8083XDS-AD
Analog and SD-SDI XDS Encoder

Instruction Manual

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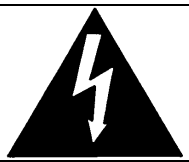
IMPORTANT SAFETY INSTRUCTIONS

	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 these instructions
- 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 are 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 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.

REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	First Edition	Apr 05
1.0.1	Added information on changing the battery	Aug 06
1.0.2	Removed references to Field Mode	Aug 07

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TABLE OF CONTENTS

Figures:

Tables:

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CHAPTER 1: OVERVIEW

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1 OVERVIEW

This manual describes the operation of the 8083XDS-AD Analog and SD-SDI XDS Encoder.

The Model 8083XDS-AD provides a cost-effective method of encoding eXtended Data Service (XDS) into Field 2 of the analog and digital video bitstream. It has been designed to meet the needs of both television broadcast and post-production facilities.

The following table summarizes the major features of the 8083XDS-AD.

Feature	8083XDS-AD
Front Panel	10 buttons
SDI Video	4:2:2
Analog Video	composite
Serial Ports	3
RS-232 / RS-422	all ports
Modems (14.4kbps)	0
Bypass Relay	Yes - both feeds
Power Supplies	1 or 2
Monitoring Decoder	Yes - both feeds
VBI Bridge	Yes
ATSC Comm.	No
XDS Insertion	Yes
WebTV URL Insertion	No
Text Article Insertion	No
Local Default V-Chip	Yes
LTC Reader	No

Table 1-1: XDS Encoder Feature Summary

1.1 THE CLOSED CAPTION and XDS SYSTEM

The Closed Caption System provides for the transmission of data on line 21 of the NTSC composite signal, or Line 22 of the PAL composite video signal. The EIA-608-B standard specifies nine data channels or “streams” for line 21 data services. In each video field there are two caption streams and two text streams. Field two also contains the Extended Data Service (XDS) data stream. These are summarized in the following chart:

Field 1		Field 2	
CC1	Primary Synchronous Caption Service	CC3	Secondary Synchronous Caption Service
CC2	Special Non-synchronous Use Captions	CC4	Special Non-synchronous Use Captions
T1	First Text Service	T3	Third Text Service
T2	Second Text Service	T4	Fourth Text Service
		XDS	Extended Data Services

The separate data streams are independent of each other in content. Within each field, the streams are time-multiplexed. Control codes are transmitted to announce the transition to a different stream. Home viewers may generally select which data stream to display with their caption decoders.

The primary Synchronous Caption Service (CC1) is primary language captioning data that must be in sync with the sound. The Secondary Synchronous Caption Service (CC3) is an alternate captioning data channel in sync with the sound, usually used for a second language.

The special Non-Synchronous channels (CC2, CC4) carry data that is intended to augment information carried in the program and is not necessarily in sync with the sound.

The four text services are used to carry general text information that may not be related to the program content. Text stream T2 is often reserved to carry URL data for WebTV applications.

Extended Data Service stream contains information about the program such as program title, length, and V-Chip-compatible program rating information.

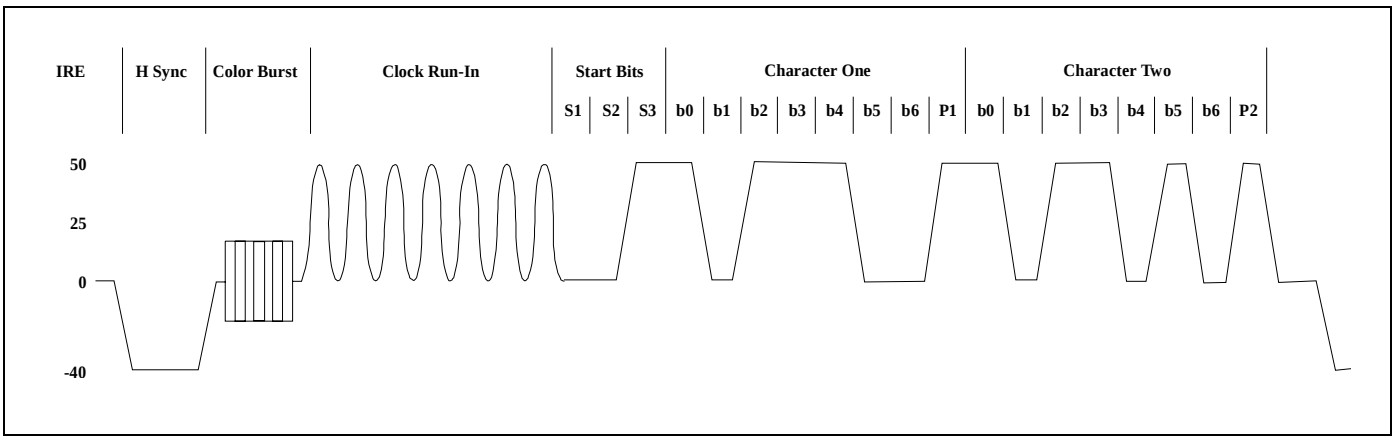

Figure 1-1: Typical Line 21 Closed Caption Signal

Figure 1-1 shows the typical waveform of the signal. The line 21 data signal consists of a 7 cycle sine wave clock burst, a start bit, and two data characters. Each character consists of seven data bits with odd parity. The clock rate is 32 times the horizontal line frequency or 503.4 KHz. The signal amplitude is 50 IRE units peak to peak. There is no setup on the line when the caption signal is present. When caption data is encoded into field 2, there must at least be null characters encoded into field 1. The full specification for the caption data waveform and data content is given in the EIA-608-B standard.

1.2 FEATURES

1.2.1 Hardware System Features:

- 3 RS-232 serial ports can be configured for direct connection to captioning computer.
- Rack mountable chassis.
- 16 digit alphanumeric display, with 8 push buttons.
- Parallel remote port for GPI control of six important 8083 functions.
- Real-time clock and calendar with battery backup.
- Flash ROM program memory for easy in-system-programmable firmware upgrades.
- Optional redundant power supply.

1.2.2 Serial Digital Video Path Features:

- Keys directly into 4:2:2 (525 or 625 line) digital video bitstream.
- 8 or 10 bit SDI video resolution supported.
- Serial digital video input provides automatic cable equalization on cable lengths up to 200 meters of low loss coax such as Belden 8281.
- Two separate serial digital video outputs.
- Serial Digital Video bypass relay activates automatically on power failure to maintain the integrity of the program video path.
- Analog composite monitor output with caption decoder provides a means of verifying the caption information that is being encoded.

1.2.3 Component Analog Video Path Features

- Keys directly into 1Vp-p component analog (525 or 625 line) video signal.
- User may select either analog or SDI video path as upstream data source for data bridging applications.
- XDS may be encoded onto both video feeds simultaneously when the feeds are frame-locked.
- Studio-quality video output with bypass relay protection.
- Monitor output with caption and XDS decoder that provides a means of verifying the information that is being encoded.
- Video bypass relay activates automatically on power failure to maintain the integrity of the program video path.

1.2.4 Data Encoding Features:

- Supports encoding of Extended Data Service (XDS) data packets including V-Chip-compatible program ratings into Field 2
- EDH packet checksum correction.
- Keyer bypass mode allows video to pass through without keying any signal in
- Data encoding line is selectable – 11 to 25 in NTSC, 6 to 25 in PAL.

1.2.5 Communications Features:

- Serial communications protocol emulates EEG 270, EEG 370 and EEG 470 Encoders.

1.3 DAYLIGHT SAVING TIME ADJUSTMENT

Daylight Saving Time (DST) was instituted to take advantage of the later hours of daylight between April and October. In 1966, the U.S. Congress passed the Uniform Time Act that standardized the length of Daylight Saving Time. For those parts of the United States that observe Daylight Saving Time, it begins at 2 a.m. local time on the first Sunday of April. Time reverts to standard time at 2 a.m. local time on the last Sunday of October. 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.

The Caption Encoders will automatically switch their local time to Daylight Saving time at 2 a.m. local time on the first Sunday of April, and back to standard time at 2 a.m. local time on the last Sunday of October. The DST Observed control allows the user to enable or disable the DST adjustment of the local encoder time (the DSO flag). For regions that observe Daylight saving time, the DST Observed setting must be set to On, and for regions that do not observe Daylight saving time, the DST Observed setting must be set to Off. Regardless of whether DST is observed in a region, DST will be In effect between the first Sunday of April and the last Sunday of October. (The DST flag) The front panel time display shows the status of the DST and DSO flags as shown in Figure 3-4.

There are two XDS packets defined by EIA-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 first Sunday of April and the Last Sunday of October). The Time of Day packet must be inserted locally at each affiliate station 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 VCR will ignore the DST Flag bit in the Time of Day packet. The Time Zone packet must be inserted locally at each affiliate in order to encode the correct time zone offset for the region. See application note AN3 at the back of this manual for more information about encoding time in XDS packets.

1.4 HOW TO USE THIS MANUAL

This manual is organized into 6 chapters: Overview, Installation, Operation, Serial Command Protocol, Technical Description, and Troubleshooting. There are also two application notes in the rear of the manual.

If you are confused by any terminology used throughout the manual, please refer to the Glossary of Terms in Chapter 1.

Items of special note are indicated with a double box like this

1.5 GLOSSARY OF STANDARDS

EIA (Electronic Industries Alliance): An association of trade associations representing various facets of the electronics industry. Each of these EIA Sector Associations manages its own standards-setting programs under EIA, the umbrella organization.

EIA-608-B: This EIA 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.

EIA-708-B 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: EIA-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.

EIA-744-A: The EIA standard that defines the formatting of content advisory information accommodating either U.S. or Canadian systems, as well as the movie industry's MPAA rating system using the vertical blanking interval. EIA 744-A redefines the XDS Program Rating (content advisory) packet, 05h, currently contained in **EIA-608-B**, Current Class.

EIA-746-A: This document is a proposed amendment to EIA-608-A to insert Internet Uniform Resource. Locators (URLs) within the line-21 data system using the Text-2 (T-2) service. These URLs may be used by receiving devices in a variety of ways to associate Internet content with related television broadcast content.

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

SMPTE 12M: The SMPTE standard for linear time code.

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 signals.

SMPTE 292M: Defines the serial interface that is used for carriage of HDTV video signals. It and its standard definition equivalent 259M 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 XDS 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.

1.6 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 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, defined in EIA-708.

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 doe 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 EIA-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 (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 optionally be 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: Stands for 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 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 EIA-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 subcarrier 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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CHAPTER 2: INSTALLATION

Figures

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2 INSTALLATION

2.1 REAR PANEL

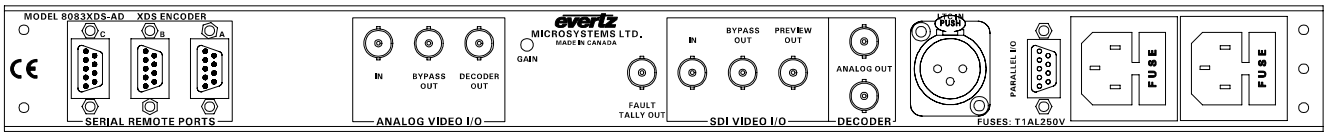

Figure 2-1: 8083XDS-AD Rear Panel

The XDS encoder will have a rear panel that closely resembles Figure 2-1. The following sections describe the purpose of the rear panel connectors and describe the specific signals that should be connected to the encoder.

2.1.1 Program Video Connections

SDI IN: A BNC connector for input of 10 bit 4:2:2 component serial digital video signals compatible with the SMPTE 259M standard.

SDI BYPASS OUT: A BNC connector for output of 10 bit 4:2:2 component serial digital video signals compatible with the SMPTE 259M standard. The video data will normally be identical to the input video data, with caption data inserted onto it. When the bypass relay is activated (on power failure or by closing the Bypass GPI to ground) the SDI BYPASS OUT is a direct relay connection to the SDI IN.

FAULT TALLY OUT: A BNC connector for output of a SMPTE 269M fault tally. The output will be open circuit when the 8083XDS-AD is processing video normally. The output will be grounded when the unit is bypassed.

ANALOG IN: A BNC connector for input of composite analog video signals compatible with the SMPTE 170M standard. Internally terminated by 75 ohms.

ANALOG BYPASS OUT: A BNC connector for output of composite analog video signals compatible with the SMPTE 170M standard. The video signal will normally be identical to the input video, with caption data inserted onto it. When the bypass relay is activated (on power failure or by closing the Bypass GPI to ground) the ANALOG BYPASS OUT is a direct relay connection to the ANALOG IN.

GAIN: This hole allows access to a multi-turn trimmer potentiometer for adjusting the output level of the ANALOG BYPASS OUT connector on the 8083XDS-AD. This trimpot is calibrated from the factory for $1V_{p-p}$ output. If adjustment is required in the field,

we recommend using a small slot-style plastic screwdriver or one with a plastic guide over the tip. This will prevent possible shorting to nearby components on the circuit board if the screwdriver slips off the adjustment screw.

2.1.2 Preview Video Connections

SDI PREVIEW OUT: A BNC connector for output of 10 bit serial digital video signals compatible with the SMPTE 259M standard. This video will be the SDI video input with data inserted onto it when the bypass relay is NOT activated. If the bypass relay is activated, this connector will have NO video output.

DECODER OUT: Two BNC connectors for composite analog output of the SDI video signal, with the captions decoded and inserted as open captions over the video. 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 captions or XDS data has been encoded correctly on the SDI program path. If the bypass relay is activated, this connector will have NO video output.

ANALOG PREVIEW OUT: A BNC connector for output of the composite analog video signal, with the captions decoded and inserted as open captions over the video. The front panel menus are used to determine which data channel will be decoded. This video will be the analog video input with data inserted onto it when the bypass relay is NOT activated and can be connected to any analog monitor to verify that the captions or XDS data has been encoded correctly on the analog program path. If the bypass relay is activated, this connector will have NO video output.

2.1.3 Serial Port Connections

PORT A: A 9-pin male 'D' connector for connection to a computer with XDS control software. The front panel Engineering menus are used to set the correct baud rate, word size and parity for use with your captioning software. (See section 3.3) This port is also used to update the firmware in the XDS Encoder (See section 5.4)

As configured from the factory, the pinout of this connector is designed so that you can use a readily-available “null modem” cable to connect to your computer via RS-232 port. Jumper settings inside the unit may alter this pinout, and reconfigure for RS-422 communications. Please refer to Figure 2-4 and Figure 2-5 for typical port pinouts and connections to a computer.

Evertz does not recommend altering the jumper settings for port A, as it may make in-field firmware updates very difficult for the user.

PORT B, C: These 9 pin male 'D' connectors may be used for connection to computers with XDS control software. The front panel Engineering menus are used to set the correct baud rate, word size and parity for use with your captioning software. (See section 3.3)

The pinout of this connector is designed so that you can use a readily available “null modem” cable to connect to your computer. Please refer to Figure 2-4 and Figure 2-5 for typical port pinouts and connections to a computer.

2.1.4 Parallel Remote Control Connections

PARALLEL: A 9-pin female 'D' connector for connection to 'closure to ground' remote control signals. Each input is optically isolated, and has an internal 47 K ohm pull-up to +5 volts. The pinout of the connector is as follows:

Pin	Description
1	Ground
2	Serial Port A Disable
3	Serial Port B Disable
4	Serial Port C Disable
5	Not used
6	Bypass Relay Enable
7	Caption Keyer Disable
8	Caption Shift Up
9	Ground

Figure 2-2: Parallel GPI Port Pinout

Refer to section 3.5 for details on the functions of each parallel port GPI pin.

2.1.5 Power Connections

LINE: The XDS Encoder has one or two universal power supplies that operate on either 115v/60 Hz or 230v/50 Hz AC operation. (Redundant supply is optional). The power supplies auto sense the input mains voltage.

2.2 MOUNTING

The XDS 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 POWER REQUIREMENTS

The XDS Encoder has one or two universal power supplies that automatically sense the input voltage. (The redundant supply is optional.) It can operate on either 115 Volt / 60 Hz or 230 Volt / 50 Hz AC.

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 minimum 18 AWG wire size; type SVT marked VW-1, maximum 2.5 m in length. The power entry module combines a standard power inlet connector, two 5 x 20 mm fuse holders and an EMI line filter.

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

2.4 CONNECTING THE DIGITAL VIDEO

2.4.1 SDI Video Input

The 8083XDS-AD requires a digital video source to be connected to the SDI video input. The 8083XDS-AD does not require an SDI video source when composite video is selected as the caption source.

The unit accepts either 525 or 625 line digital video in the component (4:2:2) format. Set the VIDEO TYPE parameter on the front panel menu to match the video input. (See section 3.2.1 for information on changing the video type setting.)

The 8083XDS-AD has LEDs labeled 525 and 625 VIDEO IN on the front panel, these indicate which input is active and if there is video present. When either LED is blinking it indicates that there is no video present. When the LED is off, no input SDI video has been detected.

2.4.2 SDI Video Output

The two SDI outputs contain the input video with closed caption data keyed in. The SDI BYPASS OUT output is bypass protected in case of power failure or operator override. Normally this output should be used for the main program output of the XDS encoder. A second non-bypassed output (SDI PREVIEW OUT) may be connected for preview applications. When the Bypass relay is active, this output contains no video signal. The Bypass relay will be activated on power failure and when the Bypass Relay GPI is closed to ground. It may also be manually activated using the front panel menus. The Fault Tally Output will be open circuit when the XDS encoder is processing video normally, and will be grounded when the bypass relay is activated.

2.5 CONNECTING THE ANALOG VIDEO

2.5.1 Decoder Outputs (from SDI video path)

A composite monitor inside the XDS encoder provides two composite DECODER outputs from the SDI video feed. The two identical outputs are typically connected to video monitors to verify that the XDS information is being applied correctly. The front panel menus are used to select which data channel will be decoded (See section 3.2.4)

2.5.2 Composite Analog Video Input

The 8083XDS-AD accepts either an SDI video source in the SDI IN BNC or a composite analog video source in the ANALOG VIDEO IN BNC or both sources simultaneously when these are frame-locked together.

For proper operation, the input analog video should be timebase corrected. For simultaneous analog and SDI operation, the video sources must also be frame-locked.

The ANALOG VIDEO IN connector accepts either 525 or 625 line composite analog video. Set the VIDEO TYPE parameter on the front panel menu to match the video input. (See section 3.2.1 for information on changing the video type setting). The UPSTREAM SOURCE parameter should also be changed to match the type of video being input, even if the upstream video contains no caption data.

The 8083XDS-AD has an LED labeled COMP VIDEO IN. When it is on steady, there is composite analog video present. When it is flashing, there is a problem such as incorrect video standard selected, or the video is of poor quality. When the LED is off, no input SDI video has been detected.

2.5.3 Composite Analog Video Output

The two composite outputs contain the input video with closed caption data keyed in. The ANALOG BYPASS OUT output is bypass protected in case of power failure or operator override. Normally this output should be used for the main program output of the XDS encoder. A second non-bypassed output (ANALOG PREVIEW OUT) has a built-in caption and XDS decoder and may be connected for preview applications. When the Bypass relay is active, this output contains no video signal. The Bypass relay will be activated on power failure and when the Bypass Relay GPI is closed to ground. It may also be manually activated using the front panel menus.

2.6 CONNECTING THE ENCODER TO AN XDS COMPUTER

Figure 2-3 shows the typical connections required when using the 8083XDS-AD in conjunction with a computer running XDS software.

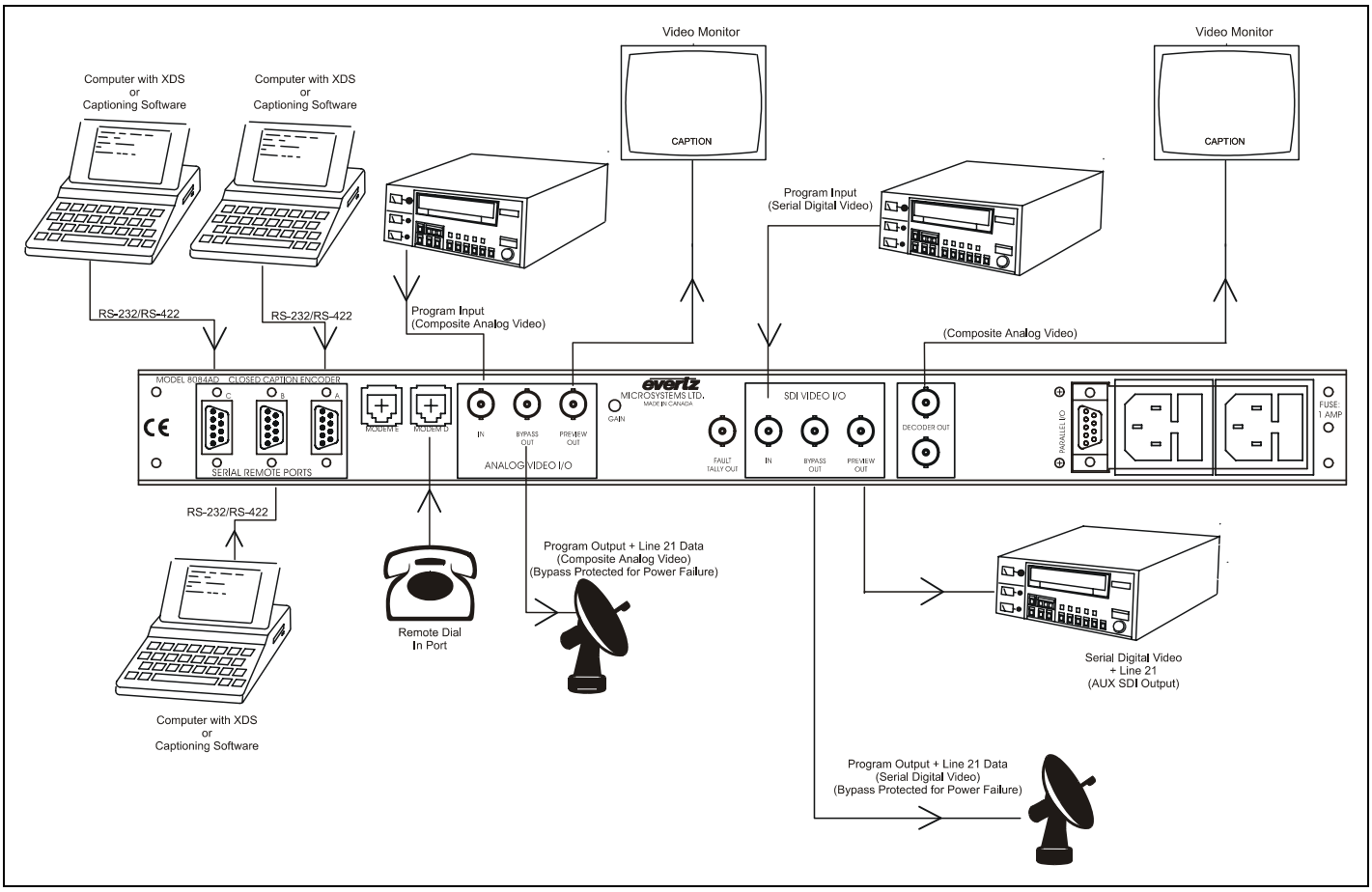

Figure 2-3: Typical Connections to the 8083XDS-AD XDS Encoder

Connect PORT A, B or C of the XDS Encoder to one of the serial ports (typically COM1 or COM2) of your computer. Figure 2-4 below shows the typical cable wiring diagram to connect Port A, B or C and a personal computer. If none of the ports have been altered from the factory settings, you can use a standard "NULL MODEM" cable to connect your PC to any port. If you are connecting only one computer running XDS encoding software, we recommend connecting it to port C.

Serial I/O Port (A,B,C) Male (pins) Description	DB-9		DB-25	DB-9	Computer End Male (pins) 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 2-4: Wiring RS-232 DTE Serial Port to Computer

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

Figure 2-5: Wiring RS-422 Tributary Serial Port to RS-422 Master

The baud rate, word size and parity of the XDS encoder must be set up to match your software configuration. The most common settings are 1200 Baud, 7 bits odd parity. The Engineering Setup menu BAUD RATE and SERIAL WORD menu items are used to configure these parameters. (See section 3.3.1)

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CHAPTER 3: OPERATION

Figures

Tables

Key Functions in Normal Display Mode

Keys	Function	Relevant Sections
SHIFT + ↓	Toggle Stream Monitor Display	3.4
SHIFT + ↑ + →	Reset to Transparent State	3.3.9
SHIFT + SELECT	Show firmware revision	5.5.3
Menu System Entry		
SETUP	Enter SETUP menu system	3.1.1
SHIFT + SETUP	Enter ENGINEERING menu system	3.1.1
Keyer Controls		
Keyer ON/OFF	Toggle Keyers ON or OFF	3.1.2
SHIFT + Keyer ON/OFF	Lock Keyers OFF	3.1.2
KEYER FLD 1	Toggle Field 1 Keyer ON/OFF	3.1.2
KEYER FLD 2	Toggle Field 2 Keyer ON/OFF	3.1.2
SHIFT + KEYER FLD 1	Lock Keyers in present state	3.1.2
SHIFT + KEYER FLD 2	Lock Keyers in present state	3.1.2

Key Functions Within Setup or Engineering Menu Systems

Keys	Function	Relevant Sections
↑ , ↓	Move UP / DOWN main menu items	3.1.1
←, →	Show choices for current menu item	3.1.1
SETUP	Exit menu system	3.1.1
SELECT	Activate current choice for menu item	3.1.1

3 HOW TO OPERATE THE XDS ENCODER

3.1 AN OVERVIEW OF KEY AND DISPLAY FUNCTIONS

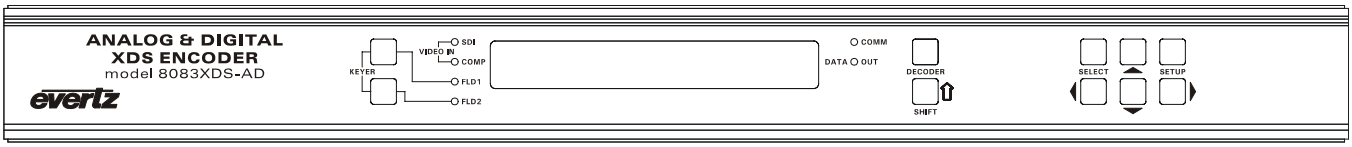


Figure 3-1: 8083XDS-AD Front Panel Layout

The display area consists of a 16 digit alphanumeric display, six LED status indicators and a ten pushbutton keypad.

A menu system provides a quick and simple method of configuring the XDS Encoder directly from the front panel. The keypad is used to control the menu system, and to provide a global Keyer disable. When the **SHIFT** key is held down, the meanings of some of the keys are modified, gaining quick access to a wider variety of functions.

Throughout this manual SHIFT + indicates that you should hold down the SHIFT key while pressing a second key.

The remainder of section 3.1 gives an overview of the XDS encoder operation. Sections 3.2 and following give detailed information on the specific operations required to control the device.

3.1.1 Navigating the Front Panel Menus -- The Setup Group

The menu systems use the 16 digit alphanumeric display and the Setup key group (**SELECT**, **SETUP,** ← → ↑ ↓) to configure the XDS encoder.

There are two menu systems used to configure the XDS encoder. Users will most often use the Setup menu, which is accessed by pressing the **SETUP** key. The Setup menu is used to configure the basic operation of the XDS Encoder. There is also an Engineering menu, which contains items not normally required during normal operation. To enter the Engineering menu press the **SHIFT + SETUP** keys.

To navigate within the menu system, press the ↑ or ↓ keys to move to the next menu item. When you have chosen the desired menu item, press the ← or → keys to view the options available for that menu item. The currently selected setting will be flashing. When you have chosen the desired setting for the menu item, press the **SELECT** key to save that value.

The currently active menu setting will be flashing.

When you have made all the desired changes, press the **SETUP** key to exit the menu system and return to the normal display mode.

The display will automatically return to the normal display mode if no key presses are made for several seconds. (See section 3.1.4)

The menu systems consist of a main menu with two or more choices for each menu item. A **")"** symbol is shown to the left of the main level Setup menu items. A **">"** symbol is shown to the left of the main level Engineering menu items. This allows them to be easily distinguished from each other and from the front panel operating messages. The sub-menu choices are shown in lower case to allow them to be easily distinguished from the main level items.

Figure 3-2 is an overview of the Setup menu system that shows all of the menu items and where you will find the menu choices.

Figure 3-3 is an overview of the Engineering menu system that shows all of the Engineering menu items and where you will find the menu choices. In each figure, factory default choices for each menu item are shown in boldface.

Each of the Setup menu items are described in section 3.2 with an explanation of what each choice does. Each of the Engineering menu items are described in section 3.3 with an explanation of what each choice does.

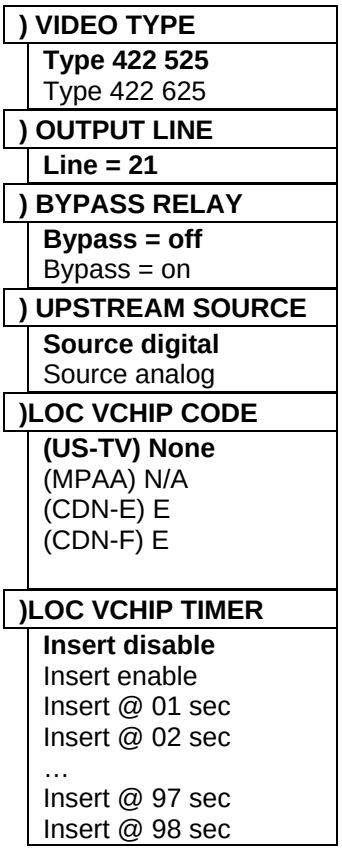


Figure 3-2: Overview of the Setup Menu System

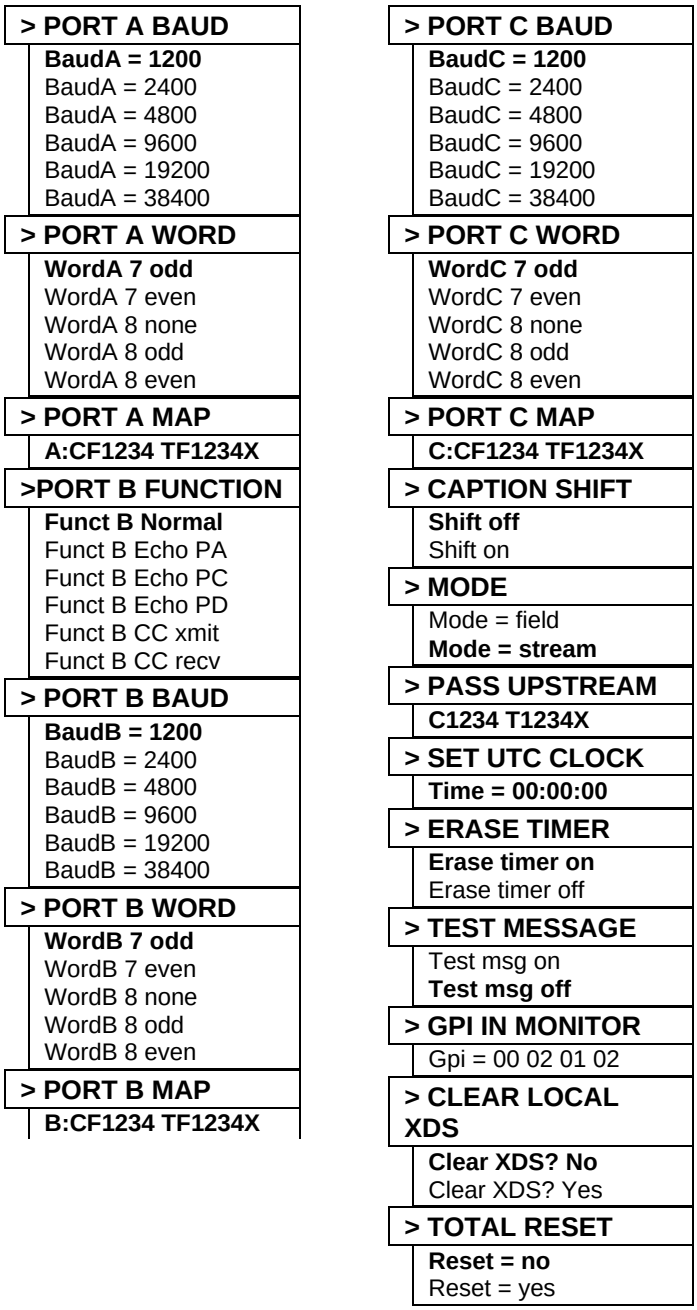


Figure 3-3: Overview of the Engineering Menu System

3.1.2 Caption Keyer Control Group

The XDS encoder has separate Field 1 and Field 2 keyer enable buttons (see section 3.1.2.1).

These controls are also be used to “lock” the keyers. When the keyers are locked, neither the keyer control buttons nor software controls can change the state of the keyers. If the user attempts to turn a keyer on or off while the keyers are locked, the front panel will briefly display **KEYERS LOCKED**.

Lock the keyers off when you want to guarantee pass through of existing line 21 data that is already on the program material. See section 3.5.2 for information on controlling the bypass relay.

Even when the keyers are turned off, EDH packet checksum correction is still performed on the SDI video, and composite video level adjustment is performed where applicable.

3.1.2.1 Keyer Control on the 8083XDS-AD

KEYER FLD 1 Toggles the Field 1 caption keyer on or off. When the keyer is off, the device will merely clock the video through its internal registers and route it to the video output. The Fld 1 LED indicates if the Field 1 keyer is enabled or not. Software commands received by the 8083XDS-AD may also turn the keyer on or off.

KEYER FLD 2 Toggles the Field 2 caption keyer on or off. When the keyer is off, the device will merely clock the video through its internal registers and route it to the video output. The Fld 2 LED indicates if the Field 2 keyer is enabled or not. Software commands received by the 8083XDS-AD may also turn the keyer on or off.

SHIFT + KEYER FLD 1
SHIFT + KEYER FLD 2 Either of these key combinations will lock both Field 1 and Field 2 keyers in their current position. Software commands received via the serial ports will not change the keyer settings when they are in the locked mode.

Separate Field 1 and Field 2 keyer ON/OFF buttons were placed on the front panel to allow the insertion of XDS in field 2 without introducing delay in the field 1 captions through re-encoding. An operator could unknowingly use this feature to insert data in field 2 when there was no caption waveform present in field 1 at all. This is contrary to EIA-608-B, and will cause some XDS decoders to shut down.

If there is no field 1 caption waveform present upstream and the field 2 keyer is on, the field 1 keyer will be forced on and the FLD 1 LED will blink.

This will cause a line 21 field 1 caption waveform to be present whenever line 21 field 2 caption waveform is present on the video consistent with EIA-608-B rules. When the field 1 keyer has been forced on and upstream Field 1 captions resume, the Field 1 Keyer will turn off again.

3.1.3 Status Indicator Lights

There are either six status indicators located on the front panel of the 8083XDS-AD. These show the operational status of the XDS encoder at a glance. The meanings of all LEDs that are found on the front panel are as follows:

SDI VIDEO IN When lit, the XDS encoder has detected incoming component digital video of the correct standard. When the LED is flashing, SDI video is detected but the video standard is not correct. When off, no incoming video has been detected at the SDI VIDEO IN connector.

COMP VIDEO IN When lit, the XDS encoder has detected incoming composite analog video of the correct standard. When the LED is flashing, there is a problem such as incorrect video standard, or the video is of poor quality. The 8083XDS-AD may still be able to insert XDS onto poor quality analog video, depending on the severity of the problems. When off, no incoming video has been detected at the ANALOG VIDEO IN connector.

FLD 1 ENABLE
FLD 2 ENABLE Indicates that the device is inserting XDS information into Field 2 of the video when lit.

Null characters will be inserted if there is no incoming data from the communications ports, or if there is no upstream caption information for the particular field when in “stream” mode.

The front panel message will display `LINE 21 KEY` when either keyer is enabled.

COMM Indicates that data is being received or transmitted on any of the communications ports. The LED will also be on during the Test Message Mode that simulates communications with captioning/XDS software.

DATA OUT Indicates that non-null data being received on one of the communications port or from the upstream captions is being inserted into the data queue for Field 2. When a keyer is enabled, this data will be inserted on line 21.

3.1.4 Front Panel Operating Messages

The front panel display is used to indicate the current operating mode of the XDS encoder as shown below. On some of the displays a period (`.`)

will be shown to the left of the display if upstream data is present on field 1. If incoming data is present in field 2 then a colon (**:**) will be shown to the left of the display. Figure 3-4 shows the front panel time display with the associated status indicators.

The normal front panel display alternates between these three messages.

If the front panel display shows a message similar to C1234 T1234E instead of these alternating messages please refer to section 3.4.

LN 21 KEYER Keyer(s) enabled. The video line number that captions are being encoded on will be displayed. The XDS encoder is enabled for Field 1 or Field 2 as indicated by the FLD 1 Enable and FLD 2 Enable LEDs.

23:59:59 The current local time display shows the local time of the 8083's real time clock. The clock can be set from the serial. Please note that the encoder does not automatically change its clock for Daylight Saving Time.

The following special indicators are used in the time display:

DST Flag Indicator: If the 'Daylight Saving Time in effect' (DST) flag is set ON inside the encoder, the separator character between the hours and minutes will be a period (.). If the DST flag is OFF, this character will be a colon (:).

DSO Flag Indicator: If the 'Daylight Saving Time observed' (DSO) flag is set ON inside the encoder, the separator character between the minutes and seconds will be a period (.). If the DSO flag is OFF, this character will be a colon (:).

If your region observes Daylight Saving Time, you should set the DSO flag on permanently; otherwise it should be set to Off. Regardless of whether your region observes Daylight Saving Time or not, you should set the DST flag ON when Daylight Saving Time begins in the spring, and OFF when Daylight Saving Time ends in the fall. **This is a requirement in order to properly encode XDS Time of Day packets.** The MetaCast 2 software package allows you to easily set these flags automatically using your PC.

JAN 15, 2002 The date display shows the local date of the 8083's real time clock. The date can be set from the serial port.

The DST and DSO flag indicators and the date display are particularly useful diagnostic information for broadcasters that have chosen to encode Time-of-Day XDS packets in field 2.

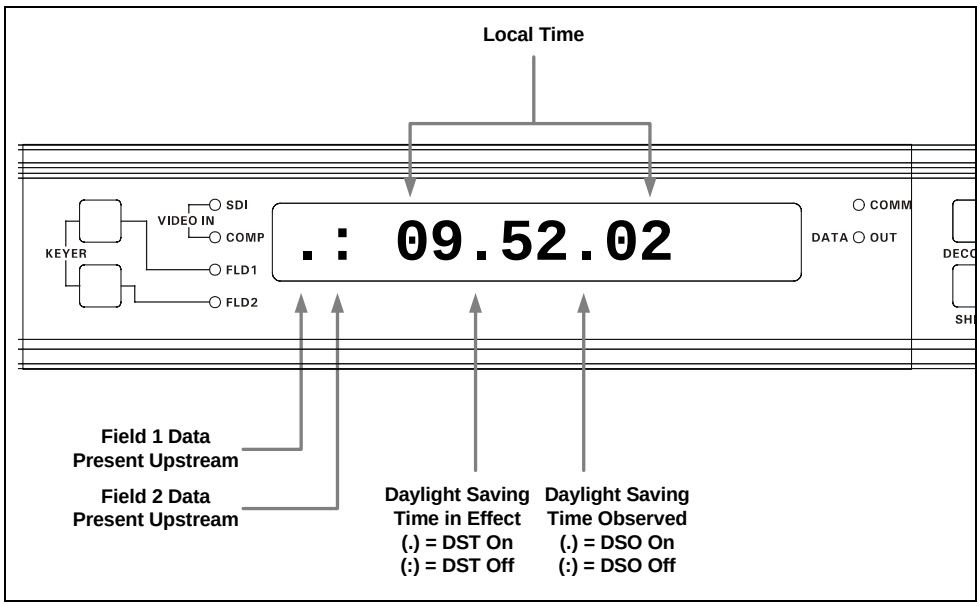


Figure 3-4: Front Panel Time Indicators

The following displays may be shown in certain modes of the 8083XDS-AD. In these modes, the normal cycling of the time and date and **LN 21 KEYER** displays is turned off.

LN 21 KEY OFF Keyers are disabled but may be enabled by the computer. Video will pass through the 8083XDS-AD without modifying upstream data.

525 LOCK OFF 525 line video selected. Keyers are disabled and may not be enabled by the computer. Video will pass through the 8083XDS-AD without modifying line 21 data.

625 LOCK OFF 625 line video selected. Keyers are disabled and may not be enabled by the computer. Video will pass through the 8083XDS-AD without modifying line 21 data.

LN 21 LOCKED Keyer(s) enabled and locked in their present state. The video line number that data is being encoded on will be displayed. The XDS encoder is enabled for Field 1 or Field 2 as indicated by the FLD 1 Enable and FLD 2 Enable LEDs.

REMOTE OVERRIDE Indicates that the keyers have been disabled by a GPI input on the parallel connector.

EXTERNAL BYPASS Indicates that the video has been bypassed due to a GPI input on the parallel connector.

LOCAL BYPASS ON Indicates that the video has been bypassed due to a front panel menu selection.

LOCKED THRU The XDS encoder is disabled and may not be enabled by computer. Video will pass through the 8083XDS-AD unmodified.

C1234 T1234E The channel monitor display is accessible by pressing the SHIFT + 🡻 keys when the unit is in stream mode. The four characters to the right of the **C** indicate what is happening to the four caption data streams. The four characters to the right of the **T** indicate what is happening to the 4 text data streams. The rightmost character indicates what is happening to the Extended Data Services stream. (See section 3.4.1 for further information). Return to the normal front panel displays by pressing the SHIFT + 🡻.

F1KEY F2KEY The field monitor display is accessible by pressing the SHIFT + 🡻 keys when the unit is in field mode. The message to the right of the **F1** indicates what is happening to the data in Field 1. The message to the right of the **F2** indicates what is happening to the data in field 2. Return to the normal front panel displays by pressing the SHIFT + 🡻.

A DISABLED This message will alternate with other displays to indicate that Port A is disabled because of a parallel port GPI. All input on Port A will be ignored while in this mode. Similar messages may appear for other ports.

NONSENSE CC F1
NONSENSE CC F2 Many caption commands consist of two-byte sequences when encoded in the video. These front panel error messages may appear when the encoder is reading upstream caption data. They indicate that the first byte of a command was received, but the second byte was not a valid command value for any command.

KEYERS LOCKED will be displayed when the operator attempts to turn the keyers On or Off while they are locked.

When in the Setup or Engineering menus, the front panel is used to display the current menu item and selected option.

3.2 SETUP MENU ITEMS

The Setup menu is used to configure the basic operational modes of the XDS Encoder such as selecting which type of video is present, which data channel will be shown on the decoder output, etc. A **")"** symbol to the left of the main level menu items allows them to be easily distinguished from the front panel operating messages. The sub-menu choices are shown in lower case to allow them to be easily distinguished from the main level items. Items shown in **bold** are the factory default values.

3.2.1 Selecting The Type Of Video Being Used

)VIDEO TYPE
Type 422 525
Type 422 625

VIDEO TYPE is used to select the correct digital video format.

Select **Type 422 525** for operation with component video with a line rate of 525 lines per frame. (Conforming to SMPTE-125M)

Select **Type 422 625** for operation with component video with a line rate of 625 lines per frame. (Conforming to EBU Tech-3267 E)

3.2.2 Selecting the Line Caption Data Will be Encoded On

)OUTPUT LINE
Line = **21**

OUTPUT LINE is used to select the line that data will be encoded on. Normally XDS data is encoded on line 21 in NTSC systems and line 22 in PAL systems. Using this function, the user may select one of lines 11 to 25 in NTSC and 6 to 25 in PAL. Press the ➔ key to see what line is currently selected. Use the ← and ➔ keys to change the line numbers. The output line number will immediately change when the ← and ➔ keys are pressed.

Note that the built-in monitoring caption decoder is fixed at Line 21 for NTSC and Line 22 for PAL captions, so it will not display captions if a non-standard caption line is selected.

3.2.3 Operating the Manual Bypass Relay

)BYPASS RELAY
Bypass = off
Bypass = on

BYPASS RELAY is used to control the video bypass relay. This relay automatically engages on power failure and directly connects the VIDEO IN connectors to the BYPASS OUT connectors, effectively bypassing all processing circuitry. The relay can also be forced into bypass from the Bypass Relay Enable parallel port control pin. (See section 3.5.1)

Select **Bypass=off** to configure the encoder for normal operation.

Select **Bypass=on** to configure the encoder to be bypassed.

When the video is bypassed, no video will be routed through the video processing circuitry. Consequently the COMPOSITE DECODER, SDI PREVIEW and ANALOG PREVIEW outputs will not be active.

3.2.4 Selecting the Upstream Caption Source

)UPSTREAM SOURCE
Source digital
Source analog

UPSTREAM SOURCE selects whether the 8083XDS-AD will read upstream data from either the composite analog or component SDI video input. The unit also synchronizes internal timing to whichever upstream source is selected, so it is important to always set this menu item correctly.

Select **Source digital** to extract XDS data from SDI video.

Select **Source analog** to extract XDS data from analog video.

If there is only one video source (digital or analog) entering the 8083XDS-AD, the UPSTREAM SOURCE must be set to that video source for the device to work properly.

3.2.5 Inserting "V-Chip" Ratings Locally

The operator may specify a "V-Chip" XDS program rating packet from the front panel menu system. The encoder may be configured to insert a specified program rating locally, without any computer connection. The operator may also enable a timer to detect a loss of upstream program rating packets, and configure the unit to insert a "default rating" on timeout. All four rating systems presently defined are supported.

The United States T.V. Parental Guidelines (US-TV) system also defines four flags (V,L,S and D) to further categorize the program content. These are not supported, and are locked in the OFF setting.

Two menu items available from the front panel menu system allow the operator to configure a local V-Chip program rating (code) and the local V-Chip insertion timer.

Inserting a Program Rating

)LOC VCHIP CODE

(US-TV) None
(MPAA) N/A
(CDN-E) E
(CDN-F) E

To begin inserting a program rating from the front panel, select the rating code that you wish to send using the *Local V-Chip Code* (LOC VCHIP CODE) menu. Then select "Insert enable" from the *Local V-Chip Timer* (LOC VCHIP TIMER) menu. The program rating will be inserted immediately, and will over-write any upstream program rating (V-Chip) code that may be present.

This feature is useful in broadcast facilities where there is no automation of program rating insertion, whenever a pre-encoded rating is to be replaced, or in post production facilities where the customer has specified that a program rating is to be included along with captioning.

Inserting a "Default" Program Rating

)LOC VCHIP TIMER

Insert disable
Insert enable
Insert @ 01 sec
Insert @ 02 sec
…
Insert @ 03 sec
Insert @ 98 sec

The encoder can detect the presence or absence of program ratings in the upstream XDS data. By enabling the Local V-Chip Timer, the encoder will begin to insert the specified program rating only after no upstream program rating has been detected for the specified time. If an upstream program rating is detected later, the local rating will automatically be disabled, allowing the upstream rating packets to pass through the encoder.

This feature is useful for automating V-Chip rating insertion in broadcast facilities where there may be a mix of sources that may or may not have ratings pre-encoded. It is important for broadcasters to always encode a program rating; some consumer decoders will simply remember the last rating packet received if the broadcaster simply stops transmitting rating packets altogether.

Compatibility With V-Chip Software

Automation software, such as the Evertz driver for Louth Automation, MetaCast 2 software, or Evertz XDS Packet Control software, has a higher priority than the local ratings. If external software sends a new program rating to the encoder, the Local V-Chip Timer will automatically revert to the "Insert disable" setting, turning it off. If the operator re-enables the local rating insertion, unexpected results may occur since two systems will then be attempting to control ratings insertion.

3.3 ENGINEERING SETUP MENU ITEMS

The Engineering menu is used to configure the advanced operational modes and hardware configuration items of the XDS Encoder. This includes selecting baud rate for communications, type of command emulation, and enabling test message encoding. A **">"** symbol to the left of the main level menu items allows them to be easily distinguished from the main setup items and the front panel operating messages. The sub-menu options are shown in lower case to allow them to be easily distinguished from the main level items.

3.3.1 Setting the Serial Port Baud Rate and Data Format

Two menu items are used to set up the serial port connection parameters. There is a pair of menu items for each of the ports. A third menu item sets the port permissions for each port.

>PORT A BAUD
BaudA=1200
BaudA=2400
BaudA=4800
BaudA=9600
BaudA=19200
BaudA=38400

PORT A BAUD is used to set the baud rate of the communications port A (similar menu items are available to configure the baud rates for ports B and C). Adjust this setting to match the baud rate of your computer. If unsure what to set the baud rate to, set it to 1200 baud (the factory default setting).

>PORT A WORD
WordA 7 odd
WordA 7 even
WordA 8 none
WordA 8 odd
WordA 8 even

PORT A WORD is used to select the number of data bits and parity of the communications port A. (similar menu items are available to configure the data format for ports B and C).

Select **WordA 7 odd** for 7 data bits, 1 stop bit odd parity.

Select **WordA 7 even** for 7 data bits, 1 stop bit even parity.

Select **WordA 8 none** for 8 data bits, 1 stop bit no parity.

Select **WordA 8 odd** for 8 data bits, 1 stop bit odd parity.

Select **WordA 8 even** for 8 data bits, 1 stop bit even parity.

3.3.2 Setting the Serial Port Access Permission

>PORT A MAP
A:CF1234 TF1234X

PORT A MAP is used to permit port A to control the various data streams (similar menu items are available to configure permissions for ports B and C). See section 4.7 for a discussion of port permissions.

The two digits to the right of the 'CF' indicates whether port A can control the caption streams in the respective field. The two digits to the right of the 'TF' indicates whether port A can control the test streams in the respective field. The rightmost digit indicates whether port A can control extended data services ('X'). A dash character in place of the numeral indicates that field is not permitted for port A. For example if `CF1---TF----X` is displayed, port A can only control the caption streams from field 1 (CC1 and CC2) and the Extended Data Services but not the caption streams from field 2 (CC3 and CC4) or any of the text streams.

Closed Caption and Text mapping does apply for the 8083XDS-AD since the unit only Encodes XDS data. Ensure that the Port is configured to insert Data on the XDS Service

Use the ← or → keys until the desired field is blinking, then press the **SELECT** key to toggle the enabled or disabled state.

3.3.3 Special Functions of Port B

>PORT B FUNCTION
Funct B Normal
Funct B Echo PA
Funct B Echo PC
Funct B CC xmit
Funct B CC recv

PORT B FUNCTION is used to select special alternate functions available only to serial port B.

When **Funct B Normal** is selected, serial port B uses the same interface as all of the other serial ports on the unit for interfacing with computers running captioning software.

Select **Funct B Echo PA** to cause command data entered via port **A** to be echoed back out of port B. The **Funct B Echo PC** settings provide similar functions to echo the commands from ports C respectively. These modes allow two or more XDS or CC encoders to be connected in a daisy-chain fashion. The successive unit(s) will then receive the same serial commands as the first unit, after a slight propagation delay. The receiving unit does not need to be placed in a special operating mode, and may be another 8000 series or 9000 series unit. Figure 3-5 shows a typical application for port echo mode.

In Port Echo mode the user is responsible for configuring identical baud rates and data words on the serial ports of the transmitting and receiving units.

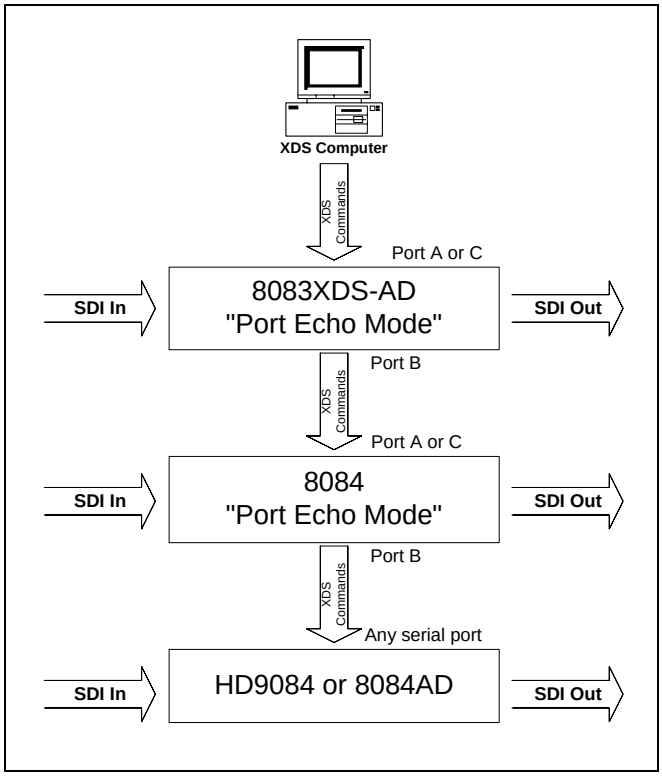


Figure 3-5: Connections for Port Echo Mode

The **Funct B CC xmit** and **Funct B CC recv** settings allow the unit to be configured as the transmit and receive sides of a "VBI bridge" around video processing equipment. For correct operation, one XDS encoder must be configured as the transmitter (select **Funct B CC xmit**) and the other configured as the receiver (select **Funct B CC recv**). The two XDS encoders may be connected via null modem cable between ports B of each unit. When these modes are selected, the port B data word is set and locked to "8 none". The user is responsible for configuring identical baud rates on the transmitting and receiving units.

When **Funct B CC xmit** is selected, all data being encoded onto the video will also be transmitted out of serial port B as raw caption data.

When **Funct B CC recv** is selected, all upstream data is blocked, and the data that appears at port B is encoded directly into the outgoing video. The internal test message is also disabled.

The VBI Bridge setup will introduce a delay in the data on the receiver side, typically one to three frames. Other equipment in the SDI video stream also influences the length of this delay.

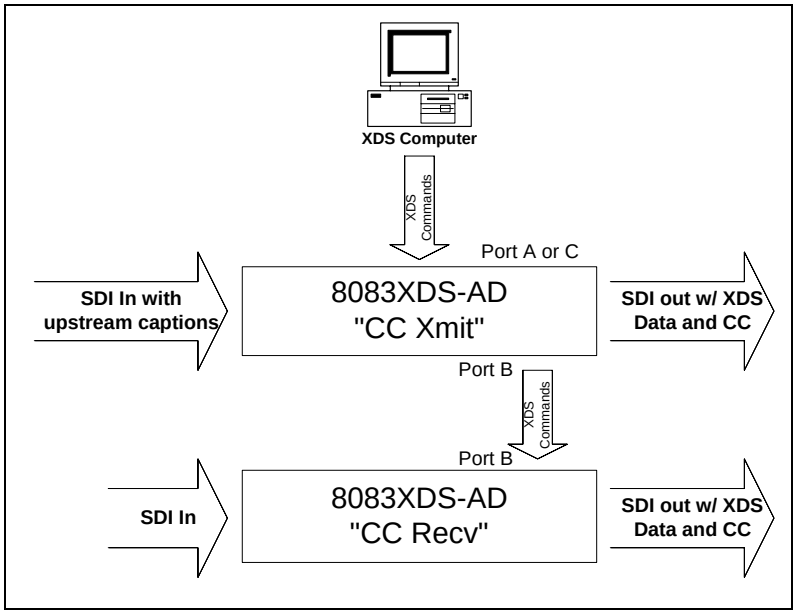


Figure 3-6: Connections to Copy XDS data between Video Feeds

Figure 3-7 shows a typical application for the VBI bridge functionality:

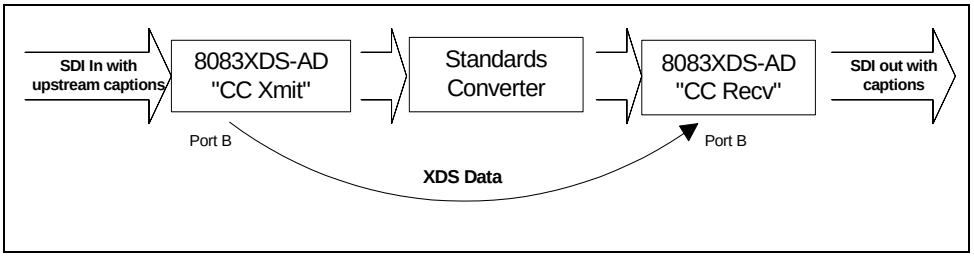


Figure 3-7: Reinserting XDS after Video Processing

3.3.4 Vertical Shift of the Caption Line Data

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 EIA 608-B waveform specification says that 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 it is generated by the XDS 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.

>CAPTION SHIFT
Shift off
Shift on

CAPTION SHIFT is used to select whether the caption data encoded on the SDI video will be shifted to adjust for setup on line 21.

Select **Shift off** to encode XDS data 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)

Select **Shift on** to encode data 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)

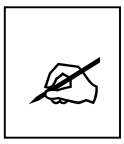
3.3.5 Configuring Whether Upstream Captions and XDS will be Passed or Blocked

>PASS UPSTREAM
C1234 T234 X

The **PASS UPSTREAM** menu item allows the user to control whether individual Data streams will be passed or blocked. When you press the ← or → keys the display shows a character to represent each data stream, CC1 through CC4, T1 through T4 and XDS, as follows:

```
C1234 T1234 X
```

Pressing the ← or → keys will change which data stream is currently selected (blinking). The SELECT key toggles whether the selected stream is passed or blocked. If a particular data stream is being blocked, the character representing that stream will change to a dash '-'.



If the encoder being configured is the first XDS (including V-Chip) encoder in the video path, or the user does not want to preserve any upstream field 2 data, we recommend that *all of the data streams in field 2* (CC3, CC4, T3, T4, XDS) should be placed in the NULL (blocked) state.

This would appear as follows:

```
C12-- T12-- -
```

3.3.6 SETTING THE ENCODER CLOCK

>SET UTC CLOCK
Time 00:00:00

The **SET UTC CLOCK** menu item allows the user to set the internal real time clock directly from the front panel. Note that the time and date entered are the UTC time. Setting of the clock is done in four stages.

- Setting the UTC time
- Setting the UTC date
- Setting the local time zone offset from UTC
- Setting whether Daylight Saving time is observed in the local region.

When you press the ➔ key you will be prompted to set the time. Press the **SELECT** key to move from one stage to the next, or press the **SETUP** key at any time during the process to exit the clock setting function and return to the original clock settings.

3.3.6.1 Setting the Time

When you enter the time setting stage, the front panel display shows the current UTC time of the internal clock with the Hours digits blinking, indicating that they can be changed. E.g. Time = 04:06:53. Press the ↑ or ↓ keys to change the hours digits or press the ➔ key move to the minutes or the ← key to move to the seconds. Set the minutes and seconds the same way. When you have entered the correct UTC time press the **SELECT** key to move to the date setting stage.

3.3.6.2 Setting the Date

When you enter the date setting stage, the front panel display shows the current UTC date of the internal clock with the Month blinking, indicating that it can be changed. E.g. June 04, 2002 Tue. Press the ↑ or ↓ keys to change the month or press the ➔ key to move to the day of the month or the ← key to move to the year. Set the day and year the same way. As you change the month, day or year, the day of the week will automatically change. When you have entered the correct UTC date press the **SELECT** key to move to the time zone setting stage.

3.3.6.3 Setting the Time Zone

When you enter the time zone setting stage the front panel display shows the local time zone offset from UTC. E.g. Time zone = 05. The number shown is the number or hours between the standard time in the local time zone and UTC. For users in time zones west of Greenwich this number will be between 1 and 12. For users in time zones east of Greenwich, this number will be between 13 and 23. (E.g. for Eastern Time set the time zone to 05) Press the ↑ or ↓ keys to change the time zone. When you have entered the correct local time Zone offset from UTC press the **SELECT** key to move on to setting the Daylight Saving time observance.

3.3.6.4 Setting the Daylight Saving Time Observance

After you set the time zone, you need to select whether Daylight saving time is observed in your region or not. Press the ↑ or ↓ keys to select the correct setting for your region. When you have entered the correct setting press the **SELECT** key to complete setting the UTC Clock in the encoder.

The front panel display will show *CLOCK UPDATED* when the internal clock has been updated successfully. You will automatically exit the menu system and the front panel should show the new time and date settings after a few seconds.

3.3.7 Encoding a Test Message

During system setup and verification it is often desirable to have the caption encoder generate a test message. Data integrity and signal quality of the captioned signal may be verified using the test message.

>TEST MESSAGE
Test msg off
Test msg on

TEST MESSAGE is used to select whether the encoder will generate test messages or not.

Select **Test msg on** to enable test message encoding. The encoder will insert a test message that includes all 9 data channels. This is generated by simulating a data stream into the Port A communications buffer. The COMM LED will blink On and the Port A output will generate a stream of prompt characters ('*').

(e.g.: TST F2 C1) is encoded for the CC3 data stream

This will allow you to verify the setup of your system without having a computer sending data to the 8083XDS-AD

The test message mode will be automatically turned off whenever the keyer is turned off from the front panel, or when a Control-C character is received on any communications port from software.

Select **Test msg off** to disable the encoder test message.

3.3.8 Using the 16 Second Erase Timer

When the Erase Timer is activated, the 8083XDS-AD will automatically encode a command to erase captions in the CC1 data stream (primary language captions) if no caption data has been received for 16 seconds. This will prevent unwanted caption text from remaining on the viewer's screen during long periods of uncaptioned material.

>ERASE TIMER
Erase Timer on
Erase Timer off

ERASE TIMER is used to select whether the erase timer is enabled or not.

Select **Erase timer on** to enable the Erase Timer.

Select **Erase timer off** to disable the Erase Timer.

3.3.9 CLEARING XDS PACKETS FROM MEMORY

>CLEAR LOCAL XDS
Clear XDS? No
Clear XDS? Yes

In the 8084 and 8084AD, local XDS packets are kept in a non-volatile memory and are restored on power up. XDS packets can only be removed from memory using the serial port of the encoder, or by using the *Clear Local XDS* menu item.

CLEAR LOCAL XDS allows the user to clear the XDS packet memory from the front panel. Setting this menu item to YES and pressing the **SELECT** key will erase the XDS Packet memory. Text articles will be preserved.

3.3.10 Monitoring the Status of the Parallel Remote Control Inputs

>GPI IN MONITOR
Gpi = 80 02 01 02

GPI IN MONITOR is used to monitor the current status of the parallel remote control inputs. When you press the ← or → keys, the display shows something similar to **Gpi = 06 02 01 02**. The left-most number is a hexadecimal representation of the bit mapped parallel input. Bit 0 is the least significant bit, bit 7 is the most significant bit. (See section 3.5 for a description of the remote control functions and bit-mappings of the pins).

This display is also used to show the revisions of the factory-programmed logic devices in the XDS encoder. These are the other three values shown on the display. Chapter 5 describes the significance of these values in detail.

3.3.11 Resetting the XDS Encoder to Factory Defaults

>TOTAL RESET
Reset = no
Reset = yes

TOTAL RESET is used to reset the configuration items that are normally saved in non-volatile memory will be restored to the factory defaults. The serial port buffers and the Article and XDS queues will be cleared. Articles and XDS packets will also be removed from memory. When you press the → button, the display shows something similar to **`Reset = yes`**. Press the **SELECT** keys to reset the XDS encoder. The XDS encoder will exit the Engineering Setup Menu and the display will show **`Reset Done`**

3.3.12 Performing a Front Panel Reset to its Power-On State

Sometimes it may be desirable to perform a reset of the 8083XDS-AD back to its power-on, especially if a communications error has left one port active, which may cause an ACCESS ERROR when another port attempts to caption. To reset the unit to the power-on state hold down the SHIFT +↑+→ keys simultaneously. The 8083XDS-AD will be completely reset to the values stored in its non-volatile memory and the Article and XDS queues will be cleared. Articles and XDS packets will not be removed from memory. The display will show **`Reset Done`**.

3.4 MONITORING THE INCOMING DATA

There are two displays provided to allow the user to view how incoming data will be handle. The Stream monitor display is available when the device is configured for the 'stream' mode of operation. The Field monitor display is available when the device is configured for the 'field' mode of operation. (See section 0 for information on configuring stream or field mode of operation.) To toggle in and out of the monitor displays, press the **SHIFT + ↓** keys when you are not in either of the menu systems.

3.4.1 Monitoring the Data in 'Stream Mode'

The stream monitor display shows each of the nine data streams and indicates how the XDS encoder is processing the data in each stream.

The front panel display shows something similar to **C1234 T1234E** when it is in the stream monitor mode. The four characters to the right of the **C** show the status of the four caption streams. The four characters to the right of the **T** show the status of the four text streams. The rightmost character is used to monitor the Extended Data Services (XDS) stream. The character in each data stream monitor position can have several values, indicating different processing options in the XDS encoder. The processing options are shown in Table 3-1.

Indicator	Description	Explanation
↓	Regen Upstream Through	Data in this stream will be decoded and regenerated in the encoder output.
X	Block Upstream	Data in this stream will be removed from the encoder output
1,2,3,4,E	Incoming Data	Indicates that the data stream is present at the encoder input. The number corresponds to the respective caption or text channel. The letter E corresponds to the Extended Data Services data stream.
D	Direct Control State	Direct Control state has been enabled for this data stream. Upstream XDS will be replaced by the incoming XDS from the serial port and will be encoded into the data stream at the encoder output.
R	Real Time State	Real Time state has been enabled for this data stream. Upstream XDS will be replaced by the incoming XDS from the serial port and will be encoded into the corresponding data stream at the encoder output.
A	Article State	Article state has been enabled for this data stream. Upstream data will be replaced by text Articles from the article queue.
|	Direct Wire	Data in this stream is copied directly to the output without regeneration.

Table 3-1: Front Panel Data Monitoring in Stream Mode

3.5 PARALLEL REMOTE CONTROL CONNECTIONS

The PARALLEL 9 pin female 'D' connector provides a method of connecting 'closure to ground' remote control GPI signals to control the XDS encoder. Each input has an internal 47K ohm pull-up to +5 volts. The pin assignment of the connector is as follows:

Parallel Pin	Monitor Bit	Function
1		Ground
2	0	Serial Port A Disable
3	2	Serial Port B Disable
4	4	Serial Port C Disable
5	6	Not used
6	7	Bypass Relay Enable
7	1	Caption Keyer Disable
8	3	Caption Shift Up
9		Ground

3.5.1 Disabling the Caption Keyer using the Parallel Remote Control

The Caption Keyer Disable GPI has two possible modes: ‘master’ mode and ‘temporary’ mode. These are configurable using the DIP switch located inside the unit. From the factory, this GPI is configured for ‘master’ mode operation. Most users will prefer this configuration. See section 5.3.3 for instructions on changing the DIP switch settings.

In ‘master’ mode, the keyer will be turned off when the Keyer Disable GPI input is low and turned on when this GPI input is high.

In ‘temporary’ mode, the keyer will be disabled while the GPI is held low and will remain disabled after the GPI input returns HIGH until the next byte of data is received on any serial remote control port.

3.5.2 Enabling the Bypass Relay using the Parallel Remote Control

The video input(s) will be connected directly to the Bypass Output(s) when the Bypass Relay Enable GPI is held low. The video input and outputs will return to normal when the Bypass Relay Enable GPI returns high.

3.5.3 Disabling the Serial Ports using the Parallel Remote Control

When the Port A Disable input is initiated low, Port A will be reset as though a ^F^F had been received. Further input on this port will be ignored until the Port A Disable input is released high. This input can be used to select which port will control the XDS encoder.

Similarly, there are GPI signals to disable serial ports B and C as well.

3.5.4 Shifting Caption Text Up using the Parallel Remote Control

When this GPI is held low, screen position codes (called PACs) in the caption data will be translated so that captions normally appearing on rows 12 through 15 will now appear on rows 1 through 4. This is intended to provide compliance with FCC rules, which state that caption text may not overlap emergency information that often appears at the bottom of the screen.

Decoded captions may not shift up immediately when this GPI is enabled, only when a new PAC is transmitted. Some real-time captioning software packages using roll-up style captions do not insert PACs at all, so these captions will not be shifted up even when this GPI is enabled.

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CHAPTER 4: SERIAL COMMAND PROTOCOL

4 SERIAL COMMAND PROTOCOL

The following sections present the command protocol for the 8083XDS-AD encoder. Section 4.1 gives a quick cross reference to the command set. Sections 4.2 to 4.7 give a full description of the commands with examples.

4.1 COMMAND CROSS REFERENCE

	Command	Function	Stream
Control & Status	^A?	Report Firmware Version	p. 4-9
	^Ac	Set/Report Time of Day	p. 4-10
	^Ad	Set/Report Date	p. 4-11
	^Au	Set Stream Mode	p. 4-9
	^AE	Set Output Line	p. 4-8
	^AI	Set Baud Rate	p. 4-6
	^AH	Command Help Message	p. 4-9
	^AM	Controlling the Caption Decoder	p. 4-8
	^AA	Display System Status	p. 4-14
	^AS	Report Bypass Status	p. 4-10
	^AY	Report Battery Status	p. 4-10
	^A5	Monitor Encoded Data	p. 4-8
	^F^F	Reset Encoder	p. 4-7
Captioning State	^A6	Null State	p. 4-12
	^A7	Transparent State	p. 4-12
Text Articles	^A0	Input Article	p. 4-15
	^A1	Output Article	p. 4-16
	^A4	Delete article	p. 4-17
	^A8	Queue Articles	p. 4-17
	^A9	Display Article Status	p. 4-17
	^AB	Display Output Queue	p. 4-18
XDS Encoding	^AP	Input XDS Packet	p. 4-19
	^AP	Block Upstream XDS Packet	p. 4-20
	^A8	Queue XDS Packets	p. 4-21
	^AP	Delete XDS Packets	p. 4-21
Comm. Port Control	^AQ	Show Port Permission Maps	p. 4-22
	^AQ	Alter Port Permission Maps	p. 4-23
	^AO	Show Ports Active Maps	p. 4-24
	^AO	Alter Ports Active Maps	p. 4-24
	^Ar	Reset Port	p. 4-25

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 following chart 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
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 D	Keep article Delete article
o/h	Output/Hold	O H	Place article in output queue Do not place article in output queue
n/l	Next/Last	N L	Place article next in output queue Place article at the end of output queue
rc	Repeat Count	0 to 9998 9999 FFFF hh:mm:ss	Decimal number of times to repeat article Repeat indefinitely Repeat indefinitely 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	

dt	Data Type	CF1	captions field 1
		CF2	captions field 2
		TF1	text field 1
		TF2	text field 2
		XDS	extended data services
ws	Word size	7	7 bit data word
		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 XDS software continues to send data and the input buffer fills completely the XDS 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 XDS encoder will transmit an XON character.

The 8083XDS-AD also 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 XDS encoder to cause the content of the associated input buffer to 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 and Error Messages

When the 8083XDS-AD 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 '>'.

COMMAND ERROR will be displayed on the front panel if the unit receives a command from a serial control port that it does not understand. It will also respond by sending back an error code 'E1'.

CMD FMT ERROR will be displayed if the unit receives invalid parameters for a serial command. It will respond by sending back an error code 'E2'.

CMD FMT ERROR will also be displayed if the unit receives a request to delete an article that has not been defined. It will respond by sending back an error code 'E4' to the control port.

OUT OF MEMORY If the unit has no more article/XDS memory available it will display this message on the front panel and respond by sending back an error code 'E6'.

PARITY ERROR If there is a problem with the serial communications baud rate, parity or word size the unit will show this message on the front panel.

ACCESS ERROR If one of the control ports tries to control a data stream which is already being controlled by another port, or if the control port has not been given access privilege to the data stream, the unit will respond by sending back an error code 'E9'.

4.2.6 Command Differences Between Operating Modes (Legacy Operation)

The 8083XDS-AD operates in one of two basic operating modes - Stream mode or Field mode. Use the MODE menu item on the Engineering Menu to select which operating mode is to be used.

When Stream mode is selected the unit manipulates each data stream independently of each other. In Stream mode, each of the individual caption data streams can be passed through or removed with by the XDS encoder. The commands available in Stream mode are discussed in section 4.4.

When Field mode is selected the 8083XDS-AD manipulates caption data on a field-wise basis. In Field mode, all the caption data in an entire field will be passed or removed.

4.3 COMMANDS COMMON TO OPERATING MODES

4.3.1 Set Baud Rate

The XDS encoder's serial remote control ports may be set to operate at any standard baud rate from 1200 to 38400. 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 baud rate can also be set using the Engineering menu BAUD RATE item.

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

If the optional port name parameter is missing, then the current control port will be assumed. If no parameters are specified, the 8083XDS-AD 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 8083XDS-AD 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 4.5.4 and 4.6.3.) Because 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.

Command: **^F^F<cr>**

Default: none

4.3.3 Set Output Line

The normal line for caption information is line 21 in NTSC and line 22 in PAL. This command allows the 8083XDS-AD to output XDS information on different line numbers. This command also changes the line number used by the decoder.

Command: **^AE<sp>LIn<cr>**

Default: ^AE<sp>L21<cr> for NTSC systems
^AE<sp>L22<cr> for PAL systems

The parameter **In** specifies the line number that caption information will be output on. The permitted values of parameter **In** 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 the Line 21 Data on the Serial Port

This command allows the 8083XDS-AD 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.

dc	Data Channel	VCHIP	V-Chip Decoder
		XDS	XDS Decoder
		XDSG	XDS Decoder
		XDSF	XDS Decoder

Note that there is only one XDS decoder mode so all 3 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 XDS encoder will respond with message identifying its firmware version and port name.

Command: **^A?<cr>**

Returns
```
Evertz 8084 Ver:CK88D5 U000427 -- Use ^AH{return} for
help
Port B
```

4.3.7 Command Help

This command returns a help message from the XDS 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 Set Stream Mode

This command will place the encoder in STREAM operating mode.

Command: **^Au<cr>**

4.3.9 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 keyer is disabled but video will be passed through the 8083XDS-AD
`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 8083XDS-AD menu selection.

4.3.10 Report Battery Status

This command will return the status of the internal battery

Command: **^AY<cr>**

Example results: `Battery OK`

4.3.11 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 EIA-608-B.

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 first Sunday in April. OFF in the winter, starting on the last Sunday in October. Other parts of the world follow different rules for DST.

4.3.12 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>**

Examples: ^Ad<sp>01/26/2000<sp>4<cr>
Set local date to January 26, 2000 and day is Wednesday.

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

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

4.4 COMMANDS SUPPORTED IN STREAM OPERATING MODE

The following commands are supported when the XDS encoder is set to stream mode. The front panel display will typically show **LINE 21 KEY** and both FLD1 and FLD2 ENABLE LED's will be on.

4.4.1 Transparent State

In Transparent state, incoming line 21 video in the respective data stream will be copied through 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>TX<cr>	XDS stream in transparent state

4.4.2 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>TX<cr>	XDS stream in Null state

4.4.3 Direct Control State

This command causes the encoder to enter the Direct Control state. 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 4 modes which 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

4.4.4 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: **^AAcr>**

Default none

Examples: ^AAcr>

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
```

4.5 TEXT ARTICLES (STREAM MODE ONLY)

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 8083XDS-AD uses an advanced memory allocation scheme that allows them 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.

4.5.1 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 previous article with that name will be replaced by the new article.

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

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

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

The parameter **n/l** 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" which will be placed at the end of the Text 1 output queue. The article will be deleted after it is output 5 times.

4.5.2 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.

4.5.3 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.

4.5.4 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.

4.5.5 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"
```

4.5.6 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  test2
Output Q: T3

Output Q: T4

Output Q: XDS
```

4.6 EXTENDED DATA SERVICES (STREAM MODE ONLY)

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. EIA-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 8083XDS-AD automatically detects whether there is a caption signal present in field 1. If necessary It will turn on the Field 1 keyer automatically (the FIELD ! LED will blink) 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 XDS 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 8083XDS-AD uses an advanced memory allocation scheme that allows them 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 by packets of the same type in the output queue.

4.6.1 Input XDS

This command allows the user to input an XDS packet into the XDS 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 parameter **edsid** identifies the XDS packet id. The XDS packet can subsequently be referred to by its packet id. If the XDS packet already exists, the previous XDS packet with that packet id will be replaced by the new 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 parameter **rc** 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, August 5th, 2000. DST is ON. The packet will be repeated indefinitely.

Time of Day and Time Zone packets behave differently than other XDS articles when defined. The defined packet 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-14 with V and L bits set. The packet will be repeated indefinitely. Other V-Chip ratings may be encoded using the information in section 6.1.12.

4.6.2 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.

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

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

4.6.3 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's are given, the XDS output queue is cleared and no XDS information will be output.

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

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

4.7 COMM PORT CONTROL COMMANDS (STREAM MODE)

The 8083XDS-AD can allow simultaneous access by all the communication ports to the keyers. This can be the effective equivalent of multiple XDS encoders, linked in 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 to allow the user to control which ports can affect the data.

The XDS 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 (see section 3.3.2) 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	CF1	captions field 1
	CF2	captions field 2
	TF1	text field 1
	TF2	text field 2
	XDS	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 XDS encoder maintains a list of which ports are active for each data type.

Normally, the various keyer commands (such as ^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 <u>not</u> 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 ^A6<cr> or ^A6 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 ^A6 C1<cr> had been sent.

4.7.1 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: **<u>^AQ<cr></u>**

Example result:

```
Permission Map
PORT A: CF1 CF2 TF1 TF2 XDS
PORT B: CF1 CF2 TF1 TF2 XDS
PORT C: CF1 CF2 TF1 TF2 XDS


Permission Map
PORT A:     CF2 TF1 TF2 XDS
PORT B: CF1     TF1 TF2 XDS
PORT C: CF1 CF2     TF2 XDS
```

This example shows 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.

4.7.2 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 –TF2 –CF2 CF1 TF1<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 CF1<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 PA – XDS –TF2 –CF2 –TF1 CF1<cr>
^AQ PB –XDS –TF2 –CF2 -CF1 TF1<cr>
^AQ PC –TF2 –CF2 -CF1 -TF1 XDS<cr>

These commands show a typical application which places the 8083XDS-AD in stream mode, allows Port A to process captions in Field 1, allows Port B to process text articles in field 1, and enables Port C for extended data services.

4.7.3 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: CF1
PORT B:     CF2
PORT C:
```

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

4.7.4 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 –CF1<cr>

This command will remove the active indication for Port B from field 1 captions.

^AO CF1<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 CF1 O<cr>

This command will force the current port to be active in the captions in field 1. Activity for other data types remain as previously set. If any other control port is active in CF1 will be reset.

4.7.5 Reset Port

This command will reset a port. This command immediately clears the input and output data queues and resets the 8083XDS-AD 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 4.5.4 and 4.6.3.) Because 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.

Command: **^Ar<sp>pn<cr>**

Example: ^Ar PB<cr> Resets Port B

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CHAPTER 5: TECHNICAL DESCRIPTION

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5 TECHNICAL DESCRIPTION

5.1 OVERVIEW

The Evertz XDS Encoder combine the latest LSI technology with sophisticated microcontroller firmware to provide a powerful, flexible system for encoding XDS data onto either a digital video bitstream or a composite analog video feed. The XDS Encoder receives XDS data from a computer running software and encodes the XDS data into the digital video bitstream.

5.2 SPECIFICATIONS

5.2.1 Serial Digital Video Input

Standards: SMPTE 259M (270 Mb/s)
Connector: 1 BNC input per IEC 169-8
Equalization: Automatic 200m @ 270 Mb/s with Belden 8281 or equivalent cable
Return Loss: > 15 dB up to 540 Mb/s

5.2.2 Serial Digital Video Outputs

Number of Outputs: 1 with relay bypass, 1 additional output.
Connector: BNC per IEC 169-8
Signal Level: 800 mV nominal
DC Offset: 0V ±0.5V
Rise and Fall Time: 470 ps nominal
Overshoot: <10% of amplitude
Return Loss: > 15 dB up to 540 Mb/s
Wide Band Jitter: < 0.2 UI

5.2.3 Composite Analog Video Input

Standards: SMPTE 170M
Connector: 1 BNC input per IEC 169-8
Input Impedance: 75Ω
Signal Level: $1V_{p-p}$ nominal
Return Loss: > 30dB up to 5 MHz

5.2.4 Composite Analog Video Outputs

Number of Outputs: 1 with relay bypass, 1 monitoring output.
Connector: BNC per IEC 169-8
Output Impedance: 75Ω
Signal Level: 1 V_{p-p} nominal
User Gain Adj.: ±10%
DC Offset: 0 V ± 50 mV
Return Loss: > 30 dB up to 5 MHz

Freq. Response: ±0.15 dB up to 5 MHz
Differential Gain: < 0.6% up to 5 MHz
Differential Phase: < 0.2 deg. up to 5 MHz
SNR: > 75 dB_{RMS} (blk field, 100 kHz to 5 MHz, unweighted)
Input-Output Delay: < 100 ns
Chroma-Luma Gain: < 0.4% up to 5 MHz
Chroma-Luma Delay: < 5ns up to 5 MHz
Line-Time Distortion: < 0.5%
Tilt: < 0.5%

5.2.5 Electrical

Voltage: 110 - 230 Volts AC, 50/60 Hz
– unit auto senses input voltage
Fuse Rating: 250 V, 1 amp, time delay
Power: 30 VA
Safety: ETL Listed, complies with EU safety directives
EMI/RFI: Complies with FCC Part 15 Class A regulations
Complies with EU EMC directive

A composite monitoring output with built-in caption decoder is provided. This is an economical method of verifying the correct insertion of the captioning data. This is described in more detail in section 5.4.2. Refer to section 3.2.4 for instructions on configuring the caption decoder from the front panel.

The front panel is used to configure various items through two menu structures, the Setup menu and the Engineering menu. (See section 3.2 and 3.3 for a complete description of the menus). The front panel also provides helpful diagnostic information at a glance, using the alphanumeric display and indicator LEDs.

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 XDS encoder is fitted with a 3V 20mm diameter Lithium battery type CR2032. This battery is used to power the clock and the article memory while power is removed from the unit. If the unit is not keeping time properly, or is not remembering the articles stored in memory 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

When you replace the battery the menu settings of the unit will be lost. To facilitate restoring the menu settings it is recommended that you go through each menu item and write down the menu setting.

- 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.
- Using the procedure outlined in section 5.3.2 reset the unit to its factory default settings. Using the front panel menu, restore the unit's configuration that you wrote down before removing the battery.
- Using the procedure in section A.4 to set the system time and date.

5.3.3 DIP Switch Functions

The main circuit board contains an 8 position DIP switch (S1) that invokes setup and diagnostic functions. Most users will have no need to alter the factory switch settings. The functions of each switch are described below.

Switch	Name	Normal	Function when Open	Function when Closed
1	Not Used	Open		
2	Port B	Open	Normal Port B Function	Engineering Function Only
3	Keyer Disable GPI	Open	Master Mode	Temporary (Sticky) Mode
4	Factory Reset	Open		Reset to factory defaults on power up
5	Not Used	Open		
6	Quick Boot	Closed	Display boot messages	Faster boot up
7	Not used	Open		
8	Not used	Open		

Table 5-1: DIP Switch Functions

To gain access to the DIP switches you will have to remove the top cover.

Before removing the top cover of the unit make sure that both power cords are disconnected from the mains.

5.3.4 Configuring Serial Port A

Serial port A can be configured for various pinouts, as described in Chapter 2. During manufacture, port A is configured for RS-232 DTE. This allows port A to connect to a captioning computer using a typical null modem cable like ports B and C.

To reconfigure port A, it is necessary to unplug the XDS encoder and remove the top cover. Figure 5-1 shows the settings of jumper block J9 on the main circuit board for the various configurations available. The pinouts corresponding to RS-232 DTE (factory setting) and RS-422 tributary configurations are given in Chapter 2.

To find out whether port A has been reconfigured for RS-422 logic levels, refer to section 5.5.3 “Viewing Firmware and PLD Revision Levels”. It is impossible to tell whether the serial port pinout has been altered without opening the unit for inspection, however. This may complicate attempts to upgrade the firmware later. The instructions for downloading new firmware to the XDS encoder assume that the serial port A configuration has not been altered from the factory settings.

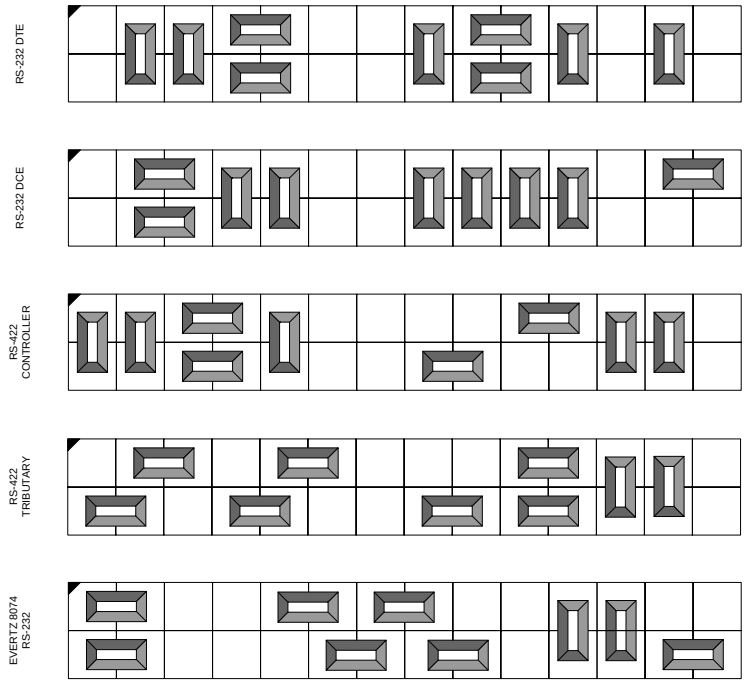

Figure 5-1: Jumper Settings for Port A Configurations

5.3.5 Configuring Serial Ports B and C

XDS encoders containing a model 8038 UART submodule have fixed RS232-DTE pinouts for ports B and C. XDS encoders manufactured using the Evertz 8058 UART submodule can be configured for RS232-DTE or RS422-tributary operation. Refer to section 5.5.3 to determine if your encoder contains an 8058 submodule or an 8038. These submodules are not interchangeable.

The pinouts corresponding to RS-232 DTE (factory setting) and RS-422 tributary configurations are given in Chapter 2. To change port B or port C between RS-232 DTE and RS-422 tributary pinouts and voltage levels, remove the top cover and locate J14, J15, J16 and J17 on the 8058 submodule. To change port B setting, you must move the jumper on J16 and the ribbon cable connector on J15. To change port C setting, you must move the jumper on J17 and the ribbon cable connector on J14. Figure 5-2 shows the ribbon cable position for either port, while Figure 5-3 shows the jumper positions for all four possible configurations of these two ports.

To find out whether ports B and C have been configured for RS-232 or RS-422 logic levels without opening the unit for inspection, refer to section 5.5.3 “Viewing Firmware and PLD Revision Levels”.

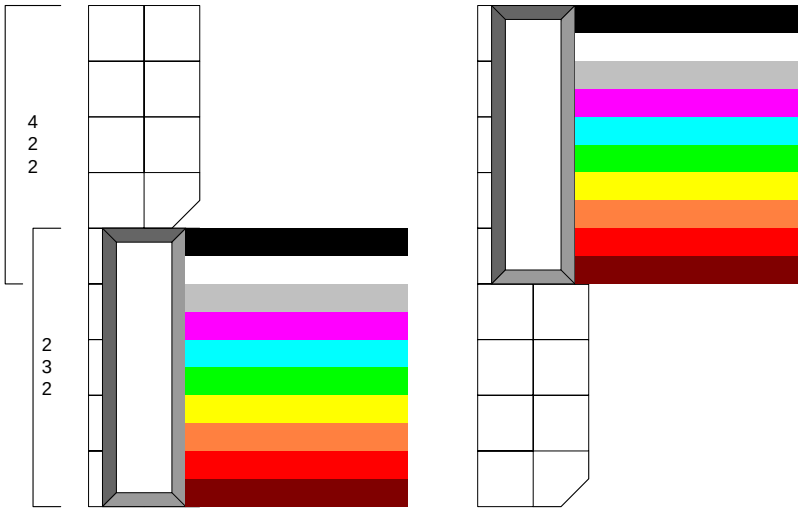

Figure 5-2: Port B or Port C Ribbon Cable Positions

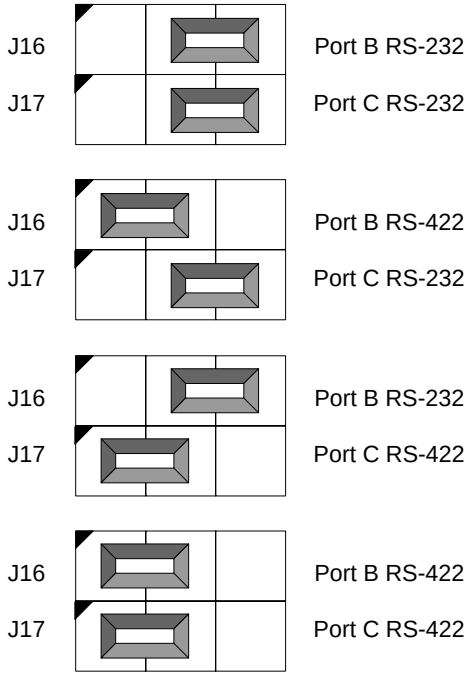

Figure 5-3: Jumper Settings for Ports B and C

5.4 CIRCUIT DESCRIPTION

5.4.1 Front Panel Display and Pushbuttons

A 16 digit alphanumeric display and a keypad with ten buttons is contained on a separate circuit card (5220) which is connected to the main circuit board via a 20 conductor ribbon cable.

To perform a keyboard test and lamp test of the front panel LEDs hold down the SETUP key on power up. The front panel display will show:

```
00    KEY
```

As you press various key combinations, different LEDs will illuminate. The front panel display will show the keyboard scan codes for each key combination pressed. Table 5-2 below shows the SCAN code for each key. To exit this test mode, remove and re-apply power to the unit.

CAPTION ON/OFF	01	KEYER FLD 1	41
KEYER FLD 2	01	DECODER	42
SHIFT	02	SELECT	45
←	05	↑	46
↓	06	SETUP	47
→	07		

Table 5-2: Keyboard Scan Codes

5.4.2 Analog Composite Monitor 9000CME

Digital video from the main circuit board is fed up the header to the 9000CME submodule, where it is converted to composite analog video. Two video output amplifiers are provided to drive analog monitors. The 9000CME is capable of encoding NTSC or PAL video types, depending on the input digital video format.

The 9000CME also contains a caption decoder capable of viewing all caption streams, text data streams and many XDS packet types, including:

- Program Rating Advisories (V-Chip) – separate display from other XDS
- Station Name and Call Letters
- Length of Show and Time Left in Show
- Program Type
- Program Description (4 lines)

5.5 UPGRADING THE FIRMWARE

5.5.1 Overview

The XDS encoder contains firmware in a FLASH ROM device. From time to time firmware updates may be provided to add additional features to the unit. The following procedure will allow you to upload new firmware from your computer.

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

- PC with available communications port. The communication speed is selectable between 9600 baud and 38,400 baud. A 486 PC or better with a 16550 UART based communications port is recommended.
- "Null-modem" serial extension cable (DB9 female to DB9 female) or (DB25 female to DB9 female). This assumes that the user has not changed the pinout of serial port A using the jumpers inside the XDS Encoder.
- Terminal program that is capable of Xmodem file transfer protocol. (such as HyperTerminal)
- New firmware supplied by Evertz.

The XDS encoder also contains instructions in programmable logic devices (PLDs). The PLDs are not field-upgradeable. Very rarely, a particular device upgrade may specify a minimum PLD revision number in addition to a firmware upgrade. If the PLD revision numbers in the XDS encoder are lower than those specified for the upgrade, Evertz technicians must service the encoder to perform the upgrade.

5.5.2 Procedure for Firmware Upgrades

1. With power disconnected, connect the null-modem cable between the XDS Encoder serial port A and the PC.

2. Power-up the PC, and start the terminal software.

3. Configure the port settings of the terminal program as follows:

Baud	**38400** or **9600**
Parity	**None**
Data bits	**8**
Stop bits	**1**
Flow Control	**XON/XOFF (software)**

4. If you wish 38,400 baud communications, hold the ↑ key on the front panel and apply power to the XDS encoder. For 9600 baud, hold the ↓ key while applying power.

5. The front panel will display the word **PROGRAMMER** and the selected baud rate. You should also see a menu appear in the terminal window on the PC.

For example:

```
----------------------------------------
8045 Flash ROM Programming Utility Ver 1.1
COPYRIGHT 2000 EVERTZ MICROSYSTEMS LTD.
----------------------------------------
Code Bank: 0 1 2 3 4 5 6 7
BLANK?     N N N N N N N N
Flash ROM is valid

-- MENU -------------------------------
 1. <X>Modem download HEX file to Flash
 2. <A>SCII download HEX file to Flash
 3. production <T>est
 4. <Q>uit Programmer (Jump into Flash)
----------------------------------------
COMMAND:
```

6. The following is a list of possible reasons for failed communications:

   - Defective Serial Null modem cable.
   - Wrong communications port selected in the terminal program.
   - Connected to wrong communications port on XDS encoder. You must use serial port A for firmware upgrades.
   - Improper port settings in the terminal program. (Refer to step 3 for settings).
   - Arrow key (↑ or ↓) not being pressed correctly during power-up.

7. Press '1' or 'X' to initiate X-modem file transfer.

8. Upload the "*.HEX" file supplied using the X-Modem transfer protocol of your terminal program. If you do not start the upload within a short time the firmware loading operation will time out. You can restart the process by selecting '1' or 'X' from the menu again.

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

For Example:

```
********** Download Complete!
```

10. The following is a list of possible reasons for a failed file transfer:
    - The supplied "*.HEX" file is corrupt.
    - Wrong file specified to be uploaded.
    - The PCs' RS-232 communications port can't handle a port speed of 38400bps.

11. To complete the upgrade, either select “Quit” from the terminal menu, or power-down the unit and reapply power without pressing any keys to resume normal operation. If the Flash ROM contains valid code, the unit will resume normal operations. If there is a problem in the new firmware, you will be prompted with an error message and remain in the bootloader.

5.5.3 Viewing Firmware and PLD Revision Levels

Your Evertz XDS encoder does not need to be taken out of service to check the firmware or PLD revision levels. These can be checked from the front panel display. The serial port configuration and power supply status can also be checked from these front panel displays.

To view the firmware revision, the encoder should be running in the normal operating display. Press SHIFT+SELECT keys. The alphanumeric display will cycle through the following messages (or similar):

CK88D5 This is the name of the HEX file that was downloaded to the XDS encoder.

000724 This is the file date of the last “released” version of firmware. In this case it is 2000, July 24.

R000724 This is the actual firmware revision for the XDS encoder. If the first character is a ‘U’ instead of an ‘R’ then the XDS encoder contains unreleased beta firmware. (Evertz does not ship unreleased XDS encoder firmware, except where customers have requested special features.)

A232 B232 C232 Indicates the logic levels of the three internal serial ports for diagnostic purposes. These may be either “232” or “422” for each port. Port A may also display “???” because it was not possible to read-back this data from earlier revisions of the IO PLD.

--- PtA MON S12 This display shows features installed in the XDS encoder. In this case, PtA stands for Port A, and MON is the 9000CME monitor/decoder. Units equipped with an 8058 submodule and dual power supplies also display the status of the power supplies here. The digits ‘1’ and/or ‘2’ appearing next to the ‘S’ indicate which supplies have power applied.

A feature was added to firmware revisions R000724 and later that allows the operator to view the PLD revision levels in the XDS encoder. Follow these steps:

1. Enter the Engineering menu system using SHIFT+SETUP.
2. Press the ↑ or ↓ until **GPI IN MONITOR** is displayed.
3. Press → to reveal the message **GPI= aa bb cc dd** where **aa bb cc** and **dd** are two-digit numbers.

“aa” is the value read from the parallel GPI port on the rear panel, as described in chapter 3.

“bb” is the revision level of the “IO PLD”. At the time of writing, the current revision level is “03”.

“cc” is the revision level of the “CORE PLD”. At the time of writing, the current revision level is “01”.

“dd” is the revision level of the “8058 PLD”. At the time of writing, the current revision level is “01”. If this has a value of “00” or there is no value displayed at all, the XDS encoder has an 8038 submodule, not an 8058 submodule. XDS encoders containing an 8038 submodule cannot be upgraded to an 8058 submodule.

CHAPTER 6: TROUBLESHOOTING

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6 TROUBLESHOOTING

6.1 ANSWERS TO FREQUENTLY ASKED QUESTIONS

6.1.1 Which serial port should I connect to?

Any serial port can be used for typical captioning functions, since they all use the same serial protocol. In the 8083XDS-AD, all three serial ports are configured from the factory to work with an off-the-shelf null-modem cable. Port A has a configurable pinout, but comes from the factory ready to accept a null-modem cable. If the user wishes to use the special "port passthrough" or "VBI bridge" modes, serial port B must be reserved for this purpose.

6.1.2 There is no SDI video being output from the unit.

The 8083XDS-AD includes an SDI video bypass relay to ensure that SDI video is passed, even when the unit is powered-down. Make sure that your SDI source is connected to the BNC connector marked SDI IN, and the primary SDI video output is connected to the BNC connector marked SDI BYPASS OUT. If you still see no video, try the following:

- Unplug the power from the XDS encoder.
- Connect your SDI source to the SDI IN connector.
- Look for video out of the SDI BYPASS OUT connector.
- If there is no still no SDI video passing through the unit, then the problem is most likely not with the XDS encoder itself. Check for presence of SDI video upstream, and check for cabling problems.

6.1.3 There is valid input video but the front panel shows "VIDEO MISSING".

The 8083XDS-AD reads upstream XDS data from either the digital video or the analog video source, as determined by the UPSTREAM SOURCE setting in the Setup menu system. If there is only one video source, either analog or digital, it is important that UPSTREAM SOURCE is set correctly even if the input video is uncaptioned. The 8083XDS-AD also locks internal counters to the indicated video source.

6.1.4 What baud rate and port settings should I use?

While the unit is capable of running at 38.4kbaud 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 and 50 characters per second per field for PAL. 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; 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 XDS encoder.

6.1.5 I see "BUFFER OVERFLOW" or "PARITY BAD" messages on the front panel.

Please refer to the previous question, 6.1.4 "What baud rate and port settings should I use?"

6.1.6 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 XDS encoder from service. Instructions are provided under 5.5.3 "Viewing Firmware and PLD Revision Levels". Since ports B and C only have two possible pinouts (with 8058 submodule), the logic level setting and pinout are generally synonymous. The only way to verify the pinout of port A is to remove the top cover and examine the locations of the jumpers in jumper block J9.

6.1.7 How do I check the status of my power supplies?

Power supply status can only be monitored on XDS encoders with an 8058 submodule and dual power supplies. Refer to 5.5.3 "Viewing Firmware and PLD Revision Levels"

6.1.8 Captions are not being encoded at all.

The 8083XDS-AD only encodes XDS and Text Article information. The 8083XDS-AD does not encode Closed Captioning. Please refer to the Evertz Closed Caption Encoder line to find a product suitable for your application.

6.1.9 The Caption Shift Up GPI is not working properly.

The Caption Shift Up GPI on parallel remote control pin 8 moves caption text from rows 12 through 15 and repositions them to rows 1 through 4. It does this by translating the Preamble Address Codes (PACs) embedded in the caption data. A PAC control code is typically sent before each new line of text to position the display cursor. After the GPI has been activated, captions will not shift up until a new PAC is transmitted. A caption that is already displayed on the screen will not shift up when the GPI is activated.

Some real-time captioning software that uses roll-up captions does not encode PACs. There may be options in your captioning software to remedy this situation. If a show has been pre-captioned using roll-up captions without PACs, the Caption Shift Up GPI will be ineffective on this program material. There is presently no solution for this particular problem.

6.1.10 How can I block upstream captions?

Depending on the user's specific needs, there are many ways to accomplish this. If all upstream captions are to be blocked, the recommended approach is to issue the serial port commands ^A6 F1 and ^A6 F2 to place both Field 1 and Field 2 into NULL STATE. Another solution is to place the XDS encoder in FIELD mode of operation from the front panel Engineering menu.

If only a particular data channel is to be blocked, such as Text Channel 2, use STREAM mode of operation, and execute the serial command ^A6 T2 to place this particular channel in NULL STATE. To block all upstream XDS material, issuing ^A6 TX will put only the XDS stream into NULL STATE. Presently there is no way to block specific XDS packet types, unless these are being replaced with updated packets of the same type by the XDS encoder. If an entire field is to be blocked, use ^A6 F2 to place all of Field 2 in NULL STATE.

6.1.11 How can I pass upstream captions?

If upstream captions are being blocked, either the XDS encoder is in FIELD mode, or the user's captioning software has failed to relinquish control of the encoder so upstream captions may pass.
The recommended solution is to switch the unit to STREAM mode of operation.

6.1.12 How can I encode XDS / V-Chip "Content Advisory" or "Program Rating" packets?

See section 4.6 of this manual for instructions on how to enter any XDS packets into the XDS data stream. The manual does not attempt to provide a comprehensive list of valid XDS packet types. The reader is encouraged to refer to the EIA-608-B standard for the currently supported and required packet types. For the V-Chip program rating packet, EIA-744-A serves as an addendum to EIA-608-B-A.

If there is no automation system or XDS software controlling the insertion of V-Chip program rating packets, the 8083XDS-AD has built-in facilities for inserting a default V-Chip program rating locally from the front panel setup menu system. Refer to section 3.2 for instructions on how to configure this feature.

At the time of writing, Evertz Microsystems provides 808x Configware software free of charge that can be used with Evertz captioning encoders to manually encode many different XDS packet types. Evertz also sells MetaCast 2 software that allows you to create a play list that matches your program schedule, so that you can automatically encode different V-Chip and XDS packets for each program segment. See the Evertz Web site (www.evertz.com) for complete information.

If you want to encode V-Chip rating packets using the serial commands you can follow this procedure.

The command to enter V-Chip packet "articles" is ^AP (see full description in section 4.6.1 of this manual). The basic form of this command is:

^AP<sp>0105<sp>9999<sp>xxxx<cr> where ^A is control-A (0x01) character, <sp> is a space character, <cr> is a carriage return (0x0D), and "xxxx" would be replaced with the rating code as shown in the following table. There are four different rating systems, each with their own sets of codes.

MPAA* Rating System

N/A	4040
G	4140
PG	4240
PG-13	4340
R	4440
NC-17	4540
X	4640
Not Rated	4740

* EIA-608-B also defines a "compatibility mode" MPAA system where the first byte has values 50 through 57.

U.S. TV Parental Guideline Rating System

None	4840
TV-Y	4841
TV-Y7	4842
TV-G	4843
TV-PG	4844
TV-14	4845
TV-MA	4846
None*	4847

* EIA-608-B defines two distinct US-TV rating codes that are both named "None".

This rating system includes provision for flags to further define the program content. These have not been included in the table.

Canadian English Rating System:

E (exempt)	5840
C	5841
C8+	5842
G	5843
PG	5844
14+	5845
18+	5846

Canadian French

E	7840
G	7841
8+	7842
13+	7843
16+	7844
18+	7845

6.1.13 When the caption decoder is set to XDS, the text sometimes disappears momentarily.

This behavior is intentional, and does not represent a problem with the encoding of XDS packets. In XDS display mode, the internal caption decoder has been configured to flush its memory and reacquire all XDS data every 16 seconds. This makes it easy for the operator to see if a particular XDS packet has been removed from the data stream altogether. Of course, if the packet has been replaced with another packet of the same type, the display will be updated immediately.

6.1.14 Captioning waveform is at the wrong voltage level when converted to analog video.

SDI to analog specifications state that there is to be no setup added to line 21. Regardless, some conversion equipment does add 7.5 IRE to line 21 when converting to analog. To correct for this, enable the CAPTION SHIFT feature of the encoder. Please refer to your manual under the heading CAPTION SHIFT or CAP'N SHIFT for more details.

6.1.15 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 or the VBI bridge, will need to be reconfigured after a Factory Reset.

6.2 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 with your software vendor.

After you have checked our web site and call our technical support line, you will be asked for specific technical information, which should be prepared in advance for speedy assistance:

Firmware revision date of the XDS encoder. This can be found by pressing SHIFT+SELECT on the front panel of the encoder.

- Which serial ports are being used on the encoder?
- What 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?

6.3 CREATING A CAPTURE FILE

Sometimes during a tech support call, the customer will be asked to make a capture file that may be emailed to Evertz tech support personnel. We look at this file to see what the customer's software is sending to the XDS encoder. We can also send this capture file to one of our encoders to attempt to duplicate the customer's problem.

To create a capture file, connect the captioning/teleprompter computer to another computer instead of the Evertz 8083XDS-AD. If the captioning

computer was connected to Port B or Port C on the encoder, one may simply disconnect the cable from the rear of the Evertz unit and connect to a computer's COM port. For Port A, some rewiring may be required depending on the system configuration.

Use a commercial "terminal" communications program to save a capture file of the data coming from the captioning computer. Note that some of the characters that are sent to the XDS encoder are not standard printable ASCII characters. If your terminal program supports any of these features, turn them OFF before saving your capture file:

Strip high-bit of incoming characters
Mask non-ASCII characters
Any translation tables (such as V T-100 or ANSI)
Store only printable characters in capture file.

The following terminal programs are known to save useable capture files:
Telix 3.21 for DOS

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A APPLICATION NOTE 3: TRANSMITTING TIME OF DAY USING XDS PACKETS

A.1 OVERVIEW

This application note describes how to properly encode Time of Day information using EIA-608-B Extended Data Services (XDS) packets. In the United States, the Public Broadcasting System (PBS) Television network and its affiliates have been providing this information to the viewing public since the mid 1990s. The application note is written in a tutorial format in order to give Engineering and Operations personnel an understanding of time, time zones and daylight saving time concepts, as well as how this information is encoded into the XDS packets. The application note also provides step by step procedures for setting up the Evertz 8084 and 8084AD Caption/XDS encoders (referred to generically as 8084AD throughout this document) and the Evertz MetaCast 2 software to accomplish this.

A.2 WHAT IS THE CORRECT TIME ANYWAY?

A.2.1. UTC AND TIMEZONES

Prior to the late nineteenth century, time keeping was a purely local phenomenon. However, once railroads began to operate and move people rapidly across great distances, time became much more critical. In the early years of the railroads, the schedules were very confusing because each stop was based on a different local time. The standardization of time was essential to efficient operation of railroads.

In 1878, Canadian Sir Sanford Fleming proposed the system of worldwide time zones that we use today. He recommended that the world be divided into twenty-four time zones, each spaced 15 degrees of longitude apart. Since the earth rotates once every 24 hours and there are 360 degrees of longitude, each hour the earth rotates one-twenty-fourth of a circle or 15° of longitude. Sir Fleming's time zones were heralded as a brilliant solution to a chaotic problem worldwide.

In 1884 an International Prime Meridian Conference was held in Washington D.C. to standardize time and select the Prime Meridian. The conference selected the longitude of Greenwich, England as zero degrees longitude and established the 24 time zones based on the Prime Meridian. Though most U.S. states began to adhere to the Pacific, Mountain, Central, and Eastern time zones by 1895, the U.S. Congress made the use of these time zones mandatory by the Standard Time Act of 1918.

There are six time zones in the fifty United States as shown in Table B-1. The local time of day in a specific time zone is calculated with respect to Universal Time, Coordinated (UTC) sometimes also referred to as Greenwich Mean Time or (GMT). UTC is the world's time standard and is essentially the standard time at the Prime Meridian that runs through Greenwich, England. All other time zones have an offset with respect to UTC, which represents the number of hours (and sometimes minutes) that they are ahead or behind the UTC time.

Offset		Time Zone	Where Observed
Code	Hours		
05	UTC-05:00	Eastern	New York
06	UTC-06:00	Central	Chicago
07	UTC-07:00	Mountain	Denver
08	UTC-08:00	Pacific	Los Angeles
09	UTC-09:00	Alaska	Alaska
10	UTC-10:00	Hawaii-Aleutian	Hawaii

Table B-1: Time Zones in the United States

A.2.2. Daylight Saving Time

Daylight Saving Time (DST) was instituted to take advantage of the later hours of daylight between April and October. In 1966, the U.S. Congress passed the Uniform Time Act that standardized the length of Daylight Saving Time. For those parts of the United States that observe Daylight Saving Time, it begins at 2 a.m. local time on the first Sunday of April. Time reverts to standard time at 2 a.m. local time on the last Sunday of October. 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.

A.2.3. Calculating The Local Time

Local time can be calculated from UTC if we know the time zone we are in and whether daylight saving time is in effect or not. (This is how VCRs are designed to arrive at local time.) Similarly we can calculate UTC if we know the local time, the time zone and whether daylight saving time is in effect or not. The following formula can be used to calculate Local time or UTC.

TZ is the Time zone offset according to the code in Table B-1.
DST has a value of 0 hours when Daylight Saving time is not in effect and the value of 1 hour when it is in effect.

Local Time = UTC – TZ + DST
UTC = Local Time + TZ - DST

See section A.4.1 for information on how to set up the 8084AD correctly for either local time or UTC as the LTC input. The 8084AD always transmits UTC in its time of day packets (see section A.3).

A.3 HOW XDS TIME OF DAY WORKS

XDS stands for eXtended Data Service. This data is encoded on Line 21 of field 2, using the same format as closed caption information. It is intended to supply program related and other information to the viewer. This may include the name of the program, content rating, name of the network, current time of day, etc. EIA-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. The 8084AD automatically inserts a null caption signal if there is no other caption signal present in field 1.

There are two XDS packets defined by EIA-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 first Sunday of April and the Last Sunday of October). The *Time of Day* packet must be inserted locally at each affiliate station 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.

In areas where the TV signal will be received in more than one time zone or in a region where one part observes Daylight Saving Time and another does not, the *Time Zone* packet must not be transmitted. In regions where the *Time Zone packet* is not transmitted, viewers will have to manually program their VCRs with the correct time zone, and whether Daylight Saving Time is observed. Older VCRs may require the user to also set the local time.

A.4 SETTING THE TIME AND DATE IN THE 8083XDS-AD

The 8083XDS-AD maintains an internal clock that is used to encode the time and date information into the XDS packets. The preferred way to set the clock in the 8083XDS-AD Caption Encoder is to connect Linear Time Code (LTC) with the date and time zone information encoded into the user bits (8083XDS-AD LTC option required). This signal is connected to the 3-pin XLR connector on the rear panel marked *LTC In*. It can be derived from a network feed off the satellite, or from a local time code generator such as the Evertz Model 5010-GPS that is locked to an accurate time reference (e.g. GPS). Section A.4.1 gives information on how to configure the LTC input correctly.

In order for the 8083XDS-AD to accurately calculate UTC and Local Time, the user must set the Time zone offset and Daylight Saving information also. If the date information is encoded in the LTC user bits then the 8083XDS-AD can read this information. Otherwise, the preferred method of setting the date and time zone information is by using the MetaCast 2 software running on a computer connected to one of the 8083XDS-AD's serial ports.

A.4.1. Configuring The 8083XDS-AD LTC Input

The 8083XDS-AD can accept Linear Time Code with either UTC or local time. With either UTC or local time as the input, the 8083XDS-AD's daylight saving time setting will have to be changed twice a year by MetaCast 2, (see section A.5.6) but the transition is smoother if UTC is used. In addition the 8084 can read date and time zone information that has been encoded in the Leitch CSD5300 encoding format. The *LTC RDR CONFIG* item on the Engineering Setup Menu is used to configure the LTC reader in the 8083XDS-AD. (Press *SHIFT+SETUP* and then use the ↓ key to go to the >LTC RDR CONFIG menu item. Then press the ← or → keys to view the options available for that menu item. The currently selected setting will be flashing. Section 3.1 of the 8083XDS-AD manual gives more information about using the Engineering Setup Menu.) The front panel time display on the 8083XDS-AD displays the Local time. In order for the 8083XDS-AD to display the correct local time you must also set the time zone and DST Flag in the 8083XDS-AD. Section A.5 gives information on how to set the time zone and Daylight Saving Flag in the 8083XDS-AD using the MetaCast 2 software.

When you have properly configured the LTC reader, the time zone and DST Flag, and apply a valid time code signal and input video, the 8083XDS-AD will show a letter T at the right side of the front panel display when the time is being displayed. The time display will have a period (.) between the hours and minutes if DST is in effect, otherwise a colon (:) will be displayed. When the 8083XDS-AD arrives from the factory its daylight saving time and time zone settings may be different from yours, so the MetaCast 2 software must be used for the initial setup and also at each daylight saving time change. When the 8083XDS-AD is confident that the extracted time is stable it will update its internal clock and display the message TIME UPDATED on the front panel display. This should take approximately 8 to 10 seconds after time code is first applied.

Sections A.4.2 and A.4.3 give the settings for the 8083XDS-AD for both UTC and Local Time LTC sources.

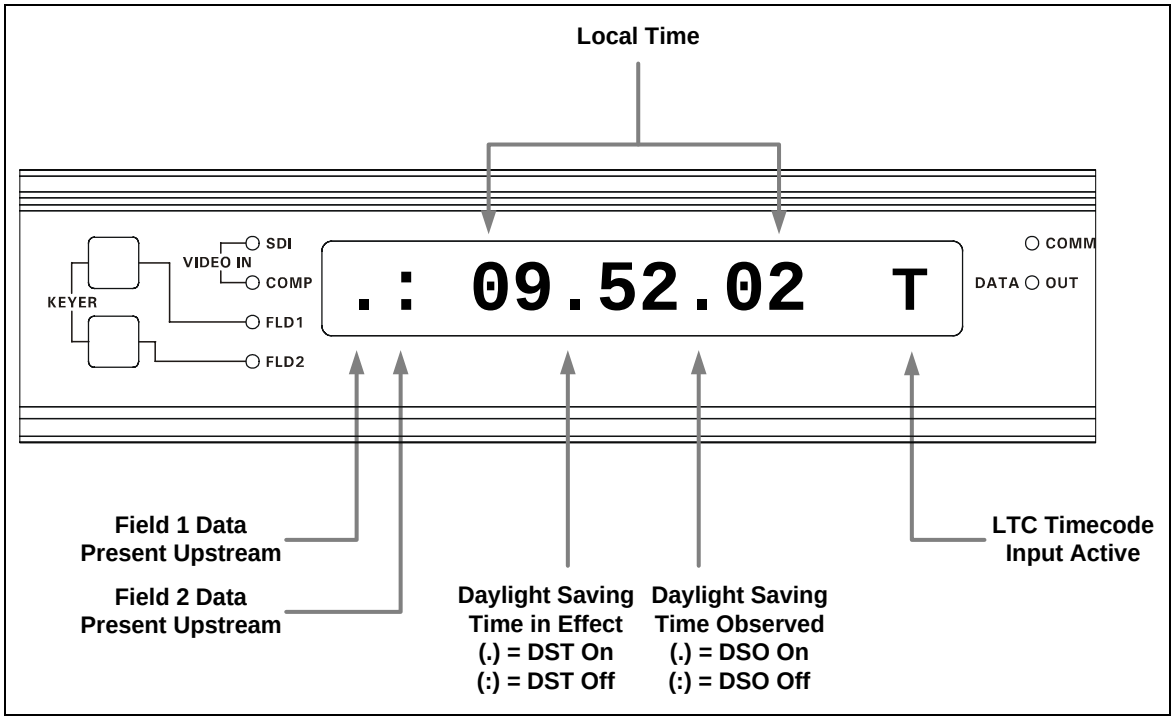


Figure B-1: 8083XDS-AD Front Panel Time Indicators

A.4.2. Using LTC that contains UTC

If your time code source has UTC time with date information in the user bits select the *UTC Time + Date* menu choice in the LTC RDR CONFIG menu item. If your time code source has only UTC time with no encoded date information select the *UTC Time* menu option. Make sure you press the *SELECT* key after you have selected the menu choice. (The selected menu choice will be flashing if it is active)

A.4.3. Using LTC that contains Local Time

If your time code source has Local time with date information in the user bits select the *Local Time + Date* menu choice in the LTC RDR CONFIG menu item. If your time code source has only Local time

with no encoded date information select the *Local Time* menu choice. Make sure you press the *SELECT* key after you have selected the menu choice. (The selected menu choice will be flashing if it is active)

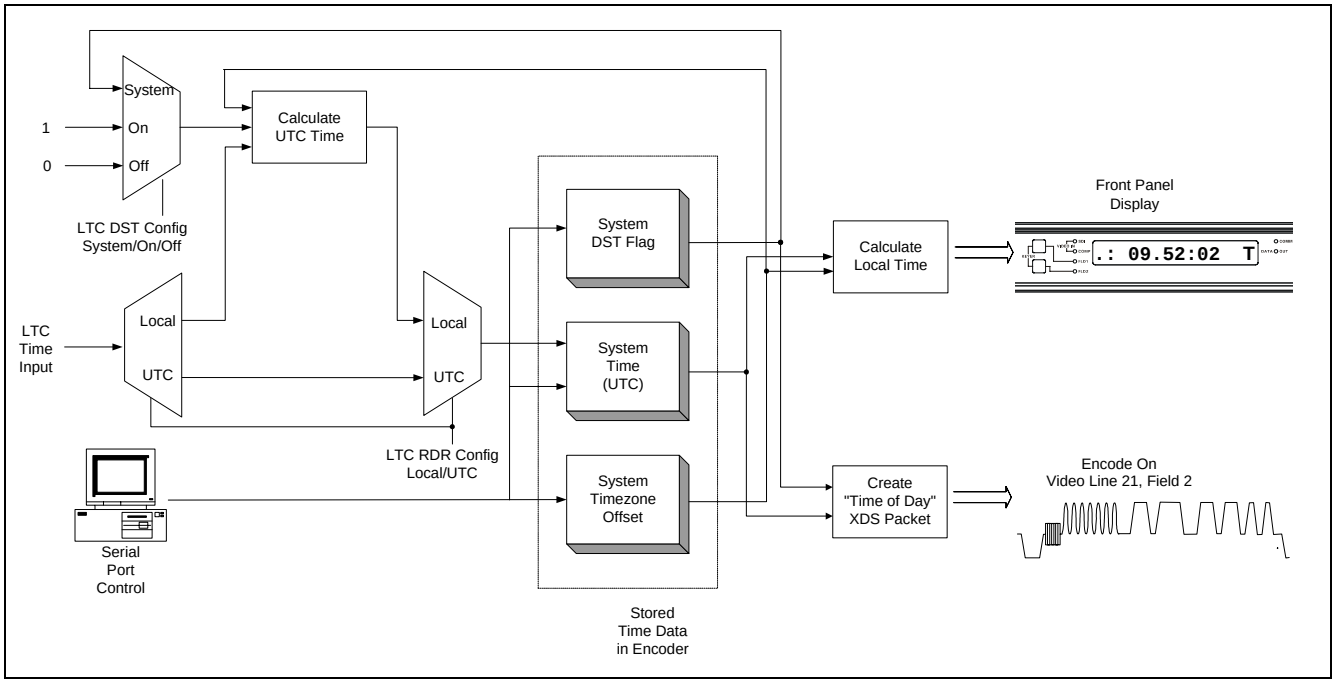


Figure B-2: 8083XDS-AD Time of Day Processing

A.5 USING METACAST 2 WITH THE 8083XDS-AD

MetaCast 2 is a Windows software application that schedules the XDS packets sent by the 8083XDS-AD Encoders according to the program schedule currently being aired. It allows the station operator to program XDS packets such as show name, duration, V-chip rating for each program segment. In order to accomplish this in sync with the programs being aired, MetaCast 2 needs to have a stable time reference. The preferred method is to have MetaCast 2 read the time from the 8083XDS-AD (which is in turn reading the time from the house time code reference). MetaCast 2 will maintain this time internally as the *Broadcast Time* and use it to control the scheduling of packets.

MetaCast 2 also provides tools to monitor and set the time, date and time zone offset of the encoder, to manage changes to and from Daylight Saving Time and to enable and disable the transmission of XDS *Time of Day* and *Time Zone* packets. These tools are available by opening the *Clocks* windows from MetaCast 2's tool bar.

A.5.1. Connecting MetaCast 2 to your 8083XDS-AD

You can connect one of the serial ports on your PC to any port on an 8083XDS-AD using an ordinary NULL modem cable that should have been supplied with the 8083XDS-AD encoder. The next step is to ensure that both devices are using the same communication settings. For the 8083XDS-AD Encoder, these can be selected from the front panel engineering menu. Check your encoder manual on how to change the port settings. It is recommended that the 8083XDS-AD be set at 9600 baud, 8 data bits and no parity.

The next step is to configure MetaCast 2 to the same settings. The encoder communication settings can be found under Comm Settings in the Encoder menu. On the dialog form, select the PC port to which the 8083XDS-AD is connected and choose the same settings in the designated combo boxes. For handshaking, it is recommended that 'Hardware' be selected but this requires all pins to be connected in the serial cable.

If the response window is not visible on the right side of the screen, click Responses from the View menu. Select Connect from the Encoder menu and watch the All or Encoder tab for indication of a successful connection. Also, if the status bar is visible on the bottom of the screen, the left most panel should say 'Online' and turn green.

A.5.2. Overview of the Clocks Page

The first box on this page displays a full version of the current Broadcast Time; this time is also available in 24-hour format on the MetaCast 2 Status bar, located at the bottom of the screen. The format is composed of Windows' Long Date and Time format as defined under Regional Settings in the Windows Control Panel. The next control allows you to select the source of the broadcast clock. The Time Zone field is not directly editable but may be modified by clicking 'Set Clock' button on the toolbar. The time zone presented generally indicates whether Daylight Saving Time is active by including the word 'Daylight' or when inactive by using the word 'Standard'. The Daylight Saving Time in Effect checkbox allows you to set whether Daylight Saving Time is currently active or not. If this field is disabled, MetaCast 2 has been set to automatically adjust for Daylight Saving Time. A check in the box means that Daylight Saving Time is active (and the DST Flag will be set in the Time of Day XDS Packet). The comments ‘Not observed in this time zone’ mean that the selected time zone will ignore the DST flag when calculating local time (and the DSO Flag will be set in the Time Zone XDS packet). The bottom two buttons allow you to toggle whether Time/Date and Time Zone packets are being encoded. If the buttons are pressed then the associated packet is being encoded and should appear on the Encoder Status page.

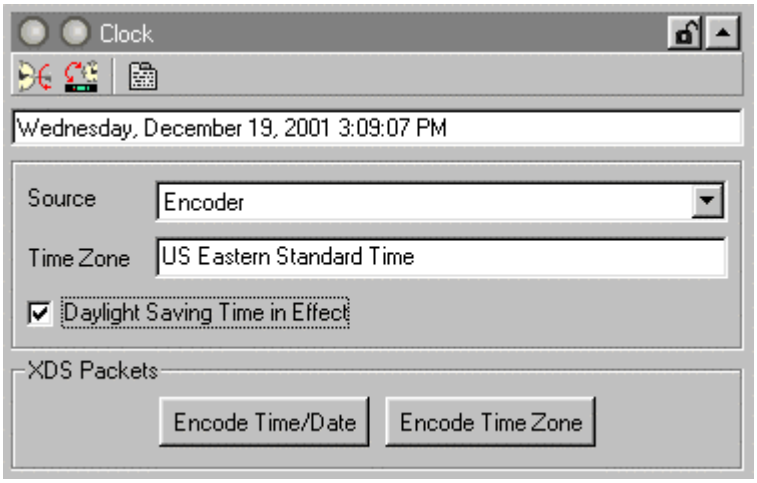
Lights

The left light indicates the status of the Time/Date packet and right light indicates the status of the Time Zone packet respectively.

 (gray)	 (green)	 (red)	 (yellow)
The packet is not in the Encoder's memory according to MetaCast 2. This is the default situation when offline.	The packet is being encoded as expected.	The packet is not being encoded as expected. There is an error of some sort.	Transition between states.

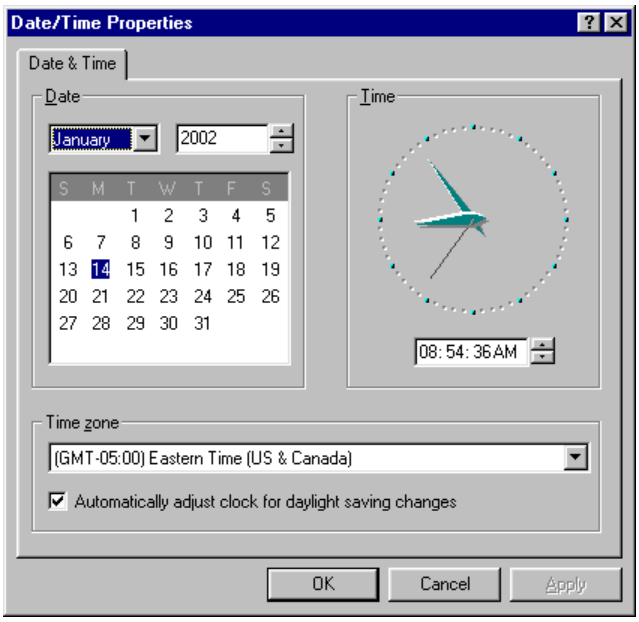
Toolbar

Icon	Name	Description
	Set Clock	Open up the Date/Time Properties window so that you can edit the Date, Time and Time Zone. If your clock source is the PC, this button will open the standard dialog used to set the PC clock.
	Sync MetaCast and Encoder	If you are connected to a Caption Encoder, this button will ensure that MetaCast 2 is synchronized with the 8083XDS-AD Encoder. If your clock source is the Encoder, MetaCast 2 will update its own clock; otherwise MetaCast 2 will update the clock in the Encoder.
	Options	Shortcut to the General Options page when you can set various clock parameters.



A.5.3. Setting the 8083XDS-AD Date from MetaCast 2

If your LTC input to the 8083XDS-AD contains date information you can go straight to section A.5.4, otherwise you will have to set the date in the 8083XDS-AD from MetaCast 2. To do this you will need to temporarily set the Time Source to *PC Clock*. Check the PC Clock's settings by clicking the 'Set Time' button on the Clock page toolbar. The *Date/Time Properties* screen will appear.



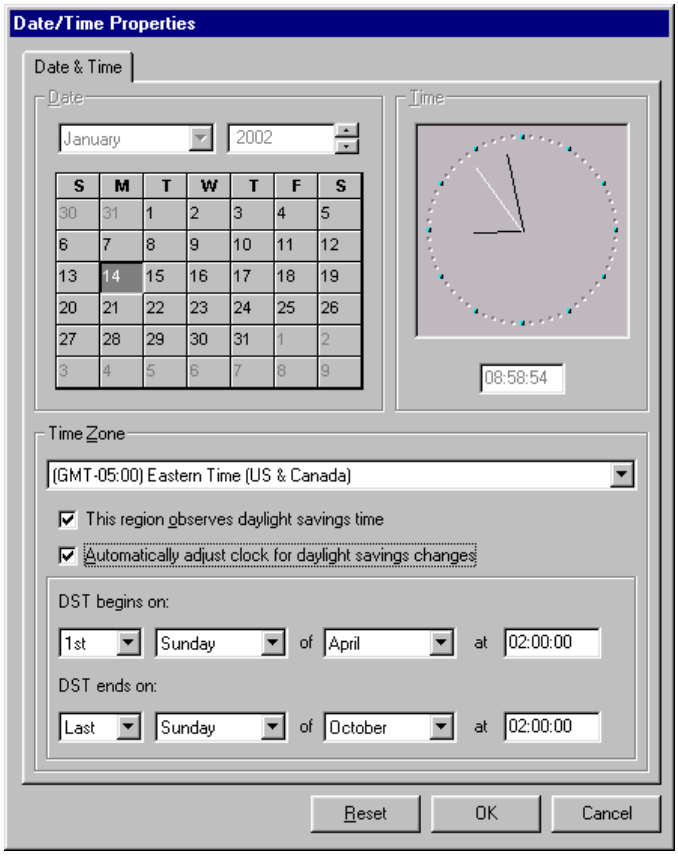
After making any changes press the Okay button to update the PC clock. After exiting the *Date/Time Properties* screen you will need to click the 'Sync MetaCast 2 and Encoder' button on the Clocks Toolbar to apply those new settings to MetaCast 2. Note that this will set the time, date and time zone into the 8083XDS-AD, however the time will be overwritten by the LTC connected to the 8083XDS-AD. Proceed to the next section to configure MetaCast 2 to update its time clock now from the 8083XDS-AD.

A.5.4. Configuring MetaCast 2 to Read the Time from the 8083XDS-AD

Set the Time Source on the Clocks page to *Encoder* to have MetaCast 2 synchronize its clock from the 8083XDS-AD (which is reading your house time code). Normally this will only synchronize MetaCast 2's *Broadcast Time,* but you can also use MetaCast 2 to set the PC Clock by checking the option on the General Options page. If you do this, additional instances of MetaCast 2 connected to other 8083XDS-AD's, can also be synchronized by selecting PC Clock as their time source.

A.5.5. Setting the Time Zone

Next you will need to set the time zone so that the 8083XDS-AD and MetaCast 2 can properly convert between UTC and local time. Click the 'Set Clock' button on the Clock page toolbar to open the *Set Time* page. To select a time zone, click the down arrow on the combobox and select your region from the dropdown list. The Date and Time options on this page are not available since this information will be taken from the Encoder; however, the Daylight Saving settings will need to be configured to match your house time source. See section A.5.6 for more information on setting the Daylight Saving Time options.



A.5.6. Configuring Daylight Saving Time

Two independent check boxes control Daylight Saving Time (DST) in MetaCast 2. The first check box is used to set the DST Flag in the 8083XDS-AD and is checked when Daylight Saving Time is currently being observed. It is located on the Clocks page and in most cases it should be updated by MetaCast 2's automatic DST adjustment controls. The second check box is used to set the DSO Flag in the 8083XDS-AD and needs to be checked if the current region you are broadcasting to observes Daylight Saving Time. MetaCast 2, and any televisions or VCRs receiving XDS *Time of Day* packets, use the DSO Flag to determine if they should adjust their time when the DST Flag is set.

Even in regions that do not observe Daylight Saving Time, you must still turn on the DST flag in accordance with surrounding regions so that they can properly calculate their local time.

The status of both check boxes can be monitored on the Clocks page. When Daylight Saving Time is active, the box next to the text 'Daylight Saving Time in Effect' will become checked. For regions that do not observe Daylight Saving Time, the comment '(Not observed in this region)' will be added to the checkbox caption.

You can choose how MetaCast 2 adjusts for DST on the Date/Time Properties page. The check box immediately below the time zone list shows if DST is observed in your region. This value is updated from the Windows' Time Zone database whenever you select a new time zone. You should normally use the default Windows value for this check box. If this check box is checked incorrectly then you probably do not have the correct windows Time zone selected.

The check box immediately below that lets you choose whether MetaCast 2 should automatically adjust for DST or not. Normally you should check this box, even if your region does not observe DST. When the box is checked, the DST time controls below become available, allowing you to configure when MetaCast 2 will automatically adjust for DST. By default, the dates are taken from Windows' Time Zone database but you can adjust them to any time you wish.

If you are feeding Local Time to the 8083XDS-AD's LTC reader, it is important that both MetaCast 2 and your house clock are configured to switch to DST at the same time, otherwise inaccuracies could occur.

The *Daylight Saving Time in Effect* check box on the Clock page will now be updated automatically based on the rules you have chosen. If you do not observe DST in your region then the comment '(Not observed in this region)' will be added.

If you do not check the *Automatic DST Adjustment* box then you will have to will manually determine when DST is in effect or not. If you do not set the *DST in Effect* check box correctly, incorrect time settings may result on Televisions and VCR's that are receiving the XDS packets.

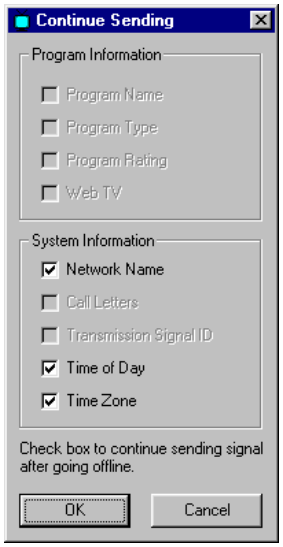
A.5.7. Synchronizing Clocks

Once your clocks have been set, the final task is to ensure that everything remains synchronized. You can resync MetaCast 2 to your Encoder by clicking 'Resync MetaCast and Encoder' button on the Clock toolbar. MetaCast 2 will also automatically resynchronize to the Encoder time periodically according to your settings on the General Options page. The 'Set PC clock' check box on this screen instructs MetaCast 2 to set the PC clock in addition to its internal BroadCast time. This allows additional instances of MetaCast 2 running on the PC to be synced to one 8083XDS-AD Encoder with an LTC reader. Note: Set PC requires admin privileges on NT4, WIN 2000 and WINXP.

A.5.8. Configuring the 8083XDS-AD to Encode Time of Day and Time Zone XDS Packets

The bottom two buttons on the Clocks page allow you to control whether *Time of Day/Date* and *Time Zone* packets are being encoded. If the buttons are pressed then the associated packet is being encoded and should appear on the Encoder Status page. Normally both buttons should be depressed. However, if you are in a region that broadcasts to two different time zones you should not transmit the *Time Zone* packets. Also, if part of your broadcast region observes Daylight Saving Time and part of it does not then you should not transmit *Time Zone* packets. Viewers in your area will have to set their own VCRs and television sets for the correct time zone, and whether they observe Daylight Saving Time or not. **Note:** if you transmit *Time Zone* packets in either of these cases viewers' VCRs will not be set correctly.

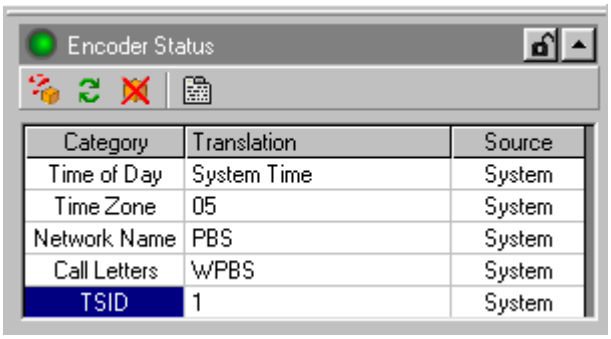
When you exit MetaCast 2, you will be presented with the choice to continue encoding XDS packets or to remove them from the 8083XDS-AD packet stream. To continue sending the *Time of Day* and *Time Zone* packets after you exit MetaCast 2 you will need to check the appropriate boxes; otherwise they will be removed.



A.5.9. Monitoring the Time of Day and Time Zone Packets in MetaCast 2

The current time and date being read from the encoder is shown on the top text box of the Clocks page. The Current time is also shown on the Status window at the bottom of the screen.

The encoder Status window shows the XDS packets that are currently being transmitted by the 8083XDS-AD. You should see an entry for the *Time of Day*



A.6 ISSUES WITH CONSUMER ELECTRONICS

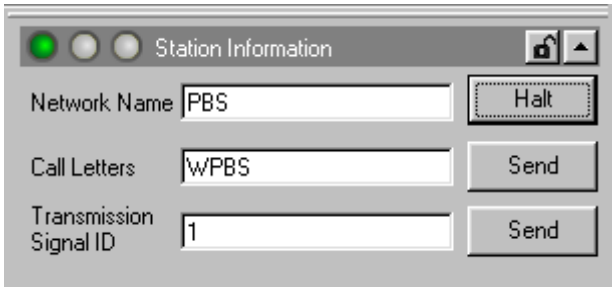
A.6.1. Line 21 Field 1 Signal Must be Present when Encoding XDS

EIA-608 Specifies that Line 21 Field1 caption signal must also be present when XDS packets are being inserted. Some XDS decoders will not function if the caption signal is not present in both fields. When encoding XDS packets, the 8083XDS-AD will automatically insert a Line21 Field 1 caption signal if there is not one present already.

A.6.2. Issues with Panasonic and Quasar VCRs

The Matsushita chipset (used in Panasonic and Quasar VCRs) has some anomalies in the way they handle *Time of Day* and *Time Zone* XDS packets

- The Network Name XDS packet MUST be present, and its contents MUST be "PBS<sp>" or “<sp>PBS” where <sp> is a space character.



- The Station Call Letters and *Time Zone* packets MUST also be present for the AUTO CLOCK feature in these VCRs to work. In areas that do encode *Time Zone* packets, in accordance with EIA-608-B rules, the AUTO CLOCK function in these VCRs will not work.

- These VCRs ignore the state of the DST bit. They figure out whether DST is in effect based on the current date & time, using the typical rules for changing the clock. This means that these VCRs may not work properly in regions of the country that do not observe daylight saving time.

- If XDS is encoded at more than one location (e.g. Network and affiliate) it is possible for some locally inserted packets to be interrupted to allow upstream XDS packets to pass through. The locally inserted packet will then be resumed when the upstream packet is completed. These VCRs will ignore *Time of Day* packets that are paused and resumed. They only acknowledge uninterrupted XDS packets. To avoid this all XDS encoding should be done locally at the point of final transmission, and the 8083XDS-AD should block upstream XDS packets, if at all possible.

A.6.3. Notes about JVC VCRs

- The *Time Zone* packets MUST be present for the AUTO CLOCK feature in these VCRs to work. In areas that do not encode *Time Zone* packets, in accordance with EIA-608-B rules, the AUTO CLOCK function in these VCRs will not work.

- These VCRs ignore the state of the DSO bit. When they are set to DST AUTO they assume DST is always observed in the region and figure out whether DST is in effect based on the current date & time, using the typical rules for changing the clock. For regions that do not observe daylight saving time you must set them to DST OFF. If the DST AUTO setting is used in these regions, the VCR clock will be off by 1 hour for a period of time around the DST change in the spring and the fall.

- When they are in the AUTO CLOCK mode, they search for incoming signals with XDS time of day and time zone packets when they are first plugged in. They only update from the XDS packets at the beginning of the minute. If these VCRs do not have a valid RF signal present at the time the VCR is plugged in the AUTO CLOCK feature will not work.

- Once the clock has been initially set, it only updates from the XDS packets once per hour at the beginning of the minute except between 11:00 p.m. and 2:00 a.m. To force the clock to update at other times, you have to turn off the AUTO CLOCK mode then turn it back on, and then power down the VCR. The clock will then update at the beginning of the next minute if there are valid *Time of Day* and *Time Zone* packets present.

A.6.4. Notes about Sony VCRs

- When they are in the AUTO CLOCK mode, they search for incoming signals with XDS time of day and time zone packets when they are first plugged in. They only update from the XDS packets at the beginning of the minute. The VCR can also lock onto the time by simply powering the unit on and then off. When this happens, the time will only get updated at the beginning of a minute.

- The *Time Zone* packets MUST be present for the AUTO CLOCK feature in these VCRs to work. In areas that do not encode *Time Zone* packets, in accordance with EIA-608-B rules, the AUTO CLOCK function in these VCRs will not work.

- If the VCR is receiving *Time of* Day and Time *Zone* packets, its clock will be updated depending on its timezone and DST settings. If the timezone is set manually in the VCR, the clock will be updated with the VCR timezone setting rather than pulling it off the 8084 packets.

- VCR does not look for the DSO flag in the *Time Zone* packet. The VCR can be set for DST On/Off/Auto. When it is set to Auto the VCR follows the DST flag bit in the *Time of Day* packet as long as both packets are present. In regions that do not observe DST the VCR must be set to DST Off.

- VCR will not automatically do rollovers for Daylight Saving Time if *Time of Day* and *Time Zone* packets are not present. The VCR needs to be turned off and then on to adjust to the correct time again.

A.6.5. Time Zones East of Greenwich

EIA-608B specifies that time zones are always interpreted as a negative whole hour offset from UTC. This means that time zones east of Greenwich and west of the International Date Line will be encoded as –23 to –13 hour offsets. Some VCRs may not realize that these time zones are on the opposite side of the International Date line and hence may decode the date incorrectly. If this happens, the *Time Zone* packets should not be encoded. (See note in section 3)

A.6.6. Miscellaneous Issues

- Some VCRs will only update their clocks once per hour
- Some VCRs will only update their clocks accurate to the minute
- Some VCRs only update their clocks one time after power up.

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