RPMX/RPMSP-D132U
RPMSP-D180U

USER MANUAL

020-100245-03

CHRISTIE®

RPMX/RPMSP-D132U
RPMSP-D180U

USER MANUAL

020-100245-03

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

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

이 기기는 업무용 (A 급) 으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이점을 주의하시기 바라며 , 가정 외의 지역에서 사용하는 것을 목적으로 합니다 .

The equipment is designed and manufactured with high-quality materials and components that can be recycled and reused.

This symbol  means that electrical and electronic equipment, at their end-of-life, should be disposed of separately from regular waste. Please dispose of this equipment appropriately and according to local regulations. In the European Union, there are separate collection systems for used electrical and electronic products. Please help us to conserve the environment we live in!

 Canadian manufacturing facility is ISO 9001 and 14001 certified. Performance specifications are typical, but may vary depending on conditions beyond Christie's control such as maintenance of the product in proper working conditions. Performance specifications are based on information available at the time of printing. Every effort has been made to ensure accuracy, however in some cases changes in the products or availability could occur which may not be reflected in this document. Christie reserves the right to make changes without notice or obligation.

WARRANTY
For complete information about Christie's limited warranty, please contact your Christie Dealer. In addition to the other limitations that may be specified in Christie's limited warranty, the warranty does not cover:

(a) Damage occurring during shipment, in either direction.
(b) Projector lamps (See Christie's separate lamp program policy).
(c) Damage caused by use of a projector lamp beyond the recommended lamp life, or use of a lamp supplied by a supplier other than Christie.
(d) Problems caused by combination of the equipment with non-Christie equipment, such as distribution systems, cameras, video tape recorders, etc., or use of the equipment with any non-Christie interface device.
(e) Damage caused by misuse, improper power source, accident, fire, flood, lightening, earthquake or other natural disaster.
(f) Damage caused by improper installation/alignment, or by equipment modification, if by other than Christie service personnel.
(g) For LCD projectors, the warranty period specified applies only where the LCD projector is in 'normal use. "Normal use" means the LCD projector is not used more than 8 hours a day, 5 days a week. For any LCD projector where 'normal use" is exceeded, warranty coverage under this warranty terminates after 6000 hours of operation.
(h) Failure due to normal wear and tear.

PREVENTATIVE MAINTENANCE
Preventative maintenance is an important part of the continued and proper operation of your projector. Please see the Maintenance section for specified maintenance items as they relate to your projector and/or model. Failure to perform maintenance as required, and in accordance with the maintenance schedule specified by Christie, will void the warranty.

1: Introduction

2: Installation and Setup

3: Operation

4: Advanced Configuration and Controls

5: Maintenance

6: Troubleshooting

7: Specifications

A: Cable Connections

B: Dimensions & Mounting Information

C: System Integration

D: Optional Input Modules

1 Introduction

RPMX/RPMSP-D132U and RPMSP-D180U are professional quality XGA and SXGA+ data projectors featuring the latest in DLP™ display technology to achieve high brightness, high resolution multimedia and video projection images. These projectors use Christie's exclusive KoRE™ electronics and firmware to accept data, graphics, and video input signals for projection onto flat, front or rear projection screens.

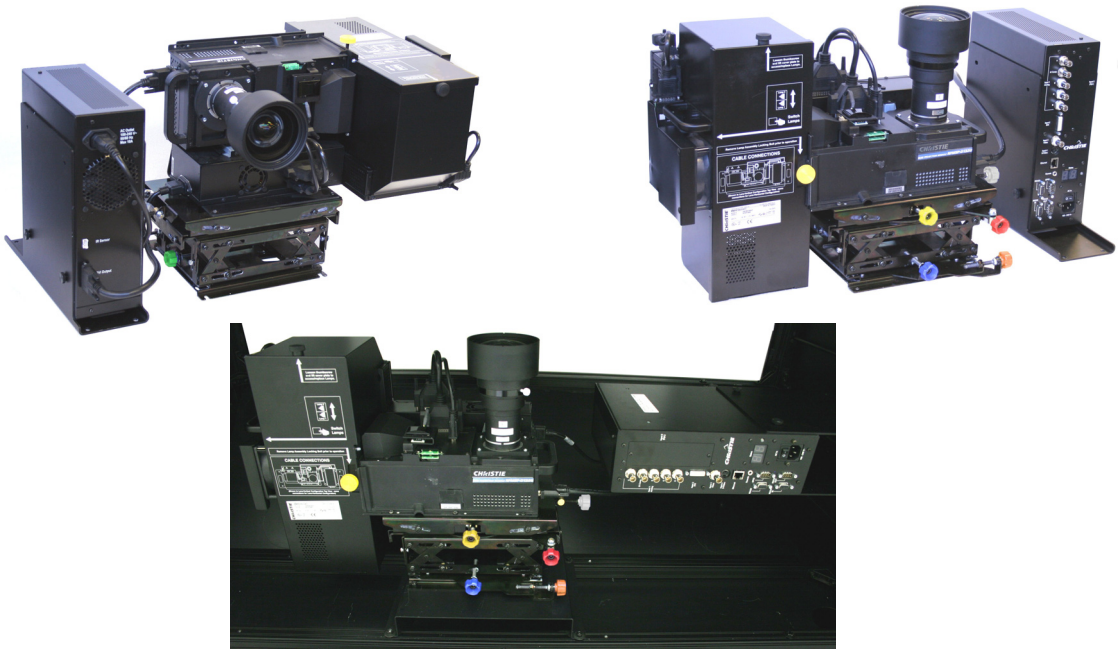


FIGURE 1-1 THE PROJECTOR

The modular design of these projectors makes them an ideal choice for rear screen projection and multi-display walls. With built-in flexibility, each projector can be configured for straight throw or 90° mirrored applications. The 6-axis adjustment mechanism enables accurate alignment of the lens to the screen minimizing distortion at all corners and edges of the display.

A dual lamp hot swappable system allows the projector to operate with minimal downtime. The mechanical lamp changer enables an automatic lamp change to occur when a lamp fails or whenever requested by a user. The purpose-built design of these projectors makes them an ideal choice for the demanding needs of 24/7 command and control centers, telecommunications, surveillance and broadcasting applications.

1.1 Key Features

- RPMSP – Native SXGA+, 1400 x 1050 resolution
- RPMX – Native XGA, 1024 x 768 resolution
- 24-bit RGB display
- 10-bit image processing module

- Display of RGB, NTSC, PAL, and SECAM video inputs and HDTV formats
- User adjustable lamp power
- Mechanical lamp changer for easy lamp change during operation
- Picture-in-picture display
- Edge Blending ability via software for seamless displays (only available on SXGA+ models)
- Dual frequency IR sensor for use with standard IR remote and optional long-range dual frequency remote
- 6-axis image geometry adjustment mechanism
- Memory for up to 50 custom “channels” (source setups)
- Intuitive on-screen menu system
- Built-in GPIO port to enable active control of external devices
- LED display for projector status monitoring
- Multiple control options including RS-232, RS-422 and ethernet
- On-board ChristieNET™ software
- Universal AC input 100-240 VAC, 50/60Hz

See *Section 7 Specifications* for a complete list of product specifications.

1.2 How the projector works

The user selects which lamp will be in operation through the Lamp Menu; Lamp #1 or Lamp #2. After the lamp ignites, the light generated is sequentially filtered into the RGB color primaries by the spinning color wheel in the light engine of the projector. This filtered light is then presented to the single chip DMD, located in the light engine. The reflected light from the DMD chip then passes through the projection lens to the screen to display the image.

1.3 Components

Make sure you have received these components before using the projector.

- Line Cord (rated, North American)
- Configuration bracket (shipped loose, for horizontal configuration)
- 6xM6 screws (for installation of configuration bracket)

NOTE: *A User’s Kit is provided with each projection system. Additional User’s Kits can be purchased separately (part number 102-144100-XX).*

1.4 Additional Tools Required

Keep these tools on hand during installation and setup:

#1 Phillips screw driver

1.5 Purchase Record and Servicing

Christie's factory and dealer service network is available to diagnose and correct projector malfunctions. Service manuals and updates are available to service technicians for all projectors.

If you encounter any problems with the projector and require assistance, contact your dealer or Christie Digital Systems. Fill out the information in the table below and keep with your records for future reference.

1.5.1 Purchase Record

Dealer:
Dealer Phone Number:
Projector Serial Number:
Purchase Date:
Installation Date, if applicable:

NOTE: *The serial number can be found on the license label.*

To register your product on-line visit http://www.christiedigital.com/ ⇒ **Product Resources & Service** ⇒ **Product Registration.** This will keep you in touch with all the latest product information, such as updates, technical bulletins, downloads and Christie newsletters.

2 Installation and Setup

Use this section to install and setup your projector. Complete these steps:

Step 1 – Unpack the projector.

Step 2 – Select and modify the projector's configuration according to the intended application: lens-vertical (90 degree) or lens-horizontal (0 degree) projection.

Step 3 – Calculate throw distance if necessary. Position and mount the projector.

Step 4 – Connect sources.

Step 5 – Turn the projector on.

Step 6 – Adjust projection lens to improve image focus.

Step 7 – Adjust image geometry using the 6-axis adjuster.

Step 8 – Adjust software to optimize image on a single screen, or multiple screens.

NOTES: *1) The illustrations used in this manual are graphical representations only and may not depict your projector model exactly.*

2) If you are installing your projector in a TotalVIEW™ 50" or 67" cube enclosure, refer to the separate installation guide provided (020-100248-XX).

2.1 Pre-Installation Considerations

Whether installing your projector permanently or temporarily take the following into account to get the best possible performance from your projector. When designing a projection room consider:

- are you operating single or multiple units
- the room size
- lighting and audience seating
- distance the audience is sitting from the display
- from which angle the display is viewed

These are important when deciding where to place the display, or what type and size of screen to use.

2.1.1 Screen Size and Type

Choose an appropriate screen size for your lens and application. If the projector is displaying text information, the image size must be large enough to allow the audience to view all text clearly. The eye-to-text distance should be less than 150 times the height of the letter. Small text located too far from the eye will be illegible at a distance no matter how sharply and clearly it is displayed.

To fill a screen with an image, the aspect ratio (expressed as the ratio of its width to its height) of the screen must be equal to the aspect ratio of the image. Screens with an aspect ratio of 4:3 are recommended for use with these projectors.

Diffused and optical screens are best suited for rear screen installations. A diffused screen has a surface which spreads the light striking it. Purely diffused screens have a gain of less than 1. Optical screens take light from the projector and redirect it to increase the light intensity at the front of the screen.

2.1.2 Ambient Lighting

The high brightness of this projector is well suited for locations where ambient lighting might be considered less than ideal for projection. A typical room with ceiling lights and windows rarely requires special attention. If light directly strikes the screen, such as when a shaft of light from a window or floodlight falls on the image, the contrast ratio in your image will be noticeably reduced and may appear washed out and less vibrant.

In general, avoid or eliminate light sources directed at the screen.

2.1.3 Other Considerations

Other considerations and tips that can help improve your installation:

- Ventilation is important, the constant ambient temperature must below 35°C (95°F). Keep the projector away from heating and/or air conditioning vents. Changes in temperature can affect the operation of the projector which may affect performance.
- Keep the projector away from devices radiating electromagnetic energy such as motors and transformers, slide projectors, speakers, power amplifiers, elevators, etc.
- Use an optical mirror for rear screen installations to shorten the optical light path and use less space in the projection room.
- When designing a projection room, consider positioning the projector and screen for maximum audience coverage and space efficiency. For example, placing the screen along the larger wall in a rectangular room reduces audience coverage.

2.2 Installation & Setup

This section outlines the installation sequence of an RPMX/RPMSP-D132U or RPMSP-D180U projector as a stand alone or multiple projector installation.

For instructions on how to install your projector into the TotalVIEW™ 50” or 67” cube enclosure, refer to the separate *Cube Installation Manual* (020-100248-XX) provided in the User’s Kit.

Step 1 Unpacking the projector

The projector is shipped fully assembled in the lens-vertical (90 degree) configuration. After receiving your projector it is important that you prepare it for installation by:

Removing the projector from the box and discarding any packing material surrounding the modules.

NOTE: *An L-shaped bracket, used to change the projector's configuration, is shipped loosely in the box with the projector. Set this aside for future use.*

Verifying all cable connections are secure. Connect any loose cables. See *Figure 2-1 Internal Cable Connections*.

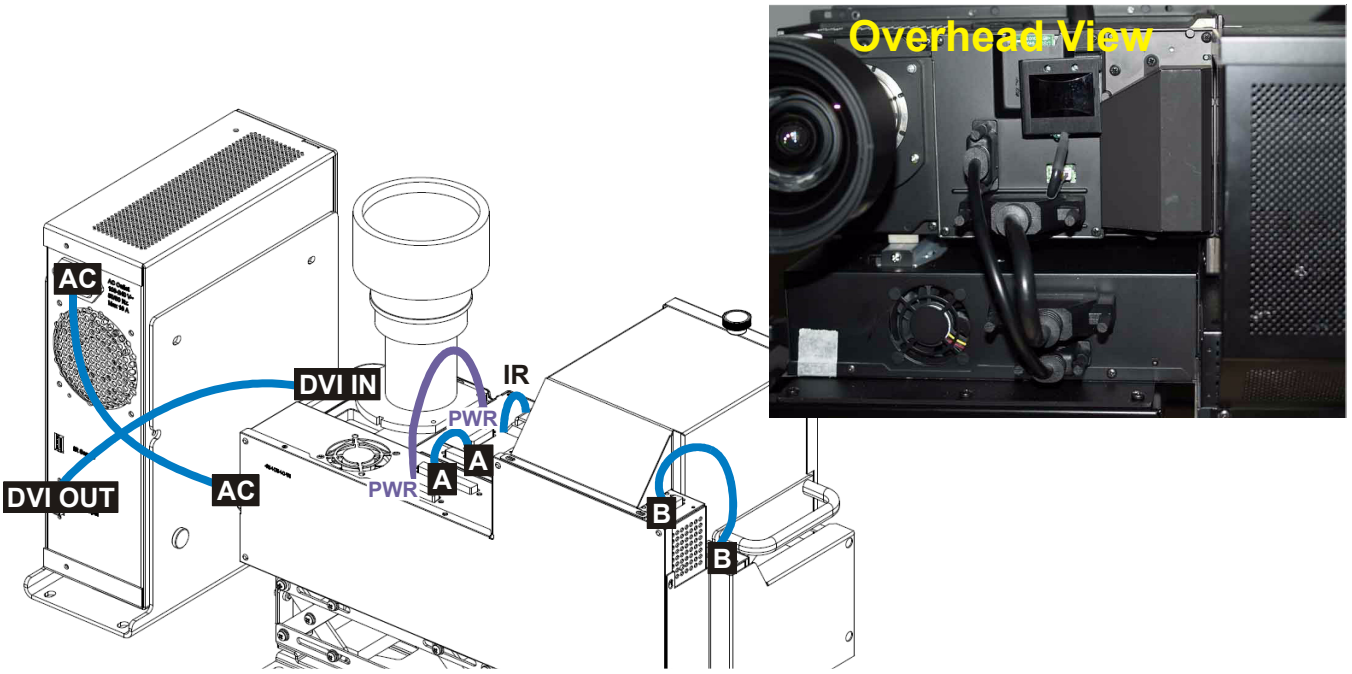


FIGURE 2-1 INTERNAL CABLE CONNECTIONS

⚠ Remove the lock screw located on the mechanical lamp changer. See *Figure 2-2 Remove Lamp Changer Lock Screw*. This screw is used for shipping purposes only and must be removed prior to turning the projector on. **Failure to do so can result in projector damage**.

⚠ Check lamp handles. These handles must lay flat against the lamp surface otherwise they will interfere with lamp operation.

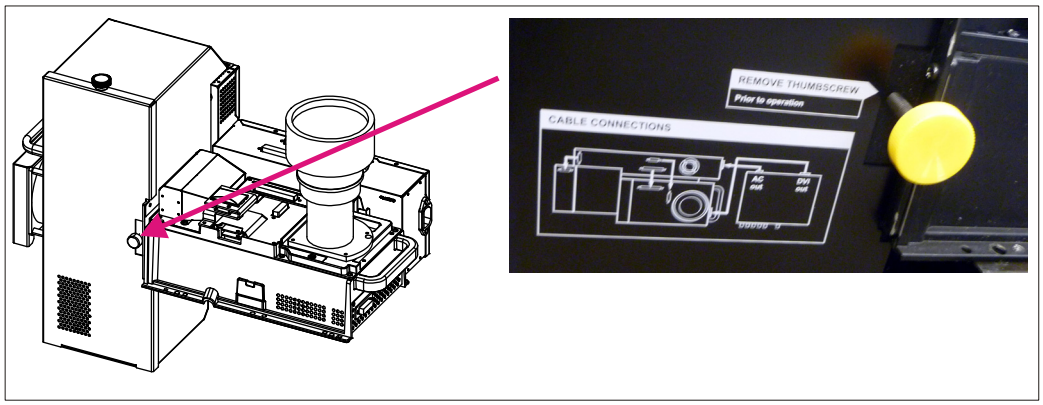


FIGURE 2-2 REMOVE LAMP CHANGER LOCK SCREW

Step 2 Modifying projector configuration (if required)

To use your projector for lens-horizontal projection then you must change its configuration. The L-shaped bracket and M6 screws shipped with the projector are needed to complete this configuration change.

1. Unplug projector from AC.
2. Disconnect all cables between the light engine and electronics module. All disconnects must be made on the light engine side.
3. Remove the (6) M4 screws securing the light engine module to the 6-axis adjuster, see *Figure 2-3 Loosen Light Engine*.

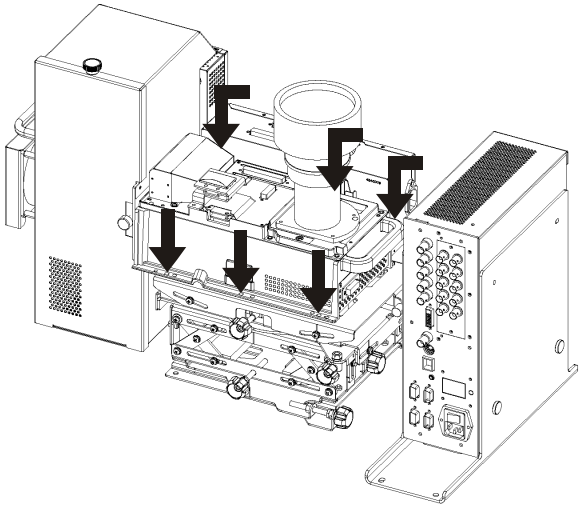


FIGURE 2-3 LOOSEN LIGHT ENGINE

4. Lift the light engine off the adjuster and set aside.
5. Align the shorter end of the L-shaped bracket with the mounting holes in the adjuster base, as shown in *Figure 2-4 Install configuration bracket to adjuster base*.
6. Secure the bracket to the adjuster base with the (6) M4 screws used to secure the light engine.

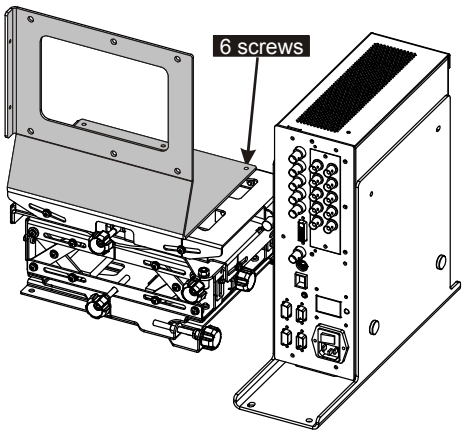


FIGURE 2-4 INSTALL CONFIGURATION BRACKET TO ADJUSTER BASE

7. Place the light engine in the lens-horizontal position on the L-shaped bracket and adjuster base. Align the mounting holes between the configuration bracket and light engine and secure using the (6) additional M6 screws provided with the projector.

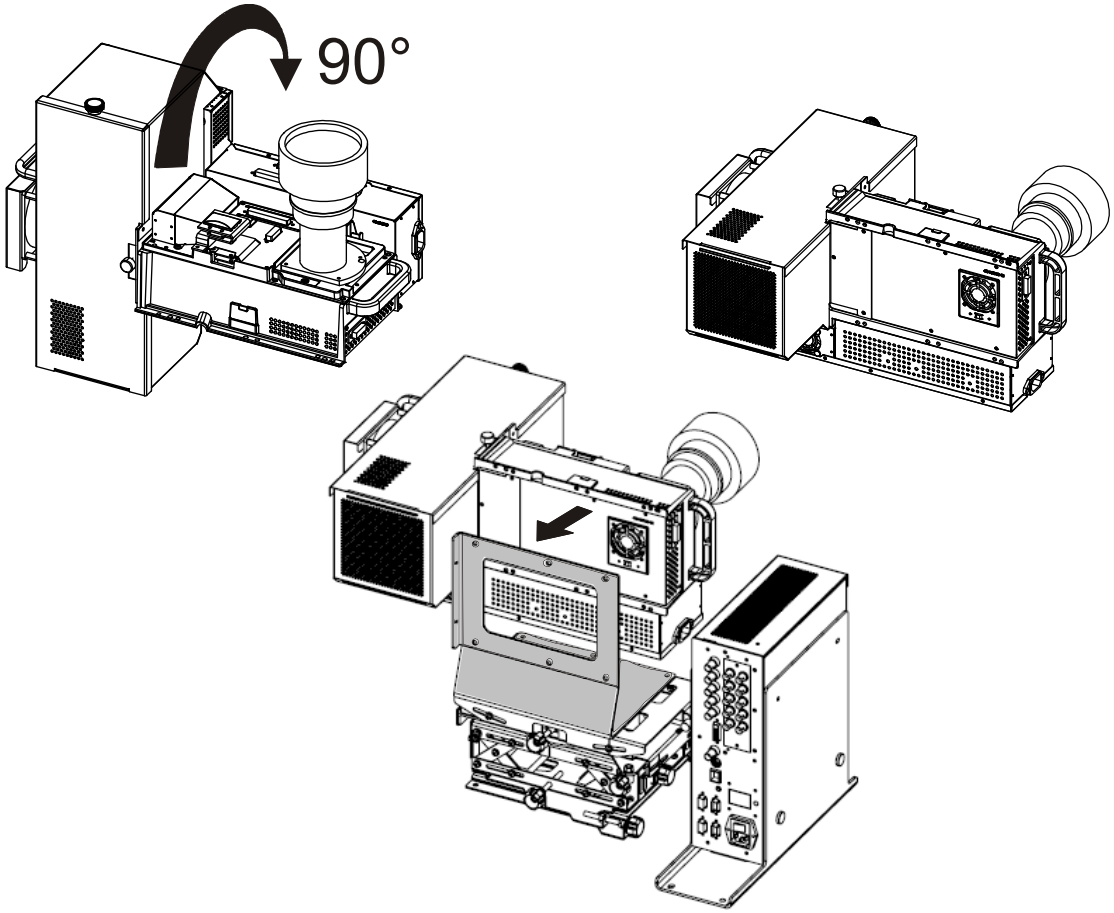


FIGURE 2-5 RE-POSITION LIGHT ENGINE

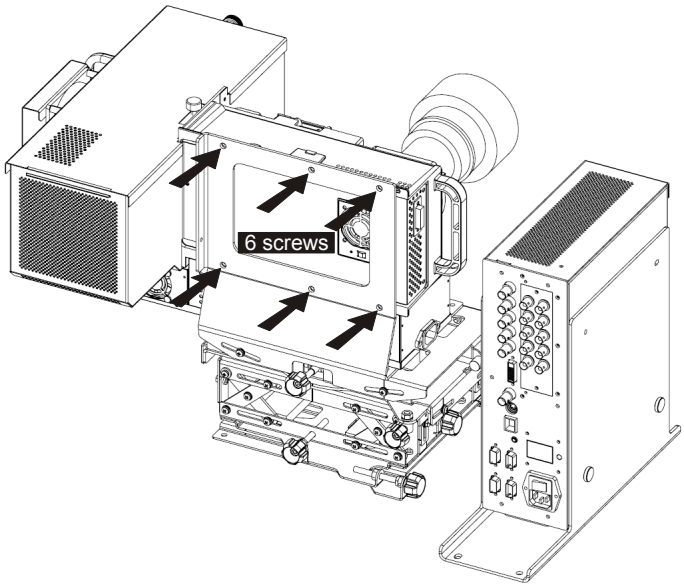


FIGURE 2-6 SECURE LIGHT ENGINE TO CONFIGURATION

8. Reconnect all cables disconnected previously in step 2. Refer to *Figure 2-1 Internal Cable Connections*.

Step 3 Calculating throw distance, position and mount projector

Throw Distance

For lens-horizontal configurations, throw distance is measured from the center of the auxiliary mounting holes in the tray to the screen. Use the appropriate formula for your projector model when calculating.

In both vertical and horizontal configurations:

TD = Throw Distance

W = screen width in millimeters

RPMX-D132U	For XGA (0.69:1 lens). TD = 0.69 x W +54 mm
RPMSP-D132U	For SXGA+ (0.69:1 lens). TD = 0.69 x w +54 mm For SXGA+ (1.20:1 lens). TD = 1.2 x W + 29 mm
RPMSP-D180U	For SXGA+ (0.69:1 lens). TD = 0.69 x W + 33 mm For SXGA+ (1.20:1 lens). TD = 1.2 x W + 29 mm

See *Figure 2-7 Throw Distance Formula for Lens-Horizontal Configuration* for an illustration of the formula.

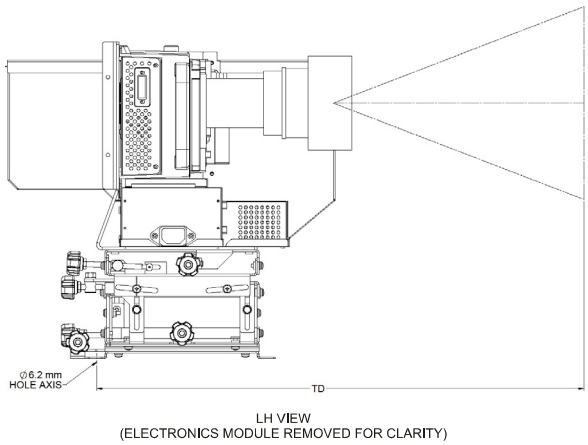


FIGURE 2-7 THROW DISTANCE FORMULA FOR LENS-HORIZONTAL CONFIGURATION

For lens-vertical configurations, where a first surface mirror is used to shorten the distance between the projector and screen by folding the optical path, throw distance is a little more difficult to calculate, as there are many variables to consider.

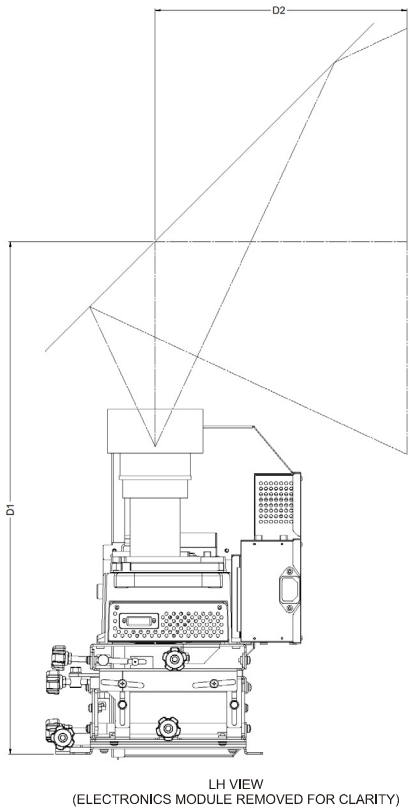


FIGURE 2-8 THROW DISTANCE FORMULA FOR LENS-VERTICAL CONFIGURATION

RPMX-D132U	For XGA (0.69:1 lens). TD = 0.69 x W + 336 mm
RPMSP-D132U	For SXGA+ (0.69:1 lens). TD = 0.69 x W + 336 mm For SXGA+ (1.20:1 lens). TD = 1.2 x W + 311 mm
RPMSP-D180U	For SXGA+ (0.69:1 lens). TD = 0.69 x W + 336 mm For SXGA+ (1.20:1 lens). TD = 1.2 x W + 311 mm

Lifting and transporting the projector

Use the handles on either side of the light engine to lift the projector. Use a stable cart to transport the projector.

Mounting

Refer to the drawings provided for your specific projector model in *Appendix Section B Dimensions & Mounting Information* for mounting hole locations and other technical information.

⚠ WARNING Mount the projector to a sturdy, flat surface that fits the entire projector.

Use all four mounting points to secure the projector to the surface. Refer to *Appendix Section B Dimensions & Mounting Information.*

Maintain an area of empty space around the projector, called a "stay out zone", to allow for air circulation and clearance for cable connections to the input panel. An insufficient stay out zone area can cause the projector to overheat during operation and/or place undue stress on source connections.

Step 4 Connecting sources

All source connections are made to the input panel of the Electronics Module. Each input is labeled for easy identification. Using the appropriate cables, connect your source. Refer to *Section 2.3 Connecting Sources* for more details on connecting a specific source.

NOTE: *An optional input module can be installed at Input 5 if additional connections are required. Refer to Appendix D Optional Input Modules.*

Step 5 Turning the projector on and selecting a source

⚠ WARNING A North American rated line cord is provided with this projector. For all other regions, make sure that you are using a line cord, power plug and socket that meet the applicable rating standards.

⚠ WARNING Do not use a damaged line cord.

Before powering on make sure the lamp changer lock screw is removed. Failure to remove this screw can cause damage to the projector and the lamp changer assembly.

1. Plug an approved line cord into the projector's AC receptacle, located on the electronics module. Plug the 3-pronged end of the line cord into a grounded AC outlet.

NOTE: *The outlet must be near the equipment and easily accessible. Use only the line cord provided with the projector or a power cord of appropriate rating that complies with regional standards.*

NOTE: *Do not use a line cord or AC supply not in the specified voltage and power range. See section Section 7 Specifications for projector power requirements.*

2. Press ⏻ for two seconds to turn the projector on. As the projector begins initialization, an active pattern of segments appears in the LED status display window. Commands will be ignored until "On" appears.

3. Press one of the input keys on the remote to select and display the image for the source connected in Step 4.

NOTE: *For more information on the keys available on the remote and their function, refer to Section Section 3 Operation.*

NOTE: *To protect the lamp, the projector enforces a 60 second wait period from the time the projector is powered down and back up again.*

Step 6 Adjusting the projection lens

FIGURE 2-9 XGA LENS ADJUSTMENT

1. Loosen the adjustment handle (turn thumb wheel) on the lens barrel.
2. When the image is focused, lock adjustments in place by tightening the adjustment handle until just tight.

⚠ CAUTION Lock lens adjustments to prevent unnecessary tampering.

Step 7 Adjusting image geometry using the 6-axis adjuster

The light engine is mounted to the 6-axis adjuster mechanism which can fine-tune the geometry of a displayed image by moving and rotating the light engine about the X, Y and Z axes.

For single projectors, adjust the 6-axis adjuster until the displayed image fills the screen and appears without geometric distortion.

For a multi-projector display wall, use the 6-axis adjuster to closely match the image across multiple screens. Start in the center of the bottom row and work out and up.

To adjust the 6-axis adjuster:

1. Center the image on screen, by adjusting vertical and/or horizontal position.
2. Zoom the image out (make smaller) until it fits within the borders of the screen.
3. Adjust keystone and tilt.
4. Zoom the image in (make larger) to fill the screen.
5. Repeat above until the image appears correctly.

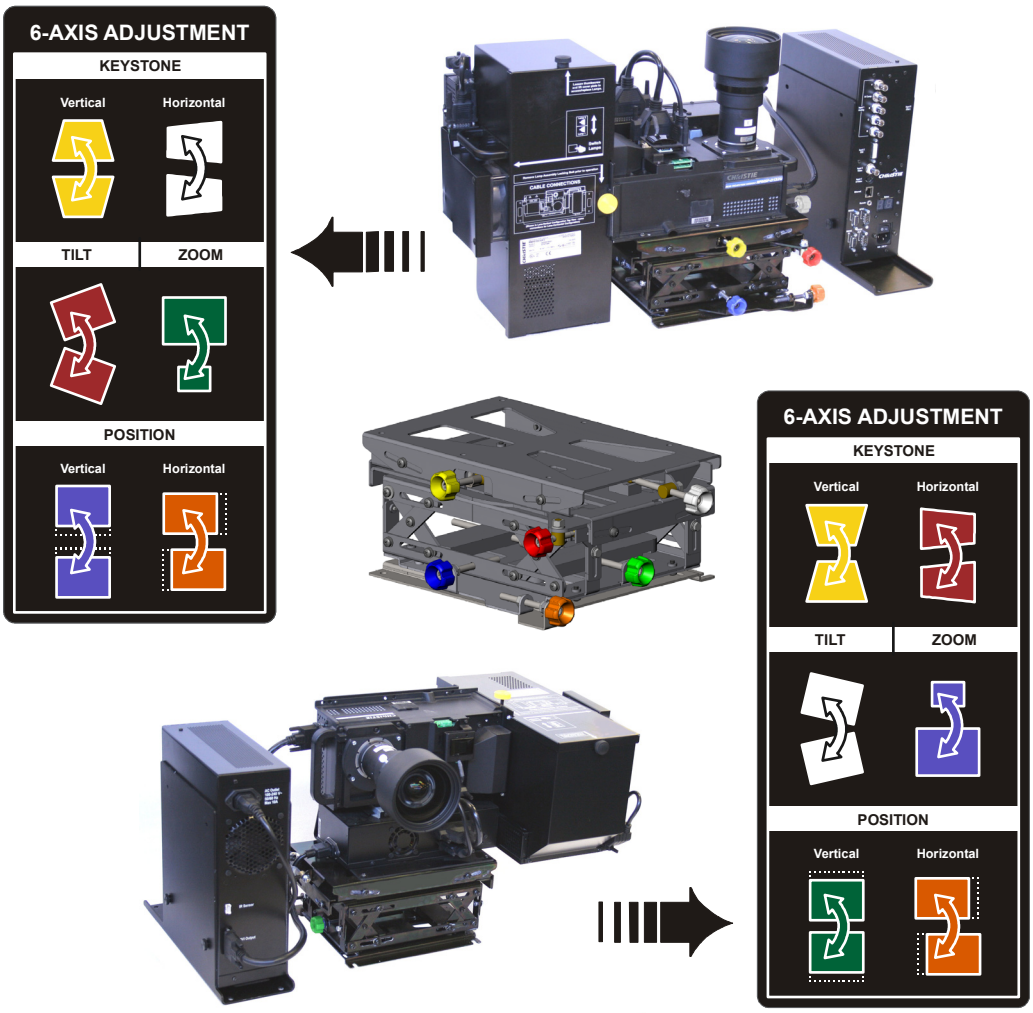


FIGURE 2-10 6-AXIS ADJUSTMENTS

Step 8 Adjust software to optimize image

NOTES: *1) Refer to Section 3 Operation for details on accessing and adjusting individual settings.*

2) Unless otherwise indicated, instructions apply to all projector models in stand-alone or multi-projector configurations.

1. Display an external signal.
2. Select a lamp operation mode. Perform all setups in the mode you select.
3. Select **Image Orientation** in the ***Configuration*** menu and change the orientation of the displayed image to suit the installation.
4. Assign projector ID number(s).
5. Modify options in ***Menu Preference*** to suit your display preferences. For example, select **Language** to change the menu language to any of the available languages.

6. Enable **Broadcast Key** in the ***Communications*** menu – this enables you to switch between communicating with one or all projectors when connected serially.
7. Select **Auto Setup** to allow the projector to choose the best possible settings for the selected input signal.
8. Change **Resize Presets** if you want the image displayed at any other resolution than native.
9. Adjust **Pixel Phase** and **Pixel Tracking** from the ***Size and Position*** menu to eliminate any noise from the displayed image.
10. Adjust **H-Position** and **V-Position** from the ***Size and Position*** menu to re-center the image on screen.
11. Adjust **Size** in ***Size and Position*** until the image is at the desired width then adjust **Vertical Stretch**. Adjusting one option may have an affect on the other, repeat adjustment if necessary. Adjust **H-Position** and **V-Position** again if required to center the image.
12. Adjust **Color Wheel Delay** if necessary. See *Section 4.9.6 Color Wheel Calibration — Submenu*.
13. Perform **Color Temperature** setup.
14. Adjust **Black levels** and **Input Levels**.
15. Adjust **Lamp Power** to match lamp brightness of adjacent projectors, if necessary.
16. Adjust color primaries, brightness uniformity and edge blending using the detailed procedure provided in *Section Section 3 Operation– Matching Colors in Multiple Projectors*.

2.3 Connecting Sources

Sources connect to the Input Panel located at the back of Electronics Module.

INPUT 1 typically accepts an RGB signal from an external analog RGB source, or it can be used for YPbPr signals or additional video sources. **INPUT 2** accepts digital or analog display signals from a computer. Connect analog composite video at **INPUT 3** or S-video at **INPUT 4** from devices such as VCRs, laser disk players or DVD players.

Christie offers optional input modules that can be installed into the projector at **INPUT 5** to connect other sources. Refer to *Appendix Section D Optional Input Modules*.

NOTES:

1) See Section Section 7 Specifications for details regarding compatible inputs.

2) Use only high quality shielded cables for all connections.

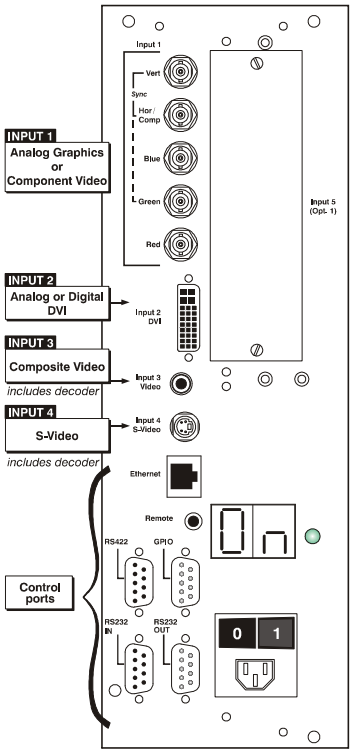


FIGURE 2-11 INPUT PANEL

RGB signals (5 BNCs)

INPUT 1 has 5 BNCs for connecting a variety of sources. A typical connection would be to an RGB source such as a PC, Mac, Sun, SGI and others. This projector supports multiple sync types: sync-on-green, composite sync, and separate H & V syncs.

Connect the **SYNC** BNC input(s). H & V syncs may be connected in any order, the projector will auto detect them. Then connect the red, green and blue source outputs to the **RED**, **GREEN**, and **BLUE** BNCs. If the source uses sync-on-green, only the red, green, and blue connections are required. If the source provides a composite sync output, connect it to the **SYNC** input labeled **HOR/COMP**. If the source provides separate horizontal and vertical sync outputs, connect horizontal sync to the **SYNC** input labeled **HOR/COMP** and connect vertical sync to **SYNC** input labeled **VERT.** See *Figure 2-12*.

NOTES: *1)Depending on the source, you may need a custom adapter cable with BNC connectors at the projector end and a different type of connector at the other (such as a 15-pin "D" connector for some computer sources). Contact your dealer for details.*

2) If the projector fails to recognize a signal as an RGB signal, specify the Color Space option within the Image Settings menu. See 3.5 Adjusting the Image.

3) To connect YPbPr signals–such as from DVDs or analog HDTV sources–to INPUT 1, use the red, green and blue BNCs as described in YPbPr Signals (below).

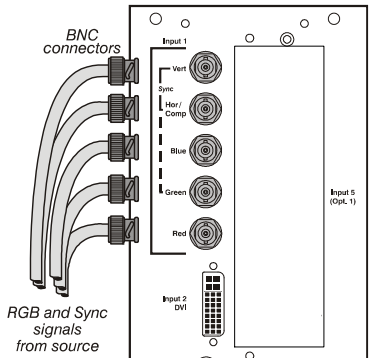


FIGURE 2-12 CONNECTING RGB

YPbPr signals

Connect a YPbPr signal (*component video*) to **INPUT 1** or **INPUT 2** as shown in figure 2.14.

NOTES: *1) If the projector fails to recognize a YPbPr signal, specify the Color Space option within the Image Settings menu. See 3.5 Adjusting the Image.*

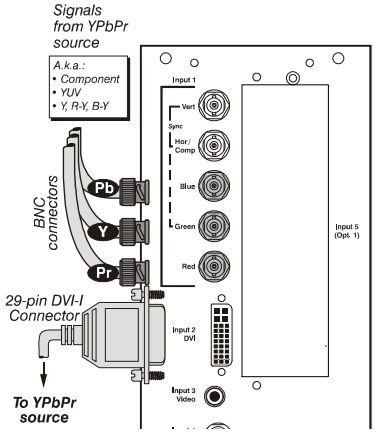


FIGURE 2-13 CONNECTING YPBPR

DVI Digital Video

Use the DVI-I connector at **INPUT 2** to connect either analog or digital video devices to the projector. Use a cable with DVI-I connectors at both ends to connect devices that transmit digital and analog video signals such as high-quality DVD players, satellite receiver and digital cable TVs.

NOTES: *1) To make sure of true digital output from devices that transmit digital signals, connect to the DVI-I connector.*

2) DVI loop through is not available unless you have the optional DVI Input Module installed at Input 5.

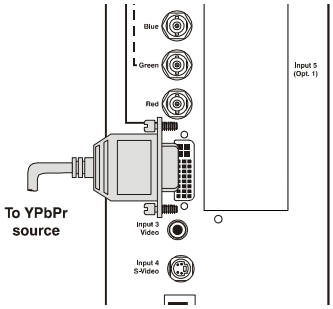


FIGURE 2-14 CONNECTING ANALOG OR DIGITAL VIDEO DEVICES

Composite and S-Video

INPUT 3 and **INPUT 4** provide simultaneous connection of both a composite video source (**INPUT 3**) and an S-Video source (**INPUT 4**).

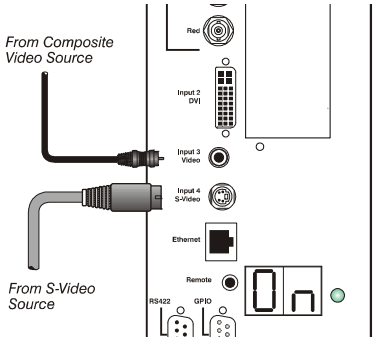


FIGURE 2-15 CONNECTING COMPOSITE / S-VIDEO

Extra Video

To use an extra video source in addition to the video source(s) connected at input 3 or input 4, connect either a Composite or S-video source to input 1 as shown.

NOTES: *1) Do not simultaneously connect composite and s-video to input 1.*

2) You can switch between video sources connected at input 1 and input 3 or input 4.

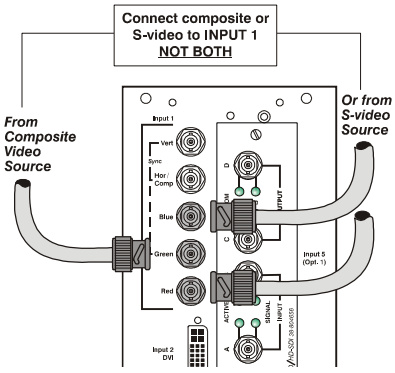


FIGURE 2-16 CONNECTING EXTRA VIDEO

Optional Inputs

Optional input modules allow you to increase your total number of inputs to accommodate different signal types, whether analog or digital. Install in the area labeled **INPUT 5.** Options include:

- RGB 500 Input Module
- RGB 400 Active Loop Thru Input Module
- RGB 400 Buffered Amplifier Input Module
- PC250 Analog Input Module
- Serial Digital Input Module
- DVI Input Module
- Dual SD/HD-SDI Module

NOTE: *See Appendix D Optional Input Modules for a brief description of each interface.*

2.4 Connecting Communications

As an alternative to the projector's keypad or remote, communicate with the projector using a PC or other controller. Commands and feedback are sent via serial links (RS-232 and RS-422) and Ethernet or GPIO communications to the projector.

2.4.1 Remote Keypad

Direct the projector's IR remote keypad towards the display screen or the projector's IR sensor. Alternatively, connect a wired (tethered) version of the remote to the RCA jack labeled **REMOTE** on the projector's input panel. Response to a wired keypad must be enabled in the *Communications* menu—see *3.6, Adjusting System Parameters and Advanced Controls* for more information.

2.4.2 Serial Port Connections

RS-232 and RS-422 are the serial ports available on the projector. Connect a device with a serial interface, such as a computer to either of these connectors (not both) and control the projector remotely by entering specific serial communication commands.

Connecting RS-232

The two 9-pin connectors labeled RS-232 IN and RS-232 OUT on the input panel are dedicated to serial communication. Using the appropriate serial communication cables connect the controlling source, such as a personal computer to the RS-232 IN connector. Set the baud rate to match that of the computer. Refer to *Section 3 Operation* for details on changing the projector's baud rate.

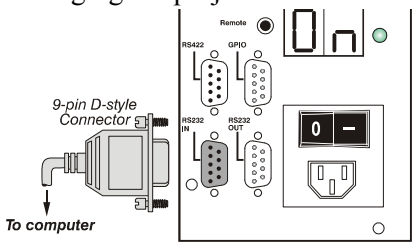


FIGURE 2-17 CONNECTING RS-232

Connecting RS-422

To control the projector with a computer or other devices with RS-422 capability, connect an RS-422 serial communication cable between the computer and the RS-422 port on the projector. RS-422 is better suited for serial communication over long distances than RS-232 communication.

Use the RS-422 port only if your device has RS-422 capability. Consult the literature provided with your equipment before connecting. Connecting to the RS-422 port with incompatible equipment could damage your projector.

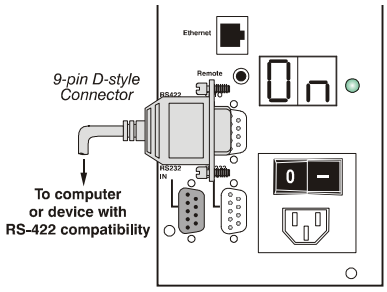


FIGURE 2-18 CONNECTING RS-422

2.4.3 Ethernet Communications

To add the projector to an existing Ethernet network, connect standard CAT5 Ethernet cable between your Ethernet hardware and the Ethernet port on the side of the projector.

The project factory default is DHCP enabled, an IP address will be ob ta i ed automatically. If there is no DHCP server available on the network or if a static IP address for the projector is required, set the address in the *Ethernet Settings* menu or via serial command.

Regardless of how it is assigned, once a projector has a valid and unique address it will respond to commands sent to this address. To determine the projector's current IP address, consult the *Status* or *Communications* menus.

Refer to *Section 3* for further information about setting up and using a projector connected via Ethernet.

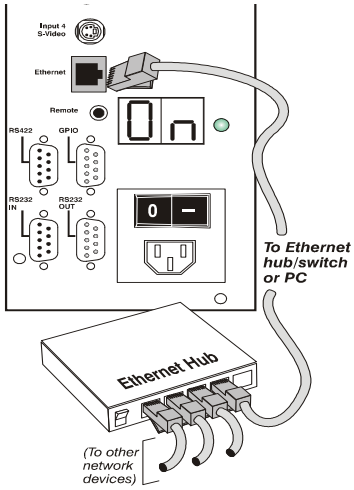


FIGURE 2-19 ETHERNET COMMUNICATION

2.4.4 Connecting Multiple Projectors

RS-232 Network

To connect multiple projectors in a network with serial communication, connect the controlling source to the RS-232 IN connector of the first projector in the network. Then take another serial communication cable and connect one end to the RS-232 OUT connector and the other end to the RS-232 IN connector of the next projector. Continue this pattern of connection with all projectors in the network. The last projector in the network will only have a connection to the RS-232 IN connector. See *Figure 2-20 Communicating through RS-232*.

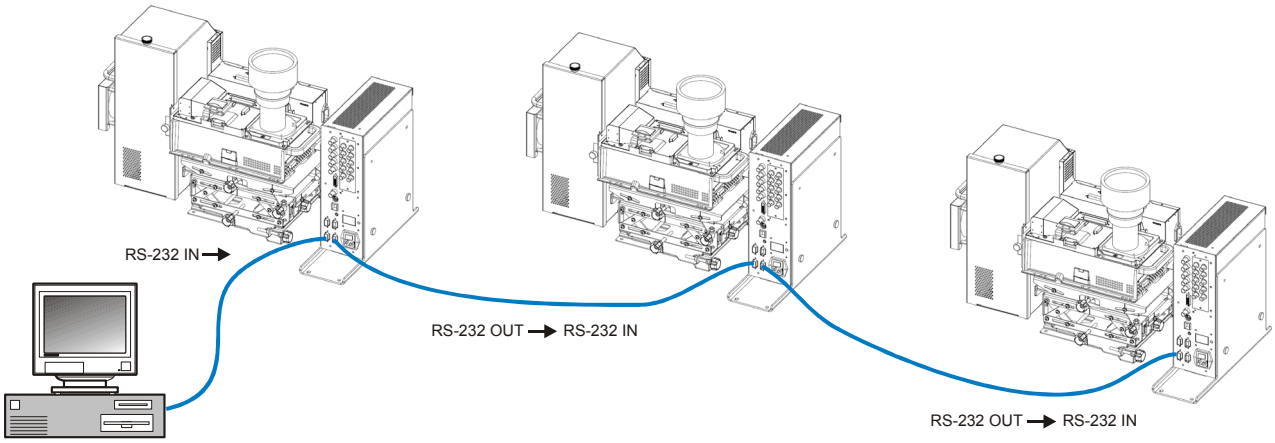


FIGURE 2-20 COMMUNICATING THROUGH RS-232

Mixed Network

To control multiple projectors with a computer/controller having an RS-422 interface, first set them all to the same baud rate as your RS-422 controller.

NOTE: *You must enable this combination of RS-422 and RS-232 in the Communications menu. Set the "Network Routing" option to "RS-232 and RS-422 Joined". See Section 3 for details.*

Then chain the projectors together by connecting an **RS-232** port of the first projector (already connected to the computer/controller through the **RS-422** port) to an **RS-232** port on the next projector in the chain. Continue connecting projectors in this manner until you've reached the last projector in the chain, so that only the last projector has one unused **RS-232** port. See *Figure 2-21 Communicating through a Mixed Network*.

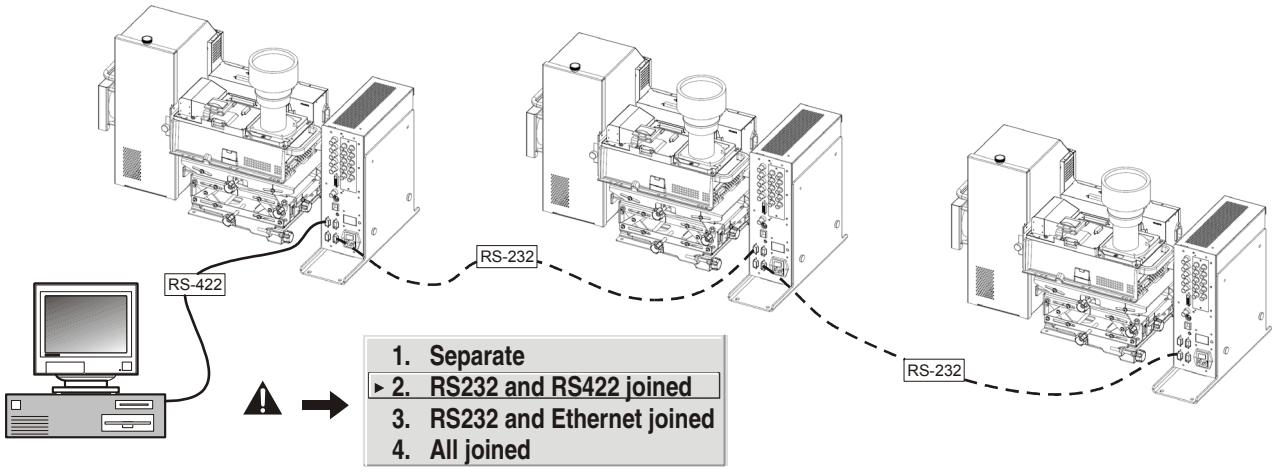


FIGURE 2-21 COMMUNICATING THROUGH A MIXED NETWORK

Communication parameters such as baud rate must be set to match the particular controlling device ***before*** connecting as a network—refer to the documentation that came with your controlling device in order to determine the proper baud rate. See ***3.6, Adjusting System Parameters and Advanced Controls*** if you need help changing the projector baud rate. Set the Network Routing to "RS-232 and RS-422 Joined" to reach all projectors.

NOTES: *1) To avoid damage, connect only properly wired serial communication cables. See Appendix C for details.*

2) Each RS-232 communication cable must be no more than 25 feet in length. Use high quality cables.

2.4.5 Ethernet Network Setup

To add one or more projectors to an Ethernet network, use standard CAT5 cable to connect each projector's Ethernet port to a hub belonging to the network. A controller or PC must also be connected to the hub. See *Figure 2-22 Ethernet Network*.

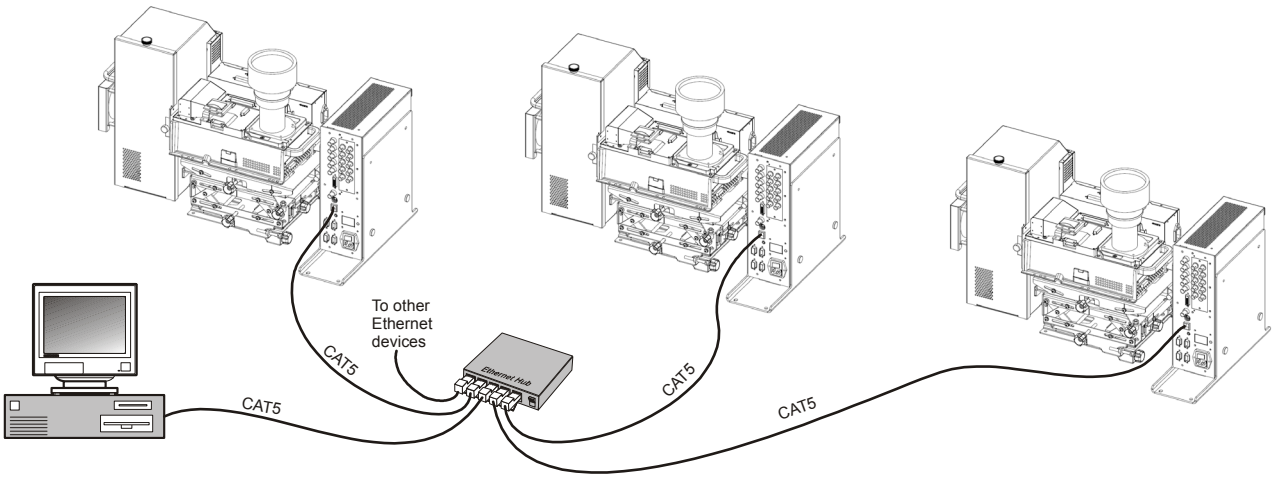


FIGURE 2-22 ETHERNET NETWORK

Setting the Projectors's IP Address

Factory default is DHCP enabled. The projector's IP address and port appear in the *Status* menu as well as the *Ethernet Settings* submenu.

A static IP address must be defined in projector memory—enter the new address in the *Ethernet Settings* submenu, or send to the projector via a serial command. The IP address will be in effect until it is changed again, or until the DHCP checkbox is re-enabled for use with a DHCP server on the network.

Changing the Port Number

On some Ethernet networks, you may be required to change the firewall restrictions from the default value (3002). If so, enter a new port number in the *Ethernet Settings* menu or include the new port# in an XIP serial command sent to the projector. It is highly recommended not to use a port# below 1024, as these ports are typically reserved for and used by common network applications.

Subnet Mask and Default Gateway

The Subnet Mask and Default Gateway are automatically assigned when DHCP is enabled. If a static IP is used, these must be assigned. The Default Gateway is an optional router device used to send and receive data outside the subnet. The address is provided by the system administrator.

ArtNet INTERFACE SETTINGS: Refer to *ArtNet Interface Settings — SUBMENU, on page 4-5* for additional information about ArtNet settings.

2.4.6 Separating Networks

By default, communications originating from one type of serial controller—RS-232 vs. RS-422 vs. Ethernet—stay on the corresponding network path. A "Separate" setting indicates this separation for "Network Routing" in the *Communications* menu. If you are using an RS-422 controller, for example, it will communicate only with the projector to which it is connected unless you change this setting to either "RS-232 and RS-422 Joined" or "All Joined".

2.4.7 Communicating to All Ports

To relay all messages to all ports—RS-232, RS-422, and Ethernet—set the "Network Routing" option in the *Communications* menu for each projector to "All Joined". This configuration is useful if you are using a non-RS-232 controller with the RS-232 linking available between these projectors. For example, you may want to use both an RS-422-compatible controller and an Ethernet-connected PC for working with a network of projectors linked via their RS-232 in/out ports.

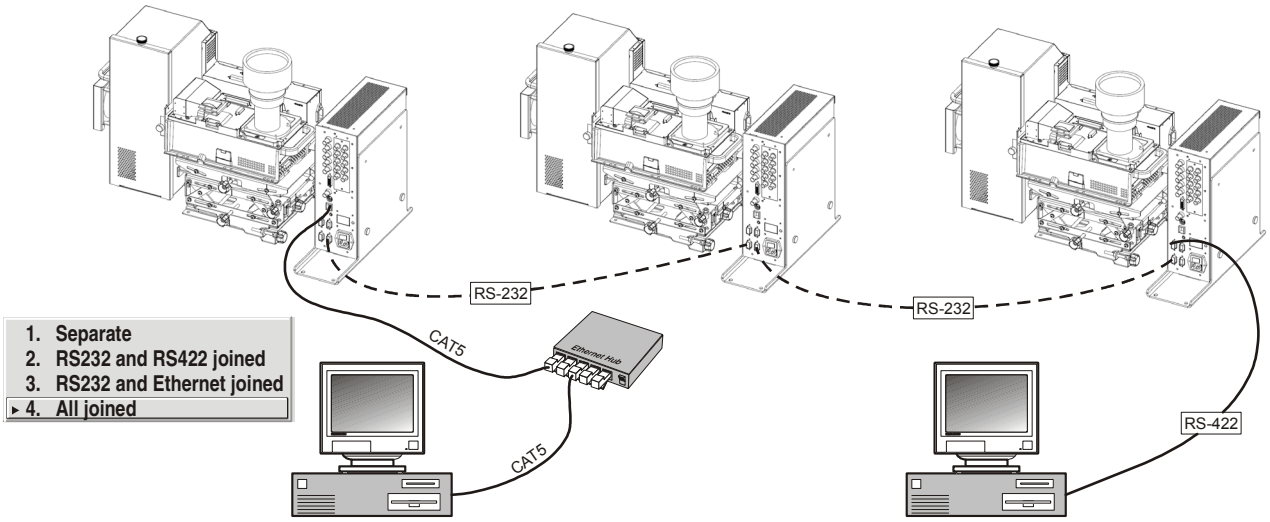


FIGURE 2-23 ALL JOINED

To isolate just RS-422 communications, select “RS-232 and Ethernet Joined”. In *Figure 2-23 All Joined*, only projector #3 will respond to the RS-422 controller. To isolate just Ethernet communications, select “RS-232 and RS-422 Joined”—only projector #1 will respond via Ethernet.

2.4.8 System Integration GPIO Connector

The GPIO connector on the input panel can be used to provide a method of interfacing a wide range of external I/O devices to the projector. Refer to *C System Integration* for complete details on pin configuration and how to program the various pins on the connector.

2.5 Power Connection

⚠ WARNING Do not attempt operation if the AC supply and cord are not within the specified voltage and power range.

A North American rated line cord is provided with this projector. For all other regions, make sure that you are using a line cord, power plug and socket that meet the appropriate rating standards.

⚠ WARNING Do not use a line cord that is damaged.

2.5.1 Connecting the projector to AC

Plug an appropriately rated line cord to the AC receptacle located on the electronics module and the 3-pronged end into a grounded AC outlet.

NOTE: *The outlet must be near the equipment and easily accessible. Use only the line cord provided with the projector or a power cord of appropriate rating that complies with regional standards.*

The input voltage to the projector must be 100-240 VAC.

2.5.2 Disconnecting the projector from AC

Power down the projector and wait for the internal cooling fans to stop before turning the main power switch on the electronics module OFF. This allows the lamps enough time to cool. Unplug the line cord from the wall outlet.

Refer to *Section 7 Specifications* for complete details on all power requirements for the projector.

⚠ WARNING Wait for the cooling fans to stop before turning the main power switch OFF and unplugging the projector.

3 Operation

This section explains how to operate the projector after it is installed. Read this section and familiarize yourself with the components and menu options before using your projector.

3.1 About the Projector

A brief description of each module is provided in this section. Knowing your projector will help you if troubleshooting is necessary.

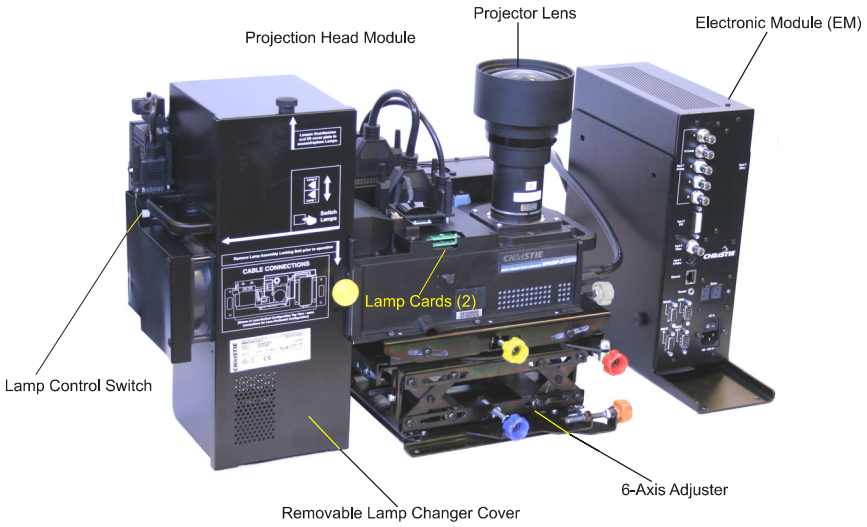


FIGURE 3-1 IDENTIFYING PROJECTOR COMPONENTS

3.1.1 Projection Head Module

The projection head module (PHM) contains the projection lens, IR sensor, color wheel, DMD, lamps and other optical components.

The PHM is mounted to the 6-axis adjustment mechanism in a lens-vertical (90 degree) configuration at the factory. It can be removed and positioned in a lens-horizontal (0 degree) configuration with the configuration bracket that comes standard with the projector.

3.1.2 6-Axis Adjuster

The 6-axis adjuster enables accurate positioning of the projector relative to the screen. This allows correct image geometry and the ability to accurately match the corners and edges of multiple displays to create one seamless image.

3.1.3 Lamps and Mechanical Lamp Changer

Integrated with the PHM is the lamp module, which holds two identical 132W or 180W (UHP) lamps. The built-in mechanical lamp changer automatically switches lamps in the event a lamp fails. The non-operating lamp can be replaced while the projector is powered on.

You can also request a lamp switch to occur by selecting the other lamp mode from the lamp menu (*Section 4.10.1*) or by pressing the illuminated LAMP CONTROL button near the lamp module. When this selection is made, the current operating lamp will turn off and the mechanical lamp changer will move to the selected lamp position before the projector attempts to ignite the lamp.

3.1.4 Electronics Module (EM)

The EM contains the video processing electronics and input connectors of the projector.

Input Panel

All source connections are made to the main input panel. Use:

- **INPUT1** to connect RGB and YPbPr sources
- **INPUT 2** for analog or digital display signals
- **INPUT 3** for composite video
- **INPUT 4** to connect S-video.
- **INPUT 5** to install one of the available optional input modules. Refer to *Appendix D Optional Input Modules* for a list of modules.

For more details on connecting sources, refer to *2.4 Connecting Sources*.

Status Display

Located just above the main power switch is a two-digit status display window that displays the current status of the projector. If the projector encounters an error during operation, an error code number will display. During normal operation “On” appears in the window.

Status LED

Located next to the 2-digit status display is a LED that conveys the current status of the system. Refer to Table 3.2 for a description of Status lights. Press Exit to acknowledge and clear errors.

Table 3.1 Table 3.2. Error LED Status

LED STATUS	DESCRIPTION
SOLID YELLOW	Projector powering down/powering up
SOLID GREEN	Projector powering on/cooling down
SOLID RED	System error – see corresponding error code on status display

★ FLASHING YELLOW	Lamp expired
★ FLASHING GREEN	Keypad command sent - Command received
★ FLASHING RED	Keypad error - Wrong protocol

Main Power Switch

The MAIN POWER SWITCH is located above the AC receptacle on the EM. Turn this switch OFF to cut all power to the projector before unplugging from an AC wall outlet.

IR Sensor

The projector has a front IR sensor that is optimally placed to receive transmissions from the IR remote from up to 100 feet away, regardless of the projector's configuration. For uninterrupted communications with the projector, it is important to keep the transmission path to this sensor unobstructed at all times, and to point the IR remote directly at the projector (or center of the screen in rear projection applications).

3.1.5 Cooling and Air Vents

Numerous air vents are located around the projector. To keep the projector at an optimum operating temperature, keep these vents unobstructed by maintaining the recommended empty space around the projector. This will make sure there is sufficient air flow and prevent overheating.

3.2 Using the Remote IR Keypad

The IR remote keypad uses a battery-powered infrared (IR) transmitter to control the projector. Use the IR remote keypad the same way you would use a remote TV or VCR remote. When making key presses, direct the keypad toward the screen or toward the front of the projector. The IR sensor on the projector will detect the signals and relay the commands for internal processing.

See Figure 3-2 Remote Keypad.

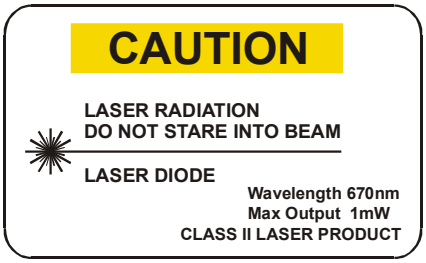
Converting to a Wired Remote

The IR remote can be converted into a wired remote keypad using a 3.5mm stereo cable (not supplied with the projector). Connect one end into the remote and the other to the mini stereo connector on the input panel labeled **REMOTE**.

The wired remote is recommended when the lighting conditions are unsuitable for proper IR transmission

NOTE: *Leave the batteries in the wired remote for the laser key ( ) to work.*

⚠ WARNING Laser radiation is emitted from the laser diode on the remote. Do not look directly into the beam of the remote.



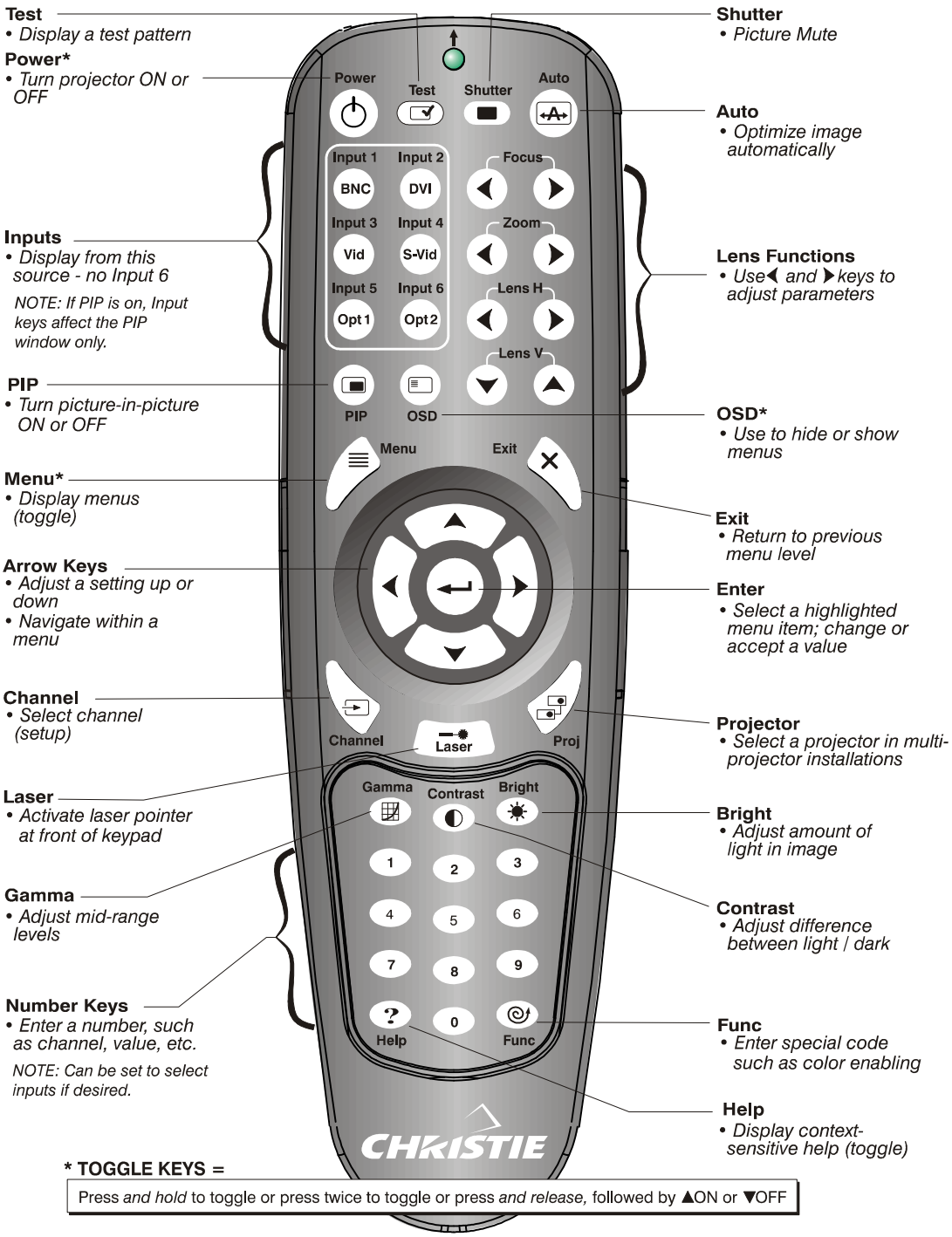


FIGURE 3-2 REMOTE KEYPAD

3.2.1 Keypad Commands

When using the keypad, keep these guidelines in mind:

- Press keys one-at-a-time; there are no simultaneous key combinations required.

- Power and OSD keys —are “press-and-hold” keys that do not function with a typical quick press-and-release key press.
- Hold arrow keys down for continuous adjustment/movement in one direction. In serial networks, pause briefly between adjustments to make sure that more distant projectors can keep up with the commands.
- If you press a key while the projector is still responding to the previous action, such as during power-up, the second key press may not take effect.

Specific keypad commands are:

Power ON/OFF

There are 3 options to power the projector ON or OFF:

- Press for two seconds to toggle the projector ON/OFF state.
- Press followed immediately by (ON) or (OFF) to switch the projector ON or OFF.
- Press to toggle the present ON/OFF state.

NOTES:

1) After powering down, the lamp cooling fan remains on for approximately 1-2 minutes to cool the lamp.

2) Keep the projector OFF for a few minutes. Hot re-strikes of the lamp may reduce lamp life.

3) The projector enforces a 60 second wait between powering OFF and ON to allow the lamp to cool down. You will see vertical scrolling bars across the status display during this wait period.

Test

Steps through the internal test patterns and the current input.

Press and then the and arrow keys to cycle in either direction through the test patterns.

Auto

Initiates an automated process that optimizes critical display parameters for the current source, see *Table 3.2 What an Auto Setup Does*. An *Auto Setup* can save time in perfecting a display and modifying the adjustments.

Table 3.2 What an Auto Setup Does

OPTIMIZES	SETS TO DEFAULT
Pixel Tracking	Contrast
Pixel Phase	Brightness
Size and Blanking	Auto Input Level (off)
Vertical Stretch	Detail (if video source)
Position	Filter
Input Levels	Luma Delay

NOTE: *You must have an unlocked channel present to use Auto Setup.*

Channel (Channel)

Select a source setup (*channel*) defined and stored in projector memory. Enter a 2-digit channel number, the display will automatically update according to the setup parameters defined for that channel. A new channel is automatically created if you adjust an image from a new source.

NOTE: *To display a list of available channels for selection make sure the Display Channel List option is enabled in the Menu Preferences menu. See Menu Preferences later in this section.*

Input 1 (Input 1)

Displays the data or video input source connected to BNCs labeled **INPUT 1**.

Input 2 (Input 2)

Displays the DVI source connected to **INPUT 2**.

Input 3 (Input 3)

Displays the composite video source connected to **INPUT 3**.

Input 4 (Input 4)

Displays the S-video source connected to **INPUT 4**.

Input 5 (Input 5)

Displays the source connected to the **INPUT 5** interface module installed in the Option 1 slot.

NOTE: *With the optional Dual SD/HD-SDI Module installed at input 5 you can connect two inputs – A and B. Whether you are displaying from input 5 or from another input, press (Input 5) to display the input last used. Press (Input 5) again to switch to the other input.*

Input 6 (Input 6)

Not applicable.

Contrast (Contrast)

Changes the amount of white in your images. Use (◀) (▶) keys until you reach the required level of contrast—for best results, start low and increase so that whites remain bright but are not distorted or tinted, and that light areas do not become white (“crushed”). Conversely, low contrast causes dim images. See *3.5 Adjusting the Image (Image Settings* subsection).

Brightness (Bight)

Increases or decreases the amount of black in the image. Use ◄ ► keys until you reach the required level of contrast. For best results, start high and decrease so that dark areas do not become black ("crushed"). Conversely, overly high brightness changes black to dark gray, causing washed-out images. See *3.5 Adjusting the Image*.

Gamma (Gamma)

"Gamma" determines how gray shades are displayed between minimum input (black) and maximum input (white) for a given amount of signal. The proper setting (normal gamma setting is 2.22) helps maintain optimized blacks and whites while ensuring a smooth transition for the "in-between" values utilized in grays. The overall tone of an image can be lightened or darkened without changing the two extremes, and your images will be more vibrant yet with good detail in dark areas.

If excess ambient light washes out the image and it becomes difficult to see details in dark areas, lower the gamma setting to compensate.

Menu (Menu)

Press to enter or exit the projector's menu system.

OSD (On-screen display) (OSD)

Press (OSD) followed by ▼ to hide the projector's menu system during use. Invisible menus are fully functional, enabling "hidden" access to numbered features and image adjustments by entering the corresponding sequence of key presses on the keypad.

To see the menus again, do one of the following:

- Press *and hold* (OSD) for a second
- Press and release (OSD) followed immediately by ▲
- Press (OSD) (OSD)

NOTE: *To hide error messages and sidebars with OSD ON, disable these options in the Menu Preferences menu.*

PIP (Picture in Picture) (PIP)

Press to enable and disable Picture-in-Picture. PIP lets you display two different images simultaneously – typically a smaller "secondary" image within a large "primary" background. When a menu control or slidebar is present, press (PIP) to toggle the current function to affect the other image.

NOTE: *Disable PIP and Best Switching for Interlaced sources > 35 kHz.*

Function Key (Func)

WITHIN A MENU: Using the (Func) for special tasks within the menu system is noted with the appropriate topic elsewhere in *Section 3*. For example, press (Func) in the *Channel Setup* menu to enable deletion or copying of a channel.

WITHIN A PRESENTATION: Press (Func) followed by a 2-digit number to enable a specific color or colors in the display (see right). For example, (Func)(6)(4) will display only red and green data, (Func)(6)(7) will display all color data. Eliminating one or more colors can help with some diagnostics and setups, such as when accurately overlaying one image on top of another from stacked projectors.

(Func)(6)(1) = Red
(Func)(6)(2) = Green
(Func)(6)(3) = Blue
(Func)(6)(4) = Red & Green
(Func)(6)(5) = Green & Blue
(Func)(6)(6) = Red & Blue
(Func)(6)(7) = All Colors

NOTE: *Color enabling can also be implemented from numerous locations within the menu system.*

Shutter (Shutter)

Picture mute toggle. Picture mute replaces video with a black screen

Projector (Proj)

Used to access a specific projector within a group of projectors or to confirm if the local projector is listening. The number in the "Enter Number" window indicates which projector is currently listening to commands, and will match the projector number that is defined in the *Menu Preferences* menu.

A checkmark indicates that the projector is connected to a keypad and is listening to commands from that keypad. If there is no checkmark, you are communicating with a different projector.

To control a specific projector with the keypad, enter the projector's 3-digit number. If you switch to another projector, the checkmark will disappear.

When broadcasting to multiple projectors, press the button twice ***without*** entering a projector number. Keypad commands will then affect all projectors present. There is no method of controlling a *group* of projectors within the same wired configuration using the wired keypad exclusively

NOTE: *The "Broadcast Keys" option in the Communications menu must be selected for only one (any) projector in a serial network. The keypad in use must be OFF (disabled) for the remaining projectors. See also 3.6, Adjusting System Parameters and Advanced Controls.*

Enter (↵)

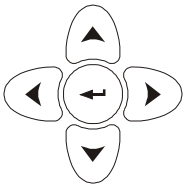
Press (↵) to select a highlighted item, to toggle a checkbox, or to accept a parameter adjustment and return to the previous menu or image.

Exit (Exit)

Press (Exit) to return to the previous level, such as the previous menu.

NOTE: (Exit) *does not save changes within text editing boxes (including number editing of a slidebar value) or within drop-down lists. It acts as a "cancel" in these cases.*

Arrow Keys



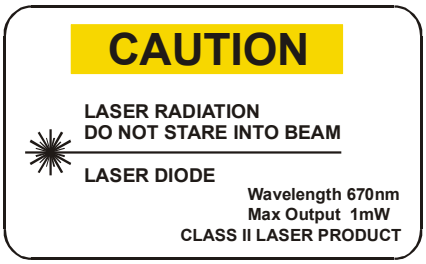
Use the ◄ ► keys to change a slidebar value or to select a different option within a drop-down list without having to first scroll through options. See also *Editing Text* later in *Section 3*.

Use the ▲ ▼ keys to navigate within a menu, drop-down list or text box.

Lens Focus, Zoom and Lens H, Lens V Focus, Zoom, Lens H, Lens V

NOTE: *Not applicable.*

Laser



Activates the laser pointer on the remote. Keep the key depressed and point the remote at the screen to highlight an area of the presentation. Release it to turn it off. The closer you are to the screen the brighter the laser beam appears. The laser pointer works best in an environment where ambient lighting can be controlled.

NOTE: *The batteries must be in the wired remote keypad for the* *key to work.*

3.3 Navigating the Menus

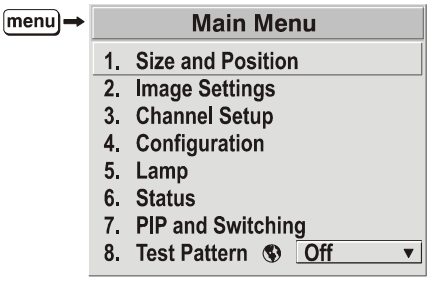


FIGURE 3-3 ENTERING THE MENU SYSTEM

Press Menu at any time to display the *Main* menu (see figure 3.3). Most of the projector controls are accessed from within the projector's menu system. There are several groups of related *functions*.

Press the number corresponding to the function menu, such as (2) for the *Image Settings* menu, or use the (▲)(▼) keys on any keypad to highlight the option, then press (↵). The corresponding function menu or drop-down list of further options will appear.

Longer menus have a scroll bar on the right. Use the arrow keys to scroll the menu. Locked or disabled items appear dimmed and cannot be selected.

NOTES:*1) If there is no signal present; all source-dependent adjustments are disabled.*

2) After 15 minutes of inactivity, the menu system closes.

- Press (Exit) to return to the previous screen
- Press (Menu) to leave the menu system and return to the presentation

On-line Help

Displays summary information about the current menu or highlighted option. Press (Help) again to exit.

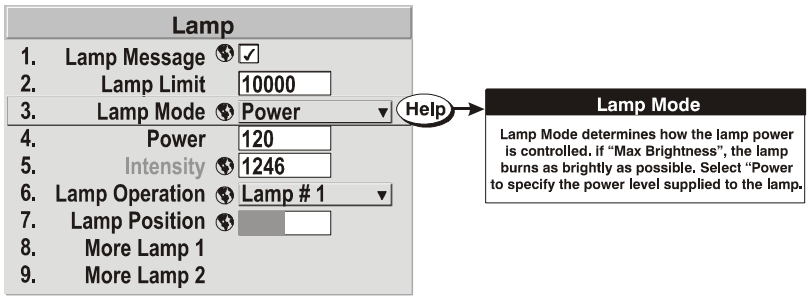


FIGURE 3-4 CONTEXT-SENSITIVE HELP

From presentation level, press (Help) to access general *Help Topics*. Press (Help) or (Exit) to return to your presentation.

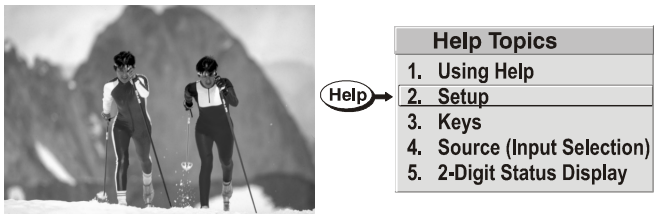


FIGURE 3-5 ACCESSING GENERAL HELP TOPICS

Time-outs

If a slidebar, menu or message is displayed you have limited time to make a keypad entry before the projector returns to presentation level and the graphic disappears. These time-outs may vary depending on what is displayed.

The Global Icon

Menu options with this icon apply universally to any incoming signal.

Using Slidebars and Other Controls

Most function menus allow you to change settings by using slidebars, checkboxes, and drop-down lists. To select a slidebar, toggle a checkbox status or view a drop-down list, do one of the following within the function menu:

- Enter the menu option number corresponding to the setting you wish to change (for example, press 1 3 to select Vertical Stretch in the *Size & Position* menu).
- Move the highlight to the option and press (Enter).
- Move the highlight to the option and press to adjust immediately.
- Bypass the menus entirely and use a single key to immediately access an adjustment during your presentation

  NOTE: *Applies only to options having their own key, such as Contrast, Brightness, Gamma, etc.*
- For "blind" access, hide the entire menu system (see OSD key, above) and/or direct slidebars activated by their own key (such as Contrast, Brightness, etc.). Control by using the proper key press or numerical sequence of key presses.

Once selected, change the setting and press to save and return to the current function menu.

FIGURE 3-6 EXAMPLE OF SLIDEBAR

Slidebars in menus – The current value for a given parameter appears to the left of its slidebar (adjustment window). This number expresses a percentage or units (such as pixels, degrees Kelvin), depending on the option. Press to adjust the setting up or down. Both the number and the length of the bar change accordingly. Hold for continuous adjustment or press to activate a slidebar text box for number entry via the keypad. Press to save or press Exit to cancel.

"Direct" slidebars - For quick access to Gamma, Brightness, and Contrast slidebars without traveling the menu system. For example, press Cont to immediately display the same contrast slidebar accessed with the Contrast option in the *Image Settings* menu.

NOTES: *1) A direct slidebar can still be adjusted if the display is turned off (see OSD or Menu Preferences menu) — the slidebar will not be visible.*

2) A direct slidebar disappears if it is not used within 5 seconds.

FIGURE 3-7 EXAMPLE OF CHECKBOX

Checkboxes - Conditions are enabled when the adjacent checkbox contains a checkmark. To toggle the checkbox, highlight and press , or highlight and use to check and to uncheck. If a checkbox is numbered, enter its number to immediately toggle the checkbox.

Drop-down lists –Parameters labeled with a ↴have a drop-down list. To see the drop-down list, highlight it and press (Enter) or enter the menu option number.

Use ▲ or ▼ keys to navigate up and down the list (the current choice is noted with a small ↴). Press ↵ to choose the highlighted option from the list.

Example of Drop-Down List

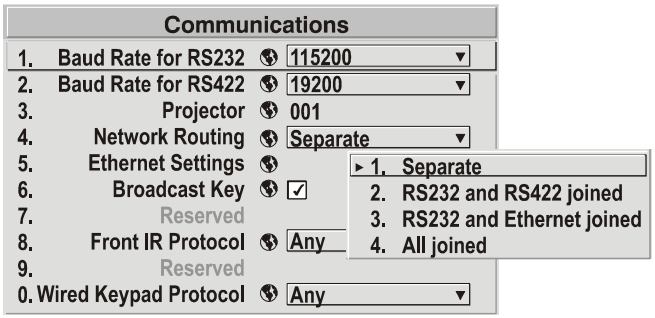


FIGURE 3-8 EXAMPLE OF DROP-DOWN LIST

To scroll through a list without first pulling it down, highlight the option and use ↵. Press ↵ when the choice appears.

NOTES: *1) Press ◄ or ► to jump between pages in an extra long drop-down list.*

2) Press Exit while in a drop-down list to cancel any change.

Editing Alphanumeric Text

To enter or edit text, highlight the parameter and press ↵ to activate its adjacent edit window. All text entered before is displayed with its first character highlighted in a square cursor, signifying that this character is ready for editing.

To navigate the edit window press ► to move the cursor forward or ◄ to move the cursor backwards.

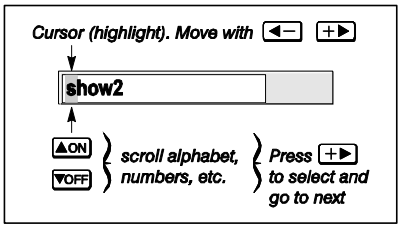


FIGURE 3-9 ENTERING AND EDITING TEXT

To edit a character press ▲ and ▼ to scroll through the alphabet, numbers, spaces and punctuation available. When the character you need appears, press ► to select it, The cursor will move to the next character of current text, if present. You can enter a number directly from the keypad—it will be accepted and the cursor will move on.

NOTE: *Channel numbers are defined with 2 digits—for example, if you enter a single digit (such as "7") for a channel number, the channel will automatically be defined as "07". Enter "07" to utilize this channel.*

To insert a space at the cursor location, press ►. To delete a highlighted character (or space), press ◄.

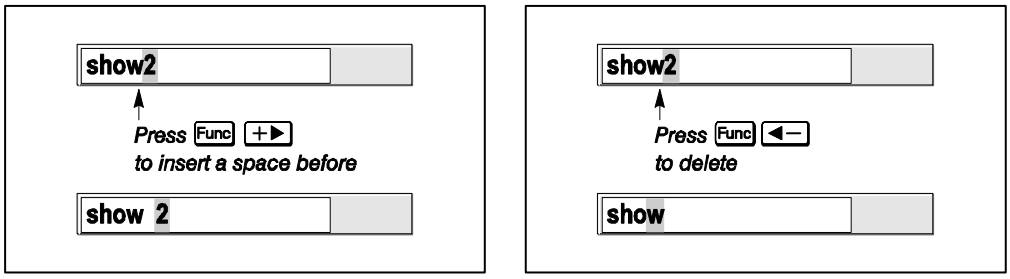


FIGURE 3-10 ADDING OR DELETING CHARACTERS

To accept edits and leave the edit window, press (Enter).

NOTES:

1) Press (Exit) at any time to cancel changes and return to the previously-defined text.

2) Once you enter the first digit, this digit replaces all old digits.

3) Pressing any non-numbered key will accept the number entered up to that point as the new value.

4) Press (Exit) to cancel editing of numerical values.

3.4 Using Inputs and Channels

NOTE: *See Section 2, Installation and Setup, for details on connecting sources to the projector.*

The projector stores and automatically recalls up to 50 different channels (source setups) for a variety of inputs. This memory feature allows you to define and use a wide variety of customized setups. Depending on what is defined, each physical source connection (i.e., input at the projector) can have several different channels associated with it.

3.4.1 Selecting an Input or Channel

INPUT – An input is a source physically connected at the projector. (Input) describes the source signal according to which *input slot* it is connected.

SWITCHING INPUTS – Press the appropriate "direct" key — (Input 1), (Input 2), (Input 3), (Input 4), (Input 5) to display from one of the five inputs connected. The image will be displayed according to the following:

If it is the first time you have used the source/input (or if you used the input but did not define a channel by adjusting anything), the projector will recognize the new input signal based on its frequencies and polarities. It will automatically display an image according to the signal default settings. In general, the image from the new source will be as large as possible without losing its aspect ratio. This and other default image settings depend on the incoming source.

If you used the source once before and changed a display parameter such as contrast, V-Position, etc., then a channel was automatically created and still exists in projector memory (see below). Using one of the (Input) keys will automatically recall this channel—and all its setup parameters—and update the display accordingly.

If more than one channel exists for the input, the image will be displayed according to the setup parameters for the first channel with matching characteristics.

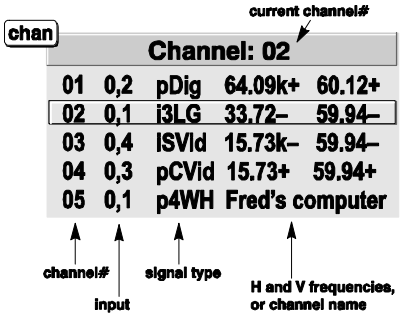


FIGURE 3-11 CHANNEL LIST

Channel

A channel is a collection of measurements, locations and settings that tailor the display of a signal to your specific needs. Since source types and applications vary, you must adjust and define parameters, such as brightness, contrast and size, to customize and optimize the display from or for a source. For example, the display settings for a VCR source may be different from a high resolution computer source, or one signal may vary from another signal used through the same input location. After adjusting a display parameter, such as pixel tracking or contrast, all current settings are stored in the projector memory as a unique 2-digit channel, such as (0)(9). Numerous distinct channels can be available for the same input. Use the (Channel) key on the keypad followed by the 2-digit channel number. to select a channel.

NOTE: *The (Channel) key may display a channel list or not, depending on what you have defined for "Display Channel List" (see Menu Preferences later in this section).*

To access channels by using on the keypad, you must first create the channels.

3.4.2 Creating a New Channel

Automatic

To use a new source with the projector, a new channel must be added to the projector memory for it to respond to an input signal from that source. A new channel can be created automatically or copied and then edited, see *3.4.4 Copying or Deleting Channels*.

When you select a direct input ((Input 1), (Input 2), (Input 3), (Input 4), (Input 5)), all currently-defined channels in the projector are searched for matching input and signal parameters (Auto Source must be enabled on these channels). If no match is found a new channel is temporarily created based on factory-defined defaults for this type of signal. The *channel number* assigned is the lowest available number from 01-50.

NOTES: *1) An automatic channel will be discarded unless one or more of its parameters are changed, and will not appear in the channel list.*

2) If two channels have the same distinguishing source characteristics except for the reversal of sync connectors (i.e., H-sync and V-sync, are switched), they are still defined as distinct channels.

3) You cannot define a new channel without an incoming signal.

If the incoming signal match an existing channel, the image will be set up and displayed as usual according to the parameters currently defined for that channel.

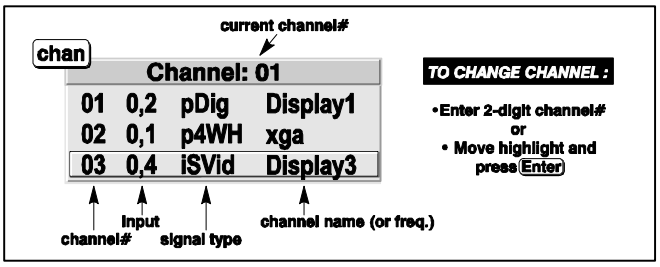


FIGURE 3-12 SELECTING A CHANNEL

3.4.3 Using a Channel

Select a channel at any time by pressing Channel (see right). To prevent a channel from appearing in this list, edit the channel as described in *Channel Edit* later in this section.

NOTE: *The current channel is highlighted upon entering the channel list, or, if this channel is not displayed here, the first channel in the list is highlighted.*

Defined Channels

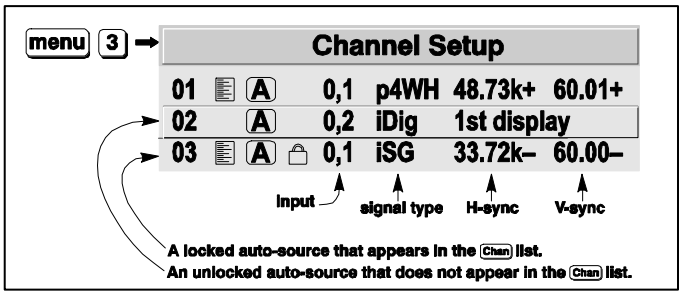


FIGURE 3-13 ALL CHANNELS APPEAR IN THE CHANNEL SETUP MENU

All available channels are listed in the *Channel Setup* menu, which describes how each channel can be accessed and which serves as the gateway for editing, copying and deleting channels.

From the presentation level press Menu to display the *Main* menu.

To display the *Channel Setup* menu, press 3, or move the highlight to the *Channel Setup* option and press ↵. The *Channel Setup* menu will appear (see sample below), with the active channel highlighted.

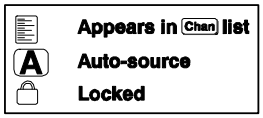


FIGURE 3-14 ICONS USED TO IDENTIFY CHANNELS

What Appears in Channel Setup Menu?

This menu lists all channels defined and indicates where they are connected on the input panel. The far left column lists channel numbers currently defined. The values in the far right columns indicate horizontal and vertical frequencies—if someone has defined a name for this channel, it appears here. Remaining columns contain details pertaining to each channel setup, such as its switcher number (0 = projector), slot location, a variety of icons indicating access to each channel, and an abbreviated description of each signal type. See *Editing a Channel Setup* for details.

NOTE: *Use* ◄ *and* ► *to see channels not visible in the initial display of channels.*

Signal Type

Both the Channel key list and the *Channel Setup* menu identify signal types in a shortened form as defined in table 3.2. These descriptors indicate what signal information the projector uses to identify a match for a given channel, and are preceded by either an "i" (interlaced signals) or "p" (progressive signal").

Table 3.3 Abbreviations for Signal Type

ABBREV	SIGNAL TYPE
4WH	Composite (4 wire) on HC input
4WV	Composite (4 wire) on V input
SG	Sync-on-green
5W	Separate H,V
5WR	Separate H,V swapped
SVid	S-Vid
CVid	Composite Video
Dig	Digital

3.4.4 Copying or Deleting Channels

Copying channels is a quick method for creating numerous channels, each of which can then be edited and adjusted for a variety of presentations in the future.

Copying a Channel

1. Highlight the channel in the *Channel Setup* menu.
2. Press Func to go to the *Channel Copy/Delete* submenu.
3. Select "Copy" and press ↵ . A new channel is created (identical to original which still exists) identified with the next available number from 01-50.

If you do *not* want to copy the current channel, press Exit to cancel and return to the previous menu.

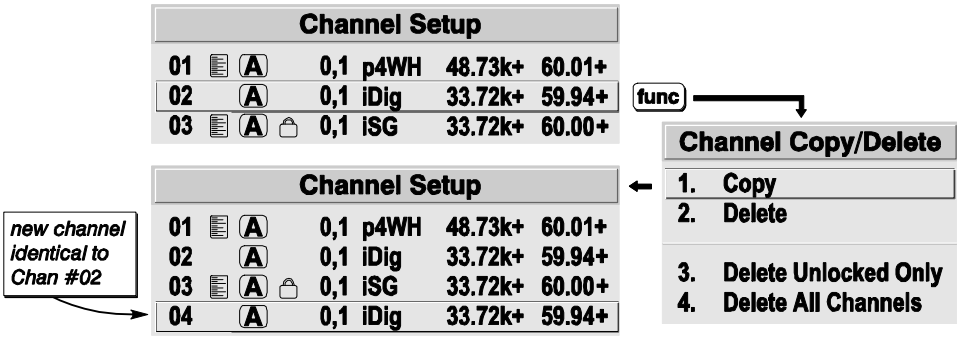


FIGURE 3-15 COPYING A CHANNEL

Deleting a Channel

1. Highlight the channel in the *Channel Setup* menu.
2. Press Func to activate the *Channel Copy/Delete* submenu.
3. Select "Delete" and press ↵. A confirmation window will appear to verify that you want to delete this channel.

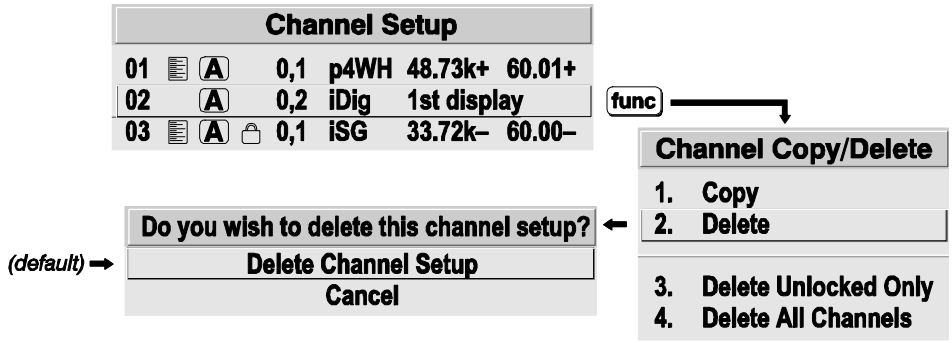


FIGURE 3-16 DELETING A CHANNEL

DELETING MULTIPLE CHANNELS

1. Highlight any channel in the *Channel Setup* menu.
2. Press Func to go to the *Channel Copy/Delete* submenu.
3. Select "Delete Unlocked Only".
4. Press ↵ to delete all unlocked channels. Or select "Delete All Channels" to delete all channels, even those that are locked. In either case, the current channel will remain but will be redefined from projector defaults. A confirmation window will appear to verify that you want to delete the channels.

Editing a Channel Setup

The *Channel Setup* menu lists the basic setups that describe how and where a channel can be accessed. These channel setups can be edited in the *Channel Edit* submenu.

1. From the presentation level, press Menu to display the main menu.
2. *P*ress 3, to display the *Channel Setup* menu or move the highlight to the *Channel Setup* option and press ↵. The *Channel Setup* menu will appear.
3. Select the relevant channel and press ↵ to edit parameters shown in the *Channel Setup* menu

The *Channel Edit* menu will appear similar to the sample shown in *Figure 3-17 Channel Edit Menu (SAMPLE)*.

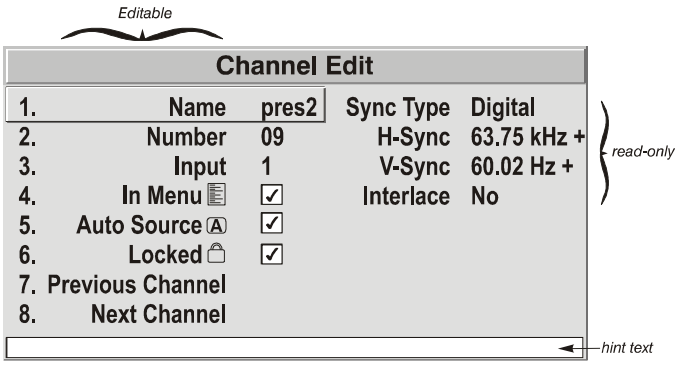


FIGURE 3-17 CHANNEL EDIT MENU (SAMPLE)

4. Review or edit the following channel setups in the *Channel Edit* menu:
   - **CHANNEL NAME:** An alpha-numeric label can be defined and/or changed here. Channel names can be up to 12 characters in length.
   - **CHANNEL NUMBER:** A 2-digit channel number can be changed here. If you enter an existing channel number, a dialog message appears indicating that this number is already in use–assign a different channel number. You can define up to 50 channels.
   - **INPUT:** 1-5, corresponding to where on the projector's input panel the source is connected.
   - **IN MENU:** If checked (default, except for automatically defined channels with unchanged parameters), this defined channel will then appear in the list available when Channel key is pressed. If unchecked, the channel must be accessed via Channel on the keypad or via the "Auto Source" function.

NOTE: *On-screen display of the channel list is an option that must be set in the Menu Preferences menu.*

   - **AUTO SOURCE:** If checked, (default), the projector can automatically locate this channel when an incoming input signal matches. If not checked, the projector can locate the selected channel only when it is directly selected via Channel on the keypad—and a change in input signal will *not* result in a channel change.
   - **LOCKED:** If checked, all image settings for this channel are disabled. If unchecked (default), all available image settings can be adjusted. Auto Setup cannot be used with a locked channel.
   - **PREVIOUS CHANNEL:** Select this option to see or change *Channel Edit* settings for the previous channel in the *Channel Setup* list.
   - **NEXT CHANNEL:** Select this option to see or change *Channel Edit* settings for the next channel in the *Channel Setup* list.

3.5 Adjusting the Image

The most commonly used options for image adjustments are accessed through 2 menus:

Size and Position (Menu 1) and *Image Settings* (Menu 2), both appear in the *Main* menu. From either menu, you can change settings effecting the image from the current channel by working with the appropriate slidebars, checkboxes and drop-down lists.

Pressing Exit will return to the previous menu (or to the presentation, if from the *Main* menu) and accept any changes you may have entered. Settings are saved with the current channel.

From your presentation, you can access the individual options in these menus by pressing Menu followed by the two-digit number representing their location in the menu system. For example, press Menu 2 3 to access the "Gamma" option in the *Image Settings* menu.

For some options, you may prefer to use a "direct key" from presentation level to go directly to a particular option without traveling through the menu system

NOTE: *Available for some display parameters only.*

For example, press Contrast to access the "contrast" slidebar immediately. Press Exit to return to your presentation.

NOTES: *1) To hide these "direct" slidebars, disable the" Display Slidebars" checkbox in the Menu Preferences menu.*

2) To hide the entire menu system from view, toggle the on-screen display by pressing the OSD ▼ *keys.*

3.5.1 Before You Begin

The first step in optimizing the image is to perform an Auto Setup. This initiates an automated process in which the projector optimizes critical display parameters such as size, position, pixel tracking, etc., based on the type of incoming source data detected. An *Auto Setup* can save considerable setup time, and you can still modify the adjustments using menu options described below.

For best results, select an image that does not display black borders, and has some white and black content.

Then press Auto.

3.6 Size and Position Menu

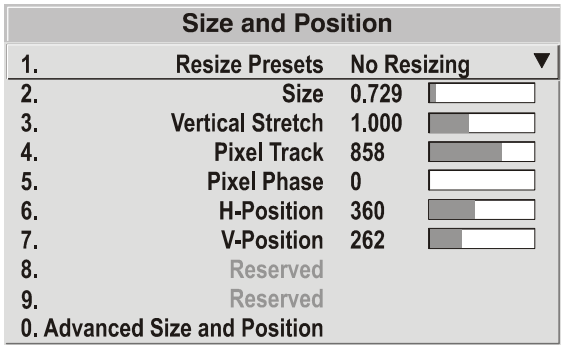


FIGURE 3-18 SIZE AND POSITION MENU

Use *Size and Position* controls to match the image precisely to the screen used at the site.

You can increase or decrease the size of your image, change its proportion (aspect ratio), move the image to a specific area of the screen, and refine other related parameters.

Refer to "*Using Slidebars and Other Controls*" for help using the options and controls. Changes made in the *Size and Position* menu are applied immediately and are saved when you exit the menu (press Exit or Menu).

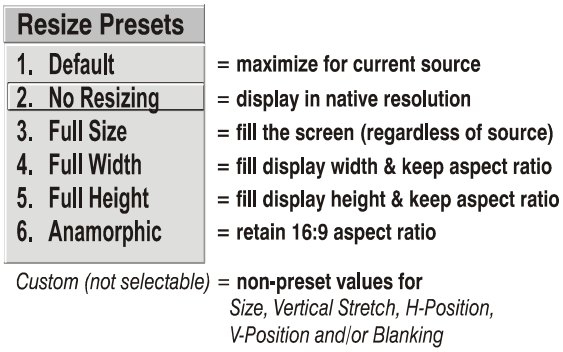


FIGURE 3-19 RESIZE PRESET OPTIONS

3.6.1 Resize Presets

NOTE: *The following text and figures describe the operation of an SXGA+ (1400x1050 native resolution) projector, but behaves similarly for other native resolutions (eg. XGA 1024x768).*

Select a *Resize Presets* option to display an image in its native resolution, automatically resize an image to closely fill the projector's native resolution, or to optimize the width or height of your display.

Size, *Position* and *Blanking* parameters automatically adjust or, if Blanking is set first, define an Active Input Area. *Resize Preset* scaling will occur only in this region of interest.

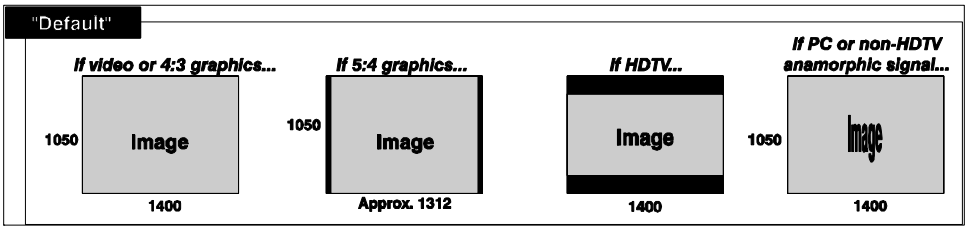
Default

By default when displaying a new source, your image will utilize as much of the projector's display area (e.g.1400 x 1050 for SXGA) as possible for the type of incoming source data, but with minimal or no changes to aspect ratio. See *Select "Default"*.

WHEN "CUSTOM" APPEARS: The "Custom" re-size descriptor appears in the *Size and Position* menu when any of the values for *Size*, *Vertical Stretch*, *H-Position*, *V-Position* or *Blanking* do not correspond to those for a preset. This option is not offered in the *Resize Presets* drop-down list.

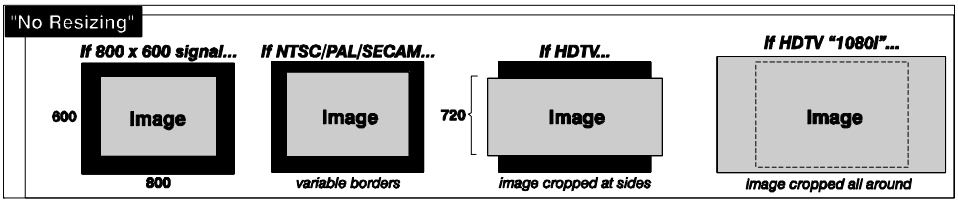
Select **"DEFAULT"** for most sources (factory default). The image will be centered and displayed as large as possible *depending on the type of source.*

- ***5:4 graphic image*** will enlarge to fill the screen height, and be centered between narrow black side bars.
- ***video image*** or 4:3 graphic image will enlarge to fill the screen.
- ***anamorphic (16:9) image*** will fill the width and be centered between black bars on top and bottom.



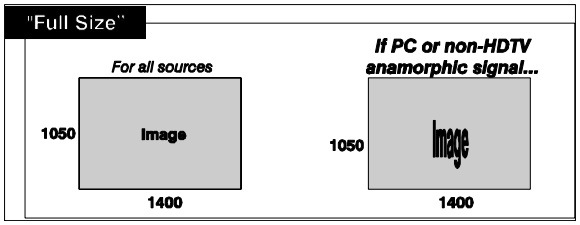
No Resizing

Displays the image in its native resolution, which may or may not match the projector's resolution. For example, for a source with a native resolution of 800 x 600, "No Resizing" will use the central 800 x 600 pixels and have a black border—the black border areas are unused areas. See below.



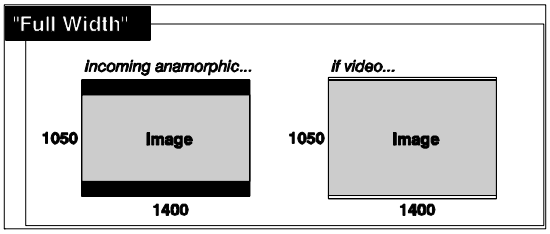
Full Size

Uses *all pixels* for displaying the image, regardless of source or original aspect ratio. Incoming source material having a different aspect ratio than the projector will be stretched for display.



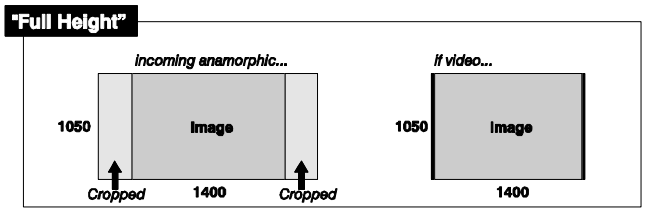
Full Width

Fills the projector's display from left-to-right without changing the original aspect ratio of the image. Depending on the source, data at the top and bottom may be discarded (cropped), or the display may have black borders at the top and bottom ("letterboxing").



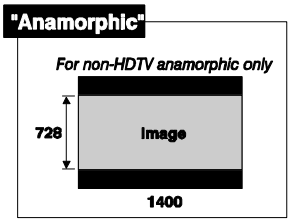
Full Height

Fills the display from top-to-bottom. Depending on the source, this may create borders.



Anamorphic

Displays an anamorphic image in its native 16:9 aspect ratio. The image will fill the screen from side-to-side and be centered between black bars at top and bottom.



3.6.2 Size

Controls both the image *width* and *height* in tandem, maintaining the current aspect ratio of the displayed signal data.

3.6.3 Vertical Stretch

Adjusts the *height* of the image while keeping the width constant. Use "*Vertical Stretch"* to change the aspect ratio of the display.

3.6.4 Pixel Track

Steady flickering or some soft vertical stripes or bands across the entire image shows poor pixel tracking. Proper pixel tracking makes sure that the image quality is consistent across the screen, that aspect ratio is maintained, and that pixel phase can be optimized, *see 3.6.5 Pixel Phase*. Tracking determines the frequency of the pixel sampling clock, indicated by the number of incoming pixels per line, so that all pixels generated by a particular source are sampled.

NOTE: *By default, the projector samples at the correct frequency for most sources.*

For best results, use a good test pattern such as a smooth gray consisting of a clear pattern of black and white pixels, or a similar "half on, half off" graphic image, such as the *Windows* shutdown screen. Adjust the slidebar until the vertical stripes broaden to the point where one large stripe fills the image. If the image still exhibits some shimmer or noise, adjust *Pixel Phase* (below).

3.6.5 Pixel Phase

NOTE: *Adjust "Pixel Phase" after "Pixel Tracking".*

Adjust pixel phase when the image (usually from an RGB source) still shows shimmer or "noise" after pixel tracking is optimized. Pixel phase adjusts the phase of the pixel sampling clock relative to the incoming signal.

For best results, use a good test pattern such as a smooth gray consisting of a clear pattern of black and white pixels, or a similar "half on, half off" graphic image, such as the *Windows* shutdown screen. Adjust the slidebar until the image stabilizes and each pixel is clearly defined. You may notice that you can stabilize the image at more than one point—i.e., you may find that the image appearance at "11" is identical to the image appearance at "38", thus you can use either setting.

If some shimmer from a video or HDTV source persists, use the "Filter" control to remove high-frequency noise from the signal.

3.6.6 H-Position

Moves the image right or left within the area of available pixels. The value shown represents where the approximate center of the image lies in relation to the total number of pixels available horizontally. This varies widely according to the signal, watch the image while adjusting.

3.6.7 V-Position

Moves the image up or down within the area of available pixels. The value shown represents where the approximate center of the image lies in relation to the total number of pixels available vertically. This varies widely according to the signal, watch the image while adjusting.

3.6.8 Advanced Size and Position —Submenu

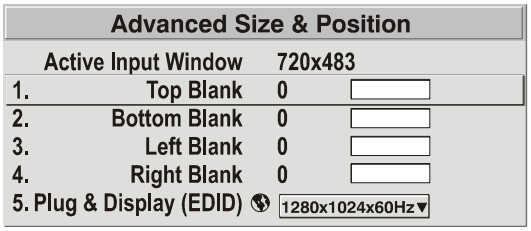


FIGURE 3-20 ADVANCED SIZE & POSITION SUBMENU

This submenu has these options:

Active Input Window

Indicates the current area of your displayed data or region of interest as defined by the blanking controls (read only). By default, the projector determines what portion of its full resolution to use, and pixels in the surrounding borders are turned off. To specify an active input window size adjust one or more "Blank" settings. For example, if you blank (cropped) 100 pixels from both the left and right edges of an incoming source of 1400 x 1050, the active input window will be reduced to 1200 x 1050.

When using SD or HD or a decoded video source at **INPUT 3** or **INPUT 4**, the default blanking of "0" defines an active input window of 720 x 483.

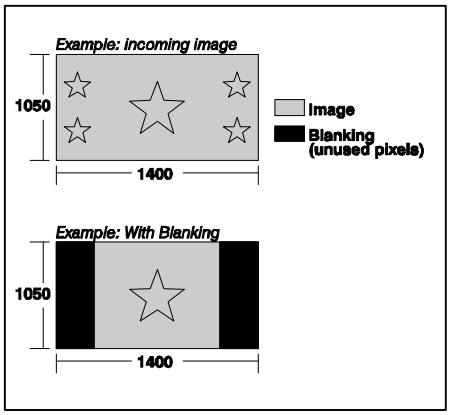


FIGURE 3-21 BLANKING

Blanking (Top, Bottom, Left, and Right)

Crop the image so that unwanted edges are removed from the display (changed to black). Blanking defines the size of the *Active Input Window*, or area of interest. Range of adjustment depends on the source resolution and other factors.

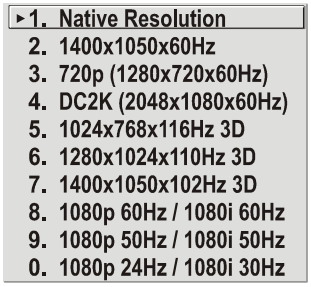


FIGURE 3-22 PLUG & DISPLAY SOURCE OUTPUTS

Plug & Display (EDID)

By default, a *Plug & Play (EDID)* source outputs a signal according to the EDID (Extended Display Identification Data) information provided by the projector. To override this information and display in a different format (for example, if your *Plug & Play [EDID]* device does not support the projector's resolution or frequency), select the *Plug & Play (EDID)* resolution from the list.

Any daisy-chained projectors will also display according to the chosen *Plug & Play (EDID)* format.

3.7 Image Settings Menu

Use options in the *Image Settings* menu to alter your image without affecting its size or position. Changes made are applied immediately and are saved when you exit the menu (press Exit or Menu).

Options not available for the projector model or source are disabled and appear dim (gray).

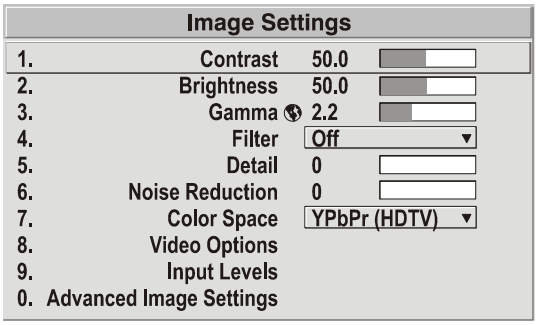


FIGURE 3-23 IMAGE SETTINGS MENU

3.7.1 Contrast

Changes the perceived difference between light and dark areas of your image (0-100). For best results, keep close to 50 or start with a low value and increase so that whites remain bright but are not distorted or tinted, and that light areas do not become white ("crushed"). If contrast is set too high, the light parts of the image lose detail and clarity. If set too low, the light areas will not be as bright as they could be and the overall image will be dim.

NOTE: *If the environment lighting changes, an adjustment of Gamma is recommended.*

3.7.2 Brightness

Increases or decreases the amount of black in the image (0-100). For best results, keep close to 50 or start with a high value and decrease so that dark areas do not become black ("crushed"). Conversely, high brightness changes black to dark gray, causing washed-out images.

3.7.3 Gamma

A global setting that determines how gray shades are displayed between minimum input (black) and maximum input (white) for all signals. A good gamma setting optimizes blacks and whites while ensuring smooth transitions for the "in-between" values utilized in other colors. The overall tone of images can be lightened or darkened without changing the extremes and all images will be more vibrant while still showing good detail in dark areas.

A gamma setting of 2.22 is correct for most signals and conditions. If ambient light washes out the image, making it difficult to see details in dark areas, lower the gamma setting improve contrast while maintaining good details for blacks. Conversely, if the image is washed out and unnatural, with excessive detail in black areas, increase the setting.

3.7.4 Filter

The proper filter setting is automatically set for most signals. It applies a low pass filter for noise reduction in the incoming input signal, particularly for HDTV or SDTV. Applied in the analog domain before sampling, this filtering removes high frequencies and reduces pixel phase noise and signal bandwidth.

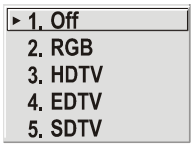


FIGURE 3-24 FILTER OPTIONS

Override only if standard pixel tracking and phase adjustments do not clear up a “noisy” video signal, or if a graphics signal appears overly “soft”.

3.7.5 Detail

“Detail” adjusts the sharpness of a video image so that edges remain clearly defined. It can be useful if a “Noise Reduction” adjustment has caused the image to appear too soft. Adjust until the display is sharp. “Detail” adds some high frequencies back into the image, it can also introduce some degree of noise.

3.7.6 Noise Reduction

“Noise Reduction” is similar to the “Filter” control, but operates in the post-sampling digital domain with a more subtle effect. Higher settings are useful for clearing up noisy RGB images such as those from a PC. Reducing noise, which reduces high frequencies, may also soften the image.

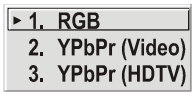


FIGURE 3-25 COLOR SPACE OPTIONS

3.7.7 Color Space

Determines how the color components of an analog input signal are decoded for accurate color in the display. Useful only for analog signals connected to **INPUT 1, INPUT 2, or INPUT 5.** Although color space for these analog signals is automatically determined by the projector, you may wish to override this and manually set a specific color space.

NOTE: *For digital signals or for signals connected to INPUT 3 or INPUT 4, the color space function is automatic and the drop-down list disabled.*

The current color space appears in the *Image Settings* menu. Press ↵ to select a different option:

- Select **RGB** *unless* you are using component video at **INPUT 1, 2, or 5.**
- Select **YPbPr (Video)** with a standard definition televised signal (SDTV)
- Select **YPbPr (HDTV)** with a high definition televised signal (HDTV).

NOTE: *When some RGB signals are first connected, the projector may not recognize them as RGB and will incorrectly decode their color information as YPbPr (video). These signals appear magenta and can include:*

RGB signals in NTSC, PAL, SECAM frequency ranges

Scan-doubled sync-on-green

Scan-quadrupled sync-on-green

For these signals, change the Color Space to RGB.

3.7.8 Video Options — Submenu

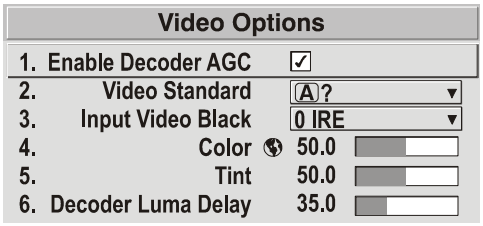


FIGURE 3-26 VIDEO OPTIONS SUBMENU

This submenu is used only with video sources, **INPUTS 3** or **4**.

Enable Decoder AGC

Automatic Gain Control (AGC) affects only decoded video images. Enter a checkmark (default) in most instances. This activates the decoder's AGC circuit to make sure of correct bright images. Delete the checkmark if a decoded video image exhibits strange color artifacts such as stripes in highly saturated colors. This indicates an incompatibility between this source and the AGC.

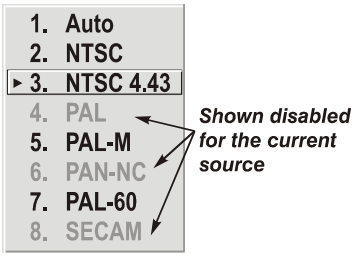


FIGURE 3-27 VIDEO STANDARD

Video Standard

For most video standards, the projector automatically detects the incoming horizontal and vertical frequencies and sets the projector's processing of this signal to the corresponding standard. The current video standard name appears in the *Video Options* submenu, and includes an "A" if it is auto-detected.

Press ↵ to view or select a different video standard from those available to the projector—any that are disabled have frequency characteristics that differ from those of the incoming signal. Selecting a specific standard forces the projector to process the signal according to this standard.

Table 3.4 Regions and Video Standards: Summary

STANDARD	WHERE USED (SUBJECT-TO-CHANGE)
NTSC	N. America and Japan
NTSC 4.43	A tape-only standard for partially-translated hybrid signals
PAL	Most of Europe, China, Australia, some of S. America, some of Africa
PAL-M	Brazil
PAL-NC	Argentina, Chile, other Latin American countries

PAL 60	
SECAM	France, Eastern Europe, most of Africa

NOTE: *Use "Auto" for all instances EXCEPT a poor quality input signal or a black-and-white video signal. To detect and display such signals, select the relevant standard from the list.*

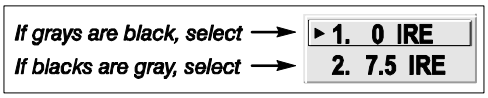


FIGURE 3-28 INPUT VIDEO BLACK OPTIONS

Input Video Black

Adjusts for incoming elevated black levels present in some video signals, and makes sure that blacks in the display are neither "crushed" (where dark grays appear black) or not excessively elevated (where blacks appear dark gray). The projector automatically finds the best setting according to the type of incoming video signal:

- **0 IRE** – Used for DVD output with "enhanced black", SECAM, most PAL standards, and Japanese NTSC.
- **7.5 IRE** – Used for most NTSC video signals.

For some types of video, you can override the setting. The control is disabled for other types of video (and all graphics sources). Generally, if black appears "crushed" when brightness = 50, choose "0 IRE". If black appears excessively elevated, use "7.5 IRE".

Color

Adjusts the color saturation level (the *amount* of color in a video image). Lower settings produce less saturated colors, for example a setting of "0" produces a black and white image. If the color level is too high, colors will be overpowering and unrealistic.

Tint

Adjusts the red/green color hue for true color reproduction of video signals connected to Input 3 or 4. For best results, adjust tint while displaying an external color bars test pattern—otherwise, it is recommended that tint remain at its default setting.

Decoder Luma Delay

This control affects any incoming composite or S-video signal, delaying the luma signal (intensity) in relation to the chroma (color). In the image, increasing the luma delay will move luma (seen as a shadow where colors overlap) to the right slightly, with colors remaining in place. Decreasing this delay will move the shadow slightly to the left. If necessary for your current source, adjust so that no shadows occur with adjacent colors.

3.7.9 Input Levels — Submenu

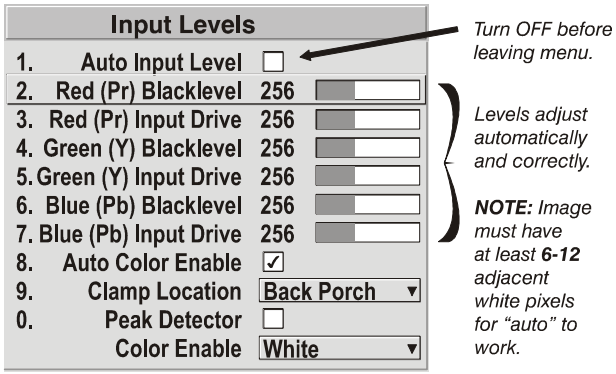


FIGURE 3-29 INPUT LEVELS SUBMENU

NOTES: *1) The projector automatically optimizes input levels for most sources. The Input Levels submenu is for experienced users only.*

2) Before beginning, verify that overall contrast and brightness settings are near 50 and that color temperature is set up on an internal grayscale test pattern.

3) There must be at least 6-12 consecutive white pixels and black pixels present in the image for proper "Auto Input Level" function. Leave this control off after use.

Good RGB or input levels (the *drives* and *blacklevels* for red, green and blue) makes sure images from analog sources, other than decoded video, have maximum contrast without "crushing". By default (and in an "Auto Setup"), the projector automatically finds the best input levels by monitoring image content and adjusting the controls. More adjustment is typically not required to get proper blacks or whites.

NOTE: *This automatic adjustment requires at least 6-12 consecutive white pixels in the image. Without these pixels, input levels may produce skewed colors, particularly in non-video images.*

For an unusual source exhibiting one or more overly high blacklevels (typically caused by a noisy source causing blacklevel spikes), an experienced user can use the *Input Levels* menu. These adjustments serve as a calibration process, compensating for differences in sources and cabling to perfect the source image input levels and eliminate the "overshoot" and "undershoot". *Input Levels* are of limited use with digital signals, but do offer some ability to tweak poorly mastered source materials.

Auto Input Level

Keep OFF for virtually all sources (default). Temporarily enter a checkmark *only* if you are an experienced user with an unusual source that needs color temperature and/or input level adjustment. After entering a checkmark, wait for the 6 slidebar values to stabilize then delete the checkmark and exit. This compensates for incoming out-of-range drives (white) and blacklevels (black) that would cause "crushing" of light and dark colors in the image.

Black Levels and Drives

To check your image and adjust these controls:

1. Make sure overall "Contrast" and "Brightness" settings are both set to near 50.

NOTE: *Not required for "Auto" adjustment.*

2. Check the color temperature setup using an internal grayscale test pattern, making sure to obtain a neutral grayscale.

NOTE: *Not required for "Auto" adjustment.*

3. Confirm that you are using an analog source ***not*** connected to **INPUT 3** or **INPUT 4**. Input Levels are not applicable for digital sources or sources going through the decoder. A grayscale is recommended.
4. If the blacks and/or whites appear OK, do not adjust input levels. If black levels are too high (and/or whites are too low), you likely have a noisy source that is producing skewed input levels. Continue to Step 5.
5. Enable "Auto" in the *Input Levels* submenu. Wait for all 6 values to stabilize. Alternatively, do *not* use "Auto"—reduce blacklevels manually instead. Change one or more of the six levels as necessary to obtain proper blacks and whites. You may want to see only a color while adjusting—use the "Color Enable" option.
6. Delete the "Auto" checkmark and leave the *Input Levels* menu.

Auto Color Enable

When a checkmark is present, selecting a specific blacklevel or drive to adjust will automatically enable the corresponding color in the display. Delete the checkmark to see all colors.

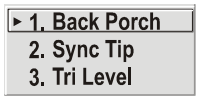


FIGURE 3-30 CLAMP LOCATION

Clamp Location

Brightens the image produced from some high-resolution high-frequency graphic sources. For most sources, the best clamp location is automatically selected by the projector. Use the normal *Back Porch* location if the image is either sufficiently bright or overly bright. Select *Sync Tip* if the image appears unusually dim, if there are horizontal streaks across the image, or if there is significant color drift. This moves the clamping pulse from the normal back porch location (which is likely too short) to the tip of the horizontal sync pulse. *Tri Level* is typically recommended for an HDTV source where the back porch is also short.

NOTE: *Clamp Location is not used for video sources or any RGB source with sync information included on the video (e.g., sync-on-green). Use Tri Level instead.*

Color Enable

Select which color or colors you want to see in the display, useful while working with color temperature white levels or input levels.

NOTES: 1*) Input levels apply for the current source only, but for any color temperature used.*

2) If color temperature is set up based on the internal test patterns, you can set up input levels for a given source to match the color temperature of the internal test patterns.

Peak Detector

A method for defining individual input levels to improve the accuracy of input levels set by the Auto Input level function. Enabling the Peak Detector activates an operating mode for detecting ***only*** pixels that are considered black or white, all other levels are displayed as a mid-level gray. Using a smooth grayscale pattern (where black and white are known to be at opposite edges of the image) adjust the individual blacklevels and

input drives until both black and white edges are ***just*** visible and distinguished from neighboring pixels. Images from this source will then display correct blacks and whites without “crushing”.

Adjusting Input Levels Using the Peak Detector

1. Display a 16 level grayscale test pattern from the external source. Enter a checkmark in the Peak Detector checkbox.

NOTE: *The “Peak Detector” will initially render the grayscale as a uniform gray field before adjustment.*

2. Use *Color Enable* to select and display one primary color.
3. Adjust the current color’s “Blacklevel” slidebar until a single band of black appears at one edge of the screen. This band represents the first band of the grayscale pattern, which is 100% black. Do not adjust too far.
4. With the same color still active, adjust the “Input Drive” slidebar until a single band of color appears at the opposite edge of the screen. This band represents the last band of the grayscale pattern, which is 100% white (or the current color, if a color is enabled). Do not adjust too far.
5. Check the black band and adjust the blacklevel slidebar if necessary. Blacklevel and Input Drive adjustments are related, so you need fine tune them until both bands are optimized.
6. Repeat Steps 2-5 with the other two remaining primary colors. When each primary color shows ***one*** optimized black band and white (or colored) band, the input levels for this source are correctly set. Upon exiting the *Input Levels* menu, the Peak Detector checkbox will clear.

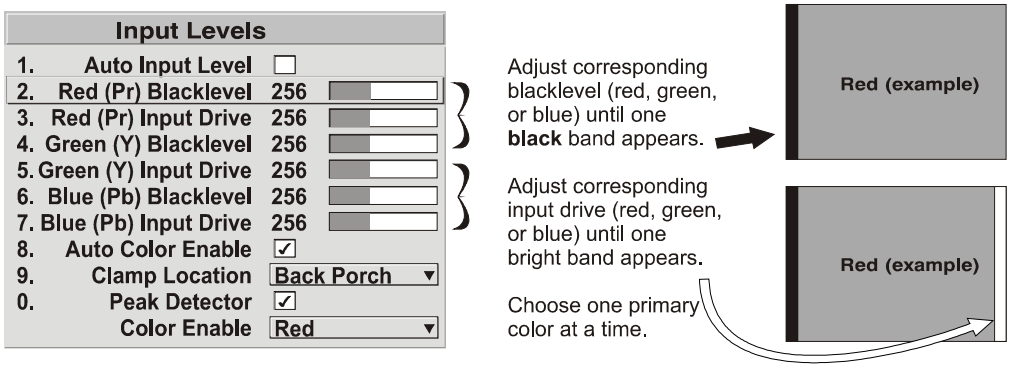


FIGURE 3-31 ADJUSTING INPUT LEVELS USING THE PEAK DETECTOR

3.7.10 Advanced Image Settings — Submenu

Gamma Table

Use this option to apply a gamma table or “curve”, controlling the intensity of midlevel colors while maintaining maximum contrast, brightness and color performance. Select an appropriate gamma curve for the incoming signal. Select “Simple” for most incoming signals, to apply a true 100% linear power curve. Select “Graphics” to apply a simple power curve for graphics sources and “Video” to apply a curve with a linear segment near black to compensate for increased blacklevels typical of video signals.

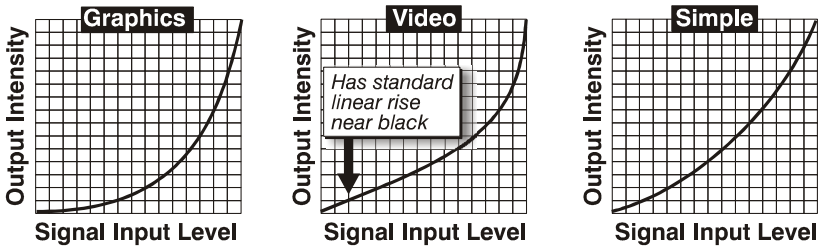


FIGURE 3-32 GAMMA TABLE OPTIONS

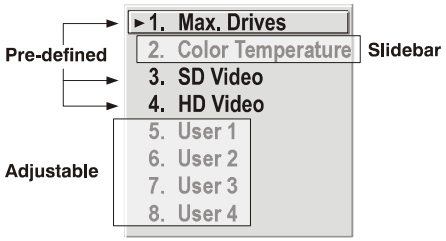


FIGURE 3-33 SELECT COLOR OPTIONS

Select Color Adjustment

Choose an overall color performance for all images. The "Max Drives" drives all 3 colors at their maximum level so that they are on and cannot be changed.
SD Video and *HD Video* apply a color gamut optimized for standard or high-definition video sources. Alternatively, you can specify a color temperature, which enables the Color Temperature slidebar and applies its current setting (default = 6500K).
If none of the pre-defined "Select Color Adjustment" options or color temperatures suits your application, select one of 4 color gamuts previously defined by a user (User 1, 2, 3, 4). A "User" option applies a customized color performance in which the user has set the hue and intensity of each color component in the *Color Adjustment by X/Y* or *Color Saturation* submenus. This is often used with multiple-projector applications. Select the color adjustment producing the best color accuracy for your application and installation.

NOTE: *User 1 is the default setting for all sources and test patterns.*

To configure a "User" color adjustment (gamut), use either the *Color Adjustment by X/Y* or the *Color Saturation* submenu located in the *Configuration* menu under *Geometry and Color.*

NOTES: *1) "Color Temperature" defaults to 6500K until changed. All 4 "User" options default to Max Drives values unless redefined by the user.*
2) White Boost automatically turns OFF when a setting other than Max Drives is selected – you will notice an immediate dimming of the display. (White Boost not available on RPMSP-D180U model.)
3) Factory-measured color primaries, for consistent color gamut from projector-to-projector, can be changed only in the Service menu.To recover factory settings select Factory Defaults in the Service menu (password-protected).

Color Temperature

Adjust to apply a specific and accurate color temperature to all displays. Color temperatures are expressed in degrees Kelvin (3200-9300K), and utilize different combinations of the projector's original native color primaries to produce a "coloration" or cast in images. The lower the temperature the more reddish the cast; the higher the temperature, the more bluish the cast. The slidebar is enabled only if you have a source connected and have selected "Color Temperature" in the "Select Color Adjustment" drop-down list in the *Advanced Image Settings* menu.

White Boost

A source dependent setting that enables you to recapture some of the lost light from the transition between color wheel segments and the white segment as it's spinning. White Boost defaults to '0' (OFF). For NTSC, HDTV, PAL and SECAM signals a White Boost no higher than 2 is recommended. For graphic signals any values can be used. As you increase the white boost setting the image becomes brighter and a little less saturated.

NOTES: 1*) White Boost is disabled (grayed out in menu) when you enable Brightness Uniformity, Edge Blending or select a color adjustment (Select Color Adjustment) other than "Max Drives".*
2) White Boost can also be adjusted specifically for internal test patterns. After switching back to a source, the White Boost settings will reset to the value set for that source.

Frame Delay

Set the interval of delay between the input signal and its appearance on screen. For applications such as simulation, where the feeling of "real time" image response is a priority, a minimum setting is usually preferable.

NOTE: *If frame delay is set too low it can cause frame tears.*

Motion Filter

Useful for smoothing out moving images from interlaced sources. Normally, the Motion Filter setting is automatically determined according to the type of incoming source signal. If the source is jittery or tearing you can override the default to make sure of stable processing for this source. Select the applicable motion filter:

1. **AUTO:** The projector will automatically use the correct motion filter according to the incoming signal.
2. **STILL:** For static images with no motion, such as graphics from a CD.
3. **MOTION:** For video images that did not originate from film, or for moving computer-generated images.
4. **FILM:** For video images that originated from film. This will optimize image quality and stability.

Film mode Threshold

Determines how sensitively the projector can detect if an incoming video signal originated from film or not.

Detail Threshold

Defines at what frequency level the "Detail" control will begin to magnify high frequencies, which adds details back into the image. Raise the threshold to *ignore* more of these high frequencies, and lower the threshold to *magnify* more of these frequencies. A setting of "0", for example, means no noise will be ignored and all will be magnified. An ideal detail threshold is one in which high frequencies that are causing objectionable noise are *not* magnified when using "Detail", but frequencies which can help sharpen an overly-soft image *are* magnified when using "Detail".

4 Advanced Configuration and Controls

The *Configuration* menu provides access to diagnostics and calibration tools and the *Service* submenu (password-protected). Use the *Configuration* menu to define general operating parameters and communications with other projectors and equipment, and to access other advanced processing and image adjustments affecting overall performance.

Settings in the *Configuration* menu (and its submenus) are typically "global" settings applied regardless of the type of source you are using. This characteristic is identified with the (globe) icon alongside the option.

NOTE: *The Configuration menu is recommended for experienced users/technicians only.*

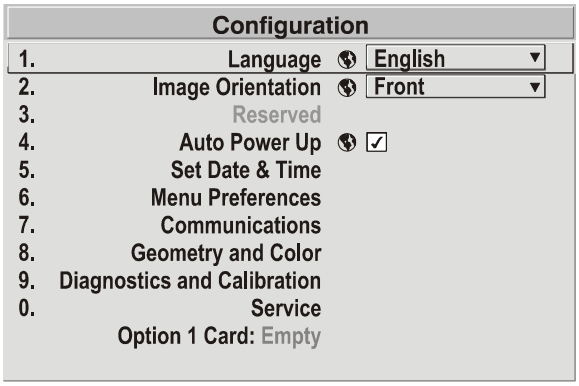


FIGURE 4-1 CONFIGURATION MENU

4.1 Language

Choose from available languages to use in the projector's menus. The change will take effect immediately.

4.2 Image Orientation

Set the orientation of the image according to the orientation of your projector. If the setting is incorrect, projected images will be reversed and/or upside down.

4.3 Fade Time

Set how long (in seconds) it takes to gradually dissolve one image into another for a source switch. Applies to seamless switching, PIP is disabled.

4.4 Auto Power-up

Enter a checkmark to enable the projector to automatically power up after losing power due to a power failure or due to unplugging the projector during operation. Note that unsaved display adjustments may be lost.

4.5 Set Date & Time

Enter/read the current year-month-day and hour-minute-second. Changes here reset the projector's real-time clock.

4.6 Menu Preferences — Submenu

Use the options in this submenu to adjust the appearance, content and/or location of on-screen menus and messages.

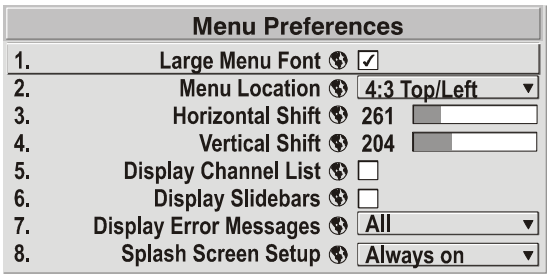


FIGURE 4-2 MENU PREFERENCES SUBMENU

LARGE MENU FONT	Checkmark to enlarge menus and their text. You may have to adjust "Menu Location" to accommodate the increased menu area.
MENU LOCATION	Use the pull-down list to choose a pre-defined default or customized location for the display of all on-screen menus. To create a custom menu location, choose a preset that is closest to the desired location. Then adjust "Horizontal Shift" and "Vertical Shift"slidebars to move the menu to the desired location. Avoid locations too close to a corner or edge to prevent cropping of larger menus.
HORIZONTAL SHIFT AND VERTICAL SHIFT	Shift your menus as desired, creating a customized menu location.
DISPLAY CHANNEL LIST	Checkmark to see a scroll channel list when you press Channel from your presentation. Channels marked with a list icon in the Channel Setup menu will appear here. The "Display Channel List" option also enables on-screen feedback when using the Input key. To hide the channel list and input dialog box while switching channels and sources during a presentation, clear the checkbox. NOTE: *The Channel List and input dialog box cannot be hidden during use of the menus.*
DISPLAY SLIDEBARS	Enter a checkmark to superimpose a small slidebar over the current image whenever an adjustable parameter is selected directly with a key such as Contrast or Bright. If "Display Slidebars" is unchecked, these slidebars can still be accessed, but will be hidden during adjustment. This option does not affect slidebars in menus.

DISPLAY ERROR MESSAGES	Choose how you want to be notified of errors detected in either the incoming signal or projector. Select “Screen” or “All” to see a brief on-screen message or select “RS-232” to receive messages via RS-232 (or RS-422) serial communication only. Select “Off” to hide error message displays.
SPLASH SCREEN SETUP	Choose when you would like to display a special introductory splash screen image, such as your company logo, graphic or message. • Always Off = A splash screen never appears • Always On = A splash screen is always on behind the current display image, similar to wallpaper. • Start-up Only – The splash screen logo appears at projector start-up only. • Start-up And No Signal – A splash screen appears at start-up only if there is no source signal. To replace the default splash screen use *KoRE Librarian* to download the desired image to the projector. This will overwrite the current splash screen content in projector memory.

4.7 Communications

Settings in the *Communications* submenu define and control how single or multiple projectors can link with each other and with a controlling device.

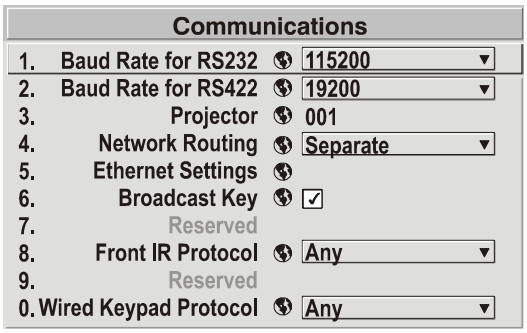


FIGURE 4-3 COMMUNICATIONS SUBMENU

4.7.1 Baud Rates

The baud rate setting determines the speed of communication to and from the projector on the RS-232 or RS-422 links. Set the baud rate to match that of your controlling device, such as your PC. If you are unsure about what baud rate to choose, refer to the documentation for the controlling device. In a network of projectors, if a projector has a different baud rate use the pull-down list and select the correct baud rate using the ↵ key. Do not just scroll this control with ◄ or ► keys. Serial communication is 8 data bits, no parity, one stop bit.

4.7.2 Projector

Enter a three-digit number (such as “001”) to assign or change a number to the projector currently in use. If the current projector already has a number assigned, that number will appear instead. Numerical identity for projectors enables you to communicate with a single projector within a multiple-projector application (see also

Proj key in *3.2, Using the Keypads*). If you make a mistake in assigning or changing the projector number, press Exit to cancel.

4.7.3 Network Routing

NOTE: *Not applicable for stand-alone projectors or simple serial networks with only one type of controller and linking.*

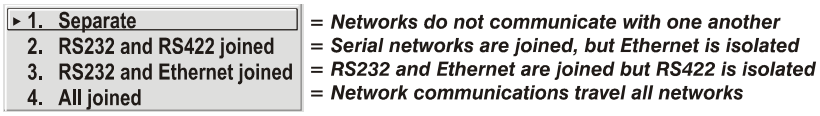


FIGURE 4-4 NETWORK ROUTING OPTIONS

.

SEPARATE	Select "Separate" (factory default) to keep RS-232, RS-422 and Ethernet messages on their respective paths instead of being broadcast to the other types of ports. In Figure 4-5 Using "Network Routing" Options A, RS-422 controls only the projector to which it is connected. In Figure 4-4 Network Routing Options B, either RS-232 or RS-422 will control the network.
RS-232 AND RS-422 JOINED	Messages originating from an RS-232 or RS-422 controller will be relayed to all RS-232 ports. Ethernet communication will not be relayed.
RS-232 AND ETHERNET JOINED	Messages to and from the RS-RS-232 ports will also be relayed to the Ethernet port, and vice versa. Any RS-422 communications will be isolated.
ALL JOINED	All messages reach all ports, regardless of type

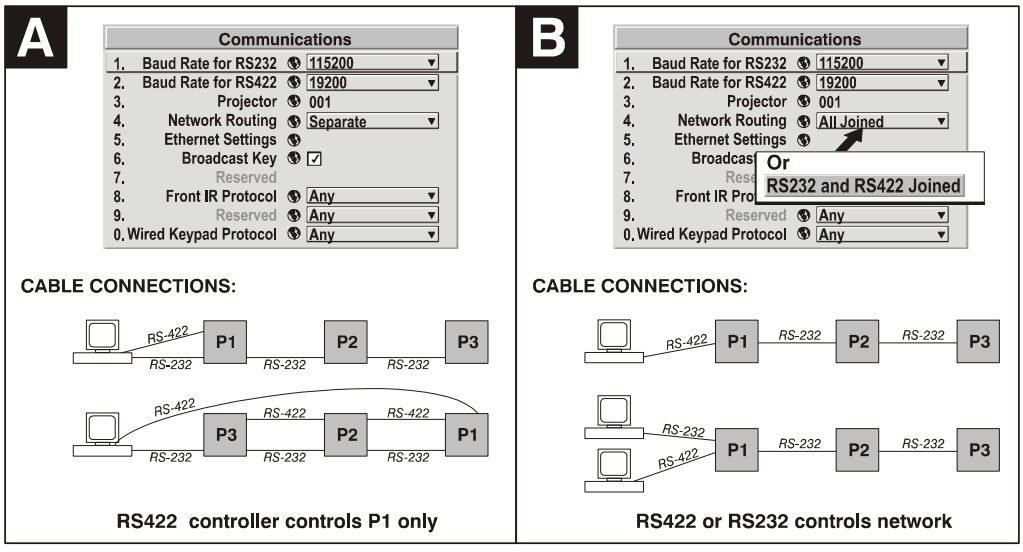


FIGURE 4-5 USING "NETWORK ROUTING" OPTIONS

4.7.4 Ethernet Settings (Submenu)

NOTE: *Recommended for network administrators only.*

DHCP

Enable this checkbox if you want a DHCP server to automatically assign an IP address that is valid and unique for use on the current Ethernet network. On networks without a DHCP server, or to override the automatic DHCP server function, delete the checkmark and enter the new "IP Address" settings desired.

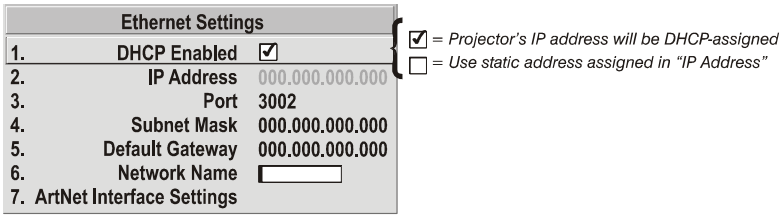


FIGURE 4-6 ENABLING AUTOMATIC IP ADDRESS

IP Address

Enter a valid and unique IP address for use on the network to which the projector is currently connected. This address will overwrite a previous IP address, such as the projector's factory-defined default (0.0.0.0), or one that is assigned by a DHCP server or other user. It takes approximately 10 seconds for the projector to respond at its new address.

Port

On some Ethernet networks, firewall restrictions may require that the port number of the projector be changed from its default of 3002. If so, enter a new valid port number here. It is highly recommended not to use a port# below 1024, as these ports are typically reserved for and used by common network applications.

Subnet Mask and Default Gateway

The Subnet Mask and Default Gateway are automatically assigned when DHCP is enabled. If a static IP is used, these must be assigned. The Default Gateway is an optional router device used to send and receive data outside the subnet. The address is provided by the system administrator.

ArtNet Interface Settings — SUBMENU

ArtNet is an Ethernet communication protocol that was developed by Artistic Licence and using the DMX512 control protocol. It is used for controlling lighting and staging equipment from a lighting console or PC application..

ARTNET SUBNET	This is the highest level address for a device, typically set to 0
ARTNET UNIVERSE	Each data packet is broadcasted to all devices plugged into a universe (maximum 512 devices/channels).
ARTNET CHANNEL	Allows you to specify the starting channel for this projector. (512 channels per universe)
ARTNET ADVANCED MODE	When enabled, each projector listens for data on 64 channels starting with the base channel. When advanced mode is not in use, the projector only listens on 10 channels. You can squeeze more devices per universe when the projector uses fewer channels. NOTE: The additional 54 functions are not implemented and are reserved for future use.

ARTNET BASE CHANNEL	When advanced mode is enabled, the projector listens to data on 64 consecutive channels or 10 consecutive channels when not enabled. The projector processes requests beginning with the 'base channel' defined here. The requests implement these functions:

DMX CHANNEL	FUNCTION	VALUE
Base	Shutter	Open (0-64), No Action (65-192), Closed (193-255)
Base +1	Slider Lock	Locked (0-254), Unlocked *(255)
Base +2	Input*	Input # (1-8)
Base +3	Channel *	Channel #(1-99)
Base +4	Lens-vertical *+	Lens down(0), Stop(1-124), Lens Up(255)
Base +5	Lens-horizontal * +	Lens Right(0), Stop(1-254), Lens Left(255)
Base +6	Lens – Focus * +	Negative Focus(0), Stop(1-254), Positive Focus(255)
Base +7	Lens- Zoom * +	Zoom Out(0), Stop (1-254), Zoom In (255)
Base +8	Power *	Power Off(0), No Action(1-254), Power On(255)
Base +9	None	

* Functions are only active when the Slider Lock is set to Unlocked
NOTE: Make sure the channels DO NOT overlap another device. Example:

GOOD	BAD
Proj1_Base = 0	Proj1_Base = 5
Proj2_Base = 10	Proj2_Base = 9
Proj3_Base = 20	Proj3_Base = 11

DEVICE NAME	Used to name each device; some ArtNet servers support querying for devices.
DEVICE DESCRIPTION	More information that is returned when a "device query" is done.

4.7.5 Broadcast Key

Enter a checkmark for keypad commands sent to any one projector to be relayed to all projectors in a serial network. The (Proj) key will temporarily "override" the effect of a broadcast setting and allow you to control a specific projector when necessary. Remove the Broadcast Key checkmark when operating redundant networks.

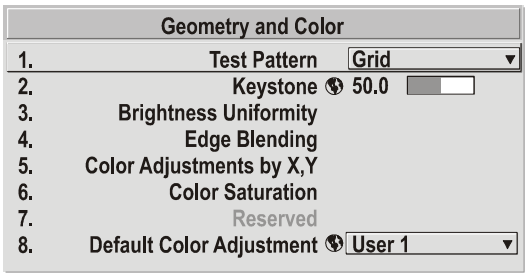
4.7.6 Front IR Protocol

This option cannot be disabled. Select "Any", to enable the projector. Use this option to select a keypad or select a specific protocol for use with the keypad. There are up to 8 protocols that can be selected. This prevents a keypad from one projector interfering with another.

4.7.7 Wired Keypad Protocol

Select “On” to enable use of a wired remote keypad connected to the rear of the projector. The projector will then respond to incoming commands from either port. To disable the wired keypad, use a different keypad (the built-in or an IR remote keypad) to select “off”. This safeguard prevents you from accidentally disabling the wired keypad during use.

4.8 Geometry and Color



In the *Configuration* menu, select the *Geometry and Color* submenu to modify overall color performance or image geometry for all sources.

4.8.1 Test Pattern

Choose the desired internal test pattern or select OFF to turn off a test pattern. Use the Test key for cycling through test patterns.

4.8.2 Vertical Keystone

Corrects an image displaying keystone where both sides of the image are inclined toward the top or bottom edge. Keystone is typically caused by tilting the projector so that the lens surface and screen are not parallel to each other.

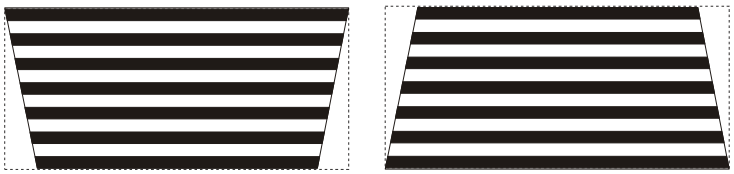


FIGURE 4-7 KEYSTONE ADJUSTMENT

4.8.3 Brightness Uniformity — Submenu

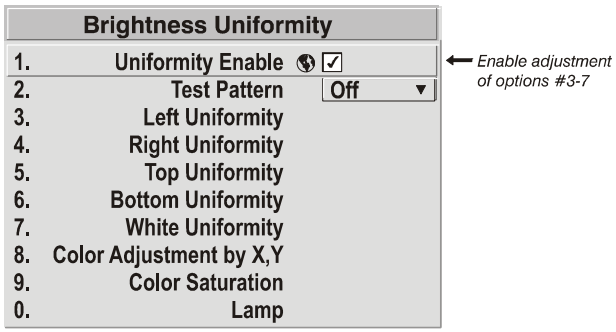


FIGURE 4-8 BRIGHTNESS UNIFORMITY SUBMENU

Provides refinement of displays already matched for their primary colors and overall light output. Use to create a smooth image in which no area appears brighter or more red, green or blue than another.

Enable the "Uniformity Enable" checkbox to access a multitude of adjustments for critical color light output control in specific areas throughout the image. Your settings apply as long as the "Uniformity Enable" checkbox is enabled and you are using a "User" color temperature defined by the Brightness Uniformity controls. Remove the checkmark to disable the Brightness Uniformity function.

NOTE: *See Section 4.13 Using Multiple Projectors for the complete step-by-step procedure for achieving uniform brightness in adjacent displays.*

4.8.4 Edge Blending — SUBMENU

Provides a range of controls for smoothing the overlapping bright edges of multiple adjacent projected images to create a single "seamless" image. NOTE: *See also Section 4.13 Using Multiple Projectors for instructions on adjustment.*

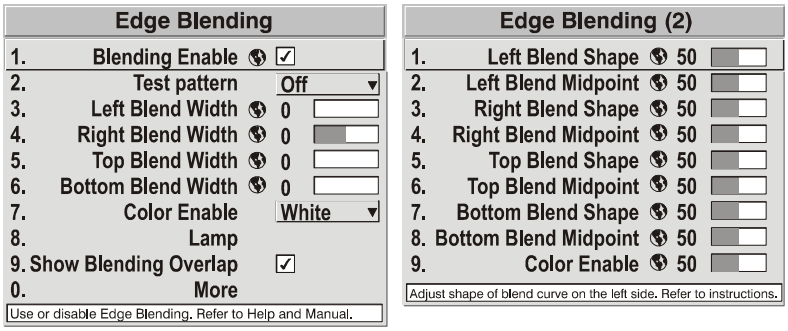


FIGURE 4-9 EDGE BLENDING SUBMENU

4.8.5 Color Adjustments by X/Y, and Color Saturation — Submenus

NOTES: 1) *For defining or changing a User 1, 2, 3, or 4 color performance or "gamut". Sometimes known as Comprehensive Color Adjustment™.* 2) *Factory-measured primary color levels make sure a specific color performs the same way from projector-to-projector. This can be altered only in the Service menu. To recover factory settings, go to the Service menu Color Primary Settings submenu (password-protected. Select "Factory Defaults".*

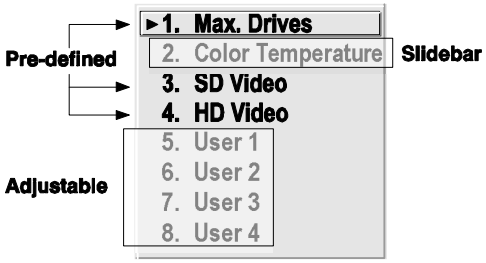


FIGURE 4-10 COLOR PERFORMANCE CHOICES

The projector can utilize any of the 3 pre-defined color performance settings identified in Figure 3.42 (default=User 1), or colors can be driven on the basis of color temperature. For most applications, one of these options will produce accurate and realistic colors from a variety of sources. They can be applied at any time in the *Advanced Image Settings* menu ("Select Color Adjustment"), and are not adjustable.

Defining "User" Color Gamuts

You may find that none of the pre-defined "Select Color Adjustment" options suit your needs. For example, you may require a unique color gamut (range) for a single projector or to precisely match colors across multiple adjacent displays.

Use either the *Color Adjustments by X,Y* or *Color Saturation* submenu to define the precise *hue* of each primary color component (red, green, blue, and white). You can create up to four custom color gamuts (User 1, 2, 3, or 4) defined by these adjustments.

The 2 menus differ only in their user interface, use the one best suited to your needs and application:

- *Color Adjustments by X,Y* — Enter known x/y coordinates from the chromaticity graph. For best results, use with a color meter.
- *Color Saturation* — Adjust color slidebars and judge image color by eye. A color meter can also be used.

A user-defined color "adjustment" can be applied by selecting it in the *Advanced Image Settings* menu ("Select Color Adjustment").

NOTE: *Defining a "User" color gamut when a test pattern is displayed does not get saved in the current channel. Display the source first then select a color gamut (User) from Select Color Adjustment. Changes here are then saved for that source in channel memory.*

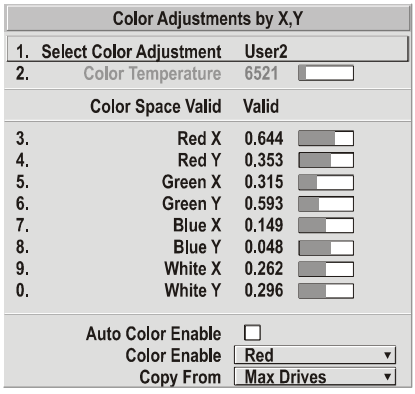


FIGURE 4-11 CUSTOMIZE COLOR HUE

Color Adjustment by X,Y

Use this submenu to alter, add or copy a color gamut (i.e., “color adjustment”). Controls in this menu define the precise hue of each primary color component (red, green, blue, and white) used to generate the millions of colors produced in displays. The x/y coordinates for each color define its location on the standard CIE chromaticity graph (see *Figure 4-12 CIE 1931 Chromaticity Diagram*) Changing either or both of these numbers will change the hue of the color, and relocate the “triangle” for possible colors.

For example, changing the x/y coordinates for red will either move the color closer to orange or closer to violet. This will in turn affect all displayed colors having a red component. Adjust the slidebars or enter new specific coordinates as desired to define or change up to four “User” color gamuts needed for your environment and applications. Apply the new User gamut at any time in the *Advanced Image Settings* menu.

NOTE: *If adjustment is made above or below the acceptable x,y coordinate limits for a color, Color Space Valid “Error” will appear the next time you enter the menu.*

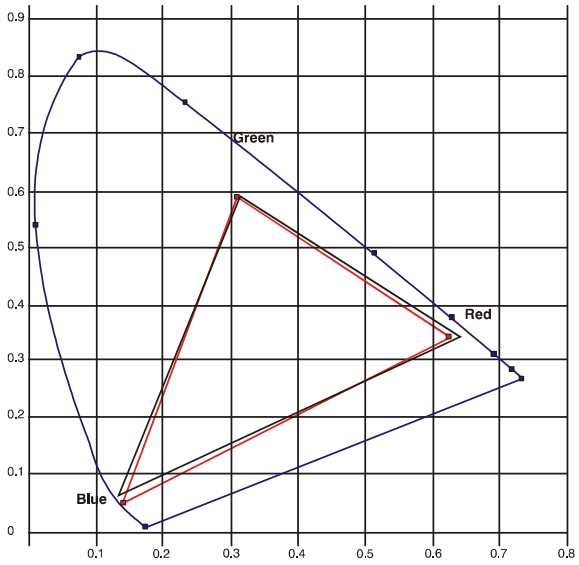


FIGURE 4-12 CIE 1931 CHROMATICITY DIAGRAM

NOTE: *Keep new x,y coordinates within the original color gamut triangle shown here. See 4.13 Using Multiple Projectors, on page 4-20* for X,Y adjustments procedure.

COLOR SATURATION

Use this submenu if you do not have specific color coordinates in mind and will simply judge color performance by eye.

Adjust the hue of each primary color (red, green, blue, and white) by using more or less of it in relation to the other colors.

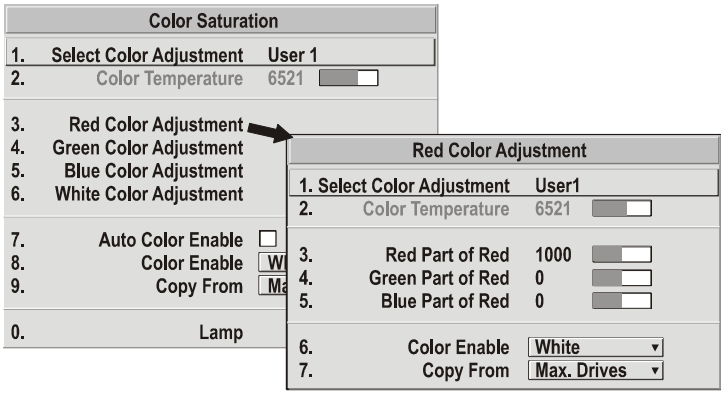


FIGURE 4-13 CUSTOMIZE COLOR

See 4.13 Using Multiple Projectors for Using Color Saturation procedure.

4.9 Diagnostics / Calibration

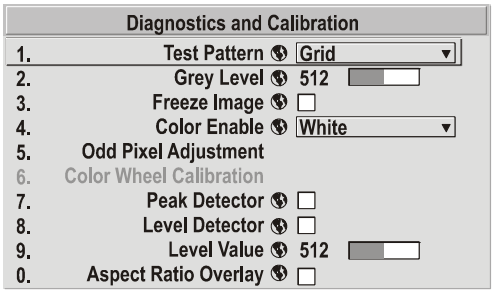


FIGURE 4-14 DIAGNOSTICS AND CALIBRATION SUBMENU

4.9.1 Test Pattern

Choose the desired internal test pattern to display or select OFF to turn off a test pattern. Use the Test key for cycling through test patterns.

4.9.2 Gray Level

Set the desired level of gray for displaying in the full gray field test pattern.

4.9.3 Freeze Image

Enter a check mark to stop an image on a single frame. Use this diagnostic tool to examine in detail a still version of an incoming image that cannot be “frozen” at the source. For example, in moving images it is sometimes difficult to observe artifacts such as external deinterlacing/resizing and signal noise. Remove the checkmark to return back to normal.

4.9.4 Color Enable

Select which color or colors you want to see. This is useful while working with color temperature, input levels or other special setup parameters. Colors can also be enabled or disabled by entering the corresponding function code listed on the back of the standard remote keypad.

4.9.5 Odd Pixel Adjustment

NOTE: *Factory-set and rarely required by user. Source must be >110 MHz.*

When using some RGB sources, you may need to adjust the normal gain or offset of odd pixels in relation to even pixels. This will smooth out very narrow (1-pixel wide) "checks" or vertical stripes that indicate adjacent "on" and "off" pixels. Although offset and gain slidebars can be adjusted individually and manually, using the Level Detector simplifies this process, see *4.9.6 Color Wheel Calibration — Submenu*.

1. Use an external analog native-sized continuous grayscale test pattern with at least 256-levels.
2. Turn "Level Detector" on.
3. Set "Level Value" to ***~200***. The image is now black-and-white (or black-and-one color, if you use "Color Enable" function).
4. Adjust ***offset*** for one color. As you adjust, you will see half of the pixels move, the other half will not.
5. Adjust until the two transition regions overlap. The stripe of noise will be minimized, defined by the value in the slidebar.
6. Continue to adjust offset for the other two colors.
7. Set "Level Value" to ***~800***. The image is now black-and-white.
8. Repeat Steps 4 and 5, but adjusting **gain** for each color. Adjust offset before gain, since offset affects gain.
9. Once all colors are adjusted, your RGB source is OK. Tweak adjustments as required.

NOTES:
1) A value of 128 represents no change in normal odd pixel offset or gain.
2) Odd Pixel Adjustment eliminates "1 pixel on, 1 pixel off" patterns only, not any type of larger patterns.

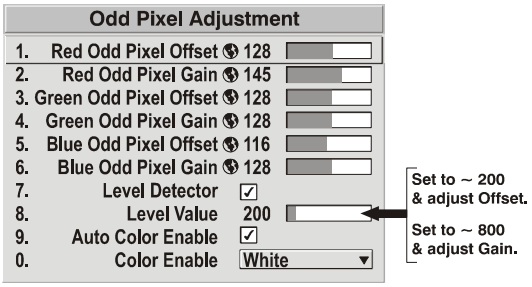


FIGURE 4-15 USING "ODD PIXEL ADJUSTMENT"

4.9.6 Color Wheel Calibration — Submenu

Adjusts the timing of the color wheel. If the color wheel is incorrectly calibrated, the colors throughout the displayed image will appear in various unmatched shades.

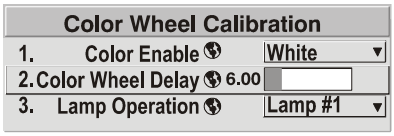


FIGURE 4-16 COLOR WHEEL CALIBRATION MENU

This adjustment is required whenever the color wheel is replaced. To calibrate the color wheel:

1. From the *Diagnostics and Calibration* menu, access *Color Wheel Calibration*. The color ramp test pattern will automatically display and the "Color Enable" option will display "White".
2. Adjust the "Color Wheel Delay" slidebar until the transitions across each color bar in the test pattern appears smooth.
3. Verify your adjustments by choosing different colors through "Color Enable". The transitions across each color bar in the test pattern must remain smooth.

4.9.7 Peak Detector

A method of defining individual input levels to improve the accuracy of input levels set by the "Auto Input Level*"* function. Enabling "Peak Detector" activates an operating mode for detecting ***only*** pixels that are considered black or white, all other levels are displayed as a mid-level gray.

Adjust individual blacklevels and input drives using a 16-step grayscale pattern with black and white bands at opposite edges of the image. Adjust the levels until both bands are just visible. Images from this source will then display correct blacks and whites without "crushing" or washing out.

4.9.8 Level Detector

The "Level Detector" checkbox enables a specific threshold for blacks and whites. Input levels that fall below a specified *Level Value* are displayed as black, and all others are displayed as white. It aids in *Odd Pixel Adjustment*. To use:

1. Enable *"Level Detector"* and display a continuous grayscale.
2. Set "*Level Value"* to near black (such as 200).
3. Adjust Offsets to minimize area of black stripe.
4. Set "*Level Value"* to near white (such as 800).
5. Adjust Gains to minimize area of white stripe.

4.9.9 Level Value

The "Level Value" defines the value to be used by the Level Detector in recognizing blacks and whites. See Level Detector, above.

4.10 Working With the Lamp

The RPMX/RPMSP-D132U projectors are installed with two132W UHP lamps and the RPMSP-D180U projectors are installed with two 180W UHP lamps. Only one lamp will be ON at any given time.

4.10.1 The Lamp Menu

The *Lamp* menu provides performance adjustments for the lamp to achieve the brightest, most uniform image for the life of the lamp. From this menu you can also access "read-only" information pertaining to the present lamps.

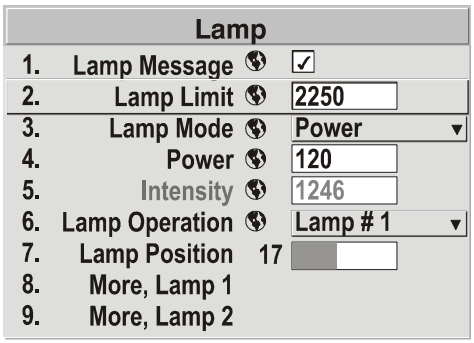


FIGURE 4-17 THE LAMP MENU

Lamp Message

Enter a checkmark to enable a warning message. The message will appear when powering ON if the lamp has reached the specified lamp limit and should be replaced. Delete the checkmark to prevent display of this message. When the lamp expires, the status display will provide a warning to replace the lamp.

NOTES:

1) It is recommended the Lamp Message checkbox remain enabled.

2) If a lamp warning message appears during power-up, press Exit *to temporarily cancel the message. This message will continue to appear upon power-up of the projector until a new lamp is installed.*

Lamp Limit

Set the lamp limit to the number of hours you expect to log on the current lamp before replacing it. This will trigger a lamp message on-screen (if enabled in *Menu Preferences*). The maximum limit for the lamps in the RPMX/RPMSP-D132U is 10000 and 7000 for the RPMSP-D180U.

NOTES:

1) If you change the lamp mode over the life of the lamp, the lamp limit you originally expected may no longer be possible.

2) Frequently turning the lamp on and off will reduce its life.

3) Do not exceed the maximum lamp limit for these lamps, as they can become dangerously fragile with overuse.

Lamp Mode

Select a lamp mode to control the light output of the projector. Generally higher light output or higher power settings can shorten lamp life. You can choose to:

- run the lamp as brightly as possible (i.e. using maximum power)

- power the lamp with a specific wattage

Use the lamp mode that best suits your brightness needs. For example, in a tiled display application you may want to precisely match brightness levels between adjacent images – judge by eye and set each individual lamp "Power" setting as necessary. Or you may want images to be as bright as possible – choose "Max Brightness". Choosing a higher lamp power setting will shorten lamp life.

Lamp modes are:

MAX BRIGHTNESS - The lamp will burn as brightly as possible. It is the same as applying the maximum power level - 132 watts or 180 watts depending on the model. The "maximum brightness" for a lamp gradually diminishes with age making images dimmer over time.

POWER - The power supplied to the lamp will remain at the specified wattage level. Select this option and enter the number of watts representing the power level you wish to maintain. Adjust the slidebar when LAMP MODE is set to "Power", to apply a specific number of watts to the lamp.

A lower power level will produce a dimmer image. Specifying a maximum power level is the same as operating in "Max Brightness" mode, and will shorten lamp life.

Lamp Operation

From the pull down list, specify which lamp to operate the projector with. The other lamp remains in reserve and will only turn on if

- the current lamp fails
- the mode is manually selected using the keypad
- the Lamp Control button is pressed.

NOTE: *A full lamp change will take approximately 80 seconds, including igniting the lamp and reaching partial brightness.The "switch" can take up to 6 minutes, if the lamp doesn't ignite on the first attempt. The projector will try a total of 3 times to ignite the lamp.*

Lamp Position

Use this slidebar to fine-tune the position of the lamp to achieve the brightest image possible. This is a fine motor adjustment that applies to the current operating lamp only.

More Lamp 1 (More Lamp 2)

There are two lamp submenus accessed from the *Lamp* menu. Each submenu is dedicated to one lamp displaying information such as lamp hours, lamp history and the current status of the lamp. You can also change lamp operation modes.

LAMP HOURS – This read-only information shows the number of hours logged on the current lamp. Whenever a new lamp serial number is detected, "Lamp Hours" will reset to the number of hours stored with the new lamp and begin logging time for the new lamp. This information also appears in the *Status* menu.

- **LAMP S/N –** This read-only information displays the serial number for the current lamp.

NOTE *The serial number for each lamp is provided on the lamp card that comes with each lamp. Whenever a lamp is replaced, this card must be replaced. The projector will automatically detect the new serial number from this card and display it here.*

- **LAMP (1 or 2) STATUS –** This read-only information displays the current status of the lamp and can be viewed any time during operation. The lamp status messages you might see are:

GOOD	Displays continually during operation until there is a lamp failure.

FAILED TO STRIKE	Displays when the projector can not turn a lamp on. This may or may not be lamp related, and may require further investigation by the user before proper servicing can take place. For example, a lamp driver may have failed causing the lamp not to ignite.
TURNED OFF UNEXPECTEDLY	Displays when a lamp or lamp related component fails. This error may be caused by a hot lamp, a failed lamp or a lamp driver that has failed.
COOLING FAN FAILED	Displays when one of the lamp cooling fans stop unexpectedly.
OPERATION ERROR	Displays when a lamp fails to move into the required position to operate properly.

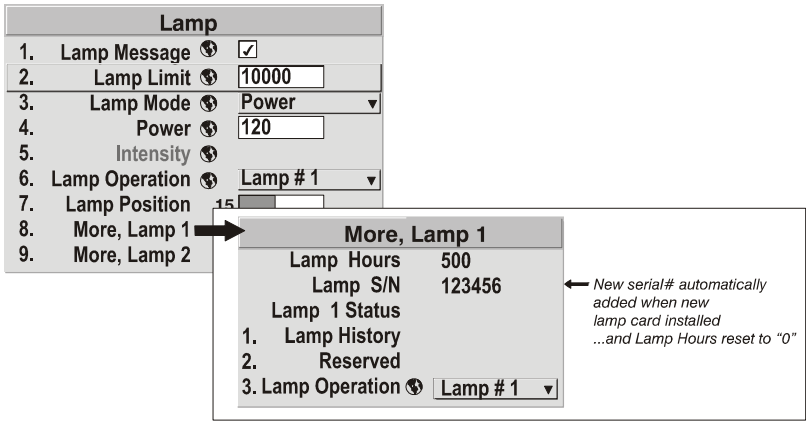


FIGURE 4-18 MORE LAMP OPTIONS

4.11 PIP and Seamless Switching

PIP (Picture-in-Picture) and Seamless Switching are independent but related projector features that utilize two image-processing paths within the projector.

PIP, double processing allows you to display two different images simultaneously, typically a smaller "secondary" image within a large "primary" background.

In a seamless switch, the double processing occurs between displays so that a full image relayed from one source can smoothly transform into a full image from another source. This change can be virtually instantaneous, or slowed so that the current image appears to dissolve or "fade" into the new image.

Options for enabling and controlling PIP and Seamless Switching reside in the same menu. Since both features utilize the projector's double processing capability, PIP and Seamless Switching cannot be used together. For example, fading a pair of PIP images into a new display from a different source is not possible.

For best PIP or Seamless Switching results, use two *different* signal types as defined in *Section Table 4.1* . Do not mix two signals of the same type.

Table 4.1

SIGNAL TYPE	DESCRIPTION (INPUT LOCATION)
#1	5 BNCs (RGBHV or YPbPr)
#2	DVI - I (analog or digital)

#3	Decoded signals (Input 3, Input 4, Composite video, S-Video, or any video signal via Input 1 BNC connectors or via an analog option card).
#4	Analog Option Cards
#5	Digital Option Cards

NOTE *HD interlaced sources are not recommended for the PIP window.*

Other PIP or Seamless Switching tips include:

- When using two digital signals or one analog and one digital, each must be 165 megapixels/sec.
- When using two analog signals, each must be 90 megapixels/sec.
- Avoid using an interlaced source in the PIP window
- Seamless switching may affect image quality in some cases

4.11.1 Working with PIP

NOTE: *To control the primary image, access all picture controls through the Main menu. To control the secondary (PIP) image, access picture controls through the Picture-in-Picture and Switching menu.*

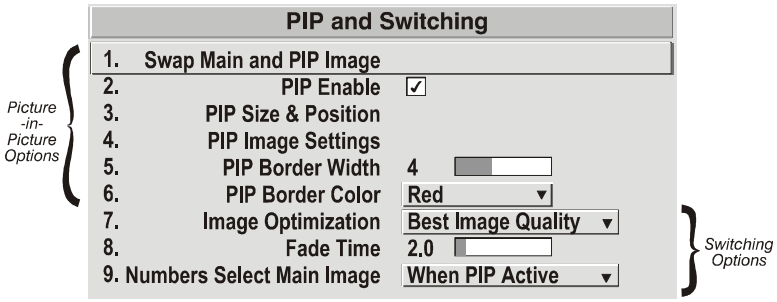


FIGURE 4-19 PIP AND SWITCHING MENU

Use the first of six options in the *PIP and Switching* menu to enable and define how you want to use PIP.

Swap Main and PIP Image

Toggle the current picture-in-picture relationship so that the primary (main) image becomes secondary (PIP), and the secondary image becomes primary. Swapping is available only when PIP is enabled.

NOTE: *There may be a slight delay when swapping the Primary and Secondary images.*

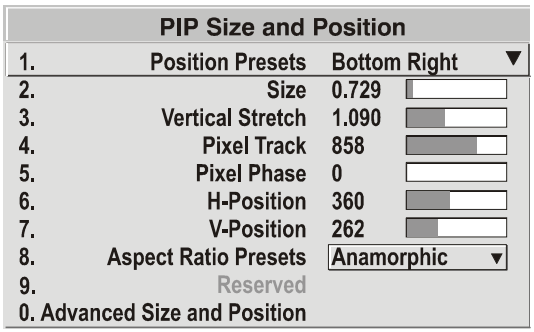
PIP Enable

Short cut: Press PIP on the Remote if menu not present.

Toggle to display from two sources at once (Picture-in-Picture) or the primary source only. This checkbox turns the secondary source on and off.

NOTE: *Disable PIP and Best Switching for Interlaced sources > 35kHz.*

PIP Size and Position – Submenu



Most controls in the *PIP Size and Position* menu adjust the PIP (secondary) image in the same fashion as their counterparts in the main *Size and Position* menu adjust the main image—see *3.5 Adjusting the Image* for details. Exceptions are:

- **POSITION PRESETS –**Set the location of the PIP (secondary) image in the display.
- **ASPECT RATIO PRESETS –** Choose the desired aspect ratio for your PIP pixels. Use the "Default" aspect ratio when incoming format has square pixels (most common). This makes sure that the resulting PIP image maintains its intended aspect ratio. Use "Anamorphic" for NTSC signals having narrower pixels--this will stretch the pixels horizontally to regain the intended aspect ratio of the PIP image.

NOTE: *If the image is already resized at the source it will remain that way in the PIP window. If, for example, an NTSC signal is already set to anamorphic through the Resize and Preset menu it will remain that way in the PIP window. If the NTSC signal is formatted as widescreen at the source, then the image in the PIP window will appear with black bars above and below it.*

PIP Image Settings — Submenu

Adjust the PIP (secondary image) without affecting the size or position. The primary image remains unchanged. See *3.5 Adjusting the Image* for details

PIP Border Width - Set the desired line thickness for your PIP window border.

PIP Border Color - Select the desired color for the PIP window border.

NOTES:

1) Numbers 7 and 8 on the Picture-in-Picture and Switching submenu control switching parameters.

2) Disable PIP to work with Seamless Switching.

3) Disable PIP and Best Switching for Interlaced sources > 35kHz.

4.11.2 Working with Seamless Switching

Seamless Switching is the ability to instantly and/or smoothly switch sources, and is controlled with options 7 and 8 in the *PIP and Switching* menu. To use Seamless Switching, PIP must be disabled.

Tips:

- Make sure a channel is configured for each source.
- Progressive digital and analog sources are recommended.
- Set Image Optimization to Seamless Switching (see below).
- For best results, use the same frame rate and gamma setting for each.

NOTE: *Avoid using two Interlaced sources.*

Image Optimization

Use this setting to choose what is more important, image quality or switching between sources. Selecting *Best Image Quality* will make sure the image is proper, but when switching sources, the screen will go blank increasing your switching time. *Smooth Switching* allows for a cleaner transition between sources. The image will fade from one image to another according to the *Fade Time* control. *Seamless Switching* overrides the *Frame Lock Enable* settings and forces the output to run at 60Hz regardless of the input signal. Image is 100% seamless when switching sources.

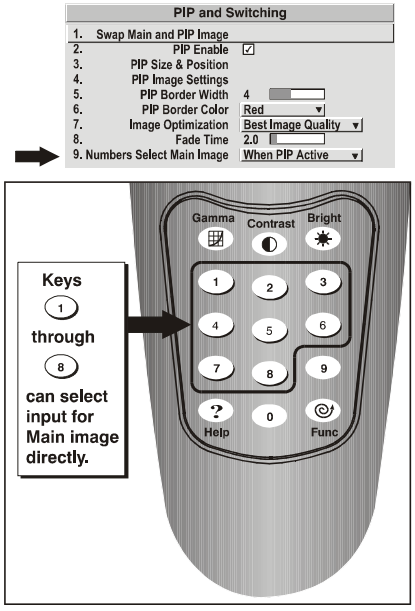
NOTE: *Disable PIP and Best Switching for Interlaced sources > 35kHz.*

Fade Time

Set how long (in seconds) it takes to gradually dissolve one image into another for a source switch when Image Optimization is set to *Smooth Switching*.

NOTE: *PIP must be disabled for Fade Time to take effect. Also, the PIP window must be closed to activate it.*

Numbers Select Main Image



Use *Numbers Select Main Image* to use the numeric keys #1-8 as input keys. This remapping of the keypad (see right) can be particularly useful with PIP displays, providing a convenient shortcut for changing the primary (background) image without first having to return to the *Main* menu. Select “Always” to use the keys

in this manner all of the time, even with single displays. For normal keypad function, select *Never* (default). Set to *When PIP Active* to activate number keys only when PIP is in use.

NOTE: *Numbers Select Main Image keypad functionality works only when menus are closed.*

4.12 Status Menu

The read-only *Status* menu lists a variety of details about the standard and optional components currently detected in the projector. Refer to the *Status* menu for versions of hardware and software installed, the type of lamp defined in projector memory, its current, voltage and hours logged in total and for a specific period, and for your projector model name and serial number. The *Status* menu identifies the current channel, its location, its frequencies and other details.

Scroll the full *Status* menu using ▲ ▼. Use ◀ ▶ for page up/down.

4.13 Using Multiple Projectors

When an installation requires multiple projectors, you can use the RS-232 serial ports to daisy-chain the units together and control the group with a single keypad or a computer/controller connected to the first projector. In such a network, you can choose to broadcast commands to the entire group, or use the Proj key as desired to limit responses to an individual projector.

Alternatively, you may want to add projectors to an Ethernet network.

NOTE: *Refer back to 3.6, Adjusting System Parameters and Advanced Controls for complete information about communicating with multiple projectors.*

4.14 Matching Colors In Multiple Screens

In a multiple-projector wall, you will likely want to precisely match color and intensity from image to image so that the full wall is as uniform as possible. This matching is typically done in conjunction with brightness uniformity.

TIP: *You may need to adjust the position of the on-screen menu (in Menu Preferences) while making these adjustments in order to have a full view of each screen.*

4.14.1 Preliminary Calibration

All primary colors in the projector are set to precise values for optimal color performance. After installation at a site, lighting and other environmental factors can change how these colors appear on the screen. To recover the intended color performance use a color meter to measure the native primary colors—red, green, blue, and white—as they appear at the screen. Record these as *Color Primary Settings* in the *Service* menu (password-protected) for each projector. Using these new values, which are stored in memory, each projector will automatically calculate all corrections to reproduce the original factory colors under the current environmental conditions. This essentially calibrates a projector to adjust for environmental and lighting factors to improve color accuracy and consistency in a group of projectors. It provides a good starting point for further customizing and matching.

To return to the factory-set color primaries, such as when a projector is moved to a different site, you must access the *Service* menu (password-protected). Select the *Reset to Factory Defaults?* option in the *Color Primaries* submenu. Repeat the calibration process describe above and continue with matching of colors.

4.14.2 Color Adjustment Procedure

After the *Color Primary Settings* are calibrated for the site (see *Section 4.14.1 Preliminary Calibration*), use the *Color Adjustments by X,Y* or *Color Saturation* menu to refine each projector's fundamental colors. The hue and intensity of each color must appear the same from one display to another. Once matched, you will have created a single new shared range of colors or "color gamut" that all of your projectors can produce. This palette—named User 1, 2, 3 or 4—can be applied or disabled for a source at any time throughout a bank of adjacent displays, simplifying both the setup and maintenance of a "seamless" wall.

1. Set up and optimize all projector settings. You can ignore color temperature, since you will be redefining color performance in this procedure, but do optimize each projector in every other aspect. Closely align all screen edges.
2. Assign projector numbers to make communications easier. Use a wired keypad.
3. Use the same lamp mode for all projectors, and do the following:
   - Set *Select Color Adjustment* to "Max Drives"
   - Display a full white test pattern
   - Adjust lamp power until adjacent white fields appear the same brightness.
4. Display the *Color Adjustments by X,Y* menus for all projectors. Each menu shows the x/y coordinates defining the "Max Drives" color gamut for this projector. Take note of the values shown in one (any) of the displays. See *Figure 4-20 Make note of a Set of "Max Drives" X/Y Values*. Or use the "Copy From" function to copy them into a "User" gamut in one projector.

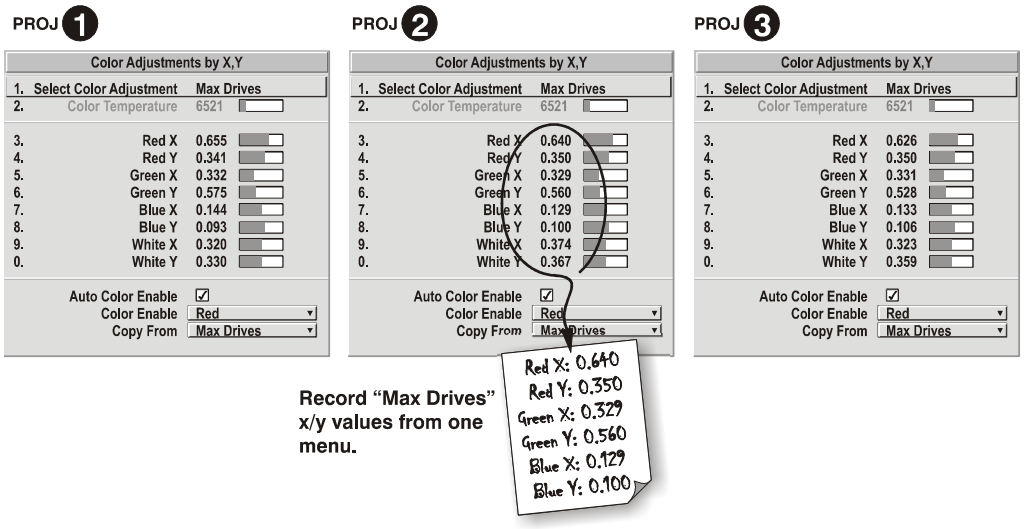


FIGURE 4-20 MAKE NOTE OF A SET OF "MAX DRIVES" X/Y VALUES

5. In each projector, select a "User" color adjustment (1-4) to enable *Color Adjustments by X,Y* changes. Then enter your recorded x/y values into each menu, see *Figure 4-21 Copy X/Y Values into All Projectors*.

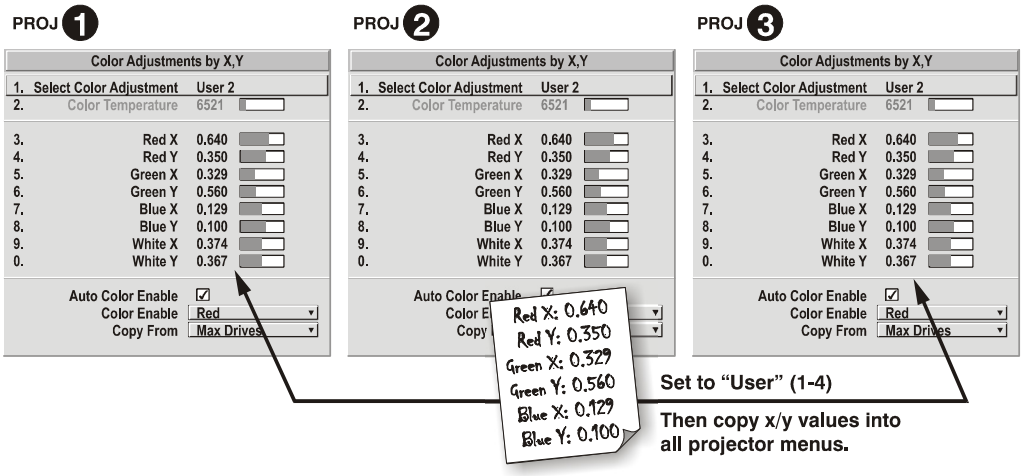
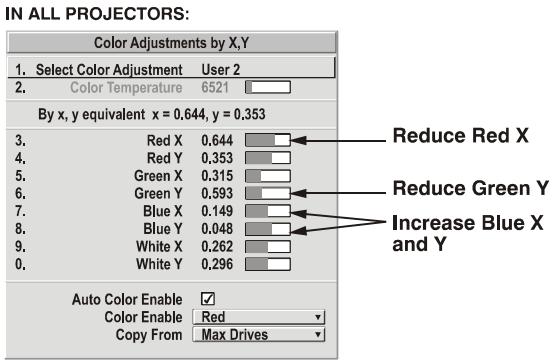


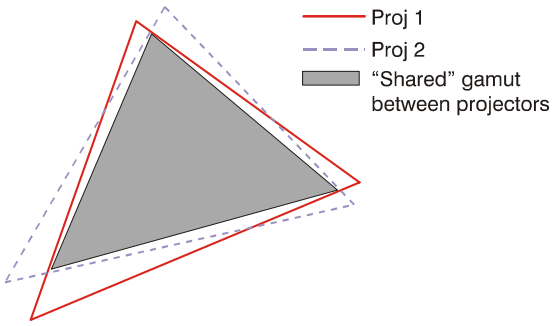
FIGURE 4-21 COPY X/Y VALUES INTO ALL PROJECTORS

6. In each projector, judge by eye and adjust x/y coordinates slightly in the following manner:



- To match reds, decrease " Red X" until full field red screens match.
- To match greens, decrease "Green Y" until full field green screens match.
- To match blues, increase both "Blue X" and "Blue Y" until full field blue screens match.

NOTE: *For speed, enable the "Auto Color Enable" checkbox. Each color coordinate you select will then automatically trigger a full field display of the corresponding color.*



These coordinate adjustments move the 3 color points closer together to establish a "shared" gamut attainable by all projectors in the group. Adjust only as necessary to make sure that the resulting color palette is as large as possible. Adjust lamp power as necessary.

7. All screens are now color-matched. Apply the new "User" gamut to a source by selecting it in the "Select Color Adjustment" list accessed in the *Advanced Image Settings* menu.

4.14.3 Using the Color Saturation Menu for Color Matching

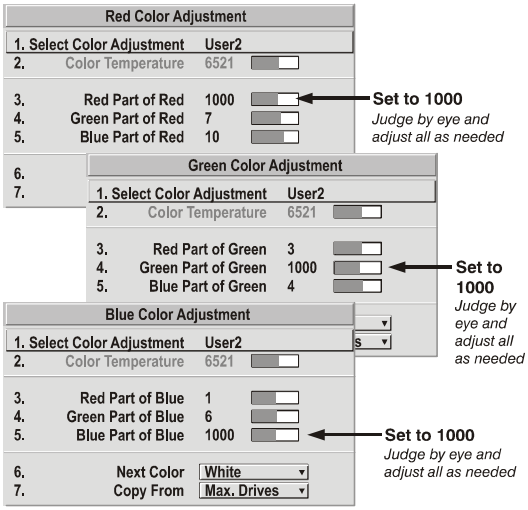


FIGURE 4-22 COLOR MATCHING USING COLOR SATURATION MENU

You may prefer to use the *Color Saturation* menu to match colors across multiple screens. In the three *Color Adjustment* submenus (Red, Green, Blue—see right), set all main values to 1000 and the secondary values to 0. Then judge by eye and adjust the slidebars as needed. Note that adjustments here define new x/y coordinates in the *Color Adjustments by X,Y* menu.

4.14.4 Achieving Brightness Uniformity

What is Brightness Uniformity?

When used to refine screens already matched for their primary colors (see *Matching Colors in Multiple Screens*, above) and overall light output, proper adjustment of *Brightness Uniformity* can create an exceptionally smooth screen in which:

- no area of the screen appears more red, green or blue than another
- no area of the screen appears brighter than another
- color and light output from one screen closely matches adjacent screens

Although the *Brightness Uniformity* control can be used for a stand-alone projector, it is particularly useful for setting up and maintaining tiled images that form a cohesive display wall in which the color "cast" and light output appear uniform throughout each image as well as throughout the entire wall. The procedure provided here assumes a multiple-screen application.

Before You Begin

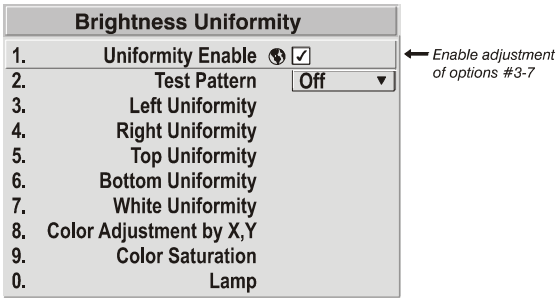
Read through the entire procedure before attempting to adjust Brightness Uniformity controls, and keep in mind the following list of prerequisites and guidelines:

- **ADJUST COLORS FIRST—**Adjust the primary colors as described in *Section 4.14 Matching Colors In Multiple Screens* before working with Brightness Uniformity. This makes sure that primary colors, color temperature, and maximized light output are all matched from one screen to another. These matches are needed before you can achieve good Brightness Uniformity results.
- **RUN LAMP FOR 100 HOURS—**Light output and Brightness Uniformity can vary significantly during the first 100 hours of lamp use. For best results with new lamps, either set up Brightness Uniformity after this period, or do an initial setup and re-check at 100 hours.
- **SET LAMP POWER—**Make sure each "Lamp Power" setting is at the maximum for your application while still maintaining a good overall match of light output from screen-to-screen. Achieving a *uniform* brightness will require a slightly reduced *overall* brightness—this reduction will make sure that there is enough range of adjustment when examining brightness variables from screen-to-screen.It will help prevent "maxing out" before matching to a specific color, zone or projector.
- **USE A "USER" COLOR TEMPERATURE—**Adjust Brightness Uniformity for a *User* color temperature defined when you matched primary colors, and continue to use it for all sources displayed on the wall. Your other color temperatures will not necessarily be matched from screen-to-screen.
- **WHITE UNIFORMITY SLIDEBARS—**White Uniformity slidebar values may not reduce to "0". Each slidebar adjusts overall light output in a specific screen zone, but the value shown represents the current setting for *green* in this zone. When other "hidden" values (red or blue) are lower than green, during adjustment in the White Uniformity menu their values will reach "0" first, causing the slidebar to stop earlier than expected.
- **JUDGE BY EYE OR USE A METER—**Good brightness uniformity can be achieved with either.

Step 1: General Setup

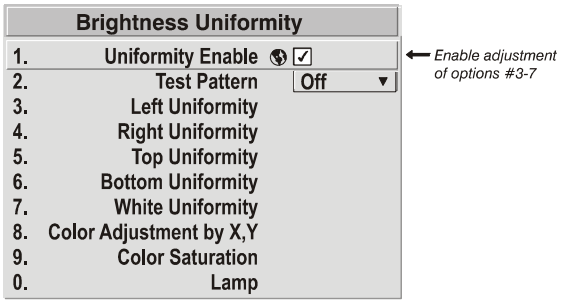
a. Adjust primary colors (see *Matching Colors in Multiple Screens)* to make sure matched overall color temperatures and light output between screens.

IMPORTANT: *Verify that all WHITES and LIGHT OUTPUT are well-matched.*



b. Enable the *Brightness Uniformity* checkbox. This will enable access to the uniformity controls and will apply the settings to your image.

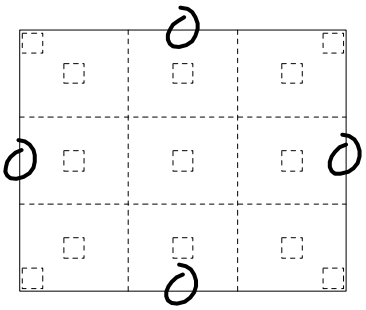
NOTE: *White Boost is automatically disabled (grayed out in menu) when you enable Brightness Uniformity.*



c. Select the 13 Point test pattern for display. This pattern provides 9 screen "zones" with 13 targets.

FOR BEST RESULTS: Rather than examining the CENTER of each zone when assessing Brightness Uniformity adjustments, focus on extreme EDGES as indicated in the illustration at right.

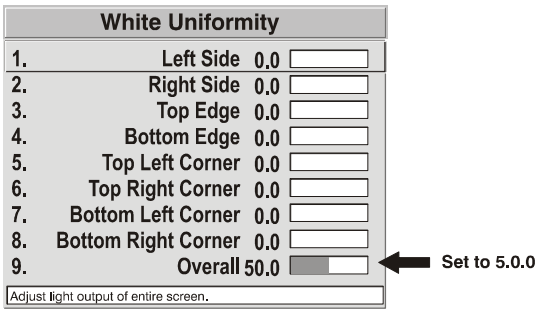
d. In either *Color Adjustment* menu, select a "User" color. Then:



- ***If you have adjusted "User 1" Color Adjustment*** to create a well-matched wall (recommended), select "User 1" and then choose a color. Continue with Step **1e**.
- ***If you prefer maximum brightness*** rather than a particular color temperature, select "Max Drives".

IMPORTANT

Do not change User 1 Color Adjustments in color-matched applications!



e. In the *White Uniformity* menu, set "Overall" to **50.0** and set all others to **0**. This decreases the light output from each color *just enough* throughout the screen so that any color level can then be *increased* later as necessary for matching light output from zone-to-zone. Do not exceed **50.0 for "Overall"**—a higher level will likely interfere with achieving brightness uniformity and is not recommended.

f. Make sure that overall light output remains well-matched from one screen center to the next. Where necessary, increase or decrease Lamp Power to recover center matches.

Step 2: Adjust Color (level of red/green/blue) in 8 Zones

NOTES:
1) Ignore the brightness of individual zones.
2) Ignore menu colors.

a. On each screen, compare the color temperatures in the 8 target zones (4 edges and 4 corners) to that of the color temperature of the center. Compare using a ***white*** field only, and take note of any areas that do not match the center. Also decide if any screen exhibits a more obvious color shift than other screens—begin with this screen in Step **2b**.

b. Return to the *Brightness Uniformity* menu. Beginning with the screen that exhibits the most obvious color shift(s), for each edge that exhibits a noticeably different color temperature from the center, select the corresponding *Uniformity* adjustment menu—*Left*, *Right*, *Top* or *Bottom*. For example, if any part of the left side is too blue, too red or too green, go to the *Left Uniformity* menu and adjust the colors (i.e., change their light output) until all portions of the left side closely match the center color temperature. Adjust an edge first (focusing on its center), then adjust its corners. See *Figure 4-23 Match Zones to Center Color Temperature*.

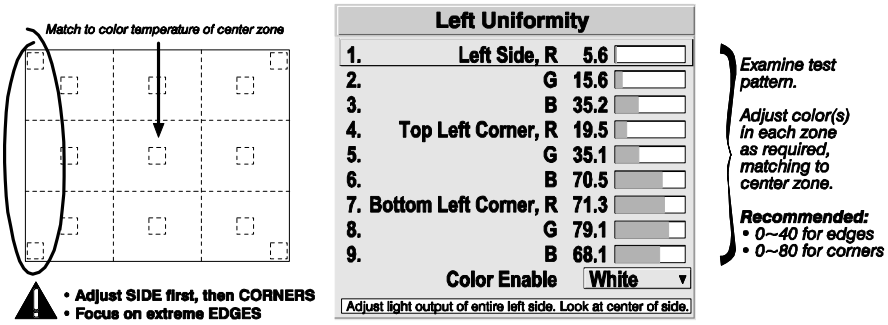


FIGURE 4-23 MATCH ZONES TO CENTER COLOR TEMPERATURE

Repeat the color adjustment of sides and corners for each edge of the screen that does not yet match the center (note that each corner is adjustable in either of its two adjacent "side" menus). When done, all areas of a given screen will match. Repeat Steps **2a** & **2b** for all remaining screens.

Step 3: Adjust Light Output in 8 Zones

c. For each screen, compare the light output of each *edge* and *corner* to that of the *center*. If any of the areas differ, use the *White Uniformity* menu to match edges and corners to the center as described below, see *Figure 4-24 Match Zones to Center Light Output*. Begin with the screen exhibiting the most obvious variations in light output.

- Adjust **edge** *White Uniformity* first—note that each edge adjustment also affects the rest of the screen slightly. Keep all edges just slightly *lower* than the center light output rather than matching light output precisely. Otherwise, it may not be possible to brighten the corners (typically the dimmest areas of the screen) enough. I.e., the best uniformity is a compromise between the brightest and darkest areas of the screen.
- Adjust **corner** *White Uniformity* last—each corner adjustment affects only this quadrant.
- Repeat for each screen.

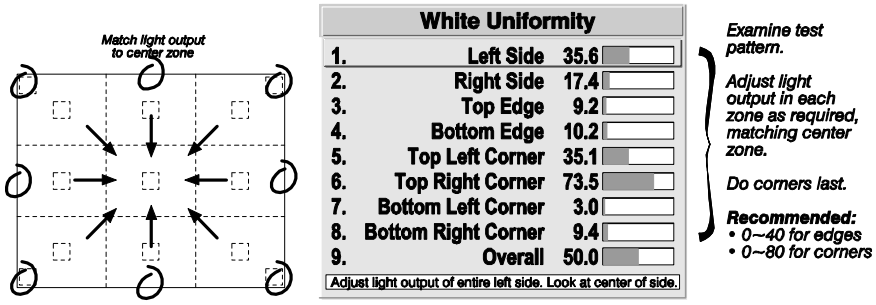


FIGURE 4-24 MATCH ZONES TO CENTER LIGHT OUTPUT

Step 4: Readjust Color Temperature (level of red/green/blue) in 8 Zones

Return to Steps **2a** & **2b** and, if necessary, fine-tune the zones so that they all still exhibit a single color temperature.

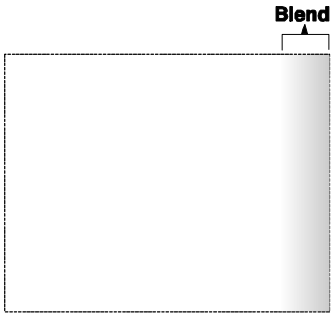
Canceling Brightness Uniformity

If you do not want to use or apply Brightness Uniformity settings, delete the checkmark from the "Uniformity Enable" checkbox at the top of the *Brightness Uniformity* menu.

Christie *Edge Blending* is an innovative set of software functions that can blend white levels along the edges of multiple adjacent projected images to create a single seamless larger image.

4.15 Edge Blending (SXGA Only)

In simple terms, a blend appears as a gradient strip along an edge of a projected image. It is darkest along the extreme edge of the image, and lightens nearer to the rest of the image (see right).



In multiple-projector walls, complementary blends between neighboring images can compensate for the extra "brightness" or intensity where these edges overlap. By controlling blend width and other properties, you can achieve uniformity across the group of images. Visible overlaps will disappear:

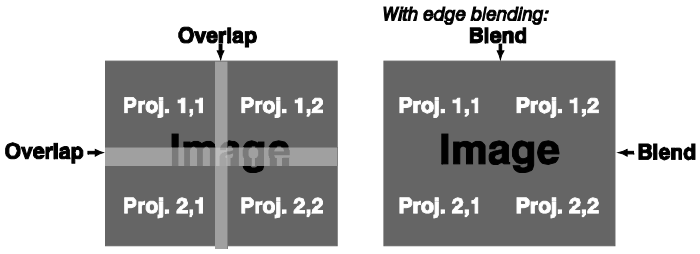


FIGURE 4-25 EDGE BLENDING CONCEPT

For best results, use the same projector model and type throughout your display wall. Avoid high-gain screens whenever possible—the optical performance of such screens demands minimal image offset, thus projectors must be located very close to one another.

Edge blending software controls are located in the 2-page *Edge Blending* submenu—access via *Configuration* menu, then go to the *Geometry and Color* menu and select *Edge Blending*. The *More* option opens the second page of the *Edge Blending* submenu.

Use edge blending controls to set the precise *width*, *shape* and *midpoint* you need to blend overlapping edges together smoothly.

- **Blend Width** determines how much area is used for blending along an overlapping edge. Slidebar values represent the number of 8-pixel steps used for the blend. For example, a setting of "3" creates a blended edge 24 pixels wide. A setting of "0" signifies no blending. For best results in most applications, use a blend width of 16-48 steps (128-384 pixels).
- Ranges: 0-80 horizontal, 0-60 vertical.
- **Blend Shape** determines the rate of roll-off across the blend width, i.e. how quickly the white levels across the blend change from light and dark. Increasing the *Blend Shape* setting accelerates the rate of change at both extremes so that *less* of the region appears mid-gray (see Figure 3.58) Decreasing the *Blend Shape* setting slows the rate of change so that *more* of the region appears mid-gray. For most applications, this subtle control is best left close to 50.

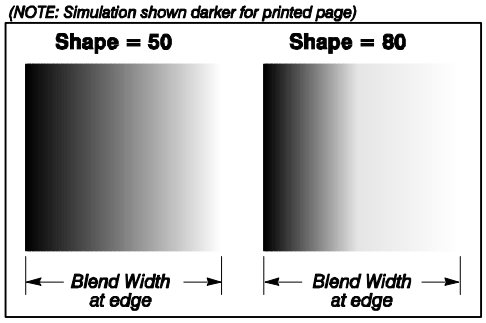


FIGURE 4-26 "SHAPE" EXAMPLES

- **Blend Midpoint** determines the white level at the blend midpoint (the point equidistant between the beginning and end of the blend). Increasing the *Blend Midpoint* setting creates a blend that appears brighter than the rest of the image. Decreasing the *Blend Midpoint* setting creates a blend that is darker than the rest of the image. A setting of 50 means the midpoint is approximately 50% black—for best results in most applications, keep fairly close to this default.

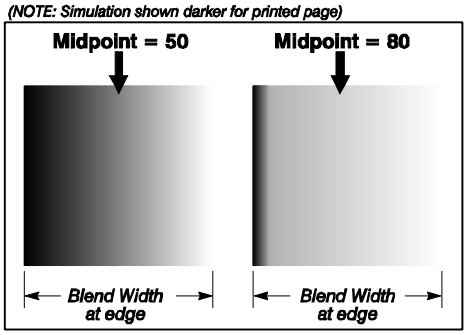


FIGURE 4-27 "MIDPOINT" EXAMPLES

Other Functions

For convenience, the *Edge Blending* submenu also includes related options for enabling a specific color and/or test pattern, or for working with colors or the lamp. Such functions duplicate those provided elsewhere in the menu system.

4.15.1 Edge Blending Procedure

Before working with edge blending software functions, you must:

- Physically align the projectors/images by correctly overlapping the displays from your intended external source
- Match colors and Brightness Uniformity.

IMPORTANT: *For a shared edge, all Blend procedures and settings must be identical on BOTH projectors.*

1. Start with 2 projectors. Display full white field test pattern from both.
2. In the *Edge Blending* submenu, enter a checkmark in the top checkbox to enable *Edge Blending*
3. Set Starting points for adjustment.
   a. Set all blend widths to 0.
   b. Go to "More" and set everything in the Edge Blending (2) menu to 50.

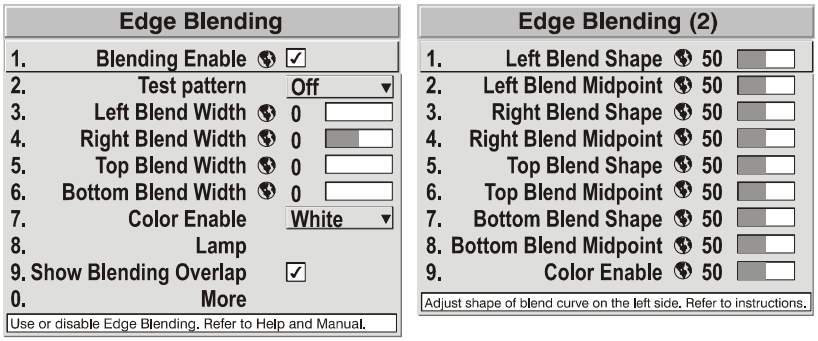


FIGURE 4-28 SET STARTING POINTS FOR EACH PROJECTOR

4. Set Blend Width. On one projector, increase the Blend Width for an overlapping edge. For example, if the projector's image is on left, its right edge overlaps the adjacent image—adjust Right Blend Width. Use the same setting on the second projector for this shared edge.

5. Re-adjust width (both projectors) until the overly bright band at the midpoint of the overlapping blends disappears or changes to very light gray. For the shared edge, use the same *Blend Width* setting on each projector. If the "best blend" appears to be between two settings, choose the wider setting for both projectors.
6. Check Blend. If the blended region appears too dark or light in relation to the rest of the image:
   a. Increase Blend Midpoint in both projectors to "lighten" the overall blend, decrease to "darken" the overall blend.
   b. Adjust Blend Shape in both projectors to fine-tune change the amount of mid-gray intensity (as opposed to black/white) in the blend.
7. Repeat steps 1 to 6 with remaining projectors / overlaps.
8. Check completed display wall with the desired external signal.
9. Adjust mechanical alignment if necessary to maintain perfect pixel-on-pixel alignment over time.
10. In applications where you are projecting only white or light images, the *Blend Width* may be slightly higher. Set according to how much overlap you have between images. Use the following as a guide (examples show overlapping width only—values for overlapping height will differ):
    - If side overlap is **15%**, set *Blend Width* to **24**
    - If side overlap is **20%**, set *Blend Width* to **32**
    - If side overlap is **25%**, set *Blend Width* to **40**
    - If side overlap is **30%**, set *Blend Width* to **48**

4.16 Remote Control of the Projector

As an alternative to using a keypad, most projector functions can be controlled remotely, typically at a controller such as a PC, via simple bi-directional ASCII messaging on an Ethernet or serial communication link.

Setting up a Remote Controller 7

To control projector functions remotely via Ethernet and your own controller, either open an Ethernet socket between your controller and the valid projector address, or connect a serial link between your controller and the RS-422 ports or the RS-232 In port. Connect all ports, if desired.

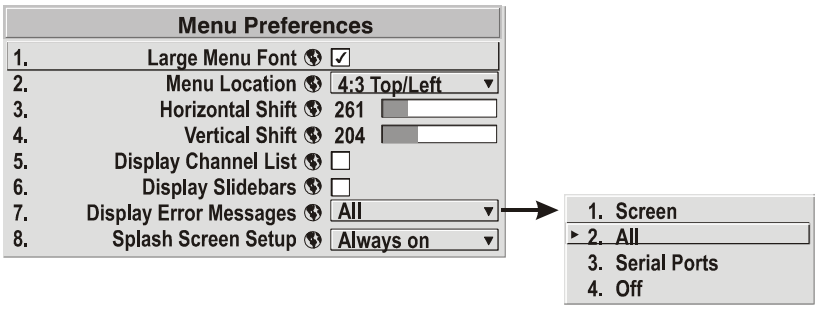
For complete information, including a list of valid ASCII messages and how to structure them for use, obtain the current ***Christie Serial Communications*** document.

4.17 Error Conditions

Occasionally the projector will encounter an error condition that can interrupt normal operation. This can be caused by a simple invalid keypad entry, an input signal error (most common) or a system error. How users are notified of error conditions is set in the *Menu Preferences* menu:

- To see error messages displayed on-screen, select the "**Screen**" option
- To be notified via a serial communication only, select the "**RS-232**" option.
- To receive both types of notifications, select "**All**".

- To disable error messages (except for “invalid user key entry”, which can’t be hidden), select “**Off**”.



The 2-digit error code that corresponds to the message appears in the status display window on the electronics module. During normal operation the status code “0n” is displayed.

4.17.1 User Errors

Invalid User Entry

A keypad entry not recognized by the projector triggers a short on-screen error message identifying the problem. For example, if you specify a channel number that is not available, the message “*Invalid Channel* will appear. Press ↵ or Exit to clear the message.

NOTE: *On-screen display of “Invalid User Entry” messages cannot be disabled, even if Display Error Messages is set to “Off”.*

4.17.2 Input Signal Errors

These messages occurs if you are in presentation level (there are no menus present) and have selected an input on which the projector detects a problem. While menus remain operational and any key press will temporarily remove the error message, you must resolve the signal problem to permanently eliminate the message.

No Signal

Occurs when there is no source signal detected at the selected input—both HSYNC and VSYNC are inactive and the screen background is black. Connect or correct the signal, or try another input.

Bad Sync

Occurs when HSYNC or VSYNC are active but the signal cannot be displayed. This condition occurs when only one of the two sync signals is present, or when either sync signal is unstable or the wrong frequency. Correct the signal or select another input.

Other Signal Error Messages

You may encounter a signal error message indicating that HSYNC and/or VSYNC are either too fast or too slow. When this message appears, check the frequencies shown in the *Status* menu. If they are correct, then the signal is not recognized by the projector. On some PCs you may be able to change the settings to generate a compatible signal. If the frequencies shown in the *Status* menu are incorrect, check the cabling to see where the problem might originate.

4.17.3 System Warnings / Errors

When the projector encounters a system malfunction, a *System Warning* or a *System Error* message will appear. These messages are accompanied by a numerical error code shown in the status display window. A system malfunction can be cleared with Exit Exit from presentation level, but may indicate the need for service by a qualified service technician. For best results reset the projector—power the projector down and up with the (power) key. Wait at least 90 seconds and allow for proper cooling.

NOTE: *System messages appear on-screen only if Display Error Messages is set to "Screen" or "All".*

System Warnings

Indicates that a system malfunction exists. A system warning message replaces any input signal message and disappears when the input signal status changes. While the projector will remain operational, the message indicates a potentially serious problem that should be reported to the manufacturer. Reset the projector.

System Errors

Indicates that a serious malfunction exists and must be reported to the manufacturer as soon as possible. The projector will no longer operate. Reset the projector.

The Status Display

If one of the error codes in table is shown in the status display window you have a system error that will require the attention of a qualified service technician.

Acknowledge and clear the error with Exit Exit from presentation level, or try resetting the projector by powering it off and on again, cooling when necessary. Consult and contact your dealer if the problem persists or if you encounter a code not listed in this table.

For detailed information, monitor the RS-232 IN port. For an indication of engine communication failure, send (SST? 1 15) to get a report.

Error Codes

CODE	DESCRIPTION
GENERAL	
12	Software bug. Contact dealer/factory.
13	Flash memory corrupted. Download new software.
14	Engineering-only programming is complete. Call Christie, replace TIPM.
15	Attempting to download code without being in boot mode.
16	Invalid interrupt. Power off/on. If it persists, contact dealer/factory.
18	Attempting to program boot mode without jumper.
8C	No communication with light engine.
8D	Engine internal failure (all other failures).

CODE	DESCRIPTION
LAMP FAILURES	
27	Lamp 1 Failed to Strike
28	Lamp 1 Turned Off Unexpectedly
32	Lamp 2 Failed to Strike
33	Lamp 2 Turned Off Unexpectedly
38	Lamp Position Failure
39	Lamp 1 Card Not Installed
3A	Lamp 2 Card Not Installed
POWER AND COOLING	
51	TIPM (EM) Fan Failure
53	Lamp Fan Failure
54	DMD Fan failure
55	Ballast A Fan Failure
56	Ballast B Fan Failure
57	Color Wheel Fan Failure
58	Power Fan Failure
TIPM (image processor)	
60	Boot code CRC failed
61	Unable to program the DigMux PLD
62	Unable to program the Control PLD
63	Unable to program the BUBKS PLD
64	Unrecognized ROM type
65	Write to flash ROM failed
66	General image processor failure
67	Downloaded code will not fit in the ROMs
68	Communication problem with scaler on image processor
COLOR WHEEL	
42	Color Wheel Stopped Spinning
BACKPLANE or OPTIONAL INTERFACE MODULE	
A0	Unable to program the Option Card
A1	Unable to power the Option Card

CODE	DESCRIPTION
A2	Unable to program the Backplane module
A3	Unable to program the Warp Module

Error LED Status

Located next to the 2-digit status display is a single LED that will illuminate one of three colors to convey the current status of the system. A solid red LED indicates a system error and the corresponding error code will display in the status display. See *Status LED , on page 3-2* for description of the LED variations. Press Exit to acknowledge and clear the error.

5 Maintenance

The projector is an international regulatory agency approved product designed for safe and reliable operation. It is important to acknowledge the following precautions while operating the projector to assure complete safety at all times.

5.1 Warnings and Safety Guidelines

⚠ WARNING Power down the projector and disconnect all power sources before servicing or cleaning.

⚠ WARNING DO NOT look directly into the projector lens. The high brightness of this projector could cause permanent eye damage.

⚠ WARNING For protection from ultraviolet radiation, keep all projector shielding intact during operation.

⚠ WARNING Installation must be performed by CHRISTIE accredited service technicians

5.1.1 Labels and Markings

Observe and follow all warnings and instructions marked on the projector.

The exclamation point within the equilateral triangle alerts the user to important operating and maintenance (servicing) instructions in the literature accompanying the projector.

The lightning flash and arrowhead symbol within the equilateral triangle alerts the user to uninsulated "dangerous voltage" within the projector's enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

5.1.2 Instructions

Read all operating instructions before using the projector.

5.1.3 Projector Location

Operate the projector in an environment, which meets the operating range as specified in *Section 6* – Specifications.

- Do not operate the projector close to water, such as near a swimming pool. Do not operate in extremely humid environments.
- Do not place the projector on an unstable cart, stand or table. A projector and cart combination must be used with care. Sudden stops, excessive force and uneven surfaces may cause the projector and cart combination to overturn.
- Do not ceiling mount this projector.

5.1.4 Lamps

Lamps require replacement when they have reached their end of life (see *Section 6 – Specifications* for lamp hours and specifications) if they have failed during operation, or have a drastic change in brightness (typical of aging lamps). To effectively maintain operation of the projector, be aware of changes that occur in brightness and the duration of each lamp. Refer to *Section 5.4.1 Replacing a lamp* for more details on lamp replacement.

Follow all safety and warning precautions regarding lamp replacement and handling.

HOT

⚠ WARNING Wait approximately 5 minutes to allow the lamp to cool before removing.

⚠ WARNING Do not stick hands into the lamp compartment during lamp replacement.

⚠ WARNING The lamp is under great pressure when hot and may explode causing physical injury and/or property damage. Allow a lamp to cool before handling and/or powering down and unplugging the projector.

Use only the lamps supplied by CHRISTIE, in the *Lamp Replacement Kit* for these projectors.

5.1.5 Power Cord and Attachments

Use only the attachment accessories recommended by CHRISTIE. Use of others may result in the risk of fire, shock or personal injury.

⚠ WARNING Use only the AC power cord supplied. Do not operate if the AC supply exceeds the specified voltage and power range. See *Section 7*.

- Do not place items on the power cord. Place the projector where the cord cannot be walked on or have objects rolling over it.
- Operate the projector only at the specified voltage. Do not overload power outlets and extension cords as this can result in fire or shock hazards.
- The projector is equipped with a three-wire grounding plug. If you are unable to insert the plug into an outlet contact an electrician to replace the outlet. Do not defeat the safety purpose of this grounding-type plug.

5.1.6 Ventilation

Slots and vents in the projector provide ventilation for reliable operation and prevent overheating. Do not block or cover these openings.

- Do not place the projector over a radiator or heat register.
- Do not place the projector in an enclosure without proper ventilation.
- Do not "poke" objects into the ventilation openings of the projector. They may touch dangerous voltages or short-out components resulting in a fire or shock hazard.
- Do not spill liquids into the projector. If a spill occurs, unplug the projector immediately and have it serviced by a **CHRISTIE accredited service technician**.

5.1.7 Servicing

If any of these conditions exist, immediately unplug the projector from the power outlet and ask a qualified service technician to look at it.

- The power cord is damaged.
- The internal cooling fans do not turn on when the projector is first powered up.
- Liquid is spilled into the projector.
- The projector is exposed to excessive moisture.
- The projector is not operating normally or its performance has significantly deteriorated in a short period of time.
- The projector is dropped or the shipping case (if applicable) is badly damaged.

⚠ WARNING Do not service the projector yourself. All servicing must be performed by CHRISTIE accredited service technicians.

Only use replacement parts that are manufacturer-approved. Using parts not specified by the manufacturer can result in fire, electric shock or risk of personal injury and irreparable equipment damage.

⚠ WARNING Do not service the projector while it is connected to AC. There are exposed voltages that could cause severe physical injuries and possibly death. Disconnect the projector from AC and wait 2 minutes to allow the capacitors on the power supply to discharge before removing the projector's covers.

5.2 Cleaning and Maintenance Guide

⚠ WARNING Power down the projector and disconnect all power sources before cleaning or servicing.

Table 5.1 Table 4.1. Maintenance Guide

Part Description	Frequency	How to clean
Projection Lens	**As required**	**CLEAN:** A small amount of dust on the lens has very little effect on picture quality. Clean only if absolutely necessary. **To clean:** Moisten a clean (not-reused), lint-free cloth with a high-quality optical cleaning fluid. Wipe the cloth in a single continuous motion across the lens surface. Discard the cloth after cleaning. Use compressed air to remove any particles remaining on the lens. **NEVER** use a cleaning solvent that contains ammonia. Avoid lens contact with Xylene and Ether.
Lamp Module (glass exit window only)	**As required**	Clean (glass only): It is important to never touch the glass surface of the lamp. Any oil left by fingerprints will seriously degrade a lamp's performance or cause "hotspots", which can lead to an accumulation of intense heat in the touched area and cause the lamp to shatter. Clean the glass exit surface of the lamp module only when absolutely necessary. **To clean:** Wait until the lamp is completely cool. Moisten a clean, lint-free cotton cloth with isopropyl alcohol and gently wipe the surface of the glass in a circular motion until clean.
	10000 hours or sooner, if required	**REPLACE:** Aged lamps that show a drastic reduction in brightness or have their end of life must be replaced immediately. Refer to *5.4.1 Replacing a lamp, on page 5-6*.
External Projector Covers	**As required**	**CLEAN:** Clean dust from external covers using a clean, lint-free cotton cloth as required. **NOTE:** *Install the lens cap before cleaning the modules. This will prevent dust particles from settling on the glass surface of the lens.*

5.3 Replacing Remote Batteries

The IR remote uses (2) AA size - 1.5V alkaline batteries.

1. Remove the back cover. See *Figure 5-1 Replacing Remote Batteries*.
2. Replace the batteries. The proper positive/negative orientation is indicated by the etching in the bottom of the compartment. See *Figure 5-1 Replacing Remote Batteries*.
3. Install the cover. Make sure the tabbed end is inserted before snapping the opposite end into place.

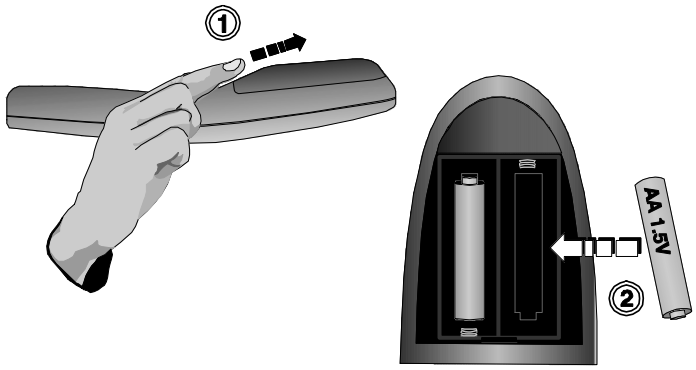


FIGURE 5-1 REPLACING REMOTE BATTERIES

5.4 Lamp Replacement

The RPMX/RPMSP-D132U projector includes 2 132W UHP lamps and the RPMSP-D180U projector includes 2 180W UHP lamps; however, only one lamp is operated at any given time. The other lamp is held in reserve until the user chooses to switch lamps operation modes or a lamp fails. The projector allows the lamp not in operation to be replaced without powering down the projector and while the other lamp is still on. It is recommended the projector be turned off during lamp replacement, this feature benefits applications where downtime must be kept to a minimum.

When do I replace a lamp? Lamps that show a reduction in brightness or have reached their end of life must be replaced immediately. To check the hours each lamp is in use, look at the number of **LAMP HOURS** in individual lamp submenus or in the *Status* menu. From the *Lamp* menu, you can set a **LAMP LIMIT** and enable the projector to send a warning message when it's powered on to indicate the lamps have reached their set limit. See *Section 4.10.1 The Lamp Menu* for more information.

At anytime during operation, you can check the status of a lamp by checking the lamp status in individual lamp submenus – *More, Lamp 1* or *More, Lamp 2*. A status message for the lamp specifies a specific failure that may require further investigation and may be directly related to the lamp. If, through investigation, you rule out the cause being an aged lamp or another component in the projector, it may indicate that your lamp has prematurely burned out or failed (check status LEDs and/or error codes through RS-232, if possible). Burned out lamps or lamps that have failed due to a flaw must be replaced as soon as possible.

In general, monitor the performance of your projector and replace lamps as needed.

5.4.1 Replacing a lamp

1. Press ⏻ to power down the projector. Wait for the internal cooling fans to stop. Turn the main power switch OFF. Allow the lamps to cool for an additional 5 minutes before continuing with Step 2.

⚠ The projector must be powered OFF when replacing a lamp. To replace the lamp in reserve while the other lamp is still on *(hot-swap),* make sure the lamp to be removed is cool.

⚠ WARNING Do not remove a hot lamp.Wait at least 5 minutes after powering down or switching lamp operation modes to allow the lamp to cool sufficiently before removing.

2. Remove the cover over the lamp changer. Turn the thumb wheel (*Figure 5-2*) on the cover until it is loose. Lift the cover off.

FIGURE 5-2 THUMB WHEEL

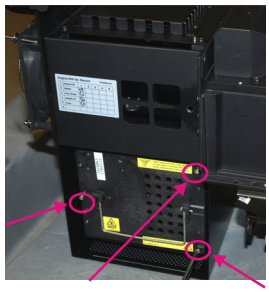


FIGURE 5-3 LAMP LOCK SCREWS

3. Loosen the (3) lock screws (*Figure 5-3*) on the lamp module held in the reserve position.
4. Using the lamp handle, pull the lamp straight up to remove from the projector.

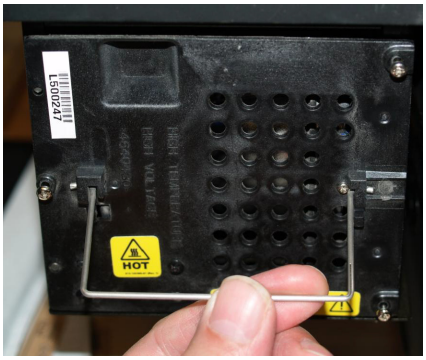


FIGURE 5-4 THE LAMP HANDLE

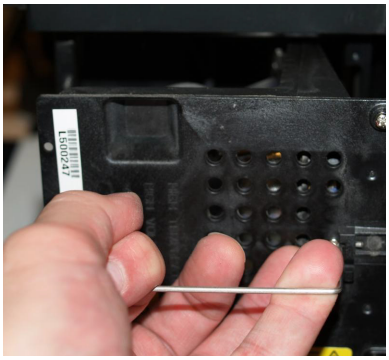


FIGURE 5-5 REMOVE THE LAMP

5. Dispose of the lamp using approved disposal methods for your area.

NOTE: *Lamps containing mercury must be treated as hazardous waste if discarded in large volumes.*

⚠ WARNING **Do not stick your hands in an empty lamp compartment.**

6. Touch the new only lamp by its handle. Align it with the terminal plug located on the side wall of the lamp compartment. Insert the lamp all the way in until it is fully seated – the lamp connector will plug into the terminal plug.
7. Tighten the (3) lamp screws on the new lamp module to "lock" it in place. Lower the lamp handle until it clips in place.

⚠ WARNING **Put the lamp handle flat before requesting a lamp position change.**

8. If the other lamp requires replacement, change the lamp position (*Figure 5-6*) to access the other lamp. Let the lamp cool and replace it using the steps described earlier in this procedure.

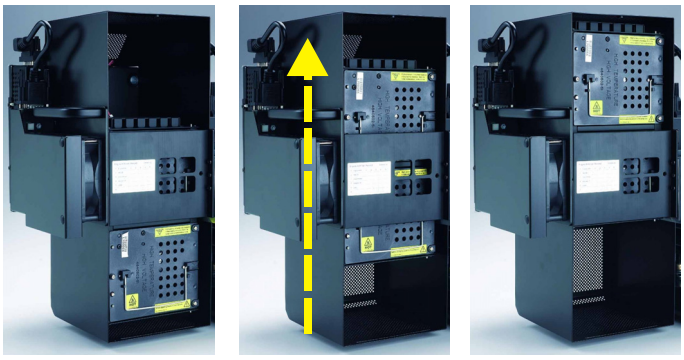


FIGURE 5-6 CHANGING THE LAMP POSITION

9. Each new lamp is supplied with a lamp card that contains lamp specific information such as the serial number. Replace the card in the PHM when a lamp is replaced. The projector will detect the new card and read the new lamp serial number when the projector is powered ON.

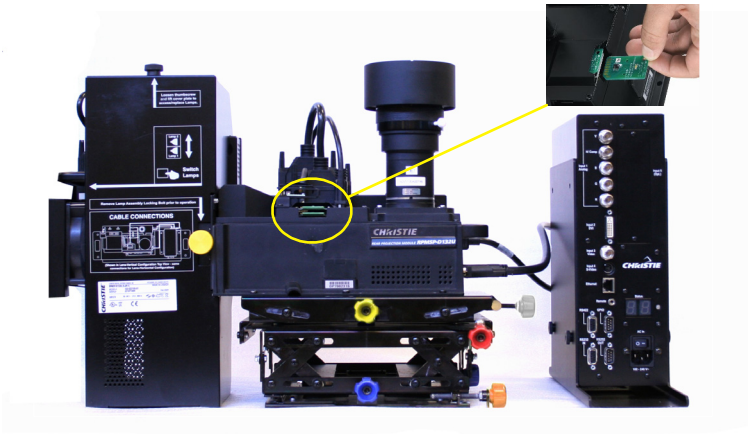


FIGURE 5-7 LAMP CARD

6 Troubleshooting

If the projector is not operating properly, note the symptoms and use this guide to assist you. If you cannot resolve the problems yourself, contact your dealer for assistance.

NOTE: *A qualified service technician is required when opening the projector to diagnose any "probable cause".*

6.1 Displays

The projector is on but there is no display

1. Was a lens cover accidentally left on? Remove lens cover.
2. Is the lamp ignited? It could take up to 5 attempts to strike a lamp. With a 30 second wait period in between each attempt it could take a total of 2 minutes to turn the lamp on. Check **LAMP STATUS**.

   NOTE: *After striking the lamp, it can take up to 5 minutes to achieve full brightness.*
3. Is the correct input selected?
4. Is the source connected properly? Check the cable connections and make sure the correct source is selected.
5. Can you access test patterns? Make sure there is not a full black test pattern selected for display—press Menu ▲ to access test patterns, then cycle patterns with ◀ ▶ keys.

Severe motion artifacts

There is a synchronization problem with reversed 3/2 pull-down in 60Hz-to-24Hz film-to-digital conversion in your source. Correct at the source.

The display is jittery or unstable

1. Make sure that the source is properly connected and of adequate quality for detection. With a poor quality or improperly connected source, the projector will repeatedly attempt to display an image, however briefly.
2. The horizontal or vertical scan frequency of the input signal may be out of range for the projector. Refer to *Section 6, Specifications* for scan frequency ranges.
3. The sync signal may be inadequate. Correct the source problem.

The display is faint

1. Brightness and/or contrast may be set very low.
2. The source may be double terminated. Make sure the source is terminated only once.
3. The source (if non-video) may need a different sync tip clamp location.
4. Adjust **LAMP POSITION** to optimize the position of the lamp for maximum brightness.

The upper portion of the display is waving, tearing or jittering

This can sometimes occur with video or VCR sources. Check your source.

Portions of the display are cut off or wrap to the opposite edge

Resizing and/or blanking may need adjustment.

The display appears compressed (vertically stretched)

1. The frequency of the pixel sampling clock is incorrect for the current source.
2. Resizing, vertical stretch and positioning options may be improperly adjusted for the incoming source signal.

Data is cropped from edges

1. Check settings for Blanking.
2. If incoming data is still missing from the image, reduce the image size to within the display area available in the projector.

Display quality appears to drift from good to bad, bad to good

1. The source input signal may be of low quality.
2. The H or V frequency of the input may have changed at the source end.

The display has suddenly frozen

If the screen blacks out inexplicably, it is possible that excessive voltage noise on the AC or ground input has interrupted the projector's ability to lock on to a signal. Power down the projector and disconnect from AC. Then plug in again and power up as usual.

Colors in the display are inaccurate

1. The color, tint, color space, color temperature and/or other settings may require adjustment.
2. Make sure you are using the proper channel for this source.
3. Check *Color Wheel Calibration*.

The display is not rectangular

1. Check leveling of the projector. Make sure that the lens surface and screen are as parallel to each other as possible.
2. Is the vertical offset correct? Adjust as necessary using the vertical offset knob.
3. Check if Keystone is incorrectly set.

The display is "noisy"

1. Display adjustment at your input source may be required. Adjust pixel tracking, phase and filter. Noise is particularly common on YPbPr signals from a DVD player. (If using a PC source, adjust using a high-frequency test pattern with one pixel on/off throughout.)
2. The video input may not be terminated. Make sure the video input is terminated (75Ohms). If it is the last connection in a loop-through chain, the video input should be terminated at the *last* source input only.

3. The input signal and/or signal cables carrying the input signal may be of poor quality.
4. If the distance between the input source device and the projector is greater than 25 feet, signal amplification/conditioning may be required.
5. If the source is a VCR or off-air broadcast, detail may be set too high.

6.2 Lamps

For more information on lamp operation modes and auto-switching, refer to *4.10.1 The Lamp Menu*.

Projector Delayed on Power Up

The projector enforces a 60 second delay between powering down and up again, because a hot lamp is more difficult to ignite.

NOTE: *It can take 2 minutes to cool a lamp sufficiently enough before re-striking it.*

Powered Up, But No Light on the Wall

It takes approximately 60 seconds for the projector to power up and strike a lamp. A UHP lamp may not strike on the first attempt. In this case, the projector will wait 30 seconds before striking the lamp again. It will try a total of five times before it declares the lamp as *"Failed to Strike"*. Therefore it could take up to 2 minutes before light is seen on the wall. You can check the status of either lamp in the projector by checking **LAMP STATUS** in the *Lamp* Menu, refer to *4.10.1 The Lamp Menu*.

Incorrect Lamp Serial Number on Status Page

When replacing a lamp in a projector with a new lamp, remember to replace the lamp card (PCB). This card contains key information about your lamp, such as serial number, and factory default color primaries. If not installed, this can lead to incorrect lamp histories and difficulty with projector color matching.

6.3 Ethernet

1. Make sure the Ethernet settings are valid for your site—all network devices should have the *same* subnet mask and *unique* IP addresses.
2. Save any address change, and re-boot to implement.
3. If you still have trouble establishing communications with a projector added to an existing Ethernet network, the projector's IP address is likely in conflict with another address already in use. Contact your network administrator.

7 Specifications

Due to continuing research, specifications are subject to change without notice.
Specifications apply to all models unless otherwise noted.

7.1 Display

	RPMSP-D132U	RPMX-D132U	RPMSP-D180U
RESOLUTION			
	SXGA+ (1400x1050)	XGA (1024 x 768)	SXGA+ (1400x1050)
BRIGHTNESS			
132W White Boost ON	2320 lumens	790 lumens	
132W White Boost OFF	1390 lumens	465 lumens	
120W White Boost ON	2100 lumens	660 lumens	
120W White Boost OFF	1225 lumens	365 lumens	
160W			1259 lumens
180W			1422 lumens
CONTRAST RATIO			
	2365:1	1180:1	2009:1
BRIGHTNESS UNIFORMITY			
	90%	90%	90%
COLORS AND GRAY SCALE			
Resolution	8 bits	8 bits	8 bits
Displayable Colors	16.8 million	16.8 million	16.8 million
COLOR WHEEL			
Type	RGWB	RGWB	RGBRGB
COLOR TEMPERATURE			
Range of Adjustment	3200K – 9600K	3200K – 9600K	3200K – 9600K
Color Temp. Variation	500K	500K	500K

7.2 Inputs

Applies to RPMX/RPMSP-D132U and RPMSP-D180U

ANALOG RGB OR YPRPB	(Interlaced or Progressive Scan Format)	
Pixel Clock Rate	13 – 210 MHz max	
Color Space	RGB or YPbPr	
Input Levels:	R, G, B, - with sync:	$1.0V_{p-p}$ ±2dB
	R, G, B, - without sync:	$0.7V_{p-p}$ ±2dB
	Pb, Pr	0.7_{p-p} ±2dB
	DC Offset	±2V
	Nominal Impedance	75 ohms
SYNC	(Interlaced or Progressive Scan Format)	
Horizontal Frequency Range	15 – 120 kHz	
Vertical Frequency Range [1,3]	23.97 – 150 Hz	
Sync Type	Separate H and V	
	Composite (bi-level, tri-level, XOR) Sync-On-Green/luma (bi-level, tri-level) Serrations and/or Equalization pulses MarcoVision™ compatible	
Polarity[2]	Positive or Negative	
Input Levels[2]	$0.5V_{pp} – 4.0V_{pp}$	
DC Operating Range[2]	±3V	
Nominal Impedance[2]	75 ohms	
Horizontal Sync Duty Cycle3% min, 20% max		

NOTES: *1)Value specifies frame rate of non-interlaced sources and field rate for interlaced sources. Frame/field rates higher than the maximum refresh rate of the panels will be displayed at a lower rate.*

2) Does not apply to sync-on-green/luma.

3) As the horizontal frequency increases and/or as the vertical scaling ratio of input lines to output lines increases many sources will run into the internal 180Mpix/s processing which limits the number of pixels that can be processed.

COMPOSITE VIDEO AND S-VIDEO		
Signal Formats	Composite-video (CVBS)	S-video (Y/C)
Video Standards	NTSC, NTSC 4.43, PAL, PAL M, PAL N, PAL60, SECAM	
Input Levels	Composite-video	1.0Vp-p ±3db *(including sync tip)*
	S-video luma (Y):	1.0Vp-p ±3dB *(including sync tip)*
	S-video chroma (C)	630*m*V nominal (burst)
	DC Offset	±2V
	Nominal Impedance	75 ohms

DVI-I – ANALOG	
Input Characteristics	Same as Analog RGB except as noted below.
Formats	RGB or YPbPr – video signal cannot be routed to the decoder
Sync Types	Separate H and V (direct or swapped) Bi-level – TTL levels only Composite (XOR, OR) Sync-on-green Serrations and/or Equalization pulses MacroVision™ (standard & progressive)
Analog Sync Logic Low	0V – 0.8v
Analog Sync Logic High	2.4V – 5V
Analog Sync Input Impedance	1kΩ

DVI-I – DIGITAL	
Input Characteristics	meets DVI spec
DVI Cable Length	5m
Max Pixel Rate	165 MPix/s
EDID	Supported

RS-232/RS-422 SERIAL INPUT	
Connector Type	2 male DB9 (RS-232 OUT, GPIO) 2 female DB9 (RS-232 IN, RS-422 IN)
Maximum Baud Rate	115200

NETWORK CONTROL	
Ethernet	1 RJ45 connector

REMOTE CONTROL	
Type	Low Frequency IR with wired ability
Range	30 Meters
Laser Pointer	Included
Battery Type (2 Required)	AA, 1.5V Alkaline

WIRED CONTROL	
Connector Type	3.5mm plug
Input Levels	High: 2.2V min. Low: 0.9V max. Power: 500mA @ 5V

7.3 Power Requirements

GENERAL	RPMX-D132U	RPMSP-D132U	RPMSP-D180U
Voltage Range	100 – 240 VAC nominal	100 – 240 VAC nominal	100 – 240 VAC nominal
Line Frequency	50 – 60 Hz nominal	50 – 60 Hz nominal	50 – 60 Hz nominal
Maximum Inrush Current	30A max.	30A max.	75A max.
Current Rating (typical)	2.13A @ 100VAC	2.26A @ 100VAC	2.95A@100 VAC
	0.89A @ 240VAC	0.94A @ 240VAC	1.21A@240 VAC
Power Consumption	213W	226W	276W

7.4 Lamps

NOTE: *The projector uses two identical lamps; however only one lamp operates at any given time.*

	RPMX/RPMSP-D132U	RPMSP-D180U
Type	132W Philips UHP	180W Philips UHP
Power	120 - 132 Watts	160 - 180 Watts
Operating Position	± 20 deg. tilt from horizontal plane	± 20 deg. tilt from horizontal plane
Warm up to full brightness	5 minutes	5 minutes
Lamp Life (typical)	10000@100W	7000@160W

7.5 Size and Weight

Dimensions with adjuster in nominal position *(Depth x Length x Height)*

90-degree configuration 15.5” DP x 33.5” LG x 15.6” HT

0-degree configuration 14.9” DP x 33.5” x 17.7” HT

Weight<50 lbs

For projector dimensions and mounting information see *Appendix B Dimensions & Mounting Information*.

7.6 Safety and EMI

CSA C22.2 No. 60950-1-03 First Edition

UL 60950-1 1st Edition

IEC 60950-1:2001 European Norm, Safety of Information Technology Equipment

Emissions

FCC Code of Federal Regulations, Title 47, Part 15, Conducted and Radiated Emissions, Class A

EN55022 (CISPR 22) for Information Technology Equipment, Conducted and Radiated, Class A

EN61000-3-2 Induced Harmonic Distortion

EN61000-3-3 Induced Voltage Fluctuations (Flicker)

Immunity

EN55024, specific to Information Technology Equipment (all parts), under which are:

EN61000-4-2 ESD,

EN61000-4-3 Radiated Immunity,

EN61000-4-4 Fast Transient/Burst Immunity

EN61000-4-5 Surge Immunity,

EN61000-4-6 Immunity to Conducted Disturbances,

EN61000-4-8 Magnetic Field Immunity,

EN61000-4-11 Voltage Dips, Short Interruptions and Voltage Variations Immunity

7.7 Environmental

Operating Environment

Temperature	5°C to 30°C (40°F to 86°F)
Humidity	20% - 80% non-condensing
Altitude	0 - 10,000ft, -5°C to 50°C

Non-Operating Environment

Temperature	-25°C to 70°C with relative humidity varying between 0% to 95%
Altitude	30,000ft, -25°C to 70°C

7.8 Standard Components

- Line Cord (rated, North American)
- Configuration bracket (shipped loose, for vertical configuration)
- (6) M6 screws (for installation of configuration bracket)
- EM mounting bracket

7.9 Optional Accessories

User's Kit *(includes User Manual, IR Remote Keypad, Setup and Adjustment Tools)*

Service manual

Dual frequency IR remote keypad

Optional Input Modules

RGB500 Input Module

RGB400 Active Loop-Through Input Module

RGB400 Buffered Amplifier Input Module

PC250 Analog Input Module

Serial Digital Input Module

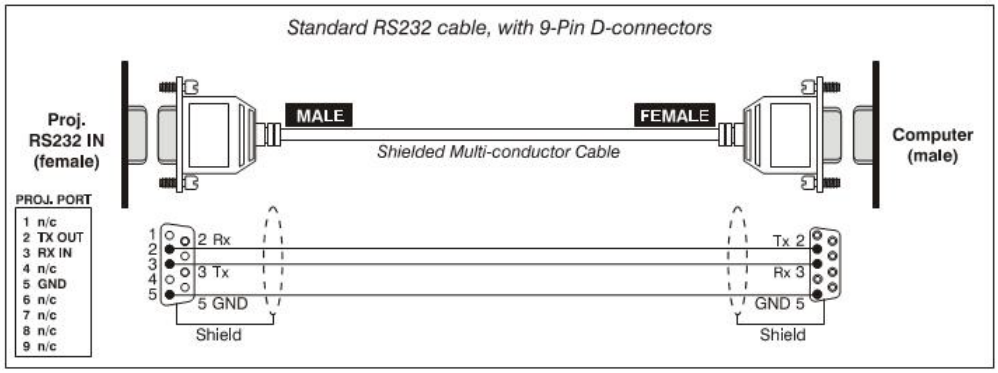
DVI/DFP Input Module

Dual SD/HD-SDI Module

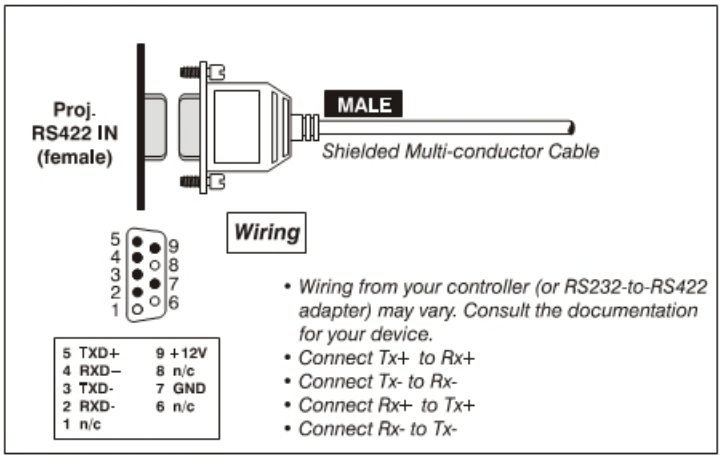
A Cable Connections

A serial link of RS-232 or RS-422 enables ASCII communication with the projector so that it can be controlled remotely from a PC or other controller. From a PC, connect a standard 9-wire RS-232 serial cable to the **RS-232 IN** port. Or, for long-distance (>100 ft.) links with an RS-422-compatible PC or controller, connect RS-422 cable to the **RS-422** port.

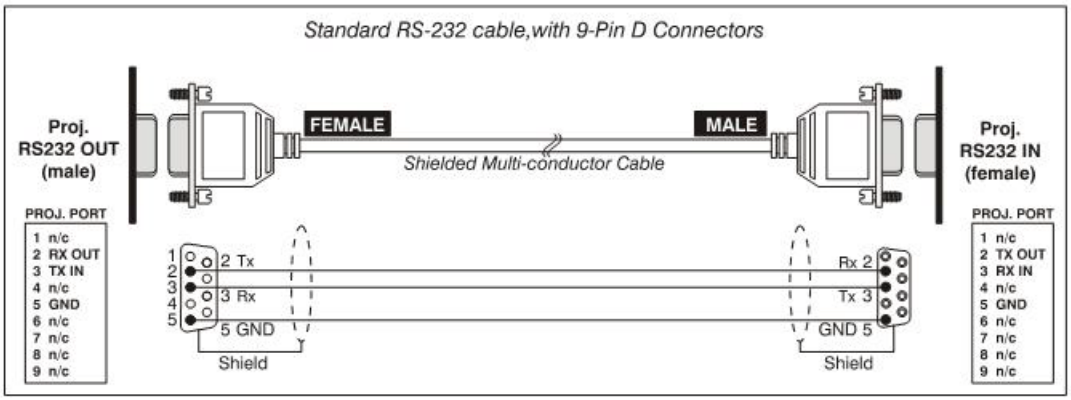
A.1 Projector to Computer (RS-232)



A.2 Projector to RS-422 compatible Computer



A.3 Projector to Projector



B Dimensions & Mounting Information

B.1 Horizontal Configuration

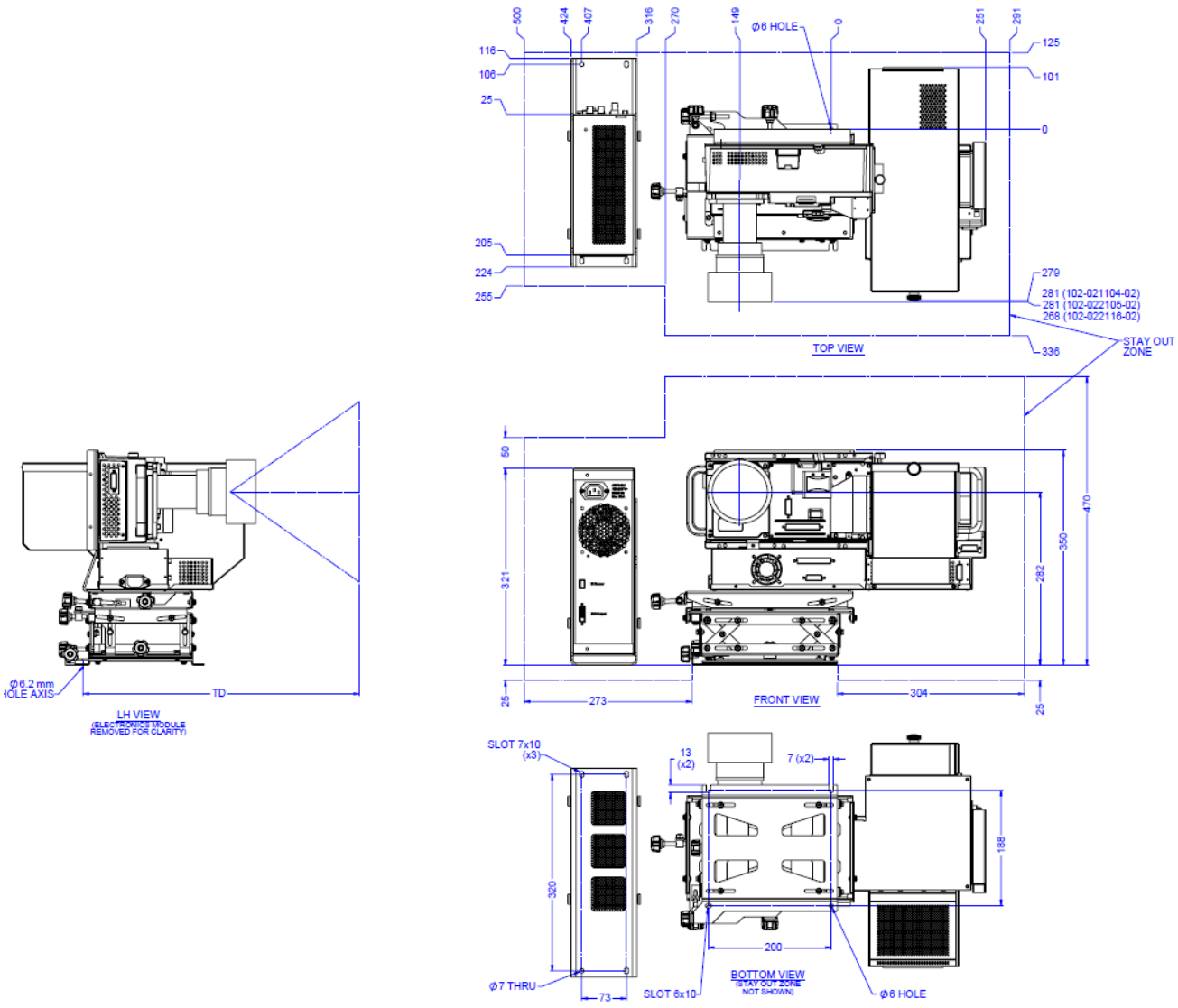


FIGURE B-1 HORIZONTAL CONFIGURATION

B.2 Vertical Configuration

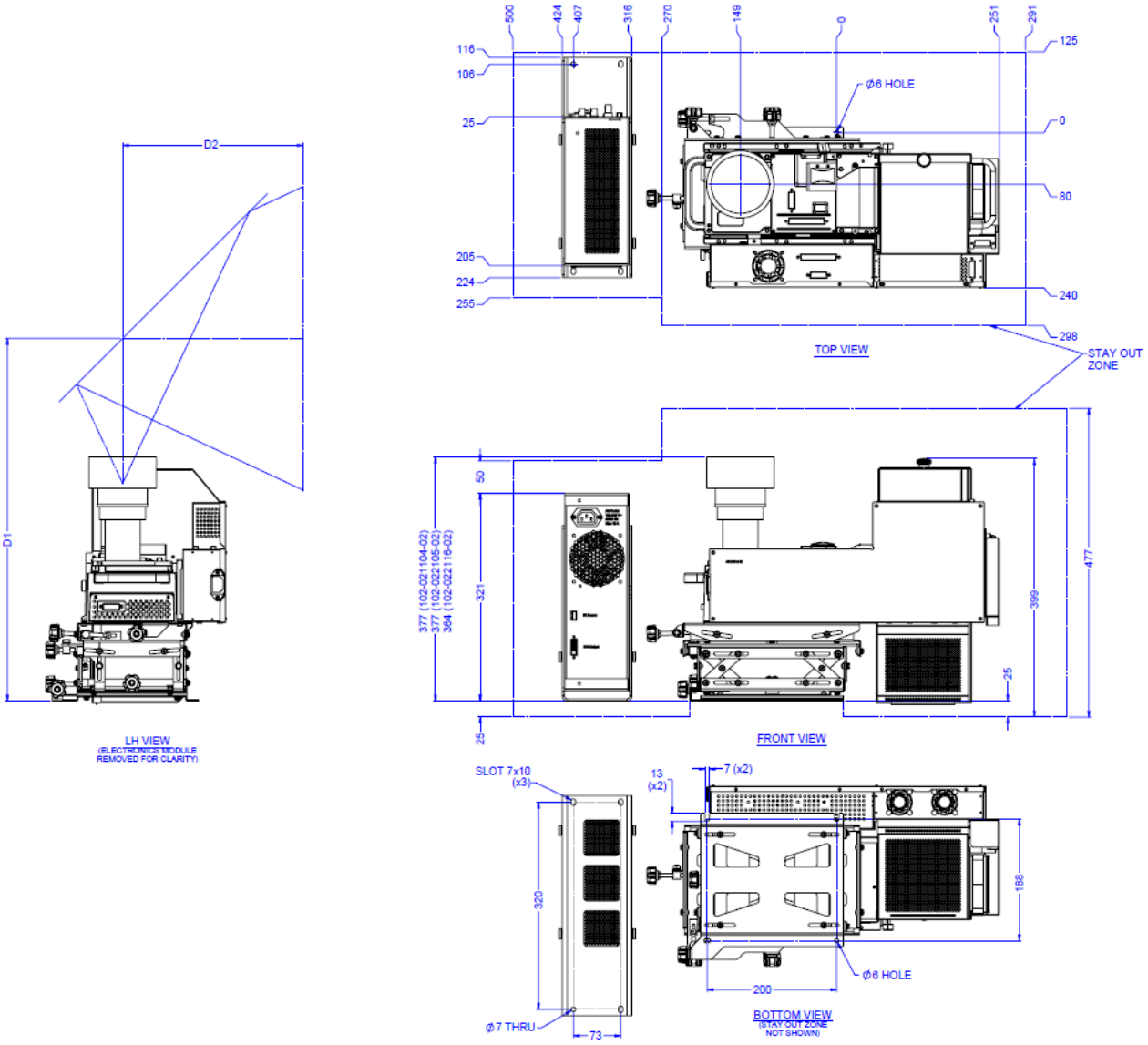
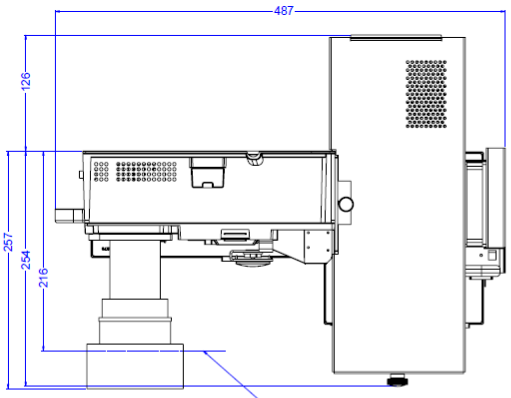
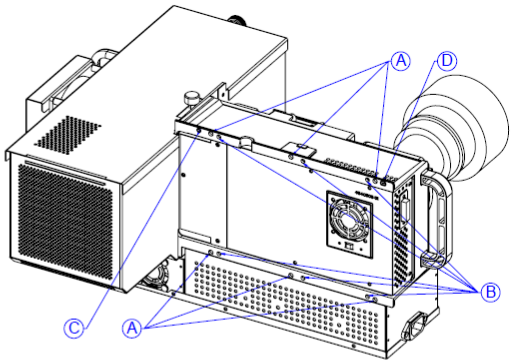


FIGURE B-2 VERTICAL CONFIGURATION

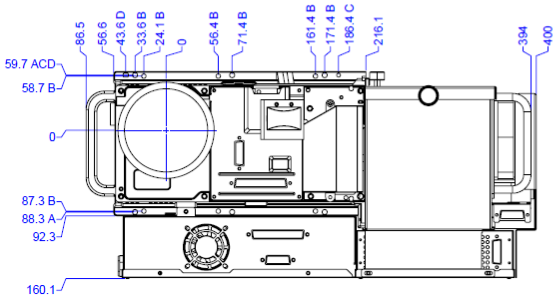
B.3 Horizontal Configuration for SXGA



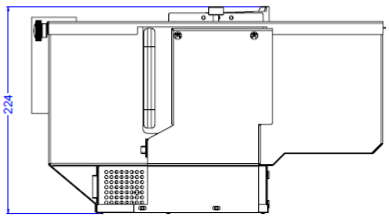
TOP VIEW



A. ∅5.5 mm HOLE.
B. M5x0.8 mm HOLE.
C. ∅4.1 mm PIN HOLE.
D. 4.1x6.5 mm SLOT.

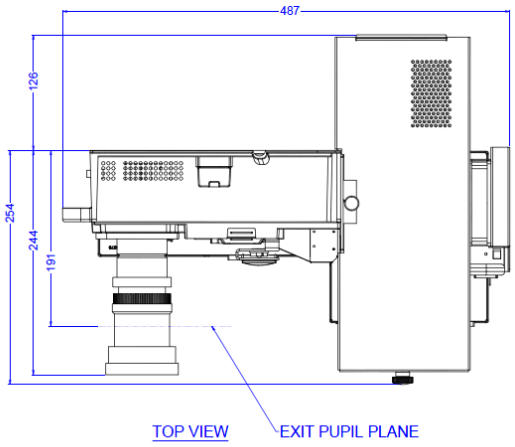


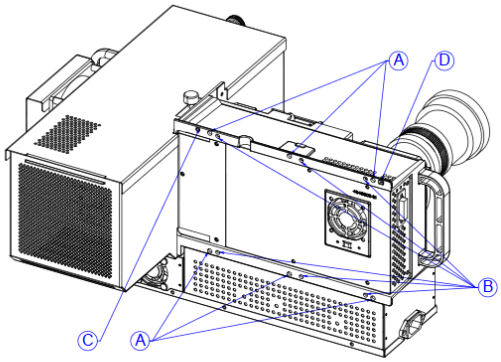
FRONT VIEW



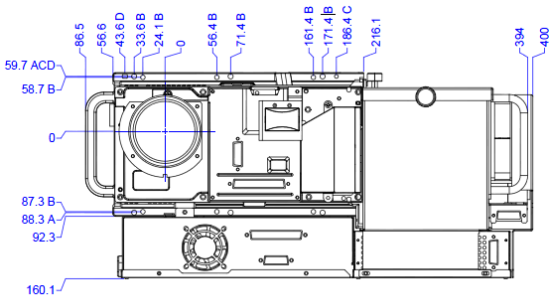
RH VIEW

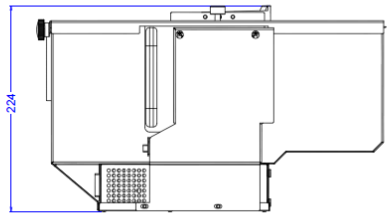
B.4 D132U Horizontal Configuration for XGA





A. ∅5.5 mm HOLE.
B. M5x0.8 mm HOLE.
C. ∅4.1 mm PIN HOLE.
D. 4.1x6.5 mm SLOT.

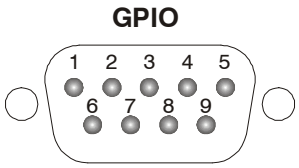




C System Integration

The GPIO connector located on the input panel provides a flexible method of interfacing external I/O devices to the projector. There are 7 GIO pins on the 9 pin GPIO connector, which are configurable via RS-232 commands. The other two pins are reserved for ground and power. See Table C.1 for pin identification.

Table C.1 GPIO Pins



PIN NUMBER	SIGNAL
1	+ 12V (200mA)
2	GPIO 1
3	GPIO 2
4	GPIO 3
5	Ground
6	GPIO 4
7	GPIO 5
8	GPIO 6
9	GPIO 7

The serial cable required for connecting the external device to the projector's GPIO connector, whether it's a standard serial cable or a custom one, must be compatible with the external device.

C.1 Configuring the GPIO

The GPIO connector can be configured to automate any number of events using the serial command code **GIO**. Each pin is defined as either an ***input*** or ***output*** depending on the desired outcome. In general, configure the pin as an input if you want the projector to respond to something the device does and as an output if you want the external device to respond to an action taken by the projector. For example, configure the pin as an output if you want the lighting in a room to automatically dim when the projector is turned on.

By using the GIO command, you can also set the state of each pin as ***high*** or ***low***. By default, the state of each pin is ***high.*** The voltage applied to pins in the *high* state is + 3.3V.

Example 1. Turn room lighting on when the projector is turned off. *(Assumes a control/automation unit is configured to turn the lights on when pin 2 of its input goes high.)*

(GIO C2 O)	Set pin #2 configuration to output
(GIO 2 H)	Set pin #2 to high (state)

Query Command

(GIO?)	Request the state and configuration of all pins
(GIO! “HHLLHLH” “OOIOOOI”)	Reply with pin state and configuration
(GIO? C2)	Request the configuration for pin #2
(GIO! C2 O)	Reply with pin #2 configuration as output
(GIO? 2)	Request the state of pin #2
(GIO! H)	Reply with pin #2 state as high

C.1.1 Real Time Event

Use the serial command **RTE** to specify an action that is initiated at a particular time or based on an external stimulus.

For General Purpose IO “G”

Parameter	Name	Value
P1	RTE type	G (Real Time I/O Event)
P2	I/O bit	1-7
P3	Pin state (1 Character) (String)	H = High L = Low “LHXXXHL” Combine multiple inputs and trigger occurs when all conditions are met
P4	Commands	Any valid serial protocol command for the device

Example 2. Projector powers up when a switch on the external device is turned on.

(GIO C2 I)	Set pin #2 configuration as input
(RTE G 2 H “(PWR 1)”)	Power on when pin #2 set to high
(RTE G 2 L “(PWR 0)”)	Power off when pin #2 set to low

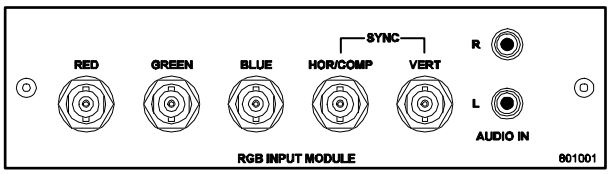
D Optional Input Modules

There are many optional input modules and accessories currently available for this projector. Contact your dealer for a complete and up-to-date listing.

NOTE: *Always unplug the projector or switcher before installing or removing any optional input module.*

D.1 RGB500 Input Module 38-804606-xx

The *RGB500 Input Module* may be installed in this projector, a *Marquee Signal Switcher*, or a *Marquee Case/Power Supply*. The module receives analog RGB input signals from computers or other RGB source devices.



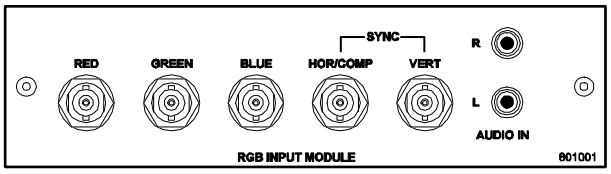
RGB500 Features

- accepts 3, 4, or 5 wire RGB video (sync-on-green, composite sync, or separate horizontal and vertical sync), up to 500 MHz bandwidth
- BNC connectors for RGB signal inputs

NOTE: *The audio connectors are not functional.*

D.2 RGB400BA Input Module 38-804610-xx

The *RGB400 Buffered Amplifier Input Module* may be installed in this projector, in a *Marquee Signal Switcher* or in a *Marquee Case/Power Supply*. Connect three-, four-, or five-wire RGB video signals of up to 400 MHz bandwidth, signals typically produced by high-resolution computer or workstations. The buffering capability of the module enables the incoming signal to be sent to a remote destination. Inputs are 75Ω terminated.



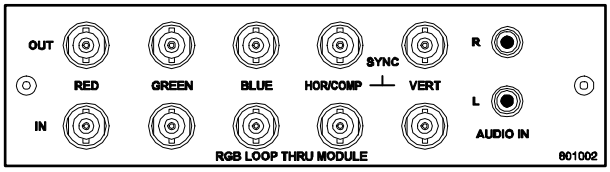
RGB400BA Features

‡accepts 3, 4, or 5 wire RGB video (sync-on-green, composite sync, or separate horizontal and vertical sync)
‡BNC connectors for RGB signal inputs
‡Buffered signals to a remote destination

NOTE: *The audio connectors are not functional.*

D.3 RGB400 Active Loop-Thru Input Module 38-804607-xx

The *RGB400 ALT Input Module* may be installed in this projector, a *Marquee Signal Switcher*, or a *Marquee Case/Power Supply*. The module receives analog RGB input signals from computers or other RGB source devices. Video inputs are 75Ω terminated. Video outputs provide buffered loop-through to another display device.



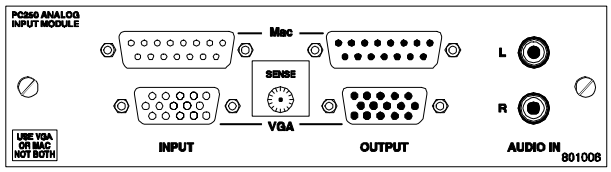
RGB400ALT Features

‡accepts 3, 4, or 5 wire RGB video (sync-on-green, composite sync, or separate horizontal and vertical sync)
‡BNC connectors for RGB signal inputs
‡buffered loop-through video outputs

NOTE: *The audio connectors are not functional.*

D.4 PC250 Analog Input Module 38-804609-xx

The *PC250 Analog Input Module* may be installed in this projector, a *Marquee Signal Switcher* or a *Marquee Case/Power Supply*. The module receives analog RGB input signals from IBM PC compatibles or Macintosh computers. Video inputs are 75Ω terminated. Video outputs are provided for buffered loop-through to another display device.



PC250 Analog Features

‡accepts VGA or MAC RGB video
‡15 pin D connectors for video
‡active loop-through video outputs

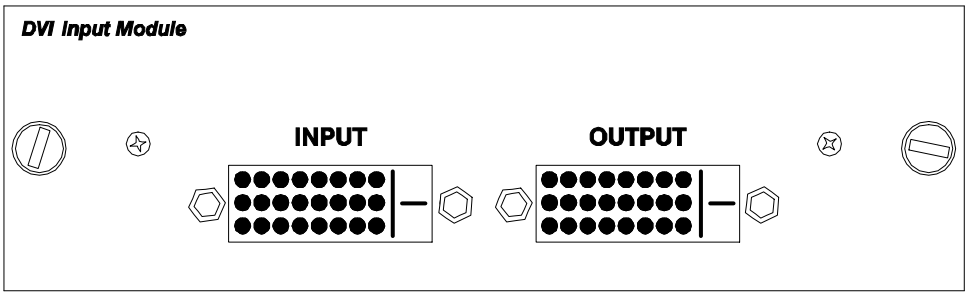
NOTES: *1) This interface does not accept VGA and MAC signals simultaneously.*

2) The audio connectors are not functional.

3) Trademarks are the rights of their respective owners.

D.5 DVI Input Module 38-804635-xx

This module can display digital video input signals conforming to the DVI (Digital Visual Interface) single-channel standard.

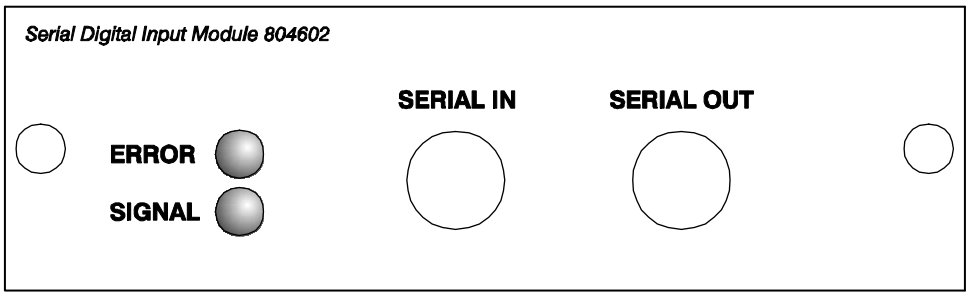


Features

‡supports Digital Visual Interface (DVI) single-channel
‡supports VESA® Extended Display Identification Data (EDID™)
‡provides an active-loop-through using a DVI connector (conforming to the DVI Specification)

D.6 Serial Digital Input Module 38-804602-xx

This module accepts a serial digital 4:2:2 component video signal (YCbCr) via a single **SERIAL IN** BNC connector. The signal can loop through the **SERIAL OUT** BNC out to another device (such as another projector). Inputs are 75Ω terminated.

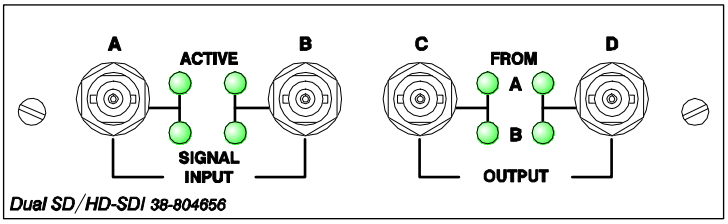


SDI Features

‡accepts serial digital 4:2:2 component video (YCbCr)
‡provides both a **SERIAL IN** and a **SERIAL OUT** BNC connector
includes status LEDs for signal and error

D.7 Dual SD/HD-SDI Module 38-804856-xx

The Dual SD/HD-SDI Module enables incoming serial digital data to be tiled across multiple screen displays, overlapped for extra-bright displays, or distributed to additional projectors for multiple, same-image screens.



Dual SD/HD-SDI Features

‡accepts and decodes up to two serial digital inputs
‡outputs up to two 10-bit YCbCr 4:2:2 video signals
‡provides input(s) to output(s) loop-through capability
‡supplies interchangeable inputs as part of the Picture-in Picture display

Corporate offices

USA – Cypress
ph: 714-236-8610

Canada – Kitchener
ph: 519-744-8005

Worldwide offices

United Kingdom
ph: +44 118 977 8000

Germany
ph: +49 2161 664540

France
ph: +33 (0) 1 41 21 44 04

Hungary/Eastern Europe
ph: +36 (0) 1 47 48 100

Singapore
ph: +65 6877 8737

Shanghai
ph: +86 21 6278 7708

Beijing
ph: +86 10 6561 0240

Korea
ph: +82 2 702 1601

Japan
ph: +81 3 3599 7481

ISO 9001 QMI REGISTERED

ISO 14001 QMI REGISTERED

For the most current technical documentation, please visit www.christiedigital.com

CHRISTIE®