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# CCE-100

Closed Caption Encoder

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# INSTRUCTION MANUAL



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## Important Safety Instructions

- 1) Read these instructions.
- 2) Keep these instructions.
- 3) Heed all warnings.
- 4) Follow all instructions.
- 5) Do not use this apparatus near water.
- 6) Clean only with a dry cloth.
- 7) Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- 8) Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- 9) Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- 10) Only use attachments/accessories specified by the manufacturer.
- 11) Unplug this apparatus during lightning storms or when unused for long periods of time.
- 12) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
- 13) **WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE.**
- 14) **DO NOT EXPOSE TO DRIPPING OR SPLASHING. DO NOT PLACE OBJECTS FILLED WITH LIQUID, SUCH AS VASES, ON THIS APPARATUS.**

### FCC Notice:

This device complies with part 15 of the FCC rules. Operation is subject to the following conditions:

1. This device may not cause harmful interference.
2. This device must accept interference received, including interference that may cause undesired operation.
3. Changes or modifications to this device that are not expressly approved by USL, Inc. could void your authority to operate this device.

## Introduction

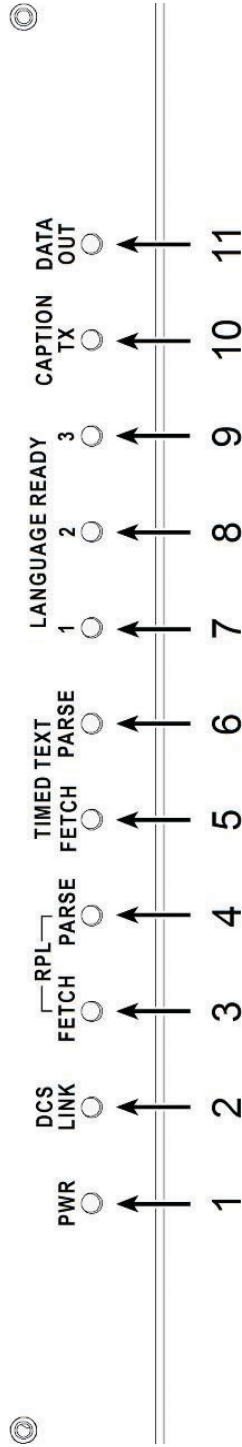
The CCE-100 is a SMPTE compliant Auxiliary Content Server (ACS) that interfaces a Digital Cinema Server to a variety of personal caption displays including Rear Window®, IR-based receivers, and Wi-Fi based receivers. A Rear Window® display may be plugged directly in to the CCE-100. The RF output of the CCE-100 can drive IR panels such as the USL IRC-28. With an optional Wi-Fi module, the CCE-100 can provide captions to Wi-Fi devices that include a web browser.

## Introduction to SMPTE Captioning

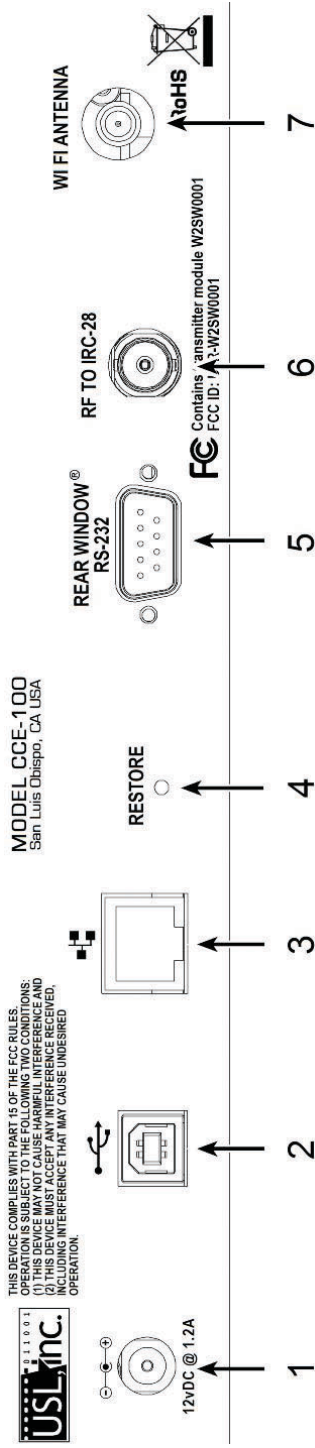
The Society of Motion Picture and Television Engineers has established several standards that are used to provide closed captioning in digital cinema. These include:

- **SMPTE 428-7**, which describes the XML (extensible markup language) structure of “timed text” files that are used for subtitles and captions.
- **SMPTE 428-10**, which constrains SMPTE 428-7 for closed captions. These constraints limit the timed text file such that the captions can be displayed on commonly used displays. These constraints deal with the number of lines in a caption, the number of characters in a line, disallows multiple captions at the same time, etc.
- **SMPTE 430-10**, which describes the Auxiliary Content Synchronization Protocol. This protocol provides synchronization information to Auxiliary Content Servers (such as the CCE-100) that handle captioning, seat shakers, lighting strobes, and other auxiliary content that may be played back in synchronization with the projected image. The CCE-100 initiates a connection over Ethernet to the Digital Cinema Server (DCS). The DCS then tells the CCE-100 where various files required for caption playback are located, tells the CCE-100 when playback is started and stopped, and provides timeline information to the CCE-100 to synchronize the captions with the audio and image.
- **SMPTE 430-11**, which describes the Auxiliary Content Resource Presentation List. This file, created by the DCS, contains a list of the auxiliary resources (such as captions), the time in playout this resource is to be used, and the language of the resource. Using the Auxiliary Content Synchronization Protocol, the DCS tells the CCE-100 where this file is located. The CCE-100 fetches and parses this file. The CCE-100 then uses the information in this file to determine the location, language, and time of use of each of the caption (timed text) files. The CCE-100 then fetches and parses the timed text files and sends them to the displays at the proper time.

**USL, Inc.** MODEL CCE-100  
CLOSED CAPTION ENCODER



1. PWR. Lit when power is applied and the processor is running. Flickers during firmware restore.
2. DCS LINK. Lit when CCE-100 connects to the Digital Cinema Server (DCS) using the Auxiliary Content Synchronization Protocol.
3. RPL FETCH. Lit when the CCE-100 is fetching an Auxiliary Resource Presentation List (RPL) file from the DCS.
4. RPL PARSE. Lit when the CCE-100 is parsing data from the RPL.
5. TIMED TEXT FETCH. Lit when the CCE-100 is fetching timed text (caption text) from the DCS.
6. TIMED TEXT PARSE. Lit when the CCE-100 is parsing a timed text file and preparing captions for display.
7. LANGUAGE READY. Lit when the CCE-100 is parsing a timed text file and preparing captions for display. Not all content has three languages, so all three LEDs may not light.
8. CAPTION TX. Toggles when the next caption is transmitted to the display device.
9. DATA OUT. Lit when the DCS has sent the "set output mode enabled" command over the Auxiliary Content Synchronization Protocol link. The DCS has started playing content that includes auxiliary content such as captions.



1. Power supply, 12VDC, 1.2A.
2. USB data duplicates RS232. Used for debug and configuration.
3. Ethernet. Connect to Digital Cinema Server control network.
4. Restore button. Use a paperclip to press button during powerup to restore original firmware and default configuration.
5. RS232 port. Connect Rear Window® display or use null modem cable to connect a terminal for debug and configuration.
6. RF to IRC-28. If an IR panel is used to transmit captions, run a 75 ohm coaxial cable from this connector to the RF IN connector on an IRC-28.
7. Wi-Fi antenna. If the optional Wi-Fi module is installed, connect an antenna in the auditorium to this connector to provide captions to Wi-Fi devices.



## System Installation

1. Choose a location for the CCE-100. The CCE-100 may be rack mounted if the optional rack mount adapter was supplied. The CCE-100 needs access to the digital cinema control network, power, and cables to drive the chosen display. Display cables may be:
  1. RS232 cable with 9 pin D connector to Rear Window® display.
  2. 75 ohm coax with BNC connectors to carry captioning RF to an IR panel in the auditorium.
  3. Coaxial cable to a Wi-Fi antenna in the auditorium.
2. Apply power and configure the system, as described below.
3. Connect the CCE-100 to the digital cinema control network and the display device (cable to Rear Window® display, cable to IR panel, cable to Wi-Fi antenna).

## System Configuration

The initial configuration of the CCE-100 can be done using a web interface, an RS-232 interface, or a USB interface.

The screenshot shows the 'USL Caption Encoder v100517 Configuration Page' in a Mozilla Firefox browser window. The page is divided into several sections for configuration:

- DCS Configuration:** Includes fields for DCS IP Address (192.168.1.151), Timesline Offset (0), DCS Caption Protocol (SMPT), and RS232 Output (No RS232 output on IRC-28C).
- Caption Output Configuration:** Includes fields for Caption Carrier (On Carrier to DCS), SMPT Closed, and Delay before Offline Text (6055).
- Offline Text:** Includes a text input field for the text to be displayed and a 'Save DCS output and Language Configuration' button.
- Caption Language Priority:** A list of languages with dropdown menus for selection, including English (United States), Estonian, Finnish, French, French (Standard), French (Belgium), French (Canada), French (France), and Japanese.
- Auditorium Data:** Includes fields for Theater Name, Theater Number, Screen Number, AES Source, Processor Type, HJ System, and VITN System.
- Network Configuration:** Includes fields for MAC Address, Host Name, IP Address, Gateway, Subnet Mask, Primary DNS, and Secondary DNS.
- Change Password:** A section for changing the configuration page password, with fields for the current password and a 'Save New Password' button.

## Using DHCP and NETBIOS

If you have a network with a DHCP server, you should be able to plug the CCE-100 in to the network. Then, open a web browser and type “captionencoder” in the address field. You should see the default caption page.

## Using IP Autoconfiguration and NETBIOS

If no network with a DHCP server is available, connect a computer to the CCE-100 using a network “crossover” cable. Some recent computers can use a standard “straight through” cable, but a crossover cable will always work. Many computers support “IP Autoconfiguration” where the computer chooses an IP address in the 169.254.x.y range. With such computers, once again, opening a web browser and typing “captionencoder” in the address field will connect you to the CCE-100 unit and show the default caption page.

## Using Default IP Address

If your computer does not support IP Autoconfiguration or NETBIOS, you should configure your network connection to be in the same subnet as the CCE-100, and set its IP address to something other than that of the CCE-100. For example, you may set your computer to have an IP address of 169.254.1.123 and a subnet mask of 255.255.0.0. Then, type the default CCE-100 IP address (169.254.1.1) in the address field of your web browser. You should see the default caption page.

## Web Interface Configuration

The CCE-100 units are shipped with a Dynamic Host Configuration Protocol client enabled. Further, the CCE-100 supports the use of NETBIOS, so it is possible to connect to the device by name instead of by IP address

## Configuring Using RS232

The CCE-100 has a command interpreter on the RS232 and USB ports. The RS232 port is wired as a DCE port (Data Communications Equipment) so a Rear Window® display can be plugged in directly. To connect a computer to the CCE-100 RS232 port, a null modem cable is required. This cable has a female DE-9 connector on each end. To act as a null modem, swap pins 2 and 3, 4 and 6, 7 and 8. Pin 5 (signal ground) should be connected to pin 5 at both ends. Use a terminal program (such as miniterm, Teraterm, or Hyperterminal) to connect to the CCE-100. The terminal program should be set to 9.6kbps, 8N1, with no handshake. Pressing the return key should cause a carriage return and line feed to be echoed by the CCE-100. See the Command Interpreter section for more details on configuring the CCE-100 using RS232.

## Configuring Using USB

Because the RS232 port is becoming rare, the CCE-100 includes a USB port that can be used for configuration and viewing log data as the system runs. To use the USB port, you need to install a “Virtual Comm Port” driver, available at [www.uslinc.com/products-sound-CCE100.html](http://www.uslinc.com/products-sound-CCE100.html) . (Note, most Linux distributions already include an appropriate driver). Once the Virtual Comm Port is installed, connecting a USB cable from the CCE-100 to the host computer should result in a new com port being added to the Device Manager. Select this com port in your terminal program and set the terminal to communicate at 9.6kbps, 8N1 with no handshake.

## Configuring the CCE-100 Via Web

Once the default caption page is visible on a web browser, add “/status.html” to the end of the URL (ie, <http://captionencoder/status.html>). The last 10 log entries will be visible. You can then select the configuration page (link at top of status page) The system will ask for a user name and password. The user name is “admin” and the default password is “ultra” (both lower case). You can change the password on the configuration page.

## Captioning Configuration

1. On the configuration web page, set the DCS IP address. This is the address the CCE-100 will use to get data from the digital cinema server.
2. If the CCE-100 is driving IR panels, select when the IR data carrier should be brought up. "On connect to DCS" will extend the life of the IR panel and reduce power consumption.
3. Set the use of the RS232 port. Different types of Rear Window<sup>®</sup> displays are supported. See "Caption Displays," below. If an internal Wi-Fi module was provided, the RS232 use should be set to use this module. The RS232 port may also be used to watch logging information as a help in debugging the system.
4. Set the timeline offset as required. Normally this is set to zero, but it can be adjusted as required to synchronize the captions with the audio and image as required.
5. Set the offline time. When captioned content is not playing, the CCE-100 transmits offline text to the display. The digital cinema server may, however, tell the CCE-100 that content has stopped, then started again, between content elements, such as between trailers. To avoid flashing the offline text on to the screen, you can configure how long the content has to be stopped before the offline text is displayed.
6. Set the offline text. This text is displayed when captioned content is not playing. You might use some sort of welcome message (Welcome to XYZ Cinemas). Text can be up to three lines with up to 32 characters per line.
7. Select language priorities. As discussed above, the Auxiliary Resource Presentation List includes the language of each resource. The CCE-100 supports the display of up to three languages on IR or Wi-Fi receivers. A single language is supported on Rear Window<sup>®</sup> displays. The CCE-100 searches the Auxiliary Resource Presentation List for the languages in the language priority list. If the first language in the priority list is not found, the Auxiliary Resource Presentation List is searched for the next language, etc. Languages are assigned to IR data streams and web streams according to priorities selected here. The first language found is assigned to stream 0 (language 1). Do NOT include the same language in more than one priority position. If the Auxiliary Resource Presentation List does not include language attributes for the caption files, the captions will be sent to stream 0. The Rear Window<sup>®</sup> display is always driven by captions on stream 0.
8. Once caption configuration settings have been made, click on the save button in the bottom of that field to save the settings.

## Network Configuration Via Web

On the configuration web page, disable DHCP, then set the caption encoder IP address, subnet mask, and gateway. The DNS fields are not currently used and may be left as is. Click “Save IP Config and Reboot.” to save these values. After the CCE-100 reboots, it should be visible at the new IP address.

## Finding The Box

At times, it can be difficult to determine the IP address of the CCE-100. You can use the Ethernet Discoverer at [www.uslinc.com/products-sound-CCE100.html](http://www.uslinc.com/products-sound-CCE100.html) to determine the IP address of the CCE-100. Clicking on the text line for the caption encoder in the Ethernet Discoverer window will open a web browser pointing to that IP address. If the IP address is on the same subnet as your computer, you should see the opening page of the caption encoder.

## Command Interpreter

Several commands are available over USB and RS232. All commands must be lower case. Parameters to commands are separated by spaces. “Dotted decimal” parameters are input as separate decimal numbers separated by spaces. If no parameters are given, the current setting is returned. Sample output is below:

```
>picver
091002
>ip 192 168 1 158

>ip
192 168 1 158
>mask 255 255 255 0

>mask
255 255 255 0
>gateway 192 168 1 1

>gateway
192 168 1 1
>dcsip 192 168 1 151

>dcsip
192.168.1.151
>
```

## Front Panel LEDs

The CCE-100 includes front panel LEDs that show the system status. As expected, the Power LED is lit when the system has power. The DCS Link LED is lit when the CCE-100 has made a Content Synchronization Protocol connection to the DCS and has received the required announce message. The RPL and Timed Text Fetch and Parse LEDs show the progress of the system as it acquires the required files from the DCS. When data is available for a language, the corresponding LED lights. The CCE-100 tells the DCS that it is ready to start playback when all assigned languages have data ready for transmission. If a movie only has captions for one language, the DCS is told that the CCE-100 is ready when language 1 (stream 0) is ready. The Data Out LED is lit when the DCS sets the output mode to enabled. This indicates that the DCS has started playback. As captions are transmitted, the Caption TX LED will toggle.

## Rear Panel Restore Button

A paper clip can be used to depress the restore button behind the rear panel. Holding this button down during power up results in the factory installed firmware to be restored and the default configuration to be restored.

## Caption Displays

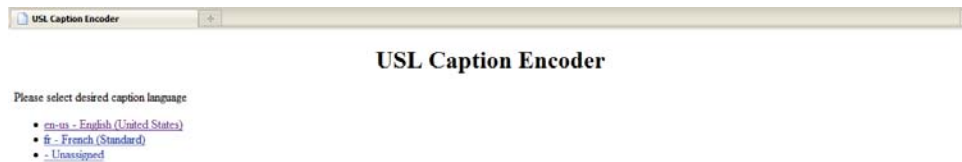
If the CCE-100 is configured to drive a Rear Window display<sup>®</sup> (see the CCE-100 configuration page), the Rear Window<sup>®</sup> display can be plugged in to the RS232 jack on the rear panel of the CCE-100. After changing the RS232 port configuration (and saving it), the CCE-100 should be powered down and back up to reinitialize the port. Three options are available for Rear Window<sup>®</sup> displays. These are:

- RearWindow32x3 - Standard Rear Window<sup>®</sup> display that has 32 characters per line and three lines. Text is sent in reverse order.
- RearWindow32x2 - Standard Rear Window<sup>®</sup> display that has 32 characters per line and two lines. Text is sent in reverse order.
- RearWindowDebug - Text is sent in forward order and line 3 contains the current timeline (frames), the time in for this caption, and the time out for this caption. When no caption is to be displayed, the third line shows "CLR: timeline TimeIn TimeOut". The TimeIn and TimeOut are the times for the next caption to be displayed. The Rear Window<sup>®</sup> display can be set to display forward text by powering it up with the bottom switch on the right side of the display up. Normally, all switches are down for reverse text display.

If the CCE-100 is to drive an IR panel, connect a 75 ohm coaxial cable (RG-59/U or similar) from the BNC jack on the CCE-100 to the RF IN jack on an IRC-28 emitter panel. Note that the IRC-23 emitter cannot be used with the CCE-100 since it cannot transmit an external RF source and the internal sources (audio channels) simultaneously. On the configuration page, set the IR caption carrier to “On Connect to DCS” or “Always ON” as desired.

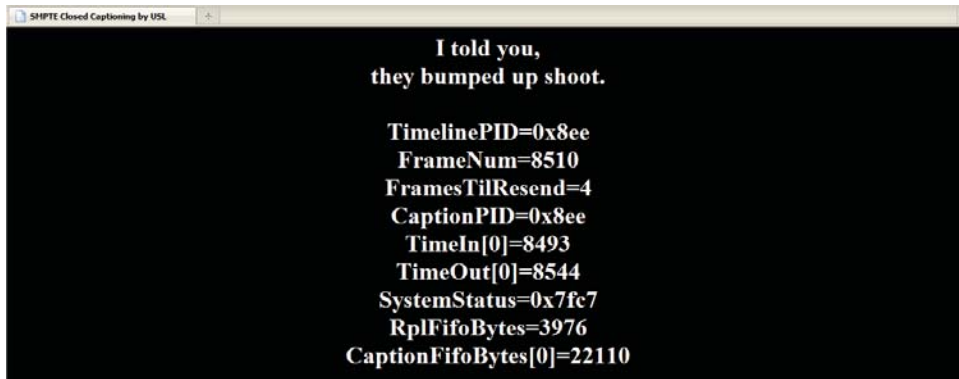
## Main Screen

The main screen appears when a web browser on the digital cinema network is directed to retrieve the default page from the CCE-100. The URL is just the IP address of the device. The main screen shows what a caption user would see on a Wi-Fi caption receiver. Up to three languages are listed. Clicking on one of these brings up captions for that language. If the content does not have three languages, fewer languages will be listed. If no languages were provided in the RPL, only the “default” language will be listed. This page can be used during system test to see what a user would see.



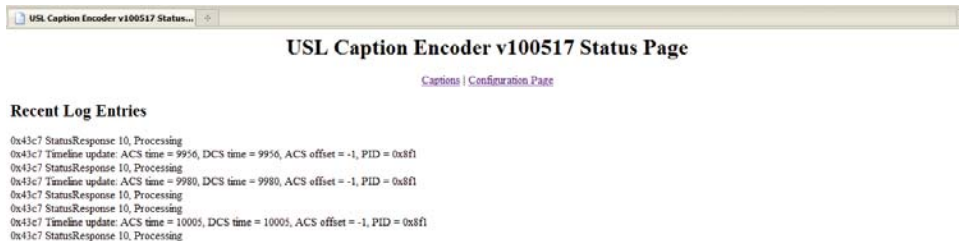
## Caption Pages

Clicking a link to a language on the main page takes you to a caption page for that language. A typical URL for a caption page is `http://192.168.3.200/captions.html?language=0` where the language can be 0, 1, or 2. In addition, the caption page can display debug information by following the URL with “&debug=1” (for example, “`http://192.168.3.200/captions.html?language=0&debug=1`”). Along with captions, the page shows the Playout ID (PID) delivered with the timeline message, which indicates what is currently playing, the PID for the next caption to display, which should be either the current timeline PID or a future one, the current frame number, the time in and time out of the next (or current) caption (in frames), a system status word to help in debug, and how much data is stored in the RPL and caption buffers.



## Status Page

A URL like `http://192.168.3.200/status.html` brings up the system status page. This shows the last 10 system events. Communications between the DCS and the CCE-100 is reported along with file fetches, parsing, etc.







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