| **Option** ➡

LTC RS-485/Audio Input/Output Option (+LTC)

Manual Supplement

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Overview

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

+LTC Option Functional Description

(See Figure 1.) Option +LTC allows bidirectional transfer and conversion between VBI timecode formats and audio LTC, as well as RS-485 LTC. Audio LTC can be received over a selected balanced analog audio, embedded or AES input channel. Audio LTC can similarly be sent as digital audio over a selected embedded or AES output channel. RS-485 LTC can be received or sent via an RS-485 port (when card slot is correspondingly fitted with a Rear Module that accommodates RS-485).

As such, cards equipped with the +LTC option can monitor video streams, RS-485 and/or selected audio channels for supported timecode formats and then select and prioritize among VBI VITC, SDI VITC, SDI ATC_VITC, SDI ATC_LTC and audio/RS-485 LTC. If the preferred format is detected, the preferred format is used by the card; if the preferred format is not detected, the card uses other formats (where available) as desired.

The function also provides conversion between various timecode formats and provides independent insertion and line number controls for each SDI timecode output format. Any format received by the card can be outputted as audio or RS-485 LTC.

+LTC Rear I/O Modules and Connections

Figure 2 shows RS-485 LTC connections using a Rear I/O Module equipped with a **COM** port connector.
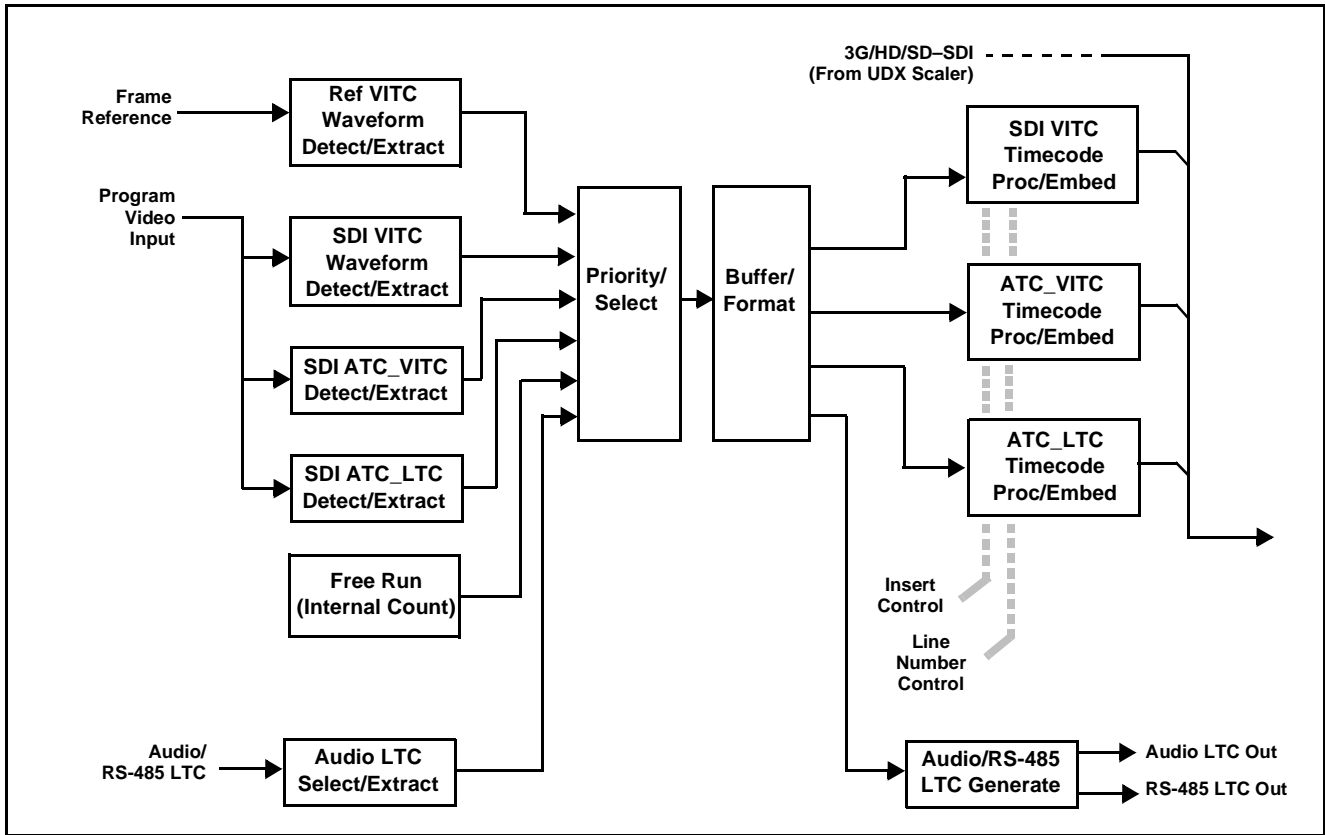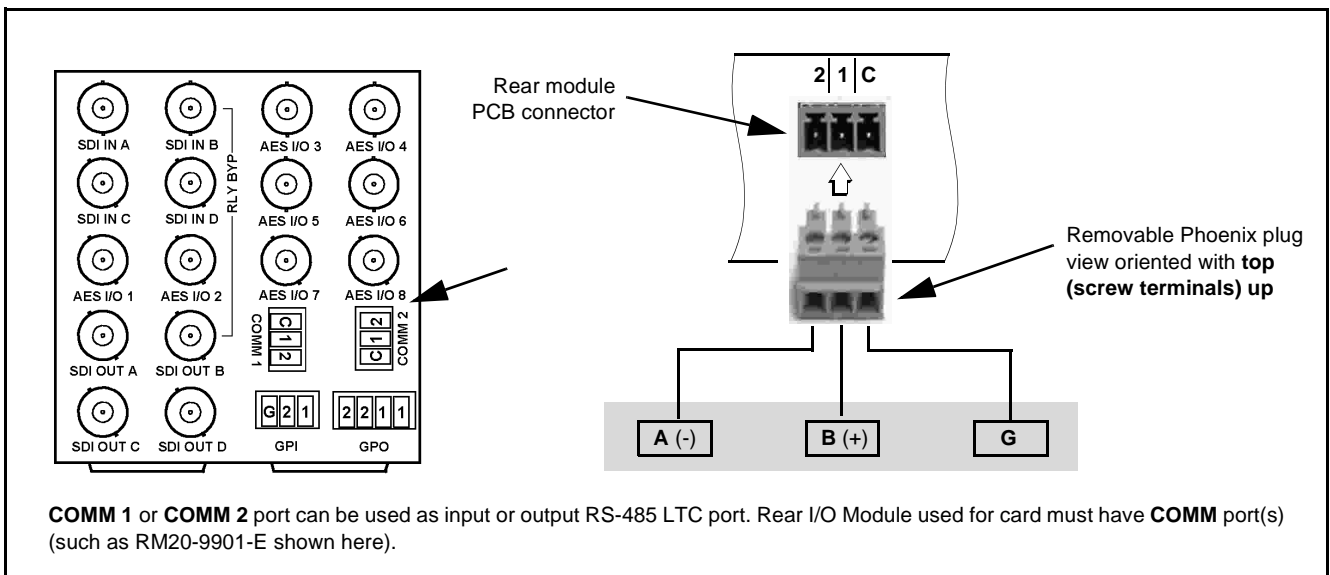
Figure 1 Timecode Processor with +LTC

COMM 1 or COMM 2 port can be used as input or output RS-485 LTC port. Rear I/O Module used for card must have COMM port(s) (such as RM20-9901-E shown here).

Figure 2 Typical +LTC (RS-485-equipped) Rear Module
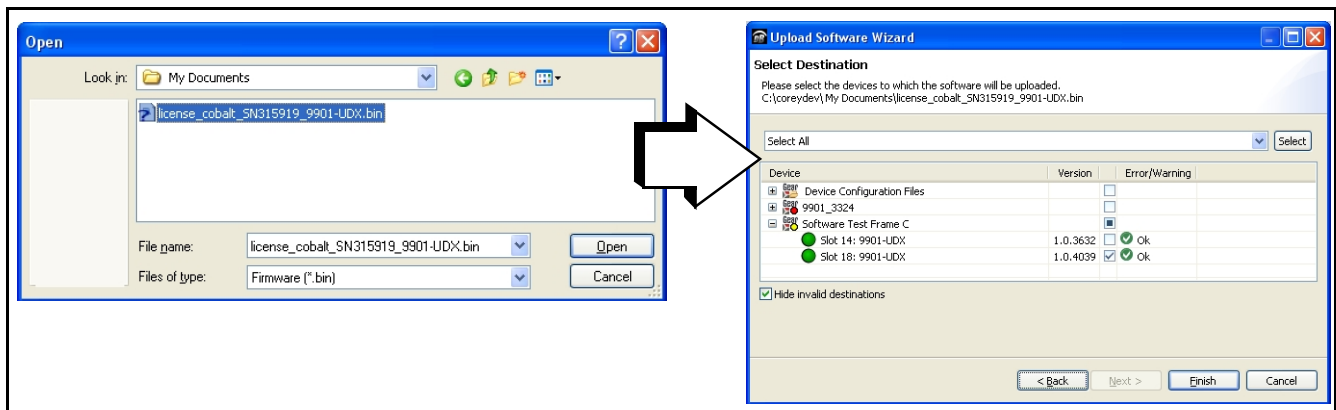
Uploading Option Feature (Field Upgrade Only)

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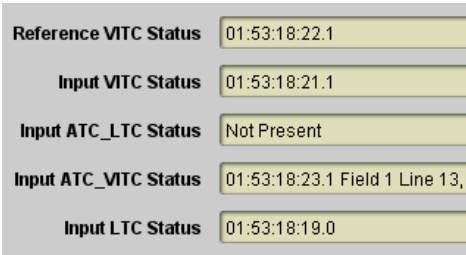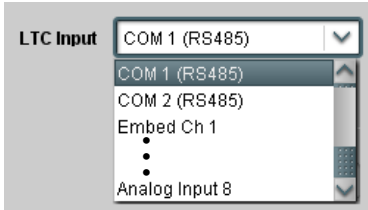
Note: Added features, when first appearing after installation, are set to their factory default states. For features having a direct impact on the output signal, all controls are initially set to disabled or null.
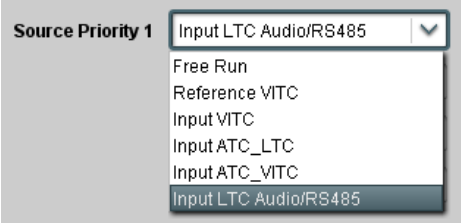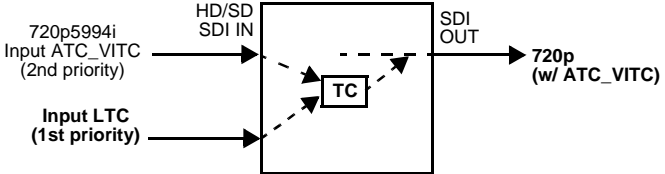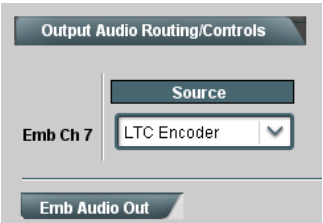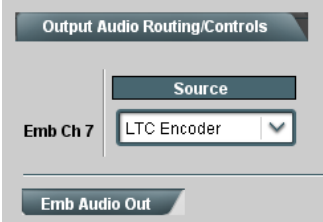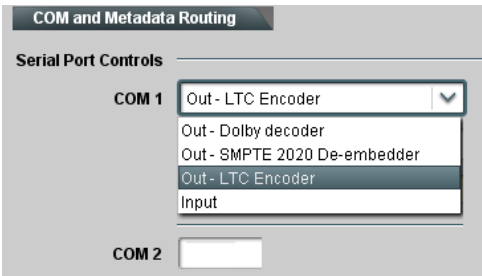
LTC Controls and Examples

Table 1 individually lists and describes typical LTC controls available using DashBoard™ for cards equipped with the +LTC option. Controls for using RS-485 LTC are found on the **Timecode** tab and **Comm and Metadata Routing** tab.

See Examples Using Audio LTC and RS-485 LTC Features, p. 6 for setups to receive and send LTC using the card's DashBoard controls.

Table 1   +LTC Option Control List and Descriptions

Timecode	
Note: Controls, functions, and examples described here are largely related to RS-485/audio LTC. For general Information regarding other standard timecode controls, refer to the card product manual.	
• **Timecode Source Status Displays** Reference VITC Status: 01:53:18:22.1 Input VITC Status: 01:53:18:21.1 Input ATC_LTC Status: Not Present Input ATC_VITC Status: 01:53:18:23.1 Field 1 Line 13, Input LTC Status: 01:53:18:19.0	Displays the current status and contents of the supported timecode formats shown to the left. • If a format is receiving timecode data, the current content (timecode running count and line number) is displayed. • If a format is not receiving timecode data, Not Present is displayed. • If Audio/RS-485 LTC is being received on selected **LTC Input** source, the timecode running count is displayed.

• **LTC Input Control**
 	
LTC Input: COM 1 (RS485)
COM 1 (RS485)
COM 2 (RS485)
Embed Ch 1
•
•
•
Analog Input 8
	Selects source to be used by card to **receive** LTC as listed below.
	    • RS-485 over COM1 or COM 2
	    • Audio LTC over Emb Ch 1 thru Ch 16
	    • Audio LTC over AES Ch 1 thru Ch 16
	    • Audio LTC over Analog audio Ch 1 thru Ch 8
	Note: • **Audio LTC Source** must be appropriately set for card to receive and process received LTC.
	    • Card audio inputs will not center inputs with DC offset. If input has DC offset, the source may need to be capacitively coupled to remove the offset.

• **Mute LTC Control**
 	
Mute LTC Audio on input loss: Enabled
	Allows LTC audio or RS-485 output to mute upon loss of selected timecode inputs.
	
	• When set to **Enabled** and input timecode is lost:
	    • RS-485 LTC output goes to frozen state.
	    • Audio LTC output mutes.
	
	• When set to **Disabled** and input timecode is lost:
	    • RS-485 LTC output keeps counting, with count value being free-run count.
	    • Audio LTC output is not muted, with count value being free-run count.
	
	Note: If muting upon loss of a particular input format is desired, set all **Source Priority 1** thru **4** to that particular input format. If this is not done, the card failover timecode selection may substitute another format choice for the format not being received.

Table 1   +LTC Option Control List and Descriptions — continued

Timecode	**(continued)**
• Source Priority Source Priority 1	Input LTC Audio/RS485 ▼ Free Run Reference VITC Input VITC Input ATC_LTC Input ATC_VITC Input LTC Audio/RS485	As described here, provides multi-level prioritization of timecode format choices from choices shown to the left. **Source Priority 1** thru **Source Priority 4** select the preferred format to be used in descending order. In this example, **Input LTC** as 1st priority selection. These settings prioritize audio or RS-485 LTC (received on selected card audio input) over SDI VITC (received on SDI input) regardless of video input material source to be processed by the card. The selected timecode source can be embedded on the SDI video output (in this example, ATC_VITC on 720p) using the selected line number. In this example, if the Audio/RS-485 LTC becomes unavailable, the card then uses the SDI VITC data received on the card SDI input.
Any timecode format received by the card can be outputted as audio LTC, and sent over an embedded or AES channel using the card **Output Audio Routing/Controls** and the **Emb Audio Out** or **AES Audio Out** sub-tabs as described below.	
• LTC Output over Embedded Channel Output Audio Routing/Controls Source Emb Ch 7	LTC Encoder ▼ Emb Audio Out	**LTC Encoder** selection in embedded channel 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. (In this example, audio LTC is the source for destination Embedded Ch 7)
• LTC Output over AES Channel Output Audio Routing/Controls Source Emb Ch 7	LTC Encoder ▼ Emb Audio Out	**LTC Encoder** selection in AES channel 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. (In this example, audio LTC is the source for destination AES Ch 7)
• LTC Output over RS-485 COM and Metadata Routing Serial Port Controls COM 1	Out - LTC Encoder ▼ Out - Dolby decoder Out - SMPTE 2020 De-embedder Out - LTC Encoder Input COM 2	**Out - LTC Encoder** selection in COM1 or COM 2 drop-down list on **COM and Metadata Routing** tab allows any timecode format received by the card to be outputted as RS-485 LTC over a selected card COM port. (In this example, RS-485 LTC is outputted on COM 1) **Note:** If a port conflict is displayed, make certain the port is not being used by another function. Typically, a conflict will be caused by a Dolby® encoder set to use the port as an input, or the **Timecode** tab **LTC Input** set to use the port also as an input.

Examples Using Audio LTC and RS-485 LTC Features

Audio LTC Receive to VBI Conversion/Insertion

Figure 3 shows an example of receiving audio LTC on an embedded channel to be inserted as ATC_VITC on the 720p output video stream.

Shown below is an example in which received 720p 5994 SDI video without VBI timecode is to receive audio LTC. The audio LTC is converted to VBI ATC_VITC timecode and inserted into the SDI video as shown below.

720p 5994 SDI (w/o program material timecode) → **Timecode Proc** → **720p 5994 w/ ATC_VITC**

Audio LTC on Emb Ch 11 ⤏

Timecode	
Reference VITC Status	04:22:51:26.0
Input VITC Status	Not Present
Input ATC_LTC Status	Not Present
Input ATC_VITC Status	Not Present
Input LTC Status	21:02:28:14.0
LTC Input	Embed Ch 11
Mute LTC Audio on input loss	Enabled
Incoming ATC Packet Removal	Enabled
Source Priority 1	Input LTC Audio/RS485
Source Priority 2	Input VITC
Source Priority 3	Input ATC_LTC
Source Priority 4	Input ATC_VITC
Output Status	21:02:28:12.1 (Source: Input LTC RS485/Audio)
HD ATC VITC Insertion	Enabled
HD ATC_VITC Insertion Line Field 1	9 - SMPTE 12M-2-2008 Recommended
HD ATC_VITC Insertion Line Field 2	8 (571) - SMPTE 12M-2-2008 Recommended

Noting that the incoming material contains audio LTC on Emb Ch 11, **LTC Input** is set to receive audio LTC via Emb Ch 11.

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

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

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

Received audio LTC is converted to ATC_VITC and inserted into the SDI output video as shown here using **HD ATC VITC Insertion** set to **Enabled** (in this example, the SMPTE recommended line number are used)
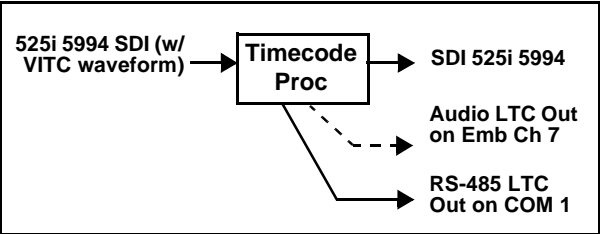
Figure 3 Audio LTC Conversion/Insert Into VBI ATC_VITC Timecode
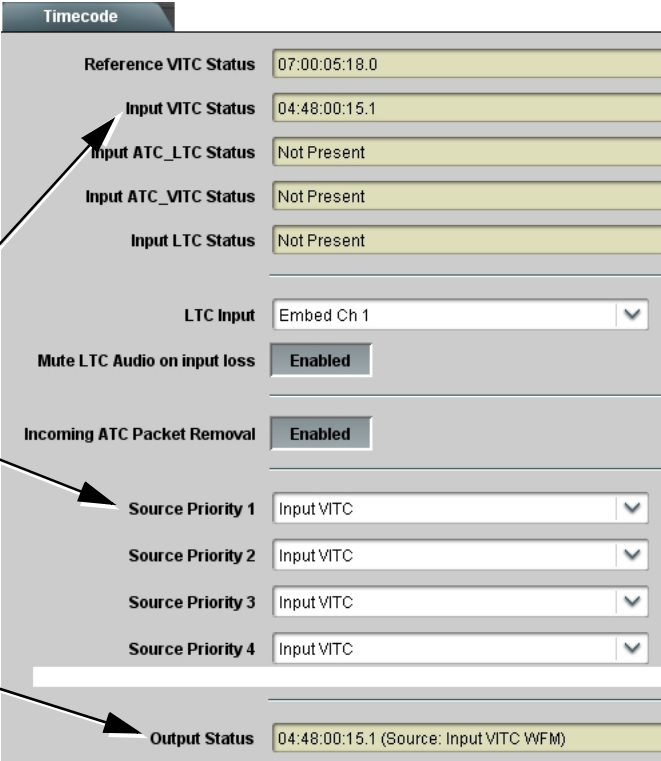
VBI Conversion to Audio/RS-485 Transmit

Figure 4 shows an example of receiving SD VITC waveform timecode on the received 525i 5994 SDI input, and converting and outputting LTC timecode on both an embedded output channel and the card RS-485 port.

Shown below is an example in which received 525i 5994 SDI video with VBI VITC waveform timecode is converted to LTC and outputted on Emb Ch 7 and an RS-485 port.
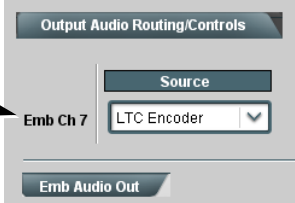
Noting that program material VITC waveform timecode is only to be used, **Source Priority 1** is set to prioritize SDI VITC as the only choice. Therefore, when VITC waveform is present, it will be considered as the source that will eventually be outputted by the card regardless of output format selected.
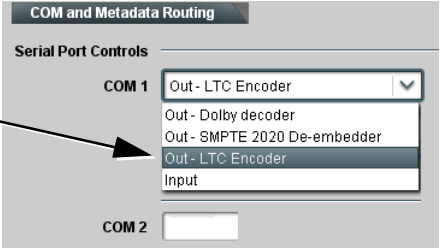
Output Status shows VITC waveform is being used as timecode source.

Using the **Output Audio Routing/Controls** tab controls, **LTC Encoder** is selected as the source for Emb Ch 7, thereby outputting LTC on this channel.

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

Figure 4 VBI Timecode Conversion/Send of Audio and RS-485 LTC Timecode

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