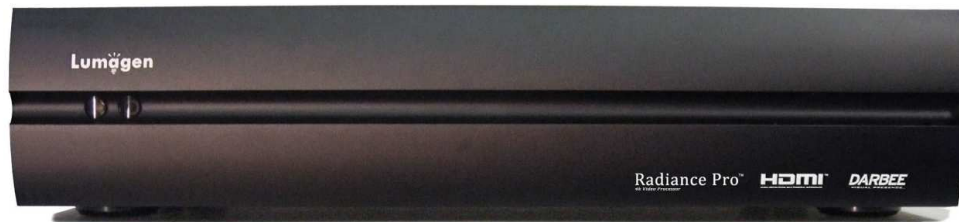




Radiance Pro™

Video Processor

Owner's Manual



Limited one (1) year warranty on Lumagen, Inc. products.

Lumagen, Inc. ("Lumagen") warrants (the "Warranty") only to the original retail purchaser ("You"), only that this Lumagen product (the "Product") will be free from defects in material and workmanship for a period of one (1) year from the date of original retail purchase from a Lumagen franchised dealer (the "Dealer"). Lumagen makes no Warranty for Products purchased from other than a Lumagen Dealer. **FAILURE TO RETURN THE WARRANTY CARD MAY MATERIALLY AFFECT YOUR RIGHTS UNDER THIS WARRANTY.**

The defective Product must be shipped in the original shipping container, together with a description of the problem, plus Your contact information and proof of the date of purchase, prepaid and insured, to Lumagen. Risk of loss during shipping is borne by You. Purchase date is subject to confirmation with the Dealer. You must contact Lumagen or the Dealer for shipping instructions.

Lumagen will examine the Product. If Lumagen determines, in its sole opinion, that the Product is defective in materials or workmanship during the Warranty period, Lumagen will, at its option, repair, or replace with an equivalent, or better, Product at no additional cost, or refund the net original purchase price. All parts that are replaced become the property of Lumagen.

If Lumagen determines that the Product is defective in materials or workmanship during the Warranty period, the Product will be returned to You within a reasonable time after it has been repaired or replaced, freight prepaid. If Lumagen determines the Product is not defective in materials or workmanship during the Warranty period, You will be charged for the examination, and the Product will be returned to You, within a reasonable time, C.O.D. for an amount that includes the examination, C.O.D. and shipping charges.

This Warranty does not include service or parts to repair damage caused by, in Lumagen's sole opinion, acts of God, acts of war, accident, misuse, negligence, inadequate packing or shipping procedures, applied voltage in excess of rated maximum, appearance of cabinetry not directly attributable to defects in materials or workmanship, for any modifications to the Product, or if the serial number has been removed or defaced.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. IF THE PRODUCT IS DEFECTIVE IN WORKMANSHIP OR MATERIALS DURING THE WARRANTY PERIOD, THE SOLE REMEDY SHALL BE REPAIR OR REPLACEMENT AS SPECIFIED ABOVE. IN NO EVENT SHALL LUMAGEN BE LIABLE FOR AN AMOUNT MORE THAN THE ORIGINAL PURCHASE PRICE OF THE PRODUCT. LUMAGEN SHALL NOT BE LIABLE FOR OMISSIONS OR ERRORS IN ITS DOCUMENTATION OR SOFTWARE. LUMAGEN RESERVES THE RIGHT TO MAKE CHANGES TO ITS PRODUCTS AND DOCUMENTATION WITHOUT NOTICE.

TO THE EXTENT NOT PROHIBITED BY LAW, IN NO EVENT SHALL LUMAGEN, ITS SUPPLIERS, OR ITS DEALERS, BE HELD LIABLE FOR ANY LOST REVENUE, LOST PROFIT, SPECIAL, INCIDENTAL, INDIRECT, CONSEQUENTIAL, OR PUNITIVE DAMAGES, HOWEVER CAUSED, REGARDLESS OF THE THEORY OF LIABILITY, RESULTING FROM THE USE OF, OR INABILITY TO USE, THIS PRODUCT, EVEN IF LUMAGEN, ITS SUPPLIERS, OR ITS DEALERS, HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Some jurisdictions do not allow exclusion or limitation of consequential damages, so the above limitations may not apply to You.

All implied warranties are expressly disclaimed. If held otherwise by a court of law, all implied warranties are limited to the duration of this express Warranty. Some jurisdictions do not allow the limitation on how long an implied Warranty lasts, so the above limitation may not apply to You. This Warranty gives You specific legal rights, and You may also have other rights, which vary from jurisdiction to jurisdiction.

Cut on line below and mail completed Warranty registration to Lumagen.

WARRANTY REGISTRATION

Name: _____
Address: _____

Email: _____
Product name: _____
Serial Number: _____
Purchase date: _____
Dealer name: _____

Place in envelope and mail to:
Lumagen, Inc.
7810 SW Miller Hill Road
Beaverton, OR 97007

LEGAL NOTICES:

TO THE EXTENT NOT PROHIBITED BY LAW, IN NO EVENT SHALL LUMAGEN, ITS SUPPLIERS, OR ITS DEALERS, BE HELD LIABLE FOR INJURY TO PERSONS OR PROPERTY, ANY LOST REVENUE, LOST PROFIT, SPECIAL, INCIDENTAL, INDIRECT, CONSEQUENTIAL, OR PUNITIVE DAMAGES, IMPAIRMENT OF OR DAMAGE TO OTHER GOODS, HOWEVER CAUSED REGARDLESS OF THE THEORY OF LIABILITY, RESULTING FROM THE USE OF, OR INABILITY TO USE, THIS PRODUCT, EVEN IF LUMAGEN, ITS SUPPLIERS, OR ITS DEALERS, HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

LUMAGEN SHALL NOT BE LIABLE FOR OMISSIONS OR ERRORS IN ITS DOCUMENTATION OR SOFTWARE. LUMAGEN RESERVES THE RIGHT TO MAKE CHANGES TO ITS PRODUCTS AND DOCUMENTATION WITHOUT NOTICE.

DarbeeVision Inc. - End User License Agreement (E.U.L.A) for DARBEE Visual Presence™ Technology in Lumagen Radiance Products: This product provides the ability to turn off DARBEE Visual Presence (DVP™) processing, because the DVP technology processing feature in this product is not intended for commercial broadcast or theatrical presentation applications. By using this product, you accept that the DVP technology ingredient is intended for personal or small network use and should be switched off if this video processor system is used to process video for commercial broadcast or commercial theatrical viewing applications. You may not record the DVP processed output of this video processor system. You may use DVP in this product to process video for up to six end user displays, within any video system application, provided the DVP processed output video of this system is not being sold to an end viewer or user. An additional commercial license is available from DarbeeVision, Inc. for larger video network, distribution, commercial applications. You may not reverse engineer or otherwise deconstruct the DVP algorithm, which is the sole intellectual property of DarbeeVision, Inc., and protected by patents and trade secrets. This E.U.L.A. is not intended to limit the use of this product or its features, when the video processor is used with DVP off.

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC rules, Canadian ICES-003, and CISPR 22. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Unauthorized modifications to this equipment may void Lumagen's limited warranty and the user's authority to operate this equipment.

Lumagen is a registered trademark of Lumagen, Inc. Radiance, Vision, and other Lumagen product names, are trademarks of Lumagen, Inc. Darbee™ and DarbeeVision™ are trademarks of DarbeeVision Inc. Other trademarks are the property of their respective owners.

WARNINGS:

- **Do not defeat the safety features of the power supply or power cord, such as, but not limited to, removing the ground pin connection.**
- **Do not open, insert objects into, or spill liquid into, this equipment.**
- **Do not block the cooling vents, and make sure there is adequate cooling around unit.**
- **Do not program an output resolution that exceeds the maximum specified refresh rate of the attached television, or projector.**
- **Improperly set gray-bar intensity may accelerate screen burn-in. Consult a home-theater specialist for help setting gray-bar intensity.**

Table of Contents

Table of Contents

| | |
|------------------------------------------------------------------|-----------|
| SECTION 1 – INTRODUCTION | 1 |
| <i>Document Conventions and Menu Navigation</i> | 2 |
| <i>Unpacking</i> | 2 |
| <i>Verify that your box contains the following items</i> | 2 |
| <i>Remote Control Battery Installation</i> | 2 |
| <i>Installation Guidelines</i> | 2 |
| SECTION 2 – OVERVIEW | 3 |
| FRONT PANEL (RADIANCE PRO 444X)..... | 3 |
| FRONT PANEL (RADIANCE PRO 424X)..... | 3 |
| REAR PANEL (RADIANCE PRO 444X)..... | 3 |
| REAR PANEL (RADIANCE PRO 424X)..... | 3 |
| <i>Remote Control</i> | 4 |
| <i>Block Diagram</i> | 5 |
| <i>Configuration Memories</i> | 5 |
| SECTION 3 – QUICK START GUIDE | 7 |
| INSTALLATION INSTRUCTIONS..... | 7 |
| SECTION 4 – SYSTEM CONFIGURATION EXAMPLES | 8 |
| SECTION 5 – BASIC COMMANDS | 9 |
| <i>Power</i> | 9 |
| <i>Input Selection</i> | 9 |
| <i>Configuration Memory Selection</i> | 9 |
| <i>Input Aspect Ratio Selection</i> | 9 |
| <i>Image Zoom</i> | 9 |
| <i>Status Screen</i> | 10 |
| <i>On-Screen Help</i> | 10 |
| <i>Quick Keys</i> | 10 |
| SECTION 6 – VIDEO OUTPUT MENU | 11 |
| VIDEO OUTPUT SETUP MENU..... | 11 |
| CUSTOM OUTPUT MODE..... | 12 |
| <i>Output Mode – Direct Commands</i> | 12 |
| <i>Exact Output Timing</i> | 12 |
| CMS MENU..... | 12 |
| <i>Gamma Factor</i> | 12 |
| <i>Color Gamut</i> | 12 |
| <i>Grayscale and Gamma</i> | 12 |
| <i>Color Decoder</i> | 12 |
| <i>Black Level</i> | 12 |
| <i>White Level</i> | 13 |
| STYLES MENU..... | 13 |
| <i>HDMI Output Type</i> | 13 |
| <i>Rate Match</i> | 13 |
| <i>Color Format</i> | 13 |
| <i>Dither</i> | 13 |
| <i>Mask</i> | 13 |
| <i>Shrink</i> | 13 |
| <i>Keystone</i> | 13 |
| <i>Gray Level</i> | 14 |
| <i>Screen Aspect Ratio</i> | 14 |
| <i>Graybar Intensity</i> | 14 |
| <i>3D Glasses Adjust (With Optional 3D Glasses Output)</i> | 14 |
| <i>Soft Edge</i> | 14 |
| MISC. OUTPUT SETTINGS..... | 14 |
| <i>3D Output Options</i> | 14 |
| <i>Copy Output Settings</i> | 14 |

Table of Contents

| | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| SECTION 7 – VIDEO INPUT MENU | 15 |
| THE VIDEO INPUT MENU IS USED TO CONFIGURE INDEPENDENT SETTING FOR EACH INPUT, INPUT MEMORY, AND INPUT RESOLUTION. OFTEN NO CHANGES ARE NEEDED USING THE INPUT MENU. | 15 |
| INPUT SETUP MENU..... | 15 |
| <i>In Configs Setup</i> | 15 |
| INPUT PICTURE CONTROLS | 15 |
| <i>Black and White Levels</i> | 15 |
| <i>Color Format</i> | 16 |
| <i>Color Decoder</i> | 16 |
| <i>Y/C Delay</i> | 16 |
| <i>Input Sizing</i> | 16 |
| <i>Vertical Shift</i> | 16 |
| <i>Non-linear Stretch</i> | 16 |
| <i>Input Masking</i> | 17 |
| <i>Letter Box Zoom</i> | 17 |
| <i>Deinterlace</i> | 17 |
| <i>Deinterlacing Field Flip</i> | 17 |
| <i>Reinterlace</i> | 17 |
| INPUT ENHANCEMENT CONTROLS..... | 18 |
| <i>Darbee</i> | 18 |
| <i>Sharpness</i> | 18 |
| <i>Noise Reduction</i> | 18 |
| <i>Copy Enhancement Settings</i> | 18 |
| INPUT OPTIONS | 18 |
| <i>HDMI Input Setup</i> | 18 |
| <i>HDCP 2.2, or HDCP 1.X, Input Mode Selection</i> | 18 |
| <i>HDMI Video Type</i> | 18 |
| <i>Input Level</i> | 18 |
| <i>Virtual to Physical Input Mapping</i> | 19 |
| <i>Video EDID Display Information for HDMI inputs</i> | 19 |
| <i>HDMI Input Hotplug Mode</i> | 19 |
| <i>Auto Aspect Selection</i> | 19 |
| <i>Input Aspect Selection Mode</i> | 20 |
| <i>Genlock</i> | 20 |
| <i>Scale Bias</i> | 20 |
| <i>Game Mode</i> | 20 |
| <i>Input Label</i> | 20 |
| <i>Copy Input Settings</i> | 20 |
| SECTION 8– AUDIO CONFIGURATION | 21 |
| SECTION 9 - CALIBRATION | 22 |
| SECTION 10 – MISCELLANEOUS COMMANDS | 23 |
| SYSTEM SETTINGS..... | 23 |
| <i>Menu Mode</i> | 23 |
| <i>Timeouts</i> | 23 |
| <i>OSD Enable</i> | 23 |
| <i>Input Reselect</i> | 23 |
| <i>Menu Placement</i> | 23 |
| <i>Input Menu</i> | 23 |
| <i>Initial Power State</i> | 23 |
| <i>Initial Input State</i> | 23 |
| <i>On/Off Message</i> | 23 |
| <i>Message Control</i> | 23 |
| <i>Test Patterns</i> | 24 |
| <i>Remote Control Arrow Buttons</i> | 24 |
| <i>LED Setup</i> | 24 |
| <i>RS-232 Setup</i> | 24 |
| <i>3D Glasses</i> | 24 |
| <i>Zoom Step</i> | 24 |
| <i>Quick Keys</i> | 24 |
| <i>Configuration Memory Usage</i> | 25 |
| <i>Fan Control</i> | 25 |

Table of Contents

| | |
|-------------------------------------------------------|-----------|
| SAVING THE CONFIGURATION..... | 25 |
| <i>Save</i> | 25 |
| <i>Undo</i> | 25 |
| <i>Restore ISF calibration</i> | 25 |
| <i>Revert To Factory Settings</i> | 25 |
| SECTION 11 – 3D SUPPORT | 26 |
| 3D TYPES | 26 |
| <i>Frame Packed</i> | 26 |
| <i>Side-by-Side</i> | 26 |
| <i>Top-Bottom</i> | 26 |
| <i>Frame Sequential</i> | 26 |
| <i>Separate Left and Right</i> | 27 |
| 3D OUTPUT SETTINGS..... | 27 |
| <i>3D Output Setup Menu</i> | 27 |
| <i>3D Output Mode = Auto</i> | 27 |
| <i>3D Output Mode = Specific Format</i> | 27 |
| <i>3D Output Type = Auto</i> | 27 |
| <i>3D Output Type = Specific 3D Type</i> | 27 |
| <i>3D EDID Configuration</i> | 27 |
| 3D SETUP PROCEDURES | 28 |
| <i>Normal Setup</i> | 28 |
| <i>Display Optimization</i> | 28 |
| <i>Setup for Non-Compliant Displays</i> | 28 |
| <i>Setup for Non-Compliant 3D Video Sources</i> | 28 |
| SECTION 12 – DARBEE VISUAL PRESENCE™..... | 30 |
| DARBEE MENU | 30 |
| <i>Darbee menu control</i> | 30 |
| <i>Gain</i> | 30 |
| <i>Mode</i> | 30 |
| <i>Enabled</i> | 30 |
| <i>View</i> | 30 |
| SECTION 13 – COMMAND INTERFACE | 31 |
| DIRECT COMMANDS | 31 |
| <i>Output Vertical Resolution</i> | 31 |
| <i>Output Mode Commands</i> | 31 |
| <i>Output Vertical Rate</i> | 31 |
| <i>Output Aspect Ratio</i> | 31 |
| <i>Miscellaneous Commands</i> | 31 |
| MENU SHORTCUTS | 31 |
| IR COMMAND LIST | 31 |
| RS-232 ASCII COMMAND LIST | 31 |
| SECTION 14 – SPECIFICATIONS..... | 32 |

Section 1 – Getting Started

Section 1 – Introduction

Thank you for purchasing a Lumagen® Radiance Pro™ video processor. The award winning Lumagen Radiance video processor family boasts the highest-performance video switching, processing and calibration available. This makes it ideal for premium quality high-definition home and commercial theater applications. Lumagen's Radiance series refines and enhances the video images presented by 4k front projectors, and flat-panel displays.

The Radiance family offers 10-bit front-end, and 12-bit back-end, processing, standard definition (SD) and high definition (HD) video de-interlacing, No-Ring™ scaling technology that does not add “Halos” around edges (unlike competing products). It supports 4k60 sources using HDMI 2.0, with HDCP 2.2, and uncompressed audio formats for Dolby-Digital TrueHD™ and DTS Master-Audio™ bitstream formats.

Radiance processors can function as a central switching hub for the audio video system. The Radiance Pro family of video processors is modular and can be configured with 2 to 8 inputs, two or four processed outputs, plus up to 6 switched outputs. The Radiance Pro 4449 supports seven independent zones, with the main zone have up to four outputs.

Key Features

- Up to eight inputs (444X) or four inputs (424X) with resolutions up to 4k60 HDMI 2.0a with HDCP 2.2
- Up to ten outputs in seven zones supporting resolutions up to 4k60 HDMI 2.0a with HDCP 2.2
 - Up to four processed outputs for the primary zone (4440, 4442, 4444, 4446)
 - Up to six switched outputs for up to 6 additional zones (4447, 4449)
 - Two processed outputs (424X)
- Proprietary Lumagen No-Ring™ scaling
- Vertical Keystone correction
- Darbee Digital Visual Presence™ (DVP™) enhancement technology (for up to 1080p60 input rate)
- CMS (Color Management System) using a 4913-point 3D Look Up Table (3D LUT) RGB color palette
- 21-point parametric grayscale and Gamma
- 10-bit processing for deinterlacing plus a 12-bit calibration pipeline
- Support for both 2D and 3D anamorphic scaling *without* an anamorphic lens
- Convert common optional 3D formats to a required 3D format that is supported by the display
- Each input has 4 user configuration memories
- Each input user configuration memory has 8 resolution sub-memories (for HD inputs)
- Each resolution sub-memory is linked to one of 8 output configurations.
- 2:2, 3:2 and 3:3 pull-down for SD/HD film sources
- SD/HD video de-interlacing
- User programmable non-linear-stretch (NLS) mode
- 4:3, LBOX, 16:9, 1.85, 2.35, 2.40 and NLS input aspect ratios
- Programmable output aspect ratio from 1.10 to 2.50
- Large suite of test patterns
- Programmable input/output color-space
- Y/C-delay calibration
- CUE and ICP filtering
- Eight channel audio up to 192 kHz, DD True-HD™ 5.1, and DTS Master Audio™ Bitstream
- IR and RS232 control inputs (See Tech Tip 11 and 12 on the Lumagen.com support page)
- Internal USB-to-serial adaptor for command input or software updates.
- Wired IR format command input
- Universal, 100-240V, ~50/60Hz external 12 VDC 5 Amp power supply
- Optional rack mounting ears

Section 1 – Getting Started

Document Conventions and Menu Navigation

Commands are selected with the supplied infrared remote or the RS232 serial port. To prevent possible command conflict, only one of these methods of command should be used at a time. See the Serial RS232 Command Interface section for information on serial commands. The infrared remote control command notation is described below:

- Remote buttons are named as shown in a bold font. Example: **MENU**.
- For comma separated lists, press the buttons in the sequence shown.
- For parenthesized lists, select one button from the list.
- For square-bracketed lists, press the buttons as needed.
Example: For the list [**◀**, **▶**, **▲**, **▼**], press the arrow keys as needed.
- For menu commands press the **MENU** button. The **▲** and **▼** arrow keys are used to select the function. The **▶** arrow key (or **OK**) is used to enter sub-menus. This is shown as: **MENU** → **MenuItem** → **MenuItem**. Generally, the **◀** arrow key (or **EXIT**) steps up one menu level.
- Numerical entries are listed as **value**. For numerical entries, the **◀** arrow key acts as backspace.
- Some commands are activated immediately without the need to press **OK**. Other commands must be explicitly accepted by pressing **OK**. If needed, **OK** is listed as part of the command, and will complete the command and return the menu to one level higher in the menu system. Note that, at default settings, pressing **OK** when it is not required will bring up the Radiance Status Screen.
- For many commands, pressing **EXIT** cancels a partially completed command and returns to one level higher in the menu system. For advanced commands changes are completed from within the command and **EXIT** just returns to one level higher in the menu system.
- There are four independent configuration memory types for each input (**MEMA**, **MEMB**, **MEMC** and **MEMD**). The input setup and output resolution/timing can be set independently for each memory. To program an input memory, first select the input, then select the desired configuration memory and use the menu system to configure.
- Some menu commands are only available when their associated input is selected.
- Before changes are saved, they can be discarded by entering standby (**STBY**) mode.
- A Save must be performed after any changes or all changes will be discarded the next time the unit enters standby (**STBY**), or power is lost. To save press **MENU**, **▲**, **OK**, **OK**, **OK**.

Unpacking

- Unpack the box.
- Save the box and packing materials in case you need to ship your Radiance.

Verify that your box contains the following items

- Lumagen Radiance video processor.
- Universal, 100-240V, ~50/60Hz, 12 VDC 5 Amp power supply
- Remote control.
- AAA Batteries (2).
- Owner's Manual.
- USB cable.
- If purchased with the Radiance Pro, the optional 19 inch rack-mount ears.

Remote Control Battery Installation

1. Locate the battery compartment on the back of the remote control.
2. Move the locking tab to open the door.
3. Remove the old batteries (if applicable).
4. Install two new AAA batteries, observing the battery polarity shown in the battery compartment.
5. Replace the battery compartment cover.

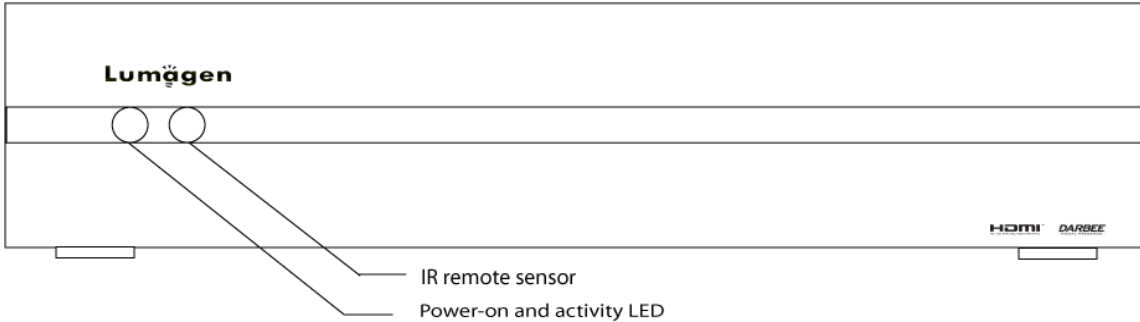
Installation Guidelines

- Disconnect wall power from all electronics before plugging in, or removing, HDMI cables
- Select a cool, well-ventilated, dry location.
- Install the Radiance on a flat, level surface such as a table, shelf, or in a 19" rack
- Verify that the cooling vents are clear of obstructions to provide adequate cooling.
- Use only the Lumagen approved power supply.
- Avoid sudden temperature changes, temperature extremes and excessive humidity.
- Unplug power to the Radiance before cleaning

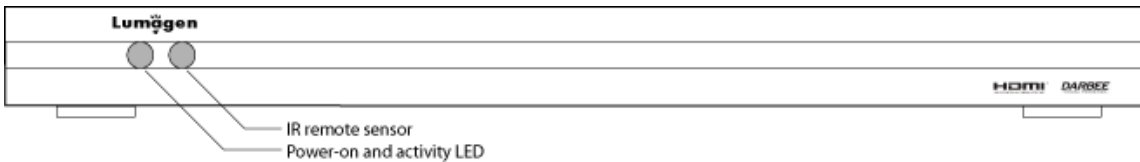
Section 2 – Overview

Section 2 – Overview

Front Panel (Radiance Pro 444X)

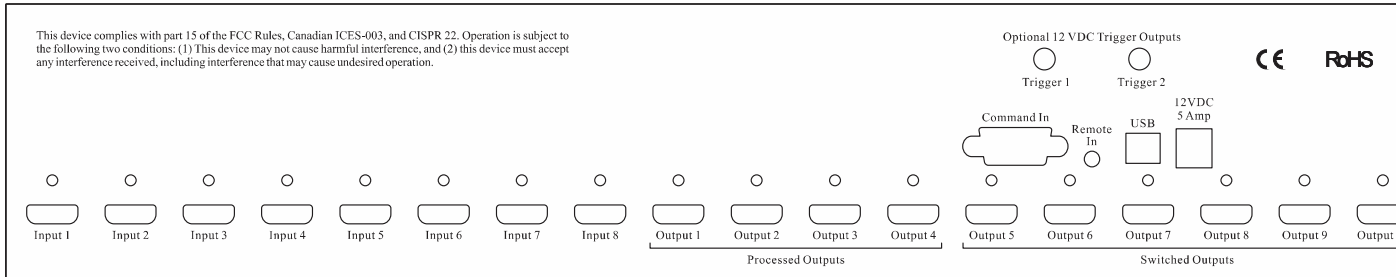


Front Panel (Radiance Pro 424X)

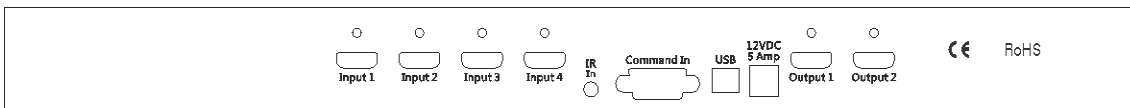


The front panel has a light-emitting-diode (LED) indicator, which is red when the unit is in “standby” and, by default, is blue when the unit is “on.” Note: The blue “on” indicator can be disabled if preferred.

Rear Panel (Radiance Pro 444X)



Rear Panel (Radiance Pro 424X)

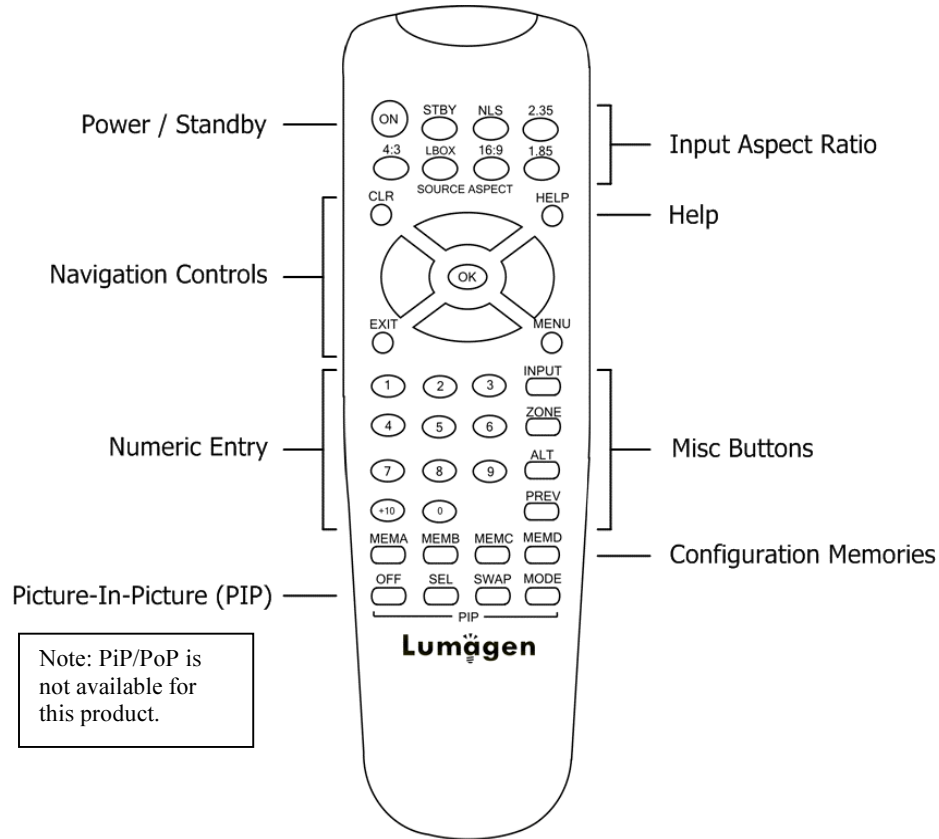


Rear panel connections are:

- Up to four HDMI 2.0 inputs (424X), or up to eight HDMI 2.0 inputs (444X), with HDCP 2.2
- Two outputs (424X), or up to ten HDMI 2.0 outputs (444X), with HDCP 2.2
- IR format command input (See Tech Tip 9 on the Lumagen.com website)
- RS232 for commands and software update (See Tech Tip 6 & 11)
- USB port for updates and calibration. This uses an internal USB-to-Serial adapter
- Internal USB-to-serial adapter for commands and software update (See Tech Tip 6 & 11)
- Power Input (12 Volts DC. Use 5 Amp power supply)

Section 2 – Overview

Remote Control



Power / Standby

ON Power On
STBY Standby

Navigation Control

CLR Clear menu or partial commands
HELP Display context-sensitive help
EXIT Go back one menu level
OK Enter/Accept command, display info screen
▲ Menu navigation / zoom in
▼ Menu navigation / zoom out
◀ Menu navigation / input aspect
▶ Menu navigation / input aspect

Numeric Entry

1-9 Input 1 to 9
+10 Input 10 and greater

Picture-In-Picture (PIP)

OFF Not applicable
SEL Not applicable
SWAP Not applicable
MODE Not applicable

Input Aspect Ratio

4:3 4:3 (1.33) aspect ratio
LBOX Letterbox
16:9 16.9 (1.78) aspect ratio
1.85 1.85 aspect ratio
2.35 2.35 aspect ratio
NLS Non-Linear-Stretch

Misc Buttons

INPUT Precedes input # selection
ZONE <not implemented>
ALT Alternate info screens
PREV Previous output

Configuration Memories

MEMA Memory A
MEMB Memory B
MEMC Memory C
MEMD Memory D

Section 2 – Overview

Block Diagram

The function of the Radiance is to act as a video switch, process the selected video source and then output video in the appropriate format and resolution. Input rates from standard definition up to 4k60 are supported. Video inputs are converted to progressive video, if necessary, and are then scaled to the video output resolution., which can be up to 4k60. Note: For Radiance Pro units with multiple zone switched outputs, the switched outputs are not processed in any way.

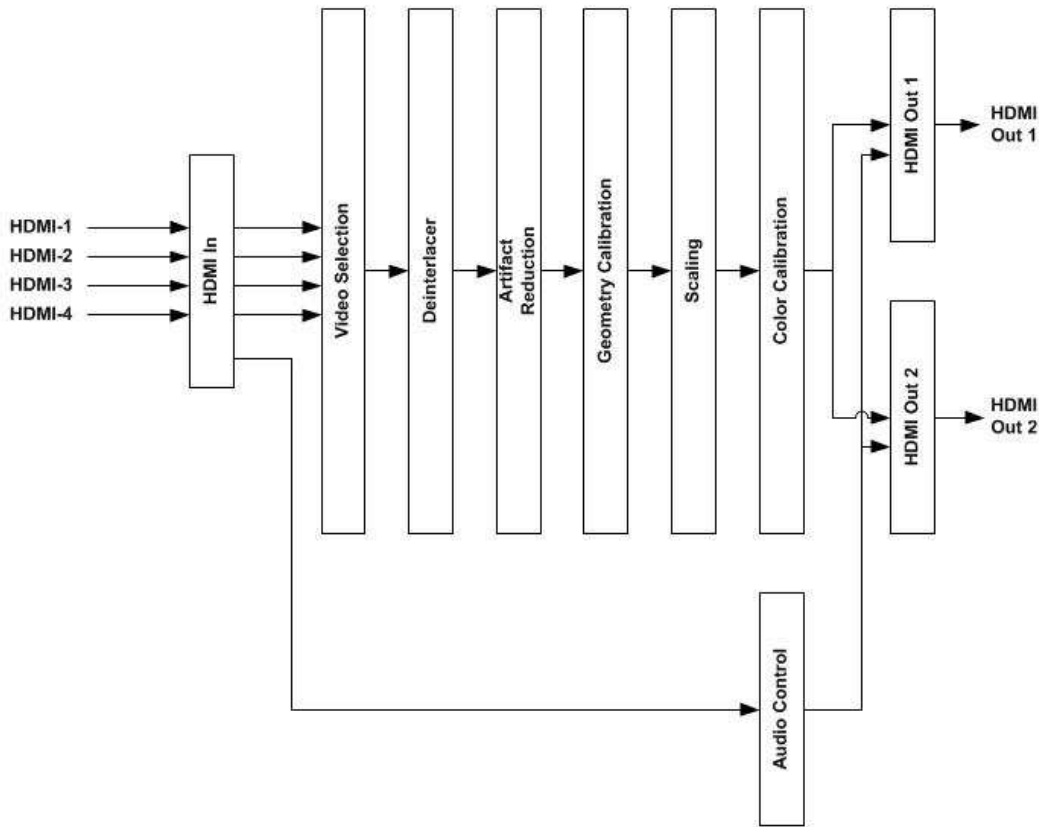
Interlaced video has been in use for more than 50 years and is still a common video format. It displays half of the lines of picture information each sixtieth (or fiftieth) of a second. Each half of the image is called a field and displays either all the even lines, or all the odd lines. So, an entire image, called a frame, takes a thirtieth (or twenty-fifth) of a second to display on the screen. An “i” suffix on the resolution specification is used to indicate interlaced formats.

In contrast, progressive video presents each frame as a whole. A “p” suffix on the resolution specification is used to indicate progressive formats. Converting interlaced video to progressive video is referred to as “deinterlacing.”

The Radiance is comprised the following major functional sections:

- Video/Audio input selection
- Video deinterlacing (if required)
- Video processing and scaling
- Video/Audio output

The functional blocks are shown below. Note The number of HDMI inputs and outputs can vary. The 4-input and two-output configuration is shown.



Commands can be sent to the Radiance by infrared remote or via the serial RS232 port. The RS232 port, or the USB port, are also used for software updates. Setup is done with the on-screen menu. User functions (e.g. select input) use direct commands to make macro programming simpler.

Configuration Memories

To understand how the Radiance functions, it is important to note that setup and calibration parameters are split into “input memories” and “output configurations.” Input memories control the video source setup. Output configurations

Section 2 – Overview

control the display setup and calibration. The Output configurations are specified by selecting a Mode, CMS and Style for each input, input memory, input resolution, and 2D/3D mode.

The Radiance has four input memories (**MEMA, MEMB, MEMC and MEMD**). Each input memory has sub-memories for the various possible input formats. These are automatically selected based on the input resolution and vertical-rate. The “Other” entry represents all the other possible input resolutions and vertical rates. Each input resolution and vertical rate has 8 sub-memories which can be selected on a per-input and per-input-memory basis.

Each Input sub-memory can be independently linked to any one of the eight Output Modes, eight CMS memories, and eight Style memories. These store setup data for the video display setup and calibration. In the factory default condition all input sub-memories are linked to “Mode 0,” “CMS 0,” and “Style 0.” To change these enter **MENU → Output → Output Setup → (2D/3D) → OK → (Mode, CMS, Style)**. These settings can be changed for each input sub-memory. To “Save” new settings, enter **MENU → Save → Save → OK**.

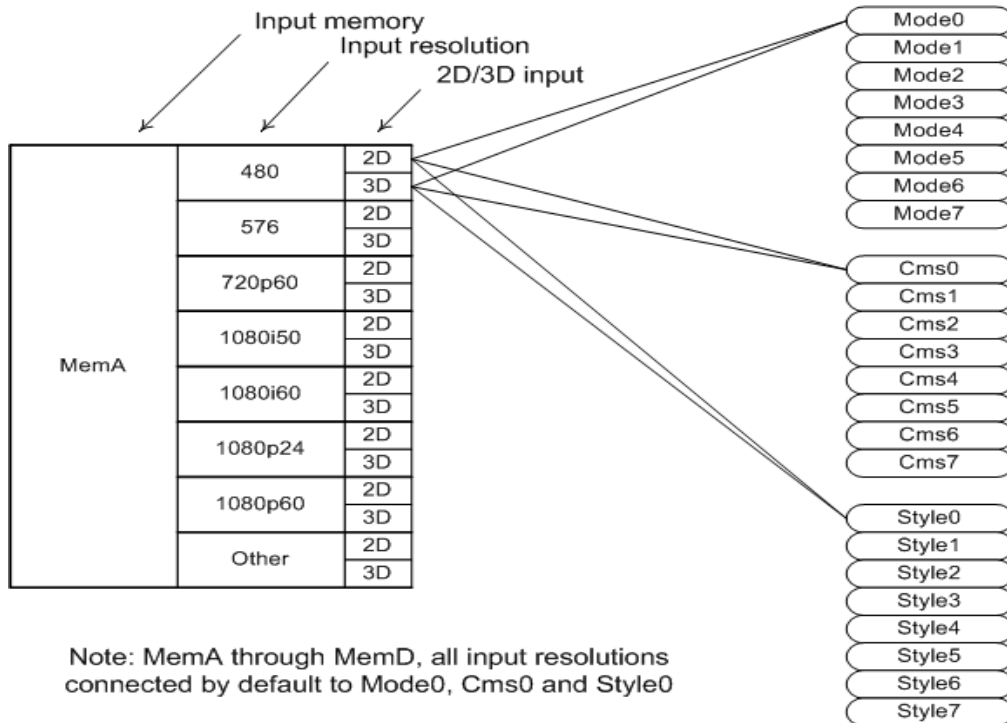
NOTE:

By default all sub-memories point to Mode0, CMS0, and Style0. In most systems the default configuration does not need to be changed.

NOTE:

Changes must be Saved to make them permanent. If changes are not Saved the Radiance Pro will revert to Saved settings when turned off.

Input memory to output configuration block diagram



Section 3 – Quick Start Guide

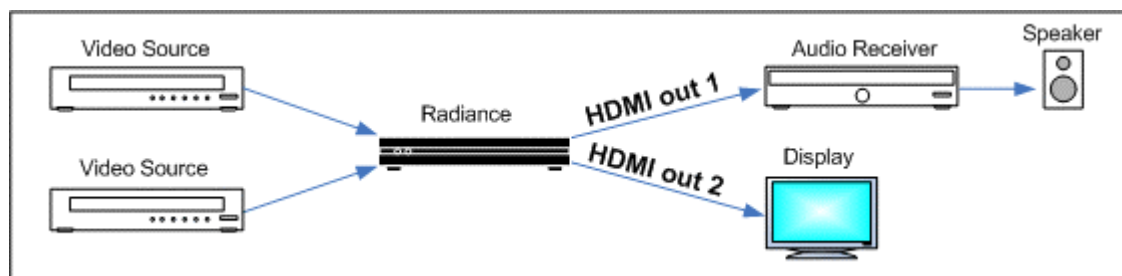
Section 3 – Quick Start Guide

Installation Instructions

1. Install two AAA batteries in the Lumagen Remote Control.
2. Disconnect all power in the system before connecting any A/V cabling to minimize the chance of damaging equipment.
3. Connect audio/video sources as appropriate.

NOTE:

The default configuration is to connect Radiance Pro HDMI Output 1 to the receiver, and HDMI Output 2 (424X) or Output 4 (444X) to the primary display. Lumagen recommends that the Radiance be used as the switching device for ease of operation, fastest video switching, and best video quality.



Default connections for Radiance Pro 4242 with AVR plus display/projector

4. Connect the Radiance outputs. If using only one Radiance output, temporarily connect the display to the highest numbered output. Then change Output 1 to output both audio and video and do a Save. Then use output 1 for the audio and video so the Audio EDID is reported back to sources. If using an AVR, or audio PrePro, connect it to Radiance Output 1 the display/projector to Output 2 (424X), or Output 4 (444X).

NOTE:

For HDMI connections on the Radiance Pro output use 6 to 10 foot (2 to 3 meters) passive HDMI cables. For Radiance Pro outputs requiring lengths over 10 feet (3 meters) Lumagen recommend using active HDMI cables. Lumagen has found that Monoprice and Ethereal cables work well.

5. Reconnect power. Plug the DC power cord from the Radiance power supply into the DC power jack on the back of the Radiance. Then connect the power cord to the Radiance power supply and plug it into a wall outlet.
6. Turn the other equipment on and use the Radiance remote control to turn the Radiance on.
7. Select the desired Radiance input using the Radiance remote control. The video inputs are numbered from 1 to 8. To select an input press the "Input" button and then press the corresponding number button on the remote. Make sure the selected source device is outputting active video.
8. You should now have an image on your display/projector. The Radiance automatically selects the appropriate output resolution and frame rate for HDMI/DVI displays/projectors (including 24p when supported), when connected according to these instructions.
9. The default output aspect ratio is 16:9 (i.e. 1.78:1). No output aspect ratio selection is needed for 16:9 displays or projectors. For other output aspect ratios, please see the User Manual for information on how to set the output aspect ratio. For 2.35 anamorphic screens the Radiance Pro can control the aspect ratio without the use of an anamorphic lens. See Tech Tip 16 for information on how to set up the Radiance Pro for an anamorphic screen.

Section 5 – Basic Commands

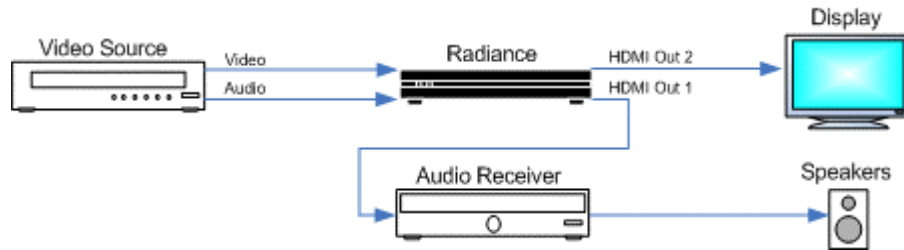
Section 4 – System Configuration Examples

The most common configurations using the Radiance are shown below. Note, that HDMI outputs 1 and 2 are shown (424X). For the Radiance Pro 444X, Use Output 1 for the Receiver and Output four for the TV/projector..

1. Receiver after Radiance.

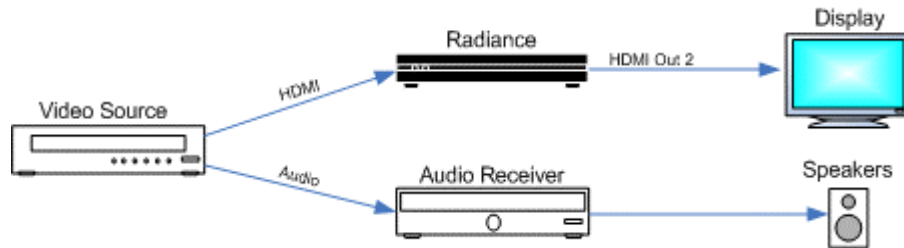
The default configuration is to connect all the video sources to an inputs of the Radiance Pro and connect the receiver, or preamp, to HDMI Out 1, and the display/projector to Radiance HDMI Out 2 (424X) or Output 4 (444X). Only after all audio and video connections have been made, connect to power and turn everything on. The Radiance automatically detects the video EDID from output 2 (424X) or Output 4 (444X), and the audio EDID from output 1 and reports the appropriate EDID modes back to all source devices.

This configuration can improve switching delays by using the Radiance Pro’s input switching and guarantees that the receiver does not degrade the video. It also minimizes the work needed to configure the Radiance since, for the TV/projector output, audio is off by default.



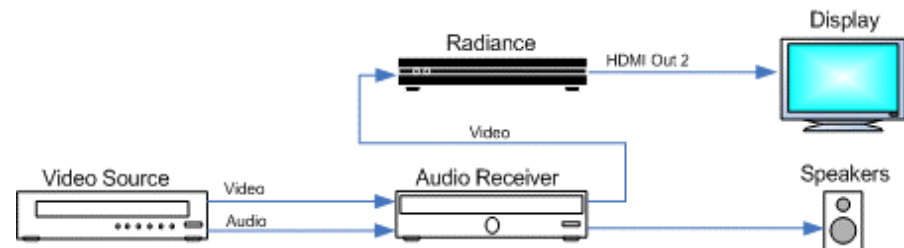
2. Audio and Video routed separately.

Route the audio and video separately to the Radiance and a receiver. Connect the TV/projector to Output 2 (424X) or Output 4 (444X). This output has its audio turned off by default and so is correct by default for this case.



3. Receiver in front of Radiance.

Use a AVR in front of the Radiance to switch the video sources. Note that some AVR’s add artifacts to the video. So turn off all video processing in the AVR. Connect the TV/projector to Output 2 (424X) or Output 4 (444X). This output has its audio turned off by default and so is correct by default for this case.



Section 5 – Basic Commands

Section 5 – Basic Commands

Power

Turn power on by pressing the **ON** button. Place the Radiance in standby-mode by pressing **STBY**.

Input Selection

There are seven zones. To change an input for a specific zone, first select the zone by pressing the **ZONE** button and then pressing the corresponding zone number button on the remote. Then to select the input press the corresponding input number button on the remote.

If the MENU, or Status Screen, is visible, to select a different input for the currently active zone press the **INPUT** button and then press the corresponding input number button on the remote.

Shortcut:

If the menu is not displayed on the screen, a new input for the currently active zone can be selected by pressing the corresponding number button on the remote.

Note:

If no switched outputs are installed (Outputs 5 through 10), then Zone 1 is the only zone and the active Zone does not need to be selected.

Configuration Memory Selection

Each input has four configuration memories. These are referred to as memory “A,” “B,” “C,” and “D.” To select one of these memories press **MEMA**, **MEMB**, **MEMC**, or **MEMD**, respectively. Note, RS232 codes are provided to directly access these memories. Each input memory has eight input “sub-memories” that are automatically selected based on the input resolution and 2D/3D input video format.

Each configuration memory, and sub-memory, is independent of the other memories. To allow the memories to be used for mode selection (e.g. day/night), by default, the memory type remains unchanged when a new input is selected. (i.e. If input 2 memory B is active, pressing “**INPUT, 3**” selects input 3 memory B).

Input Aspect Ratio Selection

The input source aspect ratio can be selected by pressing one of the **4:3**, **LBOX**, **16:9**, **1.85**, or **2.35** buttons. To use the **NLS** feature, press “**4:3, NLS**”, “**16:9, NLS**”, or “**1.85, NLS**”.

- Use **4:3** for standard definition full-screen material.
- Use **LBOX** for “letterbox” standard definition material, such as analog-television movies shown with black bars above and below the image.
- Use **16:9** for material labeled as “Enhanced for 16:9 televisions”.
- Use **1.85** for material labeled as “Aspect ratio 1.85”.
- Use ‘**Alt**’ **1.85** for material that is “Aspect ratio 1.85 letterboxed in a 16:9 (1.78) window”.
- Use **2.35** for material labeled as “Aspect ratio 2.35”.
- Use ‘**Alt**’ **2.35** for material labeled as “Aspect ratio 2.40”.
- Use **NLS** to apply a horizontal non-linear stretch, to stretch 4:3 to 16:9, or 16:9 or 1.85 to 2.35 or 2.40.

NOTE:

Make sure the “display aspect ratio” setting is 16:9 in the setup menu of all video sources (e.g. Bluray players or set top boxes), even if your display is not 16:9.

Image Zoom

After the input aspect ratio has been selected, the image can be zoomed in to better fit the screen. The zoom function uses the ▲ and ▼ arrow buttons. When the menu is off, by default, the ▲ arrow button zooms in by about 15% and the ▼ arrow button zooms out by about 15%.

Section 5 – Basic Commands

Status Screen

Pressing “OK” when the menu is off displays an on-screen information message as shown in the example below.

| | | | |
|--------------------------------------------|-----------------|---------|---------|
| Radiance Pro Info Pg 1 (for Pg 2 press Ok) | | | |
| SW Rev.xxxxxx | Serial:xxxxxxxx | | |
| Input 1A | Out1 | Out2 | |
| Resolution: | 480i | 1080p | 1080p |
| Refresh: | 59.94Hz | 59.94Hz | 59.94Hz |
| Color Fmt: | YCbCr 422 | RGB | RGB |
| HDCP: | On | Off | On |

Pressing “OK” when the information screen is displayed, will display a second status screen as shown in the example below.

| | | | |
|------------------------------------|-----------------|--------------|--|
| Radiance Pro Info Pg 2 | | | |
| Audio:HDMI1 | | | |
| In asp=16:9 | Out asp=1.78 | Zoom=0% | |
| X scaler: Off | AdjInHres: 1920 | OutHRes:1920 | |
| Y scaler: Off | AdjInVres: 1080 | OutVRes:1080 | |
| Genlock: currently off ClkN:1 PT:1 | | | |
| Deinterlacing:NA | Chip Temp: 72C | | |

On-Screen Help

Pressing, “HELP” when the menu is displayed, displays on-screen help information for the currently highlighted menu item for many of the menu options.

Quick Keys

Provides a menu to use for basic remotes that have limited buttons. The ‘Quick Keys’ menu has buttons for input aspect ratio (4:3, LBOX, 16:9, 1.85, 2.35, NLS), set zoom (Zoom+, Zoom-) and select the user memory (MemA, MemB, MemC, MemD). The “Quick Keys” menu duplicates the function of pressing the corresponding buttons on the Lumagen remote. There are also buttons to control 3D (off, SbyS, TopB).

MENU → Quick Keys → (4:3, LBOX, 16:9, 1.85, 2.35, NLS, Zoom+, Zoom-, MemA, MemB, MemC, MemD, '3D'Off, '3D'Sbys, '3D'TopB)

Section 6 – Video Output Menu

Section 6 – Video Output Menu

By default the output is set to “Auto 2” (424X) or “Auto 4” (444X). The selection “Auto 2” means the Radiance automatically reads the video EDID for the devices connected to Output 2, and automatically selects the appropriate output resolution.

For “Auto” modes the output vertical rate is selected based on the input vertical rate. For example, input formats 480i60, 720p60, 1080i60 automatically select a vertical output rate of 60 Hertz. Input formats 576i50, 720p50, and 1080i50 automatically select a vertical output rate of 50 Hz. For a 24p input formats, a 24p output vertical rate is selected if the display supports a 24p vertical rate, otherwise a 60 Hz output rate is selected.

Video Output Setup Menu

The *Video Output Setup Menu* is used to select output settings (*Mode*, *CMS*, and *Style*) based on the input number, input memory, and input video mode. The *Video Output Select Menu* does not affect the audio settings. See the *Audio Configuration* section for information on configuring audio modes.

NOTE: *The Video Output Setup Menu is not needed for typical systems*

Once selected, the parameters for the *Mode*, *CMS*, and *Style* are changed using the **MENU** → **Output Setup** → **(2D/3D)** → **Ok** → **(Mode, CMS, Style)** menu. The same menu can also be accessed at **MENU** → **Input** → **Video Setup** → **[Resolution]** → **(2D/3D)** → **Ok** → **(Mode, CMS, Style)**.

First highlight the '2D' or '3D' row and press "Ok" to edit.

| In Condition | | | -> | Video Output Selection | | | | | |
|--------------|------|---------|----|------------------------|------|-----|--------|---|---|
| In | Mode | | | 3D | | | VidOut | | |
| | | | | Mode | Type | CMS | Style | 1 | 2 |
| *2D: | 1A | 1080p24 | -> | Custom0 (Auto 2,1) | | 0 | 0 | Y | Y |
| 3D: | 1A | 1080p24 | -> | Auto 2,1 | Auto | 0 | 0 | Y | Y |

Next highlight the input condition entry that you want to edit.

Press the ▲ and ▼ buttons to set the input number, input memory, and input mode.

NOTE: *For any of the three input conditions you can press the number "4" button which then selects 'All' as the condition. This allows you to apply the output setup to multiple input conditions.*

When making settings that apply to multiple input conditions you can leave any of the output settings unchanged by selecting the '---' option for that output setting.

| 2D In Condition | | | -> | 2D Video Output Selection | | | | | |
|-----------------|-----|---------|----|------------------------------------------------------------------------------------------------------------------------------|------|-----|--------|---|---|
| In# | Mem | Mode | | 3D | | | VidOut | | |
| | | | | Mode | Type | CMS | Style | 1 | 2 |
| 1 | A | 1080p24 | -> | Custom0 (Auto 2,1) | | 0 | 0 | Y | Y |
| | | | | (Input to edit output settings of) Press '4' for 'All', '5' to see current <> Select, ^v Change, OK to set, Exit quits | | | | | |

Section 6 – Video Output Menu

Custom Output Mode

The Custom Modes store settings for the timing of HDMI video mode that drives the display. There are menus to select standard HDMI modes or custom timings for HDMI modes

Output Mode – Direct Commands

Note that these direct commands are meant as temporary overrides and not as permanent selections. The *Output Setup* menu should be used to program the output modes if the *Auto* output mode is not used. The direct commands to select output resolution are:

480p60: **MENU 0 2 1 OK** 720p60: **MENU 0 2 4 OK** 1080p24: **MENU 0 2 0 OK**
1080p60: **MENU 0 2 7 OK** 4k24: **MENU 0 2 3 OK** 4k60: **MENU 0 2 9 OK**

Exact Output Timing

After selecting a Custom Output Mode, its timing can be modified on a pixel basis. Do not change the timing using this menu unless it is really needed. Warning: Some digital displays lose picture if timing is changed by even a single pixel. The command is:

MENU → Output → Custom Modes → [Custom] → Timing → Mode Timing

CMS Menu

The Color Management System (CMS) stores settings used to calibrate the color of the display. There are menus to calibrate the position of the primary/secondary color points, calibrate grayscale tracking, calibrate the gamma curve, and compensate for red/green push errors.

Gamma Factor

The Gamma Factor adjusts the gamma of the video output up or down. Since the Radiance is in the middle of the video chain, its default goal is to not affect the image Gamma and so the default Radiance gamma is 1.00. Changing the Gamma Factor allows the Radiance a “coarse correction” control for display Gamma. It should be set to (Desired_Gamma / Measured_Gamma). The command is:

MENU → Output → CMS's → [CMS] → Gamma Factor → OK

Color Gamut

Allows primary and secondary color point calibration, or calibration of 4913-points throughout the RGB color cube, using a 3D color lookup table (3D LUT) Color Management System (CMS). A color probe and appropriate calibration software and proper training is necessary for correct adjustment. The command is:

MENU → Output → CMS's → [CMS] → Color Gamut

Grayscale and Gamma

Allows the parametric adjustment of 2, 5, 11, 12 or 21 color temperature points to adjust the grayscale and gamma for the display. The command is:

MENU → Output → CMS's → [CMS] → Gray/Gamma

Color Decoder

Used to correct color decoder errors in the display that have red and/or green push. This adjustment should generally *not* be used in conjunction with Color Gamut. The command is:

MENU → Output → CMS's → [CMS] → Color Decoder

Black Level

Used to set the black level for the display. Normally the “Brightness” or “Black Level” control in the display is used to set the black level. However, some displays cannot be set accurately. This command allows for accurate calibration when the display controls are not adequate. It is recommended that the Radiance Contrast Pattern 2 (dark contrast) be used to set the display's black level. This command is also useful when a second black level is desired (using a second output CMS) for a “day” or “night” mode. The command is:

MENU → Output → CMS's → [CMS] → Black → Ok

Section 6 – Video Output Menu

White Level

Sets the white level for the display. Normally the "Contrast" control on the display is used to set the white level. It is recommended that the Radiance Contrast Pattern 1 (White and Black squares pattern) be used to set the display's white level. The command is:

MENU → Output → CMS's → [CMS] → White → Ok

Styles Menu

The Style memory stores settings for the HDMI format used to drive the display. There are menus to set the HDMI format, size, position, aspect ratio, and graybars for the image on the display.

HDMI Output Type

You can specify the digital output range as "RGB-PC level" (e.g. for 8-bit 0 to 255) or "RGB-Video level" (e.g. for 8-bit 16 to 235). "YCbCr 422" is the recommended output format. For the HDMI RGB output, setting the level as *video* allows blacker-than-black and whiter-than-white levels to be output from the Radiance. The command is:

**MENU → Output → Styles → [Style] → HDMI Format → Type →
(Auto, RGB-Video level, RGB-PC level, YCbCr444, YCbCr422)**

Note that for some modes (4k60 using 9 GHz output cards) the mode may not be programmable. For reference the 4k60 output mode using 9 GHz I/O cards is always 4:2:0, 8-bit.

Rate Match

Some material may be sourced at 24.00/60.00 Hertz refresh rates instead of the standard 23.98/59.94 Hertz rates. It is desirable to slightly alter the output rate to match the input rate as long as the display works with these different rates. The default setting is 'Off.' Use 'Off' if your display will not accept these rates. The command is:

MENU → Output → Styles → [Styles] → HDMI Format → Rate Match → (No, Yes)

Color Format

Sets the outputs color format. It should be set to Auto except to correct for a color format error in the display. Normally Bt.601 is used for SD/ED modes and Bt.709 is used for HD modes. Use the Auto format unless there is an issue that requires a manual selection. The command is:

MENU → Output → Styles → [Style] → HDMI Format → Color Format → (Auto, Bt.601, Bt.709)

Dither

Some fixed pixel displays show contouring on images that have gradients because the physical pixel depth of each pixel is limited. The dither control can be used to enhance the resolution of the display and reduce contouring. Dither position sets the bit size of the pixel for dithering. Orientation controls the frame-to-frame randomization and can be fixed or dynamic. Masking can be turned on to clear the lowest bits after the dither addition. The command is:

MENU → Output → Styles → [Style] → HDMI Format → Dither

Mask

Allows you to "blank" the edges of the video image on the output without changing its position or scaling. This is useful to blank bad pixel data from the source that shows on screen, when you want to keep the "pixel perfect" setup (i.e. no scaling). The command is:

MENU → Output → Styles → [Styles] → Mask/Shrink → Mask

Shrink

Adjust the image size to fit inside a screen masking system. This command is useful for rear-screen and flat-panel displays when the manufacturer uses too much "overscan". The command is:

MENU → Output → Styles → [Styles] → Mask/Shrink → Shrink

Keystone

Allows adjusting for a vertical projector placement offset if the projector does not have enough optical keystone adjustment. The command is:

MENU → Output → Styles → [Styles] → Mask/Shrink → Keystone

Section 6 – Video Output Menu

Gray Level

Sets the gray level of borders created by the shrink or output mask commands. The gray level is adjustable from black to white in sixteen steps. The command is:

MENU → Output → Styles → [Styles] → Mask/Shrink → Gray Level

Screen Aspect Ratio

Select the screen aspect ratio. The screen aspect ratio range is 1.10 to 2.50 and is entered in units of hundredths (e.g. 16:9 is entered as **178**). If you have a normal fixed aspect display, select the "Single output aspect" which is the default setting. If you have a movable anamorphic lens or a projector with programmable lens-shift and focus that you are using, select "Output aspect per input aspect."

For the "Output aspect per input aspect" mode, there is a special case when you use NLS. When the input aspect is 4.3+NLS the output aspect assigned to the 16:9 entry is used. When the input aspect is LBOX+NLS, 16:9+NLS, or 1.85+NLS the output aspect assigned to the 2.35 entry is used. The command is:

MENU 0 6 (Single output aspect, Output aspect per input aspect)

Or

MENU → Output → Styles → [Style] → Aspect Ratio → (Single output aspect, Output aspect per input aspect)

Graybar Intensity

Some degree of burn-in will occur on any susceptible displays. This command can help minimize it by allowing the intensity of the graybars to be adjusted. Set to "0" for black. The command is:

MENU → Output → Styles → [Style] → Graybar → (Sides, Top/bottom)

3D Glasses Adjust (With Optional 3D Glasses Output)

When using the Radiance to control 3D glasses timing, such as with a CRT projector, this setting adjusts the timing offset of the 3D glasses. This delay is combined with the global delay setting under the **MENU → Other → I/O Setup → 3D Glasses** menu. This command has no effect if the 3D display is controlling the 3D glasses. The command is:

MENU → Output → Styles → [Styles] → 3D Adjust

Soft Edge

Rounds off the outside edges of the video, which gives movies a bit more of a theater look and can mitigate overscan issues at the edges of the screen. The command is:

MENU → Output → Styles → [Styles] → Soft Edge

Misc. Output Settings

3D Output Options

By default the display's 3D capability is automatically detected using its EDID information. However, some 3D displays do not properly report their 3D capability in their EDID. This command allows the 3D output capability to be manually set. The command is

MENU → Output → 3D Options → Output List → (Off, Auto, On).

For a dual projector 3D setup using two Radiances, each Radiance can be set to output only the right or left eye from a 3D video source. The command is

MENU → Output → 3D Options → If 3D show → (Both Eyes, Left Eye Only, Right Eye Only).

Copy Output Settings

This command copies the current output Mode/CMS/Style settings to the selected output Mode/CMS/Style. The command is:

MENU → Output → Copy → OK

Section 7 – Video Input Menu

Section 7 – Video Input Menu

The Video Input Menu is used to configure independent setting for each input, input memory, and input resolution. Often no changes are needed using the Input Menu.

Input Setup Menu

The *Input Setup Menu* is used to select input settings based on the input resolution and vertical rate. For each Input, Input Memory, and Input Resolution, there are 8 input configuration memories. The *Video Input Select Menu* does not affect the audio settings. See the *Audio Configuration* section for information on configuring audio modes.

First highlight the '2D' or '3D' row and press "Ok" to edit.

| Input Condition | | | -> | Input Config Selection |
|---------------------------------------------|----|------|----|------------------------|
| | In | Mode | | Config |
| *2D | 1A | 1080 | -> | 1080-0 |
| 3D | 1A | 1080 | -> | 1080-0 |
| ^v Selects 2D or 3D setup, press OK to edit | | | | |

Next highlight the input condition entry that you want to edit.

| 2D Input Condition | | | -> | 2D Input Config Selection |
|---------------------------------------------|-----|------|----|---------------------------|
| In# | Mem | Mode | | Config |
| 1 | A | 1080 | -> | 1080-0 |
| (Input to edit settings of) | | | | |
| <> Select, ^v Change, OK to set, Exit quits | | | | |

The < and > buttons change the active column. The ^ and v buttons select the input number, input memory, and input mode. In each Input Condition column one of the selections is "All."

Shortcut: You can press the number "4" button to select "All" as the condition for any column of the Input Condition. This allows you to apply the setup to multiple input, input memories, or input resolutions.

In Configs Setup

The *Base Input Resolutions* are 480, 576, 720, 1080, 4K, Cin4K, Other. The 4K mode is automatically selected for sources that send 3840x2160, and the *Cin4K* mode is automatically selected for sources that send 4096x2160. Each *Base Input Resolutions* has 8 user programmable configuration memories numbered 0 to 7.

For each input sub-memory adjustments include *Picture*, *Size*, *Control*, and *Enhance*.

Input Picture Controls

Black and White Levels

To set the input's black-level (also referred to as brightness) and white-level (also referred to as contrast) using the Lumagen controls, use a test pattern generator or select a PLUGE pattern from a test pattern disc. Note that the input memory black and contrast are intended to compensate for variations in video source levels, not to calibrate the display. The command is:

MENU → Input → In Configs → [Resolution] → [#] → Picture → (Black, White)

Section 7 – Video Input Menu

Color Format

Inputs 1 through 8 are HDMI. By default the appropriate color space is automatically selected (i.e. “Auto” mode) for standard-definition “Bt.601” or high-definition “Bt.709.” The “Auto” mode is generally best, but some upscaling sources do not convert the color format to Bt.709 as they should and so “Bt.601” would be manually selected for these if they are programmed to output HD formats. Bt.601 is used for SD/ED modes and Bt.709 is used for HD modes. The command is:

MENU → Input → In Configs → [Resolution] → [#] → Picture → Color Format

Color Decoder

NOTE: Set the display's Color and Hue to their default values.

Normally not used if the Color-Gamut is calibrated using the Radiance CMS system, unless the source has an error in its color decoder. Use Radiance internal color-bar pattern, a test pattern generator, or a test disc test pattern, to set color, Hue, color, and Hue offsets, if necessary. The command is:

MENU → Input → In Configs → [Resolution] → [#] → Picture → Color Decoder

Y/C Delay

Adjust the horizontal Chroma timing in relation to Luma. It is suggested that you use a Y/C-delay calibration image from a test pattern generator or test disc to calibrate the Y/C-delay. The C_B and C_R channels are adjusted independently. The command is:

MENU → Input → In Configs → [Resolution] → [#] → Picture → YC Delay

Input Sizing

Input sizing can be used to compensate for active image size differences between sources.

Note:

*The input size command does **not** affect the output size or position.
Rather, it affects which input pixels are captured for processing.*

Use the **Crop TopLeft** command to select the top-left-most active input pixel. Use the **Crop BotRight** command to select the bottom-right-most active pixel. Select the scanline using the ▲ and ▼ arrows, and the pixel using the ◀ and ▶ arrows. The command is:

MENU → Input → In Configs → [Resolution] → [#] → Size → [Aspect Ratio] → (Crop TopLeft, Crop BotRight)

Vertical Shift

The vertical shift moves the image up and down without changing the *Input Sizing* settings. There are 15 vertical settings that are shared between all input memories. Select the vertical shift setting and then the shift value. The command is:

MENU → Input → In Configs → [Resolution] → [#] → Size → [Aspect Ratio] → Vert Shift

Non-linear Stretch

Non-linear-stretch (NLS) is used to horizontally stretch a 4:3 aspect ratio source to fit a 16:9 aspect-ratio display or to stretch a 16:9/1.85 source to fit a 2.35 aspect-ratio display. The image is stretched by a constant amount in the center section, and by an increasing amount approaching the left and right edges. This eliminates the black sidebars normally seen when viewing smaller aspect material on a higher aspect display. To use non-linear stretch press the “4:3”, “16:9” or “1.85” button as appropriate and then press the “NLS” button.

The goal is to stretch the image to fill the screen in a way that looks as natural as possible. The Lumagen NLS command is very flexible and allows the image to be adjusted to user preferences to achieve this goal. The NLS adjustments are center width, center stretch, top cropping and bottom cropping. The center section of the image is stretched by a constant ratio from 0% to 24%. The width of the center section can be set from 15% to 70% of the display width. By programming the center section width and stretch amount, the amount of non-linear stretch in the left and right sections can be optimized. In addition, the top and bottom cropping can be set from 0 to 12%. Increasing the amount of cropping reduces the amount of stretch near the left and right edges of the image. When setting the cropping parameters, it is recommended that the satellite/cable-box menu be checked to insure that critical information remains visible.

Some 4:3 sources fill the entire source image (e.g. DVD 16:9 movies), but other sources place a 4:3 image in the center of a 16:9 image (e.g. HDTV with up-scaled SD source). This latter case is seen as a “pillar-boxed” image with black

Section 7 – Video Input Menu

bars on the left and right. The “PILLARBOXED” parameter must be enabled for this case. The Radiance Pro will then crop the pillarbox bars and stretch the active 4:3 image.

For a 16:9 display, when 4:3 NLS is enabled, the image will fill the screen with a 4:3 (1.33) source for any output aspect ratio up to 1.85. If the output aspect ratio is greater than 1.85, software limits the maximum width to the equivalent of 1.78 and adds left and right sidebars.

For a 2.35 display, when 16:9 NLS is enabled, the image will fill the screen with a 16:9 or 1.85 source for any output aspect ratio up to 2.40. If the output aspect ratio is greater than 2.40, software limits the maximum width to the equivalent of 2.40 and adds left and right sidebars.

Select the parameter to adjust using the ▲ and ▼ arrows, and change the value of the selected parameter using the ◀ and ▶ arrows. The command is:

MENU → Input → In Configs → [Resolution] → [#] → Size → [Aspect Ratio] → NLStretch

Input Masking

The masking command allows you to cover up the sides of the video source. It is different than cropping in that the video is not stretched to fill the screen. It can be used for pass-through modes, where you do not want the Radiance to scale the picture, to cover up some video noise on top/bottom/side of the picture. Another situation is to cover up and change the gray level of the black bars added by a video source, surrounding a letterboxed image.

When you select the command you must first select which mask number you wish to use. There are 15 available masks that can be shared among different input memories. After selecting the mask number, you can adjust how much the mask covers the 4 sides of the input. The last step is to alter the gray level for the 4 sides. If an input mask is on, its gray level takes precedence over the gray level of the aspect bar. The aspect bar gray level can be adjusted under **Output→Configs→[Config]→Other→Graybar**. If aspect bars are requested (via differing input and output aspects) the masking is added to the aspect bar width. The command is:

MENU → Input → In Configs → [Resolution] → [#] → Size → [Aspect Ratio] → Masking

Letter Box Zoom

By default the LBOX and 2.35 input aspect ratio button zoom the image to fill the height of the output. For example for a 16:9 output aspect ratio, pressing the 2.35 will zoom the 2.35 letter box image to the height of the screen and crop the left and right edges to fit the screen. If the *Output Aspect Per Input Aspect* feature is used this may not be the correct behavior. The Letter Box Zoom command can disable the Zoom for these input aspect ratio selections. The command is:

MENU → Input → In Configs → [Resolution] → [#] → Size → [Aspect Ratio] → LBox Zoom

Deinterlace

Deinterlacing converts interlaced sources to progressive. Depending on the source type, the deinterlacer can bias the algorithms to either film or video to obtain the best picture. The command is:

MENU → Input → In Configs → [Resolution] → [#] → Control → Deinterlace → Mode

Deinterlacing Field Flip

Some source devices do not follow conventions for the order of video fields. This can be seen as excessive combing in the video. While generally not required, this command allows the input fields to be swapped so these out-of-spec sources can be properly deinterlaced. The command is:

MENU → Input → In Configs → [Resolution] → [#] → Control → Deinterlace → Field

Reinterlace

Converts 480p and 576p sources back to interlaced so the Radiance can do the deinterlacing. This can provide dramatic improvements to a picture that has been poorly deinterlaced, prior to coming into the Radiance. Reinterlacing also allows for taking in 480p/576p movies and going out at 24/48/72Hz.

With this command you can "allow" or "disallow" quick remote key control for a particular resolution as well as turn it on/off. If "Reinterlace <> Keys" are set to 'allow' the left/right arrow buttons on the remote can then be used to control reinterlacing. The left arrow toggles reinterlacing on/off and the right arrow toggles the field order. Depending on how the picture was deinterlaced, the field order may or may not be important, but it can be quickly toggled to see if there is any difference. The command is:

MENU → Input → In Configs → [Resolution] → [#] → Control → Reinterlace

Section 7 – Video Input Menu

Input Enhancement Controls

Darbee

With Factory Settings the ► button is a short cut to bring up the Darbee menu. The Darbee DVP support sources up to 1080p60. See the Darbee DVP™ Section for more information. The command is:

MENU → Input → In Configs → [Resolution] → [#] → Enhance → Darbee

Sharpness

Adjusts the sharpness for all inputs. There are controls for horizontal edges, vertical edges, diagonal edges and texture (fine detail). It is generally best to leave these controls at the default setting of 0 or to use moderate settings. Using higher settings can introduce image artifacts. The command is:

MENU → Input → In Configs → [Resolution] → [#] → Enhance → Sharpness

Noise Reduction

Mosquito noise and block artifact noise are both seen in compressed material. The Radiance Pro uses temporal and spacial noise reduction to help reduce the noise level these artifacts introduce into the image. The command is:

MENU → Input → In Configs → [Resolution] → [#] → Enhance → Noise Red.

Copy Enhancement Settings

You can copy the local enhancement settings to other resolutions and memories. The command is:

MENU → Input → In Configs → [Resolution] → [#] → Enhance → Copy

Input Options

HDMI Input Setup

Often the Input setup features are not required. However, for special cases or non-conforming sources, they are available to optimize each input. If required input setup should occur after the output setup is complete.

HDCP 2.2, or HDCP 1.X, Input Mode Selection

The Radiance Pro accepts HDCP 2.2 sources. As required by the HDCP 2.2 License Agreement, an HDCP 2.2 capable source is required to output using HDCP 2.2 encryption if the downstream device supports HDCP 2.2. This is an issue if the output of the Radiance Pro is connected to a HDCP 1.X TV, or projector, since the Radiance Pro will then be required to disable video, because the TV, or projector, is not HDCP 2.2.

Generally if a HDCP 2.2 capable settop box or UHD Bluray player sees a HDCP 1.X device on its output, it will downgrade the video resolution and output as HDCP 1.X. This command allows the user to tell the Radiance Pro to report only HDCP 1.X capability back to the source so at least a downgraded video format will be output from the settop box or UHD Bluray player for 4k sources, and the Radiance Pro can output the HDCP 1.X video to the HDCP 1.X TV, or projector. The command is:

MENU → Input → Options → HDMI Setup → HDCP

HDMI Video Type

By default the HDMI input format is detected automatically using the *HDMI Info Frame*. For DVI sources, the Auto mode selects RGB format. For sources that do not report their format correctly, the input format can be selected manually. The command is:

MENU → Input → Options → HDMI Setup → Physical In → Type

Input Level

This command specifies if RGB HDMI inputs use video levels or PC levels. The input video level should be set to match the expected range of the video source. A mismatch can cause the image to be too dark or too bright. The command is only applicable for the RGB input format. The command is:

MENU → Input → HDMI Setup → Level → (Video, PC)

Section 7 – Video Input Menu

Virtual to Physical Input Mapping

If desired the input selection for HDMI sources can be assigned to different physical HDMI inputs. This “Virtual Input” feature can be useful if a receiver or HDMI switcher is used to switch several HDMI sources to a single input on the Radiance. Using Virtual Inputs different settings and calibrations for several virtual HDMI inputs can be stored for the same physical HDMI input. The command is:

MENU → Input → Options → HDMI Setup → Physical In

Video EDID Display Information for HDMI inputs

EDID is information that can be read over DVI/ HDMI cables to influence how source devices deliver video, which helps produce an optimal picture. There are 4 settings for the Lumagen EDID interface. The default setting enables all of the display modes the Radiance supports. The User defined setting allows the user to individually select which capabilities will be advertised to the source. You can scroll through the list of capabilities with the up/down arrows and toggle advertising the feature with the left/right arrows. With the Passback setting, the Radiance will read the EDID from the display/AVR connected to the selected output and pass that back to the source. The command is:

MENU → Input → Options → HDMI Setup → Video EDID

HDMI Input Hotplug Mode

NOTE:

Do not set Hotplug to "always on" unless necessary since this eliminates the ability of the Radiance Pro to inform the source of a change in the EDID data.

The Hotplug signal is part of a HDMI/DVI interface. Hotplug alerts a DVI/HDMI source device to downstream EDID changes when toggled. For some devices, such as a PC, it may be necessary to keep Hotplug high at all times. The Radiance provides two Hotplug settings, "Normal" and "Always On". The "Normal" behavior is to toggle the Hotplug signal sent back to the HDMI source when the EDID information needs to be updated. The source will then read the EDID and make any necessary changes. If the device connected to the Radiance output toggles the Hotplug to the Radiance then there may be some new EDID information to pass back to the sources and, if Hotplug is set to "Normal", Hotplug on all Radiance inputs would be toggled to inform the sources of the change.

Some sources, such as PC's, stop sending video on HDMI/DVI, or enter sleep mode, when the Hotplug signal is not asserted, so setting Hotplug on the Radiance to "Always On" is a potential solution. As mentioned above, generally Hotplug should be set to "Normal."

Sometimes the connectivity of a system can cause a "HDCP Hotplug authentication loop." An example of this is when connecting the Radiance output to an audio receiver and then connecting the HDMI output of the receiver to one of the Radiances' inputs. Then, if the Radiance toggles its Hotplug back to the receiver's output, the receiver would check the Radiance's EDID and then toggle its Hotplug back to the Radiance to inform it about this new EDID. The Radiance again toggles Hotplug in response. This can create a continuing loop of HDMI EDID activity.

MENU → Input → Options → HDMI Setup → Hotplug mode

Auto Aspect Selection

For HDMI sources (not DVI), aspect information may be sent from the source. Enabling HDMI Auto-Aspect allows the source to select the input aspect ratio using the HDMI Info Frame aspect ratio information. The Radiance Pro can also automatically detect the input aspect ratio by analyzing the image to see if it fills the height of the source raster. Options for Auto Aspect are Off (default), HDMI (only), or HDMI plus Image based auto aspect.

Since the image based auto aspect analyzes the video, it is possible in rare cases that one aspect ratio might be mistaken for another. If the user manually selects an aspect ratio, by default, that aspect ratio will be used until the next aspect ratio change is detected by the Radiance Pro. If enabled the Sticky Aspect Override feature will disable the image based aspect ratio detection new aspect will be used until the input is reselected, the **Input** button is pressed, or a memory (e.g. **MEMA**) button is pressed.

Some users prefer that, for example, 16:9 sources use the NLS function to always stretch the image to fill an anamorphic screen. If the *NLS when applicable* feature is enabled, when the Radiance Pro detects 4:3, 16:9, or 1.85 as the source aspect, the NLS features is automatically applied.

The user can also select whether the automatic aspect ratio detection applies Letterbox Zoom to letterboxed sources, or not. See the Letterbox Zoom section for more information on letterbox zoom. The command is:

Section 7 – Video Input Menu

MENU → Input → Options → Aspect Setup → Auto Aspect

Input Aspect Selection Mode

By default the input aspect ratio can be unique for each input resolution. When a control system is used to control the input aspect ratio it may be desirable to have a common aspect ratio for a given configuration memory and allow the control system to select it without regard to the input resolution. This command control whether the input aspect is common to all input resolutions for a given configuration memory, or if each input resolution has a unique aspect ratio. The command is:

MENU → Input → Options → Aspect Setup → Aspect Set

Genlock

Genlock is used to provide a constant video delay from input to output, and to avoid an occasional dropped or repeated frame. Unlike older Radiance models Genlock in the Radiance Pro is designed to not increase switching delays much. So it can be on for Settop boxes and not significantly increase channel change time.

Another advantage of the Radiance Pro Genlock is that the input to output video delay is the same within a few milliseconds independent of the input and output mode. For example, with Genlock on the input to output delay for 1080i in to 4k60 out is almost the same as for 24p in to 24p out.

By default Genlock is off. Genlock can be set to off for all input rates, on for only 24p and 25p input rates, or on for all input rates. The command is:

MENU → Input → Options → Genlock

Scale Bias

Scaling is normally on to adjust the source to exactly fit the output resolution. If the scale bias is set to "On", scaling is enabled unless the input and output resolution match exactly. Scaling is disabled/enabled independently for horizontal and vertical. If the scale bias is set to "Off" scaling is disabled if the input and output resolutions are close. This is useful when using the Radiance Pro to control aspect ratio for an anamorphic screen. This case uses *Output Shrink* and since it is difficult to match the input and output exactly for the 2.35 input to 2.35 output aspect case, turning Scale Bias to off will insure scaling is disabled when possible, providing the best possible image quality. The second page of the Status screen indicates whether scaling is active (Press **OK** on the remote twice when no Menu is displayed). The command is:

MENU → Input → Options → Scale Bias

Game Mode

Minimizes video processing latency for playing video games. Interlaced sources 480i/576i/1080i are treated as 240p/288p/540p, respectively. Deinterlacing is not available in Game Mode. Typically game mode is enabled for a specific input memory that is then selected while playing games. For games that have a vertical rate that matches the Radiance output vertical rate, turning "Genlock" on can further minimize video latency. Game mode is not intended for video/film program material, such as television shows. The command is:

MENU → Input → Options → Control → Game Mode

Input Label

Each input configuration memory can be named. Follow the on-screen directions. The ◀ and ▶ arrows select which input to change and then which character to change. The ▲ and ▼ arrows change the selected character. The command is:

MENU → Input → Options → Label

Copy Input Settings

This command can be used to copy input setting from one input and one input memory to another input and input memory, or all input for one memory, or all input for all four input memories. Copying an input memory to another input memory, copies each resolution sub-memory to the respective resolution sub-memory of the other input(s). The command is:

MENU → Input → Options → Copy

Section 8 – Audio Configuration

Section 8 – Audio Configuration

This section is under development.

Section 9 – Calibration

Section 9 - Calibration

Your theater system needs to be calibrated to provide the best possible image quality. To brighten the image in the show room, most display manufacturers intentionally change the display calibration away from industry standards. Unfortunately most displays do not have the controls necessary to undo these errors, and even many of those with calibration controls are not mathematically correct, making proper calibration impossible without an external calibration device such as the Radiance.

Correcting these intentional errors, and other unintentional errors, so the image appears, as the director intended, is a primary function of the Radiance. The Radiance has a host of features dedicated to this task.

It is recommended that a professional calibrator be hired to perform the calibration. An experienced professional calibrator has the necessary tools and experience to extract the best performance from your theater. However, you can improve your picture without hiring a professional if you prefer. You will need to learn how to use the Lumagen test patterns. Then you need to spend time learning how various calibration controls interact and how they affect image quality, with the most important being proper adjustment of the Black level in the display or projector menu.

To understand Radiance calibration, it is important to note that setup and calibration parameters are split into “input memories” and “output configurations.” Input memories are for source specific setup and calibration. Output configurations deal with display setup and calibration. These are covered elsewhere in this manual.

It is recommended that the internal Lumagen test patterns be used to calibrate the output configuration. This will assure that any variance between sources do not affect the calibration of the display.

The recommended Lumagen calibration sequence is discussed in TechTip 2 on the Lumagen support “Manuals and TechTips” page at <http://www.lumagen.com/testindex.php?module=manuals>. Please check out this and other TechTips for information on setup and calibration.

After you have completed changes, make sure to save your configuration as shown below:

MENU → Save → OK → OK → OK

Section 10 – Miscellaneous Commands

Section 10 – Miscellaneous Commands

System Settings

Menu Mode

The menu mode controls what settings can be changed in the menu. In Locked mode nothing can be changed in User Mode, Service Mode (temporary) and Service Mode (permanent). The default setting is User Mode, which allows access to all the basic controls. The Service Mode allows access to all controls including the color gamut controls. The configuration can be locked to prevent unintended changes. When locked, input selection functions normally, but setup parameters are fixed. The command is:

MENU → Other → Menu control → Menu Mode

Timeouts

In the "Normal" setting the menu and test patterns will timeout in approximately three minutes. The "Slow" setting extends the timeout by x10. Test patterns also have a setting for "Never" timeout. The command is:

MENU 0 9 0 5 (Normal, Slow) Ok

or **MENU → Other → Menu control → Timeouts → (Normal, Slow, Never)**

OSD Enable

On-Screen-Display (OSD) shown after each user command. Shows the selected input, input aspect ratio, and zoom. The command is:

MENU → Other → Menu control → OSD enable → (On, Off)

Input Reselect

By default, when the currently active input is reselected the input will be reinitialized and the input number will be displayed. This can be turned off so reselecting the active input has no effect. The command is:

MENU → Other → Menu control → In Reselect → (On, Off)

Menu Placement

In the "Standard" placement the menu is in the center of the screen. Choose "Center open" to move the menu so that the center of the screen is open for display calibration measurements. The command is:

MENU → Other → Menu control → OSD enable → Menu placement

Input Menu

Displays a list of inputs you can select when the "Input" button is pressed on the remote. The command is:

MENU → Other → Menu control → Menu Options → Input Menu → (Off, On)

Initial Power State

When power is connected, the unit will turn "on" automatically, or go to "standby-mode". The command is:

MENU → Other → OnOff Setup → Auto On → (Standby, Turn On)

Initial Input State

Sets which input and input memory is selected when the unit is turned on, either after power has been removed or the unit has been put into standby. The command is:

MENU → Other → OnOff Setup → Input Select → (After Power Removed, After Standby)

On/Off Message

A programmable string can be sent to another device via the RS-232 connector to turn the device on or off. The command is:

MENU → Other → OnOff Setup → (On Message, Off Message)

Message Control

This sets the RS-232 parameters that are used for sending a power on/off message to another device. The command is:

MENU → Other → OnOff Setup → Message Ctl

Section 10 – Miscellaneous Commands

Test Patterns

Warning:

Some test patterns can burn plasma and CRT displays if left on for more than a few seconds.

The user can select from a large selection of test patterns. Similar test patterns are organized into "Test Pattern Groups." Reference test patterns are only affected by the output PC/Video level setting and are the same as the patterns produced by a video test pattern generator. Adjustable patterns allow viewing the effect of the output color management settings. The Warm Up test pattern displays a 20 IRE to 50 IRE gray screen. See Radiance Tech Tip 5 for more information. The command is:

MENU → Other → Test Pattern → Pattern → (Reference, Adjustable, Warm up)

◀ and ▶ arrows step to the previous or next Test Pattern Group.

▲ and ▼ arrows can adjust the intensity of many test patterns from 0 to 100 IRE.

"HELP" Pressing the HELP button brings up a Help Menu.

"4" Pressing the number 4 steps through the patterns within the current Test Pattern Group.

"Prev" Toggle between the source and the pattern.

"OK" Exit the test pattern command but leave the pattern on-screen. You can then adjust various parameters to judge their effect on the pattern.

"ALT" Jump back into the pattern command.

Note: "PREV" and "Alt" functions are only valid if you leave the pattern on-screen by pressing "Ok."

Remote Control Arrow Buttons

Changes the default command usage of the arrow buttons on the remote. By default the Up/Down arrow buttons can be used to control zoom, and the right arrow displays the Darbee menu. The default behavior can be changed. The command is:

MENU → Other → I/O Setup → Remote Ctl → (Up/Down arrows, Rt/Left arrows)

LED Setup

Controls the operation of the Blue LED on the front panel. The LED can be set to "Blue" to be a power on indicator or set to "Dark" so that it is off when the Radiance is operating. The command is:

MENU → Other → I/O Setup → LED Setup → (Blue, Dark)

RS-232 Setup

With echo on the Radiance will echo all characters sent to it. With echo off the Radiance will only send a message at power on/off. With echo set to off with status, the power on/off messages are changed to status responses. See Tech Tip 11 for delimiter usage and more details. The command is:

MENU → Other → I/O Setup → RS-232 Setup → (Echo, Delimiters) → (On, Off)

3D Glasses

NOTE: Generally the display controls the 3D glasses. In this case the 3D Glasses command is not used.

These settings control the Lumagen CRT-3D Eyeglass. The Delay and Polarity settings adjust when the shutter-glasses switch eyes. The command is:

MENU → Other → I/O Setup → 3D Glasses → (Delay, Polarity, Enable)

Zoom Step

Sets the size of the Zoom step to 5% or 15%. The command is:

MENU → Other → Zoom step → (5%, 15%)

Quick Keys

Adds an optional top-level menu called "Quick Keys" that gives access to functions that are normally selected using buttons on the Lumagen remote. This menu can be used with programmable remotes that have limited buttons. You can use the arrow buttons on the remote to highlight one of the functions and press "Ok" to execute the function. Alternately you can use a number button on the remote to highlight one of the functions and then press "Ok" to execute the function. (0)4:3, (1)LBOX, (2)16:9, (3)1.85, (4)2.35, (5)NLS, (6)Zoom+, (7)Zoom-, (8)MemA, (9)MemB, (n/a)MemC, (n/a)MemD, (n/a)3D Off, (n/a)3D SbyS, (n/a)3D TopB. The command is:

MENU → Quick Keys → (function) → Ok

Section 10 – Miscellaneous Commands

Configuration Memory Usage

By default, when a configuration memory (A-D) is chosen the selection applies to all inputs. For example if input 1A is active, then input 2 is selected followed by selecting "MemB," if input 1 is again selected, it would use configuration memory 1B. This is called the "Common" configuration memory mode. Generally this mode is used when specific day and night calibrations are desired and used for all inputs.

You can set the memory usage to be "Per Input." That is the configuration memory selection is independent for each input. In this mode, using the example above, starting with input 1A, changing to input 2, pressing "MemB" and finally selecting input 1, results in using configuration memory 1A. The command is:

MENU → Other → Memory Usage

Fan Control

It is recommended that the fan speed be set such that the FPGA Temp is 85C or less. The command is:

MENU → Other → Fan Control

Saving the Configuration

Save

NOTE:

If a Save command is not executed after making changes, the changes will be discarded when the unit is put in standby power mode, or power is interrupted.

Permanently save the current configuration. Note that, once saved, the configuration is retained even if the unit is disconnected from power. The configuration from the previous save is retained to allow one level of save-undo. You can use the Radiance Configuration Utility found on the Lumagen.com support page to store a configuration file on your PC. The command is:

MENU → Save → Save → OK → OK

Undo

Revert to the configuration over-written by the last **SAVE** command. Repeating the Save Undo command toggles between the last two saved configurations. The command is:

MENU → Save → Undo → OK

Restore ISF calibration

During calibration, the video technician can save the resulting Lumagen configuration to a special hidden configuration memory. This command restores that configuration in the event that the user inadvertently changes the configuration. A **SAVE** is required to make the restore permanent. The command is:

MENU → Save → Restore ISF → OK

Revert To Factory Settings

Set all parameters to factory defaults. A **SAVE** is required to make the settings permanent. The command is:

MENU 0 9 9 9

Or **MENU → Save → FactoryReset → OK**

Section 11 – 3D Support

Section 11 – 3D Support

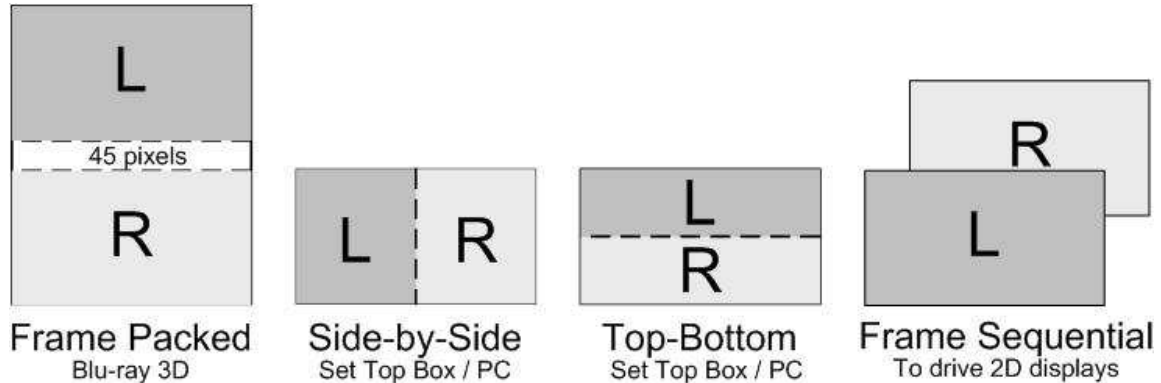
The Radiance supports HDMI 1.4 "3D". This includes 3D video source switching, 3D processing, 3D scaling, 3D aspect ratio control, and a number of 3D format conversions. The Radiance can stretch 3D images for a 2.35 screen on systems that use an anamorphic lens. The Radiance can accept HDMI 1.4 "3D" material and output either the left-eye or right-eye image, for dual projector 3D systems that use passive 3D glasses. The Radiance can also be used to display 3D on many 2D displays, such as a CRT display or projector.

If HDMI Output 1 on the Radiance is connected to a non-3D AVR the Radiance can automatically turn off video on that output when selecting a 3D video source. Most or all non-3D AVR's get confused if you try to send them a 3D video signal.

Any HDMI cable, with good electrical characteristics, will work for displaying HDMI 1.4 3D video on 3D displays.

3D Types

The Radiance can receive all the commonly used 3D types. The Radiance has options to convert 3D types, which are not supported by your 3D display, to a format supported by the display. For example the Radiance automatically converts optional 3D formats into required 3D formats. For CRT displays all supported 3D formats are converted to 3D Frame Sequential. This allows 2D CRT displays/projectors to display 3D images.



Frame Packed

The 1080p24 3D frame-packed mode consists of a frame that contains a full resolution left eye image, 45-pixel active buffer, and a full resolution right eye image. Blu-ray movies use this 3D type and are stored on the disk at 1920x2205/24.

Side-by-Side

Consists of a frame that contains Side-By-Side sub-frames for the left eye and right eye images. Set top boxes and PC's use this 3D type.

Top-Bottom

Consists of a frame that contains Top-Bottom sub-frames for the left eye and right eye image. Set top boxes and PC's use this 3D type.

Frame Sequential

Consists of individual frames of left eye and right eye images that are transmitted sequentially. Some 2D CRT and other 2D digital displays can be driven with this 3D type in order to display 3D images. For this case, an external IR Glass Driver is needed to drive the 3D active glasses.

Section 11 – 3D Support

Separate Left and Right

The Radiance can accept HDMI 1.4 “3D” video and output either the left-eye or right-eye image for a dual projector 3D system that uses passive 3D glasses. This 3D system configuration uses two Radiance video processors.

3D Output Settings

The Radiance has support for all of the commonly used 3D video sources. If you connect a HDMI 1.4a compliant 3D video source and compliant 3D display, to the Radiance, you should automatically get a 3D image, using the Radiance default settings.

The Radiance has settings that you can use to display 3D video, using non-compliant 3D video sources and displays. The Radiance has settings to optimize the video on your 3D display. The Radiance also has settings to display 3D video on some 2D displays (See section titled “3D Support for 2D Displays” for further details).

3D Output Setup Menu

You can select the 3D output settings based on the input number, input memory, and input video mode. For any of the three input conditions you can select ‘All’ to apply the output setup to multiple input conditions. When making settings that apply to multiple input conditions you can leave any of the output settings unchanged by selecting the ‘---’ option for that output setting. Press “4” for ‘All’ and press “5” to see the current settings. The command is:

MENU → Output → Output Setup → 3D → Ok

3D Output Mode = Auto

By default the output is set to “Auto 2,1.” The selection “Auto 2,1” means the Radiance automatically reads the EDID for the devices connected to both outputs, giving priority to Output 2, and automatically selects the appropriate output resolution. That is, if an active device is connected to output 2, the EDID from that device is read to determine the optimal video output resolution and the Radiance automatically selects the specified resolution. If no device is connected to output 2, or the device connected to output 2 is turned off, the Radiance uses the EDID from the device connected to Output 1 and sets the output resolution appropriately. Output 1 can have priority by selecting “Auto 1,2” from the *Video Output Select Menu*.

For “Auto” modes the output vertical rate is selected based on the input vertical rate. For example, input formats 480i60, 720p60, 1080i60 automatically select a vertical output rate of 60 Hertz. Input formats 576i50, 720p50, and 1080i50 automatically select a vertical output rate of 50 Hz. For a 1080p24 input format a 24 Hz output vertical rate is selected if the display supports a 24 Hz output vertical rate, otherwise a 60 Hz rate is selected.

If the priority output is connected to a 3D device, and the secondary output’s device is not 3D, when a 3D source is detected the Radiance automatically disables video to the 2D output.

For analog displays and digital displays, that do not properly support EDID, the output mode must be selected.

3D Output Mode = Specific Format

The Radiance will convert all 3D input formats to the specified 3D output format. For example all 3D input modes can be converted to a 1080p60 side-by-side output mode.

3D Output Type = Auto

The Radiance has support for all of the commonly used 3D Types (Frame Packed, Side-by-Side, Top-Bottom, and Frame Sequential). When the output ‘Type’ is set to ‘Auto’ the Radiance will convert all 3D modes and types to HDMI 1.4a mandatory 3D format.

3D Output Type = Specific 3D Type

The Radiance will convert all 3D input types to the specified 3D output type. i.e. All 3D input types can be converted to 3D Frame Sequential to drive a CRT display/projector.

3D EDID Configuration

By default the display’s 3D capability is automatically detected using its EDID information. However, some 3D displays do not properly report their 3D capability in their EDID. This command allows the 3D output capability to be manually enabled (or disabled). The command is

Section 11 – 3D Support

MENU → Output → 3D Options → (Out1, Out2) → (Auto, Yes, No)

3D Setup Procedures

Normal Setup

For most new 3D video sources and displays, just connect the source and display to the Radiance. You will get a 3D image, with the Radiance default settings of 3D output 'Mode=Auto' and 3D 'Type=Auto'.

1. If starting with a unit in an unknown state, press "**MENU 0999**" to restore factory default settings and save the new settings by pressing "**MENU → Save → Save → OK → OK**".
2. Connect the *Radiance* outputs. If using only one *Radiance* output, use Output 1 if the *Radiance* needs to pass audio, or Output 2 if not. If using an AVR, or audio Pre/Pro, connect it to *Radiance* Output 1 and the display to Output 2.
3. Connect a video source that supports 3D to a HDMI input on the Radiance.
4. Turn on power to the display and video source.
5. You should now have a 3D image on your display.

Display Optimization

To get the best quality 3D image, on some displays, it is necessary to convert some or all of the 3D video modes to a specific 3D output mode. Research the display specifications, to determine the optimum 3D modes and types for your display.

For example; If a display shows 720p 3D video as a letterboxed image. You can set the Radiance to convert 720p 3D video to 1080p60 Side-by-Side 3D video, which is shown full screen on the display.

1. Set the appropriate Radiance output to "3D Capable" by pressing "**MENU → Output → 3D Options → Ok → (Out1/Out2) → Yes → Ok**".
2. For example; to set the Radiance 3D output to "1080p60" "Side-by-Side", press "**MENU → Output → Output Setup → 3D → Ok → Mode → 1080p60 → Type → SbyS → Ok**". Note: You need to select a 3D output mode before you can select a specific 3D output type.
3. Save the new settings by pressing "**MENU → Save → Save → OK → OK**".

Setup for Non-Compliant Displays

The Radiance also has settings to display 3D video on non-compliant displays.

1. If starting with a unit in an unknown state, press "**MENU 0999**" to restore factory default settings.
2. Connect the *Radiance* outputs. If using only one *Radiance* output, use Output 1 if the *Radiance* needs to pass audio, or Output 2 if not. If using an AVR, or audio Pre/Pro, connect it to *Radiance* Output 1 and the display to Output 2.
3. Connect a video source that supports 3D to a HDMI input on the Radiance.
4. Turn on power to the display, Radiance and video source.
5. Set the appropriate Radiance output to "3D Capable" by pressing "**MENU → Output → Output Setup → Ok → (Out1/Out2) → Yes → Ok**".
6. Save the new settings by pressing "**MENU → Save → Save → OK → OK**".

Setup for Non-Compliant 3D Video Sources

The Radiance also has settings to display 3D video using 3D video from non-compliant video sources. It is only necessary to manually set the 3D input mode on the Radiance if the video source doesn't transmit that it's displaying a 3D mode.

1. If starting with a unit in an unknown state, press "**MENU 0999**" to restore factory default settings.

Section 11 – 3D Support

2. Connect the *Radiance* outputs. If using only one *Radiance* output, use Output 1 if the *Radiance* needs to pass audio, or Output 2 if not. If using an AVR, or audio Pre/Pro, connect it to *Radiance* Output 1 and the display to Output 2.
3. Connect a video source that supports 3D to a HDMI input on the Radiance.
4. Turn on power to the display, Radiance and video source.
5. The Quick Key Menu has settings to set the Radiance input to 2D, 3D Side-by-Side, or 3D Top Bottom mode, press "**MENU** → **Quick Keys** → (**3D Off**, **3D SbyS**, **3D TopB**) → **Ok**".
6. The direct commands to set the Radiance input to 2D, 3D Side-by-Side, or 3D Top-Bottom is:

| | |
|-----------------|---------------------|
| 2D | " MENU 030 " |
| 3D Side-by-Side | " MENU 031 " |
| 3D Top-Bottom | " MENU 032 " |
7. This setting isn't saved. Use the Quick Key Menu or a direct command to set the 3D input mode on the Radiance, when using a non-compliant 3D video source.

Section 12 – Darbee Video Enhancement

Section 12 – Darbee Visual Presence™

The Darbee Visual Presence (DVP™) feature can improve the perceived visual quality of an image. It does this by adding definition and contrast to the image. Darbee DVP can be used with the other Radiance video enhancements, especially the edge enhancement “Sharpness” control, to further enhance the image.

NOTE:

Darbee DVP is supported for input rate up to 1080p60.

By default, the Darbee video enhancement is turned on at a normal level. You can experiment with the gain setting to find the appropriate level, for your video source and display. Many users find that “HD” mode with a “Gain” setting in the range of 25, to 55, provide the best overall results.

NOTE:

The Darbee video processing is automatically turned off when a Radiance test pattern is displayed. When using an external test pattern, turn off DVP by setting “Enabled” to “No” in the Darbee menu.

Darbee menu

There are two ways to access the Darbee menu as shown below:

- That is, press the right-arrow while menu is not displayed. **NOTE:** *This is the default behavior, but this can be changed to a different function.*

or

MENU → Input → In Configs → [resolution] → [#] → Enhance → Darbee → Ok

Darbee menu control

| | | | | |
|---------------|-------------------|-------------------|-----------------------|---------------------|
| DARBEE | Gain 30 | Mode HD | Enabled Yes | View Full |
|---------------|-------------------|-------------------|-----------------------|---------------------|

Press ➤, or ⬅, arrow buttons as needed to select the setting to modify. Press the up and down arrow buttons to change the selected setting. Press the **EXIT** button to leave the Darbee menu.

Gain

The gain control range is from 0 to 120. Most people prefer a gain from 25 to 55 but the optimum setting varies for different video sources, displays, and based on personal preference. A gain setting of 0 effectively turns Darbee off, and has the same effect as setting “Enabled” to “Off”.

Mode

- **HD** The “High Def” mode can be used for watching high definition video. It has the least aggressive processing and is virtually free from processing artifacts. This is also a good general-purpose mode to use for all types of video content.
- **Full** The “Full-Pop” mode can be used for watching low-resolution or lower-quality video. It has the most aggressive processing and isn’t appropriate to use for watching high definition video or games. You may notice more image artifacts than Game Mode.
- **Game** The “Game” mode can be used for playing video games. It is also a good mode to use for watching Computer Generated Imagery (CGI) and other clean video sources.

Enabled

Set “Enabled” to “Yes” or “No” to turn the Darbee video enhancement on or off. Use this control to compare an image with and without the Darbee video processing.

View

Set “View” to “Full” for normal viewing with Darbee processing. Set “View” to “Split” to display a split-screen image, with Darbee processing on the right half of the screen. The split-screen can be used to demonstrate or evaluate Darbee DVP processing.

Section 13 – Command Interface

Section 13 – Command Interface

Direct Commands

Direct Commands are entered by using the Lumagen remote control or RS232 interface.

See Radiance Tech Tip 13 “Direct Commands and Menu Shortcuts” which contains a complete list commands. This Tech Tip is available for download at <http://www.lumagen.com>.

Output Vertical Resolution

The following output mode commands are intended for temporary testing. Use the **Output Setup** Menu to program the output mode, or modes, if the “Auto” setting is not being used.

| | | |
|----------|-------------------|----------------------------------------|
| 480p: | MENU 0 2 1 | Progressive with 480 active scanlines |
| 720p: | MENU 0 2 4 | Progressive with 720 active scanlines |
| 1080i: | MENU 0 2 8 | Interlaced with 1080 active scanlines |
| 1080p24: | MENU 0 2 0 | Progressive with 1080 active scanlines |
| 1080p: | MENU 0 2 7 | Progressive with 1080 active scanlines |
| 4k24: | MENU 0 2 3 | Progressive with 2160 active scanlines |
| 4k60: | MENU 0 2 9 | Progressive with 2160 active scanlines |

Output Mode Commands

| | | |
|---------------|-------------------|------------------------------------|
| Output 2D | MENU 0 3 0 | Set output mode to 2D |
| Output 3D-SBS | MENU 0 3 1 | Set output mode to 3D Side-By-Side |
| Output 3D-TB | MENU 0 3 2 | Set output mode to 3D Top-Bottom |

Output Vertical Rate

Set vertical rate: **MENU 0 4 (50Hz, 60Hz) OK**

Output Aspect Ratio

Output aspect ratio: **MENU 0 6 value OK** Example: For 16:9 enter 178

Miscellaneous Commands

| | | |
|------------------|---------------------|----------------------------------------------------------|
| Menu timeout | MENU 0 9 0 5 | Toggle menu timeout. Short (default) or long (saved) |
| Service Mode | MENU 0 9 1 0 | Toggle SERVICE MODE. (not saved) |
| Reinterlace Off | MENU 0 9 4 0 | Turns reinterlacing off |
| Reinterlace On | MENU 0 9 4 1 | Turns reinterlacing on |
| Unlock menu | MENU 0 9 1 5 | Can also be selected using menu |
| Output defaults | MENU 0 9 9 8 | Reset current output to default for current resolution |
| Factory defaults | MENU 0 9 9 9 | Reset to factory default (Must “Save” to make permanent) |

Menu Shortcuts

See Radiance Tech Tip 13 “Direct Commands and Menu Shortcuts” which contains a complete list commands. This Tech Tip is available for download at <http://www.lumagen.com>.

IR Command List

See Radiance Tech Tip 12 “IR Command Interface” which contains a complete list of IR commands. This Tech Tip is available for download at <http://www.lumagen.com>.

RS-232 ASCII Command List

See Radiance Tech Tip 11 “RS232 Command Interface” which contains a complete list of RS232 commands. This Tech Tip is available for download at <http://www.lumagen.com>.

Section 14 – Specifications

Section 14 – Specifications

Inputs

- Up to 8 HDMI 2.0 with HDCP 2.2 at up to 4k60 (Radiance Pro 444X)
- Up to 4 HDMI 2.0 with HDCP 2.2 at up to 4k60 (Radiance Pro 424X)

Processing

- Input resolutions up to 4k60 HDMI 2.0 with HDCP 2.2
- Proprietary Lumagen No-Ring™ scaling
- Vertical Keystone correction
- Darbee Digital Visual Presence™ (DVP™) enhancement technology (up to 1080p60 input)
- Full CMS (Color Management System) using a 4913-point 3D linear-gamma RGB color palette
- 21-point parametric grayscale and Gamma
- 10-bit processing for deinterlacing plus a 12-bit calibration pipeline
- Support for HDMI® 1.4 “3D” including anamorphic lens scaling
- Convert common optional 3D formats to a required 3D format that is supported by the display
- Each input has 4 user configuration memories
- Each input user configuration memory has 8 resolution sub-memories (for HD inputs)
- Each resolution sub-memory is linked to one of 8 output configurations.
- 2:2, 3:2 and 3:3 pull-down for SD/HD film sources
- Per-pixel SD/HD video de-interlacing
- User programmable non-linear-stretch (NLS) mode
- 4:3, LBOX, 16:9, 1.85, 2.35, 2.40 and NLS input aspect ratios
- Programmable output aspect ratio from 1.10 to 2.50
- Extensive support for anamorphic without need for an anamorphic lens
- Large suite of test patterns
- Programmable input/output color-space
- Y/C-delay calibration
- CUE and ICP filtering
- Eight channel audio up to 192 kHz, DD True-HD™ 5.1, and DTS Master Audio™ Bitstream

Outputs

- Output resolution up to 4k60 HDMI 2.0 with HDCP 2.2
- Up to 10 HDMI outputs (four processed, six switched) for Radiance Pro 444X.
- Two processed outputs for Radiance Pro 424X.
- Eight channel audio at 192 kHz
- Supports DD True-HD™, and DTS Master Audio™ bitstream formats
- Each HDMI output can provide “stand-by” power to an external device of +5V at 250 mA total including the display and any devices that scavenge power from the HDMI output.

Miscellaneous

- IR and RS232 control inputs (See Tech Tip 11 and 12 on the Lumagen.com support page)
- Internal USB-to-serial adaptor for calibration or software updates
- Wired IR format command input
- Universal, 100-240V, ~50/60Hz external 12 VDC 5 Amp power supply
- Optional rack mounting ears

ROHS

CE



503-574-2211
Beaverton, OR U.S.A.
www.lumagen.com