
**F3G
FUSION**

Option 



Dolby[®] E Encoder Option (+ENCE)

Manual Supplement



Cobalt Digital Inc.

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

Copyright

©Copyright 2012, Cobalt Digital Inc. All Rights Reserved.

Duplication or distribution of this manual and any information contained within is strictly prohibited without the express written permission of Cobalt Digital Inc. This manual and any information contained within, may not be reproduced, distributed, or transmitted in any form, or by any means, for any purpose, without the express written permission of Cobalt Digital Inc. Reproduction or reverse engineering of software used in this device is prohibited.

Disclaimer

The information in this document has been carefully examined and is believed to be entirely reliable. However, no responsibility is assumed for inaccuracies. Furthermore, Cobalt Digital Inc. reserves the right to make changes to any products herein to improve readability, function, or design. Cobalt Digital Inc. does not assume any liability arising out of the application or use of any product or circuit described herein. **This manual is a supplement and is incomplete unless used with an Owner's or Product Manual. Refer to the applicable Product Manual for complete personnel protection and equipment safety information.**

Trademark Information

Cobalt[®] is a registered trademark of Cobalt Digital Inc.

FUSION3G[®] and **COMPASS**[®] are registered trademarks of Cobalt Digital Inc.

openGear[®] is a registered trademark of Ross Video Limited. **DashBoard**[™] is a trademark of Ross Video Limited. **Dolby**[®] encoder technology on this card is manufactured under license from Dolby Laboratories. **Dolby**[®] is a registered trademark of Dolby Laboratories, Inc. Other product names or trademarks appearing in this manual are the property of their respective owners.

Linear Acoustic[®] and **AEROMAX**[®] are registered trademarks of Linear Acoustic, Inc. 2.0-to-5.1 audio upmixer licensed feature uses the **AutoMAX-II**[™] upmix algorithm provided under license from **Linear Acoustic Inc.** Loudness processor licensed feature uses **AEROMAX**[®] algorithms provided under license from **Linear Acoustic Inc.** **Linear Acoustic**, the "LA" symbol, **UPMAX**, **AutoMAX**, **AutoMAX-II**, and **AEROMAX**[®] are trademarks of Linear Acoustic Inc. All Rights Reserved.

Supplement No.:	OPT-SW-F3GENCE-MS
Document Version:	V1.3
Release Date:	October 22, 2012
Description of product/manual changes:	- Specify Dolby encoding latent delays and provide instructions for compensating for delay using card controls.

Overview

This manual supplement provides descriptions and operating instruction for the **+ENCE** (Dolby® E Encode) Option available as an option on new Cobalt® FUSION3G® (9900-Series) cards, and as a purchased field-installed licensable feature upload.

+ENCE Option Functional Description

(See Figure 1.) The Dolby® E encoder receives and encodes up to eight audio channels from the internal bus and/or optional audio DSP (upmixed and/or loudness-processed) channels. Internally generated metadata can be user-defined using the encoder controls, or external metadata from SMPTE 2020, serial, or optional on-card Dolby decoder can be used. The encoded pair can be sent from the card as embedded audio or over discrete AES-3id connections as a SMPTE 337M-formatted non-PCM signal.

Note: The Dolby® encoder can receive PCM audio inputs from any combination of internal bus or Audio DSP outputs. The resulting encoded pair can be sent only to embedded or AES card audio outputs.

Input Audio Mapping. Any audio input supported by the card can serve as audio inputs for the Dolby® E encoder. The encoder selects from these sources which can be user mapped to encoder inputs **Dolby 1** thru **Dolby 8**.

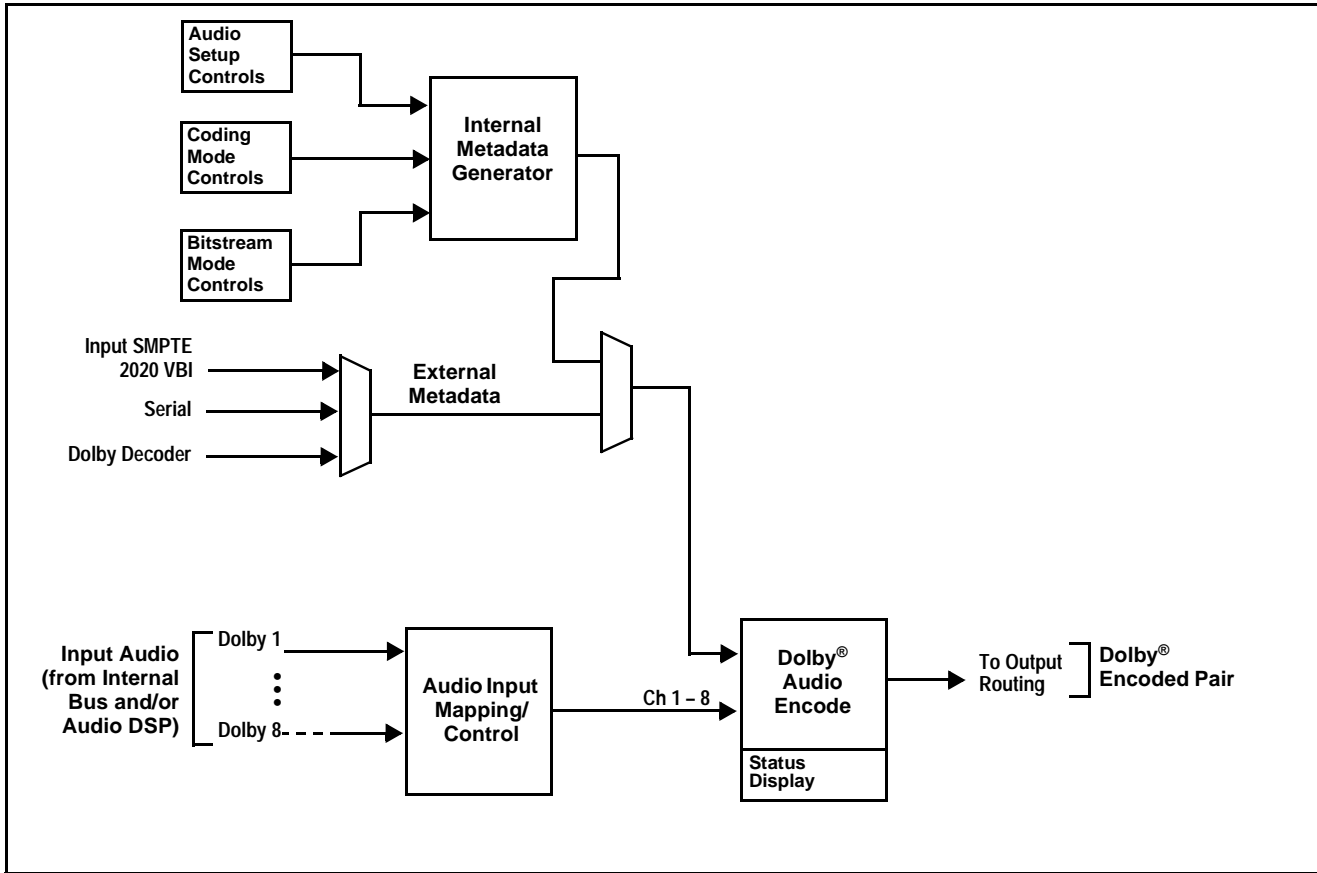


Figure 1 Dolby® Encoder Functional Block Diagram

Internal Metadata Generator. The internal metadata generator provides full audio setup, program coding, and bitstream definition controls, allowing user-generated metadata for providing Dolby® encoding without any external metadata being required.

External Metadata Modification using Internal Metadata. When external metadata is being used, metadata parameters related to loudness can be overridden with user values set locally on the encoder. This allows tailoring of certain metadata values to reflect processing done locally (such as on-card loudness processing) while preserving and using the basic external metadata.

Dolby® Audio Encode. In accordance with the selected metadata, the Dolby® audio encode function receives the audio inputs **Dolby 1- 8** from the internal bus and/or Audio DSP and provides the Dolby® encoded SMPTE 337M pair. The encoded pair is available as a source for embedded channel pairs, and as a source for AES output pairs (allowing the encoded pair to be available over a discrete AES-3id port).

Uploading Option Feature (Field Upgrade Only)

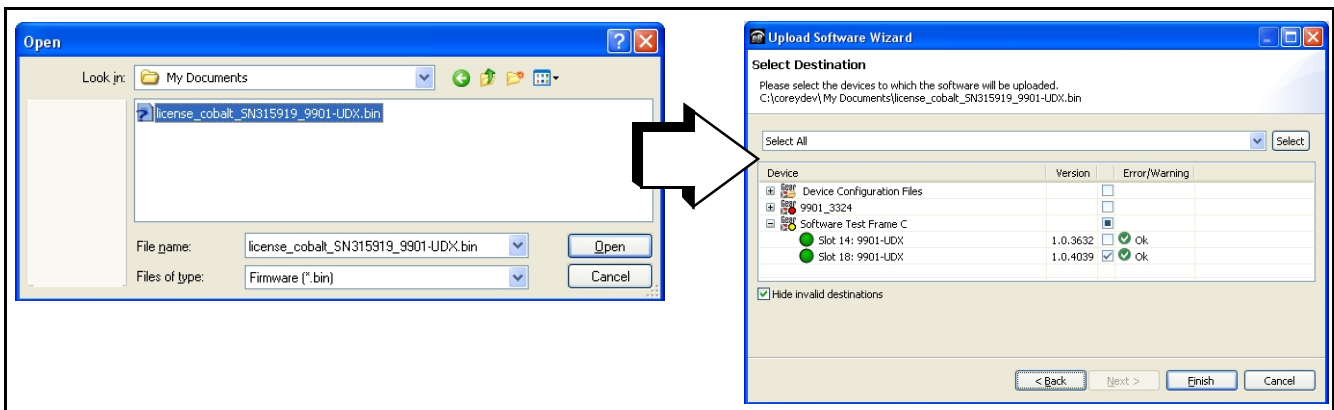
- Note:**
- If your FUSION3G[®] card was purchased with the option(s) covered here, this procedure is not required for your card. If you have purchased this feature to be field-installed on an existing card, perform the upload procedure here to upload the feature key file sent by Cobalt, and to activate the feature on your card.
 - To order features and obtain a license key, contact Cobalt[®] sales at sales@cobaltdigital.com or at the contact information on the cover of this supplement. Please provide the Serial Number of your card (displayed in the Card Info pane) when contacting us for your feature key. Typically, a feature key file is bound to the card's serial number and will only work with that card. Please indicate if upgrades are needed for more than one card.

Activate licensable feature as described below.

1. Cobalt typically supplies a .bin file (by e-mail; file size < 10kB) that activates the licensable feature. Download this file to a convenient location on the PC connected to the card's frame.

Note: During this procedure, the card will go offline while the feature is installed. Make certain card is not carrying OTA signal.

2. In DashBoard for the card being upgraded click the **Upload** button and browse to the feature license file (in the example below, license_cobalt_SN315909_9901-UDX.bin).



3. Select the file, click **Open** and then follow the prompts. With intended card selected ("Slot 18 UDX-9901" in example above), click **Finish**. When the card comes back online, the feature appears in the DashBoard controls and is ready for use.

Note: Applying the licensable feature has no effect on prior settings. All control settings and drop-down selections are retained.

Note: Added features, when first appearing after installation, are set to their factory default states. For features having a direct impact on the output signal, all controls are initially set to disabled or null.

Dolby E Encoder Controls and Examples

Table 1 individually lists and describes Dolby encoder controls available using DashBoard™ for cards equipped with the +ENCE option.

Note: Although not essential for setting up Dolby encoded audio, it is recommended to consider the small audio delay induced in the encoding. After setup is done, refer to Compensating for Dolby Encoding Audio Delays, p. 14 to remove this delay.

Table 1 +ENCE Option Control List and Descriptions


	<p>Encoder sub-tab provides global setup and status monitoring for the Dolby encoder.</p>
<p>• Encoding Mode</p> <p>Dolby DSP Mode: <input type="text" value="Enable Dolby E encoder"/> (dropdown menu with options: Enable Dolby E encoder, Disable encoders, Enable Dolby E encoder)</p>	<p>Enables or disables the Dolby E encoder.</p> <p>Note: On cards also licensed for Dolby D encoder(s), these choices will also appear in this drop-down.</p>
<p>• Int/Ext Metadata Source Select</p> <p>Metadata Source: <input type="text" value="Internal"/> (dropdown menu with options: Internal, External, even if stale, External if recent, else internal, External if recent, else stop)</p>	<p>Selects internal metadata or selects external metadata with the failover choices shown.</p> <p>Note:</p> <ul style="list-style-type: none"> • If external metadata choice is selected as source, intended physical source (SMPTE 2020 de-mux from SDI, serial, or decoder (where available)) must be appropriately selected. See External Metadata Select below for more information. • When external metadata is being used, loudness-related metadata parameters can be replaced with values set using internal metadata controls (user-set local settings). Refer to Internal Metadata sub-tab Loudness Override control description on page 8 and the example on page 10 for more information.
<p>• External Metadata Select</p> <p>Dolby DSP Metadata Source: <input type="text" value="Serial port 1"/> (dropdown menu with options: Serial port 1, Serial port 2, Dolby decoder, Input video, None)</p> <p>Metadata Without Frame Rate: <input type="text" value="Reject"/> (dropdown menu with options: Reject, Accept)</p>	<p>When external metadata is to be used, Dolby DSP Metadata Source selects the external metadata source used by the encoder from the choices shown.</p> <p>Note: If external metadata is to be used, also set other controls on the Metadata Routing and Embedding tab as intended.</p> <hr/> <p>Accepts or rejects external metadata marked as “0 frame rate”. When set for Reject and metadata is received without compatible frame rate, external metadata is blocked.</p> <p>Note: For typical use, this control should always be set to the default Reject setting.</p>

Table 1 +ENCE Option Control List and Descriptions — continued

<div style="background-color: #333; color: white; padding: 5px; text-align: center; font-weight: bold; font-size: 1.2em;">Dolby E Encoder</div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> Encoder Inputs Internal Metadata </div>	<p>(continued)</p>										
<p>• Dolby DSP Status/Reset Controls</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">Reboot Dolby DSP</td> <td style="text-align: right;"><input type="button" value="Confirm"/></td> </tr> <tr> <td>Encoded Frames</td> <td><input type="text" value="248834"/></td> </tr> <tr> <td>Encoder Errors</td> <td><input type="text" value="0"/></td> </tr> <tr> <td>Last Encode Error</td> <td><input type="text"/></td> </tr> <tr> <td>Clear Encoder Counters</td> <td style="text-align: right;"><input type="button" value="Confirm"/></td> </tr> </table> </div>	Reboot Dolby DSP	<input type="button" value="Confirm"/>	Encoded Frames	<input type="text" value="248834"/>	Encoder Errors	<input type="text" value="0"/>	Last Encode Error	<input type="text"/>	Clear Encoder Counters	<input type="button" value="Confirm"/>	<p>Provides reboot (restart) and encoding status displays.</p> <p>Note: Encoding errors are also displayed on the card's Card Info pane and overall DashBoard card status indicator (indicator changes from green to red).</p>
Reboot Dolby DSP	<input type="button" value="Confirm"/>										
Encoded Frames	<input type="text" value="248834"/>										
Encoder Errors	<input type="text" value="0"/>										
Last Encode Error	<input type="text"/>										
Clear Encoder Counters	<input type="button" value="Confirm"/>										
<p>• Encoding Info and Status Display</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Dolby E Encoder Status <input type="text" value="Encoding 16-bit keyed Dolby E in 6x1, using current external metadata"/></p> </div>	<p>Displays encoding status summary for the Dolby E encoder.</p> <ul style="list-style-type: none"> Example below shows encoder properly encoding as per selected encoding. Installed encoder that are not enabled are shown as Ready to encode. 										
<p>• Bitstream Format Select</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">Bitstream Format</td> <td style="border: 1px solid #ccc;"> <div style="background-color: #eee; padding: 2px;">16-bit keyed ▾</div> <div style="background-color: #fff; padding: 2px;">16-bit keyed</div> <div style="background-color: #fff; padding: 2px;">20-bit unkeyed</div> <div style="background-color: #fff; padding: 2px;">20-bit keyed</div> </td> </tr> </table> </div>	Bitstream Format	<div style="background-color: #eee; padding: 2px;">16-bit keyed ▾</div> <div style="background-color: #fff; padding: 2px;">16-bit keyed</div> <div style="background-color: #fff; padding: 2px;">20-bit unkeyed</div> <div style="background-color: #fff; padding: 2px;">20-bit keyed</div>	<p>Selects between 16-bit and 20-bit keyed/unkeyed formats.</p> <p>Note: For downstream equipment requiring keyed bitstream to avoid errors, use this setting (most systems can use this setting).</p>								
Bitstream Format	<div style="background-color: #eee; padding: 2px;">16-bit keyed ▾</div> <div style="background-color: #fff; padding: 2px;">16-bit keyed</div> <div style="background-color: #fff; padding: 2px;">20-bit unkeyed</div> <div style="background-color: #fff; padding: 2px;">20-bit keyed</div>										

Table 1 +ENCE Option Control List and Descriptions — continued

Dolby E Encoder

Inputs sub-tab provides source routing and gain controls for the up to 8 input channels supported in Dolby E encoding.

Encoder
Inputs
Internal Metadata

	Source	Gain	Mute	Peak
Dolby 1 (L in 5.1)	LP51 A L		<input type="checkbox"/>	-34.9 dBFS
Dolby 2 (R in 5.1)	LP51 A R		<input type="checkbox"/>	-33.1 dBFS
Dolby 3 (C in 5.1)	LP51 A C		<input type="checkbox"/>	-20.0 dBFS
Dolby 4 (LFE in 5.1)	LP51 A LFE		<input type="checkbox"/>	-20.0 dBFS
Dolby 5 (Ls in 5.1)	LP51 A Ls		<input type="checkbox"/>	-26.0 dBFS
Dolby 6 (Rs in 5.1)	LP51 A Rs		<input type="checkbox"/>	-29.0 dBFS
Dolby 7 (1L in 5.1+2)	LP Stereo A L		<input type="checkbox"/>	-25.1 dBFS
Dolby 8 (1R in 5.1+2)	LP Stereo A R		<input type="checkbox"/>	-24.8 dBFS

Encoder
Inputs
Internal Metadata

Individual input source routing controls are provided for each of the encoder inputs. These controls are described on the following pages.

Table 1 +ENCE Option Control List and Descriptions — continued

<h2 style="background-color: #333; color: white; padding: 5px; margin: 0;">Dolby E Encoder</h2>	<p>Internal Metadata sub-tab provides internal metadata audio production and bitstream controls.</p>																																																																																								
Encoder Inputs Internal Metadata																																																																																									
<p>Note:</p> <ul style="list-style-type: none"> Information provided here is intended as an overview of the screen. Displayed parameters are per ATSC A/52B definitions. Refer to ATSC A/52B for detailed descriptions and background. Default settings provide typically accepted parametric settings for each Audio Coding Mode. If settings are changed, note that settings performed here have a profound effect on program material technical and aesthetic aspects. Setup should only be performed by authorized personnel. 																																																																																									
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="background-color: #eee;">Program Configuration</td> <td>5.1 + 2</td> </tr> <tr> <td></td> <td style="text-align: center;">Program 1</td> </tr> <tr> <td>Coding Mode</td> <td>3/2 (L,C,R,Ls,Rs)</td> </tr> <tr> <td>Bitstream Mode</td> <td>Complete Main</td> </tr> <tr> <td>Dolby Surround Mode</td> <td>Not Indicated</td> </tr> <tr> <td>LFE Channel</td> <td>LFE Channel On</td> </tr> <tr> <td>Dialogue Normalization</td> <td>-25 dB</td> </tr> <tr> <td>Audio Production Information</td> <td>Present</td> </tr> <tr> <td>Mix Level</td> <td>105 dB</td> </tr> <tr> <td>Room Type</td> <td>Not Indicated</td> </tr> <tr> <td></td> <td style="text-align: center;">⋮</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td></td> <td style="text-align: center;">Program 8</td> </tr> <tr> <td>Coding Mode</td> <td>2/0 (L,R)</td> </tr> <tr> <td>Bitstream Mode</td> <td>Complete Main</td> </tr> <tr> <td>Dolby Surround Mode</td> <td>Not Indicated</td> </tr> <tr> <td>LFE Channel</td> <td>LFE Channel Off</td> </tr> <tr> <td>Dialogue Normalization</td> <td>-27 dB</td> </tr> <tr> <td>Audio Production Information</td> <td>Present</td> </tr> <tr> <td>Mix Level</td> <td>105 dB</td> </tr> <tr> <td>Room Type</td> <td>Not Indicated</td> </tr> <tr> <td></td> <td style="text-align: center;">⋮</td> </tr> </table> </div> <div style="width: 45%; vertical-align: top; padding-left: 20px;"> <p>For internally generated metadata, individual audio production parametric settings and bitstream information controls allow individual setup for the encoder. Drop-down lists provide on/off settings or selection from a range of appropriate choices in general conformance with ATSC A/52B practices.</p> </div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="background-color: #eee;">Dolby Headphone encoded</td> <td>Not Indicated</td> </tr> <tr> <td>A/D Converter Type</td> <td>HDCD</td> </tr> <tr> <td>DC Highpass Filter</td> <td>Enabled</td> </tr> <tr> <td>Bandwidth Lowpass Filter</td> <td>Enabled</td> </tr> <tr> <td>LFE Channel Lowpass Filter</td> <td>Enabled</td> </tr> <tr> <td>Surround Channel 90 Degree PSF</td> <td>Enabled</td> </tr> <tr> <td>Surround Channel Attenuator</td> <td>Bypassed</td> </tr> <tr> <td>RF Mode Profile</td> <td>Film: Standard</td> </tr> <tr> <td>Line Mode Profile</td> <td>Film: Standard</td> </tr> <tr> <td>Loudness Override</td> <td>Enabled</td> </tr> <tr> <td>Program Description</td> <td><input type="text"/></td> </tr> </table> </div> <div style="width: 45%; vertical-align: top; padding-left: 20px;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="background-color: #eee;">Dolby Headphone encoded</td> <td>Not Indicated</td> </tr> <tr> <td>A/D Converter Type</td> <td>HDCD</td> </tr> <tr> <td>DC Highpass Filter</td> <td>Enabled</td> </tr> <tr> <td>Bandwidth Lowpass Filter</td> <td>Enabled</td> </tr> <tr> <td>LFE Channel Lowpass Filter</td> <td>Enabled</td> </tr> <tr> <td>Surround Channel 90 Degree PSF</td> <td>Enabled</td> </tr> <tr> <td>Surround Channel Attenuator</td> <td>Bypassed</td> </tr> <tr> <td>RF Mode Profile</td> <td>Film: Standard</td> </tr> <tr> <td>Line Mode Profile</td> <td>Film: Standard</td> </tr> <tr> <td>Loudness Override</td> <td>Disabled</td> </tr> <tr> <td>Program Description</td> <td><input type="text"/></td> </tr> </table> </div> </div> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 45%;"> <p>• Loudness Override Controls</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="background-color: #eee;">Loudness Override</td> <td> <div style="border: 1px solid gray; padding: 2px;"> Disabled Disabled Enabled </div> </td> </tr> </table> </div> <div style="width: 45%; vertical-align: top; padding-left: 20px;"> <p>When set to Enable, individual Loudness Override controls for each Dolby E program allow internal metadata settings to override the Dialnorm, RF Mode Profile, and Line Mode Profile settings in external metadata. This allows external metadata settings to be used, while allowing re-authoring of only the settings affecting loudness. This enable/disable can be applied on a program-by-program basis.</p> <p>See the example on page 10 for an example using these controls.</p> </div> </div>		Program Configuration	5.1 + 2		Program 1	Coding Mode	3/2 (L,C,R,Ls,Rs)	Bitstream Mode	Complete Main	Dolby Surround Mode	Not Indicated	LFE Channel	LFE Channel On	Dialogue Normalization	-25 dB	Audio Production Information	Present	Mix Level	105 dB	Room Type	Not Indicated		⋮		Program 8	Coding Mode	2/0 (L,R)	Bitstream Mode	Complete Main	Dolby Surround Mode	Not Indicated	LFE Channel	LFE Channel Off	Dialogue Normalization	-27 dB	Audio Production Information	Present	Mix Level	105 dB	Room Type	Not Indicated		⋮	Dolby Headphone encoded	Not Indicated	A/D Converter Type	HDCD	DC Highpass Filter	Enabled	Bandwidth Lowpass Filter	Enabled	LFE Channel Lowpass Filter	Enabled	Surround Channel 90 Degree PSF	Enabled	Surround Channel Attenuator	Bypassed	RF Mode Profile	Film: Standard	Line Mode Profile	Film: Standard	Loudness Override	Enabled	Program Description	<input type="text"/>	Dolby Headphone encoded	Not Indicated	A/D Converter Type	HDCD	DC Highpass Filter	Enabled	Bandwidth Lowpass Filter	Enabled	LFE Channel Lowpass Filter	Enabled	Surround Channel 90 Degree PSF	Enabled	Surround Channel Attenuator	Bypassed	RF Mode Profile	Film: Standard	Line Mode Profile	Film: Standard	Loudness Override	Disabled	Program Description	<input type="text"/>	Loudness Override	<div style="border: 1px solid gray; padding: 2px;"> Disabled Disabled Enabled </div>
Program Configuration	5.1 + 2																																																																																								
	Program 1																																																																																								
Coding Mode	3/2 (L,C,R,Ls,Rs)																																																																																								
Bitstream Mode	Complete Main																																																																																								
Dolby Surround Mode	Not Indicated																																																																																								
LFE Channel	LFE Channel On																																																																																								
Dialogue Normalization	-25 dB																																																																																								
Audio Production Information	Present																																																																																								
Mix Level	105 dB																																																																																								
Room Type	Not Indicated																																																																																								
	⋮																																																																																								
	Program 8																																																																																								
Coding Mode	2/0 (L,R)																																																																																								
Bitstream Mode	Complete Main																																																																																								
Dolby Surround Mode	Not Indicated																																																																																								
LFE Channel	LFE Channel Off																																																																																								
Dialogue Normalization	-27 dB																																																																																								
Audio Production Information	Present																																																																																								
Mix Level	105 dB																																																																																								
Room Type	Not Indicated																																																																																								
	⋮																																																																																								
Dolby Headphone encoded	Not Indicated																																																																																								
A/D Converter Type	HDCD																																																																																								
DC Highpass Filter	Enabled																																																																																								
Bandwidth Lowpass Filter	Enabled																																																																																								
LFE Channel Lowpass Filter	Enabled																																																																																								
Surround Channel 90 Degree PSF	Enabled																																																																																								
Surround Channel Attenuator	Bypassed																																																																																								
RF Mode Profile	Film: Standard																																																																																								
Line Mode Profile	Film: Standard																																																																																								
Loudness Override	Enabled																																																																																								
Program Description	<input type="text"/>																																																																																								
Dolby Headphone encoded	Not Indicated																																																																																								
A/D Converter Type	HDCD																																																																																								
DC Highpass Filter	Enabled																																																																																								
Bandwidth Lowpass Filter	Enabled																																																																																								
LFE Channel Lowpass Filter	Enabled																																																																																								
Surround Channel 90 Degree PSF	Enabled																																																																																								
Surround Channel Attenuator	Bypassed																																																																																								
RF Mode Profile	Film: Standard																																																																																								
Line Mode Profile	Film: Standard																																																																																								
Loudness Override	Disabled																																																																																								
Program Description	<input type="text"/>																																																																																								
Loudness Override	<div style="border: 1px solid gray; padding: 2px;"> Disabled Disabled Enabled </div>																																																																																								
Encoder Inputs Internal Metadata																																																																																									

Table 1 +ENCE Option Control List and Descriptions — continued

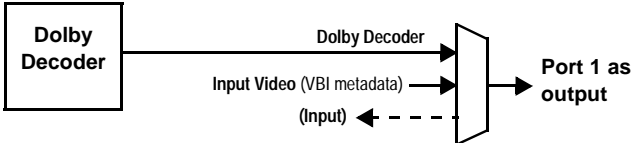
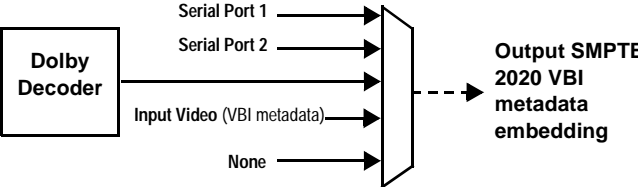
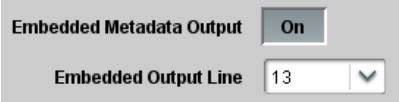

<p>COM and Metadata Routing</p>	<p>Provides input and output support of Dolby metadata routing between the Dolby decoder and serial/video interfaces.</p>
<p>Note:</p> <ul style="list-style-type: none"> • “Dolby Decoder” drop-down choice for this function appear only on cards equipped with an optional Dolby decoder. • After familiarizing yourself with the controls described here, see the following page for an example showing interrelated use of these controls. 	
<p>• Serial Port Selectors</p> <p>Serial Port Controls</p> <p>COM 1: Out - Dolby decoder Out - Dolby decoder Out - SMPTE 2020 De-embedder Input</p> <p>COM 2: Input</p> <p>Serial Port Conflicts</p>	<p>For serial ports 1 and 2, selects the source for metadata to be exported (outputted) from the card over a port as shown from the choices listed to the left and shown below. (None selection frees the port to be used as an input.)</p>  <p>Note: If settings here and described below attempt to set a given port as both an output and an input, Serial Ports Conflicts status display indicates conflict (e.g., “Port 1 configured as both input and output”).</p>
<p>• VBI SMPTE 2020 Embedding Source Selector</p> <p>SMPTE 2020 Embedder Controls</p> <p>Metadata Source: Serial port 1 Serial port 1 Serial port 2 Dolby decoder Input video None</p>	<p>For VBI embedding at the card SDI output, selects the source of metadata to be exported (outputted) from the card from the choices listed to the left and shown below.</p> 
<p>• SDI Input VBI Metadata Status Display</p> <p>Input Status Receiving embedded metadata on line 13</p>	<p>Indicates if Dolby metadata is present on input SDI VBI, as well as VBI line number. (If no metadata present, displays “Not Present”.)</p>

Table 1 +ENCE Option Control List and Descriptions — continued

COM and Metadata Routing	(continued)
<p>• Metadata Embedding</p> 	<p>Embedded Metadata Output enables SMPTE 2020-1 metadata embedding in the SDI video output, as selected using controls described above.</p> <p>Embedded Output Line allows selection of SMPTE 2020-1 metadata line location within the VANC space for re-inserted Dolby® metadata.</p> <p>(Range is 9 thru 41)</p> <p>Note:</p> <ul style="list-style-type: none"> • 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. • The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data unless existing metadata is to be intentionally overwritten. <p>Typically, when encoding is active it is recommended that any metadata not specifically related to that being used by the encoder be removed (or replaced with metadata being used by the encoder), and also that the line number be set to overwrite obsolete input VBI metadata. Also, the encoded pair carries the up to date metadata within the encoded pair stream. Removing or replacing obsolete metadata avoids any ambiguity of having different metadata packets on multiple lines, or metadata that is not related to the encoding being performed.</p>

Dolby® E Encoding Example Using Locally Authored Modified External Metadata

Note:  **(USA)** ATSC A/85 and the CALM Act (H.R. 1084/S. 2847) requires that when real-time loudness processing is applied using a fixed target loudness of -24 LKFS, downstream AC-3 encoding must correspondingly use a fixed dialnorm value of -24. The default target loudness (as set by the loudness processor Master Output Gain Control at default setting of 0.0) is -24 LKFS. Metadata re-authored to reflect corrected dialnorm should be set to propagate to downstream encoders (typically using SMPTE 2020 insertion of the re-authored metadata to replace existing metadata).

The example here shows using the encoder to encode loudness-processed audio using external metadata, but provide for local re-authoring of the Dolby loudness-related metadata to replace this metadata with that better reflecting the loudness characteristics of the loudness-processed program audio. In this example, the encoder performs the following:

- Receives SMPTE 2020 external metadata specifying 5.1+2 encoding.
- Encodes a locally loudness-processed (by the same-card optional loudness processor) 5.1 and stereo program source.
- Overrides (re-authors) the loudness-related external metadata with new user settings that are set using the **Internal Metadata** controls on the encoder.

- After encoding, removes the obsolete SMPTE 2020 external metadata from the card output SDI (to be replaced with the new, re-authored metadata inherent in the encoded audio).
- Outputs the Dolby E encoded pair on Emb Ch 1/2.

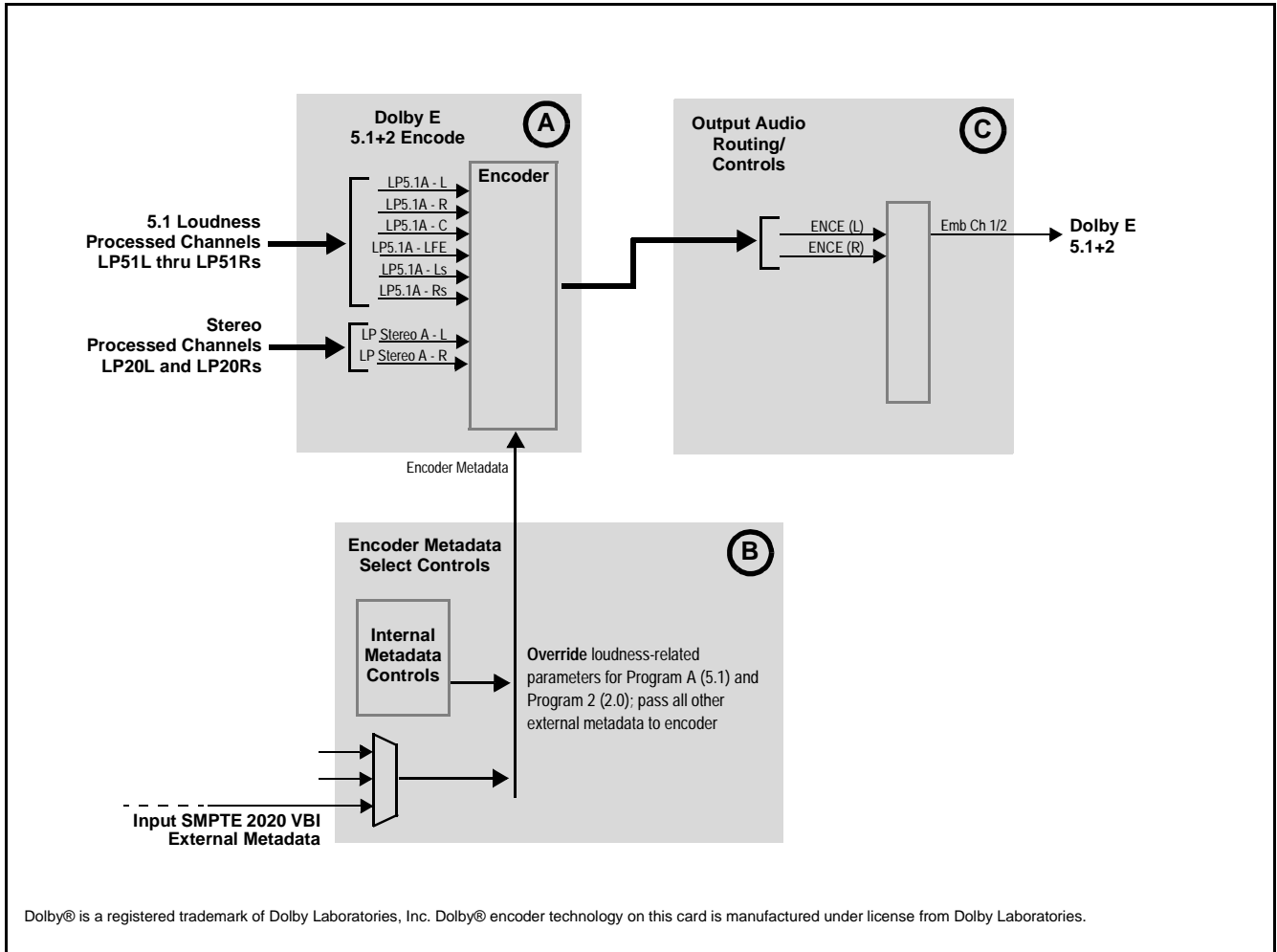
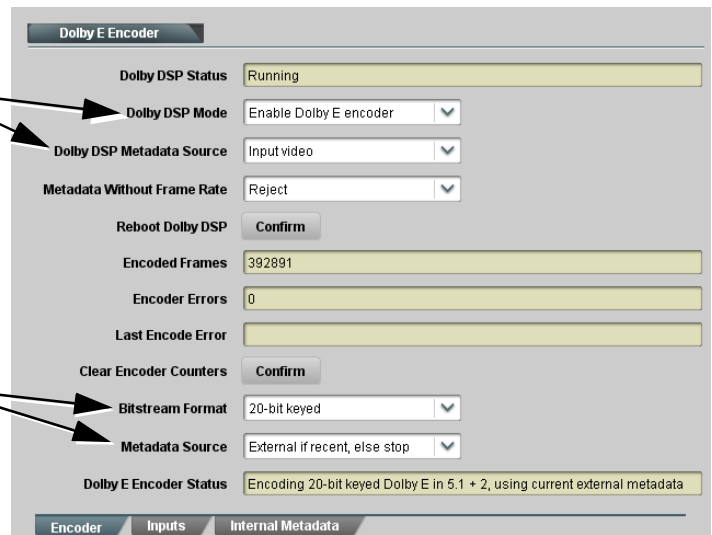


Figure 2 Example Dolby E 5.1+2 with Modified External Metadata Setup (Sheet 1 of 3)

A

First, on the **Encoder** sub-tab the encoder is set for **Dolby E Enable**. In this example because SMPTE 2020 external metadata is to be used, **Dolby DSP Metadata Source** is set to **Input Video**.

In this example, Bitstream Format is set to 20-bit keyed, and the encoder is set to use external metadata (and stop encoding if external metadata is lost).



In this example, loudness-processed 5.1-channel and stereo loudness-processed program material are to be the encoder audio sources.

As such, on the **Inputs** sub-tab sources **LP51 A(L)** thru **LP51 A(Rs)** and **LP Stereo A(L) /LP Stereo A(Rs)** are correspondingly routed to the encoder 5.1 and +2 Source inputs.

Inputs Dolby 1 thru Dolby 6 serving as 5.1 Inputs

Inputs Dolby 7 and Dolby 8 serving as +2 Inputs

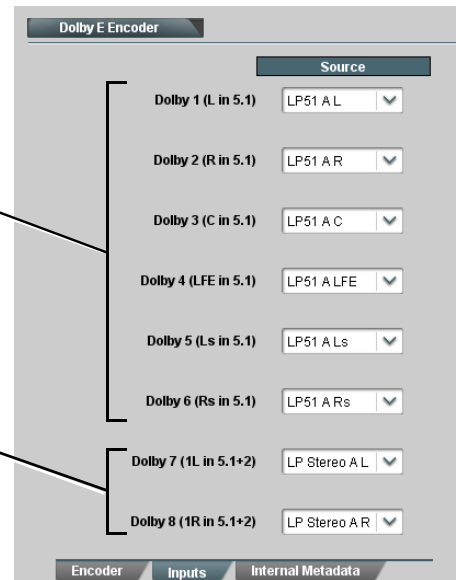


Figure 2 Example Dolby E 5.1+2 with Modified External Metadata Setup (Sheet 2 of 3)

B

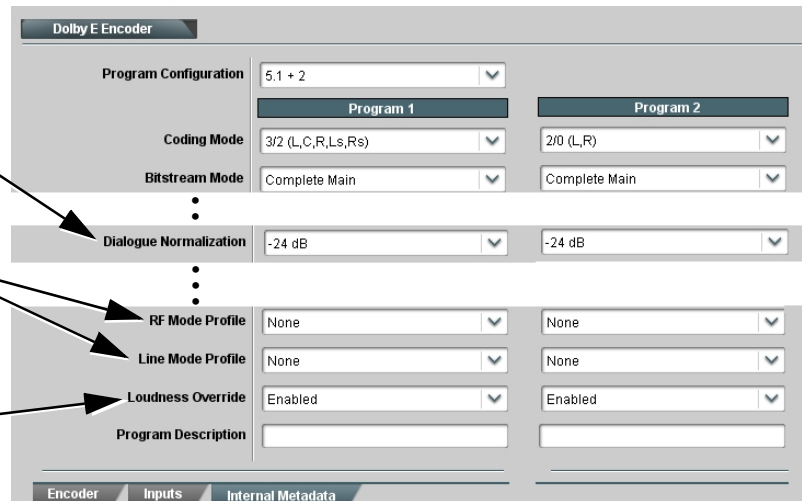
In this example since loudness processing has been applied **before** the encoder, the existing external metadata loudness parameters will no longer reflect that of the encoded audio. To account for this, the encoder is set to use locally authored loudness-related metadata as shown here.

On the **Internal Metadata** sub-tab, for both programs used here (Program 1: 3/2L and Program 2: 2/0) **Loudness Override** is set to **Enabled**, thereby allowing local Dialnorm, RF Mode Profile, and Line Mode Profile settings here to override these settings in the received external metadata.

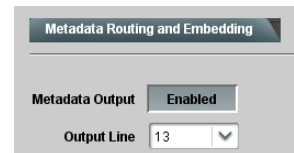
Locally set Dialnorm is set to **-24** to match that of loudness processor **-24 LKFS target loudness** (in accordance with **ATSC A/85**)

Since loudness processing is providing dynamic range control ahead of the encoder, the **Dolby DRC profiles** are set to **None**

Loudness Override Enabled setting allows for local re-authoring of loudness-related metadata parameters

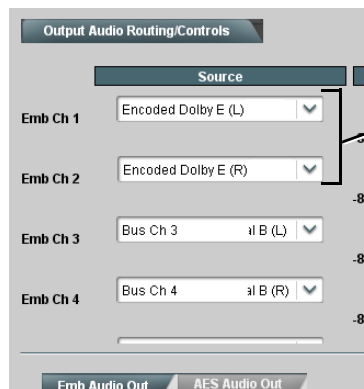


To make sure the “old” metadata is no longer available and passed along, on the **Metadata Routing and Embedding** tab, **Embedded Metadata Routing** can be set to **Off**.



C

In this example, because the Dolby encoded pair is to be outputted on Emb Ch 1/2, channels **Emb Ch 1** and **Emb Ch 2** are set for **Encoded Dolby E (L)** and **(R)**, respectively on the **Output Audio Routing/Controls > Emb Audio Out** sub-tab.



5.1+2 E Dolby Encoded pair on Emb Ch 1/2

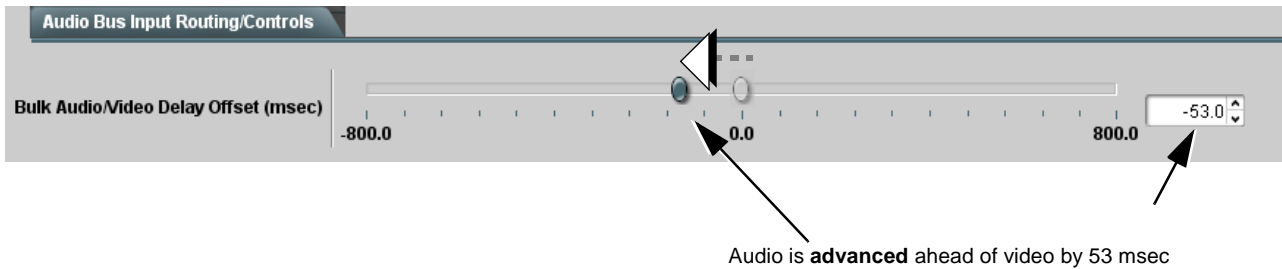
Figure 2 Example Dolby E 5.1+2 with Modified External Metadata Setup (Sheet 3 of 3)

Compensating for Dolby Encoding Audio Delays

Because of the significant DSP functions required to develop a Dolby encoded stream an audio delay results which, if not compensated for, can be noticeable when played out on the decoded receiving end. The **+ENCE** encoding audio delay for **all Dolby E modes is 53 msec**.

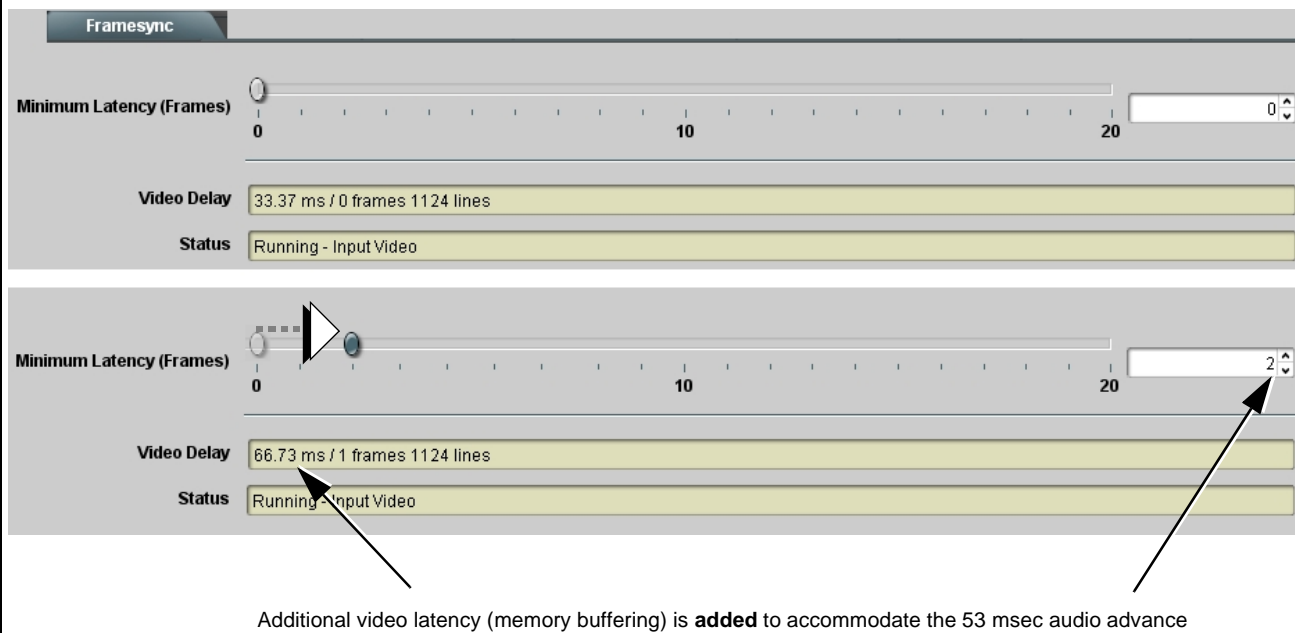
This delay can be nulled (compensated for) by delaying video and advancing the input audio timing to remove the delay as shown in the example below.

In this example, a card-generated Dolby E 5.1+2 encoded pair is being routed onto the output video. Noting that a 53 msec delay needs to be compensated for, the input audio to be applied to the encoder is **advanced** by this amount using the card **Audio/Video Delay Offset** control on the **Audio Bus Input Routing/Controls** tab. (Note that either the Bulk control or individual per-channel delay controls can be used.)



The screenshot shows the 'Audio Bus Input Routing/Controls' interface. A horizontal slider for 'Bulk Audio/Video Delay Offset (msec)' ranges from -800.0 to 800.0. The slider is positioned at -53.0, with a numerical input field to its right also showing -53.0. An arrow points to the slider's position with the text 'Audio is **advanced** ahead of video by 53 msec'.

To accommodate the 53 msec audio advance, a similar amount of video must be buffered in the card memory. Viewing the **Framesync** tab and noting that the default latent delay in this example is appr. 33 msec, more video must be added to the latency. As such, the **Minimum Latency** control setting is increased to buffer at least 53 msec of video. (It is recommended to "round up", as shown in this example where appr. 66 msec of video is now buffered.)



The screenshot shows the 'Framesync' interface. The 'Minimum Latency (Frames)' slider is set to 2, with a numerical input field showing 2. Below it, the 'Video Delay' is shown as '66.73 ms / 1 frames 1124 lines'. The status is 'Running - Input Video'. An arrow points to the 'Video Delay' field with the text 'Additional video latency (memory buffering) is **added** to accommodate the 53 msec audio advance'.



Cobalt Digital Inc.

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