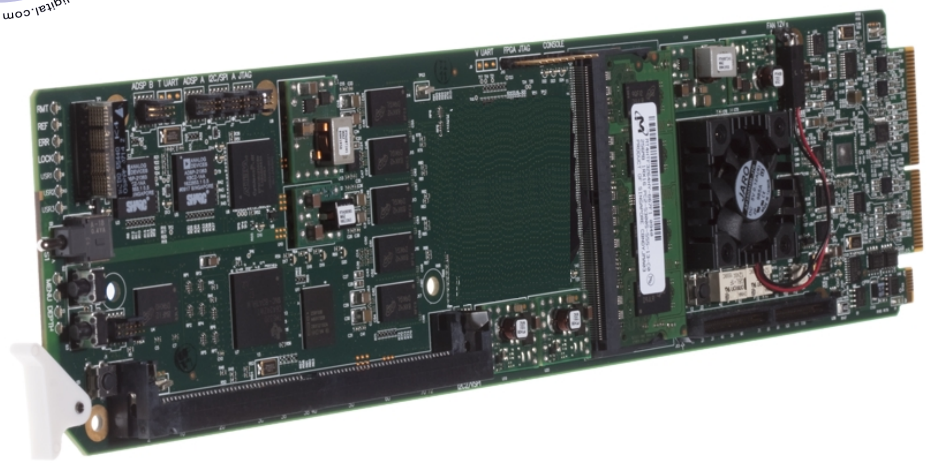
9374-EMDE Quad SDI Stream
9372-EMDE Dual SDI Stream
9371-EMDE Single SDI Stream



SDI – AES – MADI Embedder / De-embedder

Product Manual

Cobalt Digital Inc.

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

937X-OM (V1.4)

Copyright

Disclaimer

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

Trademark Information

Congratulations on choosing the Cobalt® 9374 series of MADI Embedders/De-embedders. The 9374-series 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.

Manual No.:	937X-OM
Document Version:	V1.4
Release Date:	March 18, 2014
Description of product/manual changes:	- Revise manual to reflect product functional changes of latest firmware release. Refer to Support > Firmware Downloads link at www.cobaltdigital.com for latest firmware and corresponding functional description changes and additions. - Update manual for minor errors in rear IO module info. - Update web URLs for changes in Cobalt Digital website.

Table of Contents

Chapter 1

Introduction

Overview

Note: This manual covers the 9374-Series, which consists of the 9374, 9372, and 9371 cards. These cards vary only in the number of SDI channels supported; the differences are described where applicable.

This manual provides installation and operating instructions for the 9374-Series of SDI-AES-MADI Embedder/De-embedders (also referred to herein as the 9374-Series card).

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 9374-Series cards.
- **Chapter 2, "Installation and Setup"** – Provides instructions for installing the 9374-Series card in a frame, and optionally installing Rear Modules for the card.
- **Chapter 3, "Operating Instructions"** – Provides overviews of operating controls and instructions for using the 9374-Series cards.

This chapter contains the following information:

9374-Series 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 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 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 card itself. Examples are provided below.

- Card-edge display messages are shown like this:

  Ch01

- Connector names are shown like this: **AES 8**

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

- **937X or 9374-Series** refers to the 9374-Series of SDI-AES-MADI Embedder/De-embedders.
- **Frame** refers to the HPF-9000, OG3-FR, 8321, or similar 20-slot frame that houses Cobalt® or other cards.
- **Device** and/or **Card** refers to a COMPASS® and/or FUSION3G® card.
- **System** and/or **Video System** refers to the mix of interconnected production and terminal equipment in which the 9374-Series cards and other cards operate.
- Functions and/or features that are available only as an option are denoted in this manual like this:

  Not all options are covered in this manual. In these cases, Manual Supplement(s) for the option(s) ordered have been included in the binder containing this manual.

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 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 9374-Series cards have a moderate power dissipation (20 W max.). As such, avoiding placing the card adjacent to other cards with similar dissipation values if possible.**

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

CAUTION **If card resists fully engaging in Rear Module mating connector, check for alignment and proper insertion in slot tracks. Damage to card and/or Rear Module may occur if improper card insertion is attempted.**

9374-Series Cards Functional Description

Figure 1-1 shows a functional block diagrams of the 9374-Series card.

9374-Series Input/Output Formats

The 9374, 9372, and 9371 cards which comprise the 9374-Series vary only in the number of discrete SDI streams (channels) handled by the card. Each embedded channel within an SDI stream can be swapped between SDI streams or between the card's AES and MADI interfaces as shown for each card in Table 1-1. Furthermore each of these three cards is available as embedder-only (-EM) or de-embedder-only (-DE) versions. Where functional or operating descriptions apply only to specific cards, these differences are noted.

Table 1-1 9374-Series Input/Output Overview

Card Model	SDI Streams	AES In	AES Out	MADI In	MADI Out	Analog Audio Out (2-Ch Monitor)
9374-EMDE	(4) 3G/HD/SD	8 pair max[1]	8 pair max[1]	1 BNC	1 BNC	2-Ch
9374-EM	(4) 3G/HD/SD	8 pair IN		1 BNC		2-Ch
9374-DE	(4) 3G/HD/SD		8 pair OUT		1 BNC	2-Ch
9372-EMDE	(2) 3G/HD/SD	8 pair max[1]	8 pair max[1]	1 BNC	1 BNC	2-Ch
9372-EM	(2) 3G/HD/SD	8 pair IN		1 BNC		2-Ch
9372-DE	(2) 3G/HD/SD		8 pair OUT		1 BNC	2-Ch
9371-EMDE	(1) 3G/HD/SD	8 pair max[1]	8 pair max[1]	1 BNC	1 BNC	2-Ch
9371-EM	(1) 3G/HD/SD	8 pair IN		1 BNC		2-Ch
9371-DE	(1) 3G/HD/SD		8 pair OUT		1 BNC	2-Ch

(1) On -EMDE, 8 AES pairs (BNCs) total are available, which can be selected as either inputs or outputs

(2) Input/output complements listed require appropriate rear I/O module. See 9374-Series Card Rear Modules (p. 2-4) in Chapter 2, "Installation and Setup" for more information.

Note: Video formats on **SDI IN A** / **SDI IN B** must be same format. First received input sets priority. If next received input is not of this format, its output is replaced with a flat-field of the priority format and an alarm is set. SDI input pairs on **SDI IN C** / **SDI IN D** have similar constraints. Note however that common formats are not required between input pair **SDI IN A** / **SDI IN B** and **SDI IN C** / **SDI IN D**.

Audio Crosspoint/Processing Description

Note: Descriptions below are specific to the 9374-EMDE quad stream model. Other models function identically but have less channel capacity and/or embed/de-embed as described in Table 1-1.

(See Figure 1-1.) The 9374-Series provides a full unrestricted audio crosspoint that allows channel routing between any channels on up to four SDI streams, discrete AES-3id, and AES-10 MADI interfaces. The MADI interface on the 9374-Series cards support a 64-channel payload at the industry standard 48 kHz sampling rate, and can reliably receive from 1694A cable runs up to 250m. All SDI embedding and SDI output timing is timed in common to a selected timing source. Discrete AES-3id inputs which are asynchronous with input video are accommodated using per-channel Sample Rate Converters (SRCs).

The 9374-Series audio crosspoint is built around a card internal bus that can receive from the following inputs:

- 16 channels of de-embedded audio from each SDI program video stream
- Up to 16 channels (8 pairs) of discrete AES input
- Up to 64 channels of MADI input audio on the MADI input BNC
- Digital silence (mute) setting
- 16 built-in independent tone generators
- (option **+LTC** only) LTC encoder LTCA thru LTCD

Any of the inputs described above can be cross-routed to any of the following output destinations:

- 16 channels of embedded audio onto any of the card SDI output streams
- Up to 16 channels (8 pairs) of discrete AES output
- Up to 64 channels of MADI output audio on the MADI output BNC

Note: Maximum AES-3id capacity is 8 pairs, of which each pair can be user GUI-selectable as an input or output.

For each of the inputs and outputs described above, a PPM VU meter representation on the GUI is provided. For each input channel pair is a selectable instant routing that places the channel pair on the card's analog output pair, thereby conveniently providing a confidence monitor for each channel pair. This stereo analog pair can in turn be routed to an external audio monitor or powered monitors (the analog output pair is a consumer-level unbalanced stereo pair.)

Output audio rates are always 48 kHz using timing alignment as selected by user controls to frame **REF 1** or a selected SDI input stream.

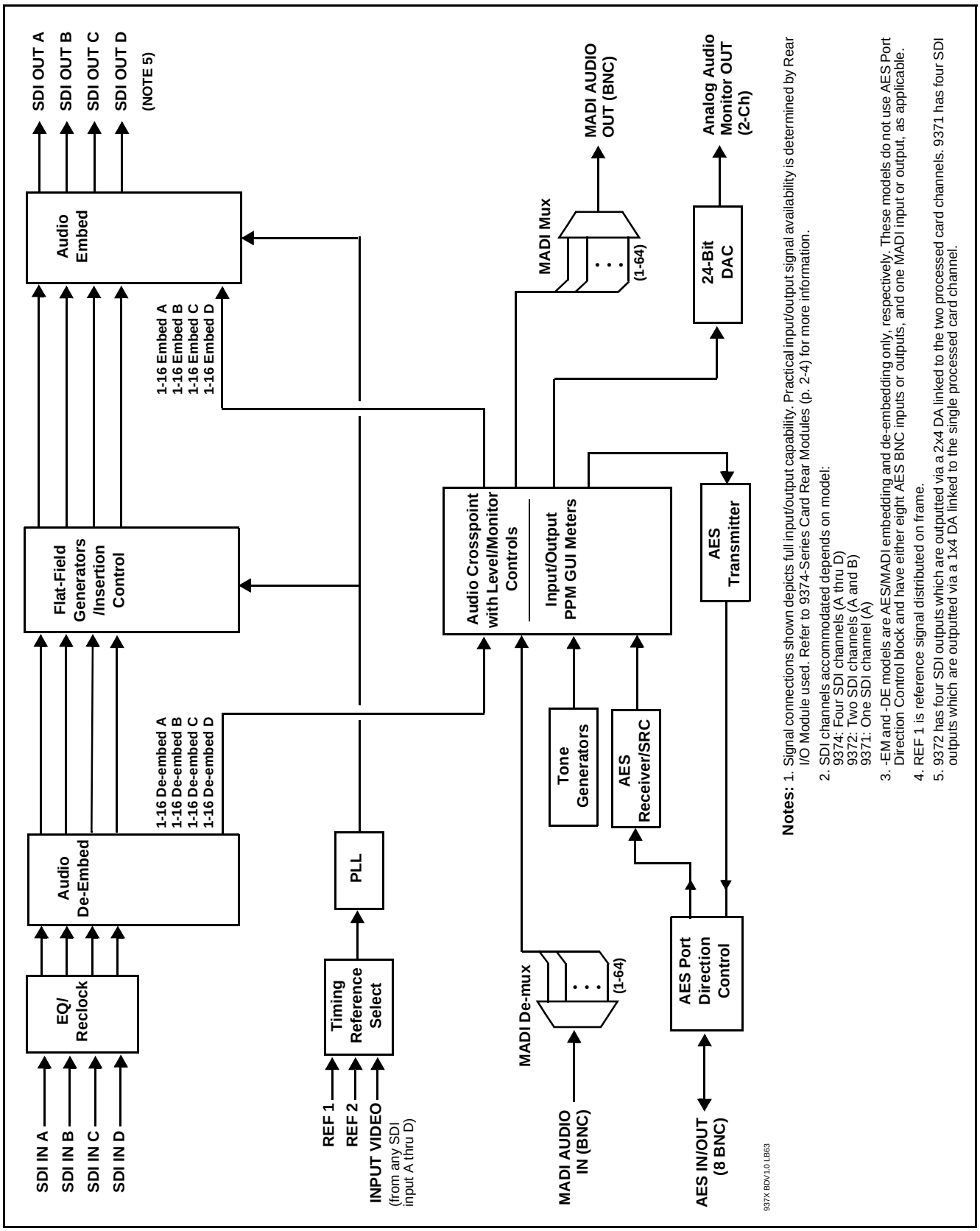


Figure 1-1 9374-Series Functional Block Diagram

Reference Function

The 9374-series cards use a common reference for all SDI video channels, with the reference being selectable from **SDI A IN** thru **SDI D IN**, or **REF 1** or **REF 2** obtained from the frame references. This provides for proper audio embedding, and rendering and switchover transitions from program video to the flat-field generators as well as stable output video.

Note: Where multiple SDI streams are to accommodated by the card, certain considerations exist regarding video formats handled simultaneously. See Considerations Regarding Multiple-Channel SDI (p. 3-8) in Chapter 3, Operating Instructions for more information. Unless all SDI inputs received by the card are synchronous, all SDI inputs should be frame-synchronized using a common frame reference, with the same reference also to be used by this card. MADI sources should also be frame-referenced to either the video being used or a reference. Asynchronous AES audio is sample-rate converted to accommodate minor timing variances. Received SMPTE 337 (Dolby® data) over an AES input is automatically bypassed from the sample rate converters; this data must be synchronous to video.

Flat-Field Generators

Independent flat-field generators are provided for each SDI channel. Either manually selected or via failover on loss of SDI input, the generators are individually configurable to output a flat field, with nine choices of color being user selectable.

Tone Generators

The 9374-Series contains 16 built-in tone generators of frequencies from 20 Hz to 20 kHz (default level is -20 dBFS). (Where card is licensed for **+LTC**, only 12 tone generators are present.)

Timecode Processor

(See Figure 1-2.) This function uses extracted timecode data from the input video (waveform or ATC), reference VITC waveform, or internal (free run) and in turn re-inserts selected timecode data into the program video signal. Each channel supported by the card has its own independent processor. The function can monitor video input and reference input for supported timecode formats, and then select and prioritize among SDI VITC waveform, SDI ATC_VITC, and SDI ATC_LTC timecode sources. If the preferred format is detected, the preferred format is used by the card; if the preferred format is not detected, the card uses other formats (where available) as desired.

The function also provides conversion between various timecode formats and provides independent insertion and line number controls for each SDI timecode output format.

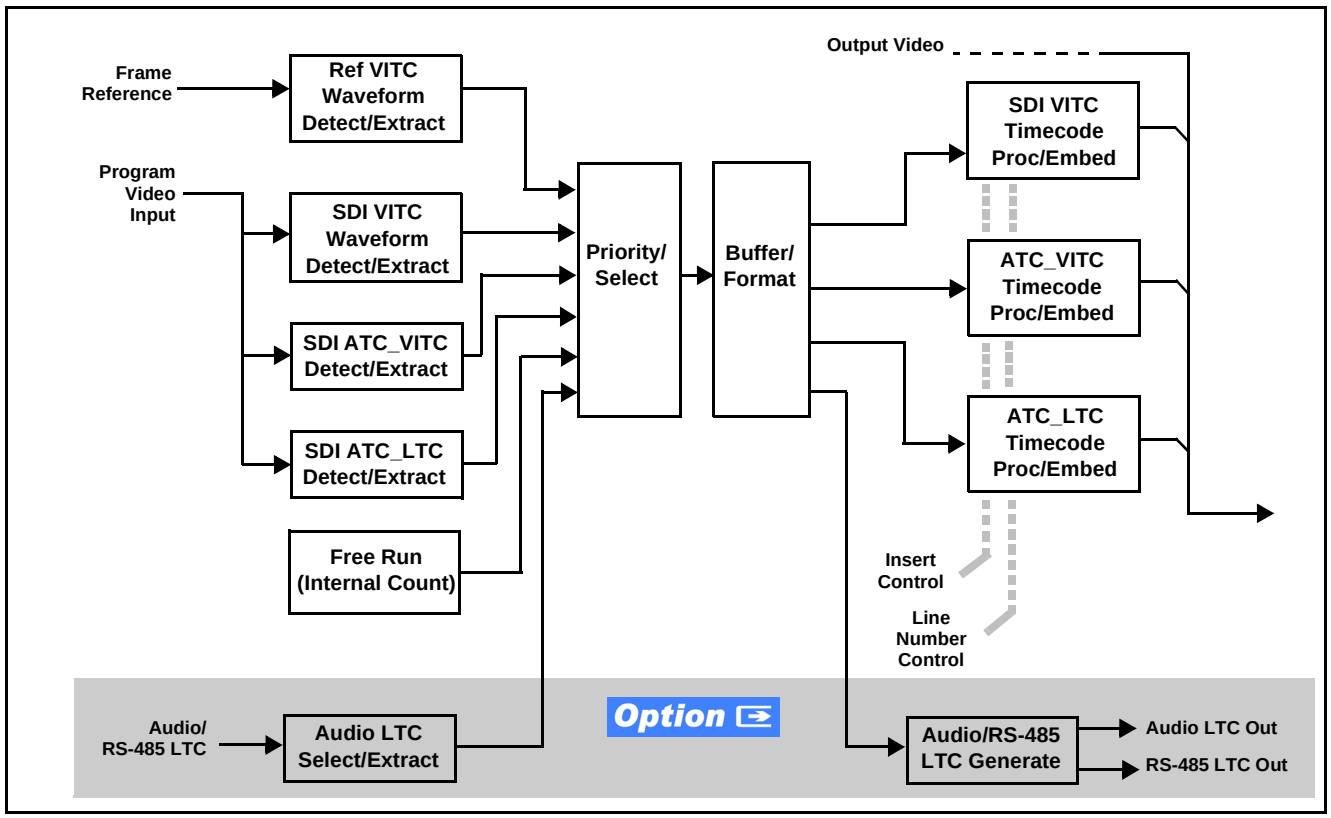


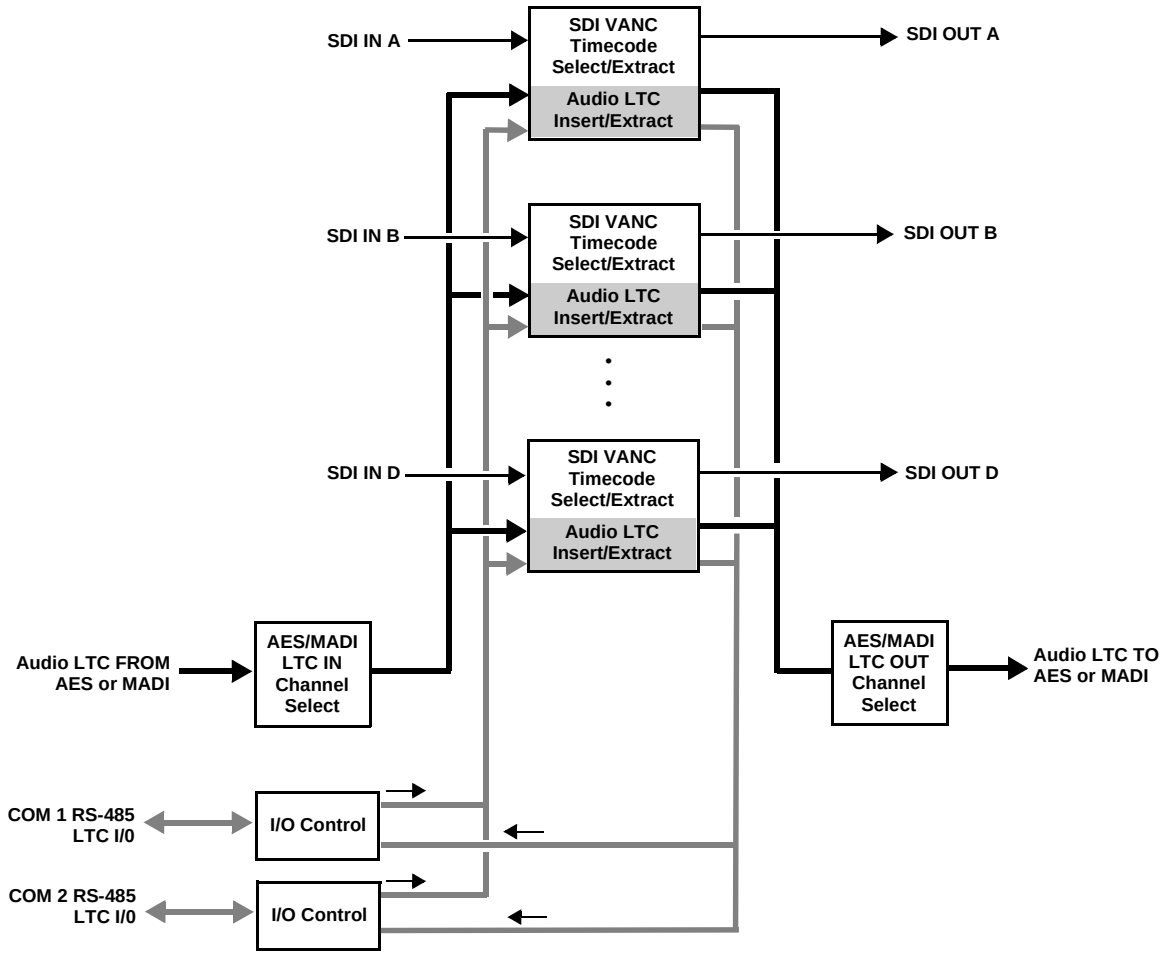
Figure 1-2 Timecode Processor (One Channel Shown)

Audio/RS-485 LTC Function (Option +LTC) Option

Note: +LTC function is an optional licensable feature. This function and its controls appear only when a license key is entered and activated. (This option (identified in Cobalt® price lists as **+LTC**) can be purchased upon initial order, or field-activated using a key string which is sent to you when this option is purchased.)

(See Figure 1-3.) Option **+LTC** allows bidirectional transfer and conversion between SMPTE 12M VANC formats over SDI and audio LTC, as well as RS-485 LTC. Audio LTC can be received or sent over digital audio using selected embedded or AES channel, as well as via two RS-485 ports on the card.

RS-485/Audio LTC can be derived from each card SDI channel VANC timecode.



LTC Input (Rx) Sources	Each SDI channel can select sources for its respective **LTCA** thru **LTCD** encoders from the following: - Audio LTC from Chan A thru D Emb 1-16 input, AES 1-16, MADI 1-64. - RS-485 LTC from COM1 or COM2. - Timecode source priority selection from reference VITC, VITC waveform, ATC_VITC, ATC_LTC, or free-run timecode as source.
LTC Output (Tx) Destinations	Each respective LTCA thru LTCD encoder is independently related to each SDI input channel, and can output LTCA thru LTCD independently (as source choices **LTCA** thru **LTCD**) to the following destinations: - SDI Chan A thru D VANC (as VITC waveform, ATC_VITC, or ATC_LTC as applicable for video format). - Output audio LTC over SDI Chan A thru D Emb 1-16 output. - Audio LTC to AES 1-16, MADI 1-64 - RS-485 COM1 or COM2. **LTCA** thru **LTCD** can be used as sources for any audio channel or SDI output channel. (9372 card has only LTCA and LTCB encoders; 9371 card has only LTCA encoder.)

Figure 1-3 Timecode Interfaces Using Option +LTC

User Control Interface

Figure 1-4 shows the user control interface options for the 9374-Series. These interfaces are individually described below.

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

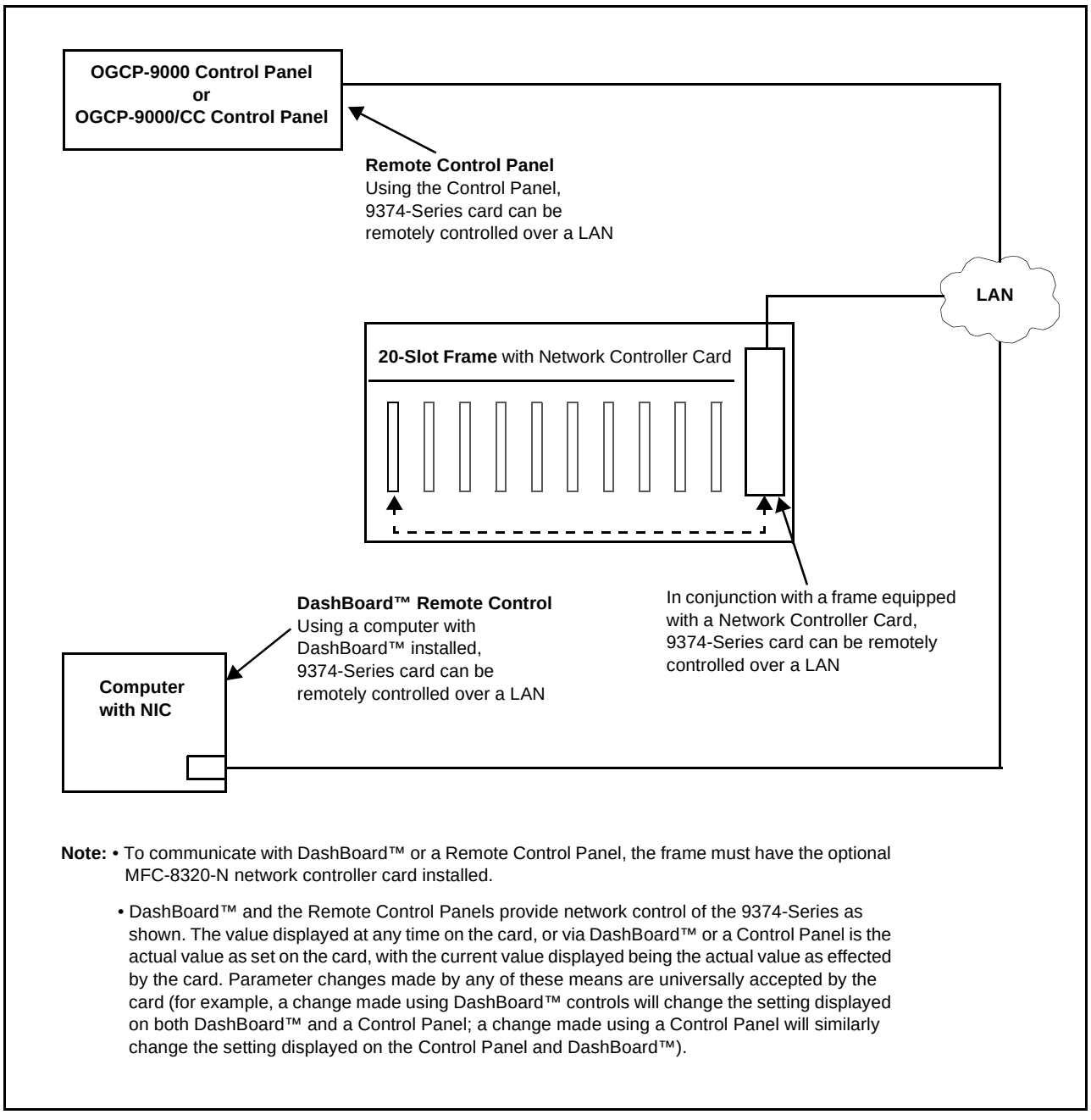


Figure 1-4 9374-Series User Control Interface

- **DashBoard™ User Interface** – Using DashBoard[1], the 9374-Series and other cards installed in openGear® frames such as the Cobalt® HPF-9000 or 8321 Frame can be controlled from a computer and monitor. DashBoard™ allows users to view all frames on a network with control and monitoring for all populated slots inside a frame. This simplifies the setup and use of numerous modules in a large installation and offers the ability to centralize monitoring. Cards define their controllable parameters to DashBoard™, so the control interface is always up to date. The DashBoard™ software can be downloaded from the Cobalt Digital Inc. website: www.cobaltdigital.com (enter "DashBoard" in the search window). The DashBoard™ user interface is described in Chapter 3,"Operating Instructions".

Note: If network remote control is to be used for the frame and the frame has not yet been set up for remote control, Cobalt® reference guide **Remote Control User Guide (PN 9000RCS-RM)** provides thorough information and step-by-step instructions for setting up network remote control of COMPASS® and FUSION3G® 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>Documents> Reference Guides** 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. 1-18).

- **Cobalt® OGCP-9000, OGCP-9000/CC and WinOGCP Remote Control Panels** – The OGCP-9000, OGCP-9000/CC, and WinOGCP Remote Control Panels conveniently and intuitively provide parameter monitor and control of the cards within the 20-slot frame. 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.

Note: Some GUI features such as VU meters are not available when using the Remote Control Panel user interface.

9374-Series Card Rear Modules

The 9374-Series cards physically interface to system video and audio connections using a Rear Module.

All inputs and outputs shown in the block diagram (Figure 1-1) enter and exit the card via the card edge backplane connector. The Rear Module breaks out the 9374-Series card edge connections to industry standard connections that interface with other components and systems in the signal chain.

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

In this manner, the particular inputs and outputs required for a particular application can be accommodated using a Rear Module that best suits the requirements. The required input and outputs are broken out to the industry standard connectors on the Rear Module; the unused inputs and outputs remain unterminated and not available for use.

The full assortment of 9374-Series Rear Modules is shown and described in 9374-Series Card Rear Modules (p. 2-4) in Chapter 2, “Installation and Setup”.

Audio and Video Formats Supported by the 9374-Series Cards

Table 1-2 lists and provides details regarding the audio and video formats supported by the 9374-Series cards.

Table 1-2 Supported Audio and Video Formats

Item	Description/Specification	
Input / Output Video	Raster Structure:	Frame Rate:
	1080p	23.98; 24 29.97; 25; 30
	1080p 3G (2)	50, 59.94, 60
	1080i (1)	25; 29.97; 30
	720p	23.98; 24; 25; 29.97; 30; 50; 59.94; 60
	486i (1)	29.97
	575i (1)	25
Embedded Audio	The 9374-Series cards support all four groups (16 channels) of embedded audio at full 24-bit resolution in both SD (with extended data packets) and HD for each of the card’s SDI streams.	
Discrete AES Audio (AES-3id)	The 9374-Series cards can accept 16 channels (8 pairs) of discrete AES audio on 75Ω BNC connections (maximum total of inputs and outputs). Sample rate conversion is employed to accommodate sample rate differences in the AES stream and the input video stream. AES-3id outputs can be sourced from any SDI embedded channel, MADI input, or other AES-3id inputs received by the card.	
MADI Audio (AES-10)	The 9374-Series cards have a 75Ω BNC input and output connection that supports the MADI standard of up to 64 channels input and output. MADI outputs can be sourced from any SDI embedded channel, AES-3id inputs, or other MADI channels received by the card.	

(1) All rates displayed as frame rates; interlaced (“i”) field rates are two times the rate value shown.

(2) All inputs must be synchronous (e.g., all frame synced to same reference) to assure clean audio cross-routing between SDI streams. Multiple simultaneous formats are supported on a limited basis (e.g., HD on SDI Inputs A/B and SD on SDI Inputs C/D). AES-3id and MADI should also be synchronous with selected SDI stream(s) to ensure clean audio cross-routing.

Technical Specifications

Table 1-3 lists the technical specifications for the 9374-Series of SDI-AES-MADI Embedder/De-embedders.

Note: Input/output types and number of input/outputs in some cases are a function of rear module installed. Refer to Table 1-1, “9374-Series Input/Output Overview” for detailed information on available input/output complements.

Table 1-3 Technical Specifications

Item	Characteristic
Part number, nomenclature	9374-EMDE Quad-Stream SDI-AES-MADI Embedder/De-embedder 9374-EM Quad-Stream SDI-AES-MADI Embedder 9374-DE Quad-Stream SDI-AES-MADI De-embedder 9372-EMDE Dual-Stream SDI-AES-MADI Embedder/De-embedder 9372-EM Dual-Stream SDI-AES-MADI Embedder 9372-DE Dual-Stream SDI-AES-MADI De-embedder 9371-EMDE SDI-AES-MADI Embedder/De-embedder 9371-EM SDI-AES-MADI Embedder 9371-DE SDI-AES-MADI De-embedder **Note:** See Table 1-1 on page 1-5 for input/output capabilities for specific models.
Installation/usage environment	Intended for installation and usage in frame meeting openGear® modular system definition.
Power consumption	< 20 Watts maximum (all options installed)
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.
Internal Tone Generators	16 built-in tone generators, each configurable for frequencies ranging from 20 Hz to 20 kHz (default level = -20 dBFS). (Where card is licensed for **+LTC**, only 12 tone generators are present.)
Standards Supported	3G: SMPTE 425 level A and B 1080p60, 1080p59.94, 1080p50 HD: 1080i60, 1080i59.94, 1080i50, 1080p29.97, 1080p25, 1080p24; 1080p23.98 720p60, 720p59.94, 720p50, 720p29.97, 720p25, 720p24, 720p23.98 SD: 486i59094, 576i50
Internally generated flat-field formats **Note:** Flat-field format is user-selectable using GUI controls and independent of received (input video) format.	3G: 1080p59.94, 1080p50 HD: 1080i59.94, 1080i50, 1080psf23.98 720p59.94, 720p50 SD: 525i59.94, 625i50

Table 1-3 Technical Specifications — continued

Item	Characteristic
BNC SDI Video Inputs/Outputs	Data Rates Supported: SMPTE 425 level A and B: 3 Gbps SMPTE 292 HD-SDI: 1.485 Gbps or 1.485/1.001 Gbps SMPTE 259M-C SD-SDI: 270 Mbps BNC Connector Input/Output Impedance: 75 Ω terminating Cable Equalization (3G): 394 ft (120 m) Belden 1694A Cable Equalization (HD): 591 ft (180 m) Belden 1694A Cable Equalization (SD): 1050 ft (320 m) Belden 1694A Return Loss: > 15 dB up to 1.485 GHz > 10 dB up to 2.970 GHz Jitter; Alignment (3G / HD / SD): < 0.3 UI / 0.2 UI / 0.2 UI Jitter; Timing (3G / HD / SD): < 2.0 UI / 1.0 UI / 0.2 UI
AES (AES-3id) Audio Inputs/Outputs	Standard: SMPTE 276M Number of inputs/outputs (maximum total between inputs and outputs): 8 pairs (16-channel) on BNC connectors per AES-3id; 75 Ω impedance Input Level: 0.2 to 2.0 Vp-p Output Level: 1.0 Vp-p Return Loss: > 15 dB @ up to 6.144 MHz Input SRC Range: 32 kHz to 96 kHz Input SRC Performance: >130 dB THD+N
MADI (AES-10) Inputs/Outputs	Number of Inputs/Outputs: 1 BNC Input, 1 BNC Output Supported Sample Rate: 48 kHz only Input/Output Impedance: 75 Ω Input Data Rates: 125 Mbps Input Level: 0.15 - 0.6 Vp-p Output Level: 0.3 - 0.6 Vp-p Output Jitter: 0.1 UI

Table 1-3 Technical Specifications — continued

Item	Characteristic
Analog Audio Outputs	Two unbalanced “RCA”; consumer-level confidence monitor (2 Vrms (+6 dBV) for 0 dBFS PCM signal)
Audio/Video Delay	Less than 30 audio samples (embed or de-embed)
Frame Reference Input	Number of Inputs: One non-terminating (looping) Frame Reference input (REF 1) Standards Supported: SMPTE 170M/318M (“black burst”) SMPTE 274M/296M (“tri-color”) Return Loss: > 35 dB up to 5.75 MHz

Warranty and Service Information

Cobalt Digital Inc. Limited Warranty

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

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

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

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

Cobalt Digital Inc. Factory Service Center
2406 E. University Avenue
Urbana, IL 61802 USA
www.cobaltdigital.com
Office: (217) 344-1243
Fax: (217) 344-1245
Email: info@cobaltdigital.com

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

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

Contact Cobalt Digital Inc.

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

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

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

Chapter 2

Installation and Setup

Overview

This chapter contains the following information:

Note: The 9374-Series cards are suitable for installation only in a 20-slot frame (Cobalt® PN HPF-9000 or 8321-CN or equivalent).

Installing the 9374-Series Card 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 9374-Series cards have a moderate power dissipation (20 W max.). As such, avoiding placing the card adjacent to other cards with similar dissipation values if possible.

CAUTION

	**This device contains semiconductor devices which are susceptible to serious damage from Electrostatic Discharge (ESD). ESD damage may not be immediately apparent and can affect the long-term reliability of the device.** **Avoid handling circuit boards in high static environments such as carpeted areas, and when wearing synthetic fiber clothing. Always use proper ESD handling precautions and equipment when working on circuit boards and related equipment.**

CAUTION

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

Note: Check the packaging in which the 9374-Series Card was shipped for any extra items such as a Rear 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 9374-Series Card into a frame slot as follows:

1. Determine the slot in which the 9374-Series 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 Module mating connector.

CAUTION

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

6. Verify that the card is fully engaged in Rear Module mating connector.
7. Close the frame front access panel.
8. Connect cabling in accordance with the appropriate diagram shown in Table 2-1, “9374-Series Card Rear Modules” (p. 2-5).
9. Repeat steps 1 through 8 for other 9374-Series Cards.

Notes:
- The 9374-Series Card BNC inputs are internally 75-ohm terminated. It is not necessary to terminate unused BNC inputs or outputs.
- 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 reference signal from an external source such as a house distribution.
- To remove a card, press down on the ejector tab to unseat the card from the Rear 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 9374-Series Card Network Remote Control (p. 2-10).

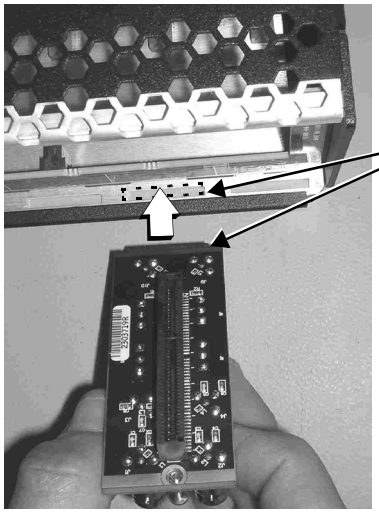
Note: If installing a card in a frame already equipped for, and connected to DashBoard™, no network setup is required for the card. The card will be discovered by DashBoard™ and be ready for use.

Installing a Rear Module

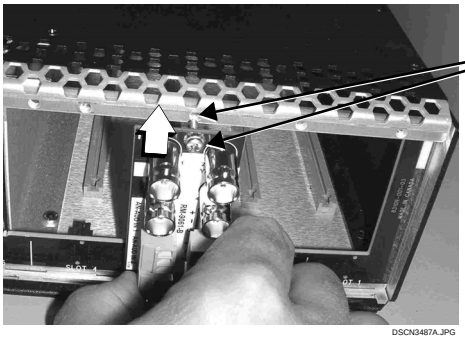
Notes:
- This procedure is applicable **only if a Rear Module is not currently installed** in the slot where the 9374-Series Card is to be installed.
- Note that some Rear Modules and labels have several ventilation holes. To allow maximum ventilation, it is recommended to place the label fully over connectors such that label is flush with rear module and holes are not obscured. Also, when a card is not installed in a slot, it is recommended that the supplied blank cover be used to preserve proper forced ventilation flow-through.

The full assortment of 9374-Series Card Rear Modules is shown and described in 9374-Series Card Rear Modules (p. 2-4). Install a Rear Module as follows:

1. On the frame, determine the slot in which the 9374-Series Card is to be installed.
2. In the mounting area corresponding to the slot location, install Rear Module as shown in Figure 2-1.



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 Module flush against frame chassis and start the captive screw. Lightly tighten captive screw.

Figure 2-1 Rear Module Installation

9374-Series Card Rear Modules

Table 2-1 shows and describes the full assortment of Rear Modules specifically for use with the 9374-Series cards.

Note: The Rear Modules shown here are standard production items. Other signal combinations may be available as custom items. Consult Product Support with requests. Also, please check our web site pages for this product; new Rear Modules may be available that are not listed here.

Table 2-1 9374-Series Card Rear Modules

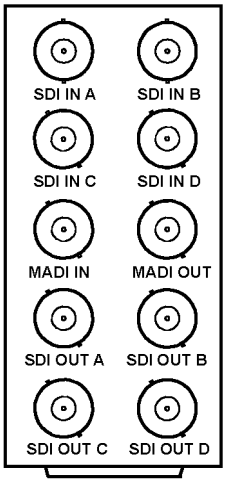
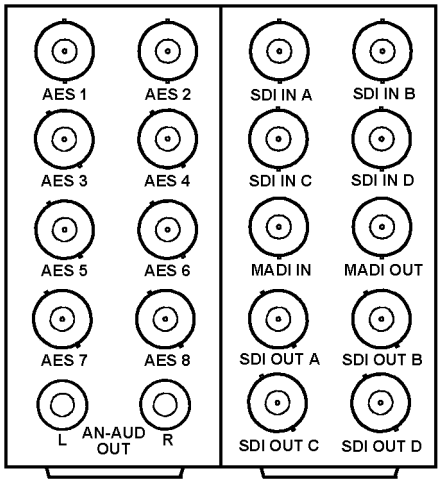
9374 Card Rear Module	Description
RM20-9374-C Rear Module  Note: MADI IN port only on 9374-EM card and MADI OUT port only on 9374-DE card.	Provides the following connections: • Four 3G/HD/SD-SDI video input BNCs (**SDI IN A** thru **SDI IN D**) • **MADI IN** and **MADI OUT** MADI AES-10 BNC input and output connectors • Four 3G/HD/SD-SDI video output BNCs (**SDI OUT A** thru **SDI OUT D**)
RM20-9374-E Rear Module  Note: AES ports are GUI-configurable as inputs or outputs on 9374-EMDE card. AES ports and MADI ports are input-only on 9374-EM card and output-only on 9374-DE card.	Provides the following connections: • Four 3G/HD/SD-SDI video input BNCs (**SDI IN A** thru **SDI IN D**) • Eight AES I/O BNC (AES-3id) input/outputs (**AES 1** thru **AES 8**; I/O choice for each connection is software-configurable; 8 ports total) • **MADI IN** and **MADI OUT** MADI AES-10 BNC input and output connectors • Two analog unbalanced (“RCA”) audio monitor outputs (**AN-AUD OUT L** and **AN-AUD OUT R**) • Four 3G/HD/SD-SDI video output BNCs (**SDI OUT A** thru **SDI OUT D**)

Table 2-1 9374-Series Card Rear Modules — continued

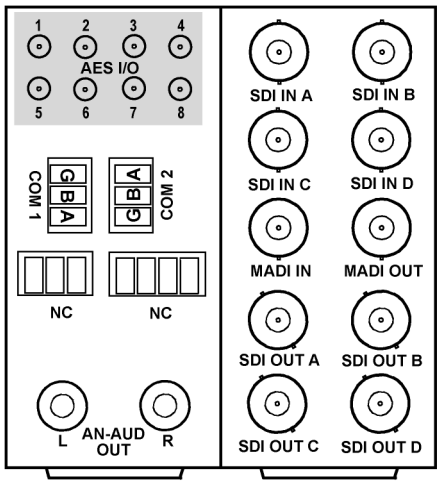
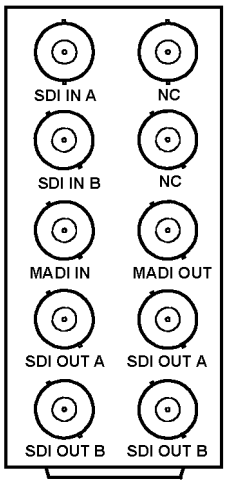
9374 Card Rear Module	Description
RM20-9374-F Rear Module  Note: AES ports are GUI-configurable as inputs or outputs on 9374-EMDE card. AES ports and MADI ports are input-only on 9374-EM card and output-only on 9374-DE card.	Provides the following connections: • Four 3G/HD/SD-SDI video input BNCs (**SDI IN A** thru **SDI IN D**) • Eight AES I/O BNC (AES-3id) input/outputs (**AES 1** thru **AES 8**; I/O choice for each connection is software-configurable; 8 ports total) • **MADI IN** and **MADI OUT** MADI AES-10 BNC input and output connectors • Two analog unbalanced (“RCA”) audio monitor outputs (**AN-AUD OUT L** and **AN-AUD OUT R**) • Two RS-485 ports (**COM 1** and **COM 2**); each assignable as **Input** or **Output-LTC Encoder A** thru **Output-LTC Encoder D** outputs • Four 3G/HD/SD-SDI video output BNCs (**SDI OUT A** thru **SDI OUT D**) **Note:** • COM ports functional only on card equipped with option +LTC. • Rear module available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9374-F-HDBNC or RM20-9374-F-DIN, respectively.
RM20-9372-C Rear Module  Note: MADI IN port only on 9372-EM card and MADI OUT port only on 9372-DE card.	Provides the following connections: • Two 3G/HD/SD-SDI video input BNCs (**SDI IN A** and **SDI IN B**) • **MADI IN** and **MADI OUT** MADI AES-10 BNC input and output connectors • Four 3G/HD/SD-SDI video output BNCs (2x **SDI OUT A** and 2x **SDI OUT B**)

Table 2-1 9374-Series Card Rear Modules — continued

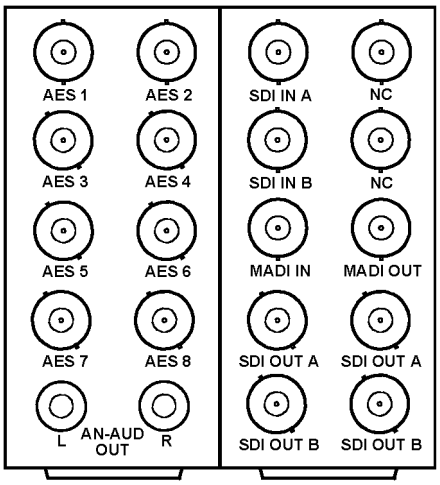
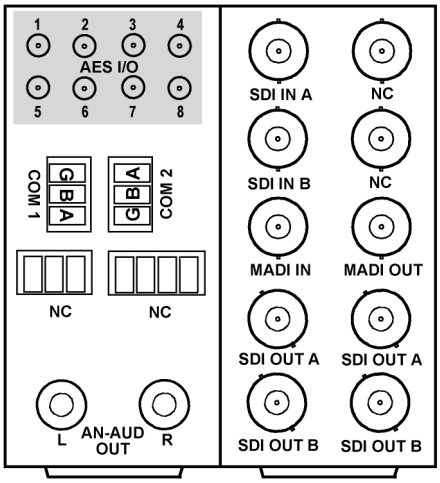
9374 Card Rear Module	Description
RM20-9372-E Rear Module  Note: AES ports are GUI-configurable as inputs or outputs on 9372-EMDE card. AES ports and MADI ports are input-only on 9372-EM card and output-only on 9372-DE card.	Provides the following connections: • Two 3G/HD/SD-SDI video input BNCs (**SDI IN A** and **SDI IN B**) • Eight AES I/O BNC (AES-3id) input/outputs (**AES 1** thru **AES 8**; I/O choice for each connection is software-configurable; 8 ports total) • **MADI IN** and **MADI OUT** MADI AES-10 BNC input and output connectors • Two analog unbalanced (“RCA”) audio monitor outputs (**AN-AUD OUT L** and **AN-AUD OUT R**) • Four 3G/HD/SD-SDI video output BNCs (2x **SDI OUT A** and 2x **SDI OUT B**)
RM20-9372-F Rear Module  Note: AES ports are GUI-configurable as inputs or outputs on 9372-EMDE card. AES ports and MADI ports are input-only on 9372-EM card and output-only on 9372-DE card.	Provides the following connections: • Two 3G/HD/SD-SDI video input BNCs (**SDI IN A** and **SDI IN B**) • Eight AES I/O BNC (AES-3id) input/outputs (**AES 1** thru **AES 8**; I/O choice for each connection is software-configurable; 8 ports total) • **MADI IN** and **MADI OUT** MADI AES-10 BNC input and output connectors • Two analog unbalanced (“RCA”) audio monitor outputs (**AN-AUD OUT L** and **AN-AUD OUT R**) • Two RS-485 ports (**COM 1** and **COM 2**); each assignable as **Input** or **Output-LTC Encoder A** thru **Output-LTC Encoder D** outputs • Four 3G/HD/SD-SDI video output BNCs (2x **SDI OUT A** and 2x **SDI OUT B**) **Note:** • COM ports functional only on card equipped with option +LTC. • Rear module available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9372-F-HDBNC or RM20-9372-F-DIN, respectively.

Table 2-1 9374-Series Card Rear Modules — continued

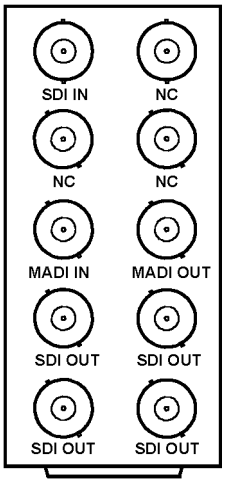
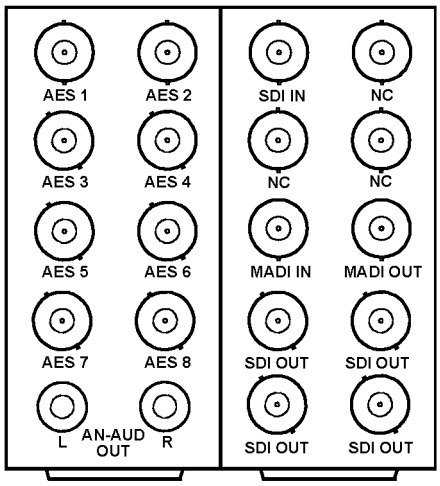
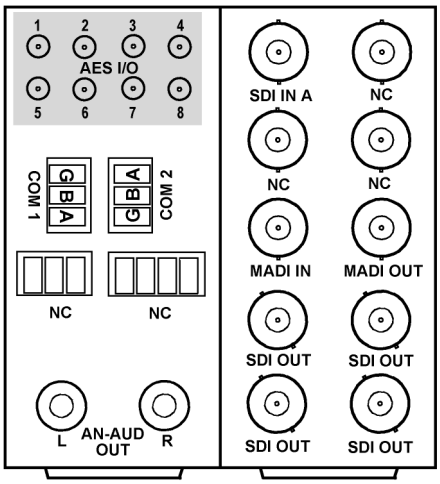
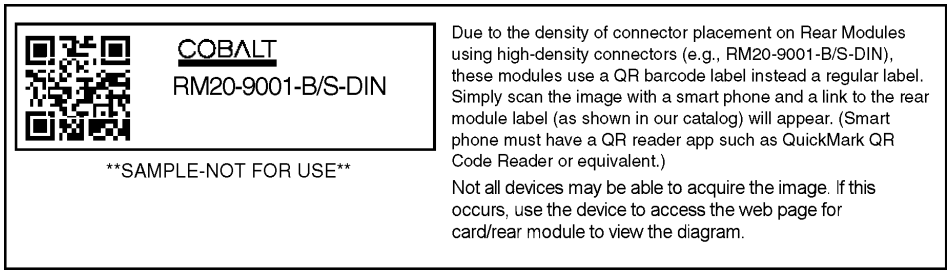
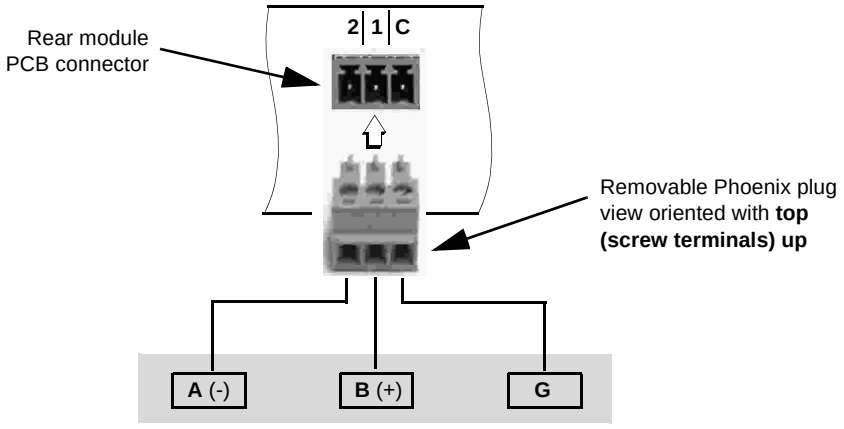
9374 Card Rear Module	Description
RM20-9371-C Rear Module  Note: MADI IN and OUT ports only on respective -EM, -DE or -EMDE card models.	Provides the following connections: • 3G/HD/SD-SDI video input BNC (**SDI IN**) • **MADI IN** and **MADI OUT** MADI AES-10 BNC input and output connectors • Four 3G/HD/SD-SDI video output BNCs (4x **SDI OUT A**)
RM20-9371-E Rear Module  Note: AES ports are GUI-configurable as inputs or outputs on 9371-EMDE card. AES ports and MADI ports are input-only on 9371-EM card and output-only on 9371-DE card.	Provides the following connections: • 3G/HD/SD-SDI video input BNC (**SDI IN**) • Eight AES I/O BNC (AES-3id) input/outputs (**AES 1** thru **AES 8**; I/O choice for each connection is software-configurable; 8 ports total) • **MADI IN** and **MADI OUT** MADI AES-10 BNC input and output connectors • Two analog unbalanced (“RCA”) audio monitor outputs (**AN-AUD OUT L** and **AN-AUD OUT R**) • Four 3G/HD/SD-SDI video output BNCs (4x **SDI OUT A**)

Table 2-1 9374-Series Card Rear Modules — continued

9374 Card Rear Module	Description
RM20-9371-F Rear Module  **Note: AES ports are GUI-configurable as inputs or outputs on 9371-EMDE card. AES ports and MADI ports are input-only on 9371-EM card and output-only on 9371-DE card.**	Provides the following connections: • 3G/HD/SD-SDI video input BNCs (**SDI IN A**) • Eight AES I/O BNC (AES-3id) input/outputs (**AES 1** thru **AES 8**; I/O choice for each connection is software-configurable; 8 ports total) • **MADI IN** and **MADI OUT** MADI AES-10 BNC input and output connectors • Two analog unbalanced ("RCA") audio monitor outputs (**AN-AUD OUT L** and **AN-AUD OUT R**) • Two RS-485 ports (**COM 1** and **COM 2**); each assignable as **Input** or **Output-LTC Encoder A** thru **Output-LTC Encoder D** outputs • Four 3G/HD/SD-SDI video output BNCs (4x **SDI OUT A**) **Note:** • COM ports functional only on card equipped with option +LTC. • Rear module available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9371-F-HDBNC or RM20-9371-F-DIN, respectively.



RS-485 Connections to Removable Phoenix Connector



9374-Series Analog Audio Output

The unbalanced “RCA” audio outputs on this card correspond to 2.2Vrms output when sourced from a unity-gain 0dBFS digital sine-wave source. Consumer audio is specified in dBV with a nominal (or recording) level of -10dBV. The 2vrms maximum output level corresponds to +6dBV. The unbalanced analog outputs on this card allow for 16dB of headroom above the nominal -10dBV consumer level (“headroom” is the range between the maximum and nominal audio levels).

Professional balanced analog audio levels in the US typically use a +4dBu nominal level with 20dB of headroom (-20dBFS). The maximum level for balanced analog interfaces is +24dBu.

The headroom difference between consumer and professional audio will result in a lower RCA consumer level when converting from professional balanced analog audio. For example, if pro level analog audio is received and transmitted via AES or embedded SDI to a receiver converting to RCA analog audio, the output will be 4dB lower, with a nominal level of -14dBV.

The analog audio outputs on this card are designed as a monitor convenience output, and are suitable for direct application with rack-mounted monitors or powered monitor loudspeakers. If connected to a professional balanced input, the center RCA conductor should be connected to XLR pin 2 (hot), and the shield conductor should be connected to XLR pin 1 (GND); pin 3 can be left open. Alternately, the center and ground RCA output conductors can be connected to XLR pins 2 and 3, respectively with the drain (shield) conductor connected to the receiving equipment chassis ground, and left open at the 9374-series card.

Setting Up 9374-Series Card 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™. (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>Documents>Reference Guides** 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. 1-18).

- 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 9374-Series Function Submenu List and Descriptions (p. 3-9).

This chapter contains the following information:

Control and Display Descriptions

This section describes the user interface controls, indicators, and displays (both on-card and remote controls) for using the 9374-Series card. The 9374-Series card functions can be accessed and controlled using any of the user interfaces described here.

The format in which the 9374-Series card 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 card functions (and the controls, indicators, and displays related to a particular function) follows a general arrangement of Function Submenus under which related controls can be accessed (as described in Function Submenu/Parameter Submenu Overview below).

After familiarizing yourself with the arrangement described in Function Submenu/Parameter Submenu Overview, proceed to 9374-Series Function Submenu List and Descriptions (p. 3-9) for detailed control descriptions and usage instructions.

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 Submenu/Parameter Submenu Overview

The functions and related parameters available on the 9374-Series 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.

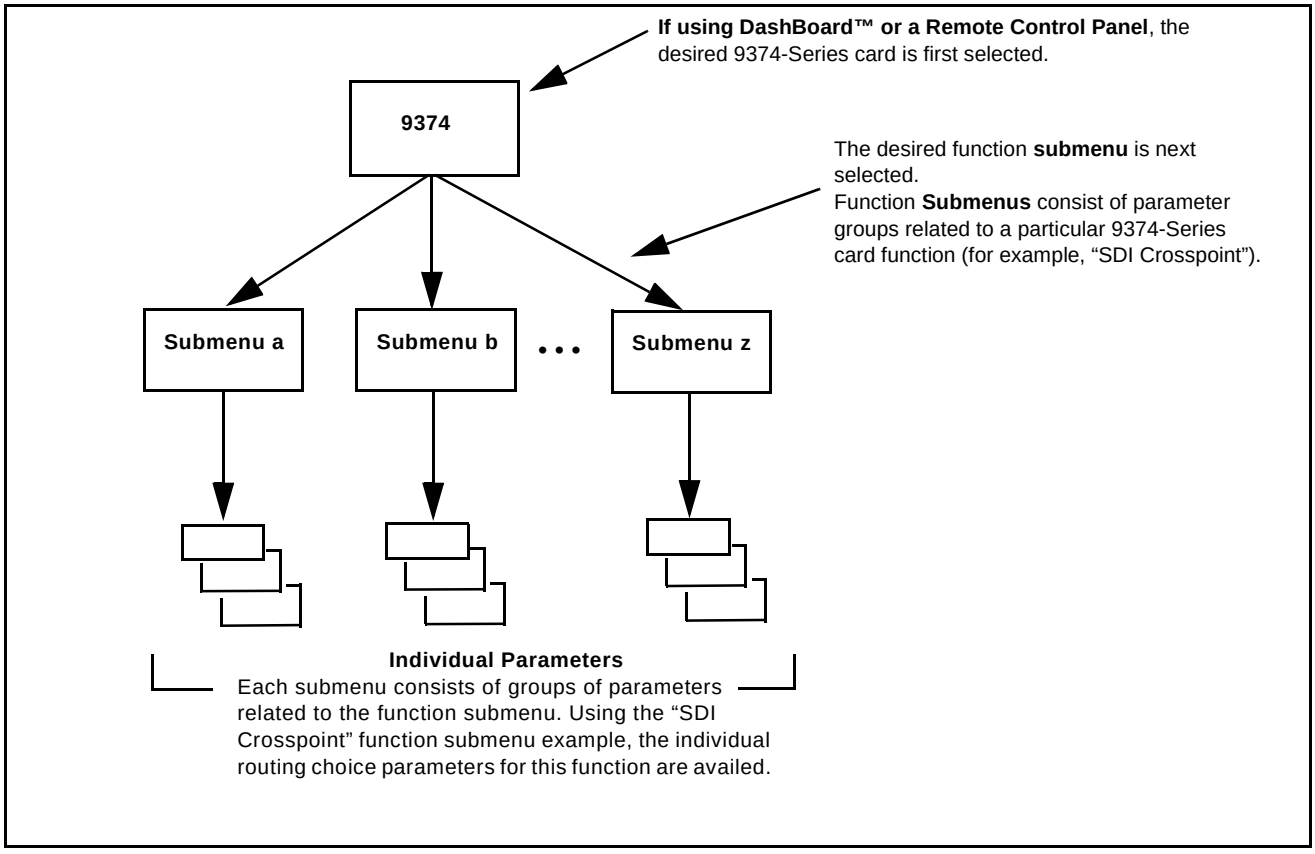
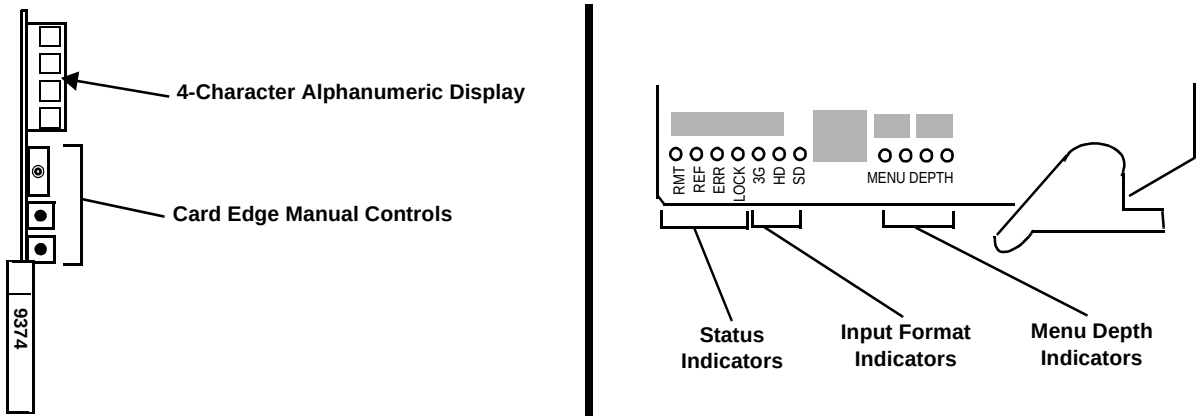


Figure 3-1 Function Submenu/Parameter Submenu Overview

9374-Series Card Edge Controls, Indicators, and Display

Figure 3-2 shows and describes the 9374-Series card edge controls, indicators, and display.



Item	Function
Display	Displays 4-digit abbreviated code showing menu and submenu selections. When in a menu displaying a parameter setting, the display shows parametric scalar value (and +/- sign where applicable).
Card Edge Manual Controls	This function is currently reserved.
Input Format Indicators	Three blue LEDs indicate the input signal format being received and locked onto by the 9374-Series card: • **3G** • **HD** • **SD** Continuous cycling of the LEDs indicates the 9374-Series card has not locked onto a particular format (as in the case of no signal input).
Menu Depth Indicators	This function is currently reserved.
RMT LED	Blue LED flashes when 9374-Series card is receiving control message from remote network control (e.g., DashBoard™ or Cobalt® Remote Control Panel)
REF LED	Blue LED illuminates when the card is receiving valid framesync when set up for framesync reference.
LOCK LED	Blue LED illuminates when the card unable to lock to framesync, or unable to lock to input standard.
ERR LED	This function is currently reserved.

Figure 3-2 9374-Series Card Edge Controls, Indicators, and Display

DashBoard™ User Interface

(See Figure 3-3.) The 9374-Series card function submenus are organized in DashBoard™ using tabs (for example, “Quick Routes” in Figure 3-3). When a tab is selected, each parametric control or selection list item associated with the function is displayed. Scalar (numeric) parametric values can then be adjusted as desired using the GUI slider controls. Items in a list can then be selected using GUI drop-down lists.

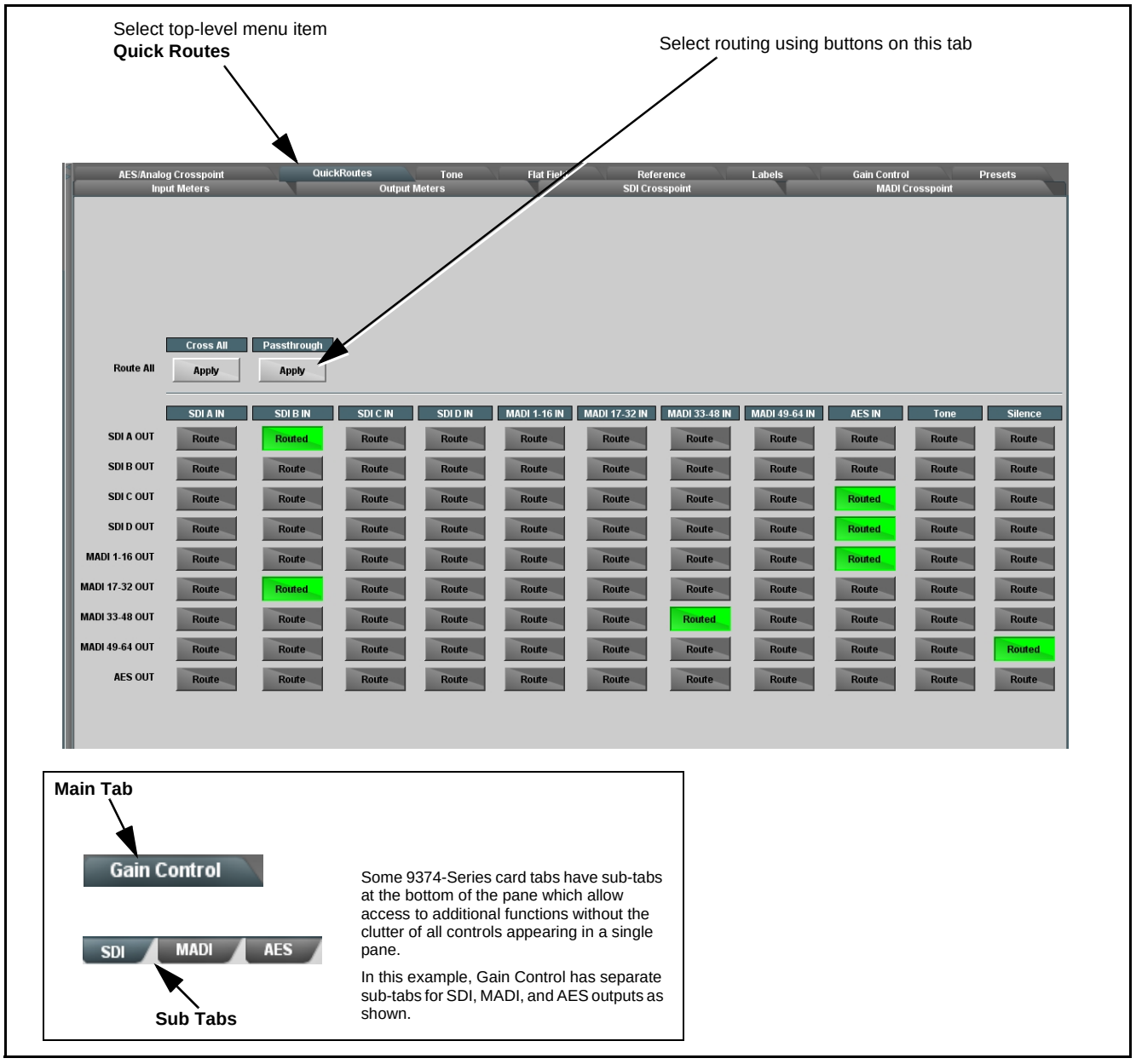


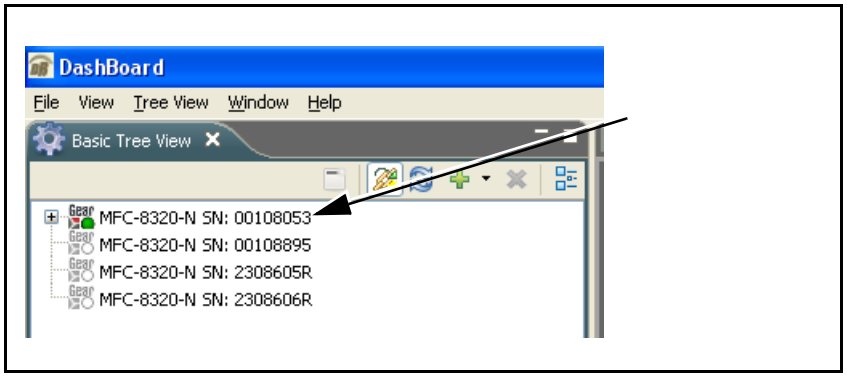
Figure 3-3 DashBoard™ Setup of Example Video Proc Function

Accessing the 9374-Series Card via Remote Control

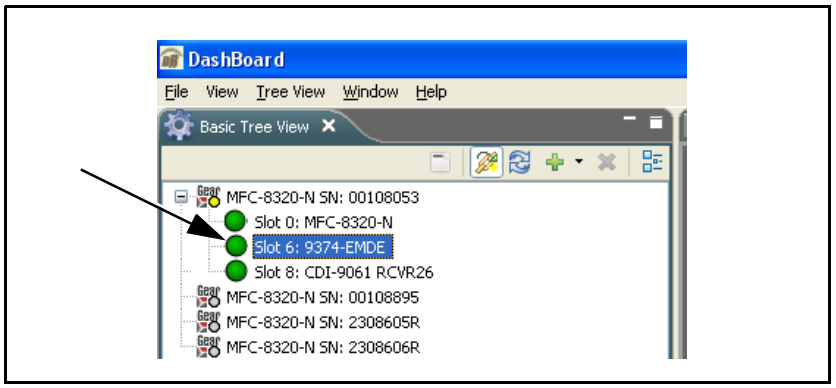
Access the 9374-Series card using DashBoard™ or Cobalt® Remote Control Panel as described below.

Accessing the 9374-Series Card Using DashBoard™

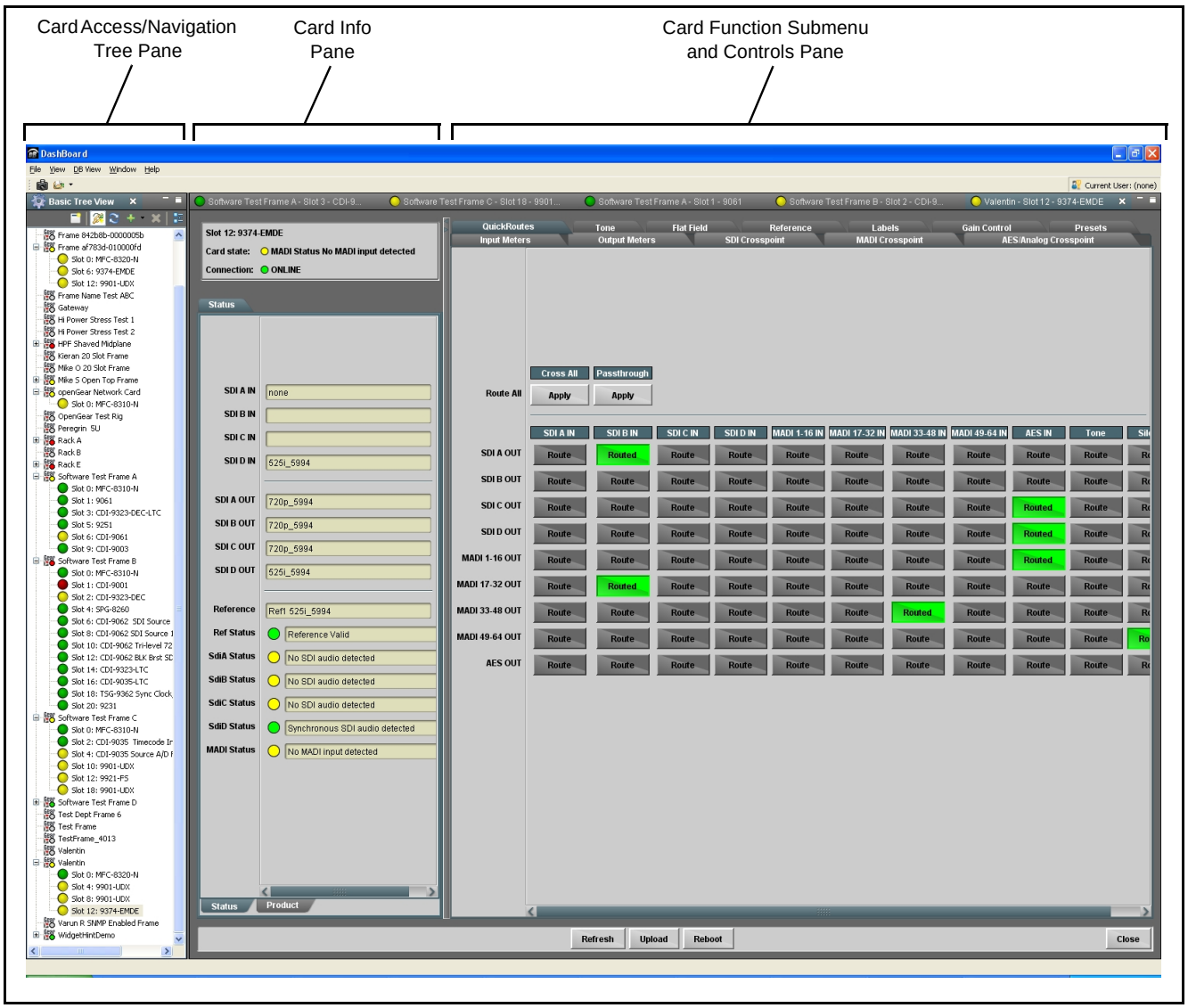
1. On the computer connected to the frame LAN, open DashBoard™.
2. As shown below (in the left side Basic View Tree) locate the Network Controller Card associated with the frame containing the 9374-Series card to be accessed (in this example, “MFC-8320-N SN: 00108053”).



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: 9374-EMDE”).



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
Basic Tree View
Slot 12: 9374-EMDE
Card state: MADI Status No MADI input detected
Connection: ONLINE
Status
Product
QuickRoutes
Tone
Flat Field
Reference
Labels
Gain Control
Presets
Input Meters
Output Meters
SDI Crosspoint
MADI Crosspoint
AES/Analog Crosspoint
Cross All
Passthrough
Route All
Apply
SDI A IN
SDI B IN
SDI C IN
SDI D IN
MADI 1-16 IN
MADI 17-32 IN
MADI 33-48 IN
MADI 49-64 IN
AES IN
SDI A OUT
SDI B OUT
SDI C OUT
SDI D OUT
MADI 1-16 OUT
MADI 17-32 OUT
MADI 33-48 OUT
MADI 49-64 OUT
AES OUT
Route
Routed
Refresh
Upload
Reboot
Close

Checking Card Information

The operating status and software version the 9374-Series 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. 3-30) 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 9374 card in slot 6.

Status Displays

Clicking the **Status** sub-tab shows the status the signal being received by the 9374, and other card conditions.

Clicking the **Product** sub-tab shows product information such as card model, options installed, and firmware versions. Use this information when communicating to Cobalt® regarding the card.

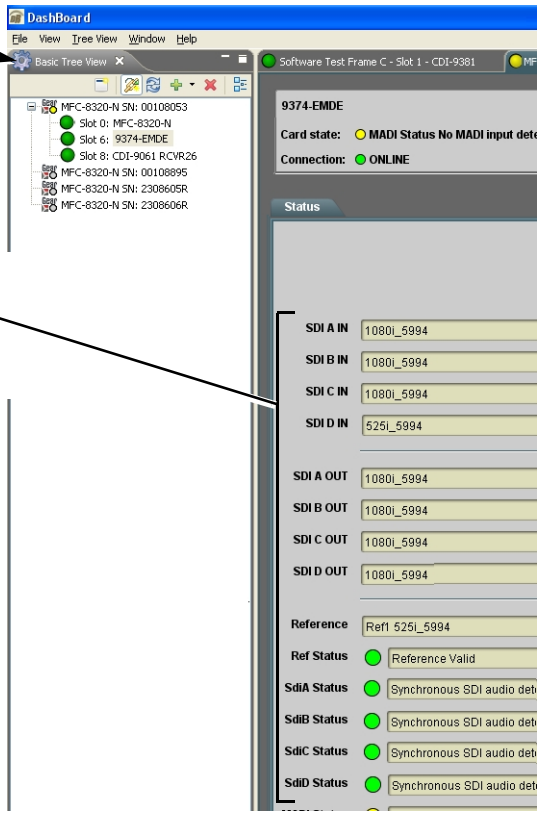


Figure 3-4 9374-Series Card Info Utility

Considerations Regarding Multiple-Channel SDI

The 9372 and 9374 cards accommodate multi-channel SDI inputs. While each SDI input supports the full range of formats (with four-group audio) as specified in Technical Specifications (p. 1-14), note the considerations and limitations described below.

In the event that a non-allowed combination is received by the card, the offending channel outputs a valid flat field, with indication of the error shown on the card **Status** tab.

Allowable Format Combinations			
A: HD **B:** HD **C:** SD **D:** SD	**A:** SD **B:** SD **C:** HD **D:** HD	**A:** HD **B:** HD **C:** HD **D:** HD	**A:** SD **B:** SD **C:** SD **D:** SD

In the above, “SD” is interchangeable with 1080p60.

If a non-allowed combination on the SDI inputs is received, the card displays the following in the **Video Path Status** display:

Note: Unless all SDI inputs received by the card are synchronous, all SDI inputs should be frame-synchronized using a common frame reference, with the same reference also to be used by this card. MADI sources should also be frame-referenced to either the video being used or a reference. AES audio is sample-rate converted to accommodate minor timing variances. Received SMPTE 337 (Dolby® data) over an AES input is automatically bypassed from the sample rate converters; this data must be synchronous to video.

9374-Series Function Submenu List and Descriptions

Table 3-1 individually lists and describes each 9374-Series card function submenu ("tab") 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 submenus and parameters.

Note:
- All numeric (scalar) parameters displayed on DashBoard™ can be changed using the slider controls, arrows, or by numeric keypad entry in the corresponding numeric field. (When using numeric keypad entry, add a return after the entry to commit the entry.)
- The GUI on the 9374-series cards require DashBoard™ version 4.1 or higher. This version can be obtained by going to www.cobaltdigital.com, and then entering "dashboard" in the search window.
- The GUI controls described here are basic routing controls if using an OGCP-9000 or WinOGCP remote control panels. VU meter displays are available only using DashBoard™ remote control.
- GUI controls shown here are for the 9374 card. Unless noted otherwise, identical controls appear on the 9372 and 9371 cards.
  - 9372 has only SDI A and SDI B source and destination embedded audio paths.
  - 9371 has only SDI A source and destination embedded audio path.

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

Some functions use **sub-tabs** to help maintain clarity and organization. In these instances, Table 3-1 shows the ordinate tab along with its sub-tabs. Highlighted sub-tabs indicate that controls described are found by selecting this sub-tab (in this example, the **Encoder Input** sub-tab).

Functions and/or features that are available only as an option are denoted in this section using this icon. When an option is not installed, tabs and controls for the function do not appear in the card DashBoard GUI.

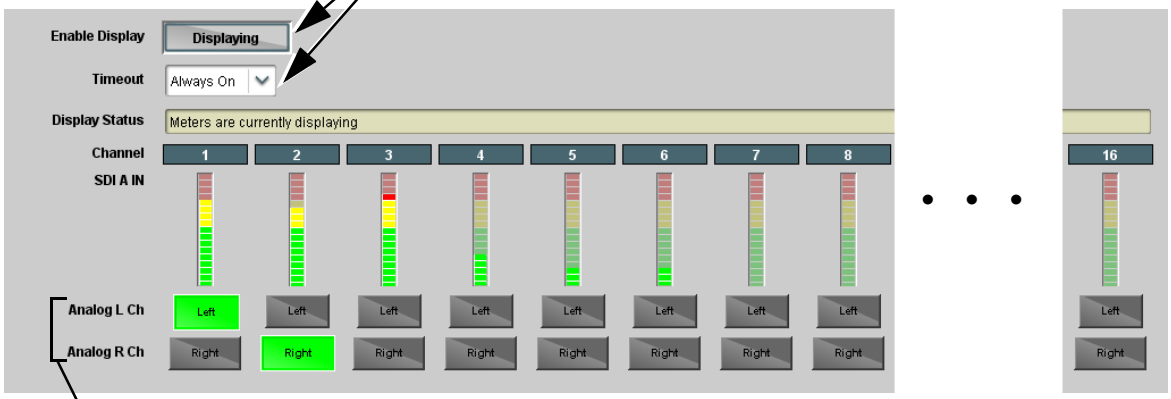
The table below provides a quick-reference to the page numbers where each function submenu item can be found.

Table 3-1 9374-Series Function Submenu List

Input Meters	Provides PPM meters in 16-channel groups for card SDI inputs, MADI inputs and AES inputs. Also provides Direct Monitor routing that allows any channel to be directly copied to the card stereo analog audio monitor outputs.

Note: 9372 and 9371 cards do not have **SDI C** and **SDI D** meter rows. 9372 has **SDI A** and **SDI B** meter rows; 9371 has **SDI A** meter row.

Enable Display and **Timeout** controls allow meter display to be turned on only when needed. (Card display/refresh speed in DashBoard™ is enhanced when dynamic displays are disabled when not needed.)

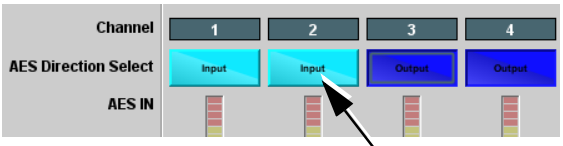


Analog L Ch and **Analog R Ch** radio buttons provide direct routing of selected channels to the card stereo analog audio monitor outputs. Selecting another monitor input clears any prior selection. (Selections made here are reflected on the AES/Analog Crosspoint tab, with changes made on that tab correspondingly also reflected here.)

SDI A IN 16-channel meter row is shown above. The following 16-channel rows are displayed:

- **SDI A IN** – SDI A embedded channels 1 - 16 (short form ID: SA01 - SA16)
- **SDI B IN** – SDI B embedded channels 1 - 16 (short form ID: SB01 - SB16)
- **SDI C IN** – SDI C embedded channels 1 - 16 (short form ID: SC01 - SC16)
- **SDI D IN** – SDI D embedded channels 1 - 16 (short form ID: SD01 - SD16)
- **MADI IN 1-16** – MADI channels 1 - 16 (short form ID: MA01 - MA16)
- **MADI IN 17-32** – MADI channels 17 - 32 (short form ID: MB01 - MB16)
- **MADI IN 33-48** – MADI channels 33 - 48 (short form ID: MC01 - MC16)
- **MADI IN 49-64** – MADI channels 49 - 64 (short form ID: MD01 - MD16)
- **AES IN 1-16** – AES-3id channels 1 - 16 (short form ID: A01 - A16)

  Note: AES channel controls have a **Direction** control to set a channel pair as a card input or output.



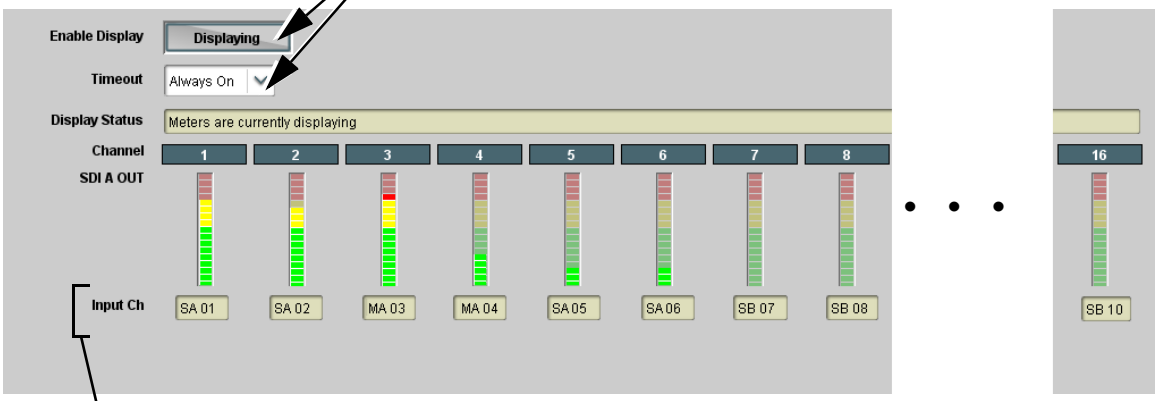
Pressing either button of a channel pair toggles between **Input** and **Output** function. In this example, pair 1 (channels 1/2) are set as **Input** (turquoise color) and pair 2 (channels 3/4) are set as **Output** (blue color). (Similar controls appear on the **Output Meters** tab and are ganged with these.)

Table 3-1 9374-Series Function Submenu List — continued

Output Meters	Provides PPM meters in 16-channel groups for card SDI outputs, MADI outputs and AES outputs.

Note: 9372 and 9371 cards do not have **SDI C** and **SDI D** meter rows. 9372 has **SDI A** and **SDI B** meter rows; 9371 has **SDI A** meter row.

Enable Display and **Timeout** controls allow meter display to be turned on only when needed. (Card display/refresh speed in DashBoard™ is enhanced when dynamic displays are disabled when not needed.)

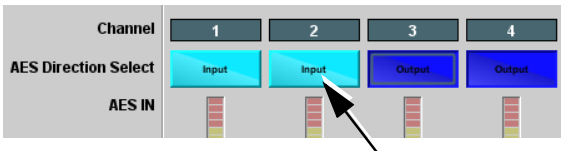


Input Ch displays show the sources currently routed to any particular output channel using a short form abbreviated ID (see below). In this example for **SDI A OUT**, SDI A embedded channels 1 and 2 (SA01, SA02) are routed to SDI A OUT embedded channels 1 and 2. Also, MADI channels 3 and 3 (MA03, MA04) are routed to SDI A OUT embedded channels 3 and 4.

SDI A OUT 16-channel meter row is shown above. The following 16-channel rows are displayed:

- **SDI A OUT** – SDI A embedded channels 1 - 16 (short form ID: SA01 - SA16)
- **SDI B OUT** – SDI B embedded channels 1 - 16 (short form ID: SB01 - SB16)
- **SDI C OUT** – SDI C embedded channels 1 - 16 (short form ID: SC01 - SC16)
- **SDI D OUT** – SDI D embedded channels 1 - 16 (short form ID: SD01 - SD16)
- **MADI OUT 1-16** – MADI channels 1 - 16 (short form ID: MA01 - MA16)
- **MADI OUT 17-32** – MADI channels 17 - 32 (short form ID: MB01 - MB16)
- **MADI OUT 33-48** – MADI channels 33 - 48 (short form ID: MC01 - MC16)
- **MADI OUT 49-64** – MADI channels 49 - 64 (short form ID: MD01 - MD16)
- **AES OUT 1-16** – AES-3id channels 1 - 16 (short form ID: A01 - A16)

  Note: AES channel controls have a **Direction** control to set a channel pair as a card input or output.



Pressing either button of a channel pair toggles between **Input** and **Output** function. In this example, pair 1 (channels 1/2) are set as **Input** (turquoise color) and pair 2 (channels 3/4) are set as **Output** (blue color). (Similar controls appear on the **Input Meters** tab and are ganged with these.)

Table 3-1 9374-Series Function Submenu List — continued

SDI Crosspoint	Provides an audio crosspoint to route any of the card source audio channels to SDI destination embedded channels.

Note: 9372 and 9371 cards do not have **SDI C** and **SDI D** channel destination rows or source columns. 9372 has **SDI A** and **SDI B** channel destination rows and source columns; 9371 has **SDI A** channel destination row and or source column.

Radio buttons allow selecting a source channel for each destination SDI output embedded channel. Route a source to an output channel by pressing the button where the destination row intersects the source column.

INPUT (source) channel columns:
- **SDI A IN** – SDI A embedded channels 1 - 16 (short form ID: SA01 - SA16)
- **SDI B IN** – SDI B embedded channels 1 - 16 (short form ID: SB01 - SB16)
- **SDI C IN** – SDI C embedded channels 1 - 16 (short form ID: SC01 - SC16)
- **SDI D IN** – SDI D embedded channels 1 - 16 (short form ID: SD01 - SD16)
- **MADI IN 1-16** – MADI channels 1 - 16 (short form ID: MA01 - MA16)
- **MADI IN 17-32** – MADI channels 17 - 32 (short form ID: MB01 - MB16)
- **MADI IN 33-48** – MADI channels 33 - 48 (short form ID: MC01 - MC16)
- **MADI IN 49-64** – MADI channels 49 - 64 (short form ID: MD01 - MD16)
- **AES IN 1-16** – AES-3id channels 1 - 16 (short form ID: A01 - A16)
- **Tone Generators 1-16** – discrete generators 1 - 16 (short form ID: T01 - A16)
- **Silence**

OUTPUT (destination) channel rows SDI A OUT (1-16) thru SDI D OUT (1-16)

In the example above, the following routing is performed:

Source (Input for embedded channel out)	SDI A OUT Destination Channels
SDI A IN Ch 1 (SA01)	**1**
SDI A IN Ch 2 (SA02)	**2**
SDI A IN Ch 3 (SA03)	**3**
SDI A IN Ch 4 (SA04)	**4**
Tone Generator 12 (T12)	**5**
Tone Generator 12 (T12)	**6**
Tone Generator 12 (T12)	**7**
Tone Generator 12 (T12)	**8**

Table 3-1 9374-Series Function Submenu List — continued

MADI Crosspoint	Provides an audio crosspoint to route any of the card source audio channels to MADI destination output channels.

Note: 9372 and 9371 cards do not have **SDI C** and **SDI D** channel source columns. 9372 has **SDI A** and **SDI B** channel source columns; 9371 has **SDI A** channel source column.

Radio buttons allow selecting a source channel for each destination MADI output channel. Route a source to an output channel by pressing the button where the destination row intersects the source column.

INPUT (source) channel columns:
- **SDI A IN** – SDI A embedded channels 1 - 16 (short form ID: SA01 - SA16)
- **SDI B IN** – SDI B embedded channels 1 - 16 (short form ID: SB01 - SB16)
- **SDI C IN** – SDI C embedded channels 1 - 16 (short form ID: SC01 - SC16)
- **SDI D IN** – SDI D embedded channels 1 - 16 (short form ID: SD01 - SD16)
- **MADI IN 1-16** – MADI channels 1 - 16 (short form ID: MA01 - MA16)
- **MADI IN 17-32** – MADI channels 17 - 32 (short form ID: MB01 - MB16)
- **MADI IN 33-48** – MADI channels 33 - 48 (short form ID: MC01 - MC16)
- **MADI IN 49-64** – MADI channels 49 - 64 (short form ID: MD01 - MD16)
- **AES IN 1-16** – AES-3id channels 1 - 16 (short form ID: A01 - A16)
- **Tone Generators 1-16** – discrete generators 1 - 16 (short form ID: T01 - A16)
- **Silence**

OUTPUT (destination) channel rows
MADI OUT (1-16)
MADI OUT (17-32)
MADI OUT (33-48)
MADI OUT (49-64)

In the example above, the following routing is performed:

Source (Input for MADI channel out)	MADI OUT Destination Channels
SDI A IN Ch 1 (SA01)	**MADI Ch 1**
SDI A IN Ch 2 (SA02)	**MADI Ch 2**
SDI A IN Ch 6 (SA06)	**MADI Ch 3**
SDI A IN Ch 7 (SA07)	**MADI Ch 4**
SDI A IN Ch 8 (SA08)	**MADI Ch 5**
AES IN Ch 1 (A01)	**MADI Ch 6**
AES IN Ch 2 (A02)	**MADI Ch 7**
AES IN Ch 3 (A03)	**MADI Ch 8**

Table 3-1 9374-Series Function Submenu List — continued

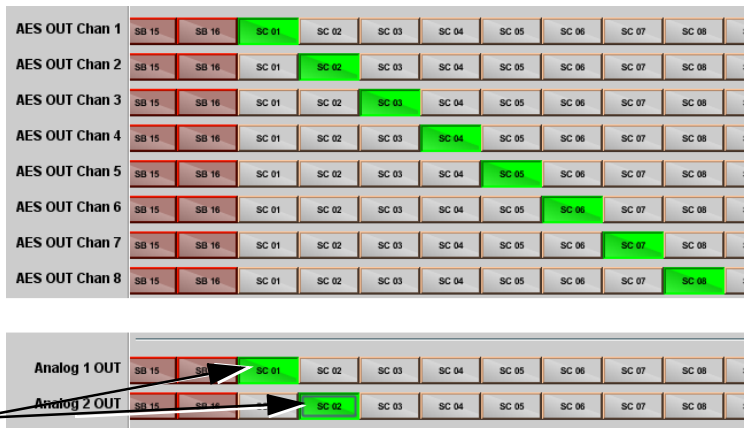
AES/Analog Crosspoint	Provides an audio crosspoint to route any of the card source audio channels to AES destination output channels and the card analog audio output monitor pair.

Note: 9372 and 9371 cards do not have **SDI C** and **SDI D** channel source columns. 9372 has **SDI A** and **SDI B** channel source columns; 9371 has **SDI A** channel source column.

Radio buttons allow selecting a source channel for each destination AES output channel and/or the card analog audio monitor pair. Route a source to an output channel by pressing the button where the destination row intersects the source column.

INPUT (source) channel columns:
- **SDI A IN** – SDI A embedded channels 1 - 16 (short form ID: SA01 - SA16)
- **SDI B IN** – SDI B embedded channels 1 - 16 (short form ID: SB01 - SB16)
- **SDI C IN** – SDI C embedded channels 1 - 16 (short form ID: SC01 - SC16)
- **SDI D IN** – SDI D embedded channels 1 - 16 (short form ID: SD01 - SD16)
- **MADI IN 1-16** – MADI channels 1 - 16 (short form ID: MA01 - MA16)
- **MADI IN 17-32** – MADI channels 17 - 32 (short form ID: MB01 - MB16)
- **MADI IN 33-48** – MADI channels 33 - 48 (short form ID: MC01 - MC16)
- **MADI IN 49-64** – MADI channels 49 - 64 (short form ID: MD01 - MD16)
- **AES IN 1-16** – AES-3id channels 1 - 16 (short form ID: A01 - A16)
- **Tone Generators 1-16** – discrete generators 1 - 16 (short form ID: T01 - A16)
- **Silence**

OUTPUT (destination) channel rows) **AES OUT (1-16) and Analog 1/2 OUT**



Analog 1/2 OUT radio buttons provide direct routing of selected channels to the card stereo analog audio monitor outputs. Selecting another monitor input clears any prior selection. (Selections made here are reflected on the **Input Meters** tab, with changes made on either tab correspondingly reflected on the other.)

In this example, SDI IN C embedded input channels 1 and 2 (SC01, SC02) are routed to the card analog monitor outputs.

In the example above, the following routing is performed:

Source (Input for AES channel out)	AES OUT Destination Channels
SDI C IN Ch 1 (SC01)	**AES Ch 1**
SDI C IN Ch 2 (SC02)	**AES Ch 2**
SDI C IN Ch 3 (SC03)	**AES Ch 3**
SDI C IN Ch 4 (SC04)	**AES Ch 4**
SDI C IN Ch 5 (SC05)	**AES Ch 5**
SDI C IN Ch 6 (SC06)	**AES Ch 6**
SDI C IN Ch 7 (SC07)	**AES Ch 7**
SDI C IN Ch 8 (SC08)	**AES Ch 8**

Note: Accessed on the **Input Meters** or **Output Meters** tabs are AES pair direction controls. Make certain pair direction is set as desired.

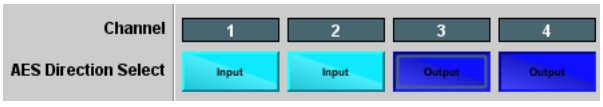
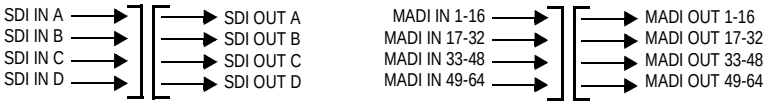


Table 3-1 9374-Series Function Submenu List — continued

QuickRoutes	Provides one-button preempt of existing routing to establish commonly used passthrough or cross routing (embed/de-embed) for all SDI and MADI inputs and outputs.

Note: 9372 and 9371 cards do not have **SDI C** and **SDI D** channel destination rows or source columns. 9372 has **SDI A** and **SDI B** channel destination rows and source columns; 9371 has **SDI A** channel destination row and or source column.

QuickRoute is useful for quickly and confidently establishing commonly used routing schemes such as passthrough and cross-route patterns. The QuickRoute button is also helpful for clearing out any custom settings and re-establishing a known routing baseline.



Passthrough establishes channel-for-channel routing between all SDI embedded channels and all MADI input and output channels.

Cross All establishes global MADI-to-SDI embedding to SDI output channels, and establishes global SDI-to-MADI de-embedding from SDI input channels to MADI output channels.

Table 3-1 9374-Series Function Submenu List — continued

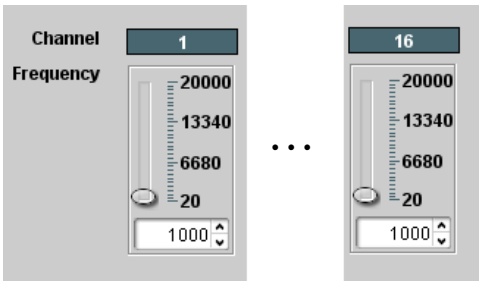
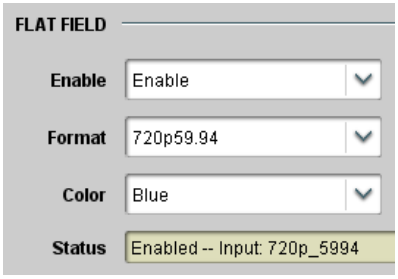
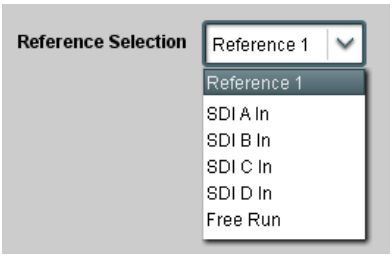
Tone	Sets the test tone frequency for each of 16 tone generators (Tone Generator 1 thru 16).
• Frequency Selectors 	Selects the frequency for each of the 16 tone generators (Tone channels 1-16; T01-T16). Independent frequencies from 20 Hz to 20 kHz (default frequency is 1.0 kHz). Default level is -20 dBFS.
Flat Field	Provides user-selected manual or failover insertion of flat fields for card SDI outputs.
Note: • 9372 and 9371 cards do not have **SDI C** and **SDI D** flat field controls. 9372 has **SDI A** and **SDI B** flat field controls; 9371 has **SDI A** flat field controls. • Controls for **SDI A OUT** thru **SDI D OUT** flat field generators are identical; only **SDI A OUT** controls are shown below.	
• Flat Field Insertion Controls 	Controls flat field insertion, failover insertion, and format as follows: • **Enable:** • **Disable** never replaces input video with flat field. • **Enable** manually replaces input video with flat field (regardless or not if input video is present). • **Enable on Loss of Video** allows valid input video to pass, but fails over to flat field upon loss of input video. **Note:** Failover occurs when receiver module does not detect stable lock for known formats supported by the card. • **Format** selects the flat-field format when flat field is inserted onto video. Choices are typical TV and film SD, HD, and 3G formats (refer to Specifications in Chapter 1. Introduction for more information). **Note:** When flat field is inserted (either manually or by failover), format of flat field is always as set per this drop-down, and does not automatically track with input video. • **Color** allows flat field color selection of nine common colors. • **Status** shows flat field insertion status, as well as status of input SDI on the video path.

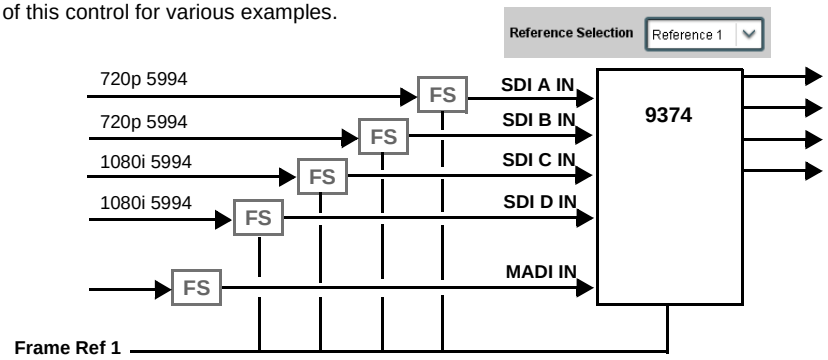
Table 3-1 9374-Series Function Submenu List — continued

Reference	Provides a master reference selection for SDI video channel sync.
• **Reference Select Control** 	Selects a master reference source for video paths as shown. **Note:** • See Considerations Regarding Multiple-Channel SDI (p. 3-8) for important information regarding operating with multiple video inputs. • Reference Selection control must be appropriately set to match upstream video signal timing: - If input video **is not locked** to a frame reference, the card should be set to lock to the respective input choice (SDI A thru SDI D). - If the video input **is locked** to a frame reference, the card should be set to same reference. • **Free Run** selection should **only** be used when no SDI inputs are to be used. This selection is valid only for internally generated flat field outputs. • A DashBoard **Reference** indication is provided that alerts to a missing reference where a reference has been selected. However, the status indication will not detect improper reference usage violating the conditions specified above.

Shown below are appropriate selections of this control for various examples.

In this example, because **all** inputs are upstreamed frame synced to frame Reference 1, 9374 can be set for ref from either an SDI input or Reference 1. **Preferred practice is to upstream lock all SDI and MADI sources to a reference that is also used by this card.**

Note: 9374 Ref 1 selection should **only** be used when upstream video is also locked to the same reference.



In this example, the 9374 is receiving only a single SDI stream. In cases where one or more synchronous SDI streams are received, the card can be set to reference from an SDI input. However, in addition to requiring all streams to be synchronous, any received MADI (or AES-3id audio carrying SMPTE 337 data) must also be synchronous with the video input (AES-3id carrying PCM can be asynchronous).

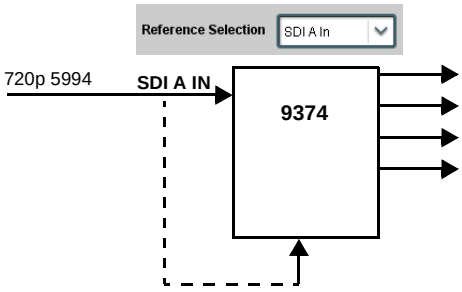


Table 3-1 9374-Series Function Submenu List — continued

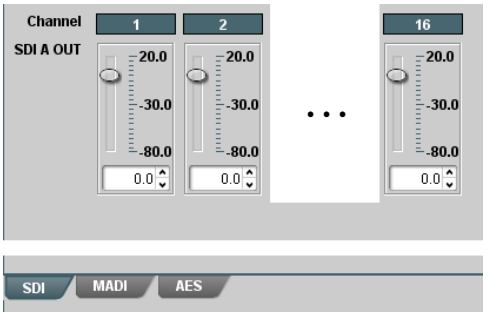
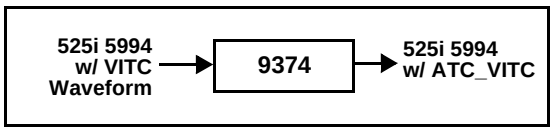
Gain Control	**Option** Provides output gain controls for each SDI embedded output, MADI, and AES-3id channel (Option **+GAIN**)
• **Gain Controls** 	Provides relative gain (in dB) control Separate sub-tabs allow access to SDI, MADI, and AES audio output channels. (-80 to +20 dB range in 0.1 dB steps; default level = -20 dBFS)

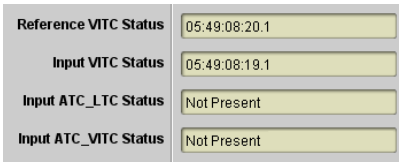
Table 3-1 9374-Series Function Submenu List — continued

Timecode A	Provides timecode data extraction from various sources, and provides formatting and re-insertion controls for inserting the timecode into the output video.

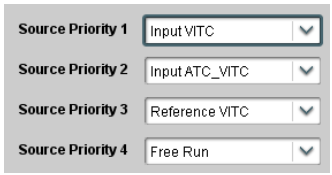
Note: 9374 has identical timecode tabs **Timecode A** thru **Timecode D** which provide independent insertions onto the respective SDI path. (9372 and 9371 have correspondingly fewer tabs).

Shown below is an example in which received SDI video with SDI VITC waveform timecode is to be converted to SDI ATC_VITC timecode data. Each Timecode control is fully described on the pages that follow.



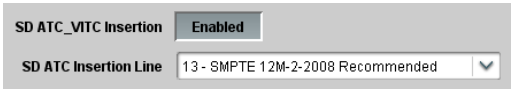


A Noting that the incoming video contains VITC waveform timecode data (as shown in the status display), set the Source Priority drop-down lists to include VITC Waveform timecode data (**SDI VITC**) as a choice. This extracts VITC Waveform timecode data from the incoming video.



B In this example, it is desired to provide SD ATC_VITC timecode data in the output video. As such, set **SD ATC VITC Insertion** to **Enabled**.

In the example here, the line numbers are set to the default SMPTE 12M-2-2008 recommended value.



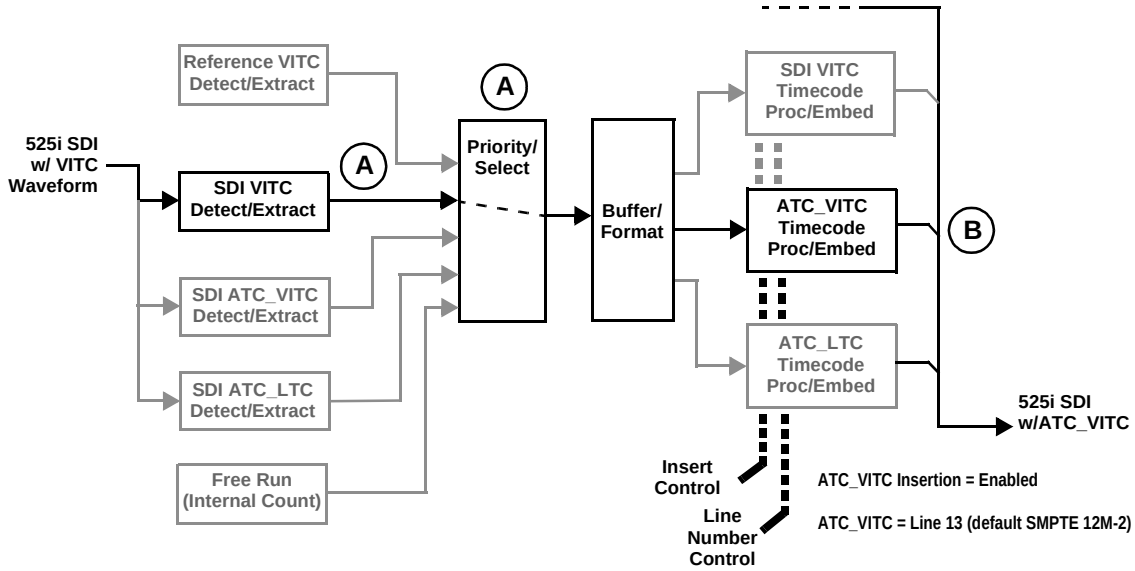
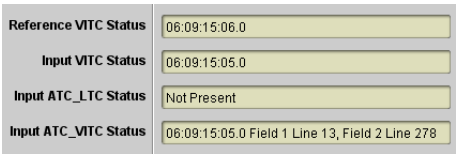
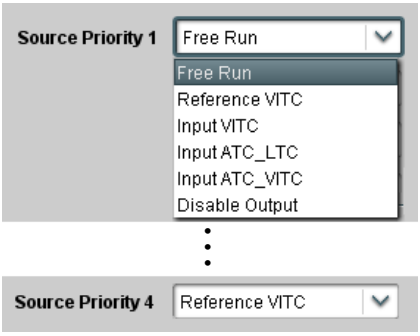
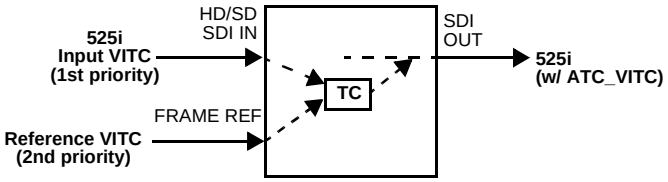


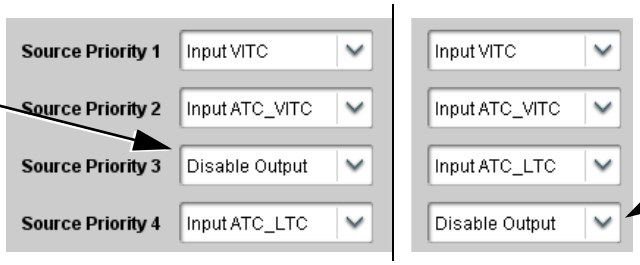
Table 3-1 9374-Series Function Submenu List — continued

Timecode A	(continued)
• **Timecode Source Status Displays** 	Displays the current status and contents of the four supported external timecode formats shown to the left. • If a format is receiving timecode data, the current content (timecode running count and line number) is displayed. • If a format is not receiving timecode data, Not Present is displayed.
• **Incoming ATC Packet Removal Control** 	Enables or disables removal of existing input video ATC timecode packets from the output. This allows removal of undesired existing timecodes from the output, resulting in a “clean slate” where only desired timecodes are then re-inserted into the output. (For example, if both SDI ATC_VITC and ATC_LTC are present on the input video, and only ATC_LTC is desired, using the Removal control will remove both timecodes from the output. The ATC_LTC timecode by itself can then be re-inserted on the output using the other controls discussed here.)
• **Source Priority** 	Selects the priority assigned to each of the four supported external formats, and internal Free Run in the event the preferred source is unavailable. **Source Priority 1** thru **Source Priority 4** select the preferred format to be used in descending order (i.e., Source Priority 2 selects the second-most preferred format, and so on. See example below.)  In this example, **Input VITC** 1st priority selection selects SDI VITC (received on SDI input) over reference VITC (received on frame reference) regardless of video input material source to be processed by the card. The selected timecode source is embedded on the SDI video output (in this example, 720p) using the selected line number. In this example, if the SDI VITC on the SDI input becomes unavailable, the card then uses the reference VITC data received on the frame reference.

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

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

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



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

Table 3-1 9374-Series Function Submenu List — continued

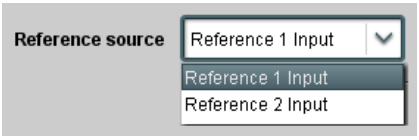
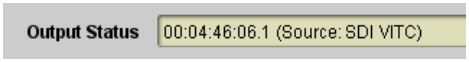
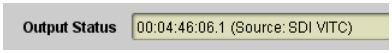
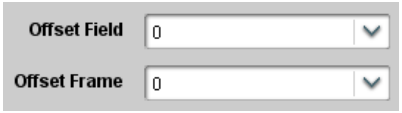
Timecode A	**(continued)**
• **Reference Source Select** 	For Reference VITC timecode choice used for Source Priority above, selects reference VITC source from the choices shown to the left.
• **Output Status Display** 	Displays the current content and source being used for the timecode data as follows:  • Output status OK (in this example, SDI VITC timecode received and outputted).  • **Timecode Insertion** button set to **Disabled**; output insertion disabled. **Note:** • If timecode is not available from Source Priority selections performed, timecode on output reverts to Free Run (internal count) mode. • Because the 1's digit of the display Frames counter goes from 0 to 29, the fractional digit (along with the 1's digit) indicates frame count as follows: 0.0 Frame 0 0.1 Frame 1 1.0 Frame 2 1.1 Frame 3 • • • 29.1 Frame 59
• **Offset Controls**  	Allows the current timecode count to be advanced or delayed on the output video. • **Offset Advance** or **Delay** selects offset advance or delay. • **Offset Field** delays or advances or delays timecode by one field. • **Offset Frame** delays or advances or delays timecode by up to 5 frames. **Note:** Default settings are null, with both controls set at zero as shown.
Note: • Although the output line drop-down on the controls described below will allow a particular range of choices, the actual range is automatically clamped (limited) to certain ranges to prevent inadvertent conflict with active picture area depending on video format. See Considerations Regarding Multiple-Channel SDI (p. 3-8) for more information. • The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data.	

Table 3-1 9374-Series Function Submenu List — continued

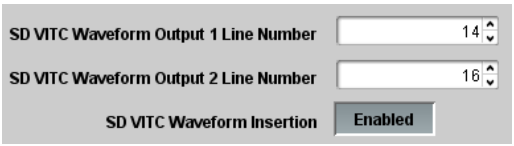
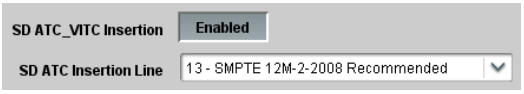
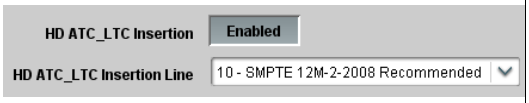
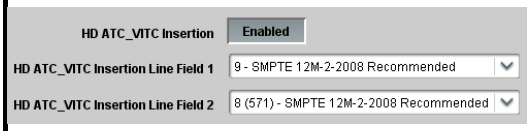
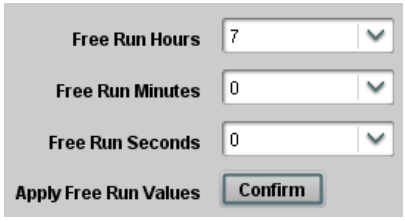
Timecode A	**(continued)**
• SD VITC Waveform Insertion Controls 	For SD output, enables or disables SD VITC waveform timecode insertion into the output video, and selects the VITC1 and VITC2 line numbers (6 thru 22) where the VITC waveform is inserted. **Note:** • If only one output line is to be used, set both controls for the same line number. • **SD VITC Waveform Insertion** control only affects VITC waveforms inserted (or copied to a new line number) by this function. An existing VITC waveform on an unscaled SD SDI stream is not affected by this control and is passed on an SDI output.
• SD ATC Insertion Control 	For SD output, enables or disables SD ATC_VITC timecode insertion into the output video, and selects the line number for ATC_VITC.
• HD ATC_LTC Insertion Control 	For HD output, enables or disables ATC_LTC timecode insertion into the output video, and selects the line number for ATC_LTC timecode data.
• HD ATC_VITC Insertion Control 	For HD output, enables or disables ATC_VITC timecode insertion into the output video, and selects the line number for ATC_VITC1 and ATC_VITC2. **Note:** If only one output line is to be used, set both controls for the same line number.
• ATC_VITC Legacy Support Control 	When enabled, accommodates equipment requiring ATC_VITC packet in both fields as a “field 1” packet (non-toggling). **Note:** Non-toggling VITC1 and VITC2 packets do not conform to SMPTE 12M-2-2008 preferences. As such, ATC_VITC Legacy Support should be enabled only if required by downstream equipment.
• Free Run Timecode Controls 	Allows an initial (starting) count to be applied to output video timecode when Free Run insertion is enabled. **Note:** • Initialization can only be applied when card is outputting Free Run timecode (as shown by Output Status displaying “Free Run”). • If failover to Free Run occurs due to loss of external timecode(s), the Free Run count assumes its initial count from the last valid externally supplied count.

Table 3-1 9374-Series Function Submenu List — continued

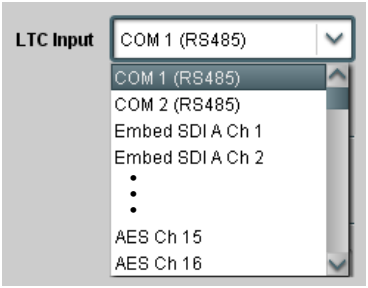
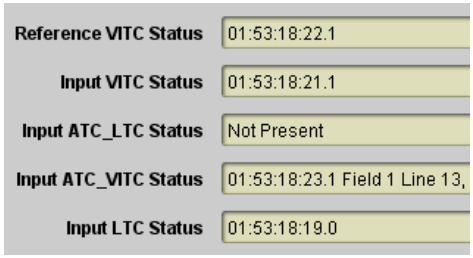
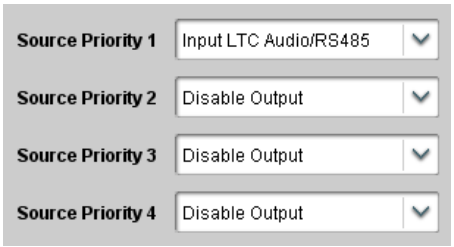
Timecode A Option +LTC	**(continued)**
Option **+LTC** allows bidirectional transfer and conversion between VANC formats over SDI and audio LTC, as well as RS-485 LTC. Audio LTC can be received or sent over digital audio using selected embedded or AES channel, as well as via two RS-485 ports on the card. RS-485/Audio LTC can be derived from each card SDI channel VANC timecode.	
Note: The controls shown here are present on each **Timecode A** thru **Timecode D** tab and provide independent insertions onto the respective SDI path. (9372 and 9371 have correspondingly fewer tabs and SDI source selections).	
Controls for Receiving LTC (LTC Rx) The controls described below allow receiving RS-485 or audio LTC. When selected as a source using the Priority controls, the received LTC can be embedded as SMPTE 12M timecode on the corresponding DCI output stream.	
• LTC Input Select Control 	Selects source to be used by card SDI channel LTC encoder to **receive** LTC as listed below. • RS-485 over COM1 or COM 2 • Audio LTC over SDI A Emb Ch 1-16 • Audio LTC over SDI B Emb Ch 1-16 • Audio LTC over SDI C Emb Ch 1-16 • Audio LTC over SDI D Emb Ch 1-16 • Audio LTC over MADI Ch 1-64 • Audio LTC over AES Ch 1-16 **Note:** • **Audio LTC Source** must be appropriately set for card to receive and process received LTC. • Card audio inputs will not center inputs with DC offset. If input has DC offset, the source may need to be capacitively coupled to remove the offset.
• Input LTC Source Status Display 	• If Audio/RS-485 LTC is being received on selected **LTC Input** source, the timecode running count is displayed.
• LTC Selected as Prioritized Choice 	The example here shows using the Source Priority controls to select receive Input (non-SDI VANC) LTC as first priority. In this example, if Input LTC is not received, the LTC encoder fails over to self-generated Free-Run. When Input LTC is used by appropriately setting it as a valid priority, it can be embedded and outputted as SMPTE 12M SDI timecode similar to any other format as described earlier.

Table 3-1 9374-Series Function Submenu List — continued

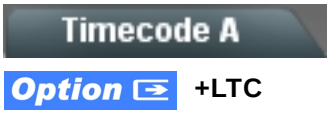
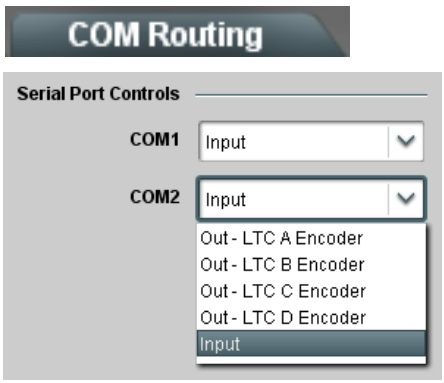
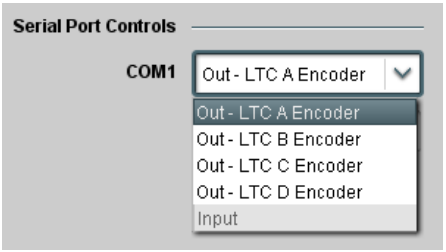
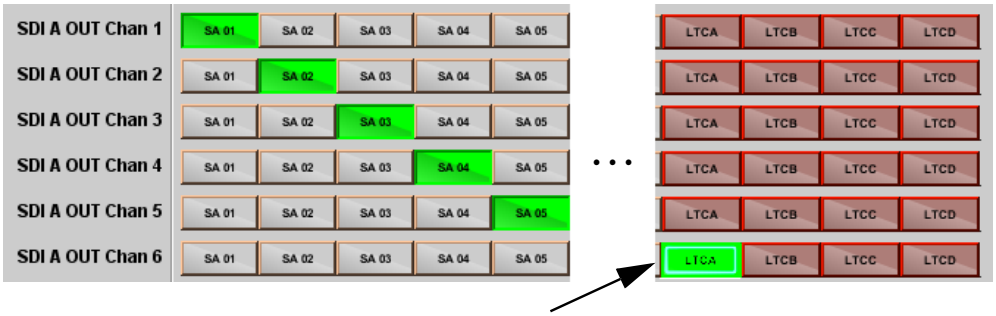
<table>
<tr><td> 
</td><td>(continued)</td></tr>
<tr><td>• RS-485 Port Direction Control
 
</td><td>If RS-485 is to be used to receive LTC, the port (COM 1 or COM 2) must be set to Input on the COM Routing tab.
Similarly, if an AES port is to be used for LTC receive, it must be set to Input (see AES/Analog Audio Crosspoint (p. 3-14) for more information).</td></tr>
<tr><td colspan="2">Controls for Transmitting LTC (LTC Rx)
The controls described below allow the sending of any timecode format supported as RS-485 or audio LTC.</td></tr>
<tr><td colspan="2">Note: Timecode tab for the channel where timecode is to be exported as LTC Tx must be set up to receive and prioritize the desired timecode source to be outputted as LTC. The timecode format and string shown in the Output Status field is the timecode data that will be outputted via the channel LTCA Encoder (or other B thru D encoder).</td></tr>
<tr><td>• Mute LTC Control
 
</td><td>Allows LTC audio or RS-485 output to mute upon loss of selected timecode inputs.
Note: • If muting upon loss of a particular input format is desired, set all Source Priority 1 thru 4 to that particular input format. If this is not done, the card failover timecode selection may substitute another format choice for the format not being received.
• If Free Run is used as a source for LTC Tx, this control must be set to Disabled to allow an output. The function of this control only “looks at” upstream-received timecode strings.</td></tr>
<tr><td>• LTC Tx over RS-485
 
</td><td>Allows routing of SDI channel A thru D LTC encoder to a selected RS-485 COM 1 or COM 2 port (example here shows encoder for SDI A channel LTC A routed to COM 1 as a transmitted output).
Note: Make certain intended COM port is not set as an input on any of the card LTC Input drop-down selectors.</td></tr>
</table>

Table 3-1 9374-Series Function Submenu List — continued

Timecode A Option +LTC	**(continued)**
• **LTC Tx over Audio Channels**	Each audio channel destination supported by the card can use an LTC encoder as its source. These destinations are: • SDI A thru D Emb Ch 1-16 • MADI Ch 1-64 • AES Ch 1-16 **Note:** Although LTC can be routed indirectly to an anlog audio output via a monitored digital audio channel (i.e., setting the Analog Out to link to a digital channel carrying LTC, this is recommended only as a basic presence check and cannot be used as an analog audio LTC output, as the card analog outputs are unbalanced and do not meet the expected 24 dBu criteria of standard analog audio LTC.



In this example, encoder **LTCA** is selected as an export source via SDI A, Emb Ch 6. Routing **LTCA** thru **LTCD** to any embedded, AES, or MADI destiniation output channel is performed similarly.

LTCA thru LTCD can be routed to **any** digital audio channel (for example, LTCA could also be routed to SDI C Emb Ch 6).

Table 3-1 9374-Series Function Submenu List — continued

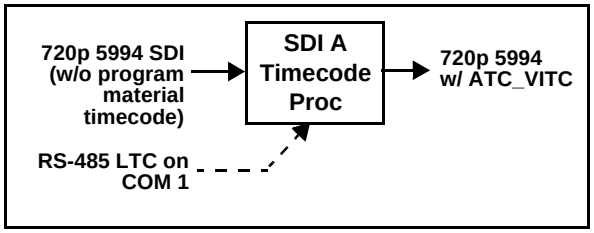
Timecode A

Option **+LTC**

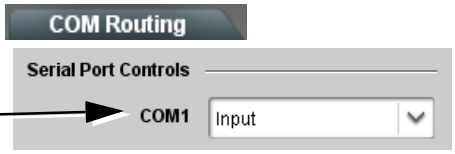
(continued)

Audio LTC Receive to SMPTE 12M VANC Conversion/Insertion Example

Shown below is an example in which 720p 5994 SDI video without SMPTE 12M VANC timecode (on card path SDI A) is to receive RS-485 LTC. The RS-485 LTC is converted to VBI ATC_VITC timecode and inserted into the SDI video as shown below.



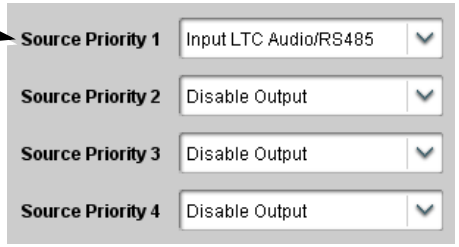
Noting that RS-485 LTC is be be received on COM 1, **LTC Input** is set to receive audio LTC via COM 1.



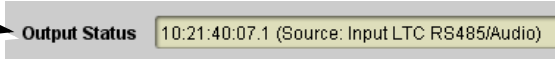
Also, COM 1 is selected to be the source the the LTC input.

Input LTC Status verifies that LTC is being received on selected routing source.

Source Priority 1 is set to prioritize Input LTC as the preferred choice. Therefore, when RS-485 LTC is present, it will be considered as the source that will eventually be outputted on the video stream.



Output Status shows audio LTC is being used as timecode source.



Received audio LTC is converted to ATC_VITC and inserted into the SDI output video as shown here using **HD ATC VITC Insertion** set to **Enabled** (in this example, the SMPTE recommended line number are used)

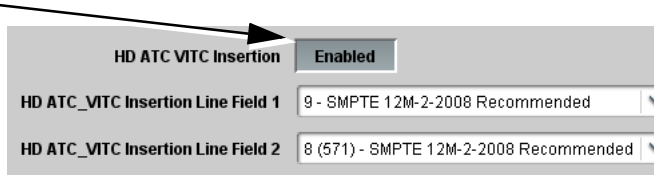
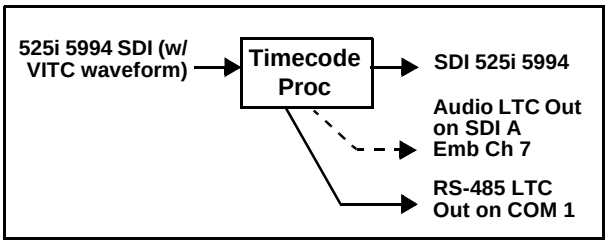


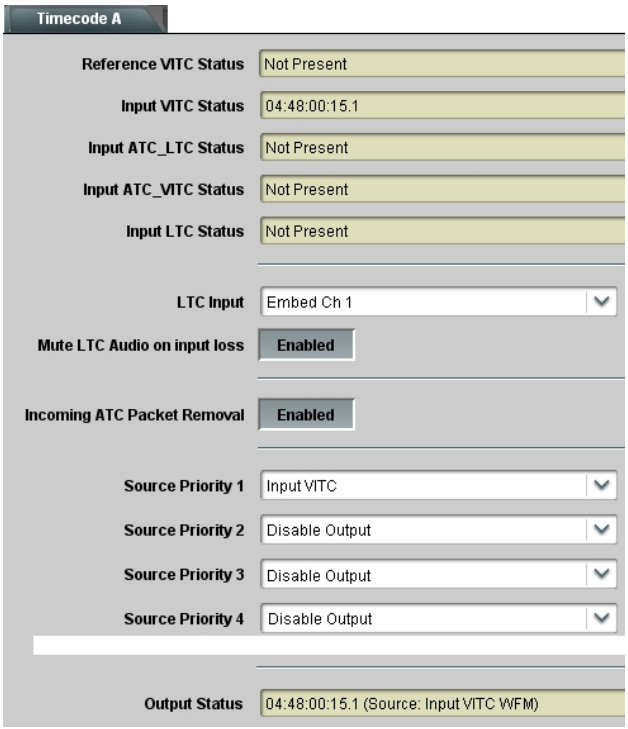
Table 3-1 9374-Series Function Submenu List — continued

Timecode A **Option** +LTC	**(continued)**

SMPTE 12M VANC Conversion to Audio/RS-485 Transmit Example

Shown below is an example in which received 525i 5994 SDI video with VBI VITC waveform timecode on SDI A is converted to Audio/RS-485 LTC and outputted on SDI A Emb Ch 7 and an RS-485 port.

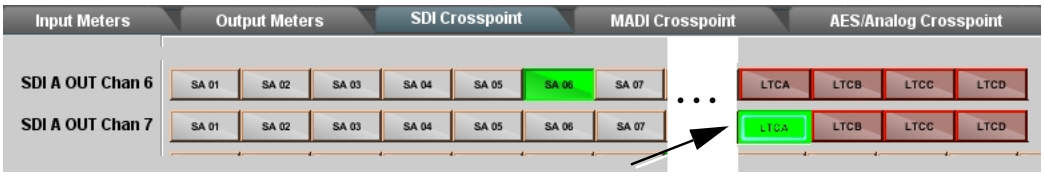




Noting that program material VITC waveform timecode is only to be used, **Source Priority 1** is set to prioritize SDI VITC as the only choice. Therefore, when VITC waveform is present, it will be considered as the source that will eventually be outputted by the card regardless of output format selected.

Output Status shows VITC waveform is being used as timecode source.

Using the **SDI Crosspoint** tab controls, SDI A LTC encoder output **LTCA** is selected as the source for SDI A Emb Ch 7, thereby outputting LTC on this channel. (If this LTC output is intended for any other audio channel, either AES, MADI, or another video path embedded channel, it can be applied by selecting LTCA also for other channels as desired.)



Because COM 1 is to be used for the RS-485 LTC output in this example, **COM 1** is set to **Out - LTCA Encoder** on the **COM Routing** tab.

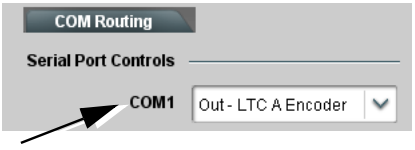
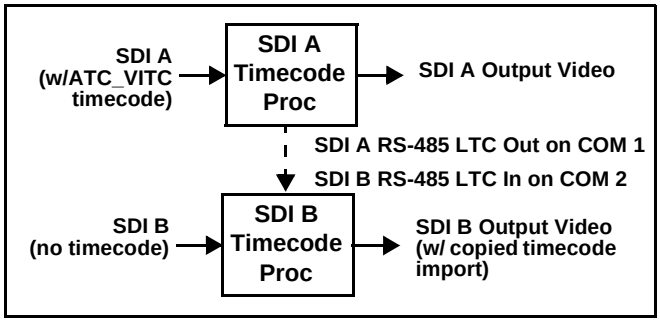


Table 3-1 9374-Series Function Submenu List — continued

Timecode A **Option** +LTC	**(continued)**

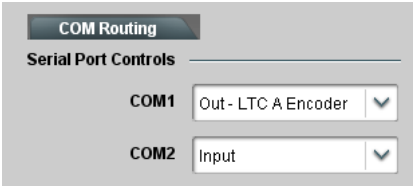
SMPTE 12M VANC Transfer From SDI-to-SDI Channel Example

Shown below is an example in which received VBI ATC_VITC timecode on SDI A is transferred (copied to) SDI B using the two RS-485 ports on the card.

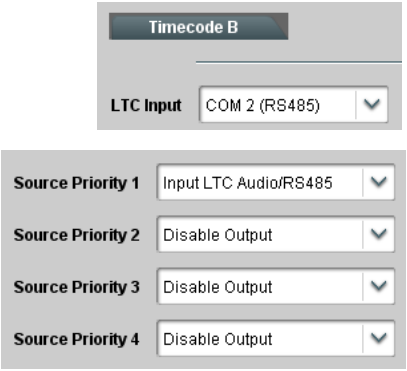


The timecode source channel controls (in this example, **Timecode A**) are set to receive and insert (output) ATC_VITC as described earlier in this section.

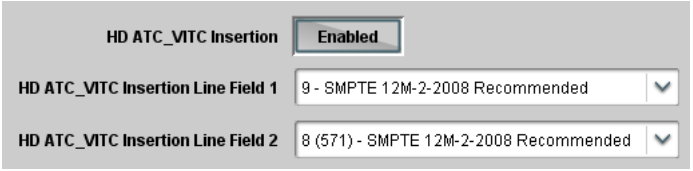
Using the COM Routing tab, the SDI A LTC encoder output **LTCA** is set to output over COM1, while COM2 is set as an input to receive the LTCA timecode (a jumper is required between the two ports).



Using the **Timecode B** tab controls, this channel is set to receive an imported RS-485 LTC (in this example, jumpered over from LTCA), and prioritize to only use this timecode.



Because no native timecode exists in the SDI B input stream, and ATC_VITC is desired as an output, the Timecode B **HD ATC_VITC Insertion** control is set to Enabled.



The Output Status display shows that the imported RS-485 LTC timecode is being used to generate the timecode output for SDI B.

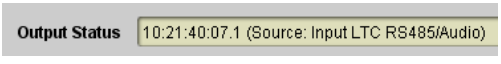


Table 3-1 9374-Series Function Submenu List — continued

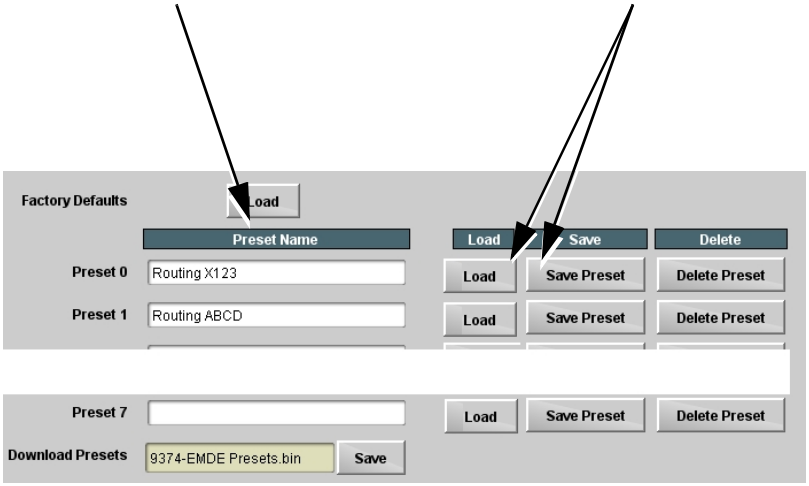
Presets	Allows up to seven card user settings configuration presets to be saved in a Preset and then recalled (loaded) as desired. All current settings are saved when a Preset Save is invoked.

Presets allow convenient recall of custom user settings performed on the card. When a preset is invoked, **only** the setting changes called by the preset are re-loaded, avoiding unnecessary delay or signal disruption that would otherwise result from a global control preset change.

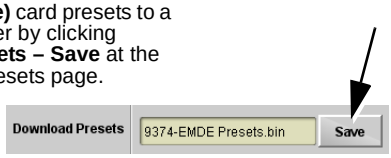
The **Preset Name** field allows entry of names that are useful in describing the purpose or action of a particular preset, as shown in the examples here.

(Up to 62 ASCII characters can be entered.)

- Preset **Save** stores all current card control settings for the selected preset (in this example, pressing **Save** for Preset 0 ("RoutingX123") saves all current card control settings to Preset 0.
- Preset **Load** recalls and applies a saved preset.

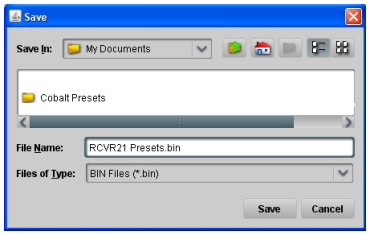


Download (save) card presets to a network computer by clicking **Download Presets – Save** at the bottom of the Presets page.



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

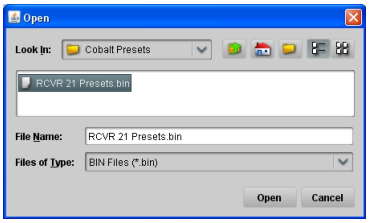
The file can then be renamed if desired (*RCVR21 Presets* in this example) before committing the save.



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

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

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



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

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

Troubleshooting

This section provides general troubleshooting information and specific symptom/corrective action for the 9374-Series card and its remote control interface. The 9374-Series 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

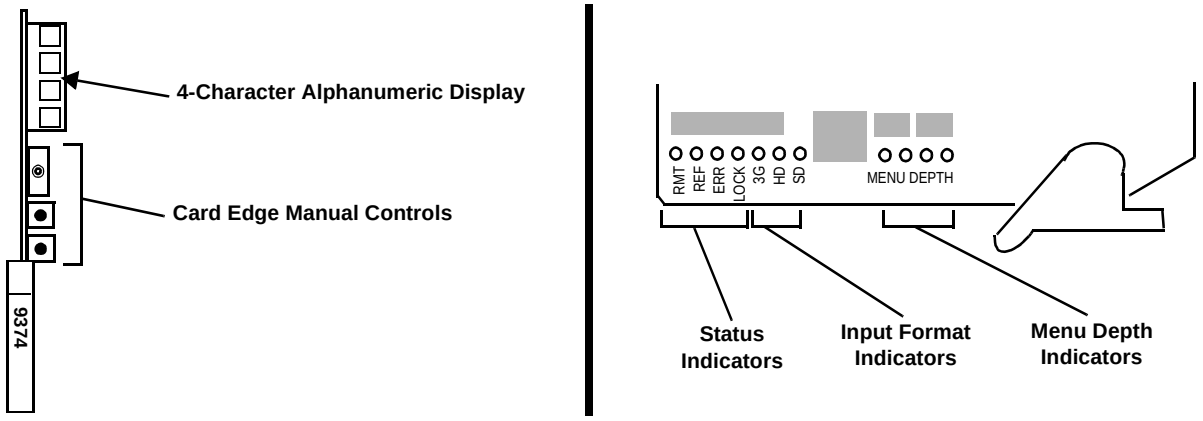
The 9374-Series card itself and its remote control systems all (to varying degrees) provide error and failure indications. Depending on how the 9374-Series card is being used (i.e, standalone or network controlled through DashBoard™, check all available indications in the event of an error or failure condition. The various 9374-Series 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. 3-34)
- 9374-Series Processing Error Troubleshooting (p. 3-34)
- Troubleshooting Network/Remote Control Errors (p. 3-36)

9374-Series Card Edge Status/Error Indicators and Display

Figure 3-5 shows and describes the 9374-Series card edge status indicators and display. These indicators and the display show status and error conditions relating to the card itself and remote (network) communications (where applicable). Because these indicators are part of the card itself and require no external interface, the indicators are particularly useful in the event of communications problems with external devices such as network remote control devices.



Item	Function
Display	Displays 4-digit abbreviated code showing menu and submenu selections. When in a menu displaying a parameter setting, the display shows parametric scalar value (and +/- sign where applicable).
Card Edge Manual Controls	This function is currently reserved.
Input Format Indicators	Three blue LEDs indicate the input signal format being received and locked onto by the card: • **3G** • **HD** • **SD** Continuous cycling of the LEDs indicates the card has not locked onto a particular format (as in the case of no signal input).
Menu Depth Indicators	This function is currently reserved.
RMT LED	Blue LED flashes when card is receiving control message from remote network control.
REF LED	Blue LED illuminates when card is receiving valid framesync when set up for framesync reference.
LOCK LED	Blue LED illuminates when card unable to lock to framesync, or unable to lock to input standard.
ERR LED	This function is currently reserved.

Figure 3-5 9374-Series Card Edge Status Indicators and Display

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 9374-Series card itself and remote (network) communications.

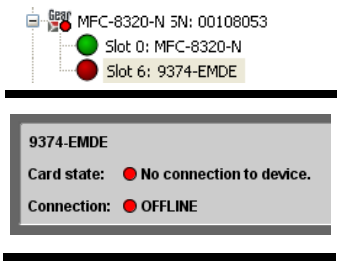
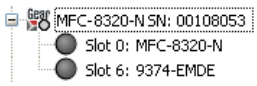
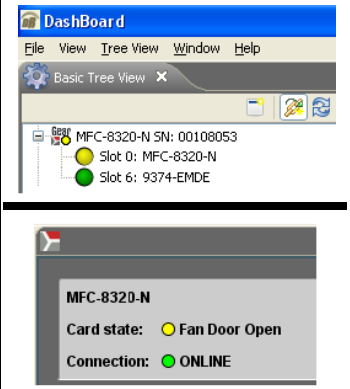
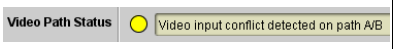
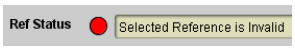
Indicator Icon or Display	Error Description
	Red indicator icon in Card Access/Navigation Tree pane shows card with Error condition (in this example, the Card Access/Navigation Tree pane shows a general error issued by the 9374 card in slot 6). Specific errors are displayed in the Card Info pane (in this example “No connection to device” indicating 9374 card is not connecting to frame/LAN). If the card is not connecting to the frame or LAN, all controls are grayed-out.
	Gray indicator icon in Card Access/Navigation Tree pane shows card(s) are not being seen by DashBoard™ due to lack of connection to frame LAN (in this example, both a 9374 card in slot 6 and the MFC-8320-N Network Controller Card for its frame in slot 0 are not being seen).
	Yellow indicator icon in Card Access/Navigation Tree pane shows card with Alert condition (in this example, the Card Access/Navigation Tree pane shows a general alert issued by the MFC-8320-N Network Controller Card). Clicking the card slot position in the Card Access/Navigation Tree (in this example Network Controller Card “Slot 0: MFC-8320-N”) opens the Card Info pane for the selected card. In this example, a “Fan Door Open” specific error is displayed.
	Yellow indicator icon in 9374 Video Path Status shows error alert, along with cause for alert (in this example, the card is receiving SDI streams that are not compatible with each other as an input pair).
	Red indicator icon in 9374 Ref Status shows error alert, along with cause for alarm (in this example, the selected reference is invalid or missing).

Figure 3-6 DashBoard™ Status Indicator Icons and Displays

Access the Card Info pane for a specific card by clicking the card slot position in the Card Access/Navigation Tree pane (as shown in the example in Figure 3-7).

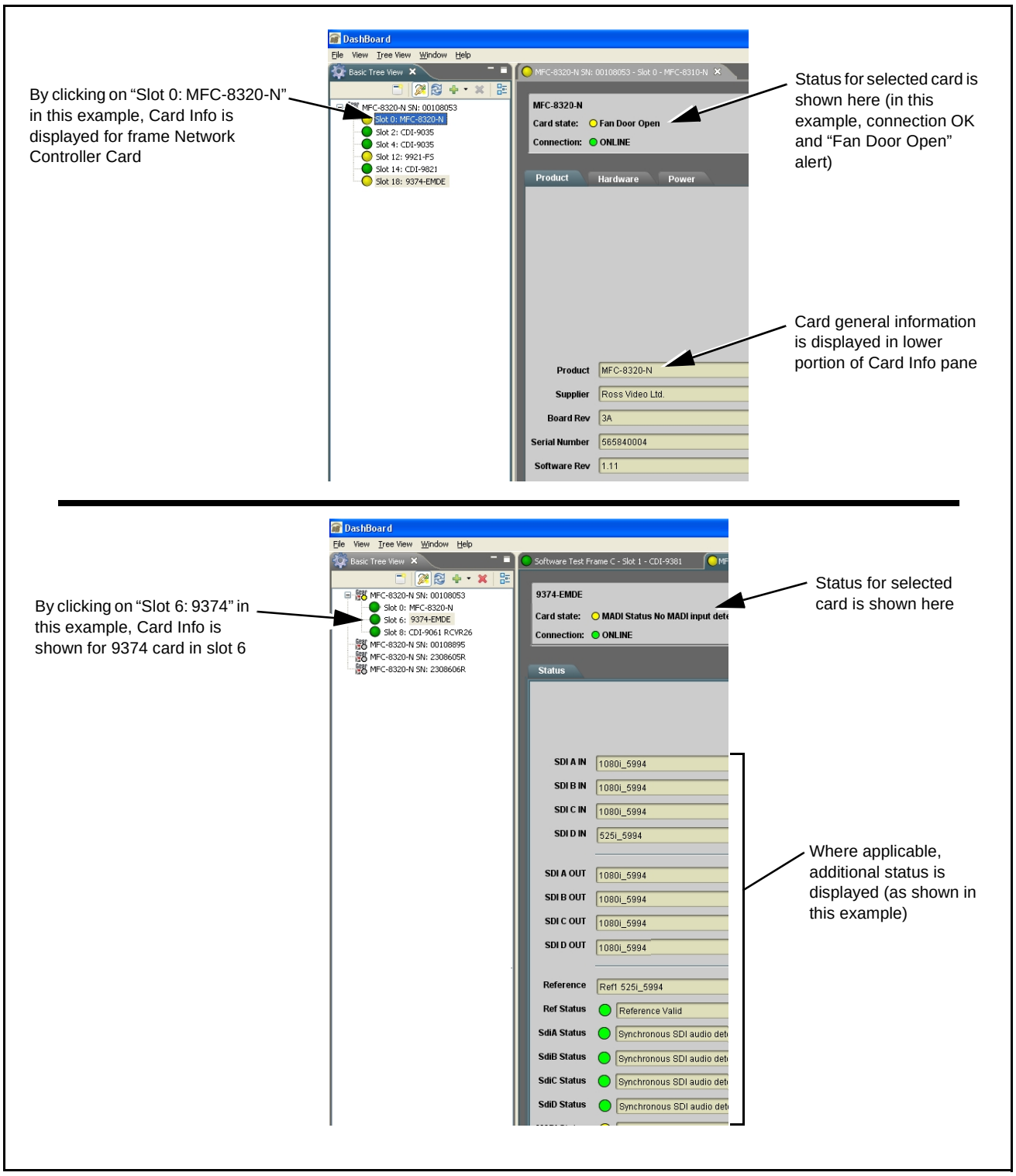


Figure 3-7 Selecting Specific Cards for Card Info Status Display

Basic Troubleshooting Checks

Failures of a general nature (affecting many cards and/or functions simultaneously), or gross inoperability errors are best addressed first by performing basic checks before proceeding further. Table 3-2 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 for power presence	On both the frame Network Controller Card and the card, 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 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.

9374-Series Processing Error Troubleshooting

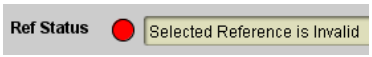
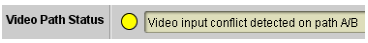
Table 3-3 provides 9374-Series processing troubleshooting information. If the card exhibits any of the symptoms listed in Table 3-3, follow the troubleshooting instructions provided.

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: 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 card edge status indicators.

Note: Where errors are displayed on both the 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 **Video** yellow icon and Input Invalid message in Card Info pane.  • If all inputs missing, card edge **Input Format** LEDs show continuous cycling.	No video input present	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.
• **DashBoard™** shows **invalid** in Ref Status message in Card Info pane. 	Reference not properly selected or not being received (card has reverted to free-run failover)	If external reference is not intended to be used, make certain the Reference selection list is set to appropriate alternate selection as desired.
• **DashBoard™** shows **Video Input conflict** in Video Path Status message in Card Info pane. 	Incompatible combination of SDI formats on SDI inputs A/B or C/D	Refer to Considerations Regarding Multiple-Channel SDI (p. 3-8). If multiple inputs SDI A/B or SDI C/D are used, inputs must conform as described.
Audio embedded from external MADI or AES sources show errors or noise/pops.	MADI audio not synchronous with video	MADI sources must be frame-referenced to either the video being used or a reference. AES audio is sample-rate converted to accommodate minor timing variances. Received SMPTE 337 (Dolby® data) over an AES input is automatically bypassed from the sample rate converters; this data must be synchronous to video.
DashBoard™ response slower than normal.	Too many PPM meters activated	Because the 9374-Series **Input Meters** and **Output Meters** tabs display near real-time dynamic data for many channels, network traffic can be economized by disabling meters when not being viewed (the meter transactions occur whenever a meter tab is enabled, regardless whether the page is being displayed). Use the meter **Timeout** or **Enable/Disable** controls to turn off metering not being used.
Input Meters or Output Meters do not display channels as expected.	**Input Meters** and **Output Meters** not enabled or have timed out	Make certain intended **Input Meters** and/or **Output Meters** are enabled, with Display Status showing “Meters are currently displaying”.
Dolby® data outputted on card SDI, AES, or MADI channels not recognized or decodable as Dolby.	Gain controls set for other than unity	If channel(s) are carrying Dolby® data, make certain Gain controls are set at default unity setting. Applying any gain change to a Dolby stream will corrupt the data.

Troubleshooting Network/Remote Control Errors

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

In Case of Problems

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

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

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

See Contact Cobalt Digital Inc. (p. 1-14) in Chapter 1, “Introduction“ for contact information.

Cobalt Digital Inc.

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