HDCC-OP47MON

(WST/OP47 Monitoring and Analysis)

HD/SD-SDI Closed Caption Card:
Decoder and Monitor

Configuration Guide

Software Version: V2.40

PIC Code Version: V1.11

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Wohler
CONFIDENCE.

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CHAPTER 1
Setting the Switches

Introduction

Overview

Thank you for purchasing Wohler's HDCC card. This chapter explains how to set up, and use your card.

Important: The terms *closed captions* and *captions* refer to WST and OP-47 encoded captions, and are not in any way related to North American closed-captions service (a.k.a. "CC") and specifications. These closed captions may also be referred to as *subtitles* as it is the common usage in Europe.

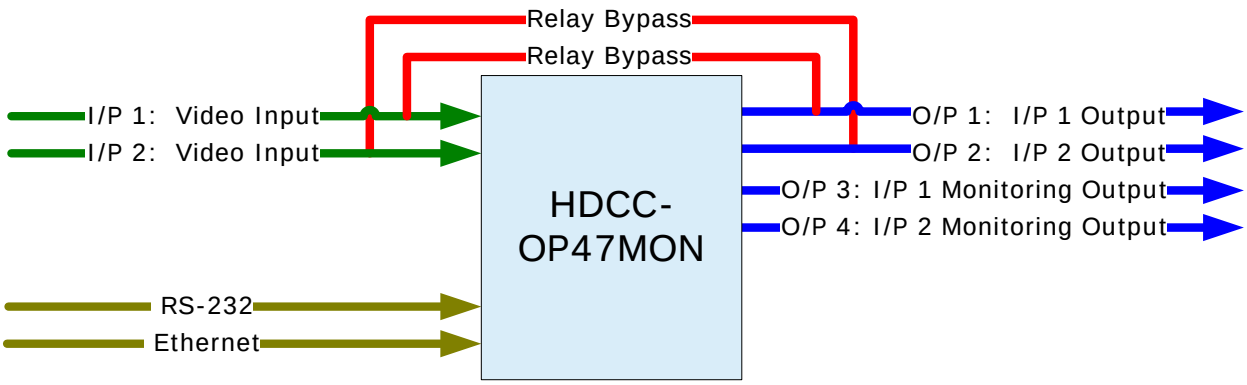
Topics

Basic Functionality

Inputs and Outputs

Figure 1–1 illustrates the basic inputs and outputs of the HDCC. In the event of a power failure, or when the system is powered down, the bypass relays engage and the outputs on O/P 1 and O/P 2 are identical to the input signals on I/P 1 and I/P 2 respectively.

Figure 1–1 I/O Functionality - No Power



Note: For Figure 1–1 above, the illustration depicts either a Codan or Evertz rear panel adapter. The IRT has two RS-232 ports and no Ethernet port.

Processes

Decoding

Decoding is the process of extracting closed caption text data from an SDI video stream, interpreting it, and making it available in human-readable form. For example, if a video/audio stream with embedded caption data is supplied to I/P 1, the caption text is decoded and supplied through a serial and/or Ethernet connection to a host PC for display. Note that the closed captioned data is not removed from the input video stream.

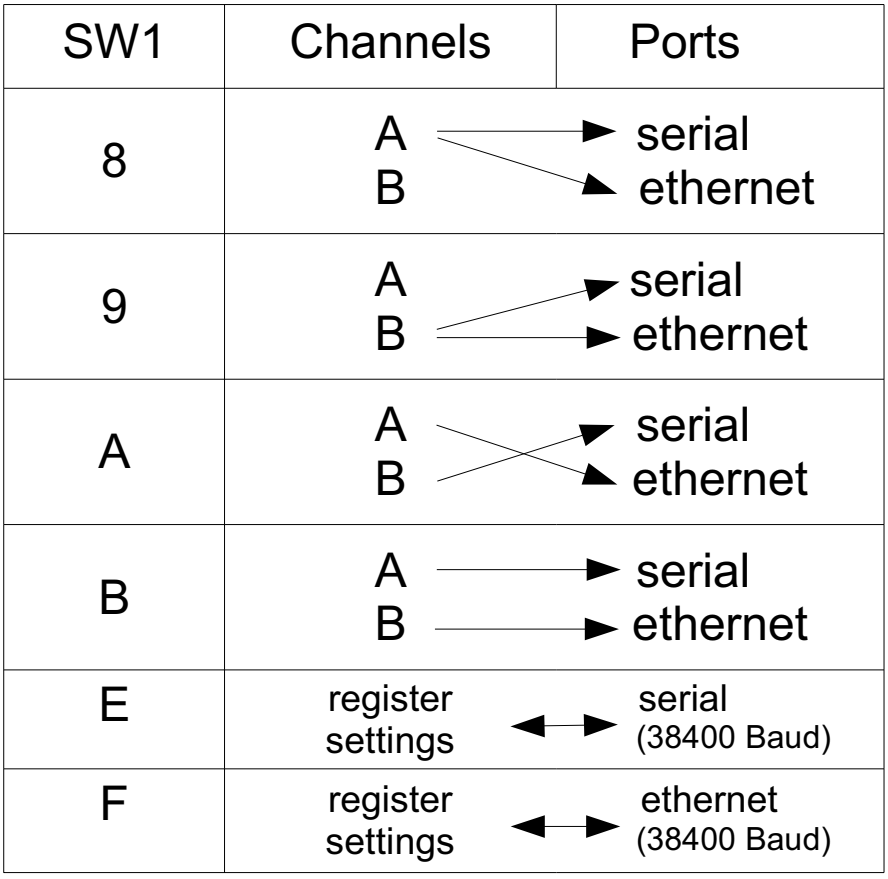
Monitoring

The HDCC also provides burnt-in caption outputs (also called open captions) on O/P 3 and O/P 4 to monitor the closed captions on O/P 1 and O/P 2 respectively.

Ethernet and Serial Communications Summary

Figure 1–2 illustrates the direction of communications between the input channels (I/P 1 and I/P 2, aka Channel A and Channel B) and the serial and Ethernet ports, depending on the settings of SW1.

Figure 1–2 Serial and Ethernet Communications for SW1 Settings)

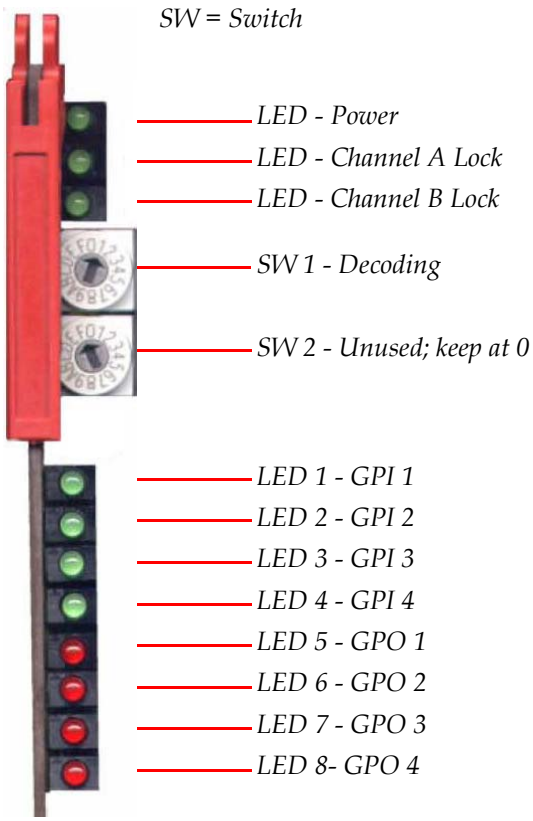


Important: SW2 is unused and to be kept to position 0.

Using the Card

Using the HDCC card amounts to little more than setting the switches, attaching the I/O cables, and connecting a PC through either an Ethernet or a serial port to decode.

Figure 1–3 HDCC Front Panel

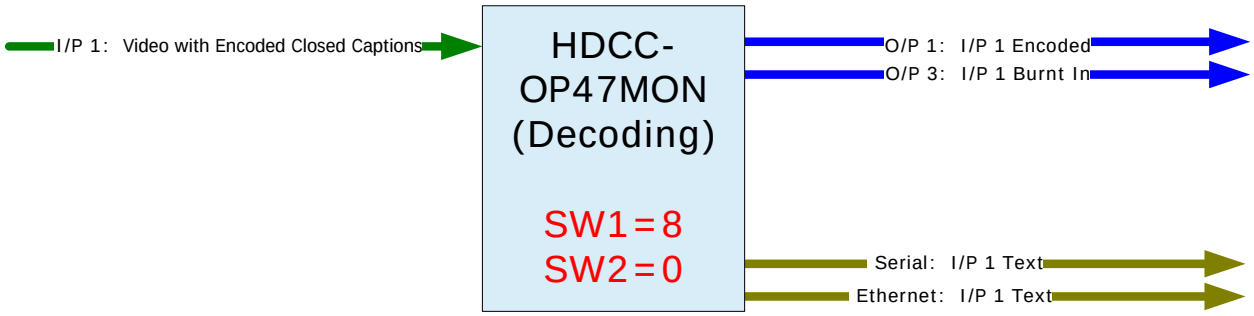


- **Switch 1 (SW 1)** is the communications router. Refer to Figure 1–2 on page 3.
- **Switch 2 (SW 2)** is unused and should remain at switch position 0.

Decoding

A signal that comes in on I/P 1 (Channel A) goes out on the odd-numbered outputs, and a signal that comes in on I/P 2 (Channel B) goes out on the even-numbered outputs, where the higher numbered outputs display burnt in captions. But before the signals reach the output ports, the embedded closed caption text is captured and output to the Ethernet port and the RS-232 port. See the (single input) example in Figure 1–4 below.

Figure 1–4 Typical Scenario for Decoding Only



Example: This simple example demonstrates the decoding feature.

I/P 1: Input encoded video source with encoded closed captions.

I/P 2: N/A

O/P 1: Connect output for encoded video stream (I/P 1).

O/P 2: N/A

O/P 3: Monitor the burned-in caption text from I/P 1.

O/P 4: N/A

Serial: Receive closed caption text from I/P 1.

Ethernet: Receive closed caption text from I/P 1.

1. Connect a video source with encoded closed captions to I/P 1.
2. Connect the output cable to O/P 1.
3. Connect a monitor to O/P 3.
4. Connect the PC to the serial or Ethernet port in the card.

Note: To use the Ethernet port as a virtual serial port, refer to: Appendix A of the *Installation Guide* (PN 821135) to download, install, and configure the Ethernet connectivity application.

5. For our example, set SW 1 to 8.

6. SW 2 should always be set to 0.

Providing the HDCC card is locked on an video signal, output from the serial and Ethernet ports will provide closed caption data decoded from the video input.

Connecting to the Card

To perform this procedure you will need:

- A PC or laptop with a serial port and/or Ethernet port
- Either or both of the following:
  - A serial cable (connected from the serial port of the PC to the serial port on the HDCC). Refer to Accessing the Configuration on page 11 for more information.
  - An Ethernet cable (connected to the Ethernet ports of the HDCC card and the PC)

To complete the connection to the HDCC card, refer to the *HDCC Product Lin Installation Guide* (PN 821135) for Ethernet connection settings.

CHAPTER 2
Setting the Engineering Registers

Introduction

Overview

This chapter explains how to access the engineering registers to configure the HDCC card for your particular system.

Topics

Accessing the Configuration

The card has a number of registers to allow easy configuration of various card parameters that can be accessed from both the RS-232 interface and the Ethernet interface.

Note: An active SDI (SD or HD) signal connected to one of the input interfaces (I/P-1 or I/P-2) is required to activate the Ethernet port.

To access the configuration registers:

1. Determine whether you want to access the engineering menu from the Ethernet port or from the RS-232 port.

2. Depending how you will access the menu, turn SW 1 to either E or F according to Table 2–1 below.

Table 2–1 Switch 1 Settings - Encoding

SW 1	Insert Text From
E	Access engineering menu through RS232 port.
F	Access engineering menu through Ethernet port.

3. Connect the serial or Ethernet cable from the host computer's port to the port on the rear panel adaptor.

   Note: IRT adaptors do not provide an Ethernet port.

4. Launch your **HDCCRegEdit** program. Refer to the *HDCCRegEdit Guide* (PN 821078) for instructions for using this application.

5. Verify that your communication settings are 38400, n, 8, 1.

Modifying the Register Settings

Table 2–2 Register Table Summary

Channel		Description
A	B	
00h	20h	HD Line for OP47 Decoding (Field 1)
01h	21h	HD Line for OP47 Decoding (Field 2)
02h	22h	SD Line for WST Decoding (Field 1)
03h	23h	SD Line for WST Decoding (Field 2)
04h	24h	Not Used
05h	25h	Not Used
06h	26h	Decoder Magazine Number
07h	27h	Decoder Page Number
08h	28h	Default Newfor Language and Transmission Features
09h	29h	Not Used
0Ah	2Ah	Not Used
0Bh	2Bh	Not Used
0Ch	2Ch	Not Used
0Dh	2Dh	Not Used
0Eh	2Eh	Not Used
0Fh	2Fh	Not Used
10h	30h	Special Features 2
11h	31h	Not Used
12h	32h	Not Used
13h	33h	Not Used
14h	34h	Not Used
15h	35h	Not Used
16h	36h	Not Used
17h	37h	Not Used
18h	38h	Not Used
19h	39h	Not Used
1Ah	3Ah	Not Used
1Bh	3Bh	Not Used
1Ch	3Ch	Not Used
1Dh	3Dh	Not Used
1Eh	3Eh	Not Used
1Fh	3Fh	Not Used
FDh		Not Used
FEh		Not Used
FFh		Not Used

Table 2–3 Register Settings 00h to 07h and 20h to 27h

Ch 1 Reg #	Ch 2 Reg #	Description	EU Default	AUST Default
00	20	**HD OP-47 Line, Field 1** *Min: 07 – Max: 25* Sets the actual Field 1 line number where the OP-47 data will be read from. Note: This is a legacy setting and this is just an indicative value, as OP-47 data will be detected by the DID/SDID, whatever it's position in the VANC, and regardless of this value.	0A	0C
01	21	**HD OP-47 Line, Field 2** *Min: 07 – Max: 25* Sets the actual Field 2 line number where the OP-47 data will be read from. Note: This is a legacy setting and this is just an indicative value, as OP-47 data will be detected by the DID/SDID, whatever it's position in the VANC, and regardless of this value.	0A	0C
02	22	**SD WST Line, Field 1** *Min: 06 – Max: 22* Sets the actual Field 1 line number where the WST data will be read from.	0A	15
03	23	**SD WST Line, Field 2** *Min: 06 – Max: 22* Sets the actual Field 2 line number where the WST data will be read from.	0A	15
06	26	**Decoder Magazine Number** *Min: 15 (00) – Max: 2F (07)* (*Hamming Encoded* Refer to Table 2–6 on page 13.) Sets the magazine number that will be used by the monitoring subtitle decoder when decoding subtitles from either a HD or SD video stream.	15 (00)	15 (00)
07	27	**Decoder Page Number** *Min: 00 – Max: 99* *(BCD Encoded)* Sets the page number that will be used by the monitoring subtitle decoder when decoding subtitles from either a HD or SD video stream.	88	01

Figure 2–1 Registers 08h to 28h

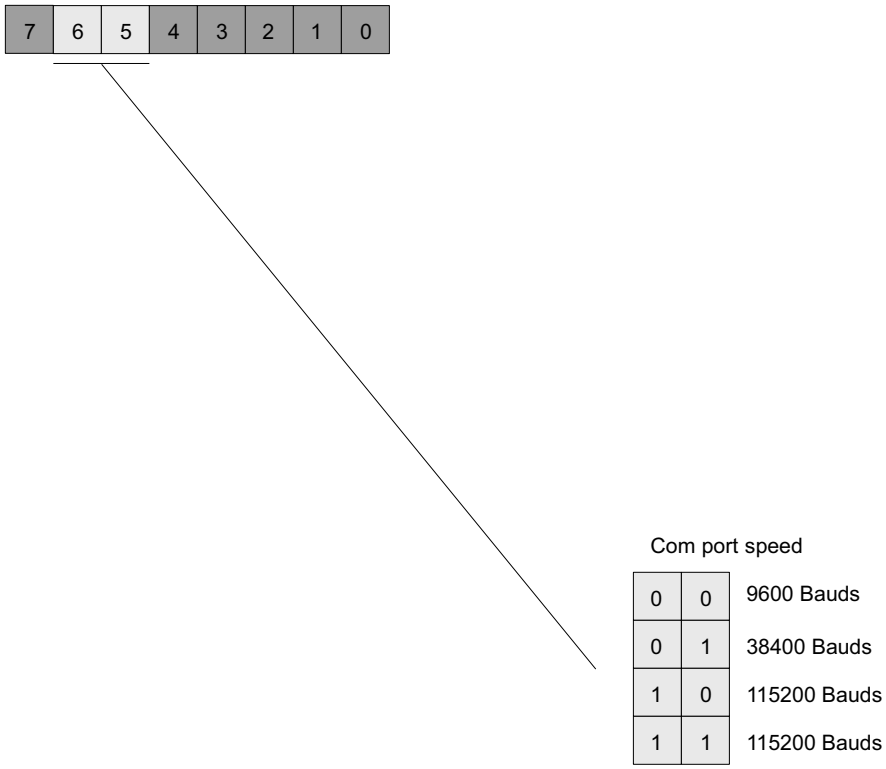


Table 2–4 Register Settings 08h to 0Bh and 28h to 2Bh

<table>
<tr><th>Ch 1 Reg #</th><th>Ch 2 Reg #</th><th>Description</th><th>EU Default</th><th>AUST Default</th></tr>
<tr><td>08</td><td>28</td><td>Default Transmission Features
Min: N/A – Max: N/A
Set decoded captions transmission options..
<table><tr><th>Bit(s)</th><th>Function</th></tr><tr><td>6:5</td><td>Baud Rate for Newfor Protocol:
00 = 9600
01 = 38400
1x = 115200</td></tr></table></td><td>00</td><td>18</td></tr>
</table>

Figure 2–2 Registers 10h and 30h

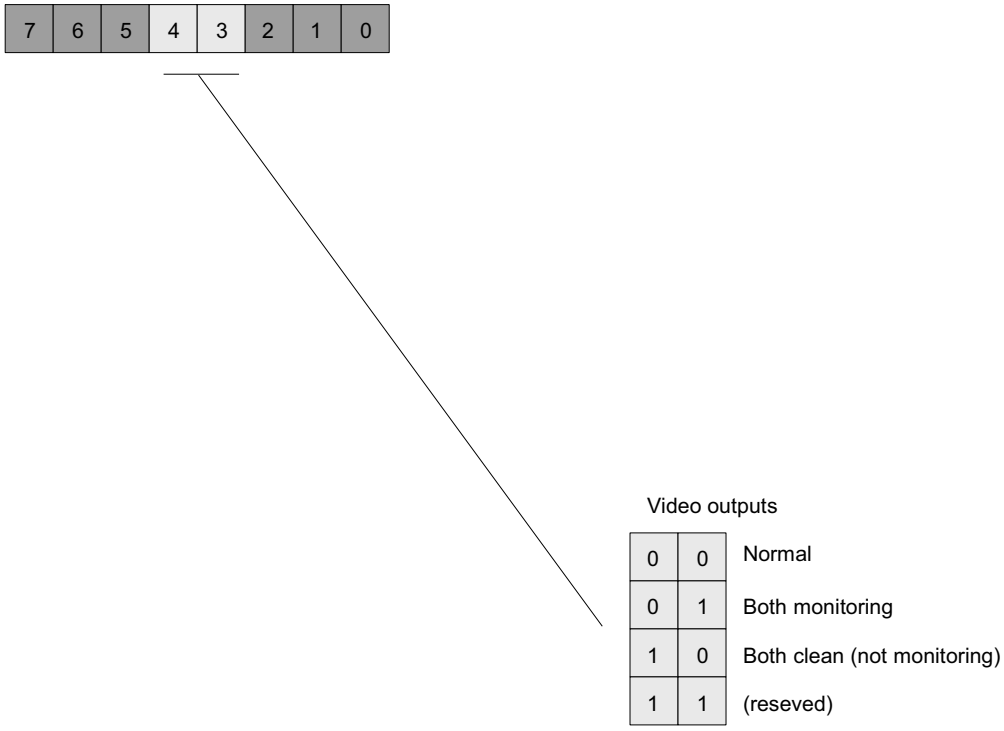


Table 2–5 Register Settings 10h and 30h

Ch 1 Reg #	Ch 2 Reg #	Description	EU Default	AUST Default
10	30	**Special Function Register—2** *Min: N/A – Max: N/A* This register controls miscellaneous functions on the card including the video outputs. Bit(s): 4[a]:3 Function: Video Output s: 00 = Normal 01 = Both outputs set to monitoring 10 = Both outputs are clean 11 = Not Used a Normal (default) = Monitoring O/Ps are 3 and 4; Clean O/Ps are 1 and 2 Monitoring = Burnt-in captions on all O/Ps Clean = No burnt-in captions on any O/Ps	80	00

For all registers with hamming encoding, the following table defines those codes.

Table 2–6 Hamming Codes

Byte	Encoding
0	15
1	02
2	49
3	5E
4	64
5	73
6	38
7	2F
8	D0
9	C7
A	8C
B	9B
C	A1
D	B6
E	FD
F	EA

Magazine and Page Number Settings

The magazine has a range of 1 through 8. Since only a 3-bit value is allowed to represent the magazine, Magazine 8 is represented by 0 and values 1 through 7 represent Magazines 1 through 7 respectively.

The page number is a BCD number between 00h and 99h.

Example: So to monitor captions on Magazine 8, Page 88 by default, set the following registers (See Table 2–4 on page 11 for details.):

- Register 08h = 15h (Magazine 8 Hamming Encoded)
- Register 09h = 88h

CHAPTER 3
Features and Specifications

Introduction

Overview

This chapter explains the features of the HDCC closed caption card and details all of the specifications.

Topics

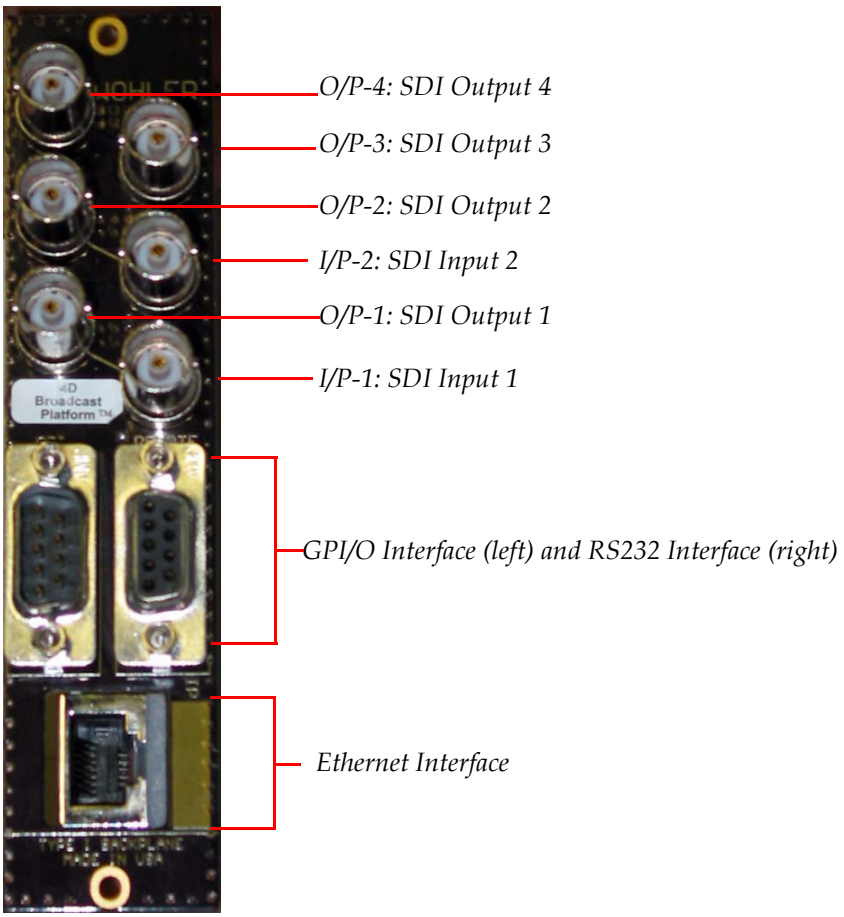
Features

Description

Hardware

The image and call outs in Figure 3–1 provide a reference for the detailed interface descriptions provided below.

Figure 3–1 Codan Adapter and Interface Layout



BNC Interfaces

- **I/P-1 and I/P-2:** These interfaces (Channel A and Channel B, respectively) accept SDI channel inputs that conform to the SMPTE 259M standard for SD and SMPTE 292M standard for HD.

- **O/P-1 and O/P-2:** These SDI outputs provide closed caption data encoded video signal. They are relay bypassed on power failure, card removal, or card failure.

- **O/P-3 and O/P 4:** These SDI outputs (Channel A and Channel B, respectively) provide closed caption data as well as an open caption display of the encoded data. The open caption display is fed from the final output stage of the card.

Ethernet and Serial Interfaces

The ethernet interface (100BT) and the serial (RS-232) interfaces receive caption data into the card when used as closed caption inserters and to get caption data from the video signal when used as closed caption analyzers.

Software

The HDCC is a dual-channel card that reads and monitors closed captioned data. The card receives closed caption data from within input video signals and provides this data through an RS-232 serial port and/or an Ethernet port, as well as proviging them as OSD on separate monitoring video outputs. The two functions of the card are:

- Closed Caption OSD Monitoring

- HD/SD Closed Caption Decoding/Analyzing

Functionality

The HD/SD Closed Caption Decoder/Analyzer (Decoding)

The HD/SD-SDI closed caption decoder/analyzer can be used to decode two SD or HD sources; the video format and captions standard is automatically detected. The two inputs are not required to be synchronous nor of the same format.

Connectivity

A serial port (RS-232) and an Ethernet interface (adaptor-dependent) are provided to send closed caption data to a PC application for analyzing and/or logging. Either interface can be tied to one or both channels of the card as required. The Ethernet interface allows you to connect to the card and get data from virtually any location within the facility as long as you have a network connection.

Supported Formats

The HDCC supports the following video formats:

- 480i60
- 576i50
- 720p (all field rates)
- 1035i (all field rates)
- 1080i (all field rates)

Advanced Operation

User Controls

Table 3–1 below lists all the values for SW 1.

Table 3–1 Switch 1 Communications Settings[a]

Setting	Function
8	Decode caption data from Channel A out to the serial and ethernet ports.
9,	Decode caption data from Channel B out to the serial and ethernet ports.
A	Decode caption data from Channel A out to the Ethernet port. Decode caption data from Channel B out to the serial port.
B	Decode caption data from Channel A out to the serial port. Decode caption data from Channel B out to the Ethernet port.

Table 3–1 Switch 1 Communications Settings[a] (Continued)

Setting	Function
E	Access configuration through serial port
F	Access configuration through Ethernet port

a See also Figure 1–2 on page 3.

Status Indicators

Table 3–2 below describes the LED status indicators on the front of the HDCC card.

Table 3–2 Front Panel Status Indicators

LED #	Label	Color	Function
LED 1	Power	Green	Lights to indicate that the card is receiving power.
LED 2	SDI Channel A Input	Green	Confirms that a valid serial digital input is present. This LED will light only when the signal is present and locked. If the signal input fails or is not stable, the LED will flash at a 1 Hz rate.
LED 3	SDI Channel B Input	Green	Confirms that a valid serial digital input is present. This LED will light only when the signal is present and locked. If the signal input fails or is not stable, the LED will flash at a 1 Hz rate.

Specifications

Table 3–3 Physical Specifications

Specification	Value
Dimensions (H x W x D)	4″ x 8.7″ x .5″ (101.60 mm x 220.98 mm x 127.00 mm)
Shipping Weight	1 lbs (.45 kg)
Space Requirements	3 RU
Supplied Accessories	Rear panel adaptor for user-specified frame
Power Requirements	Receives power from frame
Power Consumption	Approximately 10 W

Table 3–4 Technical Specifications

Specification	Value
Inputs	2 SD/HD-SDI auto-sensing on BNC 4 GPI (DB-9) (on 10-pin header on the Evertz rear panel adaptor)
Outputs	2 HD/SD-SDI Closed Captioned (BNC) 2 HD/SD-SDI Open Captioned (BNC) 4 GPO (DB-9) (on 10-pin header on the Evertz rear panel adaptor)
Inputs/Outputs	Ethernet (RJ-45) (not available on the IRT rear panel adaptor) 1 RS-232 (DB-9) (on Codan and IRT rear panel adaptors) 1 RS-232 (10-pin header on the Evertz rear panel adaptor)
Frame compatibility	• Codan • Evertz • IRT
Available functions	• Closed Caption OSD Monitoring • HD/SD Closed Caption Decoding/Analyzing
Supported closed caption specifications	WST/OP-47

Connector Pin Assignments

Table 3–5 GPI DB-9 Pin-Out Assignments (Codan and IRT Adaptors)

Pin	Label	Interface
1	Common GND	GND
2	GPO-4	Open Collector (Emitter to Ground)
3	GPO-3	
4	GPO-2	
5	GPO-1	
6	GPI-4	Active Low
7	GPI-3	
8	GPI-2	
9	GPI-1	

Figure 3–2 GPI DB-9 Male Pin-Out

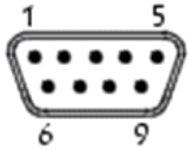


Table 3–6 RS-232 DB-9 Pin-Out Assignments (Codan and IRT Adaptors)

Pin	Label	Function
1	N.C.	Not Connected
2	TXD	RS-232 Tx Data
3	RXD	RS-232 Rx Data
4	Not Connected	
5	Common GND	GND
6	The IRT adaptor has the second serial port available on pins 6 and 7. See table 4-10 below	
7		
8		

Figure 3–3 RS-232 DB-9 Pin-Out

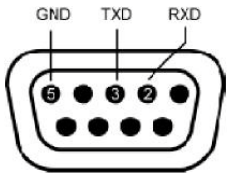


Table 3–7 14-Pin Header Assignments - RS-232 and GPI (Evertz Adaptor)

Pin	Label	Interface
1	GPO-1	Open Collector
2	GPI-1	Active Low
3	GPO-2	Open Collector
4	GPI-2	Active Low
5	GPO-3	Open Collector
6	GPI-3	Active Low
7	GPO-4	Open Collector
8	GPI-4	Active Low
9	RS-232 Rx	RS-232 Rx Data
10	RS-232 Tx	RS-232 Tx Data
11	Common GND	Reference Ground
12		
13		
14		

Figure 3–4 14-Pin Header Assignments

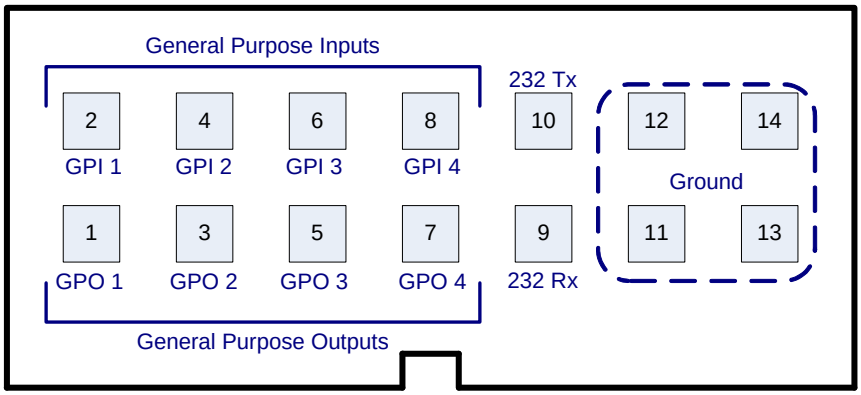


Table 3–8 DB9F Cable Connector Wiring (Codan and IRT Adaptors)

Pin	HDCC (DB9-M) to PC (DB9-F)
1	Do Not Connect.
2	Pin 2
3	Pin 3
4	Do Not Connect.
5	Pin 5

Table 3–8 DB9F Cable Connector Wiring (Codan and IRT Adaptors) (Continued)

Pin	HDCC (DB9-M) to PC (DB9-F)
6	Do Not Connect.
7	
8	
9	

Note: Table 3–9 and Table 3–10 below provide the pin-out for the cable connecting the HDCC to the PC. A straight serial cable (not a null modem cable) will also work.

IMPORTANT: Pins 1, 4, 6, 7, 8, and 9 MUST NOT be connected.

Table 3–9 HDCC (IRT) to PC Interface RS-232 #1 Wiring

HDCC (IRT) DB-9M		PC DB-9F	
Pin	Description	Pin	Description
2	Tx D	2	Rx D
3	Rx D	3	Tx D
5	GND	5	GND
1, 4, 8, and 9: NC		1, 4, 6, 7, 8, and 9: NC	

Table 3–10 HDCC (IRT) to PC Interface RS-232 #2

HDCC (IRT) DB-9M		PC DB-9F	
Pin	Description	Pin	Description
7	Tx D	2	Rx D
6	Rx D	3	Tx D
5	GND	5	GND
1, 4, 8, and 9: NC		1, 4, 6, 7, 8, and 9: NC	

Technical Functional Overview

Figure 3–5 on page 24 illustrates the design of the HDCC.

Figure 3–5 HDCC Block Diagram