

EEG CB1512
Caption Legalizer™ &
Relocating Bridge



Product Manual

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The revision date for this manual is July 7, 2011.

1 Introduction

1.1 Product Description

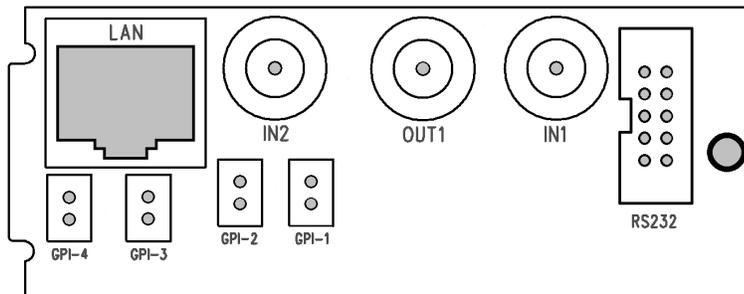
The CB1512 HD Caption Legalizer™ and Relocating Bridge provides a powerful solution for eliminating HD captioning problems in a single modular frame card operating on the openGear platform. The frame card utilizes the user friendly DashBoard software, which is available for Windows, Mac and Linux operating systems and streamlines setup of the CB1512. The CB1512 fixes common upconversion errors and maximizes interoperability by ensuring that all data complies completely with DTV captioning standards. The CB1512 regenerates all input caption data to create a fully-compliant data stream with standardization of line number, scaling attributes, and packetization style.

The CB1512 is also a relocating HD caption bridge which can bridge caption data between video sources in a wide variety of HD video formats, including 1080i, 720p, 24/23.98p, and 24/23.98psf, and relocate HD caption displays. Relocation is enabled by programmable GPI triggers and can be set to avoid emergency crawls across an adjustable region at the top or the bottom of the HD picture. The CB1512 can tolerate video inputs that are not in sync and supports the following caption bridging capabilities: HD to HD, HD to SD and SD to HD.

2 Installation

2.1 Back Panel

The CB1512 rear panel is shown below, followed by a guide to the connectors located there.

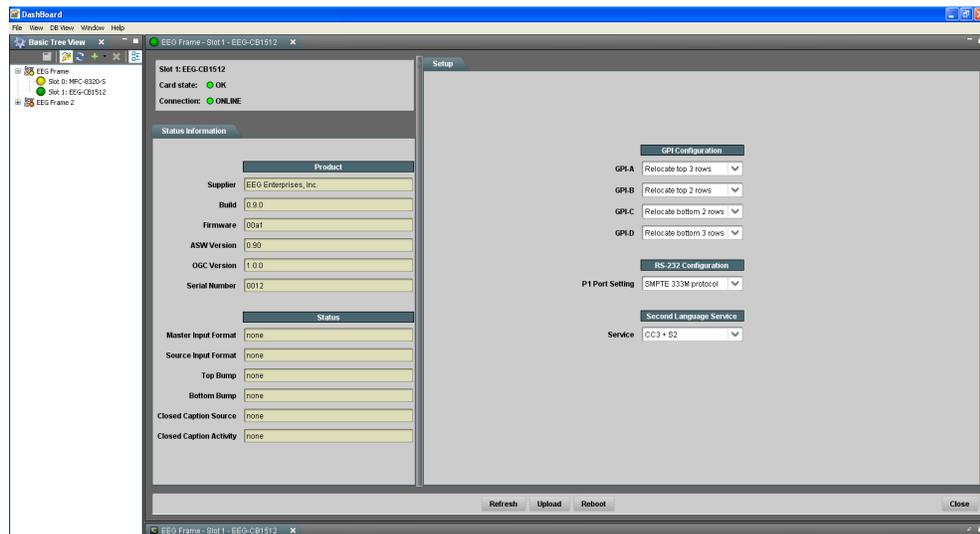


- IN1** Master video input. Accepts SMPTE 259M SD-SDI or SMPTE 292M HD-SDI.
- IN2** Source video input for caption bridging. Accepts SMPTE 259M SD-SDI or SMPTE 292M HD-SDI.
- OUT1** Program video output with relay-bypass protection.
- GPI In** 4 independent GPI input switches. Each is a 2-pin header that accepts a Molex 50-57-9402 connector.
- RS232** Connector for cable containing two DB-9 (RS-232) serial ports labeled AUX and SMPTE 333/GA. The AUX serial port is used as an input for configuration, while the SMPTE 333/GA serial port is used as an output for serial delivery of captions to an ATSC encoder.

3 Caption Legalizer™ Operation

3.1 DashBoard Menus

The DashBoard software is used to set the relay bypass status, select the caption relocating action and perform additional basic configuration for the frame card. Version 3.0.0 can be downloaded from the following URL: http://www.eegent.com/download/Ross_Video/Dashboard/ Once you have successfully installed the DashBoard tool, open the program to find information about the CB1512 and to configure your card.



There are two main sections in the DashBoard interface: the Status information on the left side and the Setup menu on the right side. At the bottom of the DashBoard there are four general purpose buttons. The **Refresh** button updates the fields on the DashBoard to reflect the card's current state. The **Upload** button prompts the user to select an upgrade file to apply to the card. The **Reboot** button restarts the card itself. The **Close** button closes the frame card interface.

The upper section on the left shows the Card State and the Connection status, each of which has an indicator light and description of the card's status. There is a more detailed tab labeled Status Information below

the two basic indicators that provides information about the card's version and its current setup configurations. The top section entitled Product displays identifying information about the hardware and software versions of the card. This section displays the manufacturer, the build number, the firmware number, the ASW and OGC numbers to identify the software installed and the serial number of the card.

The lower Status section shows what video types are present and the current behavior of the the relocation function. Master Input Format displays the video type detected on the master video input, including format information for HD video, while Source Input Format indicates the video type detected on the source video input, including format information for HD video. The relocating bridge features of the CB1512 are described by the Top Bump status, which indicates if a relocation function from the top of the screen is active, and how many rows it applies to and the Bottom Bump, which indicates if a relocation function from the bottom of the screen is active, and how many rows it applies to. The Closed Caption Source status field indicates whether the input source of the closed caption data on the Master Video output is HD VANC or SD Line 21 and the Closed Caption Activity indicates whether valid closed captioning is present through the unit.

The setup menu on the right half of the tool is broken up into three sub-menus: GPI Configuration, RS-232 Configuration and Second Language Service.

3.1.1 GPI Configuration

Each GPI Switch is activated when closed (connected to ground), and inactive when open (left floating). The default functions of these GPI switches enable remapping of caption displays to avoid either the top rows or bottom rows of the television screen. This function should be used to avoid blocking emergency information, news crawls, or other important graphics. The FCC requires that emergency alert information be visible to closed caption viewers. The options for the GPI functions are defined as follows:

GPI-A Selects the relocation behavior that results when the GPI-A switch is closed. The drop down options include relocating 2, 3 or 4 of the top caption rows or relocating the bottom 2, 3 or 4 rows of captions. The default setting relocates the top 3 rows of captioning. The GPI-A switch can also be set to **Source Input Enable**, meaning that if GPI-A is asserted, caption data from the Source Video input is bridged to the Master Video and if GPI-A is not asserted, caption data from the Master Video input is maintained. This behavior is true even if caption data is not present on the Source or Master Video inputs.

GPI-B Selects the relocation behavior that results when the GPI-B switch is closed. The drop down options include relocating 2, 3 or 4 of the top caption rows or relocating the bottom 2, 3 or 4 rows of captions. The default setting relocates the top 2 rows of captioning. The GPI-B switch can also be set to **Source Input Disable**, meaning that if GPI-B is asserted, bridging from the Source Video input is disabled and if GPI-B is not asserted, source/master switching is automatic as in the default mode.

GPI-C Selects the relocation behavior that results when the GPI-C switch is closed. The drop down options include relocating 2, 3 or 4 of the top caption rows or relocating the bottom 2, 3 or 4 rows of captions. The default setting relocates the bottom 2 rows of captioning.

GPI-D Selects the relocation behavior that results when the GPI-D switch is closed. The drop down options include relocating 2, 3 or 4 of the top caption rows or relocating the bottom 2, 3 or 4 rows of captions. The default setting relocates the bottom 3 rows of captioning.

3.1.2 RS-232 Configuration

The RS-232 port labeled SMPTE 333/GA is an output port for sending serial caption data to an ATSC encoder. This port can be configured to interface with equipment supporting either the SMPTE 333 or the Grand Alliance protocols. The SMPTE 333 mode will be entered automatically if a SMPTE 333 device is connected to the port; the GA mode must be explicitly configured. The port can also be configured to receive input regarding advanced settings for the CB1512 by selecting the General Purpose option.

When the output modes are in use, no VANC caption data will appear on the HD-SDI video outputs. The options for the P1 Port Setting are specified below:

P1 Port Setting

Selects SMPTE 333M protocol settings for the serial output port (38400 Baud, 8 data bits, no parity, and one stop bit), Grand Alliance protocol settings for the serial output port (19200 Baud, 8 data bits, no parity, and one stop bit) or General Purpose, which makes the P1 port behave similarly to the AUX port.

The default port setting is SMPTE 333M protocol, which means that the CB1512 sends its 708 caption output to a serial output queue for transport to an ATSC encoder supporting SMPTE 333M protocol. 333 is a 'pull' protocol; the ATSC encoder sends synchronization requests (SYNs) to the caption encoder, which then sends the requested data bytes out through the serial port.

If the Grand Alliance(GA) protocol settings are selected, the CB1512 sends its 708 caption output to a serial output queue for transport to an ATSC encoder supporting GA protocol.

GA is a 'push' protocol; the CB1512 sends data out through P1 as it becomes available, and the ATSC encoder synchronizes the data upon reception.

If the General Purpose option is selected the P1 port will behave like the AUX port in that it will accept the advanced configuration commands that are described in Section 3.2.

3.1.3 Second Language Service

Service Selects the second language service. The default option is CC3 + S2 which creates S2 data from CC3. S2 data can be created from CC2 instead by selecting the other option in the dropdown menu, CC2 + S2.

3.2 Using Smart Encoder Commands

Advanced configuration of the CB1512 Caption Legalizer™ can be set through the RS-232 serial port labeled AUX. The settings for this port are 1200 baud, 7 data bits, odd parity, and one stop bit. The CB1512 uses a subset of the EEG Smart Encoder command set. Encoder commands are recognized by a leading control code of <CTRL+A>, also represented by the ASCII hex code 01. The <CTRL+A> character is non-printing on most terminal screens, but on some it appears as a smiley face. An Encoder control command must end with a carriage return, which can be entered with the <ENTER> key on a keyboard or by 0D in ASCII hex.

To send the encoder commands through the serial input ports, connect a standard 9-pin straight cable between your PC's serial port and the DB9 connector marked AUX. You can now send commands to the encoder, from your PC, using a communications application such as HyperTerminal, which is bundled with most versions of Windows. The most basic Smart Encoder command, useful for checking the operation of your communication setup, is **<CTRL+A>?<ENTER>**. If your setup is working correctly, the Encoder will respond with its model name, firmware version, and serial number. If you have trouble communicating using HyperTerminal, always check to make sure that the settings in the Port Settings menu in HyperTerminal match the settings for the Encoder port you are connecting to.

In this manual, Encoder commands will be distinguished from other text by use of a smaller, bold font. Optional parameters will be enclosed in square brackets. Possible parameter values and default settings will be described in text or bullet points after the command is introduced.

3.3 Caption Processing Control

The default caption processing behavior of the CB1512 is to create a legalized output stream based on the caption data found in the Master video input. If no caption data is found in the Master, data from the

Source input will be used, with any necessary format conversions performed automatically.

This default processing behavior is configurable using the commands in this section, the Dashboard interface, or the GPI switches.

Upstream VANC Enable: <CTRL+A>! [ON/OFF] <ENTER>

Instructs the Encoder to either detect and potentially regenerate (default) or ignore incoming VANC caption data. If the encoder is set to ignore upstream VANC data, output signals will include only caption data recovered from SD video inputs. Use **OFF** to ignore upstream VANC caption data, and **ON** to resume detecting upstream VANC caption data.

Disable Upstream L21 Channel: <CTRL+A>6 Channel <ENTER>

Re-enable Upstream L21 Channel: <CTRL+A>7 Channel <ENTER>

Instructs the Encoder to ignore any incoming Line 21 data in the specified caption channel. When Line 21 data in a channel is ignored, output signals will not contain any caption data recovered from the SD video input in that channel, even if there are no other data sources available.

Channel

Sets the incoming Line 21 channel to be turned off. This parameter may be set for any NTSC Caption or Text channel. Upstream XDS data cannot be turned off with this command. The options are cc1, cc2, cc3, cc4, t1, and t2.

Set Caption Data Source: <CTRL+A>h [ON/OFF] <ENTER>

Instructs the Encoder to encode caption data recovered from the Source video input onto the Master video output. Any caption data on the Master input will be ignored. This command takes precedence over the **Source Input Enable** and **Source Input Disable** GPI mapping functions described in **GPI Configuration**.

4 Additional Features

4.1 Non-Volatile Memory

The CB1512 can store up to 32 commands in Non-Volatile Memory (NVM). When the Encoder is powered up or reset, any commands stored in NVM are executed as part of the startup process.

New NVM Command: <CTRL+A>w [List] Command <ENTER>

Enters an Encoder command for NVM storage. The command, which must be entered in complete form including the initial <CTRL+A>, will be executed as if entered through the specified port each time the Encoder is turned on or reset. NVM commands are executed in order of list number. If no list number is specified, the command will be assigned the next available number.

Example: <CTRL+A>w <CTRL+A>f ga <ENTER> will store the Grand Alliance output command in NVM and run it each time Encoder starts up.

List NVM Commands: <CTRL+A>x <ENTER>

Returns a numbered list of commands stored in NVM.

Delete NVM Command: <CTRL+A>w List <ENTER>

Deletes the command with the specified list number from NVM. The remaining commands in the list will be renumbered to fill the empty list number left by a deletion. If "-a" is specified as the list number, all commands in NVM will be deleted.

List PROM Messages: <CTRL+A>J <ENTER>

Returns a list of messages stored in the Encoder's PROM. The PROM may store up to 8 factory configured commands that execute upon power up or reset. If PROM commands are present, they are executed before NVM commands.

4.2 Serial Port Configuration

Change Baud Rate: <CTRL+A>I P2 Baud Bits Parity <ENTER> Changes the baud rate on P2, the AUX RS-232 input port. A change in communication settings takes effect immediately; thus, after entering this command, you must immediately begin communicating at the new settings you entered.

Baud Sets the new baud rate for the port. Supported rates are 1200, 2400, 4800, and 9600.

Bits Sets the number of data bits. Choose either 7 or 8.

Parity Sets the parity bit. Choose either o for odd, e for even, or n for none.

Serial Port Pin Assignments

The serial port uses a 9-pin DB9 connector with the following pin assignments:

Pin	DB9 Adapter
1	
2	Tx
3	Rx
4	
5	Ground
6-9	

These ports can be connected directly to a standard PC serial port with a 9-pin, three wire straight serial cable. A 'null modem' cable MAY NOT be used for this purpose since it will reverse the connections of pins 1 and 2.

4.3 Encoder Status Commands

Report Identification: <CTRL+A>? <ENTER>

Returns the Encoder's model, serial number, and firmware version.

Report HD Status: <CTRL+A>f <ENTER>

Returns the Encoder's current HD operation setting (334M VANC Insertion, 333M VANC Recovery, or GA VANC Recovery) and the availability of an HD video source (HD-SDI Present or HD-SDI Not Present). If an HD signal is present, the video format of the source and whether or not VANC caption data is present are also reported.

Recovery Status: <CTRL+A>A <ENTER>

Returns the data recovery status of each Line 21 channel for incoming SD video. ON indicates that data on the channel is being recovered and processed. OFF indicates that the channel has been turned off and incoming data is being ignored.

SD Video Presence: <CTRL+A>b <ENTER>

Reports either Video Present or No Video Present to indicate whether or not the Encoder is receiving an SD video signal.

Read LCD Display: <CTRL+A>N <ENTER>

Returns the current readings on the Dashboard Status display.

Report Switch Setting: <CTRL+A>S <ENTER>

Returns the current setting of the ENCODER ON bypass switch.

Report Battery Level: <CTRL+A>Y <ENTER>

Returns the status of the battery that maintains the Encoder's Non-Volatile Memory. GOOD will be returned for a properly functioning battery. BAD will be returned for a battery in need of replacement.

Monitor Line 21: <CTRL+A>5 [Channel] [I/O] <ENTER>

End Monitoring: <CTRL+C>

Monitors and displays the EIA-608B caption data encoded in the specified channel. The I/O parameter determines whether the incoming (en-

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ter as I) or outgoing (O) data is monitored. The default settings are incoming and CC1.

A Grand Alliance Interface Protocol

The following table describes the Data Packet Structure used by EEG equipment to send caption data to Grand Alliance protocol ATSC encoders. This protocol has been proven compatible with encoders from all major manufacturers supporting GA protocol.

Byte	Name	Value	Meaning
0	SOH	0x01	ASCII SOH, start of packet
1	Type	0x41 0x31 0x32	ASCII "A", ATVCC data ASCII "1", NTSC field 1 data ASCII "2", NTSC field 2 data
2	Count	5+n	Packet size, in bytes, including header and trailer bytes.
3	Data 1	EIA-708 data bytes	
4	Data 2	EIA-708 data bytes	
2+n	Data n	EIA-708 data bytes	
3+n	Checksum	<varies>	1 byte checksum. The sum of all bytes in the packet must be zero, modulo 256.
4+n	EOT	0x04	ASCII EOT, end of packet

Notes:

1. The maximum packet size is 128 (0x80).
2. Because the packet size (Count) includes the header and trailer bytes, the minimum valid count is 5. This corresponds to a packet with zero data bytes.
3. This packet structure is applied only to the data for the closed caption serial stream input to the ATSC encoder. Outgoing bytes in the ATSC stream follow the EIA-708B standard.

B Video/Connector Specifications

SDI Video Inputs	
Number of Inputs	2
Connector	BNC per IEC 169-8
Format	1.485 Gbits/s SMPTE 292M (1080i, 720p, 480p, 24psf) or SMPTE 259M 270 Mb/s
Input Level	800 mV p-p ± 10%, Out 1 bypass protected
Input Impedance	75 Ohm
Equalization	Automatic up to 100m @ 1.5Gb/s with Belden 1694 or equivalent
SDI Video Outputs	
Number of Outputs	1 relay bypass protected
Connector	BNC per IEC 169-8
Output Level	800 mV p-p ± 10%
Output Impedance	75 Ohm
Format	1.485 Gbits/s SMPTE 292M (1080i, 720p, 480p, 24psf) or SMPTE 259M 270 Mb/s (matches input format)
DC Offset	0V ± 0.5V
Rise/Fall Time	200pS nominal
Overshoot	< 10% of amplitude
Wide Band Jitter	< 0.2 UI
Data Input Characteristics	
Data Ports	2 DB-9 (RS-232) jacks
Serial Data Format	7 data bits, odd parity, 1 stop bit, 1200 baud default
GPI	4 individual 2-pin GPI connectors, each mates with a Molex 50-57-9402 connector
Electrical	
Power	115/230V AC 50/60Hz
Power Consumption	6 W
Physical	
Dimensions	12.75" long x 3" wide x 1" tall
Weight	< 1 lb.