Model HD9084
HD/SD DTV Caption Encoder

Instruction Manual

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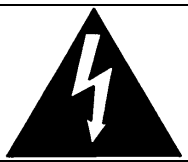
IMPORTANT SAFETY INSTRUCTIONS

	The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated “Dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.
	The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (Servicing) instructions in the literature accompanying the product.

- Read and keep these instructions
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- 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.

WARNING TO REDUCE THE RISK OF FIRE OR ELECTRIC – SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE
WARNING DO NOT EXPOSE THIS EQUIPMENT TO DRIPPING OR SPLASHING AND ENSURE THAT NO OBJECTS FILLED WITH LIQUIDS, SUCH AS VASES, ARE PLACED ON THE EQUIPMENT
WARNING TO COMPLETELY DISCONNECT THIS EQUIPMENT FROM THE AC MAINS, DISCONNECT THE POWER SUPPLY CORD PLUG FROM THE AC RECEPTACLE
WARNING THE MAINS PLUG OF THE POWER SUPPLY CORD SHALL REMAIN READILY OPERABLE

INFORMATION TO USERS IN EUROPE

NOTE

This equipment with the CE marking complies with bother the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European standards:

- EN60065 Product Safety
- EN55103-1 Electromagnetic Interference Class A (Emission)
- EN55103-2 Electromagnetic Susceptibility (Immunity)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the European Union EMC directive. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

INFORMATION TO USERS IN THE U.S.A.

NOTE

FCC CLASS A DIGITAL DEVICE OR PERIPHERAL

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING

Changes or Modifications not expressly approved by Evertz Microsystems Ltd. could void the user's authority to operate the equipment.

Use of unshielded plugs or cables may cause radiation interference. Properly shielded interface cables with the shield connected to the chassis ground of the device must be used.

NOTICE TO MODEM USERS IN THE USA

NOTE

The HD9084 Caption Encoder complies with the FCC Rules Part 68. The caption encoder is designed to be used on standard device telephone lines. It connects to the telephone line by means of a standard jack called the USOC RJ11C and should be connected to the telephone network with a FCC compliant telephone cord and modular plug.

It is not necessary to notify the telephone company before connecting the modem in the caption encoder. However, the telephone company may request the telephone number to which the caption encoder modem is connected and the FCC registration number and ringer equivalence number (REN), both of which are on the label on the rear panel.

The REN is used to determine the number of devices you may legally connect to your telephone line. In most areas, the sum of the REN of all devices connected to one line must not exceed five (5.0). You should contact your telephone company to determine the maximum REN for your calling area.

The caption encoder may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

If the modem in the caption encoder is malfunctioning, it may affect the telephone lines. In this case, disconnect the modem until the source of the difficulty is traced.

IMPORTANT INSTALLATION NOTICE

FOR A RELIABLE TELEPHONE CONNECTION TO THE MODEM IN THIS CAPTION ENCODER A DIRECT TELEPHONE LINE MUST BE USED. THIS LINE MUST NOT PASS THROUGH A PBX OR SIMILAR KEY DEVICE.

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REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Preliminary Version	Sep 2002
0.2	Revised Preliminary versions	Oct 2002
1.3	First Release version	Jan 2003
1.4	Revised Edition	Jun 2003
1.5	Revised Edition	Dec 2003
1.8	Revised Edition	Feb 2004
1.9	Updated menu structure, 708 Services	Dec 2005
1.9.1	Added information on changing battery, reformatting.	Aug 2006
1.12.	Revised Edition. Updated functionality and feature description.	Feb 2007
1.12.1	Changed pinout for RS-422 Tributary Serial Port, added to features	Jan 2008
1.12.2	Removed information regarding Down Convert capabilities and references to SDI Input Source	Oct 2008
1.12.3	Updated Composite Monitoring Output information	Oct 2008
1.12.4	Added information regarding the GPI Message Inject feature	Feb 2009
1.12.5	Updated section 3.5.1. Removed Fault/Status information.	Jun 2009
1.12.6	Made changes to section 4.3.2 regarding Reset Encoder control.	Jul 2009
1.14	Updates throughout section 3 and 5. Updated FAQ section and Glossary. Updated Real Time State description.	Oct 2009
1.15	Added items to GPO 1 to 4 Stimulus list.	Mar 2010
1.15.1	Updated power and safety electrical specifications	Apr 2010
1.16	Updated rear plate drawing in section 2.1	Jun 2010
1.17	Removed reference to Appendix A in section 4.5.2 Added reference to the CEA-608 standard	Jun 2010
1.18	Updated common commands throughout section 4 & 6	Apr 2011

1.19	Updated “SD - HD Translator” section	Oct 2012
1.20	Major update, primarily chapters 3 & 6	Nov 2013
1.21	Described new features applicable as of firmware revision 1.7 build 5.	Feb 2015

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1. OVERVIEW

The HD9084 DTVCC Caption Processor is a comprehensive, compact solution for all HD Advanced Closed Caption and SD Closed Caption requirements. Simultaneous HD-SDI and SD-SDI video I/O paths provide a one-box solution with the following functionality:

- Simultaneous encoding of new captions onto HD and SD video
- Transcoding and translation of captions from an SD source (CEA-608) onto HD source (SMPTE 334M)
- Transcoding of captions from an HD source (SMPTE 334M) onto SD source (CEA-608)
- Processing of captions from SD-SDI video source (CEA-608) to send to a compression encoder (SMPTE 333M or Grand Alliance)
- Processing of captions from HD-SDI video source (SMPTE 334M) to send to a compression encoder (SMPTE 333M or Grand Alliance)
- Direct support for caption encoding over IP

The SMPTE-292M HD-SDI video path supports 720p, 480p, 1080i, 1035i or 1080p video formats. CEA-708 captions are stored in the VANC of HD-SDI as per SMPTE-334M. The SMPTE-259M-C SDI video path supports CEA-608 captions stored on line 21 of component digital video. Both SD and HD video paths include bypass relay protection.

HD9084 supports various types of communications interface, including RS-232/422 serial, telephone modem, telnet and parallel GPI control. The HD9084 interfaces with all ATSC (MPEG) compression encoders and supports the following CEA-708 transfer formats: SMPTE 334M, SMPTE 333M and Grand Alliance. The built in HD closed caption decoder allows confidence monitoring of CEA-708 and CEA-608 captions on any Analog monitor.

The HD9084 also provides caption shifting for both SD and HD captions via GPI control. This provides compliance with FCC order prohibiting obstruction of weather warning text, which often appears on the bottom of the screen.

HD9084 is easily configured using the front panel, remotely through the various communication ports, or via On-Screen display.

1.1. HOW TO USE THIS MANUAL

This manual is organized into 7 chapters: Overview, Installation, Operation, Serial Protocol, Technical Description, Troubleshooting and Glossary. There are individual tables of contents at the beginning of each chapter as well as an overall table of contents at the beginning of the manual to aid the user in locating the appropriate information.

Chapter 1 provides a brief overview of the HD9084 operation and features.

Chapter 2 provides a detailed description of the rear panel connectors, and how the HD9084 should be connected into your system.

Chapter 3 provides instructions on how to operate the menu system of the HD9084.

Chapter 4 provides information about the serial command protocol used for external devices to communicate with the HD9084

Chapter 5 provides technical information such as the specifications, servicing information and how to update the firmware in the HD9084.

Chapter 6 provides a brief setup and troubleshooting guide. Consult this chapter before you call Evertz technical support.

Chapter 7 contains a glossary that defines concepts and terms used throughout the remainder of the manual. We highly recommend taking the time to become familiar with the terms and concepts described here before proceeding into the rest of the manual.

This symbol is intended to alert the user to important operating instructions.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important safety related operating and maintenance (Servicing) instructions in this manual.

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2. INSTALLATION

2.1. REAR PANEL

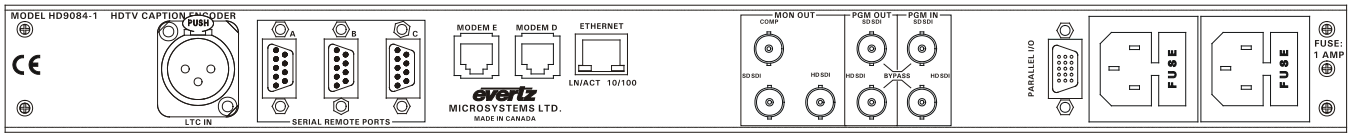


Figure 2-1: Rear Panel of HD9084

Note: The LTC IN connector is currently not supported.

2.1.1. Program Video Inputs (PGM IN)

2.1.1.1. SD SDI

The SD SDI input is a single BNC compatible with SMPTE 259M-C format(s). This input supports upstream SD video and upstream SD video with caption information. The bypass relay comes standard with the HD9084 and is enabled using the front panel controls. Please refer to section 3.1.5 for more information regarding the SD bypass relay.

2.1.1.2. HD SDI

The HD SDI input is a single BNC compatible with SMPTE 292M 1.485 Gb/s 1080i, 720p, 480p format(s). This input supports upstream HD video and upstream HD video with 334M caption information. The bypass relay comes standard with the HD9084 and is enabled using the front panel controls. Please refer to section 3.1.5 for more information regarding the HD bypass relay.

2.1.2. Program Video Outputs (PGM OUT)

2.1.2.1. SD SDI

The SD SDI output is a single BNC compatible with SMPTE 259M-C format(s). The SD SDI outputs SD SDI video or SD SDI video with CEA 608 captions in line 21. A bypass relay comes standard with the HD9084 and is enabled using the front panel controls. Please refer to section 3.1.5 for more information regarding the SD bypass relay.

2.1.2.2. HD SDI

The HD SDI output is a single BNC compatible with SMPTE 292M 1.485 Gb/s 1080i, 720p, 480p format(s). The HD SDI outputs HD SDI video or HD SDI video with 334M captions in the VANC of the HD video signal. A bypass relay comes standard with the HD9084 and is enabled using the front panel controls. Please refer to section 3.1.5 for more information regarding the HD bypass relay.

2.1.3. Monitor Video Output (MON OUT)

2.1.3.1. COMP

1 BNC connector is provided for the output of the composite analog video signal. The **COMP** Output provides decoded CEA-708 and CEA-608 open captions burned over the video for SD-SDI. The front panel menus are used to determine which data channel will be decoded. This output can be connected to any analog monitor to verify that the program data has been encoded correctly on the program path. If the bypass relay is activated, this connector will have NO video output. Please see the DECODE SETUP menu for further setup instructions.

Note that HD video will NOT be present on the monitor output; however, the decoded captions will be displayed.

2.1.3.2. HD SDI

1 BNC connector for output of HD SDI digital video signals compatible with the SMPTE 292M 1.485 Gb/s 1080i, 720p, 480p standard(s). This output is identical to the PGM HD SDI output except it is not bypass protected. If the bypass relay is activated, this connector will have NO video output.

2.1.4. Serial Remote Ports

2.1.4.1. Port A

Port A is a 9-pin male 'D' connector for connection to a computer or captioning equipment. Port A functionality includes updating firmware (see section 5.2) and Control A functions (section 3.8.7). The front panel menus are used to set the correct baud rate, word size and parity for use with your captioning software.

As configured from the factory, the pin-out of this connector is designed for use with a readily available “null modem” cable to connect to your computer via RS-232 port. It is recommended to keep Port A free for firmware upgrades.

2.1.4.2. Port B

Port B is a 9-pin male 'D' connector for connection to a computer or captioning equipment. The front panel menus are used to set the correct baud rate, word size and parity. Port B is used for transfer of SMPTE 333M / Grand Alliance captions, and Control A protocol.

As configured from the factory, the pin-out of this connector is designed for use with a readily available “null modem” cable to connect to your computer via RS-232 port.

Connecting the HD9084 to an ATSC encoder may require a null modem cable or straight-through cable. Please check with the ATSC encoder manufacturer or ATSC manual for the correct cable type.

Do not use “gender changers” or “in house fabricated cables” to connect the HD9084 to the ATSC encoder. Always use a “store bought” Null or Straight through cable and connect directly from the HD9084 to the ATSC encoder.

2.1.4.3. Port C

Port C is a 9-pin male 'D' connector for connection to a computer or captioning equipment. Port C is used for Control A protocol. The front panel menus are used to set the correct baud rate, word size and parity for use with your captioning software.

As configured from the factory, the pin-out of this connector is designed for use with a readily available "null modem" cable to connect to your computer via RS-232 port.

2.1.4.4. Configuring Ports for RS-232

Ports A, B, and C are configured for RS-232 standard from the factory. Setting the HD9084's serial ports to RS-232 is done by first removing the lid and locating the ribbon cables for Ports A (J31), B (J30), and C (J29) on the motherboard. The connectors are located on the right-hand side of the board with the front panel facing the user. Next, move the three ribbon connectors to the allocated position marked "232" on the motherboard and set DIP switch 6, 7 or 8 to the OFF position. Dip 6=Port A, Dip 7=Port B, and Dip 8=Port C. The port(s) are now configured for RS-232.

Serial I/O Port (A, B, C) Male (pins)				**Computer End Male (pins)**
Description	**DB-9**	**DB-25**	**DB-9**	**Description**
Shield				Shield
RS 232 Transmit	3	3	2	RS 232 Receive
Ground	5	7	5	Signal Ground
RS 232 Receive	2	2	3	RS 232 Transmit
RS 232 CTS	8	4	7	RS 232 RTS
RS 232 DTR	4	6	6	RS 232 DSR
RS 232 RTS	7	5	8	RS 232 CTS
RS 232 DSR	6	20	4	RS 232 DTR

Figure 2-2: Wiring RS-232 DTE Serial Port to Computer

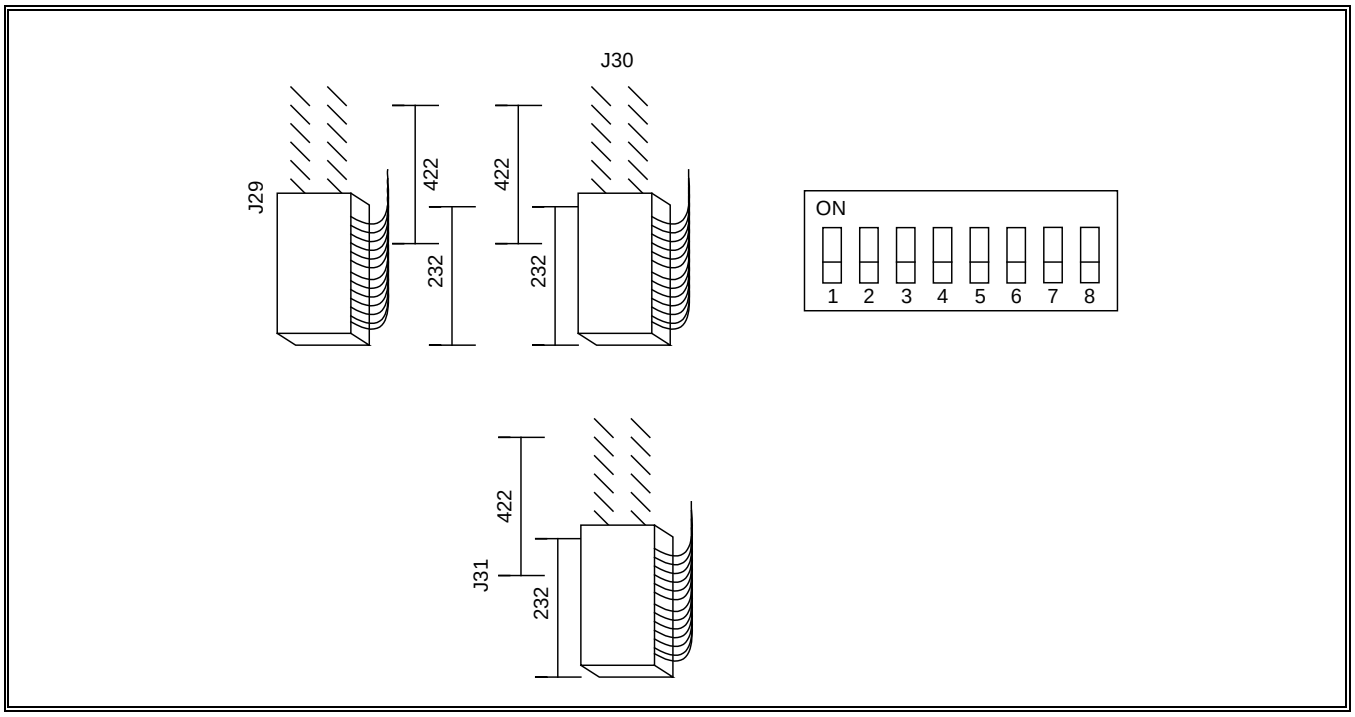


Figure 2-3: RS-232 Configuration

It is not recommended for Port A to be set to RS-422 mode since this port is used for Firmware upgrades in RS-232 mode.

2.1.4.5. Configuring Ports for RS-422

Ports A, B, or C can each be configured for RS-422. Setting the HD9084's serial ports to RS-422 is executed by first removing the lid and locating the ribbon cables for Ports A (J31), B (J30), and C (J29) on the motherboard. The connectors are located on the right-hand side of the board with the front panel facing the user. Next, move the ribbon connector(s) to the allocated position marked "422" on the motherboard and set DIP switch 6, 7, or 8 to the ON position. DIP 6=Port A, DIP 7=Port B, and DIP 8=Port C. The Port(s) are now configured for RS-422 or RS-232.

Serial I/O Port (A, B, C) Male (pins)		Computer "Master" End Female	
Description	**DB-9**	**DB-9**	**Description**
Shield			Shield
Frame Ground	1	1	Frame Ground
Transmit Common	6	6	Receive Common
Transmit -	2	2	Receive -
Transmit +	7	7	Receive +
Receive +	3	3	Transmit +
Receive -	8	8	Transmit -
Receive Common	4	4	Transmit Common
Frame Ground	9	9	Frame Ground
not used	5	5	not used

Figure 2-4: Wiring RS-422 Tributary Serial Port to RS-422 Master

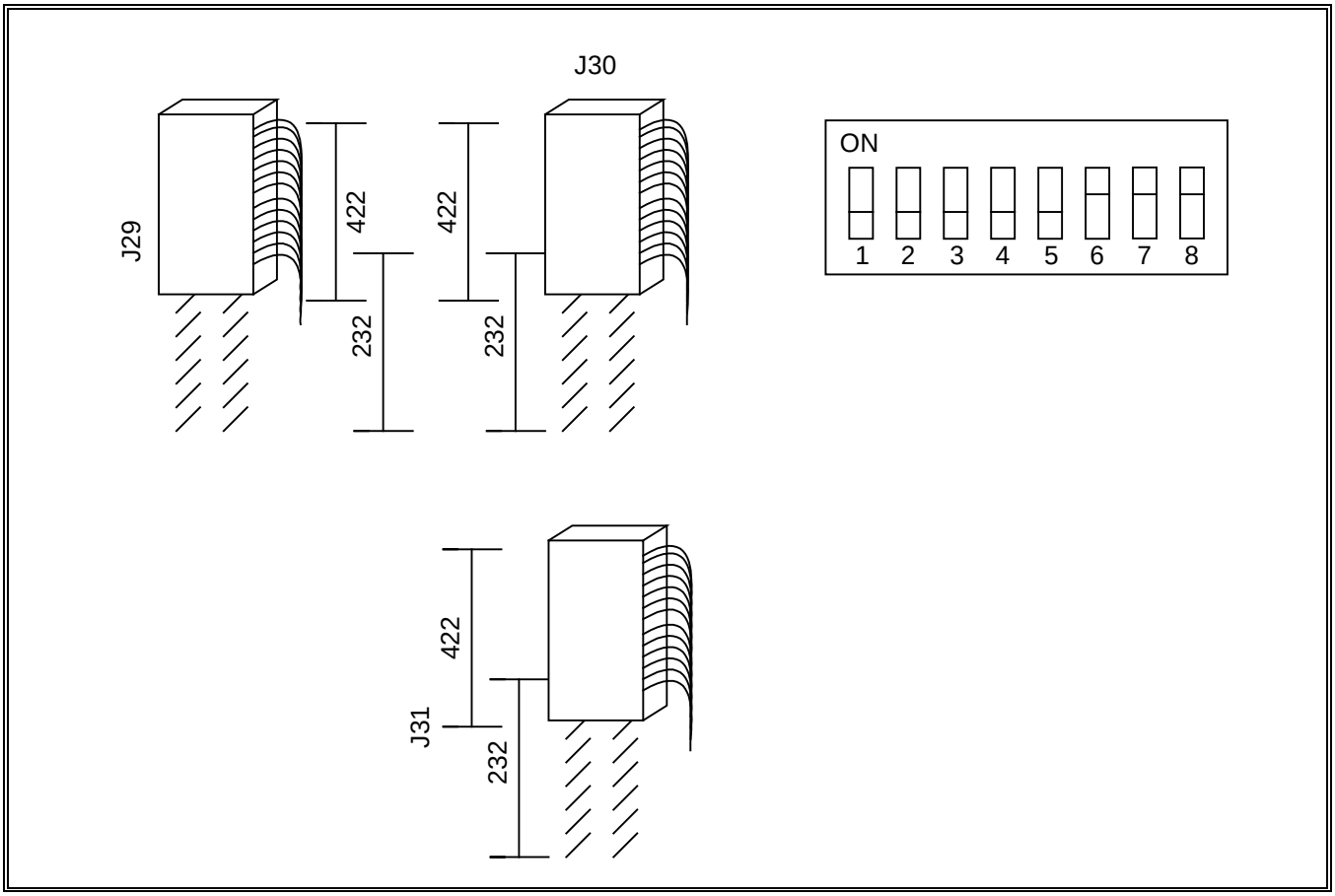


Figure 2-5: RS-422 Configuration

2.1.5. Modems

The **MODEM D** and **MODEM E** RJ11 jacks are used to connect the internal modems of the HD9084 to a telephone line, allowing computers at other locations running captioning software to communicate with the HD9084. Use of the **MODEM E** port requires the HD9084+MDM2 option to be installed in your unit. If the option is not ordered, the RJ11 jack will not be connected internally. The front panel engineering menus are used to set the correct baud rate, word size and parity for use with your captioning software.

IMPORTANT INSTALLATION NOTICE:

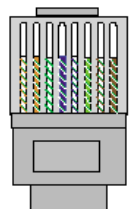
For a reliable telephone connection to the modem in the caption encoder, a direct telephone line must be used. This line must not pass through a PBX or similar key device.

2.1.6. Ethernet Network Connector

The HD9084 is equipped with an RJ-45 connector for Ethernet network communications. The Ethernet connection can be used for a variety of functions. One of the primary uses of this is as a telnet server connection for inserting captions. The HD9084 supports a single telnet session, which is configured in the menus as "Port F". Once a telnet session is established, it uses the Control-A protocol (see Section 4), the same as the serial ports and modems.

The HD9084 is designed to be used with either 10Base-T (10 Mbps) or 100Base-TX (100 Mbps) also known as *Fast Ethernet*, twisted pair Ethernet cabling systems. When connecting for 10Base-T systems, category 3, 4, or 5 UTP cable as well as EIA/TIA – 568 100Ω STP cable may be used. When connecting for 100Base-TX systems, category 5 UTP cable is required. The cable must be “straight through” with a RJ-45 connector at each end. Make the network connection by plugging one end of the cable into the RJ-45 receptacle of the HD9084 and the other end into a port of the supporting hub.

The straight-through RJ-45 cable can be purchased or can be constructed using the pinout information in Table 2-1. A colour code wiring table is provided in Table 2-1 for the current RJ 45 standards (AT&T 258A or EIA/TIA 258B colour coding shown). Also refer to the notes following the table for additional wiring guide information.



Pin #	Signal	EIA/TIA 568A	AT&T 258A or EIA/TIA 568B	10BaseT or 100BaseT
1	Transmit +	White/Green	White/Orange	X
2	Transmit –	Green/White or White	Orange/White or Orange	X
3	Receive +	White/Orange	White/Green	X
4	N/A	Blue/White or Blue	Blue/White or Blue	Not used (required)
5	N/A	White/Blue	White/Blue	Not used (required)
6	Receive –	Orange/White or Orange	Green/White or Green	X
7	N/A	White/Brown	White/Brown	Not used (required)
8	N/A	Brown/White or Brown	Brown/White or Brown	Not used (required)

Table 2-1: Standard RJ45 Wiring Colour Codes

Note the following cabling information for this wiring guide:

- Only two pairs of wires are used in the 8-pin RJ 45 connector to carry Ethernet signals.
- Even though pins 4, 5, 7 and 8 are not used, it is mandatory that they be present in the cable.
- 10BaseT and 100BaseT use the same pins; a crossover cable made for one will also work with the other.
- Pairs may be solid colours and not have a stripe.
- Category 5 cable must use Category 5 rated connectors.

2.1.7. Parallel I/O- DB15 Parallel I/O Connector

A DB15 15-pin female connector is used for General Purpose Input (GPI) and General Purpose Output (GPO) control. Each input/output is optically isolated. Refer to section 2.4 and 2.5 for GPI/O configurations.

2.1.8. Power Supply

The HD9084 has one or two (redundant supply is optional) universal power supplies that operate on either 100-115 or 220-240 volts AC at 50 or 60 Hz and automatically senses the input voltage. Power should be applied by connecting a 3-wire grounding type power supply cord to the power entry modules on the rear panel. The power cord should be a minimum 18 AWG wire size; type SVT marked VW-1, maximum 2.5 m in length.

The IEC 320 power entry modules combine a standard power inlet connector, two 5 x 20 mm fuse holders and an EMI line filter. For instructions on changing the fuses see section 5.3.1.

CAUTION - TO REDUCE THE RISK OF ELECTRIC SHOCK, GROUNDING OF MAINS PLUG GROUND PIN MUST BE MAINTAINED

2.2. MOUNTING

The HD9084 Closed Caption Encoder is equipped with rack mounting angles and fits into a standard 19 inch by 1 3/4 inch (483 mm x 45 mm) rack space. The mounting angles may be removed if rack mounting is not desired.

2.3. PARALLEL REMOTE CONTROL CONNECTIONS

A DB15 connector provides a method of connecting the remote control GPI signals to control the caption encoder. The user can configure the GPI/O functionality of the HD9084 via the front panel control. The pin assignment of the connector is as follows:

Pin #	Name	Description
1	GND	Chassis ground
2	GPO2	General purpose output 2
3	GPO1	General purpose output 1
4	GPO3	General purpose output 3
5	GPIC	General purpose input
6	GPO4	General purpose output 4
7	GPIF	General purpose input (SD Bypass Relay)
8	GPIA	General purpose input
9	GPID	General purpose input
10	GP+3.3V	+3.3V from general purpose interface board
12	GPIE	General purpose input
13	GPIG	General Purpose Input (HD Bypass Relay)
14	GPIB	General purpose input
15	VEXT (in)	External voltage source for GPI's

Figure 2-6: GPI/O Pin Identification

Pin 10 and Pin 15 can be jumped in order to provide a VEXT (IN) GPI/O pull-up source voltage with 3.3V.

2.4. GPI/O SETUP

The following features of the HD9084 can be controlled via parallel port:

- **SD-SDI Field 1 Keyer and Field 2 Keyer:** See Video Setup (Section 3.4.2)
- **HD-SDI VANC Keyer Ctrl:** See Video Setup (Section 3.4.3.2)
- **Upstream Caption Source Selection:** See Video Setup (Section 3.4.4)
- **GPI Caption Shift:** See Ports Setup (Section **Error! Reference source not found.**)
- **Port Enable/Disable:** See Ports Setup (Section 3.6.1.4)
- **GPO Output Configuration:** See Ports Setup (Section 3.6.4)

2.5. TYPICAL HD9084 CONFIGURATIONS

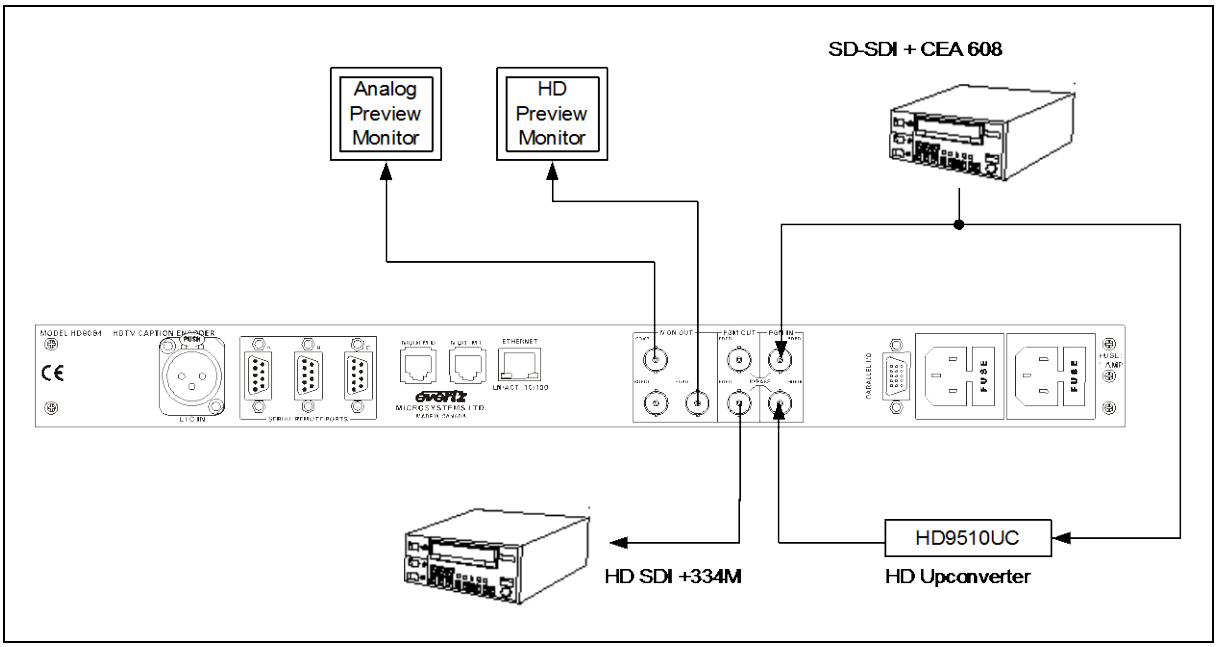


Figure 2-7: HD VANC SMPTE-334 Configuration

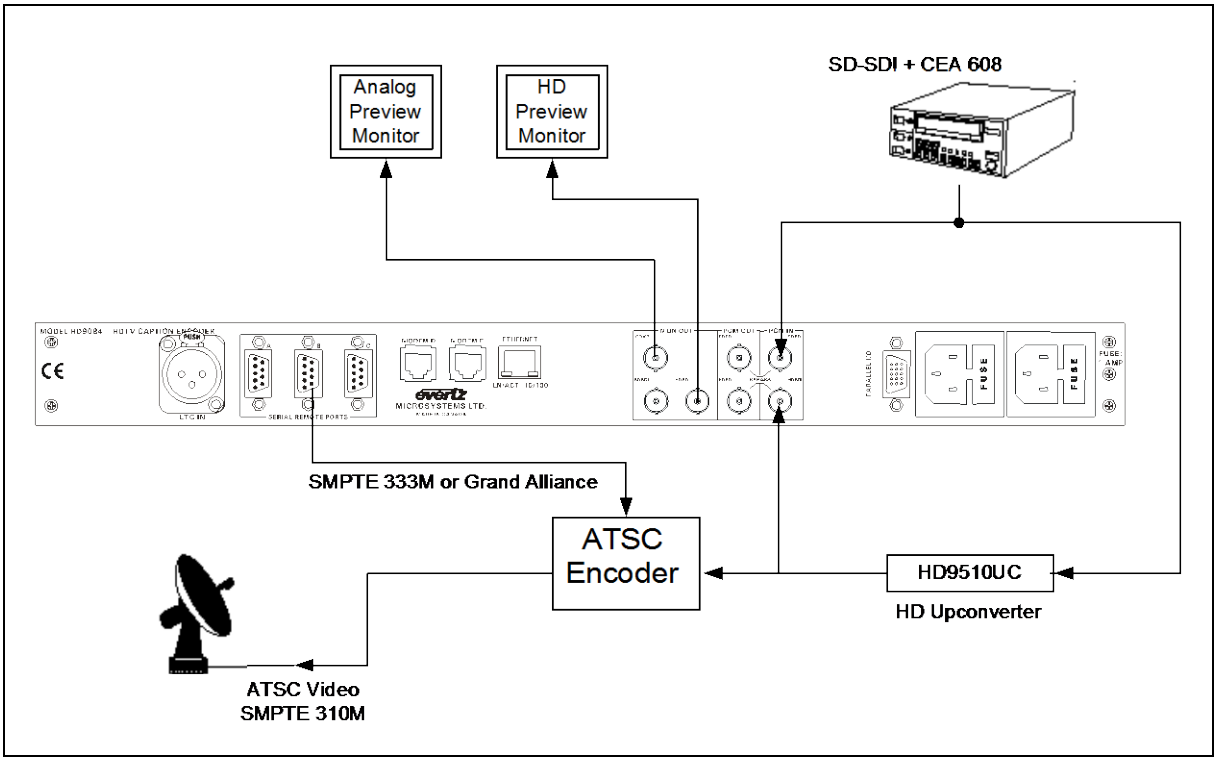


Figure 2-8: SMPTE-333 or Grand Alliance Configuration

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3. OPERATION

3.1. FRONT PANEL CONTROLS

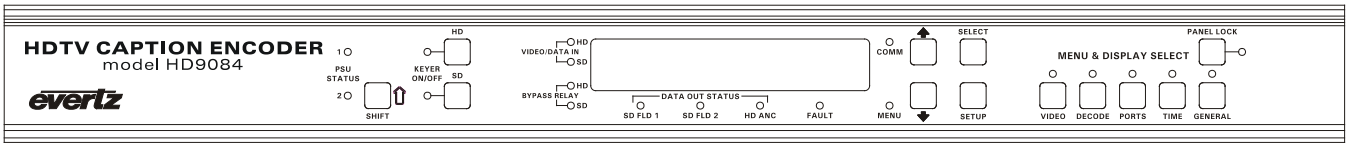


Figure 3-1: Front Panel Layout

3.1.1. Display Panel

The display panel consists of a 16 digit alphanumeric display. This allows the user to navigate through different menu systems and to see the status of the HD9084. The display panel is located on the front of the HD9084.

3.1.2. HD Keyer On/Off

The **HD KEYER ON/OFF** pushbutton toggles the High Definition Keyer on or off. When the Keyer is off, the device will clock the video through its internal registers and route it to the video output. When the Keyer is turned on, the HD ANC LED will indicate if the Ancillary data is present. The LED to the left of the pushbutton will be illuminated to indicate operative status. The pushbutton is located to the left of the display on the front panel.

Keyer will be OFF when Port B is in Grand Alliance or SMPTE-333 mode. If the HD Keyer button is pressed, the front panel message will display "VANC Out SERIAL"

3.1.3. SD Keyer On/Off

The **SD KEYER ON/OFF** pushbutton toggles the Standard Definition Keyer on or off. When the Keyer is off, the device will clock the video through its internal registers and route it to the video output. When the Keyer is turned on, both the SD FLD 1 and SD FLD 2 LED's will indicate if data is present. The LED to the left of the pushbutton illuminates to indicate operative status. The pushbutton is located to the left of the display on the front panel.

3.1.4. SHIFT (⇧)

The **SHIFT** pushbutton is used to execute some functions that intentionally cannot be performed with a single button so they can't be executed accidentally. For example, pressing **SHIFT** in combination with the **KEYER** pushbutton allows the user to toggle the bypass relay(s) On/Off. (See section 3.1.5)

3.1.5. HD/SD Bypass Relays

To toggle the HD Bypass relay on and off, hold the **SHIFT** key and press the **HD KEYER ON/OFF** Button. The **HD Bypass LED** indicates the status of the bypass relay. By default, the bypass relay is not active when the HD9084 is turned on, therefore HD processing is occurring. Once the HD bypass relay is turned on, the upstream video will be sent directly to downstream. Both the **SHIFT** and **HD KEYER ON/OFF** pushbuttons are located to the left of the front panel display. The same functionality is available for SD using **SHIFT** and **SD KEYER ON/OFF**.

No signal processing is available when relay is in the bypass state.

3.1.6. PANEL LOCK

The **PANEL LOCK** pushbutton locks the current front panel setup. The LED to the right of the button illuminates indicating that panel lock is in effect. The panel lock function must be off to change any settings on the unit. When the panel is locked, the operator may cycle through the front panel Displays, but may not enter the Menus or change the keyer or bypass relay states.

3.1.7. SETUP

The **SETUP** pushbutton is used in conjunction with the menu and display pushbuttons. This allows the user to enter the 5 different menu systems in order to modify operational settings. The menu systems are described more in detail in section 0. The **SETUP** pushbutton is located to the right of the front panel display, below the **SELECT** pushbutton.

3.1.8. Up Arrow (🡅) and Down Arrow (🡇)

The “up arrow” and “down arrow” are used to scroll through the different menu options of the HD9084. The menus are described in section 0. The 🡅 Up Arrow and 🡇 Down Arrow are located to the right of the front panel display.

3.1.9. SELECT

The **SELECT** pushbutton is used to navigate through the menu system of the HD9084. See section 0. The **SELECT** pushbutton is also used in combination with other pushbuttons for added functionality. These functions will show the use of the **SELECT** pushbutton in the appropriate sections. The **SELECT** pushbutton is located to the right of the display, above the **SETUP** pushbutton.

3.1.10. VIDEO

Pressing the **VIDEO** pushbutton repeatedly allows the user to cycle through different Video front panel Display options, described in section 3.2.1. Pressing the **VIDEO** pushbutton, then the **SETUP** pushbutton will enter the Video menu. The Video Menu is outlined in further detail in section 3.4 The LED above the **VIDEO** pushbutton will illuminate indicating the selection.

3.1.11. DECODE

Pressing the **DECODE** pushbutton repeatedly allows the user to cycle through different Decode front panel Displays, described in section 3.2.2. Pressing **DECODE**, then **SETUP** will enter the Decode menu. The Decode Menu is outlined in further detail in section 3.5. The LED above the **DECODE** pushbutton will illuminate indicating the selection.

3.1.12. PORTS

Pressing the **PORTS** pushbutton repeatedly allows the user to cycle through different Ports front panel Displays, described in section 3.2.3. Pressing the **PORTS** pushbutton, then the **SETUP** pushbutton will enter the Ports Menu. The Ports Menu is outlined in further detail in section 3.6. The LED above the Ports pushbutton will illuminate indicating the selection.

3.1.13. TIME

Pressing the **TIME** pushbutton repeatedly allows the user to cycle through different Time front panel Displays, described in section 3.2.4. Pressing the **TIME** pushbutton, then the **SETUP** pushbutton will enter the Time menu. The Time Menu is outlined in further detail in section 3.7. The LED above the Time pushbutton will illuminate indicating the selection.

3.1.14. GENERAL

Pressing the **GENERAL** pushbutton repeatedly allows the user to cycle through different General front panel Displays, described in section 3.2.5. Pressing the **GENERAL** pushbutton, then the **SETUP** pushbutton will enter the General menu. This function is outlined in further detail in section 3.8. The LED above the General pushbutton will illuminate indicating the selection.

3.1.15. PSU STATUS 1 LED

The PSU STATUS 1 LED indicates if power supply 1 is operational. If the LED is illuminated, power supply 1 is functional. If the LED is not illuminated, power supply 1 is not functional. Refer to section 5.3.1 for changing the power supply fuse. The PSU Status 1 LED is located to the left of the front panel display.

3.1.16. PSU STATUS 2 LED (Optional Redundant Power Supply)

The PSU STATUS 2 LED indicates if power supply 2 is operational. If the LED is illuminated, power supply 2 is functional. If the LED is not illuminated, power supply 2 is not functional. Refer to section 5.3.1 for changing the power supply fuse. The PSU Status 2 LED is located to the left of the front panel display.

3.1.17. Video/Data in HD LED

The Video/Data In HD indicator is on solid when HD video is present upstream and will **flash** when CEA-708 caption data is present in the upstream video. The LED is located to the left of the front panel display.

3.1.18. Video/Data in SD LED

The Video/Data In SD indicator is on solid when SD video is present upstream and will **flash** when CEA-608 caption data is present in the upstream video. The LED is located to the left of the front panel display.

3.1.19. Bypass Relay HD LED

The BYPASS RELAY HD indicator is on when the HD bypass relay is enabled. To enable the relay, please refer to section 3.1.5.

3.1.20. Bypass Relay SD LED

The BYPASS RELAY SD indicator is on when the SD bypass relay is enabled. To enable the relay, please refer to section 3.1.5.

3.1.21. MENU LED

The MENU LED illuminates indicating the user is in the menu system. The indicator is off when the user is at the Display Level. The MENU LED is located to the right of the front panel display.

3.1.22. COMM LED

The COMM LED is illuminated when data communication is received via any serial port, telephone modem, or telnet session. Non-illuminated COMM LED indicates the HD9084 is not receiving data. The COMM LED is located to the right of the front panel display.

3.1.23. SD FLD 1 LED

The SD Field 1 data out LED flashes when field one data is present in the SD upstream signal. The indicator is off when field one data is not present. The LED is located below the front panel display.

3.1.24. SD FLD 2 LED

The SD Field 2 data out LED flashes when field two data is present in the SD upstream signal. The indicator is off when field two data is not present. The LED is located below the front panel display.

3.1.25. HD ANC LED

The HD ANC data out indicator is on when SMPTE-334 captions are inserted into the downstream HD video. The indicator is off when SMPTE-334 captions are not being inserted into the downstream HD video. The indicator is located below the front panel display.

3.1.26. FAULT LED

The FAULT indicator is on when a fault is detected by the HD9084. The indicator is off when the fault is corrected or if no faults are present. Refer to section 3.9 for possible fault conditions. The FAULT LED is located below the front panel display.

3.2. FRONT PANEL DISPLAYS

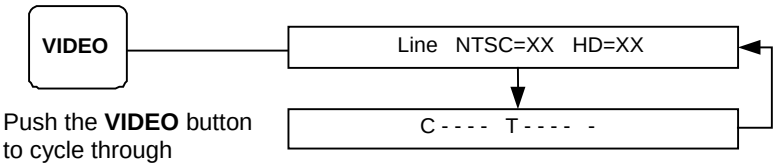
The front panel of the HD9084 can show a variety of informative diagnostic displays. These are used to quickly diagnose any problems with the captioning system.

To cycle through different display options, press one of the five Menu & Display pushbuttons (**VIDEO, DECODE, PORTS, TIME, GENERAL**). The front panel is at the Display Level when the operator is not navigating the menu systems (MENU LED is off).

When at the Display level, other informative or fault reporting messages may also appear occasionally. These are covered in section 3.9.

3.2.1. Video Display

Press **VIDEO** repeatedly to cycle through the Video front panel displays.



Push the **VIDEO** button to cycle through different video display options.

C---- T---- - **(**default setting)
Indicates the state of CEA-608 services in the video. The characters following the 'C' represent services CC1 through CC4. The four characters following the 'T' represent services Text1 through Text4. The last character by itself represents the XDS service. Possible states for each service are:
A dash (-): No activity
A number, or 'E' for XDS: Upstream data is present
'D': HD9084 is inserting captions in Direct Entry State
'R': HD9084 is inserting captions in Realtime State
'X': Upstream data is being blocked

It is also possible to see which communications port is inserting or blocking captions. See section 3.2.3: Ports Display.

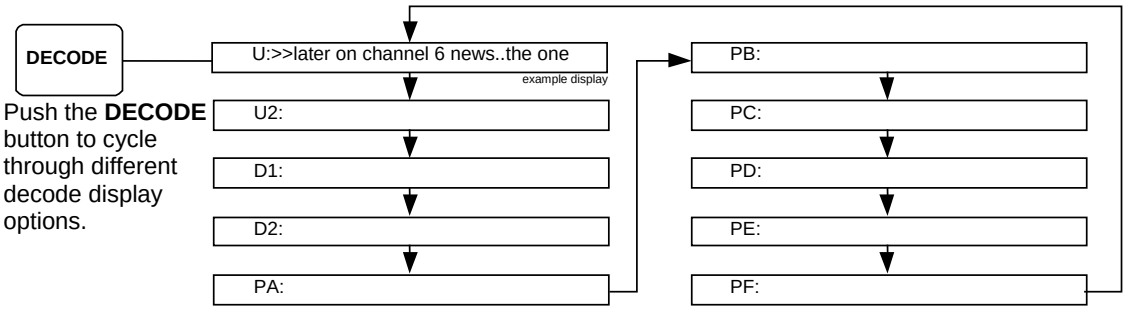
Example display: C1R-4 TX23- E

The example shows CC1 and CC4, Text2 and Text3, and XDS are present in the upstream SD-SDI video. Also, Realtime captions are being inserted onto CC2, and Text1 is blocked.

Line NTSC or PAL=21 HD=9
Indicates the line number captions are encoded on the downstream video. The encoded SD-SDI line number will be displayed next to "SD=", and the encoded HD-SDI line number will be displayed next to "HD=". To configure these settings, please refer to section 3.4.1.

3.2.2. Decode Display

Press the **DECODE** button repeatedly to cycle through the Decode front panel displays.



U1: Displays the decoded 608 caption data from upstream field 1, before any caption processing is performed by the HD9084. This display is useful to determine if any captions are valid and present in field 1 on the upstream video source.

U2: Displays the decoded 608 caption data from upstream field 2 before, any caption processing is performed by the HD9084. This display is useful to determine if any captions are valid and present in field 2 on the upstream video source.

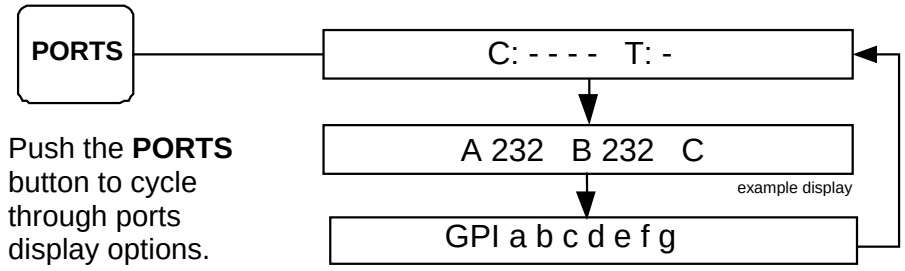
D1: Displays the decoded 608 caption data from downstream field 1, after caption processing is performed by the HD9084. This display is useful to determine if any captions have been encoded properly in field 1 post caption processing.

D2: Displays the decoded 608 caption data from downstream field 2, after caption processing is performed by the HD9084. This display is useful to determine if any captions have been encoded properly in field 2 post caption processing.

PA, PB, PC, PD, PE, and PF: Displays data received from the respective communications port. This is useful to verify port settings and connections. Ports PA, PB and PC are used to display data received from the serial ports. Ports PD and PE are used to display data received from the modem ports. Port F is used to display data received from the Ethernet port.

3.2.3. Ports Display

Press **PORTS** repeatedly to cycle through the Ports front panel displays.



C:---- T:---- - (default setting)
Indicates which communications port is controlling the insertion or blocking of caption data onto each CEA-608 caption service. The characters following the 'C:' represent services CC1 through CC4. The four characters following the 'T:' represent services Text1 through Text4. The last character by itself represents the XDS service.

Each character will be a letter representing the port (A-F) that has control over captions on that service, or a dash '-' indicating that no port is controlling the respective service.

Example display: C:ABB- T:ABBD A

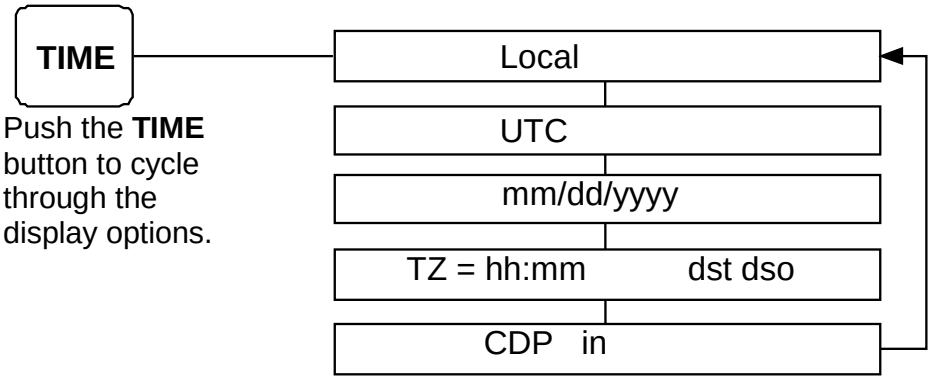
This example shows: Port A is inserting/blocking captions on CC1, Text1, and XDS. Port B is inserting/blocking captions on CC2, CC3, Text2 and Text3. Modem D is inserting/blocking captions on Text4.

A232 B232 C232
Indicates whether the respective serial port (A-C) is configured for RS-232 or RS-422 communications. Ports A, B, and C are configured to the RS-232 setting from the factory. Please refer to sections 2.1.4.4 and 2.1.4.5 to reconfigure the ports.

GPI abcDefG (example Display)
This display indicates which GPI's are asserted. The example above shows GPI d and g are in the active state. An asserted GPI will be displayed in uppercase letters.

3.2.4. Time Display

Press **TIME** repeatedly to cycle through the Time front panel displays.



Local 12:08:49 (**example display)**
Indicates local time. To configure local time, please refer to section 3.7.

UTC 13:15:38 **(example display)**
Indicates the universal coordinated time. To configure UTC time, please refer to section 3.7.

LTC IN TIME
Indicates whether the time input to the LTC Reader port is Local or UTC time.

Please note: Currently, the LTC Reader option is not available.

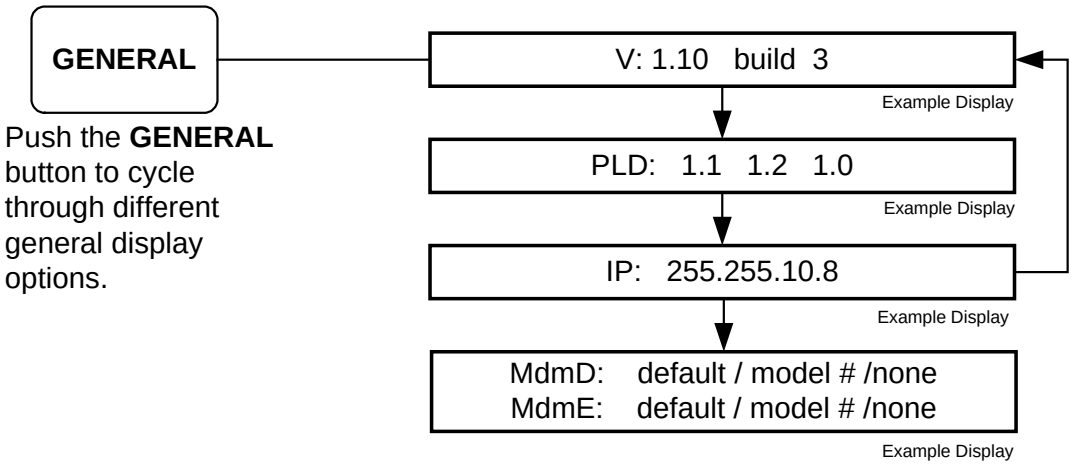
01/01/2001 Thu **(example display)**
Indicates month/day/year and calendar day. To configure the date display, please refer to section 3.7.

TZ=00:00 DST DSO
Indicates the time zone offset and whether the DST and DSO are enabled or disabled. If DSO or DST is displayed in uppercase letters, the function is ON/True. If the function is displayed in lower case letters, the function is OFF/False. To configure time zone, DST and DSO, please refer to section 3.7.1.

CDP in 15:56:30 **(example display)**
Displays the CDP time received from upstream CDP packets contained in the VANC space of the HD-SDI video bit stream. The acronym "CDP" will be displayed in uppercase letters if the time source is present, and in lowercase letters if the time source is not present.

3.2.5. General Display

Press **GENERAL** repeatedly to cycle through the General front panel displays.



V: 1.10 build 3 (example display)
Indicates Firmware version and build number.

PLD: 1.1 1.5 1.0 (example Display)
The PLD display provides version numbers on the Programmable Logic Devices in the HD9084. The PLD information might be required during troubleshooting procedures when calling into the factory.

IP: 192.168.9.99 (example display)
Indicates the IP address that is currently set.

Serial Number Display
Displays the serial number hard-coded into the memory of the HD9084. Note that this is not the same serial number as found on the underside of the chassis.

3.2.5.1. Modem D or Modem E Cycling

Indicates the current installed modems. If a modem is not detected, then the display will show a value of "**none"**.

3.3. MENU OVERVIEW

Letters in BOLD CAPITALS are reference to front panel pushbuttons.

To enter the menu system(s), select a Menu & Display button (**VIDEO, DECODE, PORTS, TIME, GENERAL**) The LED over the corresponding button illuminates to indicate the current selection. Then press **SETUP**. The MENU LED illuminates to indicate that you are now in the Menu system.

The Menu Layout is outlined on the following pages in the form of a flow chart. The menu is divided into 5 sections: VIDEO, DECODE, PORTS, TIME, and GENERAL which are accessible by pressing the buttons of the same name followed by the **SETUP** button. Sections 3.4 to 3.8 provide a pictorial overview of each of the 5 menu sections. The buttons used for navigating the menu are also shown to give the user a quick reference guide for using the menus.

Press **VIDEO** then **SETUP** - Navigates into the VIDEO menu.
Press **DECODE** then **SETUP** - Navigates into the DECODE menu.
Press **PORTS** then **SETUP** - Navigates into the PORTS menu.
Press **TIME** then **SETUP** - Navigates into the TIME menu.
Press **GENERAL** then **SETUP** - Navigates into the GENERAL menu.

The following buttons can be used to navigate throughout the above-mentioned menus:

SELECT: Navigates down one level in the menu tree (to the right on the hierarchy charts).

SETUP: Navigates up one level in the menu tree (to the left on the hierarchy charts). Parameter values shown when you leave the bottom level of the menu tree will be used as the control value.

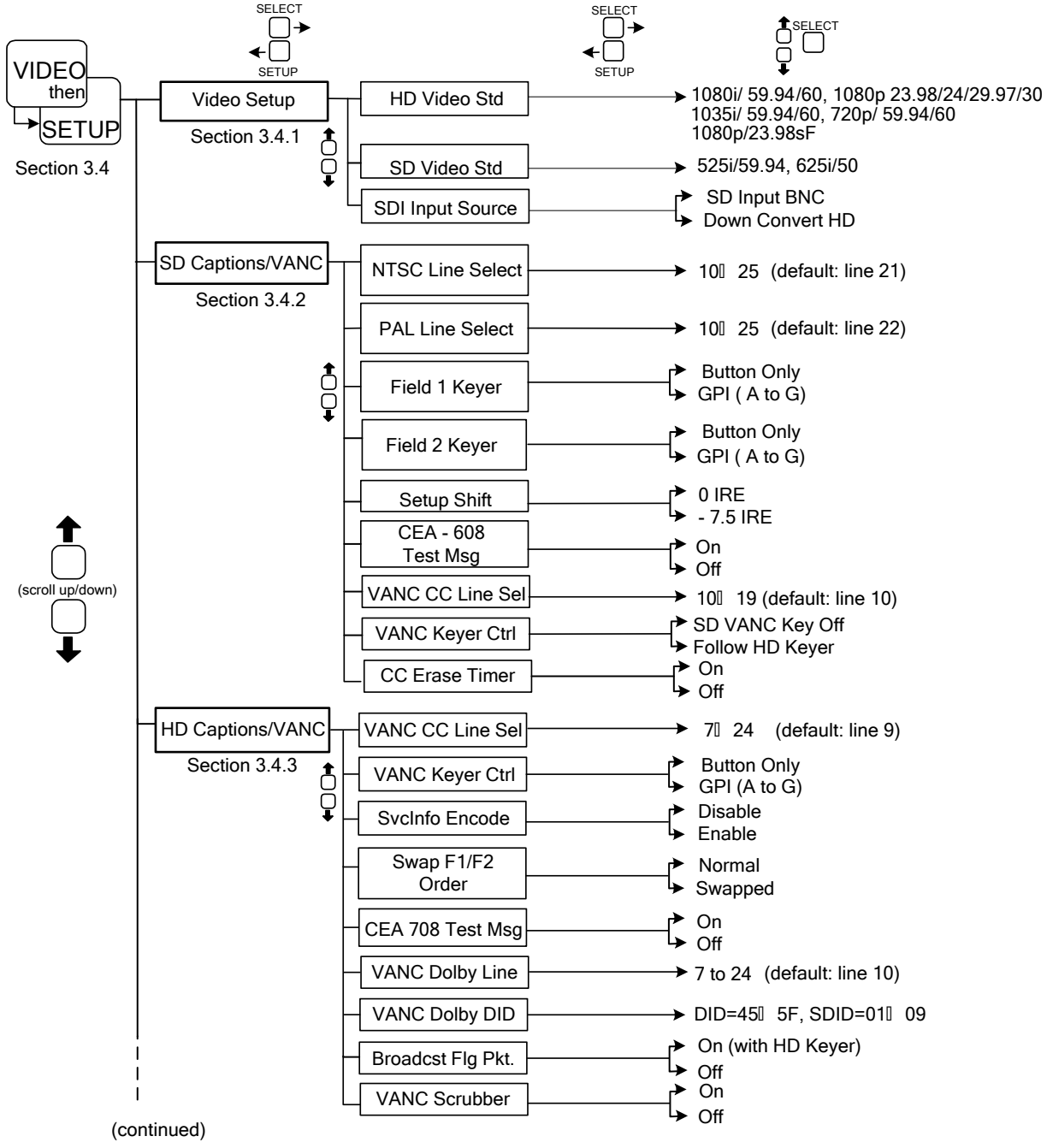
UP Arrow (↑): Scroll up through items on the same menu level.

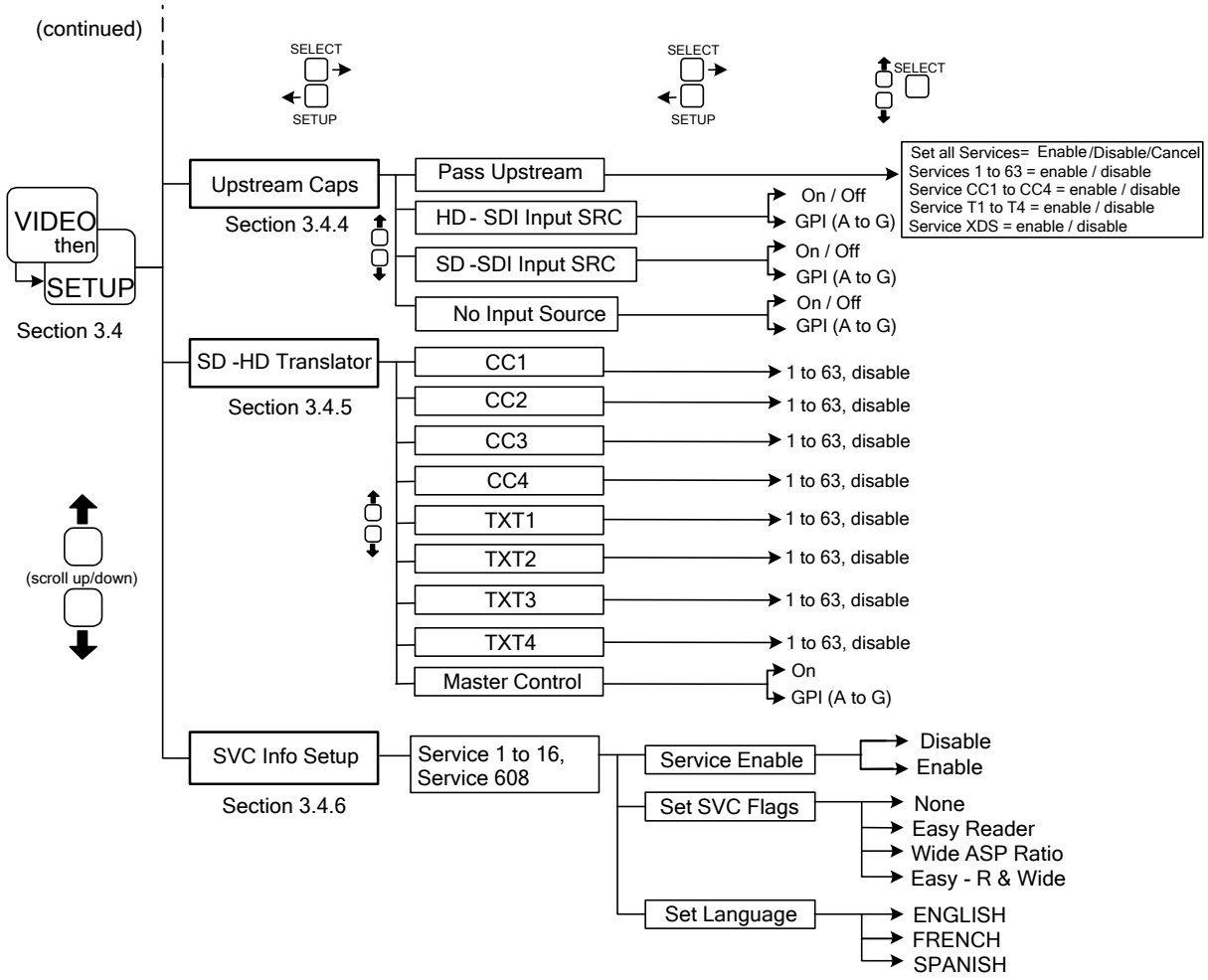
DOWN Arrow (↓): Scroll Down through items on the same menu level.

To exit out of the menu system, press the **SETUP** button until the MENU LED is off.

3.4. VIDEO SETUP MENU

The Video Setup menu allows the user to configure the upstream Video standards, SD Captions, HD Captions, Upstream Captions, and the SD-to-HD Translator. To enter the Video setup menu, press **VIDEO** then press **SETUP**. Use the **UP** and **DOWN** arrow pushbuttons to scroll through the different options as listed in sections 3.4.1 to 3.4.6. Refer to the diagram below to view a "quick reference" layout of the Video menu system. To exit the menu system, press **SETUP** until the MENU LED is off.





3.4.1. Video Setup

To enter the Video Setup sub-menu, use the **UP** and **DOWN** arrows until VIDEO is displayed on the front panel. Press **SELECT** to enter this menu. The following options are available in the Video Setup sub-menu. To see a "quick reference" layout of the menu system, please refer to section 3.4. Press **SETUP** to exit this level.

3.4.1.1. HD Video Std

The HD Video Standard menu allows the user to choose the HD-SDI upstream video standard.

The HD9084 currently supports the following HD-SDI standards:

- **1080i/ 59.94 (default)**/60
- 1080p/ 23.98/ 24/ 29.97/ 30/ 23.98sF
- 1035i/ 59.94/60
- 720p/ 59.94/ 60

3.4.1.2. SD Video Std

The SD Video Standard Menu allows the user to choose the SD-SDI upstream video standard.

The HD9084 currently supports the following SD-SDI video standards:
- 525i/ 59.94
- 625i/50

3.4.1.3. SDI Input Source

The SDI Input Source Menu allows the user to choose the SDI input source to use.

The HD9084 currently supports the following SDI input sources:
- SD Input BNCs
- Down Convert HD

3.4.2. SD Captions/VANC

The SD Captions/VANC menu allows the user to setup and configure downstream SD captions. To enter the SD Captions/VANC sub-menu, use the **UP** and **DOWN** arrows until SD CAPTIONS/VANC is displayed on the front panel. Press **SELECT** to enter this menu. The following options are available in the SD Captions sub-menu (section 3.4.2.1 to 0). To see a "quick reference" layout of the menu system, please refer to section 3.4. Press **SETUP** to exit this level.

3.4.2.1. NTSC Line Select

This function allows the user to select which line the CEA-608 captions will be available on the downstream 525 line video. The default setting for CEA-608 captions is line 21 for the 525 line video format. The HD9084 is capable of inserting CEA-608 captions on lines 10 through 25 for 525 line video format. This control sets both the line for reading captions from upstream video as well as the line for inserting captions onto outgoing video. The HD9084 does not move CEA-608 captions from one video line to another by design.

3.4.2.2. PAL Line Select

This function allows the user to select which line the CEA-608 captions will be available on the downstream 625 line video. The default setting for CEA-608 captions is line 22 for the 625 line video format. The HD9084 is capable of inserting CEA-608 captions on lines 10 through 25 for 625 line video format. This control sets both the line for reading captions from upstream video as well as the line for inserting captions onto outgoing video. The HD9084 does not move CEA-608 captions from one video line to another by design.

3.4.2.3. Field 1 Keyer

The Field 1 Keyer function allows the user to control the Field 1 Keyer using the front panel **KEYER ON/OFF** pushbutton or via GPI. If the Field 1 Keyer is set to Button Only, the front panel pushbutton is enabled and will turn both Field 1 and Field 2 Keyers ON or OFF. If the Field 1 Keyer is set to GPI mode, the user can first choose a GPI to control the Field 1 Keyer function. GPI's A through G are available. Once the GPI is set, the external trigger will now control the Field 1 Keyer. Both the **KEYER ON/OFF** pushbutton and GPI's cannot be used simultaneously.

3.4.2.4. Field 2 Keyer

The Field 2 Keyer function allows the user to control the Field 2 Keyer using the front panel **KEYER ON/OFF** pushbutton or via GPI. If the Field 2 Keyer is set to Button Only, the front panel pushbutton is enabled and will turn both Field 1 and Field 2 Keyers on or off. If the Field 2 Keyer is set to GPI mode, the user can first choose a GPI to control the Field 2 Keyer function. GPI's A through G are available. Once the GPI is set, the external trigger will now control the Field 2 Keyer. Both the **KEYER ON/OFF** pushbutton and GPI's cannot be used simultaneously.

3.4.2.5. Setup Shift

It is common for 4:2:2 component to NTSC video encoders to add setup to line 21 regardless of whether there is closed caption information on line 21 or not. Closed caption data generated at 0 IRE on component video will be translated to 7.5 IRE when setup is added by the video encoder. The CEA 608-B waveform specification states there should be no setup on line 21. In order to eliminate the setup when the encoding to NTSC video takes place, it is necessary to shift the caption data down by 7.5 IRE when generated by the caption encoder. Unfortunately, in order to shift the caption data down by 7.5 IRE, it is necessary to use digital video values that are not legal according to the SMPTE 125M Component Digital Video specification. Setup Shift is used to select whether the caption data encoded on the downstream SDI video will be shifted to adjust for setup on line 21.

0 IRE will encode captions at 0 IRE on 4:2:2 video signals. The resulting closed caption signal will contain legal SMPTE 125 data values but may have 7.5 IRE of setup added when it is encoded to a composite video signal. (Depending on the video encoder) -7.5 IRE will encode captions at -7.5 IRE on 4:2:2 video signals. The resulting closed caption signal will contain illegal SMPTE 125 data values but may have the 7.5 IRE of setup cancelled out when it is encoded to a composite video signal (depending on the video encoder).

3.4.2.6. CEA-608 Test Msg

The CEA-608 Test Message is used to test all fields and outputs of the HD9084. This function will provide test messages in Field 1 and Field 2 for the SD-SDI output and up-converted test messages on the HD output. The CEA-608 Test Message function will also produce test messages on Ports A, B, and C, which can be monitored using HyperTerminal. This function will help ensure the HD9084 is processing all information and is helpful during troubleshooting procedures. Please refer to the testing section for detailed instructions. Unlike most settings, the CEA-608 Test Message will revert to "Off" after power is removed from the HD9084.

3.4.2.7. VANC CC Line Sel

The VANC CC Line Select control is used when the user wants to insert CDP data into the VBI of the SD-SDI output. This feature is typically used in DTVCC transmission to ATSC encoders. This control selects which line of the VBI the CDP data is to be inserted on. The range of this control includes line 10 to 19 inclusive. Refer to the note following section 3.4.2.8.

3.4.2.8. VANC Keyer Ctrl

The VANC KEYER control is used when the user wants to insert CDP data into the VBI of the SD-SDI output. This feature is typically used in DTVCC transmission to ATSC encoders. This control enables or disables the VBI keyer. The possible options include SD VANC KEY OFF and FOLLOW HD KEYER. Selecting SD VANC KEY OFF will disable the VBI keyer and not encode CDP data into the VBI of the SD-SDI output. Selecting FOLLOW HD KEYER will enable the VBI keyer. The HD keyer must also be enabled. Refer to the following subsection.

3.4.2.8.1. VANC Packets in SD-SDI

SD-SDI VANC CDP INSERTER

The CDP frame rate and insert cadence will follow SD-SDI frame rate and timing if HD-SDI video is not present and SD-SDI video is present. CDP frame rate and insert cadence will follow HD-SDI frame rate and timing if HD-SDI video is present, or free-run at HD-SDI settings if neither video input video is present. There may be some combinations of HD and SD video formats that result in CDPs being inserted onto SD-SDI that are unreadable by downstream equipment.

For example, when HD-SDI video is 1080p/23.98, a CDP will not be inserted for one frame in every 5 frames of the 525i/59.94 SD-SDI, but the amount of data in each CDP will be increased to maintain a constant throughput. **Some downstream equipment may not be able to handle this condition properly.**

Keyer control for SD-SDI VANC CDP insertion will follow the HD KEYER button and GPI control settings, not the SD KEYER button and GPIs. The SD-SDI VANC CDP Keyer is disabled from factory defaults. CDPs will not be keyed onto SD-SDI VANC if serial Port B is set to output caption data via SMPTE-333 or Grand Alliance protocols. This behavior is identical to the HD-SDI VANC CDP keyer.

SD-SDI VANC CDP READER

VANC CDPs will be extracted from the upstream source indicated under the VIDEO→UPSTREAM CAPS input source setup controls. Refer to section 3.4.4 for setting these controls. If HD-SDI video is present, the HD VIDEO/DATA IN LED is on. This LED will flash to indicate that CDPs are being ingested, even if they are coming from SD-SDI VANC. If HD-SDI video is not present, the HD VIDEO/DATA IN LED is off. In this case, the presence of upstream CDPs on SD-SDI VANC can only be verified by viewing the decoder video output, or via serial port using the ^A5 command.

GENERAL NOTES

Currently these features are only tested for SD-SDI at NTSC rate (525i/59.94). The HD9084 firmware would need to be revised to support 1080i/50 on the HD-SDI video path in order to properly test PAL rate (625i/50). Most SD-SDI equipment has not been designed to recognize VANC packets, since they are seldom used in SD applications. **It is likely that downstream equipment and storage devices will corrupt or remove the CDPs inserted by the HD9084, or will incorrectly indicate an error condition in the video.** These features have added another 7 video samples of delay to the SD-SDI video path through the HD9084. HD-SDI and SD-SDI video sources must be frame-locked for accurate transposing of data between HD-SDI and SD-SDI.

Tektronix WFM700 with firmware v3.0.0B or newer is capable of reading CDPs (DID:SDID=61:01) from SD-SDI VANC. The CEA-608 caption decoder is capable of displaying the CEA-608 data contained in the packets.

3.4.2.9. CC Erase Timer

The CC Erase Timer control is used to erase the caption display. When enabled, the HD9084 will activate an internal timer and clock the time delay between processing caption data. If caption data is not detected for a period of 15 seconds, the HD9084 will encode a clear caption command. This command will be used by downstream decoders to clear the caption display. This control can either be enabled or disabled from the front panel.

3.4.3. HD Captions/VANC

The HD Captions/VANC menu allows the user to setup and configure downstream HD VANC captions (SMPTE 334M). To enter the HD Captions/VANC sub-menu, use the **UP** and **DOWN** arrows until HD CAPTIONS/VANC is displayed on the front panel. Press **SELECT** to enter this menu. The following options are available in the HD Captions/VANC sub-menu (see section 3.4.3.1 to 3.4.3.7). To view a "quick reference" layout of the menu system, please refer to section 3.4. Press **SETUP** to exit this level.

3.4.3.1. VANC CC Line Sel

VANC CC Line Select controls the line insertion of downstream HD VANC captions. The HD VANC caption (SMPTE 334M) is inserted as default in line 9 of the downstream HD video. Lines 7 through 24 are available.

3.4.3.2. VANC Keyer Ctrl

The VANC Keyer Ctrl function allows the user to control the VANC keyer using the front panel **KEYER ON/OFF** pushbutton or via GPI. If the VANC Keyer Ctrl is set to Button Only, the front panel pushbutton is enabled and will turn the HD Ancillary data ON or OFF. If the VANC Keyer Ctrl is set to GPI mode, the user can first choose a GPI to control the VANC Keyer function. GPI's A through G are available. Once the GPI is set, the external trigger will now control the VANC Keyer. Please refer to sections 2.5 for GPI/O configurations.

3.4.3.3. Service Info Encode

The SVC INFO ENCODE feature allows the user to Enable or Disable the encoding of the optional Caption Service Information section in the CDPs. Refer to section 3.4.6 for information on configuring the Caption Service Information payload.

3.4.3.4. Swap F1/F2 Order

Certain compression encoders require that the order of CEA-608 field-1 and field-2 data is reversed when encoding in CDPs. This control has two options: Normal or Swapped. The default is Normal. We recommend leaving this setting at Normal unless specifically instructed by the compression encoder manufacturer.

3.4.3.5. CEA-708 Test Msg

The CEA-708 Test Message provides captions on Services 1 through 4. Each service shows a different caption test pattern.

Service 1:
Service 1 provides a 2 window caption roll-up/down test message with the following write patterns. Service 1 provides a 2 window split test message. The caption is mirror imaged to provide a full range of decoder testing. The quadrants are divided as follows:

Top Window: Writes captions left to right. Scrolls Top to Bottom.
Bottom Window: Writes captions left to right. Scrolls Bottom to Top.

Service 2:
Service 2 is a background/foreground colour cycle with transparency tests for background. The test message cycles through the different colour options as specified by CEA-708B.

Service 3:
Service 3 tests caption positioning using a "bouncing Evertz Logo" test. The Evertz Logo is moved around the screen to all possible caption position points.

Service 4:
Service 4 is an on screen hex dump of the caption character set. The hex dump is written right to left and scrolls bottom to top.

This feature helps users test downstream equipment such as HDTV decoders and ATSC encoders. Please refer to the testing section for detailed instructions. Unlike most settings, the CEA-708 Test Message will revert to "Off" after power is removed from the HD9084.

The CEA-708 test message will not be inserted if communications Port C mode is set to "608 Receive In" or "CDP Receive In".

3.4.3.6. VANC Dolby Line

The VANC Dolby Line Select control is used when the user wants to insert Dolby Metadata data into the VANC of the HD-SDI output. This control selects which line of the VANC to insert the Dolby Metadata packets. The range of this control includes lines 7 to 24 inclusive.

3.4.3.7. VANC Dolby DID

The VANC Dolby DID control is used when the user wants to insert Dolby Metadata data into the VANC of the HD-SDI output. This control defines the Data ID (DID) and Secondary Data ID (SDID) that are used to identify Dolby Metadata packets The DID is programmable from 45 to 5F (hexadecimal values). The SDID is programmable from 01 to 09. The factory default DID: SDID settings are 45:01.

The settings in sections 3.4.3.6 and 3.4.3.7 have no effect unless serial port C is configured for "Dolby Meta In". Refer to section 3.6.1.1.

3.4.3.8. Broadcast Flag Packet Insert

The "Broadcast Flag" is a VANC packet for signaling copy protection that can be inserted into HD-SDI. It is used to restrict the recording or copying of content.

3.4.3.9. VANC Scrubber

The default behaviour of the HD9084 is to alter the DID/SDIDs of upstream CDPs to change them to "marked-for-deletion" packets after reading their contents. They are no longer CDPs once the DID/SDID is altered, and will be ignored by downstream caption equipment, but these marked-for-deletion packets will remain encoded in VANC. The HD9084 then inserts new CDPs on the video output.

Some customers expressed an interest in removing this data from VANC entirely. This is the purpose of the VANC Scrubber. The VANC Scrubber cleans-up the VANC area by removing upstream CDPs, marked-for deletion packets and start and end marker packets.

When enabled, the VANC Scrubber adds 1 line of delay to the video. Many broadcast customers find this objectionable. For this reason, we recommend leaving this feature off unless there is a specific need to use it.

3.4.4. Upstream Caps

The Upstream Caps sub-menu is used to setup and configure upstream CEA-608 and CEA-708 captions on SD-SDI and HD-SDI video inputs. To enter the Upstream Caps sub-menu, use the **UP** and **DOWN** arrows until UPSTREAM CAPS is displayed on the front panel. Press **SELECT** to enter this menu. Press **SETUP** to exit this level.

The operator can select which video input is used as the source of upstream CEA-608 and CEA-708 captions. At any time, the HD9084 only uses one video input as the upstream caption source. The three Source Controls use a priority scheme, with NO INPUT having the highest priority and SD-SDI INPUT having the lowest priority. Upstream captions are also blocked if all three controls are set OFF. This system makes it easy to configure a GPI to switch between upstream caption sources, or block all upstream captions, where desired. The following Table 3-1 is a configuration table of how to select the upstream captions to be processed. These menu controls are further described below in sections 3.4.4.1 to 3.4.4.4.

	Source Control			Effect
	NO INPUT	**HD-SDI**	**SD-SDI**	
1.	ON	(don't care)	(don't care)	All upstream captions blocked.
2.	OFF	ON	(don't care)	HD-SDI input selected.
3.	OFF	OFF	ON	SD-SDI input selected.
4.	OFF	OFF	OFF	All upstream captions blocked.

Table 3-1: Upstream Caption Source Selection

3.4.4.1. No Input Source

The NO INPUT SOURCE control is the upstream caption source control with the highest priority. It allows the user to enable or disable upstream captions from passing. If the NO INPUT SOURCE option is set to ON, the HD9084 will not process upstream CEA-608 nor CEA-708 captions. If the NO INPUT SOURCE option is set to OFF, the upstream captions processed will be dependent on the setting of the SD-SDI input or the HD-SDI input functions. The NO INPUT SOURCE can also be triggered using GPI's A through G.

3.4.4.2. HD-SDI Input SRC

The HD-SDI Input Source control allows the user to enable or disable the HD-SDI video input as the source of upstream captions. If the HD-SDI option is enabled ON, it has higher priority than the SD-SDI input source control, which will be ignored. The HD-SDI Input Source can also be controlled via GPI. GPI's A-G are available to enable this control.

3.4.4.3. SD-SDI Input SRC

The SD-SDI Input Source control allows the user to enable or disable the SD-SDI video input as the source of upstream captions. The SD-SDI Input Source control has lower priority than either No Input Source or HD-SDI Input Source controls; if either of these are ON then SD-SDI Input Source will be ignored (treated as OFF). The SD-SDI Input SRC can also be configured to control via GPI. GPI's A-G are available to trigger this control.

3.4.4.4. Pass Upstream

The Pass Upstream control allows the user to configure individual upstream caption services to pass or block. Selectable services include 1 through 63, CC1 through CC4, T1 through T4, and XDS. The Set All Services is a time-saving option that allows all caption services to be set to pass or block at once.

3.4.5. SD - HD Translator

The SD-HD TRANSLATOR option allows the user to select the CEA-608 service (CC1, CC2, CC3, CC4, T1, T2, T3, and T4) to be translated to the CEA-708 services (1 through 63). To configure the SD-HD Translator, use the **UP** and **DOWN** arrows until SD-HD TRANSLATOR is displayed on the front panel. Press **SELECT** to enter this menu. Use the **UP** and **DOWN** arrows to select the CEA-608 service (CC1, CC2, CC3, CC4, T1, T2, T3, and T4) to be translated to CEA-708. Press **SELECT** to configure. Use the **UP** and **DOWN** arrows to choose the CEA-708 service (1 through 63) or choose DISABLE to disable the option. Press **SETUP** to exit this level.

3.4.5.1. Master Control

The Master Control parameter allows GPI control to enable/disable all SD-HD closed caption translator functionality. Typical applications include automation and master control systems that require the closed caption translator to be enabled and disabled remotely. The possible options include ON (default value) or GPI.

3.4.6. Service Info Setup

The Service Information Setup allows the user to configure the Caption Service Flags and Language information that is optionally encoded in the Service Info section of CDPs. Receivers may use the service information generated by the HD9084.

Refer to section 3.4.3.3. for information on how to enable the encoding of the Service Information section in the CDPs.

3.4.6.1. Service Enable

To Enable and Disable the Service Information option, use the **UP** and **DOWN** arrows until SERVICE ENABLE is displayed on the front panel. Press **SELECT** to configure the selection. The SVC INFO can be Enabled or Disabled. The ENABLE option will enable the service. The DISABLE option will disable service information signaling for the selected service.

3.4.6.2. Set Service Flags

There are two descriptive flags that may be set for each caption service: Easy Reader and Wide Aspect Ratio. These Service Information Flags provide information to downstream devices capable of reading the Service Information section.

NONE: No caption service flags are turned on for this caption service.

EASY READER: Indicates that the captions encoded on this service are “easy reader” captions. Easy reader captions are for viewers with a lower vocabulary level (i.e. children).

WIDE ASP RATIO: Indicates that the captions are formatted for a Wide Aspect Ratio display. Each row of captions may be up to 42 characters wide, versus the typical 32.

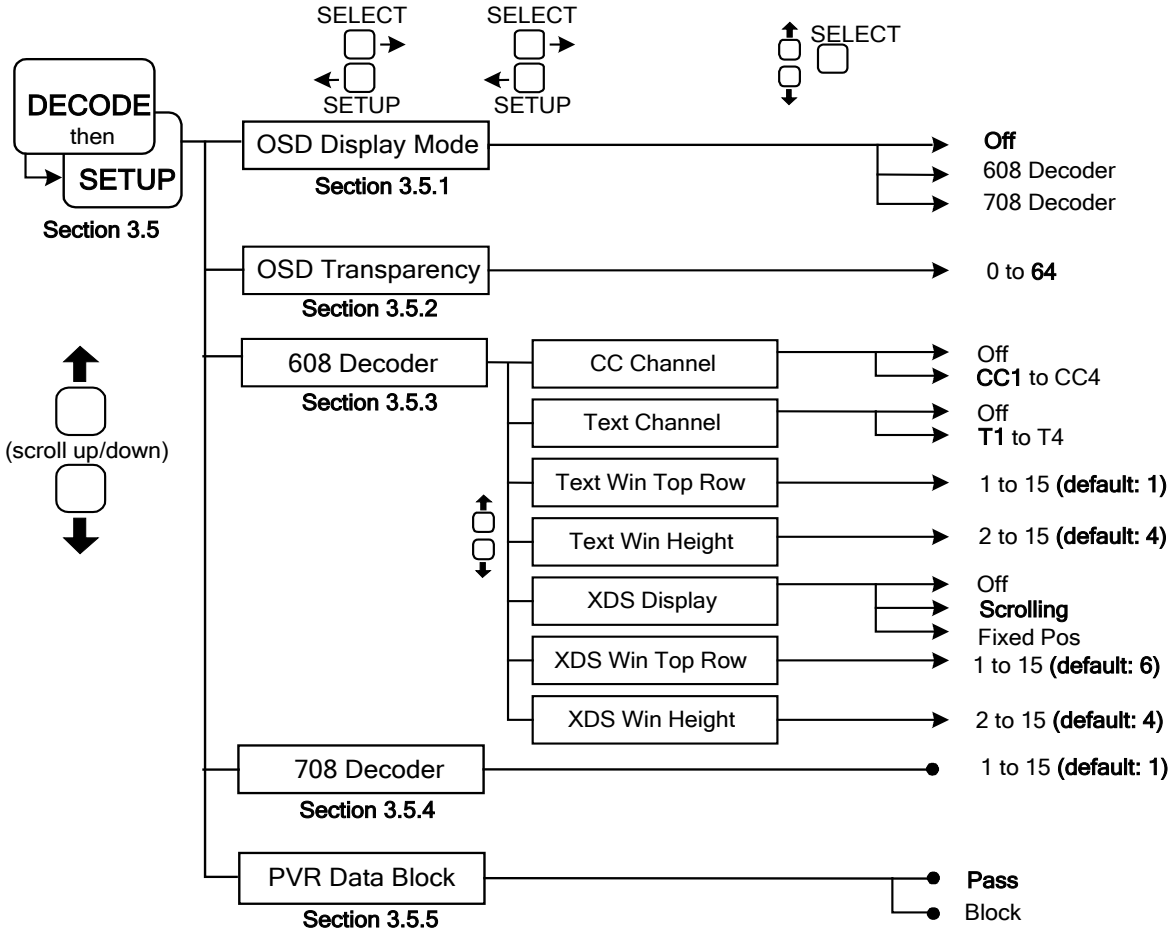
EASY-R & WIDE: Both Easy Reader and Wide Aspect Ratio flags are turned on for this service.

3.4.6.3. Set Language

The Language can be set using the HD9084. Three Language Flags are available to set English, French, and Spanish.

3.5. DECODE SETUP MENU

The Decode Menu allows the user to configure the On Screen Display (OSD) and closed caption decoders for the HD9084. The OSD feature is only available on the Composite Monitor Output BNC. To enter the Decode Setup Menu, press **DECODE** then **SETUP**. Use the **UP** and **DOWN** arrow pushbuttons to scroll through the different options as listed in sections 3.5.1 to 3.5.5. Refer to the diagram below to view a “quick reference” layout of the Decode menu system. To exit the menu system, press **SETUP** until the MENU LED is off.



3.5.1. OSD Display Mode

The OSD DISPLAY MODE option allows the user to select which OSD feature to enable. The HD9084 is capable of displaying the following information: CEA-608 captions and CEA-708 captions.

The 608 DECODER option decodes CEA-608 output captions present in either the SD-SDI video and HD-SDI signal. The captions are displayed on the Comp Mon Output. The CEA-708 DECODER option decodes output CEA-708 captions present. The captions are displayed on the Comp Mon Output. To turn off the OSD, select OFF. To configure the OSD Display, use the **UP** and **DOWN** arrows until OSD DISPLAY MODE is displayed on the front panel. Press **SELECT** to enter this option. Use the **UP** and **DOWN** arrows to scroll through the setting options. Press **SELECT** to enable the desired function. The enabled function will flash. Press **SETUP** to exit this level.

3.5.2. OSD Transparency

The OSD Transparency feature allows the user to set the opacity of OSD display. The transparency can be set from 0 to 64, 0 representing total transparency and 64 being completely opaque. To configure the OSD Display, use the **UP** and **DOWN** arrows until OSD TRANSPARENCY is displayed on the front panel. Press **SELECT** to enter this option. Use the **UP** and **DOWN** arrows to scroll through the transparency percentage. Press **SELECT** to enable the desired transparency. The enabled selection will flash. Press **SETUP** to exit this level.

3.5.3. 608 Decoder

The HD9084 is equipped with a CEA-608 Decoder which provides on-screen display of CEA-608 captions on the Composite monitoring output of the HD9084. The CEA-608 decoder is capable of displaying one CC service, one text service, and XDS packets simultaneously. The CEA-608 decoder is capable of decoding all XDS packets. To configure the CEA-608 decoder, scroll to 608 DECODER and press **SELECT**. Using the **UP and DOWN ARROWS**, scroll to the desired parameter and press **SELECT**. Sections 3.5.3.1 to 3.5.3.7 describe how to configure the 608 decoder.

3.5.3.1. CC Channel

The CC channel parameter allows the user to select the caption channel the decoder will display on the OSD. The user can select caption channels 1 through 4. The caption channel can also be turned off.

3.5.3.2. Text Channel

The Text channel parameter allows the user to select the Text channel the decoder will display on the OSD. The user can select text channels 1 through 4. The Text channel parameter can also be turned off.

3.5.3.3. Text Win Top Row

The Text Window Top Row parameter sets the window placement of the text box. Rows 1 through 15 can be selected. Row 1 is at the top of the screen and row 15 is at the bottom.

3.5.3.4. Text Win Height

The Text Window Height parameter sets the window size of the text box. Text box height 2 through 15 can be selected. Selection 2 will provide a 2 row high Text Box. Selection 15 will provide a text box that is 15 rows high.

3.5.3.5. XDS Display

The XDS display parameter selects the format that the XDS information will be displayed on. Three selections are available; OFF, SCROLLING and FIXED POS. OFF will remove the XDS window from on-screen. SCROLLING display will scroll the XDS information from top down. FIXED POS will display the XDS packets in a fixed window.

The SCROLLING mode is capable of displaying all types of XDS packets. XDS packets which are recognized will be decoded into human-readable form. XDS packet types which the HD9084 does not recognize will be displayed as raw hex bytes. The packets will scroll up in near-real-time so the operator can get an idea when the packets arrived, but they will stay on the screen long enough to be read.

3.5.3.6. XDS Win Top Row

The XDS Window Top Row parameter sets the window placement of the XDS display box. Rows 1 through 15 can be selected. Row 1 is at the top of the screen and row 15 is at the bottom.

3.5.3.7. XDS Win Height

The XDS Window Height parameter sets the window height of the XDS display box. XDS box height 2 through 15 can be selected. Selection 2 will provide a 2 row high Text Box. Selection 15 will provide an XDS display box that is 15 rows high.

3.5.4. 708 Decoder

The HD9084 is equipped with a CEA-708 Decoder which provides on-screen display of HD captions on the Composite monitoring output of the HD9084. The user can select which CEA-708 service to decode (service 1 to 15) via the Decode menu. To choose the service to decode, scroll to 708 DECODER and press **SELECT**. Using the **UP** and **DOWN ARROWS**, scroll to the service desired and press **SELECT**. The default service is 1. The information below outlines the CEA-708 decoder capabilities.

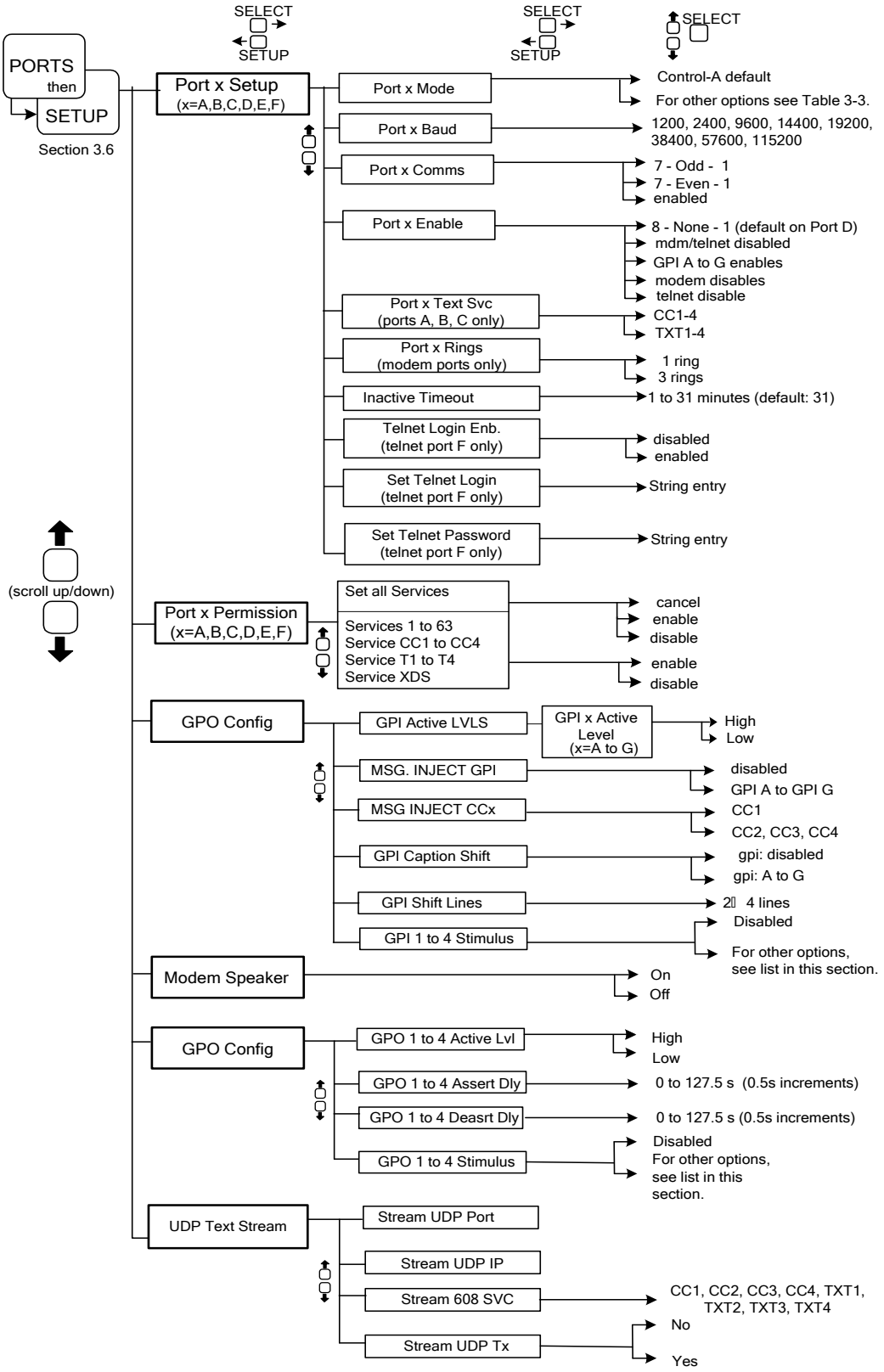
Characters	• Supports parsing the entire code space as specified in section 7 of the standard, but due to font limitations, the glyphs for the G0 and G1 code spaces are not complete.
Windows	• Support for the full eight windows.
	• Anchor points and relative positioning are supported.
Window Attributes	• No window priorities.
	• No overlapping windows.
	• Only LEFT justification is supported.
	• Only LEFT_TO_RIGHT print direction.
	• Only TOP_TO_BOTTOM scroll direction.
	• No word-wrapping support.
	• No display effects
	• Support for fill colour and opacity of up to 4 simultaneous windows.
	• No borders.
Pen Attributes	• Only STANDARD pen size is supported.
	• Only DEFAULT font style is supported.
	• No text tag support.
	• No offset (super-, and sub-script) support.
	• Italics are supported.
	• Underline is supported.
	• No edge type support.
Pen Colours	• Foreground and background colours and opacities are supported for up to 4 simultaneous pens.

Table 3-2: CEA-708 Decoder Specifications and Limitations

3.5.5. PVR Data Block

The PVR Data Block feature allows the user to block out PVR data control packets “hidden” within CEA-608 caption data. The possible options include pass or block. The default setting for this control is pass.

3.6. PORTS SETUP MENU



The Ports Menu allows the user to configure the input/output settings of Ports A through F. Ports A, B, and C are RS232/422 serial ports, Ports D and E (optional) are telephone modems, and Port F is a telnet server via the Ethernet port. Please refer to section 2.1 for rear panel layout.

To enter the Ports Setup Menu, press **PORTS** then **SETUP**. Use the **UP** and **DOWN** arrow pushbuttons to scroll through the different options as listed in sections 3.6.1 to **Error! Reference source not found.**. Refer to the diagram below to view a "quick reference" layout of the Ports menu system. To exit the menu system, press **SETUP** until the MENU LED is off.

For more information on "MSG. INJECT GPI" and "MSG. INJECT CCx" menu items, please refer to section 4.7.

3.6.1. Port x Setup (x= A,B,C,D,E,F)

Port x Setup allows the user to set the mode, baud, and communication separately for each port. To enter the Port x Setup sub-menu, use the **UP** and **DOWN** arrows until Port x Setup is displayed on the front panel. Press **SELECT** to enter the sub-menu. The following options are available in the Port x Setup sub-menu. To see a "quick reference" layout of the menu system, please refer to section 3.6. Press **SETUP** to exit this level.

Port E exists if +MDM2 option is ordered. Port E functions the same as Port D.

3.6.1.1. Port x Mode

Port x Mode configures the output of Ports A through F. The following is a list of the available settings:

PORT	Port A	Port B	Port C	Port(s) D, E, F
OUTPUT	▪ **Control A** ▪ Echo Port B ▪ Echo Port C ▪ Echo Modem D ▪ Echo Telnet F ▪ 608 Xmit Out ▪ CDP Xmit Out ▪ ASCII Text Out	▪ **Control A** ▪ SMPTE – 333M Out ▪ G. Alliance Out ▪ Echo Port A ▪ Echo Port C ▪ Echo Modem D ▪ Echo Telnet F ▪ 608 Xmit Out ▪ CDP Xmit Out ▪ ASCII Text Out	▪ **Control A** ▪ Dolby Meta In ▪ Echo Port A ▪ Echo Port B ▪ Echo Modem D ▪ Echo Telnet F ▪ 608 Receive In ▪ 608 Xmit Out ▪ CDP Receive In ▪ CDP Xmit Out ▪ ASCII Text Out	▪ **Control A**

Table 3-3: Port Mode Options

To enter the Port x mode option, use the **UP** and **DOWN** arrows until Port x Mode is displayed on the front panel. Press **SELECT** to enter this option. The user can now choose the output of the port using the **UP** and **DOWN** arrows. Press **SELECT** to enable the setting. The enabled setting will flash. Press **SETUP** to exit this level.

When Port C mode is set to "Dolby Metadata In" the baud rate is forced to 115200bps, 8-N-1. Port C must be configured for RS-422 communication.

3.6.1.2. Port x Baud

The Port x Baud option sets the baud rate of the selected port. Baud rates for all protocols have been pre-programmed. Always check to make sure the desired baud rate is selected when a different protocol is selected. Baud Rate is not applicable to telnet Port F.

Baud Rate on Ports A through C: **1200**, 2400, 9600, 14400, 19200, 38400, 57600, 115200.
Baud Rate on Port D/E: auto, 1200, **2400**, 9600.

If the baud rate of modem Port D/E is changed while the modem is in use, the new baud rate will not take effect until the caller disconnects from the modem.

3.6.1.3. Port x Comms

Port x Comms configures the communication settings, namely word size and start bits, of each port. This menu is not applicable to telnet port F. The default settings are shown below:

8-None-1 (default on Port D/E)
7-Odd-1 (default on Ports A through C)
7-Even-1

3.6.1.4. Port x Enable

The Port x Enable control allows the user to individually enable or disable the communication ports. A port may be explicitly enabled or disabled, enabled based on the state of a GPI pin, or enabled only when the modem(s) or telnet (Port F) are not in use.

Options are:

- Port Enabled
- Port Disabled
- GPI A-G Enables
- Modem Disables
- Telnet Disables
- Modem/Telnet Disables

The "Modem Disables", "Telnet Disables" and "Modem/Telnet Disables" selections will cause the indicated port to become disabled when the modem (Ports D, E) or telnet session (Port F) are in use. This would typically be selected for a port that is connected to a teleprompter, so that a remote real-time captioner can over-ride the teleprompter to caption live events.

The affected communications port will not be disabled until the modem or telnet port receives a character in the range ^A through ^G, indicating the start of a Control-A protocol command. This allows a live captioner to connect ahead of their allotted start time without disrupting teleprompter captioning in progress.

3.6.1.5. Port x Text Svc

This control is only available for ports A, B and C. This feature allows the user to set the desired caption service to use when the corresponding Port Mode is set to *ASCII Text Out*. The specified caption service will be output from the port as plain ASCII text with CEA-608 control codes removed.

3.6.1.6. Port x Rings

This control is only available for modem Ports D and E (optional). Each modem can be configured to answer the telephone line after 1 or 3 rings. This allows redundancy by connecting both modems to the same phone line, or two separate caption encoders to the same phone line. The modem which is set to "1 ring" will be the primary modem, and the one set to "3 rings" will be a backup.

3.6.1.7. Inactive Timeout

Each port has an inactivity timer that will force it to reset automatically if no data is received before the timeout period expires. The timeout period is adjustable from 1 to 31 minutes. When this feature is enabled, operators should set this to be longer than the longest expected time that a remote captioner may sit without sending any captions to the HD9084, such as through a commercial segment.

No data received before the timeout will cause the port reset as if the ^F^F command was issued. The Control-A interface will be forced to Command state and will relinquish control of any assigned caption services. It will also end any special settings, such as blocking of upstream captions that were issued from the respective port. This timeout will NOT cause a modem or telnet session to be closed.

3.6.1.7.1. Port F Disconnect Timeout

Telnet port F has an inactivity time that will cause it to disconnect if no data is received before the timeout period expires. This allows the port to reset automatically if the connection is lost. The timeout period is adjustable from 1 to 31 minutes.

3.6.1.8. Telnet Login Enable (Port F only)

When a remote system connects via telnet, the HD9084 optionally queries for a login name and password. The Telnet Login Enb menu item enables or disables the login and password authentication. The default setting is disabled. See sections 3.6.1.9 and 3.6.1.10 for setting the login name and password text.

3.6.1.9. Set Telnet Login (Port F only)

This control sets the login name that is used when telnet login and password authentication is enabled. The character being adjusted will be flashing. Press **UP** and **DOWN** arrows to change the character. Available characters are upper-case letters, lower-case letter, and numbers 0-9. A hash (#) character indicates the end of the string, and is not part of the login name itself. Press **SELECT** to advance to the next character. Press **SETUP** to exit when you are done.

3.6.1.10. Set Telnet Password (Port F only)

This control sets the password that is used when telnet login and password authentication is enabled. The character being adjusted will be flashing. Press **UP** and **DOWN** arrows to change the character. Available characters are upper-case letters, lower-case letter, and numbers 0-9. A hash (#) character indicates the end of the string, and is not part of the password itself. Press **SELECT** to advance to the next character. Press **SETUP** to exit when you are done.

3.6.2. Port x Permissions (x= A,B,C,D,E,F)

The Port x Permission option allows the user to enable/disable CEA-608 and CEA-708 services on each of the ports. CEA-608 services include CC1, CC2, CC3, CC4, T1, T2, T3, T4, and XDS. CEA-708 includes services 1 through 63. Each of these services can be enabled or disabled separately. See sections 3.6.2.1 and 3.6.2.2 to configure these settings. All services are enabled by default.

3.6.2.1. Set All Services

Set all Services allows the user to enable or disable all services at once. The Enable setting will enable all services for both CEA-608 and CEA-708. Disable will disable all services in both CEA-608 and CEA-708. After choosing Enable or Disable and pressing **SELECT**, the choice will change back to Cancel.

3.6.2.2. Service # (1-63, CC1-4, T1-4, XDS)

Each service can be individually enabled or disabled. CEA-608 services are CC1, CC2, CC3, CC4, T1, T2, T3, T4, and XDS. CEA-708 services are 1 through 63.

3.6.3. Modem Speaker

An onboard modem speaker has been provided for monitoring modem activity, to verify that the modem is connecting properly during dial-up captioning. The user can turn the modem speaker on or off.

3.6.4. GPO Config

The GPO Configuration control is used to define specific behaviour of the GPOs. To enter the GPO setup sub-menus, use the **UP** and **DOWN** arrows until GPO Config is displayed on the front panel. Press **SELECT** to enter the sub-menu. The following options are available in the GPO Config setup sub-menu. Refer to sections 3.6.4.1 to 3.6.4.4.

3.6.4.1. GPO 1 to 4 Active Lvl

The GPO active level can be defined based on the requirements of the application. The active level can be set to high or low. The default setting is low.

3.6.4.2. GPO 1 to 4 Assert Delay

The GPO assertion time can be delayed. This control is useful in time critical automation control systems. The GPO x Assert Dly has a range of 0 to 127.5s, which can be adjusted in increments of 0.5s. The default setting is 0. See Figure 3-2 for an example of how this setting affects the GPO output.

3.6.4.3. GPO 1 to 4 Deassert Delay

The GPO de-assertion time can be delayed. This control is useful in time critical automation control systems. The GPO x Assert Dly has a range of 0 to 127.5s, which can be adjusted in increments of 0.5s. The default setting is 0. See Figure 3-2 for an example of how this setting affects the GPO output.

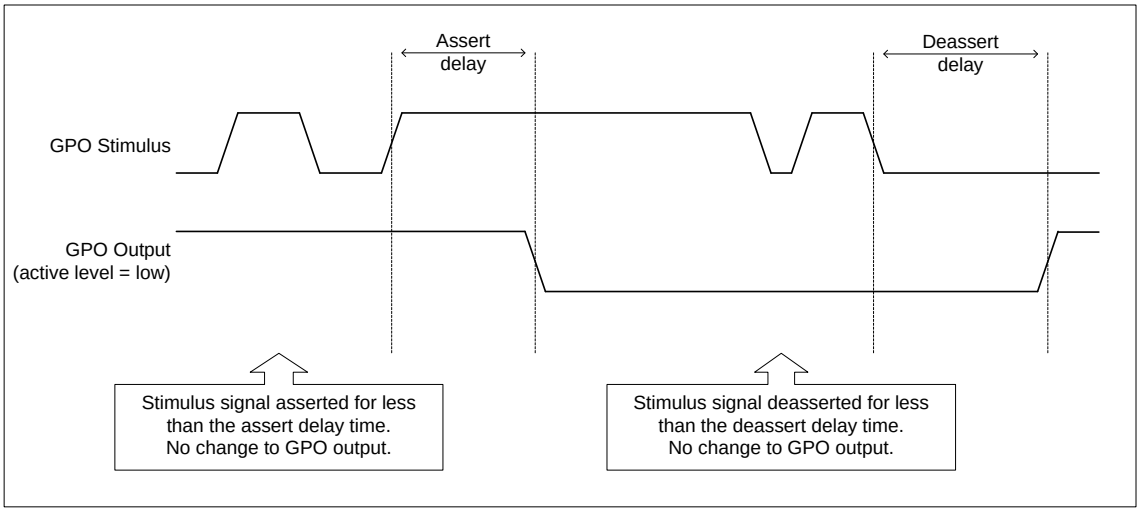


Figure 3-2: GPO Example Using Assert and Deassert Delays

3.6.4.4. GPO 1 to 4 Stimulus

The HD9084 offers different stimuli to assert a given GPO. This control defines what condition will cause the GPO to become asserted. Possible stimuli include:

- Disabled
- ½ Hz Wfm
- SD Video Present
- HD Video Present
- SD 608 Fld1 wfm
- SD 608 Fld2 wfm
- SD VANC CDP det
- HD VANC CDP det
- Port (A to F) RxD
- Fault Tally
- CC1 to CC4 Data In
- T1 to T4 Data In
- XDS Data In
- 708 Data In
- Modem D Online
- Modem E Online
- Telnet F Active

The default setting is Disabled.

3.6.5. GPI Config

The GPI Configuration control is used to define specific behaviour of the GPIs. To enter the GPI setup sub-menus, use the **UP** and **DOWN** arrows until GPI Config is displayed on the front panel. Press **SELECT** to enter the sub-menu. The following options are available in the GPI Config setup sub-menu. Refer to sections 3.6.5.1 to 3.6.5.5.

3.6.5.1. GPI Active LVLS

This control allows the user to set the GPI active levels.

3.6.5.1.1. GPI x Active Level (x= A,B,C,D,E,F,G)

GPI's A through G can be configured using this menu. The **x** represents GPI's A through G. GPI's A through G can be configured either active High or active Low.

3.6.5.2. GPI Caption Shift

The GPI caption shift feature allows the user to shift the baseline of the CEA-608 captions up by 2, 3 or 4 rows. This feature is used when weather crawl information is keyed onto the SD-SDI video. GPI's A through G can be selected to enable or disable this function.

3.6.5.3. GPI Shift Lines

This control adjusts the number of rows to move the captions when the GPI Caption Shift feature is enabled. Options are 2, 3 or 4 rows.

3.6.5.4. Message Inject GPI

This control allows the user to setup a GPI to control insertion of the text message by selecting the GPI that will control this feature. For further details on the Message Inject feature please refer to section 4.7.2.

3.6.5.5. Message Inject CCx

This control allows the user to select which CC channel the message is injected onto, the factory default is "CC1". For further details on the Message Inject feature please refer to section 4.7.2.

3.6.6. UDP Text Stream

The UDP Text Streaming feature allows the user to select a CEA-608 service to convert to plain ASCII text and stream out on the network via UDP IP packets. To enter the UDP Text Stream sub-menus, use the **UP** and **DOWN** arrows until UDP Text Stream is displayed on the front panel. Press **SELECT** to enter the sub-menu. The following options are available in the UDP Text Stream sub-menu. Refer to sections 3.6.6.1 to 3.6.6.4.

3.6.6.1. Stream UDP Port

This control sets the UDP port number for the stream.

3.6.6.2. Stream UDP IP

This control sets the UDP IP Address for the stream.

3.6.6.3. Stream 608 Svc

This control allows the user to set the CEA-608 services from the following choices; CC1, CC2, CC3, CC4, T1, T2, T3 or T4.

3.6.6.4. Stream UDP Tx

This control allows the user to enable or disable the UDP Transmit feature.

3.7. TIME SETUP MENU

The Time Setup menu configures all time display/encode/decode functions of the HD9084. To enter the Time Setup menu, press **TIME** then **SETUP**. Use the **UP** and **DOWN** arrows to scroll through the different options listed in sections 3.7.1 and 3.7.3. Refer to the diagram below to view a "quick reference" layout of the Time menu system. To exit the menu system, press **SETUP** until the MENU LED is off.

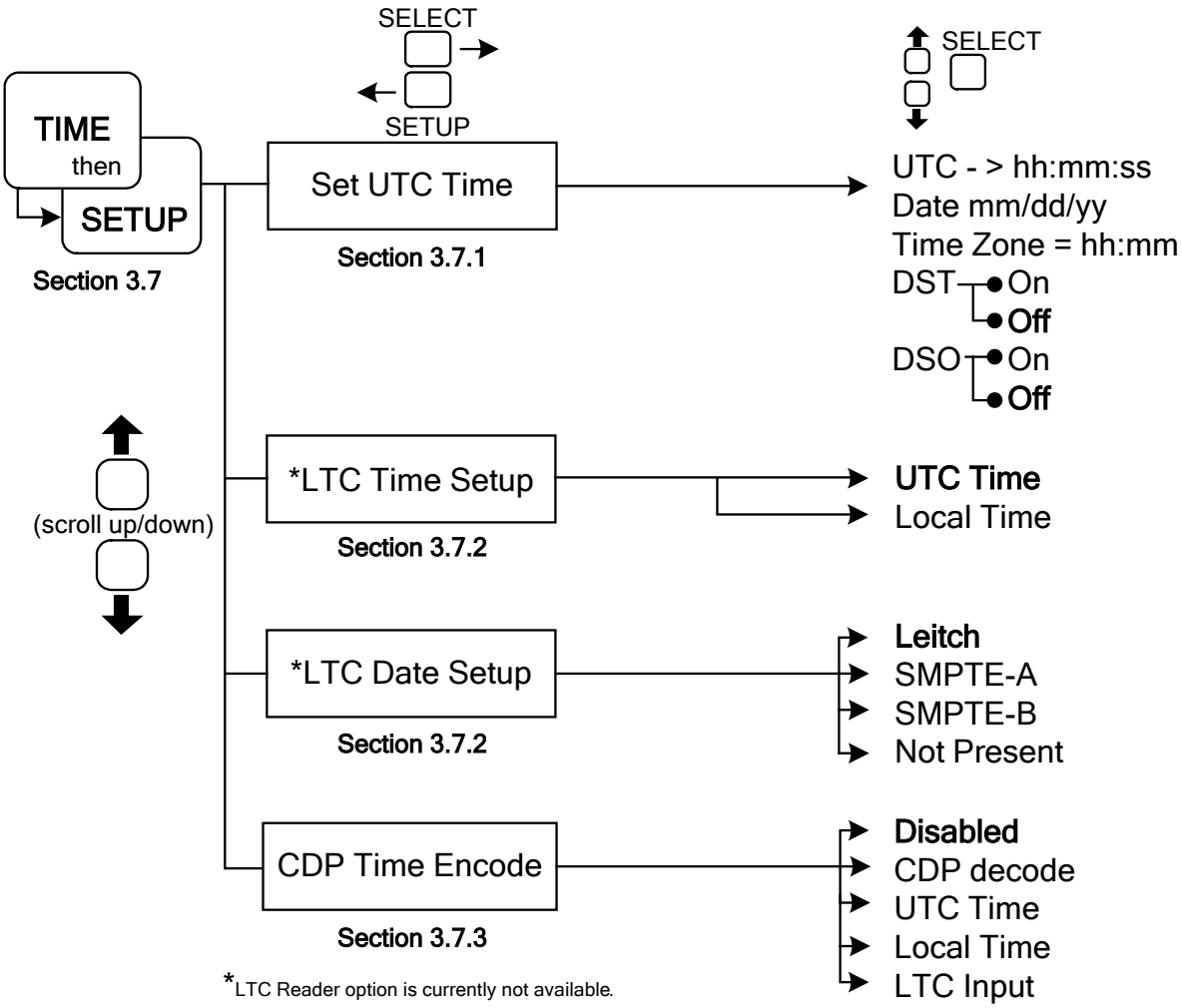


Figure 3-3: Time Setup Menu

3.7.1. Set UTC Time

The Universal Time, Coordinated (UTC) is an international time standard that defines a time that does not depend on where we are on Earth. Universal Time (UTC), Greenwich Mean Time (GMT), and Zulu Time (Z), are based at the prime meridian (0° longitude) of Earth and are used to avoid confusion of time zones.

To set the UTC time, use the **UP** and **DOWN** arrows to scroll to SET UTC TIME and press **SELECT**. The user can now configure time, date, time zone, DST, and DSO. The configuration screens will cycle as followed:

UTC -> 00:00:00
DATE 00/00/0000
TIME ZONE=00:00
DST=OFF DSO=OFF

The flashing characters indicate a selection and can be configured using the **UP** and **DOWN** arrows. When the desired setting is selected, press **SELECT** to enable the setting. Repeat the process until all desired settings have been altered. Press **SELECT** to skip configuring a setting. Once the user has cycled through the UTC menu, SET UTC TIME will be displayed on the front panel. Press **SETUP** to exit this level.

3.7.1.1. Daylight Saving Time Explained

Daylight Saving Time (DST) was instituted to take advantage of the later hours of daylight between March and November. In 1966, the U.S. Congress passed the Uniform Time Act that standardized the length of Daylight Saving Time. Daylight Saving Time begins at 2 a.m. local time on the second Sunday of March. Time reverts to standard time at 2 a.m. local time on the first Sunday of November. In the spring, clocks *spring* forward by 1 hour to 3 a.m.; in the fall clocks *fall* back by 1 hour to 1 a.m. Arizona, Hawaii and most of Indiana have chosen not to observe Daylight Saving Time.

People often consider daylight saving time to be an event that happens twice a year, setting their clocks ahead or back by one hour. In reality, DST is *in effect* (ON) for six months of the year and *not in effect* (OFF) for the other six months, in regions that observe DST.

There are two XDS packets defined by CEA-608-B for encoding time and date information. The *Time of Day* packet (0701) encodes the **UTC time** and contains a flag bit (**DST Flag**) that is to be set when Daylight Saving Time is *in effect* (i.e. between the second Sunday of March and the first Sunday of November).

The *Time of Day* packet must be inserted locally at each affiliate station if implemented so that the correct time is encoded when programs are aired at different times across the network. The *Time Zone* packet (0704) encodes the **time zone offset** from UTC time and contains a flag bit (**DSO Flag**) that is to be set when the entire area served by the signal observes Daylight Saving Time. When the DSO Flag bit is set to Off, it means that the DST Flag bit in the *Time of Day* packet will be ignored by the VCR. The *Time Zone* packet must be inserted locally at each affiliate in order to encode the correct time zone offset for the region.

(For more information, refer to the “XDS Time of Day” document located on the website at: http://www.evertz.com/resources)

3.7.2. LTC Reader Option

LTC Time Setup: Used to configure whether the time input to the LTC Reader port is Local or UTC time.

LTC Date Setup: Used to configure the format of date and time zone information contained in the LTC user bits, if any.

Currently, the LTC Reader Option is not available; therefore, these menu items do not have any practical application.

3.7.3. CDP Time Encode

The CDP Time encode parameter provides the ability to select and encode time information into the time section of the output CDP. The default setting for this control is disabled. To configure this option, use the **UP** and **DOWN** arrows until CDP TIME ENCODE is displayed on the front panel. Press **SELECT** to enter this option and use the **UP** and **DOWN** arrows to configure the state or control mode. Press **SELECT** to enable the selection. The enabled setting will flash. Press **SETUP** to exit this level.

3.8. GENERAL SETUP MENU

The General Setup menu has the following options: Load and store presets, reset the unit, upgrade the firmware, and check the current version of firmware on the HD9084. To enter the General Setup menu, press **GENERAL** then press **SETUP**. Use the **UP** and **DOWN** arrow pushbuttons to scroll through the different options. Press **SETUP** a second time to exit this level.

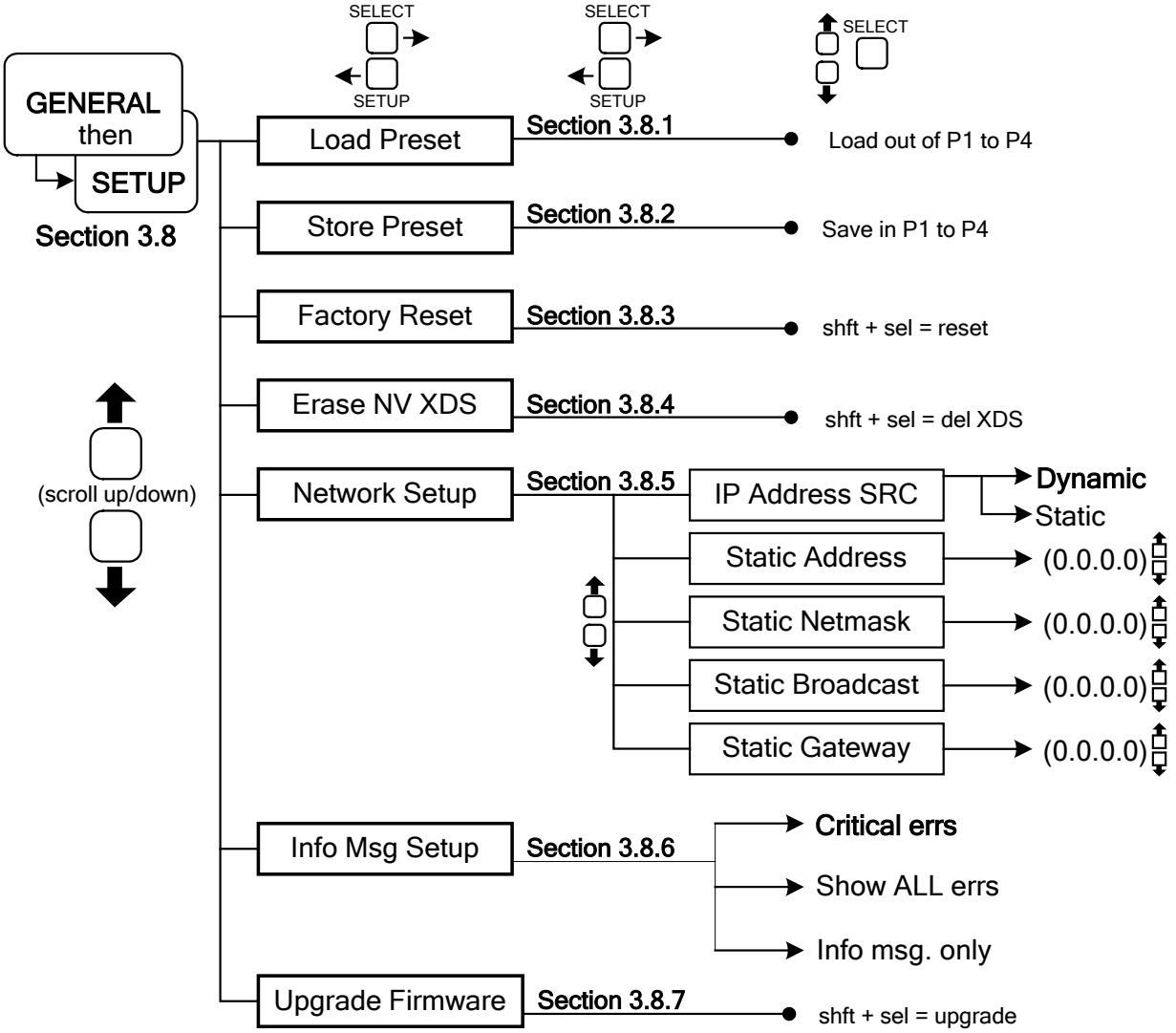


Figure 3-4: General Setup Menu

3.8.1. Load Preset

To load a desired preset, enter the General Setup menu and scroll to LOAD PRESET using the **UP** and **DOWN** arrow pushbuttons. Press **SELECT** to enter the LOAD PRESET option and use the **UP** and **DOWN** arrow pushbuttons to scroll through the presets. Choose which preset you would like to load and press **SELECT**. The preset is now loaded. To save presets, please refer to section 3.8.2.

3.8.2. Store Preset

To store a preset, first set the HD9084 to the desired settings. Enter the General Setup menu and scroll to the STORE PRESET option using the **UP** and **DOWN** arrows. Press **SELECT** to enter the STORE PRESET option and use the **UP** and **DOWN** arrow pushbuttons to choose a number to store the preset. Once a preset number is chosen, press **SELECT** to store the preset configuration to the desired number. A maximum of 4 presets can be stored. To load the saved presets, please refer to section 3.8.1. Press **SETUP** to exit this level.

The HD9084 is constantly monitoring the state of the system. When the user selects a particular configuration, the settings are written into flash memory. If a power outage occurs, the settings are automatically restored upon power up. The user may erase the flash by executing a factory reset. See section 3.8.3.

The user must exit out of the menu system in order for the changed settings to be stored into flash memory.

3.8.3. Factory Reset

The Factory Reset option is used to set the HD9084 back to the factory default setting. To reset the HD9084, enter the general menu and use the **UP** and **DOWN** arrow pushbuttons to scroll to the FACTORY RESET option. Press **SELECT** to enter the FACTORY RESET option. To reset the unit, the user must press **SHIFT + SELECT** in order to reset the unit to factory settings. Press **SETUP** to exit this level.

3.8.4. Erase NV XDS

The Erase NV XDS option removes XDS articles from memory. These articles would be stored in memory during a power loss. To clear the memory of articles, use the **UP** and **DOWN** arrows until Erase NV XDS is displayed on the front panel and press **SELECT**. The front panel will instruct the user to press **SHIFT + SELECT** to complete the process. Press **SETUP** to exit this function.

3.8.5. Network Setup

The Network Setup menu has five network parameters that need to be configured for network use.

The HD9084 network port is used to ingest control-A caption data via a telnet connection.

3.8.5.1. IP Address Source

The IP Address SRC parameter defines the type of IP address used by the HD9084. Possible options include either dynamic or static. The dynamic option should be used when a DHCP server will assign the IP address of the HD9084. The static option should be used if a dedicated IP address will be assigned to the HD9084. The default setting for this control is dynamic.

3.8.5.2. Static Address

The Static Address parameter defines the unique IP address used by the HD9084 within the network. 192.168.1.XXX is an example of an IP address defined within a private (internal) network. Take care not to define the same IP address for multiple devices that reside on the same network. To configure this option, enter the NETWORK SETUP sub-menu and use the **UP** and **DOWN** arrows until STATIC ADDRESS is displayed on the front panel. Press **SELECT** to enter this option and use the **UP** and **DOWN** arrows to configure the individual network address octets. Press **SELECT** to proceed to the next octet. Press **SETUP** to exit this level.

3.8.5.3. Static Netmask

The Static Netmask parameter defines the "subnet mask" of the network. Specifically, this parameter outlines all the IP addresses that can communicate with the HD9084. To configure this option, enter the NETWORK SETUP sub-menu and use the **UP** and **DOWN** arrows until STATIC NETMASK is displayed on the front panel. Press **SELECT** to enter this option and use the **UP** and **DOWN** arrows to configure the individual network address octets. Press **SELECT** to proceed to the next octet. Press **SETUP** to exit this level.

3.8.5.4. Static Broadcast

The Static Broadcast parameter defines the broadcast address used by the HD9084. The broadcast address is an IP address that allows information to be sent to all machines on a given subnet rather than a specific machine. To configure this option, enter the NETWORK SETUP sub-menu and use the **UP** and **DOWN** arrows until STATIC BROADCAST is displayed on the front panel. Press **SELECT** to enter this option and use the **UP** and **DOWN** arrows to configure the individual network address octets. Press **SELECT** to proceed to the next octet. Press **SETUP** to exit this level.

3.8.5.5. Static Gateway

The Static Gateway parameter defines the IP address of the gateway or "router" that resides on the network. A gateway is used to connect 2 IP-based networks together. If data that is destined for the HD9084 resides on a different network, then the IP address of the gateway must be defined. To configure this option, enter the NETWORK SETUP sub-menu and use the **UP** and **DOWN** arrows until STATIC GATEWAY is displayed on the front panel. Press **SELECT** to enter this option and use the **UP** and **DOWN** arrows to configure the individual network address octets. Press **SELECT** to proceed to the next octet. Press **SETUP** to exit this level.

To communicate beyond the private (internal) network and into the internet, all messages must be relayed via the gateway (firewall). As a result, the firewall must be configured separately by the end-user to facilitate communication. Consult your network administrator if establishing communication link beyond the private network.

3.8.6. Info Msg Setup

The Info Messages Setup parameter is used to enable or disable filtering of system information shown on the front panel display.

Options are:

- Info Msg. Only (informative messages only)
- Critical errors (informative messages and critical/fatal errors only)
- **Show ALL Errors (default)**

3.8.6.1. Critical errs

The Critical Errors parameters will only display critical and fatal error messages on the front panel. Messages of this type include caption protocol errors and fatal CDP errors.

3.8.6.2. Show ALL errs

The Show All Errors parameter will disable all filtering of error and diagnostic messages. If the HD9084 detects an error or is ready to provide an informative message, it will display the message on the front panel.

3.8.6.3. Info Msg Only

The Info Message Only parameter will filter out all messages except informative status messages. Messages of this type may include Modem Online, Caption status, etc.

3.8.7. Upgrade Firmware

The HD9084 can be upgraded in one of two ways. The first method is via the front panel menu system. Please refer to section 5.2 for full upgrade instructions. The user can also power cycle the unit causing the system to enter the boot loading application routine.

3.9. FRONT PANEL INFORMATIVE MESSAGES

3.9.1. Control-A Protocol Fault Messages

COMMAND ERROR (E1)	Indicates the command is not recognized.
FORMAT ERROR (E2)	Indicates the command parameter is not recognized.
MEMORY ERROR (E3)	Indicates the HD9084 is out of memory for text or XDS article storage.
ARTICLE ERROR (E6)	Indicates article name does not exist and/or article is invalid.
PERMISSION ERROR (E9)	Indicates a data stream is already allocated to another port.

Table 3-4 : Control-A Protocol Faults

3.9.2. SMPTE-333 Protocol Fault Messages

SMPTE333 INVALID	Indicates unrecognized character from the ATSC video encoder.
SMPTE333 NAK ERR	Indicates the ATSC video encoder has sent a negative acknowledgement in response to a SMPTE-333M packet sent by the HD9084
SMPTE333 OVERFLW	Indicates SMPTE-333M data buffer in the HD9084 has overflowed because the ATSC video encoder is not polling fast enough for data packets.
SMPTE333 TIMEOUT	Indicates that 500ms have elapsed waiting for an Acknowledge signal from the ATSC video encoder, in response to a SMPTE-333M packet sent by the HD9084.

Table 3-5: SMPTE-333 Protocol Faults

3.9.3. Caption Distribution Packet (CDP) Fault Messages

Non-fatal CDP error messages are listed in Table 3-6. These errors indicate corrupt CDP's before any processing by the HD9084. The HD9084 can account for these problems and properly clean and re-format the data on the output. This is done automatically and troubleshooting will not be required.

CDP RESERVED ERR	Indicates "reserved" bits in the CDP do not have the correct value.
CDP TIMECODE ERR	Indicates the Timecode section contains invalid data.
CDP SVCINFO ERR	Indicates the Service Info section contains invalid data
CDP TIME MISSING	Indicates that a Timecode section was expected, but the CDP did not actually contain a Timecode section.
CDP CCDATA MISSN	Indicates that a Caption data section was expected, but the CDP did not actually contain a Caption data section.
CDP SVCINFO MSSN	Indicates that a Service Info section was expected, but the CDP did not actually contain a Service Info section.
CDP COUNT DISCO	CDP header count discontinuity. Successive CDPs in the video contain a counter which is supposed to increment by +1. This fault indicates a discontinuity in the counting sequence.

Table 3-6 : Non-fatal CDP Faults

Critical/fatal error messages are listed in Table 3-7. These errors indicate invalid/corrupt CDP's before any processing by the HD9084. Troubleshooting needs to occur physically upstream of the HD9084. These errors are unrecoverable and the CDP will be discarded entirely on the output of the HD9084.

CDP BAD SECTION	Indicates an unknown section ID has been encountered.
CDP BAD CDP ID	Indicates a CDP does not start with the 0x9669 data ID.
CDP DATA COUNT	Indicates an invalid data count in the CDP section.
CDP LENGTH BAD	Indicates the actual CDP length does not match the data count.
CDP CHECKSUM	Indicates the calculated checksum does not match the indicated checksum.
CDP FRAME RATE	Indicates the value for the FRAME RATE in the header section is invalid.
CDP COUNT BAD	Indicates the CDP counter value in the header section is not the same as the value in the footer section.

Table 3-7 : Critical/Fatal CDP Faults

3.9.4. Input Caption Fault Messages

608 PARITY BAD	Indicates a parity error in CEA-608 caption data read from upstream video. You may also see this if there is excessive noise on SD line-21 or the caption level is too low.
HD INPUT OVERFLW	Indicates that the volume of HD caption data coming in from upstream video has exceeded the ability to re-encode it, causing the internal buffers to overflow. This may occur as a result of the buffers being too small (code problem) or a result of oversize CDPs encoded in the upstream video (CDP/video problem).

Table 3-8 : Input Caption Faults

3.9.5. Serial Port Fault Messages

SERIAL OVERFLOW **SERIAL OVERRUN**	Indicates that data sent via serial port or modem has exceeded the size of the buffer to hold it, and was lost.
SERIAL UNDERFLOW	Indicates that the CPU attempted to get data from the serial port input buffer, but there was none available.
SER FRAMING ERR **SER PARITY ERROR**	Indicates that communication settings of the HD9084 serial port or modem and the remote system are not identical. You may see this error if the baud rates are different as well.

Table 3-9 : Serial Port Faults

3.9.6. Dolby Metadata Fault Messages

DOLBY PACKET ERR	Indicates that an invalid/improperly formatted Dolby Metadata packet has been detected. The invalid packet will be passed.
DOLBY PACKET MISSING	This error will appear when serial port C is placed in "Dolby Metadata In" mode of operation, and Dolby Metadata packets are not detected. No packets will be inserted until the HD9084 detects Dolby Metadata.

Table 3-10 : Dolby Metadata Faults

3.9.7. System Fault Messages

PRESET LOAD ERR	These error messages indicate an error loading/saving presets to the non-volatile storage memory. Possibly correctable by performing a factory reset, or resetting preset storage from the bootloader.
PRESET SAVE ERR	

Table 3-11 : Preset Faults

PLD ERR NO FILE **PLD ERR DONE PIN** **PLD ERR DONE PIN** **PLD ERR FILE CRC** **PLD BAD REVISION**	These error messages indicate errors related to Programmable Logic Devices (CPLD/FPGA) on the main board. These errors typically indicate hardware problems that will require service.
SD INT. LOST! **HD INT. LOST!**	These error messages indicate that an SD or HD video interrupt has been missed. As a result, caption data may have been corrupted. These errors typically indicate hardware problems that will require service.

Table 3-12 : Hardware Faults

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4. CONTROL-A SERIAL PROTOCOL

The following sections describe the control protocol used by the HD9084 closed caption encoder. It is often referred to as the "Control-A Protocol" because most commands begin with a control-A character. The control-A character is abbreviated as **^A**. Section 4.1 provides a quick reference table to the command set. Sections 4.2 to 4.6 provide a full description of the commands with examples.

4.1. COMMAND QUICK REFERENCE

Control-A Command Quick Reference			
	Command	**Function**	**Section**
Control & Status	^A?	Report Firmware Version	4.3.6
	^Ac	Set/Report Time of Day	4.3.10
	^Ad	Set/Report Date	4.3.11
	^AE	Set Output Line	4.3.3
	^Al	Set Baud Rate	4.3.1
	^AH	Command Help Message	4.3.7
	^AM	Controlling the Caption Decoder	4.3.5
	^AA	Display System Status	4.3.16
	^AS	Report Bypass Status	4.3.8
	^AY	Report Battery Status	4.3.9
	^A5	Monitor Encoded Data	4.3.4
	^F^F	Reset Encoder	4.3.2
Captioning State	^A2	Real Time State	4.3.15
	^A3	Direct Control State	4.3.14
	^A6	Null State	4.3.13
	^A7	Transparent State	4.3.12
Text Articles	^A0	Input Article	4.4.1
	^A1	Output Article	4.4.2
	^A4	Delete article	4.4.3
	^A8	Queue Articles	4.4.4
	^A9	Display Article Status	4.4.5
	^AB	Display Output Queue	4.4.6
XDS Encoding	^AP	Input XDS Article	4.5.1
	^AP	Block Upstream XDS Packet	4.5.2
	^A8	Queue XDS Packets	4.5.3
	^AP	Delete XDS Packets	4.5.4
Comm. Port Control	^AQ	Show Port Permission Maps	4.6.1
	^AQ	Alter Port Permission Maps	4.6.2
	^AO	Show Ports Active Maps	4.6.3
	^AO	Alter Ports Active Maps	4.6.4
	^Ar	Reset Port	4.6.5
	^AG	Set or Display Message	4.7.1

Table 4-1: Control-A Command Quick Reference

4.2. COMMAND SYNTAX DESCRIPTION

The Command line shows the required information in **bold underlined text**. Optional parameters are shown in **bold normal text**. The default line shows the parameter values that will be invoked if the optional parameter(s) are omitted. Many of the commands use control characters which are indicated by a carat character '^' preceding a letter. (E.g. Control-A is shown as ^A). Other special characters are shown enclosed in <brackets>. (See section 4.2.1 for a description of the control characters and special characters and their ASCII values). (All ASCII values are shown in hexadecimal notation). Parameters are shown in lower case. (See section 4.2.2 for a description of the parameters and their values). All upper case alphanumeric characters that are not preceded by the carat or enclosed in brackets are to be interpreted as individual characters. (E.g. F1 is an 'F' followed by a '1').

4.2.1. Special Characters

Most commands use control characters to communicate with the encoder. The chart below shows the designators for the control characters and other special characters that are used in the command descriptions:

Designator	Name	ASCII Values (Hex)
^A	Control-A	01
^B	Control-B	02
^C	Control-C	03
^F	Control-F	06
^G	Control-G	07
^H	Control-H (backspace)	08
^X	Control-X (delete line)	18
<sp>	Space	20
<cr>	Carriage Return	0D
<xon>	Halt transmission	11
<xoff>	Start Transmission	13

4.2.2. Parameters

Some commands use parameters with variable values. The command descriptions use a generic designator to indicate these parameters. The chart below shows each of the designators with their meanings and the permitted values. The values shown are the actual characters to be inserted into the command message. Normally parameters should be separated from each other by a <sp>.

Designator	Name	Values	Description
fx	Field Number	F1	Field 1
		F2	Field 2
dc	Data Channel	C1	Caption Channel 1
		C2	Caption Channel 2
		C3	Caption Channel 3
		C4	Caption Channel 4
		T1	Text Channel 1
		T2	Text Channel 2
		T3	Text Channel 3
		T4	Text Channel 4
		XD	Extended Data Services Channel
		For compatibility with older software the following designators are also used to describe caption data channels:	
		CC1	Caption Channel 1
		CC2	Caption Channel 2
		CC3	Caption Channel 3
		CC4	Caption Channel 4
tc	Text Channel	T1	Text Channel 1
		T2	Text Channel 2
		T3	Text Channel 3
		T4	Text Channel 4
		For compatibility with older software the following designators also refer to the text channels:	
		L1	Text Channel 1
		L2	Text Channel 2
		L3	Text Channel 3
		L4	Text Channel 4

Designator	Name	Values	Description
name	Article Name		1 to 8 alphanumeric character article name
edsid			XDS packet Id input as 2 ASCII hex digit class followed by 2 ASCII hex digit type. (cctt). Valid class numbers are: 01, 03, 05, 07, 09, 0B, OD. Leading zeros of the class numbers are optional. In cases where the class and type bytes are not sufficient to uniquely distinguish the packets, (such as for 0D05 packets) the first 2 digits of the packet data may also be appended to the end of the edsid. (ccttdd)
k/d	Keep/Delete	K	Keep article
		D	Delete article
o/h	Output/Hold	O	Place article in output queue
		H	Do not place article in output queue
n/l	Next/Last	N	Place article next in output queue
		L	Place article at the end of output queue
rc	Repeat Count	0 to 9998	Decimal number of times to repeat article
		9999	Repeat indefinitely
		FFFF	Repeat indefinitely
		hh:mm:ss	Repeat until this time is being requested by the computer (Current software treats this as equivalent to 9999)
ln	Output Line	10 to 25	
bl	Caption Base Line	1 to 15	Base line of caption rollup display
rl	Caption Rollup Lines	2 to 4	Number of lines of rollup captions
pn	Port Name	P1, PA, EN1	Port A
		P2, PB, EN2	Port B
		P3, PC, EN3	Port C
		P4, MA, MD EN4	modem D
		P5, MB, ME, EN5	modem E (if installed)
dt	Data Type	CF1	Captions field 1
		CF2	Captions field 2
		TF1	Text field 1
		TF2	Text field 2
		XDS	Extended data services

Designator	Name	Values	Description
ws	Word size	7	7 bit data word
		8	8 bit data word
par	Parity	O	Odd parity
		E	Even parity
		N	No parity
tz	Time zone	0:00 to 23:59	Time zone hours and minutes relative to UTC
ovr	Override	O	Forces override

4.2.3. Flow Control Handshaking

When the encoder's input buffer is nearly full the device sends an XOFF for each character received. If the Caption software continues to send data and the input buffer fills completely, the caption encoder will show the message BUFFER OVERFLOW on the front panel display. When the input buffer has overflowed some data may be lost. When the input buffer is nearly empty the caption encoder will transmit an XON character. The HD9084 uses hardware flow control to prevent lost data. The unit will turn off the RS232 RTS signal when the buffer is nearly full, and will turn RTS on when the input buffer is nearly empty.

4.2.4. Break Handling

A break character can be sent to the caption encoder to cause the content of the associated input buffer to be discarded. If the break character is sent to a modem port (Modem D or Modem E) the modem character buffers will also be discarded. This allows the user to circumvent a backlog of data input, and regain immediate control of the encoder. The best way to reset a communications port is to send a break followed by a Control-F – Control-F command.

4.2.5. Command Responses

When the HD9084 accepts any of the Control-A commands it will respond by sending back an asterisk '*' prompt with the following exceptions:
When in real time mode it will respond with a colon ':' prompt.
When an article is being defined it will respond with a '>'.

4.3. COMMON COMMANDS

4.3.1. Set Baud Rate

The caption encoder's serial remote control ports may be set to operate at any standard baud rate from 1200 to 57600. When this command is executed the new baud rate will become immediately active, and the sending computer must immediately switch to the new rate. The new baud rate is stored in non-volatile memory and will be restored when the unit is powered up.

The modem ports may have a lower maximum baud rate that is related to the maximum baud rate of the built-in modems. The baud rate for the modem ports will also limit the maximum connection rate that the modems will allow.

Command: ^AI<sp>pn<sp>baud<sp>ws<sp>par<cr>

or ^AI<cr>

Default: none

The parameter baud specifies the baud rate that will be used. The permitted values of parameter baud are shown in the table below.

Parameter	Baud rate
12	1200
1200	1200
24	2400
2400	2400
48	4800
4800	4800
96	9600
9600	9600
192	19200
19200	19200
384	38400
576	57600

If the optional port name parameter is missing, then the current control port will be assumed.

If the baud rate of modem Port D/E is changed while the modem is in use, the new baud rate will not take effect until the caller disconnects from the modem.

If no parameters are specified, the HD9084 will respond with a report of the communication parameters of all the COMM ports as shown below.

Port A: 1200 7 Odd
Port B: 9600 8 None
Port C: 1200 7 Odd
Port D: 4800 8 None

Examples: ^AI<sp>19200<cr> Set baud rate to 19200.

^AI<sp>P1<sp>96<sp>8<sp>N Sets Port A to 9600,8,N.

4.3.2. Reset Encoder

This command immediately clears the input and output data queues and resets the HD9084 to the Transparent State in Field 1 and Field 2. Article and XDS output queues are not reset by this command. They must be explicitly reset by using the queue articles and queue XDS commands. (See sections 4.4.4 and 4.5.3.) To reset only a particular communications port, refer to the Reset Port (^Ar) command in section 4.6.5.

Command: ^F^F<cr>

Default: none

4.3.3. Set Output Line

The normal line for caption information is line 21 in SD-SDI. This command allows the HD9084 to output caption information on different line numbers. This command also changes the line number used by the decoder.

Command: ^AE<sp>Lln<cr>

Default: ^AE<sp>L21<cr> for SD-SDI systems

The parameter ln specifies the line number that caption information will be output on. The permitted values of parameter ln are 11 to 25.

Examples:	^AE<cr>	Reset to default.
	^AE<sp>L20<cr>	Set for line 20.
	^AE<sp>?<cr>	Show current line.

4.3.4. Monitoring Line 21 Data on the Serial Port

This command allows the HD9084 to extract line 21 information from the input or output video and send it out the serial port. Enter a ^G to end monitor mode.

Command: ^A5<sp>fx<sp>o<cr>

The parameter ‘fx’ specifies the field that data will be extracted from.
The parameter ‘o’ specifies that the output data will be monitored.

Example:	^A5<sp>F1<cr>	Monitor Field 1 Input.
	^A5<sp>F2<sp>O<cr>	Monitor Field 2 Output.

4.3.5. Controlling the Caption Decoder

This command allows the unit to display line 21 information on the built-in caption decoder.

Command: ^AM<sp>dc<cr> Decode a specific channel.

or ^AM<sp>OFF<cr> Turn off Decoder off.

The parameter 'dc' specifies the data channel that will be decoded and displayed. In addition to the **dc** values shown in section 4.2.2, the following additional values are supported only for this command.

VCHIP V-Chip Decoder
XDS XDS Decoder
XDSG XDS Decoder
XDSF XDS Decoder

Note that there is only one XDS decoder mode so all 4 commands will accomplish the same effect. Support for the XDSG and XDSF strings added for compatibility with the EEG command set.

Examples: ^AM<sp>C1<cr>
Display Caption Channel 1

^AM<sp>VCHIP<cr> Display V-CHIP rating

^AM<sp>XDS<cr> Switches decoder to XDS display mode.

4.3.6. Report Firmware Version

The caption encoder will respond with a message identifying its firmware version and port name.

Command: ^A?<cr>
Returns `Evertz HD9084 Ver:CK88D5 U000427 -- Use ^AH{return} for help Port B (Example)`

4.3.7. Command Help

This command returns a help message from the caption encoder.

Command: ^AH<cr>
Default: none

Returns:

```
Cmds supported - ^C,^F,...
^A +0,1,2,3,4,5,6,7,8,9,A,B,c,E,H,I,M,O,P,Q,r,t,u,S,Y,?
```

4.3.8. Report Bypass Switch Mode

This command returns a message that shows the status of the video bypass relay and the caption keyer.

Command: ^AS<cr>

Example results:

REMOTE OVERRIDE	indicates that the keyer is disabled but video will be passed through the HD9084.
EXTERNAL BYPASS	indicates the SDI bypass relay has been activated by an external signal.
LOCAL BYPASS ON	indicates the SDI bypass relay has been activated by the HD9084 menu selection.

4.3.9. Report Battery Status

This command will return the status of the internal battery

Command: ^AY<cr>
Example results: Battery OK

4.3.10. Set / Report Time of Day Clock

This command will return the current time of day or will allow the internal clock to be set. The unit will maintain the correct time even through power outages.

Command: ^Ac<cr>

Example results:
Local time is 13:47:39, Time zone is 05:00, DST is ON, DSO is ON

Command: ^Ac<sp>U<cr>

Example results:
UTC is 19:47:39, Time zone is 05:00, DST is ON DSO is ON

Command: ^Ac<sp>hh:mm:ss<sp>hh:mm<sp>dst<sp>DSO=dso<cr>

hh:mm:ss	Local time	
hh:mm	Time zone offset	
dst	OFF	Daylight Saving Time not in effect (DST Bit Off)
	ON	Daylight Saving Time in effect (DST Bit On)
dso	OFF	Daylight Saving Time not observed in this region (DSO Bit Off)
	ON	Daylight Saving Time observed in this region (DSO Bit On)

Although the time zone must be entered as hours and minutes, the XDS Time Zone packet will only transmit the time zone hours. This is a limitation of the definition of the time zone packet in CEA-608.

Example: ^Ac<sp>13:10:00<sp>5<sp>ON<sp>DSO=ON<cr>
Set local time to 1:10 pm in EDT (Daylight Saving Time in effect), Daylight Saving Time observed.

^Ac<sp>13:10:00<sp>5<sp>ON<sp>DSO=OFF<cr>
Set local time to 1:10 pm in EST (Daylight Saving Time in effect), Daylight Saving Time not observed. (E.g. as in Indiana)

^Ac<sp>06:10:00<cr>
Set local time to 6:10 am. Time zone, DST and DSO unchanged.

^Ac<sp>13:10:00<sp>4:30<sp>OFF<sp>DSO=ON<cr>
Set local time to 1:10 pm in Newfoundland Time Zone with Daylight Saving Time not in effect, but Daylight Saving time observed

The DST bit instructs the encoder whether Daylight Saving Time is currently in effect. The DSO bit instructs the encoder whether Daylight Saving Time is observed in this region. The encoder must know this information when converting between local time and UTC time internally. Most regions in North America observe Daylight Saving Time according to the following rule: ON in the summer; starting on the second Sunday in March. OFF in the winter; starting on the first Sunday in November. Other parts of the world follow different rules for DST.

4.3.11. Set / Report Calendar Date

This command will return the current calendar date or will allow the internal calendar date to be set. The encoder will maintain the correct date even through power outages.

Command: ^Ad<cr>

Example results:
Local date is: Jan/09/2000 Mon.

Command: ^Ad<sp>U<cr>

Example results:
UTC date is: Jan/10/2000 Mon.

Command: ^Ad<sp>mm/dd/yyyy<sp>day of week<sp>U<cr>
Example: ^Ad<sp>01/26/2000<sp>4<cr>
Set local date to January 26, 2002 and day is Wednesday.

^Ad<sp>03/25/2001<cr>
Set local date to March 25, 2003. No day of week indicated.

^Ad<sp>12/21/2001<sp>7<sp>U<cr>
Set UTC date to December 21, 2003.

4.3.12. Transparent State

In Transparent state, incoming line 21 video in the respective data stream will be copied to the output.

Command: ^A7<sp>fx<cr>
^A7<sp>dc<cr>

Default: ^A7<sp>F1<cr>

In the first form of the command, the optional parameter **fx** identifies the field (i.e. all streams in that field) that will be placed in the transparent state.

In the second form of the command the parameter **dc** identifies the data stream that will be placed in transparent state.

Examples:	^A7<sp>F1<cr>	Field 1 in transparent state.
	^A7<sp>C1<cr>	Captions 1 in transparent state.
	^A7<sp>T2<cr>	Text 2 in transparent state.
	^A7<sp>XD<cr>	XDS stream in transparent state.

4.3.13. Null State

In the Null state, the encoder will insert Null characters for the selected data stream into line 21. Incoming line 21 video will not be copied through on the data stream.

Command: ^A6<sp>fx<cr>
^A6<sp>dc<cr>

Default: ^A6<sp>F1<cr>

In the first form of the command, the optional parameter **fx** identifies the field (i.e. all streams in that field) that will be placed in the Null state.

In the second form of the command the parameter **dc** identifies the data stream that will be placed in the Null state.

Examples:	^A6<sp>F1<cr>	Field 1 in Null state.
	^A6<sp>C1<cr>	Captions 1 in Null state.
	^A6<sp>T2<cr>	Text 2 in Null state.
	^A6<sp>XD<cr>	XDS stream in Null state.

4.3.14. Direct Control State

This command causes the encoder to enter the Direct Control state. The Direct Control state is normally terminated by sending the End Of State command (^C), which will cause the encoder to revert to the Null state.

Command: ^A3<sp>n<sp>fx<cr>data . . . data^C

or

^A3<sp>n<sp>dc<cr>data . . . data^C

Default: ^A3<sp>4<sp>F1<cr>

In the first form of the command, the optional parameter **fx** identifies the field (i.e. all streams in that field) that will be placed in the Direct Control state. In the Direct Control state, caption information is inserted into the appropriate video field in one of the four modes that are described below. All upstream caption and text data in that field will be blocked. Any articles queued for insertion to that field will also be blocked. The computer supplies all the information for that field, formatting it with the appropriate stream control codes.

In the second form of the command, the optional parameter **dc** identifies the data channel that will be placed in the Direct Control state. All upstream caption and text data in the specified data channel will be blocked. Any articles queued for insertion to that data channel will also be blocked. The computer supplies all the information for that data channel, formatting it with the appropriate stream control codes. All caption information in the non-specified data channels will be passed through.

The optional parameter **n** identifies which variation of the Direct Control state will be used.

n=1 provides the same processing as n=2.

n=2 means that legitimate line 21 control codes are aligned and delayed so that the two byte control code pairs are transmitted in the same field.

n=3 means that legitimate line 21 control codes are aligned and delayed so that the two byte control code pairs are transmitted in the same field. Each control code pair is sent twice.

n=4 provides the same processing as for n=3. No non-line 21 codes are transmitted and the control codes are converted (if necessary) to the correct equivalent code for the current video field.

Examples:	^A3<cr>	Field 1 in Direct Control mode 4
	^A3<sp><cr>	Field 1 in Direct Control mode 4
	^A3<sp>1<cr>	Field 1 in Direct Control mode 1
	^A3<sp>F2<cr>	Field 2 in Direct Control mode 4
	^A3<sp>3<sp>F1<cr>	Field 1 in Direct Control mode 3
	^A3<sp>C1<cr>	Caption channel 1 in Direct Control mode 4
	^A3<sp>3<sp>T1<cr>	Text channel 1 in Direct Control mode 3

4.3.15. Real Time State

In Real Time state, incoming data from the caption computer is transferred as it is typed into the appropriate data stream. The line may be edited using ^H (backspace) or ^X (delete line). A delay of 1 to 9 seconds can be inserted by including ^Bn into the data. (n is the number of seconds of delay desired)

If a caption data channel is specified, captions will be in rollup format with a specified number of lines. The default format is 3 line caption rollup for caption data channels and text format for text channels.

When the data channel is put into the real time state, upstream data on the specified channel will be blocked from entering the output queue of the encoder. All subsequent data is part of the data stream until ^C is received or the encoder is reset. If the specified data stream is a text channel, articles will be suspended from the output queue while the real time state is active. All caption information in the non-specified data channels will be passed through.

Real Time state is normally terminated by a ^C. Articles will be re-enabled into the output queue starting with the suspended article. If upstream data was enabled prior to entering the Real Time State then it will be re-enabled when the Real Time state is terminated.

Command: ^A2<sp>dc<sp>rl<sp>Bbl<cr>

Default: ^A2<sp>C1<sp>3<sp>B15<cr>

The parameter **dc** identifies the data channel that will be placed in the Real Time state.

The **rl** parameter identifies the number of rollup rows and the **bl** parameter identifies the base line if the **dc** parameter is one of the caption data channels. If the base line is specified the roll up line must also be specified.

Examples:

^A2<cr>	Caption 1 in Real Time State with 3 line rollup at base line 15
^A2<sp>T2<cr>	Text 2 in Real Time State
^A2<sp>C3<sp>2<cr>	Caption 3 in Real Time State with 2 line rollup at base line 15
^A2<sp>C4<sp>3<sp>B10<cr>	Caption 4 in Real Time State with 3 line rollup at base line 10

4.3.16. Display System Status

This command displays the upstream line 21 data channels that are turned on (i.e.: upstream data being passed through to the output) and the number of bytes of memory remaining to store articles and XDS packets.

Command: ^AA<cr>

Default: none

Examples: ^AA<cr>

Returns:
Example with all channels On:

```
Memory Status: Avail-005453  # Segments-000011 Largest Avail-005453
Channel Status:
Field 1:C1 C2 T1 T2 ON
Field 2:C3 C4 T3 T4 XD ON
```

Example with all channels On except T3:

```
Memory Status: Avail-005453  # Segments-000011 Largest Avail-005453
Channel Status:
Field 1:C1 C2 T1 T2 ON
Field 2:C3 C4 T4 XD ON
```

4.4. TEXT ARTICLES

When the Article state is active, text data can be entered and stored as complete messages. These messages can be transmitted in any order, any number of times, in any of the text channels. Display attributes contained within the articles (such as colour, etc.) specifically coded for one data stream will be translated into the appropriate codes for the text channel they are ultimately inserted into.

The message can be kept in memory or deleted when you have finished transmitting it. Articles will be lost from the article memory in the event of a power loss. The HD9084 uses an advanced memory allocation scheme that enables it to store a virtually unlimited number of articles at one time. The only requirement is the maximum amount of random access memory available.

The command protocol allows editing of each line of the message by use of the ^H (backspace) and ^X (delete line) characters before the <cr> is input. A delay of 1 to 9 seconds can be inserted into the article by inserting ^Bn into the article. (n is the number of seconds of delay desired)

Once a text channel is put into Article state, upstream data on that channel will be blocked from the output queue. A data channel will be in the article state as long as any article is assigned to its output queue.

4.4.1. Input Article

This command allows the user to input an article to the article memory and assign it to the output queue of one of the text data channels.

Command: ^A0<sp>name<sp>tc<sp>rc<sp>k/d<sp>o/h<sp>n/l<cr>
data<cr>data . . .data<cr>^C

Default: ^A0<sp>name<sp>T1<sp>9999<sp>D<sp>O<sp>L<cr>

The parameter **name** identifies the name of the article. The article can subsequently be referred to by its name. If the article name already exists, the new article with the same name will replace the previous article.

The **tc** parameter identifies the text channel number that the article will be placed into.

The **rc** parameter identifies the number of times the article will be repeated. Values of 9999 or FFFF indicate that the article should be repeated indefinitely. An article's repeat count will be decremented each time the article is output in each output data stream.

The **k/d** parameter identifies whether the article should be kept or deleted when it has been transmitted the specified number of times.

The **o/h** parameter identifies whether the article should be placed into the output queue or whether it should just be held in memory for later use.

The **n/l** parameter identifies whether the article should be placed as the first article in the output queue or the last article in the queue.

All subsequent data is part of the article until ^C is received. The encoder will respond to each line of the article with a '>' prompt while the article is being defined.

Examples: ^A0<sp>Test<sp>T1<sp>5<cr>
This is the first line<cr>
and this is the last line ^C

A two line article called 'Test" will be placed at the end of the Text 1 output queue. The article will be deleted after it is output 5 times.

4.4.2. Output Article

This command allows the user to put an existing article (defined by the Input article command) into the output queue of the specified text data channels. An article may be put into an output queue more than once.

Command: ^A1<sp>name<sp>tc<sp>rc<sp>k/d<sp>o/h<sp>n/l<cr>

Default:

tc	last text channel the article was sent to
rc	current repeat count
k/d	last keep/delete status specified for the article
o/h	O

n/l last next/last status specified for the article

The parameters have the same meaning as for the Input article command. If the **o/h** parameter is H then this command may be used to change other attributes of the article without outputting it.

The parameter **name** specifies the name of a previously defined article.

If the parameter **k/d** is D, and the article is currently being output, it will not be removed until it has been completely output.

Examples: ^A1<sp>Test<sp>T2<sp>5<sp>D<cr>

The article called 'Test" will be placed at the end of the Text 2 output queue. The article will be deleted after it is output 5 times.

^A1<sp>Test<sp>T2<sp>9999<sp>H<cr>

The article called 'Test" will have its repeat count change to indefinite. It will not be placed into any of the output queues.

4.4.3. Delete Article

This command allows the user to remove an article from all output queues. If the article is currently being output, it will not be removed until it has been completely output.

Command: ^A4<sp>name<sp>k/d<cr>

Default:

k/d last keep/delete status specified for the article

The parameter **name** identifies the name of the article.

The parameter **k/d** indicates whether the article will be deleted from memory or not.

Examples: ^A4<sp>Test<sp>D<cr>

The article called 'Test" will be removed from all output queues and deleted from memory.

4.4.4. Queue Articles

This command will delete the entire specified output queue and replace it with the articles named (if any). The user enters the names of the articles separated by <cr> in the order that they are to appear in the output queue. The encoder continues to add articles to the queue until it receives a ^C. The article names may be edited by using the ^H (backspace) and ^X (delete line) characters before the <cr> is input.

Command: ^A8<sp>tc<cr>
name<cr>name<cr>....name<cr>^C

Default: none

The parameter **tc** identifies the text channel number of the output queue the articles will be placed into.

The parameter **name** identifies the name of each article to be placed in the queue. If no article names are given, the specified article output queue is cleared and no articles will be output in that data stream.

Example: ^A8<sp>T1<cr>TEST<cr>TEST2^C

Puts the previously defined articles named TEST and TEST2 into the output queue for Text Channel 1.

4.4.5. Display Article Status

This command allows the user to view the list of articles stored in the article memory and display their status.. The status includes the article name, repeat count, (9999 if infinite) the keep/delete status, and the memory storage needed for the article. The first line of the article will also be shown. A "..." will indicate multiple lines of text.

Command: ^A9<cr>

Default: none

Examples: ^A9<cr>

Returns:

```
Article Status:
Name       Repeat K/D size text
test1      009999 D 000031 "this is a sample" ...
test2      009999 D 000014 "second article"
```

4.4.6. Display Output Queue

This command displays the articles in all 5 output queues in the order in which they reside in the queues.

Command: ^AB<cr>

Default: none

Examples: ^AB<cr>

Returns a list of articles such as the following:

```
Output Q: T1
test1
Output Q: T2
test2
Output Q: T3

Output Q: T4

Output Q: XDS
```

4.5. EXTENDED DATA SERVICES

Extended Data Services (XDS) information is encoded into Field 2 and is intended to supply program related and other information to the viewer. XDS data can inform the viewer of such information as current program title, length of show, type of show, time left in show, and V-Chip-compatible program rating information.

The XDS output stream consists of a distinct XDS packet for each type of information. Each packet consists of a 1 byte class, a 1 byte type, one or more informational characters, a 1 byte end of packet code, and a 1 byte checksum.

XDS packets are stored in the article memory and output in the XDS data channel in Field 2. These packets are placed into the XDS output queue in the order specified by the user and inserted into Field 2 according to the space available. CEA-608-B specifies that when there is caption or XDS information in field 2, then there must be at least a null caption signal present in field 1 as well. When encoding into field 2, the HD9084 automatically detects whether there is a caption signal present in field 1. If necessary, it will turn on the Field 1 keyer automatically and turn it off again when upstream field 1 captions resume.

The computer uses an ASCII hex notation in describing the XDS packet id and data to the caption encoder. For example, to specify the letter A enter a 4 followed by a 1 (the hex ASCII code for A is 41).

The XDS packets are deleted from memory when they have been transmitted the specified number of times. XDS packets will be lost from the encoder's memory in the event of a power loss. The HD9084 uses an advanced memory allocation scheme that allows it to store a virtually unlimited number of XDS packets at one time. The only limit is the total amount of random access memory available.

Upstream XDS packets will be blocked in the output queue by packets of the same type.

4.5.1. Input XDS Article

This command allows the user to input an XDS packet into the caption encoder's article memory.

If an XDS packet with identical **edsid** exists it will be deleted and replaced with the new packet definition.

Command: ^AP<sp>edsid<sp>rc<sp>data...data<cr>

Default: none

The **edsid** parameter identifies the XDS packet id. The XDS packet can subsequently be referred to by its packet id. If the XDS packet already exists, the new packet with the same id will replace the previous XDS packet. The **edsid** is entered in ASCII hex notation. For example, to enter a packet id with a class of 01h and a type of 23h, enter a 0 followed by a 1 followed by a 2 followed by a 3. The leading zero of the class is optional.

The **rc** parameter identifies the number of times the packet will be repeated. Values of 9999 or FFFF indicate that the packet should be repeated indefinitely. A packet's repeat count will be decremented each time it is output.

The parameter **data** is the information bytes of the packet. This data is entered in ASCII Hex format. For example, to enter the letter A enter a 4 followed by a 1 (the hex ASCII code for A is 41)

The XDS article length is checked for the following commonly used articles: Program ID (0101), V-Chip Content Advisory (0105), Station Call Letters (0502), and Time Zone (0704). If the article length is not in the valid range for the packet type, the encoder will reject it. This length checking does not apply to XDS packets from upstream, only XDS articles that are entered using the ^AP command from a serial port.

Examples:

^AP<sp>0103<sp>10<sp>41424344<cr>
Sets the program name packet to ABCD and repeat packet ten times.

^AP<sp>0701<sp>9999<sp>456A4548474A<cr>
Time Of Day packet indicating the current UTC time is 10:05 am on Saturday, October 5th, 2002. DST is ON. The packet will be repeated indefinitely.

Time of Day and Time Zone articles behave differently than other XDS articles when defined. The defined article contents will be ignored; the encoder will generate the time of day packet data from the current internal time.

^AP<sp>0105<sp>9999<sp>486D<cr>

Program rating packet setting the rating system to “TV Parental Guideline”, rating of TV-PG with V and L bits set. The packet will be repeated indefinitely.

4.5.2. Blocking Upstream XDS Packets

Upstream XDS packets can be removed entirely from the data stream, without having to insert new XDS data of the same type. This is accomplished using a variation of the ^AP serial interface command. This feature is particularly useful for removing unwanted Time-of-Day packets, Time Zone packets, etc. off of pre-encoded material.

The manual does not attempt to provide a comprehensive list of valid XDS packet types. The reader is encouraged to refer to the CEA-608 standard for the currently supported and required packet types. For the V-Chip program rating packet, EIA-744-A serves as an addendum to CEA-608.

To remove a specific XDS packet, use the ^AP command to enter an XDS article with the packet id of the packet you want to remove, a repeat count of 9999 and article text consisting of the single character "R", or the equivalent ASCII HEX "52".

Examples:

^AP<sp>0701<sp>9999<sp>52<cr>
^AP<sp>0701<sp>9999<sp>R<cr>
Both variations block upstream Time Of Day packets

^AP<sp>0701<cr>
Allows upstream Time Of Day packets to be passed through.

Please note that the upstream XDS blocking instructions are not saved through power loss.

4.5.3. Queue XDS Packets

This command will delete the entire specified XDS output queue and replace it with the packets named (if any). The user enters the packet ids of the XDS packets separated by <cr> in the order that they are to appear in the output queue. The user enters the packet id of each packet separated by <sp> in the order that they are to appear in the output queue.

Command: ^A8<sp>F2 edsid<sp>edsid...edsid<cr>

Default: none

The parameter **edsid** identifies the packet id of each packet to be placed in the XDS queue. If no packet id is given, the XDS output queue is cleared and no XDS information will be output.

4.5.4. Delete XDS Packet

This command allows the user to remove an XDS packet from the article memory. If the XDS packet is currently being output, it will not be removed until it has been completely output.

Command: ^AP<sp>edsid<cr>

Default: none

The **edsid** parameter identifies the packet to be deleted.

Examples: ^AP<sp>0103<cr>
The program name packet will be removed from memory.

4.5.5. Inserting XDS Articles into Non-Volatile Memory

The HD9084 can store XDS articles in non-volatile memory, so that in case of a power failure, XDS information can be retained. All XDS articles starting with “05” (channel class) and “07” (miscellaneous class) are preserved in non-volatile memory. Other classes are not stored through a power low, and must be re-entered by the user upon power up.

4.6. COMM PORT CONTROL COMMANDS

The HD9084 enables the communication ports to simultaneous access the caption keyers. This can be the effective equivalent of multiple caption encoders linked in a series. By using a single video keyer, these encoder models provide the added advantage of minimizing the delays and the impact on the video quality. Several commands are provided in order to prevent data conflicts and allow the user to control which ports can affect the data. The caption encoder maintains a permission list that indicates which ports will be allowed to alter various kinds of data. The permissions for each port can be set from the front panel menus or they may be set from the communication control ports. The permission list is maintained in non-volatile memory. The data types are denoted as follows:

Data Type	C1 or CC1	captions field 1
	C2 or CC2	captions field 2
	T1	text field 1
	T2	text field 2
	XD or TX	extended data services

When multiple ports are permitted access to a particular data type, conflicts will be resolved on a "first come, first served" basis. The caption encoder maintains a list of which ports are active for each data type.

Normally, the various keyer commands (such as ^A2, ^A3, ^A6, ^A7) will set and clear the active status automatically. To obtain maximum compatibility with existing software, these commands will exhibit the following special behavior:

If a port does not have permission for the full field 1, but does have permission for the captions in field 1, then the command will not be denied, but will revert to the C1 form of the command.

For example, if Port A has permission for CF1 only, and a ^A3<cr> or ^A3 F1<cr> is issued, then although Port A does not have permission for the full field 1, the command will not be rejected. Instead, the command will be treated as though ^A3 C1<cr> had been sent.

4.6.1. Show Port Permission Maps

This command will report the permission map for each port. The permission map controls what data types a port is allowed to become active in. (e.g., captions field 1, text field 2, XDS, etc.)

Command: ^AQ<cr>

Example result:

```
Permission Map
PORT A: C1 C2 T1 T2 XDS
PORT B: C1 C2 T1 T2 XDS
PORT C: C1 C2 T1 T2 XDS
PORT D: C1 C2 T1 T2 XDS OFFLINE
```

This example shows that all ports are permitted access to all data types (the factory default setting) and the Port D modem is offline.

```
Permission Map
PORT A: C2 T1 T2 XDS
PORT B: C1    T1 T2 XDS
PORT C: C1 C2    T2 XDS
PORT D: C1 C2 T1 T2    ONLINE
```

This example shows that Port A is denied access to captions in field 1, Port B is denied access to captions in field 2, Port C is denied access to text in field 1 and Port D is online and is denied access to extended data services.

4.6.2. Alter Port Permission Maps

This command will alter the permission map for any port by adding or subtracting various data types.

Command: ^AQ<sp>pn<sp>-dt…dt…dt<cr>

Default: none

Example:

^AQ PB – XDS –T2 –C2 C1 T1<cr>
This command will disallow Port B from all field 2 data types, and enable Port B for captions and text in field 1.

^AQ C1<cr>
This command will allow the current port to access captions in field 1. Permissions for other data types remain as previously set.

^Au<cr>
^AQ PD – XDS –T2 –C2 –T1 C1<cr>
^AQ PB –XDS –T2 –C2 -C1 T1<cr>
^AQ PC –T2 –C2 -C1 -T1 XDS<cr>
These commands show a typical application which places the HD9084 in stream mode, allows modem Port D to process captions in Field 1, allows Port B to process text articles in field 1, and enables Port C for extended data services.

4.6.3. Show Port Active Maps

This command will report the active map for each port. The active map controls what port has control of a data type.

Command: ^AO<cr> (capital letter 'O')

Example result:

Active Map
PORT A: C1
PORT B: C2
PORT C:
PORT D: XDS ONLINE

This example shows Port A is actively controlling the captions in field 1, Port B is controlling the captions in field 2, Port C is not actively controlling any data, and the Port D modem is online and is controlling the extended data services.

4.6.4. Alter Port Active Maps

This command will alter the active map for any port by adding or subtracting various data types. The optional override parameter ('O') forces other control ports to relinquish control of the specified data type.

Command: ^AO<sp>pn<sp>-dt…dt…dt<sp>ovr<cr>

Default: none

Example:

^AO PB –C1<cr>
This command will remove the active indication for Port B from field 1 captions.

^AO C1<cr>
This command will indicate that the current port is active in the captions in field 1. Activity for other data types remain as previously set.

^AO C1 O<cr>
This command forces the current port to be active in field 1 captions. Activity for other data types remain as previously set. If any other control port is active in CF1 will be reset.

4.6.5. Reset Port

This command will reset a port. This command immediately clears the input and output data queues and resets the HD9084 to the Transparent State in Field 1 and Field 2. Article and XDS output queues are not reset by this command. They must be explicitly reset by using the queue articles and queue XDS commands. Since other control ports may be simultaneously sending data, this command only affects the fields and data types that have not been appropriated by other control ports. To reset all communication ports, see the Reset Encoder (^F^F) command in section 4.3.2.

Command: ^Ar<sp>pn<cr>

Example: ^Ar PB<cr> Resets Port B

4.7. GPI MESSAGE INJECT

The GPI Message Inject feature stores a 68 character message internally in the HD9084 and plays it out upon GPI contact closure.

4.7.1. Managing Message Text

Entering the Control-A command ^AG by itself, from any serial port, will display the current contents of the message.

The default text is: ~~~*The current program~is not captioned*.

The message is entered from any port using the ^AG command, eg: ^*AG ~~~This is the~message text*.

The longest message that can be stored is 68 characters in length, including all tilde (~) characters. Note that each CEA-608 caption line may contain a maximum of 32 characters.

Any tilde (~) character will be replaced with a carriage return (CR) when the message is encoded, allowing multi-line text messages to be entered. One or more CRs should be put at the beginning of the message, but none at the end. Otherwise the caption would roll-up one extra line and the last line would always be blank. For best presentation, it is recommended that 3 CRs (~~~) be placed at the beginning of the message text to ensure that all previous text is cleared from the display window before new text appears.

4.7.2. Activating Message Inject

To setup a GPI to control insertion of the text message, navigate the front panel menu PORTS->MSG. INJECT GPI then select the GPI that will control this feature.

To select which CC channel the message is injected onto, navigate to PORTS->MSG. INJECT CCx. The factory default is "CC1".

This feature shares some functionality with HD9084 serial port A. It is required that port A is enabled, port A mode is set to "Control-A", and port A is granted permission to caption onto CC1. No device may attempt to communicate with the HD9084 via port A at the same time as the CC1 Message Inject feature is enabled.

When the GPI is activated, the message will be inserted onto CC1 in 3-line rollup mode. The bottom line of text will reside on row 15, which is at the very bottom of the screen. Insertion of the text will be repeated every 15 seconds.

4.7.3. Application Tips

If you wish to move the message text up, you may also use this feature in conjunction with the GPI Caption Shift to move the text up 2, 3 or 4 rows.

If the message text is to be inserted into CEA-708 captions as well, enable the HD9084 built-in caption translator to translate it onto the desired CEA-708 service.

When used in conjunction with a GPO configured to assert on "CC1 Data In", this feature can be used to automatically insert a message when no upstream captions are observed on CC1 for up to 2 minutes.

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5. TECHNICAL DESCRIPTION

5.1. SPECIFICATIONS

5.1.1. HDTV Serial Digital Video Input

Standard: SMPTE 292M 1.485 Gb/s
1080i, 1080p, 720p, 1035i,
Number of Inputs: 1
Connector: BNC per IEC 169-8
Equalization: Automatic up to 75m @1.5 Gb/s with Belden 1694
(or equivalent). 24m with bypass relay installed
Impedance: 75 ohms

5.1.2. HDTV Serial Digital Video Output

Standard: Same as HD input
Number of Outputs: 1 program out (bypass relay protected)
1 monitoring out
Connector: BNC per IEC 169-8
Signal Level: 800mV nominal
DC Offset: 0V ± 0.5V
Rise and Fall Time: 200ps nominal
Overshoot: <10% of amplitude
Wide Band Jitter: <0.2 UI
Impedance: 75ohms

5.1.3. SDTV Serial Digital Video Input

Standard: SMPTE 259M-C
Number of Inputs: 1
Connector: BNC per IEC 169-8
Equalization: Automatic 200m @ 270Mb/s Belden 8281
(or equivalent). 24m with bypass relay installed

5.1.4. SDTV Serial Digital Video Output

Standard: Same as Input
Number of Outputs: 1 program out (bypass relay protected)
1 monitoring out
Connector: BNC per IEC 169-8
Signal Level: 800mV nominal
DC Offset: 0V ±0.5V
Rise and Fall Time: 470ps nominal
Overshoot: <10% of amplitude
Return Loss: > 15 dB
Wide Band Jitter: < 0.2 UI

5.1.5. General Purpose In/Out

Number of Inputs: 7
Number of Outputs: 4
Type: Opto-isolated, active low
Connector: Female High Density DB-15
Signal level: +5V nominal

5.1.6. Communications and Control

Serial: 3 DB-9 male
RS232 /422 selectable
1200 baud to 57.6 kbaud
7 or 8 data bits

Modem: 2 RJ-11 telephone jacks
(2nd modem optional)
1200 baud to 14.4 kbaud
V.32BIS compatible

Ethernet: IEEE 802.3 (10 BaseT)
IEEE 802.3u (100 BaseTX)
RJ-45 connector

5.1.7. Physical

Dimensions: 19”W x 1.75”H x 18.75”
(483mm W x 45mm H x 477mm D)
Weight: 8 lbs. (3.5Kg)

5.1.8. Electrical

Power: 100-240VAC 50/60HZ, 40W
Safety: TüV Listed
Complies with EU safety directive
EMI/RFI: Complies with FCC part 15, class A
EU EMC Directive

5.2. UPDATING THE HD9084 FIRMWARE

You will need the following equipment in order to update the HD9084 Firmware:

- PC with available communications port. The communication speed is 57600 baud, therefore a 486 PC or better with a 16550 UART based communications port is recommended.
- Null Modem cable (DB9 female to DB9 female or DB25 female to DB9 female)
- Terminal program that is capable of Xmodem file transfer protocol. (Such as HyperTerminal)
- New firmware supplied by Evertz. (.bin file)

Make sure a null modem cable is used for the upgrade procedure. A null modem cable is provided with the HD9084 during time of shipping.

5.2.1. PART 1: Configuring the Unit for Firmware Upgrades

Connect the null modem cable to PORT A on the rear of the HD9084, and the other end of the null modem cable to the communication port on the rear of the computer.

Set PORT A baud to 57600.
Set PORT A Comms to 8-none-1

(Refer to section 3.6)

5.2.2. PART 2: Terminal Program Setup

Start the terminal program. (Ex. HyperTerminal)
Configure the port settings of the terminal program as follows:

Baud	57600
Parity	none
Data bits	8
Stop bits	2
Flow Control	None

5.2.3. PART 3: Initiating Upgrade Mode

5.2.3.1. Front Panel Upgrade Procedure

Enter the General menu by pressing **GENERAL** then **SETUP**.
Using the **UP/DOWN** keys, scroll the menu to "**Upgrade Firmware**" and press **SELECT**.
Press **SHIFT**+**SELECT** to confirm upgrade.
"*Upload File Now, Control X to Cancel*" will appear on the terminal program.
You can now proceed to section 5.2.4 of this manual.
Press Ctrl x to cancel the upgrade.

5.2.3.2. Power Cycle Upgrade Procedure

Apply power to the HD9084. During power up, a banner with the boot code version information should appear in the terminal window. The cursor to the right of the word "BOOT>" should be spinning for about 5 seconds then the unit will continue to boot.

1. While the cursor is spinning, press the <CTRL> and <X> keys on your computer keyboard simultaneously which will stop the cursor from spinning. The spinning prompt will only remain for about 5 seconds. You must press <CTRL-X> during this 5 second delay. If the unit continues to boot-up, cycle the power off, then on, and repeat this step again.

2. Hit the <ENTER> key on your computer once.

3. Type the word "upgrade", without quotes, next to the BOOT> prompt, and hit the <ENTER> key again.

4. The boot code will ask for confirmation of upgrade. Type "y" without quotes.

5. You should now see a prompt asking you to upload the file.

5.2.4. PART 4: Uploading the New Firmware

Upload the ".bin" file supplied from Evertz using the X-Modem transfer protocol of your terminal program. If you do not start the upload within 10 minutes the HD9084 Boot code will time out.

Note: Use only the Xmodem transfer protocol. Other protocols, such as X-modem-CRC or X-modem 1K, will not work.

The boot code will indicate that the operation was successful upon completion of the upload.

The following is a list of possible reasons for a failed upload:

1. The supplied "*.bin" file is corrupt.
2. Wrong file specified to be uploaded.
3. The PCs' RS-232 communications port cannot handle a port speed of 57600.
4. Noise induced into the HD9084 Serial Upgrade cable.
5. Defective HD9084 Serial Upgrade cable.
6. Improper port settings in the terminal program or HD9084.

5.2.5. PART 5: Completing the Upgrade

5.2.5.1. Front Panel Complete Upgrade

1. The system will recognize the upgrade is complete and will automatically warm boot.

2. You can now close the terminal program and disconnect the RS-232 serial cable from the PC.

3. The update procedure is complete.

5.2.5.2. Power Cycle Complete Upgrade

1. After the Uploaded file is complete, the BOOT> prompt will appear in the terminal program.

2. The user must type in “boot” without quotations for the unit to warm boot.

3. The upgrade procedure is complete.

5.3. SERVICING INSTRUCTIONS

CAUTION – These servicing instructions are for use by qualified service personnel only. To reduce risk of electric shock, do not perform any servicing instructions in this section of the manual unless you are qualified to do so.

CAUTION – If the unit is fitted with dual power supplies, make sure that power is removed from both supplies before performing any work on the unit.

5.3.1. Changing the Fuses

Check that the line fuse is rated for the correct value marked on the rear panel. Never replace with a fuse of greater value.

The fuse holder is located inside the power entry module. To change the fuses, pull out the fuse holder from the power entry module using a small screwdriver. The fuse holder contains two fuses, one for the line and one for the neutral side of the mains connection. Pull out the blown fuse and place a fuse of the correct value in its place. Use time delay 5 x 20 mm fuses rated for 250 Volts with a current rating of 1 amp. Carefully reinsert the fuse holder into the power entry module.

5.3.2. Replacing the Battery

The HD9084 is fitted with a 3V 20mm diameter Lithium battery type CR2032. This battery is used to power the system time clock while power is removed from the unit. If the unit is not keeping time properly when it is powered down, the battery should be replaced according to the procedure outlined in section 5.3.2.1.

Before attempting to change the battery remove power from the 5600MSC

CAUTION
Danger of explosion if battery is incorrectly replaced
Replace only with the same or equivalent type

5.3.2.1. Safety Guidelines and Precautions concerning the Use of 3V Lithium Batteries

Please observe the following warnings strictly. If misused, the batteries may explode or leak, causing injury or damage to the equipment.

- The batteries must be inserted into the equipment with the correct polarity (+ and -).
- Do not attempt to revive used batteries by heating, charging or other means.
- Do not dispose of batteries in fire. Do not dismantle batteries.
- Do not short circuit batteries.
- Do not expose batteries to high temperatures, moisture or direct sunlight.
- Do not place batteries on a conductive surface (anti-static work mat, packaging bag or form trays) as it can cause the battery to short.

5.3.2.2. Procedure for Replacing the Battery

- Remove the top cover of the unit.
- Carefully lift out the old battery.
- Insert the new battery with the + side facing up. Make sure it is firmly inserted into the socket.
- Replace the top cover of the unit and apply power.
- Set the system time and date using the methods described in section 3.7.

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6. CONFIGURATION AND TROUBLESHOOTING

6.1. TYPICAL CONFIGURATION EXAMPLES

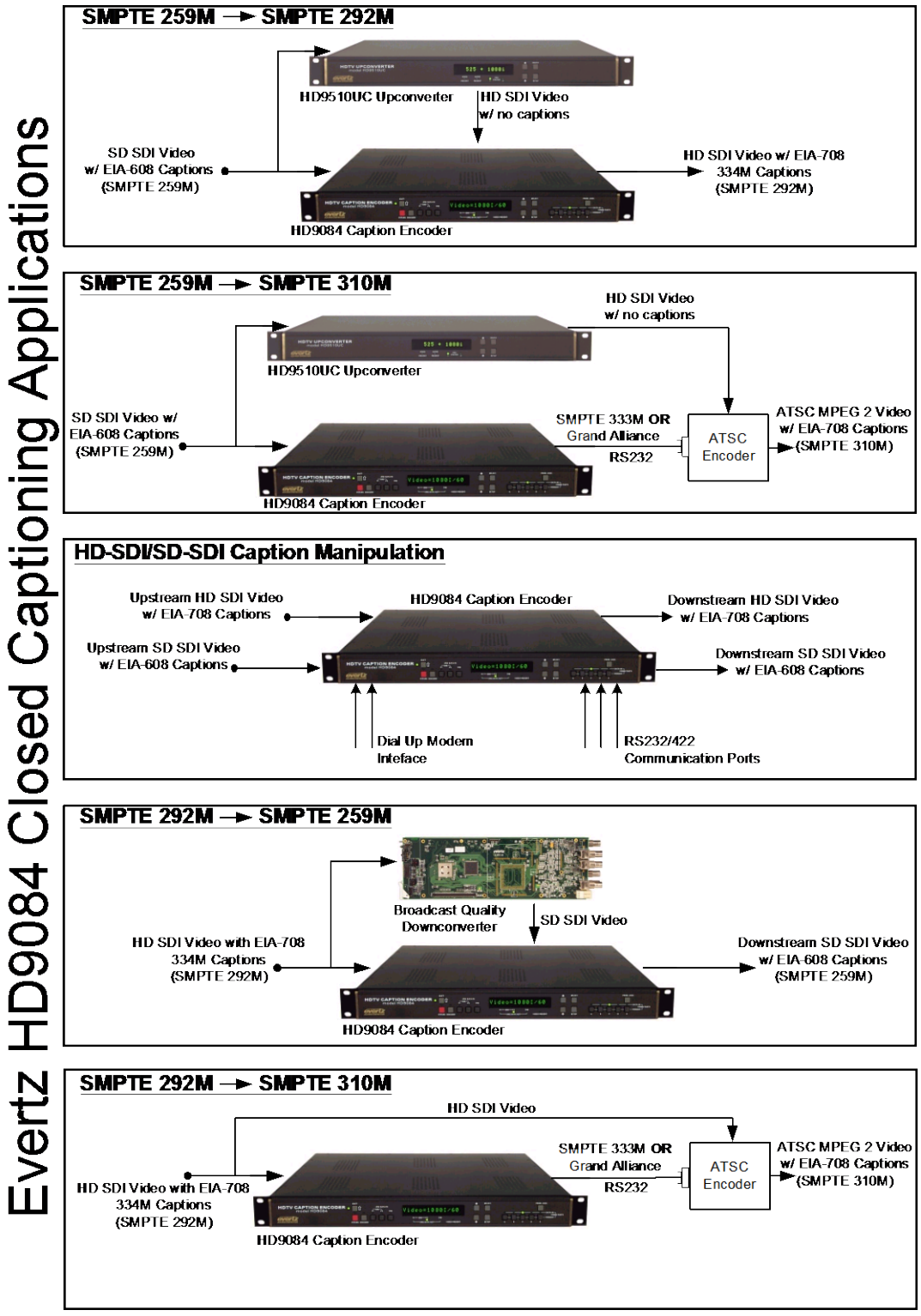

Figure 6-1 : HD9084 Typical Applications

6.2. PARALLEL GPI/O PORT EXAMPLE APPLICATIONS

It is straight-forward to fabricate a DB15 plug with wires soldered across certain pins to make a custom "GPI/O dongle" for use with the HD9084 Parallel I/O connector. This can be used to implement new features not otherwise available in the HD9084. In the following example applications, the GPI and GPO pins were selected arbitrarily; any available GPI and GPOs on the Parallel I/O connector could be used.

6.2.1. Automatic Upstream Caption Source Selection (defaults to HD-SDI)

This configuration will switch the upstream caption source to the HD-SDI input unless a CEA-608 line-21 waveform is seen on field-1 of the SD-SDI input. If a CEA-608 waveform is present, SD-SDI will be selected as the upstream caption source. The GPO 2 Deassert Delay determines how long the HD9084 will continue to look at the SD-SDI input for upstream captions if the CEA-608 waveform disappears.

Fabricate the GPI/O dongle as follows:
Connect pins 10 and 15 to provide pullup voltage for GPI/O.
Connect GPO2 [pin 2] to GPIA [pin 8].

In the front panel menus, configure the following settings:
Set PORTS → GPI/O CONFIG → GPO 2 Stimulus = SD 608 Fld1 wfm
Set PORTS → GPI/O CONFIG → GPO 2 Active Level = High
Set PORTS → GPI/O CONFIG → GPO 2 Assert Delay = 0 seconds (switch immediately to SD-SDI)
Set PORTS → GPI/O CONFIG → GPO 2 Deassert Delay = 0.5 seconds (delay switching to HD-SDI)
Set PORTS → GPI ACTIVE LVLS → GPI A Active Level = Low
Set VIDEO → UPSTREAM CAPS → No Input Source = OFF
Set VIDEO → UPSTREAM CAPS → SD-SDI Input Source = ON
Set VIDEO → UPSTREAM CAPS → HD-SDI Input Source = GPI A

NOTE: For most applications, the CDPs will contain good CEA-608 and probably CEA-708 that was derived by translating the 608 data. Recommended configuration is to leave the HD9084 translator setup to translate CEA-608 CC1 to CEA-708 service-1 always.

6.2.2. Automatic Upstream Caption Source Selection (defaults to SD-SDI)

This configuration will switch the upstream caption source to the SD-SDI input unless Caption Distribution Packets (CDPs) are present on the HD-SDI input video. If there are Caption Distribution Packets (CDPs) appearing regularly on HD-SDI input video, HD-SDI will be selected as the upstream caption source. The GPO 2 Deassert Delay determines how long the HD9084 will continue to look at the HD-SDI input for upstream captions if the CDPs disappear.

Fabricate the GPI/O dongle as follows:
Connect pins 10 and 15 to provide pullup voltage for GPI/O.
Connect GPO2 [pin 2] to GPIA [pin 8].

In the front panel menus, configure the following settings:
Set PORTS → GPI/O CONFIG → GPO 2 Stimulus = HD VANC CDP detect
Set PORTS → GPI/O CONFIG → GPO 2 Active Level = Low
Set PORTS → GPI/O CONFIG → GPO 2 Assert Delay = 0 seconds (switch immediately to HD-SDI)
Set PORTS → GPI/O CONFIG → GPO 2 Deassert Delay = 0.5 seconds (delay switching to SD-SDI)
Set PORTS → GPI ACTIVE LVLS → GPI A Active Level = Low

Set VIDEO → UPSTREAM CAPS → No Input Source = OFF
Set VIDEO → UPSTREAM CAPS → SD-SDI Input Source = ON
Set VIDEO → UPSTREAM CAPS → HD-SDI Input Source = GPI A (see NOTE 1 below)

NOTE 1: HD-SDI caption input source control has higher priority than SD-SDI input source control. That's why this works even though SD-SDI Input Source = ON.

NOTE 2: For most applications, the CDPs will contain good CEA-608 and probably CEA-708 that was derived by translating the 608 data. Recommended configuration is to leave the HD9084 translator setup to translate CEA-608 CC1 to CEA-708 service-1 always. Do not use GPI A to drive the translator "Master Control" because its active state will be backwards in this configuration.

NOTE 3: The mechanism that controls the CDP presence GPO does not perform any error checking on the CDPs. The GPO will be asserted even if the CDPs are corrupted with fatal errors and cannot be processed.

6.2.3. Disabling Teleprompter On Either Modem Or Telnet Connection

A teleprompter is usually connected to one of the RS-232 communication ports of the HD9084. Using the “Port x Enable” menu settings, the HD9084 has the ability to automatically disable this port when a remote live captioner is connected to either modem Port D/E or telnet Port F. However, only one of these options may be selected at a time. Using the Parallel I/O port, it is possible to disable the teleprompter port when either the modem or telnet is in use. This example assumes the teleprompter is connected to Port C.

Fabricate the GPI/O dongle as follows:
Connect pins 10 and 15 to provide pullup voltage for GPI/O.
Connect GPO1 [Pin 3] to GPIA [Pin 8]
Connect GPO2 [Pin 2] to GPIA [Pin 8] also.

In the front panel menus, configure the following settings:
Set PORTS → GPI/O CONFIG → GPO 1 Stimulus = Port F RxD
Set PORTS → GPI/O CONFIG → GPO 1 Active Level = Low
Set PORTS → GPI/O CONFIG → GPO 1 Assert Delay = 0 seconds
Set PORTS → GPI/O CONFIG → GPO 1 Deassert Delay = 30 seconds
Set PORTS → GPI/O CONFIG → GPO 2 Stimulus = Port D RxD
Set PORTS → GPI/O CONFIG → GPO 2 Active Level = Low
Set PORTS → GPI/O CONFIG → GPO 2 Assert Delay = 0 seconds
Set PORTS → GPI/O CONFIG → GPO 2 Deassert Delay = 30 seconds
Set PORTS → GPI ACTIVE LVLS → GPI A Active Level = High
Set PORTS → PORT C SETUP → Port C Enable → GPI A
Set PORTS → PORT C SETUP → Port D Enable → Enabled
Set PORTS → PORT F SETUP → Port F Enable → Enabled

Port F (telnet) controls GPO1 and Port D (modem) controls GPO2. Either one of these can pull GPI A low, which will disable Port C. If you unplug the GPI/O dongle for some reason, the teleprompter will still function. With no input, GPI A will be pulled high, so Port C will be enabled.

6.3. ANSWERS TO FREQUENTLY ASKED QUESTIONS

6.3.1. Can the HD9084 correct “illegal” captions?

Yes. The HD9084 reads each CDP, buffers the data on a per-service level, and rebuilds new CDPs on the output. It can also look at the incoming CEA-608 in the CDPs and translate into comparable CEA-708. Due mostly to these two features it can fix numerous caption problems such as:

- Bits marked as "reserved" not at levels specified by standard
- Sequence counter discontinuities
- Header signaling optional sections that are not actually present in the CDP
- CDPs on wrong field or both fields of interlaced video (should only appear on first field of each frame)
- CDPs wrong length for the video standard
- Wrong amount of CEA-608 data in CDPs (always want 120/1.001 characters per second of 608 data regardless of video frame rate)
- Poor CEA-608 to CEA-708 translation (corrected by ignoring upstream CEA-708 and re-translating from CEA-608)
- Multiple CCPs per CDP (not an error but some equipment doesn't like this)
- CCP split across multiple CDPs (not an error but some equipment doesn't like this)
- relocate CDPs to specified line
- Do not pass data from CDPs that are likely corrupted (i.e.: critical or fatal errors)

When many of these problems are encountered by the HD9084, it will indicate this by displaying a fault message on the front panel and illuminating the FAULT LED. Refer to section 3.9 for descriptions of the fault messages.

6.3.2. Which Serial Port Should I Connect To?

The HD9084 rear panel has three serial ports, labeled A, B and C. Any serial port may be used for typical captioning functions, since they all support the same Control-A serial protocol. All three serial ports are configured from the factory for RS-232 communications, and the pinout is compatible with an off-the-shelf null-modem cable. Ports A, B, and C are all configurable to support both RS-232 and RS-422 communications.

If possible, keep Port A configured for RS-232 and do not connect equipment to it unless both ports B and C are already in use. If the firmware requires upgrade in the future, as described in section 5.2 you must connect a PC to Port A to load the firmware onto the HD9084.

If you wish to connect to an ATSC encoder, you must use Port B. Only Port B supports SMPTE-333 and Grand Alliance protocols used by these devices. Refer to section 3.6 for configuring Port B to use these communication protocols.

6.3.3. There is No SD-SDI Video Present on the SD-SDI Output

The HD9084 includes a SD-SDI video bypass relay to ensure that SD-SDI video is passed, even when the unit is powered-down. Make sure that your SD-SDI source is connected to the BNC connector marked SD-SDI PGM IN, and the primary SD-SDI video output is connected to the BNC connector marked SD-SDI BYPASS PGM OUT. If you still see no video, try the following:

1. Unplug the power from the Closed Caption Encoder.

2. Connect your SD-SDI source to the SD-SDI IN connector.
3. Look for video out of the SD-SDI BYPASS PGM OUT connector.

If there is still no SD-SDI video passing through the unit, check for presence of SD-SDI video upstream, and check for cabling problems.

6.3.4. There is No HD-SDI Video Present on the HD-SDI Output

The HD9084 includes a HD-SDI video bypass relay to ensure that HD-SDI video is passed, even when the unit is powered-down. Make sure that your HD-SDI source is connected to the BNC connector marked HD-SDI PGM IN, and the primary HD-SDI video output is connected to the BNC connector marked HD-SDI BYPASS PGM OUT. If you still see no video, try the following:

1. Unplug the power from the Closed Caption Encoder.
2. Connect your HD-SDI source to the HD-SDI IN connector.
3. Look for video out of the HD-SDI BYPASS PGM OUT connector.

If there is still no HD-SDI video passing through the unit, check for presence of HD-SDI video upstream, and check for cabling problems.

6.3.5. How Do I Check if Captions are Being Processed?

6.3.5.1. Control-A Protocol Test Using a Terminal Program

Control-A protocol can be used to determine if captions are processed and available out of Ports A, B, or C. Please ensure the latest firmware is downloaded from www.evertz.com and installed in the HD9084.

Follow the load firmware section in 5.2.

Procedure:

- Connect a null modem cable to Port A, B, or C and to the RS-232 communication port of a PC.
- Begin a Terminal Program (Windows Hyper-terminal) and configure the communication settings to the following:

Baud	57600
Parity	none
Data bits	8
Stop bits	2
Flow Control	None

- Make sure captions are present in the up-stream SD-SDI and/or HD-SDI video or enable the CEA-608 Test Message of the HD9084.
- Turn the HD9084 on.
- Using the front panel menu system set the desired port to Control-A protocol. See section 3.6.
- Set the Port settings to match the settings in Hyper-terminal as shown above.
- Press ENTER on the keyboard and ensure you see an asterisk (*) prompt every time you push the ENTER key.
- If you do not see the asterisk (*) prompt, communication has not been established between the HD9084 and PC. Begin from the beginning of this procedure and ensure all settings are correct.
- At the prompt with the *astrix in Hyper-Terminal, type in the following command:

Ctrl + a (the control button on the keyboard plus the letter A button)
5
SPACE (space bar)
f
1
You will not see this displayed at the prompt.

- Press the ENTER key
- This Control A command is further outlined in section 4.3.4
- All captions in field 1 should now be displayed in HyperTerminal
- To turn this feature off, type in the following command
- CTRL + g (Control key on the keyboard and the G key)
- The captions will stop scrolling

This test shows the HD9084 is processing captions and allows the user to verify this through Hyper-Terminal.

If captions are not displayed, check the following:

- Ensure the command was entered properly.
- Are captions present in the upstream video?
- Turn on the CEA-608 Test Message via front panel.

6.3.5.2. Composite Monitoring Output Check

The HD9084 can decode both CEA-608 and CEA-708 captions. To check if captions are present and processed, connect a BNC cable from the Comp Mon output of the HD9084 to an Analog Monitor. Make sure video is present upstream. To verify CEA-608 captions are present and processed, make sure SD-SDI video is present upstream.

To verify CEA-708 captions are present and processed, make sure HD-SDI video is present upstream. Turn the appropriate decoder on (see section 3.5). Please note that video will not be present on the monitor output, however, the decoded captions will be displayed.

If captions are not viewed on the Analog monitor, make sure the keyers are on, and captions are present on the upstream video. The built in CEA-608 Test Message can also be turned on to verify if the HD9084 is working properly. See section 3.4.2.6 to enable and disable the test message.

6.3.6. There are No Captions Present Out of the ATSC Encoder

Make sure the correct communication cable is used between the HD9084 Port B and the ATSC encoder. A null modem cable is used in almost all cases.

Avoid using gender changers, “homemade” cables, or distribution boxes between the HD9084 and ATSC encoder. Ensure a direct path is provided from the HD9084 to the encoder with a proper working cable.

Only Port B supports the SMPTE-333 and Grand Alliance serial protocols used by ATSC encoders. Ensure that the ATSC encoder is connected to port B, and that Port B is set to the proper protocol and baud rate using the front panel menu. See section 3.6.1 to configure Port B.

Verify captions are present on the upstream video following the procedure outlined in section 6.3.5.2

6.3.7. What Baud Rate and Port Settings Should I Use?

While the unit is capable of running at 57.6k baud on all internal serial ports, it is not necessary to run at the fastest baud rate possible for most captioning operations. NTSC captions are encoded at a maximum of 60 characters per second in each field. A serial port set to 1200 baud can transfer data at up to 120 characters per second including 7-bits of data, start, stop and parity bits. This is adequate for most captioning applications since the communications overhead is generally very low.

Some older PC's do not function correctly at over 19.2k baud, especially when running under Windows. Many PC's also have difficulties at 19.2k baud and above when using only the software (XON/XOFF) flow control method. Try turning on hardware (CTS/RTS) flow control on your computer if the captioning software supports it, and/or reducing your communications baud rate. Make sure that you alter your captioning computer's serial port settings to match those of the caption encoder.

6.3.8. How Do I Check the Logic Levels and Pinouts of the Serial Ports?

The logic levels (RS-232 or RS-422) can be checked from the front panel without removing the caption encoder from service. Push PORTS to cycle through the ports display option. See section 3.2.3 Ports Display.

6.3.9. How Do I Check the Status of My Power Supplies?

Power supply status can be monitored from the front panel PSU STATUS 1 and 2 LED's. If the LED is on, the power supply is functional/present. If the LED is off, the power supply is non-functional/not present. Note: The +2PS option (redundant power supply) must be ordered for both LED's to be on.

6.3.10. Captions are not Being Encoded at All

If there is no option in the captioning/teleprompter software for the Evertz encoder, configure your software to communicate with an EEG 270, EEG 370 or EEG 470 model Smart Encoder. The Evertz caption protocol is compatible with these units.

Make sure that the caption encoder unit is set to the correct video type, 525-60 for component NTSC.

Check that the caption keyer is turned on. There are green LED's to the left of the HD/SD Keyer ON/OFF pushbuttons that indicate HD-SDI and SD-SDI caption keyers are enabled. The encoder will not encode new captions into the video if the keyers have been turned off.

Check your serial port communications settings. Make sure that these are identical between the caption encoder and the attached captioning computer.

Check that the unit is receiving data from the serial port or modem.

Try enabling the built-in CEA-608 test message, as described in the manual section 3.4.2.6. If you still cannot see captions, then it is likely that downstream equipment is corrupting the caption data, or your caption decoder is not functioning correctly.

6.3.11. Captions are not Being Encoded Correctly

If there is no option in the captioning/teleprompter software for the Evertz encoder, configure your software to communicate with an EEG 270, EEG 370 or EEG 470 model Smart Encoder. The Evertz caption protocol is compatible with these units.

Make sure that the caption encoder unit is set to the correct video type, 525-60 for component NTSC.

Check your serial port communications settings. Make sure that these are identical between the caption encoder and the attached captioning computer.

Check that the unit is receiving data from the serial port or modem.

If certain accented and special characters do not display correctly, this is likely the fault of the caption decoder being used to display the captions. Some decoders do not support the entire character set for captions.

Certain teleprompter software packages have been known to not encode accented characters correctly. Please contact your software provider for possible updates before contacting Evertz technical support.

6.3.12. How Can I Block Upstream Captions?

Depending on the user's specific needs, there are several ways to accomplish this. If all upstream captions are to be blocked, this can be accomplished by one of the following methods:

- Change the Upstream Source front panel controls. See section 3.4.4.
- Issue the serial port commands ^A6 F1 and ^A6 F2 to place Field 1 and Field 2 into NULL STATE. See section 4.3.13.

If only particular caption services are to be blocked, such as Text Channel 2:

- Change the setting of the Pass Upstream menu controls. See section 3.4.4.4.
- Issue the ^A6 (NULL STATE) serial command, ex: ^A6 T2 to place Text Channel 2 in NULL STATE. See section 4.3.13.
- To block specific XDS packet types, see the ^AP command in section 4.5.2.

6.3.13. How Can I Pass Upstream Captions?

If upstream captions are being blocked, the user's captioning software might have failed to relinquish control of the encoder so upstream captions may pass.

If captioning software is leaving the unit in DIRECT STATE or REAL TIME STATE or NULL STATE when it is sitting idle, this issue must be resolved in the caption software itself.

6.3.14. When Should I Use "Reset to Factory Defaults?"

Factory Reset should not be used lightly. It is intended primarily for use when Evertz technical support personnel are assisting an operator with a problem. The Factory Reset could also be used when the encoder is placed in a particular undesirable mode of operation and the operator is highly unsure as to how to resolve the situation. Note that any special features that have been enabled by the operator, such as baud rate settings, will need to be reconfigured after a Factory Reset.

6.3.15. My Modem Connection Hangs-Up Unexpectedly

The following can cause unexplained hang-ups on a modem connection:

RAIN: If there has been any significant rainfall during this time, moisture can get into the lines and cause power hums and other sorts of phenomenon. This can cause the DC level of the phone line to vary, which modems can interpret as loss of carrier.

DISTANCE: If the captioner is a long distance from the CO (Central Office) where they are near the limit of transmission, dropouts can occur if there is not a line booster in place. If there is a line booster, this can also be a problem if there are grounding issues, etc.

CAPTIONERS MODEM: If the initialization string is setup incorrectly, this can cause the modem to not function correctly. The user may want to check the modem manufacturer for the recommended set-up for their particular modem so it is capable of operating in the 1200 to 2400 baud range. Some people that use US Robotics 57.6k modems have reported difficulties connecting at lower baud rates due to these setup strings.

OTHER SOFTWARE: If there is any other software on the system that uses the modem, it may have changed the initialization string or be interfering with the modem. On computers that use a COM-port mouse, the mouse may also interfere with the modem operation if it is configured incorrectly.

READ THE MANUAL: Be sure the captioners know their system inside and out. They should, at minimum, be able to supply what their system configuration is.

CALL WAITING: If this service is installed on the captioner's phone line, it MUST be disabled before using the modem. If an outside caller tries to call the phone line that the modem is connected to, the tone that is generated will disrupt modem communications, resulting in loss of carrier.

ONLY CONNECT TO POTS: (Plain Old Telephone System) For a reliable telephone connection to the caption encoder a direct telephone line must be used. This line must not pass through a PBX or similar key device.

Today, many telephone companies digitize the signal within their networks, unbeknownst to the customer. You may be able to establish a reliable connection to the caption encoder at 1200 or 2400 baud, but no higher. (This speed is acceptable for most captioning applications.) In other cases, you may need to ask the telco for a phone line with higher bandwidth, possibly at extra charge.

ENSURE THE LATEST FIRMWARE IS INSTALLED: From time-to-time, Evertz may release updated firmware for the HD9084 to add new features or improve performance. It is recommended to always check for firmware updates when you encounter a problem. The firmware release notes will provide some guidance as to whether a firmware upgrade will address your specific problem.

6.4. BEFORE YOU CALL EVERTZ TECHNICAL SUPPORT

Check for any product upgrades that may address your problem at the Evertz web site (www.evertz.com) and consult your software vendor.

After reviewing the website and calling Evertz customer service, you will be asked for specific technical information, which should be prepared in advance for speedy assistance:

- Serial number of unit.
- Firmware version of the caption encoder. This is displayed on the front panel display by pressing **GENERAL** on the front panel of the HD9084 encoder.
- Which serial ports and modem ports (A through E) are being used on the encoder?
- What captioning or teleprompter software is being used to control the encoder? (manufacturer, product name, revision number)
- Is this a new installation, or was the unit functioning in your system previously?
- Did the problem occur after installing some new hardware or software?

CHAPTER 7: GLOSSARY
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7. GLOSSARY

7.1. GLOSSARY OF STANDARDS

CEA (Consumer Electronics Association): CEA is a professional organization that recommends standards and practices for the U.S. consumer electronics industry.

CEA-608: This CEA standard serves as a technical guide for those providing encoding equipment and/or decoding equipment to produce material with encoded data embedded in Line 21 of the vertical blanking interval of the NTSC video signal. It is also a usage guide for those who will produce material using such equipment

CEA-708: Defines the coding of DTV closed captions (DTVCC) as they are delivered in an ATSC signal, and also defines the Caption Distribution Packet (CDP). This structure contains fields that can hold: CEA-608-B data for use if the video is converted to standard definition analog; DTV captions for use in an ATSC program; Caption Descriptors; and Time Code. The CDP is the basic unit of data that is transported through the professional portion of a DTV plant. As such, it is central to the methods discussed in this document.

SMPTE (Society of Motion Picture and Television Engineers): A professional organization that recommends standards for the film and television industries.

SMPTE 12M-1: The SMPTE standard for the Time and Address Control signal in widespread use in the professional video and audio industries. SMPTE 12M-1 defines the specifications for both Linear Time Code (LTC) and Vertical Interval Time Code (VITC).

SMPTE 12M-2: The SMPTE Recommended Practice for transmitting Time code in the ancillary data space of serial digital television signals

SMPTE 125M: The SMPTE standard for bit parallel digital interface for component video signals. SMPTE 125M defines the parameters required to generate and distribute component video signals on a parallel interface.

SMPTE 244M: The SMPTE standard for bit parallel digital interface for composite video signals. SMPTE 244M defines the parameters required to generate and distribute composite video signals on a parallel interface.

SMPTE 259M: The SMPTE standard for 525 line serial digital component and composite interfaces.

SMPTE 269M: This SMPTE standard defines an opto-isolated fault tally output signal for connecting to user-defined equipment such as warning indicators.

SMPTE 291M: Defines the method of multiplexing ancillary data such as audio and captions to 292M and 259M-C signals.

SMPTE 292M: Defines the serial interface that is used for carriage of HDTV video signals. It and its standard definition equivalent 259M-C provide a standard transport mechanism, not only for the video signal, but also for digitized audio and data such as captions.

SMPTE 309M: The SMPTE standard for encoding date information into the user bits of linear time code.

SMPTE 333M: The SMPTE standard for serially interfacing captioning equipment with ATSC caption encoders.

SMPTE 334M: Assigns addresses to be used to multiplex specific data services such as captioning into the vertical ancillary (VANC) space defined by 291M. It also specifies that the payload of a VANC packet used for captioning is CDP. Superseded by SMPTE-334-1 and SMPTE-334-2.

SMPTE 334-1: Vertical Ancillary Data Mapping of Caption Data and Other Related Data.

SMPTE 334-2: Caption Distribution Packet (CDP) Definition.

SMPTE 425M: Specifies the mapping of different video signals to the 3G physical interface, as well as the supported video formats.

SMPTE RP2007: CDP and “Grand Alliance” serial communication interfaces.

7.2. GLOSSARY OF TERMS

AES: (Audio Engineering Society) A professional organization that recommends standards for the audio industries.

AES/EBU: Informal name for a digital audio standard established jointly by the Audio Engineering Society and the European Broadcasting Union organizations.

ANALOG: An adjective describing any signal that varies continuously as opposed to a digital signal that contains discrete levels representing digits 0 and 1.

A-TO D CONVERTER (ANALOG-TO-DIGITAL): A circuit that uses digital sampling to convert an analog signal into a digital representation of that signal.

ATSC A/65: Defines information that describes the contents of an ATSC broadcast. Some of this information may pertain to the closed captioning.

BIT: A binary representation of 0 or 1. One of the quantized levels of a pixel.

BIT PARALLEL: Byte-wise transmission of digital video down, a multi-conductor cable where each pair of wires carries a single bit. This standard is covered under SMPTE 125M, EBU 3267-E and CCIR 656.

BIT SERIAL: Bit-wise transmission of digital video down, a single conductor such as coaxial cable. May also be sent through fiber optics. This standard is covered under SMPTE 259M-C and CCIR 656.

BIT STREAM: A continuous series of bits transmitted on a line.

BNC: Abbreviation of "baby N connector". A cable connector used extensively in television systems.

BYTE: A complete set of quantized levels containing all the bits. Bytes consisting of 8 to 10 bits per sample are typical in digital video systems.

CABLE EQUALIZATION: The process of altering the frequency response of a video amplifier to compensate for high frequency losses in coaxial cable.

CDP: Caption Distribution Packet, was defined in SMPTE-334M-2006 (and formerly in CEA-708-B). CDPs may contain CEA-708 and/or CEA-608 caption data.

CCIR (International Radio Consultative Committee): An international standards committee. (This organization is now known as ITU.)

CCIR-601: See ITU-R601

CCIR-656: See ITU-R656

CLIFF EFFECT: (also referred to as the 'digital cliff') This is a phenomenon found in digital video systems that describes the sudden deterioration of picture quality when due to excessive bit errors, often caused by excessive cable lengths. The digital signal will be perfect even though one of its signal parameters is approaching or passing the specified limits. At a given moment however, the parameter will reach a point where the data can no longer be interpreted correctly, and the picture will be totally unrecognizable.

COMPONENT ANALOG: The non-encoded output of a camera, video tape recorder, etc., consisting of the three primary colour signals: red, green, and blue (RGB) that together convey all necessary picture information. In some component video formats these three components have been translated into a luminance signal and two colour difference signals, for example Y, B-Y, R-Y.

COMPONENT DIGITAL: A digital representation of a component analog signal set, most often Y, B-Y, R-Y. The encoding parameters are specified by ITU-R601. ITU-R656 and SMPTE 125M specify the parallel interface.

COMPOSITE ANALOG: An encoded video signal such as NTSC or PAL video that includes horizontal and vertical synchronizing information.

COMPOSITE DIGITAL: A digitally encoded video signal, such as NTSC or PAL video that includes horizontal and vertical synchronizing information.

D1: A component digital video recording format that uses data conforming to the ITU-R601 standard. Records on 19 mm magnetic tape. (Often used incorrectly to refer to component digital video.)

D2: A composite digital video recording format that uses data conforming to SMPTE 244M. Records on 19 mm magnetic tape. (Often used incorrectly to refer to composite digital video.)

D3: A composite digital video recording format that uses data conforming to SMPTE 244M. Records on 1/2" magnetic tape.

DSO: (Daylight Saving time Observed)

DST (DAYLIGHT SAVING TIME): The civil time observed when daylight saving time is adopted in a country or region. It is usually standard time + 1 hour. (see also *Standard Time*)

DTVCC: Digital Television Closed Captioning, defined in CEA-708.

EBU (European Broadcasting Union): An organization of European broadcasters that among other activities provides technical recommendations for the 625/50 line television systems.

EBU TECH 3267-E: The EBU recommendation for the parallel interface of 625 line digital video signal. This is a revision of the earlier EBU Tech 3246-E standard that was in turn derived from ITU-R601.

EDH: Error Detection and Handling (EDH) is defined in SMPTE RP-165 as a method of determining when bit errors have occurred along the digital video path. Check words and flags are combined into a special error detection data packet that is included as ancillary data in the serial digital signal.

EMBEDDED AUDIO: Digital audio is multiplexed onto a serial digital video data stream.

EXTENDED DATA SERVICES (XDS): XDS is a third data service in field 2 that is intended to supply program related and other information to the viewer. This information may include such items as program title, length of show, type of show and program content codes such as V-Chip program ratings.

ITU: The United Nations regulatory body governing all forms of communications. ITU-R (previously CCIR) regulates the radio frequency spectrum, while ITU-T (previously CCITT) deals with the telecommunications standards.

ITU-R601: (This document previously known as CCIR-601). An international standard for component digital television from which was derived SMPTE 125M and EBU 3246-E standards. ITU-R601 defines the sampling systems, matrix values and filter characteristics for both Y, B-Y, R-Y and RGB component digital television signals.

ITU-R656 (This document previously known as CCIR-656). The physical parallel and serial interconnect scheme for ITU-R601. ITU-R656 defines the parallel connector pinouts as well as the blanking, sync and multiplexing schemes used in both parallel and serial interfaces. It reflects definitions found in EBU Tech 3267 (for 625 line systems) and SMPTE 125M (parallel 525 line systems) and SMPTE 259M-C (serial 525 line systems).

JULIAN DATE: The Julian day number is a count of days elapsed since Greenwich mean noon on January 1, 4713B.C. January 1st, 1993 was JD 2448989; January 1st, 2000 was JD 2451545.

MODIFIED JULIAN DATE (MJD): The Modified Julian Date is a continuous count of the number of days elapsed since 17 November 1858. It is often more useful than conventional calendar dates for record keeping over long periods of time, since the MJD's of two events can easily be subtracted to determine the time difference in days. Usually, the MJD is specified as a number with 5 significant digits. As an example, the MJD for 1 January 1995 is 49718, meaning that this many days have elapsed between 17 November 1858 and 1 January 1995. The Modified Julian date is calculated by subtracting 2400000.5 days from the Julian Date. Thus the Modified Julian Day 1 begins at Greenwich midnight.

LED: Light Emitting Diode.

LINEAR TIME CODE (LTC): A digital code used for timing and control purposes on videotape and associated audiotape machines. It is recorded on a longitudinal track with audio characteristics and is referred to as LTC (Sometimes this code is also referred to as longitudinal code or SMPTE). Each 80 bit code word is associated with one television frame, and consists of 26 time bits, 6 flag bits, 32 user bits and 16 sync bits. Date information may be optionally encoded into the user bits. This code is often used for distribution time of day information to station clock displays and automation systems. The SMPTE 12M standard defines LTC.

PAC: Preamble Address Code. These codes are embedded into the line 21 caption data. They define the caption text position on the screen, and set special features such as colour, italics and underline.

PIXEL: The smallest distinguishable and resolvable area in a video image. A single point on the screen. In digital video, a single sample of the picture. Derived from the words *picture element*.

PSIP: Program and System Information Protocol, defined in ATSC A/65.

RESOLUTION: The number of bits (eight, ten, etc.) determines the resolution of the signal. Eight bits is the minimum resolution for broadcast television signals.

SERIAL DIGITAL (SDI): Digital information that is transmitted in serial form. Often used informally to refer to serial digital television signals.

STANDARD TIME: The civil time adopted for a country or region. (See also *Daylight Saving Time*)

TIME ZONE OFFSET: The difference in time between the local time and UTC

TRS: Timing reference signals used in composite digital systems. (It is four words long).

TRS-ID: Abbreviation for "Timing Reference Signal Identification". A reference signal used to maintain timing in composite digital systems. (It is four words long.)

UNIVERSAL COORDINATED TIME

UNIVERSAL TIME, COORDINATED (UTC): Universal Coordinated Time (UTC) is an international time standard that defines a time that doesn't depend on where we are on Earth. Universal Time (UTC), Greenwich Mean Time (GMT), and Zulu Time (Z), are based at the prime meridian (0° longitude) of Earth and are used to avoid confusion of time zones.

VANC: Vertical Ancillary data. Data carried in serial digital video signal (SMPTE 259M-C or 292M), in accordance with SMPTE 291M, in the active portion of scan lines that are outside the active picture area.

VBI: Vertical Blanking Interval. The scan lines that are outside the active picture area of a standard definition video signal (analog or serial digital). These can be used for carriage of data, including closed captioning, in analog video broadcasting.

V-Chip: Abbreviation for "Viewer Chip" (commonly misread as "Violence Chip"). V-Chip-enabled television sets extract Program Rating packets from the XDS data stream in Field 2 captions to determine the rating of a show. Also see Extended Data Services.

WebTV: The encoding of URL (Uniform Resource Locators) normally used on the Internet, into line 21 caption style data. This URL string is made up with the familiar http:// followed by a target location on the Internet. The URL must be formatted to match the Electronic Industries Association specification CEA-746-A.

XDS: See Extended Data Services.

4:2:2 A commonly used term for a component digital video format. The details of the format are specified in the ITU-R601 standard. The numerals 4:2:2 denote the ratio of the sampling frequencies of the luminance channel to the two colour difference channels. For every four luminance samples, there are two samples of each colour difference channel.

4Fsc Four times sub-carrier sampling rate used in composite digital systems. In NTSC this is 14.3 MHz. In PAL this is 17.7 MHz.

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