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World Leader of In-Rack, Audio, Video, Data Monitoring, and Closed Captioning Solutions

HDCC-200A (OP-47/WST) Multi-Function Card

Multi-Purpose Closed Caption Card: Inserter, Decoder, Bridger, Monitor, and Transcoder

Configuration Guide

Software Version: V2.34
PIC Code Version: V1.09

Part Number 821047, Revision A

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CHAPTER 1
Setting the Switches

Introduction

Overview

Thank you for purchasing Wohler's HDCC-200A card, a product that provides a variety of closed-captioning functions. This chapter explains how to install, set up, and use your card.

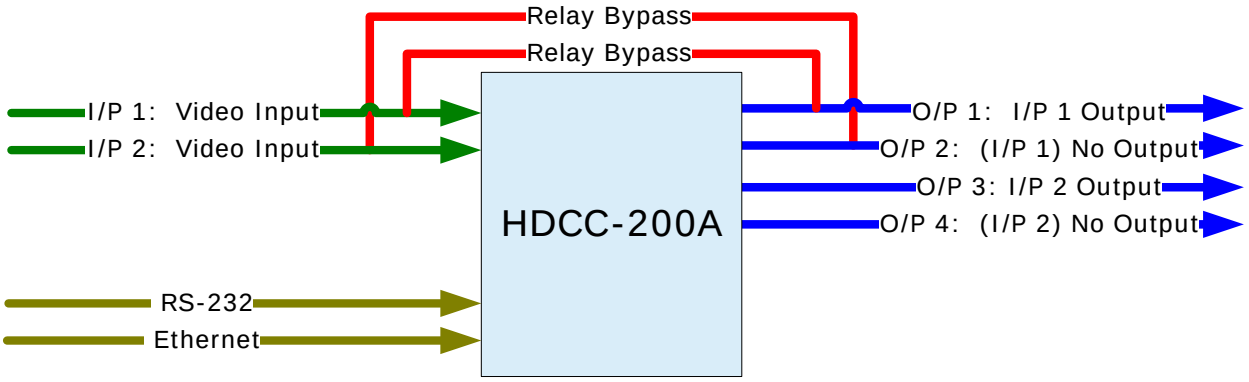
Topics

Basic Functionality

Inputs and Outputs

Figure 1–1 illustrates the basic inputs and outputs of the HDCC-200A. 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 through Figure 1–9 on page 14, the illustrations depict either a Codan or Evertz rear panel adapter. The IRT has two RS-232 ports and no Ethernet port.

Processes

Encoding

Encoding allows the broadcaster to embed, or encode, caption text from a separate source into the video/audio stream. For example, the video/audio stream would come in on I/P 1, and the caption data would come in on the serial port from a PC on which an operator keys in the text of the caption data. Then the encoded video/audio/data stream would come out on O/P 1. O/P 3 provides burned-in captions, literally superimposing the text of the caption data on the video display.

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 text is not removed from the input video stream.

Bridging / Transcoding

Bridging is the process of extracting closed captioning data from one SDI data stream and inserting it into another. For example, a video stream with embedded text would come in on I/P 1 and a clean video stream would come in on I/P 2. In this scenario, the HDCC-200A would copy the closed caption text data coming in on I/P 1 and embed it into the video stream of I/P 2. Note that the closed captioned text is not removed from the source input video stream. If the two signals are different, say SD and HD, then this scenario also exemplifies transcoding.

Monitoring

The HDCC-200A also provides burned-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.

Figure 1–2 Valid Switch Settings for Both Switch 1 and Switch 2

SW	Function
1	Encoding & Decoding
2	Transcoding

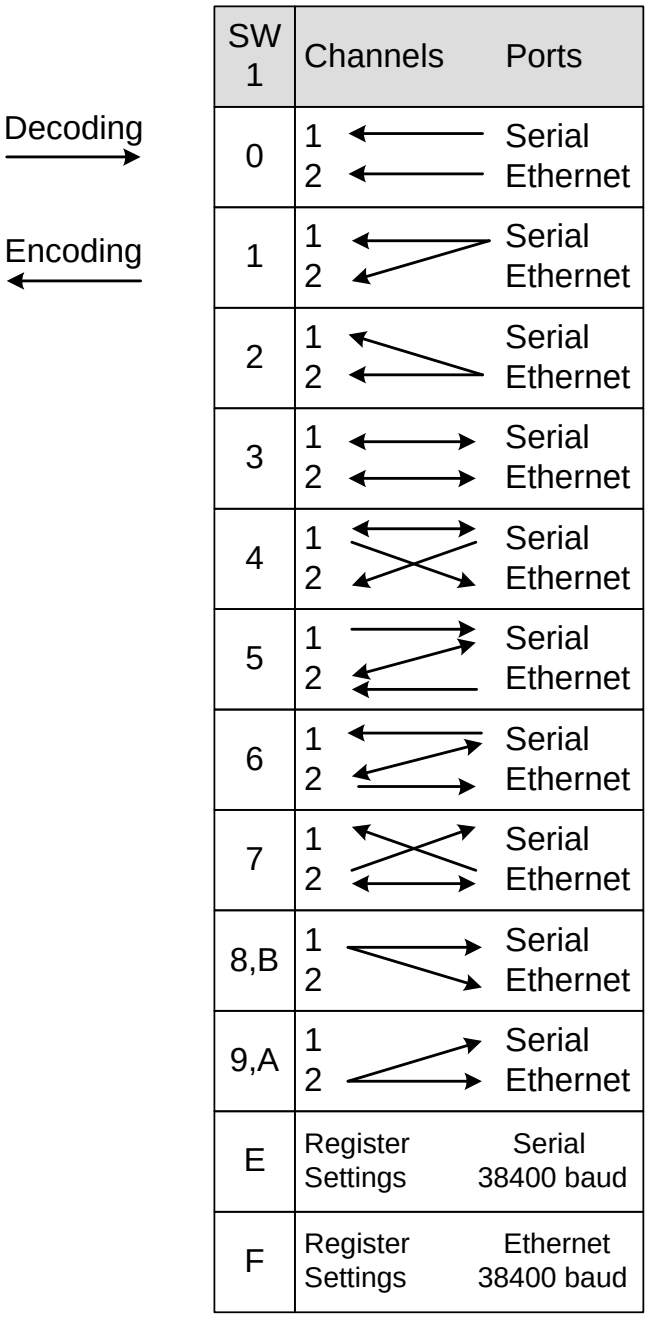
Pos	SW1 Function
0	Insert captions on Ch 1 from Serial Insert captions on Ch 2 from Ethernet
1	Insert captions on Ch 1 & 2 from Serial
2	Insert captions on Ch 1 & 2 from Ethernet
3	Insert captions on Ch 1 from Serial Insert captions on Ch 2 from Ethernet Decode Ch 1 to Serial Decode Ch 2 to Ethernet
4	Insert captions on Ch 1 & 2 from Serial Decode Ch 1 to Serial & Ethernet
5	Insert captions on Ch 1 & 2 from Ethernet Decode Ch 2 to Serial & Ethernet
6	Insert captions on Ch 1 & 2 from Serial Decode Ch 2 to Serial & Ethernet
7	Insert captions on Ch 1 & 2 from Ethernet Decode Ch 1 to Serial & Ethernet
8, A	Decode Ch 1 to Serial & Ethernet
9, B	Decode Ch 2 to Serial & Ethernet
A-D	Not Used
E	Access Engineering menu through Serial Port
F	Access Engineering menu through Ethernet Port

Pos	SW2 Function
0	Transcode Off
1	Transcode from Ch 1 to Ch 2
2	Transcode from Ch 2 to Ch 1
A-F	Not Used

Ethernet and Serial Communications Summary

Figure 1–3 illustrates the direction of communications between the input channels (I/P 1 and I/P 2, aka Channel 1 and Channel 2) and the serial and Ethernet ports, depending on the settings of SW1.

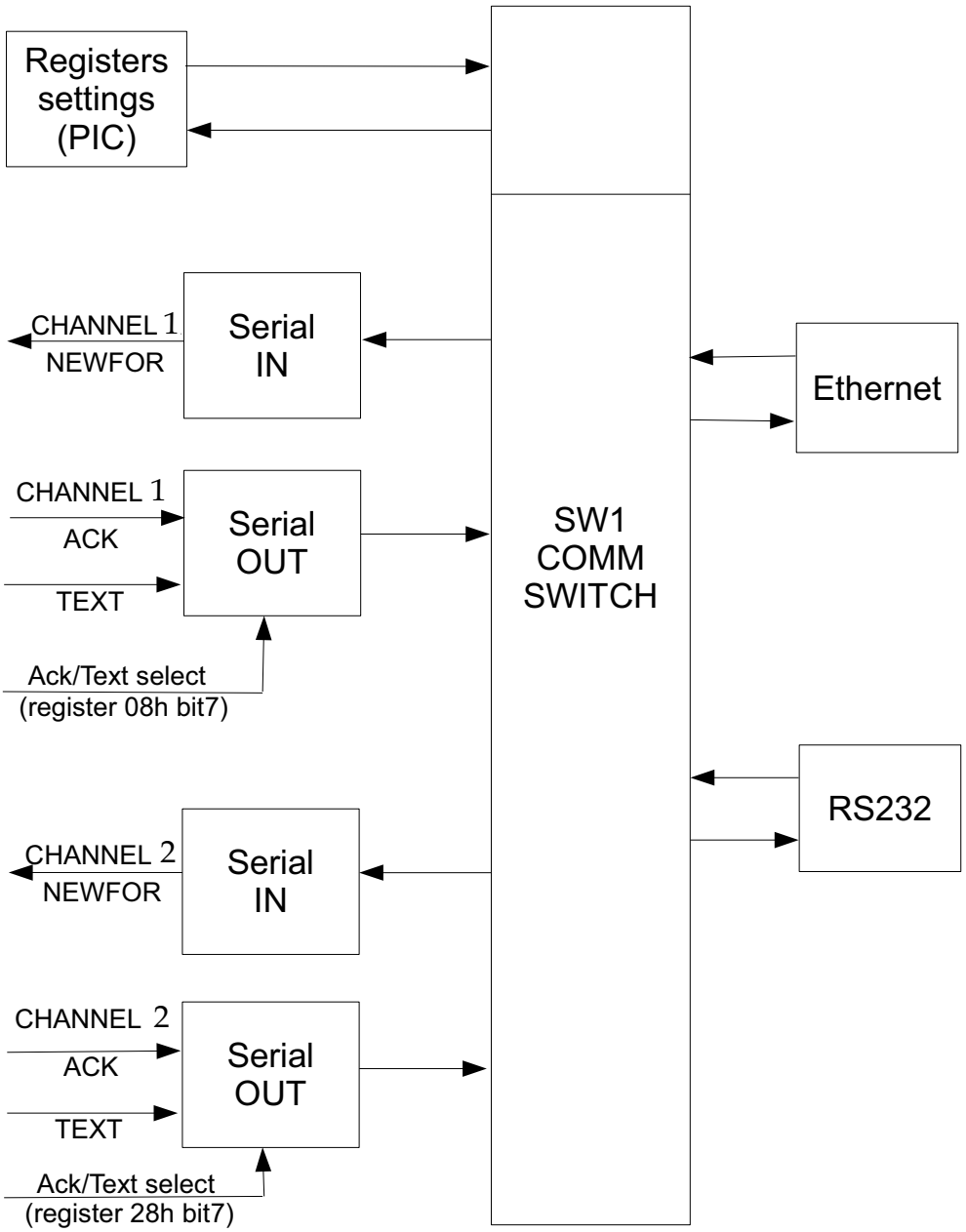
Figure 1–3 Serial and Ethernet Communications for SW1 Settings)



Communications Paths

Figure 1–4 below illustrates the serial and Ethernet communication as it relates to the Ack/Nak settings in Registers 08h and 28h.

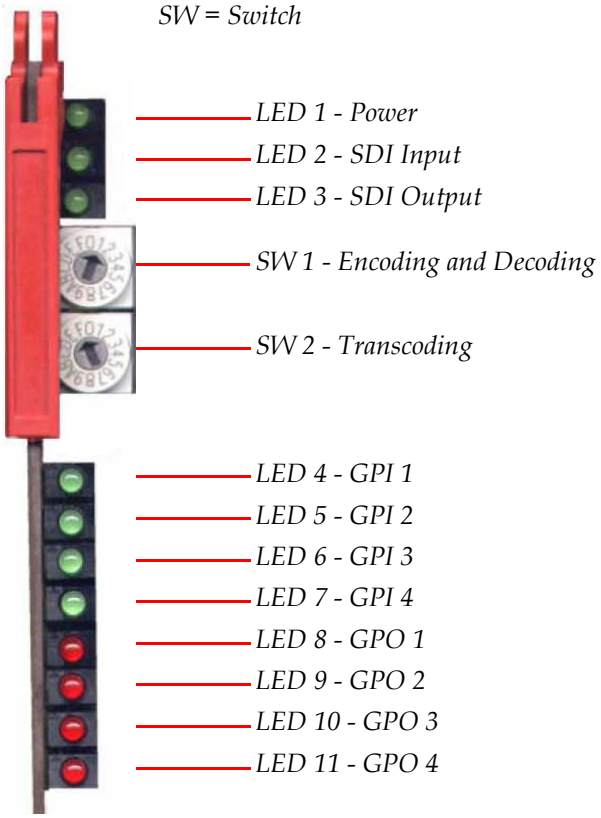
Figure 1–4 Serial and Ethernet Communications Relative to Ack/Nak Settigns



Using the Card

Using the HDCC-200A 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 encode or analyze. (But a PC connection is not needed for bridging.)

Figure 1–5 HDCC-200A Front Panel



Note: The general purpose input and/or output (GPI/O) functions and pin outs are described in Connector Pin Assignments on page 57.

- **Switch 1 (SW 1)** controls whether the card is set to **encoding** (settings 1 or 2), **encoding and decoding** (settings 3 through 7) or **decoding** (settings 8 or 9).
- **Switch 2 (SW 2)** controls whether the card performs the **bridging** and **transcoding** functions (settings 1 or 2).

Also refer to Figure 1–3 on page 5.

Table 1–1 Switch Values Summary for Each Function[a]

Switch	Encoding	Encoding and Decoding	Decoding (Analyzing)	Transcoding
SW 1	0, 1, or 2	3, 4, 5, 6, or 7	8 or 9	N/A
SW 2	0, 1, or 2	0, 1, or 2	0, 1, or 2	1 or 2

a Typically you should set SW2 to 0 during encoding and decoding; but you can decode while transcoding and/or interrupt a transcoding session with encoding.

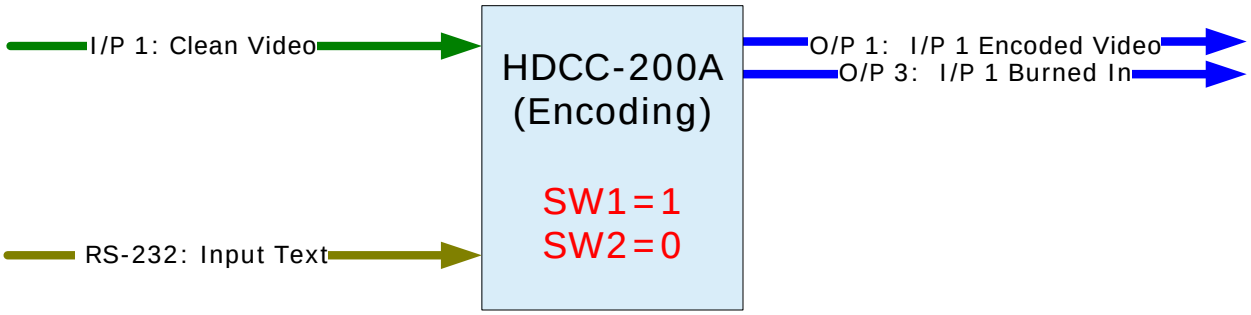
Important: For the encoding example, you should be able to transmit the Newfor text over the serial port.

For the decoding and bridging examples, you will need a video feed with closed captions already inserted.

Encoding Only

When encoding, a signal that comes in on I/P 1 goes out on the odd-numbered outputs, and a signal that comes in on I/P 2 goes out on the even-numbered outputs. See Figure 1–6 below.

Figure 1–6 Typical Scenario for Encoding



Example: This simple example demonstrates the encoding feature.

I/P 1: Input clean video stream.

I/P 2: NC

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

O/P 2: NC

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

O/P 4: NC

Serial: Input closed caption text.

Ethernet: NC

1. Connect a *clean* (un-encoded) video source to I/P 1.

2. (Optional) Connect an output cable to O/P 1.

3. Connect your monitor to O/P 3.Connect a data source for closed captioned text to the serial port.

   Note: To use the Ethernet port as a virtual serial port, refer to Appendix C: Creating a Virtual Serial Connection on page 81 to download, install, and configure the Ethernet connectivity application.

4. Set SW 1 according the port through which you will insert the closed caption text. For our example, set SW 1 to 1. See Table 1–2 below a list of additional options.

Table 1–2 Switch 1 Settings - Encoding

SW 1	Insert Text From
0	Inserts captions on I/P 1 from the RS-232 port. Inserts captions on I/P 2 from the Ethernet port.
1	Inserts captions on I/P 1 and on I/P 2 from the RS-232 port.
2	Inserts captions on I/P 1 and on I/P 2 from the Ethernet port.

5. Set SW 2 to 0.

6. Launch the closed caption text insertion application and verify that you have connected to the HDCC-200A using the correct com port at the correct baud rate.

7. Begin sending text from your closed caption text insertion application.

Once the HDCC-200A card auto-detects both the video stream and the closed caption text, it will begin to encode them and then send the composite (encoded) data stream to O/P 1 and the burned-in data stream to O/P 3.

Note: You can repeat the previous steps 1 through 4 (using I/P 2, O/P 2, and O/P 4 in Steps 1 through 3 respectively) to encode a second video stream with either the same or a different text source/communications port since the HDCC-200A is a dual-channel card. Moreover, the signals need not be synchronous.

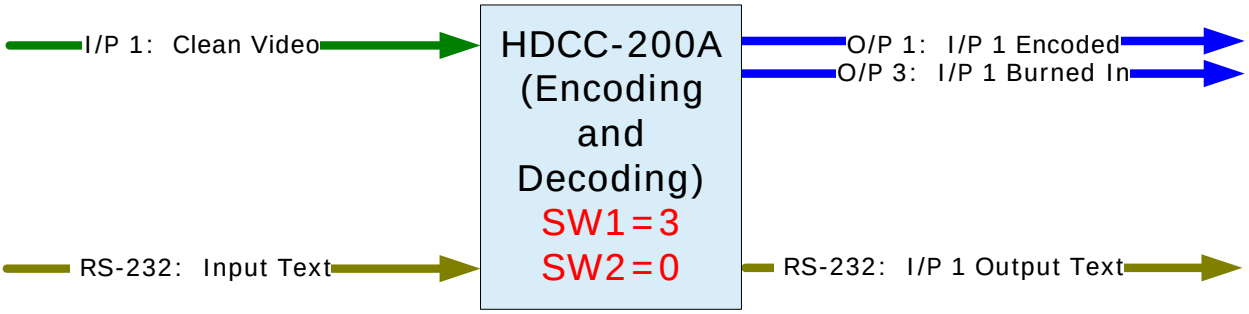
Important: If you have difficulty getting the correct results on the ouput connectors/ports, you may need to modify some of the register settings to fit your particular installation. Refer to Chapter 2: Setting the Engineering Registers on page 17 for more information.

Encoding and Decoding

Because the HDCC-200A is a true, dual-channel card, it can simultaneously encode one input and decode the other.

Important: You cannot decode the captions you are currently encoding. To decode, the captions must already be on the incoming data stream.

Figure 1–7 Typical Scenario for Encoding and Decoding



Important: For all SW 1 values that support encoding and decoding on the same port (either serial or virtual serial) you must remember to set the baud rate for your laptop application to 38.4k baud.

Example: This simple example demonstrates the encoding and the decoding features.

I/P 1: Input clean video stream.

I/P 2: Input an encoded video stream.

O/P 1: (Optional) Connect output for I/P 1.

O/P 2: (Optional) Connect output for I/P 2.

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

O/P 4: Monitor the burned-in caption text from I/P 2.

Serial: Send closed caption text to I/P 1 and

Ethernet: Receive closed caption text from I/P 2.

1. Connect a clean video source to I/P 1.
2. Connect an encoded video stream to I/P 2.
3. (Optional) Connect the output cable to O/P 1.
4. Connect your monitor to O/P 3.
5. Connect another monitor to O/P 4.
6. Connect a data source for closed captioned text to the RS-232 port.

   Note: To use the Ethernet port as a virtual serial port, refer to Appendix C: Creating a Virtual Serial Connection on page 81 to download, install, and configure the Ethernet connectivity application, if you have not already done so.

7. Set SW 1 according the port through which you will insert the closed caption text. For our example, set SW 1 to 3. See Table 1–2 below for a list of additional options.

Table 1–3 Switch 1 Settings - Encoding and Decoding[a]

SW 1	Description
3	Insert captions on I/P 1 from the serial port. Insert captions on I/P 2 from the Ethernet port. Decode I/P 1 and send the text data to the serial port. Decode I/P 2 and send the text data to the Ethernet port.
4	Insert captions on I/P 1 and I/P 2 from the serial port. Decode I/P 1 and send the text data out both the serial and the Ethernet ports.
5	Insert captions on I/P 1 and I/P 2 from the Ethernet port. Decode I/P 2 and send out text data on both the serial and the Ethernet ports.
6	Insert captions on I/P 1 and I/P 2 from the serial port. Decode I/P 2 and send out text data on both the serial and the Ethernet ports.
7	Insert captions on I/P 1 and I/P 2 from the Ethernet port. Decode I/P 1 and send out text data on both the serial and the Ethernet ports.

a For all SW 1 settings that provide both encoding and decoding, the decoded text appears on both the serial and the Ethernet ports.

8. Set SW 2 to 0.

9. Launch your closed caption text insertion application and verify that you have connected to the HDCC-200A using the correct com port at the correct baud rate.

10. Begin sending text from your closed caption text insertion application.

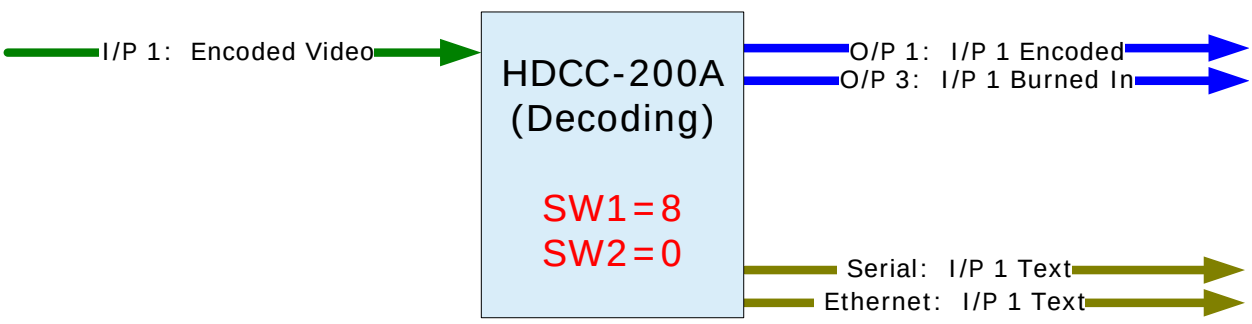
Once the HDCC-200A card auto-detects both the video stream and the closed caption text, it will begin to encode the video and then send the composite data stream to O/P 1 and the burned in video to O/P 3. The serial port will operate in both directions: input to the serial port will be encoded as closed caption data; output from the serial port will show closed caption data decoded from the output. When operating a single channel, the input and output data of the serial port will be identical.

Important: If you have difficulty getting the correct results on the ouput connectors/ports, you may need to modify some of the register settings to fit your particular installation. Refer to Chapter 2: Setting the Engineering Registers on page 17 for more information.

Decoding Only

Like encoding, a signal that comes in on I/P 1 goes out on the odd-numbered outputs, and a signal that comes in on I/P 2 goes out on the even-numbered outputs. In decoding, however, the embedded text is captured and output to the Ethernet port and the RS-232 port and can be displayed using the Callisto Lite application. See Figure 1–8 below.

Figure 1–8 Typical Scenario for Decoding



Example: This simple example demonstrates the decoding feature.

I/P 1: Input encoded video stream.

I/P 2: N/A

O/P 1: (Optional) 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: N/A

1. Connect the embedded video signal to I/P 1.
2. (Optional) Connect the output cable to O/P 1.
3. Connect a monitor to O/P 3.
4. Connect the PC to the serial port in the card.
5. (Optional) Connect the PC to the Ethernet port in the card.

   Note: To use the Ethernet port as a virtual serial port, refer to Appendix C: Creating a Virtual Serial Connection on page 81 to download, install, and configure the Ethernet connectivity application.

6. For our example, set SW 1 to 8. Table 1–4 below also lists one additional option.

Table 1–4 Switch 1 Settings - Decoding

SW 1	Capturing Text From
8	Decodes caption data from **I/P 1** and outputs the text to both the serial and the Ethernet ports.
9	Decodes caption data from **I/P 2** and outputs the text to both the serial and the Ethernet ports.

7. Set SW 2 to 0.

Once the HDCC-200A card auto-detects the video stream it will decode it and then send the text to the serial and Ethernet ports.

Important: If you have difficulty getting the correct results on the ouput connectors/ports, you may need to modify some of the register settings to fit your particular installation. Refer to Chapter 2: Setting the Engineering Registers on page 17 for more information.

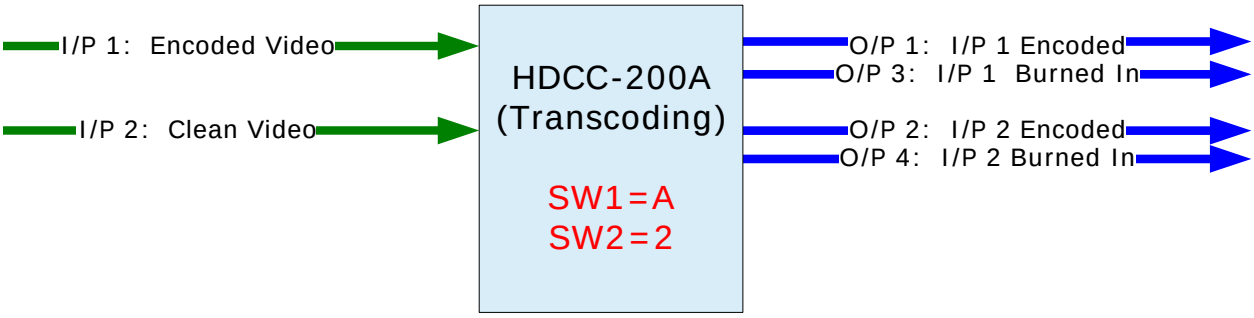
Bridging

During bridging the embedded text is copied from one video stream to another. As in decoding, the text is also output through both the Ethernet and serial ports for analysis.

Note: It is not necessary to match the resolutions and/or refresh rates when using multiple inputs, with one exception: when transcoding, the target video stream must match or be faster than the source video stream.

For example, you can transcode from a HD-50Hz to a HD-60Hz signal but not the other way around.

Figure 1–9 I/O Functionality - Transcoding



1. Connect the encoded video signal to I/P 1.
2. Connect the clean video signals to I/P 2.
3. (Optional) Connect the output cables to O/P 1 and O/P 2.
4. Connect monitor cables to O/P 3 and/or O/P 4.
5. Optional: To capture/analyze the text, connect the PC to the serial port.

   Note: To use the Ethernet port as a virtual serial port, refer to Appendix C: Creating a Virtual Serial Connection on page 81 to download, install, and configure the Ethernet connectivity application.

6. For our example, set SW 2 to 2. Set SW 1 to A.

Once the HDCC-200A card auto-detects both the video streams, it should begin to bridge and/or transcode them and then send the composite data stream to the output ports and the text to the serial and Ethernet ports.

Important: If you have difficulty getting the correct results on the ouput connectors/ports, you may need to modify some of the register settings to fit your particular installation. Refer to Chapter 2: Setting the Engineering Registers on page 17 for more information.

CHAPTER 2
Setting the Engineering Registers

Introduction

Overview

This chapter explains how to access the engineering registers to configure the HDCC-200A card for your particular system.

Topics

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:
  - An Ethernet cable (connected to the Ethernet ports of the HDCC-200A card and the PC) or
  - A serial cable (connected from the serial port of the PC to the serial port on the HDCC-200A).

Decision Point:

If you have an HDCC-200A card with an IRT rear panel adaptor, or you do not wish to use the Ethernet port on your Codan or Evertz adaptor, then skip to Accessing the Main Menu on page 21.

Otherwise, if you do want to use your Ethernet port (either as an Ethernet connection or as a virtual serial port) continue on to Updating the IP address of the HDCC-200A immediately below.

Updating the IP address of the HDCC-200A

Important: You must obtain a valid IP address for your network from your network administrator. In the following example, we'll be using IP address 192.168.1.167 for our HDCC-200A.

To change the IP address on the new HDCC-200A:

1. Refer to Downloading the Software on page 82 (Appendix C) for instructions for downloading the Ethernet configuration application. Continue through the end of Installing the Software on page 83.

Optional:

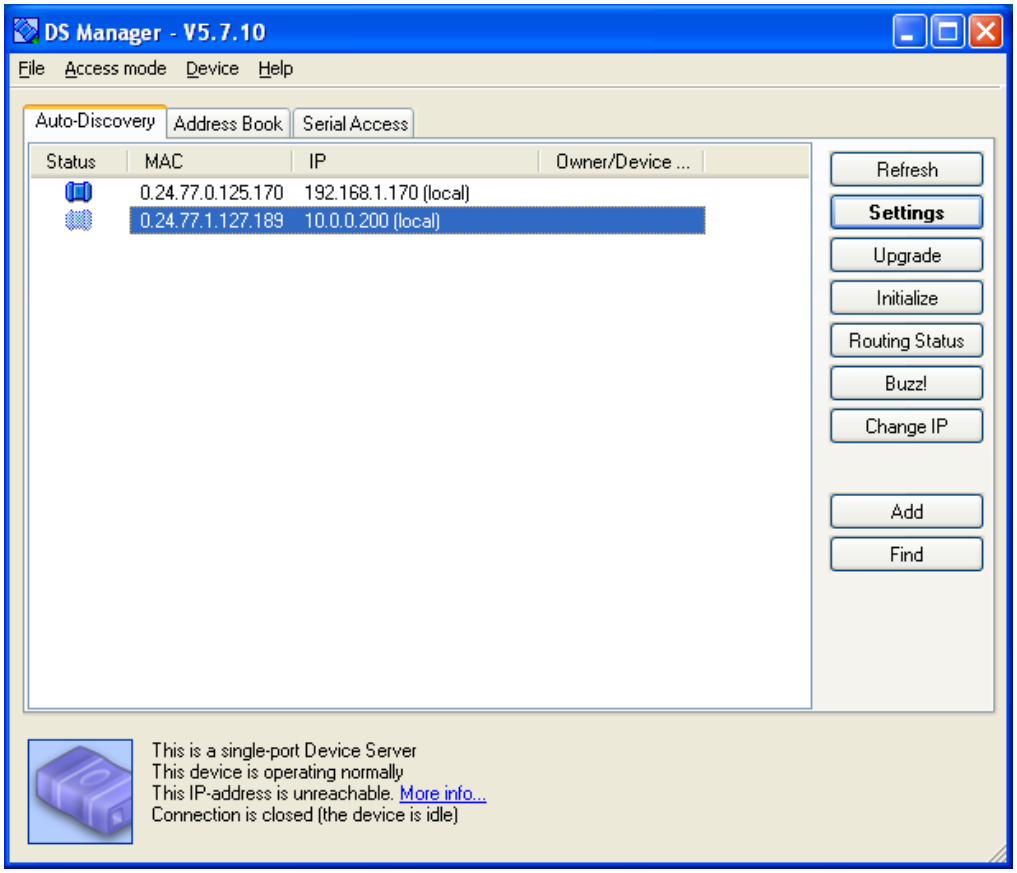
2. If you want to use your Ethernet connection as a virtual serial port (mostly for accessing the engineering menu) continue through the end of Configuring a Virtual Serial Port on page 86 (Appendix C).

3. Launch the DS Manager.

4. Click the **Auto-Discovery** tab if it is not already highlighted.

5. New HDCC-200A cards (with Codan or Evertz backplanes) will have a default IP address of 10.0.0.200. Highlight the HDCC-200A with IP 10.0.0.200.

Figure 2–1 DS Manager Configuration Screen



Note that the color under the **Status** column shows IP 10.0.0.200 disabled (i.e., this card is currently not accessible to the network). The card with IP 192.168.1.170 is an existing HDCC-200A on the network.

6. Click the **Change IP** button.

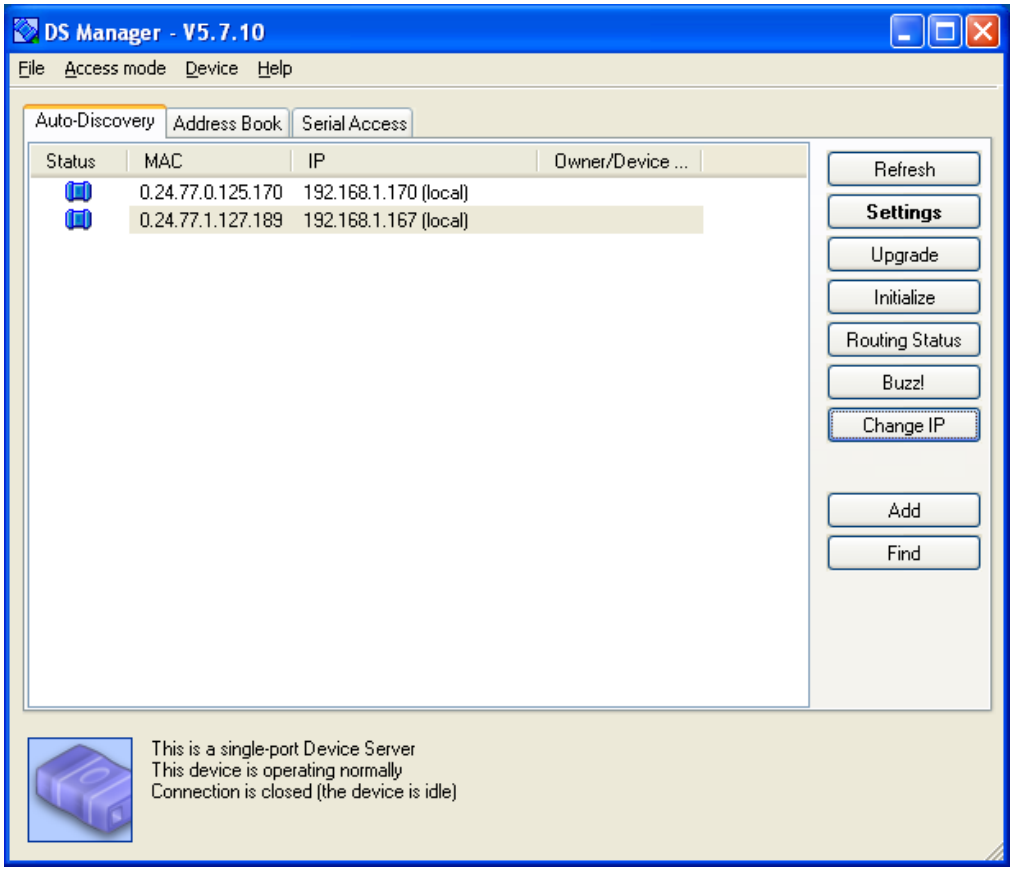
Figure 2–2 Default IP Address Screen

7. In our example we're changing the IP to 192.168.1.167. Type in the address your network administrator gave you.

Figure 2–3 New IP Address Screen

8. Click **OK**.

Figure 2–4 Enabled New IP Address



The new HDCC200A with IP 192.168.1.167 is now accessible through the network.

9. Close the DS Manager application.

Important: This concludes the Ethernet configuration procedure. If needed, continue on to Accessing the Main Menu below.

Accessing the Main Menu

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.

To access the configuration registers:

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.

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. Turn SW 2 to 0.

4. 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.

5. Launch your terminal emulation program.

6. If you are using the RS-232 interface, verify that your communication settings are 38400, n, 8, 1.

7. Press the Enter key to refresh the display of the terminal emulation program and to display the **Main Menu** as shown below.

```
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E-Mail: support@wohler.com

MAIN MENU

1: Engineering Register Setup
2: Register Dump
3: Set Default Registers for AUSTRALIAN Market.
4: Set Default Registers for EUROPEAN Market.

PIC Microcode:    848116 V1.09
Xilinx Firmware:  847131 V2.34
```

8. Press the numeral key that corresponds to the menu option you want to use as shown in the screen shot above.

Modifying the Register Settings

Figure 2–5 on page 24 through Figure 2–8 on page 38 and Table 2–4 on page 25 through Table 2–6 on page 35 define each register and its default values.

Important: Please do not change the value of any register whose description reads, *Reserved for future use*. Modifying any of these values could cause the HDCC-200A to behave in unpredictable ways.

Note: All registers and register values are in hexadecimal unless otherwise indicated. Refer to Appendix B on page 79 for details.

Table 2–2 Register Table Summary

Channel		Description	EU Default	AUST Default
1	2			
00	20	HD-Field 1 OP-47 Insertion Line	0A	0C
01	21	HD-Field 2 OP-47 Insertion Line	0A	0C
02	22	SD-Field 1 WST Insertion Line	0A	15
03	23	SD-Field 2 WST Insertion Line	0A	15
04	24	Default Newfor Magazine Number	15 (00)	15 (00)
05	25	Default Newfor Page Number	88	01
06	26	Decoder Magazine Number	15 (00)	15 (00)
07	27	Decoder Page Number	88	01
08	28	Default Newfor Languages and Transmission	00	18
09	29	Horizontal Timing Offset for GPI SD Line	Reserved	
0A	2A	SD Line Number for GPI Data	0D	13
0B	2B	HD Line Number for GPI Data	0D	09
0C	2C	Special Features 1	00	00
0D	2D	Horizontal Timing Offset for WST SD Line	1E	1E
0E	2E	Block Regeneration and GPI LED Settings	00	00
0F	2F	GPI Rx/Tx Polarity Control	00	00
10	30	Special Features 2	80	00
11	31	External GPI Bypass Control	00	00
12	32	Enabled GPI Insertion and Timeout Control	0F	0F
13	33	GPI Mapping for Tx	E4	E4
14	34	GPI Mapping for Feature Control	E4	E4
15	35	Time Filler Page Number	FF	FF
16	36	Time Filler Subcode Bottom 2 Digits	7E	7F
17	37	Terminator Page Number	FF	EE
18	38	Terminator Subcode Bottom 2 Digits	7E	7F
19	39 to FD	Reserved for future use		

Table 2–3 GPO Mapping Registers Summary—Not Channel-Specific

Register	Description	EU Default	AUST Default
FE	GPO 1 and 2 Mapping	10	10
FF	GPO 3 and 4 Mapping	32	32

Figure 2–5 Registers 00h to 0Eh and 20 to 2E

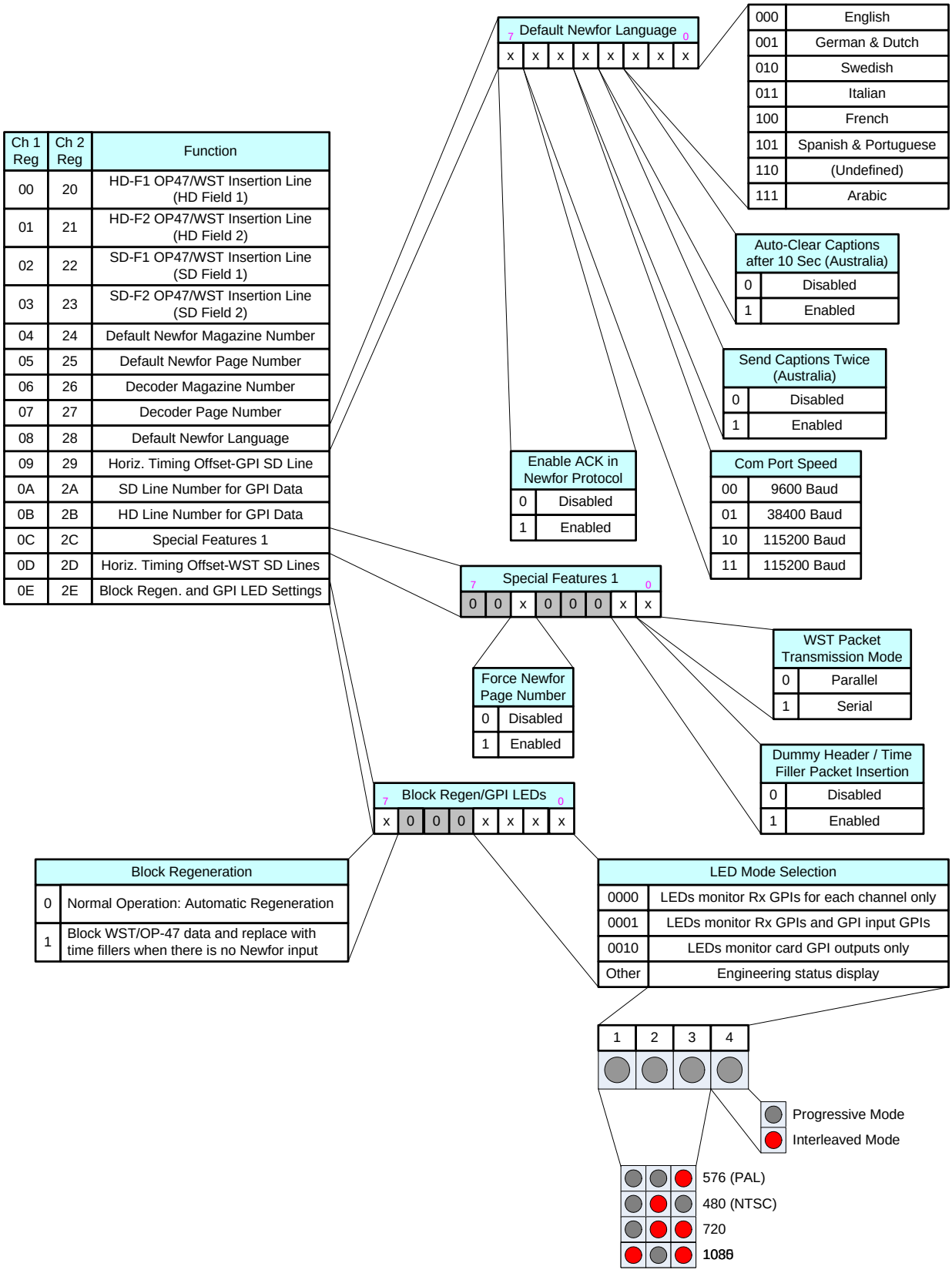


Table 2–4 Register Settings 00h to 0Fh

Ch 1 Reg #	Ch 2 Reg #	Description	EU Default	AUST Default
00	20	**HD OP-47 Insertion Line, Field 1** *Min: 07 – Max: 19* Sets the actual Field-1 line number that the OP47 data will be inserted. The OP47 data is inserted into the HD-VANC. The HD-HANC is not manipulated. Note: Since the OP47 data overwrites any existing data in the VANC, verify that no other data is already present on this line.	0A	0C
01	21	**HD OP-47 Insertion Line, Field 2** *Min: 07 – Max: 19* Sets the actual Field-2 line number that the OP47 data will be inserted. The OP47 data is inserted into the HD-VANC. The HD-HANC is not manipulated. Note: Since the OP47 data overwrites any existing data in the VANC, verify that no other data is already present on this line.	0A	0C
02	22	**SD WST Insertion Line, Field 1** *Min: 06 – Max: 16* Sets the actual Field-1 line number that the WST data will be inserted. The WST Subtitle Line complies with EBU ETS-300-706 Level 1 specifications. Note: Since the WST data overwrites any existing data in the VBI, verify that no other data is already present on this line.	0A	15
03	23	**SD WST Insertion Line, Field 2** *Min: 06 – Max: 16* Sets the actual Field-2 line number that the WST data will be inserted. The WST Subtitle Line complies with EBU ETS-300-706 Level 1 specifications. Note: Since the WST data overwrites any existing data in the VBI, verify that no other data is already present on this line.	0A	15

Table 2–4 Register Settings 00h to 0Fh (Continued)

Ch 1 Reg #	Ch 2 Reg #	Description	EU Default	AUST Default
04	24	**Default Newfor Magazine Number** *Min: 15 (00) – Max: 2F (07)* (Hamming Encoded) Used by the caption inserter only, this register value sets the default magazine number that will be used when inserting subtitles on either a HD or SD video stream in the event that the system fails to receive the appropriate command to change the magazine number. *Note: Interacts with Register 0C*	15 (00)	15 (00)
05	25	**Default Newfor Page Number** *Min: 00 – Max: 99* (BCD Encoded – See Appendix B on page 79.) Sets the default page number that will be used when inserting subtitles on either a HD or SD video stream in the event that the system fails to receive the appropriate command to change the page number. *Note: Interacts with Register 0C*	88	01
06	26	**Decoder Newfor Magazine Number** *Min: 15 (00) – Max: 2F (07)* (Hamming Encoded) 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 Newfor Page Number** *Min: 00 – Max: 99* (BCD Encoded – See Appendix B on page 79.) 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

Table 2–4 Register Settings 00h to 0Fh (Continued)

<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 Newfor Languages and Transmission
Min: N/A – Max: N/A

Sets the default magazine number that will be used when inserting subtitles on either a HD or SD video stream in the event that the system fails to receive the appropriate command to change the magazine number.

<table>
<tr><th>Bit(s)</th><th>Function</th></tr>
<tr><td>7</td><td>ACK/NAK support for Newfor standard:
0 = Disabled
1 = Enabled</td></tr>
<tr><td>6:5</td><td>Baud Rate:
00 = 9600
01 = 38400
1x = 115200</td></tr>
<tr><td>4</td><td>Send Caption Twice: (Australia)
0 = Disabled
1 = Enabled</td></tr>
<tr><td>3</td><td>10-Second Caption Clear: (Australia)
0 = Disabled
1 = Enabled</td></tr>
<tr><td>2:0</td><td>Newfor Language:
000 = English
001 = German
010 = Swedish
011 = Italian
100 = French
101 = Spanish/Portuguese
110 = Undefined
111 = Arabic</td></tr>
</table></td><td>00</td><td>18</td></tr>
<tr><td>09</td><td>29</td><td>Horizontal Timing Offset for GPI SD Line
Min: N/A – Max: N/A</td><td colspan="2">Reserved</td></tr>
</table>

Table 2–4 Register Settings 00h to 0Fh (Continued)

Ch 1 Reg #	Ch 2 Reg #	Description	EU Default	AUST Default
0A	2A	**SD Line Number for GPI Data** *Min: 06 – Max: 16* Sets the line number that will be used when inserting and decoding GPIs from an SD video stream. Note: Since the GPI data overwrites any existing data in the VBI, verify that no other data is already present on this line. **WARNING**: Do not use the same line number that is used for caption insertion as this data will overwite.	0D	13
0B	2B	**HD Line Number for GPI Data** *Min: 07 – Max: 19* (Value in hex: Default 09h = Line 9) Sets the line number that will be used when inserting and decoding GPI from an HD video stream. Note: Since the GPI data overwrites any existing data in the VANC, verify that no other data is already present on this line. **WARNING**: Do not use the same line number that is used for caption insertion as this data will overwite.	0D	09

Table 2–4 Register Settings 00h to 0Fh (Continued)

<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>0C</td><td>2C</td><td>Special Features 1
Min: N/A – Max: N/A
Bit-5 of this register is used to force the Page and Language mode of this card.
<table><tr><th>Bit(s)</th><th>Function</th></tr><tr><td>7:6</td><td>Unused</td></tr><tr><td>5</td><td>Force Newfor Page Number (Register 07 value):
0 = Disabled
1 = Enabled</td></tr><tr><td>4:2</td><td>Unused</td></tr><tr><td>1</td><td>Enable Terminaor Headers Packets Insertion:
0 = Disabled
1 = Enabled</td></tr><tr><td>0</td><td>WST Packets Transmission Mode:
0 = Parallel
1 = Serial</td></tr></table></td><td>00</td><td>00</td></tr>
<tr><td>0D</td><td>2D</td><td>Horizontal Timing Offset for WST SD Lines
Min: 00 – Max: FF</td><td>1E</td><td>1E</td></tr>
</table>

Table 2–4 Register Settings 00h to 0Fh (Continued)

<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>0E</td><td>2E</td><td>
Block Regeneration and GPI LED Settings
Min: N/A – Max: N/A

This register is used to control miscellaneous functions on the card including the front status LED's.

<table>
<tr><th>Bit(s)</th><th>Function</th></tr>
<tr><td>7</td><td>Block Regeneration:

0 = Normal operation: automatic regeneration.

1 = Block OP-47/WST data and replace with time fillers when no Newfor input is available.</td></tr>
<tr><td>6:4</td><td>Reserved: Set to 0</td></tr>
<tr><td>3:0</td><td>LED Mode Selection:

0000 = GPI Rx Ch. A shown on LEDs 0 thru 3 (Register 03) and GPI Rx Ch. B shown on LEDs 4 to 7 (Register 2E)

0001 = As above, ORed with GPIs 1 to 4

0010 = GPI Tx Ch. A shown on LEDs 0 to 3 (Register 0E) and GPI Tx Ch. B shown on LEDs 4 to 7 (Register 2E).

0011 = Engineering status display

All other values = Show status on LEDs 0 to 3 as shown below

<table>
<tr><th colspan="2">GPI 4</th></tr>
<tr><th>LED</th><th>Description</th></tr>
<tr><td>On</td><td>Interleaved Mode</td></tr>
<tr><td>Off</td><td>Progressive Mode</td></tr>
</table>

<table>
<tr><th rowspan="2">Description</th><th colspan="3">GPI LED</th></tr>
<tr><th>1</th><th>2</th><th>3</th></tr>
<tr><td>576 (PAL)</td><td>Off</td><td>Off</td><td>On</td></tr>
<tr><td>480 (NTSC)</td><td>Off</td><td>On</td><td>Off</td></tr>
<tr><td>720</td><td>Off</td><td>On</td><td>On</td></tr>
<tr><td>1035</td><td>On</td><td>Off</td><td>Off</td></tr>
<tr><td>1080</td><td>On</td><td>Off</td><td>On</td></tr>
</table>
</td></tr>
</table>
</td><td>00</td><td>00</td></tr>
</table>

Figure 2–6 Registers 0F to 10 and 2F to 30

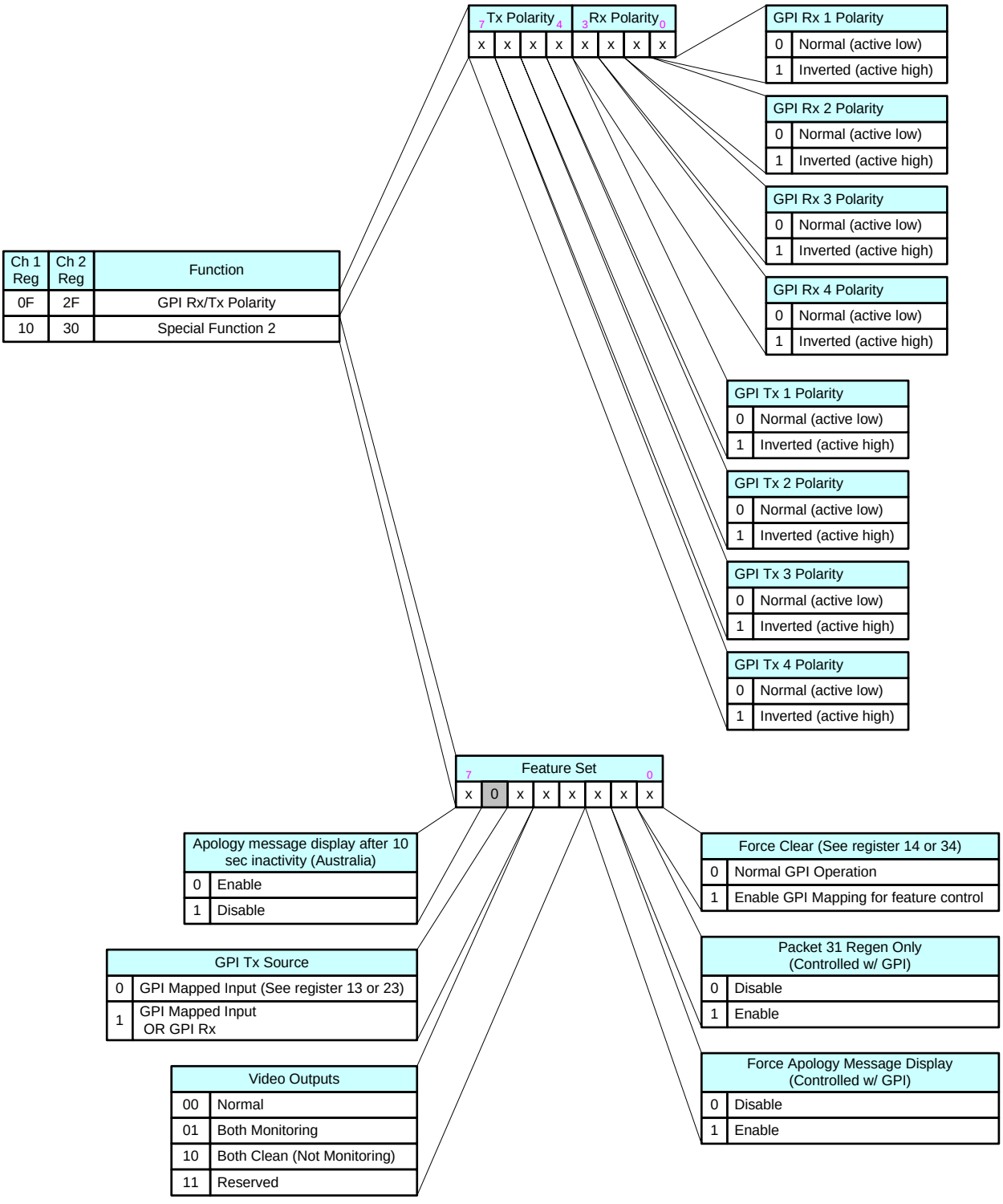


Table 2–5 Register Settings 00h to 0Fh

<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>0F</td><td>2F</td><td>GPI Rx nd Tx Polarity Control
Min: N/A – Max: N/A
(See GPI Encoded Polarity (Tx) on page 47 for details.) Controls the polarity of the Rx and Tx GPIs for the card.
<table>
<tr><th>Bit(s)</th><th>Type</th><th>Function</th></tr>
<tr><td>7
6
5
4</td><td>Tx Input</td><td>0 = Normal (Active Low)
1 = Inverted (Active High)</td></tr>
<tr><td>3
2
1
0</td><td>Rx Output</td><td>0 = Normal (Active Low)
1 = Inverted (Active High)</td></tr>
</table></td><td>00</td><td>00</td></tr>
</table>

Table 2–5 Register Settings 00h to 0Fh (Continued)

<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>10</td><td>30</td><td>
Special Function Register—2
Min: N/A – Max: N/A

This register controls miscellaneous functions on the card including the Newfor baud rate and video outputs.

<table>
<tr><th>Bit(s)</th><th>Function</th></tr>
<tr><td>7</td><td>Disable “No Captions” Apology Message Display:
0 = Enable “No Captions” message
1 = Disable “No Captions” message</td></tr>
<tr><td>6</td><td>Reserved: Set to 0</td></tr>
<tr><td>5</td><td>Not Used</td></tr>
<tr><td>4[a]:3</td><td>Video Output Mode:
00 = Normal
01 = Both outputs set to monitoring
10 = Both outputs are clean
11 = Not Used</td></tr>
<tr><td>0</td><td>Not Used</td></tr>
<tr><td>1[b]</td><td>Reserved: Set to 0</td></tr>
<tr><td>0</td><td>Enable Special GPI Functions:
0 = No functional change
1 = Allows the GPIs to be routed to various special functions. See Register 14 for more detail.</td></tr>
</table>
a Normal (default) = Monitoring O/Ps are 3 and 4; Clean O/Ps are 1 and 2
Monitoring = Burned-in captions on all O/Ps
Clean = No burned-in captions on any O/Ps
b Both modes (values) of Bit 1 require Bit 6 to be set to 0.
</td><td>80</td><td>00</td></tr>
</table>

Figure 2–7 Registers 11 and 31 to 19 and 39

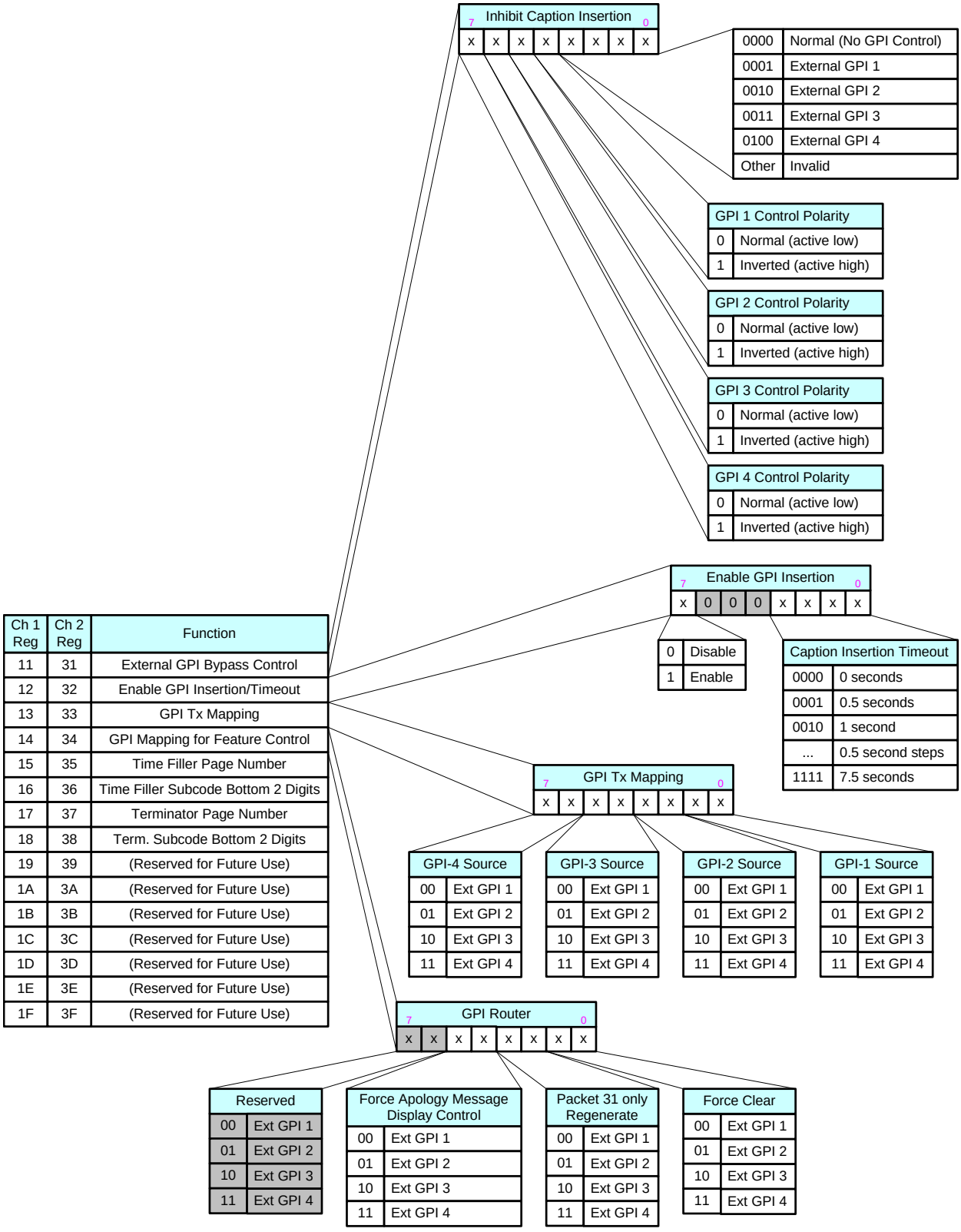


Table 2–6 Register Settings 10h to 1Fh

<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>11</td><td>31</td><td>Bypass Control with External GPI
Min: N/A – Max: N/A
This register assigns a GPI to inhibit the insertion of subtitles. When on, the GPI controls whether the captions are inserted. Special care needs to be taken to assure the GPI selected has not been already assigned to another task.
<table><tr><th>Bit(s)</th><th>Function</th></tr><tr><td>4
5
6
7</td><td>GPI:
0 = Active Low
1 = Active High</td></tr><tr><td>3:0</td><td>GPI Polarity:
0000 = No GPI control
0001 = GPI 1
0010 = GPI 2
0011 = GPI 3
0100 = GPI 4
All other values = invalid</td></tr></table>For more information refer to Inhibit Captions on page 46 and GPI Assertion Polarity (Rx) on page 47.)</td><td>00</td><td>00</td></tr>
</table>

Table 2–6 Register Settings 10h to 1Fh (Continued)

<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>12</td><td>32</td><td>
GPI Data Insertion Control and Newfor Insertion Timeout
Min: N/A – Max: N/A

Bit 7 enables the insertion of GPI data into the video stream.

Bits 0 thru 3 control the timeout settings for subtitle insertion. These bits set the changeover time between loss of Newfor data and the pass-through of input captions when present. If a valid teletext header is present on the input and the timeout has been reached then the card will select this data to be passed through after the timeout has expired. The timeout is reset on the detection of Newfor data.

<table>
<tr><th>Bit(s)</th><th>Function</th></tr>
<tr><td>7</td><td>GPI Insertion:
0 = Off
1 = On</td></tr>
<tr><td>6:4</td><td>Reserved: Set to 0</td></tr>
<tr><td>3:0</td><td>Time Out:
0000 = Invalid
0001 = 0.5 seconds
0010 = 1.0 seconds
...
1110 = 7.5 seconds
1111 = 8.0 seconds</td></tr>
</table>
</td><td>0F</td><td>0F</td></tr>
</table>

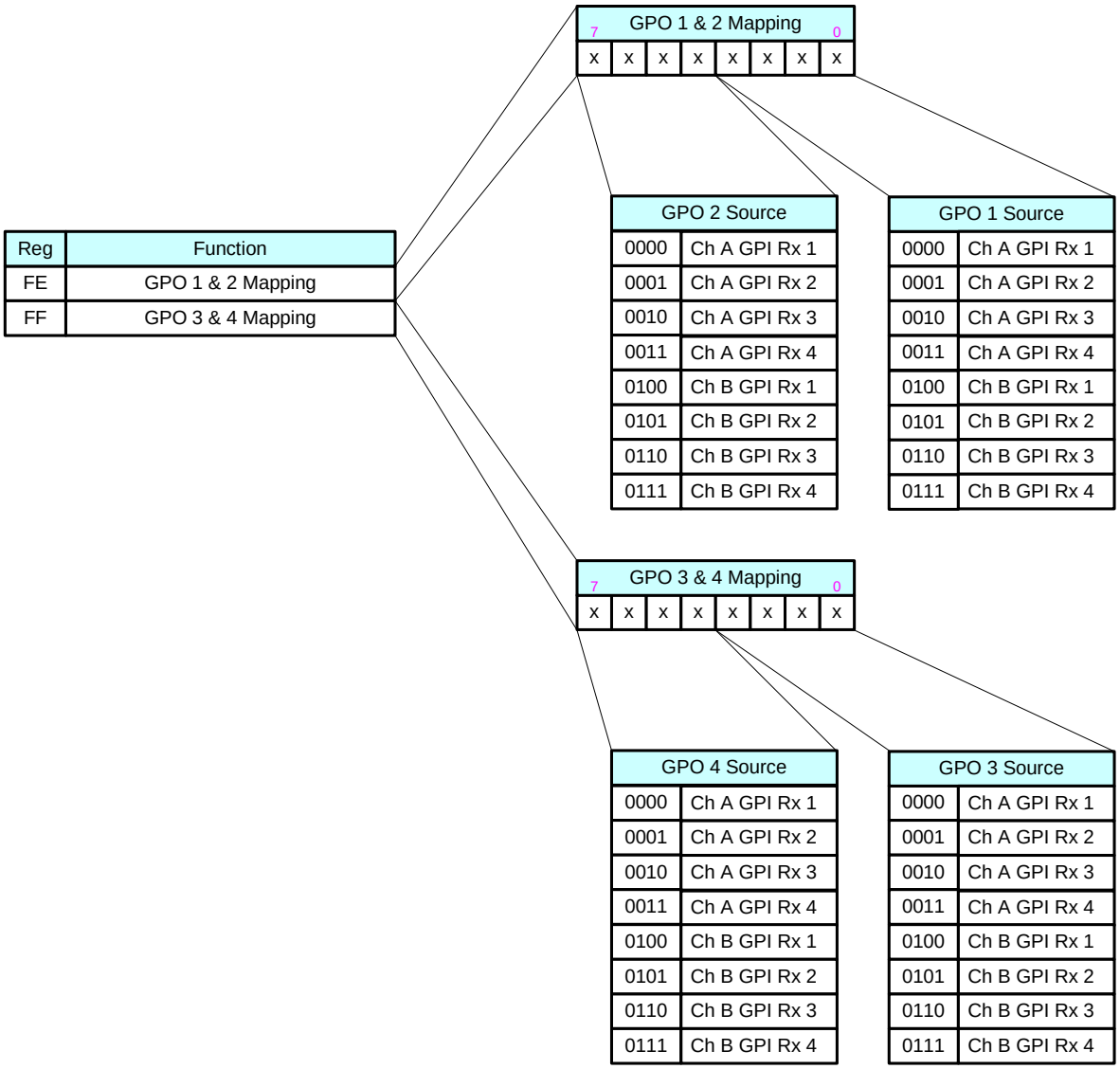
Table 2–6 Register Settings 10h to 1Fh (Continued)

<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>13</td><td>33</td><td>GPI Mapping for Tx
Min: N/A – Max: N/A
This register allows you assign physical GPIs to any of the four virtual GPIs transmitted by the card. The card transmits four GPIs but in some instances, users may need to re-map the actual GPIs sent in any of these four placeholders.
<table><tr><th>Bit(s)</th><th>Internal GPI</th><th>Function</th></tr><tr><td>7:6</td><td>4</td><td rowspan="4">External GPIs:
00 = GPI 1
01 = GPI-2
10 = GPI 3
11 = GPI 4</td></tr><tr><td>5:4</td><td>3</td></tr><tr><td>3:2</td><td>2</td></tr><tr><td>1:0</td><td>1</td></tr></table></td><td>E4</td><td>E4</td></tr>
<tr><td>14</td><td>34</td><td>GPI Mappting for Feature Control
Min: N/A – Max: N/A
This register determines how the GPI are routed.
<table><tr><th>Bit(s)</th><th>Function</th></tr><tr><td>7:4</td><td>Reserved</td></tr><tr><td>3:2</td><td>Controls the GPI used to activate the “inhibit pass through”
00 = GPI 1
01 = GPI-2
10 = GPI 3
11 = GPI 4</td></tr><tr><td>1:0</td><td>Controls the GPI used to activate the “force clear”
00 = GPI 1
01 = GPI-2
10 = GPI 3
11 = GPI 4</td></tr></table></td><td>E4</td><td>E4</td></tr>
<tr><td>15</td><td>35</td><td>Time Filler Page Number
Min: 00 – Max: FF</td><td>FF</td><td>FF</td></tr>
</table>

Table 2–6 Register Settings 10h to 1Fh (Continued)

Ch 1 Reg #	Ch 2 Reg #	Description	EU Default	AUST Default
16	36	**Time Filler Subcode Bottom 2 Digits** *Min: 00 – Max: 7E*	7E	7F
17	37	**Terminator Page Number** *Min: 00 – Max: FF*	FF	EE
18	38	**Terminator Subcode Bottom 2 Digits** *Min: 00 – Max: 7F*	7E	7F
19	39 thru FD	Reserved: Do Not Change		

Figure 2–8 Registers FE and FF



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 hexadecimal number between 00h and FEh.

Example: So to insert captions on Magazine 8, Page 88, set the following registers (See Table 2–4 on page 25 for details.):

- Register 06h = 15h (Magazine 8 Hamming Encoded)
- Register 07h = 88h

You should also set Registers 08h and 09h for the decoder.

Note: Do not try to convert 88 into a hexadecimal number—it's already in hexadecimal format.

Note Sending a PAGE 999 command will restore the inserter to the default magazine and page.

CHAPTER 3
Using the General Purpose Inputs/Outputs

Introduction

Overview

This chapter describes the functionality of the GPI/O connectors on the adaptors.

Topics

Functionality

The GPI interface allows the user to encode contact closure triggers into a HD or SD video stream frame accurately. The encoded data uses a proprietary algorithm designed to withstand severe degradation and prevent false triggering or releasing of GPIs. Error checking information is embedded within the GPI data stream which accomplishes this task and is far more advanced than simple CRC or other antiquated encoding techniques.

Typical triggers that users can encode from automation include (but are not limited to:

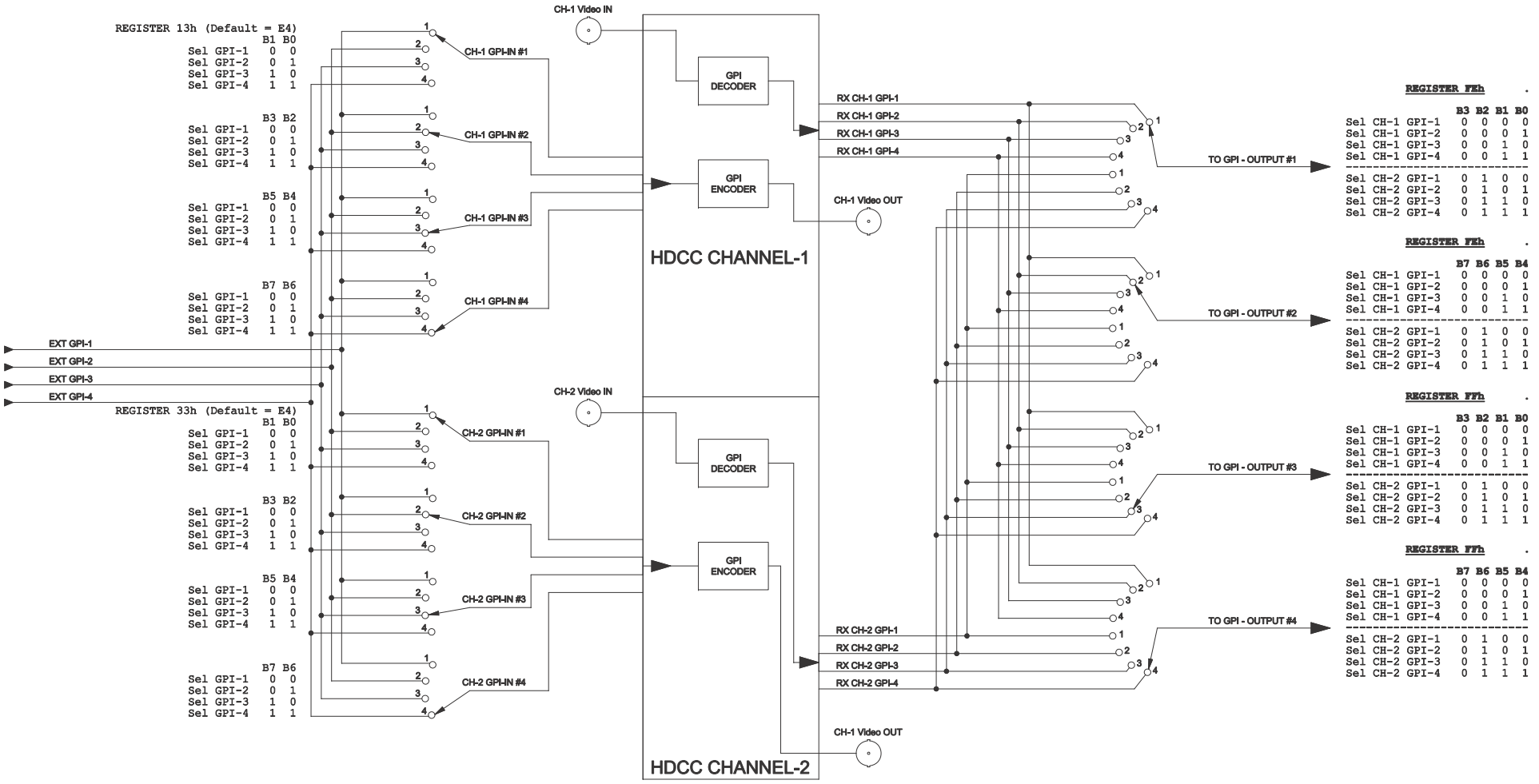
- ARC switching
- Commerical cue triggers (more accurate than the antiquated cue tone system)
- Machine control
- Regional commercial insertion cards

Typically the GPI data is encoded on Line 9 of the HD-SDI signal and on line 19 of the SD-SDI signal. However, the HDCC-200A is flexible enough to allow you to assign the lines on which you want the GPI data. See Table 2–4 on page 25 through Table 2–6 on page 35 for details.

You can also use the GPI interface to control other operational aspects of the card. (See Alternate Uses on page 45.)

Figure 3–1 on page 43 illustrates the GPI/O signal flow through the HDCC-200A. For our purposes, a GPI is an input signal to the HDCC-200A card supplied by the user through the user interface that either (1) activates certain modes in the HDCC card, or (2) is encoded onto the outgoing SDI video stream to notify downstream equipment of some condition, event, or command. A GPO is a signal the HDCC-200A card receives on the incoming SDI video stream that is output to the user interface to signify some condition, event, or command generated by upstream equipment.

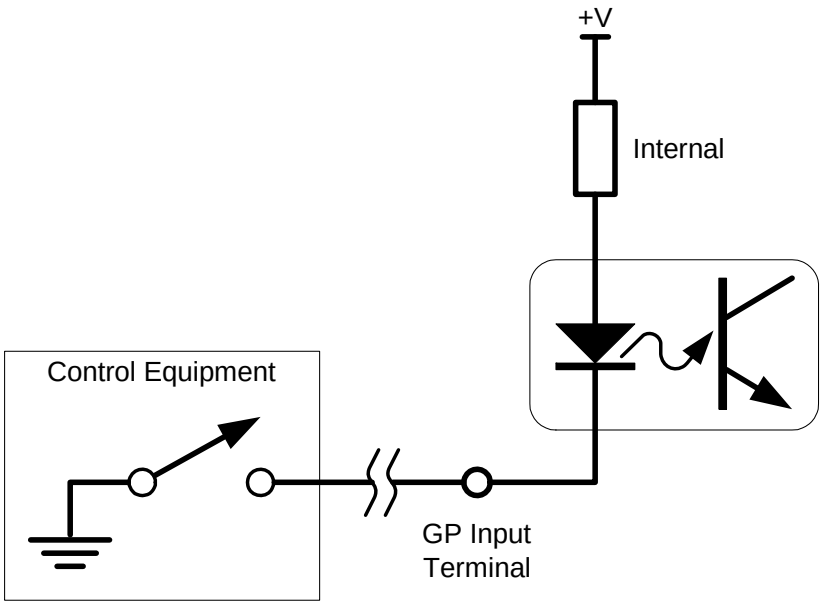
Figure 3–1 GPI/O Functional Diagram



GPIs

The GP inputs are designed to be asserted by switching the closures to ground. Asserting a GP input will result in that input state being encoded on the appropriate line of the video signal.

Figure 3–2 Input Diagram



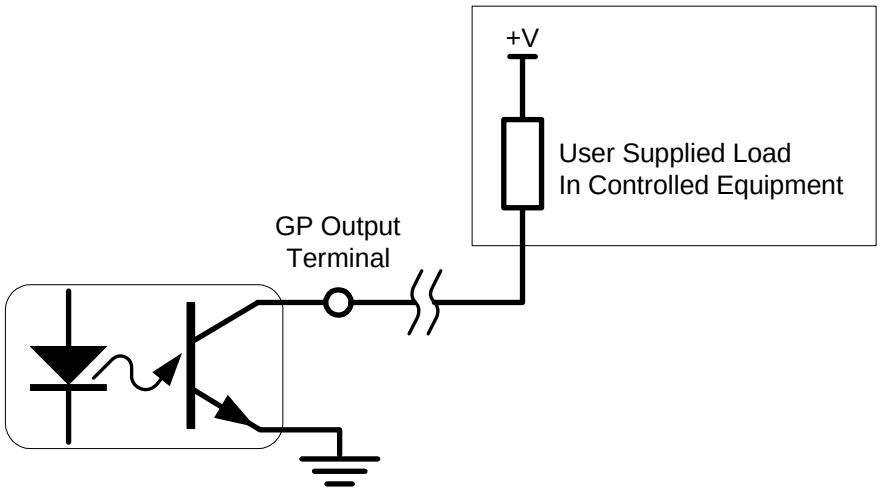
GPOs

If the incoming SDI data stream contains GP data on the appropriate line of the video signal, the corresponding GP output on the card will be activated. The GP output is asserted when its voltage is high.

Important: The GP outputs are optically isolated and "open collector" so the user must provide the appropriate pull-up resistor for each GP output. See Figure 3–3 below.

The HDCC-200A provides four GP outputs. (See Connector Pin Assignments on page 57 in Chapter 4 for connectivity.)

Figure 3–3 Output Diagram



Alternate Uses

In addition to the standard functionality, the GP inputs can be re-assigned to perform specific pre-defined tasks.

WARNING! EXERCISE EXTREME CAUTION when modifying register values. Improper configuration of the registers can cause the HDCC-200A to behave in unexpected ways.

These functions include:

- Force Text box to Semi-Transparent
- Force CC Clear Command
- Bypass Captioning

When used for these functions, GPI-1 and GPI-2 are not available as GPI/Os.

Force Clear

Refer to Registers 14 and 24 (GPI Mappting for Feature Control Min: N/A—Max: N/A on page 37) for more information.

Table 3–1 Force Clear and Semi-Transparent Box

Channel	Register	Bit(s)	Values
1	10h	0	0=Normal
			1 = GPI1: Force clear for Packet 31 data only
2	30h	0	0=Normal
			1 = GPI1: Force clear for Packet 31 data only

GPI-1 will cause a closed caption clear command to be inserted into the video stream, so that the captions and their text box will disappear from the monitor.

Inhibit Captions

In this mode, captions can be inhibited so that they are not displayed even when caption data is being supplied. Moreover, the card will also insert, “This program is not captioned.” The bits set determine which GPI forces the inhibit as shown in Table 3–2 below.

Table 3–2 Inhibit Captions

Bits 3 through 0	GPI to Force Bypass
0000	No Control (default)
0001	GPI-1
0010	GPI-2
0011	GPI-3
0100	GPI-4
Else	Invalid

GPI/O Polarities

You can control the polarities of the GPI/Os, both as asserted and as encoded.

GPI Assertion Polarity (Rx)

Channel	Register	Bit(s)	Values
1	0Fh	0 through 3	See Table 3–3 below.
2	2Fh	0 through 3	

The polarity settings are listed in Table 3–3 below.

Table 3–3 GPI Assertion Polarity

Bits	GPI	Active Low (default)	Active High
0	GPI-1	0	1
1	GPI-2	0	1
2	GPI-3	0	1
3	GPI-4	0	1

GPI Encoded Polarity (Tx)

Channel	Register	Bit(s)	Values
1	0Fh	4 through 7	See Table 3–4 below.
2	2Fh	4 through 7	

You can set the polarity of the GPI as encoded on the data stream as shown in Table 3–4 below.

Table 3–4 Register 0Fh and 2Fh: Bits 4 through 7

Bits	GPI	Active Low (default)	Active High
4	GPI-1	0	1
5	GPI-2	0	1
6	GPI-3	0	1
7	GPI-4	0	1

GPO Received Polarity

Channel	Register	Bit(s)
1	0Fh	4 through 7
2	2Fh	4 through 7

You can set the polarity of the GPO as received on the data stream as shown in Table 3–5 below.

Table 3–5 Register 0Fh and 2Fh: Bits 0 through 3

Bits	GPI	Active Low (default)	Active High
4	GPI-1	0	1
5	GPI-2	0	1
6	GPI-3	0	1
7	GPI-4	0	1

Enabling/Disabling GPI Transmission

Channel	Register	Bit(s)	Values
1	12h	7	0=Disable 1=Enable
2	22h	7	

The HDCC-200A can be configured to disable transmission of GP data by setting the switch over timeout.

Important: The lower four bits (bits 0 through 3) of Register 12h and 22h are used for setting the automatic switch over time; be careful not to inadvertently modify these bits when changing the value of this register.

CHAPTER 4
Features and Specifications

Introduction

Overview

This chapter explains the features of the HDCC-200A closed caption card and details all of the specifications.

Topics

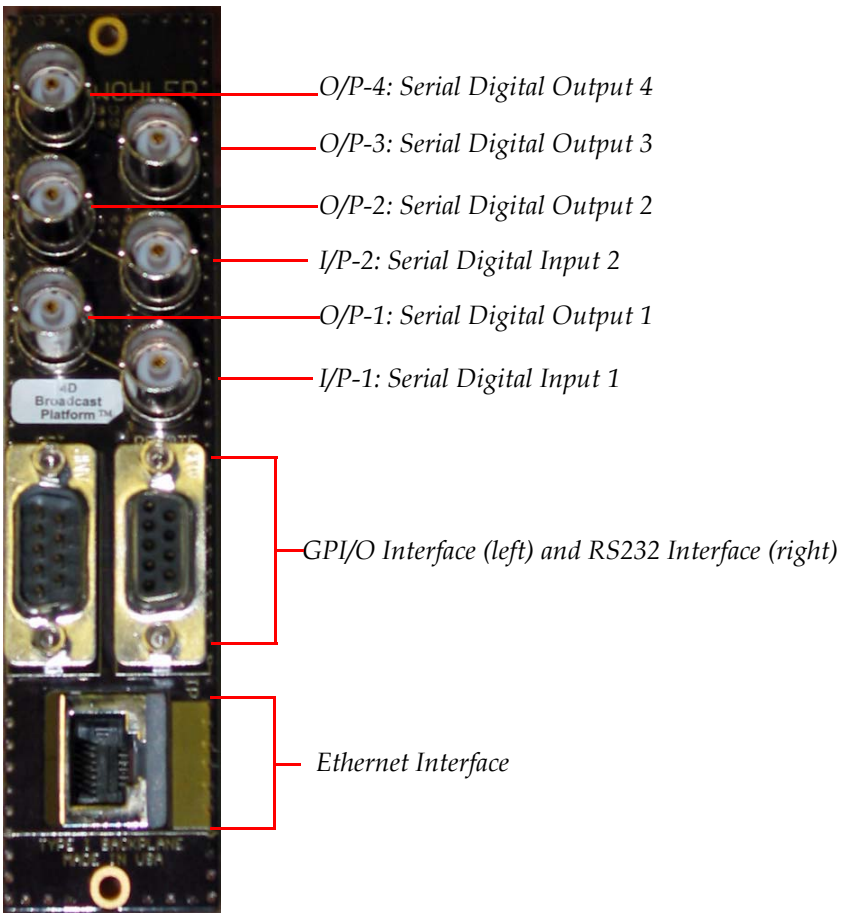
Features

Description

Hardware

The image and call outs in Figure 4–1 provide a reference for the detailed interface descriptions provided below.

Figure 4–1 Codan Adaptor and Interface Layout



BNC Interfaces

- **I/P-1 and I/P-2:** These interfaces (Channel 1 and Channel 2, respectively) accept serial digital 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 serial digital outputs provide closed caption data. They are relay bypassed on power failure, card removal, or card failure.

- **O/P-3 and O/P 4:** These serial digital outputs (Channel 1 and Channel 2, 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.

GPI Interface

Four GP inputs and four GP outputs are provided for products that use the GPI/O functionality. All GPI/Os are opto-coupled through the card.

Ethernet Interface

The ethernet interface (100BT) is used to input Newfor data into the card when used as a closed caption inserter and as a monitoring port when used as a closed caption analyzer.

Software

The HDCC-200A is a dual-channel card that delivers closed captioned text and performs a variety of other tasks related to closed captioning. The card receives Newfor caption data through an RS-232 serial port and/or an ethernet port. The four functions of the card are:

- HD Closed-Caption Inserting
- SD Closed-Caption Inserting
- HD/SD Closed Caption Decoding/Analyzing
- HD/SD Closed Caption Transcoding

Functionality

The HD Closed-Caption Inserter (Encoding)

The HD closed caption inserter can be used to encode two independent HD-SDI sources with unique closed caption data, or two independent HD-SDI sources with identical data where the signal is intended to be

used for different markets. The two signals do not need to be synchronous.

The SD Closed-Caption Inserter (Encoding)

The SD closed caption inserter is identical to the HD version, except that it encodes SD signals instead of HD.

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

The HD/SD closed caption decoder/analyzer can be used to decode two SD or HD sources and will automatically switch each channel between HD and SD modes. The two inputs are not required to be synchronous.

The HD/SD Closed Caption Transcoder (Transcoding)

The HD/SD closed caption transcoder isolates the closed caption data from any VBI line of a standard definition signal and then embeds it into the HDVANC (OP-47 compliant) of an HD signal.

Connectivity

Interfaces

A serial port (RS-232) and an ethernet interface (adaptor-dependent) are provided to insert Newfor caption data. Either interface can be used to control one or both channels of the card as required. Subtitling workstations that use Newfor protocol can be connected to the card through either interface to allow the insertion of captions. The Ethernet interface allows you to control the card from virtually any location within the facility as long as you have a network connection.

Newfor Protocol

Newfor is a protocol used by a number of caption workstations to create closed caption data. The closed caption inserter takes the Newfor data input and converts it into the required data. The closed caption inserter then inserts the converted data and also inserts the appropriate "Dummy Header/Time Filler" packets required for a usable transmission.

Data Insertion

Each channel of the card has a "clean" output from a relay bypass and a captioned output that provides the burnt-in display of the captioned data that can be used for monitoring.

Automatic Page Clearing

In the event no Newfor data or external data has been sent to the card for a 30 seconds, the card will send the following message: "This Program is not Captioned."

Automatic Newfor/Changeover

The closed caption inserter is continually monitoring the Ethernet port, the RS-232 port, and the Newfor sourc for valid caption data. Once the time out period has expired, the card looks for pre-existing data at its input. If no data is present, the card automatically inserts new "Dummy Header/Time Filler" packets with the "PAGE CLEAR" every 10 seconds.

GPI Interfaces

Four optically isolated GPI/O signals are available on the card and are used on products that insert and extract of GPI/O data in the VBI or HDVANC.

Supported Formats

The HDCC-200A supports the following video formats:

- 525i/60
- 525i/50
- 720p (all frequencies)
- 1080i (all frequencies)
- 1080p (all frequencies)

Advanced Operation

User Controls

Table 4–1 below lists all the values for SW 1.

Table 4–1 Switch 1 Communications Settings[a]

Setting	Function
0	Insert captions on Channel 1 from the serial port and on Channel 2 from the ethernet port. No decoding.
1	Insert captions on Channel 1 and Channel 2 from the serial port. No decoding.
2	Insert captions on both Channel 1 and Channel 2 from the ethernet port. No decoding.
3	Insert captions on Channel 1 from the serial port and on Channel 2 from the ethernet port. No decoding.
4	Insert captions on both Channel 1 and Channel 2 from the serial port. Decode I/P captions from each video I/P-1 and send out the ethernet and serial port.
5	Insert captions on Channel 1 and Channel 2 from the ethernet port. Decode I/P captions from each video I/P-2 and send out through both the ethernet and the serial ports.
6	Insert captions on Channel 1 and Channel 2 from the serial port. Decode I/P captions from each video I/P-2 and send out through both the ethernet and the serial ports.
7	Insert captions on Channel 1 and Channel 2 from the ethernet port. Decode I/P captions from each video I/P-1 and send out through both the ethernet and the serial ports.
8	Analyzer Mode Only - Decode caption data from Channel 1 out to the serial and ethernet ports.
9	Analyzer Mode Only - Decode caption data from Channel 2 out to the serial and ethernet ports.
A thru D	Not used
E	Access the RS232 Engineering Menu
F	Access the Ethernet Engineering Menu

a See also Figure 1–3 on page 5.

Table 4–2 below lists the valid settings for SW 2.

Table 4–2 Switch 2 Communications Settings

Setting	Function
0	Not Used
1	Move captions from I/P 2 to I/P 1
2	Move captions from I/P 1 to I/P 2
3 thru F	Not used

Status Indicators

Table 4–3 below describes the LED status indicators on the front of the HDCC-200A card..

Table 4–3 Front Panel Status Indicators

LED #	Label	Color	Function
LED 1	Power	Green	Lights to indicate that the card is receiving power.
LED 2	SDI I/P	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 O/P	Green	Confirms that the selected function is generating a locked serial digital output. A valid serial digital input is required. If the signal output fails or is not stable, the LED will flash at a 1 Hz rate.
LED 4	GPI-1	Green	Received GPI-1
LED 5	GPI-2		Received GPI-2
LED 6	GPI-3		Received GPI-3
LED 7	GPI-4		Received GPI-4
LED 8	GPO-1	Red	Received GPO-1
LED 9	GPO-2		Received GPO-2
LED 10	GPO-3		Received GPO-3
LED 11	GPO-4		Received GPO-4

Specifications

Table 4–4 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 4–5 Technical Specifications

Specification	Value
Inputs	2 HD/SD-SDI on BNC 1 Ethernet (RJ-45) (not available on the IRT rear panel adaptor) 1 RS-232 (DB-9) (on 10-pin header on the Evertz rear panel adaptor) 2 RS-232 (DB-9) (on IRT rear panel adaptor) 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)
Frame compatibility	• Codan • Evertz • IRT
Available functions	• Encoding • Decoding • Transcoding/Bridging • Monitoring

Table 4–5 Technical Specifications

Specification	Value
Available protocols	• OP-47/WST
Available languages	• English • German • Swedish • Italian • French • Spanish • Arabic

Connector Pin Assignments

Table 4–6 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 4–2 GPI DB-9 Male Pin-Out

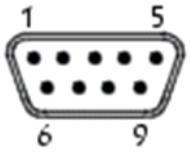


Table 4–7 RS-232 DB-9 Pin-Out Assignments (Codan and IRT Adaptors)

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	Not Connected	
7		
8		

Figure 4–3 RS-232 DB-9 Pin-Out

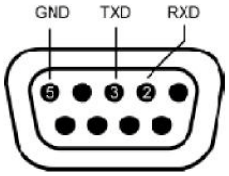


Table 4–8 14-Pin Header Assignments - RS-232 and GPI (Evertz Adaptor)

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

Table 4–8 14-Pin Header Assignments - RS-232 and GPI (Evertz Adaptor) (Continued)

Pin	Label	Interface
11	Common GND	Reference Ground
12		
13		
14		

Figure 4–4 14-Pin Header Assignments

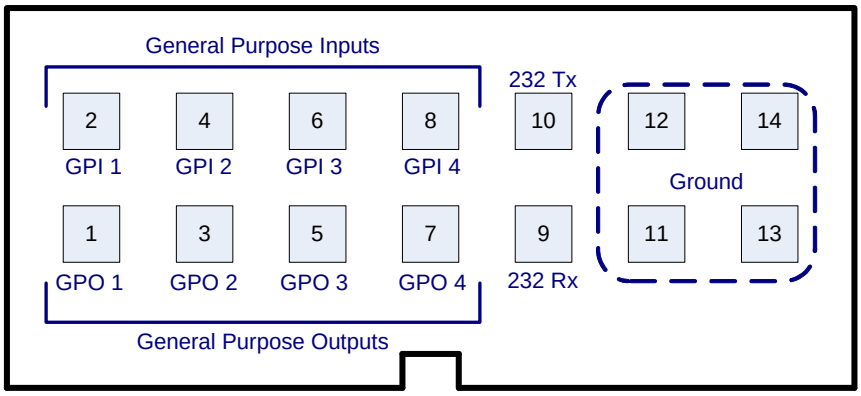


Table 4–9 DB9F Cable Connector (Codan and IRT Adaptors)

Pin	HDCC-200A (DB9-F) to PC (DB9-M)
1	Do Not Connect.
2	Pin 2
3	Pin 3
4	Do Not Connect.
5	Pin 5
6	Do Not Connect.
7	
8	
9	

Note: Table 4–10 and Table 4–11 below provide the pin-out for the cable connecting the HDCC-200 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 4–10 HDCC-200A (IRT) to PC Interface RS-232 #1

HDCC-200A (IRT) DB-9F		PC DB-9M	
Pin	Description	Pin	Description
2	Tx D1	2	RS-232 #1
3	Rx D1	3	
5	GND	5	
1, 4, 8, and 9: NC		1, 4, 6, 7, 8, and 9: NC	

Table 4–11 HDCC-200A (IRT) to PC Interface RS-232 #2

HDCC-200A (IRT) DB-9F		PC DB-9M	
Pin	Description	Pin	Description
7	TxD2	2	RS-232 #2
6	RxD2	3	
5	GND	5	
1, 4, 8, and 9: NC		1, 4, 6, 7, 8, and 9: NC	

Technical Functional Overview

Figure 4–5 illustrates the design of the HDCC-200A.

Figure 4–5 HDCC-200A Block Diagram