VP7configure™ User's Manual

Revision 7.0.4

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Revision Status

Rev	Release Date	Reason For Change	Update By
1.0		First Printing	RJP
1.1	12/3/04	Contrast and Brightness Control	RJP
1.2	12/21/04	Increment Delays	RJP
1.3	1/20/05	Data Mapping under output electrical, IBD	RJP
1.4	2/2/05	Name change	RJP
1.5	2/23/05	IBD change	RJP
1.6	4/1/05	Color adjust. Update, auto-detect, Int_Static	RJP
1.7	7/11/05	OSD options added	RJP
1.8	9/21/05	Video options added	RJP
1.9	10/4/05	External Sync option added	JRG
2.0	10/6/05	Reverted for VP7 rev A	RJP
6.0	12/2/05	Release for VP7configure 6.0	RJP
6.1	12/20/05	Project window, encoder, FPGA, EDID, ITSC	RJP
7.0	8/22/06	Interlaced output, supports all firmware	RJP
7.0.1	10/30/06	Changed color of adjustment status to yellow	JRG
7.0.2	4/12/07	Support dithering for 6 bit panels.	JRG
7.0.3	3/17/10	Sharpness control / live update for video input.	JRG
7.0.4	5/12/2010	Green to gray for LDI mapping. Chroma kill in color adjustments.	JRG

TABLE OF CONTENTS

TABLE OF FIGURES

1 System Requirements

VP7configure™ will run on Windows 2000 or Windows XP. A COMM port is required to communicate with a VP7™ box.

2 Installation

2.1 Installing VP7configure™ for the First Time

If the PC has never had the VP7configure™ application installed, follow these steps to install the application.

STEP 1: Insert the distribution disk into the CD-ROM drive of the PC or a CD-ROM drive networked to the PC and view the contents of the CD in the Windows Explorer window.

STEP 2: Double click on "VP7CONFIGURE SETUP.EXE" file.

STEP 3: Follow the on-screen instructions to install the VP7configure™ application.

2.2 Removing VP7configure™

STEP 1: Uninstall the existing VP7configure™ application by double clicking the "Add/Remove Programs" applet in the Control Panel.

STEP 2: Select "VP7configure" from the list of programs and click the Add/Remove button.

STEP 3: Follow the on-screen instructions to uninstall the VP7configure™ application.

2.3 Updating VP7configure™

STEP 1: Remove the existing VP7configure™ application following the steps in Section 2.2.

STEP 2: Install the VP7configure™ application following the steps in Section 2.1.

3 Creating a Connection

To create a new connection to a VP7™ box, select **File->New Connection** from the menu bar, or press **Ctrl + N** on the keyboard. The VP7configure™ Wizard window will appear.

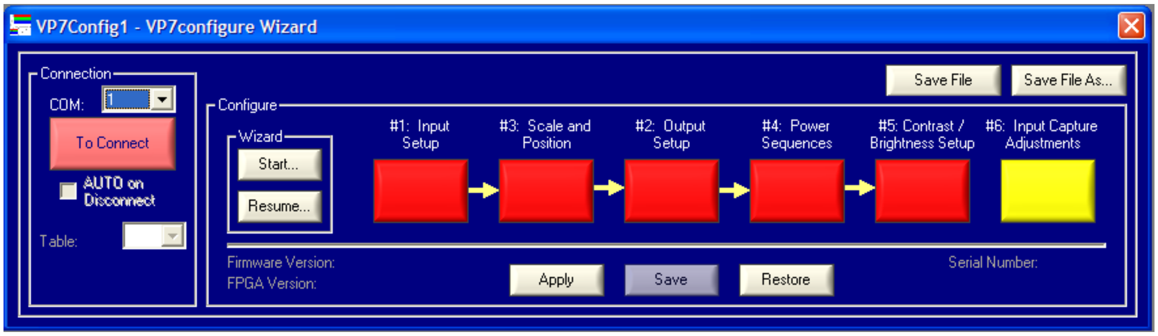


Figure 1 VP7configure™ Wizard

4 Using the VP7configure™ Wizard

The VP7configure™ Wizard performs the steps necessary to configure a VP7™ box. Its graphical user interface outlines the logical flow for setting up a VP7™. It can be used while a VP7™ is connected and changes can be applied immediately, or a file can be created, saved, and applied to a VP7™ at a later time.

4.1 Connecting to a VP7™

To connect to a VP7™, connect the RS-232 connector of the VP7™ to the RS-232 communications port on the computer. Select the COM port number from the **COM:** drop-down menu. Then click the red To **Connect** button.

Figure 2 Connect

If a VP7™ is detected, a window will appear asking "Do you want to load settings from the VP7 into the wizard?" Select **Yes** if you wish to read the settings from the VP7™, and load them into the VP7configure™ Wizard. Select **No** to retain the settings that are already in the VP7configure™ Wizard.

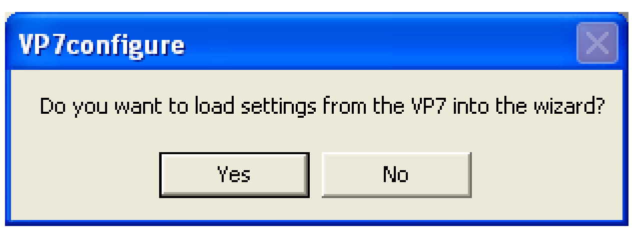


Figure 3 Load Settings

If the VP7™ was in AUTO mode, it will be set to fixed mode while editing, and can then be set back to AUTO mode upon disconnecting. A message will appear indicating this.

After connecting, the button labeled "To Connect" will change to green and be labeled "To Disconnect." The "Table" (see section 4.1.1), "Firmware Version," and "FGPA Revision" will be shown.

To disconnect from a VP7™, click the green **To Disconnect** button.

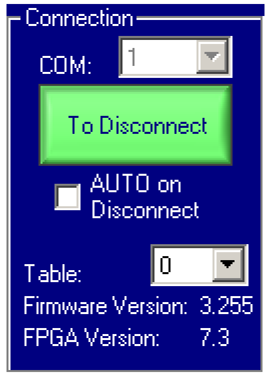


Figure 4 Disconnect

4.1.1 Selecting a Table

The VP7™ allows for 8 different "tables," or configuration sets. Once a VP7™ is connected, the "Table" drop down list will be enabled, and the table number will be automatically selected. To change the table, click the drop down list, and select from 0 through 7. After changing the table, a window will appear asking "Do you want to load settings from the VP7 table into the wizard?" Select **Yes** if you wish to read the settings from the VP7™ table, and load them into the VP7configure™ Wizard. Select **No** to retain the settings that are already in the VP7configure™ Wizard.

4.1.2 AUTO Table Selection

The VP7™ can be set up to automatically load the table which matches the input video. A table must be created for every possible input video to use auto-mode. Using AUTO mode is not recommended when the input video is constant. AUTO mode is only supported in VP7™ firmware version 3.0 and later.

To enable AUTO mode, select **AUTO on Disconnect**. The option will have been already selected if the VP7™ was already in AUTO mode when connected. The VP7™ will be set to AUTO upon disconnecting. To disable AUTO mode, deselect **AUTO on Disconnect**, and click **To Disconnect**.

4.2 Running the Wizard

The wizard performs the following steps:

STEP 1: *Configure input capture parameters.*

STEP 2: *Define the characteristics of the output video.*

STEP 3: *Select the area of interest of the input video. Scale and position the area of interest onto the output video.*

STEP 4: *Define the power sequences for the critical events. Select options for when valid input video is lost.*

STEP 5: *Select methods for controlling Contrast and Brightness.*

STEP 6: *Adjust the color capture from the input video. Adjust the input capture boundary and ADC clock phase.*

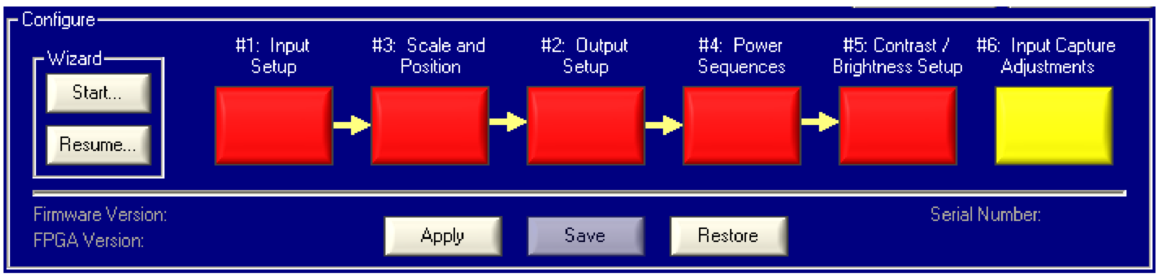


Figure 5 Wizard

4.2.1 Entering the Wizard

To begin using the wizard, click **Start…** If you have previously engaged the wizard, but closed out of the process, click **Resume…** to return to where you left off. To move directly to an individual step within the process you may click the corresponding button on the main window. While inside a step, the corresponding button will be highlighted in a yellow square. Starting at the beginning of the wizard is recommended when configuring a VP7™.

4.2.2 Moving Between Steps

To move to the next step in the wizard process, click **Next>** in the lower right hand corner of the window. To move to the previous step click **<Previous**. On the last step of the wizard, click **Finish** to leave the wizard. To leave the wizard, and discard the changes for the current step, close the window by clicking the **X** in the upper right hand corner of the window.

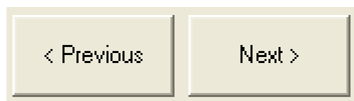


Figure 6 Next, Previous

The wizard validates each step after it is performed. When you click "Next>" or "<Previous," the parameters you just entered will be checked. If they are valid, the wizard will move on, and the button corresponding to the step will turn green. If a problem is found, a message will be displayed describing the problem. It will ask, "Continue anyway?" If you select **Yes**, the wizard will move on, but the button will remain red. If you select **No**, the wizard will remain at the current step.

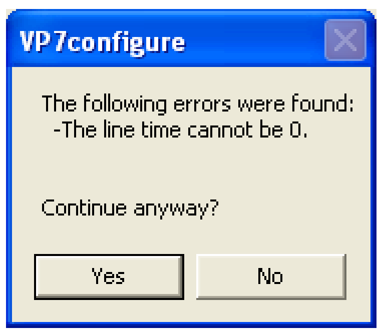


Figure 7 Problem Found

4.3 Input Setup

The parameters for capturing the input video are defined under "Input Setup." This is the first step in the configuration process. To go directly to this step, click the button under "Step #1: Input Setup."

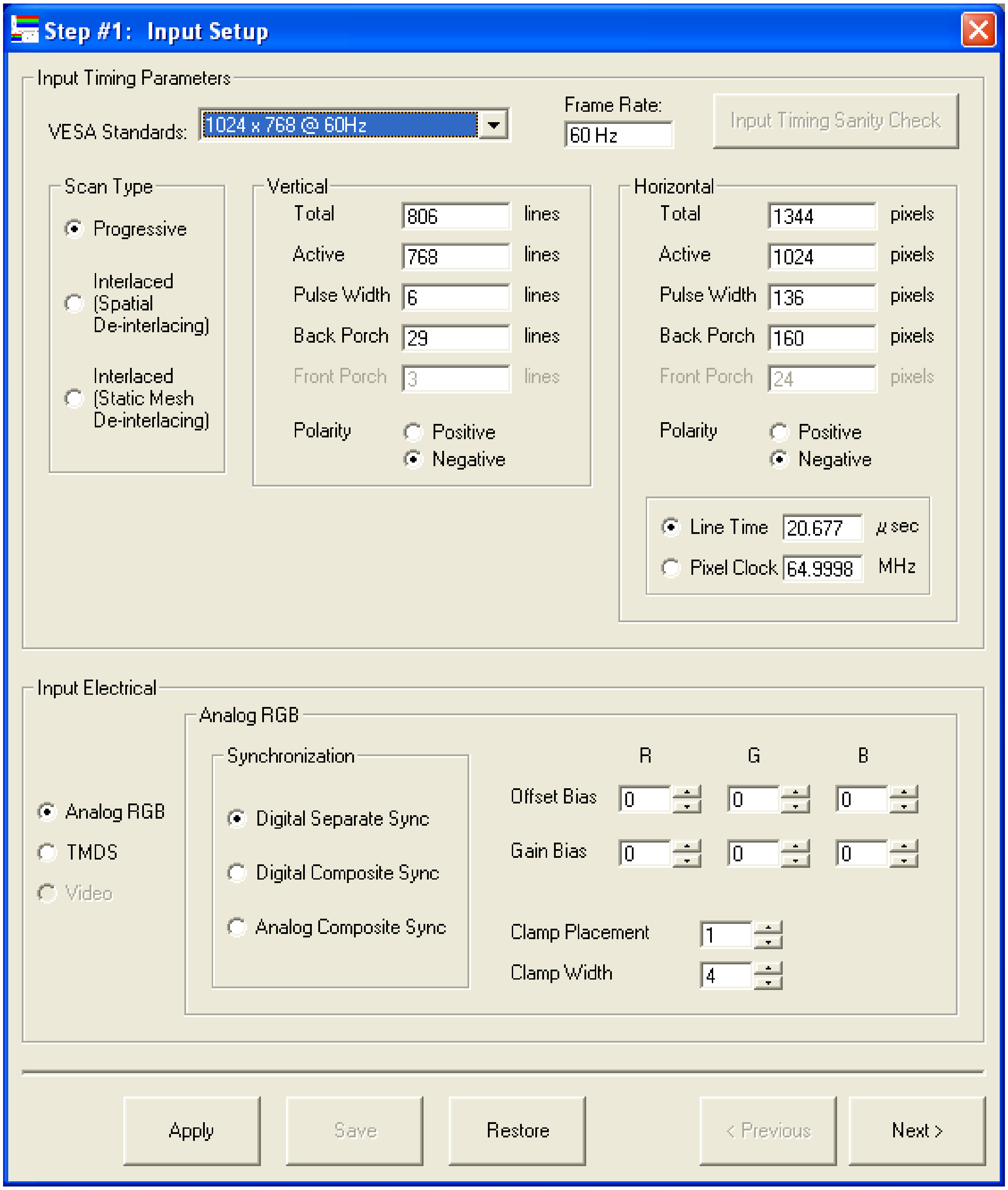


Figure 8 Input Setup

4.3.1 Input Timing Parameters

The input timing parameters are set to match the characteristics of the input video so the video data can be correctly captured. If the input parameters are changed at any time, the input adjustments will be reset to zero.

4.3.1.1 VESA Standard

There are several predefined timing specifications that can be automatically applied to the timing parameters. To use a predefined standard, click the drop-down list and select the one you wish to use. The fields in the "Input Timing Parameters" frame will be automatically filled in.

If the parameters in the fields match one of the VESA standards in the list, that standard will automatically be selected in the drop-down list. If not, **Custom** will be selected in the list.

4.3.1.2 Scan Type

Select **Progressive** if each line of input video is sent one line after the other. Select **Interlaced** if lines are sent in two interlaced fields, one containing even numbered lines and the other containing odd numbered lines. Select the "Interlaced" option that corresponds to the de-interlacing method that is used, **Spatial** or **Static Mesh** de-interlacing. Spatial de-interlacing should be used for video with high motion content (like a camera). Static mesh de-interlacing should be used for low motion content video (like computer graphics). Static mesh de-interlacing is supported in VP7™ firmware version 3.0 and later.

If the input video is interlaced, the back porch values for the odd and even lines can be different. When **Interlaced** is selected, an additional field for the even back porch value is added to the "Vertical" parameters.

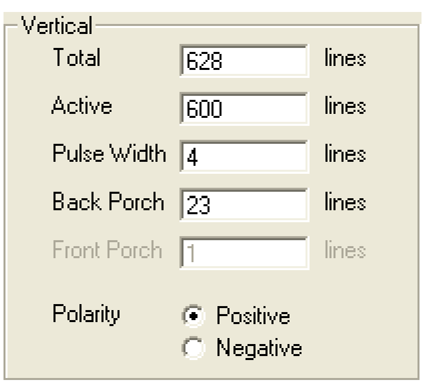


Figure 9 Progressive Scan

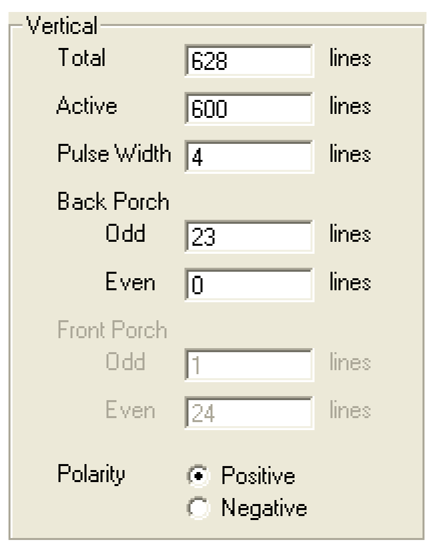


Figure 10 Interlaced

4.3.1.3 Vertical

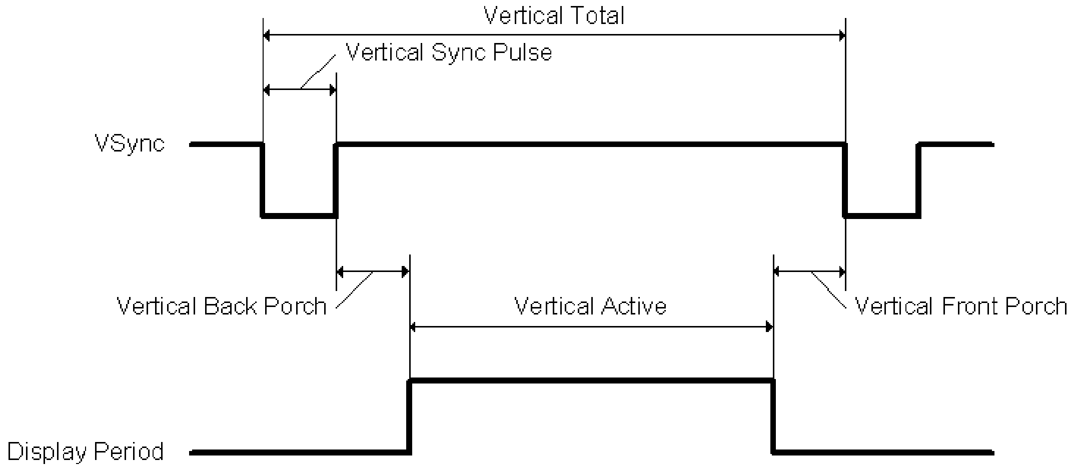


Figure 11 Vertical Timing Diagram

Total

Vertical Total defines the total number of lines of input video, including blanking.

Active

Vertical Active defines the number of active or visible lines of input video.

Pulse Width

Vertical Pulse Width defines the width of the vertical sync pulse in lines.

Back Porch

Vertical Back Porch defines the number of lines between the end of the vertical sync pulse and the beginning of active video. If **Progressive** is selected as the scan type, only "Back Porch" is used. If **Interlaced** is selected, "Back Porch Odd" defines the back porch for the odd fields, and "Back Porch Even" defines the back porch for the even fields.

Front Porch

Vertical Front Porch defines the number of lines between the end of active video and the beginning of the vertical sync pulse. It is calculated automatically when a vertical timing parameter changes, and cannot be set. If **Progressive** is selected as the scan type, only "Front Porch" is shown. If **Interlaced** is selected, "Front Porch Odd" shows the front porch for the odd fields, and "Front Porch Even" shows the front porch for the even fields.

Polarity

Vertical Polarity defines the polarity of the vertical sync pulse. Select **Positive** if the pulse is active high and **Negative** if the pulse is active low.

4.3.1.4 Horizontal

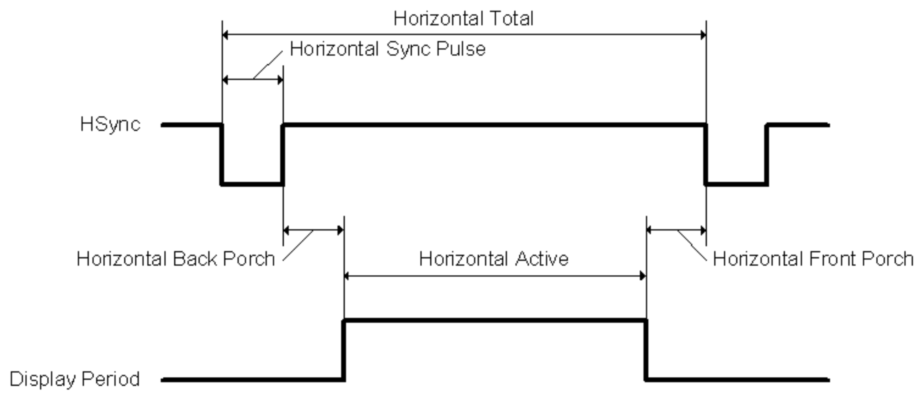


Figure 12 Horizontal Timing Diagram

Total

Horizontal Total defines the total number of pixels in one line of input video, including blanking.

Active

Horizontal Active defines the number of active or visible pixels of one line of input video.

Pulse Width

Horizontal Pulse Width defines the width of the horizontal sync pulse in pixels.

Back Porch

Horizontal Back Porch defines the number of pixels between the end of the horizontal sync pulse and the beginning of active video.

Front Porch

Horizontal Front Porch defines the number of lines between the end of active video and the beginning of the horizontal sync pulse. It is calculated automatically when a horizontal timing parameter changes, and cannot be set.

Polarity

Horizontal Polarity defines the polarity of the horizontal sync pulse. Select **Positive** if the pulse is active high, and **Negative** if the pulse is active low.

Line Time or Pixel Clock

The capture rate can either be defined by line time or the pixel clock rate. Select line time by clicking the **Line Time** option or pixel clock by selecting the **Pixel Clock** option. "Line Time" defines the time that it takes to scan one line of video. Its units are microseconds (µsec). "Pixel Clock" defines the rate that pixels are scanned. Its units are megahertz (MHz).

4.3.2 Input Timing Sanity Check

The Input Timing Sanity Check can be used as a measurement tool to verify and detect your input timing parameters. Some measurements are directly measurable while others require some conditions to be met. To use the Sanity Check tool click **Input Timing Sanity Check**.

4.3.2.1 Analog RGB

This tool is intended to help you verify that your Input Timing parameters are set up correctly for Analog RGB video.

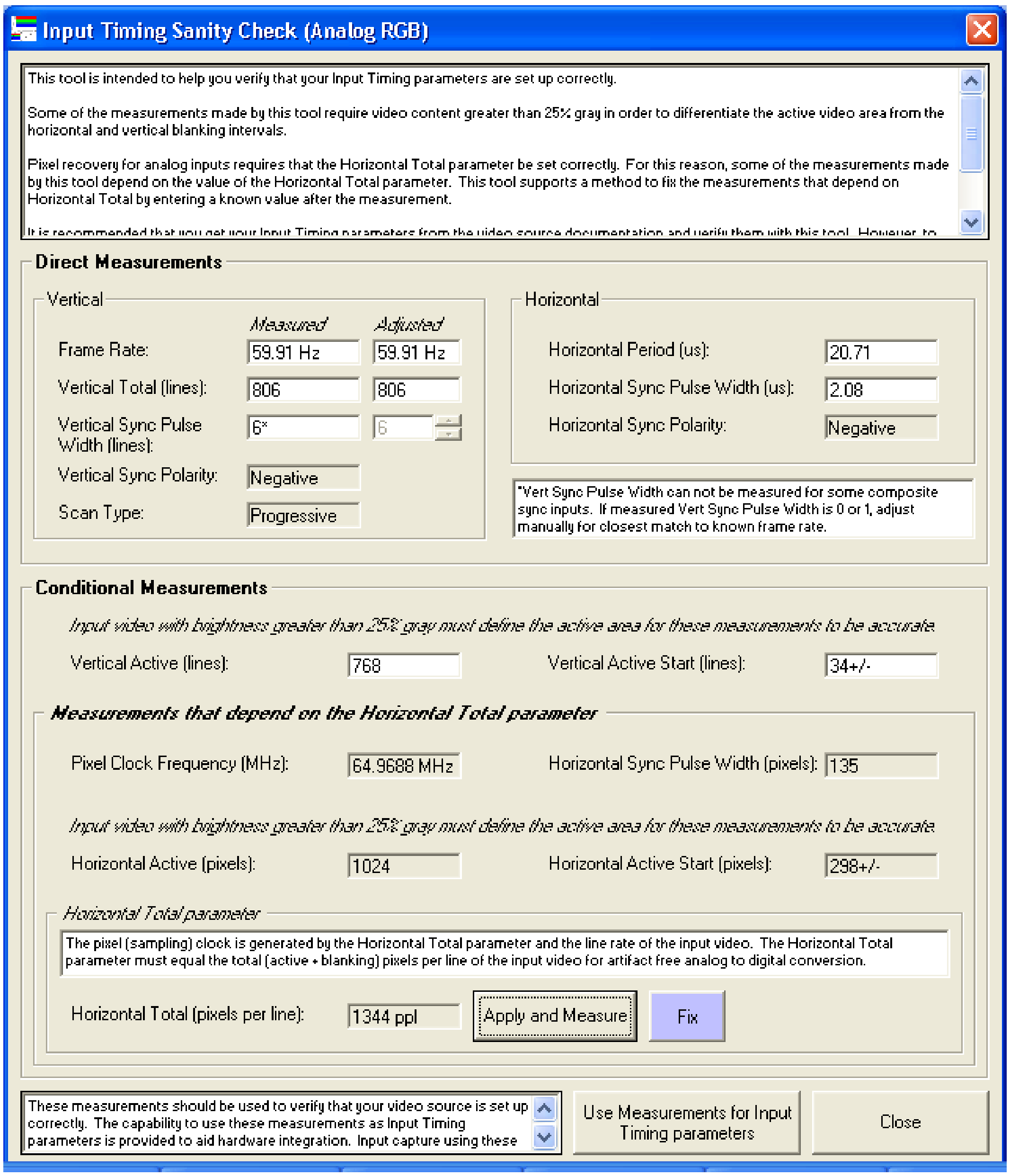
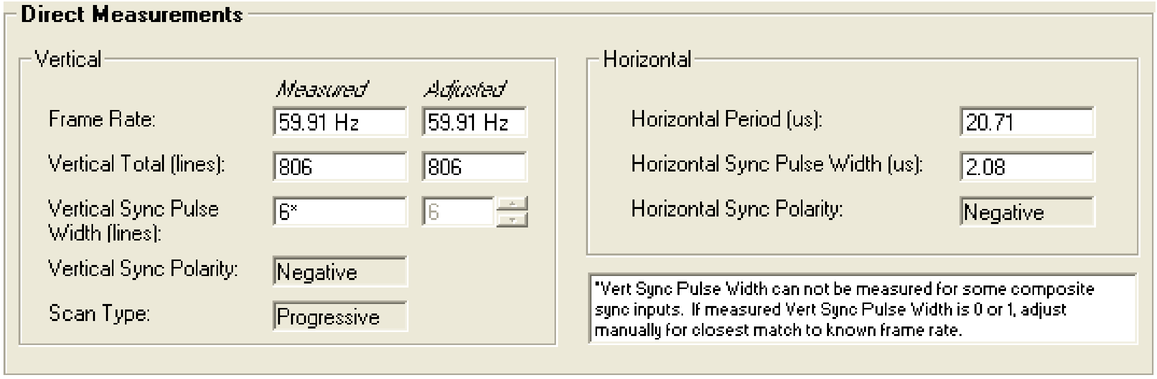


Figure 13 Input Timing Sanity Check (Analog RGB)

4.3.2.1.1 Direct Measurements



Direct measurements are measurements that can be arbitrarily measured for a valid analog RGB source. This means the timing of the video does not need to be known, and the video content can be anything. These measurements include:

Frame Rate (Hz)

Vertical Total (lines)

Vertical Sync Pulse Width (lines)

Vertical Sync Polarity (Positive, Negative)

Scan Type (Progressive, Interlaced)

Horizontal Period (µs)

Horizontal Sync Pulse Width (µs)

Horizontal Sync Polarity (Positive, Negative)

The Vertical Sync Pulse Width cannot be measured for some composite sync inputs. If measured Vertical Sync Pulse Width is 0 or 1, adjust manually for closest match to known frame rate. To adjust, click the up and down arrows.

4.3.2.1.2 Conditional Measurements

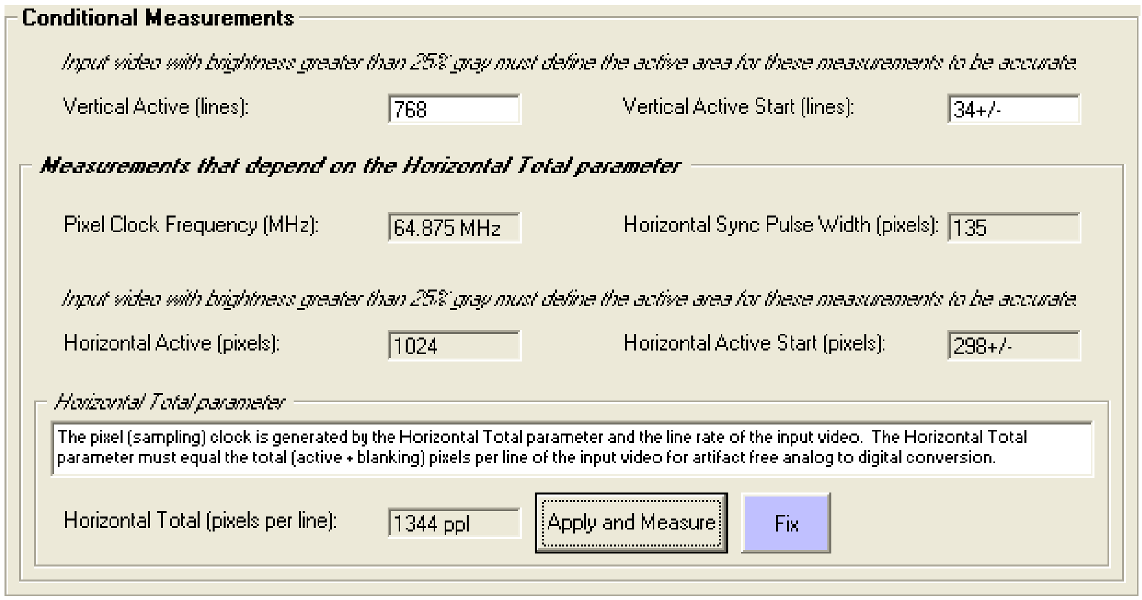
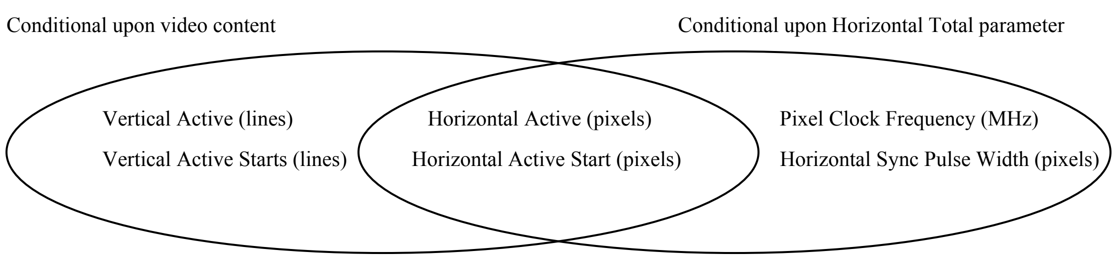


Figure 14 Conditional Measurements

Pixel recovery for analog inputs requires that the Horizontal Total parameter be set correctly. For this reason, some of the measurements made by the Input Timing Sanity Check depend on the value of the Horizontal Total parameter. In addition some of the measurements require video content greater than 25% gray in order to differentiate the active video area from the horizontal and vertical blanking intervals. These measurements are included under "Conditional Measurements." The grouping of measurements is shown below:



4.3.2.1.3 Apply and Measure

To apply the current Horizontal Total parameter, and measure the other timing parameters, click **Apply and Measure**. The results will be shown in the appropriate fields.

4.3.2.1.4 Fix

The sanity check supports a method to fix the measurements that depend on Horizontal Total by entering a known value after the measurement. The pixel (sampling) clock is generated by the Horizontal Total parameter and the line rate of the input video. The Horizontal Total parameter must equal the total (active + blanking) pixels per line of the input video for artifact free analog to digital conversion. To use the fixing feature, click **Fix**.

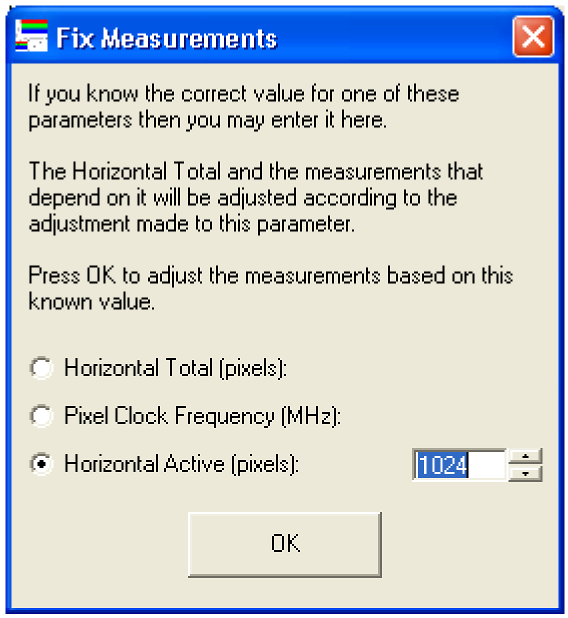
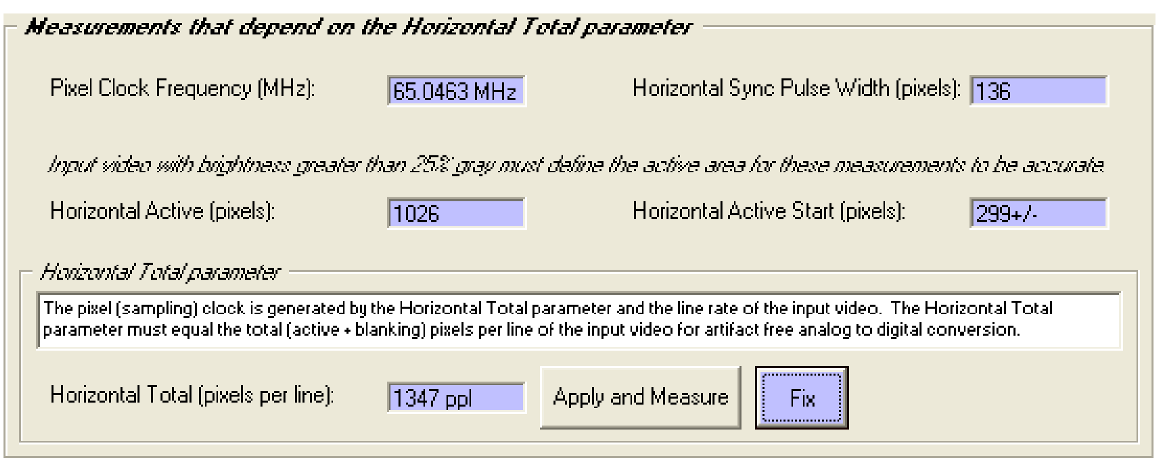


Figure 15 Fix

If you know the correct value for the Horizontal Total, Pixel Clock Frequency, or Horizontal Active, click the option button beside it. Enter the value, and click **OK**. The Horizontal Total and the measurements that depend on the value will be adjusted according to the adjustment made to the parameter. The adjusted parameters will appear in blue. Click **Apply and Measure** again to apply the adjusted Horizontal Total, and re-measure all the parameters.



4.3.2.1.5 Use Measurements for Input Timing Parameters

It is recommended that you get your Input Timing parameters from the video source documentation and verify them with the sanity check. However, to aid in integration, it is possible to use measurements made by the sanity check as the Input Timing parameters. After a few iterations, of Measure/Fix, the measurements made by the sanity check will approach the actual values of the video source. Due to the resolution of some of these measurements, input capture using these measurements (specifically, Horizontal Total) as the Input Timing parameters will probably have artifacts and will need to be fixed. To use the measurements, click **Use Measurements for Input Timing Parameters**.

4.3.2.2 TMDS and Video

This tool is intended to help you verify that your Input Timing parameters are set up correctly for TMDS and Video input formats. To measure the video parameters, click **Measure**.

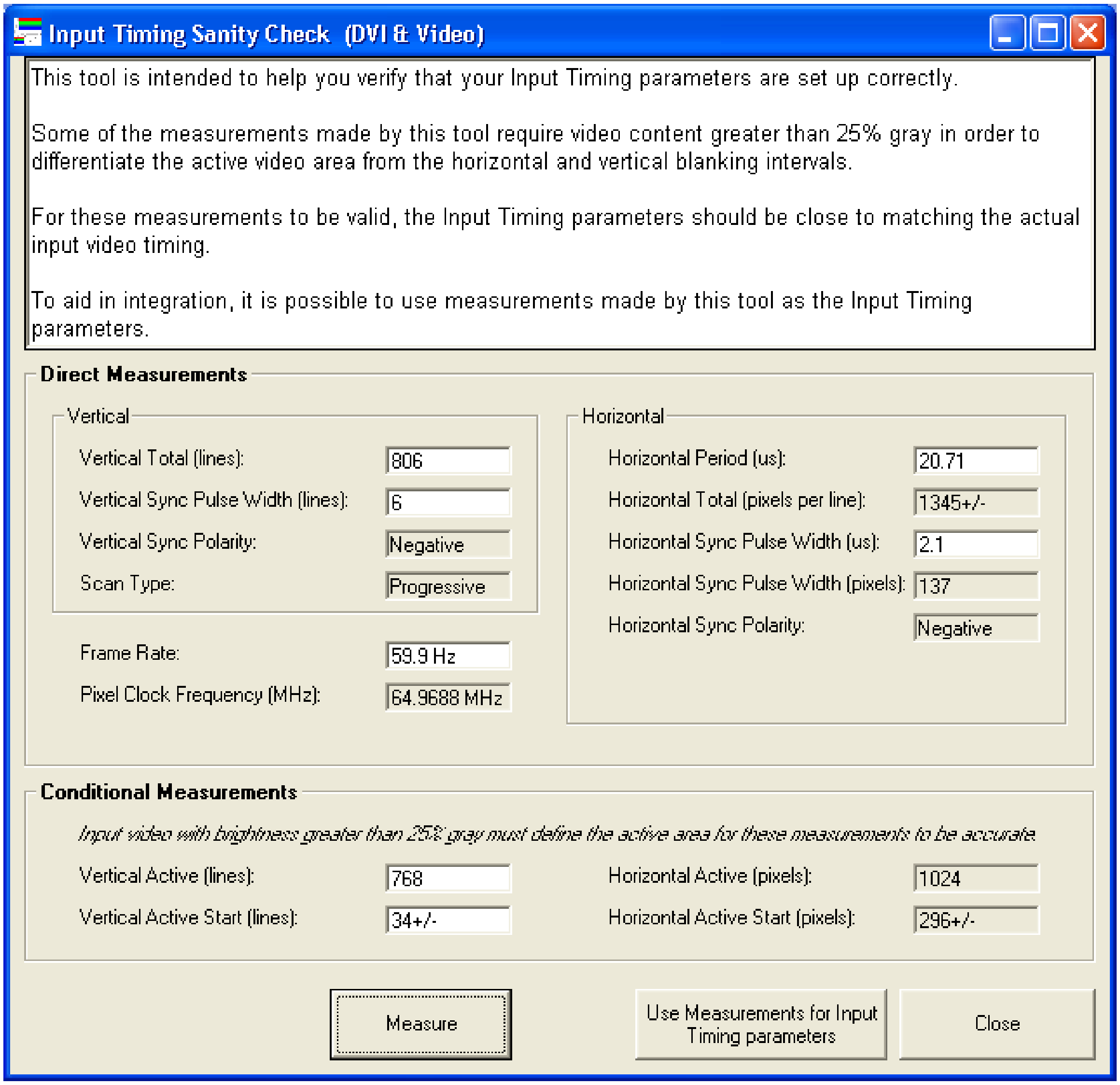


Figure 16 Input Timing Sanity Check (TMDS and Video)

4.3.2.2.1 Direct Measurements

Direct measurements are measurements that can be arbitrarily measured for a valid TMDS or Video source. This means the timing of the video does not need to be known, and the video content can be anything. These measurements include:

Vertical Total (lines)

Vertical Sync Pulse Width (lines)

Vertical Sync Polarity (Positive, Negative)

Scan Type (Progressive, Interlaced)

Frame Rate (Hz)

Pixel Clock Frequency (MHz)

Horizontal Period (µs)

Horizontal Total Pixels (pixels per line)

Horizontal Sync Pulse Width (µs)

Horizontal Sync Pulse Width (line)

Horizontal Sync Polarity (Positive, Negative)

4.3.2.2.2 Conditional Measurements

Some of the measurements made by this tool require video content greater than 25% gray in order to differentiate the active video area from the horizontal and vertical blanking intervals. The measurements include:

Vertical Active (lines)

Vertical Active Start (lines)

Horizontal Active (pixels)

Horizontal Active Start (pixels)

4.3.2.2.3 Use Measurements for Input Timing Parameters

It is recommended that you get your Input Timing parameters from the video source documentation and verify them with the sanity check. However, to aid in integration, it is possible to use measurements made by the sanity check as the Input Timing parameters. To use the measurements, click **Use Measurements for Input Timing Parameters**.

4.3.3 Input Electrical

The input electrical parameters define the format of the input video. There are three choices for video formats selectable by radio buttons: **Analog RGB**, **TMDS**, and **Video**. When a format is selected, the fields to the right of the choices will change to match the selected format.

4.3.3.1 Analog RGB

Select **Analog RGB** if the input video format is analog RGB. Complete the fields to the right to configure the analog to digital converter.

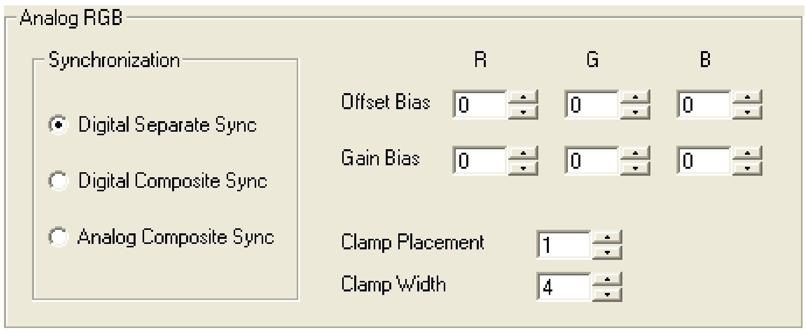


Figure 17 Analog RGB

Synchronization

Select **Digital Separate Sync** if the horizontal and vertical synchronization signals are separate. Select **Digital Composite Sync** if the horizontal and vertical synchronization signals are combined into one signal. Select **Analog Composite Sync** (sync on green) if the horizontal and vertical synchronization signals are combined on the green video signal.

Offset Bias

The offset biases are added to the calibration values that eliminate the DC offset from the analog video signals. Each color component (R, G, and B) has an offset bias.

Gain Bias

The gain biases are added to the calibration values that aligns the full analog RGB range of the analog video signals. Each color component (R, G, and B) has a gain bias.

Clamp Placement

"Clamp Placement" defines the starting position after a horizontal sync pulse when the input analog signal is clamped for DC restoration. It is programmed in increments of eight input clock edges. In most cases, the clamp placement can be set to "1."

Clamp Width

"Clamp Width" defines the interval that the input analog signal is clamped for DC restoration. It is programmed in increments of eight input clock edges. In most cases, the clamp width can be set to "4."

4.3.3.2 TMDS

Select **TMDS** if the input video format is TMDS.

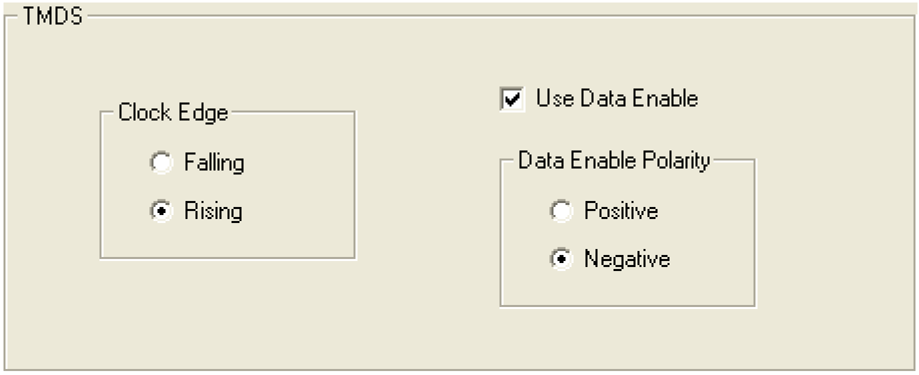


Figure 18 TMDS

Clock Edge

Select **Falling** if pixel data is latched on the falling edge of the input clock. Select **Rising** if pixel data is latched on the rising edge of the input clock.

Use Data Enable

Select the option **Use Data Enable** to use the data enable signal to qualify active data. De-select the option to identify active data arbitrarily within the line.

Data Enable Polarity

Select **Positive** if active data is present when the data enable signal is high. Select **Negative** if active data is present when the data enable signal is low.

4.3.3.3 Video

Select **Video** if the input video format is ITU656 video. (*NOTE* the Video option is only enabled on VP7 boards with firmware version 4.0 and higher).

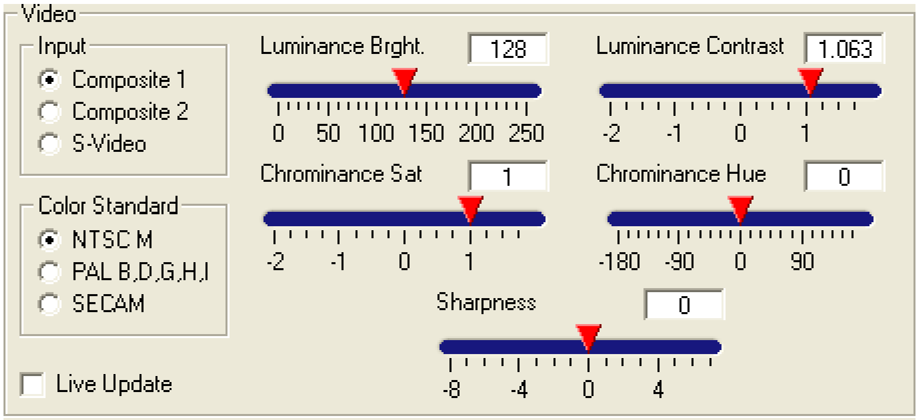


Figure 19 Video

Input

Select the physical connector of the input video. Choose between **Composite 1**, **Composite 2**, or **S-Video**.

Color Standard

Select the color standard of the input video. The options are **NTSC M**, **PAL B,D,G,H,I**, and **SECAM**.

Live Update

Select "Live Update" to update the hardware incrementally as the Video parameters are adjusted.

Luminance Brightness

Adjust the "Luminance Brightness" using the sliders, or by entering a value from 0 to 255. A value of 255 gives maximum brightness, 128 is the ITU level, and 0 is dark.

Luminance Contrast

Adjust the "Luminance Contrast" using the sliders, or by entering a value from -2 to 1.984. A value of 1.063 is the ITU level, 0 yields no luminance, -1 gives inverse luminance, and -2 gives inverse luminance.

Chrominance Saturation

Adjust the "Chrominance Saturation" using the sliders, or by entering a value from -2 to 1.984. A value of 1.0 is the ITU level, 0 yields no color, -1 gives inverse chrominance, and -2 gives inverse chrominance.

Chrominance Hue

Adjust the "Chrominance Hue" using the sliders, or by entering a value from -180 to 178.6 degrees.

Sharpness

Adjust the "Sharpness" using the sliders, or entering a value from -8 to 7.

4.4 Output Setup

The parameters for the output video are configured under "Output Setup." This is the second step in the configuration process. To go directly to this step, click the button under "Step #2: Output Setup."

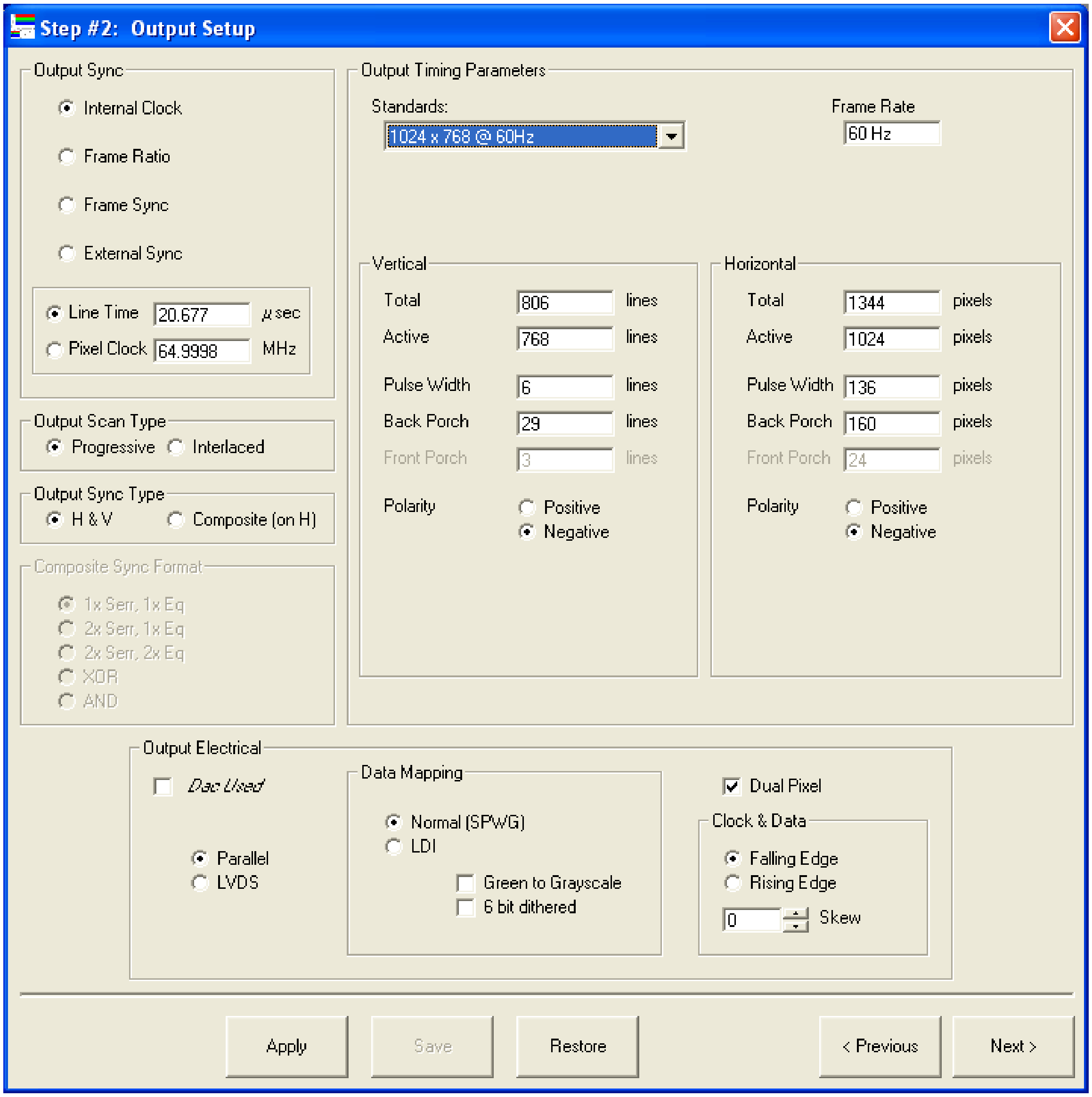


Figure 20 Output Setup

4.4.1 Output Sync

4.4.1.1 Internal Clock

Select **Internal Clock** to use an internally generated output clock to generate the output video.

4.4.1.2 Frame Ratio

Select **Frame Ratio** to synchronize the output video to the input video at a certain ratio of frames. For every number of frames of input video, there can be a certain number of frames output. When using "Frame Ratio," the pixel clock of the output video is adjusted to satisfy the ratio. Enter the number of input frames into **In Frames**, and the number of output frames into **Out Frames**.

4.4.1.3 Frame Sync

Select **Frame Sync** to synchronize the refresh rate of the output video to that of the input video. One output frame is generated for every input frame and a constant phase relationship exists between the output and input frames such that no video data is lost. There will be limits to this feature. At this time, we cannot guarantee the output timing parameters.

4.4.1.4 External Sync

Select **External Sync** to generate an output frame each time an externally supplied pulse is received. As with Frame Sync, the output timing is generated at the specified clock rate. The extent to which a complete output frame can be generated is determined by the rate of the externally supplied pulses.

4.4.1.5 Clock

The "Clock" field sets the rate of the output video clock, or how quickly each pixel datum is sent out.

4.4.2 Output Scan Type

Select Progressive to scan out video one line after another. Select interlace to scan out video in two interlaced fields, one with odd lines, and one with even. When using interlaced, alternate options for setting the timing parameters are used (see section 4.5).

4.4.3 Output Sync Type

4.4.3.1 H & V

Select this option to use separate digital H and V sync signals.

4.4.3.2 Composite (on H)

Select this option to combine the output H and V syncs onto the digital H sync channel. *(A.K.A. Digital Composite Sync.)* When using this option, alternate options for setting the timing parameters are used (see section 4.5).

4.4.4 Output Timing Parameters (Progressive Scan)

The output timing parameters define the timing characteristics of the output video.

4.4.4.1 VESA Standard

There are several predefined timing specifications that can be automatically applied to the timing parameters. To use a predefined standard, click the drop-down list and select the one you wish to use. The fields in the "Output Timing Parameters" frame will be filled in automatically.

If the parameters in the fields match one of the VESA standards in the list, that standard will automatically be selected in the drop-down list. If not, **Custom** will be selected in the list.

4.4.4.2 Frame Rate

This is an indicator that shows the output frame rate. The Frame Rate is based on the Line Time and the total number of lines (Vertical Total).

4.4.4.3 Vertical

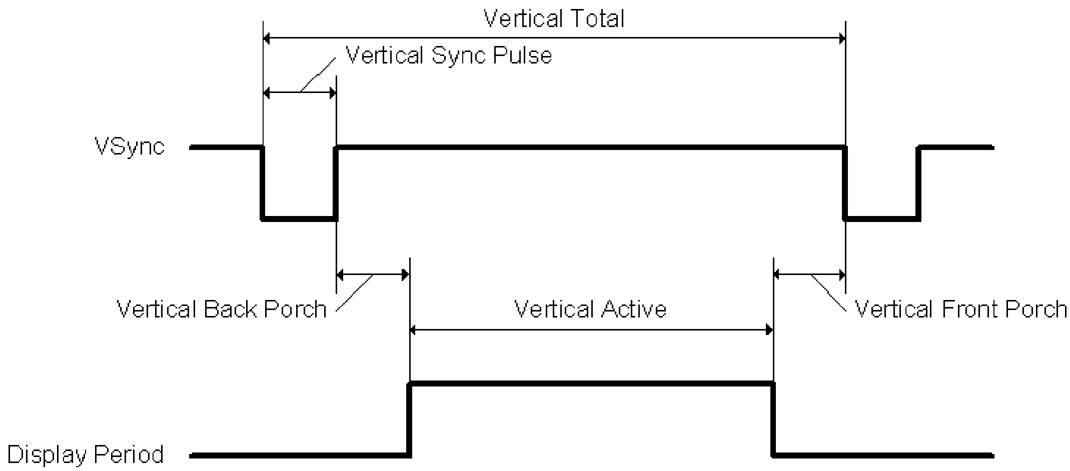


Figure 21 Vertical Timing Diagram

Total

Vertical Total defines the total number of lines of output video, including blanking.

Active

Vertical Active defines the number of active or visible lines of output video.

Pulse Width

Vertical Pulse Width defines the width of the vertical pulse in lines.

Back Porch

Vertical Back Porch defines the number of lines between the end of the vertical sync pulse and the beginning of active video.

Front Porch

Vertical Front Porch defines the number of lines between the end of active video and the beginning of the vertical sync pulse. It is calculated automatically when a vertical timing parameter changes, and cannot be set.

Polarity

Vertical Polarity defines the polarity of the vertical sync pulse. Select **Positive** if the pulse is active high and **Negative** if the pulse is active low.

4.4.4.4 Horizontal

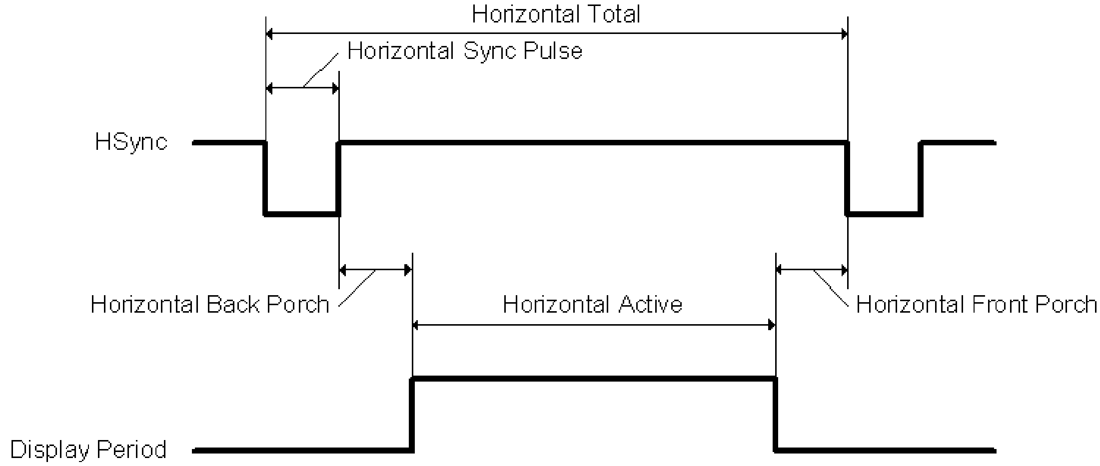


Figure 22 Horizontal Timing Diagram

Total

Horizontal Total defines the total number of pixels in one line of output video, including blanking.

Active

Horizontal Active defines the number of active or visible pixels of one line of output video.

Pulse Width

Horizontal Pulse Width defines the width of the horizontal sync pulse in pixels.

Back Porch

Horizontal Back Porch defines the number of pixels between the end of the horizontal sync pulse and the beginning of active video.

Front Porch

Horizontal Front Porch defines the number of lines between the end of active video and the beginning of the vertical sync pulse. It is calculated automatically when a horizontal timing parameter changes, and cannot be set.

Polarity

Horizontal Polarity defines the polarity of the horizontal sync pulse. Select **Positive** if the pulse is active high and **Negative** if the pulse is active low.

4.4.5 Output Electrical

"Output Electrical" defines the format of the output video.

4.4.5.1 Parallel

Select **Parallel** if the output video format is parallel.

4.4.5.2 LVDS

Select **LVDS** if the output video format is LVDS (Low Voltage Different Signal).

4.4.5.3 Data Mapping

The output video data signals can be mapped in different fashions. Select **Normal (SPWG)** to use the Standard Printed Wiring Group configuration. This configuration is also the mapping to use for normal parallel output. Select **LDI** to use the LDI configuration.

4.4.5.4 Green to Grayscale

Use the green video signal to produce monochrome output.

4.4.5.5 6 Bit Dithered

Dither bit 2, (b1,b0 = 0) to make a 6 bit panel appear to have 8 bits.

4.4.5.6 Dual Pixel

Select **Dual Pixel** if the display being driven requires dual pixel video.

4.4.5.7 Clock Edge

Select **Falling Edge** to output pixel data on the falling edge of the output clock. Select **Rising Edge** to output pixel data on the rising edge of the output clock.

4.4.5.8 DAC Used

Select **DAC Used** to force the output electrical parameters to support the Westar DAC board. When selected, the "Data Mapping" will be set to "SPWG 8-bit," format set to "Parallel," and Clock Edge set to "Rising." Toggling Discrete 0 will not be allowed in any power sequences, since it is used by the DAC for selecting single or dual pixel.

4.5 Output Setup (Interlaced Scan or Composite Sync Output)

The parameters for the output video are configured under "Output Setup." Many parameters are common to both progressive scan and interlaced output timing. This section documents the parameters that are specific to interlaced outputs or progressive with composite sync outputs.

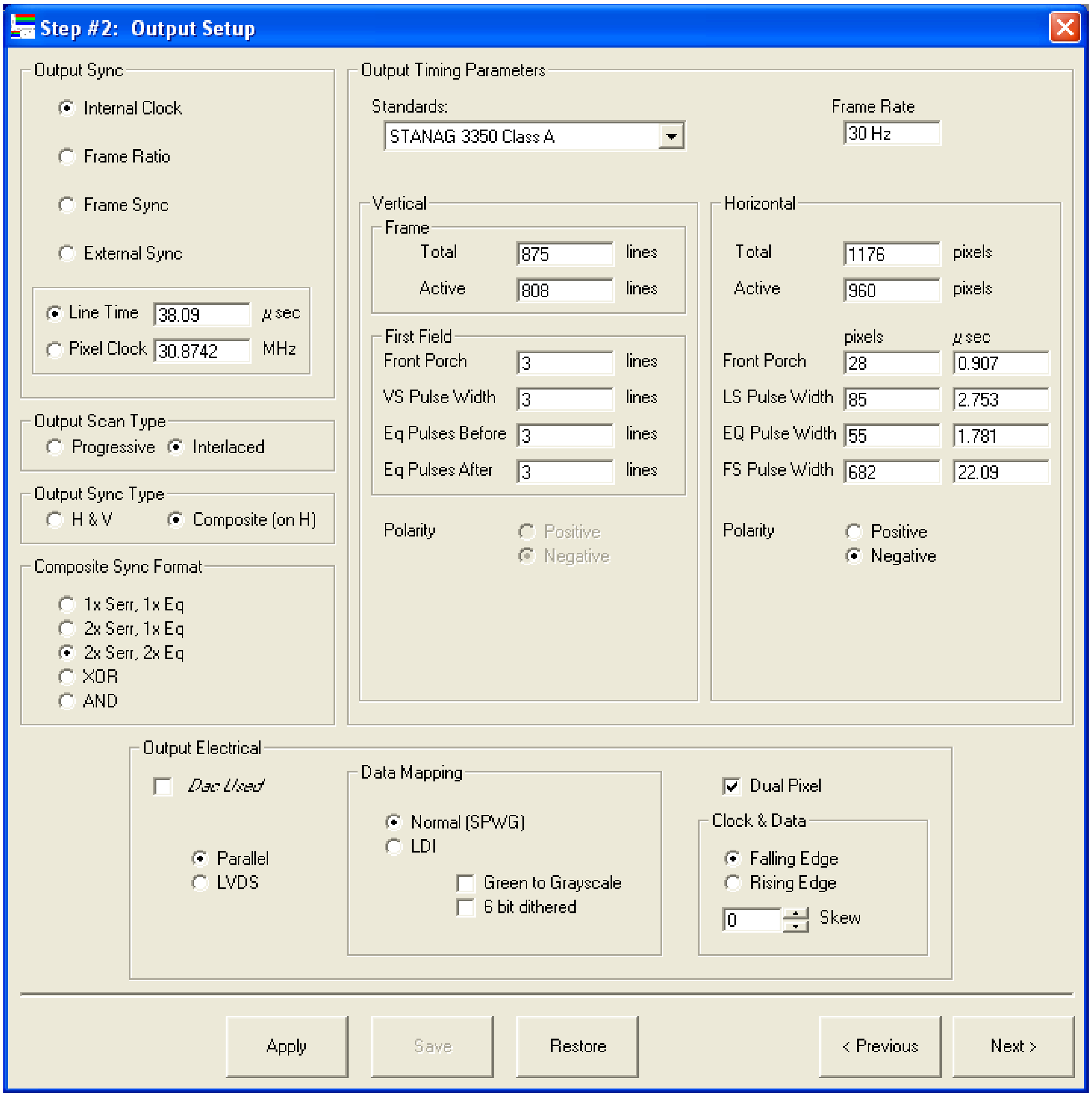


Figure 23 Output Setup (Interlaced Scan or Composite Sync Output)

4.5.1 Sync Format

The Sync Format describes the behavior of the H and V sync signals during the vertical blanking interval for composite type syncs.

Serration Pulses: Serration pulses are generated during the vertical sync pulse. They are generated at either 1x or 2x the horizontal line rate and are positioned according to the horizontal front porch. They are also known as field sync pulses. Their width is described by the field sync (FS) pulse width.

Equalization pulses: Equalization pulses are generated before and after the vertical sync pulse. They are generated at either 1x or 2x the horizontal line rate and are positioned according to the horizontal front porch. Their width is described by the equalization (EQ) pulse width.

1x Serr, 1x Eq – Serration pulses are generated at 1x the horizontal line rate. Equalization pulses are generated at 1x the horizontal line rate.

2x Serr, 1x Eq – Serration pulses are generated at 2x the horizontal line rate (2 per line). Equalization pulses are generated at 1x the horizontal line rate.

2x Serr, 2x Eq – Serration pulses are generated at 2x the horizontal line rate (2 per line). Equalization pulses are generated at 2x the horizontal line rate (2 per line).

XOR – There are no serration or equalization pulses. Horizontal sync pulses are effectively inverted during the vertical sync pulse.

AND - There are no serration or equalization pulses. There are no horizontal sync pulses are effectively inverted during the vertical sync pulse.

4.5.2 Output Timing Parameters

The output timing parameters define the timing characteristics of the output video.

4.5.2.1 Vertical

A complete frame of interlaced video is made up of two fields. Each field draws either even or odd numbered lines on the display.

4.5.2.1.1 Frame Parameters

Total

Vertical Total defines the total number of lines of output video, including blanking, per frame.

Active

Vertical Active defines the number of active or visible lines of output video per frame.

4.5.2.1.2 First Field

Front Porch

Vertical Front Porch defines the number of line periods between the end of active video (for the 1st field) and the beginning of the vertical sync pulse. The resolution for the vertical front porch parameter is ½ lines. This is to support the "2x Serr, 2x Eq." sync format.

VS Pulse Width

VS Pulse Width defines the width of the vertical sync pulse in line periods. The resolution for the VS pulse width parameter is ½ lines. This is to support the "2x Serr, 1x Eq." and "2x Serr, 2x Eq." sync formats.

Eq Pulses Before

Eq. Pulses Before defines the number of consecutive line periods before VSync that have equalization pulses.

Eq Pulses After

Eq. Pulses After defines the number of consecutive line periods after VSync that have equalization pulses.

Polarity

Vertical Polarity defines the polarity of the vertical sync pulse. Select **Positive** if the pulse is active high and **Negative** if the pulse is active low.

4.5.2.2 Horizontal

4.5.2.2.1 Total

Horizontal Total defines the total number of pixels in one line of output video, including blanking.

4.5.2.2.2 Active

Horizontal Active defines the number of active or visible pixels of one line of output video.

4.5.2.2.3 Front Porch

Horizontal Front Porch defines the number of pixels between the end of active video and the beginning of the vertical sync pulse.   The horizontal front porch may be entered in units of pixels or time.

4.5.2.2.4 LS Pulse Width

The Line Sync Pulse Width defines the width of the horizontal sync pulses outside the vertical blanking interval and outside the region surrounding the VSync pulse covered by equalization pulses. The line sync pulse width may be entered in units of pixels or time.

4.5.2.2.5 EQ Pulse Width

The Equalization Pulse Width defines the width of the equalization pulses that lead and trail the VSync pulse. The equalization pulse width may be entered in units of pixels or time.

4.5.2.2.6 FS Pulse Width

The Field Sync (Serration) Pulse Width defines the width of the serration pulses. (The serration pulses occur within the VSync pulse.) The field sync (serration) pulse width may be entered in units of pixels or time.

4.5.2.2.7 Polarity

Horizontal Polarity defines the polarity of the horizontal sync pulses. Select **Positive** if the pulses are active high and **Negative** if the pulses are active low.

4.6 Scale and Position

The "Scale and Position" step configures the parameters that define the video I/O relationship. It has support for selecting, scaling and positioning an area of interest (AOI) from the input video onto the output video.

This is the third step in the configuration process. To go directly to this step, click the button under "Step #3: Scale and Position."

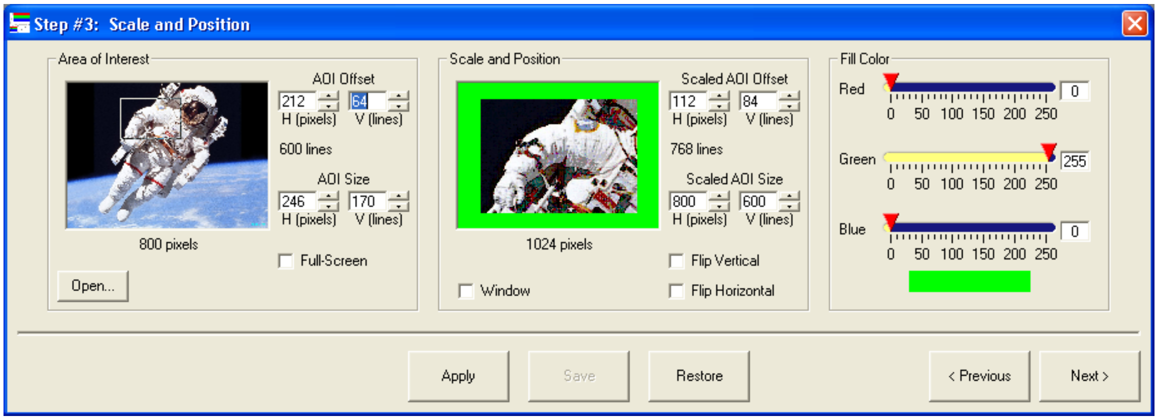


Figure 24 Scale and Position

4.6.1 Defining the Output Video

There are three steps in defining the content of the output video. First, select an area of interest (AOI) from the active area of the input video. Second, scale and position the AOI into the active area of the output video. Third, define the color to be used to fill any of the output active area that is not covered by the scaled and positioned AOI.

4.6.1.1 Area of Interest

The area of interest in the input video (AOI) is selected in the "Area of Interest" frame. The main window for selecting the AOI is proportional to the active area of the input video.

The area of interest is selected by entering the offset and size, or selecting it within the "Area of Interest" window. The AOI cannot go outside of the active area of the input video.

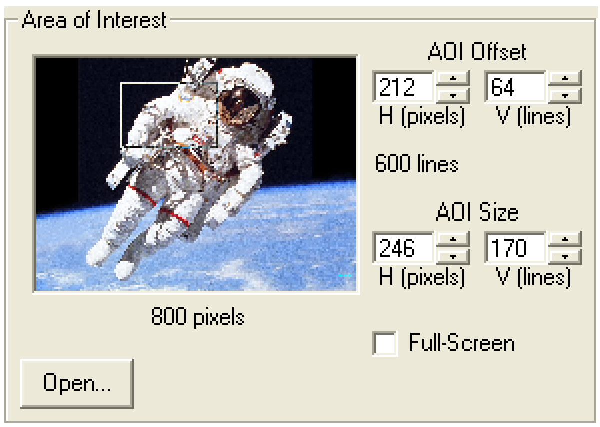


Figure 25 Area of Interest

Entering the AOI Offset

The offset of the AOI can be entered using the **AOI Offset** fields. The vertical offset is the number of lines from the top of the input active area to begin the area of interest. The horizontal offset is the number of pixels from the left of the input active area to begin the area of interest. When these fields are changed, the position of the box in the "Area of Interest" window also changes.

Entering the AOI Size

The size of the area of interest can be entered using the **AOI Size** fields. The vertical size is the number of lines in the AOI, and the horizontal size is the number of pixels in the area of interest. When these fields are changed, the size of the box in the "Area of Interest" window also changes.

Selecting the Area of Interest in the Window

Within the "Area of Interest" window, the box can be moved and sized which coarsely selects the area of interest. To move the box with the mouse, move the cursor inside the box, and the cursor will change into a "grabber" . Click and hold the mouse button and the cursor will change into a "dragger" . The box can then be dragged around within the window. To change the size of the box, move the cursor to the border of the box, and the cursor will change into an arrow indicating the directions that the size can be changed in. Click and drag to change the size. When the box is moved, the "AOI" size and offset fields are updated.

Full Screen

To force the area of interest to be the entire input active area, select the option **Full Screen**. When the area of interest is sized to be full screen, the option will be automatically selected.

Preview Image

A "preview image" can be used to represent an input source and show how the resulting output may appear. To use an image select the button labeled **Open…** and an "Open Picture" window will appear. A picture file with the extension ".bmp," ".jpg," or ".gif" may be used. If a picture is not chosen, a default image is used. When a change is made in the AOI or scale and position (see section 4.6.1.2), the image in the windows will be redrawn accordingly.

4.6.1.2 Scale and Position

The scale and position of the area of interest (Scaled AOI) is set in the "Scale and Position" frame. The window for setting the scaled AOI is proportional to the active area of the output.

The scaled AOI is set by entering the offset and size, or setting it within the "Scale and Position" window. The scaled AOI cannot go outside the output active area. The minimum vertical size of the scaled AOI is one half of the area of interest size plus one line. The minimum horizontal size of the scaled AOI is one half of the area of interest size plus one pixel.

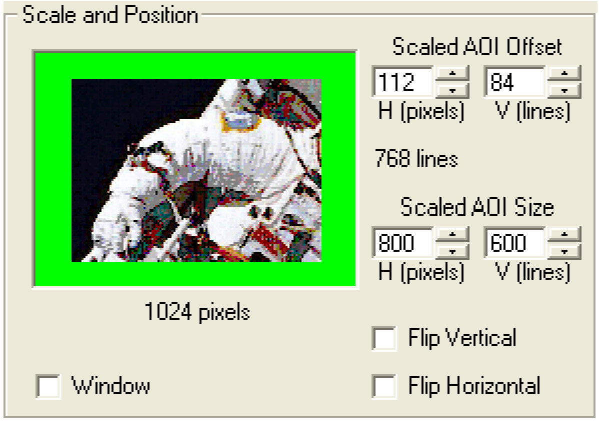


Figure 26 Scale and Position

Entering the Scaled AOI Offset

The offset of the scaled AOI can be entered using the **Scaled AOI Offset** fields. The vertical offset is the number of lines from the top of the output active area. The horizontal offset is the number of pixels from the left of the output active areas. When these fields are changed, the position of the picture in the "Scale and Position" window also changes.

Entering the Scaled AOI Size

The size of the scaled AOI can be entered using the **Scaled AOI Size** fields. The vertical size is the number of lines in the scaled AOI, and the horizontal size is the number of pixels in the scaled AOI. When these fields are changed, the size of the picture in the "Scale and Position" window also changes.

Setting the Scaled AOI in the Window

Within the "Scaled AOI" window, the picture can be moved and sized which coarsely sets the scaled AOI. To move the picture with the mouse, move the cursor inside the picture, and the cursor will change into a "grabber" . Click and hold the mouse button and the cursor will change into a "dragger" . The picture can then be dragged around within the window. To change the size of the picture, move the cursor to the border of the picture, and the cursor will change into an arrow indicating the directions that the size can be changed. Click and drag to change the size. When the picture is moved, the "Scaled AOI" size and offset fields are updated.

Window Scaled AOI

To force the scaled AOI size and offset to match the AOI, select the option **Window**. If the scaled AOI is sized and positioned to match the AOI, the option will be selected automatically.

Flip Scaled AOI

The scaled AOI can be flipped vertically or horizontally as part of the output video. To flip the scaled AOI vertically, select the **Flip Vertical** option. When using the "Flip Vertical" option, it is recommended that "Frame Ratio" be used as the output sync source. This provides greater stability. To flip the scaled AOI horizontally, select the **Flip Horizontal** option.

Figure 27 Normal Image

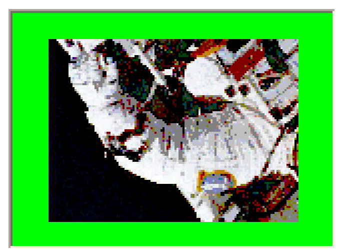


Figure 29 Flipped Vertically

Figure 28 Flipped Horizontally

Figure 30 Flipped Vertically and Horizontally

4.6.1.3 Fill Color

A solid color is used to fill the rest of the output video. The color is set using "Fill Color." Select the color using the sliders, or entering a value from 0 to 255 for each color component (RGB). The color will be shown in the in "Scale and Position" window.

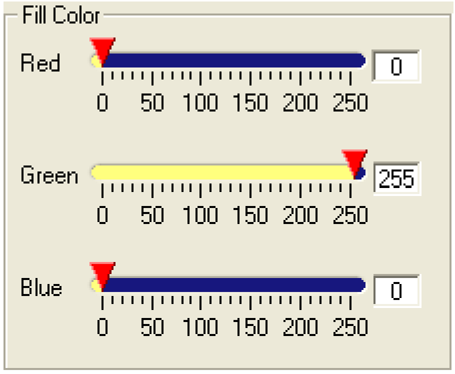


Figure 31 Fill Color

4.7 Power Sequences (VP7s with firmware version 6.0 and later)

Sequences of actions to take at critical events, and options for OSD (On-Screen Display) and flat field color are setup under the "Power Sequences" step. If the firmware version of the VP7 board connected is earlier than 6.0, or the file open was created for such a board, refer to section 4.8. This is the fourth step in the configuration process. To go directly to this step, click the button under "Step #4: Power Sequences."

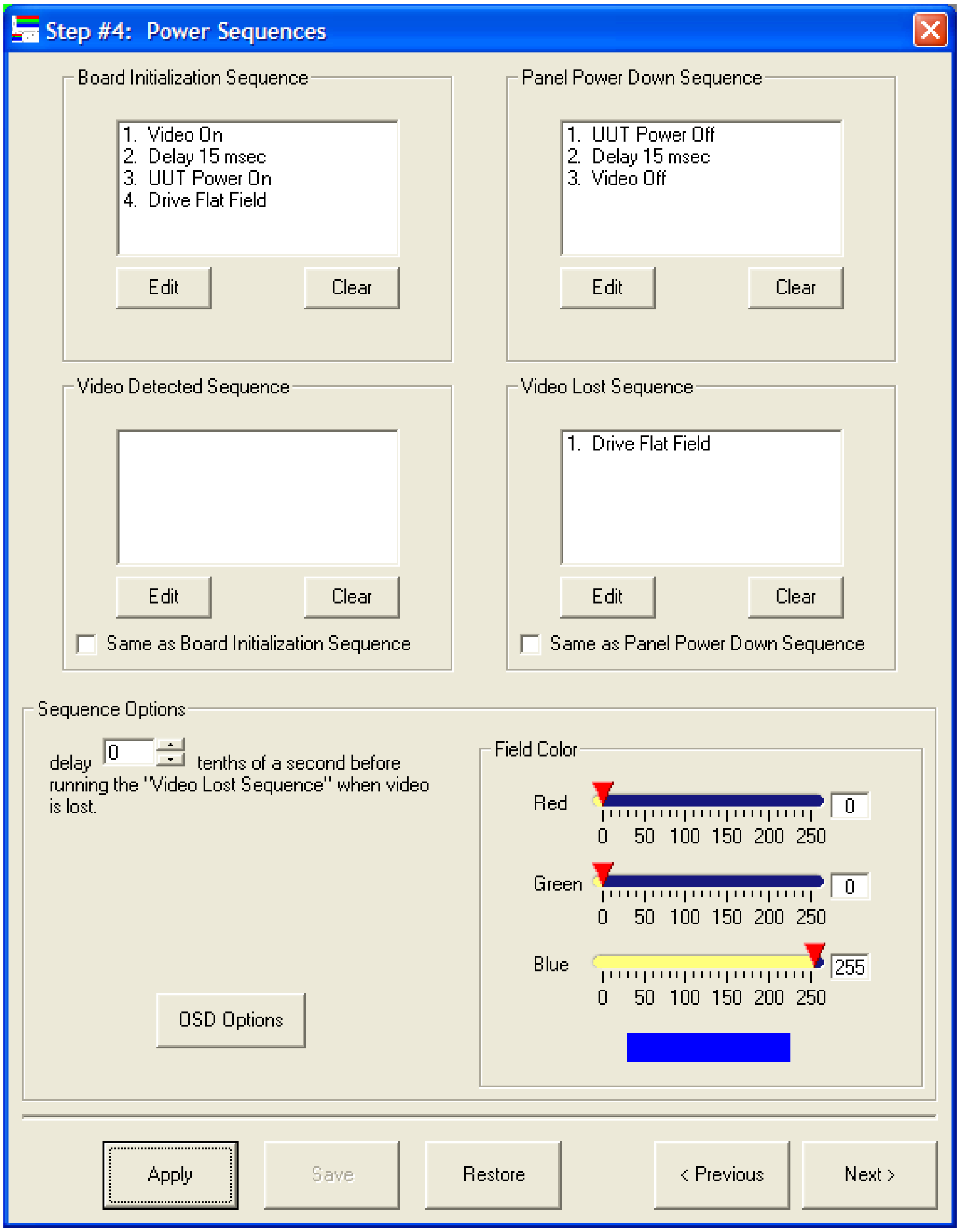


Figure 32 Power Sequences

4.7.1 Setting Power Sequences

There are four critical events which can a power sequence to be run: when the board is being initialized, when the panel is command to power down, when valid video is detected, and when valid video is lost.

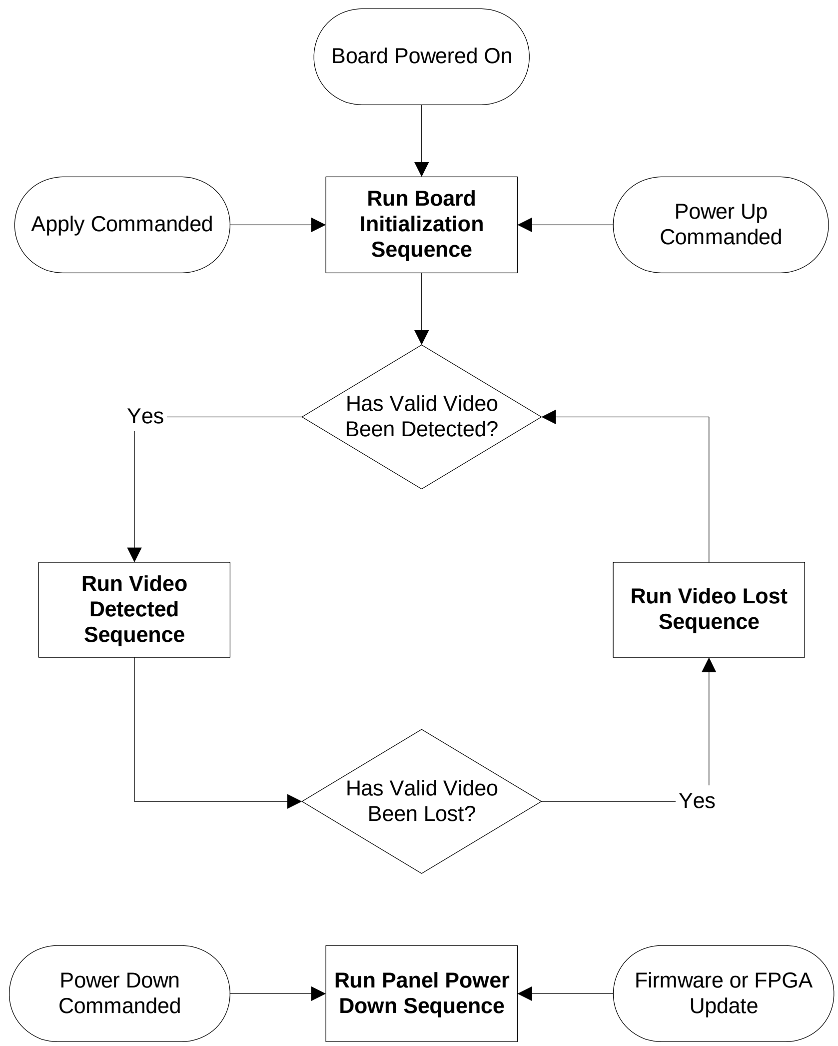


Figure 33 Power Sequence Events

To edit a sequence, click **Edit** under the sequence type of sequence. An editor window will then appear.

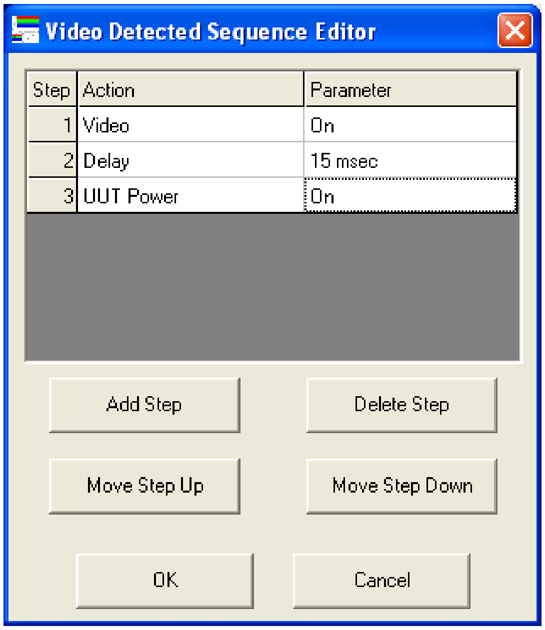


Figure 34 Power Sequence Editor

To add a new step to the sequence, click **Add Step**. To define a step, first click the cell under "Action" for the step you are editing, and select an action from the list. Once the action is selected, select the "Parameter" by clicking the cell and selecting a parameter from the drop-down list.

If the action is "Delay," enter the delay time in the cell. "Drive Flat Field" has no parameter associated with it.

If the action is "OSDX," enter the time that the OSD should remain on the screen. If the OSD should remain indefinitely, select the ∞ option. If the OSD is driven as part of the "Power Up" sequence, the OSD will remain on the screen for the allotted time. For other sequences, the OSD will remain on the screen for the allotted time or until the next critical event occurs which causes a power sequence to run.

To move a step up in the order, select the step and click **Move Step Up**. To move a step down, click **Move Step Down**. To delete a step, select the step and click **Delete Step**. Once editing is completed, click **OK**. To cancel editing and discard any changes, click **Cancel**.

After exiting the edit window, the sequence will be shown in the box above the "Edit" button. To clear the sequence, click **Clear**.

To force the "Video Detected" sequence to match the "Board Initialization" sequence, click **Same as Board Initialization Sequence**. To force the "Video Detected" sequence to match the "Board Initialization" sequence, click **Same as Board Initialization Sequence**. If the sequences happen to match, the options will be selected automatically.

4.7.1.1 Sequence Actions

Action	Description	Parameter
UUT Power	Power to the panel being driven	ON, OFF
Video	Video to the panel being drive	ON, OFF
Backlight Power	Power to the backlight being driven	ON, OFF
Backlight On/Off	Discrete to turn on/off the backlight	HIGH, GROUND
Discrete 0	Discrete output voltage	HIGH, GROUND
Discrete 1	Discrete output voltage	HIGH, GROUND
Discrete 2	Discrete output voltage	HIGH, GROUND
Discrete 3	Discrete output voltage	HIGH, GROUND
Discrete 4	Discrete output voltage	HIGH, GROUND
Discrete 5	Discrete output voltage	HIGH, GROUND
Discrete 6	Discrete output voltage	HIGH, GROUND
Discrete 7	Discrete output voltage	HIGH, GROUND
Discretes Enable	Enables Discrete output	ON/OFF
Power Supply 0	Discrete output voltage to power supply	HIGH, GROUND
Power Supply 1	Discrete output voltage to power supply	HIGH, GROUND
Power Supply 2	Discrete output voltage to power supply	HIGH, GROUND
Power Supply 3	Discrete output voltage to power supply	HIGH, GROUND
Power Supply Enable	Enables Power Supply discrete output	ON/OFF
OSD1	On-Screen Display 1 displayed for time	Time (sec)
OSD2	On-Screen Display 2 displayed for time	Time (sec)
OSD3	On-Screen Display 3 displayed for time	Time (sec)
Drive Flat Field	Drive the screen to a flat color	none
Delay	Delay for time	Time (msec)

4.7.2 Sequence Options

Options for the power sequences can be set up under "Sequence Options."

4.7.2.1 Delay

To delay an action after video is lost, enter the delay time in tenths of seconds into **delay**.

4.7.2.2 Field Color

If you selected "drive display to flat field," select the color under "Field Color." Select the color using the sliders, or entering a value from 0 to 255 for each color component (RGB).

4.7.2.3 OSD Options

As part of a power sequence, An OSD (On-Screen Display) may be shown with a message. To configure the OSD message box, click **OSD Options**. There are three OSD configurations that can be set up. Click the tab labeled **OSD1**, **OSD2**, or **OSD3** to choose. Once finished, click **OK** to remember the settings and return the 'Power Sequences, or **Cancel** to return without any changes. (*NOTE* OSD Options are enabled only in Firmware version 3.6 or later, and will be disable otherwise.)

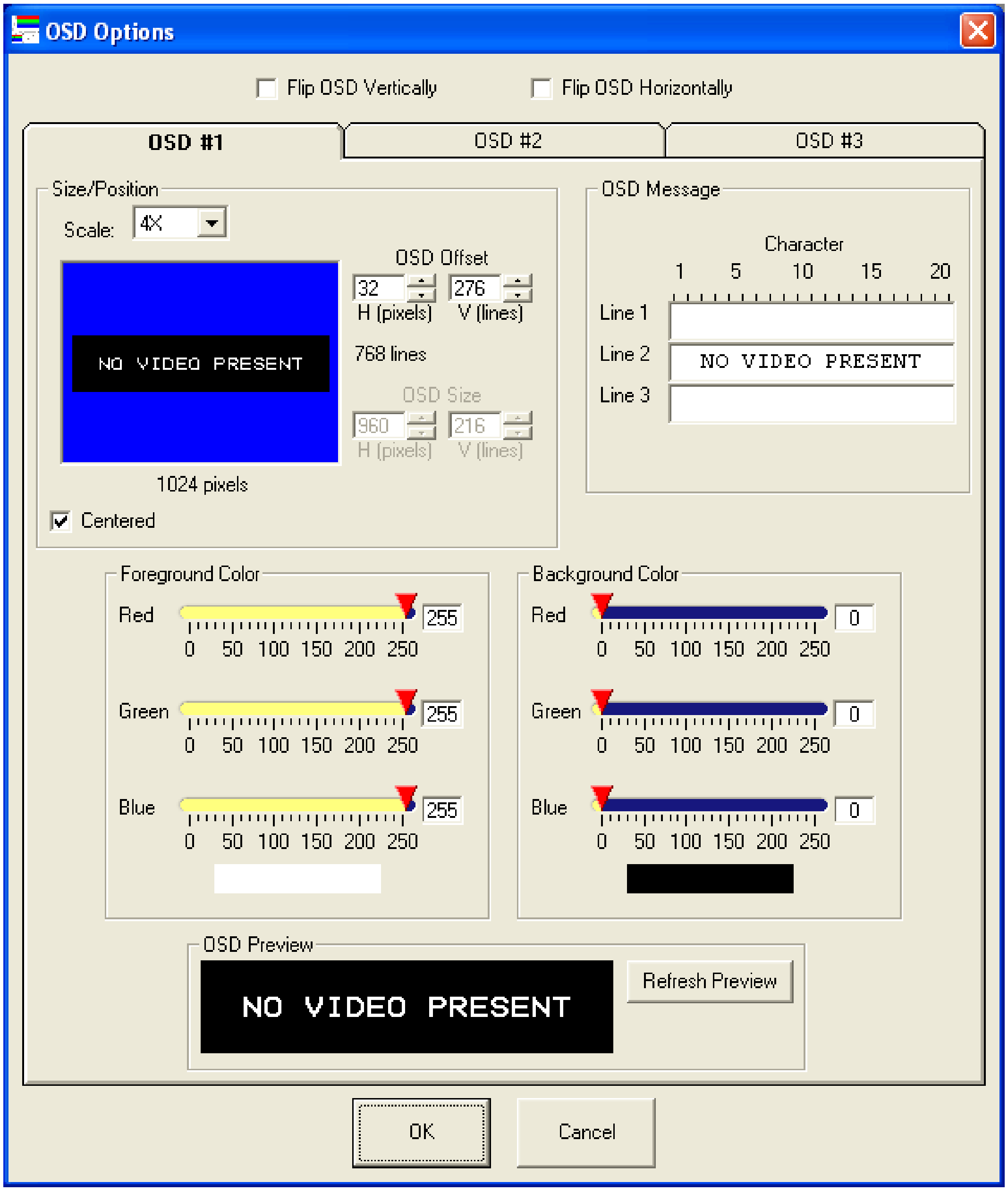


Figure 35 OSD Options

4.7.2.3.1 Scale

Four different sizes for the OSD message box can be selected. Click **Scale** and choose between 1X to 4X depending on the size of your display and preference.

4.7.2.3.2 OSD Offset

The position of the OSD message box is set under 'OSD Offset.' Enter the horizontal position of the left edge of the OSD box in **H (pixels)**. Enter the vertical position of the top edge of the OSD box in **V (lines)**. The position can also be set by moving the box around inside the positioning window using the grabber .

Click **Centered** to enter a horizontal and vertical offset that will center the OSD box in the output video. If a position is entered that happens to be centered, the option will be selected automatically.

4.7.2.3.3 Flip OSD Vertically

Select **Flip OSD Vertically** to flip the OSD vertically in the output video.

4.7.2.3.4 Flip OSD Horizontally

Select **Flip OSD Horizontally** to flip the OSD horizontally in the output video.

4.7.2.3.5 OSD Message

Enter the message that you would like to be display under 'OSD Message.' The message can be 3 lines of 20 characters each. Center the message using spaces, if desired. (*NOTE* When the settings are applied, the OSD message is automatically saved in the VP7.)

4.7.2.3.6 Foreground Color

Enter the color of the OSD foreground (or characters) under 'Foreground Color.' Select the color using the sliders, or entering a value from 0 to 255 for each color component (RGB). (*NOTE* When the settings are applied, the foreground color is automatically saved in the VP7.)

4.7.2.3.7 Background Color

Enter the color of the OSD background under 'background Color.' Select the color using the sliders, or entering a value from 0 to 255 for each color component (RGB). (*NOTE* When the settings are applied, the background color is automatically saved in the VP7.)

4.7.2.3.8 OSD Preview

To see what the OSD will look like in the output video, click **Refresh Preview**. The OSD box will be redrawn based on the settings.

4.8 Power Sequences (VP7s with firmware versions earlier than 6.0)

Power sequences for the display and backlight being driven, and the action to take when loss of video is detected are setup in the "Power Sequences" step. This is the fourth step in the configuration process. If the firmware version of the VP7 connected is earlier than 6.0, or the file opened was created for such a board, this interface is used. Otherwise, refer to section 4.7. However, files previously created for boards with firmware earlier than 6.0 can still be loaded on boards with firmware later than 6.0. To go directly to this step, click the button under "Step #4: Power Sequences."

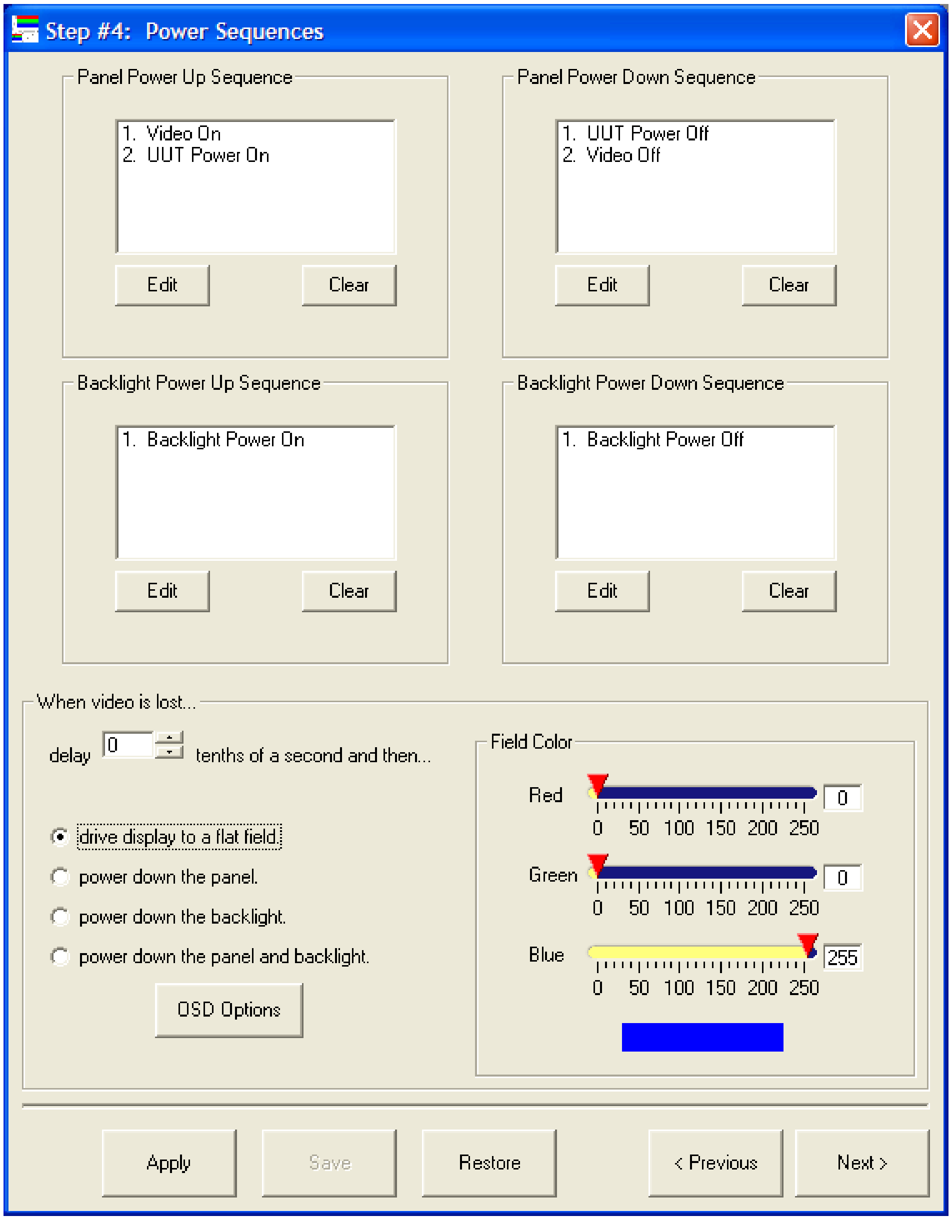


Figure 36 Power Sequences

4.8.1 Setting Power Sequences

The sequence of events to turn on and off the panel and backlight are set up under "Panel Power Sequences" and "Backlight Power Sequences." The sequences for the panel and backlight are set up separately, with a sequence to power up and power down.

To edit a sequence, click **Edit** under the sequence type of sequence. An editor window will then appear.

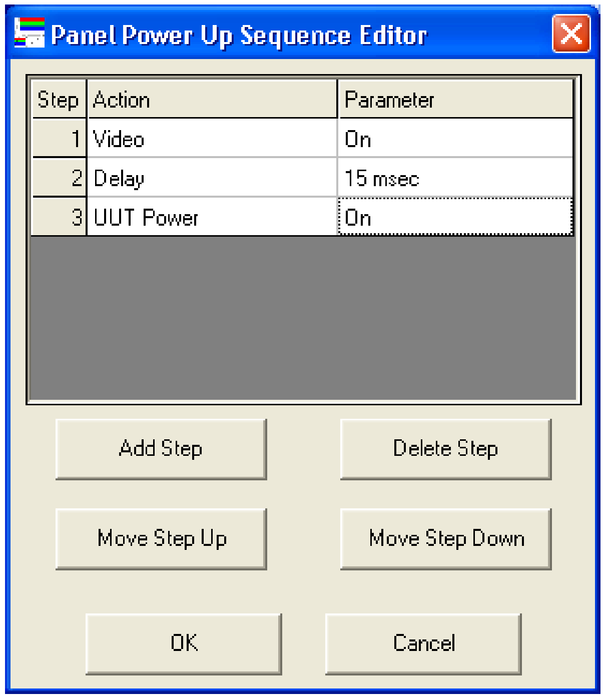


Figure 37 Power Sequence Editor

To add a new step to the sequence, click **Add Step**. To define a step, first click the cell under "Action" for the step you are editing, and select an action from the list. There are different options for "Action" depending on whether it is a panel or backlight power sequence. Once the action is selected, select the "Parameter" by clicking the cell and selecting a parameter from the drop-down list. If the action is "Delay," enter the delay time in the cell.

To move a step up in the order, select the step and click **Move Step Up**. To move a step down, click **Move Step Down**. To delete a step, select the step and click **Delete Step**. Once editing is completed, click **OK**. To cancel editing and discard any changes, click **Cancel**.

After exiting the edit window, the sequence will be shown in the box above the "Edit" button. To clear the sequence, click **Clear**.

4.8.1.1 Panel Actions

Action	Description	Parameter
UUT Power	Power to the panel being driven	ON, OFF
Video	Video to the panel being drive	ON, OFF
Discrete 0	Discrete output voltage	HIGH, GROUND
Discrete 1	Discrete output voltage	HIGH, GROUND
Discrete 2	Discrete output voltage	HIGH, GROUND
Discrete 3	Discrete output voltage	HIGH, GROUND
Discrete 4	Discrete output voltage	HIGH, GROUND
Discrete 5	Discrete output voltage	HIGH, GROUND
Discrete 6	Discrete output voltage	HIGH, GROUND
Discrete 7	Discrete output voltage	HIGH, GROUND
Discretes Enable	Enables Discrete output	ON/OFF
Power Supply 0	Discrete output voltage to power supply	HIGH, GROUND
Power Supply 1	Discrete output voltage to power supply	HIGH, GROUND
Power Supply 2	Discrete output voltage to power supply	HIGH, GROUND
Power Supply 3	Discrete output voltage to power supply	HIGH, GROUND
Power Supply Enable	Enables Power Supply discrete output	ON/OFF
Delay	Delay for time	Time (msec)

4.8.1.2 Backlight Actions

Action	Description	Parameter
Backlight Power	Power to the backlight being driven	ON, OFF
Backlight On/Off	Discrete to turn on/off the backlight	HIGH, GROUND
Discrete 0	Discrete output voltage	HIGH, GROUND
Discrete 1	Discrete output voltage	HIGH, GROUND
Discrete 2	Discrete output voltage	HIGH, GROUND
Discrete 3	Discrete output voltage	HIGH, GROUND
Discrete 4	Discrete output voltage	HIGH, GROUND
Discrete 5	Discrete output voltage	HIGH, GROUND
Discrete 6	Discrete output voltage	HIGH, GROUND
Discrete 7	Discrete output voltage	HIGH, GROUND
Discretes Enable	Enables Discrete output	ON/OFF
Delay	Delay for time	Time (msec)

4.8.2 Video Lost Action

When the loss of valid input video is detected, the power down sequence of the panel and/or backlight can be run, or the display can be driven to a flat color field.

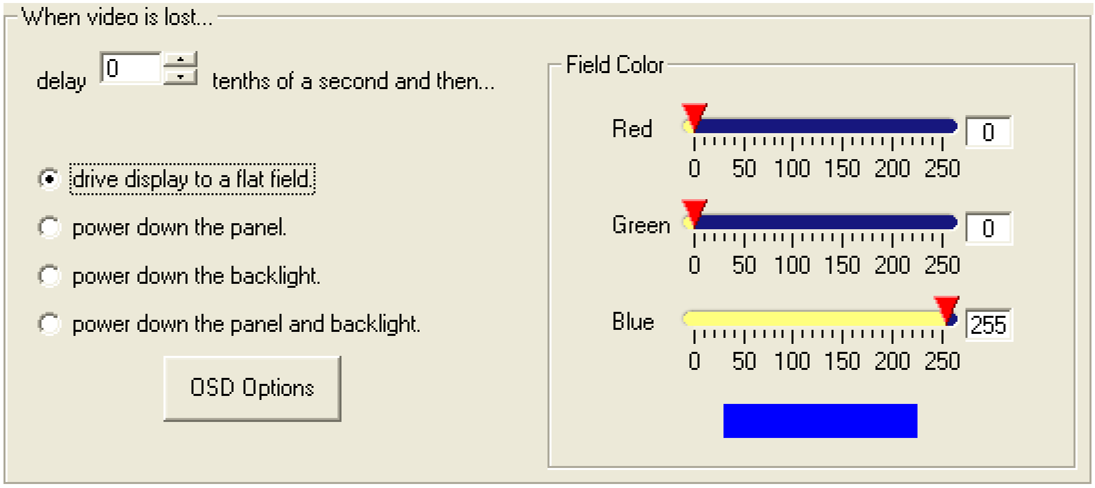


Figure 38 Video Lost Action

4.8.2.1 Delay

To delay an action after video is lost, enter the delay time in tenths of seconds into **delay**.

4.8.2.2 Action

Select the action to take by clicking on the corresponding button. Select **drive display to flat field** to drive the display to a solid color indicated by "Field Color." Select **power down the panel** to run the panel power down sequence. Select **power down the backlight** to run the backlight power down sequence. Select **power down the panel and backlight** to run the panel and backlight power down sequences.

4.8.2.3 Field Color

If you selected "drive display to flat field," select the color under "Field Color." Select the color using the sliders, or entering a value from 0 to 255 for each color component (RGB).

4.8.2.4 OSD Options

If you are driving the screen to a flat field when video is lost, an OSD (On-Screen Display) may also be shown with a message. To configure the OSD message box, click **OSD Options**. Once finished, click **OK** to remember the settings and return the 'Power Sequences, or **Cancel** to return without any changes. (*NOTE* OSD Options are enabled only in Firmware version 3.6 or later, and will be disable otherwise.)

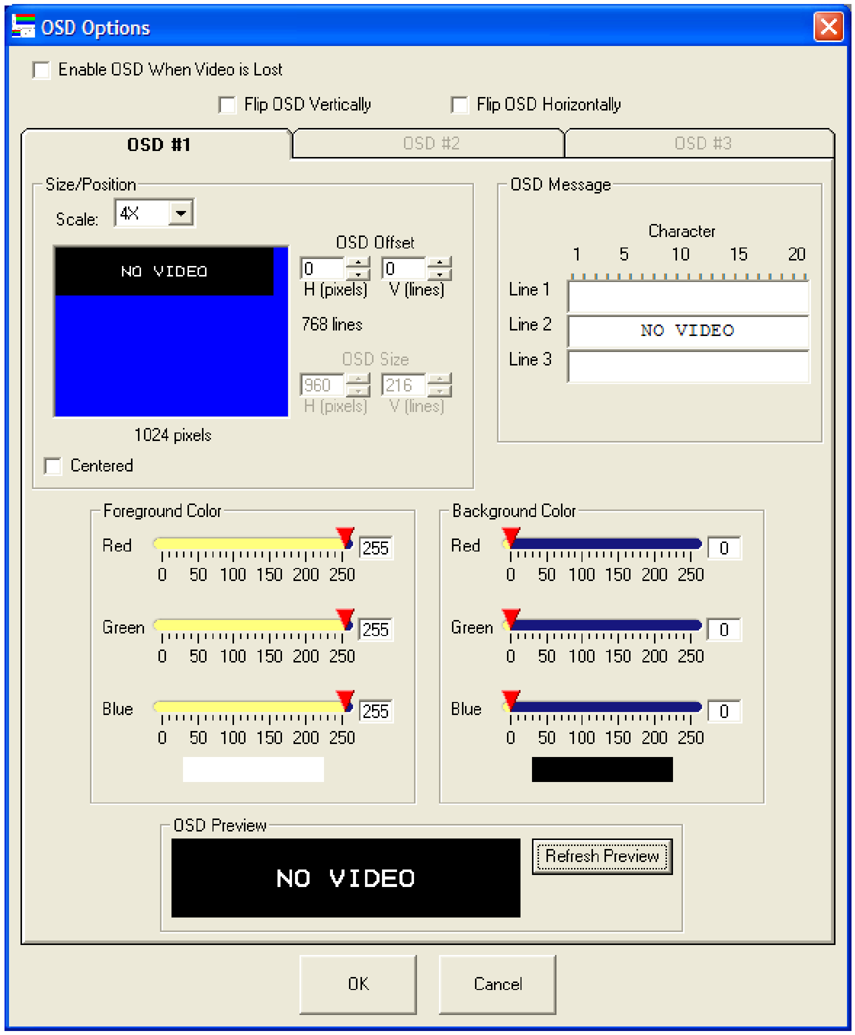


Figure 39 OSD Options

4.8.2.4.1 Enable OSD When Video is Lost

To enable the OSD, select the option **Enable OSD When Video is Lost**. De-select the option if you do not want an OSD to be shown when video is lost.

4.8.2.4.2 Flip OSD Vertically

Select **Flip OSD Vertically** to flip the OSD vertically in the output video.

4.8.2.4.3 Flip OSD Horizontally

Select **Flip OSD Horizontally** to flip the OSD horizontally in the output video.

4.8.2.4.4 Scale

Four different sizes for the OSD message box can be selected. Click **Scale** and choose between 1X to 4X depending on the size of your display and preference.

4.8.2.4.5 Position

The position of the OSD message box is set under 'Position.' Enter the horizontal position of the left edge of the OSD box in **H (pixels)**. Enter the vertical position of the top edge of the OSD box in **V (lines)**.

Click **Centered** to enter a horizontal and vertical offset that will center the OSD box in the output video. If a position is entered that happens to be centered, the option will be selected automatically.

4.8.2.4.6 OSD Message

Enter the message that you would like to be display under 'OSD Message.' The message can be 3 lines of 20 characters each. Center the message using spaces, if desired. (*NOTE* When the settings are applied, the OSD message is automatically saved in the VP7.)

4.8.2.4.7 Foreground Color

Enter the color of the OSD foreground (or characters) under 'Foreground Color.' Select the color using the sliders, or entering a value from 0 to 255 for each color component (RGB). (*NOTE* When the settings are applied, the foreground color is automatically saved in VP7s with firmware versions earlier than 6.0.)

4.8.2.4.8 Background Color

Enter the color of the OSD background under 'background Color.' Select the color using the sliders, or entering a value from 0 to 255 for each color component (RGB). (*NOTE* When the settings are applied, the background color is automatically saved in the VP7s with firmware versions earlier than 6.0.)

4.9 Contrast and Brightness Control

The parameters for manually controlling the contrast and backlight inverter (brightness) of the display being driven are set up under "Contrast\Brightness Control." This is the fifth step in the configuration process. To go directly to this step, click the button under "Step #5: Output Setup."

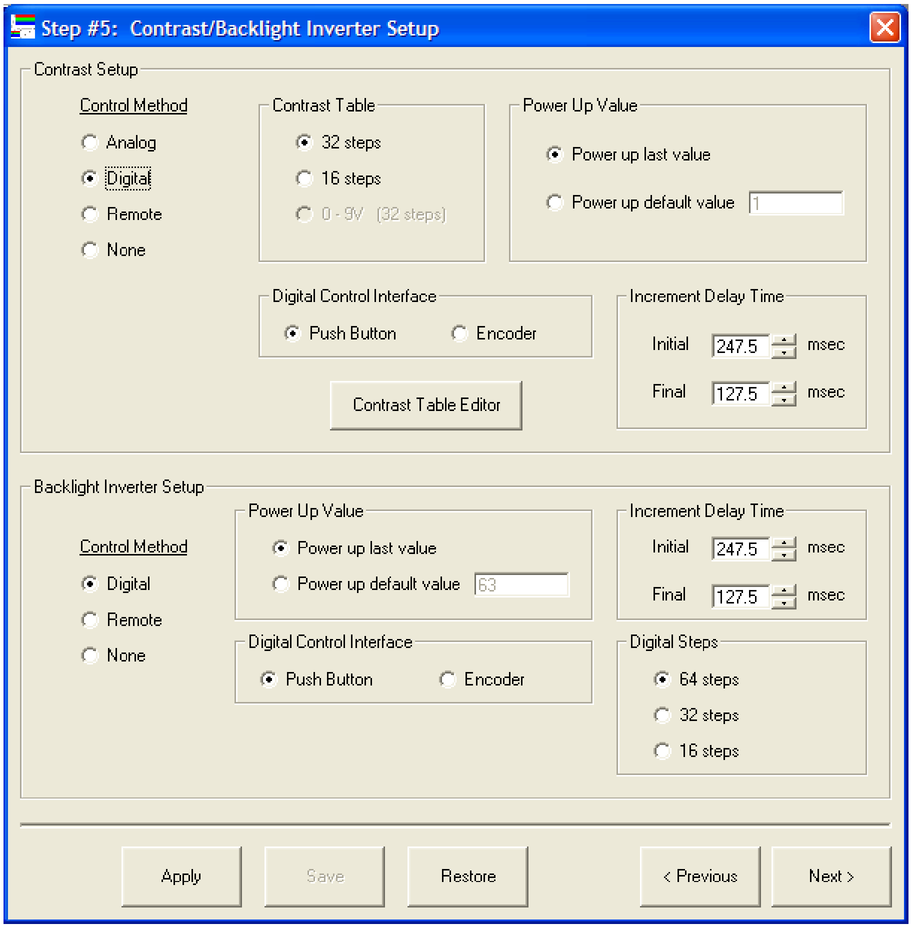


Figure 40 Contrast\Brightness Setup

4.9.1 Contrast Setup

The method of contrast control and the "Contrast Table" to use are selected under "Contrast Setup." (See section 7 for more about the Contrast Tables).

4.9.1.1 Control Method

Select the method of manually controlling the contrast under "Control Method."

Analog

Select **Analog** to use the analog input to the VP7 as the control.

If "Analog" is selected, the options under "Contrast Table" will change. Select between **-9 to 9V (32 steps)**, **0 to 5V (16 steps)**, **0 to 9V (32 steps)**.

Digital

Select **Digital** to use the digital contrast control.

If "Digital" is selected, the options under "Contrast Table" will change. Select between **32 step** and **16 steps**.

Remote

Select **Remote** to use remote commands to control the contrast.

None

Select **None** if you do not wish to manually control the contrast. The contrast will be set to the value made under "Color Adjustments" (section 4.8.1).

4.9.1.2 Contrast Table Editor

Click **Contrast Table Editor** to launch the "Contrast Table Editor" (see section 7.1).

4.9.1.3 Power Up Value

The "Power Up Value" is the step that the contrast is set to when the board is powered up. This is only used if the digital control is used.

Power Up Last Value

Select **Power Up last value** to have the board remember the last contrast step when it was last powered down.

Power Up Default Value

Select **Power Up default value** to have the board power up with the same contrast step every time. Enter the value into the box beside the option. The range for the value is 1 to 32 if Table 1 is used, and 1 to 16 if Table 2 is used.

4.9.1.4 Digital Control Interface

The "Digital Control Interface" selects the type of digital input used for control if "Digital" is selected. Select **Push Button** if the control is two buttons. Select **Encoder** is the control is a digital encoder, such as a knob.

4.9.1.5 Increment Delay Time

"Increment Delay Time" sets how quickly the contrast step is incremented when the digital control is held down. The delay time is the time between each increment.

Initial

The "Initial" delay is the time between each increment during the first four steps, as the digital control is held down. The time can range from 0 to 1912.5 microseconds.

Final

The "Initial" delay is the time between each increment after four steps, as the digital control is held down. The time can range from 0 to 1912.5 microseconds.

4.9.2 Backlight Inverter Setup

The method of the backlight inverter level control and the backlight inverter level to use at power up are selected under "Backlight Inverter Setup."

4.9.2.1 Control Method

Select the method of manually controlling the backlight inverter level under "Control Method."

Digital

Select **Digital** to use the digital backlight inverter voltage level control.

Remote

Select **Remote** to use remote commands to control the backlight inverter level.

None

Select **None** if you do not wish to manually control the backlight inverter level.

4.9.2.2 Power Up Value

The "Power Up Value" is the value that the backlight inverter level is set to when the board is powered up.

Power Up Last Value

Select **Power Up last value** to have the board remember the last backlight inverter level value when it was last powered down.

Power Up Default Value

Select **Power Up default value** to have the board power up with the same backlight inverter level every time. Enter the value into the box beside the option. The range for the value is 0 to 63.

4.9.2.3 Digital Control Interface

The "Digital Control Interface" selects the type of digital input used for control if "Digital" is selected. Select **Push Button** if the control is two buttons. Select **Encoder** is the control is a digital encoder, such as a knob.

4.9.2.4 Increment Delay Time

"Increment Delay Time" sets how quickly the backlight inverter level is incremented when the digital control is held down. The delay time is the time between each increment.

Initial

The "Initial" delay is the time between each increment during the first four steps, as the digital control is held down. The time can range from 0 to 1912.5 microseconds.

Final

The "Initial" delay is the time between each increment after four steps, as the digital control is held down. The time can range from 0 to 1912.5 microseconds.

4.9.2.5 Digital Steps

"Digital Steps" are the number of steps or increments between minimum and maximum backlight inverter brightness. The choices are 64, 32, or 16.

4.10 Input Capture Adjustments

Adjustments are made to the input ADC sampling clock phase and capture boundaries during the "Input Capture Adjustments" step. Also, adjustments to the color of the captured input video can be made.

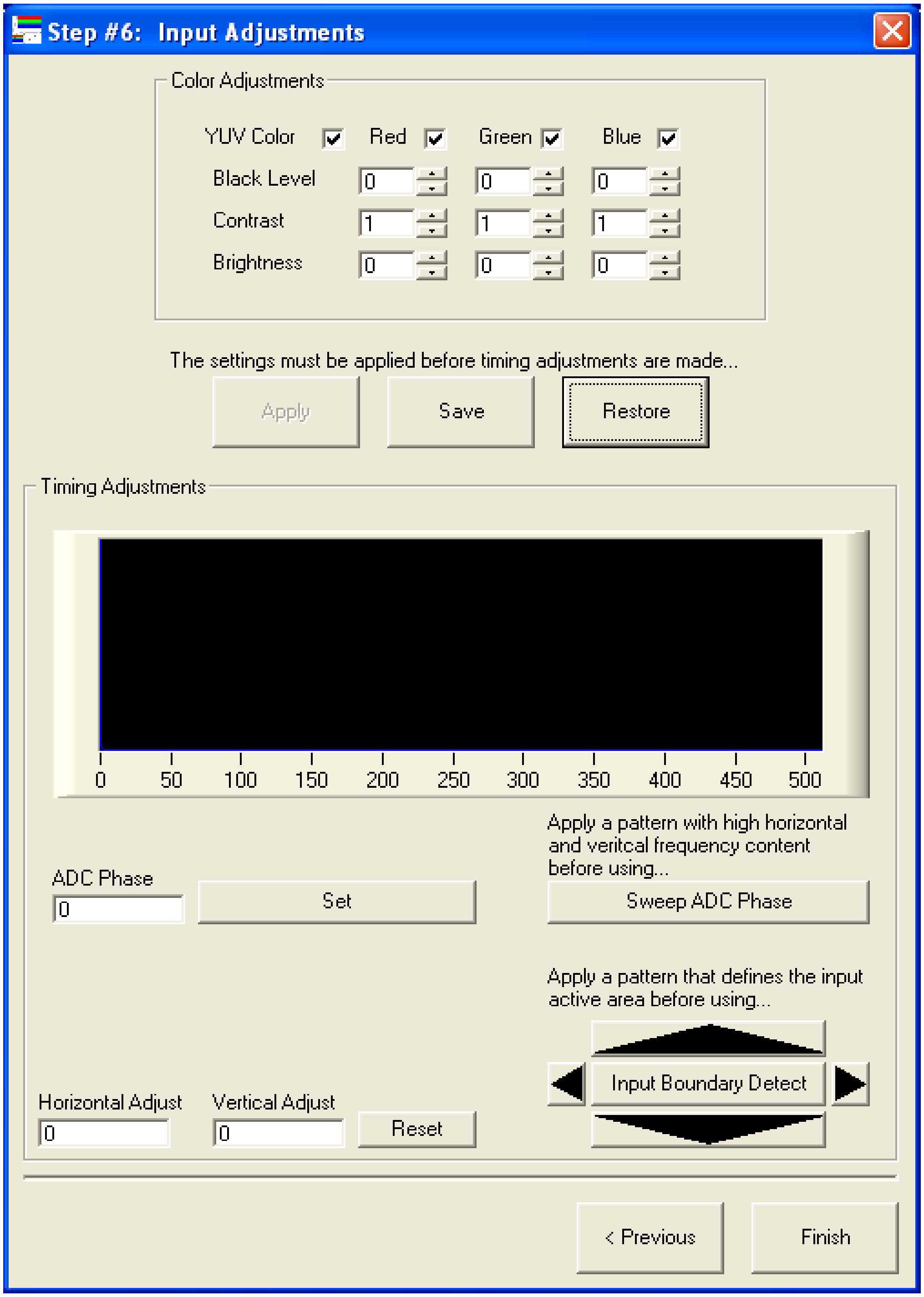


Figure 41 Input Capture Adjustments

4.10.1 Color Adjustments

Adjustments to the color of the input source can be made under "Color Adjustments." The check boxes offer the capability to kill chroma in YUV color space (leaving a grayscale image) or to kill the R, G, or B color component after the YUV to RGB conversion. Standard black level, contrast and brightness adjustments can be made to R, G and B independently.

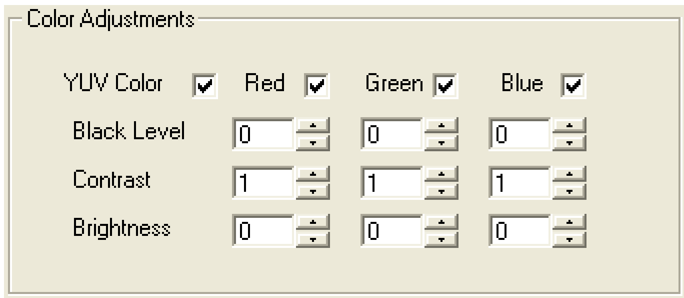


Figure 42 Color Adjustments

4.10.1.1 Chroma Kill

The YUV Color checkbox offers the ability to set the chrominance saturation to zero (unchecked) in YUV color space, leaving a grayscale image. The RGB checkboxes offer the ability to zero (unchecked) the R, G, and B color components after the internal YUV to RGB color space conversion. This capability can be useful for night vision applications.

4.10.1.2 Black Level

The **Black Level** value is subtracted from the color data from the input source. The default value is "0." It can range from 0 to 255.

4.10.1.3 Contrast

Color data from the input source is multiplied by the **Contrast** value. The default value is "1." It can range from 0 to 1.998.

4.10.1.4 Brightness

The **Brightness** value is added to the color data from the input source. The default value is "0." It can range from 0 to 255.

When used in conjunction, the color adjustments follow the following equations:

$$R(out) = (R - RedBlackLevel) * RedContrast + RedBrightness$$

$$G(out) = (G - GreenBlackLevel) * GreenContrast + GreenBrightness$$

$$B(out) = (B - BlueBlackLevel) * BlueContrast + BlueBrightness$$

The black level is applied first, followed by contrast, and then brightness.

4.10.2 Timing Adjustments

To use the timing adjustments, a valid video source must be connected to the video input. It is recommended that the video output also be connected so the adjustments can be seen. Before making timing adjustments, all the parameters must be applied. If the parameters have not been applied, the adjustments will be disabled. Also, if a VP7™ is not connected, the timing adjustments will be disabled.

4.10.2.1 Sweep ADC Phase

Click **Sweep ADC Phase** to run a test of different phase delays of the analog to digital converter sampling clock. The process takes several minutes to complete. When using the test, apply a pattern with high horizontal and vertical frequency content as the source, or a "busy" image.

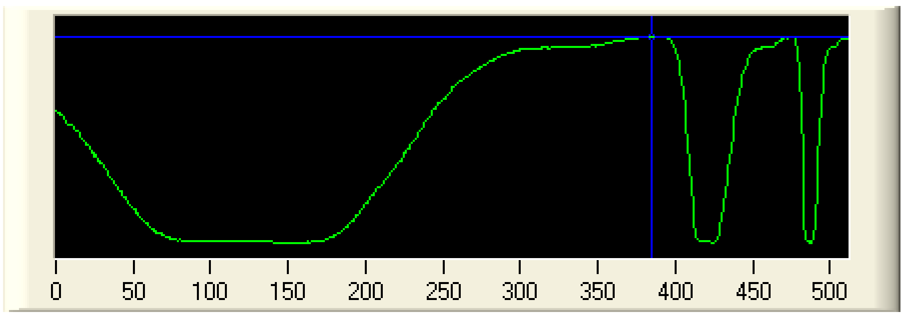


Figure 43 ADC Phase Plot

The phase delay is varied over a range of 0 to 511. For each delay, the sum of differences of consecutive pixel data is measured and plotted in the graph. As the test progresses, the delay the yields the highest difference is tracked. The best delay to choose corresponds to the peak of the widest sum of difference cycle.

To stop the testing at any time, click **STOP**.

After the test has been run, the delay that yields highest difference is applied. The phase delay can also be selected manually by clicking on the graph or entering it into **ADC Phase**. Click **Set** to program the delay if you wish to set it manually.

4.10.2.2 Input Boundary Detect

Clicking **Input Boundary Detect** adjusts the input capture area so the entire area is captured correctly. When running the "Input Boundary Detect," apply a pattern that defines the input active area as set up in Step #1: Input Setup. When it completes, if the pattern did not appear to define the input active area, a message will appear.

To manually adjust the input boundary, click any of the arrow buttons surrounding the "Input Boundary Detect" button. The input boundary will shift in the opposite direction of the arrow, causing the output image to shift in the direction of the arrow. As the image is adjusted, the offsets are shown in "Horizontal Adjust" and "Vertical Adjust." To reset the adjustments to zero, click **Reset**.

4.11 Applying, Saving, and Restoring Parameters

The **Apply**, **Save**, and **Restore** buttons appear at every step of the wizard at the bottom of the window, and in the VP7configure™ Wizard window. To use any of the buttons, a VP7™ must be connected. If one is not connected, an error message will appear if any of the buttons are clicked.

Figure 44 Apply, Save, Restore

4.11.1 Apply

Clicking **Apply** sends all the parameters to the volatile memory of the VP7™, and applies them. If there is a problem with one of the parameters, a message box will appear saying which set of parameters has a problem. The parameters will not be applied if there is an error.

After the "Apply" is done, the **Apply** button will be disabled and the **Save** button will be enabled. **Apply** will be enabled again when there is a change to one of the parameters, and **Save** will be disabled.

4.11.2 Save

Clicking **Save** stores the parameters for the VP7™ channel. The parameters that are in memory are copied into non-volatile memory, so the VP7™ channel can remember the parameters the next time it is powered down.

When the **Apply** button is enabled, meaning there is unapplied changes to the parameters, the **Save** button is disabled. The **Save** button is enabled after the current parameters are successfully applied to the VP7™ channel.

4.11.3 Restore

Clicking **Restore** reads back the parameters stored in nonvolatile memory of the VP7™ channel into volatile memory. The parameters are then reapplied and read into the VP7configure™ program. This can be used to discard recent changes and return to the last saved state.

5 Saving a Connection

Files are saved as text files (*.txt) containing VP7™ text commands.

To save a set of parameters to the PC, select **File->Save** from the menu, click the **Save** button in the VP7configure™ Wizard window, or press **Ctrl + S** on the keyboard. If you haven't saved the connection before, it will ask for a text file name. You may enter a new name, or replace an existing file. If you have saved already, it will not ask for a file name and save it under the same name.

After a file is saved, the file name will be displayed in the title bar of the VP7configure™ Wizard window. Before it is saved, it is given a default name.

Figure 45 Unsaved File

Figure 46 Saved File

To save an already saved connection under a different file name, select **File->Save As…** from the menu, or click the **Save As…** button in the VP7configure™ Wizard window. The program will then prompt for a text file name to save under.

6 Opening a Connection

Text files containing VP7™ commands or files saved by VP7configure™ can be opened and loaded into the VP7configure™ Wizard.

To open an existing file, select **File->Open Connection** from the menu or press **Ctrl + O** on the keyboard. Choose the text file (*.txt) you wish to open.

VP7configure™ checks each line in the file, and, if it is a valid VP7™ command, loads its parameters into the VP7configure™ Wizard. If there is an invalid line in the file, an error message will be displayed showing the invalid line. If an error message appears, click **OK** to continue reading the rest of the file, or click **Cancel** to stop.

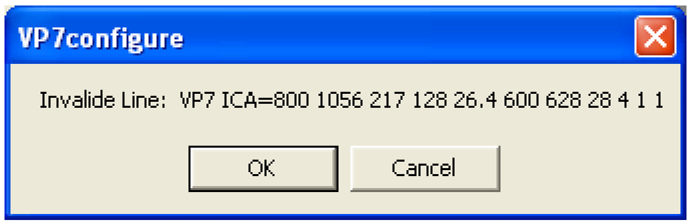


Figure 47 Invalid Line

7 Creating a Project

If multiple tables (configuration sets) are being used in the VP7™, a project can be created to link to and sort wizard files associated with each table. To create a new project for a VP7™, select **File->New Project** from the menu bar. The VP7configure™ Project window will appear.

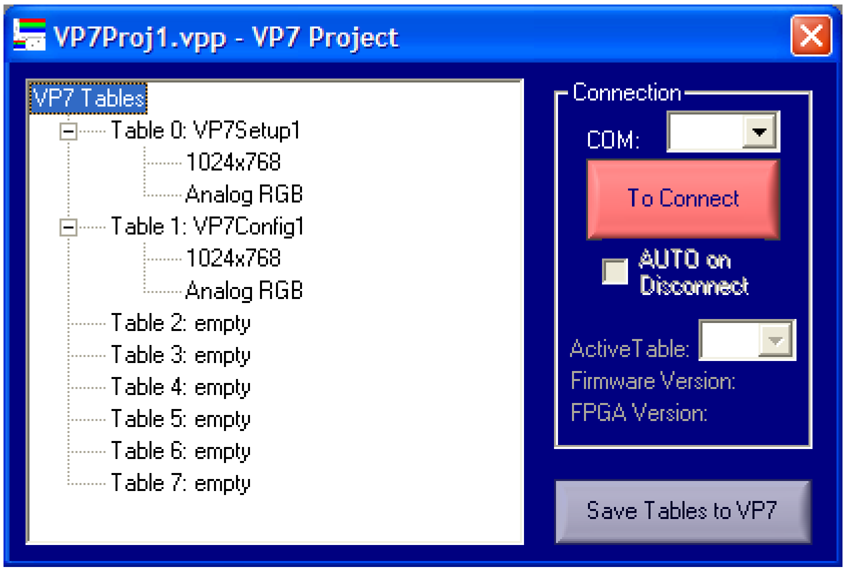


Figure 48 Project Window

7.1 Adding Files

To add a file to a table, right click on the table, and select **Enter File…** from the popup menu or double click an empty table slot. Then select a VP7™ file from the browser. If the file is a valid VP7™ file, the resolution and input format will be added to the tree as subsets of the Table. Click the plus sign ("+"), to show the properties, or the minus sign ("-") to hide them.

7.2 Removing Files

To remove a file from a table slot, right click on the table, and select **Remove File**. The slot will then display "empty."

7.3 Viewing/Editing Files

To view or edit a file, right click on the Table, and select **View File…** from the popup menu, or double click the table. A wizard window for the file will then appear. The "Connection" frame will be disabled, since it is controlled from the project window. If you wish to read up the settings from the table in the VP7™, click **Restore**.

7.4 Sorting Files

To move or insert a file to a different table, simply drag the file from the original table, to the table it will reside in. The rest of the tables will be sorted accordingly.

7.5 Connecting to a VP7™ through the Project Window

To connect to a VP7™ through the project window, connect the RS-232 connector of the VP7™ to the RS-232 communications port on the computer. Select the COM port number from the **COM:** drop-down menu. Then click the red To **Connect** button.

Figure 49 Connect

If a VP7™ is not detected, a message box will appear indicating so.

If the VP7™ was in AUTO mode, it will be set to fixed mode while editing, and can then be set back to AUTO mode upon disconnecting. A message will appear indicating this.

After connecting, the button labeled "To Connect" will change to green and be labeled "To Disconnect." The "Table" (see section 4.1.1), "Firmware Version," and "FGPA Revision" will be shown. To disconnect from a VP7™, click the green **To Disconnect** button.

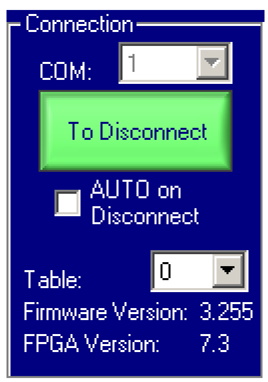


Figure 50 Disconnect

7.5.1 Selecting a Table

The VP7™ allows for 8 different "tables," or configuration sets. Once a VP7™ is connected, the "Table" drop down list will be enabled, and the table number will be automatically selected. To change the table, click the drop down list, and select from 0 through 7.

7.5.2 AUTO Table Selection

The VP7™ can be set up to automatically load the table which matches the input video. A table must be created for every possible input video to use auto-mode. Using AUTO mode is not recommended when the input video is constant. AUTO mode is only supported in VP7™ firmware version 3.0 and later.

To enable AUTO mode, select **AUTO on Disconnect**. The option will have been already selected if the VP7™ was already in AUTO mode when connected. The VP7™ will be set to AUTO upon disconnecting. To disable AUTO mode, deselect **AUTO on Disconnect**, and click **To Disconnect**.

7.6 Saving Tables to VP7

To save the tables to the VP7™, click **Save Tables to VP7**. Each table with a VP7™ file associated with it will then be saved off to the VP7™.

8 Saving a Project

Project files are saved with the extension .vpp.

To save a project to the PC, select **File->Save Project Settings** from the menu. If the project has not been saved before, it will ask for a file name. You may enter a new name, or replace an existing file. If the file has been saved already, it will not ask for a file name and save it under the same name. Note that when a project is saved, the tables themselves are not saved. Those must be saved individually if you wish to edit them (see section 5).

After a file is saved, the file name will be displayed in the title bar of the VP7™ Project window. Before it is saved, it is given a default name.

Figure 51 Unsaved File

Figure 52 Saved File

To save an already saved connection under a different file name, select **File->Save Project Settings As…** from the menu. The program will then prompt for a text file name to save under.

9 Opening a Project

To open an existing project file, select **File->Open Project** from the menu. Choose the project file (*.vpp) you wish to open.

The project tree is then populated with the files associated with each table. If a file is not found, "(File not found)" will be displayed by the file name.

10 Contrast Tables

The "Contrast Tables" are tables stored in the VP7™ which contain contrast values for each step of manual control. There are three such tables for different analog voltage ranges and step numbers.

If the contrast is being controlled by the analog input, one of the three tables can be used. Table 1 can be used for an input ranging from -9V to +9V, and has 32 steps. Table 2 can be used for an input ranging from 0V to +5V, and has 16 steps. Table 3 can be used for an input ranging from 0 to +9V, and has 32 steps.

To select a value for the contrast under analog control, the input voltage is measured and compared to ranges for each step in the table. For example, Table 1 is being used, which ranges from –9V to 9V. The analog input is measured to be 0V. Step 16 is chosen since 0V falls within its range. The contrast value stored in step 16 is used.

If the contrast is being controlled by the digital contrast control, one of two tables can be used. Table 1 can be used to have 32 contrast steps, and Table 2 can be used to have 16 contrast steps. The same contrast tables are used for digital control as the tables used for analog control, but the digital control disregards voltages ranges. The step number to choose from the table is set by the digital counter.

10.1 Contrast Table Editor

Use the "Contrast Table Editor" to change the contrast values stored in the contrast tables. Select **Maintenace->Contrast Table Editor** to open the editor.

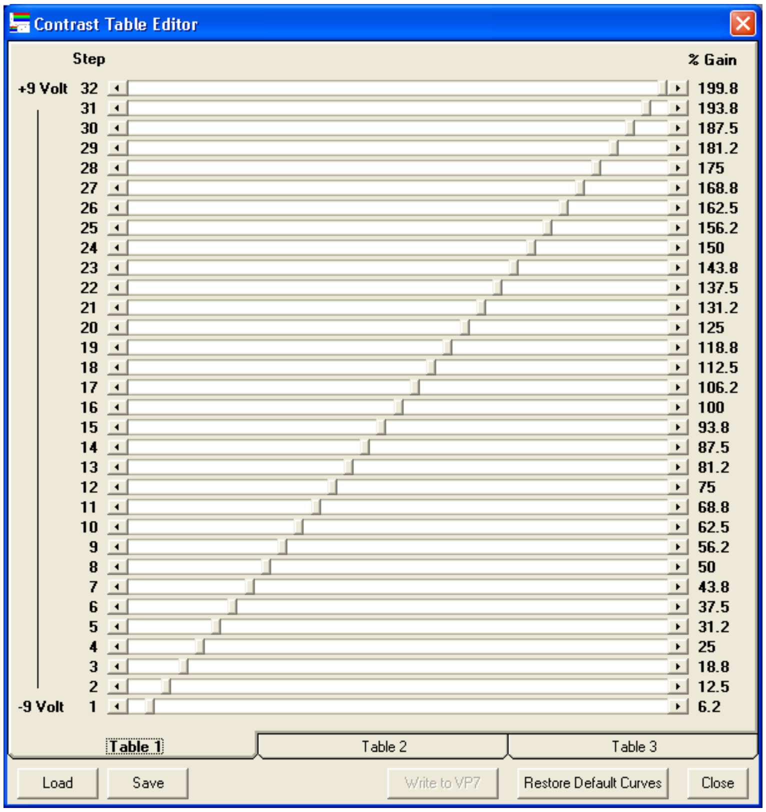


Figure 53 Contrast Table Editor

10.1.1 Editing a Table

To edit a table, first select the tab for the table you wish to edit (**Table 1**, **Table 2**, or **Table 3**). To change the contrast value for a certain step, move the slider beside the step number to the desired value. As the slider moves, the "% Gain" is shown to the left.

To return to the default table settings, click **Restore Default Curves**.

To store the tables onto the VP7™, click **Write to VP7** if a VP7™ is connected. If one is not connected, this button is disabled.

10.1.2 Saving a Table

To save the settings for the tables to the PC, click **Save**. Contrast table files are stored with the extension "*.cts."

10.1.3 Loading a Table

To load a saved table settings file from PC, click **Load**. You will then be prompted to select a file with the extension "*.cts." After selecting the file, its settings will be loaded into the editor.

11 Download Font Table

If you are displaying an OSD as part of a power sequence, the Font Table will need to be downloaded to the VP7™. Select **Maintenance->Download Font Table** from the menu to download the font table. This needs to be done only once, as the table exists in non-volatile memory. In virtually all cases, the font table will already have been downloaded during production, and it will be unnecessary to use this feature. If there is a problem with the OSD displaying, where the OSD box can be seen but the characters are invalid or not seen, it may be necessary to download the font table again. Some future firmware versions may require the font table to be reloaded, which will be noted with the firmware release.

This feature only allows for the default VP7™ font table to be loaded, but may be expanded for different tables in the future.

12 EDID

The VP7™ contains an EDID, which some panels may require. The information stored in the EDID can be read from or written to a VP7™.

12.1 Reading the EDID

To read the EDID information up from the VP7™, click **Maintenance->Read EDID…** You will then be prompted to save the file as a text file (*.txt) or a hex file (*.hex). The text file contains hexadecimal values for each byte, delimited by a space. The hex file is saved off in the standard hex format.

12.2 Loading the EDID

To load the EDID information into the VP7™, click **Maintenance->Load EDID…** You will then be prompted to open a text file (*.txt) or a hex file (*.hex). The text file must contain hexadecimal values for each byte. The bytes can be delimited by any character that is not 0-9, A-F, a-f. The hex file must be the standard hex format.

13 Updating the FPGA

The VP7™ is designed so the FPGA can be updated in the field. To update the FPGA, click **Maintenance->Update FPGA…** from the menu. Select the FPGA file (*.rpd). **Only use FPGA updates provided by Westar.** Loading an invalid file may render the board useless until a valid FPGA update is loaded.

14 Feedback Level

Two different levels of feedback can be used when communicating with a VP7™. To change the feedback level select **Options->Set Feedback Level to High/Low**.

When "Low Feedback" is selected, if unexpected data is in the serial buffer while communicating with the VP7™, it will be ignored, unless it is an error. When "High Feedback" is selected, any unexpected data in the serial buffer will be shown in a message box, and the current VP7™ communication will be stopped.