EEG DE291 HD Caption Decoder/VANC Monitor

Product Manual

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Contents

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1. Introduction

1.1. Product Description

The DE291 HD Caption Decoder/VANC Monitor is an all-purpose closed caption decoder which creates an HD open caption display for monitoring CEA–708 data quality and full standards compliance, while also providing an extensive VANC monitoring suite. The DE291 can be con- figured from the front panel to display caption data in HD Services 1 through 6, and all caption channels present in the EIA-608 compatibility bytes. In addition to producing broadcast quality open–captioned video, the DE291 decodes a wide array of metadata types, including AFD (Ac- tive Format Descriptors), audio metadata and XDS. The DE291 also fea- tures HANC embedded AES audio decoding with channel levels, peaks, and phase detection.

The DE291 comes equipped with a powerful Web-based VANC Analysis Tool for viewing and capturing live VANC data, sorted by service type, DID/SDID or line number. The DE291 Web Tools offer an efficient new way to monitor VANC packets, providing programmable triggers with logging for packet drop-outs or changes, as well as other features.

The EEG DE291 offers a comprehensive VANC monitoring solution and HD closed caption decoder with the proven quality and full standards compliance of the industry's leading provider of HD closed caption de- coding equipment.

2. Installation

2.1. Front Panel

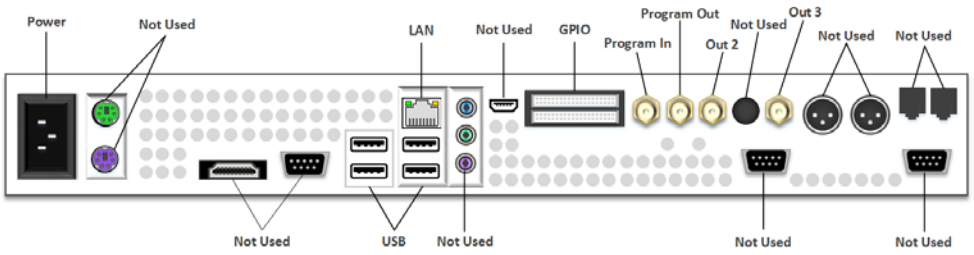
The DE291 front panel is shown below, followed by a brief guide to its functions.

LCD Screen	The LCD Screen will provide access to the unit's front panel configuration menu. When the menu is not in use, video status is shown. See the next section for front panel configuration updates.
Control Pad	The Control Pad navigates menus and changes settings in 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**. In most configuration menus, use **LEFT** and **RIGHT** to navigate between parameters, **UP** and **DOWN** to change the value of the selected parameter, **ENTER** to select a category or save a change, and **CANCEL** to return to the previous menu without saving changes. See Front Panel LCD Menu in Decoder Operation for further details.
USB Port	A front panel USB port is provided to enable quick and easy software upgrade.
Power Button	Toggles the Decoder on and off. LED will light steady green when the unit is powered on.

Insert Button	Toggles the Decoder between active operation (LED on) and Relay Bypass mode (LED off). In Relay Bypass mode, the signal at the Program video input is routed directly through to the Pro- gram video output, with no on-screen display created. All other inputs and outputs are inactive and the web analysis tools cannot

2.2. Rear Panel

The DE291 rear panel is shown below, followed by a guide to the connectors located there.



Power	AC power input, 120–240 V, 50–60 Hz tolerant. Connect to the unit's primary power source. Turn on/off with switch next to connector.
LAN	100-Base Ethernet port for network features including web tools suite
USB Ports	Can be used for data capture and installing software updates.
GPIO	GPI and GPO connector for changing presets and detecting caption presence. See Appendix A.1 for GPI and GPO pinouts and instructions
Program In	Video input for the Program video chain. The on-screen display will be burned onto this video signal. See Appendix E for list of supported standards.
Program Out	Relay-bypass protected decoder video output
Program Out 2	Non relay-bypass protected copy of the decoder output signal
Program Out 3	Non relay-bypass protected copy of the decoder output signal

3. Front Panel Menus

The front panel LCD screen and Control Pad are used to configure decoder settings and networking, and to perform flash updates. The inter-face is organized in a series of hierarchical menus; use the **LEFT** and **RIGHT** keys to scroll between menu options and the **ENTER** or **DOWN** keys to select options or enter sub-menus. Press the **CANCEL** key from any menu screen to return to the top of the menuhierarchy.

The default display on the front panel is the decoder status screen. The top left shows the format of the Source video input. The bottom left shows the format of the Program video input. The top right will display "LAN" if the Ethernet connection is active. If the front panel display is inactive for 20 seconds or more, the display will revert to the status screen, unless an update is in progress or the audio level meter is in use. When this timeout occurs, press any key on the Control Pad to return to the sub-menu that was in use.

The front panel can also be put into Preset Mode at any time by holding down the **CANCEL** key (marked by an 'x') for 5 seconds. The default display in Preset Mode is the full title of the current layout. To change the current layout, use the **LEFT** and **RIGHT** keys to scroll between layout choices. When you have reached the desired layout press the **ENTER** button to accept the new layout. Once you have entered Preset Mode, the display will stay in this mode and will not automatically revert back to the default decoder status screen. To return to Normal mode, hold down the **CANCEL** key for 5 seconds.

Note: The preset mode will only display custom layouts saved from the OSD web configuration. The factory defaults will not be a selectable option.

3.1. Decoder Setup

Decoder On/Off	Turns the on-screen caption decoder display on or off. Use the **UP** and **DOWN** keys to select an option, then press **ENTER** to exit and apply changes or **CANCEL** to exit and cancel changes.
Set HD Service	Selects the service that is decoded to create the HD caption display on the decoder output if HD video input is present. The DE291 can display 708 caption Services 1 through 6, or 608 compatibility data for caption channels CC1 through CC4.
Set SD Service	Selects the service that is decoded to create the SD caption display on the decoder output if SD video input is present. The DE291 can display 608 caption channels CC1 through CC4.
708 Font	Selects the display font for the decoder output. Choose "default" to see the font style as it is encoded in the 708 caption data. Fonts are only selectable when a 708 caption service is selected for decoding.
708 Size	Selects the size of the display text for the decoder output. Choose "default" to see the text size as it is encoded in the 708 caption data. Text sizes are only selectable when a 708 caption service is selected for decoding.
708 Opacity	Selects the opacity of the caption display for the decoder output. Choose "default" to see the colors and opacity as they are encoded in the 708 caption data. Opacity is only selectable when a 708 caption service is selected for decoding.

Subtitle Mode	Turns subtitle mode on or off for caption display on the decoder output. Subtitle mode removes the black background and displays yellow text with a black shadowed outline. This feature is useful for creating easy–to–read subtitles.

3.2. System Setup

LCD Display

➥ **Contrast**	Sets the contrast level of the display screen. The value ranges from 0 (lightest) to 20 (darkest). Use the **UP** and **DOWN** keys to make changes. When you are finished making changes, use the **ENTER** key to exit the menu and save changes, or the **CANCEL** key to exit the menu and reject changes.
➥ **Backlight**	Sets the brightness level of the display screen's backlighting. The value ranges from 0 (darkest) to 50 (brightest). Use the **UP** and **DOWN** keys to make changes. When you are finished making changes, use the **ENTER** key to exit the menu and save changes or the **CANCEL** key to exit the menu and reject changes.

Network

➥ **IP Address**	Sets a fixed network address for the unit onyour LAN. Use the **LEFT** and **RIGHT** keys to move the cursor between digits and the **UP** and **DOWN** keys to change the selected digit. When you are finished making changes, use the **ENTER** key to exit the menu and save changes or the **CANCEL** key to exit the menu withoutsaving.
➥ **Subnet Mask**	The subnet mask should be set to match the bit mask used on your LAN.
➥ **Gateway**	The gateway should be set to the address of the computer or device that the unit will use to communicate outside of your local network.
Version	Provides version information about the unit, including build number and firmware version.

Set Layout	Allows you to choose a layout from the list of available layouts. Use the **LEFT** and **RIGHT** keys to select the name of the layout, then press **ENTER** to exit and apply changes or **CANCEL** to exit and cancel changes.
Update	The Update utility allows you to upgrade your firmware to the most recent version. Begin by downloading a firmware update file from the EEG website to any USB memory device. Insert the memory stick into the front panel USB port, navigate to the Update option, and press **ENTER**. The update utility will find the installation file on the memory device, display the revision number, and prompt you to continue. Press **ENTER** to pro- ceed and install the new firmware, or **CANCEL** to end the utility. A message will appear on the LCD screen when the update utility has finished. **Do NOT remove the memory device while the update utility is running.** When the update utility is finished, the new firmware is completely installed; there is no need to reboot the unit. De- pending on the size and type of memory device used, there may be a momentary delay before the device is detected. If you see "Cannot Update: In- sert USB Disk", wait a few seconds and try again.

3.3. Utilities

Capture VANC

Captures VANC data of the selected DID/SDID from the Master video input and loads it onto a USB storage device. Use the **UP** and **DOWN** keys to select the desired DID/SDID and insert a USB device into the box. 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 and 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 help on opening and interpreting your USB VANC capture please see Appendix D.

Capture All VANC

Captures VANC data of all DID/SDIDs from the Master video input and loads it onto a USB storage device. Insert a USB device into the box and 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 and 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 help on opening and interpreting your USB VANC capture please see Appendix D.

Capture 608

Captures 608 data from Line 21 of the Master video input and loads it onto a USB storage de- vice. Insert a USB device into the box and press **ENTER** to begin downloading the VANC data or **CANCEL** to exit. To stop capturing 608 data press any front panel key. Depending on the size and 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 help on opening and interpreting your USB 608 capture please see Ap- pendix D.

4. OSD

The OSD monitors offer a variety of information about the video signal. This includes decoded ANC data such as XDS, AFD, audio, closed caption services and a full 608 and 708 closed caption decoder.

4.1. XDS Monitor

The OSD XDS Monitor shows common XDS fields such as:

- Net Station
- Program Name
- Rating (turns red to indicate invalid rating)
- CGMS

- Description
- Program Type
- Program ID

The XDS Monitor found at the top left corner of the OSD in the default layouts.

4.2. Nielsen® Watermark Monitor

The OSD Nielsen Watermark Monitor displays all Nielsen Watermark currently present in the program. You can set the decoder to display an alert indicating the absence of a specified watermark by configuring the Watermark Alarm Settings located in the Nielsen section of the web interface of the DE291. See section 5.3 of the manual to learn about setting the Watermark Alarm.

4.3. AFD Monitor

The OSD AFD Monitor displays the AFD code present, AR, bar data present and a description of the AFD code. This monitor is found on the bottom left corner of the OSD in the default layouts.

4.4. Caption Service Monitor

The Caption Service Monitor displays any caption services currently present on the video signal, as well as the service that the OSD is cur-rently decoding. The service being decoded is displayed in green. This monitor is found at the top right corner of the OSD in the default layouts.

4.5. Audio Metadata Monitor

The OSD Audio Metadata Monitor displays audio metadata that is present on the video signal.

4.6. Audio Monitor

The OSD Audio Monitor shows real-time audio volume levels for each channel, as well as well as phase values for each channel pair. This

monitor is found at the bottom right corner of the OSD in the default layouts. It is dB full-scale (dbFS) which measures the signal against "full-scale", or the largest possible sample value. In this scale, 0 dB is the highest the level can possibly be. All other values are negative, showing that they are smaller than the largest possible signal.

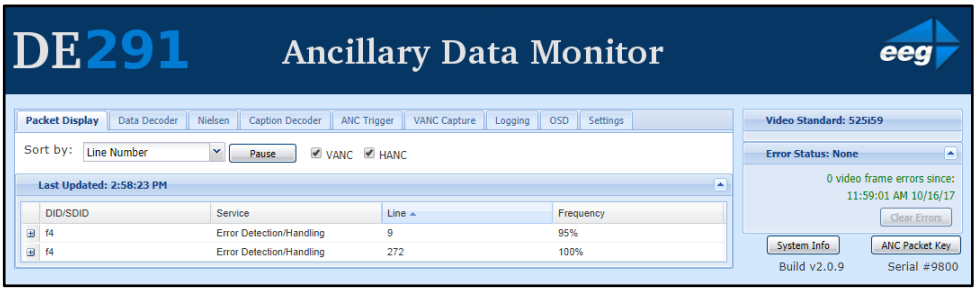
Note: Blue bars are displayed at -40 dB to indicate the presence of Dolby E or other compressed audio data which is not decoded by this monitor.

4.7. Error Monitor

The OSD Error Monitor is used to display alarms/triggers/errors which are user configurable from the Web Tools Suite. These messages are displayed at the top center of the OSD in the default layouts.

5. Web Tools Suite

The Web Tools module is a high-powered network-driven remote application for the DE291 that provides new ways to view VANC data, as well as advanced configuration and monitoring tools. To use Web Configuration, the Decoder first must be connected to a 100-Base LAN, and con-figured with a valid IP address and subnet mask for that LAN through the front panel Network menu. Once the decoder has been given an address, access the web tools by typing the Decoder's IP address into a web browser from any computer on the same LAN.

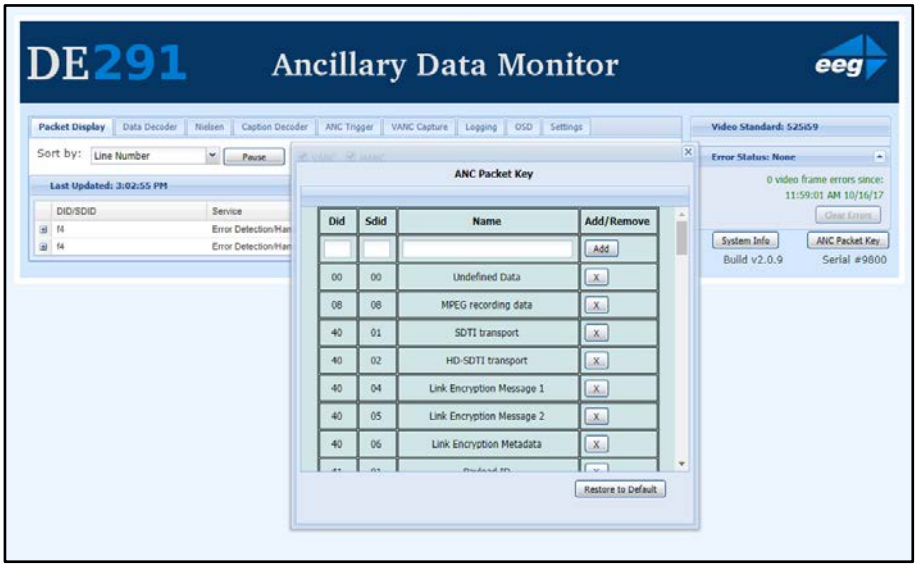


Using an intuitive interface, the Web Tools module displays the detailed options tabs on the upper left hand side while showing the current video standard selected on the upper right hand side. Below the video stan- dard on the right side, the error status is displayed in a continuously updated list which can be hidden or expanded by clicking on the arrow button located at the top of the error list. This list will briefly display any current video errors that appear on–screen. There is also a **Clear Errors** button that clears past errors and restarts the error count.

Below the error status display on the left is the **System Info** button, which displays the version number of each software component of the DE291 to make sure the current software loaded is up to date.

To the right of the **System Info** button is the **ANC Packet Key** button which provides a fully customizable reference for seeing which DID/SDID value maps to which service. Pre-defined DID/SDID values are listed in rows giving the DID value, the SDID value, the name of the data and the option to remove this mapping. These mappings determine the name of the service corresponding to a particular

DID/SDID listed in the Packet Display tab. To add a new mapping you can use the top row of the chart to enter a DID value, a SDID value, and the corresponding name you would like associated with the DID/SDID and then click the **Add** button.



5.1. Packet Display Module

The Packet Display Module displays real–time VANC data on the website which can be sorted by one of three methods. This is the starting page in the main pane of the DE291 Web Tools module and is shown on the previous page. The VANC packets can be sorted by DID/SDID, Service Type or Line Number. The sorting method can be selected from the drop down menu located at the top of the packet display module. The default viewing mode for the Packet Display Module gives an overview of which service types are present, along with their line numbers, DID/SDID values and frequency. A more detailed view is available by clicking on the **'+'** button located to the left of each VANC packet. The expanded view displays the hex dump, field, checksum and location/type of the data. The hex dump begins with the sample offset in the line followed by a colon and the hex value of each sample in the packet. The checksum field evaluates whether or not the checksum is valid. The Location/Type field displays whether it is VANC or HANC and which type it is. To return to the default view click on the '-' button at the top of packet line. The VANC packets are continuously updated and displayed in the chart. If you would like the current data to remain on the screen temporarily, click the **Pause** button on the top left of the Packet Display Module. To resume seeing the live updated data, click the **Resume** button.

5.2. Data Decoder Module

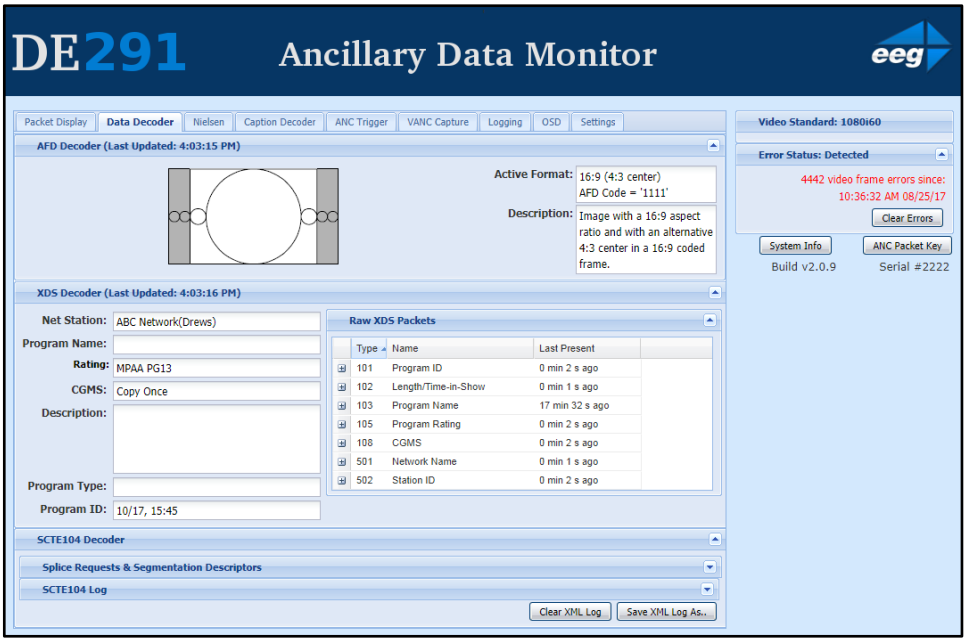
The Data Decoder Module is a three part visualization tool which dis- plays decoded AFD data on the top part of the screen, decoded XDS data alongside raw XDS packets on the middle portion of the screen and SCTE104 data on the bottom of the screen.

5.2.1. AFD Decoder

The upper portion of the screen contains the AFD Decoder module which displays the current AFD code on the top right of the module, the de- coded aspect ratio description below the code, and a visual representation of the AFD code on the left hand side. The default viewing option shows the AFD Decoder display. To hide the AFD decoder module, click on the upwards arrow at the top right hand corner. To expand the module, click the downwards arrow at the top right hand corner.

5.2.1. XDS Decoder

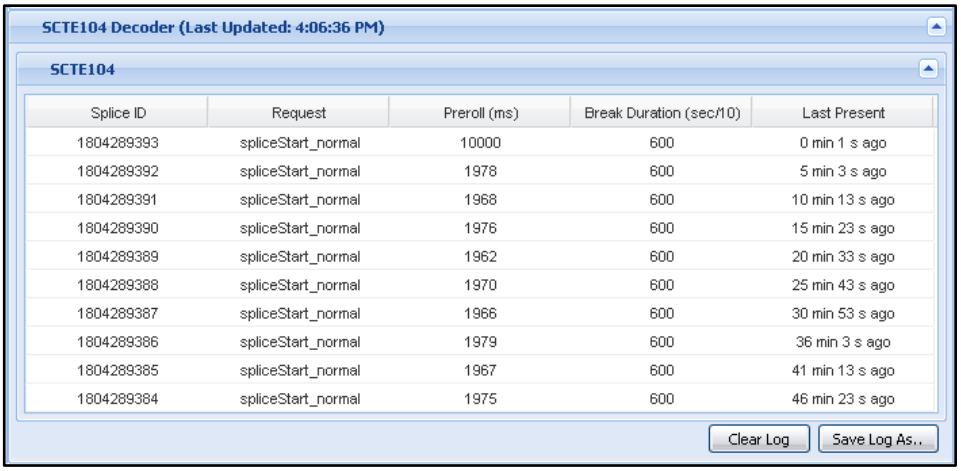
The middle section of the screen contains the XDS Decoder module which displays decoded XDS data on the left and the raw XDS packets on the right. The decoded XDS fields shown on the left include the Net Station, the Program Name, the Rating, CGMS, the Description, the Program Type and the Program ID.



On the left, the raw XDS data in hex pair format can be sorted by type, name or how recently it has been updated. To view the raw XDS click on the **'+'** button located to the left of the packet to expand the packet and view the data. To hide the XDS decoder module, click on the upwards arrow at the top right hand corner. To expand the module, click the downwards arrow at the top right hand corner. The same hide/expand feature is also available for only the raw XDS Packet chart on the right.

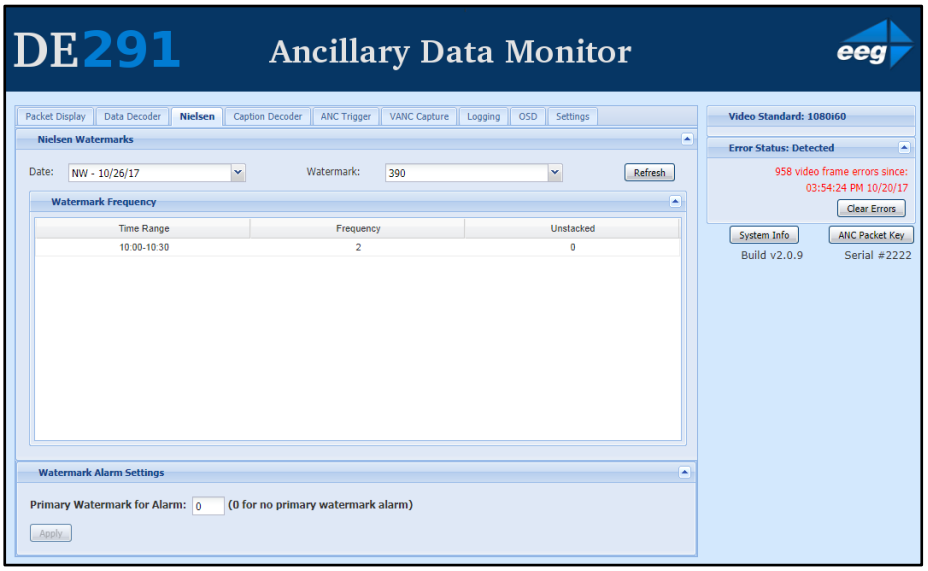
5.2.2. SCTE104 Decoder

The bottom section of the screen contains the SCTE104 Decoder module. This module displays recent SCTE104 messages detected by the system. A grid layout provides details about the message which in- clude Splice ID, Request, Preroll (ms), Break Duration (sec/10) and a Last Present timestamp. A running log of all SCTE104 messages can be downloaded by clicking the **Save Log As** button. This can be useful for tracking SCTE104 messages from the past. The log is cleared by clicking the **Clear Log** button.



5.3. Nielsen® Decoder Module

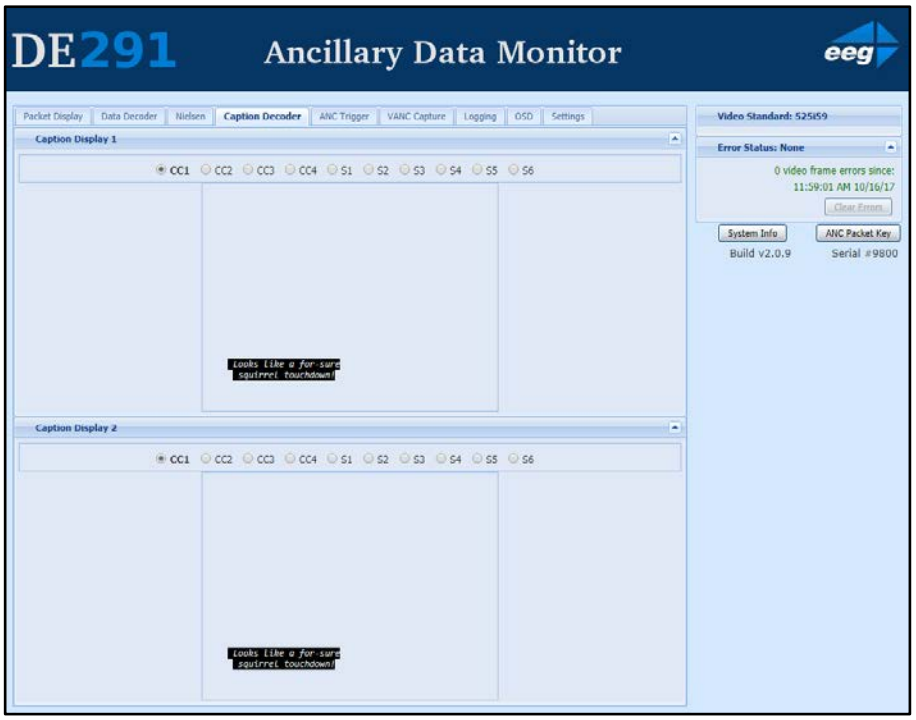
The Nielsen Decoder Module decodes and logs Nielsen rating watermarks detected in the audio of the main program input. The following types of watermarks are read; Nielsen VI, Nielsen II, and CBET Watermarks. This section displays how many times a particular watermark is received and the time-frame in which it was received. The **Date** drop-down allows you to look at historical Nielsen data while the **Watermark** dropdown determines which watermark you are looking for in the log. Detected watermarks are displayed in real-time in the on-screen display output of the DE291. The **Watermark Alarm Settings,** found at the bottom of this section, allows you to program the module to produce a visual alert in the on-screen display output for the absence of a specified watermark.



5.4. Caption Decoder Module

The Caption Decoder Module simulates the placement of captions in the two Caption Feed sections. The Caption Feed sections have a row of radio buttons for selecting the caption service that will appear in the screen simulation below the menu. Caption services CC1 to CC4, and S1 to S6 are displayed, with the active caption services in bold.

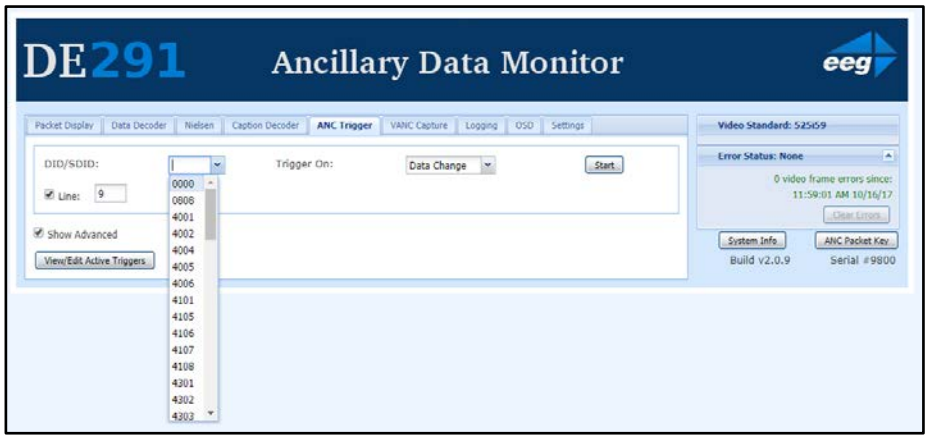
The default viewing option shows both the Caption Feed 1 and Caption Feed 2 displays, but either Caption Feed window can be hidden by clicking on the upwards arrow at the top right hand corner of the appropriate section. To expand the module, click the downwards arrow at the top right-hand corner.



5.5. ANC Trigger

The ANC Trigger tab allows you to create triggers made up of two parts: the ANC data of interest, and the behavior you would like to observe. The data type is selected using the DID/SDID value, and the trigger can be set on behaviors such as Present, Absent, Change, Data Change and line number. Setting triggers is a useful way to monitor incoming ANC data to check the frequency of events such as missing data. Using the web interface, triggers can be chosen and then monitored in a live–update pop-up window that is tied to your browser session, making the ANC analysis tool ideal for watching until an event occurs. To

record triggers that will be stored on the DE291 for detailed viewing or to view information about infrequently occurring errors, please see the next section on Logging.



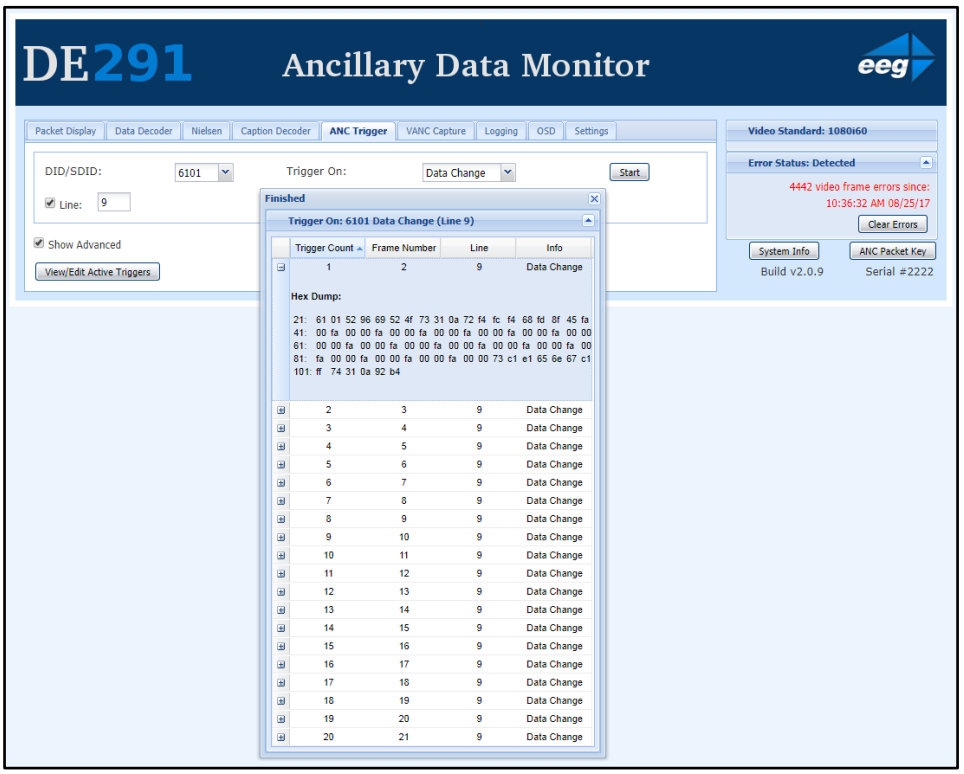
To set a trigger, select a DID/SDID value from the dropdown menu on the left and then choose a specific event type from the adjacent drop down menu. One of the following events can be chosen: “Present,” which triggers when a particular packet is present in the video stream, “Absent,” which triggers when a packet is not present in the video stream, “Change,” which triggers when the packet presence changes from being present to not present or vice versa, and “DataChange,” which triggers when the packet presence remains the same, but the data within the packet has changed. The events are evaluated on a per–field basis.

After creating an ANC trigger, click on the **Start** button to monitor the trigger activity. A pop–up window will appear with multiple columns. The text in the upper left corner of the pop–up window indicates whether the trigger is active or has completed.

If the trigger is set to go off when the packet is absent, then the pop–up window will display the Trigger Count column and the Frame Number that the packet was missing from. If the trigger event is set to go off when the packets are present, changed or the data has changed, the pop–up window will display the Trigger Count, the Frame Number that

the event has taken place in and the Line number in which the event happened.

To view the packets delivered at the trigger time, click the '**+**' button to the left of the trigger number. Regardless of the event type, the pop–up window will display up to twenty instances of the triggered event. To stop a trigger, click the 'x' button at the upper right corner of the pop–up window. To continue viewing current information about the trigger, re- set the trigger by repeating the instructions to create a trigger.

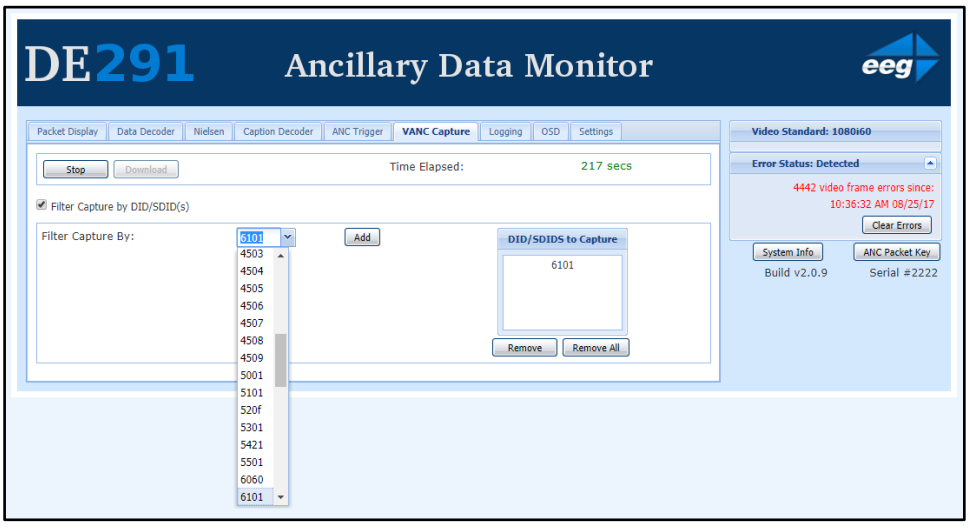


By clicking on the **View/Edit Active Triggers** button, the running trig- gers can be managed by viewing the triggers, removing specific triggers, or removing all triggers. This feature is useful in multi–user environments, as well as situations in which the DE291 has unexpectedly lost power. If the message "This trigger is already in use." occurs when attempting to set a trigger that does not appear to be in use, this feature can be used to check whether that trigger is in fact in use. If the trigger

is not being observed by any other user, it can be removed using the pop–up window that displays the active triggers in a list. To remove one trigger, click on the trigger in the Trigger List so that it is highlighted and then click **Remove** to remove the selected trigger. To remove all of the active triggers, click **Remove All**. To return to the main window without modifying the active triggers, click the 'x' at the top of the pop–up window.

5.6. VANC Capture

The VANC Capture tab provides a convenient way to capture real–time VANC data, with or without filtering, so that it can be downloaded and reviewed. To begin capturing all VANC data, click on the **Start** but- ton. The elapsed time is displayed in the upper right hand corner. To end the VANC capture, click on the **Stop** button. If only certain VANC data is of interest, click on the checkbox to the left of 'Filter Capture by DID/SDID(s)' to reveal the filter submenu.

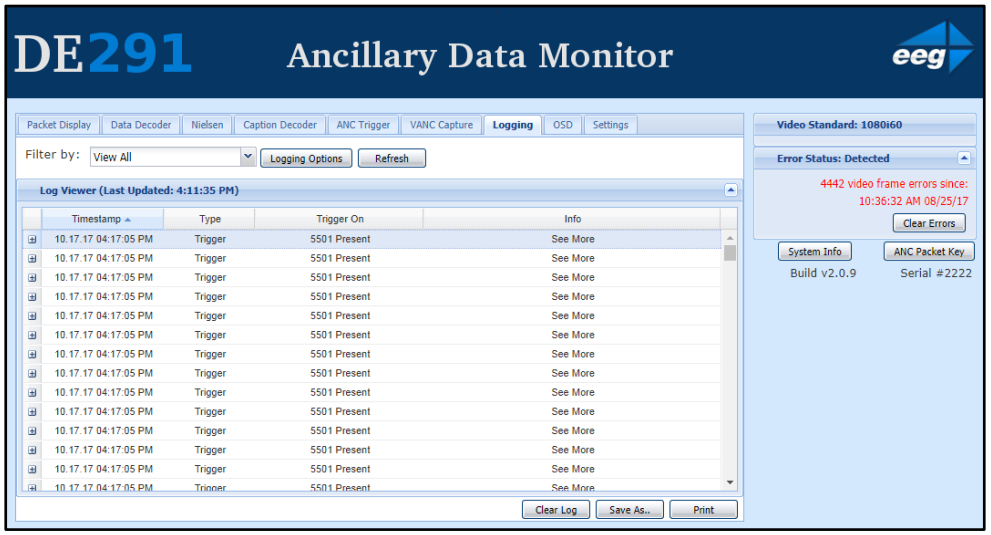


Using the dropdown menu on the left side of the submenu, choose the desired DID/SDID and click the **Add** button to the right of the dropdown

menu. The added value will appear in the 'DID/SDID to Capture' area on the right part of the screen. Repeat this process until all VANC data of interest is added to the list. To remove a filter item, highlight the item by selecting the DID/SDID value in the list and then click on the **Remove** button below the list. To clear all filters, click the **Remove All** button in the lower right hand corner. After selecting filters, start and stop the VANC capture process as previously specified. To save and view the captured VANC data as a binary dump, click on the **Download** button.

5.7. Logging

The Logging tab provides a customizable solution for gathering VANC data for in-depth analysis and debugging. Logging is ideal for checking the behavior of triggers over a longer time period, monitoring error messages, and for any situation in which a saved copy or printout for later reference is desired. Logs are saved in non-volatile storage on the DE291 box.



The VANC Analysis tools can record two types of behavior, Log Triggers

and Alarms. Log Triggers are similar to the normal triggers discussed in the previous section, but are intended for longer term use, when the user is not constantly watching the screen and waiting for a change. The Log Triggers operate only within the Logging tab, just as the normal triggers operate only within the VANC Triggers tab. Alarms are used to record the time and frame location of an error message. The Alarms report the content of the packet and are arranged in three categories in the **Logging Options** pop-up window.

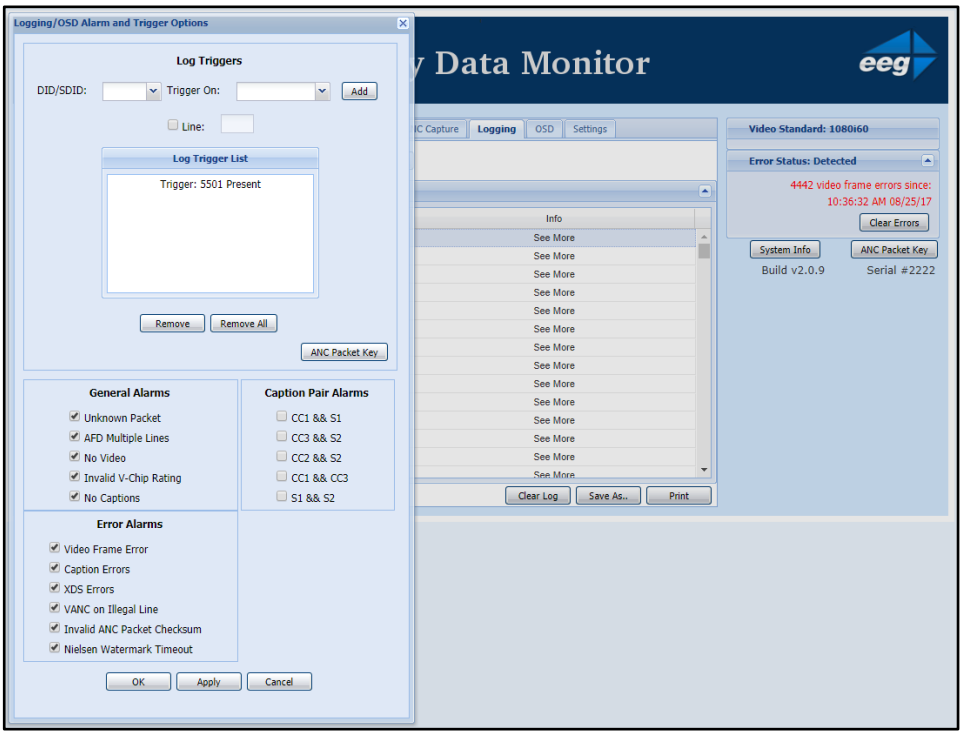
5.7.1 Log Viewer

The Logging tab displays stored information regarding triggers and alarms, allows the log to be printed or saved, and provides options for the information the log stores. The default log screen shows all alarms and triggers that appear in the Log Viewer. The events are sorted by the time at which they occurred and also contain information about the event type and when the event triggers, if applicable. To view more information about the Trigger or Alarm, click on the **'+'** button to the left of the the Trigger or Alarm of interest.

The Log Viewer display can be altered by using the "Filter By:" drop down menu to limit or expand which trigger or alarm types are being displayed. The displayed log can be updated by clicking the **Refresh** button, which is found at the upper right corner of the Logging module. To remove the current log information and start a new log, click the **Clear Log** button below the Log Viewer.

The current log can be saved or printed out to retain the information. Click on the **Save As** button to save a copy of the log as an HTML file to a specified location. It may take 10 to 15 seconds to create the downloadable log. To print a copy of the log, click on **Print** to launch a pop–up window with print options. The printable copy can be filtered by what is present in the log, much like the drop–down filter menu used for viewing the log. There is also an option to select the range of log entries printed, or the option to print all. After selecting the desired print options, click **OK** to choose a printer and print the log, or **Cancel**

to discard the print options and return to the main window of the log viewer.



5.7.2 Logging/OSD Alarm Settings

To begin monitoring and storing Log Triggers and Alarms, click on **Logging Options** which will bring up a window in which Triggers and Alarms can be assigned or removed. The pop–up window may take a few seconds to load. Log Triggers can be assigned in the top half of the pop–up window. Alarms can be selected in the lower half of the pop–up window by checking the desired boxes.

To set a Log Trigger, select a DID/SDID value from the dropdown menu on the left and then choose a specific event type from the adjacent drop down menu. There is also a checkbox that can be enabled for trig- gering on a selected line. One of the following events can be chosen: “Present,” which triggers when a particular packet is present in the video stream, “Absent,” which triggers when a packet is not present in the video stream, “Change,” when the packet presence changes from be-

ing present to not present or vice versa, and "DataChange," which triggers when the packet presence remains the same, but the data within the packet has changed. The events are evaluated on a per–field basis. After selecting a value for DID/SDID and Trigger On, click **Add** to begin logging occurrences of the Log Trigger.

To set any of the Alarms, click the box to the left of the desired Alarm. After selecting all Log Triggers and Alarms of interest, click **Apply** and then **OK** to begin logging the selected Log Triggers and Alarms and to return to the Log Viewer. To disregard the changes made, click **Cancel** to return to the Log Viewer.

The available alarms are grouped into three categories: General Alarms, Caption Pair Alarms and Error Alarms.

General Alarms

There are five alarms in the General Alarms category that can be used to get an overview of possible problems.

Alarm Name	Description
Unknown Packet	Sets an alarm to go off when a packet cannot be recognized by the DE291 as a known type.
AFD on Multiple Lines	Sets an alarm that goes off when there is more than one AFD packet in a single video field.
No Video	Sets an alarm that goes off when there is no video signal or the video cannot be displayed.
Invalid V-Chip Rating	Sets an alarm that goes off when the V-Chip rating is not present or is not valid.
No Captions	Sets an alarm that goes off when there is no 6101 VANC packet present.

Caption Pair Alarms

There are five alarms in the Caption Pair Alarms category that can be used to detect when certain combinations of caption channels are active.

For each selected alarm, the two channels are checked over a 10 second period for data presence. If data is present in one channel but not the other, the alarm goes off.

Alarm Name	Description
CC1 && S1	Sets an alarm that goes off when there is a mismatch between the presence of primary language SD captions and HD captions.
CC3 && S2	Sets an alarm that goes off when there is a mismatch between the presence of secondary language SD captions and HD captions.
CC2 && S2	Sets an alarm that goes off when there is a mismatch between the presence of secondary language SD captions and HD captions.
CC1 && CC3	Sets an alarm that goes off when there is a mismatch between the presence of primary and secondary language SD captioning.
S1 && S2	Sets an alarm that goes off when there is a mismatch between the presence of primary and secondary language HD captioning.

Error Alarms

There are three alarms in the Error Alarms category that can be used for specific troubleshooting.

Alarm Name	Description
Video Frame Error	Sets an alarm that goes off when there is an error involving the video signal.
Caption Error	Sets an alarm that goes off when a caption error is detected. A complete list of caption errors can be found after this table.
XDS Error	Sets an alarm that goes off when there is an error involving the Extended Data Services packets.
VANC on Illegal Line	Sets an alarm that goes off when there is an error involving VANC on a different line than what's depicted in the SMPTE specification
Invalid ANC Packet Checksum	Sets an alarm that goes off when an invalid ANC packet checksum is detected.

The following table lists each Caption Error and provides a short description.

Caption Error	Description
CDP header not found	The body of a VANC packet did not begin with 0x96 0x69, which marks the start of a CDP.
CDP footer not found	The CDP footer section wasn't found. Since the footer includes the checksum, the decoder will not process such packets.
CDP sections out of order	The CDP should contain the following sections, in this order: a header, an optional timecode section, an optional caption data section, an optional caption service info section, and a footer. If one or more of those was out of order, you'll see this message.
CDP sequence mismatch	The CDP header contains a 16-bit sequence counter which should increment by one each frame. If you see this, the sequence numbers jumped between two VANC packets.
CDP header/footer sequence mismatch	The CDP footer contains a copy of the header sequence counter; in this case, they were not identical.

Caption Error	Description
CDP checksum error	The CDP footer contains a checksum for the entire CDP; if you see this, it didn't match what the decoder expected.
CDP length mismatch	The CDP header contains an 8-bit length count; if you see this, the length didn't match the number of bytes actually recovered.
CDP frame rate mis-match	The frame rate indicated by the CDP header doesn't match the video. For example, you'll see this if you capture VANC captions in 720p and play them back in 1080i.
Invalid CDP frame rate	The CDP frame rate was something nonsensi-cal; for example, zero.
Wrong number of CC constructs	The CDP count of caption data pairs didn't match what was actually recovered.
No line 21 captions	No 608 data was found.
Bad line 21 alternation	In 720p, the 608 data are supposed to alter-nate between field 1 and field 2; this means that two consecutive frames of one or the other went by.
No line 21 field X	In 1080i, each frame is supposed to have field 1 and field 2 data for 608.
Line 21 not first in packet	The 608 bytes are supposed to come first in the caption data section of the CDP, before any 708 data.
Bad DTV triplet	In the CDP caption data section, 708 data are split into pairs and marked with 0xFF(start of a caption channel packet) or 0xFE(next part of a CCP). 608 data are marked with 0xFC(field 1) or 0xFD(field 2). The rest of the caption data section should be filled with pairs marked 0xF8, 0xF9, 0xFA or 0xFB. If a DTV triplet doesn't begin with any of those markers, this message will appear; it might mean the DTV packets are misaligned.

Caption Error	Description
Unexpected DTVCC continue	DTV pairs marked 0xFE should only appear after an 0xFF pair. (See "Bad DTV triplet" for definitions.)
Valid DTV data after filler	If a 708 service block doesn't fill the caption data section, the remaining bytes should be marked as filler.
Caption channel packet sequence error	Caption channel packets have a two-bit sequence counter; this means that there was a skip. This will usually happen at the same time as CDP sequence mismatches; it's unlikely that one would skip and the other wouldn't.
Truncated caption channel packet	Caption channel packets aren't allowed to span multiple VANC packets.
Invalid null service block	A service block had service number zero but non-zero length.
Multi-packet service block	A service block was too long to fit in one VANC packet.
Not defining window X: too many rows	The FCC requires that decoders be capable of displaying at least four rows. This effectively means that any captioning with more than four rows is not guaranteed to work on all decoders. This message can be triggered by a single window with more than four rows or multiple windows whose rows add up to more than four.
Caption text overflow	The caption text can't fit in the current row; some of it was dropped. This may happen if certain commands(e.g., create a new window, move to the next row) are lost.

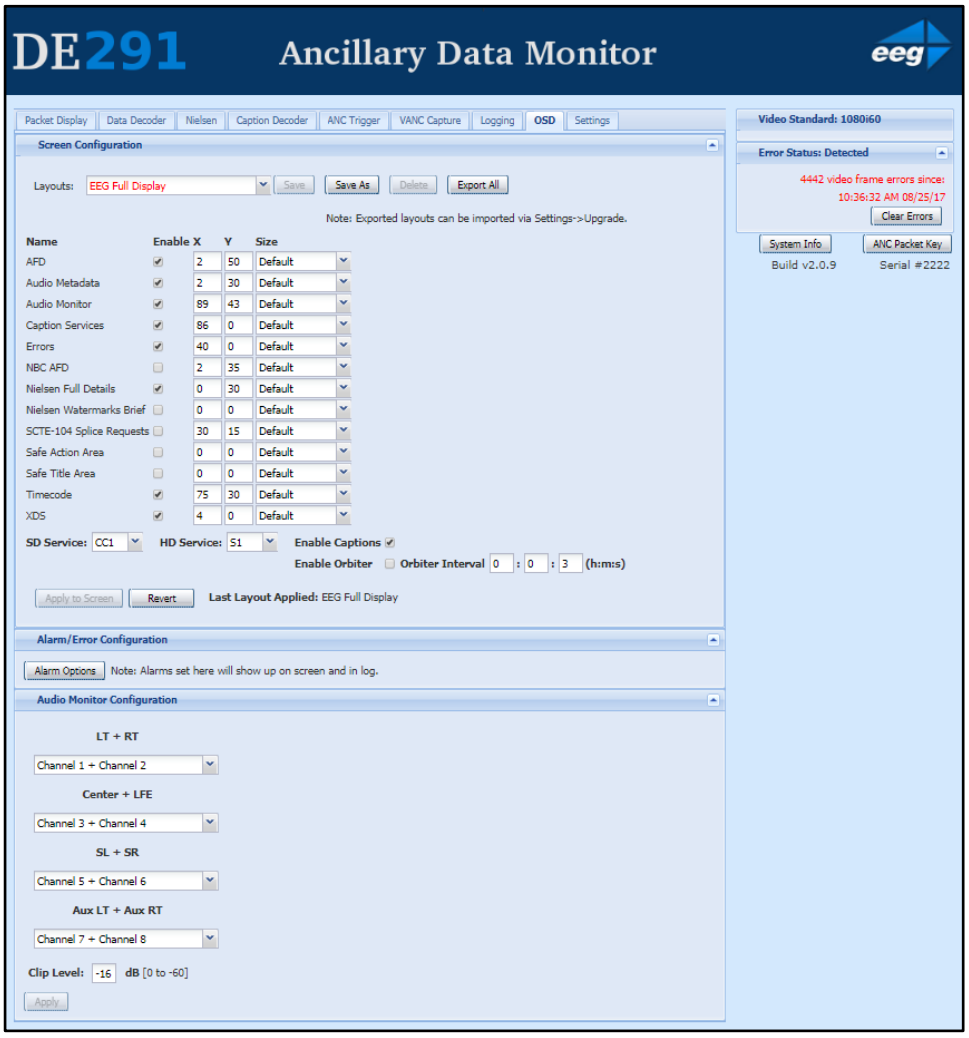
5.8 OSD

The OSD tab allows for a fully customizable screen configuration using the tools on the upper part of the OSD tab and a user specified audio monitor configuration on the lower half of the screen.

5.8.1 Screen Configuration

The upper part of the OSD tab provides a tool for customizing the screen configuration by allowing the user to choose the presence and screen location of Caption Services, XDS data, AFD data, Audio Monitor, Audio Metadata and Errors/Alarms. The DE291 comes pre-loaded with several default layouts. To apply a default layout, use the pulldown menu next to Layouts to view the available options and choose the desired layout. If you are satisfied with the factory layout, click on the **Apply to Screen** button at the bottom of the Screen Configuration section to load the selected layout.

To manually configure the screen there is a check box to the right of each data type's name that can be checked in order to display the data, or unchecked to hide the data. To the right of the checkbox are the 'X' and 'Y' fields that control the horizontal and vertical positioning of the data, respectively. Both fields have a range of 0–100, with X=50, Y=50 signifying the center of the screen.



The text size can also be specified for each data type by using the drop-down list in the size column to select the desired size. Below the check-boxes is the caption enabling section where you can choose an SD and HD service using the dropdown lists, as well as using the rightmost checkbox to enable or disable all captions. Once you are satisfied with the newly configured layout, click **Apply to Screen** to put the specified screen configuration into effect, or **Revert** to discard any changes made and return to the last applied settings. The most recent layout applied to the screen is shown to the right of the **Revert** button for reference.

5.8.2 Alarm/Error Configuration

The middle section of the OSD tab allows the user to set the alarms and errors for OSD display. An explanation of setting these alarms and errors can be found in Section 5.6.2.

Note: Alarms set in this manner will show up on the OSD and in log.

5.8.3 Audio Monitor Configuration

The lower section of the OSD tab allows the user to customize the mapping of audio channels to the audio monitor. Using the four dropdown lists, you can select which audio channel pair you would like to map to which audio monitor pair. Below these dropdown lists you can specify a clip level in decibels in the range of 0 to -60 dB. To put changes into effect, click the **Apply** button at the bottom of the screen.

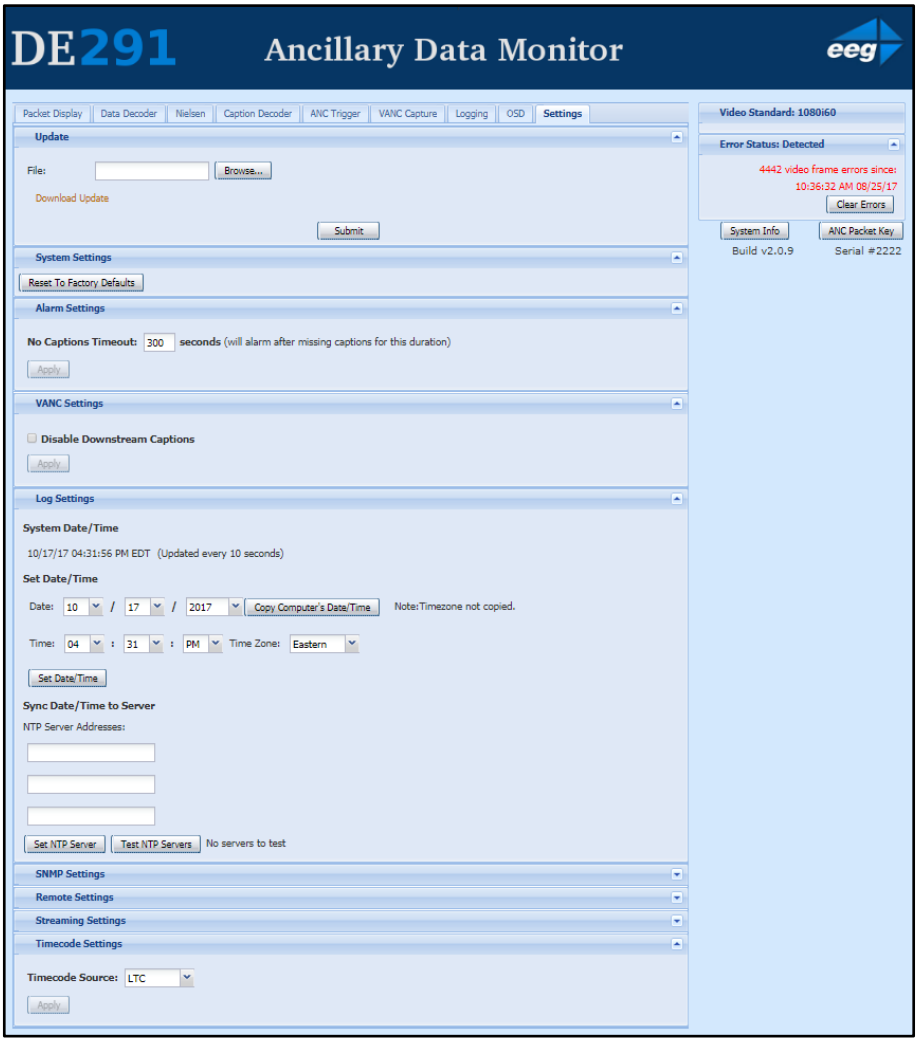
5.9 Settings

The Settings tab contains several subsections that allow the user to customize various aspects of the 291 website and screen configuration.

5.9.1 Upgrade

The Upgrade subsection provides an easily accessible way to update the firmware that comes pre-installed on the DE291. The DE291 can be upgraded through the USB front panel as discussed in the System Setup Menu section or the upgrade can be performed through the website. Begin by downloading the most recent firmware update file from the EEG website or from the 'Download DE291 Upgrade' link on the website and saving it to a location on your computer. After downloading the firmware upgrade, click on the **Browse** button to the right of the File

field, select the EEG firmware update and then click **Submit** to update the firmware.



5.9.2 System Settings

The Systems Settings subsection allows the user to restore the factory defaults on the box by clicking the **Reset To Factory Defaults** button.

5.9.3 Alarm Settings

The Alarm Settings subsection allows the user to set a value in seconds that captions can be missing for before a GPIO alarm is triggered on pin 1. To change this value, enter a new value into the text field and click the **Apply** button to update the No Captions Timeout. If you would like to see this alarm on the logging section of the website you must set the 'No Captions' alarm by going to the Logging tab, clicking on the **Logging Options** button and selecting the 'No Captions' checkbox.

5.9.4 VANC Settings

The VANC Settings subsection provides a way to enable or disable pass- ing VANC data through the box on the outputs. This option will prevent other decoders from double decoding the VANC on the video feed after the DE291.

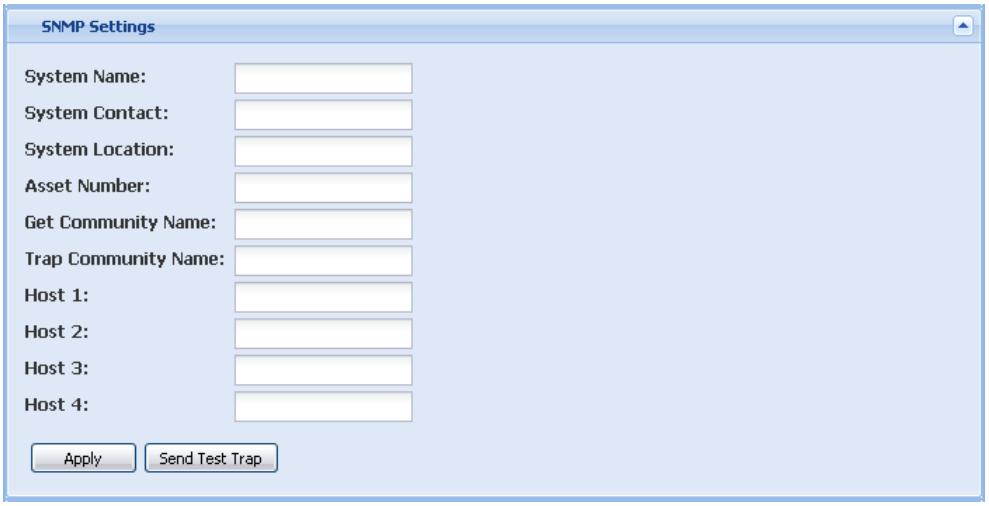
5.9.5 Log Settings

The lower part of the Settings tab is the Log Settings subsection, which provides a way to set the date, time and time zone for accurate trigger and alarm logging. The current date, time, and timezone can be seen to the right of the **Set Date/Time** button. To change the Date/Time, simply use the dropdown menus to select the month, day and year and then set the local time and time zone that you are in. Alternatively, you can set the date and time by clicking on the **Copy Computer's Date/Time** button, which uses the date and time from your current machine to set the date and time. When using this option be aware that the timezone is not copied along with the date and time information. To confirm the settings, click the **Set Date/Time** button at the bottom of the Log Settings section. The triggers and alarms will now have the correct timestamp when viewed in the Logging module.

5.9.6 SNMP Settings

The DE291 can be configured to send SNMP traps. The following table provides the SNMP settings fields as well as a description of each field.

Setting	Description
System Name	Name identifier for the system.
System Contact	Contact identifier for the system.
System Location	Location identifier for the system.
Asset Number	Asset number identifier for the system.
Get Community Name	Determines which SNMP Get requests are responded to.
Trap Community Name	Determines the SNMP community string that traps will be sent with.
Host 1-4	Host systems that will receive the traps.



5.9.7 Remote Settings

The Remote Settings subsection will be used in future development.

5.9.8 Streaming Settings

The DE291 can pass upstream caption data through to any YouTube, Wowza, or UVault live stream when supplied with a stream URL and associated credentials in this section.

5.9.9 Timecode Settings

Controls the timecode source to be displayed in the timecode section of the on-screen display output.

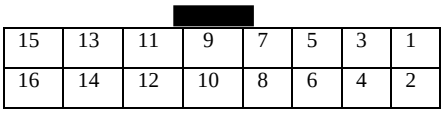
Appendices

Appendix A: GPI/GPO

The GPIO pins are located on the two 16-pin IDC connectors on the rear panel of the DE291. The top connector is used for the GPI switches and the bottom is used for the GPO switches, with the pins numbered in the following manner on each connector:

A1. GPI

The GPIs use the upper 16-pin connector, which mates to a female IDC-16 connector. The pin assignments are given in the table below.



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

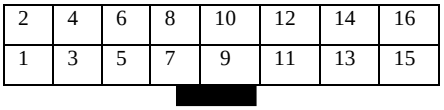
Pins	Input
1, 3, 5, 7, 9, 11, 13, 15	Ground
2	GPI-A
4	GPI-B
6	GPI-C
8	GPI-D
10	GPI-E
12	GPI-F
14	GPI-G
16	GPI-H

A1.1. Layout Scrolling

Pins 1 & 2 and 3 & 4 can be used for layout scrolling to change the current active layout. Pin 2 (GPI-A) scrolls "left" or to the previous layout. Pin 4 (GPI-B) scrolls "right" or to the next layout.

A2. GPO

The GPOs use the lower 16-pin connector, which mates to a female IDC-16 connector. The pin assignments are given in the table below:



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

A2.1. Caption Presence Alarm

The GPO Output 1 is used as an alarm for missing captions. The missing captions time timeout can be set in the middle section of the Settings tab on the website. Pins 15 and 16 are switch contacts for an external alarm to be connected or built

Appendix B: SNMP Traps

SNMP traps are sent for all system alarms (as shown in the OSD Error Monitor), as well for each received SCTE104 trigger.

Appendix C: Video/Connector Specifications

HD–SDI Video Inputs	
Number of Inputs	1 (Program In relay bypass protected)
Connector	BNC per IEC 169–8
Format	3G (SMPTE 424M), HD (SMPTE 292M), and SD (SMPTE 259M and 344M)
Input Level	800 mV p–p ± 10%
Input Impedance	75 Ohm
Equalization	Automatic up to 100m @ 1.5Gb/s with Belden 1694 or equivalent
HD–SDI Video Outputs	
Number of Outputs	3 (Program Out 1 relay bypass protected)
Connector	BNC per IEC 169–8
Output Level	800 mV p–p ± 10%
Output Impedance	75 Ohm
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	Three serial DB9 female connectors
GPI/GPO	Two 16–pin IDC male ports
Serial Data Format	(TEST, for factory use only)
USB Ports	1 located on the front panel 4 located in the rear
LAN	RJ45 connector, 10/100 Base T TCP/IP
Electrical	
Power	115/230V AC 50/60Hz
Power Consumption	< 20 W
Physical	
Dimensions	19” rack mount x 1RU x 16.5” deep

Appendix D: Binary ANC Dump Data Format

To view the ANC capture that you have saved to your USB stick, first open the file in a hex editor and then view the data format chart below.

Description	**Size**
DID	1 byte
SDID	1 byte
Data Count	1 byte
Data	specified by Data Count
Checksum	1 byte
Frame Number	1 byte
ANC Line Number	2 bytes

The ANC Line Number is little endian. If the most significant bit is set, the packet came from HANC; if not it came from VANC.

The Frame Number is a 1 byte counter generated internally to the DE291 that will allow you to determine frame barriers or gaps when looking at series of packets.

Appendix E: Supported Video Signal Inputs

SD	525i	59.94
SD	625i	50
HD	720p	50
HD	720p	59.94
HD	720p	60
HD	1035i	59.94
HD	1035i	60
HD	1080i	50
HD	1080i	59.94
HD	1080i	60
HD	1080psf	23.98
HD	1080psf	24
HD	1080psf	25
HD	1080psf	29.97
HD	1080p	23.98
HD	1080p	24
HD	1080p	25
HD	1080p	29.97
3G	1080p	30
3G	1080P	60