

# Input Processing Analog to Digital Video Converter with Audio Embedding and Frame Sync and Dolby<sup>®</sup> Decoding Option

# **Product Manual**



## **Cobalt Digital Inc.** 2406 E. University Ave.

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

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Congratulations on choosing the Cobalt<sup>®</sup> 9034 Input Processing Analog to Digital Video Converter with Audio Embedding and Frame Sync. (9034-SD is a functionally identical SD-only version.) The 9034 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 9034, please contact us at the contact information on the front cover.

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# Chapter 1

# Introduction

## **Overview**

This manual provides installation and operating instructions for the 9034 Input Processing Analog to Digital Video Converter with Audio Embedding and Frame Sync and Dolby<sup>®</sup> Decoding Option card (also referred to herein as the 9034).

**Note:** This manual also covers the 9034-DEC, which is the 9034 card equipped with Dolby<sup>®</sup> decoding as an option. Where applicable, descriptions related exclusively to either the 9034 or the 9034-DEC are respectively denoted by **(9034 only)** or **(9034-DEC only)**. In all other aspects, both the 9034 and 9034-DEC function identically as described in this manual.

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 9034.
- Chapter 2, "Installation and Setup" Provides instructions for installing the 9034 in a frame, and optionally installing 9034 Rear I/O Modules.
- Chapter 3, "Operating Instructions" Provides overviews of operating controls and instructions for using the 9034.

This chapter contains the following information:

- 9034 Card Software Versions and this Manual (p. 1-2)
- Manual Conventions (p. 1-3)
- Safety Summary (p. 1-4)
- 9034 Functional Description (p. 1-5)
- Technical Specifications (p. 1-20)
- Warranty and Service Information (p. 1-24)
- Contact Cobalt Digital Inc. (p. 1-25)

# 9034 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<sup>TM</sup>. See Checking 9034 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 <b>earlier</b> 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 <b>Support&gt;Firmware</b> <b>Downloads</b> 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 <b>newer</b> than version in manual	A new manual is expediently released whenever a card's software is updated <b>and specifications and/or functionality have changed</b> 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 <b>Support&gt;Documents&gt;Product Information and</b> <b>Manuals</b> link at www.cobaltdigital.com.

# **Cobalt Reference Guides**

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

# **Manual Conventions**

In this manual, display messages and connectors are shown using the exact name shown on the 9034 itself. Examples are provided below.

• Card-edge display messages are shown like this:



• Connector names are shown like this: **SDI OUT** 

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

- 9034 refers to the 9034 Input Processing Analog to Digital Video Converter with Audio Embedding and Frame Sync and Dolby<sup>®</sup> Decoding Option card.
- **Frame** refers to the HPF-9000, OG3-FR, 8321, or similar 20-slot frame that houses the Cobalt<sup>®</sup> or other cards..
- **Device** and/or **Card** refers to a COMPASS<sup>®</sup> card.
- System and/or Video System refers to the mix of interconnected production and terminal equipment in which the 9034 and other COMPASS<sup>®</sup> cards operate.
- Functions and/or features that are available only as an option are denoted in this manual like this:



#### 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**

$\triangle$	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.
	<ul> <li>Symbol (WEEE 2002/96/EC)</li> <li>For product disposal, ensure the following:</li> <li>Do not dispose of this product as unsorted municipal waste.</li> <li>Collect this product separately.</li> <li>Use collection and return systems available to you.</li> </ul>

# **Safety Summary**

#### Warnings



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

#### Cautions

CAUTION	This device is intended for environmentally controlled use only in appropriate video terminal equipment operating environments.
CAUTION	This product is intended to be a component product of an openGear® frame. Refer to the openGear frame Owner's Manual for important safety instructions regarding the proper installation and safe operation of the frame as well as its component products.
CAUTION	Heat and power distribution requirements within a frame may dictate specific slot placement of cards. Cards with many heat-producing components should be arranged to avoid areas of excess heat build-up, particularly in frames using only convection cooling. The 9034 has a moderate power dissipation (13 W). As such, avoiding placing the card adjacent to other cards with similar dissipation values if possible.
CAUTION	If required, make certain Rear I/O Module(s) is installed before installing the 9034 into the frame slot. Damage to card and/or Rear I/O Module can occur if module installation is attempted with card already installed in slot.
CAUTION	If card resists fully engaging in rear I/O module mating connector, check for alignment and proper insertion in slot tracks. Damage to card and/or rear I/O module may occur if improper card insertion is attempted.

# **9034 Functional Description**

Figure 1-1 shows a functional block diagram of the 9034. The 9034 frame synchronizer includes a full 16-channel audio embedder that receives either 8-pair AES or 8-channel balanced analog audio inputs. The 9034 also handles AFD code insertion and transfer of Dolby<sup>®</sup> metadata.

(**9034-DEC only**) The 9034-DEC also performs Dolby<sup>®</sup> E and Dolby<sup>®</sup> Digital<sup>TM</sup> decoding and decoded channel routing.

(**9034-SD only**) The 9034-SD is functionally equivalent to the 9034, except that it is limited to SD analog video input, processing, and associated controls.

Note: Some of the functions described below are available only when using the DashBoard<sup>™</sup>, or Cobalt<sup>®</sup> OGCP-9000 or OGCP-9000/CC Control Panels user interfaces. Refer to User Control Interface (p. 1-16) for user interface descriptions.

#### 9034 Input/Output Formats

The 9034 provides the following inputs and outputs:

- Inputs:
  - Y/Cmpst IN, Pr/C IN, Pb IN analog composite/component video inputs
  - AES I/O (1-4) user-switchable as AES inputs or AES outputs
  - AES IN (5-8) dedicated AES inputs
  - AN-AUD IN (1-8) balanced analog audio inputs
- Outputs:
  - SDI OUT two dual-rate HD/SD-SDI buffered video outputs
  - AES OUT (1-8) dedicated AES outputs
  - AES I/O (1-4) user-switchable as AES inputs or AES outputs
  - DOLBY META RS-485 Dolby<sup>®</sup> metadata output (extracted from input video). (9034-DEC only) RS-485 Dolby<sup>®</sup> metadata output can consist of input video or Dolby<sup>®</sup> decoder metadata output.
- **Note:** The input/output complement listed above represents the maximum capability of the 9034. The practical input/output complement is determined by the particular Rear I/O Module used with the 9034. Refer to 9034 Rear I/O Modules (p. 1-18) for more information.



Figure 1-1 9034 Functional Block Diagram

#### **Video Processor Description**

#### Video Processor

The 9034 provides full color processing control (luma gain and lift, chroma saturation, and color phase) of the output video.

#### **Frame Sync Function**

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

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

A video/audio delay offset function allows adding or reducing audio delay from the matching video delay. This function is useful for correcting lip sync problems when video and audio paths in the chain experience differing overall delays. A Reset Framesync function resets the frame sync following any horizontal or vertical offset changes, clearing any buffered audio and video and re-establishing the frame sync. The 9034 re-establishes video/audio sync following framesync changes by applying an offset in small, progressive amounts to provide a seamless, glitch-free retiming. A user-selectable hard resync function allows setting a threshold at which hard resync is applied if audio-video offset exceeds the threshold. Hard resync provides fastest snyc-up suitable for off-air manipulation. Conversely, a threshold setting that avoids hard resync allows glitch-free on-air manipulation.

In the event of input video loss of signal, this function provides for disabling the video, going to a desired color raster, or freezing to the last intact frame.

(9034-DEC only) When Dolby<sup>®</sup> data is received and actively routed into embedded or AES output channels, the frame sync function delays the video by one frame (as required by the Dolby<sup>®</sup> decode processing delay) to maintain video/audio sync.

#### **AFD Inserter**

This function provides for assignment and insertion of AFD codes into the SDI output video. Using this function, AFD codes in accordance with the standard 4-bit AFD code designations can be applied to the output video.

When used in conjunction with a separate downstream card capable of providing AFD-directed scaling, the image can in turn be scaled in accordance with the AFD coding embedded by this card.

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

#### Dolby® Metadata Extractor/Re-inserter (9034-DEC only)

This function allows Dolby<sup>®</sup> metadata from the Dolby decoder, to be inserted in the output SDI. The extracted metadata is buffered and then output on a user-selectable line number on the SDI output, and on an RS-485 port on cards equipped with an appropriate Rear I/O Module.

#### **Timecode Processor**

(See Figure 1-2.) This function provides for extraction of timecode data from the input video (for SD formats), and in turn re-insertion of timecode data into the output SDI. Timecode insertion (depending on raster format) can select and prioritize among SDI VITC, SDI ATC VITC, and SDI ATC LTC timecode sources.

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

**Option** Solution +LTC allows bidirectional transfer and conversion between VBI formats over SDI and audio LTC, as well as RS-485 LTC. Audio LTC can be received or sent over a selected balanced analog audio input, or as digital audio over a selected AES input.



Figure 1-2 Timecode Processor

#### **Audio Processor Description**

The audio processor operates as an internal audio router. The router function chooses from the following inputs:

- 16 channels (8 pairs) of discrete AES input
- 8 channels of balanced analog audio input
- Four independent internal tone generators (described below)
- Digital silence (mute) setting
- Internal Down Mix and Mono Mixer outputs (described below)
- (9034-DEC only) Decoded Dolby<sup>®</sup> channels

The router function provides the following audio outputs:

- 16 channels of embedded audio on the SDI output
- 16 channels of discrete AES output on eight AES pairs

The router acts as a full audio cross point. Each of the 32 output channels (16 embedded AES, 16 discrete AES) can receive signal from any one of the 16 AES or 8 analog input channels, four internal tone generators, or several mixer outputs. Unused output channels can be mapped to a "Silence" source. Each output also provides gain adjustment and selectable polarity inversion.

Output audio rates are always 48 kHz locked to output video, but discrete AES inputs can pass through the sample rate converters to align these inputs with the output timing. (AES must be nominally 48 kHz input; 32, 44.1, 96, and 192 kHz inputs are not compatible with the 9034.) The sample rate converters are disabled by default. Output AES is always precisely synchronized with the output video. The balanced analog audio input is sampled at 48 kHz with a +24 dBu clipping level (+24 dBu => 0 dBFS).

Note: As shown in Figure 1-1, the 9034 is equipped with eight discrete AES input pair ports and eight discrete AES output pair ports. On Rear I/O Modules having limited AES I/O capabilities, switches S11 thru S14 allow available rear module BNC connectors to be allotted between AES inputs and outputs as desired. Buffered copies of AES OUT (1-4) are available as dedicated outputs and as respective outputs fed through S11 – S14 on the 9034 card.

#### Audio Down Mixer and Mono Mixer Function

(See Figure 1-3.) The Audio Down Mixer function provides for the selection of any AES discrete, analog audio (or Dolby decoder where equipped) sources serving as Left (L), Right (R), Center (C), Left Surround (Ls), and Right Surround (Rs) individual signals to be multiplexed into a stereo pair (Down Mix Left (DM-L) and Down Mix Right (DM-R)). The resulting stereo pair DM-L and DM-R can in turn be routed and processed just like any of the other audio sources described earlier.



Figure 1-3 Audio Mixing Functional Block Diagram with Example Sources

The Mono Mixer function (Figure 1-4) generates an additional mono-mixed channel from two selected AES, analog (or Dolby decoder where equipped) input channels serving as left and right inputs. The resulting mono mix channel **MONO** can in turn be routed and processed just like any of the other audio sources described earlier.



Figure 1-4 Audio Mono Mix Functional Block Diagram with Example Sources

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#### 2.0-to-5.1 Upmix Function Option 至

**Note:** Upmix 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<sup>®</sup> price lists as **+UM**) can be purchased upon initial order, or field-activated using a key string which is sent to you when this option is purchased.)

The 2.0-to-5.1 upmixer function receives a normal PCM stereo pair from the Audio Routing/Gain Control function and upmixes the pair to provide 5.1 channels (Left (L), Right (R), Center (C), Low Frequency Effects (LFE), Left Surround (Ls), and Right Surround (Rs)). Whenever the upmixer is active, it overwrites the six selected channels with the new 5.1 upmix signals (including replacing the original source stereo L and R inputs with new L and R signals).

The 2.0-to-5.1 upmixer can be set to up mix in any of three modes: Always upmix, Bypass upmix, or Auto enable/bypass upmixing. The Auto upmixing mode looks at the signal levels on the selected channels and compares them to a selectable level threshold. It then determines whether or not to generate 5.1 upmixing from the stereo pair as follows:

- If the upmixer detects signal level **below** a selected threshold on **all four** of the selected channels designated as C, LFE, Ls, and Rs, this indicates to the upmixer that these channels are not carrying 5.1. In this case, the upmixer overwrites all six selected channels with the new 5.1 content.
- If the upmixer detects signal level **above** a selected threshold on **any** of the four selected channels designated as **C**, **LFE**, **Ls**, and **Rs**, this indicates to the upmixer that the channel(s) are already carrying viable 5.1 content. In this case, the upmixer is bypassed, allowing the original channels to pass unaffected.

The examples in Figure 1-5 show the automatic enable/disable up-mixing function applied to example selected channels **Emb Ch 1** thru **Emb Ch 6**. As shown and described, the processing is contingent upon the signal levels of the channels selected to carry the new 5.1 upmix relative to the selected threshold (in this example, -60 dBFS). Note also that this function is applied **after** the Audio Routing/Gain Control function. Because all audio inputs pass through the Audio Routing/Gain Control function before the up mixer, the up mixer can use embedded, AES discrete, and/or analog audio sources.



Figure 1-5 Up Mix Auto Enable/Bypass with Example Sources

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## Loudness Processor (Option +LP) **Option E**

**Note:** Loudness processor 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<sup>®</sup> price lists as **+LP**) can be purchased upon initial order, or field-activated using a key string which is sent to you when this option is purchased.)

If your card was purchased with option **+LP**, loudness processor manual supplement "5.1 and Stereo Loudness Processing Options for Compass<sup>®</sup> Cards (+LP51, +LP20) Manual Supplement" (OPT-SW-LP-MS) is included in your documentation package. Supplement OPT-SW-LP-MS can be downloaded from our website or requested using the Cobalt contact information in this manual.

#### **Tone Generator Function**

The 9034 contains four built-in tone generators (Tone Generator 1 thru Tone Generator 4). Each of the four tone generators can be set to a different frequency, and are available as audio sources for the embedded or AES audio outputs.

18 discrete sine wave frequencies are available, ranging from 50 Hz to 16 kHz (default frequency is 1.0 kHz).

#### **AES Audio Input Advanced Features**

#### **AES Sample Rate Converter**

The 9034 AES inputs have sample rate converters that can be independently enabled for each AES pair to allow the card to interface with asynchronous AES sources (sources in which AES timing does not match the video input timing). The sample rate converters are set to disabled (bypassed) by default; this is necessary when embedding non-PCM AES audio such as Dolby<sup>®</sup> E or Dolby<sup>®</sup> Digital audio streams. When a valid Dolby<sup>®</sup> E or Dolby<sup>®</sup> Digital signal (in accordance with SMPTE 337M) is detected on an AES or embedded audio signal, SRC is automatically bypassed along with gain and polarity controls.

#### Zero-Delay Audio Embedding

In cases where additional delay must be avoided, it may be desirable to embed AES with minimum latency. For example if Dolby<sup>®</sup> E is to be embedded into video with no latency, additional delay may not be tolerable. Using zero-delay embedding, the video can then be delayed by one frame to account for the Dolby E encoding delay. In this manner, any delay between video and audio can be cleanly contained within one frame period.

When zero-delay audio embedding is enabled for a given AES pair, the pair is directly embedded into its corresponding group (for example, AES Pair 1 into embedded channels 1 and 2; AES Pair 2 into embedded channels 3 and 4, and so on) with the normal frame sync audio delay being bypassed.

This function overrides the audio routing system (for example if AES Pair 1 is selected, then the controls to route AES Pair 1 into other embedded channels will not apply). Gain and polarity control is not available when this option is selected. Zero-delay audio embedding is set to Off by default.

#### Low-Latency AES Passthrough

This function is similar to zero-delay audio embedding. If low-latency AES passthrough is selected for a given input pair, it causes the corresponding AES output pair to act as a bit-for-bit copy of the corresponding AES input pair.

This control overrides the normal audio routing and delay. Gain and polarity control is not available when this option is selected. Passthrough is set to Off by default.

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## Dolby<sup>®</sup> Decoding (9034-DEC only) **Option D**

Note: Although the 9034-DEC Dolby<sup>®</sup> decoder can provide Dolby<sup>®</sup> Digital<sup>™</sup> (AC-3) decoding, discussion and examples here describe only Dolby<sup>®</sup> E decoding.

When Dolby<sup>®</sup> E or Dolby<sup>®</sup> Digital<sup>TM</sup> is present on an embedded audio pair, the decoder produces up to 10 decoded channels (according to the Dolby<sup>®</sup> sub-format received from the metadata). All resulting channels are available as inputs to the audio router.

#### Dolby® Identification and Metadata Output Processing

(See Figure 1-6.) All AES channels are checked by the 9034-DEC for valid Dolby<sup>®</sup> status. When a valid Dolby<sup>®</sup> encoded embedded pair is detected, the channel pair carrying the Dolby<sup>®</sup> format is displayed as "Present, Dolby E" or "Present, Dolby Digital", as applicable. (The decoder always uses the metadata associated with its respective pair.) A selected encoded channel pair can then be directed to the Dolby<sup>®</sup> decoder. The decoder then displays the Dolby<sup>®</sup> bitstream format and program configuration (for example, "Dolby E 20-bit 5.1+2" indicating 5-channel surround with LFE channel and stereo monitor pair) for the selected pair, as defined by its metadata.

The 9034-DEC can embed metadata on the SDI output. Similarly, the 9034-DEC **DOLBY META** output can provide RS-485 metadata for downstream devices or systems.

#### **Audio Decoding**

(See Figure 1-6.) Based on the channels carrying the Dolby<sup>®</sup> encoded pair and the format defined within, the Dolby<sup>®</sup> decoder provides up to 10 decoded audio channels (**Dolby Ch 1** thru **Dolby Ch 8**; **Dolby Mix 1**, **Dolby Mix 2**). Each channel can be routed just as any other audio channel described in this section.



Figure 1-6 Dolby<sup>®</sup> Decoding and Metadata Output Processing

#### **User Control Interface**

Figure 1-7 shows the user control interface options for the 9034. These options are individually described below.

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



Figure 1-7 9034 User Control Interface

- Built-in Card Edge User Interface Using the built-in card edge controls and display, card control settings can be set using a front panel menu.
- Note: Some of the 9034 functions described in this manual are available only when using the DashBoard<sup>™</sup>, or Cobalt<sup>®</sup> OGCP-9000 or OGCP-9000/CC Remote Control Panel user interfaces.
  - DashBoard<sup>™</sup> User Interface Using DashBoard<sup>™</sup>, the 9034 and other cards installed in openGear<sup>®1</sup> frames such as the Cobalt<sup>®</sup> 8321 or HPF-9000 frame can be controlled from a computer and monitor.

DashBoard<sup>™</sup> 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<sup>™</sup>, so the control interface is always up to date.

The DashBoard<sup>™</sup> software can be downloaded from the Cobalt Digital Inc. website: <u>www.cobaltdigital.com</u> (enter "DashBoard" in the search window). The DashBoard<sup>™</sup> 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<sup>®</sup> 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<sup>®</sup> cards using DashBoard<sup>™</sup>. (Cobalt<sup>®</sup> 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<sup>®</sup> as listed in Contact Cobalt Digital Inc. (p. 1-25).

 Cobalt<sup>®</sup> 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 HPF-9000 or 8321 frame.

The remote 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<sup>®</sup> control software DashBoard<sup>TM</sup>; any changes made with either system are reflected on the other.

<sup>1.</sup> openGear® is a registered trademark of Ross Video Limited. DashBoard<sup>TM</sup> is a trademark of Ross Video Limited.

#### 9034 Rear I/O Modules

The 9034 physically interfaces to system video and audio connections using a Rear I/O Module. Figure 1-8 shows a typical 9034 Rear I/O Module.

All inputs and outputs shown in the 9034 Functional Block Diagram (Figure 1-1) enter and exit the card via the card edge backplane connector. The Rear I/O Module breaks out the 9034 card edge connections to industry standard connections that interface with other components and systems in the signal chain.

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

The full assortment of 9034 Rear I/O Modules is shown and described in 9034 Rear I/O Modules (p. 2-6) in Chapter 2, "Installation and Setup".



Figure 1-8 Typical 9034 Rear I/O Module

#### Audio and Video Formats Supported by the 9034

The 9034 supports all current SMPTE standard SD and HD video formats. Table 1-1 lists and provides details regarding the audio and video formats supported by the 9034.

ltem	Dese	cription/Specification
Input / Output Video	Raster Structure:	Frame Rate:
	1080PsF	23.98; 24
	1080p	23.98; 24
	1080i <sup>(1)</sup>	25; 29.97; 30
	720p	23.98; 24; 25; 29.97; 30; 50; 59.94; 60
	486i <sup>(1, 2)</sup>	29.97
	575i <sup>(1, 2)</sup>	25
Embedded Audio	The 9034 supports all four full 24-bit resolution in both	groups (16 channels) of embedded audio at h SD (with extended data packets) and HD.
Analog Audio	The 9034 supports 8 chan The analog audio is encod digital 0 dBFS.	nels of balanced (differential) analog audio. ed such that a +24 dBu input is equivalent to
Discrete AES Audio Input	The 9034 can accept 16 c 75 $\Omega$ BNC connections. Sa account for minor clock rat input video stream.	hannels (8 pairs) of discrete AES audio on mple rate conversion can be employed to te differences in the AES stream and the
	Note: The AES signal must 48 kHz. The 9034 d 44.1 kHz, 96 kHz or	st have a nominal rate of approximately loes not support AES input at 32 kHz, r 192 kHz rates.
Discrete AES Audio Output	The 9034 can provide 16 c $75\Omega$ BNC connections.	channels (8 pairs) of discrete AES audio on
<b>(9034-DEC only)</b> Dolby <sup>®</sup> E/ Dolby <sup>®</sup> Digital™ Audio Input Decode	The 9034-DEC provides u Dolby <sup>®</sup> E or Dolby <sup>®</sup> Digital or embedded inputs with c	p to 10 decoded AES channels when valid ™ audio is received on either discrete AES corresponding metadata.
(1) All rates displayed as frame rates; in	terlaced ("i") field rates are two times	the rate value shown.

#### Table 1-1 Supported Audio and Video Formats

(2) 9034-SD support only NTSC and PAL SD rates.

# **Technical Specifications**

Table 1-2 lists the technical specifications for the 9034 Input Processing Analog to Digital Video Converter with Audio Embedding and Frame Sync card.

Item	Characteristic	
Note: HD specifications apply only to 9034; 9034-SD only accepts and outputs SD signals.		
Part number, nomenclature	<ul> <li>9034 – Input Processing Analog to Digital Video Converter with Audio Embedding and Frame Sync</li> </ul>	
	<ul> <li>9034-DEC – Input Processing Analog to Digital Video Converter with Audio Embedding and Frame Sync and Dolby<sup>®</sup> Decoding Option</li> </ul>	
	<ul> <li>9034-SD is functionally equivalent, but processes only SD anlaog video with a resulting SMPTE 259M SDI output</li> </ul>	
Installation/usage environment	Intended for installation and usage in frame meeting openGear <sup>®</sup> modular system definition.	
Power consumption	< 13 Watts (not including Dolby decoder)	
Environmental: Operating temperature: Relative humidity (operating or storage):	32° – 104° F (0° – 40° C) < 95%, non-condensing	
Frame communication	10/100 Mbps Ethernet with Auto-MDIX.	
Indicators	Card edge display and indicators as follows:	
	Status/Error LED indicator	
	Input Format LED indicator	
Controls	Card edge switches as follows:	
	Menu Enter pushbutton switch	
	Menu Exit pushbutton switch	
	Up/down selection toggle switch	
Internal Tone Generators	Four built-in tone generators, each configurable for 18 discrete sine wave frequencies ranging from 50 Hz to 16 kHz.	
	Generator source signal level is equivalent to -20 dBu.	
Analog Video Input	Input Complement:	
	Separate component Y/composite, Pr/C, and Pb inputs	
	Input Type:	
	Differential; Common Mode Rejection = 5 VAC	

Item	Characteristic
Analog Video Input (cont.)	Video Input Types:
	HD: Component YPbPr and RGB SMPTE
	SD: Composite, Component YPbPr (BetaCam™, MII™, SMPTE/N10), RGB, and Y/C
	Conversion Bit Depth:
	12 bits
	SD Color Separation:
	5-Line Adaptive Comb or Notch Filter
	Frequency Response (HD):
	Y: 0 – 25 MHz ± 0.3 dB Pb/B: 0 – 13.5 MHz ± 0.3 dB Pr/R: 0 – 13.5 MHz ± 0.3 dB
	Frequency Response (SD): 0 – 5.2 MHz ± 0.25dB
	Differential Phase (SD): < ± 0.4° typical
	Differential Gain (SD):
	$< \pm 0.4\%$ typical
	Analog Front-End Crosstalk:
	Within noise floor measurement
	Return Loss:
	> 20 dB to 30 MHz
Resolution	10-bit video data path
Video A/D Process	HD: 4:4:4 SD: 8:8:8
Resolution:	12-bit A/D and 10-bit video data path
SD Comb Filter:	5-line adaptive
Post-Processor Serial Digital Video	Number of Outputs:
Outputs	Two HD/SD-SDI BNC per IEC 60169-8 Amendment 2 (9034-SD is SD only)
	Impedance:
	75 Ω
	Return Loss:
	> 15 0B at 5 MHz - 270 MHz > 12 dB at 270 MHz - 1 485 CHz

Table 1-2 Technical Specifications — continued	Table 1-2	Technical Specifications — continued
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Item	Characteristic
Post-Processor Serial Digital Video Outputs (cont.)	Signal Level: $800 \text{ mV} \pm 10\%$ DC Offset: $0 \text{ V} \pm 50 \text{ mV}$ Jitter (HD): < 0.15  UI (all outputs) Jitter (SD): < 0.10  UI (all outputs) Overshoot: < 0.2% of amplitude
AES Audio Input	Standard: SMPTE 276M Number of Inputs (maximum): 8 unbalanced Input Level: 0.1 to 2.5 Vp-p (5 Vp-p tolerant) Input Impedance: 75 Ω Return Loss: > 12 dB at 100 kHz to 6 MHz Resolution: 24-bit only Sample Rate: 48 kHz SRC: 32-channel; 142 dB S/N
Analog Audio Input	Number of Inputs (maximum): Eight, 3-wire balanced analog audio using Phoenix connectors with removable screw terminal blocks (Phoenix PN 1803581; Cobalt PN 5000-0013-000R) Sampling Rate: 48 kHz (locked to video input) Signal Level: +24 dBu => 0 dBFS A/D Frequency Response: 20 – 20 kHz ± 0.25 dB

Item	Characteristic
AES Audio Output	Standard: SMPTE 276M Number of Outputs (maximum): 8 unbalanced Output Impedance: 75 Ω Return Loss: > 30 dB 100 kHz to 6 MHz Sample Rate: 48 kHz
RS-485 Metadata I/O	Metadata extracted from input video (per SMPTE 2020-1-2008) or Dolby <sup>®</sup> decoder (where equipped) on RS-485 interface; 3-wire balanced via Phoenix terminal block connector. With option +LTC, also provides RS-485 LTC input or output.
Reference Video Input	Number of Inputs: Two non-terminating (looping) Frame Reference inputs Standards Supported (HD): 720p 24; 25; 29.97; 30; 50; 59.94 1080i 25; 29.97 1080p 23.98; 24; 25; 29.97; 30 1080p/sF 23.98; 24 Standards Supported (SD): 486i 29.97 (NTSC); 575i 25 (PAL) Signal Level: 1 Vp-p nominal Signal Type: Analog video sync (black burst or tri-level) Impedance: 75 $\Omega$ Return Loss: > 30 dB to 30 MHz Allowable Maximum DC on Ref Input: ±1.0 V

Table 1-2	Technical Specifications — continued
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# 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<sup>®</sup> 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	Office: (217) 344-1243
Urbana, IL 61802 USA	Fax: (217) 344-1245
www.cobaltdigital.com	Email: info@cobaltdigital.com

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# **Contact Cobalt Digital Inc.**

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

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

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

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# Chapter 2

# Installation and Setup

#### **Overview**

This chapter contains the following information:

- Setting I/O Switches for AES I/O (1-4) Ports (p. 2-1)
- Installing the 9034 Into a Frame Slot (p. 2-2)
- Installing a Rear I/O Module (p. 2-5)
- Setting Up 9034 Network Remote Control (p. 2-9)

## Setting I/O Switches for AES I/O (1-4) Ports

- **Note:** This procedure is applicable only if any of the four AES I/O (1-4) ports on the 9034 are to be used as **outputs** (the switches are set to input mode by factory default). The 9034 is equipped with a four-section red DIP switch that sets AES pairs 1 thru 4 as either inputs or outputs. The factory default position is the **input** position for each pair.
  - If all of the AES I/O (1-4) ports are to be used as inputs (or not used at all), omit this procedure.
  - If any of the AES I/O (1-4) ports are to be used as outputs, set the switches as described in this procedure.

Note switch S11 thru S14 settings for **AES I/O 1** thru **AES I/O 4** mode shown in Figure 2-1. For port to be used as an **output**, set switch to down position as shown in Figure 2-1.

Note: Regardless of S11 thru S14 settings for AES I/O 1 thru AES I/O 4, outputs AES OUT (1-8) are still available on cards equipped with a Rear I/O Module having dedicated AES OUT (1-8) BNC connectors.



Figure 2-1 9034 AES I/O (1-4) Mode Switches

# Installing the 9034 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 9034 has a moderate power dissipation (13 W). As such, avoiding placing the card adjacent to other cards with similar dissipation values if possible.

#### CAUTION



- **Note:** If installing the 9034 in an 8310-C-BNC or 8310-BNC frame (which is pre-equipped with a 100-BNC rear I/O module installed across the entire backplane) or a slot already equipped with a suitable I/O module, proceed to card installation steps below.
  - If installing the 9034 in a slot with no rear I/O module, a Rear I/O Module is required before cabling can be connected. Refer to Installing a Rear I/O Module (p. 2-5) for rear I/O module installation procedure.

#### CAUTION

If required, make certain Rear I/O Module(s) is installed before installing the 9034 into the frame slot. Damage to card and/or Rear I/O Module can occur if module installation is attempted with card already installed in slot.

**Note:** Check the packaging in which the 9034 was shipped for any extra items such as a Rear I/O Module connection label. In some cases, this label is shipped with the card and to be installed on the Rear I/O connector bank corresponding to the slot location of the card.

Install the 9034 into a frame slot as follows:

- 1. Determine the slot in which the 9034 is to be installed.
- 2. Open the frame front access panel.
- **3.** While holding the card by the card edges, align the card such that the plastic ejector tab is on the bottom.
- 4. Align the card with the top and bottom guides of the slot in which the card is being installed.
- **5.** Gradually slide the card into the slot. When resistance is noticed, gently continue pushing the card until its rear printed circuit edge terminals engage fully into the rear I/O module mating connector.

#### CAUTION

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

- 6. Verify that the card is fully engaged in rear I/O module mating connector.
- **7.** Close the frame front access panel.
- 8. Connect the input and output cables as follows:
  - If the 9034 is being installed in a PN 8310-BNC or 8310-C-BNC frame, refer to the label on the connector bank corresponding to the card's slot location for connector designations.
  - If the 9034 is being installed in a frame using a specific 9034 Rear I/O Module, connect cabling in accordance with the appropriate diagram shown in Table 2-1, "9034 Rear I/O Modules" (p. 2-6).

- 9. Repeat steps 1 through 8 for other 9034 cards.
- **Note:** The 9034 BNC inputs are internally 75-ohm terminated. It is not necessary to terminate unused BNC inputs or outputs.
- **Note:** External frame sync reference signals are received by the card over a reference bus on the card frame, and not on any card rear I/O module connectors. The frame has BNC connectors labeled **REF 1** and **REF 2** which receive the reference signal from an external source such as a house distribution.
- **Note:** To remove a card, press down on the ejector tab to unseat the card from the rear I/O module mating connector. Evenly draw the card from its slot.
  - 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 Cobalt<sup>®</sup> reference guide "COMPASS<sup>TM</sup> Remote Control User Guide" (PN 9000RCS-RM).
- Note: If installing a card in a frame already equipped for, and connected to DashBoard<sup>™</sup>, no network setup is required for the card. The card will be discovered by DashBoard<sup>™</sup> and be ready for use.

# Installing a Rear I/O Module

**Note:** This procedure is applicable **only if a Rear I/O Module is not currently installed** in the slot where the 9034 is to be installed.

If installing the 9034 in a 8310-C-BNC or 8310-BNC frame (which is pre-equipped with a 100-BNC rear I/O module installed across the entire backplane) or a slot already equipped with a suitable I/O module, omit this procedure.

The full assortment of 9034 Rear I/O Modules is shown and described in 9034 Rear I/O Modules (p. 2-6). Install a Rear I/O Module as follows:

- 1. On the frame, determine the slot in which the 9034 is to be installed.
- **2.** In the mounting area corresponding to the slot location, install Rear I/O Module as shown in Figure 2-2.



Figure 2-2 Rear I/O Module Installation

#### 9034 Rear I/O Modules

Table 2-1 shows and describes the full assortment of Rear I/O Modules specifically for use with the 9034.

- **Notes:** Rear I/O Modules equipped with 3-wire Phoenix connectors are supplied with removable screw terminal block adapters. For clarity, the adapters are omitted in the drawings below.
  - Rear I/O Modules with **DOLBY META** port provide RS-485 port usable for Dolby metadata decoder output (where equipped with option **+DEC**) or serial LTC I/O (where licensed for option **+LTC**).
  - RM20-x Rear I/O Modules compatible only with 20-slot frames.

#### Table 2-1 9034 Rear I/O Modules

9034 Rear I/O Module	Description
RM20-9034-A $\bigcirc$	<ul> <li>Provides the following connections:</li> <li>Analog Y/composite, Pr/C, and Pb coaxial inputs (Y/Cmpst, Pr/C, and Pb, respectively)</li> <li>Four AES I/O coaxial input/outputs (AES I/O 1 thru AES I/O 4; I/O function of each connection is user-configurable)</li> <li>Two buffered SDI coaxial outputs (SDI OUT 1 and SDI OUT 2)</li> </ul>
RM20-9034-B	<ul> <li>Provides the following connections:</li> <li>Analog Y/composite, Pr/C, and Pb coaxial inputs (Y/Cmpst, Pr/C, and Pb, respectively)</li> <li>Four analog balanced audio inputs (AN-AUD IN 1 thru AN-AUD IN 4)</li> <li>Two buffered SDI coaxial outputs (SDI OUT)</li> </ul>
### Table 2-1 9034 Rear I/O Modules — continued

9034 Rear I/O Module	Description
RM20-9034-C         Image: AES IN 5       AES IN 6       Image: Complexity of the second	<ul> <li>Provides the following connections:</li> <li>Analog Y/composite, Pr/C, and Pb coaxial inputs (Y/Cmpst, Pr/C, and Pb, respectively)</li> <li>Four AES I/O coaxial input/outputs (AES I/O 1 thru AES I/O 4; I/O function of each connection is user-configurable)</li> <li>Two dedicated AES coaxial audio inputs (AES IN 5 and AES IN 6)</li> <li>Eight analog balanced audio inputs (AN-AUD IN 1 thru AN-AUD IN 8)</li> <li>Two buffered SDI coaxial outputs (SDI OUT)</li> </ul>
RM20-9034-D         Image: Algorithm of the second state of the secon	<ul> <li>Provides the following connections:</li> <li>Analog Y/composite, Pr/C, and Pb coaxial inputs (Y/Cmpst, Pr/C, and Pb, respectively)</li> <li>Four AES I/O coaxial input/outputs (AES I/O 1 thru AES I/O 4; I/O function of each connection is user-configurable)</li> <li>Four dedicated AES coaxial audio inputs (AES IN 5 thru AES IN 8)</li> <li>Six dedicated AES coaxial audio outputs (AES OUT 1 thru AES OUT 6)</li> <li>Two buffered SDI coaxial outputs (SDI OUT)</li> <li>Note: AES OUT 1 thru AES OUT 4 on RM20-9034-D Rear I/O Module always function as outputs regardless of whether AES I/O 1 thru AES I/O 4 are used as inputs or outputs.</li> </ul>

### Table 2-1 9034 Rear I/O Modules — continued

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9034 Rear I/O Module	Description	
RM20-9034-F $A B G RS-485$ $O O O O O O O O O O O O O O O O O O O $	<ul> <li>Provides the following connections:</li> <li>Analog Y/composite, Pr/C, and Pb coaxial inputs (Y/Cmpst, Pr/C, and Pb, respectively)</li> <li>Eight analog balanced audio inputs (AN-AUD IN 1 thru AN-AUD IN 8)</li> <li>Four AES I/O coaxial input/outputs (AES I/O 1 thru AES I/O 4; I/O function of each connection is user-configurable)</li> <li>Two buffered SDI coaxial outputs (SDI OUT)</li> <li>Dolby<sup>®</sup> RS-485 metadata output (RS-485)</li> <li>Note: On card with +LTC option, this connector provides RS-485 LTC I/O as well as Dolby metadata output (selectable using card control).</li> </ul>	
RM20-9034-E-DIN-HDBNC         Pb IN       NC         O       O         Pr/C IN       Y/Cmpst IN         OUT1       OUT4         O       OUT5         OUT3       OUT6         I/O1       I/O2         I/O1       I/O2         I/O1       I/O2         I/O1       I/O2         I/O1       I/O2         I/O3       I/O4         I/O3       O         I/O4       IN5         I/O5       O         I/O5       O         I/O4       I/O5         I/O5       O         I/O5       O	<ul> <li>High-density rear modules provides the following connections:</li> <li>Analog Y/composite, Pr/C, and Pb coaxial inputs (Y/Cmpst, Pr/C, and Pb, respectively)</li> <li>Four dedicated AES coaxial audio inputs (AES IN 5 thru AES IN 8)</li> <li>Four AES I/O coaxial input/outputs (AES I/O 1 thru AES I/O 4; I/O function of each connection is user-configurable)</li> <li>Six dedicated AES coaxial audio outputs (AES OUT 1 thru AES OUT 6)</li> <li>Two buffered SDI coaxial outputs (SDI OUT)</li> <li>Note: Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9034-E-HDBNC or RM20-9034-E-DIN, respectively.</li> </ul>	
COBALT RM20-9001-B/S-DIN **SAMPLE-NOT FOR USE**	Due to the density of connector placement on Rear Modules using high-density connectors (e.g., RM20-9001-B/S-DIN), these modules use a QR barcode label instead a regular label. Simply scan the image with a smart phone and a link to the rear module label (as shown in our catalog) will appear. (Smart phone must have a QR reader app such as QuickMark QR Code Reader or equivalent.) Not all devices may be able to acquire the image. If this occurs, use the device to access the web page for card/rear module to view the diagram.	

### Setting Up 9034 Network Remote Control

Perform remote control setup in accordance with Cobalt<sup>®</sup> 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<sup>®</sup> 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<sup>™</sup> cards using DashBoard<sup>™</sup>. (Cobalt<sup>®</sup> 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<sup>®</sup> as listed in Contact Cobalt Digital Inc. (p. 1-25).

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

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## Chapter 3

# **Operating Instructions**

### **Overview**

This chapter contains the following information:

If you are already familiar with using DashBoard or a Cobalt Remote Control Panel to control Cobalt cards, please skip to 9034 Function Submenu List and Descriptions (p. 3-9).

- Control and Display Descriptions (p. 3-1)
- Accessing the 9034 Card via Remote Control (p. 3-5)
- Checking 9034 Card Information (p. 3-7)
- Ancillary Data Line Number Locations and Ranges (p. 3-8)
- 9034 Function Submenu List and Descriptions (p. 3-9)
- Troubleshooting (p. 3-48)

### **Control and Display Descriptions**

This section describes the user interface controls, indicators, and displays for using the 9034 card. The 9034 functions can be accessed and controlled using any of the user interfaces described here.

The format in which the 9034 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 9034 functions (and the controls, indicators, and displays related to a particular function) follows a general arrangement of Function Submenus under which related controls can be accessed (as described in Function Submenu/Parameter Submenu Overview below).

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

www.cobaltdigital.com>Support>Documents>Reference Guides.

**Note:** When a setting is changed, settings displayed on DashBoard<sup>™</sup> (or a Remote Control Panel) are the settings as effected by the 9034 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 9034 card are organized into function **submenus**, which consist of parameter groups as shown below.

Figure 3-1 shows how the 9034 card and its submenus are organized, and also provides an overview of how navigation is performed between cards, function submenus, and parameters.



Figure 3-1 Function Submenu/Parameter Submenu Overview

### DashBoard<sup>™</sup> User Interface

(See Figure 3-2.) The 9034 function submenus are organized in DashBoard<sup>TM</sup> using tabs. When a tab is selected, each parametric control or selection list item associated with the function is displayed. Scalar (numeric) parametric values can then be adjusted as desired using the GUI slider controls. Items in a list can then be selected using GUI drop-down lists. (In this manner, the setting effected using controls and selection lists displayed in DashBoard<sup>TM</sup> are comparable to the submenu items accessed and committed using the 9034 card edge controls.)



Figure 3-2 Typical DashBoard Tabs and Controls

### **Cobalt® Remote Control Panel User Interfaces**

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

When the desired function submenu is selected, each parametric control or selection list item associated with the function is displayed. Scalar (numeric) parametric values can then be adjusted as desired using the control knobs, which acts like a potentiometer. Items in a list can then be selected using the control knobs which correspondingly acts like a rotary switch. (In this manner, the setting effected using controls and selection lists displayed on the Control Panel are comparable to the submenu items accessed and committed using the 9034 card edge controls.)

Figure 3-3 shows accessing a function submenu and its parameters (in this example, "Video Proc") using the Control Panel as compared to using the card edge controls.

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



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

### Accessing the 9034 Card via Remote Control

Access the 9034 card using DashBoard<sup>TM</sup> or Cobalt<sup>®</sup> Remote Control Panel as described below.

### Accessing the 9034 Card Using DashBoard™

- 1. On the computer connected to the frame LAN, open DashBoard<sup>TM</sup>.
- **2.** As shown below, in the left side Basic View Tree locate the Network Controller Card associated with the frame containing the 9034 card to be accessed (in this example, "MFC-8320-N SN: 00108053").



 As shown below, expand the tree to access the cards within the frame. Click on the card to be accessed (in this example, "Slot 6: CDI-9034 RCVR21").



As shown on the next page, when the card is accessed a DashBoard<sup>TM</sup> 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<sup>TM</sup>).



### Accessing the 9034 Card Using a Cobalt® Remote Control Panel



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

### **Checking 9034 Card Information**

The operating status and software version the 9034 card can be checked using DashBoard<sup>TM</sup> or the card edge control user interface. Figure 3-4 shows and describes the 9034 card information screen using DashBoard<sup>TM</sup> and accessing card information using the card edge control user interface.

**Note:** Proper operating status in DashBoard<sup>™</sup> 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. 3-48) for corrective action.



Figure 3-4 9034 Card Info Utility

### **Ancillary Data Line Number Locations and Ranges**

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

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

1. The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data.

2. While range indicated by drop-down list on GUI may allow a particular range of choices, the actual range is automatically clamped (limited) to certain ranges to prevent inadvertent conflict with active picture area depending on video format. Limiting ranges for various output formats are as follows:

Format	Line No. Limiting	Format	Line No. Limiting	Format	Line No. Limiting
525i	12-19	720p	9-25	1080p	9-41
625i	9-22	1080i	9-20		
	I I	1		1	

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



Figure 3-5 Example VANC Line Number Allocation Example

### **9034 Function Submenu List and Descriptions**

Table 3-2 individually lists and describes each 9034 function submenu ('tab") and its related list selections, controls, and parameters. Where helpful, examples showing usage of a function are also provided. Table 3-2 is primarily based upon using DashBoard<sup>TM</sup> to access each function and its corresponding submenus and parameters.

- Note: All numeric (scalar) parameters displayed on DashBoard<sup>™</sup> can be changed using the slider controls, a 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.)
  - HD controls and setting described in this section are not applicable for 9034-SD card model.

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



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

Function Submenu Item	Page	Function Submenu Item	Page
Video Signal Controls	3-10	Dolby Metadata (9034 only)	3-30
Audio Input Controls	3-11	Dolby Decoder (9034-DEC only)	3-31
Video Proc	3-14	Dolby E Metadata (9034-DEC only)	3-34
AFD	3-15	Dolby D Metadata (9034-DEC only)	3-35
Framesync	3-16	Timecode	3-36
Embedded Audio Group 1/2	3-21	Audio Mixing	3-40
Embedded Audio Group 3/4	3-25	Tone Generator	3-45
AES Audio Out Pairs 1-4	3-26	Licensable Features	3-45
AES Audio Out Pairs 5-8	3-30	Presets	3-46

### Table 3-29034 Function Submenu List

Video Signal Controls	Sets the 9034 video signal input type and preference and priority.
• HD Analog Input Type Input Video Preference SDI Only HD Analog Input Type SD Analog Input Type NTSC Contains 7.5 IRE of Setup	When receiving analog video input, sets the 9034 HD input video type to accept received input signal from choices shown. <b>Note:</b> Input type must be appropriately set for the 9034 to correctly process the received input.
• SD Analog Input Type Input Video Preference SDI Only HD Analog Input Type YPbPr SD Analog Input Type Composite NTSC Contains YDbPr BetaCam YPbPr MII YPbPr SMPTE	When receiving analog video input, sets the 9034 SD input video type to accept received input signal from choices shown. <b>Note:</b> Input format must be appropriately set for the 9034 to correctly lock to the input.
• NTSC Contains      Input Video Preference SDI Only     HD Analog Input Type YPbPr     SD Analog Input Type Composite      NTSC Contains     0 IRE of Setup     7.5 IRE of Setup	<ul> <li>This setting tells the 9034 how much setup (pedestal) needs to be removed from an NTSC-formatted input.</li> <li>0 IRE of Setup: No setup removed.</li> <li>7.5 IRE of Setup: Removes 7.5 IRE of setup. This is typically preferred when analog signals containing 7.5 IRE pedestal are converted to SDI.</li> </ul>

Audio Input Controls	Controls the AES Audio Input features for the eight AES pairs, and displays signal status for received AES pairs. Also provides global unity routing/parameter control resets. <b>Note:</b> Also refer to AES Audio Input Advanced Features (p. 1-14) in Chapter 1, "Introduction" for detailed information regarding these functions.
AES SRC     AES SRC     Pair 1 Disabled     Pair 2 Enabled     .     .     Pair 8 Disabled	<ul> <li>Individual SRC Disable control for each AES pair (1 thru 8) disables or enables Sample Rate Conversion (SRC) bypass as follows:</li> <li>Disabled On: In this mode, AES SRC for the corresponding AES pair is bypassed (button pressed in). SRC is set to Disabled (bypass turned on) by default. This mode is preferred where the AES rate matches the input video rate. This mode is necessary when embedding non-PCM AES audio such a Dolby<sup>®</sup> E or Dolby Digital<sup>™</sup> audio streams.</li> <li>Note: In this mode AES rate must match the input video rate or audio dropouts will occur.</li> <li>Note: AES audio must be nominally 48 kHz.</li> <li>Disable Off: In this mode, AES SRC for the corresponding AES input pair is enabled (button in out position). SRC enabled allows the 9034 to interface with asynchronous AES sources (sources in which the AES timing does not match the video reference timing). SRC can be used to compensate for minor clock rate differences in the AES stream and the input video stream.</li> </ul>
• AES Passthrough AES Passthrough Pair 1 Off Pair 2 On • • • • • • • • • • • • •	<ul> <li>Individual AES Passthrough On/Off control for each AES pair (1 thru 8) disables or enables Passthrough as follows:</li> <li>Off: Disables AES passthrough for the selected AES input pair. Passthrough is set to Off by default.</li> <li>On: Passthrough is turned on, with the corresponding AES output pair to act as a bit-for-bit copy with zero delay of the corresponding AES input pair.</li> <li>Note: AES Passthrough set to On overrides normal audio routing. Gain and polarity control is not available when AES passthrough is enabled.</li> </ul>
• AES Zero Delay Embedding AES Zero Delay Embedding Pair 1 Off Pair 2 On Pair 8 Off	<ul> <li>Individual AES Zero-Delay Embedding On/Off control for each AES pair (1 thru 8) disables or enables Zero-Delay Embedding as follows:</li> <li>Off: Disables Zero-Delay Embedding for the selected AES input pair. Zero-delay embedding is set to Off by default.</li> <li>On: The selected pair directly embeds into its corresponding group (AES Pair 1 embeds into embedded channels 1 and 2; AES pair 2 embeds into embedded channels 3 and 4, and so on) with the normal frame sync audio delay being bypassed.</li> <li>Note: Zero Delay Embedding overrides the standard audio routing system. For example, if AES Pair 1 is selected, then the controls to route into embedded channels 1 and 2 will not apply. Gain and polarity control is not available when zero-delay embedding is enabled.</li> </ul>

Audio Input Controls	(continued)
Status Displays     AES Status     Pair 1 Not Present     Pair 2 Present, Professional     .     .     Pair 8 Not Present	<ul> <li>Individual signal status displays for AES pairs 1-8 as follows:</li> <li>Not Present: Indicates AES pair does not contain recognized audio PCM data.</li> <li>Note: Channel displaying Not Present may still carry usable audio data with Not Present being displayed due to invalid headers.</li> <li>Present, Professional: Indicates AES pair contains recognized AES audio PCM data.</li> <li>Present, Consumer: Indicates AES pair contains audio PCM data other than AES (for example, S/PDIF).</li> <li>Present, Dolby E: Indicates AES pair contains Dolby<sup>®</sup> E encoded data.</li> <li>Present, Dolby Digital: Indicates AES pair contains Dolby<sup>®</sup> Digital encoded data.</li> <li>Note: Dolby status displays shown to the left only occur for valid Dolby<sup>®</sup> signals meeting SMPTE 337M standard.</li> <li>(9034 only) The 9034 card does not perform Dolby<sup>®</sup> processing on the signal. Although the 9034 controls will appear to be usable for this signal tag, the signal is passed through with SRC bypassed as well as all gain and polarity controls set to unity.</li> <li>(9034-DEC only) When Dolby<sup>®</sup> E or Dolby<sup>®</sup> Digital<sup>TM</sup> is present on a discrete AES pair the decoder can provide up</li> </ul>
• Embedded Unity Channel Selection Embedded Unity Channel Selection AES AES Analog Dolby	<ul> <li>to 10 decoded channels (according to the Dolby<sup>®</sup> sub-format and received metadata). All channels are available as inputs to audio routing.</li> <li>Selects unity reset to Embedded Audio Group 1/2 and 3/4 controls and re-establishes default 1-to-1 routing as follows:</li> <li>AES: Routes AES Ch 1 thru Ch 16 as sources to destination channels Embedded Ch 1 thru Embedded Ch 16.</li> <li>Analog: Routes Analog Ch 1 thru Ch 8 as sources to destination channels Embedded Ch 1 thru Embedded Ch 8. Sets Embedded Ch 9 thru Ch 16 to Silence.</li> <li>Dolby: (9034-DEC only) Routes Dolby decoder output channels Ch 1 thru Ch 8 as sources to destination channels Embedded Ch 1.</li> </ul>
AES Unity Channel Selection      AES Unity Channel Selection      AES      AES      Analog      Dolby	<ul> <li>Selects unity reset of AES Outputs Pairs 1-4 and 5-8 controls and re-establishes default 1-to-1 routing as follows:</li> <li>AES: Routes AES Ch 1 thru Ch 16 as sources to destination channels AES Ch 1 thru AES Ch 16.</li> <li>Analog: Routes Analog Ch 1 thru Ch 8 as sources to destination channels AES Ch 1 thru AES Ch 8. Sets AES Ch 9 thru Ch 16 to Silence.</li> <li>Dolby: (9034-DEC only) Routes Dolby decoder output channels Ch 1 thru Ch 8 as sources to destination channels AES Ch 1 thru AES Ch 9 thru Ch 16 to Silence.</li> </ul>

Audio Input Controls	(continued)
Apply Audio Channel Selection     Apply Audio Unity Settings     Confirm	<ul> <li>Applies embedded and AES unity channel selection (as set in the above drop-down lists). To apply the selections, click the Confirm button. When Confirm is clicked, a Confirm? pop-up appears, requesting confirmation.</li> <li>Click Yes to proceed with the unity reset.</li> <li>Click No to reject unity reset.</li> <li>For any selection following confirm, the destination channel controls are default reset as follows:</li> <li>Gain is to unity</li> <li>Phase control is set to Normal</li> <li>Channel is set to Unmuted</li> </ul>
Tie AES and Embedded Controls     Tie AES and Embedded Controls     Enabled	When set to Enabled, gangs <b>Gain</b> , <b>Phase</b> , and <b>Mute</b> controls for same-numbered Embedded and AES channels. Ganging is bilateral, with embedded channel control settings affecting corresponding AES channel controls, and vice-versa.





Framesync	Provides video Frame Sync delay control and audio re-sync tools.
• Framesync Enable	<ul> <li>Disables the Frame Sync function, or selects from choices below.</li> <li>Off: Video path bypasses frame sync entirely; output video timing tracks with input video timing.</li> <li>Reference 1: Allows Frame Sync function to use external Reference 1 as the reference ("house") standard.</li> <li>Reference 2: Allows Frame Sync function to use external Reference 2 as the reference ("house") standard.</li> <li>Note: If Reference 1 or Reference 2 is selected and an appropriate external reference is not received, the Frame Sync Preference Imaid indication appears in the Card Info status portion of DashBoard™, indicating invalid frame sync reference error. (Additionally, the card edge ERR indicator illuminates indicating the same.) External reference signals Reference 1 and Reference 2 are distributed to the card and other cards via a frame bus.</li> <li>Input Video: Allows full framesync functionality (such as delay offset), but instead uses the input video signal as the reference standard.</li> <li>Note: • If Input Video is used for framesync, any timing instability on the output video. This setting should only be used where syncing to input video is known to be reliable.</li> <li>Negative vertical or horizontal delay values (using the controls below) should not be used when using Input Video mode. This may result in image motion "jerkiness". To add an offset in this case, instead apply a positive value that results in the desired net offset.</li> </ul>
Vertical Delay Control      Vertical Delay (Lines)     -1124	<ul> <li>When Framesync is enabled, sets vertical delay (in number of lines of output video timing) between the output video and the frame sync reference.</li> <li>(Range is -1124 thru 1124 lines.)</li> <li>Note: Lines refer to lines in the output video format, and not to the reference format.</li> </ul>
• Horizontal Delay Control Horizontal Delay (us) -64.000	<ul> <li>When Framesync is enabled, sets (in µsec of output video timing) horizontal delay between the output video and the frame sync reference.</li> <li>(Range is -64.000 thru 64.000 µsec)</li> <li>Note: When an external framesync reference is used, the card will not produce a framesync reset until the variance between framesync reference and output video exceeds ± 2 clock periods. Therefore, a framesync reset will not result if offsets within this window are applied.</li> <li>To apply an offset/framesync reset within this window, first apply a relatively large offset, then apply the target smaller offset.</li> <li>Example: To apply a 1-period offset, first apply a 10-period positive offset and then apply a 9-period negative offset. This results in the target 1-period offset being applied to the output video.</li> </ul>

Framesync	(continued)
Input Video Mode Fixed Delay Control Input Video Mode Fixed Delay     0.000	When Framesync is enabled and set to <b>Input Video</b> , allows adding video delay. This is useful when compensating for processes which result in large audio delays. (Range is 0.0000 thru 300.0 msec.)
Framesync Audio SRC On/Off Control Audio SRC Off	When Framesync is enabled and set to <b>Input Video</b> , allows disabling audio SRC. This is required if the card is to pass non-PCM audio such as Dolby® audio to downstream devices.
Minimum Latency Frames Control      Minimum Latency (Frames)	When Framesync is enabled, specifies the smallest amount of latency allowed by the frame sync (latency measurement in output video frames). The frame sync will not output a frame unless the specified number of frames are captured in the buffer. The operational latency of the frame sync is always between the specified minimum latency and minimum latency plus one frame (not one field). (Maximum range is 0 to 32.)
	<ul> <li>Note: Due to card memory limits, the maximum available Minimum Latency Frames is related to the output video format selected. For example, with a 525i59.94 output, the practical maximum limit is 13.</li> <li>When using this control, be sure to check the Framesync Status display as follows:</li> </ul>
	Framesync Status       On         • Latency frames selection within limits.         Framesync Status       Minimum Latency Frames set to 3 the maximum amount for this standard         • Latency frames selection exceeds limits.





Table 3-2	9034 Function Submenu List — continued

Framesync	(continued)		
Current Audio Delay Display Current Audio Delay 2.02 ms / 0 Frames 31 lines	Displays the current input-to-output audio delay (in msec units) as well as in terms of Frames/fractional frame (in number of lines).		
Video Delay Display     Video Delay     0.06 ms / 0 Frames 1 lines	Displays the current input-to-output video delay (in msec units) as well as in terms of Frames/fractional frame (in number of lines).		
• Framesync Status Display Framesync Status On	Displays the current framesync status as follows: Framesync Status On • Framesync status OK. Framesync Status Off • Framesync Enable set to Off. Framesync Status Off no valid reference detected • Improper or missing framesync reference. Framesync Status Minimum Latency Frames set to 3 the maximum amount for this standard • Latency frames selection exceeds limits. Note: See Minimum Latency Frames Control (p. 3-17) for more information about this message.		
• Loss of Input Signal Selection On Loss of Input Signal: Disable Outputs Disable Outputs Freeze Last Frame Freeze to Color	<ul> <li>In the event of input video Loss of Signal (LOS), determines action to be taken as follows:</li> <li>Disable Outputs: Disable all outputs.</li> <li>Freeze Last Frame: Freeze image to last good frame (last frame free of timing errors).</li> <li>Freeze to Color: Freeze image to a color raster (as selected using Framesync LOS Freeze Color control).</li> <li>Note: Freeze Last Frame and Freeze to Color choices are functional only when frame sync is set to lock to valid reference.</li> </ul>		
• Framesync LOS Freeze Color Framesync LOS Freeze Color White Yellow Cyan Green Magenta Red Blue Gray 10% Gray 25% Gray 50% Black Custom	In the event of LOS with <b>Freeze to Color</b> enabled above, sets the image raster color from choices shown to the left.		

Framesync	(continued)		
Custom Color Hue	Adjusts raster hue (phase angle) for custom LOS color.		
Custom Color Hue	(-360° to 360° range in 0.1° steps; null = 0°)		
Custom Color Saturation	Adjusts raster saturation level for custom LOS color.		
Custom Color Saturation	(0% to 100% range in 0.1% steps)		
Custom Color Y Level	Adjusts raster luma level for custom LOS color.		
Custom Color Y Level	(64 to 940 range)		
Reset/Resync Framesync	Reset Framesync resets the frame sync, clearing any buffered audio and video.		
Reset Framesync Confirm	<b>Resync Video and Reference</b> resets the input processing paths for video and reference.		
Resync Video and Reference Confirm	When Confirm is clicked, a <b>Confirm?</b> pop-up appears, requesting confirmation.		
	Click Yes to reset the frame sync.		
	Click No to reject reset.		
	<b>Note:</b> These controls are not normally used or required when the card is receiving a stable, continuous frame sync reference.		

		Also prov for each c	ides Gain, Phase Invert hannel.	, and Muting contro
SD Audio Depth 2	) bit			
Group Enable 0	n			
Destination	Embedded Ch 1	Embedded Ch 2	Embedded Ch 3	Embedded Ch 4
Source	Silence	Silence	AES Ch 1	AES Ch 3
Gain (dB)	40.0 -40.0 -80.0 0.0 \$	40.0 -40.0 -80.0 0.0   ≎	40.0 0.0 -40.0 -80.0 0.0 \$	40.0 0.0 -40.0 -80.0 0.0 ¢
Channel is	Unmuted	Unmuted	Unmuted	Unmuted
Phase	Normal	Normal	Normal	Normal
Group Enable	n			
Destination	Embedded Ch 5	Embedded Ch 6	Embedded Ch 7	Embedded Ch 8
Source	AES Ch 5	AES Ch 8	Analog Ch 3	Tone 1 💙
	0.0 -40.0 -80.0 20.0 ≎	0.0 -40.0 -80.0 20.0 ≎	0.0 -40.0 -80.0 15.0	-10.0 ¢
Channel is Phase	Unmuted Normal	Unmuted Normal	Unmuted Invert	Unmuted Normal
The example a various Source individual audie for various audie the Destination <b>Embedded Cf</b> <b>Embedded Cf</b> <b>Audio Groups</b> resulting setup The source-to- correlation sho example; <b>any</b> of the left can cor destinations or Embedded Audie 4 (not shown h sources not sh available. Thee on the following The controls sho	bove shows e selections and o control settings io sources fed to a channels 1 thru 8 in Embedded 1 and 2, with the (right). destination wn here is only an of the sources on inect to <b>any</b> of the o the right, or to dio Groups 3 and ere). Additional own here are also se are described g pages.	AES I/O (1-4) AES IN (5-8) AN-AUD IN (1-8) Analoc	Silence	Embedded Audio Group 1 CH1 CH2 CH2 CH3 CH3 CH4 CH4 CH4 CH5 CH5 CH7 CH7 CH8

Embedded Audio Group 1/2	(continued)		
SD Audio Depth     SD Audio Depth     20 bit     SD Audio Depth     24 bit	<ul> <li>Allows option of using 24-bit audio data structure per SMPTE 272M, §3.10 (default is 20-bit per SMPTE 272M, §3.5).</li> <li>Note: If 24-bit depth is desired, make certain downstream equipment is compatible with 24-bit SD audio data.</li> <li>Depth control setting applied here affects both Embedded Audio Group 1/2 and 3/4.</li> </ul>		
• Group Enable	<ul> <li>When enabled (<b>On</b>), enables the embedding of the corresponding embedded audio group (Embedded Audio Group 1 or Embedded Audio Group 2).</li> <li>Embedded Audio Group 1 consists of embedded channels 1 thru 4.</li> <li>Embedded Audio Group 2 consists of embedded channels 5 thru 8.</li> <li>Two Group Enable buttons correspondingly enable or disable Embedded Audio Group 1 and Embedded Audio Group 2.</li> <li>Disabling a group removes the entire group of embedded audio channels while preserving the settings of the channels belonging to the group.</li> </ul>		
<ul> <li>Note: • Embedded Ch 2 thru Embedded Ch 8 had described here for Embedded Ch 1. There</li> <li>• For each channel, its source and destinat channels should be set to the Silence set</li> </ul>	ave controls identical to the <b>Source</b> , <b>Gain</b> , <b>Mute</b> , and <b>Phase</b> controls refore, only the <b>Embedded Ch 1</b> controls are shown here. ion should be considered and appropriately set. Unused destination ection.		
Embedded Channel Source     Destination Embedded Ch 1     Source Analog Ch 1	Using the <b>Source</b> drop-down list, selects the audio input source to be embedded in the corresponding embedded channel from the choices described below.		
AES Ch 1 thru AES Ch 16 as Source     Destination     Embedded Ch 1     Source     AES Ch 1     AES Ch 1     AES Ch 1     AES Ch 16	AES Ch 1 thru AES Ch 16 range in Source drop-down list enables a discrete AES channel (Ch 1 thru Ch 16) to be the source for the selected destination Embedded Audio Group channel. (In this example, AES Ch 1 is the source for destination Embedded Ch 1)		
Analog Ch 1 thru Ch 8 as Source     Destination     Embedded Ch 1     Source     Analog Ch 1     Analog Ch 1     Analog Ch 3	Analog Ch 1 thru Analog Ch 8 range in Source drop-down list enables a balanced-input analog channel (Ch 1 thru Ch 8) to be the source for the selected destination Embedded Audio Group channel. (In this example, Analog Ch1 is the source for destination Embedded Ch 1)		

Embedded Audio Group 1/2	(continued)		
Down Mix Left or Right as Source     Destination     Embedded Ch 1     Source     Down Mix Left     Down Mix Left     Down Mix Right	<ul> <li>Down Mix Left and Down Mix Right selections in Source drop-down list allow either downmixer left or right channel to be the source for the selected destination Embedded Audio Group channel.</li> <li>(In this example, the Down Mix Left channel is the source for destination Embedded Ch 1)</li> <li>Note: Down Mix Left and Down Mix Right channels are a stereo pair derived from the L, C, R, Ls, and Rs channel inputs selected using the Audio Mixing function. The stereo pair consists of basic L/R PCM signals with no additional encoded information.</li> <li>Refer to Audio Mixing function description on page 3-40 for more information.</li> </ul>		
Mono Mix as Source      Destination     Embedded Ch 1      Source     Mono     V	<ul> <li>Mono selection in Source drop-down list allows mono mix content to be the source for the selected destination Embedded Audio Group channel. (In this example, the mono content is the source for destination Embedded Ch 1)</li> <li>Note: Mono mix content is set up using Mono Mixer Selection in the Audio Mixing function). Refer to Audio Mixing function description on page 3-40 for more information.</li> </ul>		
• Dolby <sup>®</sup> Decoded Channel as Source     Destination     Embedded Ch 1     Source     Dolby Ch 1     Dolby Ch 1     Dolby Ch 1     Dolby Mix 2     Dolby Mix 2	<ul> <li>(9034-DEC only) Dolby Ch 1 thru Dolby Ch 8 range in Source drop-down list enables a Dolby<sup>®</sup> decoded channel to be the source for the selected destination Embedded Audio Group channel.</li> <li>(In this example, Dolby<sup>®</sup> decoded Ch 1 is the source for destination Embedded Ch 1)</li> <li>Note: Drop-down choices of Ch 1 thru Ch 8 and Mix 1/Mix 2 represent maximum channels available. Actual active channel complement is per received Dolby<sup>®</sup> format and upstream encoding. Inactive channels should not be used.</li> <li>Refer to Dolby Metadata function description on page 3-30 for more information.</li> </ul>		
• Tone Generator 1 thru 4 as Source     Destination     Embedded Ch 1     Source     Tone 1     Tone 2     Tone 3     Tone 4	<ul> <li>Tone Generator 1 thru Tone Generator 4 range in Source drop-down list enables one of four tone generators (Tone 1 thru Tone 4) to be the source for the selected destination Embedded Audio Group channel.</li> <li>(In this example, Tone 1 (tone generator 1) is the source for destination Embedded Ch 1)</li> <li>Note: Tone generator frequencies can be independently set for the four tone generator sources.</li> <li>Refer to Tone Generator function description on page 3-45 for more information.</li> </ul>		

Embedded Audio Group 1/2	(continued)		
Audio LTC as Source      Destination Embedded Ch 1      Source LTC V      Option	<ul> <li>LTC selection in Source drop-down list allows any timecode format received by the card to be outputted as audio LTC over an embedded audio output (destination) channel.</li> <li>(In this example, audio LTC is the source for destination Embedded Ch 1)</li> <li>Note: • When LTC is selected as source, Gain and Mute controls are disabled.</li> <li>• Refer to Timecode function description on page 3-36 for more information.</li> </ul>		
Silence (Mute) as Source      Destination     Embedded Ch 1      Source     Silence       Silence      S	Silence selection in Source drop-down list mutes the selected destination Embedded Audio Group channel. Use this setting for unused destination channels. (In this example, silence (muting) is applied to Embedded Ch 1)		
• Gain (dB) Control	Adjusts and displays relative gain (in dB) applied to the corresponding destination Embedded Audio Group channel. (-80 to +40 dB range in 0.1 dB steps; unity = 0.0 dB)		
Mute Control Channel is Unmuted Channel is Muted	Allows pushbutton On/Off channel muting while saving all other settings.		
Phase Control      Phase     Invert     Normal	Selects between <b>Normal</b> and <b>Invert</b> phase (relative to source original phase) for the destination Embedded Audio Group channel.		

Table 3-2
 9034 Function Submenu List — continued

Embedded Audio Group 3/4	Selects the audio source for each embedded audio channel 9 thru 16 (Embedded Audio Groups 3 and 4). Also provides Gain, Phase Invert, and Muting controls for each channel.	
SD Audio Depth     SD Audio Depth     20 bit     SD Audio Depth     24 bit	<ul> <li>Allows option of using 24-bit audio data structure per SMPTE 272M, §3.10 (default is 20-bit per SMPTE 272M, §3.5).</li> <li>Note: If 24-bit depth is desired, make certain downstream equipment is compatible with 24-bit SD audio data.</li> <li>Depth control setting applied here affects both Embedded Audio Group 1/2 and 3/4.</li> </ul>	
• Group Enable	<ul> <li>When enabled (On), enables the embedding of the corresponding embedded audio group (Embedded Audio Group 3 or Embedded Audio Group 4).</li> <li>Embedded Audio Group 3 consists of embedded channels 9 thru 12.</li> <li>Embedded Audio Group 4 consists of embedded channels 13 thru 16.</li> <li>Two Group Enable buttons correspondingly enable or disable Embedded Audio Group 3 and Embedded Audio Group 4.</li> <li>Disabling a group removes the entire group of embedded audio channels while preserving the settings of the channels belonging to the group.</li> </ul>	
<ul> <li>Note: • Embedded Ch 9 thru Embedded Ch 16 have controls that are identical to the Source, Gain, Mute, and Phase controls described for Embedded Ch 1. Refer to Embedded Audio Group 1/2 on page 3-21 for descriptions of these controls.</li> <li>• For each channel, its source and destination should be considered and appropriately set. Unused destination channels should be set to the Silence selection.</li> </ul>		





AES Audio Out Pairs 1-4	(continued)
<ul> <li>Note: • AES Ch 2 thru AES Ch 8 have controls there for AES Ch 1. Therefore, only the A</li> <li>• For each channel, its source and destination should be set to the Silence selection.</li> </ul>	nat are identical to the <b>Source</b> , <b>Gain</b> , <b>Mute</b> , and <b>Phase</b> controls described <b>ES Ch 1</b> controls are shown here. Fon should be considered and appropriately set. Unused destination channels
AES Channel Source  Destination AES Ch 1  Source AES Ch 9	Using the <b>Source</b> drop-down list, selects the audio source to be routed to the corresponding AES output channel from the choices described below.
• AES Ch 1 thru AES Ch 16 as Source Destination AES Ch 1 Source AES Ch 5 AES Ch 5 AES Ch 16	AES Ch 1 thru AES Ch 16 range in Source drop-down list enables a discrete AES channel (Ch 1 thru Ch 16) to be the source for the selected destination AES channel. (In this example, AES Ch 5 is the source for destination AES Ch 1)
• Analog Ch 1 thru Ch 8 as Source Destination AES Ch 1 Source Analog Ch 1 Analog Ch 1 Analog Ch 8	<ul> <li>Analog Ch 1 thru Analog Ch 8 range in Source drop-down list enables a balanced-input analog channel (Ch 1 thru Ch 8) to be the source for the selected destination AES channel.</li> <li>(In this example, Analog Ch1 is the source for destination AES Ch 1)</li> </ul>
Down Mix Left or Right as Source      Destination     AES Ch 1      Down Mix Left      Down Mix Left      Down Mix Right      Down Mix Right	<ul> <li>Down Mix Left and Down Mix Right selections in Source drop-down list allow either downmix left or right channel to be the source for the selected destination AES channel.</li> <li>(In this example, the Down Mix Left channel is the source for destination AES Ch 1)</li> <li>Note: Down Mix Left and Down Mix Right channels are a stereo pair derived from the L, C, R, Ls, and Rs channel inputs selected using the Audio Mixing function. The stereo pair consists of basic L/R PCM signals with no additional encoded information.</li> <li>Refer to Audio Mixing function description on page 3-40 for more information.</li> </ul>
Mono Mix as Source      Destination     AES Ch 1      Source      Mono	<ul> <li>Mono selection in Source drop-down list allows mono mix content to be the source for the selected destination AES channel.</li> <li>(In this example, the mono content is the source for destination AES Ch 1)</li> <li>Note: Mono mix content is set up using Mono Mixer Selection in the Audio Mixing function). Refer to Audio Mixing function description on page 3-40 for more information.</li> </ul>

AES Audio Out Pairs 1-4	(continued)
• Dolby <sup>®</sup> Decoded Channel as Source     Destination     AES Ch 1     Dolby Ch 1     Dolby Ch 1     Dolby Ch 1     Dolby Mix 2     Dolby Mix 2	<ul> <li>(9034-DEC only) Dolby Ch 1 thru Dolby Ch 8 range in Source drop-down list enables a Dolby<sup>®</sup> decoded channel to be the source for the selected destination AES channel.</li> <li>(In this example, Dolby<sup>®</sup> decoded Ch 1 is the source for destination AES Ch 1)</li> <li>Note: Drop-down choices of Ch 1 thru Ch 8 and Mix 1/Mix 2 represent maximum channels available. Actual active channel complement is per received Dolby<sup>®</sup> format and upstream encoding. Inactive channels should not be used.</li> <li>Refer to Dolby Metadata function description on page 3-30 for more information.</li> </ul>
• Tone Generator 1 thru 4 as Source     Destination     AES Ch 1     Source     Tone 1     Tone 2     Tone 3     Tone 4	<ul> <li>Tone Generator 1 thru Tone Generator 4 range in Source drop-down list enables one of four tone generators (Tone 1 thru Tone 4) to be the source for the selected destination AES channel.</li> <li>(In this example, Tone 1 (tone generator 1) is the source for destination AES Ch 1)</li> <li>Note: Tone generator frequencies can be independently set for the four tone generator sources.</li> <li>Refer to Tone Generator function description on page 3-45 for more information.</li> </ul>
Audio LTC as Source      Destination     AES Ch 1      Source      Destination      Coption	<ul> <li>LTC selection in Source drop-down list allows any timecode format received by the card to be outputted as audio LTC over an AES audio output (destination) channel.</li> <li>(In this example, audio LTC is the source for destination AES Ch 1)</li> <li>Note: • When LTC is selected as source, Gain and Mute controls are disabled.</li> <li>• Refer to Timecode function description on page 3-36 for more information.</li> </ul>
Silence (Mute) as Source      Destination     AES Ch 1      Source      Silence      Silenc	Silence selection in Source drop-down list mutes the selected destination AES channel. Use this setting for unused destination channels. (In this example, silence (muting) is applied to AES Ch 1)

Table 3-2
 9034 Function Submenu List — continued

AES Audio Out Pairs 1-4	(continued)		
• Gain (dB) Control Gain (dB)	Adjusts and displays relative gain (in dB) applied to the corresponding destination AES channel. (-80 to +40 dB range in 0.1 dB steps; unity = 0.0 dB)		
Mute Control Channel is Unmuted Channel is Muted	Allows pushbutton On/Off channel muting while saving all other settings.		
Phase Control      Phase     Normal     Normal	Selects between <b>Normal</b> and <b>Invert</b> phase (relative to source original phase) for the destination AES output channel.		



able 3-2 90	34 Function Subm	enu List —	contin	nued	
	Dolby Option 💽			<b>(9034-DEC</b> Dolby <sup>®</sup> dec display and	<b>C only)</b> Routes a Dolby <sup>®</sup> encoded pair to the coder, and provides Dolby <sup>®</sup> configuration d metadata handling controls.
Note: •	<ul> <li>The Dolby tab contro</li> <li>Decoded channels s channel designations examples shown her</li> </ul>	ols described shown in Dasl s are a functio e.	here ap∣ hBoard⊺ on of en	bear only on card ec M correlate to typica coding. Based on er	quipped with Dolby Decoder option (-DEC). I channel designations as shown below. Note that nooding, actual channel designations may vary from the
	Decoder Channels	E5.1+2	E7.1+	-2 E8x1	7
	Ch 1	LF	LF	Ch 1	-
	Ch 2	RF	RF	Ch 2	-
	Ch 3	С	С	Ch 3	-
	Ch 4	LFE	LFE	Ch 4	-
	Ch 5	LS	LS	Ch 5	
	Ch 6	RS	RS	Ch 6	
	Ch 7	Aux 1	LB	Ch 7	
	Ch 8	Aux 2	RB	Ch 8	
	Mix 1	Lo	Lo	Mono Mix 1	
	Mix 2	Ro	Ro	Mono Mix 2	
	<ul> <li>See other importa available with the</li> </ul>	ant notes in decoder fu	this sub nction.	osection regarding	the proper use of metadata embedding tools
•	AES Pair as Input			<b>AES Pair 1</b> thru <b>/</b> an AES Pair (1 th	<b>AES Pair 8</b> range in Input Select drop-down list selects ru 8) to be the input for the Dolby <sup>®</sup> decoder.
	Input Select AES Pair AES Pair AES Pair AES Pair	x1 ▼ 1 ▲ 8 ▼		(In this example, )	AES Pair 1 is the input for the Dolby <sup>®</sup> decoder)
• Deco	Decoder Mode  Auto Detect Format and Decode (Pass PCM)  Auto Detect Format and Decode (Pass PCM)  Out Detect Format and Decode (Pass PCM)		Using the drop-do absence of Dolby	own list, selects the action to take in presence or $^{^{\tiny (\!$	
	Only Decode Dolby Digital	else Mute			

Table 3-2	9034 Function Submenu List — continued
	Soot i unction ousinent List continued

Dolby	(continued)
Dolby <sup>®</sup> Mode Display Bitstream Format Dolby E 20-bit Dolby E Program Configuration 5.1 + 2	Shows specific bitstream information and Dolby <sup>®</sup> decoding type (Dolby <sup>®</sup> E or Dolby <sup>®</sup> Digital) for input applied to Dolby <sup>®</sup> decoder. (In this example, Dolby <sup>®</sup> E 20-bit with 5.1+2 decoded channel configuration is being decoded) If selected input has invalid or missing Dolby <sup>®</sup> data (such as if wrong channels are applied to decoder), <u>PCM/No Dolby Stream</u> is displayed. (In this case, PCM data passes undecoded and is present on <b>Dolby Ch 1</b> and <b>Dolby Ch 2</b> channels.)
Dolby <sup>®</sup> Digital Channel and Dynamic Range Controls      Dolby Digital 16-bit Channel Select     Channel 1     Channel 1     Channel 2      Dolby Digital Dynamic Range Control     Line Mode     RF Mode     Custom     Bypass	Channel Select drop-down list sets the channel carrying the Dolby <sup>®</sup> Digital encoded signal for D1/0 formats as shown from choices on the left. Dynamic Range Control drop-down list selects from audio level compression scheme choices as shown to the left. (Line Mode is typical setting; RF Mode is used where signal may be fed through low-cost video/ audio RF modulator, in which case RF Mode helps prevent overmodulation. Refer to ATSC A/52B for more information.)
Metadata Embedding     Metadata Embedding     On	<ul> <li>Metadata Embedding (On/Off) controls SMPTE 2020-1 metadata embedding in the SDI video output.</li> <li>When set to On, metadata from selected source is embedded in the output SDI video.</li> <li>When set to Off, metadata is not embedded in the output SDI video.</li> </ul>
• Metadata Output Source Metadata Ouput Source Embedded: Dolby Decoder, RS485: Dolby Decoder Embedded: Input Video, RS485: Dolby Decoder Embedded: Input Video, RS485: Input Video	<ul> <li>Drop-down list allows embedding and RS485 metadata routing to the choices shown to the left and described below.</li> <li>Embedded: Dolby Decoder, RS485: Dolby Decoder – Routes the metadata from the Dolby<sup>®</sup> decoder to both embedding on the output SDI and the RS485 port on card so equipped.</li> <li>Embedded: Input Video, RS485: Dolby Decoder – Preserves input metadata and directly re-routes it to the output SDI. Routes the metadata from the Dolby<sup>®</sup> decoder to only the RS485 port on card so equipped.</li> <li>Embedded: Input Video, RS485: Input Video – Routes the metadata from the Dolby<sup>®</sup> decoder to only the RS485 port on card so equipped.</li> <li>Embedded: Input Video, RS485: Input Video – Routes the preserved input metadata to both embedding on the output SDI and the RS485 port on card so equipped.</li> <li>Note: Typically, Metadata Output Source should be set to Embedded: Dolby Decoder, RS485: Dolby Decoder, since this is the new metadata produced by the card decoder and should also be made available in the SDI stream and to any other external systems. If embedding new metadata, make certain to set its line number such that such that any old metadata for the same line number as the old metadata to be replaced).</li> </ul>
Dolby	(continued)
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Metadata Output Line	Allows selection of SMPTE 2020-1 metadata line location within the VANC space for source embedding selected above.
Metadata Output Line 13 🗘	(Range is 9 thru 41; default is line #13.)
	<ul> <li>Note: • Although the output line drop-down will allow any choice within the 9 thru 41 range, the actual range is automatically clamped (limited to) certain ranges to prevent inadvertent conflict with active picture area depending on video format. See Ancillary Data Line Number Locations and Ranges (p. 3-8) for more information.</li> <li>The card doos not check for conflict on a given line number.</li> </ul>
	<ul> <li>The card does not check for conflicts on a given line number.</li> <li>Make certain the selected line is available and carrying no other data unless existing metadata is to be intentionally overwritten.</li> </ul>









Table 3-2	9034 Function Submenu List — continued

Timecode	(continued)
<b>Option E</b> Audio LTC and RS-485 LTC contr feature. This feature allows bidirectional conversion be interfaces.	rols described below only appear on cards with +LTC licensed optional etween VBI-based timecode and LTC timecode on audio and RS-485
Timecode Source Status Displays	Displays the current status and contents of the supported timecode formats shown to the left
Analog VITC Waveform Status 05:41:12:00.1	<ul> <li>If a format is receiving timecode data, the current content (timecode running count and line number) is displayed.</li> </ul>
Audio LTC Status Unlocked	If a format is not receiving timecode data, Unlocked is displayed.
Audio LTC Source AES Input Ch 7	<ul> <li>If Audio LTC is being received, the timecode running count is displayed.</li> </ul>
	<ul> <li>Audio LTC Source selects audio source to be used by card audio LTC function as listed below.</li> <li>AES Ch 1 thru Ch 16</li> <li>Analog audio Ch 1 thru Ch 8</li> </ul> Note: Audio LTC Source must be appropriately set for card to receive and process audio LTC.
RS-485 Port LTC Control      RS-485 Port Function     LTC In (Overrides Audio LTC Source)     Dolby Metadata     LTC In (Overrides Audio LTC Source)     LTC Output	<ul> <li>Allows RS-485 port to be used to receive LTC, or send LTC over RS-485 port as follows:</li> <li>If RS-485 LTC is to be received via the shared RS-485 port, set the RS-485 Port Function control to LTC In.</li> <li>If RS-485 LTC is to be outputted via the shared RS-485 port, set the RS-485 Port Function control to LTC Output. The timecode string carried on the LTC output is that selected using the Source Priority controls described on the next page.</li> </ul>
Incoming ATC Packet Removal Control Incoming ATC Packet Removal Disabled	This control is not applicable for this card.
Source Priority 1     Source Priority 2     Source Priority 3     Source Priority 4	As described here, selects the priority assigned to each of the four supported formats in the event the preferred source is unavailable. Each of the four Source Priority selection lists allows assignment of source priority from the following choices: Analog VITC Analog VITC Audio LTC 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.

Table 3-2	9034 Function Submenu List — continued

Timecode	(continued)
• Output Status Display Output Status 06:14:32:16.1 (Source: Analog VITC)	Displays the current content and source being used for the timecode data as follows: Output Status OE:14:32:16.1 (Source: Analog VITC) • Output status OK (in this example, running analog VITC timecode received and outputted). Output Status No Output Available • Timecode not available due to lack of appropriate input timecode data on enabled formats. Note: • Timecode output requires that source and priority are appropriately selected (as described above in Source Priority). Also, video input must contain appropriate timecode data. • 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     Offset Advanced     Offset Field 0     Offset Frame 0     Note: • Although the output line drop-down on the range is automatically clamped (limited) to depending on video format. See Ancillary     The card does not check for conflicts on a	<ul> <li>Allows the current timecode count to be advanced or delayed on the output video.</li> <li>Offset Advance or Delay selects offset advance or delay.</li> <li>Offset Field delays or advances or delays timecode by one field.</li> <li>Offset Frame delays or advances or delays timecode by up to 5 frames.</li> <li>Note: Default settings are null, with both controls set at zero as shown.</li> </ul>
• SD VITC Waveform Insertion Controls     VITC Waveform Output 1 Line Number     14     SD VITC Waveform Output 2 Line Number     SD VITC Waveform Insertion     Enabled	<ul> <li>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.</li> <li>Note: • If only one output line is to be used, set both controls for the same line number.</li> <li>• SD VITC Waveform Insertion control only affects VITC waveforms inserted (or copied to a new line number) by this function.</li> </ul>
• SD ATC Insertion Control  SD ATC_VITC Insertion Enabled  SD ATC Insertion Line 13 - SMPTE 12M-2-2008 Recommended	For SD output, enables or disables SD ATC_VITC timecode insertion into the output video, and selects the line number for ATC_VITC.



Timecode	(continued)
HD ATC_LTC Insertion Control  HD ATC_LTC Insertion HD ATC_LTC Insertion Line 10 - SMPTE 12M-2-2008 Recommended	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      HD ATC_VITC Insertion HD ATC_VITC Insertion Line Field 1     9 - SMPTE 12M-2-2008 Recommended  HD ATC_VITC Insertion Line Field 2     8 (671) - SMPTE 12M-2-2008 Recommended	<ul> <li>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.</li> <li>Note: If only one output line is to be used, set both controls for the same line number.</li> </ul>
ATC_VITC Legacy Support Control     ATC VITC Legacy Support Disabled	<ul> <li>When enabled, accommodates equipment requiring ATC_VITC packet in both fields as a "field 1" packet (non-toggling).</li> <li>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.</li> </ul>

Audio Mix	king		<ul> <li>Provides down-mix audio routing selections that multiplexes any five AES, analog audio, or Dolby decoder (where equipped) channel sources into a stereo pair (Down Mix Left and Down Mix Right), or selection of any two audio sources to be mono-mixed to serve as a monaural source.</li> <li>With an optional upmixer licensable feature activated, any normal PCM stereo pair can be fed to the upmixer to generate 5.1 surround sound audio which in turn can be applied to six user-selectable channels.</li> </ul>
Down Mixer Selection	n		Separate drop-down lists for Left, Right, Center, Left Surround (Ls), and Right Surround (Rs) inputs allow AES channel audio source selection for each of the five AES inputs.
Left	AES Ch 1	~	The example below shows selection from various sources and the resulting stereo pair DM-L and DM-R. The two signals comprising the pair
Right	AES Ch 2	~	can be routed and processed the same as any other audio input source.
Center	AES Ch 3	~	AES Ch 1 - Ch 16
Left Surround Right Surround	AES Ch 5	~	Right       AEB Ch 2         Center       AEB Ch 6         Left Surround       AEB Ch 4         Right Surround       AEB Ch 5         Note:       The stereo pair consists of basic L/R PCM signals with no additional encoded information.
• Center Mix Ratio Con	ntrol		<ul> <li>Adjusts the attenuation ratio of center-channel content from 5-channel source that is re-applied as Lt and Rt content to the DM-L and DM-R stereo mix.</li> <li>Minimum attenuation setting (-0.0 dB) applies no ratiometric reduction. Center channel content is restored as in-phase center-channel content with no attenuation, making center-channel content more predominate in the overall mix.</li> <li>Maximum attenuation setting (-10.0 dB) applies a -10 dB ratiometric reduction of center-channel content. Center-channel content is restored as in-phase center-channel content. Center-channel content is restored as in-phase center-channel content at a -10 dB ratio relative to overall level, making center-channel content less predominate in the overall mix.</li> <li>(0.0 dB to -10.0 dB range in 0.1 dB steps; default = -3 dB)</li> <li>Note: Default setting of -3.0 dB is recommended to maintain center-channel predominance in downmix representative to that of the original source 5-channel mix.</li> </ul>

Audio Mixing	(continued)
• Surround Mix Ratio Control Surround Mix Ratio (dB)	<ul> <li>Adjusts the attenuation ratio of surround-channel content from 5-channel source that is re-applied as Lo and Ro content to the DM-L and DM-R stereo mix.</li> <li>Minimum attenuation setting (-0.0 dB) applies no ratiometric reduction. Surround-channel content is restored with no attenuation, making Lo and Ro content more predominate in the overall mix.</li> <li>Maximum attenuation setting (-10.0 dB) applies a -10 dB ratiometric reduction of surround-channel content. Surround-channel content is restored at a -10 dB ratio relative to overall level, making surround-channel content less predominate in the overall mix.</li> <li>(0.0 dB to -10.0 dB range in 0.1 dB steps; default = -3 dB)</li> <li>Note: Default setting of -3.0 dB is recommended to maintain surround-channel predominance in downmix representative to that</li> </ul>
Mono Mixer Selection     Mono Mixer Selection     Left AES Ch 11	Separate drop-down lists for <b>Left</b> and <b>Right</b> inputs allow selected AES or the DM-L / DM-R input channels to provide an additional mono-mixed channel. The resulting mono mix ( <b>Mono</b> ) is available as an audio source for any of the 16 destination AES output channels as shown below.
Right AES Ch 12	Destination       AES Ch 1         Mono       Down Mix Left         Down Mix Right       AES Ch 1- Ch 16         Mono       Tone 1         Tone 2       AES Ch 12         Note: Selection of any two channels for mono mixing in no way affects the source channels themselves.



Audio Mixing	(continued)
• Up Mixer Mode Control Up Mixer Controls Mode Auto Always Upmix Bypass	<ul> <li>Enables or bypasses upmixer as follows:</li> <li>Auto: Automatic enable/bypass of 5.1 upmix function as follows: <ul> <li>If detected signal level on all four of the selected channels designated as Center, LFE, Left Surround, and Right Surround are below the level threshold set using the 5.1 Detection Threshold control, upmixer overwrites all six selected channels with the new 5.1 content generated by the upmixer.</li> <li>If detected signal level on any of the four of the selected channels designated as Center, LFE, Left Surround, and Right Surround is above the level threshold set using the 5.1 Detection Threshold control, upmixer is bypassed and the original channels pass unaffected.</li> </ul> </li> <li>Always Upmix: Manual enable turns on upmixer and overwrites content on all six selected channels with new 5.1 content generated by the upmixer regardless of original signal level or content.</li> <li>Bypass: Manual disable bypasses the upmixer. When bypassed, the six embedded audio channels pass unaffected.</li> </ul>
• Up Mixer Status Display     Status Auto Mode - Currently Upmixing     Status Auto Mode - Currently Bypassed     Status Upmixing     Status Bypassed	<ul> <li>Shows activity status of upmixer processing as follows:</li> <li>Auto Mode - Currently Upmixing: With upmixer enable set to Auto, indicates selected channels designated as Center, LFE, Left Surround, and Right Surround are clear for use (as described above); upmixer is currently up-mixing received stereo pair and overwriting the six selected channels with new 5.1 upmix.</li> <li>Auto Mode - Currently Bypassed: With upmixer enable set to Auto, indicates selected channels designated as Center, LFE, Left Surround, and Right Surround have content (such as existing original 5.1 or other content); upmixer is bypassed (disabled) and allows normal passage of six selected channels.</li> <li>Upmixing: Indicates upmixer is manually enabled (set to Always Upmix) and is currently up-mixing received stereo pair and overwriting the six selected channels with new 5.1 upmix.</li> <li>Bypassed: Indicates upmixer is manually disabled (set to Bypass) and is currently passing all selected channels unaffected.</li> </ul>
Auto Crossfade Speed Controls      Auto Crossfade Speed Upmix to Bypass     Very Slow     Slow     Medium     Quick     Very Quick     Instant      Auto Crossfade Speed Bypass to Upmix     Very Slow     Very Slow     Slow     Medium     Quick     Very Slow     Slow     Medium     Quick     Very Quick     Instant	Individual controls select the relative crossfade transition speed between Upmix to Bypass (going to inactive; from 5.1 to 2.0) and Bypass to Upmix (going to active; from 2.0 to 5.1) when upmixer enable is set to <b>Auto</b> and the active threshold (as set by the <b>5.1 Detection Threshold</b> control) is crossed in either direction. To suit program material and production aesthetic preferences, several choices are available as shown to the left. Slower settings allow for a more gradual transition between modes, however with a longer interval before levels stabilize. Faster settings conversely allow for a smaller interval before levels stabilize, however with greater perceived abruptness.



3

Tone Generator	Sets the test tone frequency for each of four tone generators (Tone Generator 1 thru 4).	
Frequency Selection Lists     Tone Generator 1 Frequency 1 KHz       Tone Generator 4 Frequency 1 KHz	Selects the frequency for each of the four tone generators. 18 discrete sine wave frequencies are available, ranging from 50 Hz to 16 kHz (default frequency is 1.0 kHz). <b>Note:</b> Unity-gain signal level is equivalent to -20 dBu.	
Licensable Features	Allows activation of optional licensed features.	
<b>Note:</b> For card pre-ordered with licensed feature(s), the activation steps described below are not required; the feature will already be installed activated. To order features and obtain a license key, contact Cobalt <sup>®</sup> sales at sales@cobaltdigital.com or at the contact information in Contact Cobalt Digital Inc. in Chapter 1, "Introduction". Please provide the "SSN" number of your card (displayed in the Card Info pane) when contacting us for your key.		
License Feature and Key Entry window	Activate licensable feature as described below.	
Feature Unlicensed	<ol> <li>Enter the feature key string in the Feature Key box. Press return or click outside of the box to acknowledge entry.</li> </ol>	
Feature Key Enter Key Here	Note: Entry string is case sensitive. Do not enter any spaces.	
	2. In the DashBoard <sup>™</sup> Card Info pane, wait for the feature identification to be shown for the card product number (for example, "-UM" appearing after the card part number) and <b>Valid Key Entered</b> to be displayed. This indicates the key was correctly entered and recognized by the card.	
	Note: If DashBoard <sup>™</sup> card function submenu/control pane does not re-appear, close the card and re-open it.	
	<ol><li>Click and confirm <b>Reboot</b>. When the card function submenu/control pane appears again, the licensable feature will be available.</li></ol>	
	<b>Note:</b> Applying the licensable feature and its reboot has no effect on prior settings. All control settings and drop-down selections are retained.	

Presets	Allows up to 16 card user settings configuration presets to be saved in a Preset and then recalled (loaded) as desired. All current settings (including list selections and scalar (numeric) control settings such as Gain, etc.) are saved when a Preset Save is invoked.
Card Name RCVR21 Selected Preset 1.FactPre	The <b>Preset Name</b> field and <b>Preset Save</b> button allow custom user setting configurations to be labeled and saved to a Preset for future use. The <b>Preset Load</b> button and the <b>Selected Preset</b> drop-down list allow saved presets to be selected
Preset Name FactPre Preset Save Confirm	and loaded as desired. When a preset is loaded, it immediately becomes active with all user settings now automatically set as directed by the preset.
Preset Load Confirm	Saved presets can be uploaded to a computer for
	Each of the items to the left are described in detail on
Reset Current Preset Confirm	the following pages.
Download Presets CDI Presets.bin	Save
Preset Save and Load     Preset Save Confirm     Preset Load Confirm	<ul> <li>Preset Save stores all current card control settings to the currently selected preset.</li> <li>(For example, if Preset 1 is selected in the Selected Preset drop-down list, clicking and confirming Preset Save will then save all current card control settings to Preset 1)</li> <li>Preset Load loads (applies) all card control settings defined by whatever preset (Preset 1 thru Preset 16) is currently selected in the Selected Preset drop-down list.</li> <li>(For example, if Preset 3 is selected in the Selected Preset drop-down list, clicking and confirming Preset Load will then apply all card control settings defined in Preset 3)</li> <li>The above buttons have a Confirm? pop-up that appears, requesting confirmation.</li> <li>Note: Applying a change to a preset using the buttons described above rewrites the previous preset contents with the invoked contents. Make certain change is desired before confirming preset change.</li> </ul>
Selected Preset	Selected Preset 1 thru Selected Preset 16 range in drop-down list selects one of 16 stored presets as ready for Save (being written to) or for Load (being applied to the card).
Selected Preset 1.FactPre	<b>Note:</b> The preset names shown to the left are the default (unnamed) preset names. All 16 presets in this case are loaded identically with the factory default settings.
0	Text entry field provides for optional entry of card name, function, etc. (as
• Card Name	Note: Card name can be 31 ASCII characters maximum
Card Name RCVR 21 Input Processing	

Presets	(continued)
Preset Name     FactPre	With one of 16 presets selected, provides for entry of custom name for the preset (as shown in example below). Selected Preset 2.RCVR21 Preset Name RCVR21 RCVR21 Entering text in Preset Name field (in this example, "RCVR21") applies custom name to selected Preset (in this example, Preset 2) Note: • Preset name can be seven ASCII characters maximum. • The Preset ID number does not need to be entered; it is added automatically.
Reset Current Preset     Reset Current Preset     Confirm	• Reset Current Preset resets all parameters (including preset custom name entered) of the currently selected Preset (as displayed in the Selected Preset field) to factory default settings. The button has a Confirm? pop-up that appears, requesting confirmation.
Download Presets     Download Presets     Download a presets file to a computer on the card's I     then he unloaded head to the card.	Download Presets allows all 16 presets to be stored to a specified location on a network computer for use with other same-model COMPASS™ cards. Refer to Cobalt <sup>®</sup> reference guide "Remote Control User Guide" (PN 9000RCS-RM) for instructions on using the Download Presets function.
Note also that a presets file can also be uploaded to using a single card can be easily applied to other same twork computer by clicking         Download         Presets – Save at the bottom of Download Presets	o other same-model COMPASS <sup>®</sup> cards. In this manner, presets built up me-model cards without repeating the setup work on the other cards. Upload (open) card presets from a network computer by clicking Upload at the bottom of DashBoard.
The Presets page. Browse to a desired save location (in this example, My Documents (Cobalt Presets). The file can then be renamed if desired (RCVR21 Presets) in this example) before saving. File Nume: FCVR21 Presets bin Files of Type: EIN Files (* bin) save served for the same serv	Browse to the location where the file was saved on the computer or drive (in this example, <i>My Documents\Cobalt Presets</i> ). Select the desired file and click <b>Open</b> to load the file to the card. To upload presets saved from one card to another same-model card, simply click <b>Upload</b> on the other same steps here. Note: • Preset transfer between card download and file upload is on a <b>group</b> basis (i.e., individual presets cannot be downloaded or uploaded separately). • After uploading a presets file, engagement of a desired preset is only assured by pressing the Preset Load button for a desired preset.

# Troubleshooting

This section provides general troubleshooting information and specific symptom/corrective action for the 9034 card and its remote control interface. The 9034 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 9034 card itself and its remote control systems all (to varying degrees) provide error and failure indications. Depending on how the 9034 card is being used (i.e, standalone or network controlled through DashBoard<sup>TM</sup> or a Remote Control Panel), check all available indications in the event of an error or failure condition.

The various 9034 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. 3-52)
  - 9034 Processing Error Troubleshooting (p. 3-53)
  - Troubleshooting Network/Remote Control Errors (p. 3-56)

### 9034 Card Edge Status/Error Indicators and Display

Figure 3-6 shows and describes the 9034 card edge status indicators and display. These indicators and the display show status and error conditions relating to the card itself and remote (network) communications (where applicable). Because these indicators are part of the card itself and require no external interface, the indicators are particularly useful in the event of communications problems with external devices such as network remote control devices.



Figure 3-6 9034 Card Edge Status Indicators and Display

## DashBoard<sup>™</sup> Status/Error Indicators and Displays

Figure 3-7 shows and describes the DashBoard<sup>™</sup> status indicators and displays. These indicator icons and displays show status and error conditions relating to the 9034 card itself and remote (network) communications.



Figure 3-7 DashBoard™ Status Indicator Icons and Displays

Access Card Info panes for specific cards by clicking the card slot position in the Card Access/Navigation Tree pane (as shown in the example in Figure 3-8).



Figure 3-8 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 3-3 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.

Item	Checks
Verify power presence and characteristics	<ul> <li>On both the frame Network Controller Card and the 9034, 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.</li> <li>Check the Power Consumed indications for both the +12 V and -7.5 V supply rails for the 9034 card. This can be observed using the DashBoard<sup>™</sup> Card Info pane, or using the card edge controls and indicators as shown in Figure 3-4 on page 3-7.</li> <li>If either of the rail supplies show <b>no</b> power being consumed, either the frame power supply, connections, or the 9034 card itself is defective.</li> <li>If either of the rail supplies show <b>excessive</b> power being consumed (see Technical Specifications (p. 1-20) in Chapter 1, "Introduction"), the 9034 card may be defective.</li> </ul>
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 <sup>™</sup> and the 9034 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.

Table 3-3 Basic Troubleshooting Checks

## 9034 Processing Error Troubleshooting

Table 3-4 provides 9034 processing troubleshooting information. If the 9034 card exhibits any of the symptoms listed in Table 3-4, follow the troubleshooting instructions provided.

In the majority of cases, most errors are caused by simple errors where the 9034 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<sup>™</sup> and/or the 9034 card edge status indicators.
- **Note:** Where errors are displayed on both the 9034 card and network remote controls, the respective indicators and displays are individually described in this section.

Symptom	Error/Condition	Corrective Action
<ul> <li>DashBoard<sup>™</sup> shows Video yellow icon and Input Invalid message in 9034 Card Info pane.</li> <li>Video Input Invalid</li> </ul>	No video input present	Make certain intended video source is connected to appropriate 9034 card video input. Make certain BNC cable connections between frame Rear I/O Module for the card and signal source are OK.
Card edge Input Format LEDs show continuous cycling.		
<ul> <li>DashBoard<sup>™</sup> shows Frame Sync red icon and Reference Invalid message in 9034 Card Info pane.</li> </ul>	Frame sync reference not properly selected or not being received	<ul> <li>If external frame sync reference is not intended to be used, make certain the Framesync Enable selection list is set to Off or Input Video as desired.</li> </ul>
Frame Sync 🔶 Reference Invalid		<ul> <li>If external frame sync reference is intended to be used, make certain selected external frame sync reference is active on frame sync frame bus. (External reference signals)</li> </ul>
Card edge red ERR indicator illuminated.		Reference 1 and Reference 2 are distributed to the 9034 and other cards via a frame bus.)
		Refer to <b>Framesync</b> function submenu tab on page 3-16 for more information.

#### Table 3-4 Troubleshooting Processing Errors by Symptom

Symptom	Error/Condition	Corrective Action
DashBoard™ shows         Framesync Status error         message in 9034 Framesync         function submenu screen.         Framesync Status         Minimum Latency Frames	Specified Minimum Latency Frames setting exceeds 9034 card buffer space for the selected output video format	Reduce the Minimum Latency Frames setting as specified in the error message to correct the error. Note: Due to card memory limits, the maximum available Minimum Latency Frames is related to the output video format selected. For example, with a 1080i 5994 output, the maximum setting is 5. For a 1080i film (2398) output, the maximum setting is 3 (due to the increased buffer space needed for the slower frame rate). Conversely, greater maximum settings are allowed for SD formats such as 525i 5994, where the practical maximum limit is 13.
Video/audio synchronization or delay noted.	Source synchronization condition	Use the <b>Audio Offset from Video</b> control to compensate for video/audio delay. Refer to <b>Framesync</b> function submenu tab on page 3-16 for more information.
Unsmooth, "jerky" motion observed on video output with Framesync set to lock to input video.	Incompatible negative H/V delay value user setting of Vertical Delay or Hoeizontal Delay controls	Negative vertical or horizontal delay values (using the controls below) should <b>not</b> be used when using Input Video mode. To add an offset in this case, instead apply a positive value that results in the desired net offset.
Ancillary data (closed captioning, timecode, Dolby <sup>®</sup> metadata, AFD) not transferred through 9034.	Control(s) not enabled	<ul> <li>Make certain respective control is set to On or Enabled (as appropriate).</li> </ul>
	<ul> <li>VANC line number conflict between two or more ancillary data items</li> </ul>	• Make certain each ancillary data item to be passed is assigned a unique line number (see Ancillary Data Line Number Locations and Ranges on page 3-8).
DashBoard <sup>™</sup> shows red	Analog peak audio input on selected input exceeds +24 dBu level	Reduce analog audio level at the source.
Audio icon and Analog Input Clipping message in 9034 Card Info pane. Audio Analog Input Clipping		<b>Note:</b> 9034 audio gain controls cannot be used to correct analog input overload condition. The condition must be corrected at the source.
Card edge display shows code     E101.		
(9034-DEC only) Dolby <sup>®</sup> data indicated as <b>Present</b> on Audio Input Controls Status display does not process, or cannot be accessed as an audio source	Input Select in Dolby     Decoder function selection     not set for pair carrying     locked Dolby <sup>®</sup> data	<ul> <li>Make certain intended channels carrying locked Dolby<sup>®</sup> data are selected as the input for the Dolby<sup>®</sup> decoder.</li> </ul>
	<ul> <li>Upstream metadata not enabled</li> </ul>	<ul> <li>Check upstream device or system and enable as required.</li> </ul>

 Table 3-4
 Troubleshooting Processing Errors by Symptom — continued

Symptom	Error/Condition	Corrective Action
Audio signal(s) do not route as expected. Parameter control not available as expected.	• (9034 only) AES audio contains Dolby <sup>®</sup> E or Dolby Digital encoded signal	<ul> <li>When a valid Dolby<sup>®</sup> E or Dolby Digital signal (in accordance with SMPTE 337M) is detected on an AES signal, SRC is automatically bypassed (disabled) along with gain and polarity controls being bypassed (even though controls may appear to be functional). Gain and polarity controls are not available for this signal type.</li> <li>Refer to Status displays in Audio Input Controls function submenu tab on page 3-11 for more information.</li> </ul>
	Audio Input Controls AES     Passthrough or Zero Delay     Embedding mode may     inadvertently be enabled	<ul> <li>When either of these modes is enabled, flexible routing and parametric controls are not available. When either of these modes is not intended for use, make sure they are disabled.</li> <li>Refer to Audio Input Controls function submenu tab on page 3-11 for more information.</li> <li>Note: Routing and parametric controls may appear functional when either of these mode are enabled, although the controls will not be functional.</li> </ul>
Audio not processed or passed through card.	<ul> <li>Input audio of type that cannot be locked by 9034 card</li> </ul>	<ul> <li>AES discrete audio must be nominal 48 kHz input.</li> <li>Note: Although the Status Displays in Audio Input Controls function submenu tab will show audio formats other than "Present, Professional" as being locked (such as "Present, Consumer"), in any case the audio must be at nominal 48 kHz rate for lock and processing to occur.</li> </ul>
	Enable control not turned on	• Group Enable button for Embedded Audio Group 1/2 or Embedded Audio Group 3/4 function submenu must be turned on for sources to be embedded into respective embedded channels.

 Table 3-4
 Troubleshooting Processing Errors by Symptom — continued

Symptom	Error/Condition	Corrective Action
Audio not processed or passed through card (cont.).	Upmixer inadvertently enabled (Upmixer Licensed Feature only)	<ul> <li>Make certain upmixer is set to Bypass if not intended for use.</li> <li>Note: When manually enabled or set for automatic enable with appropriate signal levels, upmixer overwrites selected channels with new data; same-channel output will no longer represent same-channel inputs for</li> </ul>
	AES pairs 1 thru 4 switch not set for Input (factory default) mode	<ul> <li>If any of AES IN 1 thru AES IN 4 are to be used as inputs, the respective DIP switch must be set to the default INPUT mode position.</li> </ul>
		See Setting I/O Switches for AES I/O (1-4) Ports (p. 2-1) in Chapter 2, "Installation and Setup" for more information.
	<ul> <li>Dolby-encoded pair not recognized by downstream devices/systems</li> </ul>	<ul> <li>If framesync is enabled and using Input Video as source, Audio SRC must be set to Off to maintain integrity of Dolby pair for downstream devices.</li> </ul>

Table 3-4 Troubleshooting Processing Errors by Symptom — continued

## **Troubleshooting Network/Remote Control Errors**

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

## In Case of Problems

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

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

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

See Contact Cobalt Digital Inc. (p. 1-25) 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