PremierViewProHD-LED
Operating Instructions

This manual explains how to operate your PremierViewProHD-LED (PVProHD-LED) image scaler. The PVProHD-LED is designed to provide users with a powerful and flexible method of driving large display devices.

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E&OE.

Contents

SAFETY WARNING:

1. THERE ARE NO USER SERVICEABLE PARTS WITHIN THE UNIT. REMOVAL OF THE TOP COVER WILL EXPOSE DANGEROUS VOLTAGES. DO NOT OPERATE THE UNIT WITHOUT THE TOP COVER INSTALLED.

2. ENSURE THAT ALL ELECTRICAL CONNECTIONS (INCLUDING THE MAINS PLUG AND ANY EXTENSION LEADS) ARE PROPERLY MADE AND COMPLY WITH ELECTRICAL SAFETY REGULATIONS.

3. ENSURE THAT THE INTEGRITY OF THE EQUIPMENT ISOLATION BARRIER IS MAINTAINED WHEN CONNECTING TO OTHER EQUIPMENT. THIS MEANS THAT ONLY LOW VOLTAGE ISOLATED CIRCUITS MAY BE CONNECTED TO THE SIGNAL INPUTS AND OUTPUTS. IF ANY DOUBT EXISTS CONSULT QUALIFIED SERVICE PERSONNEL.

4. TO PREVENT SHOCK OR FIRE HAZARD DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE. IF SUCH EXPOSURE OCCURS, REMOVE THE PLUG FROM THE MAINS OUTLET AND HAVE THE EXPOSED UNIT CHECKED BY QUALIFIED SERVICE PERSONNEL.

5. DO NOT CONTINUE TO OPERATE THE EQUIPMENT IF YOU HAVE ANY DOUBT ABOUT IT WORKING NORMALLY, OR IF IT IS DAMAGED IN ANY WAY. WITHDRAW THE MAINS PLUG FROM THE MAINS OUTLET AND CONSULT QUALIFIED SERVICE PERSONNEL.

6. DO NOT REMOVE ANY FIXED COVERS UNLESS YOU ARE QUALIFIED TO DO SO AND EVEN THEN WITHDRAW THE MAINS PLUG FROM THE MAINS OUTLET BEFORE YOU START.

7. THIS EQUIPMENT CONTAINS NO USER SERVICEABLE PARTS. REFER ALL SERVICING AND MAINTENANCE TO QUALIFIED SERVICE PERSONNEL.

8. TO AVOID EXPLOSION, DO NOT OPERATE THIS EQUIPMENT IN AN EXPLOSIVE ATMOSPHERE

INTRODUCTION

1.1. General Introduction

PVProHD-LED is a very flexible image scaler developed specifically for driving full-color LED displays from video or graphics sources. Seamless switching functionality is available via user-definable hotkeys which provides a “last-frame capture, clean switch to new input” function with fast input switching, ideal for source control in small installations where a vision mixer is not available.

PVProHD-LED features state of the art digital image processor which provides market leading HD& SD per-pixel multiple low-angle aperture-adjusted motion-adaptive de-interlacing and automatic film pull-down correction for 3:2, 2:2 and non-standard and broken cadences, significantly outperforming the capabilities of benchmark competitor products.

PVProHD-LED features post-production “HQV by Teranex” studio-grade image processing algorithms for the very best scaling, film and video noise reduction, MPEG artefact reduction and automatic audio time-line correction to maintain lip-sync. PVProHD-LED is a very flexible video and audio router with multiple HDMI and analog input channels, digital, analog and optical audio support and SDI/HD-SDI compatibility.

Output image sizing is very easily controlled for quick and simple configuration to drive any LED screen from 64x48 through to 1920x1080 active image sizes. The output image may also be zoomed and panned to select a particular area of interest. Actual minimum and maximum achievable image sizes are dependent on input and output resolutions selected.

PVProHD-LED uses a very flexible high performance video input front end including true component video support in analog YPbPr and RGBS formats and HDSDI/SDI digital formats as well as dual composite (CVBS) and YC/S-Video inputs. A very high performance video decoder is utilised with 2x oversampling and active comb filter for outstanding video image clarity. HDMI and DVI video with HDCP encryption is also supported, as are computer graphics inputs in SVGA analogue and HDMI/DVI digital formats.

The output format can be set to Video I/O Track mode where it will automatically switch between 50Hz, 59.94Hz and 60Hz depending on the input signal type so as to ensure best motion performance on the LED screen while still performing time base correction, or can be set to a fixed output frame rate for driving basic LED screens which are not 50Hz-compatible.

Alternatively I/O Lock mode can be selected which precisely locks the output frame rate to the input frame rate dynamically without frame rate conversion so as to reduce system latency. (I/O Lock is only compatible with screens connected by DVI and may not operate will all LED screen types. It is not compatible with CRT displays.)

Low latency mode with non-motion adaptive reduced processing, includes selectable vertical temporal recursive filtering for reduced flicker with interlaced inputs.

Genlock allows any pre-defined output resolution to be vertically genlocked to a 50Hz, 59.94Hz or 60Hz SD or HD video signal on the Component 1, Component 2, VGA, DVI or HDMI inputs. When Genlock is enabled and a valid Genlock sync has been detected, the chosen Video I/O Track setting and chosen output refresh rate will be automatically overridden and the output will run locked to the field sync present on the Genlock signal.

Outputs are available in VGA analog and DVI digital formats which are useable simultaneously so that one output can drive the LED screen while the other runs a local monitor for applications where the LED screen is not visible from where the scaler is situated. Note that if an HDCP encrypted signal is connected to the HDMI or DVI input, the DVI output signal will be similarly HDCP encrypted and the VGA analog output will be disabled.

PVProHD-LED features left/right image extraction of 3D data formats on DVI/HDMI inputs for passive glasses 3D projection systems

System control is via a front-panel LCD menu controlled via keys or through an intuitive ‘Windows’ application connected via a normal RS232 serial port or via TCP/IP (ethernet).

1.2. Packing List

PVProHD-LED is supplied with the following

1) This manual

2) CD which contains a PC based Windows software application which enables the user to configure PVProHD-LED via a standard RS232 link or via TCP/IP Ethernet.

3) 3 pin plug IEC mains cable

4) DVI-D output cable

PVPROHD-LED SYSTEM DESCRIPTION

2.1. Product Overview

PVProHD-LED is designed to accept the following input signals:

- 2x Composite video via BNC
- 2 x S-Video via 4-way miniDIN
- 2 x YPbPr or RGBS SD/ED/HD component video via 3/4xBNC
- HDSDI/SDI (Serial Digital Interface) via BNC
- VGA analog (computer interface) via 15HDD
- DVI (Digital Visual Interface) via DVI-D
- HDMI via HDMI connector

2.2. Product Specification

This section provides technical details for all possible inputs. Please note that not all possible input options may be applicable to certain output modes.

2.2.1. Power Supply Requirement

100V-264VAC 50/60Hz maximum power 60W connected via a standard IEC connector located on the rear panel . The power input socket contains a fuse which should only be replaced with the same type and rating for continued product safety. The correct type and rating of fuse is stated on a label on the side or rear of the equipment.

2.2.2. Video Inputs

Composite via BNC connectors, S-Video via 4-way mini DIN sockets

Signal formats	Composite (CVBS), S-Video (Y/C), Standards NTSC, PAL, SECAM
Composite (CVBS) input level	1V p-p nominal inc. sync
Luminance (Y) input level	1V p-p nominal inc. sync
Chrominance (C) input level	0.6V p-p nominal
Input Impedance (all inputs)	75 Ohms

2.2.3. Component Video Inputs

Via 3 or 4 BNC connectors

YPbPr, YPbPrS, RGB and RGBS component video, menu selectable.

Signal formats 484i (480i) and 576i (SD), 480p, 576p (ED), 720p, 1080i at 50, 59.94 and 60Hz and 1080p at 24, 25, 29.97 and 30Hz.

Please note this input does not support Computer SVGA signals which should be connected via the Computer SVGA input

2.2.4. HDSDI Input

Format: SD-SDI and HD-SDI YCbCr 4:2:2 serial digital component video
Input impedance: 75 ohms.

SMPTE 292M and SMPTE 259M-C compliant, accepts 484i, 576i, 720, 1080i and 1080p single link formats at 270Mb or 1.485Gb rates.

2.2.5. Computer (SVGA) Inputs VESA formats

Signal formats:	DOS	720 x 400	70Hz
	VGA	640 x 480	60Hz to 75Hz inclusive
	SVGA	800 x 600	56Hz to 75Hz inclusive
	XGA	1024 x 768	60Hz to 75Hz inclusive
	WXGA	1280 x 768	60Hz
	SXGA	1280 x 1024	60Hz
	1080p	1920x1080p	60Hz

RGB video level	0.7V - 1.0V
RGB input impedance	75 Ohms
Sync format	Separate H & V sync at TTL/5V levels.

2.2.6. HDMI & DVI Inputs

HDMI 1.3 with or with out HDCP, 30-bit video compatible.

DVI-D input with or without HDCP

Signal formats -video

484i and 576i (SD) in double-rate formats (1440 pixels per line), 480p, 576p (ED), 720p, 1080i at 50, 59.94 & 60Hz, 1080p at 24, 25, 30, 50, 59.94 & 60Hz, 2K (2048x1080p) at 50, 59.94 & 60Hz.

Signal formats – computer

DOS	720 x 400	70Hz
VGA	640 x 480	60Hz to 75Hz inclusive
SVGA	800 x 600	56Hz to 75Hz inclusive
XGA	1024 x 768	60Hz to 75Hz inclusive
WXGA	1280 x 768	60Hz
WXGA	1366x768	60Hz
SXGA	1280 x 1024	60Hz
UXGA	1600x1200	60Hz
WUXGA	1920x1200	60Hz

2.2.7. Audio Inputs

Analog audio stereo pairs via RCA jack (4 sets)
S/PDIF coaxial digital audio (2x)
Toslink optical digital audio (2x)

2.2.8. Audio Output

Analog audio stereo pair via RCA jack (1 set)
S/PDIF coaxial digital audio (1x)
Toslink optical digital audio (1x)

2.2.9. Display Output

Two output connectors are provided which are useable simultaneously, provided the input signal is not HDCP encrypted. When the input signal has HDCP encryption, the DVI-D output connector will carry a similarly HDCP encrypted signal and the VGA connector may be disabled. ***When an HDCP encrypted signal is input, but the display device does not support HDCP, the output image will turn orange or pink (depending on the input color space) to indicate this.***

One is a DVI-D output and the other is a VGA style output. Both conform to normal VESA standards for connectors and pinouts for these signal types. The DVI-D connector will support HDMI 1.3 with 30-bit video and HD audio formats when connected to a suitable HDMI 1.3 receiver.

2.3. Genlock

The Genlock module allows any pre-defined output resolution to be vertically genlocked. The genlock signal can be derived from the HDMI, DVI, SVGA or RGBS/YPbPrS or HDSDI inputs. *(Note: If HDMI is displayed, genlock cannot be to DVI and vice versa since these two inputs share a common signal processing datapath. Genlock via HDMI or DVI is only available when that HDMI or DVI input is the main image being displayed*). **It is recommended for best performance to apply genlock as an analog bi or tri-level sync or black & burst to the S channel of Component1 or Component2, or as an SDI or HDSDI digital sync.**

The genlock signal must be a video format or computer VESA format compatible with the input to which it is connected and must have a vertical rate of 24Hz, 50Hz, 59.94Hz or 60Hz. The output will be vertically locked to the Genlock signal at the exact same rate, except for 24Hz genlock where the output will be locked at 48Hz.

Genlock mode is compatible with Analog (VGA) and DVI LED screens. However it should be noted that the setting of the PLL Phase or tracking on an LED screen connected via Analog (VGA) may be more sensitive when Genlock is used, especially if the incoming Genlock sync contains any noise or is being provided as a composite video signal rather than a sync or sync+burst. Best Genlock performance is obtained using DVI signal connection between the PVProHD-LED and the LED screen.

Genlock status is shown via the front panel status indication on the right-hand side of the screen, provided that Genlock has been enabled on the menu.

When Genlock is enabled and a valid Genlock sync has been detected, the chosen Video I/O track setting and chosen output refresh rate will be automatically overridden and the output will run locked to the field sync present on the Genlock signal.

Note: Genlock can be used with any pre-defined output mode but is not compatible with custom defined user-configured output modes.

3.1. Menu Tree

- Start up Screen
- Main Menu
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    - Inputs List
  - Input Adjust
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      - Saturation (Video inputs only)
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    - Reset 1
    - Reset 2
    - Reset 3
    - Reset 4
    - Rename 1
    - Rename 2
    - Rename 3
    - Rename 4

3.2. Introduction

The front panel displays information via a 4 line by 40 character display. All data entry is via four direction keys, a Select/Enter key and a Menu/Escape key.

Certain adjustments take time for the unit to complete, this will be indicated by the display showing Busy at the top of the screen. Further adjustments should not be attempted while the screen is showing Busy.

Use the Up and Down arrow keys to scroll to the parameter you need to adjust. Then press the Select/Enter key to enable you to then adjust the parameter. Use the Up/Down or Left/Right keys to adjust the parameter to the required value. Press the Select/Enter key again when the parameter has been adjusted to the required value.

Some adjustments take effect immediately, but others do not take effect until the Select/Enter key is pressed for a second time. The changed settings are saved into non-volatile memory when the Select/Enter key is pressed for the second time.

Some adjustments are not applicable to all signal types or operating modes, in which case those non-applicable functions will not be accessible via the menus.

The four keys under the display are user definable hotkeys for seamless input switching. Key definition is performed by allocating the correct key number to the desired input channel in the Input Channel Config section of the Miscellaneous menu. The LCD display shows the input channel allocated to each key, the illumination color of the key shows which input is presently selected.

3.3. Startup Screen

The startup screen shows the currently selected input signal and output resolution. It also shows the input currently allocated to each of the input select buttons.

3.4. Main Menu

The main menu lists the 6 sub menus. Input Select, Input Adjust, PIP, Output Settings, Information and Miscellaneous.

To set up your PVProHD-LED it is recommended that you follow this procedure:

Choose the correct output mode and parameters to suit your LED screen and controller.

Select the correct input signal.

Set the correct output image size (via Window Size) on the output menu.

Set the input levels and features appropriately to optimize the appearance of your image.

Set any other parameters to suit your application.

Note: All Input parameters are specific to your chosen input channel and input signal type, they are not global to the unit. All Output and Miscellaneous parameters are global

3.5. Input Select

The list of available inputs can be scrolled through using the Up and Down arrows. The new input is not selected until the Select/Enter key is pressed again.

The list of inputs are:- Analog, DVI, HDMI, S-Video 1, S-Video 2, Component 1, Component 2, CVBS 1, CVBS 2 and HDSDI.

Test patterns can be generated by PVProHD-LED without needing an input connected. When Test Pattern is selected as the input, the required test pattern can be chosen from the Input Channel Config section of the Miscellaneous menu. NB: Some complex test patterns can take many seconds to draw, during which time the screen will be blank and the LCD will indicate “Busy”. This is not a fault.

3.6. Input Adjust

This menu contains adjustments associated with setting up inputs to the unit. Use the Up and Down arrows to scroll to the required sub-menu and press the Select/Enter key to enter the sub-menu. The following sections list the sub-menus.

3.6.1. Input Levels

This menu contains parameters related to the level and color of the input signal.

Contrast
Control of video gain

Black Level
Control of background level

Black Level IRE
Used to select 7.5IRE black level set-up adjustment. Should always be ON for HDMI video inputs and should usually be off for analog video inputs.

Saturation and Hue
Control of video saturation and hue – applies to all video inputs but not computer input signals or formats.

Input Color temperature
To select the color temperature of the incoming material. Options are 5500K, 6500K, 7500K & 9300K and Custom

Custom Color Temperature
This is a user-defined color temperature setting whereby individual R,G,B gain and offset can be set so as to accurately calibrate a particular input/source to the display device. Once the custom mode has been set up here it can be selected from the Input Color Temperature menu.

Input gamma mode
Set this value to match the native gamma of the input signal. Input gamma and output gamma both default to 2.2. If they are both set to the same value, there is no effect on the image.

3.6.2. Clock/Position

For analog graphics inputs only, clock auto fit can be selected to automatically adjust the frequency and phase of the sampling clock. This automatic adjustment is strongly recommended. The clock phase and frequency can also be adjusted manually if needed.

3.6.3. Pan/Zoom/Tilt

By using the zoom and pan controls a part of the input can be selected and used to fill the display window. Please note it is not possible to pan unless the zoom has been set to a non-zero value.

3.6.4. Input Capture

Overscan
Select the amount of overscan. Analog video inputs default to 2.5% overscan, digital inputs and computer inputs default to 0%. Maximum overscan is 10%, minimum is 0%.

Input Window Shift
Allows horizontal and vertical adjustment of the captured active image area within the overall display resolution. Note: The range of position adjustment available is limited by the characteristics of the signal timings from the image source equipment: in some circumstances adjustment may not be possible, particularly with HDMI/DVI signals.

Changes in output image position (to correct for alignment errors or image positioning errors on the display device) should be effected via the Window edge adjustment for LED screens, or the Warp corner-adjustment menu or the image position controls on the output menu for projectors, plasmas and LCDs. The input window shift function should only ever be used to correct input capture discrepancies.

3.6.5. Input Features

The input features menu provide three image enhancement functions. Note that the enhancement settings apply to video input signals only, not computer graphics signals.

Sharpness
Control of the sharpening enhancement filters' levels. These are peaking filters to improve high-frequency response. Note that setting this control too high on a signal which already has good high frequency response will cause ringing or ghosting.

Detail Enhance
This filter provides powerful 2D image enhancement which can be used to greatly improve detail definition and clarity without causing image ringing or ghosting. It improves both horizontal and vertical detail. Correct setting of the detail enhance filter can make SD signals look virtually indistinguishable from true HD.

Unsharp Mask
Performs a real-time per pixel unsharp mask function on the image content to greatly improve clarity on soft images.

Contrast Enhance
Preconfigured contrast enhancements which can be selected to suit the display operating environment and the subject material being viewed.

3.6.6. Aspect Ratio

Select from Normal,Full Screen, Crop, Anamorphic, Flex Wide and custom aspect ratio. Note that some aspect ratios may not be applicable to all signal types, in which case selecting a non-applicable aspect ratio conversion will have no effect on the displayed image.

3.6.7. Filters

A submenu containing selection options for many image clean-up filters (for video inputs only) including:

CCS	Cross Chrominance Suppression filter (reduction of chroma-crawl) – SD only
CUE	Chroma Upsampling Error correction filter
ICP	Interlace Chroma Problem filter - Reduces chroma interlace errors on diagonals and curves
TNR	Temporal Noise Reduction (removes "electronic" noise found on broadcasts, film material and particularly noticeable on LED and plasma screens)
TNR & MNR	Selects which noise reduction filters are applied – TNR only, TNR+MNR, or Auto for automatic image content and noise based selection of filters.
MPEG	Selects whether MPEG mosquito and block noise is on or off and adjusts the level of MPEG noise reduction for SD signals. Not applicable to HD formats – use TNR for removal of all types of noise from HD formats.

3.7. PIP

Use the up and down arrows to scroll to the required sub-menu and press the Select/Enter key to enter the required sub-menu.

Enable

To enable PIP mode, select PIP Enable. Note: You cannot use the PIP menu successfully without at least two active inputs connected to PVProHD-LED.

Selecting the input

Use the PIP/Input Video menu to select which picture is displayed in the PIP window

Swapping PIP

Use the Swap function to swap the primary image with the PIP image

Positioning the PIP

Use the Quadrant function to choose the location of the PIP image from Top Left, Top Right, Bottom Left, Bottom Right. In addition, the PIP may be freely positioned around the screen using the Horiz Position and Vert Position controls. It is not restricted to the four pre-defined locations. The PIP size can be set using the Size control

PIP Limitations

Due to the high demands on the processing power available within the Realta HQV chip when an HD main image is displayed, full Teranex Video Processing is not always available when PIP is in use. Therefore reduced image quality may be observed when PIP is enabled.

If the main image is 1080i or 1080p and the PIP image is 720p, 1080i or 1080p the maximum available image processing bandwidth may be exceeded. In such circumstances Teranex Video Processing is automatically disabled resulting in reduced image quality. Full image processing performance and quality is automatically restored when the PIP is closed.

If the main image or the PIP image is SD then full Teranex Video Processing is maintained even with a PIP showing.

Important: The main image and the PIP image must be from different input groups, since each group shares a common video bus within the hardware.

Input Groups are:

Group 1: HDMI, DVI

Group 2: Component1, Component2, SVGA, HDSDI

Group 3: CVBS1, CVBS2, S-Video1, S-Video2

3.8 Output Adjust

This menu contains adjustments associated with setting up outputs from the unit. Use the up and down arrows to scroll to the required sub-menu and press the Select/Enter key to enter the sub-menu. The following sections list the sub-menus.

3.8.1 Display Type

Display

Select Display to be LED, LCD Plasma or Projector to match display device. Note that the available menu items change depending on the selected so it is important that this setting is chosen appropriately.

Output Resolution, Frame Rate and Video I/O Track

(Important – also refer to Lock Mode section on next page)

Video I/O Track causes the output frame rate to track the incoming field rate based on the detected input standard when the input signal is a video signal. It has no effect when the input signal is VGA or DVI. When I/O track is selected, for a 50Hz input signal, a time-base corrected 50Hz output mode is run. For a 59.94Hz input signal, a time-base corrected 59.94Hz output mode is run. The user's chosen output vertical rate is overridden by Video I/O Track when enabled.

As a general rule, best performance is obtained on smaller LED screens using 640x480 60Hz output mode with Video I/O Track turned on.

Unless running Genlocked, use of Video I/O Track is strongly recommended unless the LED screen you are using does not support 50Hz modes, or where field/frame rate conversion is desirable, e.g. for showing 50Hz material in-camera on a 59.94Hz TV scenario.

Should your LED screen have a resolution which requires an output format in excess of 640x480 then the lowest suitable resolution (mode) should be selected for best image performance. This ensures best possible image quality. Selecting a higher resolution than is needed to support the screen size will result in image quality degradation, particularly when showing HD video and high-resolution computer images.

Important: When Genlock is enabled and a valid Genlock sync has been detected or I/O Lock is selected, the chosen Video I/O Track setting and chosen output refresh rate will be automatically overridden. The output will run locked to either the input frame rate in the case of I/O Lock or to the field sync present on the Genlock signal in the case of genlock.

Sync Polarity

Control the H and Vsync polarity of the output video signal – necessary to get the correct image position on some types of display.

3.8.2 3D Extract

PVProHD supports HDMI1.4a primary 3D formats. When a 3D mode is detected the left or right image is extracted according to this menu setting and output. 3D projection systems with two projectors and passive glasses can be driven accordingly.

3.8.3 Window Size

These settings are used to adjust the image to the correct size and shape on your LED screen. Move each edge until the image is correct on your LED screen. It is best to do this using a full-screen image from a camera or a test pattern generator. Alternatively the PVProHD-LED internal test patterns can be selected via the Miscellaneous menu - these can then be used to set the correct image size to suit your LED screen.

It is VERY STRONGLY RECOMMENDED that the lowest output resolution large enough to support your LED screen is chosen. This gives best overall performance of your PVProHD-LED. There is no performance gain and potentially performance loss will be encountered by selecting an output mode in excess of that required for your LED screen size. Window Top,Bottom, Left and Right edges can all be adjusted.

3.8.4 Gamma/Color/Crush

Output Gamma Mode
Set this value to match the native gamma of the display. Input gamma and output gamma both default to 2.2. If they are both set to the same value, there is no effect on the image.

Never simultaneously adjust gamma and color in the PVProHD as well as in the display device, adjust one of the other. Adjusting both simultaneously may lead to loss of dynamic range on the signal which can cause picture noise.

Display Color Temperature
To match the color temperature of the display, choose one of the options 5500K, 6500K, 7500K, and 9300K. If both Display Colour Temperature and the Input Colour Temperature are set to the same value, no conversion is performed.

Note: The most common adjustment required is to reduce the level of red in the image. To make this adjustment, select a higher number for the Input Colour Temperature, or a lower number for the Display Colour Temperature.

Important: Alter the colour temperature using the PVProHD-LED controls, or using the display controller R,G,B levels. Never adjust both simultaneously since this will lead to loss of dynamic range on the signal which can cause picture noise.

Black Crush
Black Crush provides a coring function on the output stage of the PVProHD-LED, this allows low-level noise in dark areas to be clamped to black which can be useful on LED screens on which black level noise can be particularly noticeable. It modifies the black response of the gamma & colour curves so as to hide any black-level noise which may be apparent on the LED screen when high LED brightnesses are used, but does this without reducing peak white brightness, unlike when black level is adjusted.

It is recommended to use a setting between 0 and 16 and not more than 20. For particularly noisy subject material 24 can be used but detail loss may occur in dark areas. If too high a setting is chosen, image solarization may be observed where dark image areas turn completely black or even change colour.

The input black level should have been optimized first prior to using Black Crush and the TNR (and where applicable MPEG) noise reduction filter settings should be optimized first. It is not a replacement for correct input settings but is available to clean up any remaining black level noise on the signal which may become apparent on very bright LED screens.

For most LED screens the optimum setting for Black Crush is between 8 and 20.

3.8.5 Lock Mode

Genlock

Genlock allows any pre-defined output resolution to be vertically genlocked to a 50Hz or 59.94Hz SD or HD video signal on the HDSDI, Component 1, component 2, VGA, DVI or HDMI inputs. (Note: If HDMI is displayed, genlock cannot be to DVI and vice versa since these two inputs share a common signal processing datapath).

When enabled via the Lock Mode, the Genlock function operates automatically when a valid Genlock sync signal is detected. There are no further user adjustments required, lock configuration is fully automatic.

The genlock signal must be a video format or computer VESA format compatible with the input to which it is connected and must have a vertical rate of 24Hz, 50Hz, 59.94Hz or 60Hz. The output will be vertically locked to the Genlock signal at the exact same rate, except for 24Hz genlock where the output will be locked at 48Hz.

Genlock mode is compatible with Analog (VGA) and DVI LED screens. However it should be noted that the setting of the PLL Phase or tracking on an LED screen connected via Analog (VGA) may be more sensitive when Genlock is used, especially if the incoming Genlock sync contains any noise or is being provided as a composite video signal rather than a sync or sync+burst. Best Genlock performance is obtained using DVI signal connection between the PVProHD-LED and the LED screen.

Genlock status is shown via the front panel status indication on the right-hand side of the screen, provided that Genlock has been enabled on the menu.

When Genlock is enabled and a valid Genlock sync has been detected, the chosen Video I/O track setting and chosen output refresh rate will be automatically overridden and the output will run locked to the field sync present on the Genlock signal.

Note: Genlock can be used with any pre-defined output mode but is not compatible with custom defined user-configured output modes.

HDMI and DVI signals can only be used as the genlock source when they are also being used as a video source. Component and VGA inputs can be used as the genlock source whether or not they are also being used as a video source

I/O Lock

I/O Lock performs an internal genlock function whereby the output frame rate is dynamically locked to the input frame rate by adding lines to or dropping lines from the output timing. This method of frame locking is not compatible with all display devices but does provide best possible motion performance and also reduces processing latency by 1 frame since the frame rate conversion memories are bypassed.

I/O Lock is recommended for low-latency applications but should only be used with a DVI output connection and only when connected to a display which has been proven to be compatible with this mode. Most digital displays will operate correctly with I/O Lock mode, but VGA analog and CRT-based displays are not compatible.

3.8.6 When 24Hz input

When the input is 24Hz the following options for the output frame rate are available. The Lock Mode needs to be set to disabled for these options to apply.

IMPORTANT: Many displays are not compatible with 24Hz or 48Hz display modes, always run set to “Frame rate” with displays without 24Hz or 48Hz support.

Frame rate

If I/O Track is off then the output frame rate will be set by the Frame Rate setting in the Output Settings/Display Type menu. If I/O Track is on the output will run at 60Hz as this will give less flicker than running at 50Hz

Output 24Hz

24Hz output timing is available if the selected output resolution is 720p or 1080p

Output 48Hz

48Hz output timing is available for all output resolutions.

3.8.7 Processing Mode, Latency Adjustment and VT Filter

Best Picture

Noise reduction and motion-adaptive de-interlacing operate in this mode to give the best quality picture. There is optional MPEG noise reduction for SD interlaced inputs. Typical latency is 5-8 frames, worst case is 9 frames. Exact latency depends on whether the input is progressive or interlaced, which noise reduction filters are enabled and whether Video I/O Lock is enabled. In most configurations latency will be 5-7 frames depending on configuration and whether Video I/O Lock is enabled.

Low Latency

In this mode noise reduction and motion-adaptive de-interlacing are disabled which allows the delay through the unit to be reduced to 3 frames with Video I/O Lock off or 2 frames with Video I/O lock on.

Low latency mode with non-motion adaptive reduced processing, includes selectable vertical temporal recursive filtering for reduced flicker with interlaced inputs.

VT Filter

The Vertical Temporal Filter reduces interlace bounce or flicker when showing an interlaced input signal and operating in Low Latency mode. It is only operational in this scenario, it is not required in Best Picture mode. By choosing the filter strength and recursion mode it is possible to choose between higher levels of flicker reduction or better motion reproduction. By default typical optimal settings suitable for most applications are automatically selected but certain types of content may be optimised by changing the filter settings.

Strength – controls the filter weighting of prior field versus current field

Recursion – chooses between vertical filtering of current and prior input fields, or current field and recursive data output from filter during prior field.

3.8.8 Multiple Unit

This function allows PVProHD-LED to process only a portion of the overall image, for use in applications where multiple processors are used to drive very large screens.

To enable this mode, choose the number of scalers horizontally and vertically which are being used to drive your screens. Then set the horizontal and vertical position of the portion of the screen being driven by this particular PVProHD-LED. This way, multiple units can drive one single large screen.

Important: When using multiple PVProHD-LED units to drive one single large screen, it is essential that all PVProHD-LED scalers are genlocked to the same genlock sync source using an external genlock sync, or I/O Lock mode is enabled.

If genlock or I/O Lock is not used in multiple unit configurations, motion tear will be observed at the boundaries of the image processed by each PVProHD-LED.

It is also essential that all filter settings and operating mode settings (except for the multiple unit scaler vertical and horizontal position) are exactly identical on every unit, otherwise the output images may not be synchronised due to different processing latencies through each differently configured scaler.

3.8.9 Define Custom Mode

Allows the user to define a custom output mode by entering the horizontal and vertical timings. This function should be used with care – it can cause loss of output image if incorrect values are entered. Custom Mode is not compatible with Genlock and may cause errors in Multiple Unit operating mode.

3.9. Information

Displays information about the current configuration of the unit. Use the up and down arrows to scroll to the required values.

3.10. Miscellaneous

This menu contains miscellaneous parameters generally associated with setting up the configuration of the whole unit rather than input or output parameters. Use the up and down arrows to scroll to the required sub-menu and press the Select/Enter key to enter the sub-menu. The following sections list the sub-menus.

3.10.1 Select Test Pattern

To display the test pattern, Test Pattern must be chosen from the Input Select function on the Input menu or from the Test Pattern function on the Miscellaneous menu.

The default test pattern can be chosen within the Input Channel Config submenu in the Miscellaneous menu.

Once Test Pattern has been chosen as the selected input, from the top level status screen it is possible to scroll through all available test patterns by pressing the Up or Down arrow keys.

3.10.2 Input Channel Config and Seamless Switching Configuration

This menu allows an audio channel and an input select hot-key button to be associated with each video source. That hot key is then used to seamlessly switch to the pre-defined input channel.

IMPORTANT: Seamless switching requires the PVProHD-LED to operate at a fixed output frame rate for input selection to be truly seamless. Therefore it requires Video I/O Lock to be off and Video I/O Track to be off, or all input signals to be running at the same frame rate, or for a valid Genlock input signal to be present and active.

Scroll to the Input Channel Config menu. Press the Select/Enter key. Scroll to the Input you want to configure and press the Select/Enter key. The following items are available for each channel.

Audio Channel

Choose Audio In to select an audio channel.

If there is no associated sound channel (e.g. for a PC input with no audio) choose None

Note: HDMI audio inputs can only be associated with the matching HDMI video input. For best audio performance we recommend using Coax or Optical SPDIF audio where supported by the source.

Input Select Button

There are 4 select buttons on the front of the unit which can be associated with inputs, these are used for seamless input selection as described above.

Native Modes in EDID (HDMI Only)

Allows configuration of which modes are shown as “Native” in the HDMI EDID. Can be used to force some consumer electronics source equipment to produce native format outputs.

Legacy Mode (HDMI Only)

Allows support of older HDMI source equipment which is slower to handshake or unable to support more modern HDMI requirements. Use this setting if your HDMI source fails to produce an output signal when connected to PVProHD.

Color Space (HDMI Only)

Allows selection of the HDMI color space format. Auto is the default setting but some older or “rogue” HDMI sources may show incorrect picture colors in Auto in which case the format can be manually chosen. Options are Auto, RGB, YCbCr 4:4:4 and YCbCr 4:2:2

Component Format

For analog Component Video inputs only, select whether the input source provides YPbPr, YPbPrS, RGB or RGBS video. It is also possible to choose between 0.7v and 1.0v video levels on the component inputs. Most sources provide 0.7v video, plus 0.3v sync, but some do provide 1.0v (excluding syncs).

Incorrect format selection will cause severe color errors or loss of stable picture, incorrect level selection will cause the picture be very dim, or cause peak whites to be compressed.

Channel Reset

The configuration for an input channel can be removed by performing a channel reset.

Test Pattern

When Test Pattern is selected as the input channel the default test pattern displayed can be selected here. To actually display the test pattern, Test Pattern must be chosen from the Input Select function on the Input menu or from the next level up in the Miscellaneous menu.

3.10.3. Audio

HDMI Audio Input

Allows the user to set the format of the HDMI audio channel. Use to choose how many channels of audio are requested from the HDMI source equipment.

Audio Delay

The audio delay is automatically set to compensate for the latency through PVProHD. The Audio Delay adjustment does not override this automatic setting but allows fine calibration of the audio delay in steps of approximately 1mS, to advance or retard the audio so as to compensate for further delays in your display device or your audio system.

3.10.4. No Sync Color

Defines the output background color when no valid input signal is detected on the current selected input. Options are Blue, White and Black. Default is Black. Important: Must be set to Black to ensure seamless switching operates cleanly.

3.10.5 Border Color – LED only

Defines the color of the border round the output window to aid window size setup. Options are Blue, White and Black. Default is Black.

It is recommended that border color always be set to black once an installation or show build-up is complete, prior to live use of an LED screen. When in Multiple Unit mode, always leave Border Color set to black, otherwise the join between each screen may become visible on some image content.

3.10.6. Factory Reset

Factory reset puts all settings in the unit back to factory defaults..

3.10.7. Unit Configuration

Menu Timeout

Sets the time for the front panel to go back from displaying the current menu to display the top level menu

Front Panel Backlight

Sets the brightness of the front panel backlight

OSD (enable/disable) and Use Front Panel/OSD

To switch to control via the osd, first enable the OSD then set to Use OSD. This function should only be used when driving a projector, plasma or LCD, do not enable OSD for LED screens since on smaller screen sizes it may not be possible to view the OSD due to the LED screen not being of a high enough resolution!

IR Remote

Enables control of the unit via an optional IR remote control. By default this function is disabled.

Ethernet Config

The IP address type (static or DHCP), IP address, subnet mask and extended network prefix can all be entered here. *It is recommended that a static IP address be manually assigned if remote control software is to remain permanently connected, otherwise connectivity may be lost if the network DHCP server re-assigns the IP address previously allocated to PVProHD.*

When changing from DHCP to Static mode or vice versa it is strongly recommended that PVProHD is powered down using its rear power switch after such a change, then powered back up, so that it is properly recognised by other devices on the network.

Presets

The whole system configuration can be stored to one of four presets and can then be recalled later. Within this menu it is possible to name, copy, load and reset pre-sets.

Actual parameter saving when adjusted in other menu pages is automatic into the chosen preset.

PC SOFTWARE INSTALLATION AND USE

4.1. Introduction

The control software runs under WindowsXP®. Operation under Vista, 2000, Win98 and NT4 may be possible but is not guaranteed. The software communicates with the PVProHD-LED via a standard RS232 interface on a COM port (9600 baud 8 bit data, 1 stop bit no parity), or via TCP/IP Ethernet. TCP/IP control is strongly recommended since operation is much faster.

All parameter functionality is exactly as the adjustments via the front panel menu system. The hierarchy of the windows is similar to the front panel menu tree. Refer to Section 3 for details.

4.2. Installing the Software

Insert the CD, select the Software folder double click on the Setup application and follow the installation wizard instructions.

4.3. Software Operation

To use the PC serial port, select the Connect Com option. Connect the PC's serial port to the PVProHD-LED using a 9-pin serial extension cable, that is one wired pin-pin with a male connector on one end and a female on the other. A null-modem or crossover cable should never be used. The software scans automatically to find the correct COM port.

To use an Ethernet connection, select the Connect Ethernet option. A dialog box appears which allows the IP address of the unit to be entered. The IP address of the unit can be read from the Information menu on the front panel of PVProHD-LED

4.4. Toolbar Commands

The toolbar has three options

File

Unit

Help

The File option allows the user to save the current PVProHD-LED settings to a PC, or load settings from a PC to PVProHD-LED. A progress bar is displayed while these two activities are taking place.

The Unit option allows the user to choose to connect via the PC serial port or via Ethernet.

The Help option displays the About box which contains information relating to the software issue, the PVProHD-LED software issue and access to your PC System information.

ENVIRONMENTAL AND EMC

5.1. Recommended Operating Conditions

Temperature 0^{O}C to 40^{O}C

Humidity (non condensing) 0% to 95%

5.2. Storage

Temperature -25^{O}C to $+85^{O}$C

Humidity (non condensing) 0% to 95%

5.3. CE and FCC Compliance

CE: This product complies with the requirements of 89/336/EEC Electromagnetic Compatibility Directive amended by 92/31/EEC and 93/68/EEC, and 73/23/EEC Low Voltage Directive. Compliance is to EN55022 Class A.

FCC: **WARNING:** This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. Operation of this equipment in a residential area is likely to cause interference in which case the user will be required to correct the interference at their own expense.

The user is cautioned that changes and modifications made to the equipment without approval of the manufacturer could void the user's authority to operate this equipment.

It is suggested that the user use only shielded and grounded signal cables to ensure compliance with FCC rules.