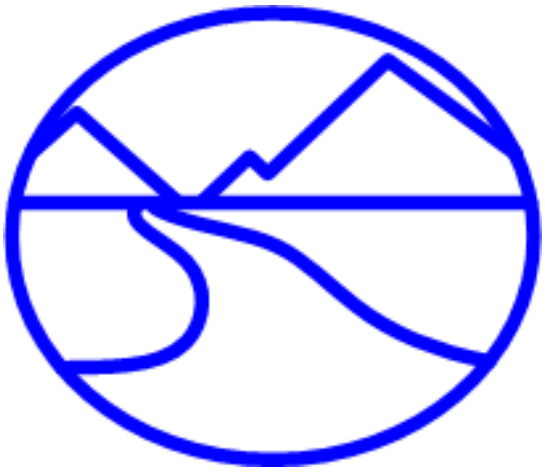


Gravity

HSLA (HotLink Serial Link Analyzer)

Users Manual

Instructions for using HSLAview software with HSLA controller.

Rev G

February 12, 2010

Contact Information

Telephone	1 (866) 478-4491
Company Fax	(505) 883-1375
Email	grt@greatrivertech.com
Web Address	www.greatrivertech.com

Table of Contents

1.0 Introduction

The HotLink Serial Link Analyzer (HSLA) is a tool designed to aid engineers in design and analysis of HotLink interfaces. The system assumes that the user is experienced in HotLink technology and HotLink interfaces. It is recommended that the user review the datasheet for the HotLink device to be evaluated. The HSLA controller uses a Cypress CYP15G0201 device.

The HSLA consists of the HSLA controller and HSLAview software. The HSLA controller consists of Single Board Computer (SBC) and Great River Interface card in a convenient portable enclosure. The system link rate is set at the factory, and cannot be changed in the field. The HSLA controller runs Windows XP. All necessary drivers and software are installed on the system. The user should refrain from installing software onto HSLA as this may impact HSLA performance. The HSLA controller should not be connected to the LAN or other network, as this will impact product performance. The user can access stored data via a USB memory device.

The HSLA controller is programmed via the HSLAview software application. The HSLAview is a GUI based program that allows the user to capture, view, load, and save data.

The HSLA is a complete system including hardware and software. All HSLA controller functions are accessed through the HSLAview software. The HSLA controller does not require custom application development.

1.1 Start Up Procedure

The HSLA controller is shipped with standard keyboard, and USB mouse. The user must provide either VGA or DVI monitor to display to data. Connect the keyboard, mouse power cable, and monitor before proceeding.

The HSLA controller power switch is located at the rear of the unit. Turn the switch to the ‘ON’ position to power up the HSLA controller. Windows XP will boot and initialize the system.

The HLSA system may issue a start up warning the virtual memory is disabled or that the paging file size is set to zero. This is normal behavior. The Virtual memory feature of the PC is disabled to ensure that all memory allocation comes from physical memory and not from the hard disk drive. Disk drive throughput is not sufficient to sustain capture or playback at high baud rates.

Once the boot up sequence is complete select HSLAview as the login name. There is no password for login. Double click the HSLAview ICON on the HSLAview user screen to start the HSLAview application.

Select the appropriate HSLA card type from the Drop list. The options are PCI, PCIX and PCIe. Consult GRT for the correct selection based on the HSLA system configuration. Use the default card number of '0'. Use the mouse to select the 'Connect button'. The HSLA will initialize the hardware and software drivers. The console will display messages on the HSLA controller status. Upon successful initialization the console will show the "HSLA ready!" message.

The HotLink external input connections to the HSLA controller can be made. The HSLA supports either FCN, or SMA connections. Please refer to Section 3.0 for the external connection options. Data acquisition can begin with or without the HSLA controller connected to an external HotLink data stream. To quickly capture data:

1. Set the 'Record Tab' -> 'Record Method" to 'Trigger Immediate',
2. Set the the 'Record Tab' -> 'Number of Triggers' to 1,
3. Set the the 'Record Tab' -> 'Bytes per Trigger' to 48K,
4. Set the 'Input Output Select'->'Record HSLA Record From' to ChB Rx.
5. And select the 'Record' Button.

The 'Record on Trigger' dialogue will appear and when data capture is complete the dialogue will display 'Record Complete'. Select 'OK' to dismiss the 'Record on Tirgger' dialogue. The data will display in the 'Record Data' section of the display.

1.2 Shut Down Procedure

To shut down the HSLA controller:

1. First save any capture data that you want to keep as a permanent record.
2. Select the Disconnect Button.
3. Exit the HSLAview application using the 'Exit' button or 'File'->'exit' menu.
4. Log out from Windows XP user screen.
5. Select turn off the computer from the XP window options.
6. When the display is blank turn off the power switch located at the rear of the HSLA controller.

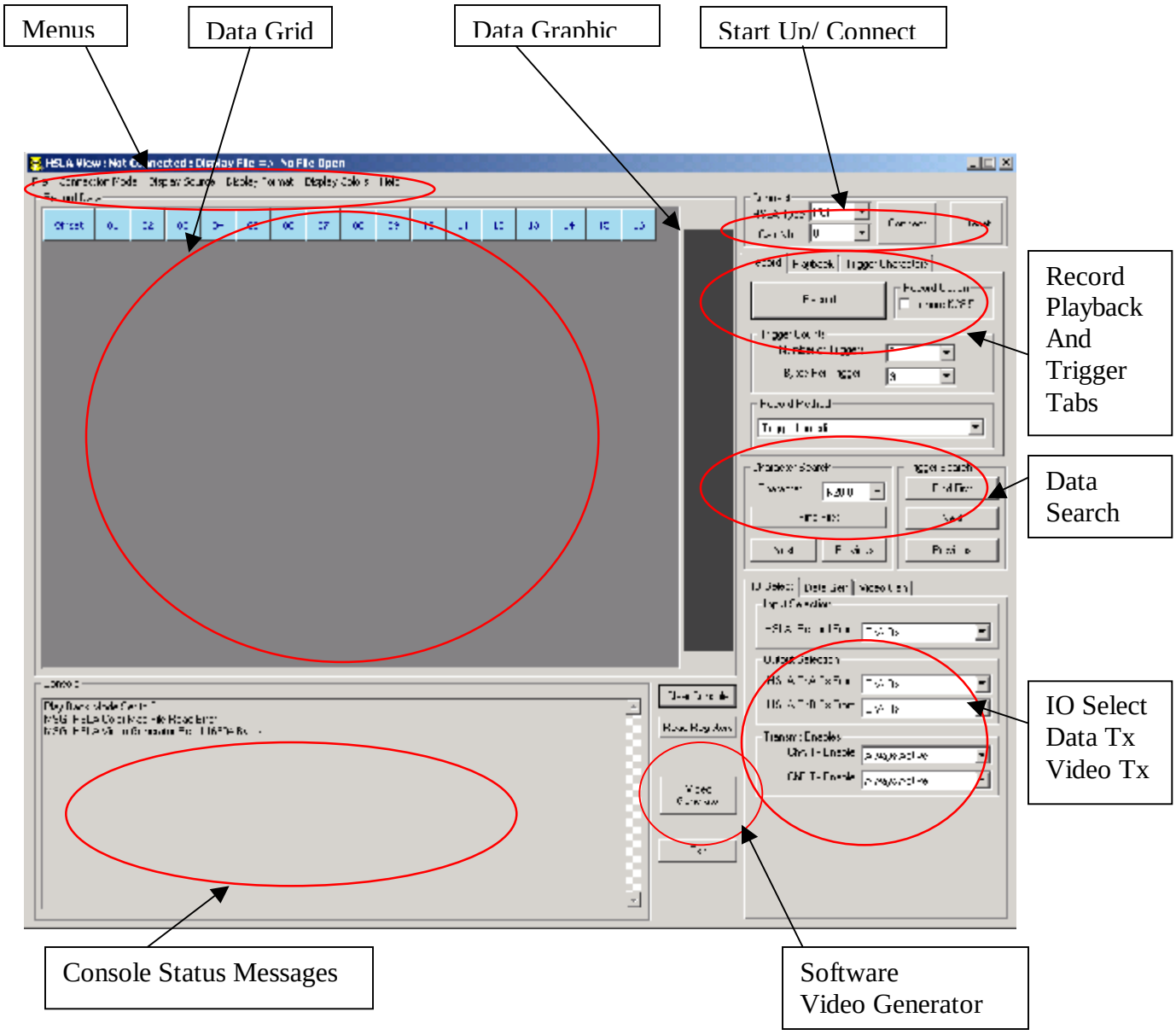


Figure 1.1 HSLAview Main Screen

2.0 HSLAview Application

The HSLAview application consists of ‘Menu’ section, ‘Record Data’ display screen, ‘Console’ display screen ‘Connect’ options, ‘Record’ Tab controls, ‘Character Search’ section, ‘Trigger Search’ section, ‘Input Output Select’ tab controls. Figure 1.1 shows the locations of the Tabs and Menus. The following sections will describe each item and function.

2.1 Menu Options

2.1.1 File

The File Menu consists of file save and load options as well and a way to close the application.

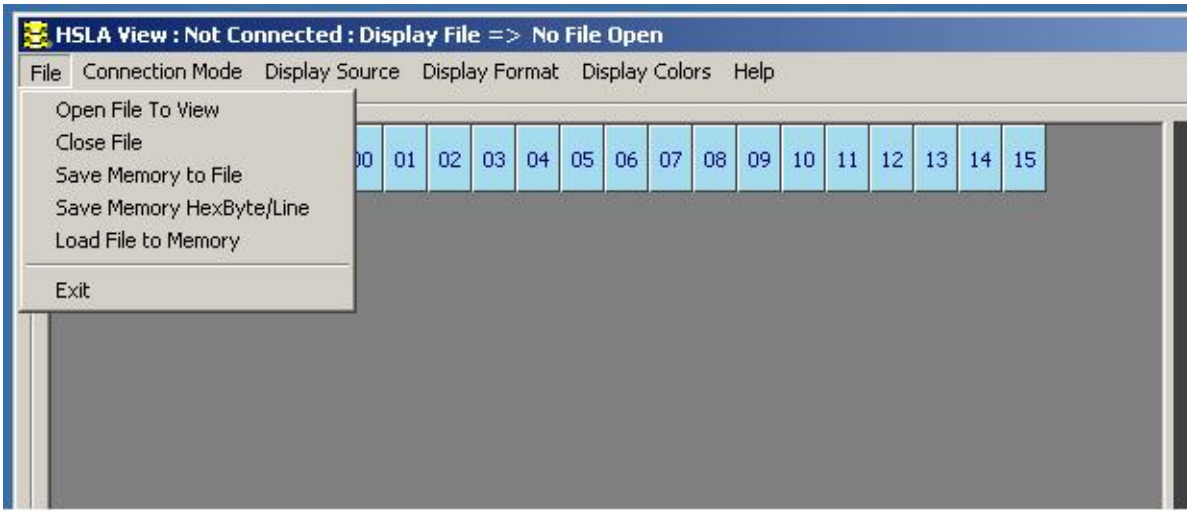


Figure 2.1.1 File Menu.

‘Open File’ allows the user to open any file type and display the data in the ‘Record Data’ screen. The file can be viewed as a ‘HEX’ dump format. The file to be opened could be from a previous data record session. This allows the user to retrieve data from previous record sessions for analysis. When this item is selected a file open dialogue box will appear allowing the user to navigate the directory to the appropriate file location.

‘Close File’ will close any open file.

‘Save Memory to File’ will save the currently captured data to a file in HSLA binary format. A save file dialogue box will open and allow the user to select the destination directory and file name. This file format can be read back into memory for viewing or playback at a later time.

‘Save Memory HexByte/Line’ will save the currently captured data to a file in ASCII text format one character per file line. This is useful for small capture sizes to view or search with text editor, or custom program.

‘Load File to Memory’ will load a file to capture memory. The file will be interpreted as a HSLA binary format file.

‘Exit’ will exit the application. Any open files will be closed. Currently recorded data will be lost, unless the user saves the data using the ‘Save Memory to File’ menu option.

2.1.2 Connection Mode

The connection mode allows the user to interface to the HSLA controller in ‘Local Controller’ or ‘Remote Host TCP/IP’ mode. The only valid selection at this time is as a ‘Local Controller’. In this mode the HSLAview application is running on the same PC that the HSLA hardware is installed. This will not affect the record speed of the system and allows for faster viewing of recorded data.

‘Remote Host TCP/IP’ allows for a remote connection to the HSLA controller. In this mode the HSLAview software is running on a separate host and data is exchanged via the Ethernet TCP/IP interface.

NOTE: This mode is not enabled at this time.

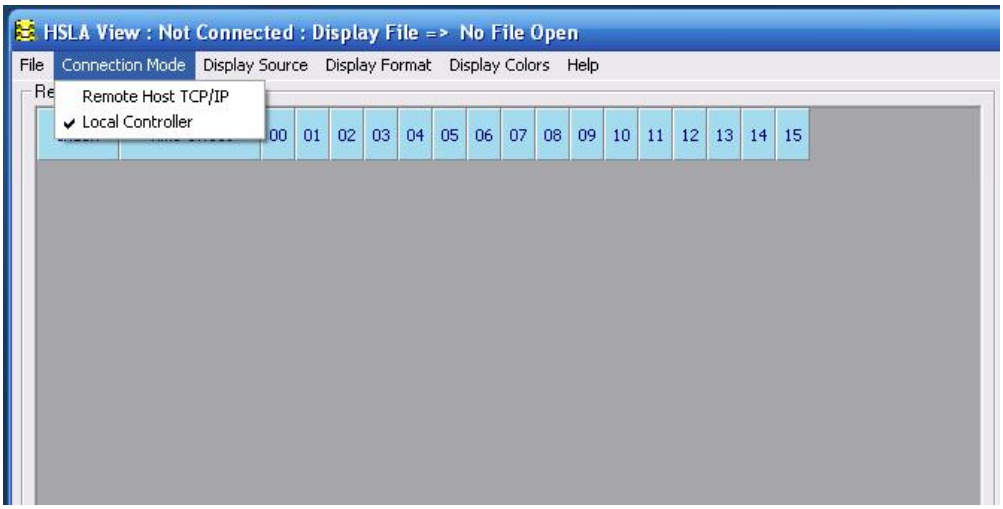


Figure 2.1.2 Menu Connection Mode

2.1.3 Display Source

The HSLAview application allows for both capture memory and file data to be viewed. The captured data is stored in PC memory. For file view mode the selected file is opened and accessed directly on disk. The File view functions will be slower due to disk access times. The ‘Display Source’ is used to select the source of the data being viewed in the ‘Record Data’ screen.

The ‘From File Data’ will display data from the currently open file. If no file is open the screen will be blank.

The ‘From Record Data in Memory’ will display data from the capture memory. If no data has been recorded the screen will be blank.

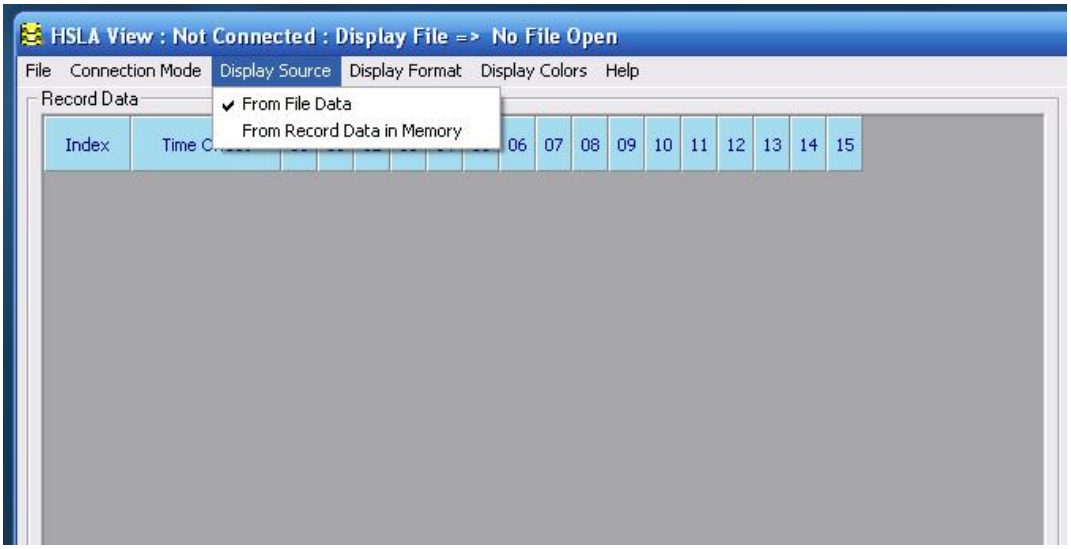


Figure 2.1.3 Display Source

2.1.4 Display Format

The Display format gives the user the options to chose the way the recorded data or file data is viewed.

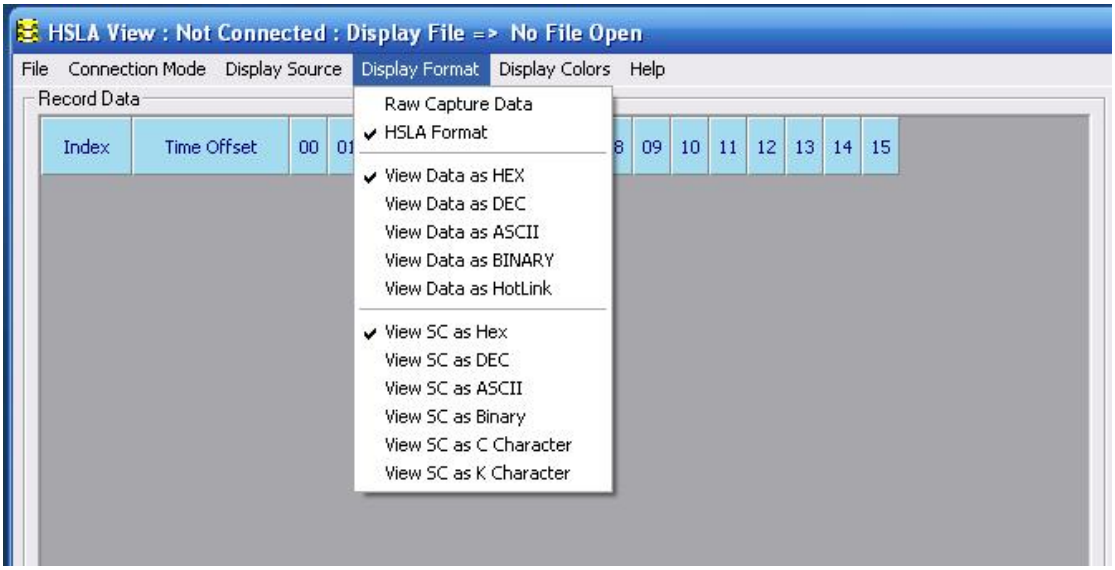


Figure 2.1.4 Display Format

'Raw Capture data' will display each byte of captured data. In this mode the special character bits of every third byte are not translated. This is useful as a diagnostic mode, however without the translation of the special character bits this mode is not as useful for HotLink analysis.

'HSLA Format' translates every third byte and will display data color coded as HotLink data or HotLink special characters. This is the most useful mode for viewing recorded data.

The remaining options are valid only when 'HSLA Format' option has been selected. These options determine the formatting of the text that is displayed for each byte recorded. Data characters and Special Characters (SC) have individual controls, but the formatting options are similar. Data characters have a different color pallet than the Special Characters.

Data Display Format Options:

- 'View Data as HEX' will display the data as a two digit hex value from 00 to FF.
- 'View Data as DEC' will display the data as a three digit decimal value from 000 to 255.
- 'View Data as ASCII' will display the data as an ASCII character if it is a valid ASCII character otherwise it is left blank.
- 'View Data as Binary' will display the data in an eight-bit format consistent with HotLink data encoding, for example 000_00000.

- ‘View Data as HotLink’ will display the coded data as HotLink values such as D0.0, and D31.7.

Special Character Display Options:

- § ‘View SC as HEX’ will display the the special characters as a two digit hex value from 00 to FF.
- § ‘View SC as DEC’ will display the the special characters as a three digit decimal value from 000 to 255.
- § ‘View SC as ASCII’ will display the the special characters as an ASCII character if it is a valid ASCII character otherwise it is left blank.
- § ‘View SC as Binary’ will display the special characters in an eight-bit format consistent with HotLink data encoding, for example 000_00000.
- § ‘View SC as C Character’ will interpret special characters as HotLink C characters such as C5.0, and C1.0.
- § ‘View SC as K Character’ will interpret special characters as FC K characters like K28.0, and K28.5.

2.1.5 Display Colors

The HSLAview software allows the user to set colors for data of interest. There are three character color maps to edit. Data character, C character, and K character color maps. The default colors are loaded each time the application is run. The user can change the foreground and background color of individual data and special character values.

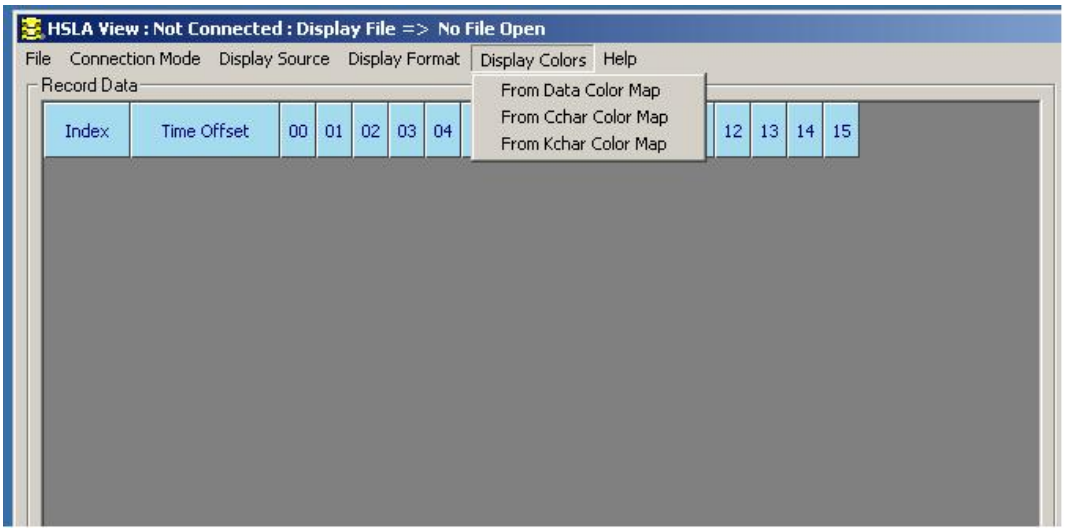


Figure 2.1.5.0 Display Colors

‘From Data Color Map’ will display the color map for data values.

‘From Cchar Color Map’ will display the color map for C character values.

‘From Kchar Color Map’ will display the color map for K character values.

When the color map is displayed a right mouse button click will bring up the color pallet selection dialogue box and the user can select a background color. When the color map is displayed a double left mouse button click will bring up the color pallet selection dialogue box and the user can select a foreground color.

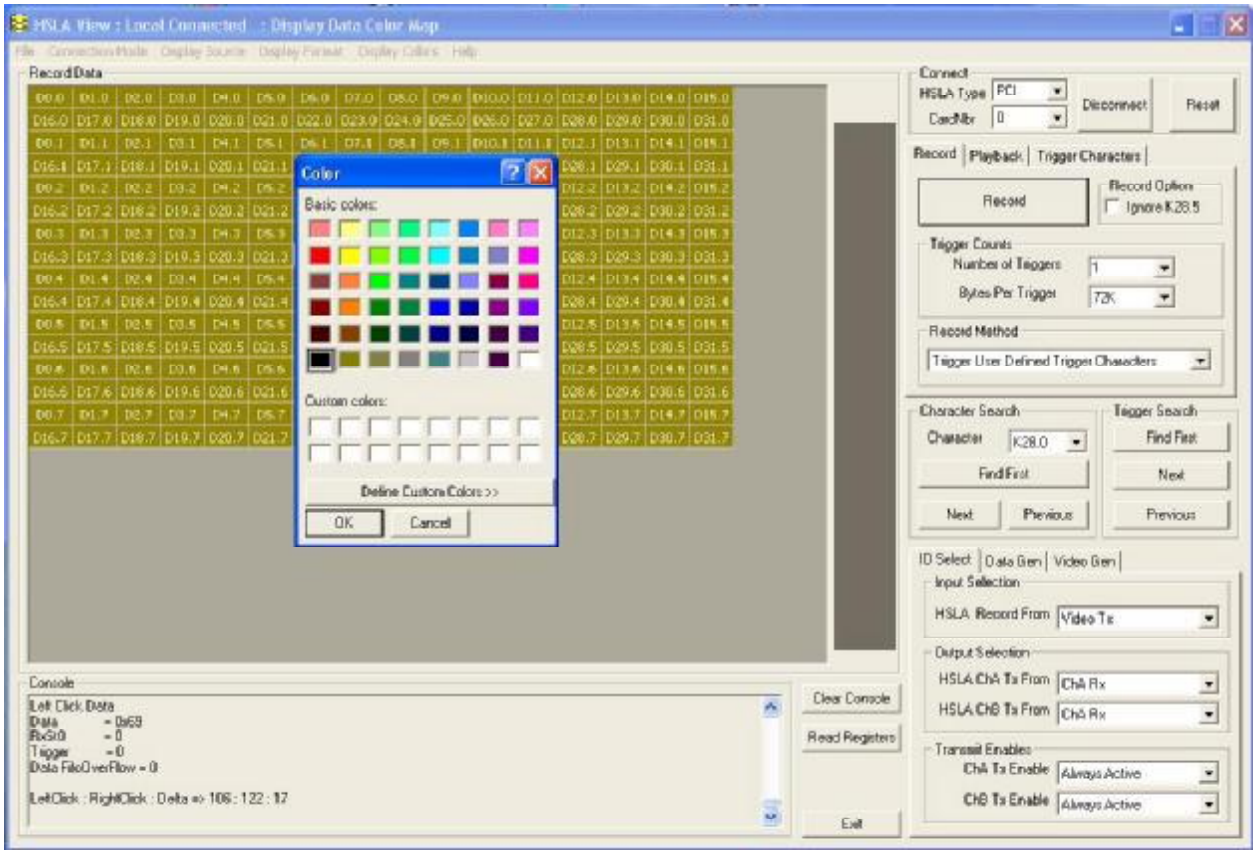


Figure 2.1.5.1 Color Map Dialogue Box

2.1.6 Data Graphic

The Data Graphic represents the data that has been recorded into capture memory. The data Graphic updates after each capture, and each time a left mouse click occurs with in the Data Graphic rectangle. In File view mode the Data Graphic is not updated.

A left hand mouse click in the Data Graphic area will update the Graphic Display, and set the current cell location to the represented are of data.

The Data Graphic gives a visual representation of the captured data and assists in identifying patterns and features of the captured data.

2.1.7 Mouse Button Functions

When using the mouse Right and Left buttons in the Data Grid the Console will report Statistics about the click location. The Right and Left mouse click have separate registers will display the information about the selected byte and the Delta in Bytes from one location to the next.

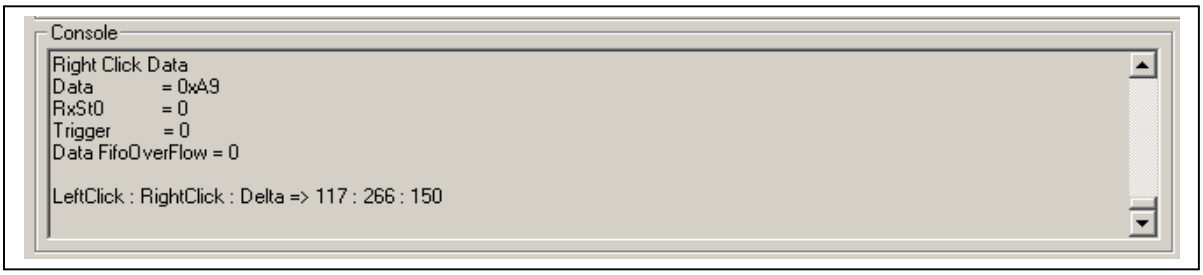


Figure 2.1.7 Mouse Function Display Data

The First Message indicates the last mouse function either “Right Click Data” or “Left Click Data”. Data is the Hex value of the selected byte. RxSt0 when ‘1’ indicates a special character, and when ‘0’ indicates a regular data character. The Trigger filed when ‘1’ indicates that this byte was the source of a capture trigger. The DataFifoOverflow value when ‘1’ means that the HSLA card internal FIFO has overflowed and that data has been lost. When this occurs the system will continue to capture data, but all data after the overflow event will have a black background. Overflows can occur when the link rate exceeds the capability of the system to extract data from the card, or Windows is blocking a DMA transfer of data. Keep in mind that Windows in not a RTOS. A DataFifoOverflow condition is a rare event, but can happened.

The next line will summarize the data of the last two mouse clicks. The message lists the location of the last Right Click, the location of the last Left Click and the difference. The difference count includes in the count the bytes that were selected with the mouse click.

2.1.8 Help

The Help Menu has one option at this time. ‘Help’->’About’ will display version information about the HSLAview application.

2.2 Connect Section

2.2.1 Manual Connection

The Connect Section of the HSLAview application allows the user to initialize the hardware drivers and establish connection to the HSLA controller. At this time only 'Local Controller' is supported. See Section 2.1.2 Connection Mode for more information.

The Connect Section has two drop down box selections for HSLA Type and Card Number. There is a Connect/Disconnect button and Reset Button.

The values for HSLA Type are PCI, PCIX and PCIe. The default for CardNbr is 0. Set the HSLA type, and CardNbr based on the current configuration of the system.

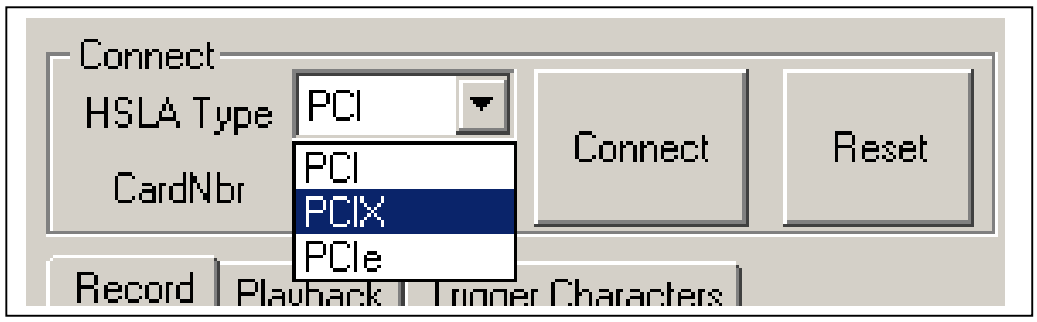


Figure 2.2 Connect Section

When the Connect button is selected the software will initialize the hardware and report the status in the Console Screen. Upon successful initialization the Connect button text will change to Disconnect.

The Reset Button can be used to re-initialize the hardware. This should not be necessary under normal operation. The 'Reset' button will reset the Card to it power on values and reset the current settings of the system to these default values.

2.2.2 Command Line Options

As a convenience Card Type, Slot Number and Connect function can be set and initiated from the command line arguments.

The order of the parameters is CardType, SlotNumber, and AutoConnect.

CardType	:	0 : PCI (PCI 32 Bit Card) 1 : PCIX (PCI 64 Bit Card 2: PCIe (PCI Express) Default is PCI
SlotNumber	:	Any Integer in the Range of 0 to 5. This is system configuration dependent.
AutoConnect	:	When 0 the HSLAview application will not automatically attempt to connect the hardware. When '1' the HSLAview application will attempt to automatically connect to the hardware

The Console area will display the values of the command line parameters and the status of the Autoconnect if selected. If any of the parameters and not compatible with the system configuration the HSLAview application will not connect to the hardware. An example of command line options to Auto Connect to CardType PCI64Bit, SlotNumber 0 is:

HSLAview 1 0 1

2.3 Record Controls

The Record Controls consists of the Record Tab, Playback Tab, and Trigger Characters Tab.

2.3.1 Record Tab

The Record Tab is used to set the amount of data to record and the method to start the data record.

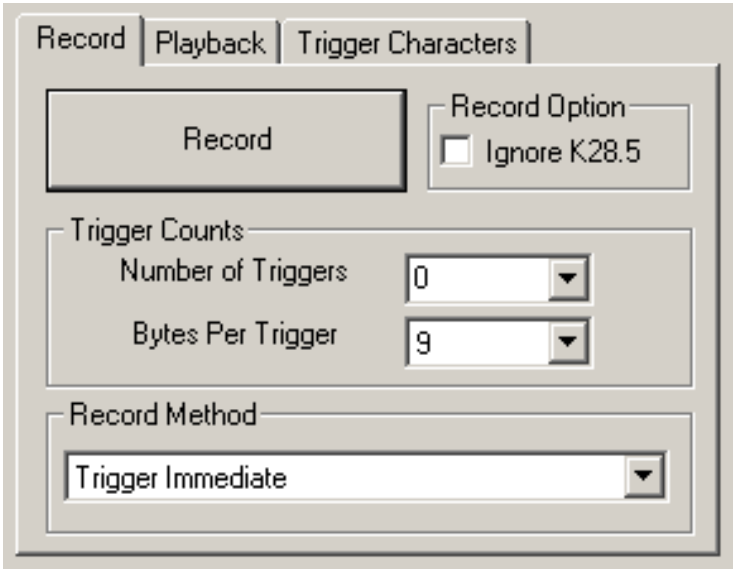


Figure 2.3.1.0 Record Tab

The ‘Number of Triggers’ allows the user to specify the number of trigger events to record, and the ‘Bytes Per Trigger’ determines how many bytes for each trigger event.

The Record Method specifies what method will start the data record.

The total number of bytes recorded is equal to ‘Number of Triggers’ times the ‘Bytes Per Trigger’. This value is the rounded up to the nearest 48K byte increment.

The ‘Ignore K28.5” option allows the user to capture all data except K28.5 characters.

When the user selects the ‘Record’ button the ‘Record on Trigger’ dialogue box will appear and report the status of the data record.

Figure 2.3.1.1 Record On Trigger Dialogue Box

The text message will indicate the state of the data record:

1. Waiting on Trigger Event.
2. Data Record in progress.
3. Data Record Complete.

The Enable Progress Update is normally checked and enables the automatic update of the Dialogue box. When the box is un-checked the Interrupt Count, Bytes Received, and Progress Bar will not update. These items will update as soon as the box is checked again. When the data record is complete the user must select the OK button to dismiss the 'Record on Trigger' Dialogue box and display the recorded data.

The Record Method options (Figure 2.3.1.2) allow the user to determine how the data record will start.

1. 'Trigger Immediate' will start data record as soon as the user selects the 'Record' button.
2. 'Trigger On non K28.5 Character' will start data record after the user selects the 'Record' button, and the HSLA controller detects a non-K28.5 character.
3. 'Trigger User Defined Trigger Characters' uses the trigger characters defined on the 'Trigger Characters' Tab to start data recording after the user selects the 'Record' button.

4. ‘Trigger on External Signal Active Low’ will start the data record after the user selects the ‘Record’ button and the HSLA controller has detected a low signal on the external input connector.
5. ‘Trigger on LFI Signal High (Not Active)’ will start data record after the user selects the ‘Record’ button and the HSLA controller detects that the LFI signal for the currently selected Rx channel is not active. This is useful for recording data when a remote connect first powers up and the HotLink becomes active.
6. ‘Record’ Until Stopped by User’ will record data when the user selects the ‘Record’ button and will not stop until the user dismisses the Record dialogue box with the ‘OK’ button.
7. ‘Record’ Until Stopped by Ext. Sig. Active Low’ will record data when the user selects the ‘Record’ button and will not stop until the external signal input is active low.

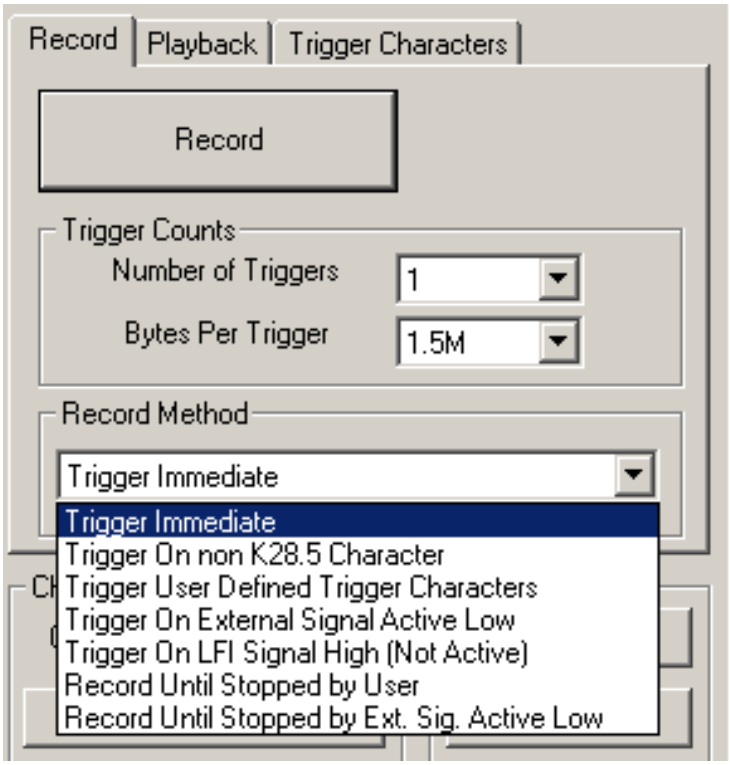


Figure 2.3.1.2 Record Method

2.3.2 Playback Controls

The playback tab is similar to the ‘Record Tab’. Playback is not a standard fearure of the HSLA system. Please contact GRT for details on this option. If enabled the Playback feature allows the user to transmit the data stored in the PC memory. The Playback can be set to loop a programmable number of times.

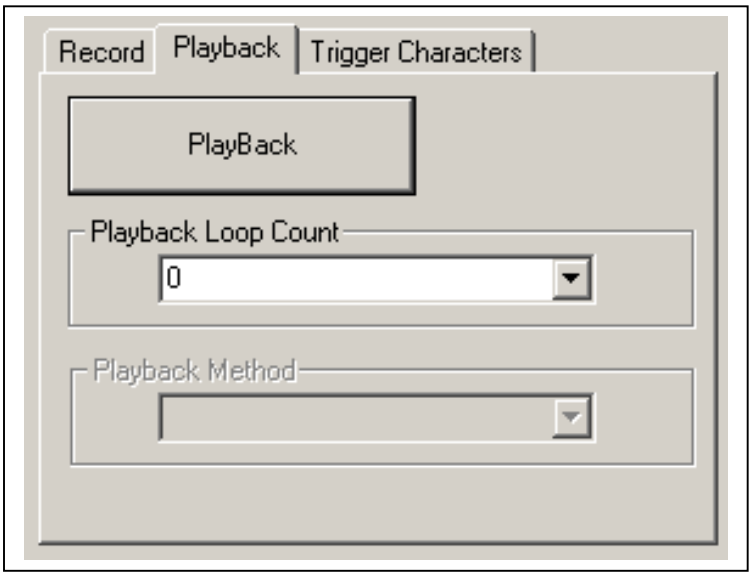


Figure 2.3.2.1 Playback Tab

The ‘Playback Loop Count’ sets the number of times the HSLA will loop through the currently capture memory.

During Playback a dialog box will display the number of loops executed and the total number of bytes transmitted.

Play back Method is not implemented at this time.

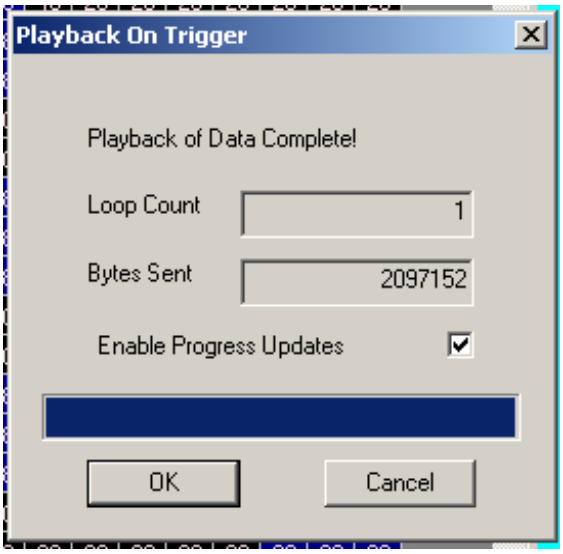


Figure 2.3.2.1 Playback Status Dialog Box

2.3.3 Trigger Characters

When the ‘Record Method’ is set to ‘Trigger User Defined Trigger Characters’ the ‘Trigger Characters’ tab settings defines the trigger event.

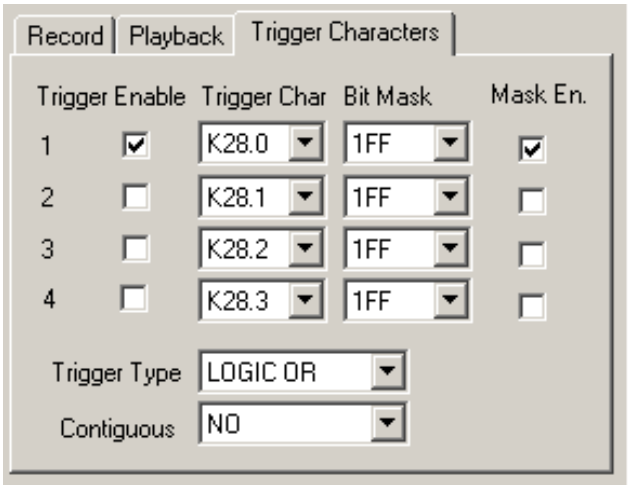


Figure 2.3.3 Trigger Characters Tab

Four Trigger events can be defined. Each trigger event has an enable, a trigger character, a Mask, and mask enable option. This allows the user to select multiple trigger conditions and to select specific bits to trigger on.

The Trigger type can be ‘Logic OR’ meaning a trigger event is defined as Trigger1 or Trigger2 or Trigger3 or Trigger4 condition occurring.

The Trigger type can be Logic AND meaning a trigger event is defined as Trigger1 and Trigger2 and Trigger3 and Trigger4 condition occurring.

For the ‘Logic AND’ setting the Trigger1 and Trigger2 and Trigger3 and Trigger4 event can be contiguous meaning not other characters received between the defined trigger characters, or not contiguous allowing for other characters to be received between the defined trigger characters.

When the trigger mask is enabled the mask value is logically ‘AND’ with trigger character. This can be used to select specific bits of interest.

2.4 Search Options

2.4.1 Character Search

The Character Search section allows the user to search the displayed data for characters. When a character is found it will be outlined on the display. The next and previous buttons will move thought the display data. When large amounts of data are recorded of a large file is being searched the search time can long. The status of the search is displayed in the Console window. Please be patient when searching large volumes of data.

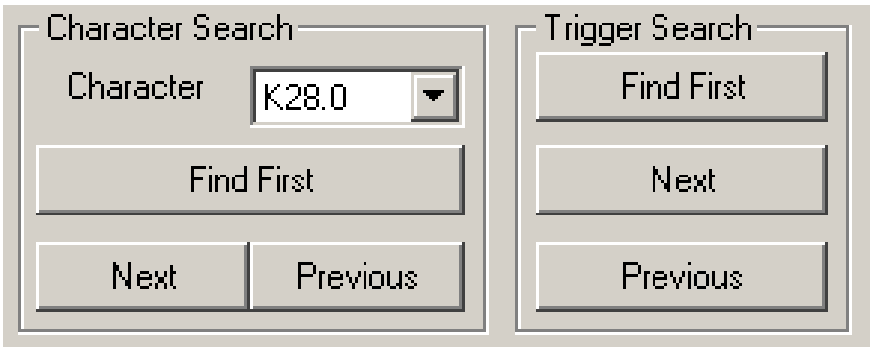


Figure 2.4.1 Search Section

The Trigger Search is similar to the Character Search. A special bit marks each Trigger Even and the HSLAview software can identify the start of each trigger event. Trigger character events are also displayed in red on the Record Data screen.

2.5 Input Output Selection

The Input Output Selection tab allows the user to configure the Receive and transmit data channels for various functions. Internal to the HSLA controller data from the ChA and ChB receive ports can be routed to various outputs and also to the record FIFO.

Figure 2.5.1 Input Output Selection shows all possible connections for the receive, transmit, and record data paths. The IO selector is very flexible and takes some time to understand the various options.

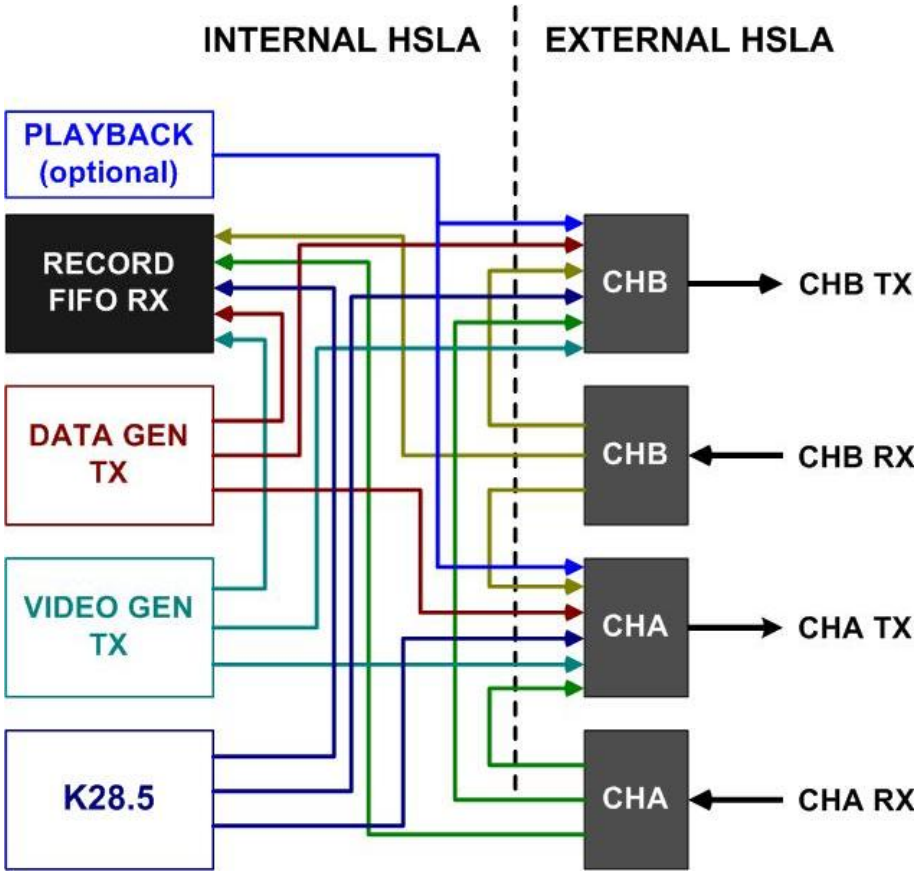


Figure 2.5.1 Input Output Selector

2.5.1 Input Select

The input select determines the source of the record data.

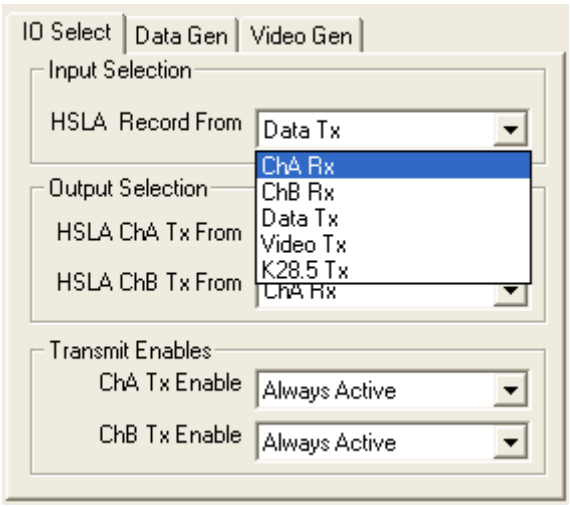


Figure 2.5.1 Input Select

Data can be recorded from ChA Rx, ChB Rx, the Internal Data Generator Tx, Internal Video Generator Tx , and an internal constant K28.5 stream.

2.5.2 Output Selection

The output selection determines what is transmitted out of the HSLA controller.

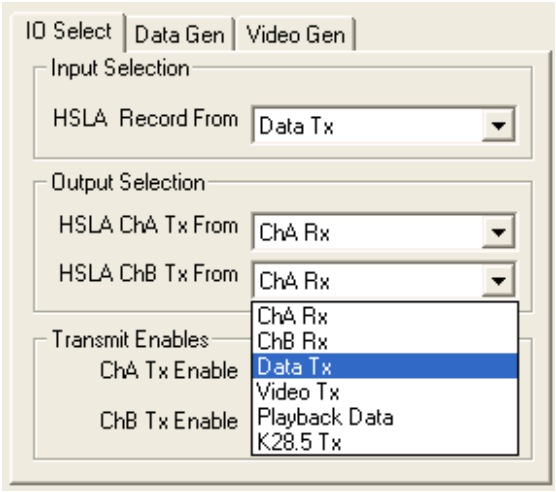


Figure 2.5.2 Output Selection

Output selection for ChA Tx and ChB Tx are independently set. This allows for HotLink Line splitting and repeating functions. In addition the internal Data Generator Tx, or Video Generator Tx can be routed to the ChA and ChB transmit outputs as well as a constant K28.5 stream.

For Playback mode the option “Playback Data” should be chosen for ChA and/or ChB. Data can playback on both channels simultaneously.

2.5.3 Transmit Enables

The transmit enables are used to control when the ChA Tx and ChB Tx outputs are powered up and active. This does not mean that any specific type of data is on the Tx lines only that the Hotlink Transmitters are powered up. What is placed on the output lines is determined by the output selection for that channel.

1. 'Always Active' means that the transmitter is powered up and transmitting.
2. 'Always Disabled' means the transmitter is always powered down.
3. 'Follow Channel A LFI' will enable this channels transmitter when a valid signal is detected on the ChA Rx input.
4. 'Follow Channel B LFI' will enable this channels transmitter when a valid signal is detected on the ChB Rx input.

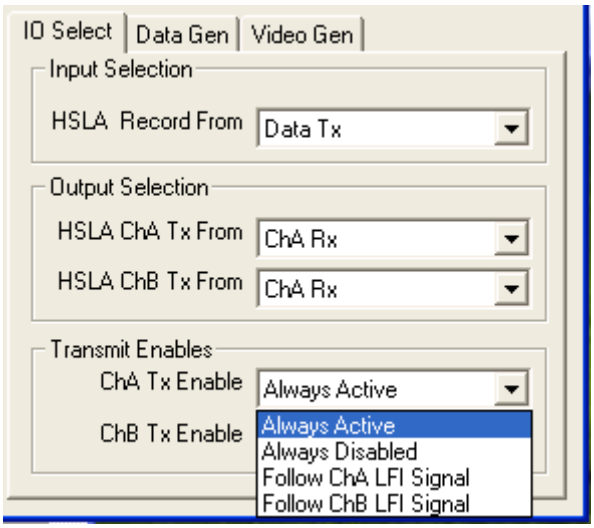


Figure 2.5.2 Transmit Enable.

2.5.4 Power On Configurations

Jumper JB1 can be used to set the power on IO select configuration. Based on the jumper settings the ChA Tx and ChB Tx function can be driven by either the ChA Rx or ChB Rx source upon power up.

When the HSLAview software is started and the card is initialized the IO configuration derived from the JB1 jumper settings will be over written by the last HSLA configuration file.

The Power on function is a means to setup a splitter or repeater function upon power up without having to execute the HSLAview software. See section 4.0 Hardware Configuration for details on the JB1 jumper settings.

2.6 Hardware Video Generator

2.6.1 Hardware Video Generator Setup and Options

The HSLA controller has a firmware based video generator used for diagnostics purposes. The video generator does not use any PCI bus bandwidth. The Video Generator is useful for validating connections, exploring the Trigger options and Search options, and testing a Hotlink video receiver. Figure 2.6.1 illustrates a common HotLink II video format.

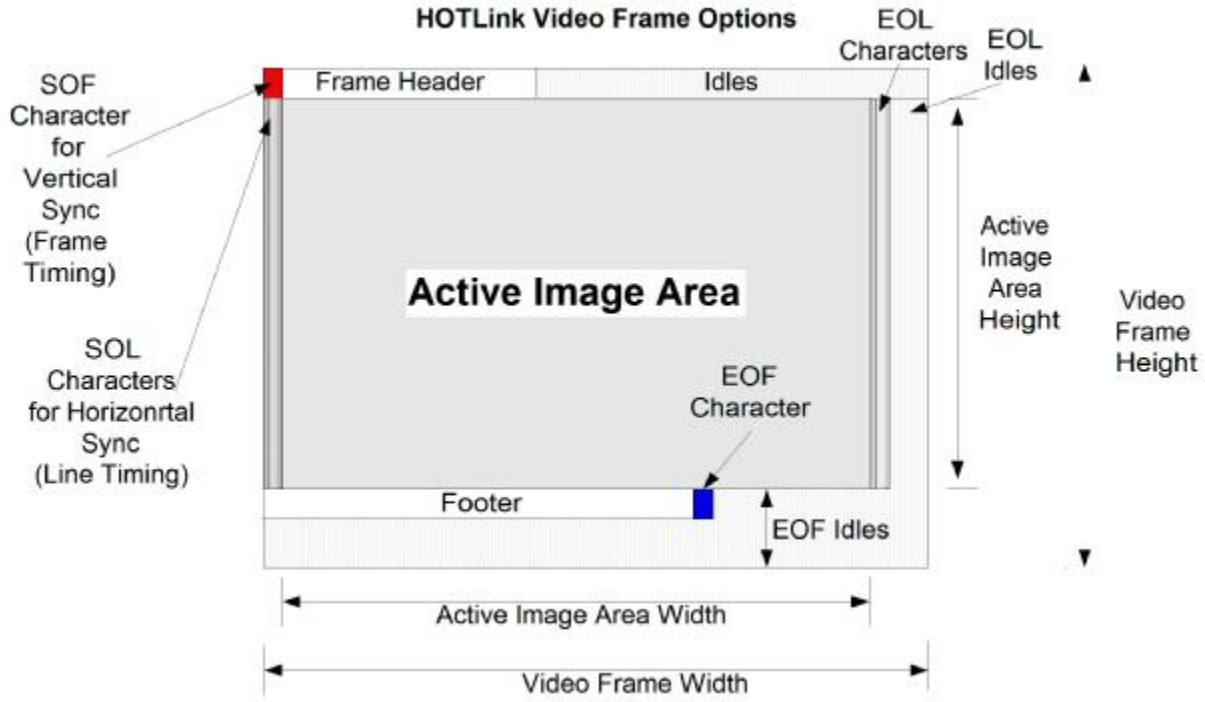


Figure 2.6.1 HotLinkII Video Format

The HSLA control panel allows easy programming of the video parameters. Figure 2.6.2 illustrates the Video Generator Control Panel.

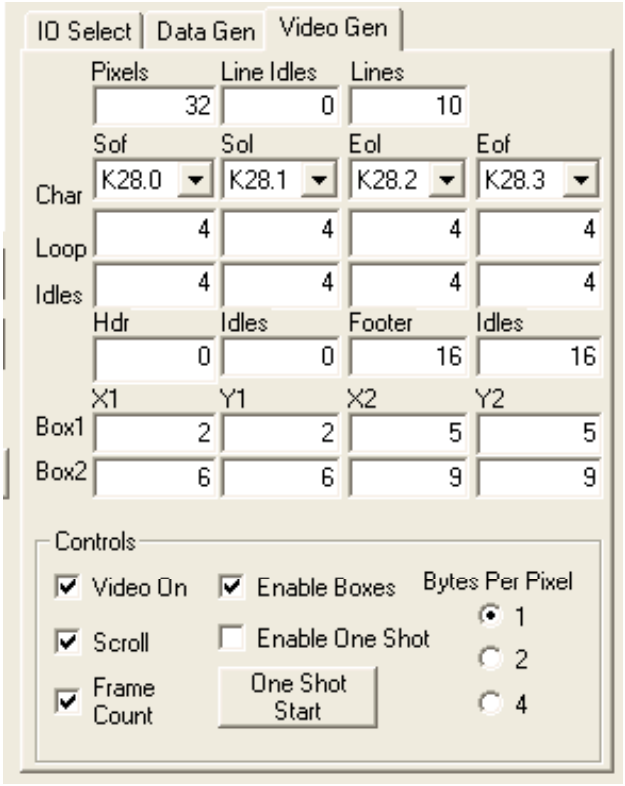


Figure 2.6.2 Video Generator Control Panel

When programmed and turned ‘Ctrl’ ON’ the video generator transmits frames of data based on the programming options.

Pixels is the Horizontal Pixel Count of the image.

Line Idles are the number of K28.5 Characters to transmit at the end of each line of data.

Lines is the vertical resolution in number of lines in the image.

SOF Char is the character to be transmitted at the start of a video frame.

SOF Loop is the number of SOF character to be transmitted**.** . If SOF Loop is set to zero then no start of frame character is transmitted.

SOF Idles is the number of K28.5 characters to transmit after the SOF characters. If Sof Idles is zero then no K28.5 characters are transmitted after the SOF characters.

SOL Char is the character to be transmitted at the start of a video data line.

SOL Loop is the number of SOL character to be transmitted**.** . If SOL Loop is set to zero then no start of line character is transmitted.

SOL Idles is the number of K28.5 characters to transmit after the SOL characters. If SOL Idles is zero then no K28.5 characters are transmitted after the SOL characters.

EOL Char is the character to be transmitted at the end of a video data line.

EOL Loop is the number of EOL character to be transmitted**.** . If EOL Loop is set to zero then no end of line character is transmitted.

EOL Idles is the number of K28.5 characters to transmit after the EOL characters. If EOL Idles is zero then no K28.5 characters are transmitted after the EOL characters.

EOF Char is the character to be transmitted at the end of a video frame

EOF Loop is the number of EOF character to be transmitted**.** . If EOF Loop is set to zero then no end of frame character is transmitted.

EOF Idles is the number of K28.5 characters to transmit after the EOF characters. If EOF Idles is zero then no K28.5 characters are transmitted after the EOF characters.

HDR is the number of Header bytes to transmit after the SOF sequence is complete.

HDR IDLES is the number of K28.5 characters to transmit after the Header data.

FOOTER is the number of Footer bytes to transmit before the EOF sequence is transmitted.

FOOTER IDLES is the number of K28.5 characters to transmit after the Footer data.

BOX1 allows the user to specify a region in the video frame that will be set to all "xFF". Box1 will be enabled on even count video frames.

BOX2 allows the user to specify a region in the video frame that will be set to all "xFF". Box1 will be enabled on odd count video frames.

(The effect of Box1 and Box2 are alternating regions of xFF) pixels.)

Controls Section:

Video On is used to turn the video generator on and off. When off the video generator will output K28.5 characters.

Scroll adds a scroll bar to the image. The scroll bar will set a line of the video to 'xFF'. The scroll bar will advance on line after each frame is transmitted.

Frame Count adds a frame count graphic to the image. The Frame count will advance one count on each transmitted frame. The first pixel of each line of the image will contain the LSB of the Frame Count.

Enable Boxes enables the display of BOX1 and BOX2.

Enable One Shot enables the one shot mode for the transmitter.

One Shot Start if Enable One Shot is selected then the transmitter will transmit one video frame then go into and idle state and output K28.5 characters.

Bytes Per Pixel sets the number of bytes per pixel to 1, 2, or 4.

The video generator can be turned ON or OFF at anytime without effecting the throughput on the PCI bus. Due to the highly programmable nature of the Video Generator it is recommended to turn off the Video Generator before making changes to the configuration. Once configured the video generator can be safely turned on.

2.6.2 Header, Image Payload, and Footer Data Format

The Video Generator will output an incrementing byte count for the video frame Header, Image Payload, and Footer. The count starts and 0 and ends at N-1, where N is the number of bytes for Header, Footer, and Video line. The incrementing byte count

allows the user to quickly validate that the correct number of bytes has been received at the capture application.

2.6.3 Video Generator Configuration Example

As an example for the use of and the configuration the Video Generator consider an engineer is required to design a HotLinkII receiver for and imaging sensor. The sensor will not be available for 3 months. The engineer will use the HSLA Video Generator to simulate the output of the image sensor.

The Specification of the Image Sensor is:

SOF = K28.1
SOL = K28.0
Image size is 640 pixels by 512 lines.
Pixels are two bytes per pixel.
EOL Idles = 124 K28.5
EOF = K28.3
Frame Rate is 50Hz
K28.5 characters fill the data between frames.
Link rate is 360 Mbps.

The Total bytes in the image given by Bytes per Frame is:

SOF + (SOL + Pixels * BytesPerPixel + EOL Idles) * Lines + EOF =

1 + (1 + 640 * 2 + 124) * 512 + 1 =

718,894 Bytes/Frame

The desired frame rate is 50fps or:

50 fps * 718,894 Bytes/Frame =

35,968,100 Bytes per second

The Link Rate is 360 Mbps or also given by 36 MBps. Eight bit Data bytes are represented on the link by 10bit codes. The link is 8B10B encoded. The Inter Frame Total Idle time is given by:

Link Rate – Total Image Data Characters per second =

36,000,000 – 35,968,100 = 31,900 Bytes

The EOF Idles is given by:

Total Inter Frame Idle Time / Frames per Second

31,900 / 50 =

638 EOF Idles.

The Figure 2.6.3 Demonstrates how to create this video timing.

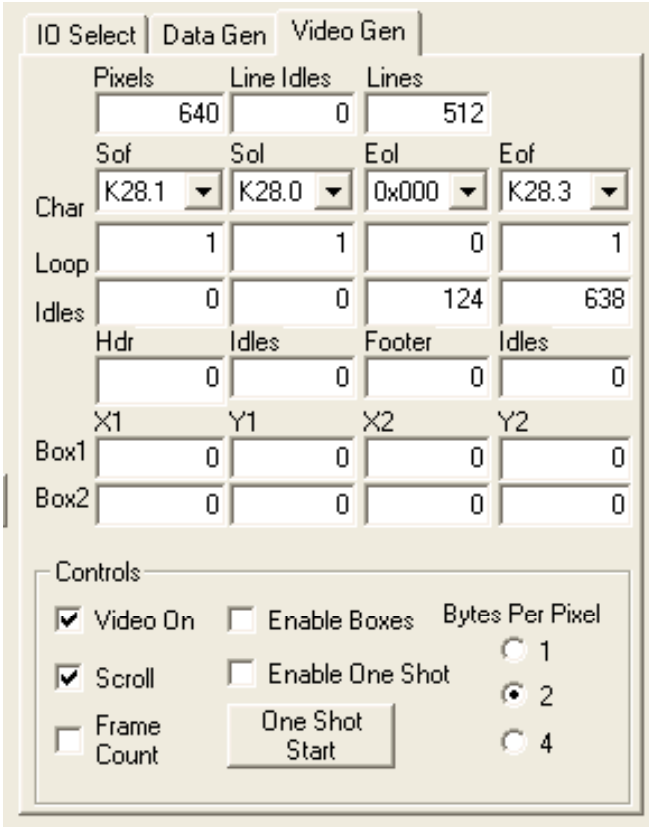


Figure 2.6.3 Video Configuration Example

2.7 Software Video Generator Setup

The Software Video Generator menu allows the selection of 5 independent video formats. For each format Header, Image and footer data can be specified, and SOF, SOL, EOL, and EOF sequences can be set. The Software Video Generator GUI is displayed when the “Video Generator” button on the main panel is selected. The GUI appears as show in figure 2.7.1.

1. Format Select. This section is used to select the format that is being edited.

2. Start of Frame Sequence. Four fields allow the specification of a Start of frame sequence. Four characters can be selected along with repeat counts for each character.

3. Header Source data. Select a text file as source for header data to be used. The file is a text file with the first value representing the byte count of the header. Each line is one character. The file is read until the byte count is reached of the EOF is reached. An example Header file is:

   0x006
   0x101
   0x001
   0x002
   0x003
   0x004
   0x102

   Here there are 6 characters in the header file. The first character is a special character K28.1 followed by for data characters and ends with a K28.2

4. Start of Line and End of Line Sequence. Four fields allow the specification of a start of frame sequence. Four characters can be selected along with repeat counts for each character.

5. Footer Source data. Select a text file as source for footer data to be used. The format is the same as the Header File.

6. End of Frame Sequence. Four fields allow the specification of a End of frame sequence. Four characters can be selected along with repeat counts for each character.

7. Frame Repeat. This number determines the number of times this frame format will be repeated when generating the Video Data.

8. The Video Generator Button will compile all the video formats and load the video data into the PC memory buffer called “Video Generator Memory”. The “Video Generator Memory” can be view from the front panel.

The Typical sequence to use the software video Generator is:

1. From the main screen select the “Video Generator” button.
2. Fill in format 1-5 with the desired data
3. Select the “Generate Video data” button on the “Video Generator” GUI
4. Select the “OK” button.
5. Select “Display Source”->”From Video Memory” on the main screen.
6. Verify the Video Format is correct.
7. Select the Playback Tab.
8. Choose “Playback Method” -> “From Video Generated Memory”
9. Click the button with text “Playback Video Memory is OFF”, and the text will change to ‘Playback Video Memory is ON”.

The Video memory in the PC is transferred to the HSLA hardware circular buffer for continuous playout.

Be sure not to skip step #3 as the video configuration is only loaded into PC video memory when “Generate Video data “button is selected.

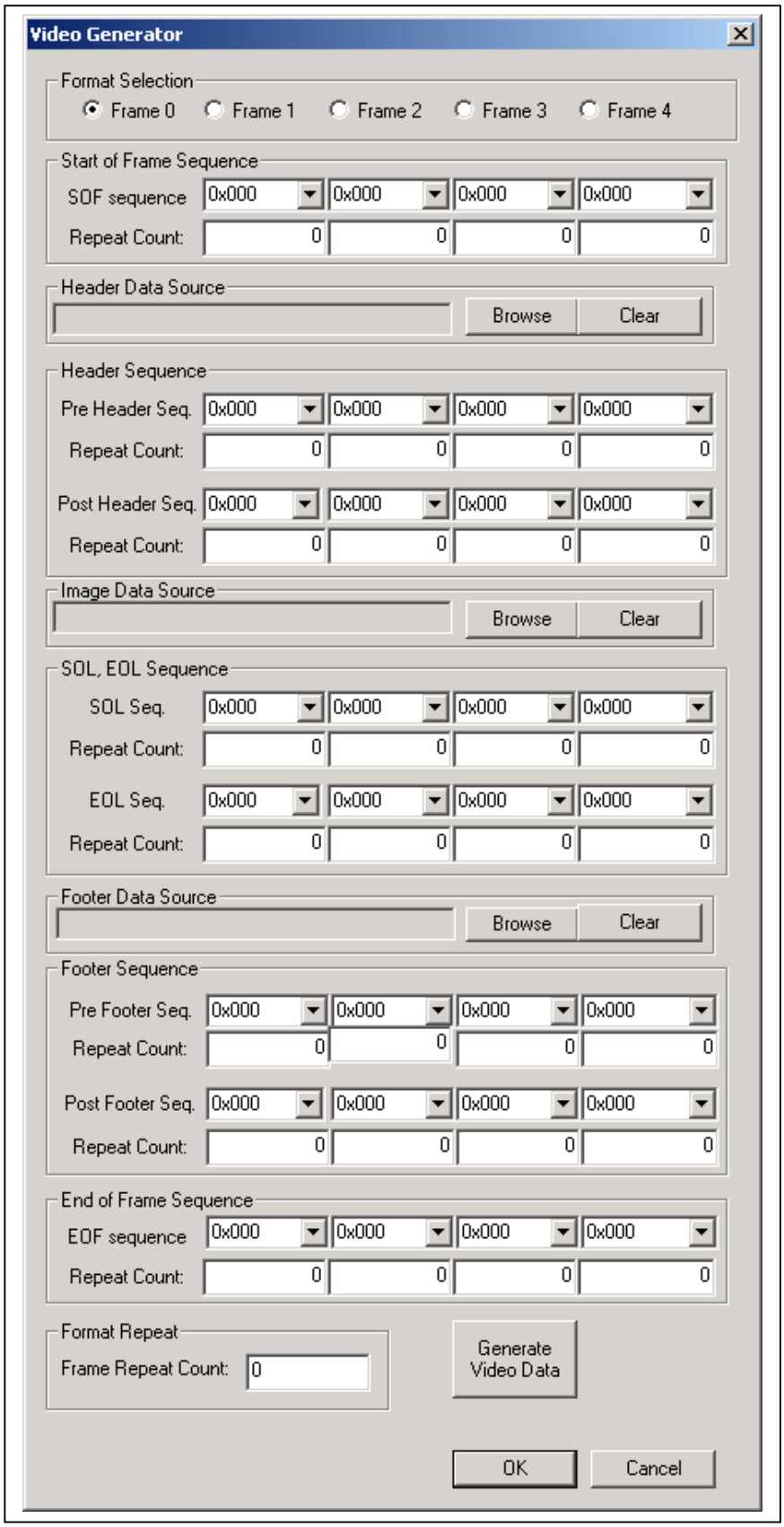


Figure 2.7.1 Video Generator GUI

2.8 Data Generator Tx Setup

The HSLA controller has a firmware based packet generator used for diagnostics purposes. The Data Generator does not use any PCI bus bandwidth. The Data Generator is useful for validating connections and exploring the Trigger options and Search options.

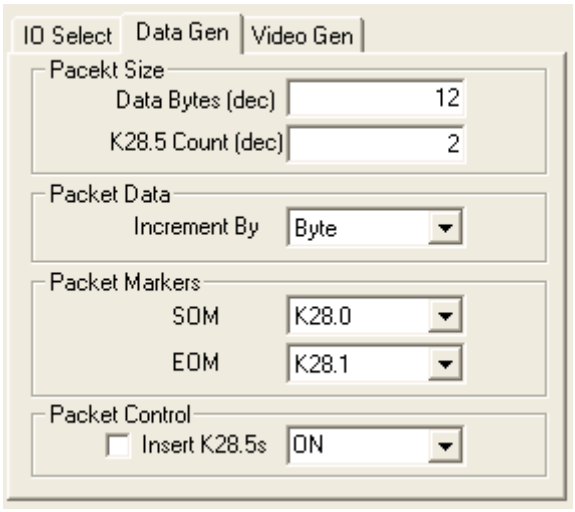


Figure 2.7.1 Data Generator Setup

When programmed and turned ‘ON’ the Data Generator will transmit packets of data in the following format:

SOM [BYTE_1 BYTE_2 …….BYTE_N] EOM K28.5(s)

The SOM and EOM are selected from the drop down list of characters. The data bytes can increment from hex 00 to hex FF on each byte or on each packet. The number of data bytes and number of inter-packet idles can be set from 0 to 65535.

The Data Generator can be turned ON or OFF at anytime without effecting the throughput on the PCI bus.

The “Insert LK28.5s” option will insert one K28.5 between every data byte. This is useful for testing system sensitivity to K28.5 placement.

2.9 Overview

The HSLAview software allows for flexible programming of the HSLA controller. Data can be quickly and easily displayed.

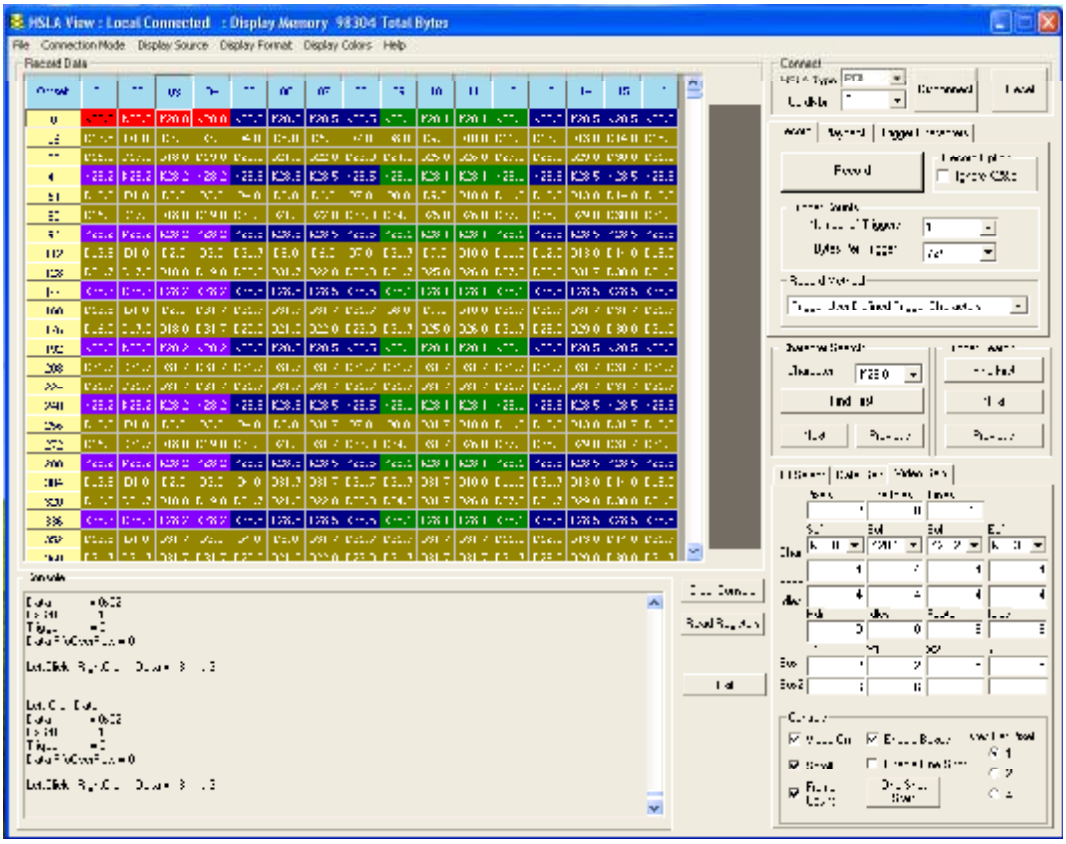


Figure 2.7 Overview

2.9.1 Configuration Files

There are two configuration files saved when the HSLAview application is closed. The absence of the configuration files will start the HSLAview application in its default settings.

The “HSLAconfig.txt” files saves the register settings of the hardware and is loaded when the HLSA “Connect” button is selected.

The “HSLAColorMap.dat” is a binary file that saves the current color settings for the HSLAview display.

The “HSLAVideoGenerator.dat” is a binary file that saves the current software video generator.

3.0 External Connections

There are several options for the external connections on the HSLA Dual FCN, Single SMA, and Single Rx BNC. The Back plate connections are different for the PCI, PCIX and PCIe system options. Refer to Figure 3.0, Figure 3.1 and the labeling on the back panel out the HSLA for more information.

Channel A is the Bottom connections. Channel B is the top connections. For SMA and BNC only channel B can be connected.

The External Trigger is the same for the PCI, PCIX and PCIe options. The External Trigger are differential inputs on a 6-pin din connector with the following pin out starting at the key and going clockwise around the connector:

1. Output1 +
2. Output1 -
3. NC
4. NC
5. Input1 –
6. Input1 +

Input1 +/- is used to trigger the HSLA controller. It is recommended to use an external relay of to short pin 5 to pin 6 to initiate an external trigger event.

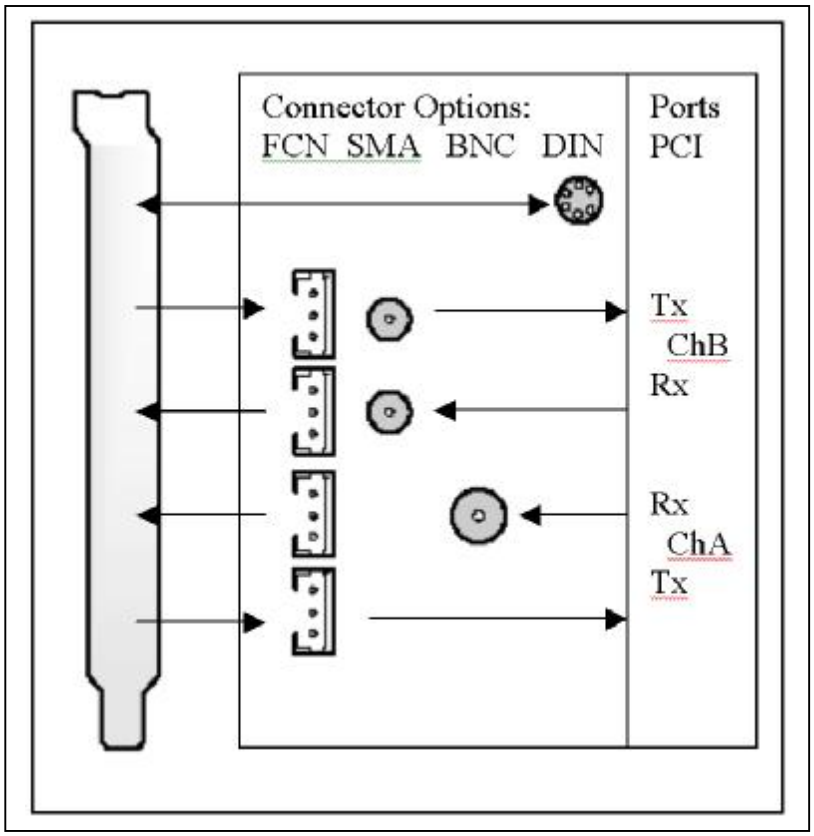


Figure 3.0 PCI Back Plate Connections

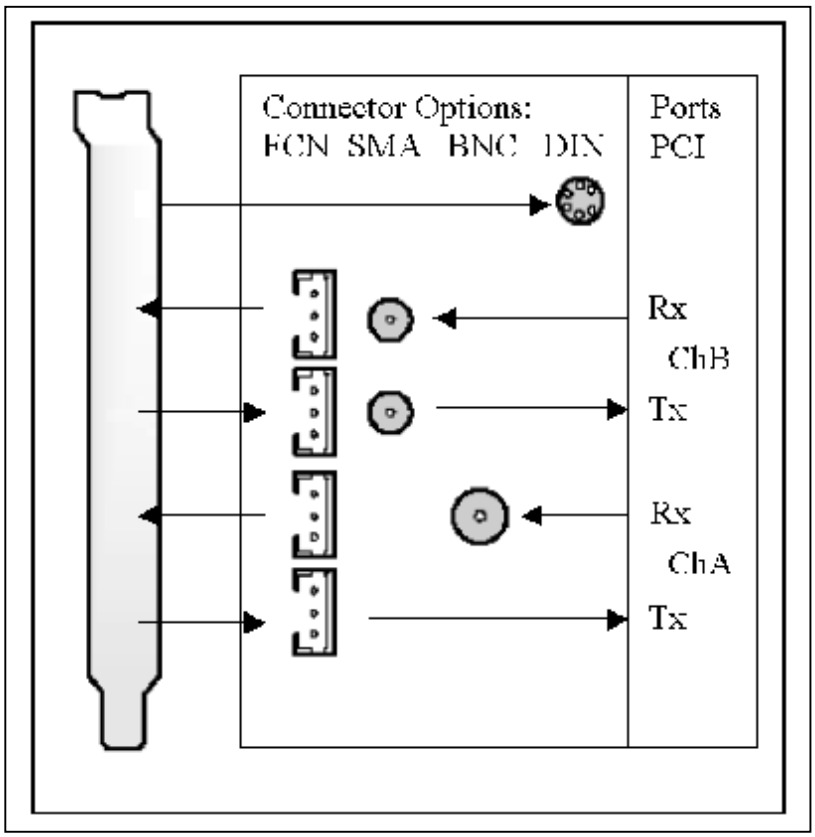
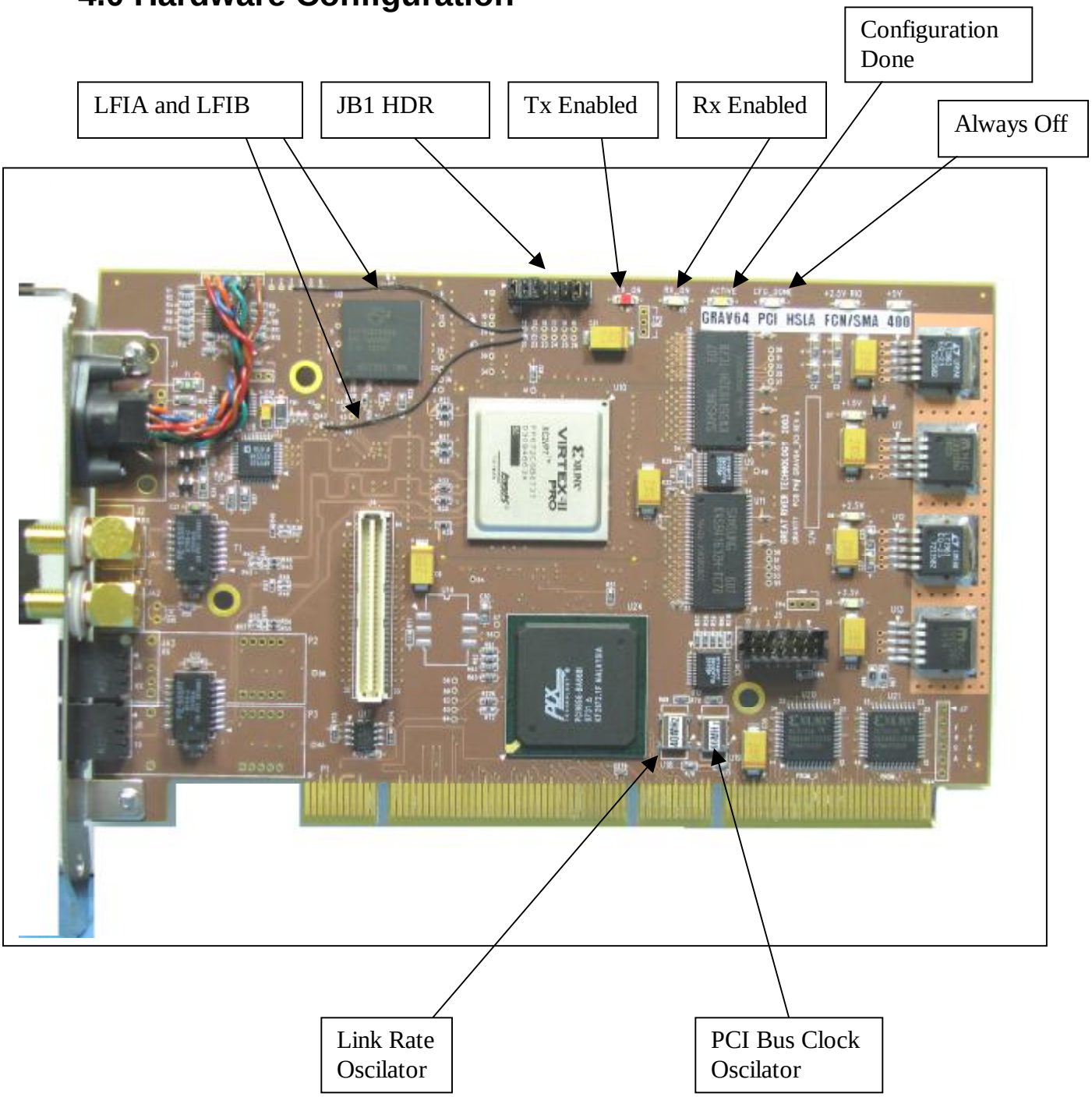
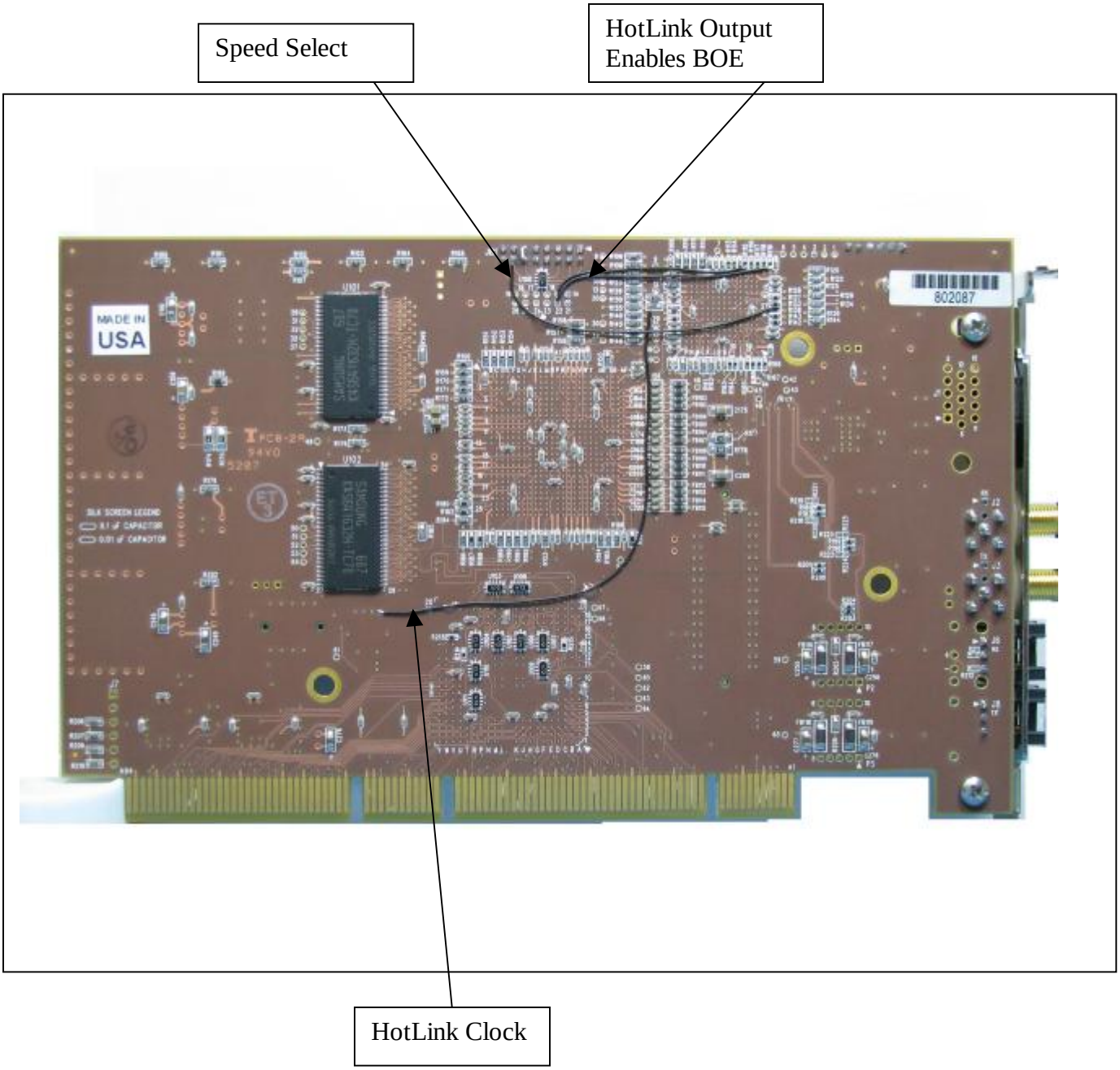


Figure 3.1 PCIX and PCIe Back Plate Connections

4.0 Hardware Configuration




Speed Select
HotLink Output Enables BOE
MADE IN USA
802087
HotLink Clock

JB1 Configuration Settings:

15-16	13-14	12-13	9-10	7-8	5-6	3-4	1-2	JB1 Pin#
0	1	2	3	4	5	6	7	CFGIO #
PCI Bus	Speed Select				ChA Tx Select	ChB Tx Select	Mode	
PCI 64-bit	High				ChB Rx	ChB Rx	Test	Open
PCI 32-bit	Low	Mid			ChA Rx	ChA Rx	Normal	Installed

Jumper	Open	Installed
15-16	GRAV64	GRAV32
13-14	800-1500bps	200-400bps
11-12	-	-
12-13(*)		400-800bps
9-10	-	-
7-8	-	-
5-6	ChA Tx = ChB Rx	ChA Tx = ChA Rx
3-4	ChB Tx = ChB Rx	ChB Tx = ChA Rx
1-2	Test	Normal

Note * : Jumper 12-13 is across the bottom of CFGIO1 and CFGIO2 for MID setting.