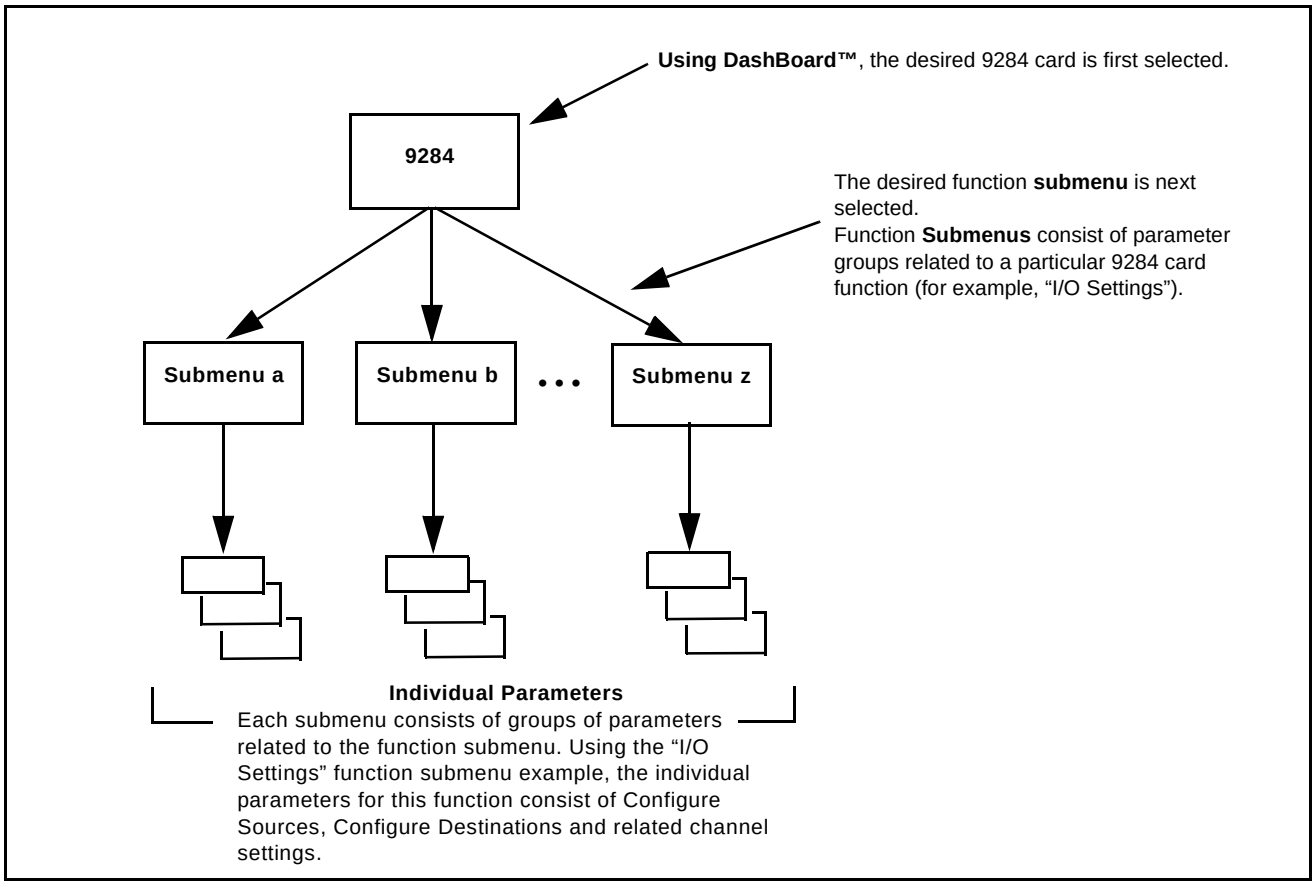
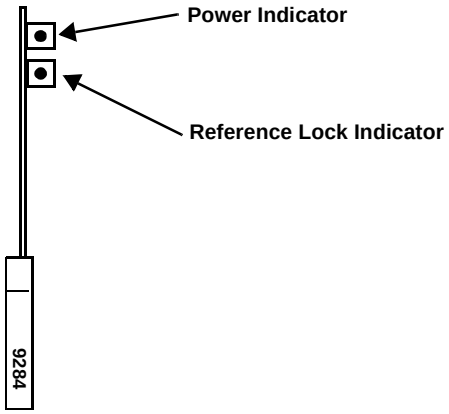


Figure 3-1 Function Submenu/Parameter Submenu Overview

9284 Card Edge Indicators

Figure 3-2 shows and describes the 9284 indicators.



Item	Function
Power Indicator	Illuminates when card is properly powered up and inserted into frame slot
Reference Lock Indicator	Illuminates when card is receiving valid reference signal on selected reference source (**EXT REF 1** or **EXT REF 2**)

Figure 3-2 9284 Card Edge Indicators

DashBoard™ User Interface

(See Figure 3-3.) The card function submenus are organized in DashBoard™ using tabs (for example, “I/O Settings” in Figure 3-3). When a tab is selected, each item associated with the function is displayed. Items can then be configured or selected using GUI drop-down lists, checkboxes/buttons, or text entry fields as appropriate.

In this example, card destination outputs **Dest 1** thru **Dest 4** are named to suit the intended uses (in this example, “Playout A” thru “Playout C” and “Monitor”), with all outputs set to be auto reclocking. Card source inputs **Src 1** thru **Src 5** are named to identify plant IRD sources and videodecks (**Src 6** thru **Src 8** are not used in this example).

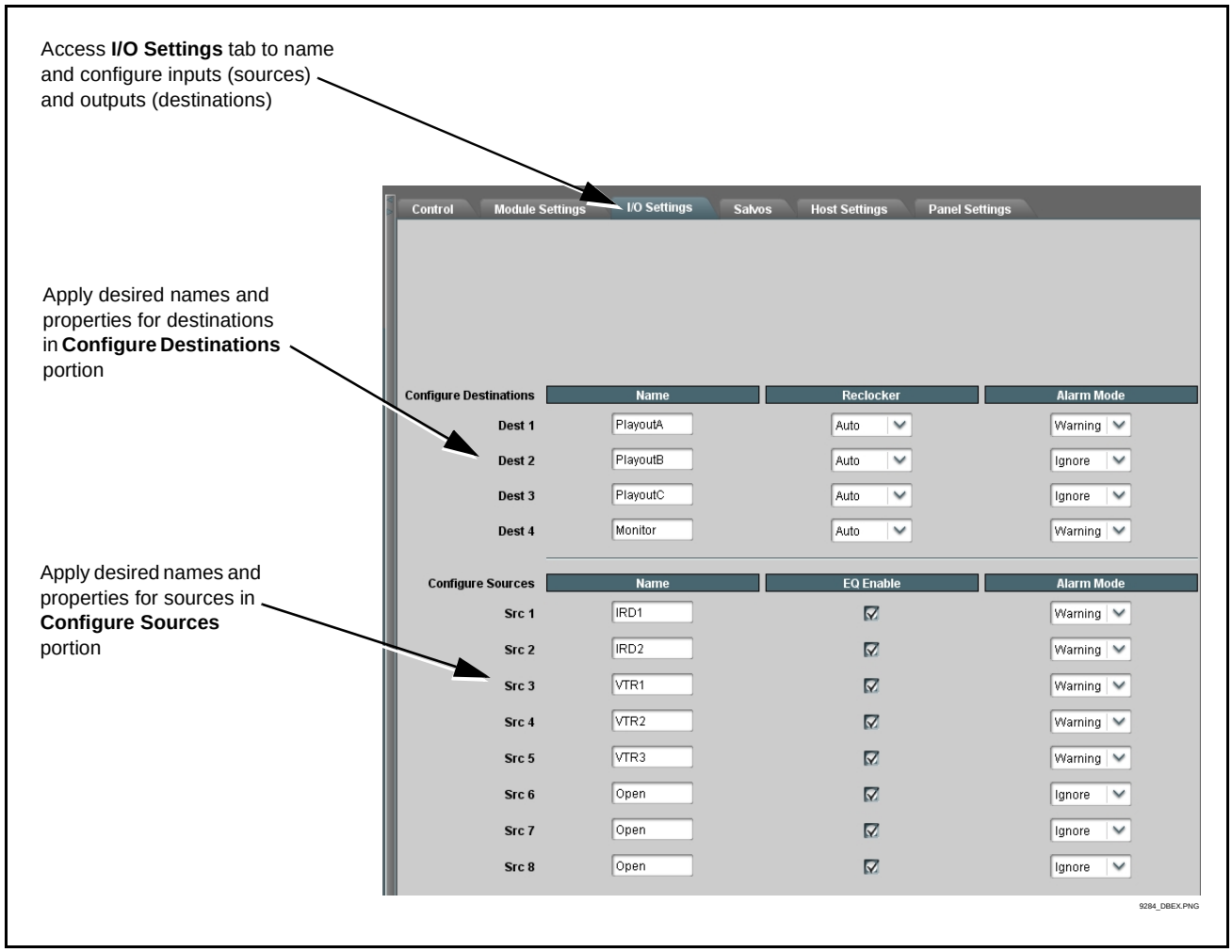
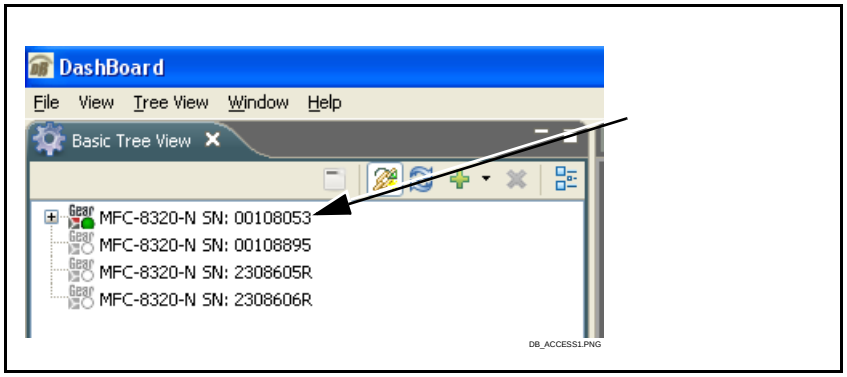


Figure 3-3 DashBoard™ Setup of Example I/O Sources and Destinations

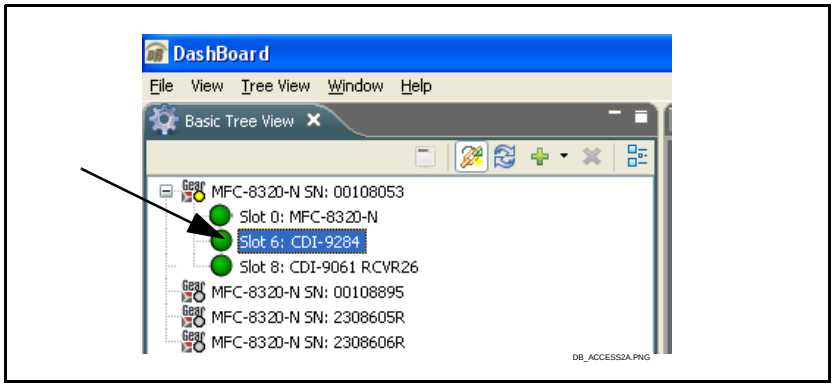
Accessing the 9284 Card via DashBoard™

Access the card using DashBoard™ as described below.

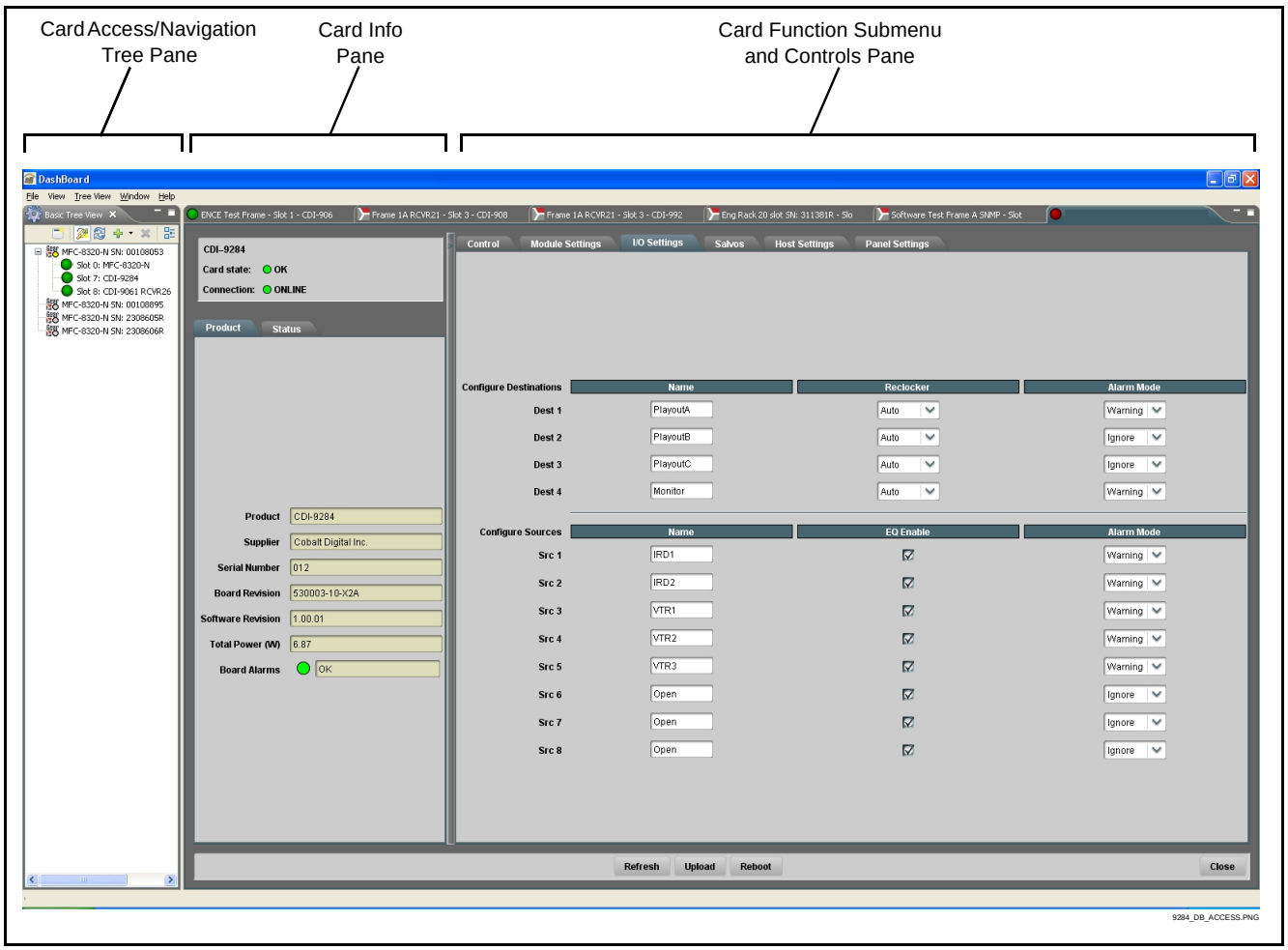
1. On the computer connected to the frame LAN, open DashBoard™.
2. As shown below (in the left side Basic View Tree) locate the Network Controller Card associated with the frame containing the 9284 card to be accessed (in this example, “MFC-8320-N SN: 00108053”).



3. As shown below, expand the tree to access the cards within the frame. Click on the card to be accessed (in this example, “Slot 6: CDI-9284”).



As shown on the next page, when the card is accessed in 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™).


Card Access/Navigation Tree Pane
Card Info Pane
Card Function Submenu and Controls Pane
DashBoard
File View Tree View Window Help
Basic Tree View
MFC-8320-N SN: 00108053
Slot 0: MFC-8320-N
Slot 7: CDI-9284
Slot 8: CDI-9061 RCVR26
MFC-8320-N SN: 00108895
MFC-8320-N SN: 2308605R
MFC-8320-N SN: 2308606R
ENCE Test Frame - Slot 1 - CDI-906
Frame 1A RCVR21 - Slot 3 - CDI-908
Frame 1A RCVR21 - Slot 3 - CDI-992
Eng Rack 20 slot SN: 311381R - Slo
Software Test Frame A SNMP - Slot
CDI-9284
Card state: OK
Connection: ONLINE
Product
Status
Product CDI-9284
Supplier Cobalt Digital Inc.
Serial Number 012
Board Revision 530003-10-X2A
Software Revision 1.00.01
Total Power (W) 6.87
Board Alarms OK
Control
Module Settings
I/O Settings
Salvos
Host Settings
Panel Settings
Configure Destinations
Name
Reclocker
Alarm Mode
Dest 1 PlayoutA Auto Warning
Dest 2 PlayoutB Auto Ignore
Dest 3 PlayoutC Auto Ignore
Dest 4 Monitor Auto Warning
Configure Sources
Name
EQ Enable
Alarm Mode
Src 1 IRD1 Warning
Src 2 IRD2 Warning
Src 3 VTR1 Warning
Src 4 VTR2 Warning
Src 5 VTR3 Warning
Src 6 Open Ignore
Src 7 Open Ignore
Src 8 Open Ignore
Refresh
Upload
Reboot
Close
9284_DB_ACCESS.PNG

Checking 9284 Card Information

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

Note: Proper operating status in DashBoard™ is denoted by green icons for the status indicators shown in Figure 3-4. Yellow or red icons respectively indicate an alert or failure condition. Refer to Troubleshooting (p. 3-17) for corrective action.

The **Tree View** shows the cards seen by DashBoard™. In this example, Network Controller Card MFC-8320-N (serial number ...8053) is hosting a 9284 card in slot 6.

Card State Product/Status Display
Product and Status tabs in Card Info pane show Product Info (shown in example here) or detailed card status when Status tab is selected (this tab is shown in detail later in this chapter).

Software Version Number
Refer to these numbers to check that documentation (such as this manual) matches the card's Software Release Number and Software Build Number. Use these numbers also when communicating to Cobalt® regarding this card.

Power Consumption Display
This display shows the total power consumed by the card for both the +12V and -7.5V rails.

Board Status Display
Show the status of all card internal monitoring alarms.

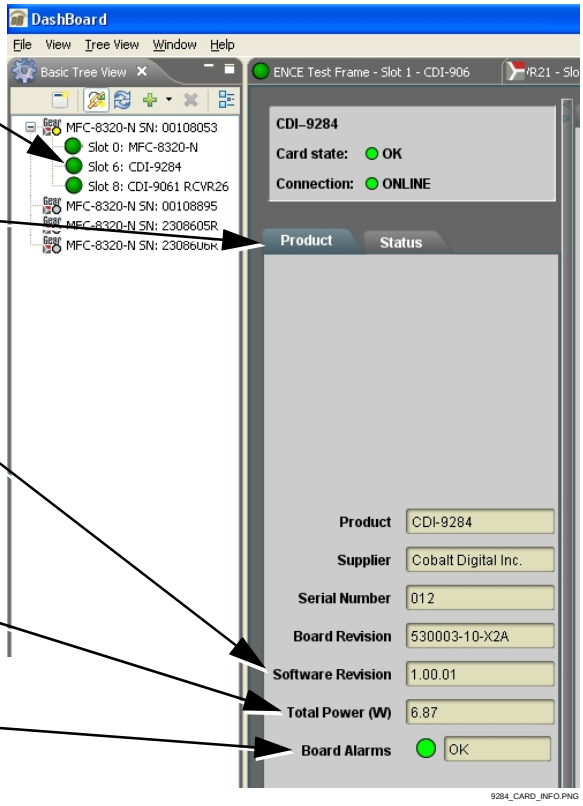


Figure 3-4 9284 Card Info Utility

Operating Controls Overview

The card has several function submenus (“tabs”) which are used as follows, and typically in the order listed here for initial setup.

- **Module Settings** tab – Items in this tab set global parameters for the card, such as the frame reference source to be used, video format and frame rate, and the VBI line where switching is to be performed. **Items in this tab should be set first** before proceeding to other tabs or attempting to use the card for switching.
- **I/O Settings** tab – Items in this tab allow custom names to be applied to the card source inputs and destination outputs. Also provided are channel properties controls that enable or disable input EQ, output reclocking, and alarm enable/severity level for each input and output channel.
- **Salvos** tab – Items in this tab allow configuring the source-to-destination routing for up to 10 user-defined salvos using a source-to-destination selection matrix. Also provided are fields in which each salvo can be given a custom name if desired.
- **Control** tab – This is the tab from which a salvo is launched. When inputs/outputs and salvo routing are defined (as described for the above tabs), the salvos will be identified by the names you have entered, as well as the routing defined for each salvo.
- **Host Settings** tab – These controls are reserved.
- **Panel Settings** tab – These controls are reserved.

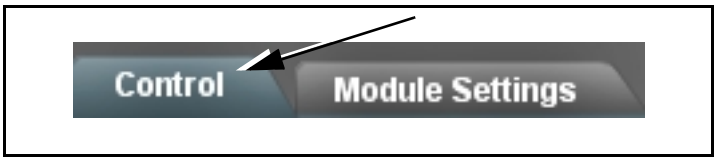
9284 Function Submenu List and Descriptions

Table 3-1 individually lists and describes each card function submenu ("tab") and its related list selections, controls, and parameters. Where helpful, examples showing usage of a function are also provided.

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.)

Note: For any text entries made using the card GUI (unless accompanied by a **Save** button), commit the changes using the card **Refresh** button.

On DashBoard™ itself and in Table 3-1, 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
Module Settings	3-10
I/O Settings	3-12
Salvos	3-14
Control	3-15

Note: **Host Settings** and **Panel Settings** tabs are for dedicated serial communication control and are reserved for this product's release.

Table 3-1 9284 Function Submenu List

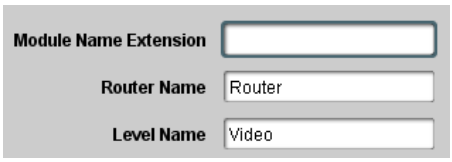
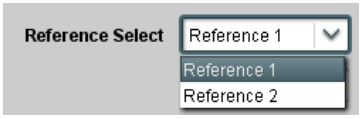
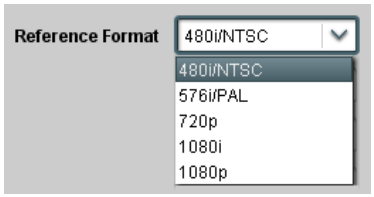
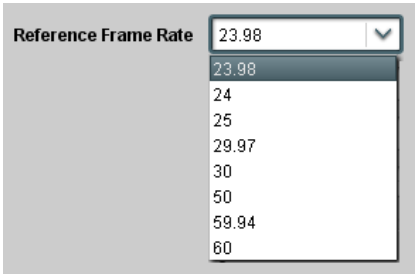
Module Settings	Provides controls for setting global card parameters, such as frame reference source, video format and frame rate, and VBI switching line control.
• **Card Naming Entry** 	Allows custom names to be applied to the card (which are then visible in DashBoard™). **Note: Module Name Extension** field allows a maximum of 33 characters. **Router Name** field allows a maximum of 21 characters. **Level Name** field allows a maximum of 9 characters.
• **Take Button Enable** 	When checked, inserts a Take button on the Control screen which allows settings to be entered and then only applied when finished by clicking the **Action** > **Take** button. If Take Button Enable is not checked, the card will "take" each time a source is selected. **Note:** Refer to **Control** tab for more information related to the Take function.
• **Reference Select** 	Selects the frame distributed reference source to be used by the card. **Note:** If Reference 1 or Reference 2 is selected and an appropriate external reference is not received, improper switching may occur, with switching possibly occurring in active video. External reference signals Reference 1 and Reference 2 are distributed to the card and other cards via a frame bus.
• **Reference Format** 	Configures the card to operate with the received reference format from the choices shown to the left. **Note:** Reference Format selected should match that of the external reference. If improperly set, switching may occur during active video.
• **Reference Frame Rate** 	Configures the card to operate with the received reference frame rate from the choices shown to the left. **Note:** Reference Frame Rate selected should match that of the external reference. If improperly set, switching may occur during active video.

Table 3-1 9284 Function Submenu List — continued

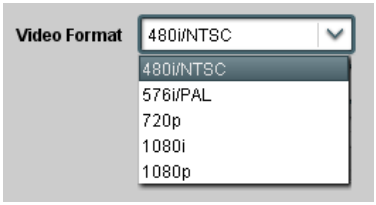
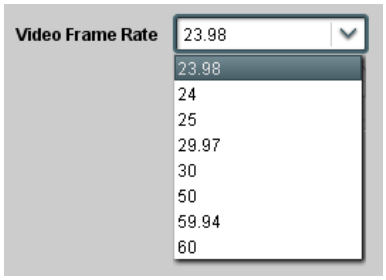
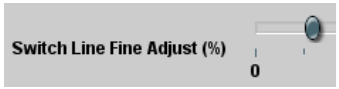
Module Settings (continued)	
• **Video Format** 	Configures the card to operate with the video format of the input sources received from the choices shown to the left. **Note:** Video Format selected should match that of the input sources. If improperly set, switching may occur during active video.
• **Video Frame Rate** 	Configures the card to operate with the video frame rate of the input sources received from the choices shown to the left. **Note:** Video Frame Rate selected should match that of the input sources. If improperly set, switching may occur during active video.
• **Switch Line / Switch Line Fine Adjust** 	**Switch Line** sets VBI line where switching will occur (default is line 12 for all format selections). **Switch Line Fine Adjust** sets the horizontal point within the line where switching will occur (0% to 100% range in 1% steps; default = 50% (mid-line)) Recommended typical switching lines are as follows: **Format** / **Switching Line**: NTSC 10; PAL 6; 3G/HD 7 **Note:** Make certain selected switching line is not being used to carry active VANC data or packets.

Table 3-1 9284 Function Submenu List — continued

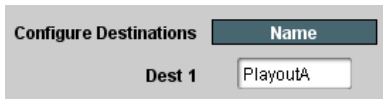
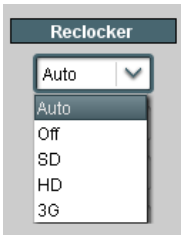
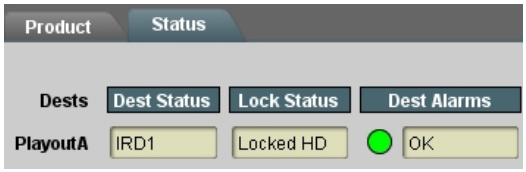
I/O Settings	Allows custom names to be applied to card source inputs and destination outputs. Also provides channel properties controls and alarm enable/severity level for each input and output channel.
• **Configure Source Setup** 	Individual source name and setup controls for each of the card source input channels (**Src 1** thru **Src 8**). • **Name:** Allows custom name to be applied to input (in this example, "IRD1"). The custom name then appears elsewhere on all card controls. **Note:** Name field allows a maximum of 8 characters. • **EQ Enable:** When checked, provides input EQ correction to accommodate long cable lengths (default setting is Enabled) • **Alarm Mode:** Allows signal absence alarm enable/severity reporting for each input channel. Choices provided are: • **Ignore:** Missing input status for input channel is ignored, no alarms shown for channel regardless of signal status. • **Warning:** Missing input status for input channel triggers **yellow** alarm icon for input channel. • **Alarm:** Missing input status for input channel triggers **red** alarm icon for input channel. **Note:** If a source is not intended to be used, make certain its **Alarm Mode** is set to **Ignore**. If this is not done, the card will display nuisance alarms for unused channels.
• **Configure Destination Setup**   	Individual destination name and setup controls for each of the card destination output channels (**Dest 1** thru **Dest 4**). • **Name:** Allows custom name to be applied to output (in this example, "PlayoutA"). The custom name then appears elsewhere on all card controls. **Note:** Name field allows a maximum of 8 characters. • **Reclocker:** Provides reclocking from the choices shown to the left. • **Auto:** When Auto is selected, clocking is automatically detected from the routed source signal with output locking to the SMPTE format of the incoming input signal. If a non-SMPTE data rate is detected, reclocking automatically enters a bypass mode, passing the signal without reclocking. • **SD, HD, 3G:** Provides forced reclock modes correlating to the selection. **Note:** Default setting of Auto is recommended in most cases. • **Alarm Mode:** Allows signal absence alarm enable/severity reporting for each output channel. Choices provided are: • **Ignore:** Missing output status for output channel is ignored, no alarms shown for channel regardless of signal status. • **Warning:** Missing output status for output channel triggers **yellow** alarm icon for output channel. • **Alarm:** Missing output status for output channel triggers **red** alarm icon for output channel. **Note:** If a destination is not intended to be used, make certain its **Alarm Mode** is set to **Ignore**. If this is not done, the card will display nuisance alarms for unused destinations.

Table 3-1 9284 Function Submenu List — continued

I/O Settings	**(continued)**

Source and Destination Channel Status Displays

Source and destination channel status (such as signal presence) can be observed by selecting the **Status** tab within the Card Info pane. Note that Warning (yellow) and Alarm (red) status indications are only displayed when the channel is set to display these alarms (as described on the previous page). Shown below are example status displays.



Example Destination channel display showing locked HD signal and green (OK) status

Example Destination channel display showing unlocked signal and red (Alarm) status

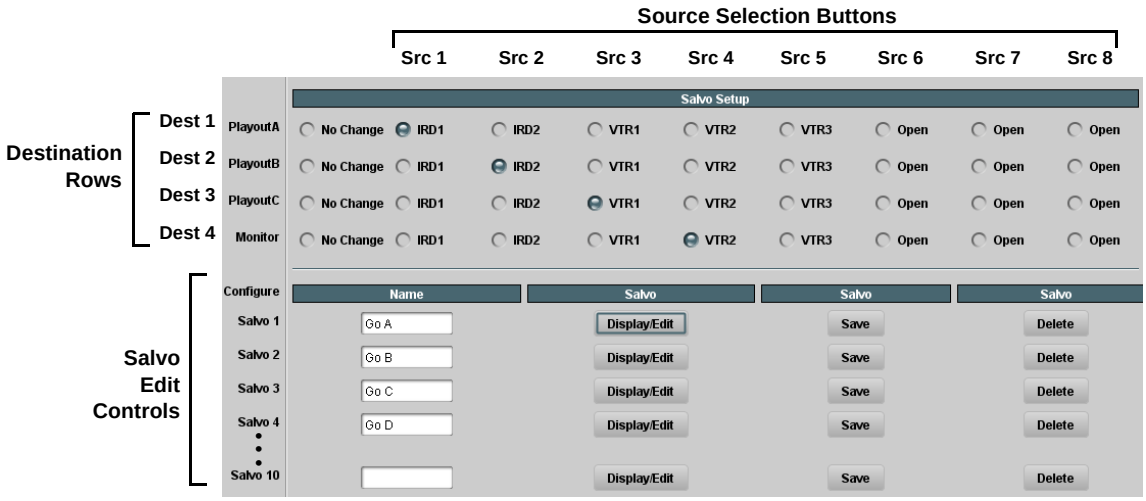
In this example, destination channel Alarm Mode is set to Ignore. Even though the channel shows unlocked, a alarm is not produced. This setting is useful for channels which are not to be used.

Example Source channel display showing no signal and yellow (Warning) status

In this example, source channel Alarm Mode is set to Ignore. Even though the channel shows no signal, a alarm is not produced. This setting is useful for channels which are not to be used.

Table 3-1 9284 Function Submenu List — continued

Salvos	Defines the source-to-destination routing for up to 10 user-defined salvos. Also provides fields for custom naming each salvo.



Defining Salvos

1. In the **Name** field for the salvo, enter a custom name if desired (“Go A” thru “Go D” for salvos 1 thru 4 in this example).

   Note: Click **Refresh** to commit name changes when done.

2. For the salvo to be defined (**Salvo 1** thru **Salvo 10**), click its **Display/Edit** button. The salvo is now ready for editing, with each salvo independently allowing setup for all four destinations.

3. For each destination row **Dest 1** thru **Dest 4** (“PlayoutA” thru “PlayoutD” in this example), set up source routing by selecting the button within the row corresponding to the desired source.

4. For the salvo just defined, click **Save**. A **Confirm?** pop-up appears, requesting save confirmation.

5. Repeat these steps for each salvo to be defined.

6. To check the settings of a salvo, click **Display/Edit**. The settings for the salvo are now displayed and can be re-edited and re-saved as described above.

   Note: When defining a salvo, setting the **No Change** button retains settings for the corresponding destination while allowing other destination settings (rows) to be changed.

7. To delete a salvo, click **Delete**. A **Confirm?** pop-up appears, requesting delete confirmation.

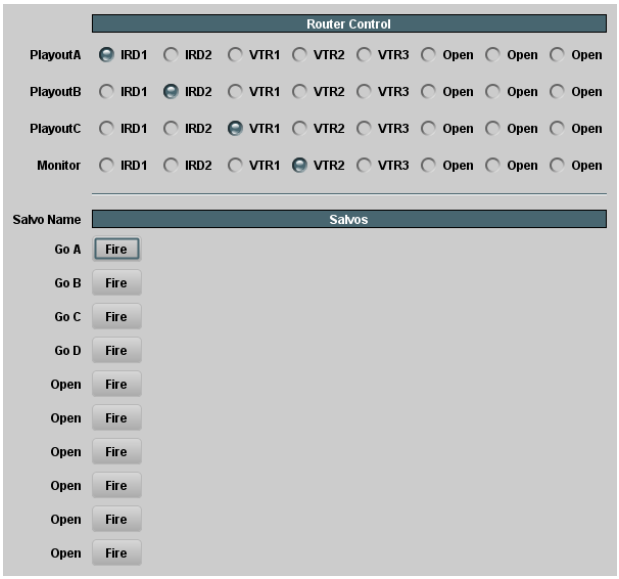
In the example shown above for Salvo 1 (“Go A”), when this salvo is launched it results in the following routing:

Destination	Source
Dest 1 (“PlayoutA”)	Src 1 (“IRD1”)
Dest 2 (“PlayoutB”)	Src 2 (“IRD2”)
Dest 3 (“PlayoutC”)	Src 3 (“VTR1”)
Dest 4 (“Monitor”)	Src 4 (“VTR2”)

Table 3-1 9284 Function Submenu List — continued

Control	Provides single-button launch control using salvos, or by individually routing a source using Router Control matrix.

Salvo Settings View



Salvo Launch Buttons

Note: The Source/Destination matrix on this tab can be used to change routing on the fly (see **Routing Control Using Router Control Matrix** on next page). However, changes made here cannot be saved.

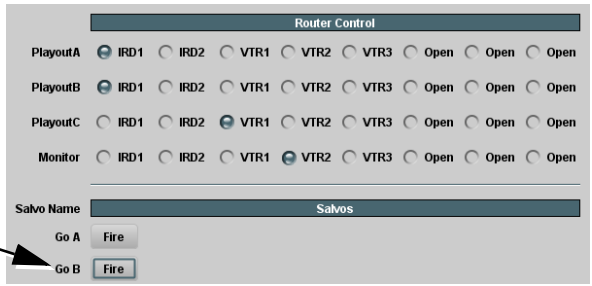
Edit controlled salvo routing using the **Salvos** tab (see pg. 3-14).

Routing Control By Launching a Salvo

To launch a salvo, simply click the **Fire** button for the desired salvo. The salvo launches at the next instance of the selected switching line (as selected during Module Setting setup). Launch another salvo by simply clicking its **Fire** button.

Shown to the right are example salvos “Go B” and “Go C”, and the resulting routing.

Destination	Source
Dest 1 (“PlayoutA”)	Src 1 (“IRD1”)
Dest 2 (“PlayoutB”)	Src 1 (“IRD1”)
Dest 3 (“PlayoutC”)	Src 3 (“VTR1”)
Dest 4 (“Monitor”)	Src 4 (“VTR2”)



Destination	Source
Dest 1 (“PlayoutA”)	Src 4 (“VTR2”)
Dest 2 (“PlayoutB”)	Src 3 (“VTR1”)
Dest 3 (“PlayoutC”)	Src 2 (“IRD2”)
Dest 4 (“Monitor”)	Src 4 (“VTR2”)

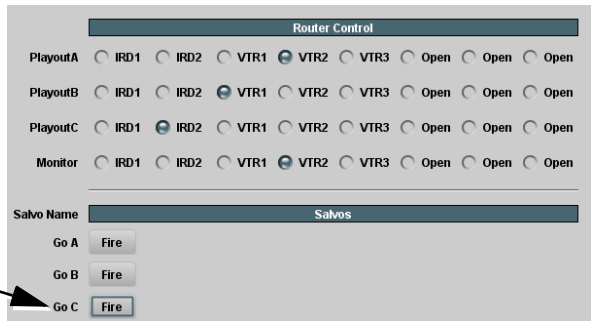


Table 3-1 9284 Function Submenu List — continued

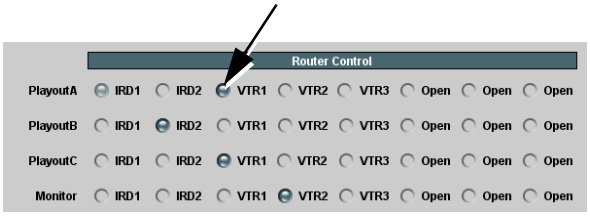
Control	(continued)

Routing Control Using Router Control Matrix

From the Control tab, individual source changes for any of the destinations can be performed on the fly by simply selecting the radio button for the desired new source.
Note: Changes performed in this manner cannot be saved.

Using the example from the previous page, routing directed by “Go A” salvo is changed to now route VTR1 to destination “PlayoutA” by selecting the VTR1 button in the PlayoutA destination row.

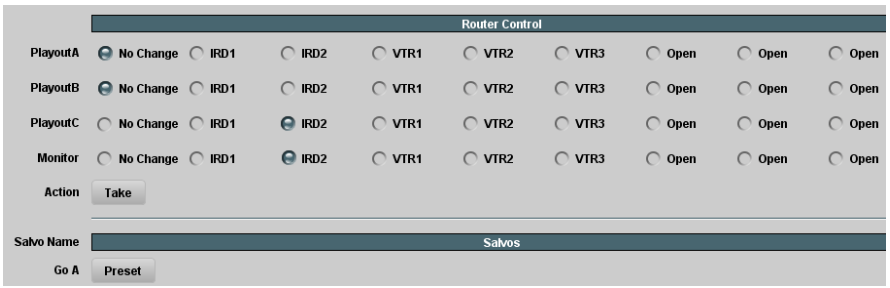
Destination	Source
Dest 1 (“PlayoutA”)	Src 1 (“IRD1”)
Dest 1 (“PlayoutA”)	**Src 3 (“VTR1”)**
Dest 2 (“PlayoutB”)	Src 2 (“IRD2”)
Dest 3 (“PlayoutC”)	Src 3 (“VTR1”)
Dest 4 (“Monitor”)	Src 4 (“VTR2”)



With **Action : Take** button insertion enabled, any changes performed using the matrix are held off until the **Take** button is clicked (thereby allowing multiple changes to be cued, and then applied using one button).

In the example below, the routing directed by “Go A” salvo is changed to now route IRD2 over destinations “PlayoutC” and “Monitor”. When the **Take** button is clicked, the change is then applied. Destinations that did not have any routing changes display as No Change. Note that when the **Take** button is inserted, the salvo Fire buttons are instead labeled as **Preset**; salvos will not launch until after the **Take** button is clicked.

Note: Insert or remove the **Take** button using the **Module Settings** tab. See Module Settings (p. 3-10).



Troubleshooting

This section provides general troubleshooting information and specific symptom/corrective action for the card and its remote control interface. The 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 card itself and its remote control systems all (to varying degrees) provide error and failure indications. Check all available indications in the event of an error or failure condition.

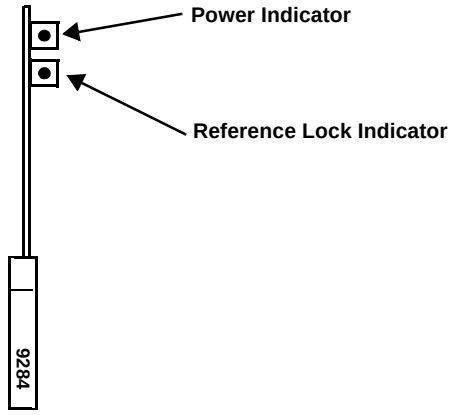
The various card and remote control error and failure indicators are individually described below.

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. 3-19)
- 9284 Processing Error Troubleshooting (p. 3-19)
- Troubleshooting Network/Remote Control Errors (p. 3-21)

9284 Card Edge Status Indicators

Figure 3-5 shows and describes the card edge status indicators. 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.



Item	Function
Power Indicator	Illuminates when card is properly powered up and inserted into frame slot
Reference Lock Indicator	Illuminates when 9284 is receiving valid reference signal on selected reference source (**EXT REF 1** or **EXT REF 2**)

Figure 3-5 9284 Card Edge Status Indicators

DashBoard™ Status/Error Indicators and Displays

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

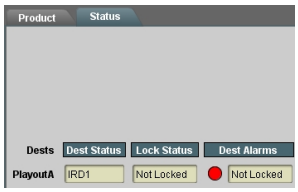
Indicator Icon or Display	Error Description
	Red or yellow indicator icon in 9284 **Card Info > Status** pane shows error alert, along with cause for alert (in this example, the card is receiving no video input, or a video input that is invalid for the indicated destination channel).

Figure 3-6 DashBoard™ Status Indicator Icons and Displays

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 9284, in all cases when power is being properly supplied there is always at least one indicator illuminated. Any card showing no illuminated indicators should be cause for concern.
	• Check the Power Consumed indication for the 9284 card. This can be observed using the DashBoard™ Card Info pane.
	  • If **no** power is being consumed, either the frame power supply, connections, or the 9284 card itself is defective.
	  • If **excessive** power is being consumed (see Technical Specifications (p. 1-22) in Chapter 1, “Introduction”), the card may be defective.

Check Cable connection secureness and connecting points	Make certain all cable connections are fully secure (including coaxial cable attachment to cable ferrules on BNC connectors). Also, make certain all connecting points are as intended. Make certain the selected connecting points correlate to the intended card inputs and/or outputs. Cabling mistakes are especially easy to make when working with large I/O modules.
Card seating within slots	Make certain all cards are properly seated within its frame slot. (It is best to assure proper seating by ejecting the card and reseating it again.)
Check status indicators and displays	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.

9284 Processing Error Troubleshooting

Table 3-3 provides card processing troubleshooting information. If the 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 card is not appropriately set for the type of signal being received by the card.

Note: If alarms are not enabled on the card, loss of signal and other signal alarms may not be reported by the card DashBoard™ Card Info pane. (See I/O Settings (p. 3-12).

Table 3-3 Troubleshooting Processing Errors by Symptom

Symptom	Error/Condition	Corrective Action
• **DashBoard™** shows yellow or red icon (No Signal) in Card Info pane. 	• No video input present on a source input	Make certain intended video sources are connected to appropriate card video inputs. Make certain BNC cable connections between frame Rear I/O Module for the card and signal source are OK.
	• **Alarm Mode** set for Warning or Alarm on unused channel.	Nuisance alarm due to alarm set for channel not intended to be used. Set **Alarm Mode** for these input channels to **Ignore**.
• **DashBoard™** shows yellow or red icon (Not Locked) in Card Info pane. 	• Destination routed from input containing no signal.	• Make certain intended video source is connected to appropriate card video input. Make certain BNC cable connections between frame Rear I/O Module for the card and signal source are OK. • Make certain source selection is as intended (as verified on salvo launch source/ destination matrix display).
	• **Alarm Mode** set for Warning or Alarm on unused destination.	Nuisance alarm due to alarm set for destination not intended to be used. Set **Alarm Mode** for these destinations to **Ignore**.
Video/audio noise noted during switching transitions.	• Reference not selected or not present	• Make certain intended reference is present and selected for use by the card. Refer to **Module Settings** function submenu tab on page 3-10 for more information.
	• Reference incompatible with SDI program video.	• Make certain reference is compatible with SDI program video (i.e., reference rate numerically related to SDI rate).
	• Card controls not set to match reference and/or program video.	• Make certain all drop-down selections in the Module Settings tab are set to match the formats of the program video and reference being sent to the card. Refer to **Module Settings** function submenu tab on page 3-10 for more information.
VANC data corruption during (or as a result of) switching transitions.	• Switching line selected on card is conflicting with line used for active VANC data transmission.	• Make certain selected switching line is not in conflict with line used for active VANC data transmission. Refer to **Module Settings** function submenu tab on page 3-10 for more information.

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. 1-26) in Chapter 1, “Introduction“ for contact information.

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