User's Manual

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Section 1

Introduction

1.1 Projector Overview

The *RPMS* and *CS70* projectors are SXGA single chip projector's based on Digital Light Processing™ (DLP™) technology by Texas Instruments to achieve high brightness multi-media projection. These models are specially designed for rear screen and mission critical control room applications.

The modular design of these projectors provide quick and easy maintenance - ideal for applications where down time must be minimal.

Some of the projector's key features are listed below. *For a complete list of product specifications, see Section 5.*

◊ SXGA native resolution (other resolutions fully scaleable in Xe models only)
◊ 1chip DLP™ technology
◊ Brightness:
  ◊ RPMS >900 ANSI lumens
  ◊ CS70 >700 cd/m^2
◊ Contrast Ratio: 300:1 full field
◊ 24-bit RGB display
◊ 50" – 120" diagonal image size
◊ Advanced tiling features, including LiteLOC™ and Color Control
◊ 500 watt Xenon CERMAX™ lamp
◊ uniquely integrated 6-axis geometry adjustment system
◊ 0° and 90° lens orientation (90° in CS70)
◊ IR Remote control
◊ intuitive menu system
◊ easy, fast on-site lamp replacement
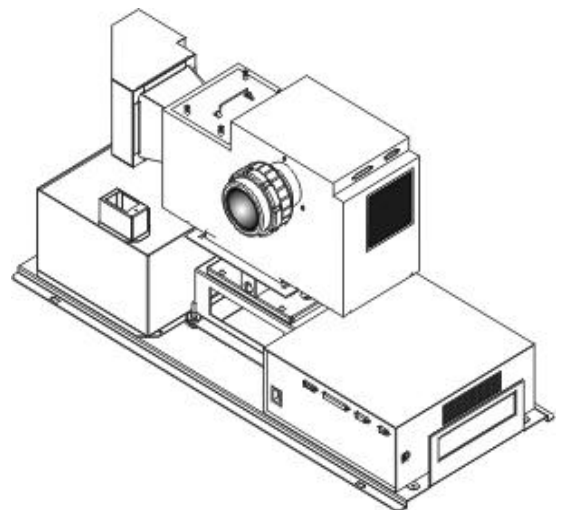
Figure 1.1. The Projector
(shown in RPMS lens-horizontal position)

How the projector works ' The projector accepts an SXGA input signal from an external source. The light generated by an internal 500 watt Xenon CERMAX™ lamp is sequentially filtered into RGB color primaries by a spinning color wheel and presented to the single DMD™ in sequence. Reflected light from the DMD™ chip then passes through the projection lens and is displayed on a display screen for viewing. NOTE: In CS70 display cubes, the light from the lens hits the optical mirror and is then projected onto the rear screen.

1.2 Components

The following components are shipped with each product. Ensure you have received these components with your product.

RPMS ' Each RPMS projector is shipped with an approved 120V AC line cord.

Each purchased RPMS system is provided with a User's Kit (#38-804809-01), which contain the following items:

◊ User's Manual (54-017170-xxP)
◊ Installation Guide (54-017171-xxP)
◊ IR remote keypad with batteries

CS70 ' The CS70 display cube is shipped with the projector, the cube enclosure, the optical mirror and all internal harnesses connected. It also contains a package of the following hardware components required for cube to cube, cube to base and screen mounting: **8** - 5/16x3 ¼" screws, **2** – 5/16x1 ¾",**8** – 5/16-18 hex nuts, **8** split lock washers, and **16** flat washers. 4, 1 mm nylon spacers have also been included that are required for screen spacing.

Each purchased CS70 display system is provided with a User's Kit (#38-804816-01), which contains the following items:
◊ User's Manual (54-017170-xxP)
◊ Installation Guide (54-017178-xxP)
◊ IR remote keypad
◊ assorted ball drivers (9/64", 7/64")
◊ allen key (5/64")
◊ lint free cotton gloves
Additional User's Kits can be purchased through Christie.
RPMS-500Xe/XeF User's Kit *(38-804809-01)*
CS70-500Xe/XeF User's Kit *(38-804817-01)*

1.3 Purchase Record and Servicing

Whether the projector is under warranty or the warranty has expired, Christie's highly trained and extensive factory and dealer service network is always available to quickly 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.

Purchase Record

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

NOTE: The projector serial number can be found on the license label on the electronics module.

Source Setup

2.1. Introduction

This section includes information on the setup and connection of various sources to the projector. Sources should only be connected after the projector has correctly been installed. For mechanical installation and first-time setup instructions, refer to the separate **Installation Guide** provided in the User's Kit.

2.2. Source Connections

A variety of external sources can be connected to the input ports on the Electronics Module (EM) main input panel.

The projector's main input panel is located on the Electronics Module. Use the illustration below (Figure 2.1.) to compare the various connectors available with each projector model.
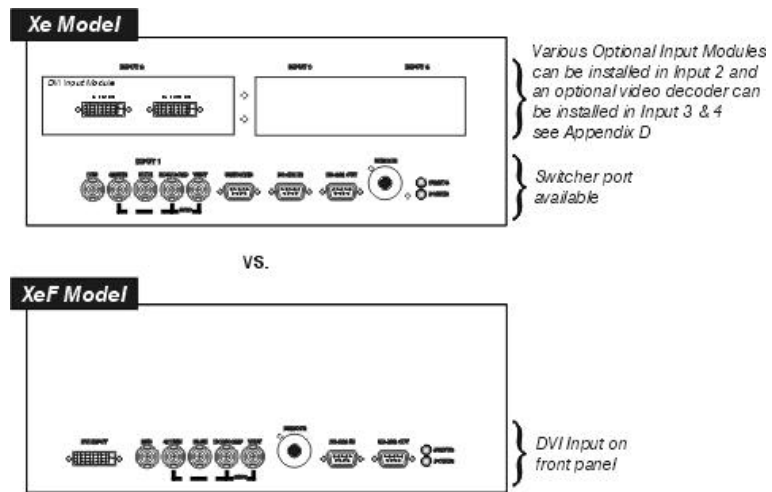

*Figure 2.1. Comparing connector availability between models*

RGBHV (5 BNCs) ❜ Input 1 provides 5 BNC connectors for connecting to a variety of sources such as VGA, SVGA, XGA, SXGA, Mac, PowerMac, DEC, Sun, SGI and others. This projector supports multiple sync types with RGB signals: sync-on-green, composite sync, and separate H & V syncs.

To properly connect RGB sources to INPUT 1 use the table and illustration below (Figure 2.2.). *NOTE: Front panel shown for the Xe model. Same connection applies to XeF models.*

RGB Source Outputs	Connectors at INPUT 1 (5 BNCs)				
	Red	Green	Blue	Hor/Comp	Vert
sync-on-green	*Ö*	*Ö*	*Ö*		
composite sync	*Ö*	*Ö*	*Ö*	*Ö*	
separate horizontal and vertical sync	*Ö*	*Ö*	*Ö*	*Ö*	*Ö*

NOTE: Connect the Sync BNC inputs first.
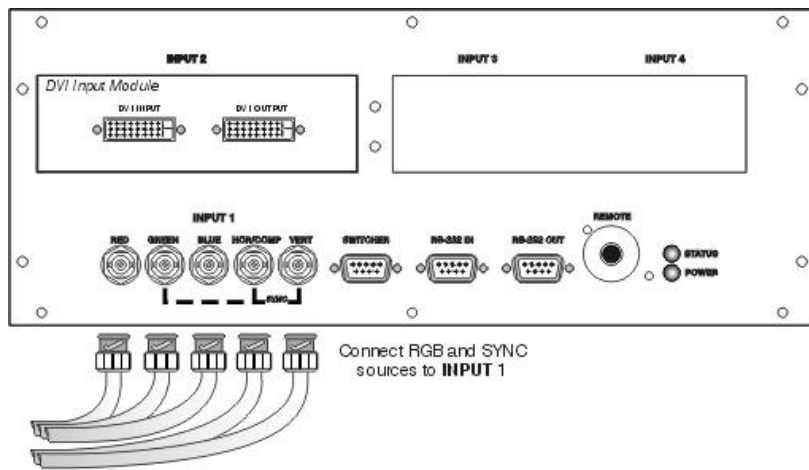
Figure 2.2. Connecting RGBHV sources

Component Video (YPbPr) ❜ Connect a YPbPr signal (*component video*) to INPUT 1.

*NOTES: **1**) Not applicable to RPMS-500XeF models. **2**) If, for some reason, the projector fails to recognize a YPbPr signal, specify this **Color Space** option within the **Image Settings** menu. **2**) Do not connect digital component signals to INPUT 1. Use the appropriate digital interface installed at INPUT 2.*
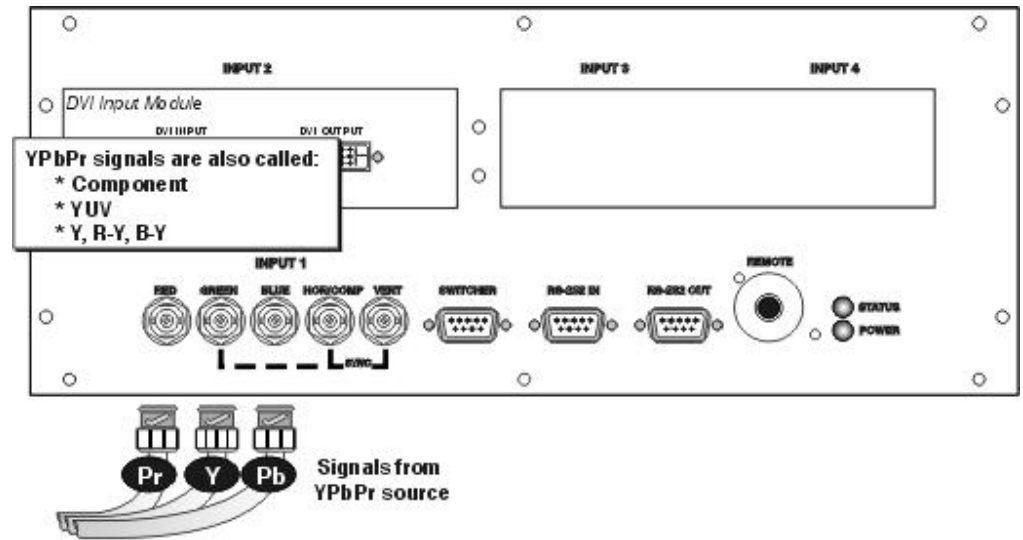
Figure 2.3. Connecting Component Video Sources

DVI Digital Video Signals

The DVI Input module installed in INPUT 2 displays digital video input signals conforming to the DVI (Digital Visual Interface) standard. This is a standard module in *Xe* projectors only.

DVI Connection '
Xe Models

To connect an incoming digital video signal to the projector, connect the cable running from the source to the DVI input connector at Input 2 - the DVI output adjacent to the DVI input connector remains empty. If you want to loop the source through to another display device, connect a cable from the DVI output connector (that was empty) to a DVI input connector on the digital display.
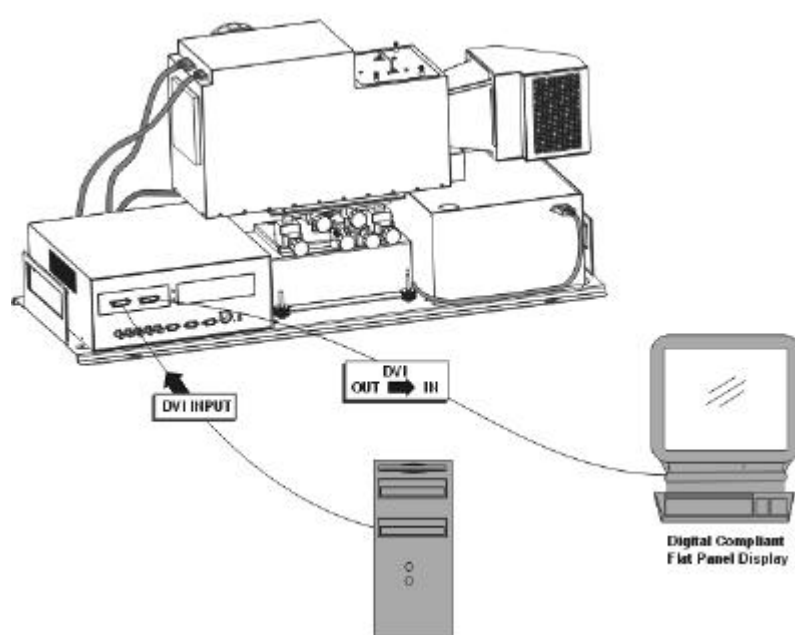
Figure 2.4. Connecting a Digital Video Input Signal

NOTE: The DVI output connector (J94) on the output panel is used to connect the Projection Head Module (PHM) and Electronics Module (EM).

DVI Loop Through ' To loop a single incoming digital video input signal (connected to the DVI input) through to another projector connect a cable from the source to the DVI input connector on the main input panel. Take another cable and connect it to the DVI output connector (adjacent to DVI input) and connect it to the DVI input connector of the next projector. Continue looping connection to all projectors – your last projector will have an empty DVI output connector.

NOTES: 1) When looping a DVI input signal, all projectors will display the same data from that one source.
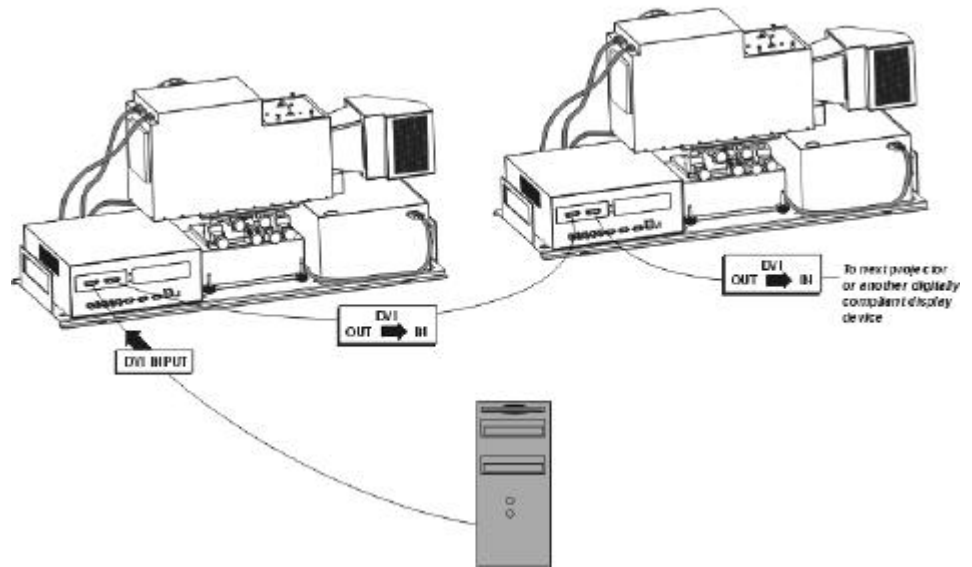
Figure 2.5. Loop Digital Video Input Signals

DVI Connection ' The DVI input connector available on *XeF* models accepts DVI standard input
RPMS-500XeF   signals in the projector's native resolution only. No loop-through or resizing ability available on these projectors.

Typical connection to this port is shown below.

Figure 2.6. Connecting a Digital Video Input Signal to RPMS-500Xe*f*

Composite Video ' Connect a composite video input to either the BNC connector or the RCA jack provided on the video decoder module (**INPUT 3**).

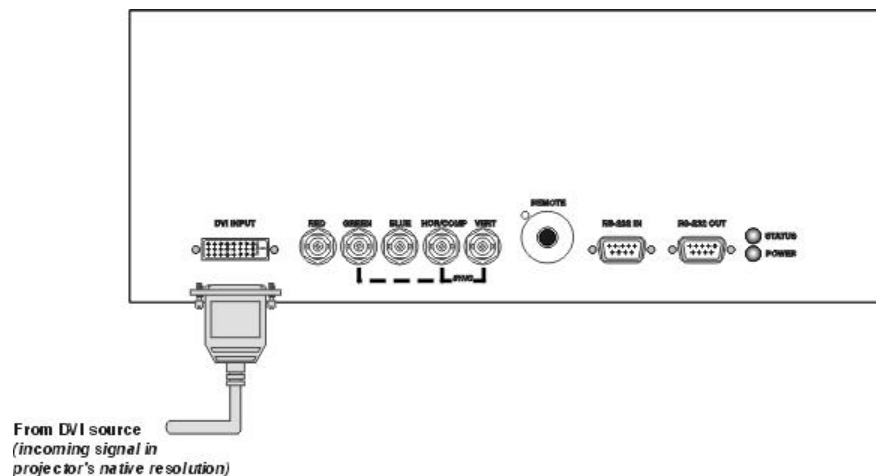*NOTE: 1) Requires Optional Video Decoder. 2) If you want to loop a composite signal through to another projector or display device, see **Video Loop Through** later in this section. 2) Not applicable to XeF models.*
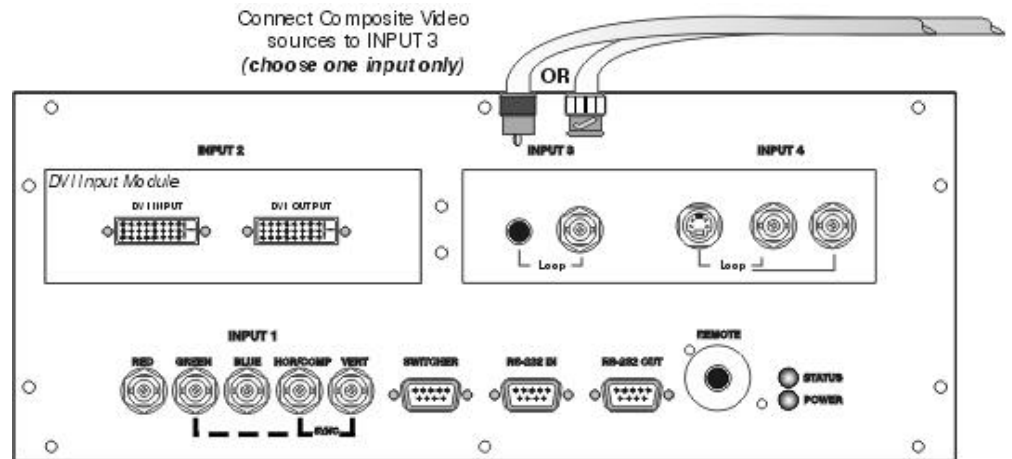
Figure 2.7. Connecting Composite Video Sources

S-Video ' Connect an S-Video input to either the 4-pin mini DIN connector or the Y and C BNC connectors provided on the video decoder module (**INPUT 4**).

NOTE: 1) Requires Optional Video Decoder module (38-804600-01). 2) Not applicable to XeF models.
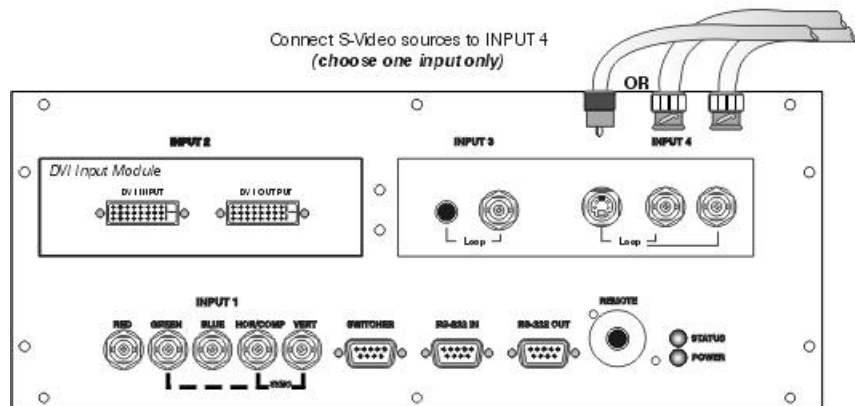
Figure 2.8. Connecting S-Video Sources

Video Loop Through ' To loop a single incoming video input signal (connected at the video decoder) through to another projector or display device, use the empty connector(s) adjacent to this same input as described below.

Composite Video Loop Through

CONNECTIONS: From your source, connect a composite video signal to **INPUT 3** using either the small RCA plug or the adjacent BNC. Connect a second cable from whichever **INPUT 3** connector is free to one of the composite video inputs of the next display device or projector. Continue this looping method for each projector, using

either the phono-plug or the adjacent BNC as input into **INPUT 3**, then using the other connector as an output (i.e., loop through). Whether you use the BNC or the phono plug as input or output depends on the type of cable you have on hand and what type of connectors are on each end.

Figure 2.9. Composite Video Loop Through

VIDEO TERMINATION: In the *Video Options* menu (*Image Settings*), make sure "Video Termination" is checked for the final projector *only*. All other projectors must have this option unchecked in order for the signal to continue. For other types of display devices in the chain, typically a "Hi-Z" switch position is needed.

S-Video Loop Through

CONNECTIONS: From your source, connect an S-video source signal to **INPUT 4** using either the 4-pin mini DIN or the 2 adjacent BNCs labeled Y and C. Connect a second cable from whichever **INPUT 4** connector is free to one of the S-video inputs of the next display device or projector. Continue this looping method for each projector, using either 4-pin mini DIN or the 2 adjacent BNCs as input into **INPUT 4**, then using the other connector(s) as an output (i.e., loop through). Whether you use 4-pin mini DIN or the 2 adjacent BNCs as input or output depends on the type of cable you have on hand and what type of connectors are on each end.
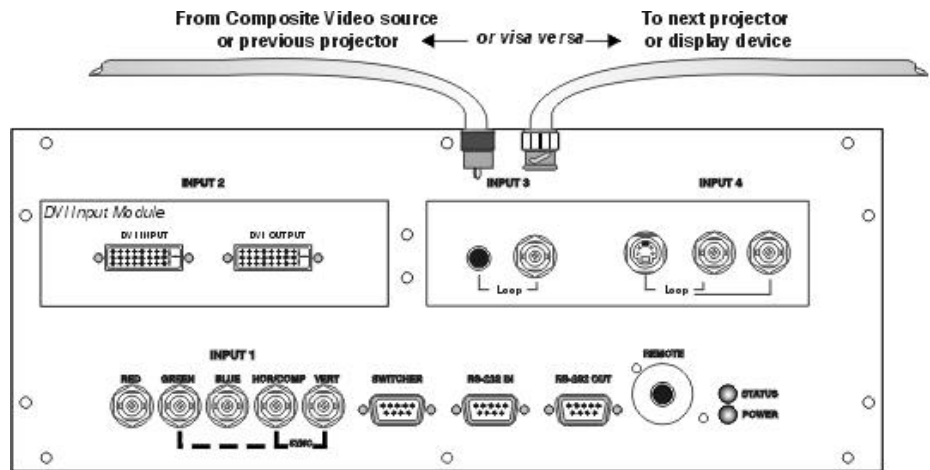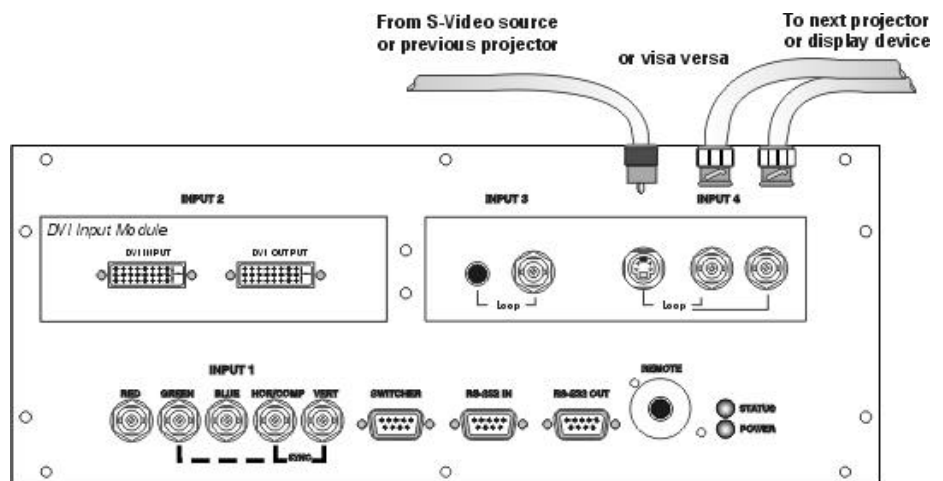

Figure 2.10. S-Video Loop Through

*NOTE: Make sure any MarqueeÔ Signal Switcher connected directly to the
projector is set as "Switcher #1". If it is not, unplug the switcher and turn the
thumbwheel to "1" before plugging back in and connecting to the projector and/or
network.*
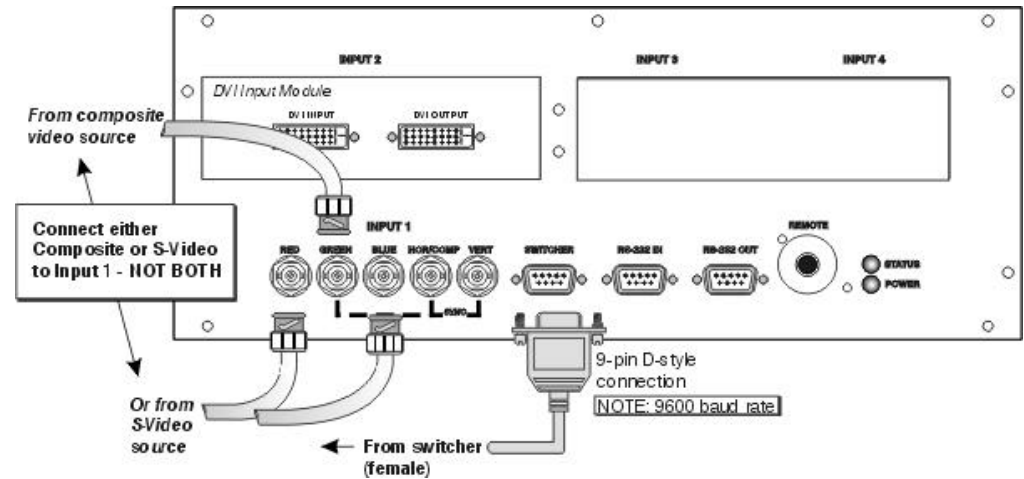
Figure 2.12. Connecting a MarqueeÔ Signal Switcher

Connecting Multiple   '
Switchers

If you are using more than one *MarqueeÔ Signal Switcher*, daisy-chain the RS-232
switcher inputs/outputs together to form a complete network of inputs accessible
from the projector (you can network up to 9 switchers), and connect Switcher #1 to
the projector as shown in Figure 2.12. In addition, connect the RGB output from each
switcher to its matching slot on switcher #1–for example, connect the RGB output
from switcher #2 to slot #2 on switcher #1, and the RGB output from switcher #3 to
slot #3 on switcher #1. Note that slots used in this manner on switcher #1 are no
longer recognized as inputs to the projector–if you select a slot location that is
connected to another switcher's RGB output, the projector will display the "no input

████████████
**2.3   Serial Port
Connections**

Multiple projectors can be connected via the serial port inputs on the input panel for
control using serial communication commands, otherwise known as RS-232.

Connection: Located just below the video decoder module are two 9-Pin DIN
connectors dedicated to serial communication. Using the appropriate serial
communication cables (see *Appendix D*) connect the controlling source (PC) to the
RS-232 IN connector.

*NOTE: A third RS-232 serial port, located on the main input panel of the Electronics
Module, is intended for future use only.*
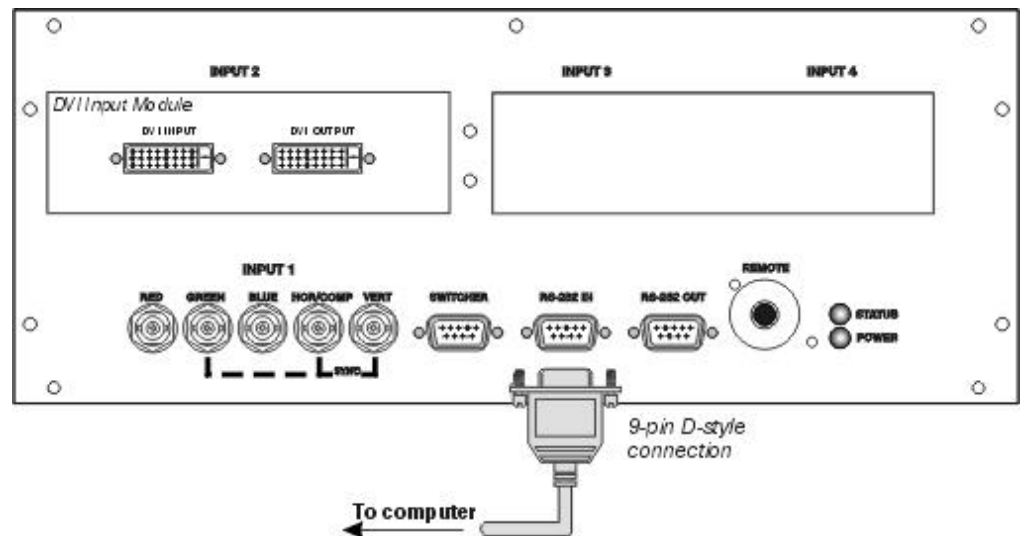
Figure 2.13. Connecting to the RS-232 input connector

When connecting 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. The last projector in the network will only have a connection to the RS-232 IN.
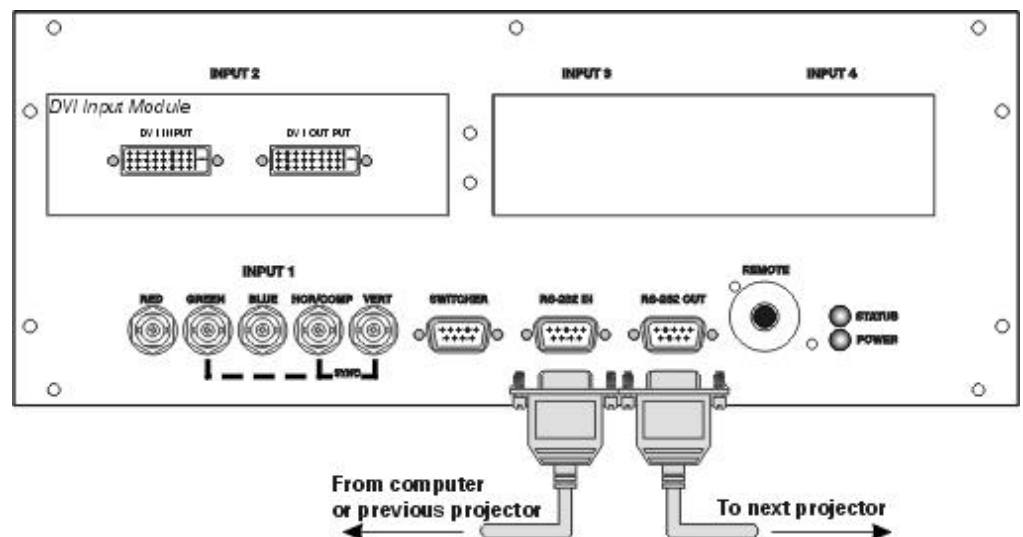
Figure 2.14. Looping RS-232 cables between multiple projectors
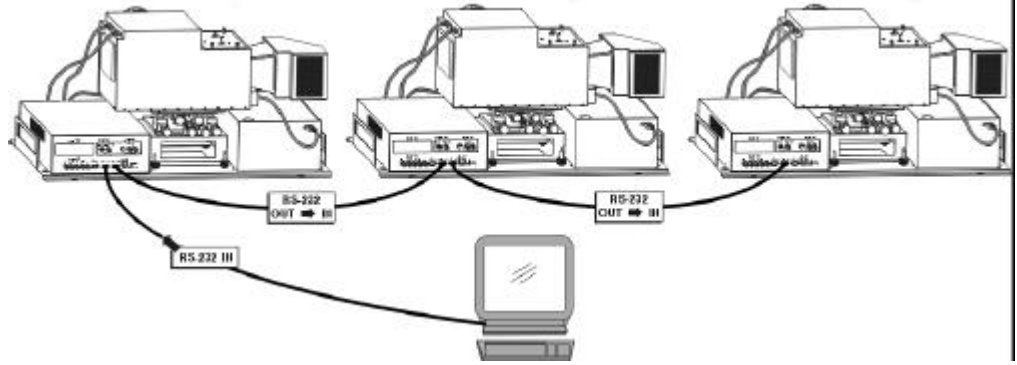
Figure 2.15. Connecting RS-232 between multiple projectors

2.4   Power Connection

Plug the projector's line cord into the AC receptacle located on the top of the Ballast Module, then plug the 3-pronged end of the line cord into a grounded AC outlet. Input voltage to *Xe* and *XeF* models must be capable of ***100-240*** VAC. ***Use the proper power source and the rated line cord provided (North America only).*** See *Section 5, Specifications* for all power requirements.

WARNING

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

⚠ *Caution: Once the projector is powered down, wait approximately 10 minutes to allow the lamp to cool sufficiently before unplugging the projector from the AC outlet.*

2.5   Keypad Protocol

At manufacture every keypad is assigned "A" as its default protocol, which is simply a collection of settings that determine how the keypad operates. Once assigned, this protocol remains in effect until it is changed—that is, the keypad will operate as it currently does until you change its protocol.

Protocols are most useful for multiple-projector applications. For example, you might want to change a keypad protocol if you are working with two projectors and two remote keypads in the same room and need to control each projector independently (Figure 2.16). When Keypad A has a different protocol than Keypad B, each keypad communicates *only* with the projector having a matching protocol. Or, if you have a network of two or more projectors connected together via RS-232 serial ports, you may want only certain projectors to respond to a wired keypad, thus you can use different protocols to limit responses.

*NOTE: Matching the protocol on the projector to that of a keypad is done through a setting in the **Communications** menu. See menu descriptions for further information on how to change the projector's infrared sensor (rear and front) protocol.*

A protocol for either type of remote keypad — IR or wired — can be changed. A remote can be changed manually by "hard-wiring" new jumper settings inside the keypad so that they remain in effect until you change the hard wiring. Note that a hard-wired protocol can be temporarily overridden by the software protocol change, effective until the keypad is unplugged and plugged in again (if a wired remote) or until a battery is removed (if an IR remote).
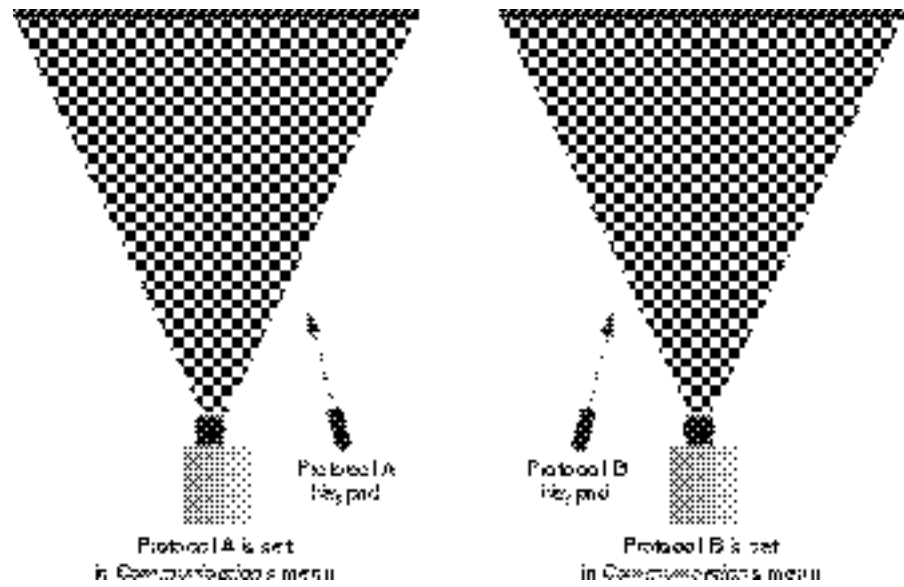
Figure 2.16. Independent Keypads and Projectors

Remote Keypad '
Protocol
IR or optional Wired Keypad

The standard IR remote keypad or the *optional* wired remote can be set to one of two different protocols — "A" or "B". To hard-wire a protocol to "A" or "B" in either remote, follow Steps 1 through 5:

Step 1

Unplug the keypad from the projector (applies to wired remote only).

Step 2

Unlatch and open the empty battery compartment on the back of the keypad as shown in Figure 2.17.

NOTE: A wired keypad opens as shown, but a cable passes through the battery compartment cover.
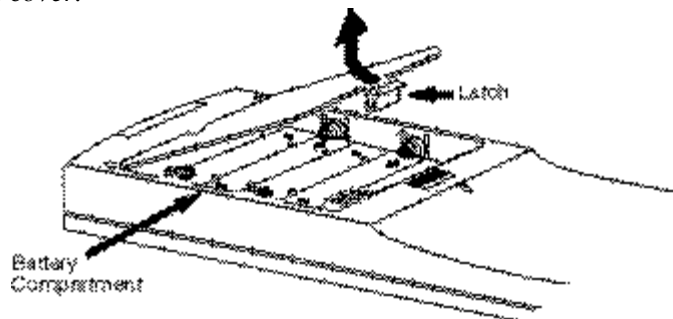
Figure 2.17. Opening the Keypad

Step 3

Find the 4 jumpers located along the latching side of the battery compartment. These jumpers set the keypad protocol and other settings so that the keypad functions in a certain manner.

Step 4: Set the Jumpers

Set the jumpers as shown in Figure 2.18. Refer to the correct part of the drawing — IR or wired (optional). Use tweezers or needle-nose pliers to remove and replace each jumper as necessary.

- **J1** jumper: For either remote, set between pins 1 and 2 to set as Protocol "A". Set between pins 2 and 3 to set as Protocol "B".

- **J2** jumper: For either remote, set between pins 2 and 3 as shown; otherwise, the projector will not respond correctly to keypad commands.

- **J3** jumper: For the IR remote, make sure that the jumper is set between pins 2 and 3 as shown. For the wired remote, make sure that the jumper is set between pins 1 and 2 as shown.

- **J4** jumper: For the IR remote, make sure that the jumper is set between pins 1 and 2 as shown. For the wired remote, make sure that the jumper is set between pins 2 and 3 as shown.

Step 5

Replace battery compartment cover. Plug into projector (wired keypad only) and test.
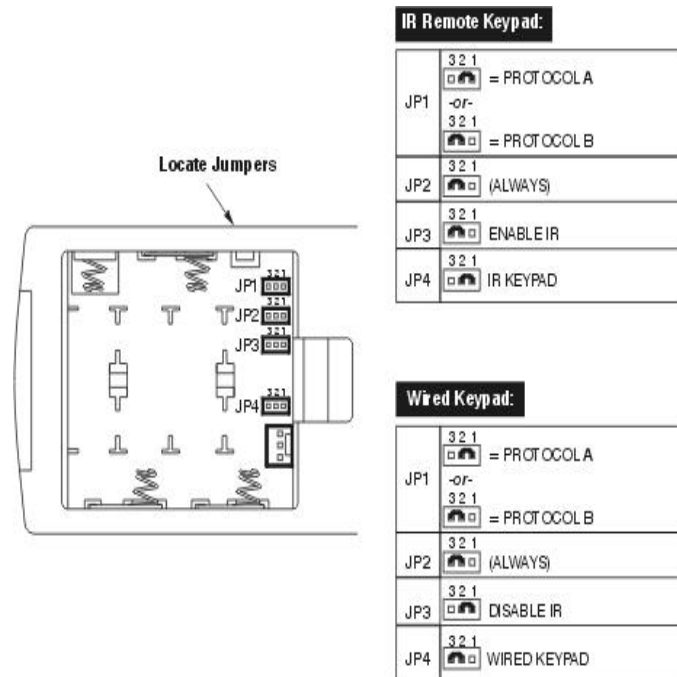
Figure 2.18. Locating and Setting the Jumpers

NOTE: A wired keypad can be converted into an IR remote keypad, and vice versa. Follow the settings shown above, adding or deleting the cable and batteries as required. The cable is available separately from your dealer – #38-804011-01)

Converting a Keypad '

If desired, you can convert an IR remote keypad into a wired remote keypad and vice versa.

TO CHANGE FROM INFRARED TO WIRED:

1. Remove battery compartment cover from back of keypad.
2. Remove batteries.
3. Wait 1-2 minutes.
4. Set keypad protocol as desired, using "wired" jumper settings.
5. Plug the keypad cable (available separately) into the empty battery compartment. Make sure that the battery cover is notched smoothly to accommodate the cable.
6. Replace battery compartment cover.
7. Plug into the 3-pin XLR port at the rear panel of the projector.

TO CHANGE FROM WIRED TO INFRARED:

1. Unplug the keypad from the projector.
2. Open the keypad cover and unplug the keypad cable.
3. Wait 1-2 minutes.
4. Set keypad protocol as desired, using "IR" jumper settings.
5. Install batteries (see *Section 4*).
6. Replace battery compartment cover.

Operation

3.1 Overview

This section explains how to operate the projector after it has been installed. Make sure that you have read and understood the instructions in this section before operating the unit.

3.2 Projector Basics

The projector is modular in design, which allows for quick and easy access to various components during operation and servicing.

Listed below are the main modules of the projector and a brief description about their function and features.

Projector Head Module (PHM)

The PHM module (containing the light engine) contains the main optical components of the projector. It also provides all the electrical interfaces to drive the DMD™ and colorwheel. The lamp, lens, all internal optical prisms, lenses and

Figure 3.1. Projector Components

(RPMS-500Xe shown)

DMD™, colorwheel , IR sensor and cooling fans are located in this module. For lens-vertical configurations, the PHM and cooling duct are the only components that must be "flipped". *NOTE: Refer to the Installation Guide supplied in the User's Kit for instructions on changing projector configuration.*

Lamp and Filter

The projector uses a 500W Xenon lamp, which can be adjusted through software to maintain a constant level of brightness. It is located on the PHM and can be easily replaced on site within a few minutes without having to disassemble the entire PHM to access. The filter is also located on the PHM module and is typically replaced when replacing the lamp. See *Section 4 – Replacing the Lamp* and *Replacing the Filter* for replacement instructions.

Electronics Module (EM)

The EM module is mounted to the tray and contains all the main electronics and input connectors of the projector.

Main Input Panel

All source connections are made to the main input panel. *NOTE: The connectors located on the input panel vary between projector models. See Section 2.*

Output Panel
The output panel includes connectors that connect "internal" cables between modules of the projector. See Installation Module for Connections Diagram.

Auxiliary Fan Connector
A connector exists on the side of the EM that can be used to connect a separate cooling fan – useful in applications where the projector is mounted within the confines of an enclosure. (eg. cube).
Refer to *Appendix D* for pinout information.

Status and Power LEDs

Two LEDs are located in the lower right corner of the main input panel, which indicates projector "Status" (top) and "Power" (bottom). During normal operation, the "Power" light is steady green and the "Status" light flashes green each time a key is pressed on the keypad or the projector receives a serial communication command. Use the following as a guide:

STATUS LED	
Off	Normal
Steady Yellow	Initializing
Single Green Flash	Command Received
Single Yellow Flash	Wrong Protocol
Continuous Yellow Flash	Expired Lamp
Red & Yellow Pattern	System Error

POWER LED	
Off	Projector Unplugged
Steady Yellow	Powered Down
Steady Green	Powered Up or Cooling Down
Steady Red	System Error
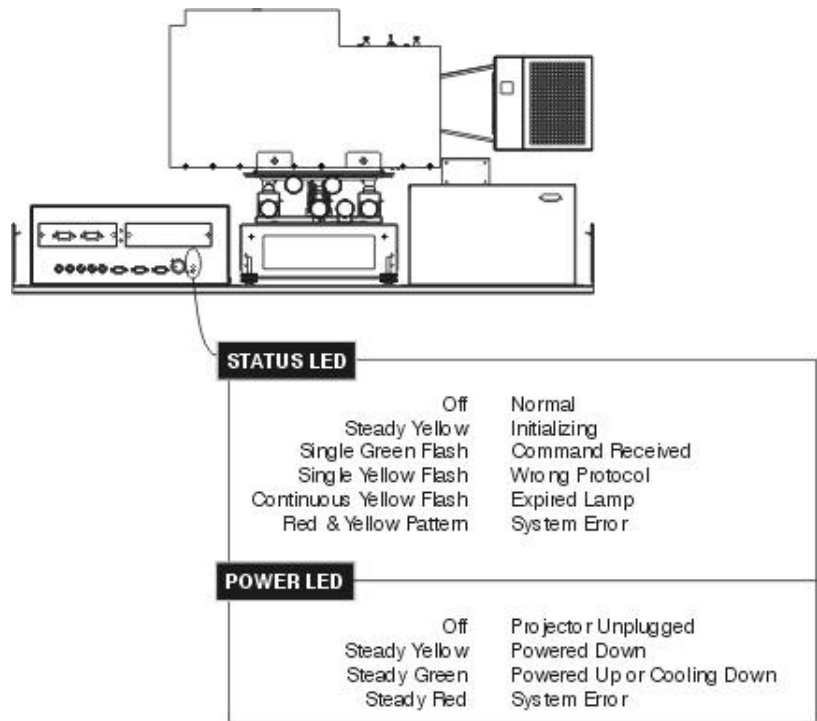
Ballast Module (BM)

The BM contains the projector's lamp power source (500 W ballast). It is mounted to the tray and it connects to the EM. The approved line cord supplied with the projector is plugged into the AC receptacle located on top of the BM.

6-Axis Adjuster

The 6-axis adjuster is manually adjusted to modify the geometry of an image. This capability is useful during the setup of a multi-level videowall where screen matching is extremely important. Adjustments can be locked in place by tightening three lock screws located on the adjustment blocks. Two stabilizers are also included in the design of the adjuster to ensure stability of the

Figure 3.2. 6-Axis Adjuster

adjuster during projector operation. Refer to the Installation Guide or the label on the product for instructions on how to adjust the adjuster. *NOTE: A separate label is included in RPMS-500Xe/XeF User's Kit, which illustrates how to adjust the adjuster when the projector is in a lens-vertical configuration. It can be adhered over top of the lens-horizontal label for easy reference, if desired.*

3.3 Using the Keypad

The projector is controlled via an IR remote keypad. The keypad accesses various menus in which settings can be changed and saved into memory (called channels). There are 99 channels in which you can store customized settings for various sources.

The IR remote keypad provided in the User's Kit provides the user with wireless control of the projector of up to 100 feet away. The keypad is operated by 4AA batteries, which require periodic replacement (*Section 4*).

The most effective method of operating the projector is by facing and pointing the keypad directly at the screen. There is only one IR sensor that picks up the transmissions of the keypad and it is located just below the lens. It is important to keep the transmission path clear because any obstruction will limit if not prohibit transmission of commands.

IR Remote Keypad ' The IR Remote Keypad controls the projector by way of wireless communications from a battery-powered infrared (IR) transmitter. Use the IR remote keypad the same way you would use a remote keypad supplied with a TV or VCR. When making key presses, point the keypad directly at the center of the screen. The IR sensor, responsible for detecting signal and relaying commands for internal processing, is located just below the projection lens on the PHM.

Figure 3.3. The Keypad

Wired Remote '
—OPTIONAL— The wired remote keypad connects to the 3-pin XLR jack via a 25 ft. cable. It is recommended when:

- the lighting conditions are unsuitable for proper IR transmission
- you want to use a separate keypad for each projector in a group
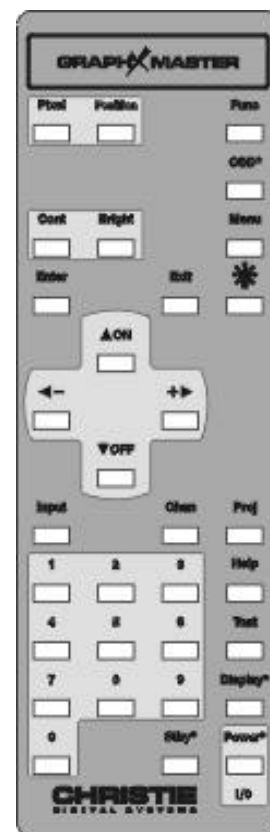
*NOTES: 1) For extra long distances and/or harsh environments, you may prefer to use an optional remote **Two-Way Controller** to control the projector. For operating details, please see the **Two-Way Controller User's Manual** included with this accessory.*

Keep in mind the following guidelines:

1) Press keys one-at-a-time; there are no simultaneous key presses required.
2) For any key having an "*" ([Power*], for example), hold the key for approximately 1 second in order to toggle the function with a single key press. For other keys (or to use a "*" key in conjunction with [▲ON] or [▼OFF]), a momentary press similar to a mouse click is sufficient.
3) Press the "lightbulb key" to temporarily illuminate the backlight for the keys without sending any other command.
4) [◄−], [+►], [▲ON], and [▼OFF] repeat their "arrow" actions when held down. For other keys, release and press again to repeat an action. In a network, pause between adjustments to ensure that the last projector can "keep up" with the commands.
5) If you press a key while the projector is busy with another action, such as during a power-up, the key press may not take effect.

When you turn on the projector it begins operating at *presentation level,* such as an image from the most recently used source signal. The projector temporarily leaves presentation level whenever you use the keypad to work with control settings, display menus, or on-line help. For example, pressing [Menu] after startup displays the main menu — presentation level is no longer active, although the image still appears in the background. Press [Menu] again (or [Exit]) to return or leave the menu system and return to presentation level.

Keypad Commands '

Specific keypad commands are explained below:

[Power*] ### Power ON/OFF

Press and hold for approximately 1 second to turn the projector on or off with a single key press. Or press [Power*] followed immediately by [▲ON] or [▼OFF] if you want to guarantee the correct toggle (useful if you are unsure of the present status).

NOTES: 1) It is recommended that you wait at least 10 minutes after powering down the projector and before unplugging it from the power outlet. The cooling fans in the projector DO NOT automatically turn off when the lamp is cool. This waiting period gives the lamp enough time to cool before unplugging the projector. 2) Avoid turning the projector ON and OFF without waiting 10 minutes – hot re-strikes reduce lamp life.

[Chan] ### Channel

Press [Chan] to select a specific source setup (*channel*) defined and stored in projector memory. Once you enter a 2-digit channel number (or, if there is a list displayed, highlight it and press [Enter]), the display will automatically change and update according to the numerous setup parameters defined for that channel.

*NOTE: [Chan] key behavior during a presentation depends on whether or not the **Display Channel** option is selected in the **Menu Preferences** menu. You can choose to use a scrollable list of channels when you press [Chan], or you may prefer to enter*

*the desired channel number "blind", i.e., without on-screen feedback. See **Menu Preferences** later in this section.*

[Stby*] **Standby**

Press [Stby*] and hold for approximately 1 second to blank the display while keeping the projector in a warmed-up and ready state. Or quickly press and release [Stby*] and follow immediately by [▲ON] or [▼OFF] if you want to guarantee the correct toggle (useful if you are unsure of the present status). Note that the lamp and electronics remain ON in standby mode, even though the image turns to black and most functions are disabled. To leave standby press and hold [Stby*] again (or use [Stby*] [▼OFF]). Or simply press [Exit] or [Menu].

[Menu] **Menu**

Press [Menu] to display the *Main* menu. A list of several options appears for access to specific functions, such as *Configuration* or *Image Settings*. Press [Menu] again to remove all menus and return to presentation level.

[Enter] **Enter**

Press [Enter] to select a highlighted item, to toggle a checkbox (checked vs. unchecked), 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 slidebars) or within pull-down lists. It acts as a "cancel" in these cases.*

Arrow Keys

The arrow keys have a variety of functions depending on the situation. Some typical uses are described below. See also *Editing Text* later in this section.

- Use [◄—] or [+►] to change a slidebar value—hold as desired for continuous adjustment (*note the adjustment increments and range depend on the parameter being adjusted*).
- Use [◄—] or [+►] to change to a different option within a pull-down list without having to display the list first
- Use [◄—] or [+►] to jump between "pages", such as in *Help* or lengthy pull-down lists.

[▲ON] *or* [▼OFF]

Use the [▲ON] or [▼OFF] keys to navigate within a menu, pull-down list or text box, or to increase or decrease the value in the second (bottom) slidebar of a double slidebar.

You can also use [▲ON] or [▼OFF] in conjunction with certain *toggle* keys—i.e., those including an asterisk symbol—to ensure a toggle *only* in the desired direction. If you press [Power*] and hold it for approximately 1 second in hopes of turning the projector *on*, the projector will actually turn *off* if the projector was already on. Instead, to avoid the risk of toggling in the wrong direction, quickly press *and release normally* the function key you wish to toggle (in this case [Power*]). Then immediately (within 2 seconds) press either [▲ON] or [▼OFF] as desired. The specific toggle will occur.

Toggle keys are labeled with an asterisk on the keypad. They are listed below:

- Stby* + ▲ON = put the projector in standby mode
  Stby* + ▼OFF = leave standby
- Power* + ▲ON = turn the projector on
  Power* + ▼OFF = turn the projector off
- Display* + ▲ON = turn the menu system on
  Display* + ▼OFF = turn the menu system off

Cont Contrast

Press Cont to change the amount of white in your images. Use ◄— and +► until you reach the desired 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 (i.e., are "crushed"). Conversely, low contrast causes dim images. See *Image Settings.*

Bright Brightness

Press Bright to increase or decrease the amount of black in the image. Use ◄— and +►
decrease so that dark areas do not become black (i.e., are "crushed"). Conversely, high brightness changes black to dark gray, causing washed-out images. See *Image Settings.*

Proj Projector

Press Proj when you want to access a specific projector within a network or if you simply need to see if the local projector is listening. The number appearing in the "Enter Number" window indicates which projector is currently listening to commands, and will match the projector number that has been defined in its *Communications* menu.

The "Projector" checkbox (read-only) shows whether or not the projector physically connected to a keypad is listening to commands from that keypad. A checkmark means that connected projector is listening; if there is no checkmark, you are communicating with a different projector.

To use a specific projector, enter the 3-digit number assigned to the projector you want to use. Press Enter to select, press Exit to cancel. If you switch to a projector other than the one you are currently using, the checkmark will be deleted.

To broadcast to multiple projectors, press Proj and then Proj again ***without*** entering a projector number. Keypad commands will then affect all projectors present.

*NOTES: 1) 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 **Keypad Protocols** and **Communications** later in this section.*

Pixel Pixel

Press Pixel to access the pixel tracking and pixel phase double slidebar. Adjust pixel tracking first: use ◄— and +► to increase or decrease the frequency of the pixel sampling clock to correct consistency of the image. For proper phase, use ▲ON and ▼OFF to increase or decrease pixel phase so that any shimmer disappears and the image is stable throughout. See *Size and Position* for a complete explanation of tracking and phase.

⬛Position⬛ *Position*

Press ⬛Position⬛ to move the image using the double slidebar. At the slidebar, use ⬛◄−⬛ and ⬛+►⬛ to move the image left or right, use ⬛▲ON⬛ and ⬛▼OFF⬛ to move the image up or down.

⬛Func⬛ *Function Key*

From presentation level, press ⬛Func⬛ followed by a 2-digit number to enable a specific color or colors in the display. For example, ⬛Func⬛⬛6⬛⬛4⬛ will display only red and green data, ⬛Func⬛⬛6⬛⬛7⬛ will display all colors data. The list of available color combinations is shown below and also appears on the back of the IR remote keypad. Color enabling can also be accessed through the menu system rather than these shortcuts.

⬛Func⬛⬛6⬛⬛1⬛ = Red
⬛Func⬛⬛6⬛⬛2⬛ = Green
⬛Func⬛⬛6⬛⬛3⬛ = Blue
⬛Func⬛⬛6⬛⬛4⬛ = Red and Green
⬛Func⬛⬛6⬛⬛5⬛ = Green and Blue
⬛Func⬛⬛6⬛⬛6⬛ = Red and Blue
⬛Func⬛⬛6⬛⬛7⬛ = All colors (⬛Exit⬛ does the same thing)

NOTE: Once ⬛Func⬛ is pressed in presentation level, the projector will not respond to non-numeric entry until 2 digits have been entered or until 5 seconds of inactivity have elapsed.

Use of the ⬛Func⬛ key 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.

⬛OSD*⬛ *OSD* (On-screen display)*

Press and hold ⬛OSD*⬛ for approximately 1 second to toggle menus on or off (i.e., visible or invisible). Or press ⬛OSD*⬛ followed immediately by ⬛▲ON⬛ or ⬛▼OFF⬛ to guarantee the correct toggle direction (useful if you are unsure of the present status). Note that invisible menus are fully functional.

NOTES: 1) With OSD on, you can still mute menus, error messages, slidebars, etc. with the appropriate setting in the Preferences menu.

⬛Help⬛ *Help*

Press ⬛Help⬛ for detailed information about any current menu and highlight. Press ⬛Help⬛ again to exit. From presentation level, press ⬛Help⬛ to access the *General Help* menu consisting of *Using Help, Setup, Keys, Source (Input) Selection*, and *Stat/Pwr LEDs*. Press ⬛Exit⬛ to leave *General Help* and return to presentation level.

⬛Test⬛ *Test*

Press ⬛Test⬛ to display one of the available test patterns. Press ⬛Test⬛ again to display the next available pattern in the sequence. ⬛Test⬛ will exit after the last pattern, or press ⬛Exit⬛ at any time to remove the current test pattern from the screen and return to presentation level.

*NOTE: For a complete list of all test patterns, see the **Geometry** menu description later in Section 3.*

Display* **Display ***

Use Display to hide the current menu. Press and hold Display for approximately 1 second to toggle on or off with a single key press. Or quickly press and release Display and follow immediately with ▲ON or ▼OFF if you want to guarantee the correct toggle (useful if you are unsure of the present status).

3.4 Navigating the Menus

Most of the controls for the projector are accessed from within the projector's menu system. There are several groups of related *functions*, with each group selectable from the *Main* menu. Press Menu at any time to display the *Main* menu.
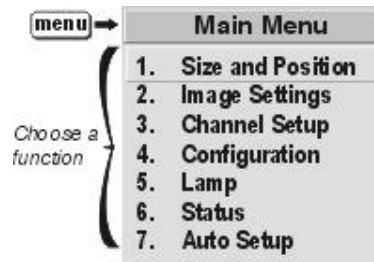
On the keypad, either enter the number corresponding to the function menu you wish to access, such as ② for the *Image Settings* menu, or use the ▲ ▼ keys to highlight the desired option and press Enter. The function menu you selected will then appear. If you select "Auto Setup", this will not activate a separate function menu but rather begin an automated process of optimizing critical display parameters such as size, position, pixel tracking, etc.

Once you have a function menu displayed, navigate in a similar manner—enter a menu option number for any numbered option, or use ▲ ▼ to move the highlight and press Enter at the desired option. Extra long menus have a scroll bar on the right– use the arrow keys to see the remainder of the menu. Items that are locked out or do not pertain to the current action 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 projector leaves the menu system and returns to the presentation. 3) The **Status** menu is read-only.*

When finished with a function menu, do one of the following:

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

On-line Help ' If at any time you are uncertain what to do next, press Help to display detailed information about the current menu or highlighted option. A scroll bar appears on the right-hand side of a help window if there is additional text–use the arrow keys to scroll. Press Help again to exit. At the bottom of some menus, a line of hint text also appears.

From presentation level, press Help to access general *Help Topics*. Scroll as necessary within a topic. Press Exit to return to your presentation.

Help Topics
1. Using Help
2. Setup
3. Keys
4. Source (Input) Selection
5. Status/Power LEDs
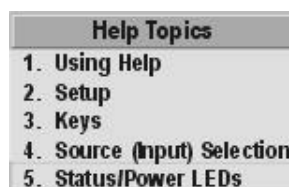
Figure 3.4. General Help Topics

Time-outs ' Whenever the projector is not at presentation level, such as when there is a slidebar, menu, message or test pattern displayed, you have limited time in which to make a keypad entry before the projector returns to presentation level and the graphic disappears. These time-outs vary depending on the current display, as shown in the following chart:

TIME-OUTS	
Slidebar (from pres.)	5 seconds
Slidebar (from menu)	15 minutes
Lamp Timer Msg.	30 seconds
Channel entry	5 seconds
Other	15 minutes

The Global Icon ' A menu item marked with a global icon means that any changes made to that option are global to the projector and will be applied to all incoming signals.

Using Slidebars and Other Controls ' Most of the function menus allow you to change settings by using slidebars, checkboxes, and pull-down lists. To select a slidebar, toggle a checkbox status, or view a pull-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 ② for Size in the *Size & Position* menu).

Or press ▲ON or ▼OFF to:

- move the highlight to the desired parameter and press Enter.
- move the highlight to the option desired and press ◄– or +►.
- Or bypass menus entirely and use a single key to immediately access an adjustment (*note: applies only to options having their own key, such as Position, Pixel, Bright, and Contrast*).

Once selected, change the setting as desired (see below) and press Enter to save and return to the current function menu.

Slidebars in menus - The current value for a given option, such as size or vertical stretch, appears to the left

Bright 50.0 ▯

of its slidebar icon. This number may express a percentage or specific units (such as pixels, degrees Kelvin, etc.), depending on the option. Press ◄– or +► to gradually adjust the setting up or down—both the number and the length of the bar change accordingly (for continuous adjustment, hold down the desired arrow key). Or press Enter to activate a slidebar text box for specific number entry via the keypad, then press ◄– or +► and Enter to save (or press Exit to cancel).

Double slidebars - In double slidebars, such as the *Pixel Tracking* / *Pixel Phase* double slidebar, adjust the top slidebar with ◄– or +► as desired. When you have finished with the top slidebar (whether changed or not),

Adjust with ◄– or ◄+
position
↔ H-Position 519 ▯ ◄
↔ V-Position 365 ▯ ◄
Adjust with ▲ON or ▼OFF
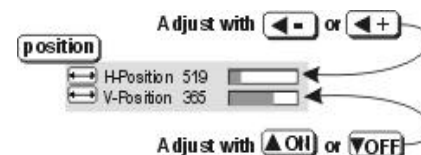
adjust the bottom slidebar with ▲ON or ▼OFF. When you are done, press Exit to return to your presentation. For fast continuous adjustments, hold down the desired arrow key.

"Direct" slidebars - For quick access, you can often use a slidebar (or double slidebar) without traveling the menu system. For example, simply press Cont to immediately display the same contrast slidebar accessed with the *Contrast* option in the *Image Settings* menu. Direct slidebars are listed below.

LIST OF DIRECT SLIDEBARS	
H-Position or V-Position	Position
Pixel Tracking or Phase	Pixel
Contrast	Cont
Brightness	Bright

Use the arrow keys to adjust a direct slidebar, or press Enter and enter a specific number from the keypad, then Enter or ◄– or +► to save *(or* Exit *to cancel)*. When you are done, press Exit to save and return to your presentation.

NOTES: 1) You can still adjust a direct slidebar as usual if the menu display is turned off (see OSD* or **Menu Preferences** *menu) — the slidebar just won't be visible. 2) A direct slidebar disappears if it is not used within 5 seconds.*

Checkboxes - Conditions are present if its adjacent
checkbox contains a checkmark. To toggle the checkbox,
simply highlight and press Enter, or highlight and use +► to check and ◄– to uncheck. For a checkbox that is numbered, simply enter the number of the option to toggle the checkbox.

> Broadcast Key ☑

Pull-down lists – To see a pull-down list of options available for a given parameter labeled with a ▼, you can:

- Highlight it and press Enter
- Or enter the menu option number.

Use ▲ON or ▼OFF keys to navigate up and down within the list (the current choice is noted with a small '). Press Enter to choose an option from the list, if desired.
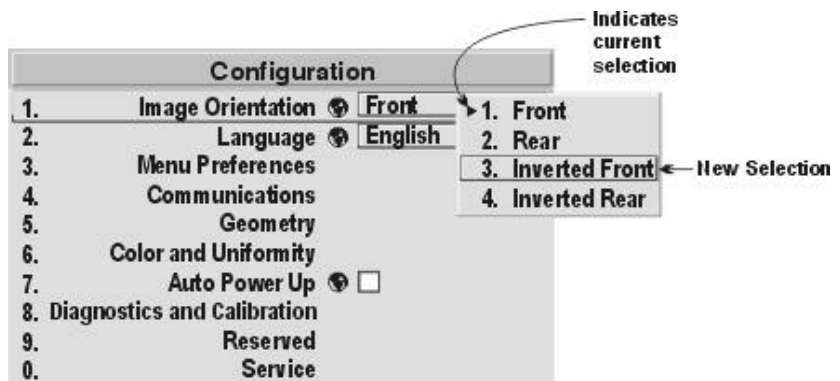
Figure 3.5. Example of Pull-Down List

Or, of you prefer to quickly scroll through a list without first pulling it down, highlight the option and use ◄─ or ╋► . Press Enter when the desired choice appears.

*NOTES: 1) Press ◄─ or ╋► to jump between "pages" in an extra long pull-down list. 2) Press Exit while in a pull-down list to **cancel** any change.*

Editing Text ' **ACTIVATE THE EDIT WINDOW**: To enter or edit text, highlight the desired parameter (such as a channel name) and press Enter to activate its adjacent edit window. Any previously entered text is displayed with its first character highlighted in a square cursor, signifying that this character is ready for editing.

NAVIGATE WITHIN THE EDIT WINDOW: Press ╋► to move the cursor forward or ◄─ to move the cursor backwards as desired.
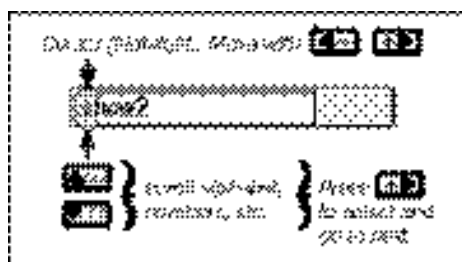
Figure 3.6. Entering Text

EDIT A CHARACTER: To edit a highlighted character, use ▲ 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. Note that you can also enter a number directly from the keypad—it will be accepted and the cursor will move on.

ADD OR DELETE A CHARACTER OR SPACE: To insert a space at the cursor location, press Func ╋► . To delete a highlighted character (or space), press Func ◄─ .
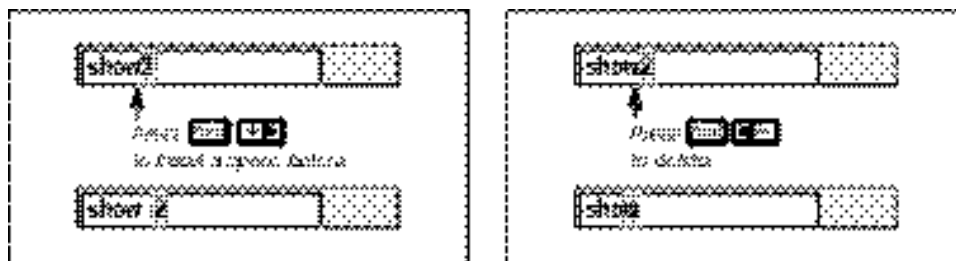
PRESS Enter WHEN FINISHED: To accept the edits and move out of the edit window, press Enter .

NOTE: Press Exit at any time to cancel changes and return to the previously defined text.

Editing Numerical Values ' Enter numbers directly from the keypad in order to specify numbers representing projectors, channels (source setups), switchers, or slots. As each digit is entered, it is displayed and the cursor moves on. Note that channel numbers are defined with 2 digits—for example, if you enter only a single digit (like "7") for a channel number, the channel will automatically be defined as "07". Use "07" to utilize this channel.

NOTES: 1) Once you enter the first digit, this digit replaces all old digits. 2) If you press any non-numbered key, the number entered up to that point is accepted and updated as the new value. 3) Press Exit to cancel editing of numerical values.

3.5 Using Inputs and Channels

*NOTE: See **Section 2, Source Setup**, for a full explanation of how to connect a variety of sources to the projector.*

The projector stores and automatically recalls up to 99 different channels (source setups) for a variety of inputs. This memory feature allows you to define and conveniently use a wide variety of customized setups rather than having to repeatedly re-configure the projector for different presentations. Each physical source (i.e., *input*) can have several different channels associated with it.

Do I Select an Input ' Or a Channel?

INPUT – An input simply describes a physical location for an incoming signal connection. These connections are always either on the projector itself (one of the four inputs at the rear of the projector) or on any switcher connected to the projector's switcher port. Input describes the source signal according to two specific criteria only—to which *switcher* it is connected and to which *slot* it is connected— and is identified by a 2-digit number entered on the keypad. The first digit specifies the switcher (0-9), the second specifies the slot (1-9). Note that the projector is always considered "switcher #0".

> **EXAMPLES:**
> Input 1 3 = use source connected to switcher #1, slot #3
> Input 0 1 = use source connected to the projector, slot #1

To switch between input ports (if your projector has a switcher connected to it) press the Input key and enter the 2-digit number representing the switcher and slot location for the desired signal. (*Note there is no on-screen feedback for entering the numbers.*)

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, and will automatically display an image according to default settings for such a signal.

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). Selecting an Input (Input 0 1, Input 0 2, Input 0 3 or Input 0 4) will automatically recall this channel—and all its setup parameters—and update the display accordingly. *Note: 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.*

CHANNEL - A channel is a collection of measurements, locations and settings that tailor a display to your specific needs. Since source types and applications can vary greatly, you will likely want to adjust and define a wide variety of parameters, such as brightness, contrast, size, etc., in order to customize and optimize the display coming from a particular source. For example, the display settings you choose for a VCR source may be very different from those you choose for a high resolution computer source, or one signal may simply vary from another signal used earlier through the same input location. Once you have adjusted a display parameter, such as pixel tracking or contrast, all current settings are collectively stored in the projector's memory as a unique 2-digit channel, such as 0 9. You can have numerous distinct channels available for the same input, any of which can be selected by using the Chan key on the keypad followed by the 2-digit channel number.

Channel List

NOTE: The [Chan] *key may display a channel list or not, depending on what you have defined within the **Menu Preferences** menu (see **Menu Preferences** later in this section). Shown at right is a sample channel list available from* [Chan] *.*

In order to use channels ([Chan] on the keypad), you must first create them. See below.

Figure 3.7. Channel List

Creating a New '
Channel
— AUTOMATIC —

To use a new source with the projector, a new channel must be added to projector memory so that the projector will respond properly to an input signal from that source in the future. A new channel can be created automatically, as described here, or it can be copied from an existing channel and then edited as necessary (see *Copying or Deleting Channels* later in this section).

When you select an input (eg. [Input] [0] [1]) the existing channels in the projector are searched for matching input and signal parameters. If no match to the incoming input signal is found in the currently defined channels, a new channel is temporarily created based on factory-defined defaults for this signal. The *channel number* assigned to this channel is the lowest available number from 01-99.

*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 a signal present.*

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

USING A CHANNEL: You can normally select a channel at any time by pressing [Chan]. If you want to prevent a channel from appearing in this list, you must edit the channel as described in *Channel Edit* later in this section. Such a channel can be selected by entering its number or by highlighting it and pressing [ENTER], (see Figure 3.7 above).

*NOTES: **1**) The current channel is highlighted upon entering the **Channel List,** or, if this channel is not displayed in the list, the first channel in the list is highlighted. **2**) Channels created automatically do not appear in the **Channel List** unless a parameter has been changed.*

What Channels '
Are Defined So Far?

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 [Enter]. The *Channel Setup* menu will appear (see sample at right), with the active channel highlighted.
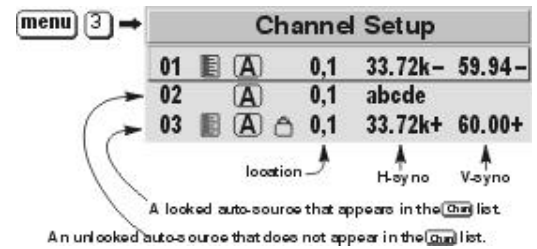
Figure 3.8. All Channels Appear in the Channel Setup Menu

WHAT APPEARS IN THE CHANNEL SETUP MENU? As shown in Figure 3.8, this menu lists all channels defined so far and indicates how they are connected to the projector. The far left column contains current channel numbers defined. The values in the far right columns indicate horizontal and vertical frequencies—if a name has been defined for this channel, it appears here instead. Other columns contain details pertaining to each channel setup, such as its switcher number, slot location, a variety of icons indicating access to the channel, and an abbreviated description of each signal type. See *Editing a Channel Setup* for details.

SIGNAL TYPE — Either channel list, whether the [Chan] key list or the *Channel Setup* menu, identifies signal types in a shortened form as defined below. These descriptors indicate what signal information the projector used to identify a match for a given

i" (interlaced signal) or "**p**" (progressive signal). See Table 3.1.

Table 3.1. 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
SR	Sync-on-red
5W	Separate H,V
5WR	Separate H,V swapped
SVid	S-Vid
CVid	Composite Video
3LH	Tri-Level on HC input
3LV	Tri-Level on V input
3LG	Tri-Level on green
E3LH	European Tri-Level on HC input
E3LV	European Tri-Level on V input
E3G	European Tri-Level on green
Dig	Digital

If you have more than a handful of channels, use [◄—] and [+►] to see the remaining channels not visible in this initial display.

To copy, delete or edit any of the channels listed in the *Channel Setup* menu, highlight the desired channel and do one of two things:

• Press Func if you want to copy the selected channel or delete this or other channels. See *Copying or Deleting a Channel* below.

• Press Enter if you want to edit channel setups (i.e., non-image related parameters) for the selected channel. See *Editing a Channel Setup*, below.

Copying or '
Deleting Channels

TO COPY A CHANNEL, highlight the desired channel in the *Channel Setup* menu, then press Func to go to the *Channel Copy/Delete* submenu. Select "Copy" and press Enter—a new channel will be created. It is identical to original, which still remains, but it is identified with the next available number from 01-99. If you change your mind and do *not* want to copy the current channel, press Exit to cancel and return to the previous menu. 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.
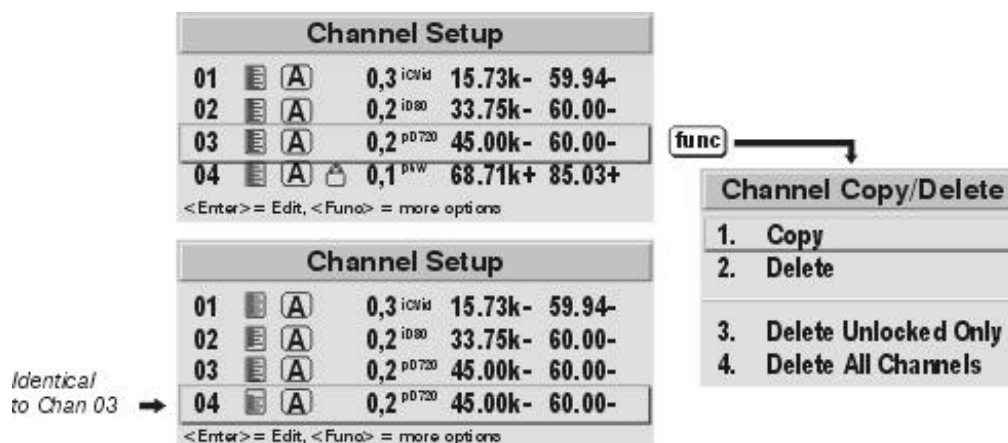
Figure 3.9. Copying A Channel

TO DELETE A CHANNEL, highlight the desired channel in the *Channel Setup* menu, then press Func to activate the *Channel Copy/Delete* submenu. Select "Delete" and press Enter—a confirmation window will appear to make sure that you really want to delete this channel.
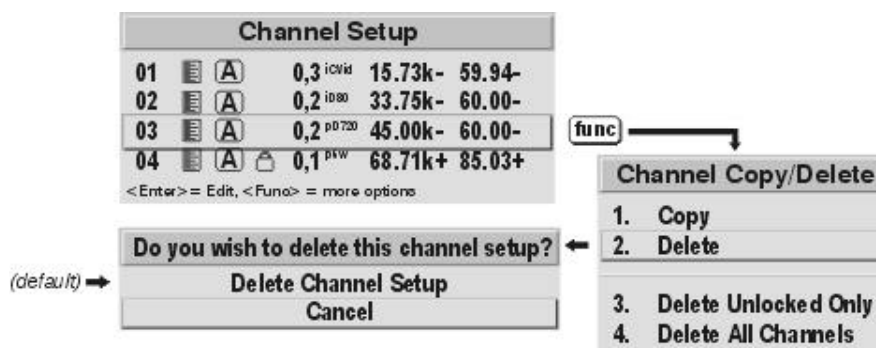
Figure 3.10. Deleting a Channel

TO DELETE MULTIPLE CHANNELS, highlight any channel in the *Channel Setup* menu and press Func to go to the *Channel Copy/Delete* submenu. Select "Delete Unlocked Enter 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.

NOTE: For any deletion, a confirmation box appears to make sure that you really want to delete. Select "Cancel" (default) if you don't want to delete after all.

Editing a Channel Setup ' The basic setups that describe how and where a channel can be accessed are listed in the *Channel Setup* menu. These channel setups can be edited at any time in the *Channel Edit* submenu.

CHANNEL EDIT — STEP 1 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 Enter. The *Channel Setup* menu will appear.

CHANNEL EDIT — STEP 2 To edit parameters shown in the *Channel Setup* menu, select the relevant channel and press Enter.

Channel Edit

1.	Name	pres2	Sync Type	Digital	} read-only
2.	Number	09	H-Sync	63.75 kHz +	
3.	Switcher	0	V-Sync	60.02 Hz +	
4.	Slot	1	Interlace	No	
5.	In Menu ▤	☑			
6.	Auto Source Ⓐ	☑			
7.	Locked ⚏	☑			
8.	Previous Channel				
9.	Next Channel				

Figure 3.11. Channel Edit Menu (SAMPLE)

CHANNEL EDIT — STEP 3 If desired, 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 channel number from 01 to 99 can be changed here. *NOTE: If you enter a channel number that already exists, a dialog message appears indicating that this number is already in use–assign a different channel number.*

- **SWITCHER NUMBER**: "0" represents the projector itself. Or, if the input source is connected to a switcher, the default will be the lowest switcher number available (from 1-9)–change here as desired.

- **SLOT**: 1 (Input1), 2 (Input2), 3 (Input3), or 4 (Input4) for projector inputs, or current slot number (1-9) if the source is connected to a switcher.

- **LOCKED**: If checked, all of the image settings for this channel are disabled. If unchecked (default), all available image settings can be adjusted as desired. You cannot use Auto Setup with a locked channel.

- **IN MENU:** If checked (default, except for automatically defined channels with unchanged parameters), this defined channel will then appear in the list available when Chan key is pressed. If unchecked, the channel must be accessed via Chan 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 ⌨Chan on the keypad—and a change in input signal will *not* result in a channel change.

- **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.

3.6 Adjusting an Image and Setting System Parameters

Most options for image adjustments can be accessed through two menus: *Size and Position* (⌨Menu ⌨1) and *Image Settings* (⌨Menu ⌨2), both of which are listed in the *Main* menu. While in either of these two menus, you can change settings affecting the image from the current channel by working with the appropriate slidebars, checkboxes and pull-down lists. Selecting ⌨Exit will always return you to the previous menu (or to the presentation, if from the *Main* menu) and accept any changes you may have made.

From your presentation, you can access any of the individual options in these menus by pressing ⌨Menu followed by the appropriate two-digit number representing their location in the menu system. For example, press ⌨Menu ⌨2 ⌨6 to quickly access the "Color Setup" option in the *Image Settings* menu.

Note that for certain options, you may prefer to use a "direct key" from presentation level to go directly to a particular option rather than traveling through the menu system at all (*Note: this is not available for all display parameters*). For example, press ⌨Cont to access the "contrast" slidebar immediately. Press ⌨Exit to return to your presentation.

NOTE: 1) To hide the "direct" slidebars only, make sure the Display Slidebars option in the Menu Preferences menu is unchecked. 2) Press and hold the ⌨OSD key to toggle the on-screen display OFF – this hides the entire menu system from view.*

Size and Position '

The *Size and Position* menu allows you to 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. Use *Size and Position* controls to match the image precisely to the screen size and aspect ratio needed for your application.

Size and Position		
1. Resize Presets	No Resizing	▼
2. Size	1000	
3. Vertical Stretch	1000	
4. Pixel Track	1600	
5. Pixel Phase	0	
6. Filter	0	
7. H-Position	700	
8. V-Position	545	
9. Lens Control		
0. More		

Size and Position (2)		
1. Top Blank	0	
2. Bottom Blank	0	
3. Left Blank	0	
4. Right Blank	0	
5. PLL Loop Gain	10	
6. Keystone	⊕ 50.0	
7. Plug & Display (EDID)	⊕ 1280x1024x60Hz	▼
8. Tiling Setup		
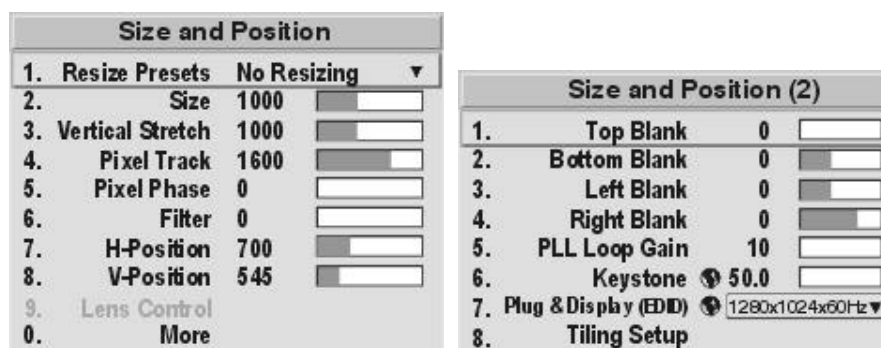
Figure 3.12. Size and Position Menu

Refer to *"Using Slidebars and Other Controls"* (earlier in this section) if you need help using any of the following slidebars or pull-down lists to alter your image.

Changes made to the *Size and Position* menu are applied immediately and are saved when you exit the menu (press Exit or Menu).

NOTE: "Resize Presets", "Size", "Vertical Stretch","Lens Control", "Keystone", "Plug & Display" and "Tiling Setup" are not applicable to RPMS-500XeF models. This projector displays images in its native resolution only – no resizing ability.

Resize Presets

Applicable only to *Xe* models - use *Resize Presets* to quickly display an image in its native resolution (including anamorphic) or to automatically resize an image to closely fit the screen. The value for *Size*, *Position* and *Blanking* parameters (described later) will, in turn, change as necessary without your having to set them manually.

Resize Presets
1. Default = maximize for current source
2. No Resizing = display in native resolution
3. Full Size = fill the screen (regardless of source)
4. Full Width = display full width
5. Full Height = display full height
6. Anamorphic = retain 16:9 aspect ratio ("letterbox")
7. Tiled Full Size
8. Tiled Full Width
9. Tiled Full Height
0. Tiled Anamorphic

Same as above except multiple screens used - as indicated in "*Tiled Setup*"

Figure 3.13. Resize Presets Submenu

WHAT IS THE PROJECTOR'S DEFAULT? When displaying a new source, by default your image will fill the screen as fully *as possible* for the type of source present. See *Select "Default"* below.

WHEN "CUSTOM" APPEARS: The "Custom" descriptor automatically appears in the *Size and Position* menu when any of the values for *Size*, *Vertical Stretch*, *H-Position*, *V-Position* or *Top, Bottom Right and Left Blanking* do not correspond to those for a preset. It is not an option in the *Resize Presets* pull-down list.

- **SELECT "DEFAULT"** (default) for most images. This option will center and display your image as large as possible *for the present source* as described below:

  ⇒ *A graphic image* will resize to fill the screen, regardless of its original aspect ratio. For example, 1024 x 768 becomes 1280 x 1024
  ⇒ *A video image* will resize to fill the screen while still maintaining its aspect ratio (assumed to be 5:4).
  ⇒ *An HDTV wide-screen (16:9) image* will resize to fill the screen horizontally while maintaining its 16:9 aspect ratio—i.e., there will be black borders at top and bottom, commonly called "letterboxed".
  ⇒ *A non-HDTV anamorphic (16:9) image*, typical of DVDs, will be stretched vertically.
  So with the exception of HDTV (16:9), the "Default" setting produces an aspect ratio that is either almost or exactly 5:4. See examples below.

- **SELECT "NO RESIZING"** to display the image in its native resolution, which may be smaller or larger than the native resolution of the projector. All *Size*, *Vertical Stretch*, *H-Position*, *V-Position* or *Blanking* values will change accordingly. For example, for a source with a native resolution of 800 x 600, "No Resizing" will center a small image within a black border. Conversely, an HDTV image is wider than both 1024 and 1280 and will be cropped on the sides—or, in the case of "1080i" HDTV, cropped at top and bottom too. With "No Resizing", signals with

non-square pixels, such as video connected to **INPUT 3** or **INPUT 4**, produce distorted images that are too tall or too wide. See below.

- **SELECT** "**FULL SIZE**" to use *all pixels* for displaying the image, regardless of source or original aspect ratio. See right. *NOTE: SXGA resolution shown.*

"Full Size"

For all sources

1024   Image

1280
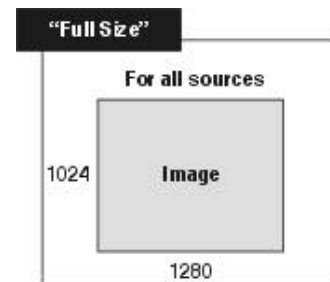
- **SELECT** "**FULL WIDTH**" to fill the screen from left-to-right for displaying the image. The top and bottom of the image may appear black (similar to a 16:9 image).

"Full Width"

(EXAMPLE)

820   Image

1280
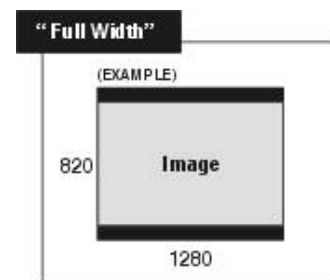
- **SELECT** " **FULL HEIGHT**" to fill the screen from top-to-bottom for displaying the image. The left and right areas of the image may appear black.

" Full Height"

(EXAMPLE)

1024   Image
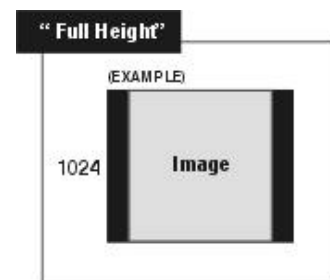
- **SELECT** "**ANAMORPHIC**" to display an entire *non*-HDTV "wide screen" (anamorphic) image in its native 16:9 aspect ratio. Known as letterbox, the image will fill the screen from left-to-right, but will not use all vertical pixels available (top and bottom will be black). If you do not choose "Anamorphic" when a non-HDTV anamorphic image is present, the default image will be stretched vertically, characterized by obvious distortion and "thin

"Anamorphic"

For non-HDTV anamorphic...

Image

1280
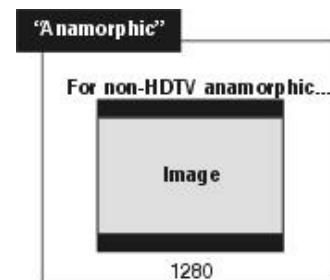
*NOTE: Use "Anamorphic" for regaining a 16:9 display of **non**-HDTV anamorphic sources only (typically found on some DVDs, for example). For HDTV, the "Default" setting will produce the same result.*

Resize Presets" will appear only when a multi-tiled array is defined in the ***Tiling Setup Menu*** – described later in this section.

• SELECT "TILED FULL SIZE" to fill all screens in the defined array with the data from the incoming signal. The data will be stretched horizontally and vertically to fill all screens – this option does not maintain aspect ratio.
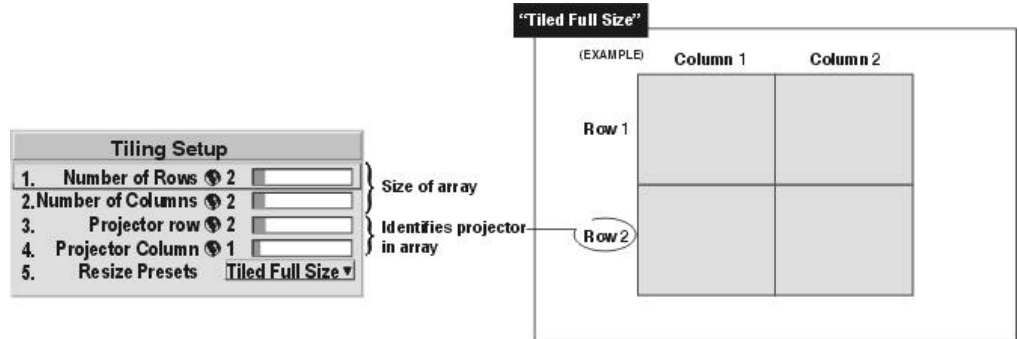
• SELECT "TILED FULL WIDTH" to fill all screens from left-to-right with the data from the incoming signal. The data will fill the width of the array leaving a top and bottom black border - aspect ratio maintained. Best suited for HDTV signal.
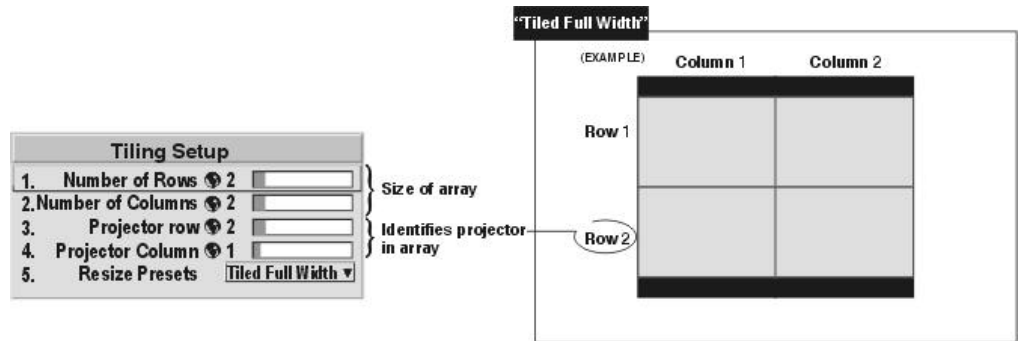
• SELECT "TILED FULL HEIGHT" to fill all screens from top-to-bottom with the data from the incoming signal. The data will fill the array vertically while maintaining aspect ratio – black borders will appear on the left and right of the image.
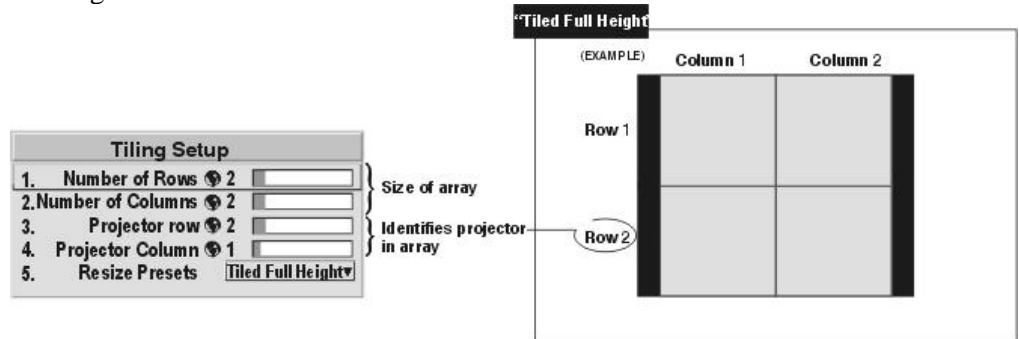
• SELECT "TILED ANAMORPHIC" to display a "wide-screen" (anamorphic) image in a 16:9 aspect ratio.

Size

Size controls both the image width and height in tandem, maintaining the current aspect ratio (proportion) of data from the incoming signal.

Vertical Stretch

Vertical stretch adjusts the height the image while keeping the width constant. Use Vertical Stretch to display data from the incoming signal in a different aspect ratio.

Pixel Track

(*SHORT CUT:* Press [Pixel] and adjust the top slidebar.)

Pixel tracking adjusts the frequency of the pixel sampling clock, indicated by the number of pixels per line, so that all pixels generated by a particular source are sampled. Proper pixel tracking ensures that the image quality–whether good or poor– is *consistent* across the screen, that aspect ratio is correct, and that pixel phase can be optimized (below).

NOTE: By default, the projector will sample at the correct frequency for most sources.

Pixel tracking is adjusted most effectively using a good test pattern, such as a smooth gray consisting of a clear pattern of tiny black and white dots, or a similar "half on, half off" graphic image, such as the *Windows* shutdown screen. Steady flickering or several soft vertical stripes or bands across the entire image indicates poor pixel tracking. Adjust the slidebar until the stripes broaden to the point where one large stripe fills the image. Again, the image may still exhibit some noise.

Pixel Phase

(*SHORT CUT:* Press [Pixel] and adjust the bottom slidebar.)

Pixel phase adjusts the phase of the pixel sampling clock relative to the incoming signal. It is used primarily for adjusting RGB inputs.

*NOTE: Adjust pixel phase **after** pixel tracking is properly set.*

Adjust pixel phase when the image (usually from an RGB source) shows shimmer or "noise". Pixel phase adjustment is done most effectively from within a proper test pattern, such as a smooth gray consisting of a clear pattern of tiny black and white dots, or a similar graphic image, such as the *Windows* shutdown screen. Adjust until the image is stable and each dot is clearly defined. Using the numbers on the slidebar as a guide, you will notice that you can actually 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 select either setting.

Filter

Filter applies a low pass filter to the input signal. This removes high frequencies, which can improve pixel phase noise, but also reduces signal bandwidth. Note that most signals will not require any filter adjustment—use the filter option only if standard pixel tracking and phase adjustments do not adequately clear up a "noisy" signal. For best results:

1) Optimize *Pixel Tracking* and jot down the value.
2) Optimize *Pixel Phase*
3) If the image is still too noisy, return to *Pixel Tracking* and "mis-adjust" so that 2 vertical bands of noise appear, separated by a good center band. See Figure 3.14.
4) Adjust *Filter* to maximize the width of the good area. See Figure 3.14.
5) Return *Pixel Tracking* to its correct setting from Step 1.
6) Readjust Phase.
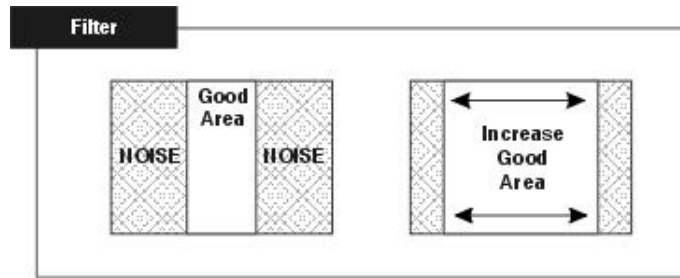
Figure 3.14. Adjust Filter

NOTE: "Filter" affects only the current signal.

H-Position

(SHORT CUT: Press Position and adjust the top slidebar.)

This option moves image right or left.

NOTE: 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.

V-Position

(SHORT CUT: Press Position and adjust the bottom slidebar.)

This option moves the image up or down.

NOTE: 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.

Top, Bottom, Left or Right Blanking

By adjusting these options you blank (turns to black) the top, bottom, left, or right edge of the image so that any unwanted information is cropped from view. For example, when displaying native size video you may want to blank out a few of the top lines.

PLL Loop Gain

This control changes the relative offset to the default gain. The default PLL (Phase Lock Loop) Loop Gain setting of 10 is set automatically with a Pixel Tracking adjustment and is correct in most cases. In rare instances, such as if your image exhibits tearing or "flag-waving", increase the PLL loop gain setting as necessary. Or, if your image is unstable and "breaks up", this may indicate that the PLL loop gain setting is either too high or too low. PLL Loop Gain affects the current channel only.

Keystone - Adjust the "Keystone" slidebar if images appear non-rectangular in shape.

NOTES: 1) Keystone is enabled for a source only if Size is ³ 1000 and Size x Vertical Stretch (in Size and Position Menu) is ³ 1,000,000. 2) Keystone adjustments are not available to RPMS-500XeF models.

Generally, set at 50 (default) to apply no keystone – if your projector is positioned with its lens surface parallel to the screen, images will be rectangular. If images are too narrow at the bottom, increase keystone. If images are too narrow at the top, reduce keystone.

The keystone control may be limited when "Size" is just slightly greater than 1000. In general, work with image "Size", "Vertical Stretch" and "Keystone" controls as necessary for your application.

Plug & Display (EDID)

By default the "Plug & Display" option detects an incoming digital flat panel video signal and displays it in the native resolution of your projector. If you have additional daisy chained projectors they too will display in this resolution. If you want to use a different resolution (for example, your graphics card may not support the current resolution), select a different Plug & Display setting from the list – see right.

```
1. 1024x768x60Hz
2. 1024x768x120Hz
► 3. 1280x1024x60Hz
4. 1280x1024x105Hz
5. 1600x1200x45Hz
```
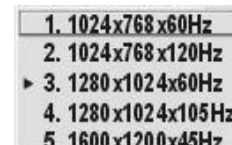
NOTE: Unavailable options appear grayed out.

Tiling Setup

NOTE: Enabled for Xe models only.

Use the options provided in this menu to define the size of a tiled array (also known as a videowall).

```
         Tiling Setup
1.    Number of Rows     2
2. Number of Columns     2
3.       Projector row   2
4.   Projector Column    1
5.     Resize Presets   Default  ▼
```
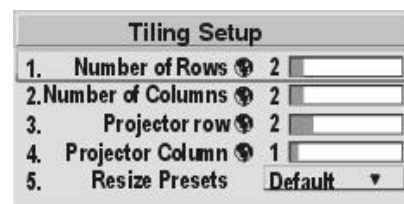
NUMBER OF ROWS – Adjust the slidebar until the value shows the correct number of rows of projectors in the array. It can be set between the range of 1 to 4.

NUMBER OF COLUMNS – Use the slidebar until the value shows the correct number of columns of projectors in the array. It can be set between the range of 1 to 4.

PROJECTOR ROW AND PROJECTOR COLUMN – By adjusting these slidebars you can define the location of the projector within the array. See Figure 3.15.
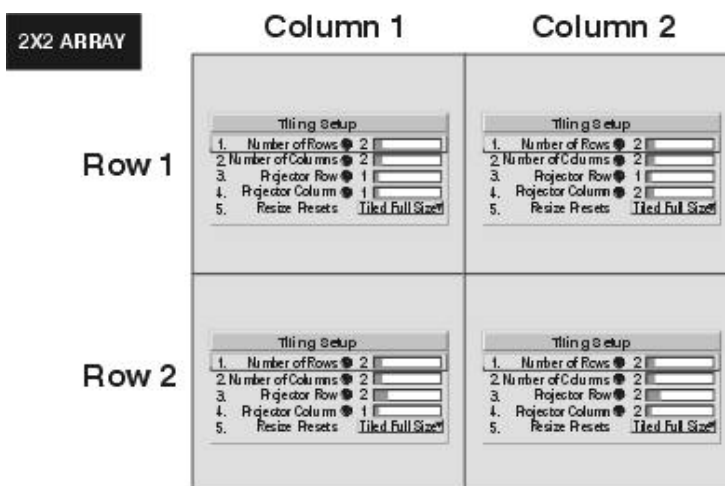
Figure 3.15. Tiling Setup (Example of 2x2 array)

Image Settings ' Use the options available in the two-page Image Setting Menu to alter your image. Options not available are grayed out and cannot be selected. Changes made to the *Image Settings* menu are applied immediately and are saved when you exit the menu (press [Exit] or [Menu]).

Image Settings				Image Settings (2)		
1.	Contrast	50.0	▭	1.	Processing Mode	Auto ▼
2.	Brightness	50.0	▭	2.	Motion Filter	Auto ▼
3.	Pixel Phase	0	▭	3.	Dark Interval ◍ 0	▭
4.	Detail	2	▭	4.	Invert Stereo3D	▭
5.	ColorSpace	RGB ▼		5.	White Boost	10
6.	Color Setup			6.	PLL Loop Gain	10
7.	Video Options			7.	Noise Reduction	0
8.	Input Levels			8.	Horizontal Filter	0
9.	More			9.	Vertical Filter	0
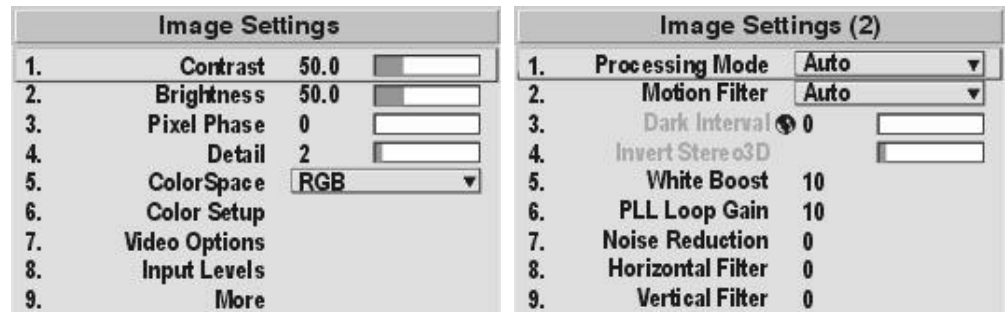
Figure 3.16. Image Settings Menu (page 1 and 2 shown)

NOTES:1) Detail, Color Space, Video Options, Processing Mode, Motion filter, Noise Reduction, Horizontal Filter, Vertical Filter are not available to RPMS-500XeF. 2) Dark Interval and Invert Stereo3D are not available in both models.

Contrast

(SHORT CUT: Press [Cont] and adjust the slidebar.)

"Contrast" increases or decreases the perceived difference between light and dark areas of your image (0-100). 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 image will be dim. Start low and increase so that whites remain bright but are not distorted or tinted, and that light areas do not become white (i.e., are "crushed"). For best results, keep close to 50.

Brightness

(SHORT CUT: Press [Bright] and adjust the slidebar.)

"Brightness" increases or decreases the amount of black in the image (0-100). Start high and decrease so that dark areas do not become black (i.e., are "crushed"). Conversely, high brightness changes black to dark gray, causing washed-out images. For best results, keep close to 50.

Pixel Phase

(SHORT CUT: Press [Pixel] and adjust the bottom slidebar.)

Refer to description under Size and Position menu.

Detail

(SHORT CUT: Press [DETAIL] and adjust the slidebar.)

"Detail" adjusts the sharpness of the video image. Use [◄−] or [+►] until the display is as sharp as possible, keeping in mind that any level of detail above 3 (default) will increase the level of detail as well as introduce some level of noise in the image. Set below 3 to filter the signal and remove noise from a noisy source. Keep at 3 to apply no detail.

Color Space

This option determines how the color components of an input signal are decoded for accurate color in the display. Selecting a color space option is useful only for analog signals connected to **INPUT 1** or **INPUT 2**. Although the color space for such a signal is automatically determined by the projector, in some circumstances you may wish to override this and manually set a different color space.

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

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

	Image Settings		
1.	Contrast	50.0	▯
2.	Brightness	50.0	▯
3.	Pixel Phase	0	
4.	Detail	2	
5.	ColorSpace	RGB	▸1. RGB
6.	Color Setup		2. YPbPr (Video)
7.	Video Options		3. YPbPr (HDTV)
8.	Input Levels		
9.	More		
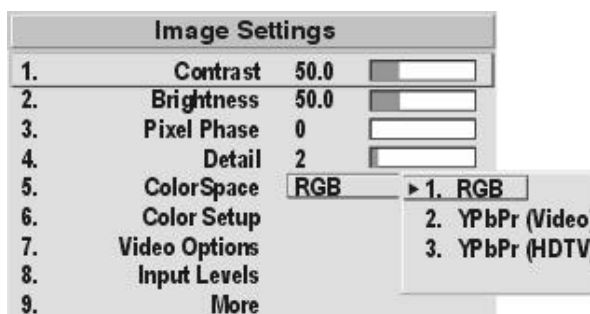
- Select **RGB** *unless* you are using component video at **INPUT 1** or **2**.
- Select **YPbPr (Video)** with a standard definition televised signal (SDTV)
- Select **YPbPr (HDTV)** with a high definition televised signal (HDTV).

NOTE: When certain RGB signals are first connected, the projector may not initially recognize them as RGB and will incorrectly decode their color information as YPbPr (video). These signals 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, which will define a new channel for future use.

Color Setup

Select this option to gain access to another window that offers options to modify Color, Tint, Gamma and Color Temperature of an image.

	Color Setup		
1.	Color	50.0	▯
2.	Tint	50.0	▯
3.	Select Color Temp	6500K	▾
4.	Interpolated Color	6500K	
5.	Gamma	Default	▾
6.	Color Temp Setup		

Note: Color, Tint, and Interpolated Color are not available to RPMS-500XeF models.

COLOR -"Color" adjusts the color saturation level or the amount of color in a video image. When set to "0' the image appears black and white and when set too high the colors appear unrealistic. Use ◄─ and ╪► to adjust "Color" until the desired saturation level is displayed.

TINT - "Tint" adjusts color hue to obtain true color reproduction of NTSC video signals or HDTV signals. Use ◄─ and ╪► until the desired balance or red-to-green is displayed in your image. It is best to adjust tint while displaying an external test pattern- otherwise, it is recommended that tint remain at its default setting.

SELECT COLOR TEMP - "Select Color Temp" applies either a preset color temperature (3200K, 5400K, 6500K or 9300K) or any previously "User" defined color temperature.

All temperatures are measured in degrees Kelvin and represent the "coloration" (reddish or bluish) of the whites displayed by the projector. Whites appear more reddish when a low color temperature is selected and more bluish when a higher color temperature is selected.

INTERPOLATED COLOR - Increase or decrease the value of "Interpolated Color" if you need a specific color temperature somewhere in between two preset color temperatures. For example 7841 is interpolated from 6500 and 9300.

GAMMA - *NOTE: Gamma does not normally require adjustment and is intended for experienced users only.*

The "Gamma" option affects the shape of the curve determining what gray shades are available for a given amount of signal input between minimum (black) and maximum (white). Different curves can improve performance for certain kinds of source input and applications. Generally the best gamma curve is one that produces maximum contrast, brightness and color performance for the current signal and ambient lighting conditions.

DEFAULT (default) – This setting provides good black levels and high contrast under optimum viewing conditions for virtually all types of images, including video, HDTV and computer graphics.

ENHANCED – This setting elevates *middle* gray levels compared to "Default", and provides a more gradual rolled-off transition to maximum white. Together, these differences can improve the appearance of many kinds of images.

HIGH AMBIENT – This setting elevates *low* gray levels compared to the "Default" and "Enhanced" settings. In high ambient light conditions, details can be seen in the dark parts of an image that would otherwise be difficult to perceive.

PAL/SECAM – This setting results in a darker image with higher contrast. The gamma curve more closely matches the official standard for PAL and SECAM video signals.

NTSC ENHANCED – This setting is similar to **ENHANCED**, but results in a darker image with higher apparent contrast.

LINEAR – This setting is a straight, linear transition from black to white. For normal source signals, it results in a picture of low contrast with highly elevated low- and mid- level grays. It should be used only with sources that have their own pre-applied gamma control.

COLOR TEMPERATURE SETUP

Select the "Select Color Temp" option if you want to apply, alter, add, or copy a color temperature, or if you want to use an unaltered factory default color temperature.

By default, the projector can utilize any of four calibrated factory-set color temperatures: 3200, 5400, 6500 or 9300 (expressed in degrees Kelvin). For most applications, these temperatures will display accurate and realistic colors from a variety of sources. They can be selected at any time in either the *Image Settings* menu (*4. Color Setup*) or in the *Color Temperature Setup* menu.
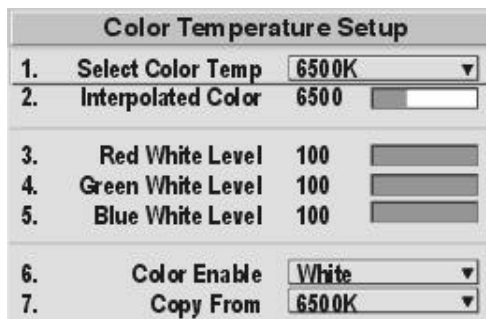
Figure 3.17. Color Temperature Setup Menu

However, if you require extra color temperatures, you can also add up to five custom color temperatures–four "User" and one "Interpolated"–by defining them within the *Color Temperature Setup* menu (each defaults to 6500K until then). Any "User" or "Interpolated" temperature created here is immediately applied, or it can be selected at any time from the *Image Settings* menu (*4. Color Setup*) as usual, regardless of your source or channel. The *Color Temperature Setup* menu options are described below.

NOTE: For best results, use an internal grayscale test pattern when working with color temperature.

SELECT COLOR TEMP – The current color temperature is shown in the menu and can be changed here just as in the *Image Setting "Color Setup"* menu. When a "User" color temperature is selected, the White Level and Interpolated options are disabled and can be adjusted to create your own color temperature.

INTERPOLATED – Use this option to increase ($\boxed{+\blacktriangleright}$) or decrease ($\boxed{\blacktriangleleft-}$) the value of "*Interpolated Color*" if you need a specific color temperature somewhere in between two preset color temperatures. For example 7841 is interpolated from 6500 and 9300.

*WHITE LEVELS –*These 3 controls are adjustable only if a "User" choice is selected (in which case "User 1, 2, 3 or 4" appears at the top of the *Color Temperature Setup* menu). Their current values are shown for the active color temperature. Changing a white level here changes the drive (contrast) for that color, essentially creating a new color temperature that is "warmer" or "cooler" etc. ***For maximum overall brightness, always keep at least one white level at 100.*** When you are satisfied with the new "User" temperature, it can be used immediately upon exit or it can be selected from either the *Image Settings "Color Setup"* menu or the *Color Temperature Setup* menu as usual. You can re-define a "User" color temperature at any time using the *Color Temperature Setup* menu.

COLOR ENABLE – Select which color or colors you want to see, useful while working with color temperature white levels.

COPY FROM – Use this option to replace the currently selected "User" color temperature setup with that of another. This function can be particularly useful for creating a starting point for a new "User" color or for accessing an unaltered factory default. It is disabled for all color temperatures *except* "User". See Figure 3.18.
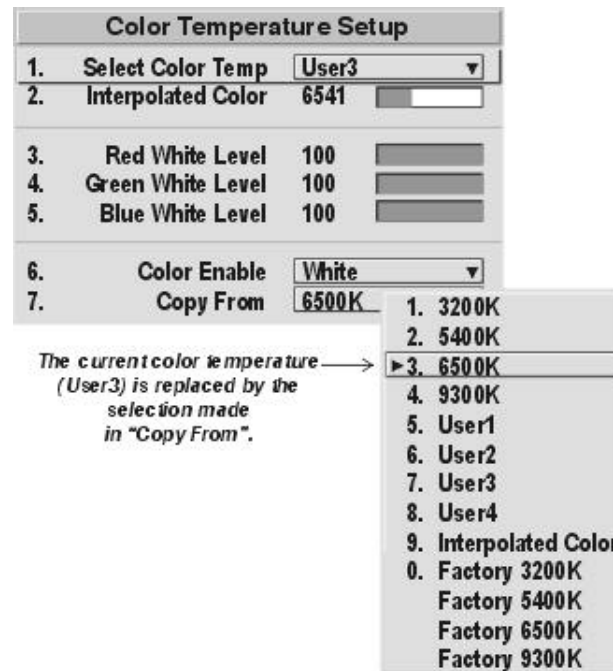
Figure 3.18. "Copy From"

To create a starting point: To set a starting point for a new custom user color temperature, select a user temperature, then highlight "Copy From" and select a temperature that is similar to what you want. Adjust white levels from there as desired.

To use a factory default: The preset color temperature setups (3200K, 5400K, 6500K and 9300K) can be altered from within the password-protected *Service* menu only—note that although such an alteration changes the *setup and appearance* for a preset, it does not change its *name*. If you suspect that you are using a preset temperature that has been altered and you want instead to use the original factory-calibrated color temperature without clearing the entire projector memory, you can use the "Copy From" option in the *Color Temperature Setup* menu to set up a "User" temperature with settings from a permanent factory preset:

1) Select the "User" color temperature you wish to update at the top of the *Color Temperature Setup* menu, such as "User 2".
2) From the "Copy From" list, select the matching temperature labeled "Factory" (such as "Factory 5400K"). These are the calibrated color temperatures set at manufacture—they remain intact for the life of the projector.

3) The setups for the "User" color temperature you selected at the top of the *Color Temperature Setup* menu will now be updated/replaced by those for the permanent factory calibrated temperature you selected in the "Copy From" list. Again, a "User" temperature can be altered at any time, if desired.

Video Options

VIDEO STANDARD -The projector automatically detects the video standard present and displays the name of this standard here. Press ⌨ENTER to view or select a different video standard from a complete list available to the projector (some will appear disabled, depending on the current incoming signal). Selecting a specific standard forces the projector to process the signal according to this standard.

NOTE: This option should remain set at "Auto" for all instances EXCEPT: 1) a poor quality input signal or 2) a black-and-white video signal. In order to detect and display such signals, select the relevant standard.

INPUT VIDEO BLACK - This control compensates for incoming elevated black levels–called "setup"–that are present in certain video signals, and ensures that blacks on screen are neither crushed (i.e., with dark gray appearing black) nor excessively elevated (i.e., with black appearing dark gray). By default, the projector automatically determines the correct setting according to the type of incoming video signal:

- **0 IRE** – For DVD output with "enhanced black", SECAM, most PAL standards, and Japanese NTSC
- **IRE** – 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 also for graphics sources. Generally, if black appears crushed when brightness = 50, choose "0 IRE". If black appears excessively elevated, use "7.5 IRE".

VCR – This control determines to what degree the projector tolerates signal disturbances. The correct setting is automatically determined and set according to the type of incoming source signal–for instance, there should be a checkmark for all VCR sources. The VCR option may require a change from its auto setting in very rare circumstances only, such as if you are having difficulty switching between two unusual and almost identical VGA computer sources. Otherwise, it is not necessary to change this option.

VIDEO TERMINATION - Enter a checkmark to terminate the video inputs 3 and 4 (75 Ω). The input should be terminated unless the signal loops through (continues) to another projector or display device, in which case only the last projector in the chain should be terminated.

ENABLE DECODER AGC -The "automatic gain control" affects decoded video images only. Enter a checkmark (default) for most decoded video sources—this activates the AGC circuit to ensure properly bright images. Delete the checkmark if a decoded video image exhibits strange color artifacts such as stripes in highly saturated colors, indicating an incompatibility between this source and the AGC.

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.

Input Levels

*NOTES: **1**) It is recommended that only experienced users use the **Input Levels** menu—the projector automatically optimizes input levels for all but the most unusual of sources. **2**) Always check that overall contrast and brightness settings are near 50 **and** that color temperature is properly set up on an internal grayscale test pattern before attempting an input level adjustment. **3**) There must be at least one white pixel present in the image for proper "Auto Input Level" function. Leave this control **off**.*

Input Levels		
1.	Auto Input Level	☐
2.	Red (Pr) Blacklevel	50.2
3.	Green (Y) Blacklevel	50.2
4.	Blue (Pb) Blacklevel	50.2
5.	Red (Pr) Input Drive	50.2
6.	Green (Y) Input Drive	50.2
7.	Blue (Pb) Input Drive	50.2
8.	Clamp Tip	☐
9.	Color Enable	White ▼
0.	Peak Detector	☐
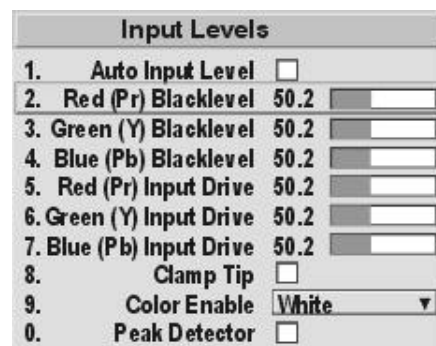
Figure 3.19. Input Levels Menu

Good RGB or input levels—that is, the *drives* and *blacklevels* for each of the three colors, red, green and blue—ensure that images from analog sources other than decoded video have maximum contrast without crushing black or white. By default (and in an "Auto Setup" from the *Main* menu), the projector automatically determines the best input levels by monitoring image content and adjusting the controls appropriately—further adjustment is typically not required to obtain proper blacks or whites. *NOTE: This automatic adjustment requires at least **1 white pixel** in the image. Without a white pixel, input levels may produce skewed colors, particularly in non-video images.*

However, for a very unusual source exhibiting overly high blacklevels (most often caused by a noisy source that causes blacklevel spikes), an experienced user may prefer to use the *Input Levels* menu (see Figure 3.19). These adjustments, which are actually a calibration process to compensate for differences in sources and cabling, enables an experienced user to perfect the source image input levels. Note that *Input Levels* are of limited use with digital signals, but 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 and you have an unusual source that you feel needs further color temperature and/or input level adjustment. After entering a checkmark, wait for the six values to stabilize, then delete the checkmark and exit.

BLACKLEVELS AND DRIVES - To check your image and adjust these controls:

1) Make sure overall Contrast and Brightness are both set to near 50. *NOTE: Not required for "Auto" adjustment.*

2) $\boxed{\text{Cont}}$ = 50 (approx.)

3) $\boxed{\text{BRITE}}$ = 50 (approx.)

4) Check the color temperature setup using an internal grayscale test pattern, adjusting as desired to obtain a neutral grayscale. *NOTE: Not required for "Auto" adjustment.*

5) Make sure you are using an analog source ***not*** connected to **INPUT 3** or **INPUT 4**, as Input Levels are not applicable for digital sources or sources going through the decoder. A grayscale is recommended.

6) If the blacks and/or whites appear OK, input levels do not need adjustment. If black levels are too high (and/or whites are too low, which is rare), you likely have a noisy source that is producing skewed input levels. Continue with Step 5.

7) Temporarily enable "Auto" in the *Input Levels* submenu. Wait for all 6 values to stabilize. Alternatively, do *not* use "Auto"—reduce blacklevels manually instead. Judge by eye and change one or more of the six levels as necessary to obtain proper blacks and whites. You may want to see only a certain color while adjusting—use the "Color Enable" option (described below).

8) Delete the "Auto" checkmark and leave the *Input Levels* menu.

IMPORTANT: Do not use Input Levels to adjust color temperature. This will distort Contrast and Brightness functions as well as color temperature.

CLAMP TIP – This option (full name *sync tip clamping*) can brighten the image produced from certain high resolution, high frequency graphic sources. Enter a checkmark if the image appears unusually dim, if there are horizontal streaks across the image, or if there is significant color drift. Delete the checkmark if the image is either sufficiently bright or overly bright.

NOTE: The sync tip clamping option is not used for video sources or any RGB source with sync information on the video (e.g., sync-on-green).

COLOR ENABLE – Select which color or colors you want to see, 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) Assuming that color temperature has been set up based on the internal test patterns, you can then set up input levels for a given source so that it matches the color temperature of the internal test patterns.
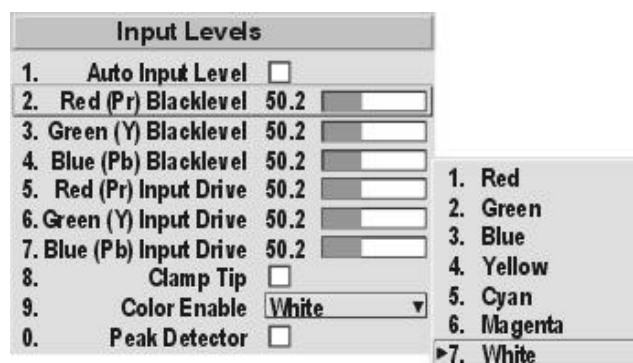
PEAK DETECTOR – Enabling the Peak Detector activates a special operating mode that detects only pixels that are considered black or white—all other levels are displayed as a mid-level gray. When used with a 16-step grayscale pattern, where the black and white bands are known to be at the edges of the image, you can watch

these isolated areas while adjusting individual blacklevels and input drives. Images from this source will then display correct blacks and whites without crushing.

See Figure 3.20.

1) Display a 16 level grayscale test pattern from the desired external source, and enter a checkmark in the Peak Detector checkbox. *NOTE: The "Peak Detector" will render all but the black-and-white side edges as a uniform gray field.*

2) Display one primary color (use *Color Enable* to select).

3) For the current color, adjust its corresponding "Blacklevel" slidebar *just* until a single band of black appears at one edge of the screen. This band represents the first band of the grayscale pattern, which should be 100% black. Do not adjust too far.

4) With the same color still active, adjust its corresponding "Input Drive" slidebar *just* until a single band of white appears at the opposite edge of the screen. This band represents the last band of the grayscale pattern, which should be 100% white. Do not adjust too far.

5) Go back and check the black band—adjust the blacklevel slidebar if necessary. Adjustments are related, so you may have to go back and forth until both bands are *just* optimized.

6) Repeat Steps 2-5 with the other two remaining primary colors. When each primary color shows *one* optimized black band and white band, the input levels for this source are correctly set. Upon exiting the *Input Levels* menu, the Peak Detector checkbox will clear.
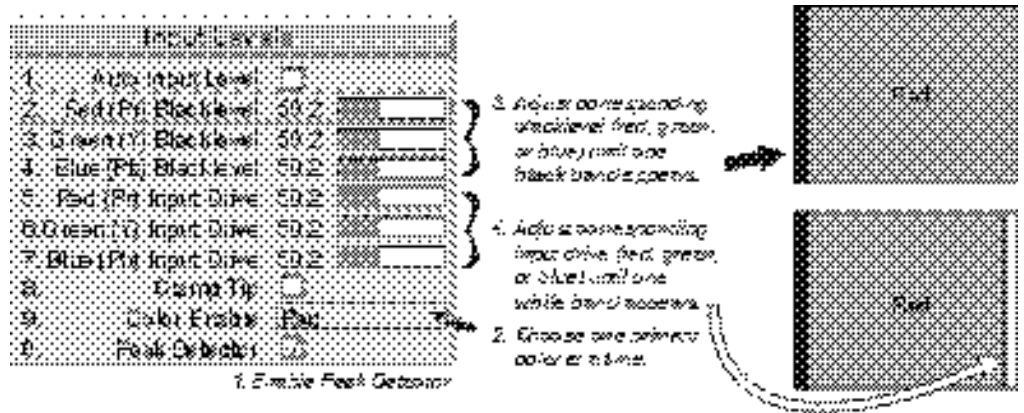
Figure 3.20.Adjusting Blacklevels by Enabling Peak Detector

Processing Mode

This control determines the projector's processing route for the incoming signal.

1) **AUTO** (default): The projector will automatically select the correct processing mode according to what input signal it detects. Use "Auto" unless you want or need to override its performance and apply a specific mode instead.

2) **VIDEO**: Performs 15 kHz NTSC/PAL video de-interlacing, regardless of signal type. Note that this option utilizes 8-bit processing.

3) **GRAPHICS / HDTV**: Performs basic de-interlacing and scaling, regardless of signal type. Note that this option utilizes 8-bit processing.

4) MINIMUM DELAY: Single option enabled for XeF models only.

5) ADVANCED 10-BIT (ADP): Uses 10-bit processing instead of the standard 8-bit processing provided in the projector, resulting in smoother and clearer details in video images. This feature requires installation of optional internal hardware—the *Advanced Digital Processing Module*—and is disabled unless this module is present. It provides full source-to-screen 10-bit processing for a digital video source, typically connected via the optional *Serial Digital Input Module* or the *Digital HDTV Input Module* (**INPUT 2**). Images from analog signals (**INPUT 1**, **3** or **4**) will also be noticeably improved, however these signals are first converted with 8-bit processing before routing through the ADP module.

Motion Filter - This control is most useful for smoothing out moving images from interlaced sources. In most cases the proper Motion Filter setting is automatically determined according to the type of incoming source signal. However, if your source is noisy and/or inconsistent you may wish to "force" a setting to ensure stable processing for this source—if desired, override the default "Auto" setting by selecting the appropriate motion filter:

```
► 1. Auto
  2. Still Video
  3. Video
  4. Film
  5. Graphics
  6. Motion
```

1) AUTO: The projector will automatically use the correct motion filter according to the incoming signal. Note that the "Still Video" filter will be applied for RGB *non*-HDTV interlaced signals, and the "Motion" filter will be applied for RGB HDTV interlaced sources.

2) STILL VIDEO: For static images with no motion, such as graphics from a CD. *Note: Applied for RGB **non**-HDTV interlaced signals.*

3) VIDEO: For video images that did not originate from film, or for moving computer-generated images. *NOTE: Applied for RGB HDTV interlaced signals.*

4) FILM: For video images that originated from film. This will optimize image quality and stability.

5) *NOTES: **1**) For 60 Hz video standards: NTSC, PAL M, PAL 60. **2**) Also recommend for PAL video standard if the ADP module is present—note that you must select film mode manually in this case. **3**) Signals can be from RGB video, composite video or S-video sources.*

6) GRAPHICS: For graphic images.

7) MOTION: For video images that did not originate from film, or for moving computer-generated images. *NOTE: Applied for RGB HDTV interlaced signals.*

Dark Interval – Not available – appears grayed out.

Invert Stereo3D – Not available – appears grayed out.

White Boost

Note: This option is only enabled when the "Brightness Uniformity" option (in Configuration – Color and Uniformity) is disabled.

This option allows you to recapture some of the lost light from the transition between segments in the color wheel when it is spinning. Use the slidebar to increase the value of "White Boost" from 0 to 10. Set at "0" this option is turned OFF. As you increase the value you will notice the image becomes slightly brighter and a little less saturated.

For NTSC, HDTV, PAL and SECAM signals the default is set to "2" and for graphic

PLL Loop Gain – see description in Size and Position.

Noise Reduction – *requires optional ADP Module*

Select the amount of image noise reduction desired, with "0" applying no noise reduction (default) and "10" applying maximum noise reduction. The higher the value, the softer the image. *Not available in XeF models.*

Horizontal Filter – *requires optional ADP Module*

Select the amount of horizontal filtering desired for the current source. Note that the default setting of "0" allows the projector to optimize the amount of horizontal filtering according to the current source, and is the recommended setting for most situations. You can override this by selecting a value from 1-10, with "1" applying no filtering and "10" applying maximum filtering. High filtering levels will soften the image slightly, particularly evident along vertical edges.

Vertical Filter - *requires optional ADP Module*

Select the amount of vertical filtering desired for the current source. Note that the default setting of "0" allows the projector to optimize the amount of vertical filtering according to the current source, and is the recommended setting for most situations. You can override this by selecting a value from 1-10, with "1" applying no filtering and "10" applying maximum filtering. High filtering levels will soften the image slightly, particularly evident along horizontal edges.

Configuration ' Use the options in the *Configuration* menu to change system parameters to suit your preferences, run diagnostics and access the *Service* Menu. These options should only be modified by experienced users and technicians and typically don't require modification when switching sources.

Configuration		
1.	Image Orientation ⊕	Front ▼
2.	Language ⊕	English ▼
3.	Menu Preferences	
4.	Communications	
5.	Geometry	
6.	Color and Uniformity	
7.	Auto Power Up ⊕	☐
8.	Diagnostics and Calibration	
9.	Reserved	
0.	Service	
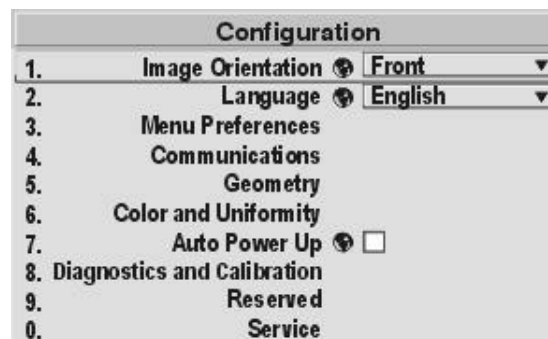
Figure 3.21. Configuration Menu

Image Orientation

Use this pull down list to change the orientation of the image according to your installation. For example, when the projector is in a rear-screen, lens-vertical configuration using a first-surface optical mirror the image must be inverted and flipped, therefore "Inverted Rear" should be selected.

Language

Choose from English, French, Spanish, German and Italian language. The menus will change immediately upon selection.

Menu Preferences

Choose the options in this menu to adjust the way the on-screen menus are displayed in presentation level.
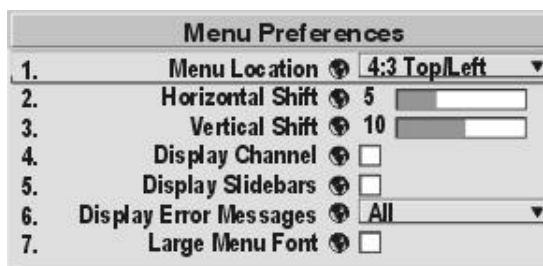
Figure 3.22. Menu Preferences Menu

MENU LOCATION – Use the pull down list to choose a default location for the display of on-screen menus. 7 preset and 1 custom locations are available.

To create a custom menu location, choose a preset that is closest to the desired area. Then adjust the slidebars of *Horizontal Shift* and *Vertical Shift* to move the menu to the desired location. Menus may differ in size and therefore it is recommended that you do not choose a location too close to a corner or edge to prevent cropping larger menus.

HORIZONTAL SHIFT AND MENU SHIFT – *see Menu Location above.*

DISPLAY CHANNEL – Enter a checkmark to display a list of channels that are available. These channels must be marked with a list icon 📄 in the *Channel Setup* menu to appear in the *Display Channel* list.

DISPLAY SLIDEBARS – Enter a checkmark to display a slidebar over the current image when an adjustable parameter is selected directly with a key. These "*direct*" slidebars include ⌨Pixel⌨, ⌨Position⌨, ⌨CONT⌨, and ⌨Bright⌨. If "Display Slidebars" is unchecked, these slidebars can still be accessed, but will be hidden during adjustment.

DISPLAY ERROR MESSAGES – Use this pull down list to select the way you want to view error messages generated by the projector. Select "Screen" or "All" to see a brief on-screen messages or select "RS232" to be see messages via RS232 and RS-422 serial communication only. To disable error message display, select "Off".

LARGE MENU FONT – Enter a checkmark to enlarge menu character size. *Note: On-screen menus will be larger and may require you to change the "Menu Location" to accommodate.*

Communications

Use the checkboxes and pull-down lists in the *Communications* menu to alter the methods or types of communication to and from the projector. Refer to *"Using Slidebars and Other Controls"* subsection if you need help. *NOTE: Changes made to the Communications menu will be saved when you exit the menu.*

Figure 3.23. Communications Menu

BAUD RATE – The baud rate setting determines the speed of communication to and from the projector. By default, the projector baud rate is set to 19200. Setting the correct speed is important when you are controlling the projector with an external device such as a computer or another projector via an RS-232 or RS-422 port. You must set the projector baud rate at these ports to match the baud rate of the controlling device. If you are unsure about what baud rate to choose, refer to the documentation for the controlling device. In an existing network, if you discover that a projector has the wrong baud rate, make sure to use the pull-down list and select the correct baud rate with the ⌨Enter key—do not just scroll this control with ◀— and +▶ keys.

*NOTE: 1) The baud rate setting does not affect the switcher port, which is always 9600 baud. 2) See **Serial Port Connections** and **Appendix D** for more information about cable connections between devices.*

FRONT IR - As described in Section 2, the standard IR remote keypad is capable of sending data to the projector in either one of two protocols called A or B. Likewise, the front IR sensor on the projector can be set to accept IR data accordingly, responding to A, B or both. The projector's A or B default is adequate for most single-projector installations. Select a specific protocol to prevent interference when you are controlling two protectors in the same area and want to work with one projector at a time.

<div align="center">

IMPORTANT

**Keep at "A OR B" unless you are sure of
the current IR keypad protocol.**

</div>

*NOTES: 1) The IR remote keypad for this projector is set at manufacture to "Protocol A". See **Keypad Protocols** for information about changing the keypad protocol. 2) A key press from a conflicting protocol will cause a single yellow flash on the Status LED located in the lower right corner of the rear projector panel.*

WIRED KEYPAD - Like the IR remote keypad, the optional wired keypad is either a "Protocol A" keypad (default) or a "Protocol B" keypad. Likewise, the projector can be set to accept wired keypad data accordingly, responding to A or B. If desired, you can prohibit the projector from responding to a particular wired keypad protocol, or you can ensure that the projector responds to either protocol (default). You can also prevent the projector from responding to the keypad entirely. In the pull-down list, select the desired protocol.

*NOTE: The wired keypad for this projector is set at manufacture to "Protocol A". See **Keypad Protocols** for information about changing the keypad protocol.*

ADDING A PROTOCOL: To add a protocol, select the **A or B** option.

CHANGING A PROTOCOL: As a safeguard, you cannot accidentally select an option in the "Wired Keypad" list that would disable the wired keypad during use, since such options are automatically disabled in the list. In other words, you cannot switch to the opposite protocol or select **OFF** using the wired keypad. Instead, if you want to quickly change to the other protocol, you may find it more convenient to use the IR remote to execute the protocol change for the wired keypad. The projector will now recognize only the opposing wired keypad protocol. Or, if you prefer, use the wired keypad to safely change its own protocol:

1. Select the **A or B** option. This will ensure that once your keypad is manually changed (see Step 2), it will still be recognized by the projector.
2. Unplug the keypad and change the protocol in the keypad as desired. Do this either by hard-wiring the keypad as described in *2.10, Keypad Protocols and Conversion*.
3. Plug the keypad back into the projector. Return to the *Communications* menu and select the new protocol you have just set up in the wired keypad.

TURNING OFF THE WIRED KEYPAD: If you want to disable the wired keypad entirely, you cannot use it to select the **OFF** option. This safeguard prevents you from accidentally disabling the wired keypad during use. Use the IR remote keypad to select **OFF**. The projector will no longer respond to the wired keypad.

BROADCAST KEY - Enter a checkmark if you want keypad commands sent to one projector to be relayed to all projectors in a network. Note the [PROJ] key will temporarily "override" the effect of a broadcast setting and allow you to control a specific projector when necessary. Make sure to remove the checkmark if using the split network feature.

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 here. Numerical identity for projectors is required whenever you want to communicate with a single projector within a multiple-projector application (see [PROJ] key description in 3.8, Using the Keypad). If you make a mistake in assigning or changing the projector number, press [Exit] to cancel.

For complete information about controlling multiple projectors, see ***Using Multiple Projectors***.

SPLIT NETWORK - Enter a checkmark if you have a network in which each projector is connected via both its RS-232 and RS-422 serial ports (***Figure 3.24*** - Option A). At each projector, serial communications will then remain on either its RS-232 or RS-422 path (depending on the controller) rather than being broadcast to all 3 remaining serial ports. Should a projector or path ever fail, the other path will be available as a back-up.

The Split Network feature is unnecessary when only a single serial link is connected between any two projectors (***Figure 3.24*** – Option B), and will cause communication errors if these single links vary from RS-232 to RS-422 anywhere in the network. Likewise, if you have two serial links connected between any two projectors, failure to use the Split Network checkbox can also cause a communication error.
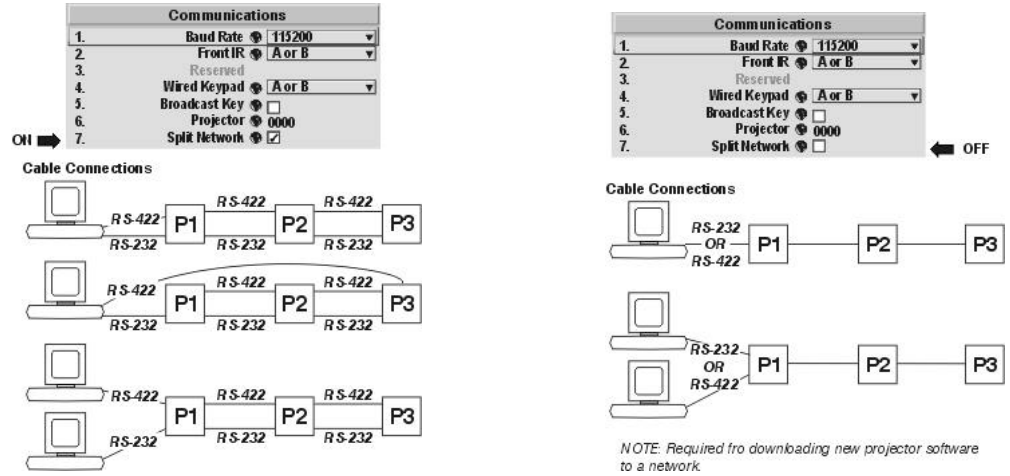
Option A – Split Network ON   **Option B – Split Network OFF**

Figure 3.24. Split Network Options

NOTES: 1) Requires double serial links—RS-232 and RS-422—between all projectors in a network. 2) Set each projector's Broadcast Key OFF. 3) Keypads cannot broadcast in a split network—use controller(s) instead. 4) Do not use a split network when downloading new projector software to a network.

Geometry

Select *Geometry* to access another sub-menu with *Keystone*, *Tiling Setup* and *Test Pattern* options.
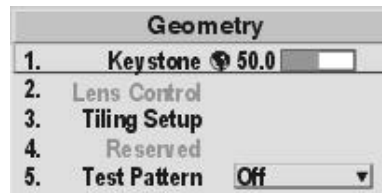
Figure 3.25. Geometry Menu

KEYSTONE and TILING SETUP – Refer to description under *Size and Position* earlier in this section.

LENS CONTROL – This option is not supported by all models and will appear grayed out in these instances.

TEST PATTERN – Use the pull down list to select and display one of the available internal test patterns. Select OFF to turn off the display of a test pattern.

```
▶1.  Off
  2.  Checker
  3.  Gray16
  4.  Gray256
  5.  White
  6.  Gray
  7.  Black
  8.  Convergence
  9.  13 Point
  0.  Color Bars
      Geometry
```

Color and Uniformity

Use the options in this menu to select or adjust *Color Temperature*, *Adjust Primary Colors (CSC)* or to enable or disable *Brightness Uniformity*.

```
Color and Uniformity
1.      Color Temp Setup
2.  Adjust Primary Colors
3.  Brightness Uniformity
```

Figure 3.26. Color and Uniformity Menu

Color Temp Setup – Refer to *Color Temperature Setup* description under *Image Settings*.

Adjust Primary Colors

When selected a separate menu appears that gives you the ability to adjust primary colors and intensity. This is particularly important in multiple screen installations where the color and intensity of one screen must precisely match all other adjacent screens to create a seamless image.

Primary color adjustments affect all sources and can be applied or disabled at any time by entering or deleting a checkmark at the top of the *Adjust Primary Colors* menu (*Primary Color Enable*).

```
Adjust Primary Colors (CSC)
1.  Primary Color Enable 🌐 □
2.          Red Primary
            Green Primary
3.          Blue Primary
4.   Select Color Temp   6500K    ▾
5.     Red White Level 🌐 69.7 ▭
       Green White Level 🌐 78.3 ▭
6.     Blue White Level 🌐 100 ▭
7.            Lamp
Use primary colors or defaults. Primary colors uses default gamma.
```

Figure 3.27. Adjust Primary Colors (CSC) Menu

Refer to **Using Multiple Projectors** for a step-by-step procedure on adjusting the items in this menu.

Brightness Uniformity

This menu allows you to "*Enable Uniformity*", and access "*Test Patterns*", "*White Uniformity*", "*Color Temp Setup* "and "*Lamp*" options.

Enter a checkmark beside "Enable Uniformity" to enable various options to control and smooth out overall color and brightness of an image – useful in multi-screen applications. Adjust the options in this menu only after you have adjusted the primary color in the *Adjust Primary Colors* menu.

Refer to **Adjusting Brightness Uniformity** later in this section.
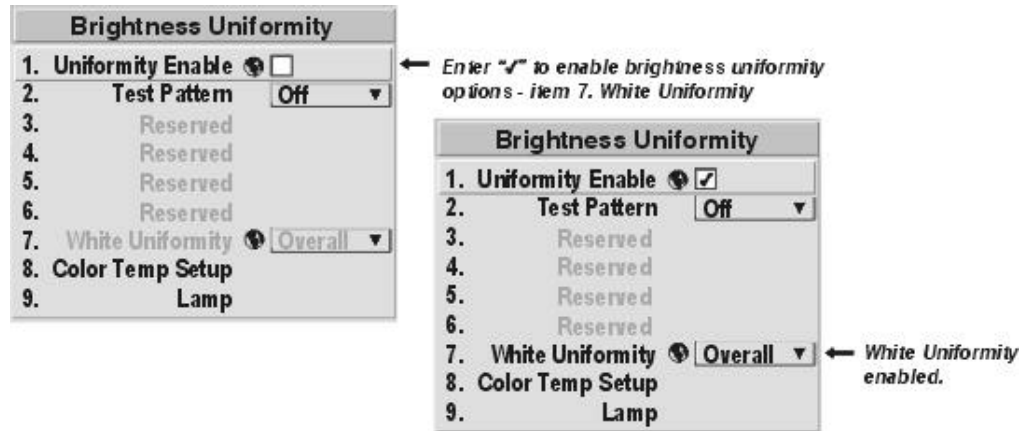
Figure 3.28. Enabling Brightness Uniformity

TEST PATTERNS – Use this option to select a variety of test patterns. Select the 13 Point test pattern when adjusting *Brightness Uniformity*.

White Uniformity

White Uniformity is a separate menu accessible only when *Uniformity Enable* is enabled by placing a checkmark in the checkbox. The options in *White Uniformity* menu allow you match light output across multiple screens. See **Adjusting Brightness Uniformity** later in this section for adjusting *White Uniformity* in a tiled array.

Figure 3.29. White Uniformity

Auto Power Up

Enter a check mark to enable the projector to automatically power up after losing power to unplugging or a power failure. Note that unsaved display adjustments may be lost.

Diagnostics and Calibration

From the *Diagnostics and Calibration* menu you can access options useful in calibration and setup of an image. You can access test patterns, enable various colors, freeze an image for inspection and access the *Odd Pixel Adjustment* menu.
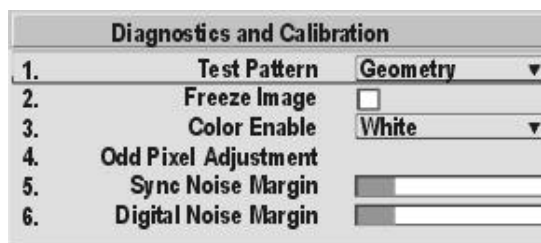
Figure 3.30. Diagnostics and Calibration menu

TEST PATTERN – Refer to description under *Configuration*.

COLOR ENABLE – Refer to description under *Image Settings*.

FREEZE IMAGE - Enter a check mark to freeze the currently displayed image. Remove the checkmark to return back to normal.

ODD PIXEL ADJUSTMENT – *This menu is used when Color Space is set to RGB only. NOTE: Enabled for Xe models only.*

When using certain RGB sources with still images, 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. You can remove these patterns as follows:
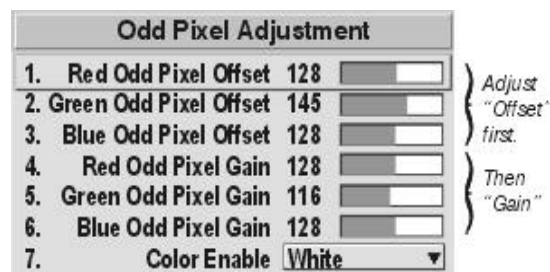
1) Use an external grayscale test pattern with both dark and light gray areas.
2) Display the image in its native resolution – select "*No Resizing*" by accessing *Resize Preset* in *Size and Position menu*.
3) Display a single color from the *"Color Enable"* option or use the [Func] key options described on the back of the keypad.
4) Examine an area of darkest gray (but not black). If there is a 1-pixel wide pattern present, adjust "*Odd Pixel Adjustment*" **offset** for the current color. Stop when the pattern disappears and the area is smooth.
5) Examine an area of lightest gray (not white). If there is a 1-pixel wide pattern present, adjust "*Odd Pixel Adjustment*" **gain** for the current color. Stop when the pattern disappears and the area is smooth.
6) Repeat for each color, adjusting offset then gain for each.

NOTES: 1) Adjust offset before gain since offset affects gain. 2) A value of 128 represents no change in normal odd pixel offset or gain. 3) Odd Pixel Adjustment eliminates "1 pixel on, 1 pixel off" patterns, not any type of larger patterns.

SYNC NOISE MARGIN – Enabled for *XeF models* only, this option allows you to set how sensitive the V & HC sync inputs are to noise. A higher value will allow noisier sources to be locked onto properly and a lower value will allow locking to more heavily attenuated signals. Adjust sync noise margin using the slidebar.

DIGITAL NOISE MARGIN – *This option is enabled for XeF models only.* This option allows you to set how sensitive the digital inputs are to noise, cable lengths and slight incompatibilities between the transmitter and receiver. Adjust the slidebar for the best image possible.

Service

This is a password-protected menu intended for use by qualified technicians. When accessed, passwords can be enabled or disabled, access to *User Lockout*, *Color Temperature*, *Lamp Counter*, *Color Wheel Calibration* and *Factory Defaults* options can be accessed and modified.

Refer to the Service Manual for complete details on the various options available in this menu.
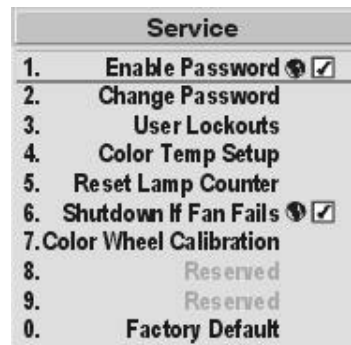
Figure 3.31. Service Menu

Lamp ' The Lamp menu can be accessed through several other secondary menus or by selecting item 5. in the Main Menu. Whenever you install a new lamp in the projector you need to access the *Lamp* menu and record the lamp serial number in the projector's memory. You can also set different *Lamp* submenu options such as intensity (output) or power as required. These setups can be changed at any time. Read-only information includes the number of hours logged on the lamp so far and the serial number recorded for the installed lamp.

*NOTE: See **Replacing the Lamp and Filter in Section 4** for complete instructions on installing a new lamp in the projector.*

LAMP HOURS - This is a read only window that shows the number of hours logged on the current lamp. Whenever you record a new lamp serial number, this value automatically resets to "0", where it begins to log time for the new lamp. *NOTE: This information also appears in the Status menu.*

LAMP S/N – This is a read only window that displays the serial number recorded for the current lamp. When you install a new lamp and enter its serial number, the number will appear here in the *Lamp* menu.

LAMP MESSAGE - Enter a checkmark to enable a warning message to appear once the projector has powered-up which indicates if the lamp has reached the specified lamp limit and should be replaced. Delete the checkmark if you do not want to see this warning—instead, when your lamp expires, only the status information on the back of the projector will provide the warning to replace the lamp.

NOTES: 1) It is recommended that the Lamp Message checkbox remain enabled. 2) Press ⌑EXIT⌑ *to temporarily cancel the warning message. The message will continue to appear upon power-up until you install a new lamp.*

LAMP LIMIT – Enter the number of hours you expect to log on the current lamp before replacing it.

NOTES: 1) If you change modes over the life of a lamp, the lamp limit you originally expected may no longer be possible. 2) Turning the lamp on and off can reduce lamp life significantly, as will other factors.

LAMP MODE - Use the pull down list and select a *Lamp Mode* you want to use in order to control the light output. Although there are exceptions, in most lamps, the higher the light output or power setting, the shorter the life span of the lamp.

Use the *Lamp Mode* that best suits your brightness needs. For example, in a tiled application you may want to closely match brightness levels between adjacent images—choose *Intensity* for each projector, then judge by eye and set each individual intensity setting as necessary (see "Intensity", below). Or you may simply always need as much brightness as possible—choose *Max Brightness*.

Lamp modes are described below:

- **Max Brightness**: The lamp will always burn as brightly as possible, driven by maximum power of 500W. Keep in mind that the "maximum brightness" for any lamp gradually diminishes with age—the image will become dimmer over time. Its current output level appears in the "*Intensity*" option (*not* in lumens).

- **Intensity**: Brightness will remain close to a specified level for as long as possible. Once you select this option, enter a number representing the intensity level (brightness) you wish to maintain—the projector will automatically adjust power as needed to maintain this intensity as closely as possible. Note that the intensity value is a *correlation only* (0-9999), not actual lumen levels possible. See "*Intensity*" below.

- **Power**: The power supplied to the lamp will remain at a desired watt level throughout the life of the lamp. Once you select this option, enter the number of watts representing the power level you wish to maintain. See "*Power*" below.

POWER - The number shown here indicates how many watts are applied to the lamp. Set the power to (*insert range*) watts as desired. For any model, keep in mind that lower power levels produce dimmer images. When in "*Power*" or "*Max Brightness*" modes, the power level remains constant. When in "*Intensity*" mode, the power level will change as necessary. Specifying the maximum power level in *Power* mode is the same as operating in "*Max Brightness*" mode.

NOTES: 1) Power level can be set only if the lamp is in "Power" mode. 2) If you are in "Intensity" mode, the power level value will automatically increase over time as necessary to maintain the desired brightness as closely as possible, until power reaches its maximum. 3) If set too low, the aging lamp can cause a projector shutdown. Upon your next power up, lamp power will automatically maximize—a message box relates "Unexpected lamp off. Power set to max".

INTENSITY – This number is a representation of the current brightness of your lamp, decreasing over time when you are operating at "*Max Brightness*" or at a specific **power** level. However, when you are operating in "*Intensity*" mode, this value remains at the original "*Intensity*" setting chosen.

NOTE: The number shown for "intensity" is not the actual lumen output, but rather a correlated value only—9999 may represent up to 2000 lumens, for example.

Intensity" mode, judge by eye and set the level as desired for your application, remembering that higher settings can significantly shorten lamp life. Over time, the projector will automatically increase the power supplied to the lamp as needed to maintain the chosen intensity as closely as possible. This is called "brightness tracking".

Keep in mind that once the lamp power has reached its *maximum* watts (see "**Power**", above), this tracking is no longer possible. At this point, the lamp will gradually begin to dim as usual, even though your original "*Intensity*" value will still appear in the menu. To resume accurate tracking, reduce the intensity setting so that the resulting "*Power*" value is under its maximum—the lower the intensity, the longer it can be maintained.

Do not lower the "*Intensity*" so much that the corresponding "*Power*" value reaches its *minimum*— the intensity setting will be inaccurate and cannot be maintained. *Intensity*" setting is high enough to keep the corresponding lamp power. *NOTES: 1) Lamps become more stable over time, thus a specific intensity is more easily maintained as the lamp ages. 2) Intensity can be set only if the lamp is in "Intensity" mode. 3) Intensity cannot exceed the output of "Max Brightness" mode.*

LAMP HISTORY - This read-only option lists the most lamps most recently installed and recorded in the projector. *Lamp History* automatically updates whenever you record a new lamp serial number—the new lamp is added to the bottom of the list.

Change Lamp" to record the serial number for a newly installed lamp.

In the "L*amp S/N*" window, use the number text entry keys to record the new lamp serial number, and press ENTER again to accept the change. See *Using Slidebars and Other Controls* if you need help entering the number. Once entered, the new lamp serial number will be added to the *Lamp History* menu and the *Lamp Hours* timer will reset to "0". *Lamp Mode* and *Lamp Limit* remain as they were for the previous lamp, and can be changed at any time.

*NOTE: Enter a serial number **only** if you have just installed a new lamp. This will help ensure that lamp timer is not reset on an old lamp and that the number of hours logged on the lamp will be accurate.*

⚠ IMPORTANT ⚠
Always record the serial number of a NEW lamp.

Status ' This read-only menu lists a variety of details about the standard and optional components currently in use on the projector. Refer to the *Status* menu for versions of hardware (left side) and software (right side) installed, the number of lamp hours logged in total and for a specific period (such as a rental period), and for your

projector model name and serial number. In addition, the *Status* menu identifies the current channel, switcher, slot and frequencies.

Use [▲ON], [▼OFF], [◄—] or [+►] to see additional *Status* information.

Figure 3.32. Status Menu (SAMPLE)

Auto Setup '   If you want the projector to quickly set up the image for you, select "*Auto Setup*" from the *Main* menu. A separate message window appears and requests confirmation that you want to continue with Auto Setup, in which case display parameters listed in the Table below will be set for you. Selecting "*Auto Setup*" can save you some time in setting up an image, and you can also make further adjustments as desired. You must have an unlocked channel present to use Auto Setup.

What an "*Auto Setup*" Does	
OPTIMIZES:	*SETS TO DEFAULT:*
Pixel Tracking	Contrast & Brightness
Pixel Phase	Auto Input Level (off)
Size	Blanking
Vertical Stretch	Detail *(if video source)*
Position	Filter
Input Levels *(if analog source)*	Luma Delay

3.7   Using Multiple Projectors

When working with multiple projectors, you may want to use the RS-232 or RS-422 serial ports to chain the projectors together in a network that you control from either a keypad or a computer/controller (*see 2.9, Serial Port Connections*). Or you may prefer that each projector stand alone, in which case you will probably use a single IR remote keypad. In either case, you can switch back and forth between broadcasting to all projectors or controlling each projector individually.

Assigning a '   Make sure you have assigned a unique projector number to each projector present —
"Projector#"   this number will be required in order get the exclusive attention of an individual projector. To assign a projector number:

Press [Menu] and select the *Communications* menu. In the *Communications* menu, scroll down to "Projector#" and enter a three-digit number (000 to 999) for identifying the current projector. Press [Enter] to accept the entry, or [Exit] to cancel.

Repeat for each projector, using a unique three-digit number for each. Once every projector has its own number, you can begin to control the network.

Controlling One Projector ' First make certain that only one (any) networked projector has its "Broadcast Keys" option selected (checked) and IR sensors enabled — the remaining projectors must have the "Broadcast Keys" option unchecked and their keypads disabled (do this in *Preferences* menu). The "Broadcast Keys" projector will then relay keypad commands to the other projectors. If using a wired remote, make sure to select the "Broadcast Keys" option for the projector to which the wired remote is connected.

To work with a single projector, press PROJ to display an editable window from each projector. Enter the three-digit number you have assigned to the projector you wish to control. All keypad commands will then affect this projector exclusively until you press PROJ again and enter a different number, or until you switch to broadcast mode (below).

NOTES: 1) If you are using a computer or controller to issue commands, use the correct RS-232 software command to gain control of a single projector.

Broadcasting to
All Projectors
PROJ PROJ ' First make certain that only one (any) networked projector has its "Broadcast Key" option selected (checked) — the remaining projectors must have the option unchecked and their keypads disabled (do this in the *Configuration – Communications* menu). The "Broadcast Key" projector will then relay keypad commands to the others. If using a wired remote, make sure to select the "Broadcast Key" option for the projector to which the wired remote is connected.

On either the IR remote or wired keypad, press PROJ to display the projector box. Press PROJ again *without* entering a number — the keypad commands will now affect all projectors.

NOTE: 1) If you are using a computer or controller to issue commands, use the correct RS-232 software command to broadcast.

Matching Colors of
Multiple Projectors ' The main objective when setting up a videowall is to try and precisely match image color and brightness from screen to screen so the wall appears seamless. This requires adjustment of the various options in the *Adjust Primary Colors (CSC)* and *Brightness Uniformity* menus.

To match screens in a videowall, do the following:

NOTES: 1) Look only at the center of the screen when performing this procedure. 2) A color meter may be used but is not required to successfully perform this procedure. 3) Refer to the on-line hints for additional guidance during adjustment. 4) Color matches are optimized for graphic sources. If using video sources with over-adjusted primary colors, you may notice a slight posterized or banded effect in images. 5) It is recommended that you look at your primary colors again after installing a new lamp

Step 1: Preliminary Setup

1a) **Setup and optimize all projector settings** – It's not important to setup color temperature at this point. It is however, important to try and get all other projector settings as close to perfection as possible. Also make sure the edges of adjacent screens are close to one another.

1b) **Assign projector ID numbers** – Make sure each projector is assigned a unique 3-digit number. This will give you the freedom to switch between communicating to one projector (PROJ ###) or all projectors (PROJ PROJ).

1c) *Display a 100% white field test pattern on each screen.*

Use of the internal white field is strongly recommended. However, if you wish to use an externally generated white field, set Contrast and Brightness (in Image Settings) to 50 for each projector. Then, in the Input Levels menu, set input levels correctly for each projector while displaying an external 256-step grayscale.

> 1. Enter a checkmark for the Auto Input Level option.
> 2. Wait for the 6 values (blacklevels and drives) to stabilize.
> 3. Delete the checkmark and leave the Input Levels menu. Input levels are now correct for the source. Switch to the external white field for the remainder of this procedure.

NOTE: Avoid using a digital source (particularly YUV) for the white field.

1d) *Set all projectors to the same Lamp Mode (Power or Intensity).*
NOTE: Do not try to match perceived light output at this point.

STEP 2: *Establish Starting Point for Color Adjustment*

2a) ENABLE PRIMARY COLOR ADJUSTMENT. In the *Adjust Primary Colors (CSC)* menu, enter a checkmark in the Use Primary Color Enable checkbox so that primary color controls can be adjusted and applied to the image.

If at any time you decide not to use or apply the Adjust Primary Colors (CSC) feature, delete the checkmark – this disables Red, Green and Blue Primary controls (and they will appear grayed out in the menu).
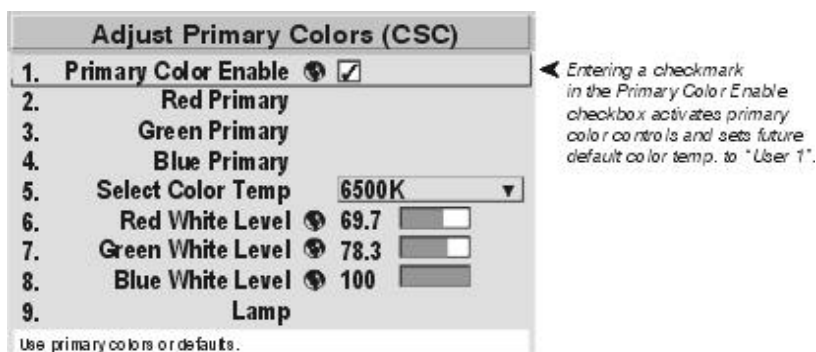
Figure 3.33. Enabling Primary Color Adjustment

2b) SELECT A "USER" COLOR TEMPERATURE ("USER 1" RECOMMENDED) (Figure 3.34.) In the *Adjust Primary Colors (CSC)* menu, select a "User" color temperature that you will be defining through your adjustment of primary colors on each projector. Choose any of the four User choices, but note that User 1 is the default color temperature applied if you add a new source in the future while Primary Color Adjustment is activated (instead of the usual default of 6500K applied when Primary Color Adjustment is not enabled). As in any color temperature menu, white levels for preset color temperatures cannot be changed.
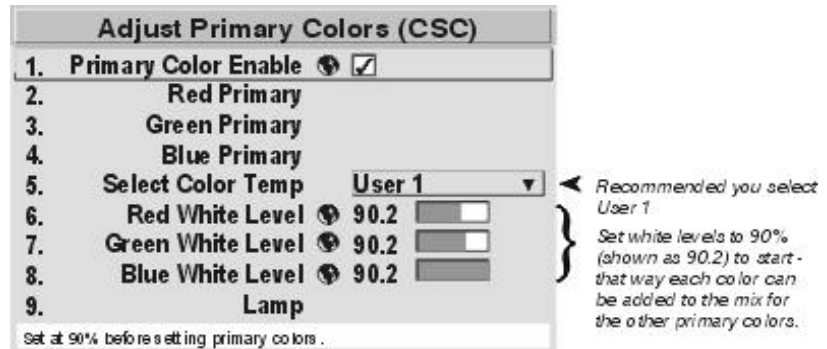
Figure 3.34. Select User 1 and set White Levels to 90%

2c) SET WHITE LEVELS TO 90% – In the *Adjust Primary Color* menu, set all White Levels to 90%. Note: A starting point should not be 100% because this color could not be added to the mix for either of the two remaining primary colors, therefore limiting the success for matching colors.

2d) MATCH ALL LIGHT OUTPUT OF INDIVIDUAL PROJECTORS – Compare all white fields and choose the dimmest. Using the PROJ ### function to talk to the other projectors individually, reduce Lamp power settings as necessary until each projector has approximately the same light output as the dimmest.

STEP 3: *Primary Color Adjustment*

3a) SELECT GREEN PRIMARY SUBMENU – In the *Adjust Primary Color* menu select the Green Primary option. The *Green Primary* menu will appear and your screens will turn to a full green field.

3b) MATCH GREEN LIGHT OUTPUT. Compare green fields and choose the dimmest. For each remaining projector reduce the Green White Level as necessary until all green light output appears to match.

3c) MATCH GREENS – compare green fields and choose the least saturated green (the green you feel is the furthest from a true green). In the Green Primary menu for each remaining projector – starting with the adjacent projector – add red or blue as necessary until all green fields match the first, both in color and light output. In some cases, all projectors will need some color and in other cases only red or blue may be required. *NOTE: Green affects the light output of any color the most, blue the least.*

3d) ADJUST NEXT PRIMARY IN ALL PROJECTORS – When all greens match, select Next Primary from the Green Primary menu. The blue Primary menu will appear and your screens will turn to a full blue field. Repeat steps 3b) & 3c) for blue and then red. For each primary adjustment, add other "secondary" colors as necessary.

3e) RECHECK ALL COLORS AND ADJUST IF NECESSARY.

3f) ADJUST WHITES – Exit the main *Adjust Primary Colors (CSC)* menu to view all white fields once more. If necessary, adjust white levels to match all white fields.

All screens should now be color matched. For each projector, the settings define your chosen User color temperature. For best results, set Lamp Mode to Intensity on all projectors – light output from each will be maintained over time to within 10% of the current level. Then proceed to the *Achieving Brightness Uniformity* procedure provided below.

Applying the Primary Color Adjustments for New Sources

For any new sources that you may use, keep in mind the following:

- "User 1" is the default color temperature for all sources as long as the Primary Color Enable checkbox is checked in the Adjust Primary Colors (CSC) menu.

- 6500K is the default color temperature if you adjusted primary colors for User 2, 3, 4 regardless of the status of Primary Color Enable. To switch to your primary color adjustments, select the proper User color temperature as usual from any color temperature menu. Make sure that the Primary Color Enable checkbox is checked.

- 6500K is the default color temperature if the Primary Color Enable checkbox is unchecked regardless of which User color temperature you chose in Step 6.

Canceling a Primary Color Adjustment

To disable all primary color adjustments delete the checkmark in the Primary Color Enable checkbox. This will disable Red, Green and Blue Primary controls and re-enable the Gamma control.

Achieving Brightness Uniformity

' As described earlier in this section, by adjusting brightness uniformity you are attempting to create a seamless image in which the appearance of red, green and blue are the same. Also no one area of the screen appears any brighter than another. Achieving this smooth overall appearance is important in stand-alone projectors, but ever so important in videowall displays.

To adjust brightness uniformity, do the following:
NOTE: The procedure assumes you are adjusting a multi-screen display.

⚠️ **Before you begin**

Read through the entire procedure before starting and keep in mind the following checklist of prerequisites and guidelines.

◊ **USE PRIMARY COLORS**
◊ **RUN LAMP FOR 100 HOURS**
◊ **SET LAMP POWER**
◊ **USE USER 1 COLOR TEMPERATURE**
◊ **IGNORE THE COLOR OF MENUS**
◊ **USE WHITE UNIFORMITY SLIDEBARS**
◊ **JUDGE BY EYE OR USE A METER**

STEP 1: *General Setup*

1a) Adjust primary colors (see *Matching Colors in Multiple Screens*). This ensures matched overall color temperatures and light output between screens.

⚠️ IMPORTANT ⚠️

**Double-check that all WHITES and LIGHT OUTPUT are well-matched.
See Step 3f of Matching Colors in Multiple Screens
procedure. Use a color meter if necessary.**

1b) Enable *Brightness Uniformity* by entering a checkmark in the checkbox. This enables access to the uniformity controls and applies the settings to your image.
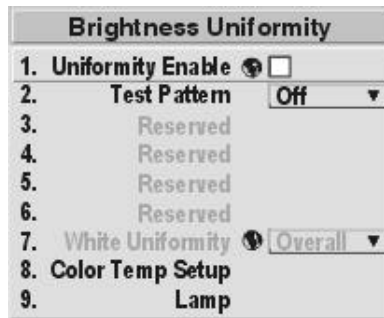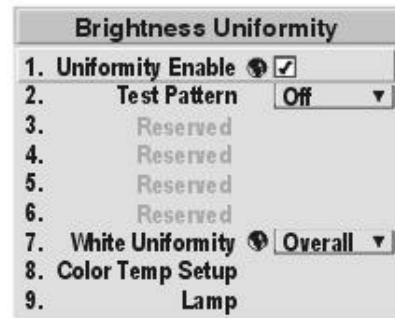
1c) Select the 13 Point test pattern for display. This pattern provides 9 screen "zones" with 13 targets. *For best results,* look at the extreme top/bottom, left/right edges of the image instead of the center.
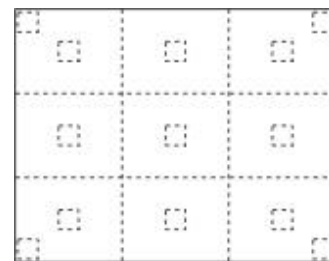
1d) Select User 1 in the *Color Setup* window (accessed through *Image Settings*).

◊ *If you have adjusted User 1 primary colors* to create a closely-matched wall, continue to Step 2a).

◊ *If you prefer maximum brightness* rather than a particular color temperature set the User 1 white levels to 100 (maximum).

⚠ IMPORTANT ⚠

Never change color temperature white levels in color-matched applications!

Step 2: Adjust Light Output in 8 Zones

2a) 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. 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. In the *White Uniformity* menu "*Overall*" should be set to 50.0 or less. Do not exceed 50.0 – a higher level will interfere with achieving brightness uniformity and is not recommended.

◊ Adjust corner *White Uniformity* last – each corner adjustment affects only this quadrant.

◊ Repeat for each screen.

Canceling Brightness Uniformity

If you don 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.

3.8 Error Conditions

Occasionally the projector may encounter an error condition that interrupts normal operation. These can be caused by invalid user entry, an input signal error (most common) or some other system error.

If you would like to be notified on-screen of such errors, select the "*Screen*" option from the "*Display Error Messages*" pull-down list (in *Menu Preferences* menu). If you would like to be notified via a serial communication only, select the "*RS-232*" option instead. To receive both notifications, select "*All*". To disable error messages (except for invalid user entries), select "*Off*".

User Errors ' ### Invalid User Entry

Any keypad entry not recognized by the projector will trigger an on-screen error message describing the problem. For example, if you specify a channel number that has not been defined, the message "*Invalid Channel* will appear. Or if you try to enter the wrong password, you'll see "*Invalid Password*". Press ⌨Enter or ⌨Exit to confirm the message and eliminate the message box.

NOTE: Displaying of "Invalid User Entry" messages cannot be disabled, even if **Display Error Messages** *has been set to "Off".*

Input Signal Errors ' Input signal errors messages appear when you are in presentation level (i.e., when there are no menus present) and have selected an input on which the projector detects a problem. While menus remain operational and pressing any key will temporarily remove the message from the screen, you must resolve the signal problem in order to permanently eliminate the message.

NOTE: Input signal messages appear on-screen only if **Display Error Messages** *has been set to "Screen" or "All".*

No Signal

The message *"No signal"* appears when there is no signal detected at the selected input. Both HSYNC and VSYNC are inactive and the screen background is black. Connect or correct the signal, or select another input.

Bad Sync

The message *"Bad Sync"* is displayed when HSYNC or VSYNC are active but the signal cannot be displayed. Such a condition occurs when only one of the two signals is present, or when either signal is unstable or of the wrong frequency. Correct the signal or select another input.

Other Signal Error Messages

In addition to the common *"Bad Sync"* and "*No Signal*" errors, you may encounter a signal error message indicating that Hsync and/or Vsync are either too fast or too slow. When such a 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 is.

System Warnings / Errors ' When the projector encounters a system malfunction, either a System Warning message or a System Error message may appear. Both types of messages are accompanied by a steady red "Power" LED and a flashing red-and-yellow error code

on the "Status" LED. This condition indicates the need for service by a qualified service technician.

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

System Warnings

A system *warning* message indicates that a system malfunction has been detected (see *Status LED Codes*, below). 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 the presence of a serious problem that should be reported to the manufacturer. You can press ⌷EXIT⌷ to remove the message, but for best results you should reset the projector—power the projector down and up again with the ⌷POWER⌷ key.

System Errors

A system *error* message indicates that a serious malfunction has been detected and must be reported to the manufacturer (see *Status LED Codes*, below). The projector will no longer operate and must be reset—power the projector down and up again with the ⌷POWER⌷ key.

The Status LED Codes

If the "Status" LED on the back of the projector repeatedly flashes a pattern of yellow and red light while the "Power" LED glows a continuous red, you have encountered a likely system error requiring the attention of a qualified service technician (see *System Warnings* and *System Errors*, above). Try resetting the projector by powering it off and on again, cooling when necessary. Consult Table 3.2 and contact your dealer if the problem persists.

The specific pattern of flashing indicates the 2-digit code identifying the type of problem encountered—the number of yellow flashes represents the first digit and the number of red flashes indicates the second digit. For example, a pattern of "yellow-yellow-red-red-red" is "Code 23", meaning the lamp ballast (power supply) is overheated. These codes are listed in Table 3.2.

Table 3.2. System Error Codes

Code	Description
GENERAL	
12	Software bug. Contact dealer/factory.
13	CRC error in flash ROM. Download new software.
14	Replace IPM
15	Attempting to download code without being in boot mode
16	Invalid interrupt. Power off/on. If persists, contact dealer/factory.
LAMP / BALLAST	
21	Unable to turn the lamp on
22	Lamp is overheated
23	Lamp ballast (power supply) is overheated
24	One or more of the lamp interlock switches are open
25	Lamp may be on before being turned on
26	Cannot read valid lamp ballast ID
27	Unexpected lamp shut-off
IMAGE PROCESSOR MODULE	
31	Boot code CRC failed
32	Unable to program the Sync Xilinx part
33	Unable to program a device on Altera programming bus
34	Unable to program a device on JTAG programming bus
35	Unrecognized ROM type
36	Write to flash ROM failed
37	General IPM failure
38	Code being downloaded will not fit in ROMs
PANEL DRIVER MODULE / LIGHT ENGINE ELECTRONICS	
41	Unrecognized Panel Driver Module (PDM)
42	Unable to program a device on Panel Driver programming bus
49	Color wheel stopped error
POWER & COOLING	
51	Fan #1 failed
52	Fan #2 failed
53	Fan #3 failed
54	Fan #4 failed
55	Low voltage power supply failed to turn on
59	Fan #5 failed
Projection Head Module (PHM)	
71	Unable to access EEPROM on the PHM
72	EEPROM memory has re-initialized
VIDEO DECODER MODULE (INPUT 3 OR 4)	
81	Unable to program the video decoder (VDM)
OPTIONAL INTERFACE MODULE	
91	Unable to program the option card

If you encounter a system error, try resetting the projector by powering it off and on again (allow proper cooling if necessary). Contact dealer/factory if error persists.

Maintenance

4.1 Warnings and Guidelines

The projector is an internationally approved product designed for safe and reliable operation. To assure complete safety at all times it is important to acknowledge the following precautions while operating the projector.

⚠ WARNING

NEVER 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.

❘ CAUTION

Installation should be performed by qualified personnel.

Labels and Markings ʼ   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.

Instructions ʼ   Read all operating instruction prior to using the projector.

Projector Location ʼ   Operate the projector in an environment, which meets the operating range specified in *Section 5 – 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 should be used with care. Sudden stops, excessive force and uneven surfaces may cause the projector and cart combination to overturn.

Lamp Replacement ' You will notice a significant change in the performance of the lamp when it is nearing the end of its life. It is important that the changes in lamp performance are noted and the number of hours the lamp has been in use is considered. Refer to *Section 2 – Lamp* for details on menu options.

⚠ WARNING ⚠

Never attempt lamp replacement soon after shutdown. The lamp is under great pressure when hot and may explode causing physical injury and/or property damage. Always allow the lamp to cool completely before handling.

Allow the lamp cooling fans to run approximately 10 minutes after powering down and before unplugging the projector.

Use only the lamps specified and supplied by the manufacturer.

Power Cord ' Use only the attachments and/or accessories recommended by the manufacturer. Use *and Attachments* of others may result in the risk of fire, shock or personal injury.

⚠ WARNING

Use only the AC power cord supplied by the manufacturer. Do not attempt operation if the AC supply is not within the specified voltage and power range.

◊ Do not set or rest items on the power cord. Locate the projector in an area where the projector cord cannot be abused or damaged by persons walking on it or by objects rolling over it.

◊ Operate the projector at the specified voltage only. 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 plug having a third grounding pin. This is a safety feature – if you are unable to insert the plug into an outlet contact an electrician to have the outlet replaced. Do not defeat the safety purpose of this grounding-type plug. *NOTE: The power cord supplied with the projector is approved for North American use only. An appropriately rated power cord with IEC320 type plug is required for European and other countries.*

Ventilation ' Slots and vents in the projector provide ventilation. Never block or cover these openings. This ensures reliable operation of the projector and prevents overheating.

◊ Do not place the projector over a radiator or heat register. The projector should not be placed in an enclosure unless proper ventilation is provided.

◊ 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 of any kind into the projector. Should an accidental spill occur, immediately unplug the projector and have it serviced by a qualified service technician.

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

◊ The power cord has been damaged.

◊ The internal cooling fans do not start operating when the projector is first turned on. *(NOTE: Fans in the lamp ballast will start once lamp is ignited.)*

◊ Liquid has been spilled into the projector.

◊ The projector has been exposed to excessive moisture.

◊ The projector is not operating normally or its performance has significantly deteriorated in a short period of time.

◊ The projector has been dropped or the shipping case (if applicable) has been badly damaged.

⚠ WARNING

Do not attempt to service the projector yourself. All servicing must be performed by manufacturer accredited service technicians.

Use replacement parts that are manufacturer-approved only. Use of any other part other than the ones specified by the manufacturer can result in fire, electric shock or risk of personal injury and irreparable equipment damage.

4.2 Cleaning and Maintenance

The projector itself requires little or no cleaning if it is operated in an environmentally controlled environment. However, if you find that the projector may need some cleaning based on its performance call a qualified service technician.

The table below provides cleaning instruction for those items on the projector that may require periodic cleaning.

⚠ WARNING

Always power down and unplug the projector before any cleaning or servicing.

Table 4.1. Maintenance Guide

Part Description	Frequency	How to clean
Lens	*As required*	Clean if absolutely necessary. A small amount of dust on the lens has very little affect on picture quality. **To clean:** Apply a solvent such as Acetone, Alcohol or Vinegar sparingly to clean, lint-free lens tissue. Wipe in single sweep across the surface of the lens. Do not scrub or rub tissue in circular motion, this will scratch the

Part Description	Frequency	How to clean
		lens. Do not reuse tissue. Do not use cleaning tools treated with Ether. If particles still appear on the lens, try using compressed air to remove.
Lamp (cleaning)	*Clean as required*	Clean if absolutely necessary. Never touch the glass surface of the lamp. Any oil (left by fingerprints) will seriously degrade lamp performance or cause "hotspots" which can lead to an accumulation of intense heat in the touched area and cause the lamp to shatter. **To clean:** Moisten a clean, lint-free cotton cloth with isopropyl alcohol and gently rub the surface of the glass in a circular motion until clean.
Lamp (replacement)	*As required.*	It is recommended that you replace the lamp when you notice a significant change in its performance over a short period of time.
Filter	*Replace when you replace lamp.*	Check the filter at 3000 hours to determine the typical accumulation of dust occurring in your environment. Typical environments require the replacement of lamp and filter at the same time. *NOTE: The filter must be replaced and cannot be cleaned and reused. See **Replacing the Lamp and Filter** procedure later in this section.*
Adjuster	*As required*	Use a clean cloth and remove any dust from the knobs, top plate and adjuster tray as required.
Exterior Module Covers	*As required*	Clean dust from external module covers using a clean, lint free cotton cloth as required. *NOTE: Before cleaning the modules, it is recommended that you install the lens cap. This will keep dust particles from settling on the glass surface of the lens.*

4.3 Replacing Keypad Batteries
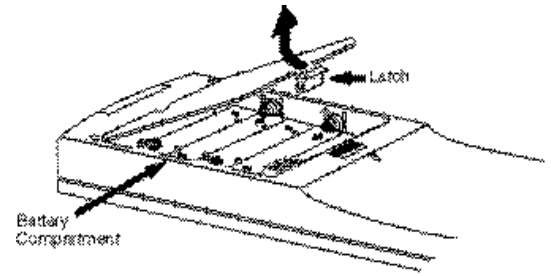
Figure 4.1. Open Keypad Battery Compartment

4.4 Replacing the Lamp

checkbox located in the "Lamp" menu.

⚠ Before you begin

It is important that you read and understand all the safety precautions and warnings regarding lamp replacement. *Before replacing the lamp, do the following:*

◊ Power down the projector and allow the fans to run approximately 10 minutes before uplugging the projector.

◊ Do not touch the glass surface of the lamp. Handle the lamp by its handle only. Intense heat can accumulate in areas where fingerprints exist. These "hotspots" can lead to an accumulation of intense heat, which may result in the lamp exploding. Wearing clean cotton gloves when handling the lamp will prevent getting fingerprints on the glass surface.

◊ Never leave the lamp half inserted into the lamp compartment in lens-vertical configurations. It could fall out and shatter.

NOTE: The following lamp instructions assume the projector is in the lens-horizontal configuration. Other than orientation, the lamp is removed in the same manner when the projector is in the lens-vertical configuration.

To remove a lamp:

1) Power down the projector and allow cooling fans to run for approximately 10 minutes.

2) In CS70 display cubes the lamp access door can be removed to access the lamp – 4 screws.
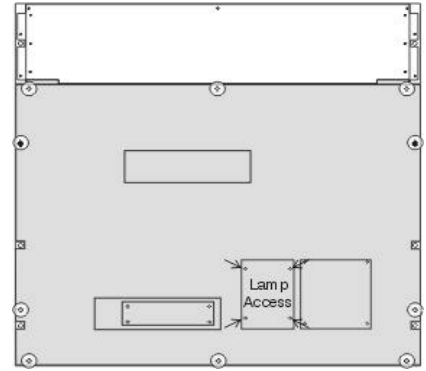
3) Turn the main power switch OFF and unplug the line cord from the outlet.

4) Loosen the 4 spring loaded captive screws located on the top plate (black with handle) with a #1 Phillips head screwdriver.
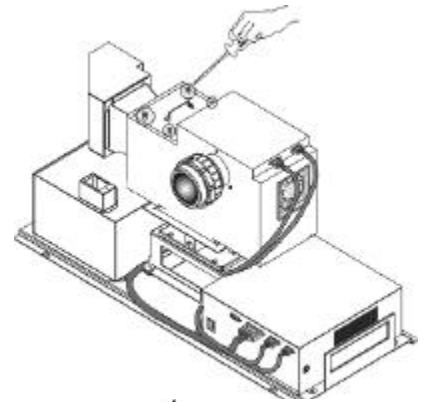
5) Grasp the small handle and lift straight up until the side "locating" tabs are clear and the lamp module is free.

6) Discard the lamp using approved disposal procedures in your area.
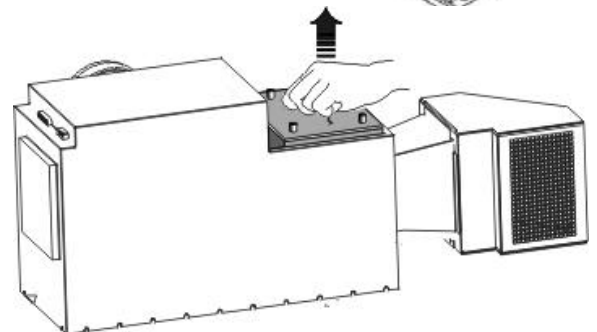
To replace a lamp:

7) Grasp the new lamp by the handle only and lift it over the opening. Align the side "locating" tabs with the cutout (recessed area) in the lamp compartment.
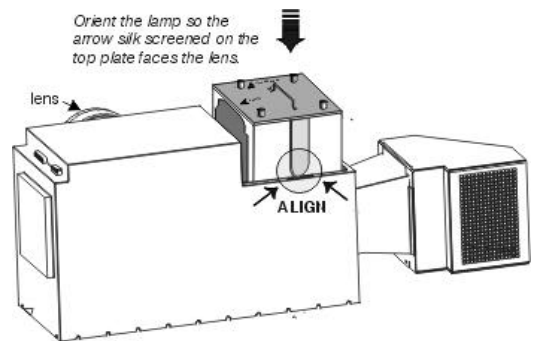
8) Lower the lamp all the way in so the lamp seats fully into the terminal block at the bottom of the compartment.
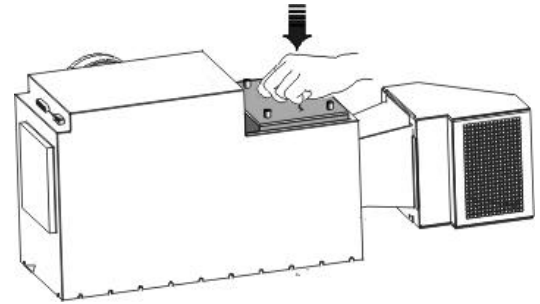
9) Tighten the 4 captive screws loosened in Step 3 until the lamp plate is flush with the lamp housing. The lamp will not strike if the screws are not tightened.
10) Plug-in and power up the projector.
11) Access the *Lamp* menu (item 5. in *Main Menu*) and select the "*Change Lamp*" option. Enter the new serial number in the *Lamp S/N* text box. When the new number is recorded, the lamp timer will automatically reset to "0" hours and begin to log time.
NOTES: 1) Once entered, the new lamp serial number is also automatically added to the "Lamp History" submenu (read-only). 2) Lamp life data is required for warranty claims.

IMPORTANT

If you fail to enter a serial number the lamp timer will not automatically reset to "0" and inaccurate lamp hours will be shown in the Status menu. The lamp life limit may then expire prematurely.

12) *If the projector is part of a videowall,* you will notice a difference in brightness between the projector with a new lamp and surrounding projectors (with older lamps). To match brightness between projectors, change the *Intensity* setting (*in the Lamp menu*) of the projector with the newly installed lamp until brightness appears the same.

4.5 Replacing the Filter

The filter should be replaced whenever the lamp is replaced. If the operating environment appears extraordinarily dusty then replacement of the filter should occur more frequently.

⚠ CAUTION⚠
Do not attempt to clean and reuse a filter. Discard old filters.

Use the filter supplied in the Lamp and Filter Replacement Kit.

1) Disconnect the cables above the filter.
2) Slide the filter out of its holder and discard.
3) Slide the new filter in – **wire side facing IN**.
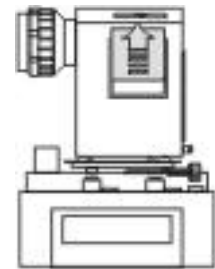
Figure 4.2. Remove filter

4.6 Troubleshooting

Use the following table as a guide in identifying general operating problems, the cause and how they can be corrected. Most of these problems can be corrected by a User and do not require the assistance of a qualified technician. The more "technical"

problems that require the attention of a qualified technician can be found in the Service Manual.

Symptom ' ***The projector does not power on when the*** POWER ***key is pressed.***
Cause/Remedy:
   1) To power up make sure you press the POWER key for at least 1 second or quickly press the POWER key followed by the ▲ON key.

   2) Check the status of the LEDs on the input panel. Are they lit? If not, check the connection of your power cord to the wall outlet.

   3) Does the green "Status" LED produce a single flash with each keypress? If not, it is not receiving any of the keypad IR signals. Point the keypad directly at the center of the screen – the IR sensor is located at the front of the projector. Also ensure that there is nothing blocking the transmission path.

   4) Replace the keypad batteries. See the instructions in this section.

   5) Ensure the keypad protocol has not been changed for your keypad. See Section 2.

Symptom ' ***The projector is on, but no image is displayed…***
Cause/Remedy:
   1) Make sure the lens cap has not been left on.
   2) Ensure projector is not in standby mode? Press EXIT to clear.
   3) Is an active source connected properly? Check all cable connections.
   4) Are there test patterns or menus present? If yes, check your source connections again.
   5) Make sure the room lighting is not too bright. Reduce light reflections as much as possible.
   6) Increase contrast and/or brightness of image.
   7) Make sure the projector is not too far away from the screen.
   8) Is the "Status" LED flashing a pattern of yellow and red lights while the "Power" LED is steady red? This indicates an internal system error that may prevent the projector from operating. If the problem persists contact a qualified service technician.

Symptom ' ***The projector does not respond to the infrared remote keypad…***
Cause/Remedy:
   1) Check to see if the wired keypad works. If yes, check that the correct protocol is used for that keypad.
   2) Make sure there is nothing blocking the transmission path between the keypad and IR sensor.
   3) Check keypad batteries.
   4) Keep ambient lighting to a minimum. This may be interfering with keypad IR transmission.
   5) Ensure the keypad has not been disabled for use with this projector. Press PROJ to broadcast to all projectors.

Symptom ' ***The power is on but the lamp isn't…***
Cause/Remedy:
   1) Check to see that an error code doesn't exist.
   2) Check lamp hours via RS-232 – the lamp may have reached the end of its life.
   3) Check that the lamp is fully inserted.

Symptom '
Cause/Remedy:

The display is jittery or unstable…

1) If the display is jittery or if it disappears and reappear erratically, check that the source is properly connected and that its signal is of adequate quality for detection. For example, if the projector scans the default input for a signal to display, and a poor quality or improperly connected source is connected, the projector will briefly and repeatedly attempt to display an image. If no source is connected, the " No signal " error message appears over a blank display. Correct the source connection.

2) The horizontal or vertical scan frequency of the input signal may be out of range of the projector. Refer to the *Specifications* in Section 5.

3) The sync signal may be inadequate. Correct the source problem.

4) The input signal type may conflict with the input module. Install/use the correct module for the source.

5) Pixel tracking, phase, filter, etc. may need more adjustment.

Symptom '
Cause/Remedy:

The display is faint…

1) Check the Input Levels options (Image Settings) and turn the Auto Input Level to "off", then "on".

2) Brightness and/or contrast may be set too low. Adjust as necessary.

3) Gamma setting may be inadequate. It is recommended that the "default" gamma is used for most sources.

4) The projection room may be too bright. Limit the amount of light reflecting off the screen.

5) Ensure the projector is not too far from the screen.

6) Is the screen being viewed from the best angle. Check seating plans and viewing angles.

7) Ensure the source is only terminated once.

8) The source (if non-video) may need sync tip clamping. Enter a check in the "*Clamp Tip*" box in Input Levels submenu.

Symptom '
Cause/Remedy:

The display is reversed and/or upside down…

1) Image orientation is not set correctly. Access "*Image Orientation*" in the *Configuration* menu. See Section 2.

Symptom '
Cause/Remedy:

Portions of the display are cut off or warp to the opposite edge…

1) Reduce top, bottom, left or right blanking from within the Size and Position menu. Check adjustments.

2) Resizing may need some adjustment. Adjust until entire image is visible and centered.

Symptom '
Cause/Remedy:

The display appears compressed or stretched…

1) The frequency of the pixel sampling clock is incorrect for the current source.
2) Size and position options may be adjusted incorrectly for the incoming source.

Symptom '
Cause/Remedy:

The image appears to drift from good to bad and visa versa…

1. The operating temperature of the projector may be fluctuating. Watch that the projector is not located too close to heating/air conditioning vents.

2. The source input signal may be of low quality.

3. The horizontal or vertical frequency of the input may have changed at the source end.

Symptom   **The display has suddenly frozen, or an unknown menu has appeared…**

1. You may have accidentally entered a special engineering code using the ⌨Func key in combination with certain numbers, or you may have selected the "Freeze ⌨Exit as necessary to cancel the function and return to presentation level.

Symptom   **A split rolling image has appeared…**

1. The electronics of the projector require resetting – press ⌨Power* ⌨▼OFF / ⌨▲ON and then press ⌨Func ⌨9 ⌨9 ⌨9 .

Symptom ＇ **The display is not sharp or "clean"…**

CAUSE / REMEDY:

1. More display adjustment may be required – focus, brightness, contrast, pixel tracking, pixel phase, and detail.
2. If you are using a BNC T-connector, try using a distribution amplifier to boost signal levels.
3. Is the video input signal properly terminated? Set in *Image settings – Video Options* menu.
4. The screen size may be too large. As screen size increases, magnification increases, reducing brightness and clarity. See lens specifications in *Section 5*.
5. The source input signal may be of low quality. Try another source.

Symptom ＇ **Colors in the display are inaccurate…**

CAUSE / REMEDY:

1. The color, tint, gamma, color space and/or color temperature settings may require adjustment. Review all settings. See also *Section 2* for descriptions and instructions.
2. Check cable connections. Make sure Red is red, etc.

Symptom ＇ **The display is not rectangular…**

CAUSE / REMEDY:

1. Check leveling of the projector. If necessary, try relocating the projector or screen so that the lens surface and screen are approximately parallel.
2. The "Vertical Stretch" option may need adjustment. Also check pixel tracking.
3. Turn keystone to 50.0.

Symptom ＇ **The display is "noisy"…**

CAUSE / REMEDY:

1. Display adjustment may be required. Adjust pixel tracking, phase and filter. Noise is particularly common on YPbPr signals from a DVD player.
2. The video input may not be terminated. Make sure the video input is terminated (75Ω). If it is the last connection in a loop-through chain, the video input should be terminated at the *last* projector only.
3. The signal cables carrying the input signal may be of poor quality. Use only good quality signal cables.
4. Switching between analog and digital sources (both connected to EM at the same time) – disconnect the source that is not being used.
5. The distance between the input source device and the projector may be too great. If the distance between the input source device and the projector is greater than 25 feet, signal amplification/conditioning may be required.

6. The input signal may be of poor quality.

7. If the source is a VCR or off-air broadcast, detail may be set too high. Keep near 4 for most sources.

Specifications

Specifications

*NOTES: **1**) Due to continuing research, specifications are subject to change without notice. **2**) Specifications apply to all models unless otherwise noted. **3**) CS70 specifications assume the use of the High Performance Screen 38-804812-01.*

Display '

Display Resolution

SXGA resolution, 1280 X 1024 pixels

Brightness

RPMS-500Xe/XeF >900 ANSI lumens
CS70-500Xe/XeF >700 cd/m^2 (nits)

Contrast Ratio

300:1 full field ON/OFF

Gray Scale and Color Resolution

8 bits resolution
16.8 million displayable colors

Color Temperature

Default 5500K $\pm$ 500 at 100% white
Range 3200K – 9600K

CS70 Viewing Angle (using High Performance Screen 38-804812-01)

Horizontal $\pm$ 25 degrees (half gain viewing angle)
Vertical $\pm$ 9 degrees p-p (half gain viewing angle)

Inputs Xe model '

Analog RGB (interlaced or progressive scan formats)

Horizontal frequency range	15-120 kHz	
Vertical frequency range	23.97 – 120Hz	
Pixel clock rate (maximum)	160 MHz	
Input Levels	RGB with sync	1.0V$_{p-p}$ $\pm$ 2dB (0.79 V$_{p-p}$-1.26V$_{p-p}$)
	RGB without sync	0.7V$_{p-p}$ $\pm$ 2dB (0.56 V$_{p-p}$-.88V$_{p-p}$)
		0.7 V$_{p-p}$ $\pm$ 2dB (0.56 V$_{p-p}$-.88V$_{p-p}$)
Nominal Impedance	75 ohms	

Sync (interlaced or progressive scan formats)

Horizontal frequency range	15-120 kHz
Vertical frequency range	23.97 – 120Hz
Sync Types	Separate H and V
	Composite (bi-level and tri-level)

Sync-on-green/luma (bi-level and tri-level)

Nominal Impedance	75 ohms
Polarity	positive or negative
Input Level	$0.5V_{p-p} - 5.0V_{p-p}$
DC Operating range	0-5V

Composite Video and S-Video

Signal Formats		composite video (CVBS), S-Video (Y/C),
Video Standards (requires optional Video Decoder)		NTSC, NTSC 4.43, PAL, PAL M, PAL N, PAL60, SECAM
Input Levels	Composite video	$1.0V_{p-p} \pm 3dB$
	S-Video luma	$1.0V_{p-p} \pm 3dB$
	S-Video chroma	630mV norminal
Nominal Impedance		75 ohms

Inputs Xef model ' ### *Analog Inputs*

VESA Standards Supported		
Resolution	1280 x 960	1280 x 1024
Pixel Frequency (MHz)	108	108
H-Frequency (KHz)	60	63.96
H Width (pix)	112	112
H Back Porch (pix)	312	248
Tracking	1800	1688
V-Frequency (Hz)	60	60
V Width (lines)	3	3
Total Lines	1000	1066
Type	Progressive Scan	Progressive RGB

Sync

Horizontal Frequency Range	VESA15 & VESA17
Vertical Frequency Range	VESA15 & VESA17
Scan Format	Progressive
Sync Types	Separate H & V

Power Requirements '

Voltage Range	100 - 240 VAC
Line Frequency	50 Hz – 60 Hz nominal
Inrush current	60A max
Current rating	7.3A @ 100V, 2.9A @ 240V (± 10%)
Power Consumption (max.)	730W max @ 100V, 696W max @ 240V (±10%)

Lamp '

Type	Xenon Cermax™ lamp
Power	500 Watts maximum
Warm-up to full brightness	1 minute

Lens '   0.76:1 lens OR 1.2:1 lens (CS70 uses the 0.76:1 short throw lens)

Environmental Conditions '

Operating Temperature	10°C to 35°C
Operating Humidity	20% to 80% non-condensing
Altitude	0 to 3000 meters
Storage	-10° to 50°C, 20 to 80% RH, NC

Physical Characteristics (projector only) '	Weight (without lens, including adjuster)	< 85lb. shipping weight includes packaging <115lb.
	Size (include lens and 6-axis adjuster and tray in lens horizontal configuration)	15.25" depth X 37.5" length X 19.2" height tolerance ± 0.25"
	CS70 Weight	207lbs (without screen)

CS70 Stacking Limits   '   4 display cubes high   ⚠ **Display cubes can be stacked up to 4 high – the vertical number of cubes stacked must be less or equal to the number of display cubes on the horizontal.**

Dimensions ' ***For RPMS-500Xe and RPMS-500XeF with 0.76:1 and 1.2:1 lens***

NOTE: The lens vertical dimensions apply to projectors enclosed in CS70 display cubes.
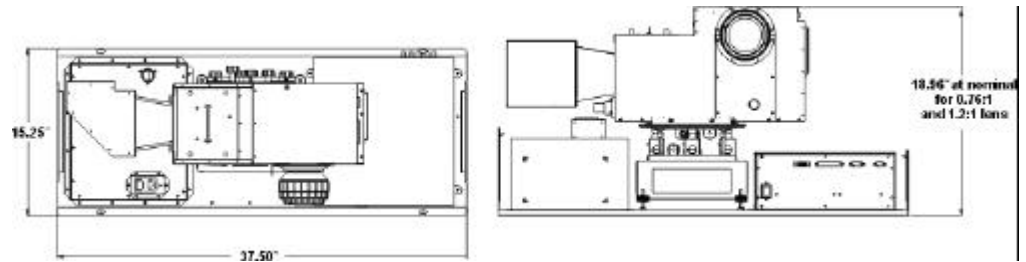
Lens Horizontal Configuration
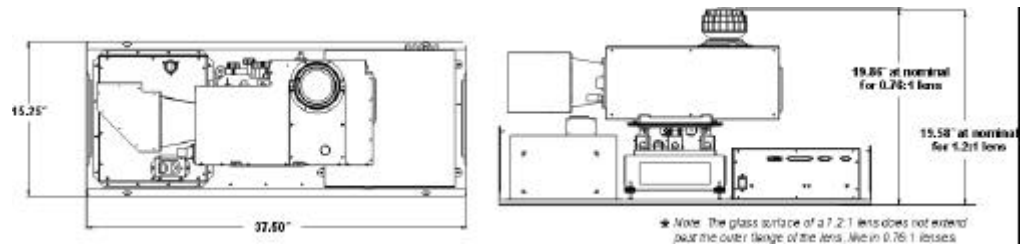
Lens Vertical Configuration

For CS70
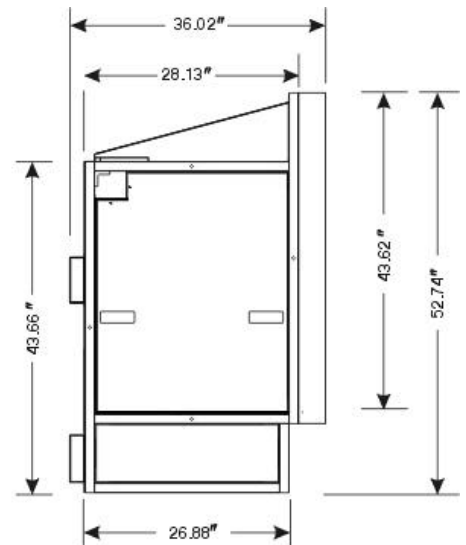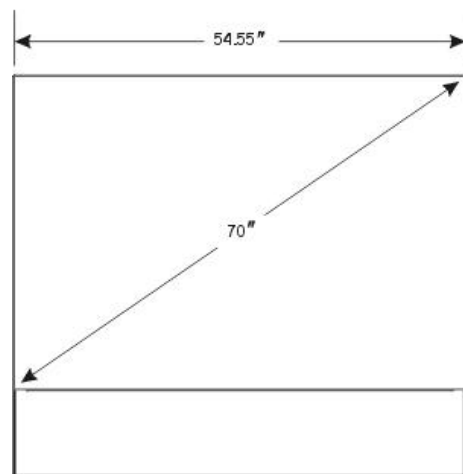
Safety and '
Regulatory Compliance

CSA C22.2 No. 950
UL 1950 3ʳᵈ Edition
EN60950 European Norm, Safety of Information Technology Equipment

Electro-Magnetic Compatibility (E.M.C) Emmisions
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)

Electro-Magnetic Compatibility (E.M.C) 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

Appendix A

Glossary

This appendix defines the specific terms used in this manual as they apply to this projector. Also included are other general terms commonly used in the projection industry.

Active Line Time ' The time, inside one horizontal scan line, during which video is generated.

Ambient Light Rejection ' The ability of a screen to reflect ambient light in a direction away from the "line of best viewing". Curved screens usually have good ambient light rejection. Flat screens usually have less ambient light rejection.

Analog Video ' The video output of most computers and videotape machines. Analog video can generate a large number of colors.

Aspect Ratio ' The ratio of the width of an image to its height, such as the 4:3 aspect ratio common in video output.

Auto Source ' The ability of the projector to automatically recognize and synchronize to the horizontal and vertical scan frequencies of an input signal for proper display.

Bandwidth ' The frequency range of the projector's video amplifier.

Baud Rate ' The speed at which serial communications travel from their origin. In this projector, the RS-232 or RS-422 default baud rate of 19200 can be changed to match a controlling device. The switcher baud rate of 9600 cannot be changed.

Blanking Time ' The time inside one scan line during which video is not generated. The blanking time of the input signal must be equal to or greater than the retrace time of the projector.

Brightness ' In projection, brightness usually describes the amount of light emitted from a surface such as a screen. It is measured in foot-lamberts or candelas per square meter.

Candela or Candle ' Unit of measure for measuring intensity of light.

Channel ' A collection of measurements stored by the projector for a given input source, including frequencies, pulse width, polarity, syncs, channel number and location, user-adjustable display settings, etc. Use channels to switch between a variety of setups quickly, automatically recalling previously defined display parameters.

Channel List ' A list/menu of previously-defined channels available in projector memory.

Channel Number ' A number that uniquely identifies a specific channel retained in projector memory. The projector can retain up to 99 channels.

Checkbox ' A menu item that indicates whether an option is currently in effect (checked) or not (unchecked).

Color Shift ' A change in the tint of a white field across an image.

Color Temperature ' The coloration (reddish, white, bluish, greenish, etc.) of white in an image, measured using the Kelvin (degrees K) temperature scale. Higher temperatures output more light.

Component Video ' See *YCbCr* or *YPbPr*.

Composite Video ' The output of video tape players and some computers, characterized by synchronization, luminance and color signals combined on one output cable.

Contrast (ratio) ' The degree of difference between the lightest and darkest areas of the image.

Convergence ' The alignment of the red, green, and blue elements of a projected image.

Curved Screen ' A projection screen which is slightly concave for improved screen gain. Curved screens usually have screen gains, which are greater than 1 but viewing angles much less than 180°. Curved screens are not recommended for use with this projector.

DDI ' A "direct digital interface" signal can be supplied to the projector via an optional digital input module installed in **INPUT 2**. For example, you can input an SMPTE-259M signal using a *Serial Digital Input Module* or input an SMPTE-272M signal from a *Digital HDTV Serial Input Module*.

DMDŌ ' Digital Micromirror Devices™ used in this projector for processing red, green, and blue color data.

Decoder ' Located at **INPUT 3** and **INPUT 4**, this device converts NTSC 3.58, NTSC 4.4, PAL, PAL-N, PAL-M, or SECAM to RGB video.

Detail ' The sharpness of a display from a video source.

Diffused Screen ' A type of rear-projection screen which spreads the light striking it. Screen gain is less than 1 but audience viewing angles are increased.

Display Setting ' An adjustment that affects the display of an image. Such display settings include contrast, brightness, tint, blanking, size, offsets, and others.

Flicker ' A very rapid variation in image brightness caused by a frame rate that is too slow. (See *Interlace*.)

Frame Rate ' The frequency at which complete images are generated. For non-interlaced signals, the frame rate is identical to the vertical frequency. For interlaced signals, the frame rate (also known as field rate) is one half of vertical frequency.

Foot-candle ' The intensity of visible light per square foot.

Foot-lambert ' The luminance (brightness) which results from one foot-candle of illumination falling on a perfectly diffuse surface.

Gain or Screen Gain ' The ability of a screen to direct incident light to an audience. A flat matte white wall has a gain of approximately 1. Screens with gain less than 1 attenuate incident light;

screens with gain more than 1 direct more incident light to the audience but have a narrow viewing angle. For example: An image reflecting off a 10 gain screen appears 10 times brighter than it would if reflected off a matte white wall. Curved screens usually have larger gain than flat screens.

Help Screen ' A display of help information regarding the current task or presentation.

Horizontal Frequency ' The frequency at which scan lines are generated, which varies amongst sources. Also called horizontal scan rate or line rate.

Horizontal Offset ' The difference between the center of the projected image and the center of the projector lens. For this projector, this value is expressed as the maximum percentage of the image that can be projected to one side of the lens center without degrading the image quality. Horizontal offset ranges can be affected by the type of lens in use, and whether or not the image is offset vertically at the same time.

Hot Spot ' A circular area of a screen where the image appears brighter than elsewhere on the screen. A hot spot appears along the line of sight and "moves" with the line of sight. High gain screens and rear screens designed for slide or movie projection usually have a hot spot.

ILS™ ' The *Intelligent Lens System™* describes the ability of projectors having a motorized lens mount to automatically return to lens settings previously defined for a particular channel.

Input ' A physical connection route for a source signal, described by a 2-digit number representing 1) its switcher/projector location and 2) its slot in the switcher/projector.

Input Signal ' Signal sent from a source device to the projector.

Interface ' A device, such as the *Serial Digital Input Module*, that accepts an input signal for display by the projector.

Interlace ' A method used by video tape players and some computers to double the vertical resolution without increasing the horizontal line rate. If the resulting frame/field rate is too low, the image may flicker depending on the image content.

Keypad ' A small push-button device for controlling most projector settings and operation. For more information, refer to *3.3, Using the Keypad.*

Keystone ' A distortion of the image which occurs when the top and bottom borders of the image are unequal in length. Side borders both slant in or out, producing a "keyhole" shaped image. It is caused when the screen and lens surface are not parallel, or (in "X" models) by poor Keystone adjustment.

Linearity ' The reproduction of the horizontal and vertical size of characters and/or shapes over the entire screen.

Line of Best Viewing ' When light from a projector is incident on a screen, the light reflects from the screen such that the angle of reflection equals the angle of incidence. The Line of Best Viewing is along the line of reflection.

Loopthrough (Loopthru) ' The method of feeding a series of high impedance inputs from a single video source with a coaxial transmission line in such a manner that the line is terminated with its characteristic impedance at the last input on the line.

Lumen '	The unit of measure for the amount of visible light emitted by a light source.
Lux '	The amount of visible light per square meter incident on a surface. *1 lux = 1 lumen/square meter = 0.093 foot-candles*
Menu '	A list of selectable options displayed on the screen.
NTSC Video '	A video output format of some video tape and disk players. There are two types of NTSC (National Television Standards Committee) video: NTSC 3.58 and NTSC 4.43. NTSC 3.58 is used primarily in North America and Japan. NTSC 4.43 is less commonly used.
Optical Screen '	A type of rear-projection screen which re-directs light through the screen to increase image brightness in front of the screen. Screen gain is usually greater than 1 but audience viewing angles are reduced.
PAL Video '	PAL (Phase Alternating Line) video is a 50 Hz standard with 768 x 576 resolution. It is found on some video tape and disk players (used primarily in Europe, China and some South American and African countries).
Pixel (picture element) '	The smallest discernible element of data from a computer-generated image.
Pixel Phase '	The phase of the pixel sampling clock relative to incoming data.
Pixel Tracking '	The frequency of the pixel sampling clock, indicated by the number of pixels per line.
Presentation Level '	The projector is at presentation level when an image from a source is displayed without the presence of a slidebar, menu, pull-down list, or error message.
Projector-to-Screen Distance '	The distance between the projector's front feet centers and the screen. Also called "Throw Distance".
Protocol '	The type of code format called "A" or "B" utilized by the remote keypad(s). The default protocol set at manufacture is Protocol "A". By using two different keypad protocols, adjacent projectors can be controlled independently with their remote IR keypads.
Pull-down List '	A selectable menu item that unfolds into a list of options pertaining to it.
Rear Screen '	A translucent panel for screen projection. Incident light travels through the incident surface of a rear screen and forms an image on the other surface.
Resizing '	The ability to manipulate through software commands the physical size, placement and/or aspect ratio of an image.
Resolution (lens) '	The maximum number of alternate white and black horizontal lines that can be distinguished on a screen when a photographic target is placed between the lens and a light source and illuminated by that source.
Resolution (projector) '	The maximum number of pixels that the projector can display horizontally and vertically across an image, such as 1024 x 768 (called XGA).
Retrace Time (Horizontal) '	The minimum time required for a CRT projector to move the position of the scanning spot from the right edge to the left edge.

Rise Time ' The time required by the video amplifier of the projector to increase its output from 10% to 90% of the maximum value.

RGB Video ' The video output (analog or digital) of most computers. Analog RGB video can have 3, 4, or 5 wires — one each for red, green, and blue, and either none, one or two for sync. For three-wire RGB, the green wire usually provides sync. (See TTL Video).

RS-232 ' A common asynchronous data transmission standard recommended by the Electronics Industries Association (EIA). Also called serial communication.

RS-422 ' A less common asynchronous data transmission standard in which balanced differential voltage is specified. RS-422 is especially suited to long distances.

S-Video ' The output from certain video tape players and video equipment. S-Video separates sync and luminance from color information, typically producing a higher quality display than composite video.

Scan Frequency ' The horizontal or vertical frequency at which images are generated.

Scan Line ' One horizontal line on the display.

SECAM ' A video output format of some video tape and disk players (used primarily in France). SECAM (Sequential Couleur á Mémoire) signals are similar in resolution and frequency to PAL signals. The primary difference between the two standards is in the way color information is encoded.

Slidebar ' A slidebar is a graphical display of an adjustable setting. The numerical setting often represents a percentage but can be a specific unit such as degrees Kelvin.

Source ' The device, such as a computer or VCR, connected to the projector for display. A source is identified at the projector as `Input1`, `Input2`, `Input3` or `Input4`, or as other user-defined numbers. A source may have numerous corresponding channels defined and recognized by the projector. See *Input*.

Source Setup ' See *Channel*.

Spot Size ' The diameter of the smallest dot that can be generated by a CRT projector. This projector has a fixed spot (pixel) size.

Switcher ' A signal selector, such as the Christie *Marquee Signal Switcher*, that can be connected to a projector for the purpose of adding more sources.

Sync ' This term refers to the part of the video signal that is used to stabilize the picture. Sync can occur in three forms:

1) "Composite sync": the horizontal and vertical components are together on one cable.
2) "Sync-on-green": the sync is part of the green video.
3) "Separate sync" or "H.SYNC and V.SYNC": the horizontal and vertical components of the sync are on two separate cables.

Sync Width ' The duration of each sync pulse generated by a computer. The sync width is part of the blanking time.

TTL Video ' A type of RGB video with digital characteristics.

Terminated ' A wire connecting a single video source to a display device, such as a projector, must be terminated by a resistance (usually 75Σ for video).

Throw Distance ' The distance between the front feet of the projector and the screen. Also called "Projector-to-Screen Distance". Always use the correct Christie throw distance formula to calculate the proper throw distance (±5%) required for your lens.

Tint ' Balance of red-to-green necessary for realistic representation of NTSC signals.

Variable Scan ' The ability of a projector to synchronize to inputs with frequencies within a specified range.

Vertical Frequency ' The frequency at which images are generated. Vertical frequencies vary amongst sources. Also called vertical scan rate.

Vertical Offset ' The difference between the center of the projected image and the center of the projector lens. For this projector, this value is expressed as the maximum percentage of the image that can be projected above or below the lens center without degrading the image quality. Vertical offset ranges depend on the type of lens in use, and whether or not the image is offset horizontally at the same time.

Video ' The signal that is used by display devices (such as projectors) to generate an image. This term also refers to the output of video tape/disk players and computers.

Video Decoder ' An optional device that converts NTSC 3.58, NTSC 4.4, PAL, PAL-N, PAL-M or SECAM to RGB video.

Video Standard ' A specific type of video signal, such as NTSC, PAL, SECAM. This projector can automatically recognize and interpret the incoming standard and display accordingly.

Viewing Angle ' Screens do not reflect equally in all directions. Most light is reflected in a conical volume centered around the "line of best viewing". Maximum brightness is perceived if you are within the viewing cone defined by the horizontal and vertical viewing angles.

White Balance ' The color temperature of white used by the projector.

White Field ' The area of an image that is white only. For example, a full white field is an image that is white everywhere. A 10% white field is a white area (usually rectangular) that occupies 10% of the image; the remaining 90% is black.

YCbCr ' A high-end *digital* component video signal.

YPbPr ' A high-end *analog* component video signal. Sometimes called YUV, Component, or Y, R-Y, B-Y, the YPbPr signal by-passes the video decoder in this projector.

YUV ' See *YPbPr*.

Zoom ' The adjustment of image size by means of a zoom lens.

Keypad Reference

Adjust pixel phase and tracking — **Pixel**

Adjust horizontal and vertical position — **Position**

Adjust contrast — **Cont**

Adjust brightness — **Bright**

Use to select a menu item, change a value and accept an option — **Enter**

▲ON

◄ −   **+ ►**

Move highlight in menu up/down, increase/decrease values, toggle power on/off — **▼OFF**

Use with number keys to select an input — **Input**

Use to enter a value, projector ID — **1 2 3 / 4 5 6 / 7 8 9 / 0**

Turn image off - screen goes black — **Stby***

GRAPH✕MASTER

Func — To access color shortcuts

OSD* — Turn menu on/off

Menu — Access Main Menu

Exit / ☀ — Turn keypad backlighting on

Use to exit a menu, or return to previous

Chan / **Proj** — Select projector

Select a channel

Help — Access general help

Test — Access test pattern(s)

Display* — Toggle current menu on/off

Power* — Power projector on/off

CHRISTIE DIGITAL SYSTEMS

I/O

* indicates "Press and Hold" for approximately 1 second to activate the feature.

Appendix C

Auxiliary Fan Connector

Auxiliary Fan Connector

6	3
5	2
4	1

(View looking into connector)

pin 1   -12V (300mA max.)
pin 2   GND
pin 3   DETECT (connect to pin 2 or 4 to enable detection of external fan)
pin 4   GND
pin 5   SENSE (connect to open collector style tachometer output of 3rd wire style fan)
pin 6   +12V (600mA max.)

PCB Connector: AMP 770969-1
Recommended Mating Connector: AMP 172168-1
Recommended Mating Connector Terminals: AMP 770902-1 or 770986-1

Serial Communications Cables

When connecting projector to a computer or another projector use the appropriate serial communication shielded cabling as illustrated.

❏ *From projector to computer (RS-232)*
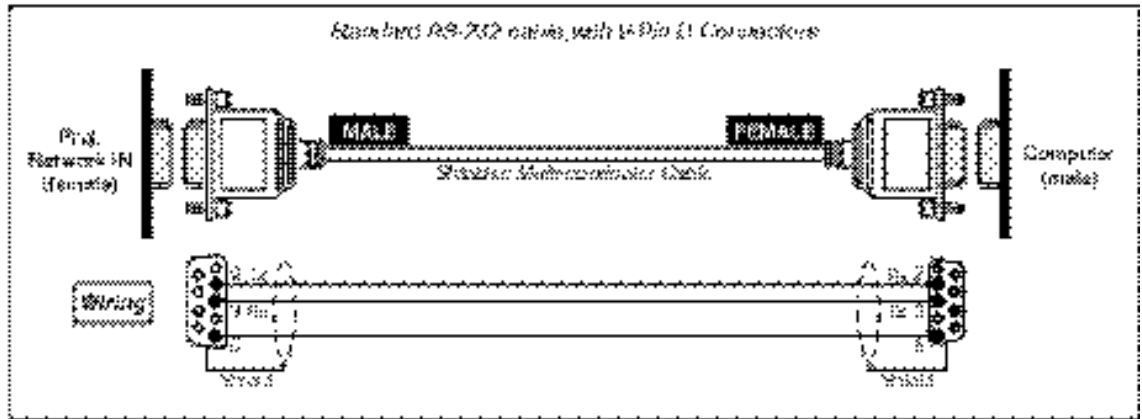
❏ *From projector to computer (RS-232)*
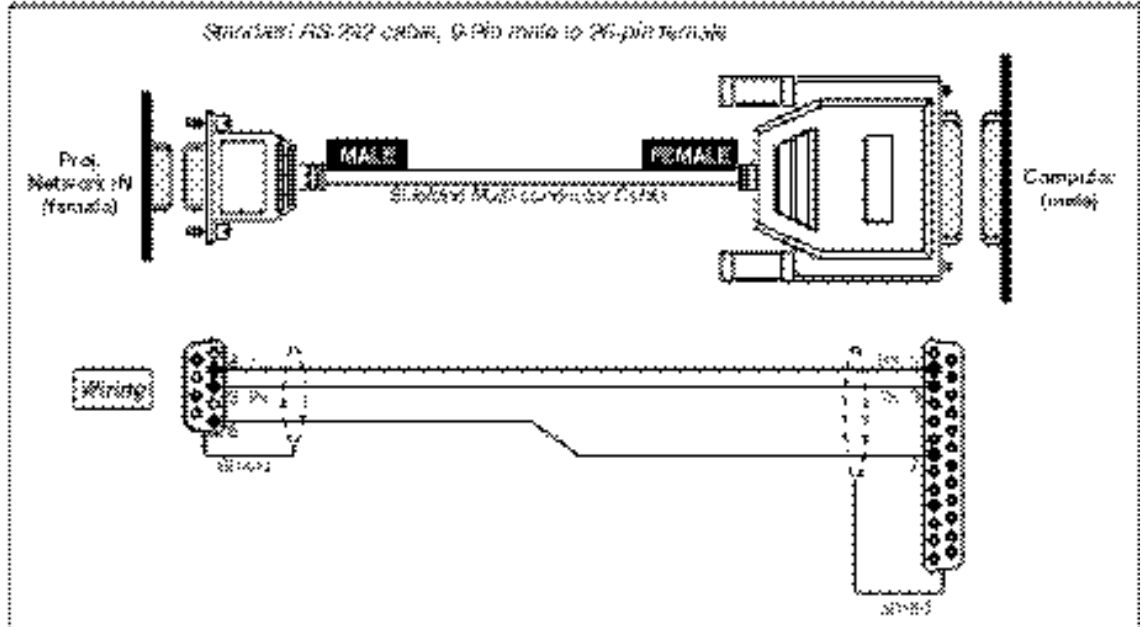
NOTE: RS-422 not available on all projector models – RPMS-500Xe only.

❏ From projector to RS-422 compatible computer
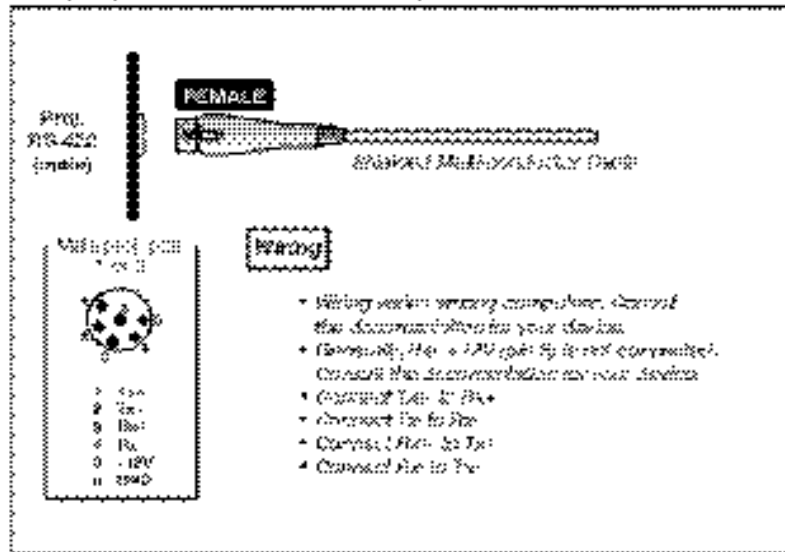
❏ From projector to projector (RS-232)
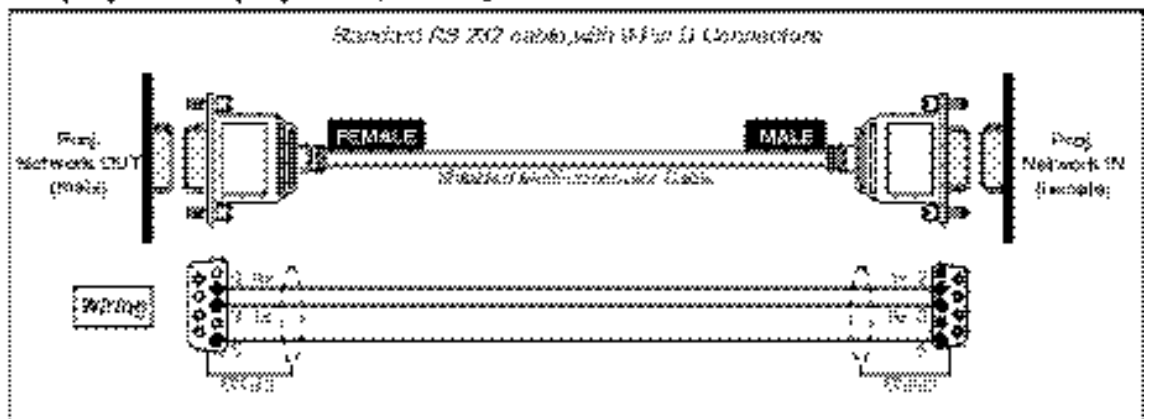
❏ *From projector to projector (RS-422)*
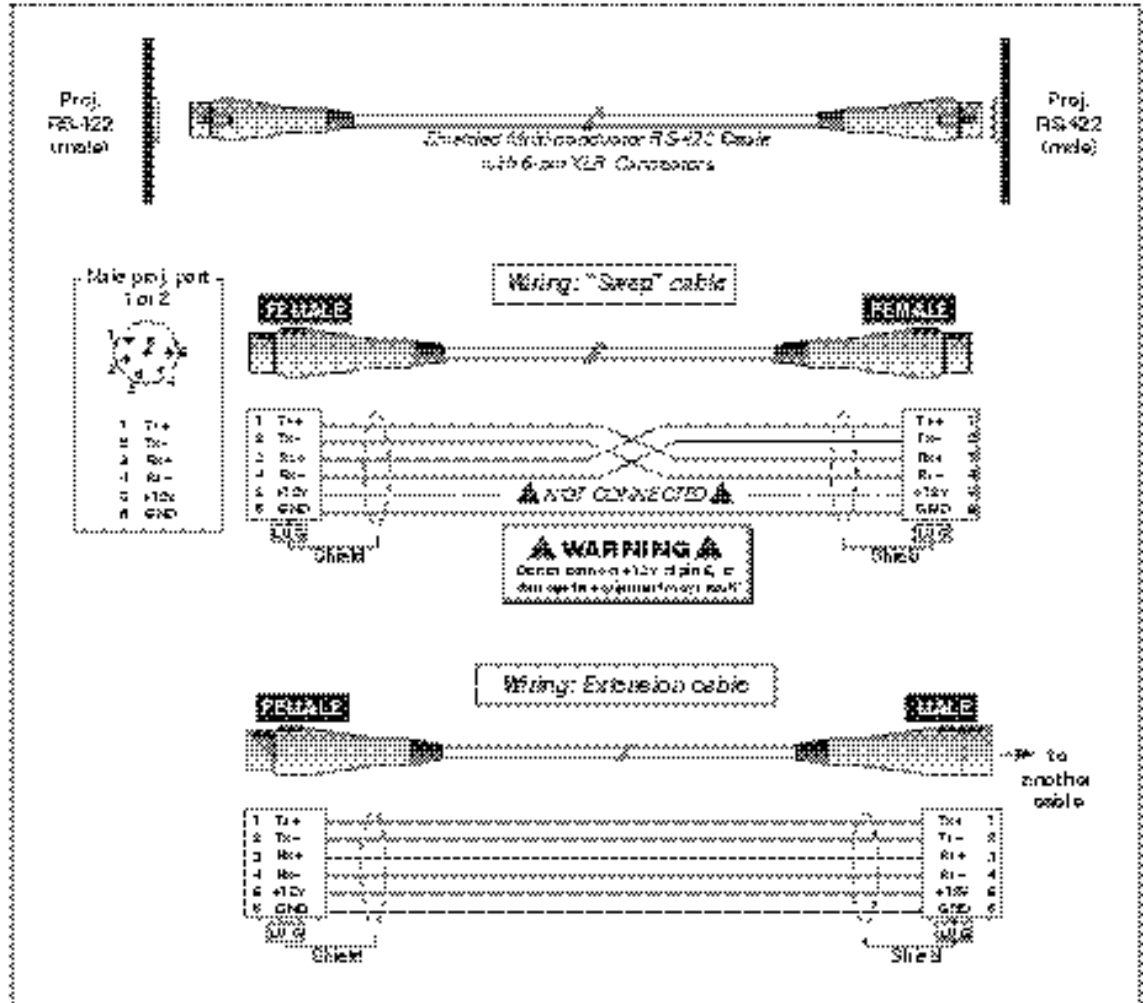
❏ *From projector to switcher, new installation*

Standard RS-232 cable, with 9-Pin D Connectors
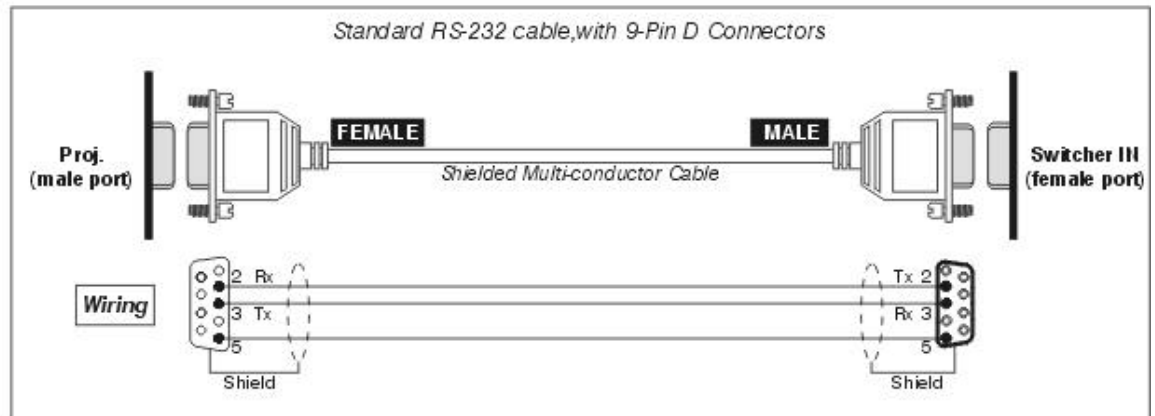
❏ *From projector to switcher, in existing Marquee™ installation*

For adding a projector to an existing installation in which the switcher OUT port is used (such as with Marquee™ installations), add a gender-changing adapter at the projector port as shown:

Standard RS-232 cable, with 9-Pin D Connectors
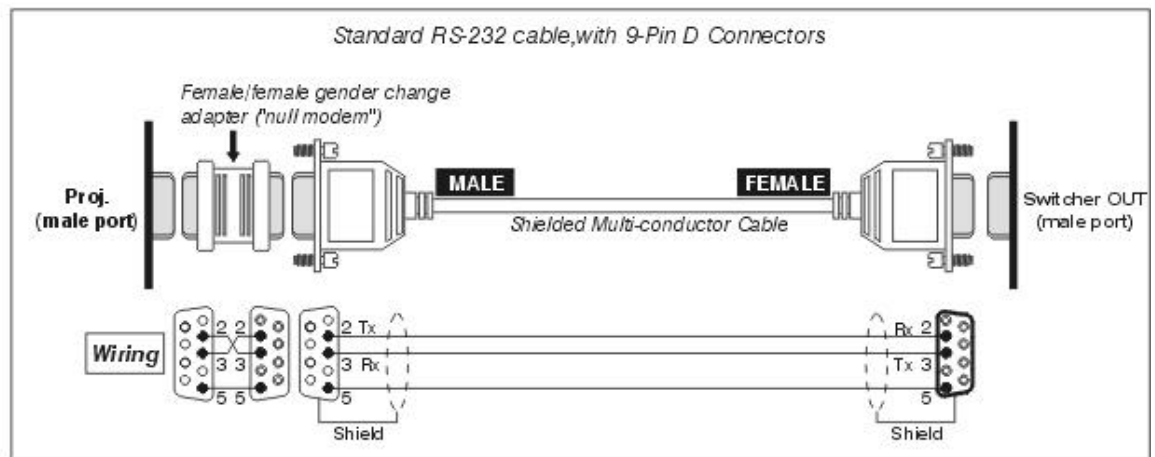
Optional Input Modules

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 or decoder.

**RGB500 Input Module ˈ
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.
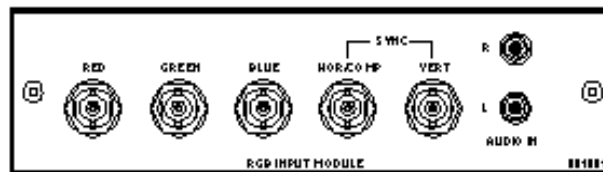
RGB500 Features
◊ accepts 3, 4, or 5 wire RGB video (sync-on-green, composite sync, or separate horizontal and vertical sync), up to 500 MHz bandwidth
◊ BNC connectors for RGB signal inputs

NOTE: The audio connectors are not functional.

**RGB400BA Input Module ˈ
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 75Σ 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.

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 75Σ terminated. Video outputs provide buffered loop-through to another display device.
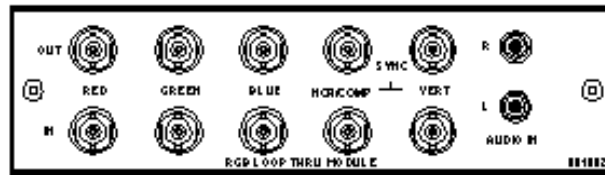
RGB400ALT Features

◊ 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.

Composite / S-Video Input Module 38-804608-xx ' The Composite/S-Video Input Module may be installed in this projector, with a *Marquee Signal Switcher*. The module receives either composite video or S-video input signals from tape or disk players (do not connect both types of signals simultaneously). Video inputs are 75Σ terminated. Video outputs are provided for buffered loop-through to another display device.
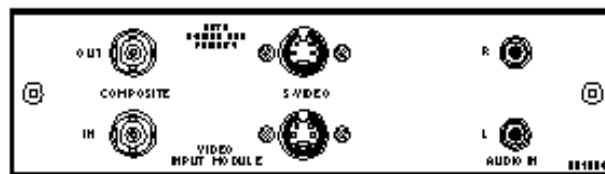
Composite/S-video Features

◊ BNC connectors for composite RGB signals
◊ 4-pin mini-DIN connectors for S-Video signals
◊ buffered loop-through video outputs

NOTES: 1) This interface is not a decoder. NTSC, PAL, or SECAM signals must connect to the video decoder installed at **INPUT 3 / INPUT 4**. *2) The audio connectors are not functional. 3) For use with this projector, do not connect* **both** *composite video and S-video signals to the Composite / S-Video Input Module–connect one or the other, even when plugged into a switcher.*

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 recei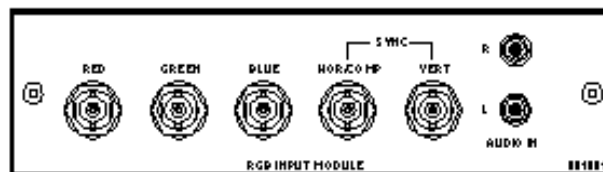ves analog RGB input signals from IBM PC compatibles or Macintosh computers. Video inputs are 75Σ terminated. Video outputs are provided for buffered loop-through to another display device.
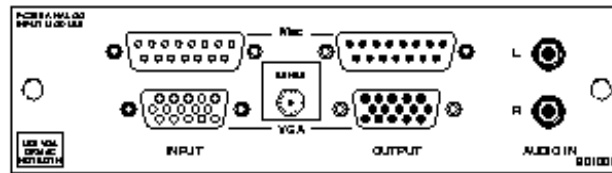
PC250 Analog Features

◊ 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.

Digital HDTV Input Module ▔
38-804611-xx

The *Digital HDTV Input Module* can be installed in the projector at **INPUT 2**, where it accepts a digital 4:2:2 component HDTV 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 75Σ terminated.

Features

◊ accepts a variety of digital HDTV 4:2:2 component signals (YCbCr), and de-serializes into a parallel 20-bit 4:2:2 component signal (10 bits each for Y and CbCr)
◊ SMPTE 292M compatible
◊ Two data rates: 1.485 Gb/sec or 1.485/1.001 Gb/sec.
◊ provides both a **SERIAL IN** and a **SERIAL OUT** BNC connector
◊ includes 4 status LEDs

Serial Digital Input Module ▔
38-804602-xx

The *Serial Digital Input Module* (*SDI*) can be installed in the projector at **INPUT 2**, where it 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 75Σ terminated.
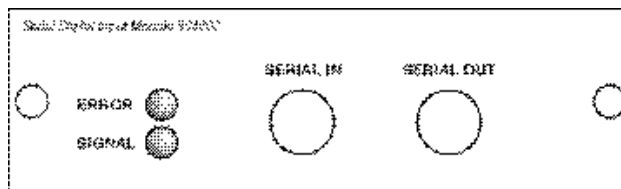
SDI Features

◊ 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

Position
- H-Position 519
- V-Position 355

Pixel
- Pixel Track 1284
- Pixel Phase 0

Bright — Bright 50.0

Cont — Contrast 50.0

Func — Color Enable, etc.

Input
- Switcher 0
- Slot 1

Chan — Channel: 01 (Sample)
- 01 0,2 hdtv 1080i
- 02 0,1 xga 60 hz
- 03 0,4 s-video

Menu

Main Menu
1. Size and Position
2. Image Settings
3. Channel Setup
4. Configuration
5. Lamp
6. Status
7. Auto Setup

Help

Help Topics
1. Using Help
2. Setup
3. Keys
4. Source (Input) Selection
5. Status/Power LEDs

Test

LEGEND
- Black Heading = 1st Level Menu (accessed from Main Menu)
- Gray Heading = 2nd Level Menu
- No Heading = 3rd Level Options

NOTE: While navigating the menus, some menu options appear grayed out. This indicates that the option is either not available to the projector model or is not currently enabled.

① Size and Position
1. Resize Presets
2. Size
3. Vertical Stretch
4. Pixel Track
5. Pixel Phase
6. Filter
7. H-Position
8. V-Position
9. Lens Control
0. More

Size and Position (2)
1. Top Blank
2. Bottom Blank
3. Left Blank
4. Right Blank
5. PLL Loop Gain
6. Keystone
7. Plug & Display (EDID)
8. Tiling Setup

Lens Control
1. Focus
2. Zoom
3. Lens Horizontal Offset
4. Lens Vertical Offset
5. Intelligent Lens System

(Resize Presets)
1. Default
2. No Resizing
3. Full Size
4. Full Width
5. Full Height
6. Anamorphic
7. Tiled Full Size
8. Tiled Full Width
9. Tiled Full Height
0. Tiled Anamorphic

(Plug & Display)
1. 1024x768x60Hz
2. 1024x768x120Hz
3. 1280x1024x60Hz
4. 1280x1024x105Hz
5. 1600x1200x45Hz

② Image Settings
1. Contrast
2. Brightness
3. Pixel Phase
4. Detail
5. ColorSpace
6. Color Setup
7. Video Options
8. Input Levels
9. More

(ColorSpace)
1. RGB
2. YPbPr (Video)
3. YPbPr (HDTV)

Color Setup
1. Color
2. Tint
3. Select Color Temp
4. Interpolated Color
5. Gamma
6. Color Temp Setup

(Select Color Temp)
1. 3200K
2. 5400K
3. 6500K
4. 9300K
5. User1
6. User2
7. User3
8. User4
9. Interpolated Color
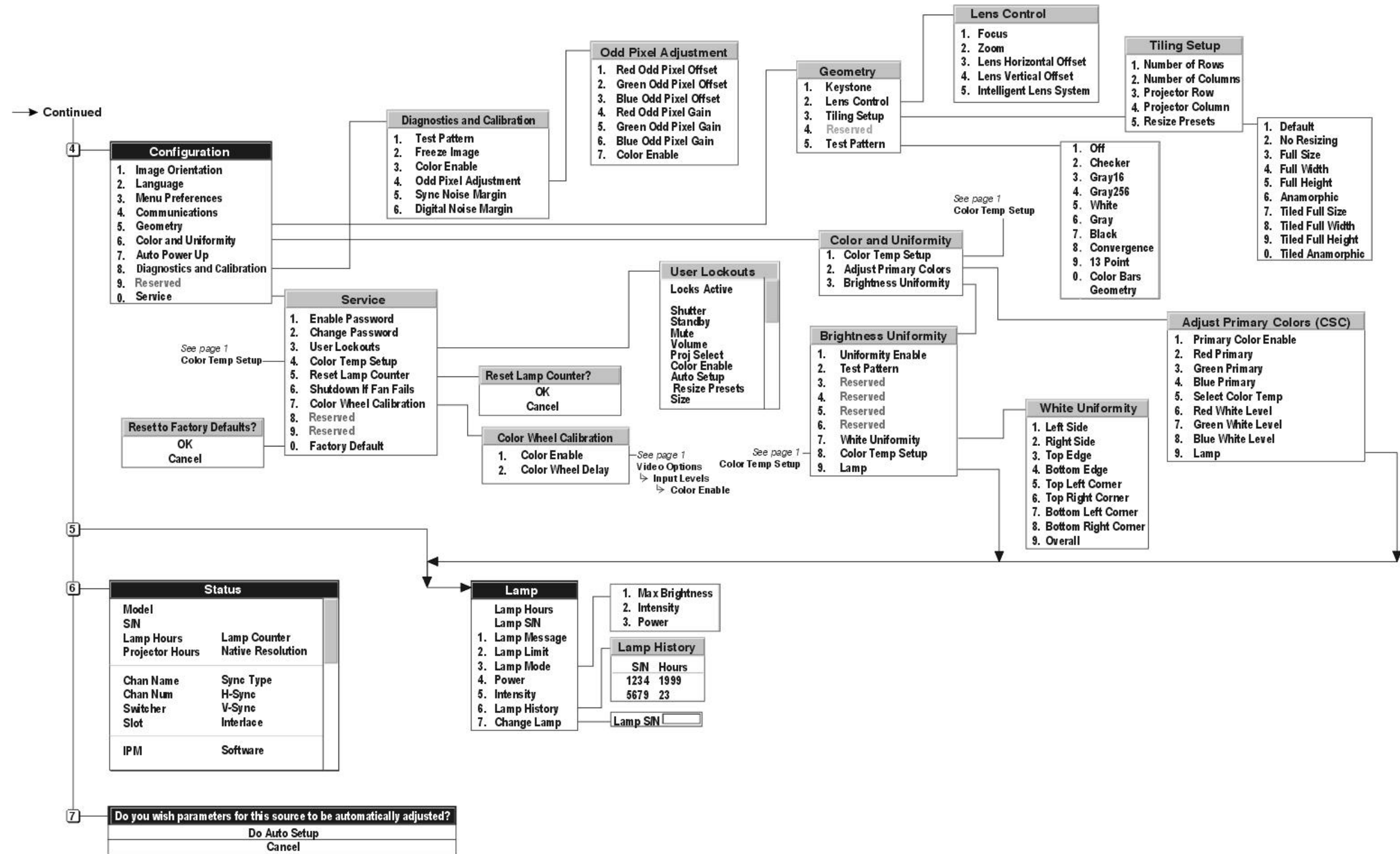
(Gamma)
1. Default
2. Enhanced
3. High Ambient
4. PAL/SECAM
5. NTSC Enhanced
6. Linear

Color Temperature Setup
1. Select Color Temp
2. Interpolated Color
3. Red White Level
4. Green White Level
5. Blue White Level
6. Color Enable
7. Copy From

③ Channel Setup
- 01 0,3 kvid 15.73k- 59.94-
- 02 0,2 i080 33.75k- 60.00-
- 03 0,2 p0720 45.00k- 60.00-
- 04 0,1 pkw 68.71k+ 85.03+

\<Enter\>= Edit, \<Func\> = more options

Channel Edit
1. Name   Sync Type
2. Number   H-Sync
3. Switcher   V-Sync
4. Slot   Interlace
5. In Menu
6. Auto Source
7. Locked
8. Previous Channel
9. Next Channel

enter

func

Channel Copy/Delete
1. Copy
2. Delete
3. Delete Unlocked Only
4. Delete All Channels

Input Levels
1. Auto Input Level
2. Red (Pr) Blacklevel
3. Green (Y) Blacklevel
4. Blue (Pb) Blacklevel
5. Red (Pr) Input Drive
6. Green (Y) Input Drive
7. Blue (Pb) Input Drive
8. Clamp Tip
9. Color Enable
0. Peak Detector

Video Options
1. Video Standard
2. Input Video Black
3. VCR
4. Video Termination
5. Enable Decoder AGC
6. Decoder Luma Delay

(Video Standard)
1. Auto
2. NTSC
3. NTSC 44
4. PAL
5. PAL-M
6. PAL-NC
7. PAL-60
8. SECAM

(Input Video Black)
1. 0 IRE
2. 7.5 IRE

(Color Enable)
1. Red
2. Green
3. Blue
4. Yellow
5. Cyan
6. Magenta
7. White

④ Configuration
1. Image Orientation
2. Language
3. Menu Preferences
4. Communications
5. Geometry
6. Color and Uniformity
7. Auto Power Up
8. Diagnostics and Calibration
9. Reserved
0. Service

(Image Orientation)
1. Front
2. Rear
3. Inverted Front
4. Inverted Rear

(Language)
1. English
2. Francais
3. Espanõl
4. Deutsch
5. Italiano

Menu Preferences
1. Menu Location
2. Horizontal Shift
3. Vertical Shift
4. Display Channel List
5. Display Slidebars
6. Display Error Messages
7. Large Menu Font

(Menu Location)
1. 4:3 Top/Left
2. 4:3 Inset 1
3. 4:3 Inset 2
4. 16:9 Top/Left
5. 16:9 Inset 1
6. 16:9 Inset 2
7. Custom

(Display Error Messages)
1. Off
2. Screen
3. Rs232
4. All

Communications
1. Baud Rate
2. Front IR
3. Reserved
4. Wired Keypad
5. Broadcast Key
6. Projector
7. Split Network

(Baud Rate)
1. 1200
2. 2400
3. 9600
4. 19200
5. 38400
6. 57600
7. 115200

(Front IR)
1. A or B
2. A
3. B
4. Off

⑨ Image Settings (2)
1. Processing Mode
2. Motion Filter
3. Dark Interval
4. Invert Stereo3D
5. White Boost
6. PLL Loop Gain
7. Noise Reduction
8. Horizontal Filter
9. Vertical Filter

(Processing Mode)
1. Auto
2. Video
3. Graphics/HDTV
4. Minimum Delay
5. Advanced 10-Bit ADP

(Motion Filter)
1. Auto
2. Still Video
3. Video
4. Film
5. Graphics Motion

▶ Configuration items 5-0 see next page

▶ For Main Menu items 5-7 see next page

Lens Control
1. Focus
2. Zoom
3. Lens Horizontal Offset
4. Lens Vertical Offset
5. Intelligent Lens System

Tiling Setup
1. Number of Rows
2. Number of Columns
3. Projector Row
4. Projector Column
5. Resize Presets

Odd Pixel Adjustment
1. Red Odd Pixel Offset
2. Green Odd Pixel Offset
3. Blue Odd Pixel Offset
4. Red Odd Pixel Gain
5. Green Odd Pixel Gain
6. Blue Odd Pixel Gain
7. Color Enable

Geometry
1. Keystone
2. Lens Control
3. Tiling Setup
4. Reserved
5. Test Pattern

Diagnostics and Calibration
1. Test Pattern
2. Freeze Image
3. Color Enable
4. Odd Pixel Adjustment
5. Sync Noise Margin
6. Digital Noise Margin

1. Default
2. No Resizing
3. Full Size
4. Full Width
5. Full Height
6. Anamorphic
7. Tiled Full Size
8. Tiled Full Width
9. Tiled Full Height
0. Tiled Anamorphic

→ Continued

④ **Configuration**
1. Image Orientation
2. Language
3. Menu Preferences
4. Communications
5. Geometry
6. Color and Uniformity
7. Auto Power Up
8. Diagnostics and Calibration
9. Reserved
0. Service

See page 1
Color Temp Setup

1. Off
2. Checker
3. Gray16
4. Gray256
5. White
6. Gray
7. Black
8. Convergence
9. 13 Point
0. Color Bars
   Geometry

Color and Uniformity
1. Color Temp Setup
2. Adjust Primary Colors
3. Brightness Uniformity

User Lockouts
Locks Active

Shutter
Standby
Mute
Volume
Proj Select
Color Enable
Auto Setup
Resize Presets
Size

Service
1. Enable Password
2. Change Password
3. User Lockouts
4. Color Temp Setup
5. Reset Lamp Counter
6. Shutdown If Fan Fails
7. Color Wheel Calibration
8. Reserved
9. Reserved
0. Factory Default

See page 1
Color Temp Setup

Reset Lamp Counter?
OK
Cancel

Brightness Uniformity
1. Uniformity Enable
2. Test Pattern
3. Reserved
4. Reserved
5. Reserved
6. Reserved
7. White Uniformity
8. Color Temp Setup
9. Lamp

Adjust Primary Colors (CSC)
1. Primary Color Enable
2. Red Primary
3. Green Primary
4. Blue Primary
5. Select Color Temp
6. Red White Level
7. Green White Level
8. Blue White Level
9. Lamp

White Uniformity
1. Left Side
2. Right Side
3. Top Edge
4. Bottom Edge
5. Top Left Corner
6. Top Right Corner
7. Bottom Left Corner
8. Bottom Right Corner
9. Overall

Reset to Factory Defaults?
OK
Cancel

Color Wheel Calibration
1. Color Enable
2. Color Wheel Delay

See page 1
Video Options
↳ Input Levels
  ↳ Color Enable

See page 1
Color Temp Setup

⑤

⑥ **Status**
Model
S/N
Lamp Hours   Lamp Counter
Projector Hours Native Resolution

Chan Name   Sync Type
Chan Num   H-Sync
Switcher   V-Sync
Slot   Interlace

IPM   Software

Lamp
Lamp Hours
Lamp S/N
1. Lamp Message
2. Lamp Limit
3. Lamp Mode
4. Power
5. Intensity
6. Lamp History
7. Change Lamp

1. Max Brightness
2. Intensity
3. Power

Lamp History
S/N	Hours
1234	1999
5679	23

Lamp S/N [   ]

⑦ **Do you wish parameters for this source to be automatically adjusted?**
Do Auto Setup
Cancel

Index

V

W

Y