iCap™ Connect AV650

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Introduction

Product Description

The iCap Connect AV650 is EEG's 1RU SDI encoder that supports native 12G caption encoding and decoding. As the newest generation of the EEG iCap Encoder, the AV650 is equipped to future-proof any production studio or event space looking to caption in 4K resolution.

With the AV650, users can now overlay open captions on a 4K display, or in ATSC 3.0 for in-room monitor accessibility. The SDI signal with captions can also be sent to a separate streaming media encoder, and then converted to RTMP for a live streaming workflow.

The AV650 is the ideal solution for event production companies looking to expand their audiences by having the flexibility to work with broadcast, live stream, and in-room spaces, while having the option to encode in 4K.

List of Features

- ✔ **iCap connectivity** for secure real-time captioning over a standard broadband connection without the use of dial-up phone lines or external audio couplers.
- ✔ **Connectivity to EEG's Cloud-hosted Automatic Captioning service, Lexi.**
- ✔ **Encoding of caption data sourced from previously encoded video sources**, two RS232 serial ports, or a dial-up modem *(optional)*
- ✔ **Encoding of CTA-708 standard closed captions** from native 708 or legacy 608 (SD) sources
- ✔ **Caption relocation** from configurable GPI triggers
- ✔ Modules for **web-streaming, scoreboard connectivity**, and much more.
- ✔ Local **logging of caption input** for future reference

Encoder Setup

Quick Network Setup

To use iCap or Lexi and to access further features on the encoder's web interface, you must first select **Network Settings** from the front panel LCD menu and set up the encoder on your network.

- ✔ **Use a Static IP address on your network to assign the Encoder (recommended)**. It doesn't have to be, and in most cases should not be, a publicly routable IP address.

- ✔ **Program a gateway address** – the gateway address is typically the local network address of your router. This is necessary if you plan to connect out of your local network to iCap, Lexi, or any other application from the iCap Encoder.

- ✔ **Program a Subnet Mask** for your network

- ✔ **Important for Lexi use only: Program your network to allow outbound connections to https://eegcloud.tv on port 443**. Your encoder must also have a valid DNS server configured under the Network tab on the web portal. See additional Lexi setup instructions on Page 6.

As an alternative to these recommended steps you may also set up the encoder for DHCP – Selecting DHCP will automatically pull available IP, gateway, and subnet information from your network. *IMPORTANT: With DHCP, your encoder's assigned IP may change on its own which will affect how you access the web interface for your encoder.*

Video Input/Output

Put SDI video into the encoder. Output captions will appear on the SDI video output. Reference the Rear Panel Diagram located in the Hardware Reference for a diagram of the rear-panel connector.

Test Captions

With video input connected to the encoder, you can send a stream of encoder-generated test captions to the output video to ensure proper initial setup of the encoder. To send test captions navigate to **Utilities > Test Captions > Enable > On** and a stream of test caption text should appear on the output of your encoder. Note that video input is required to send test captions.

Setting Audio Levels

Your program audio source is typically embedded in the standard video input to your encoder. Audio may also originate from a separate Analog or AES source (XLR connector input to encoder). To send this program audio to captioners through iCap, you must first configure the audio settings through the front panel menu of the encoder.

From the main menu go to **Audio Setup > Audio Mix** and set to *Stereo* or *Surround* appropriately. Next, visit **Audio Setup > Peak Level** and ensure the audio level peaks at around 80% and does not warn *"Clipping!"* This step is crucial for ensuring that quality audio is being sent to the captioner (quality audio = quality captions).

If your audio levels are too low, or too high – you can achieve an appropriate level by adjusting the audio source itself or simply adjusting the source audio level from the encoder front panel LCD menu **Audio Setup > Scale Audio** which allows you to scale the audio up or down in 6 decibel increments.

Detailed Explanation of Audio Setup Menu Options

Input Select	Selects whether the input audio format is analog, AES digital or embedded audio. Use the **LEFT** and **RIGHT** keys to select the correct format, then press **ENTER** to exit and apply changes or **CANCEL** to exit and cancel changes. The AV650 does not currently support direct input of Dolby® E or other compressed audio signals.
Peak Level	Dynamically displays the peak signal level at the audio input. A warning message will be displayed when clipping is detected at the input. For optimal sound quality, the peak level bar should reach at least 60% across the screen, but should never display "Clipping!"
Scale Audio	Adjusts the audio input level without adjusting the output level of your source. The built-in digital input trim can boost or cut the audio input level up by as much as 12 dB.
Audio Group	Selects the SDI embedded audio channel group that the iCap™ mix is sourced from. Up to 4 channel groups can be carried on an SDI signal, though most commonly Group 1 carries the primary audio program. ***Applies only when embedded audio input is selected.***
Audio Mix	Selects whether the iCap™ mix is being created from a Stereo or Surround channel group. Choose "Stereo" to select a mix of the left and right channels (1 & 2 or 3 & 4 within the selected Audio Group, according to the Stereo Channel setting), or "Surround" to select a mix of the left, right, and center channels (1, 2 & 3 within the selected Audio Group). ***Applies only when embedded audio input is selected.***
Stereo Channel	Selects whether the iCap™ stereo mix is being created from channels 1 & 2 or channels 3 & 4 within the selected Audio Group. ***Applies only when embedded audio input AND stereo audio mix are selected.***

Accessing Your Encoder's Web Interface

Your Encoder's web interface can be accessed through any computer on your local network and controls many of your encoder's applications, configurations, and features (see *Security Settings and Password Protection* below for instructions on how to secure access to the web interface). You will see it referenced many times throughout this manual.

The encoder must be connected on your network to access the web interface (reference *Quick Network Setup*). The web interface is accessed by entering the IP address assigned to your encoder in your computer's web browser. Note that if you set the encoder up with DHCP, the address can change at will and you should check the IP from the front panel of your encoder at **System Setup > Network > IP Address** to ensure you are using the correct IP to access the web interface.

Security Modes and Password Protection

To limit access to the encoder's web interface, you may set up a password through the front panel of your encoder via **Setup > Security > Security Mode.** This password will be required for access to the encoder's web interface, not the front-panel LCD menu. See below for a complete description of all Security Mode options. iCap connections are still allowed in all modes.

Debug	SSH and Ping available; web interface accessible via HTTP, no password
Password	SSH and Ping available; web interface accessible via HTTPS, requires password
Production	SSH and Ping disabled; web interface accessible via HTTPS, requires password
Locked	Highest-security setting; SSH, Ping, and web interface all disabled

Setting Date & Time

The Date and Time can be set by selecting Date/Time from the side menu on the web interface.

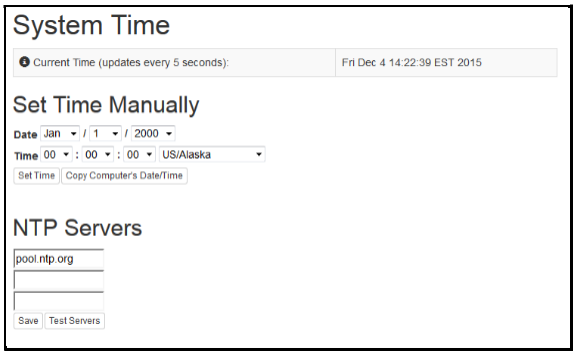


Figure 1: Date/Time Settings on the Encoder Web Interface

Updating Your Encoder

Before updating you must first download the latest update file for your encoder model from the product updates section of our website https://eegent.com/support/product_updates

Once you have downloaded the latest version for your encoder model you can apply it to the encoder either through the web interface OR the front panel USB port / LCD Menu.

- ✔ **Web Interface:** Select *Update* from the left side menu. Browse for the update file downloaded from our website, then click *Upload*, and finally click *Proceed*.

- ✔ **USB / LCD:** Transfer the update file to any USB stick. Insert the memory stick into the front panel USB port, navigate to the **System Setup > Update** from the LCD menu, and press enter to proceed and install the update. A message will appear on the LCD screen when the update has finished. **Do not remove the memory device while the update is running.**

iCap Setup and Testing

This section will walk you through a basic test run of iCap and point out the important information your captioner needs from you to get started. For sections that require you to access the iCap admin site – iCap Admin credentials are supplied by EEG at the time of encoder purchase/rental along with your unique access code and is accessed at https://accounts.eegicap.com. If you did not indicate iCap usage at the purchase of your encoder, contact technical support at 516-293-7472 to be set up with iCap.

1. Connect iCap From the Encoder's Web Interface

✔ Select *iCap* from the menu on the left and confirm that the *Company Name, User Name, and Password* are all present and correct.

✔ On the same page confirm that iCap Status says *Connected*. Additionally, the **iCap LED on the front panel of your encoder should be green**. This also means the encoder is connected to iCap.

✔ If all information is correct and the status does NOT say *Connected* – try clicking the *Start* button found on this page to connect to the iCap Network. *An iCap Connectivity indicator light on the left face of the encoder will also show green when iCap is connected and red if not connected.*

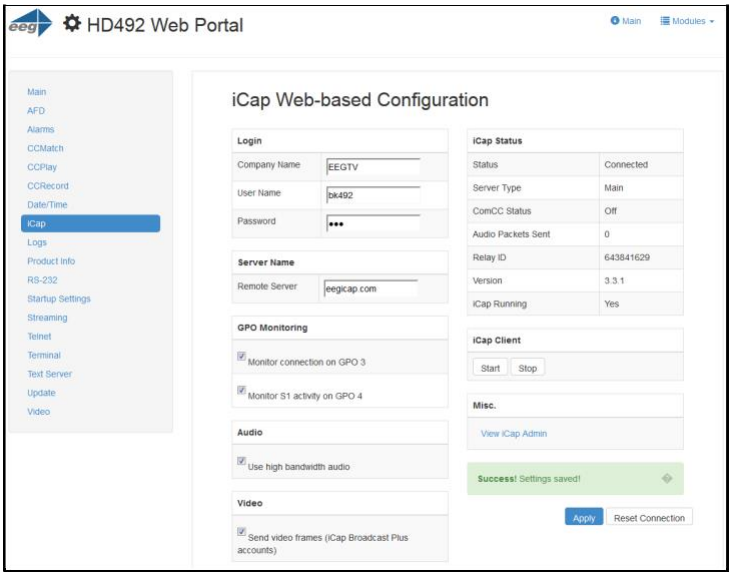


Figure 2: Encoder's Web Interface iCap Settings

2. Know Your iCap Access Code:

- ✔ Your **Access Code is what you provide to your captioner** so that they can Access your program audio and provide live captions through iCap.

- ✔ Your unique **Access Code can be found in the shipping documentation** provided with your Encoder. It may also be found by logging into the iCap Admin website at https://accounts.eegicap.com

- ✔ ONLY "share" your Access Code with your caption service provider in the iCap Admin site. *Your access code may already be shared with them in iCap Admin if you provided the information to EEG as part of your order. This can be verified in iCap Admin.*

3. Coordinate Testing with Your Caption Service Provider

This step requires your caption provider to connect to your encoder from their iCap software. You MUST connect your audio/video input to the encoder BEFOREHAND.

- ✔ Once you've provided your access code to the captioner and connected your program video/audio to the encoder you will test your connection to ensure audio is reaching them and caption data is coming in.

- ✔ **Enter the iCap Admin portal**. In the Users tab - confirm audio status for your encoder says "Audio OK" *(see figure 3)* - this means your captioner is receiving Audio. If the Status says "No Listeners" it means that the captioner has not yet connected to your access code and you should verify that they have done so. The Users tab shows all users connected to your encoder and confirms their status.

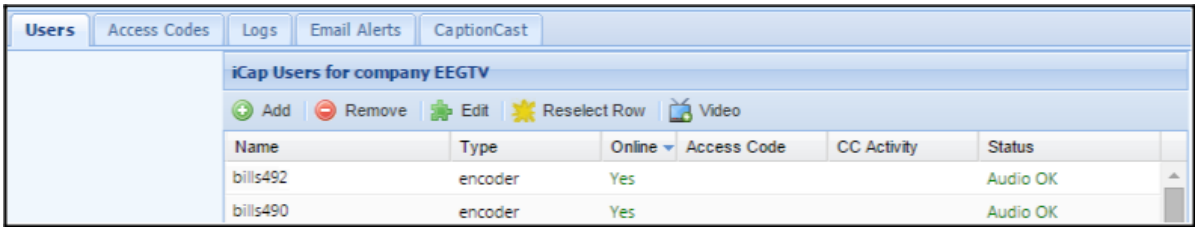


Figure 3: iCap Admin Users Tab with Audio Status

(Cont. on next page)

✔ Once you've confirmed the audio - click on the *Access Codes* tab to confirm incoming CC Activity from your captioner. Once the captioner presses "Start" on their iCap software the CC Activity in iCap Admin should read "Active" *(see figure 4)*. Alternatively, confirm the **CC LED on the front panel of your encoder is green**. This means that your encoder is receiving caption data from your captioner.

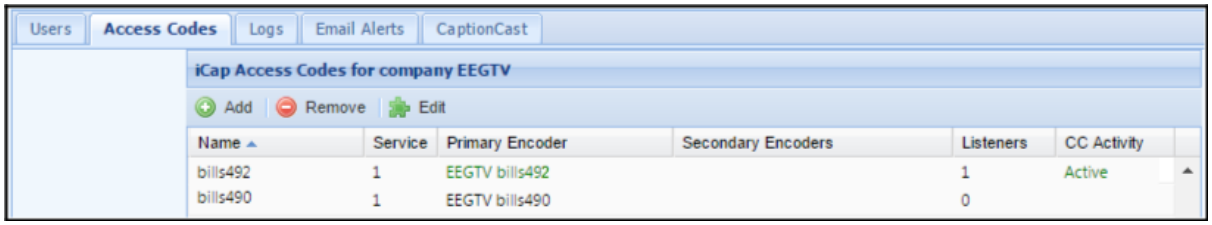


Figure 4: iCap Admin Access Codes Tab with CC Status

✔ iCap Audio and Caption activity can also be verified locally by taking the following additional measures in the web interface.

- Check the *Audio Packets Sent* under the iCap menu in the encoder web interface. If the number is growing then Audio is being sent to the captioner. If it says 0, check with your captioner to ensure they have connected.

- Check caption activity by selecting *Logs* from the side menu on the encoder web interface. Then look for iCap, and select the log with today's date. The iCap log will show some communication data which means that captions are being received.

- Alternatively, you can view the "Clone" logs section which will show all binary commands sent - also indicating captions are coming through the connection.

Checking iCap Admin Logs

To monitor or view past captioner connection history to your encoder's access code, login to iCap Admin and select the *Logs* tab. Next, select either the encoder name or access code you want to see history for. Once you've selected the desired encoder, an event log will appear that you can view to see all activity on your encoder.

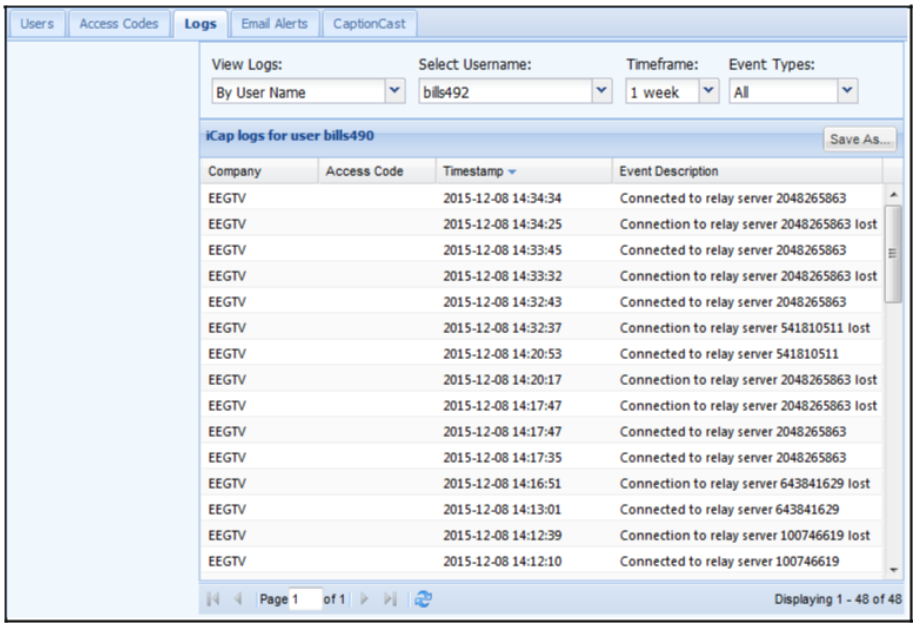


Figure 5: iCap Admin Logs Tab

Lexi Setup and Testing

If you did not indicate interest in Lexi at the purchase of your encoder, please contact EEG technical support at 516-293-7472 to obtain the necessary iCap and Lexi / EEG Cloud credentials. Also, be sure your AV650 is properly set up on your network prior to setting up Lexi (instructions on Page 3).

Please note that **an iCap account IS required for your AV650 to communicate with Lexi** over a standard broadband connection.

1. Confirm iCap Connectivity and Know Your iCap Access Code:

✔ **From the main page of the AV650 web interface, confirm the iCap Status says *Connected to remote server.*** If inactive, contact EEG support for credentials.

✔ **Your iCap Access Code can be found in the shipping documentation provided with your Encoder.** This will be used in the next step to enable Lexi to access live program audio from, and return automatic captions to, your encoder over iCap.

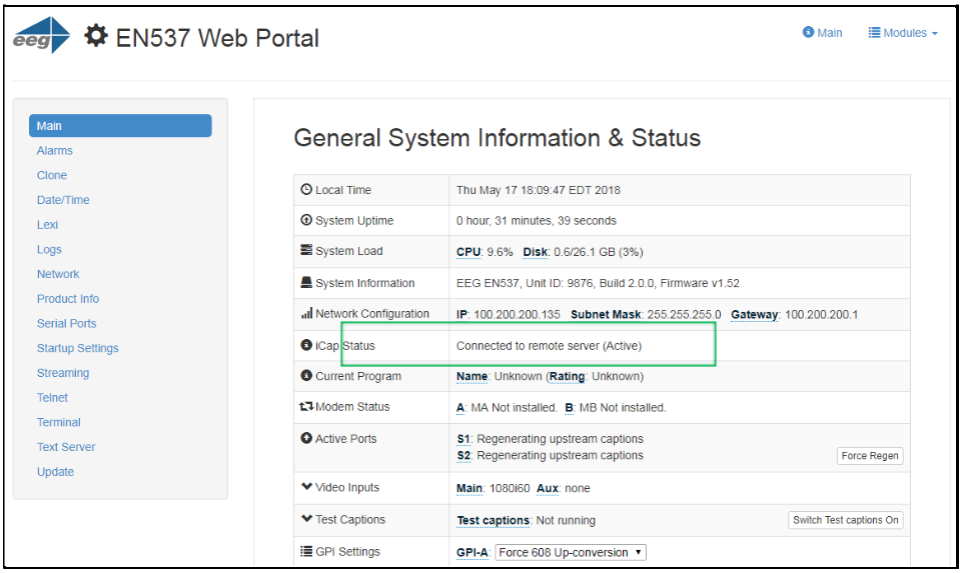


Figure 6: Active iCap Status on Encoder's Web Interface Main Page

2. Configure Lexi on Your Encoder

✔ **Select the Lexi module from the left hand menu of the web interface. Enter your EEG Cloud Username and Password along with your encoder's Access Code.** If this information has not been pre-configured prior to shipment, noted in the paperwork that came with your encoder, or provided to you via e-mail by EEG Support contact us at 516-293-7472 to setup your Lexi account and obtain this information.

✔ **Ensure additional preferences are configured as desired.** Below are descriptions for each setting field. Once this is complete you may **click Apply Settings.**

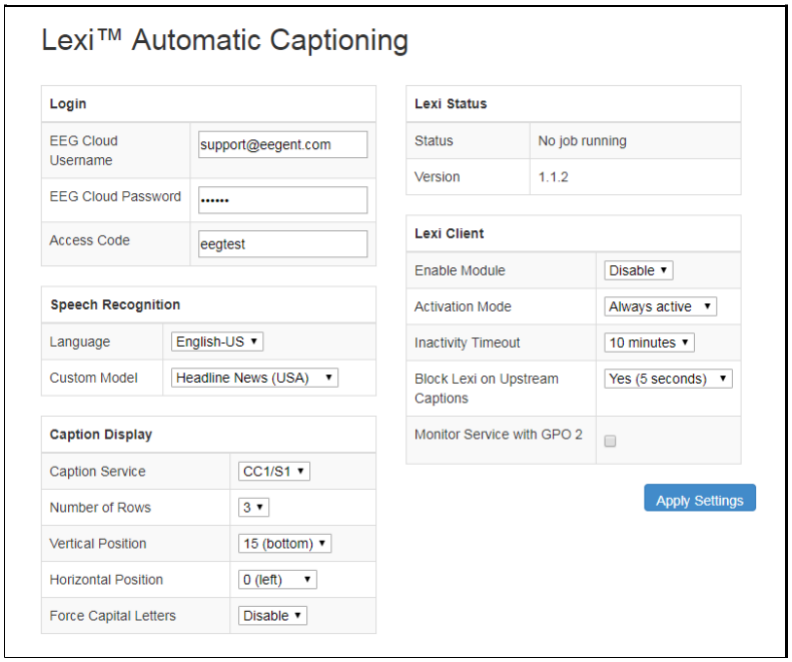


Figure 7: Lexi Module on Encoder's Web Interface Main Page

Speech Recognition

Language The base language models supported by Lexi currently include English-US, English-UK, and Spanish.

Custom Model Through the EEG Cloud web site, you can manage your Lexi account and create custom language models to further improve accuracy for your unique application. This dropdown box will display all of the custom models available under your active EEG Cloud account.

Caption Display

Caption Service Choose from primary language (CC1/S1) and secondary language (CC3/S2) options.

Number of Rows The number of rows per roll-up caption can range from 2 to 4.

Vertical Position CTA-608 base row options range from 2 (top of the screen) to 15 (bottom of the screen).

Horizontal Position	Choose a left horizontal offset from 0 to 28 characters.
Capital Letters	When enabled, all captions will be written in upper-case.

Lexi Client

Enable Module	Lexi must be enabled in order for the encoder to communicate with Lexi and receive captions from the cloud.
Activation Mode	When "Always active" is selected, a Lexi captioning job will be started immediately upon enabling the client module. When "Require GPI-E" is selected, a Lexi captioning job will start when GPI 5 is asserted and will run until GPI-E is de-asserted.
Inactivity Timeout	A Lexi job that runs for this amount of time without any dialog being transcribed will be terminated automatically by the server. Set to "None" if you want jobs to be able to run indefinitely without dialog.
Block Lexi on Upstream Captions	Setting this to "Yes" will ensure that Lexi will not generate captions when upstream data is present. The time in parentheses indicates how long upstream captions will have to be absent in order for Lexi to start up again.
Monitor Service With GPO 2	When selected, GPO 2 will be active when Lexi is captioning to the selected access code, and will be inactive otherwise.

Other Live Captioning Methods

Modem

Standard RJ-11 connection. Connect to a phone line to enable dial-up captioning and provide your captioner with the telephone number associated. Using a PBX or other digital non-POTS system is NOT recommended - many of these are not compatible with modem communications.

Telnet

Enable Telnet via the encoder's web interface and select a port. Configure your firewall to allow a captioner to get to your encoder on the designated port and then give your caption service provider the port number and public IP address.

RS-232 / RS-422 (Teleprompters or Other Devices)

See hardware section for cabling detail. Serial port settings are controlled through the web interface of the encoder by selecting **Serial Ports** from the left side menu or by navigating to **System Setup > P1 Mode** from the front panel LCD menu of the encoder. The AV650 supports RS-232, RS-422, and RS-422 Sony (with RS-422 and RS-422 Sony options configurable on Port 1 only). Default settings are 1200 baud, odd parity, and 7 data bits. Customized settings are sticky after power cycles. Modem will automatically take priority when active so that the prompter can be overridden as desired.

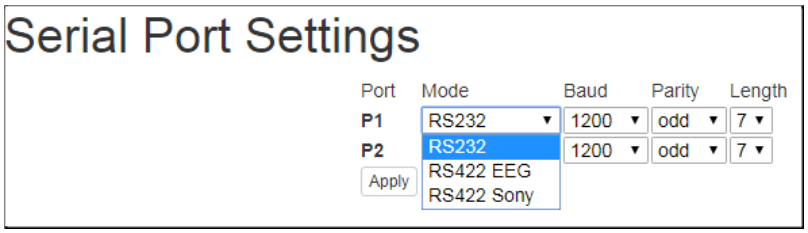


Figure 8: Serial Port Settings in the Web Interface

Common Applications

Caption Bridging

Caption bridging copies captions in either direct from/to the source video (AUX) from/to the master video output. This happens automatically when you have a captioned video input connected to one input and a video with no caption data to the other. The front panel LCD screen will indicate when the encoder is in Bridging mode.

Dual Encoding (Two Video Paths)

The AV650 can caption to two independent video channels, embedding the same closed captions in both channels. Any two supported video standards can be combined on the inputs to produce closed-captioned video on the respective outputs. For example, if 2160p60 12G-SDI is present on the Main input and 1080p60 3G-SDI is present on the Aux input, Main Out 1 will be closed-captioned 2160p60 12G-SDI and the Aux output will be closed-captioned 1080p60 3G-SDI.

GPI Relocation

GPI Relocation allows on-command placement control of closed captions on your output to avoid blocking essential action such as screen crawls and emergency information. You can control this feature by accessing the *Main* section of the side menu of the encoder web interface and scrolling down to the GPI settings at the bottom.

The screen is mapped into 15 regions from top to bottom that can be protected with the use of GPI settings. If you are creating a GPI switch and require a diagram of the GPIO Pinout – see the GPIO pinout / wiring detail found in the *Hardware Reference* section of the manual

Figure 9: GPI Settings Found in “Main” Section of the Encoder Web Interface

Scoreboard Interface for Stadiums *(Caption Text Server Module)*

The Scoreboard Interface module is an add-on component that produces a TCP/IP-accessible stream of the decoded caption output from the Master video signal.

To determine if Text Server is installed on your unit, access your encoder's web interface, look for an entry that says *Text Server* on the left side menu and select it. If you are prompted for a license key, the feature is not installed and can be purchased by contacting the EEG sales team.

To access closed caption data from the encoder unit with the Scoreboard Interface installed, utilize a TCP/IP socket interface configured with the following settings.

- ✔ For the IP address to connect to, use the IP that you have set on the front panel on the decoder
- ✔ unit System **Setup > Network > IP Address**. The receiving unit must be a member of the same subnet as the encoder.

- ✔ For the port number to connect to, use 2400.

If these settings are correct, the Scoreboard Interface should accept your connection immediately. At this point, you will receive ASCII text data over the connection which is a copy of the current CC1 caption data.

The output text is formatted using blank spaces and line breaks to approximate the intended appearance of the CC1 captioning on a 608-compliant decoder. When you are ready to stop receiving the caption text, simply disconnect at any time. You may connect multiple clients to the Streaming Caption Text Server simultaneously, but it is better to remove connections that are not in use, as a very large number of simultaneous connections could eventually have a negative effect on the system resource usage on the encoder or decoder unit.

Further instruction for this feature may be found at https://eegent.com/support/resources

Timed Playout of Caption Files *(CCPlay Module)*

CCPlay inserts caption data from imported text or binary files into the encoder's SDI video output. The caption data files contain time codes, and insertion into the video can be synced to ANC VITC (embedded in the SDI video input) or timed with a self-generated video frame clock. CCPlay also allows you to schedule files for future playout and shift time codes to adjust caption timing. A wide range of caption and subtitle file formats are supported, including ECF, SCC, SRT, CAP, TT, WebVTT, and more. CCPlay is controlled primarily through the encoder's web interface but can also be controlled remotely through an HTTP API - for more information on this API point your browser to *http://{your-encoder's-ip}/ccplay/api*

To determine if CCPlay is installed on your unit, access your encoder's web interface, look for an entry that says *CCPlay* on the left side menu and select it. If you are prompted for an access key, the feature is not installed and can be purchased by contacting the EEG sales team.

To import caption files into CCPlay, go to the CCPlay tab on the encoder's web interface. Then, click on the "Upload" sub-tab. Click in the box labeled "Please select your file", and an open dialog will appear, allowing you to navigate the drives accessible from your local computer. Click "Open" when you have selected a file, and then press "Upload." Once the file is uploaded, CCPlay checks it for a compatible format. You may see an error message if your file cannot be understood by CCPlay. When successfully uploaded, your file should now appear in the "Filelist" sub-tab, along with all other files imported into CCPlay. You can click on the file name to download the file or view it in your browser. CCPlay also displays compact metadata for each file, including the start and end time code values. The start time code value is especially important for syncing your file to a time code source, or setting up the correct self-generated time code for play out.

Further documentation for CCPlay may be found at https://eegent.com/support/resources

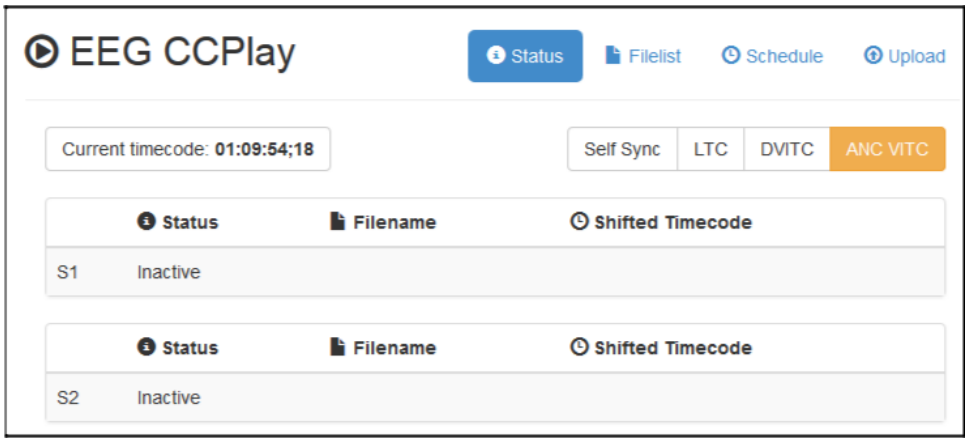


Figure 12: CCPlay Settings in the Web Interface

Record / Store As-Run Caption Data *(CCRecord Module)*

CCRecord creates real time as-run recordings of caption data running through the encoder, in a variety of popular caption file formats. Captions recorded may be locally inserted to the video through iCap, telnet, or dial-up mechanisms (encoders only), or they may be present on the input video, and will always reflect the data encoded on the output of the master video signal.

To determine if CCRecord is installed on your unit, access your encoder's web interface, look for an entry that says *CCRecord* on the left side menu and select it. If you are prompted for a license key, the feature is not installed and can be purchased by contacting the EEG sales team.

The recording in and out times for CCRecord files are triggered in real time through one of four GPI switches. The switch number is configurable, to provide maximum flexibility with a variety of encoder module configurations. The switch is used to begin recording on the rising edge, and to end a recording on the falling edge. A new recording can be engaged immediately once the prior recording is ended.

Each recorded file is named based on the ANSI timestamp string representing the beginning of the recording. Files can be stored locally on the unit until downloaded, or automatically transferred with FTP. When recording begins, each file begins counting SMPTE drop-frame time code at a default start time of 01:00:00.00.

Further documentation for this feature may be found at https://eegent.com/support/resources

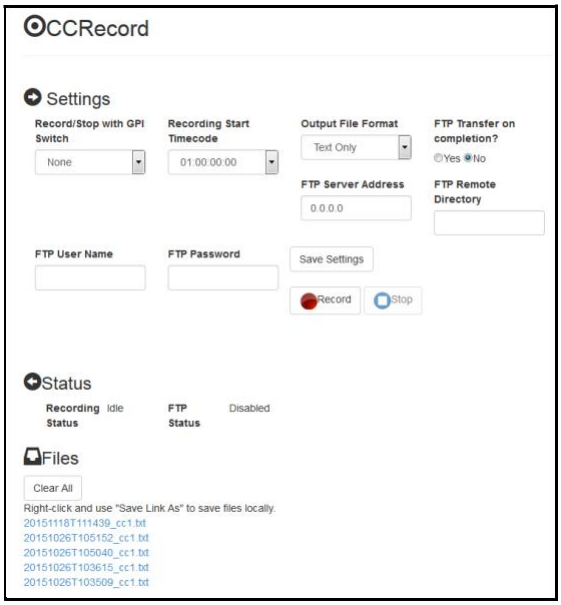


Figure 13: CCRecord Settings on the Web Interface

Caption Uplink to Streaming Media Servers *(Streaming Module)*

The *Streaming* feature posts real-time caption data to external web services for delivering high-quality web-based closed captioning.

To determine if Streaming is installed on your unit, access your encoder's web interface, look for an entry that says *Streaming* on the left side menu and select it. If you are prompted for a license key, the feature is not installed and can be purchased by contacting the EEG sales team.

While the HTTP Streaming Uplink module is active, all closed captions through the encoder will be passed to the streaming server. These captions may be locally inserted to the video through iCap, telnet, or dial-up mechanisms (encoders only), or they may be present on the input video, and originally coded using either real-time/roll-up or offline/pop-on workflows.

Before using the Streaming feature, you will need a stream URL for posting captioning data (example: http://in.videolinq.net/caption), a stream ID or username, and a password.

Further instruction for this feature may be found at https://eegent.com/support/resources

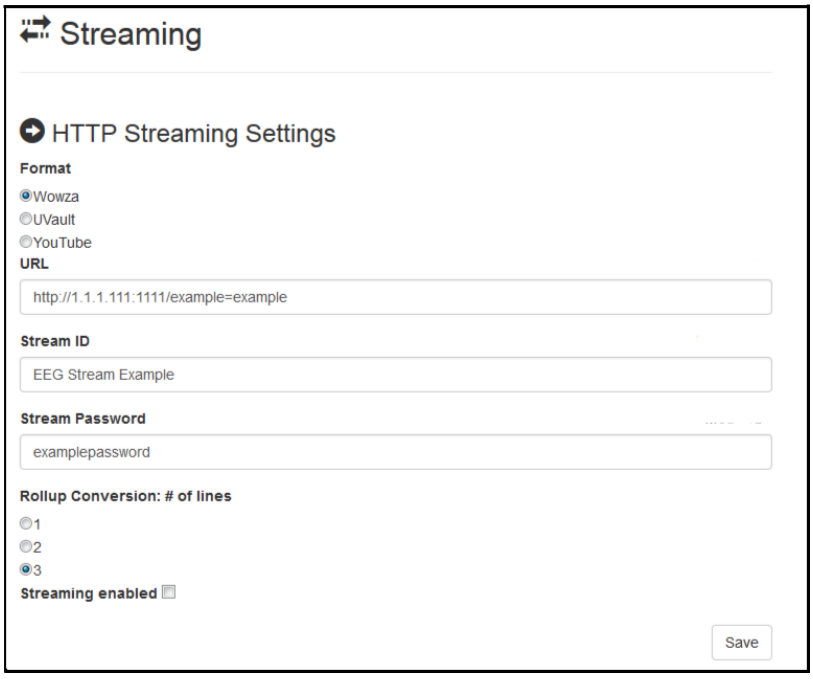


Figure 14: Streaming Settings on the Encoder Web Interface

Cloning Live Data to Additional Encoders *(Clone Module)*

The Clone feature re-transmits all control commands and caption data to one or more additional caption encoders. The additional encoders can be connected either through RS-232, or through the Clone TCP/IP interface.

To determine if Clone is installed on your unit, access your encoder's web interface, look for an entry that says *Clone* on the left side menu and select it. If you are prompted for a license key, the feature is not installed and can be purchased by contacting the EEG sales team.

The master encoder must have the Clone port optional software installed, and then set up through the Clone section of the web interface. When any "Clone Server" option is enabled, the encoder will copy commands and data that are received through the dial up modem, iCap, telnet, or RS-232 (P1, plus P2 if it is being used for input and not Clone output). You can also choose to copy these commands to the RS-232 port (Start RS-232).

Further documentation for this feature may be found at https://eegent.com/support/resources

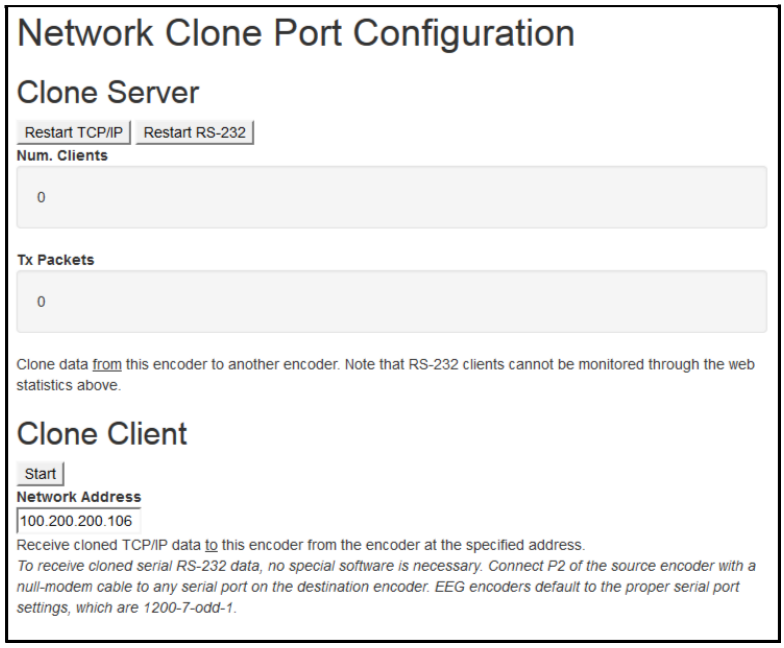


Figure 15: Clone Settings on the Encoder Web Interface

Caption Decoder *(Open Caption Display)*

The unit's built-in decoder allows for an open-captioned video output to be used for display or monitoring purposes. When Decoder mode is enabled, the Aux Monitor Output will contain both open captions (burned into the video) and closed captions, on a copy of the Main Video input. To enable the decoder, navigate to **Decoder > Decoder On** via the front-panel LCD menu. Font, font size, and opacity may also be controlled in the Decoder Settings section.

Additional Features

Caption Absence Alarm

The Caption Absence Alarm feature, accessed from the Alarm section of the side menu of the encoder web interface, allows you to set alarms to automatically alert you when caption presence is not detected on the encoder for a certain amount of time. This is a useful feature for monitoring caption activity on your encoder.

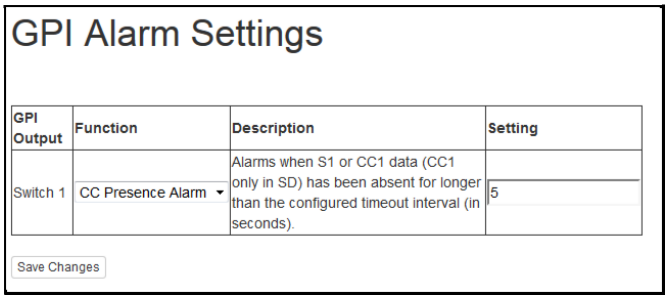


Figure 8: GPI Alarm Settings on the Encoder Web Interface

Caption Input Blocking

You can block caption input to your encoder via the following non-relocation GPI functions found in the GPI Settings on your web interface. They are as follows:

- ✔ **Modem Lockout:** Blocks caption input from the Modem
- ✔ **P2 Lockout:** Blocks caption input from Serial Port 2
- ✔ **Force Regen:** Blocks caption input from Modem, P2, and iCap

Capturing Incoming VANC or 608 Data for Analysis

You can capture and save VANC data from the master video input to a USB stick for review or troubleshooting. Place a USB stick into the USB port on the front panel of your encoder and navigate to **Utilities > Capture All VANC** from the front panel LCD. Press ENTER to begin downloading the VANC data or CANCEL to exit. To stop capturing VANC data press any front panel key. Depending on the size/type of memory device used, there may be a momentary delay before the device is detected. If you see “Failed: Insert USB Disk”, wait a few seconds and try again. For questions about analyzing your VANC data. Please contact our support team at 516-293-7472 or eeg.support@ai-media.tv

VANC Readahead

The AV650 encoder performs many default tasks for the purpose of cleaning up incoming VANC data. These tasks include removing packets that have been marked for deletion, packets that contain illegal embedded black pixels and so on. The delay buffer required to process VANC data in this manner results in a minor latency slightly greater than one half of a video line. The settings found under the VANC Readahead feature will allow you to control the delay buffer. To disable the advanced VANC processing features in cases where they are not required navigate to **System Setup > VANC Readahead** from the front panel LCD and select the "¼ Line" option.

Decoder Output Video Blanking

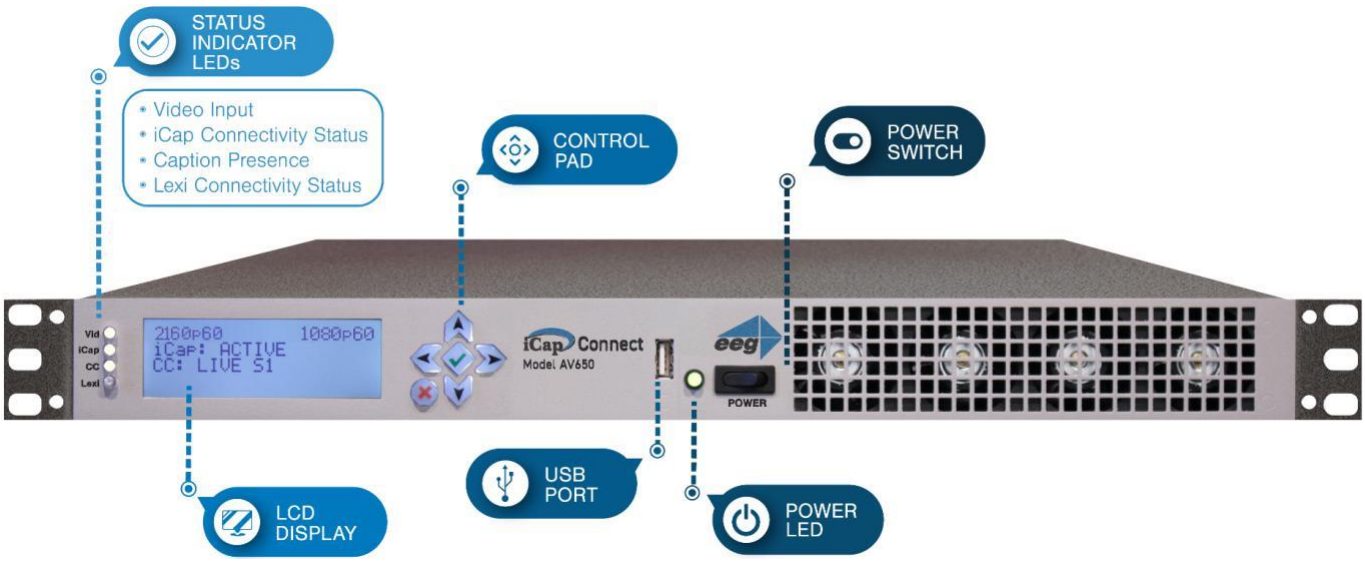
The Video Blanking feature creates a secondary blank (black) decoder output with open captions displayed in addition to the master output of captioned video. Blanking requires video input on the master input of the unit to operate and provides open captions over black video on the Aux Mon output (Decoder Output) only. Turn Video Blanking on/off by navigating to **Decoder Setup > Blank Output** from the front panel LCD.

Black 1080i Video Generation

The Black 1080i Video Generation feature creates a high definition black video on all outputs with closed captions displayed (open captions will display on the decoder output). This feature requires no video input to the unit as it is intended to serve users who do not have a video source and only seek to output closed captions over black screen. To provide audio reference to a remote captioner in this scenario, the AV650 accepts AES digital or analog audio through the rear panel XLR connector which is configurable from the LCD control on the front panel. Turn Black 1080i Video Generation on/off by navigating to **Utilities > Generate 1080i** from the front panel LCD. When the feature is active a "Gen: 1080i60" indicator will display on the front panel LCD home screen.

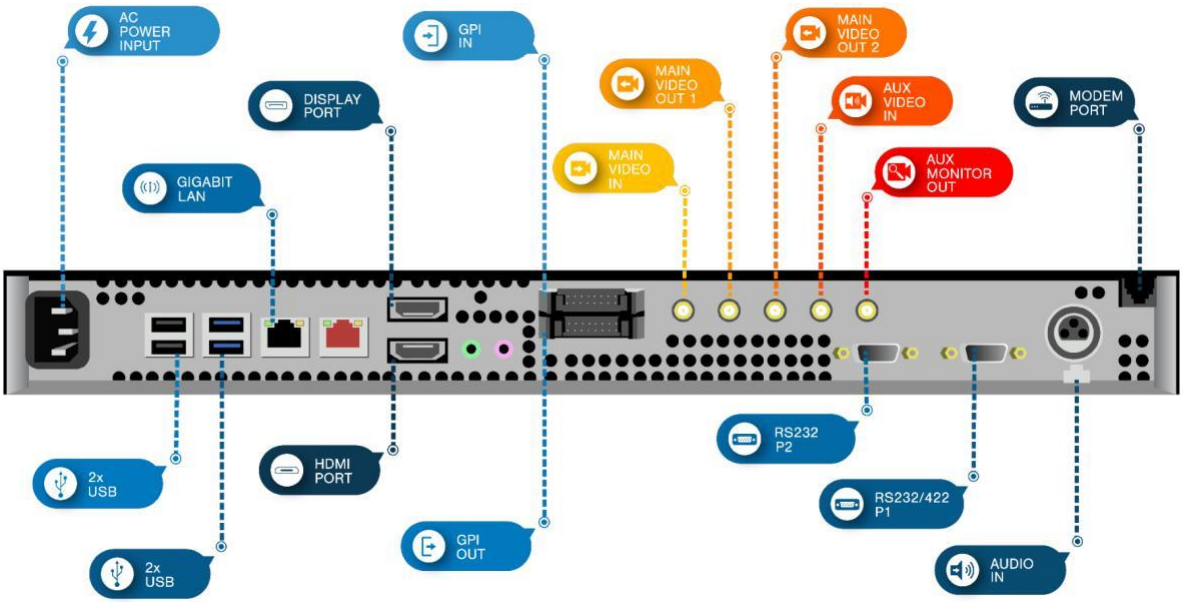
Hardware Reference

Front Panel



Power Switch	Controls whether the unit is on or off
LCD Screen	The LCD Screen provides access to the unit's front panel configuration menu. Status information is displayed when the menu is not in use. Press the "check mark" button to enter the menu at any time.
Control Pad	The Control Pad provides menu navigation for the front panel configuration menus. The control pad buttons are: **ENTER** (marked by a check), **CANCEL** (marked by an 'X'), **LEFT, RIGHT, UP,** and **DOWN.**
USB Port	The front panel USB port provides firmware upgrade capability via a flash memory device. Updates can be applied through the USB port as well as the web interface. See *Updating Your iCap Encoder* section on page 5 to learn more.

Rear Panel



AC Power	AC power input, 120 – 240 V, 50-60 Hz tolerant.
Main Video In	HD-BNC input for program video source - can use 12G-SDI, 3G-SDI, or HD-SDI.
Main Video Out 1	Primary video output.
Main Video Out 2	Copy of primary video output.
Aux Monitor Out	In “Decoder” mode, outputs open-captioned copy of primary video output. In “Dual Encode” mode, outputs Aux Video In with closed captions.
Aux Video In	The Aux Video In can be used as a source of caption data when connected to a pre-captioned video source. Caption data from the Aux Video In will be up-converted or down-converted as necessary for encoding to the Main Video signal. See Applications section for more information about bridging options.
Modem	Standard RJ-11 port. Connect to a phone line to enable dial-up captioning. Modem is a paid add-on option.
Serial Ports	iCap Encoders have two serial data ports. Both Port 1 and Port 2 are RS232 ports. Additionally, Port 1 also supports RS422 communication.

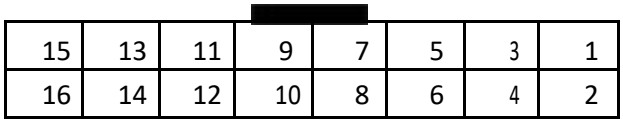
LAN Port	Used to connect the encoder to your local network for access to the web interface and features such as iCap. The encoder will be reachable on your network using the static or DHCP IP address set in the front panel configuration menu.
GP In & Out	Two blocks of 8 GPI input switches and 8 GPO output notifications. Switch functions vary based on software configurations. See GPIO section of manual for more information.
Audio In	Balanced audio input for program companion audio in analog or AES digital format. If using AES digital audio, an AES pair of PCM encoded audio at 48kHz should be used. iCap uses the audio input to send encrypted IP transmission to your caption service provider.

GPIO Pinout / Wiring Detail

The GPIO pins are located on the two 16-pin connectors on the rear panel of the unit. Each connector mates with an Omron XG5N-161-U receptacle and Omron XG5W-0231 crimps.

✔ GPI Pin Assignments

The GPIs use the upper 16-pin connector.

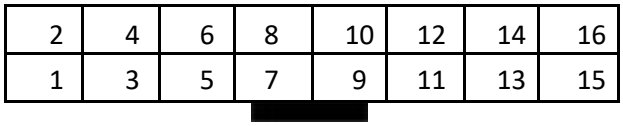


15	13	11	9	7	5	3	1
16	14	12	10	8	6	4	2

Pin(s)	Input
1,3,5,7,9,11,13,15	Ground
2	A
4	B
6	C
8	D
10	E
12	F
14	G
16	H

✔ GPO Pin Assignments

The GPOs use the lower 16-pin connector.



2	4	6	8	10	12	14	16
1	3	5	7	9	11	13	15

Pins	Output
1, 2	1
3, 4	2
5, 6	3
7, 8	4
9, 10	5
11, 12	6
13, 14	7
15, 16	8

GPIO Switch Functions

GPI triggers can be used to automatically perform tasks related to various encoder functions including caption display relocation (to avoid blocking emergency information, news crawls, or other important graphics). Default GPI function mappings are defined below. Settings can be changed from the Main tab of the encoder web interface – the dropdown menu for each GPI will offer various options for caption relocation.

GPI-A: Force 608 Up-conversion

Activating this function causes upconverted 608 caption data from the SD video input to be encoded onto the HD/3G/12G video outputs, even in the presence of upstream captioning on the HD/3G/12G input. Locally input data will still override the upstream 608 data, but all upstream VANC caption data will be ignored.

GPI-B: Modem Lockout

Activating this function disables the dial-up modem for data input. The modem will still answer calls, but users will not be able to enter caption data. If a modem user is entering data, and then this switch is closed, the modem user will be cut off from entering more data

GPI-C: Port 2 Lockout

Activating this function disables P2 for data input. Users connected to P2 will not be able to enter any caption data, and if a user is inputting data and then the switch is closed, the serial port user will be cut off from entering more data.

GPI-D: Force Regeneration

Activating this function causes all locally input caption data to be ignored. Upstream caption data will be regenerated as if no local caption modes were active.

GPI-E through GPI-H: Unused

The default GPO function mappings are defined as follows:

GPO-3: iCap™ Server Connection

If iCap is active on your encoder, checking **Monitor connection on GPO-3** on the iCap configuration page will cause GPO-3 to close when your encoder has a valid connection to an iCap server, and open when iCap™ is not connected.

GPO-4: CC1/S1 Activity

If iCap is active on your encoder, checking **Monitor S1 activity on GPO-4** on the iCap configuration page will cause GPO-4 to close when your encoder is receiving real-time caption data for CC1/S1 through iCap™, and open when the iCap connection is idle.

Other GPOs: No functionality currently defined

RS-232 / RS-422 Connection Detail

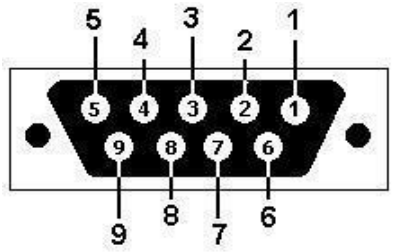
Both Serial ports 1 and 2 use DB-9 connectors. Only serial port 1 supports RS-422 and RS-422 Sony. See the following pin assignments:

RS-232 Protocol		
Pin	**Master**	**AV650**
1		
2	Rx	Tx
3	Tx	Rx
4		
5	Ground	Ground
6-9		

RS-422		
Pin	**Master**	**AV650**
1	Rx-	Tx-
2	Rx+	Tx+
3	Tx+	Rx+
4	Tx-	Rx-
5	Ground	Ground
6-9		

RS-422 Sony		
Pin	**Master**	**AV650**
1		
2	Rx-	Tx-
3	Tx+	Rx+
4		
5	Ground	Ground
6		
7	Rx+	Tx+
8	Tx-	Rx-
9		

DB-9 Female connector pinout on rear of AV650 encoder:



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 2 and 3. Null Modem cable may be used only when the intent is to connect two encoders together via the serial port (see *Cloning* on page 17).

Encoder Specs

SDI Video Inputs	
Number of Inputs	2
Connector	Amphenol HD-BNC
Format	12G (SMPTE ST 2082), 3G (SMPTE 424M), HD (SMPTE 292M)
Input Level	800 mV p-p ± 10%
Input Impedance	75 Ohms
SDI Video Outputs	
Number of Outputs	3
Main Output 1	Main program output
Main Output 2	Copy of main program output
Aux Output	Auxiliary output
Connector	Amphenol HD-BNC
Output Level	800 mV p-p ± 10%
Output Impedance	75 Ohms
DC Offset	0V ± 0.5V
DATA PORTS	
LAN	RJ45 connector, 10/100/1000 Base T TCP/IP
USB	Three standard USB ports, one on front panel and two on rear
Serial Ports	Two serial DB-9 connectors, selectable RS-232C / RS-422.
Serial Data Input Format	7 data bits, odd parity, 1 stop bit, settable between 1200-38400 baud
Modem	Paid Option. One RJ-11 port, 1200/2400 baud
GPI/GPO	Two ports which each mate to Omron XG5N-161-U connectors Normally-open GPO relays rated to 2A / 30 VDC Open-collector optocoupler-based GPIs
AUDIO PORTS	
Port 1	Program audio input for streaming audio applications
Connector	Female mini-XLR
Format	Balanced analog or AES balanced 110-ohm digital
FRONT PANEL	
Display	Back-lit LCD display with six-button keypad and navigable menus for unit configuration
Power	Unit power switch with LED indicator
PHYSICAL	
Dimensions	19” rack mount x 1 RU x 16.5” deep
ELECTRICAL	
Power Supply	115/230V AC 50/60Hz
Power Consumption	In-rush: 370mA, 39 W, 43 VA, 0.37 PF Normal: 370mA, 44 W, 45 VA, 0.96 PF

Developer Features

Encoder Command Concept

Encoder Commands allow you to communicate with and control the operation of your encoder either manually or through your custom written software that contains any combination of the commands detailed in this section. All commands begin with a leading control code of <CTRL+A> *or the ASCII hex code 01* for developers writing software. All commands must end with a carriage return (the <ENTER> key on a keyboard *or 0D in ASCII hex*). For manual entry of commands, the three following methods may be used. A Full Command Reference may be found at the end of this section.

Telnet: Commands may be entered through a telnet connection to your encoder only after you've enabled a telnet connection through your encoders web interface (select Telnet from the side menu)

Web Terminal: The Command Terminal is found on the web interface of your encoder (select *Terminal* from the side menu). This emulates the serial port interface to your encoder and allows you to enter commands directly from your encoders web interface (see figure 19).

RS-232: Commands may be entered through an RS-232 connection to your encoder. Default settings on the encoder allow entry through RS-232 right out of the box.

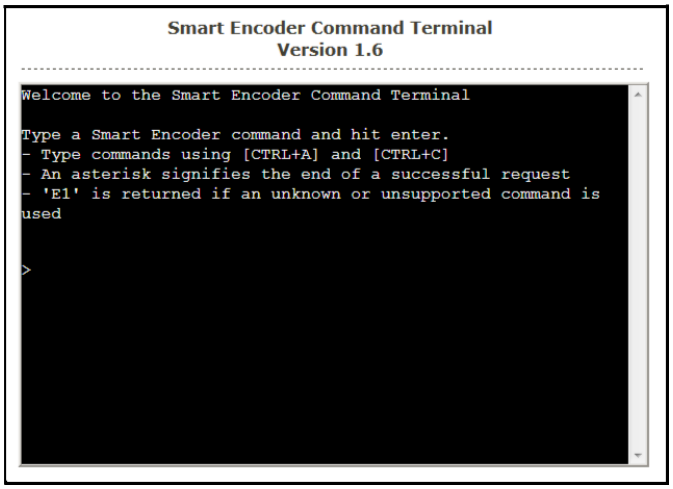


Figure 9: Command Terminal on the Encoder Web Interface

Startup Settings

The Startup Settings Editor enables entry of Encoder commands that will run every time the encoder starts up. Use Startup Settings whenever you want a setting to be “sticky”; settings entered through the Web Terminal or the serial port only are not sticky and will revert to defaults when the encoder is power-cycled. Startup Settings can be accessed via the encoder web interface by selecting *Startup Settings* from the side menu.

To use the Startup Settings editor, type any Smart Encoder command into the command box. *Omit the <CTRL+A> character entirely as this character is implied at the beginning of each line*. To add additional commands, press the ‘+’ button and more lines will appear.

When you have entered commands for all the settings that you want to make sticky, click Update Startup Settings. The configuration changes will take the next time the encoder starts up.

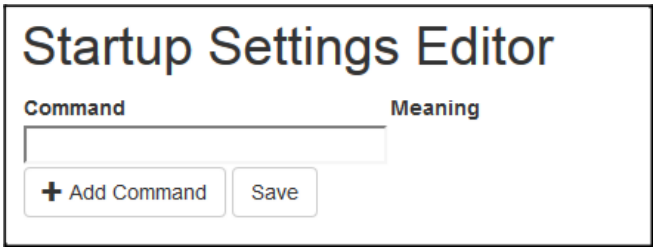


Figure 10: Startup Settings on the Encoder Web Interface

Command Reference

Local Entry Modes

Regenerate Upstream VANC	**<CTRL+A>! [ON/OFF] <ENTER>**
Ignore Upstream Caption Channel	**<CTRL+A>6 Channel <ENTER>**
Return Upstream Caption Channel	**<CTRL+A>7 Channel <ENTER>**
Begin PassThru Mode	**<CTRL+A>3 [Pairing] [Field] <ENTER>**
End PassThru Mode	**<CTRL+C>**
Begin RealTime Mode	**<CTRL+A>2 [Channel] [Rollup] [bBase] <ENTER>**
End RealTime Mode	**<CTRL+C>**

HD Output Types

VANC Insertion Disabled	**<CTRL+A># OFF <ENTER>**
VANC Insertion Enabled	**<CTRL+A># ON <ENTER>**
VANC Line Change	**<CTRL+A>f vanc [Line] <ENTER>**

Encoder Status Commands

Report Identification	**<CTRL+A>? <ENTER>**
Report Port Activity	**<CTRL+A>O <ENTER>**
Modem Status	**<CTRL+A>+ [Modem] <ENTER>**
Recovery Status	**<CTRL+A>A <ENTER>**
Video Status	**<CTRL+A>b <ENTER>**
Report Switch Setting	**<CTRL+A>S <ENTER>**
Monitor Line 21	**<CTRL+A>5 [Channel] [I/O] <ENTER>**
End Monitoring	**<CTRL+C>**