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MARQUEE®



Ultra

User's Manual

P/N: 54-017049-01P

Version 2.10

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VDC Display Systems Limited Warranty Policy

VDC Display Systems (hereinafter VDCDS) warrants this product to be free from defects in material and workmanship under normal use, subject to the limitations provided below.

Product Warranties		
Product	**Parts**	**[3]Labor**
[1]MARQUEE™ CRT Series	3-years (1-year for CRTs)	1-year
[1]MARQUEE™ SIM Series	3-years (90-days for Lamps)	3-year
[2]Spare/Refurbished Parts	90-days	n/a
Accessories	90-days	n/a
Refurbished Projectors	90-days	90-days

[1]This applies to projectors purchased under the standard reseller agreement. May vary from reseller-to-reseller and purchase agreements.

[2] Warranty for replacement parts is 90-days or the remainder of the projector warranty, whichever is greater.

[3] Labor warranties are valid only if the defective product is returned to VDCDS or an authorized Service Depot. Does not cover on-site service.

Warranty Period (CRT/SIM Series):

- The warranty period as stated in the above Product Warranties, will start after the date of installation, but limited to a maximum of thirty-nine (39) months (CRT Series-parts only / SIM Series-parts & labor) from date of shipment from the factory, whichever occurs first. VDCDS will repair or replace any defective part, without charge for parts or labor as stated above. Replacement parts will be covered by this limited warranty for the remainder of the warranty period. This Limited Warranty applies only to parts supplied or designed by VDCDS.

Date of Installation:

- To establish the date of installation, the VDCDS Certificate of Registration should be completed, signed and returned to VDCDS postmarked no later than thirty (30) days from the date of installation and no later than ninety (90) days from date of shipment. If the VDCDS Certificate of Registration is not returned within such time, VDCDS will use the date that the system was shipped from the factory as the date of installation.

Original Purchaser:

- This Limited Warranty is limited to the original purchaser (customer) of this product from either VDCDS or VDCDS authorized service depot or reseller.

Reseller Obligation:

- The reseller is expected to evaluate the product upon receipt, to insure that it is in proper working condition. Additionally, the reseller is responsible for making any minor set-up at no cost to VDCDS or the customer.
- The reseller must advise the customer that the Certificate of Registration be filled-out and returned within thirty (30) days from the date of installation. See Date of Installation.

Warranty Service:

- It is the responsibility of the reseller to provide technical assistance and/or warranty service to the customer.
- In cases where the reseller can not provide technical assistance or perform the warranty service required;
- It is the resellers' responsibility to contact VDCDS or its closet service depot for technical assistance;
- In the event that the reseller can not perform the warranty service required and the product must be returned, it is the responsibility of the reseller to insure that the product is properly packed, and obtain the required Return Authorization Number, see Product Return/Shipping

Product Return/Shipping:

- Prior to returning this product or any sub-assembly to VDCDS,
- An RA Request form must be completely filled-out and submitted to VDCDS or an authorized service depot.
- A Return Authorization Number (RA#) must be obtained from the VDCDS Technical Service Department.
- The product must be shipped in the manufacturer's original shipping carton or other VDCDS approved packaging.
- All freight and shipping charges to VDCDS must be prepaid by the customer. The return shipping of the product under warranty will be the responsibility of VDCDS.
- Damage resulting from abuse in shipment of this product is not covered by this Limited Warranty.
- VDCDS approved shipping cartons are available from VDCDS for a nominal charge.

Environmental Damage:

- This Limited Warranty does not cover damage or repairs that are necessary due to floods, winds, fires, lightning, accidents, corrosive atmosphere, and excessive exposure to water (moisture), heat, or any condition beyond the control of VDCDS.

Serial Number Defacement:

- This Limited Warranty is void for the product if the serial number has been changed, removed or defaced.

Limitations

This Limited Warranty does not cover:

- incorrect installation;
- voltage conditions, blown fuses, open circuit breakers or any other inadequacy or interruption of properly grounded electrical service;
- any condition outside the operating specifications of the projector;
- misapplication, abuse, improper servicing, or any other improper operation, including mis-adjustments of any control;
- defects in or caused by associated equipment;
- repair and/or modification of the product or any sub-assembly performed by other than VDCDS factory personnel;
- phosphor degradation of the picture tube (CRT); example, visible burns or patterns on phosphor screen during normal use

System Maintenance:

- Normal maintenance as outlined in the installation and servicing instructions of the respective Operator's Manual will be the responsibility of the purchaser.

VDCDS MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, IN CONNECTION WITH THIS PRODUCT EXCEPT AS HEREINABOVE PROVIDED. IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ARISING FROM A COURSE OF DEALING OR USAGE OF TRADE ARE SPECIFICALLY EXCLUDED. SHOULD THIS PRODUCT PROVE TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP, THE PURCHASER'S SOLE REMEDY SHALL BE SUCH REPAIR OR REPLACEMENT AS HEREINABOVE EXPRESSLY PROVIDED AND UNDER NO CIRCUMSTANCES SHALL VDCDS BE LIABLE FOR ANY LOSS, OR DAMAGE, DIRECT, INCIDENTAL OR CONSEQUENTIAL, INCLUDING LOSS, OR LOSS OF PROFITS OR BUSINESS OPPORTUNITIES, RESULTING FROM RESELLER INSTALLATION OR SERVICES.

Some states do not allow the exclusion of incidental or consequential damages, so the above limitation may not apply to you. This Limited Warranty gives you specific legal rights, and you may also have other rights which may vary from state to state or country. NO other person is authorized to assume for VDCDS any additional obligations beyond those provided herein.

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Section 1
INTRODUCTION

1.1 The Projector

The VDC Display Systems (VDCDS) MARQUEE® & MARQUEE® Ultra Series projectors are ultra high resolution data graphics projectors compatible with virtually all computer sources. Their superior performance and high quality projected images place them well above other projection systems in their class. Features of the MARQUEE® Ultra Series include:

- automatic lock to inputs between 30 kHz and 152 kHz
- projected display size to 25 feet diagonal
- liquid coupled (8500LC/9500LC models) or air coupled (8500/8520) lens design
- high brightness projection: from 225-240 ANSI lumens, depending on model
- high video bandwidth – 150 MHz bandwidth (-3 dB)
- multi-use full function keypad
- intuitive menu driven, multi-language interface with on-line help
- external computer control capability
- superior geometry control, contrast, astigmatism and color performance
- Contrast Modulation
- ASR and ASI to reduce the need for manual display adjustments
- Image Shifter Module to help lengthen CRT life (Optional)
- optional ACON II automatic convergence feature

1.1.1 Functional Description

The projector accepts data/graphics and video input signals from a variety of sources for projection onto flat, curved, or rear projection screens. System inputs are processed to provide separate red, green, and blue image components for projection through the projector's three front lenses. The three primary color components converge on the projection screen to provide a high quality display output.

Sophisticated processor-based logic and control circuitry provide many of the automatic features available on the MARQUEE®® & Ultra Series. This circuitry interfaces with the keypad to provide projector control by the user, such as:

- turning the projector on or off
- switching input sources
- adjusting all display settings such as contrast, brightness, and size
- correcting for display effects and input noise
- displaying projector operating status screens and on-line help
- controlling projector operating settings

Should projector servicing be required, service personnel can use the keypad to make service adjustments and alignments. In some cases the projector may be serviced without accessing the projector's internal circuitry.

Projector settings, usually different for different sources, are stored in memory for each individual source. These settings are retained until changed by the user, even if power is removed from the projector.

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1.1.2 Construction

The projector body is comprised of a sturdy metal chassis, metal top covers, and durable plastic side covers. The front top cover can be temporarily removed to access the keypad and align the lenses. The rear top cover and rear panel are removable for servicing and projector upgrading.

1.1.3 Expandability

MARQUEE® Series projectors can be expanded or upgraded to include additional features, accessories, and input options; these include a variety of quick plug-in interface modules to suit the input devices you are using, a signal switcher, a video decoder, a ceiling mount, and floor mount accessories. For more information or if you need assistance for upgrading your projector, contact your reseller or VDCDS.

1.2 Purchaser's Record and Servicing

Whether the projector is under warranty or the warranty has expired, VDCDS extensive factory and authorized service network is always available. VDCDS service technicians are fully trained to quickly diagnose and correct projector malfunctions. Complete service manuals and updates are available to service technicians for all new projector models manufactured by VDCDS.

If you have a problem with your projector or require assistance, contact the authorized VDCDS dealer from which the projector was purchased. Fill out the information below for your records.

Purchaser's Record

Reseller:	
Reseller Phone Number:	
Projector Serial Number:	
Purchase Date:	

Note: Display projector serial# by pressing [✶] at presentation level.

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1.3 VDCDS Service Locations

Headquarters

VDCDS
7177 N. Atlantic Avenue
Cape Canaveral, Florida 32780
Ph: 321.784.4427
Fax: 321.784.6617

support@vdcdisplaysystems.com
www.vdcdisplaysystems.com

Authorize Service Depots

Hi-Def Engineering

2440 N. Glassell, Unit V
Orange, CA 92865
Phone: 714-279-0525
Fax: 714-283-5742
E-Mail: hidefenginc@aol.com

Hi-Rez Projections, Inc.

957 Worcester Road
Framington, MA 01701
Phone: 508-820-3377
Fax: 508-820-3388
E-Mail: gguidi@hometheater1.com

APV Communications

Hillview, Jack's Bush, Lapcombe
St, Salisbury, Wiltshire, SP5 1DA, UK
Phone: 011 44 7798-665236
Fax: 011 44 1264-782496
E-mail: tony.pope@apvcom.co.uk

Christie Singapore
627A Aljunied Road , # 05-02 Biz Tech Centre, Singapore, 389842
Phone: +65 6877-8737
Fax: +65 6877-8747

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Section 2

INSTALLATION & SETUP

This section explains how to install and set up the projector. If you are familiar with the projector and want to quickly set it up for temporary use, follow the Quick Setup instructions in Section 2.1. For a complete setup, skip Section 2.1 and follow the instructions and guides covered in the remaining subsections.

2.1 Quick Setup

Note: Follow these 7 steps for quick set up of the projector:

Step 1. Position the Projector

To perform a quick setup, the projector must be positioned so that the throw distance is the same as that used during the most recent optical alignment; otherwise a detailed setup is required. The throw distance is the distance between the center lens on the projector and the center of the projection screen. See Appendix B for more information.

Note: If an optical lens alignment is required, refer to Section 2.9, Optical Alignment.

Step 2. Connect the Power Cord

Plug the AC line cord into the line input unit on the lower front panel of the projector. Plug the three prong end of the line cord in a grounded AC outlet.

Note: Input voltage must be between 90 VAC and 264 VAC.

Note: Ensure the line cord is the proper type for the AC receptacle.

Step 3. Connect a Source

Connect a source to the projector's built-in RGB input (slot 1) or, if the optional Image Shifter is installed connect to the RGB input (slot 2). Ensure the source is on and properly connected.

Step 4. Access the Keypad

Remove the projector's front top cover to access the keypad. See page 3-2.

Step 5. Turn the Projector On

Press [**POWER**] on the keypad to turn the projector on. Hold down the power key for about one second.

Note: If the keypad has been configured for IR remote operation, point it towards the screen or the front of the projector.

Step 6. Select the Input

Press [**SOURCE**] [**0**] [**1**] to select the source connected to the built-in RGB input. Or, if installed with the optional image shift, press [**SOURCE**] [**0**] [**2**] to select the source connected to the Image Shifter input.

Step 7. Adjust the Display

Press [**HELP**] [**1**] to select the Guided Source Setup tutorial.

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2.2 Installation Considerations

Careful consideration should be given as to how and where the projection system is installed. Although the projector offers high performance, the final display quality could be compromised if the projector is not installed properly. This subsection discusses the considerations you should make before proceeding with a final installation. These considerations include the installation type (floor, ceiling, rear), screen size and type, room lighting, and ventilation.

2.2.1 Installation Type

Choose the installation type which suits your needs: front or rear screen, floor mount or ceiling mount.

Front Screen, Floor Mount Installation

ADVANTAGES

- Easy to set-up.
- Can be moved or changed quickly.
- Easy to access projector.

CONSIDERATIONS

- Shares floor space with audience.
- May be accidentally moved, necessitating re-alignment.

Front Screen, Ceiling Mount Installation

ADVANTAGES

- Does not take up audience space.
- The projector is less noticeable.
- The projector cannot be accidentally moved.

CONSIDERATIONS

- Installation is more permanent.
- It is more difficult to physically access the projector.

Rear Screen, Floor Mount Installation

ADVANTAGES

- Projector is completely hidden from the audience.
- Easy to access projector.
- Usually good ambient light rejection.

CONSIDERATIONS

- Requires separate room.

Rear Screen, Ceiling Mount Installation

ADVANTAGES

- Projector is completely hidden from the audience.
- Usually good ambient light rejection.

CONSIDERATIONS

- Requires separate room.
- Installation cost is usually higher.

Rear Screen, Floor Mount with Mirror

ADVANTAGES

- Projector is completely hidden.
- Usually good ambient light rejection.
- Less space is required behind the screen than other rear screen installations.

CONSIDERATIONS

- Requires separate room.
- Installation cost is usually higher.

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2.2.2 Screen Type

Screen type is a very important factor when designing a projection system. Inexperienced users or installers should always consult their dealer when deciding on screen type. The following guidelines may be helpful to understand the differences between screen types.

2.2.2.1 *Front Screen Installations*

There are two basic screen types: flat and curved. The choice between a flat screen versus a curved screen is dependant on audience viewing angle and screen gain. There is always a trade-off between viewing angle and gain. Viewing angles for both screen types are illustrated in Figure 2-1 and Figure 2-2.

Flat screens offer a gain of about 1 with a viewing angle just less than 180°. Incident light reflects equally in all directions so the audience can see the display from various angles. Because of the lower gain, flat screens are more effective when ambient lighting is reduced.

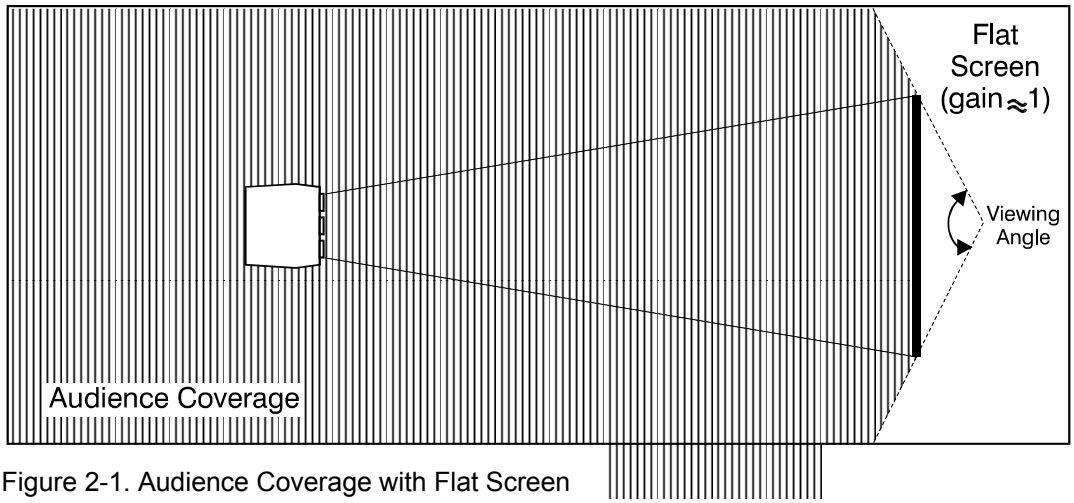


Figure 2-1. Audience Coverage with Flat Screen

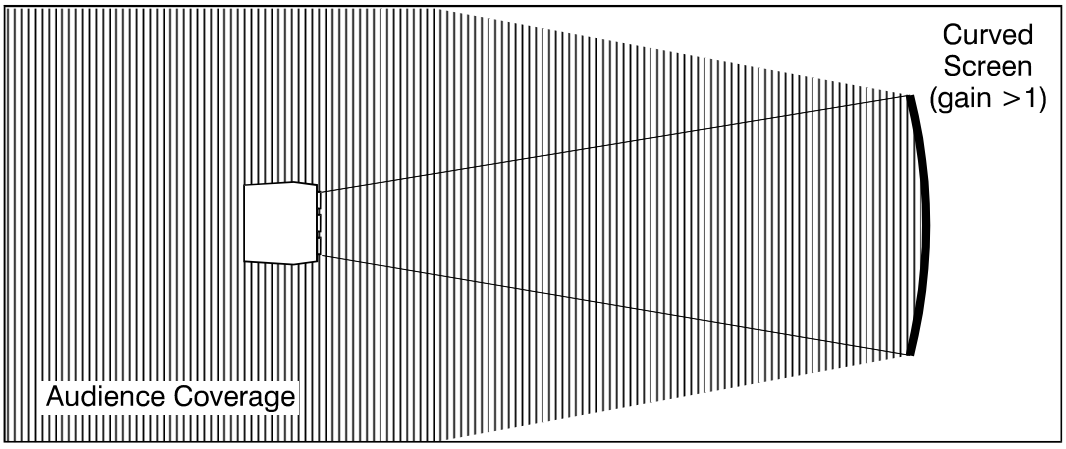


Figure 2-2. Audience Coverage with Curved Screen

Curved screens have gains larger than 1 and viewing angles much less than 180°. Most curved screens have different horizontal and vertical viewing angles. Incident light does not reflect equally in all directions. The reflected light concentrates in a conical volume or "viewing cone". Audiences within the viewing cone see a brighter image than that from an equal area on a flat screen. Audiences outside the viewing cone see a dimmer image.

To summarize, curved screens are better suited for brightly lit rooms where the audience is situated within the viewing cone. Flat screens are best suited when a wide viewing angle is required and ambient room lighting (near the screen) is low.

Note: Screen Gain is defined in Appendix G, Glossary.

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2.2.3 Rear Screen Installations

There are two basic types of rear screens: diffused and optical. A diffused screen has a surface which spreads the light striking it. Purely diffused screens have a gain of less than 1. The main advantage of the diffused screen is its wide viewing angle, similar to that of a flat screen for front screen projection.

Optical screens take light from the projector and redirect it to increase the light intensity at the front of the screen. This reduces it in other areas. A viewing cone, similar to that of a curved front screen installation, is created.

To summarize, optical screens are better suited for brightly lit rooms where the audience is situated within the viewing cone. Diffused screens are best suited when a wide viewing angle is required but there is low ambient room lighting.

2.2.4 Screen Size and Throw Distance

Screen size and throw distance are interrelated. See Appendices F and G. As screen size increases, the distance between the projector and the screen also increases. During projection room design, make sure that the room can accommodate the required position of the projector for the screen size you need.

2.2.4.1 *Screen Size*

Screen sizes vary according to model and lens type. See Appendix B. Choose a screen size which is appropriate for your application. If the projector will be used to display text information it is important that the image size allows the audience to clearly resolve all text. The eye usually sees a letter clearly if eye-to-text distance is less than 150 times the height of the letter. Small text, located too far from the eye, may not be legible at a distance even though it is projected sharply and clearly on the screen.

To fill a screen with an image, the aspect ratio of the screen must be equal to the aspect ratio of the image. The aspect ratio of an image is the ratio of its width to its height. Standard video from a VCR has a 4:3 or 1.33:1 aspect ratio. For example, to display a VCR output with a 4:3 aspect ratio onto a 10 foot (3m) high screen, the width of the screen must be at least 13.3 feet (4m).

Note: Screen size is often specified as diagonal size. Screens specified by diagonal size have aspect ratios of 4:3. Screens with other aspect ratios are not typically specified by diagonal size.

2.2.4.2 *Throw Distance*

The throw distance (projector-to-screen distance) must be determined for every new installation. Throw distance, the distance between the projector's center lens and the center of the screen, is based on screen size. As screen size increases, the distance between the projector and the screen increases. Make sure that the room can accommodate the required position of the projector for the chosen screen size.

Once your screen size is known you can determine the required throw distance for your projector model and lens by using the formulas and tables in Appendix B.

Note: Calculated values are for reference only. It is good practice to simulate the setup to determine the necessary throw distance.

Note: Display size is affected by input signal characteristics. Once the projector is set, use the Size function to fine tune display size.

Note: Throw distance and projection angle: Keep in mind that the ability to properly focus all areas of the image is limited if a significantly tilted projector is too close to the screen.

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2.2.5 Lighting

Proper lighting is another important factor when designing a projection room. Visiting a movie theatre can give you an idea of what makes a good projection environment. All walls, floors and furnishings are dull colored and non-reflectively finished. Every effort should be made to create the best environment for your system.

When designing a projection room, try to avoid white, reflective ceilings and non-directional lighting such as fluorescent lights. The white ceiling spreads the light which makes the room appear brighter. You want to keep the lighting and reflections to a minimum. If it is not possible to keep fluorescent lights off, consider using parabolic reflectors ("egg crates") to direct light down to the floor and away from the ceiling. Spot lighting (incandescent) is a better way to obtain illumination. Installing light dimmers or rheostats allows you to control your lighting environment.

Outside windows are undesirable in any projection environment. A small crack between curtains on a sunny day can severely wash-out an image. Make sure that curtains are opaque and fit snugly. Some curtains can provide up to 100 percent blockage of outside light. Pay close attention to the curtain material facing inside the room. It should have a matte finish.

Even with no external light at all, reflections from room surfaces can degrade the image. Light from the screen should be absorbed by surfaces so that it will not be reflected back to the screen. Keep reflective surfaces to a minimum.

To minimize the effects caused by unwanted light from door and aisle ways, carefully choose the position of your projector and screen. Figure 2-3 shows an installation where poor screen placement has allowed too much unwanted light to enter the screen. In Figure 2-4, the screen and the projector are positioned so that unwanted light is minimized.

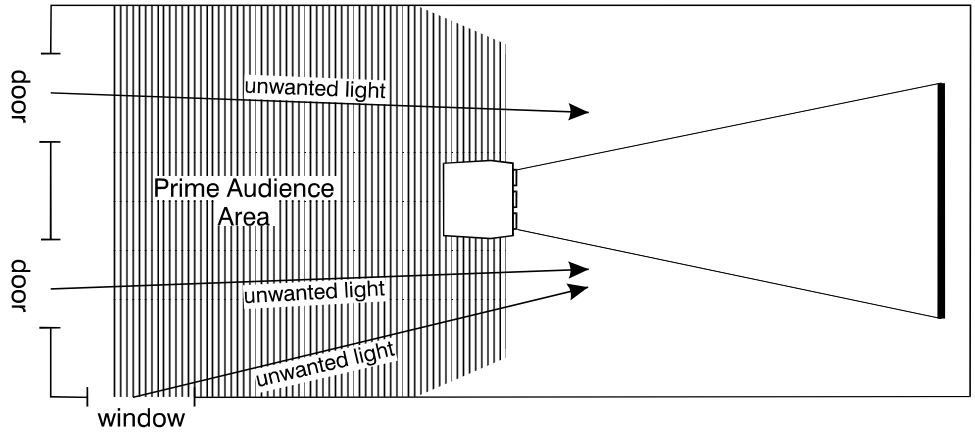


Figure 2-3. Poor Screen Placement

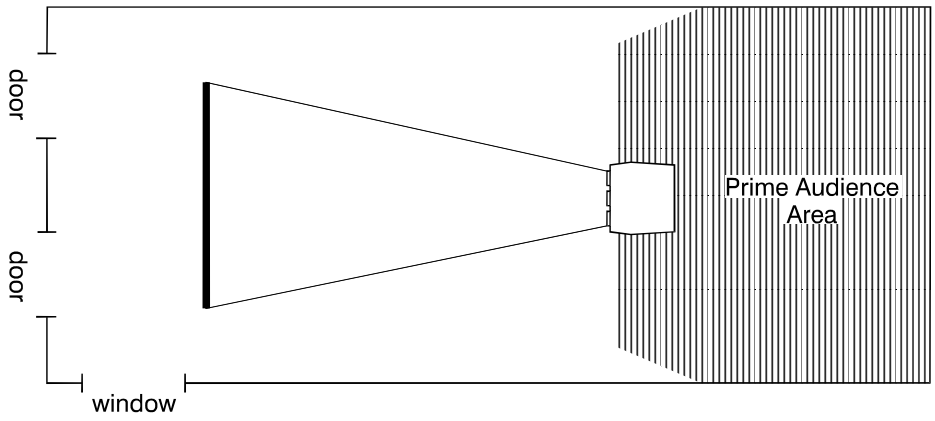


Figure 2-4. Good Screen Placement

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2.2.6 Other Considerations

Here are some other considerations and tips which can help you improve the design of your projection system.

Proper ventilation is important. The ambient temperature should be kept constant and below 35 °C (95 °F). Keep the projector away from heating and/or air conditioning vents. Changes in temperature can cause drifts in the projector circuitry which may affect performance.

Keep the projector away from devices which radiate electromagnetic energy such as motors and transformers. Common sources of these are slide projectors, speakers, power amplifiers, elevators, etc. Keep 35 mm slide projectors at least 2 feet away from the projector. Even if both are not used at the same time, the magnetic fields created by the slide projector can cause permanent magnetization of the projector.

For rear screen applications, less space is required if a mirror is used to fold the optical path.

Choose the right screen size for your application:

- As screen size increases, magnification increases which reduces brightness. This reduces the contrast ratio which affects legibility. Sharp defined edges become soft and fuzzy. Consider whether screen size is more important.
- Installing a large screen in a small room is similar to watching television close up; too large a screen can overpower a room. A good rule of thumb is to be no closer than 1.5 times the width of the screen.
- Larger screens require greater attention to lighting conditions.

When laying out your projection room, consider positioning the projector and screen in a manner which will achieve maximum audience coverage and space efficiency. For example, placing the screen along the larger wall in a rectangular room will reduce audience coverage.

Figure 2-5 shows two examples of how audience coverage is maximized.

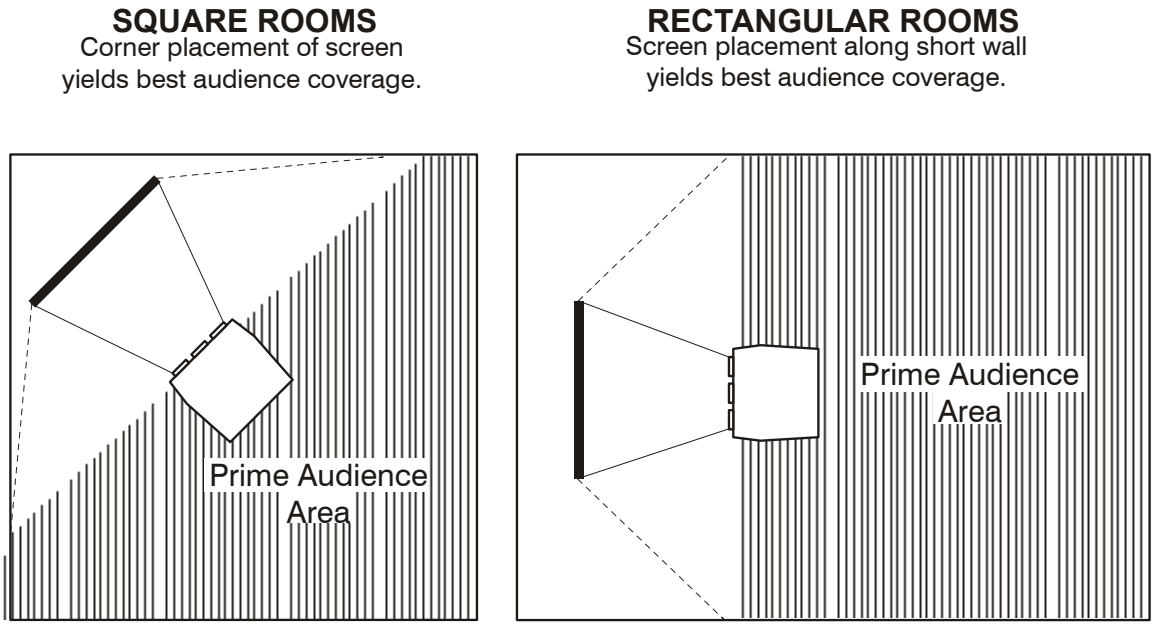


Figure 2-5. Screen Locations for Maximum Audience Coverage

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2.3 Hardware Setup

This section explains: how to convert the keypad from a built-in keypad to a remote keypad, how to change keypad protocol and backlit settings, and how to determine if reverse scan setup is required.

2.3.1 Keypad Conversion

The projector includes a multi-use full-function keypad which may be configured for use as a built-in, IR remote, or wired remote keypad. The keypad is configured at the factory for built-in use. It is located below the front top cover. You can use the keypad as it is or re-configure it for remote operation. You can also "hard wire" the keypad to be a protocol A or protocol B keypad (see Section 3.7, Utility Features for information about keypad protocols).

Follow the steps below to convert the keypad to a remote keypad and change its protocol setting.

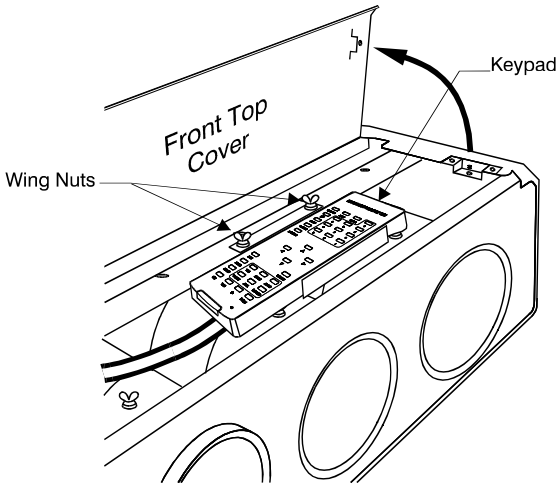


Figure 2-6 Built-in Keypad Access

Step 1.

Unplug the projector then lift the front top cover to access the built-in keypad. To lift the cover, grasp it above the red and blue lenses then lift it until the keypad is exposed. The keypad is mounted to a securing bracket located above the lens assemblies. Loosen the two bracket wing nuts then move the keypad away from the bracket. See Figure 2-6.

Step 2.

Locate the battery compartment at the back side of the keypad. Squeeze the latch to open the door. See Figure 2-7.

If converting the keypad to an IR remote, unplug the cable connector. Locate the jumper wires next to the cable connector location. See Figure 2-8. The jumper wires control the keypad's operating settings.

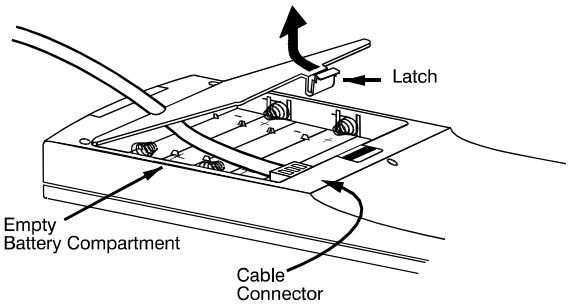


Figure 2-7.Battery Compartment

JP1	3 2 1	PROTOCOL A
	3 2 1	PROTOCOL B
JP2	3 2 1	(ALWAYS)
JP3	3 2 1	BACKLIT FEATURE OFF
	3 2 1	BACKLIT FEATURE ON
JP4	3 2 1	BUILT-IN OR WIRED KEYPAD
	3 2 1	IR REMOTE KEYPAD

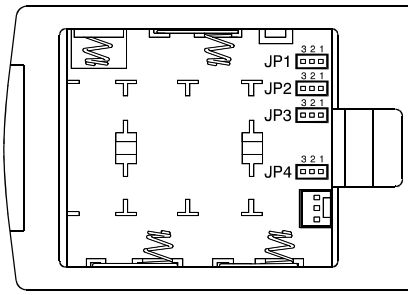


Figure 2-8. Jumper Settings

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JP1

This jumper setting is important if the keypad is configured for remote operation. There are two keypad protocols: A and B. These protocols are available to allow two projectors in the same room to be independently controlled by separate remote keypads. The protocol setting of the keypad must match that set in the projector's Keypad Options menu ([**UTIL**] [**6**] [**1**]). For more information about keypad protocols, refer to the *Remote Control Options* entry in Section 3.7, Utility Features.

JP2

This jumper must always be set between pins 1 and 2 as shown; otherwise, the projector will not respond correctly to keypad commands.

JP3

This jumper must always be set between pins 1 and 2 as shown; otherwise, the backlit feature will be disabled and the projector will not respond correctly to keypad commands.

JP4

The JP4 jumper setting sets the keypad type. If you are converting the keypad to an IR remote, move the JP4 jumper from between pins 2 and 3 to between pins 1 and 2.

Step 3.

For an IR remote keypad, place four AA size, 1.5V alkaline batteries in the compartment ensuring that the +/- orientation of each battery is correct. Position the compartment door into place.

For a wired remote keypad, an optional accessory cable (#03-001106-02P) is required. Plug the cable into the cable connector then position the door into place. Plug the cable jack into the remote jack input on the projector.

! WARNING: DO NOT INSTALL BATTERIES IN THE KEYPAD IF A BUILT-IN OR WIRED REMOTE CABLE IS ATTACHED TO IT. THIS MAY CAUSE THE BATTERIES TO EXPLODE.

2.3.2 Keypad Operating Settings

The keypad includes its own memory to store keypad operating settings. With a few simple keystrokes you can over-ride the "hard wire" protocol setting (explained earlier) and enable or disable the backlit feature. Keypad battery life is increased if the backlit feature is disabled. The new operating settings are stored in the keypad until the batteries are replaced (IR remote keypad) or the keypad connection cable is unplugged (wired or built-in keypad).

If the keypad is configured for IR remote operation, make sure the batteries are installed. If it is configured for built-in or wired remote operation, make sure its extension cable is properly connected to the projector. Perform the following keystroke sequences to change its operating settings:

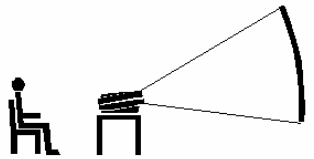
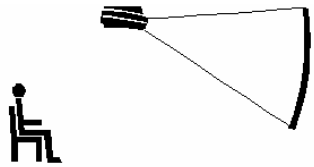
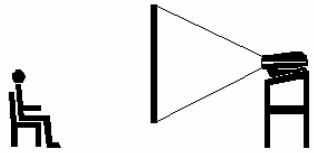
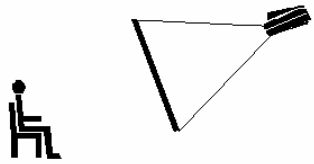
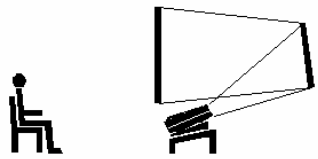
- To toggle the keypad's protocol setting (A or B), press [✶] [**BRITE**] [**TINT**] [**DETAIL**] [**1**].
- To toggle the backlit feature (enable or disable), press [✶] [**BRITE**] [**TINT**] [**DETAIL**] [**3**].
- To return all configuration settings to the jumper settings, press [✶] [**BRITE**] [**TINT**] [**DETAIL**] [**0**].
- .Note: The projector will not respond to keypad commands if you press [✶] [**BRITE**] [**TINT**] [**DETAIL**] [**2**]. If pressed accidentally, press [✶] [**BRITE**] [**TINT**] [**DETAIL**] [**0**] to clear all keystroke settings.

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2.4 Reverse Scan

If the projector is not installed in a front screen, floor mount configuration, reverse scan setup may be required. Reverse scan setup must be performed by a qualified Reseller service technician. Refer to Table 2-1. Operating Configurations to determine if reverse scan setup is required. Contact your dealer for assistance.

Table 2-1. Operating Configurations

OPERATING CONFIGURATION		HORIZONTAL SCAN	VERTICAL SCAN
	Front Screen, Floor Mount (default configuration)	NORMAL	NORMAL
	Front Screen, Ceiling Mount	REVERSED	REVERSED
	Rear Screen, Floor Mount	REVERSED	NORMAL
	Rear Screen, Ceiling Mount	NORMAL	REVERSED
	Rear Screen, Floor Mount, With Mirror	NORMAL	NORMAL

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2.5 Mounting

The projector should be mounted after the system design has been established and reverse scan setup (if required) is complete.

2.5.1 Front Screen Installations

2.5.1.1 *Floor Mount*

Mount the projector on a secured table or cart. Position the projector at the chosen room location with the projector pointing towards the center of the projection screen. The angle of projection, combined with the tilt angle of the screen should direct the reflected image towards the center of the audience. It is recommended that the difference between the projection angle and the screen tilt angle (within a common reference) be less than 15°. Refer to Figure 2-9.

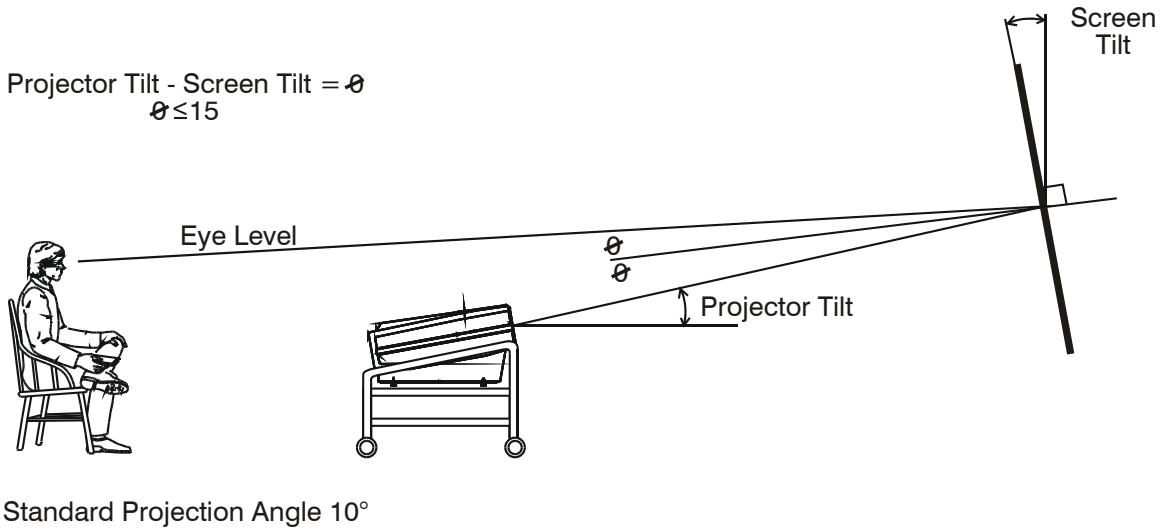


Figure 2-9. Floor Mount Installation

You can adjust projection angle and level by adjusting the height of the projector legs. See Figure 2-10.

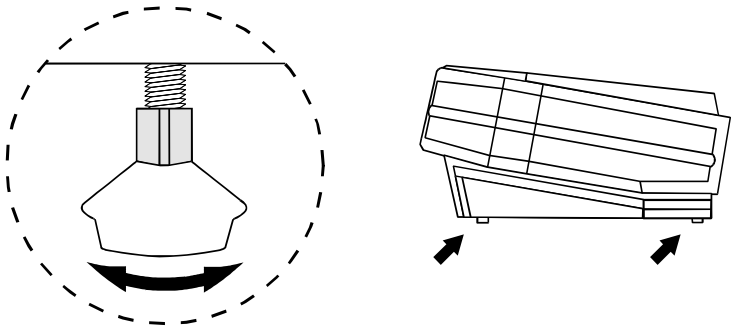


Figure 2-10. Leg Adjustment

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2.5.1.2 *Ceiling Mount*

Mounting the projector to the ceiling requires the use of a projector ceiling mount fixture. The fixture is shipped from the factory in kit form (with assembly instructions) for assembly and installation by the dealer/installer. For more information, contact your reseller.

Position the projector so that it is pointing toward the center of the projection screen. The angle of projection combined with the tilt angle of the screen should direct the reflected image towards the center of the audience. It is recommended that the difference between the projection angle and the screen tilt angle (within a common reference) be less than 15°. See Figure 2-11.

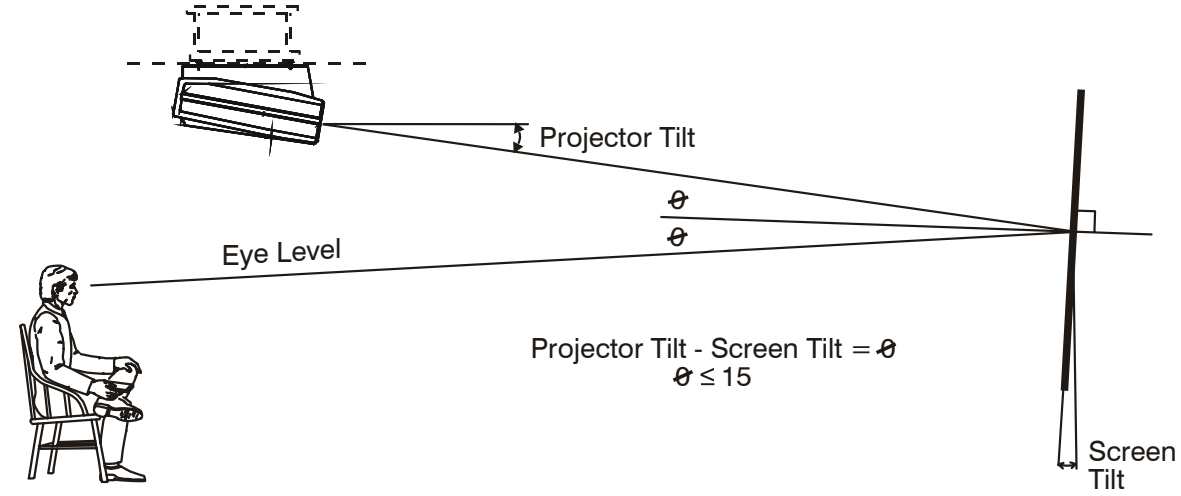


Figure 2-11. Ceiling Mount Installation

Instructions for adjusting projection angle are provided with the fixture kit. For more information, contact your reseller.

2.5.2 Rear Screen Installations

When installing a rear screen system, the vertical positioning of the projector is dependant on the type of rear screen being used. There are two basic types of rear screens: optical and diffused.

2.5.2.1 *Optical Rear Screen Systems*

If the system includes an optical rear screen, mount the projector along the center axis of the screen as shown in Figure 2-12.

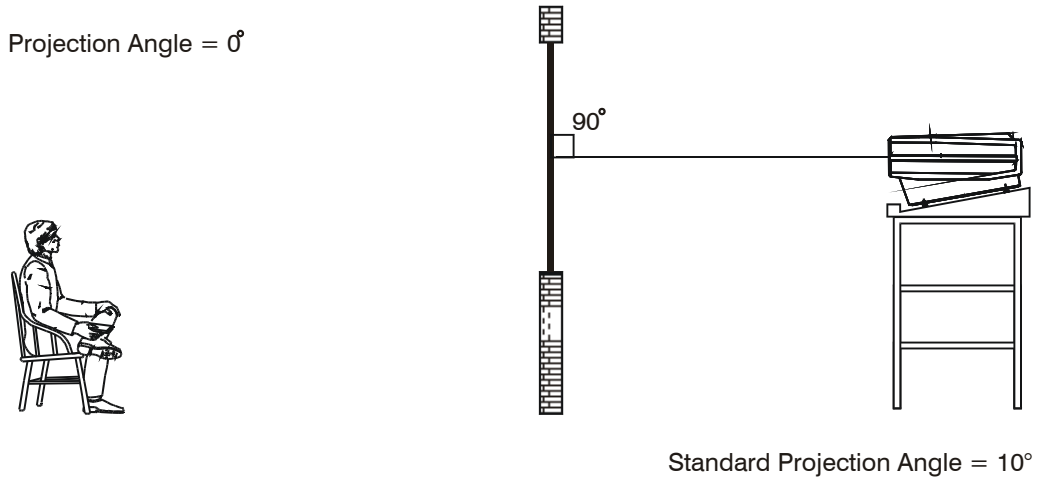


Figure 2-12. Optical Rear Screen Installation

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2.5.2.2 *Diffused Rear Screen Systems*

If the system includes a diffused rear screen, floor mount or ceiling mount the projector so that the image is directed to the center of the audience. Projection tilt should be less than 15°. See Figure 2-13.

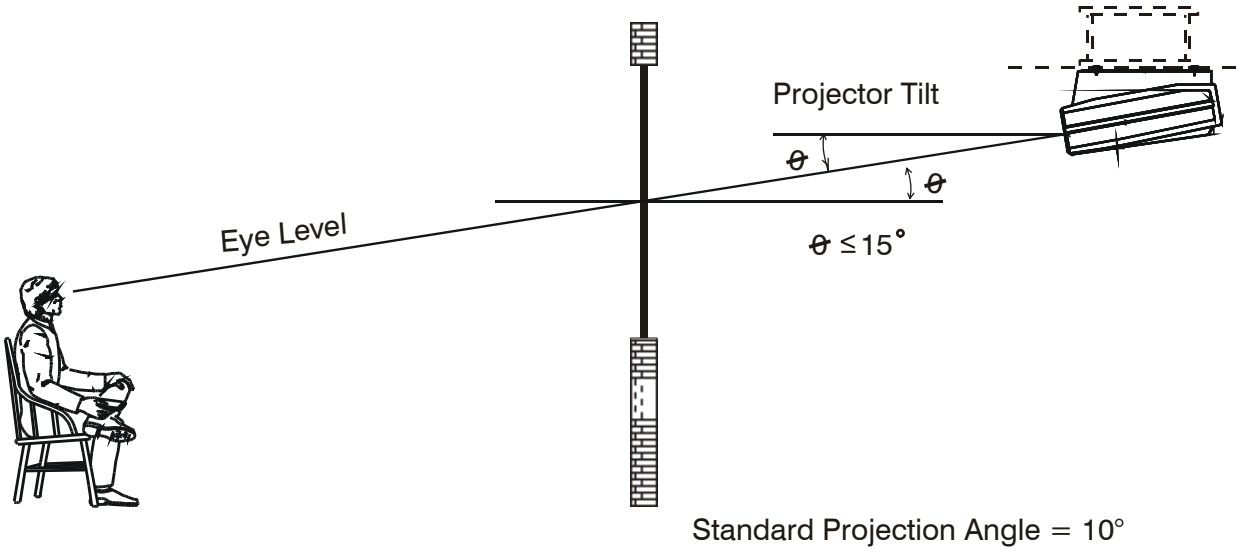


Figure 2-13. Diffused Rear Screen Installation

In situations where the space behind the projector is limited, a mirror may be used to fold the optical path as illustrated in Figure 2-14. If a diffused screen is used, the projection angle Ø should be less than 15°. If an optical screen is used, the optical path between the mirror and the screen should be perpendicular to the screen. Much attention must be given to the positioning of the projector and the mirror. This can be quite difficult for installers unfamiliar with this type of installation. It is recommended that your reseller or an experienced installer perform the installation.

Note: When using a mirror as shown in Figure 2-14, the calculated throw distance (D) is the sum of D1 and D2.

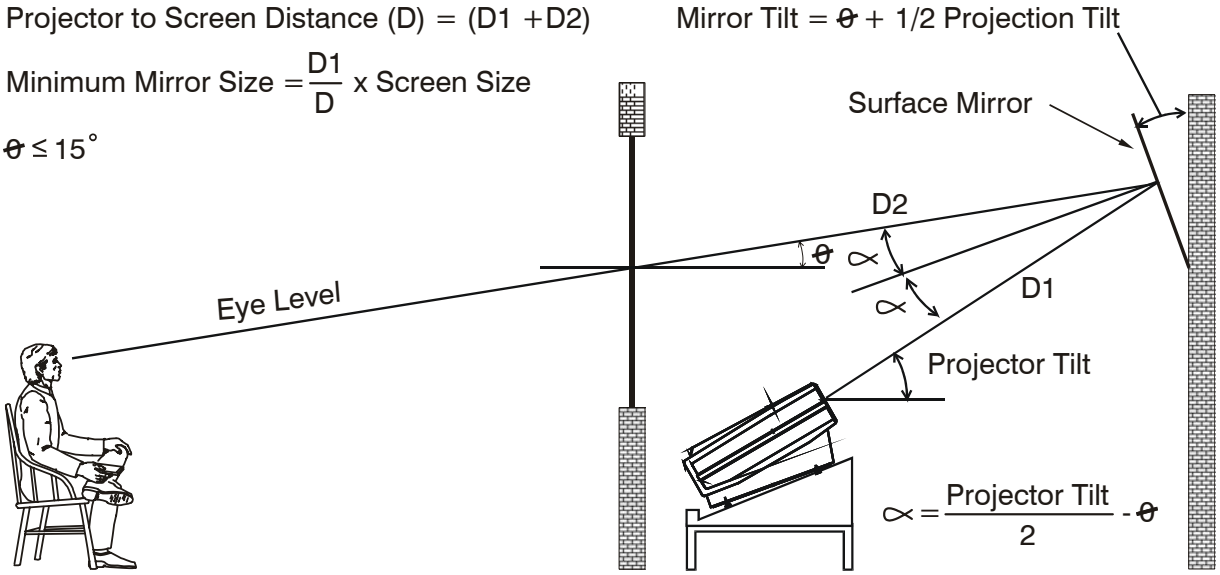


Figure 2-14. Folded Optics

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2.6 Power Connection

To apply power to the projector, plug the AC line cord into the line input socket located at the front panel of the projector. Plug the three prong end of the line cord in a grounded AC outlet. Input voltage to the projector must be between 90 and 264 VAC, 50 or 60 Hz. The power source must supply 650 watts of power to the projector.

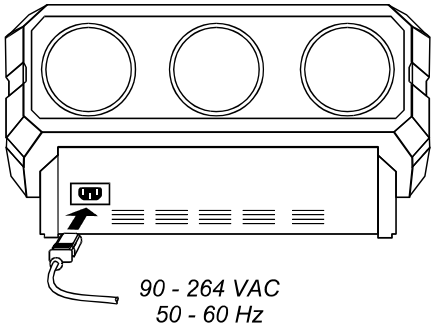


Figure 2-15. Power Connection

2.7 Source Connections

The projector includes a built-in RGB input interface for connection of external RGB sources and audio equipment. This input interface is shown in Figure 2-6. The built-in interface is not removable.

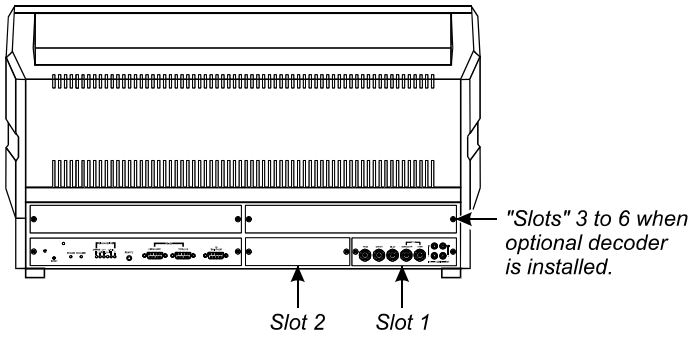


Figure 2-16. Projector Input Slots

Optional interface modules are available to accommodate other signal types. These include a Composite/S-Video Module, an HDTV Input Module, and a PC Analog Input Module. Any one of these can be installed in slot 2. A MARQUEE® Multi-Standard Decoder may be installed to add four additional inputs to the system ("slots" 3 to 6). To further increase the number of inputs, a signal switcher may be connected to the RGB interface in slot 1 to add 8 more sources to the system (9 switcher inputs replace one RGB input). Other switchers may be connected to the first switcher for more inputs. Brief descriptions of the above mentioned optional modules are given in Appendix E, Interfaces. For additional details, contact your reseller.

The two RGB interfaces provided allow connection of an RGB source having one of the following sync types: sync on green, composite sync, or separate H & V sync. To connect a source, connect the red, green, and blue outputs to the RED, GREEN, and BLUE inputs on the interface. If the source uses sync on green, no additional cables are required. If the source provides a composite sync output, connect it to the HOR/COMP input. If the source provides separate horizontal and vertical sync outputs, connect the horizontal sync signal to the HOR/COMP input, and connect the vertical sync input to the VERT input. Interconnection cables must be terminated with BNC connectors. Figure 2-17 show source connections for the built-in interface.

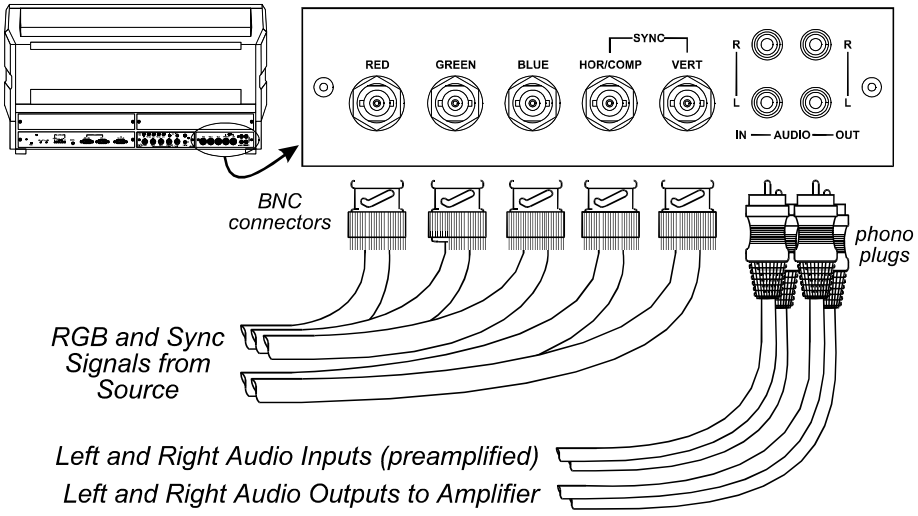


Figure 2-17. Built-in RGB Interface Connections

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To control audio levels in an audio/visual system, pre-amplified (line level) audio inputs are connected to the left and right channel audio inputs on the interfaces. Audio outputs from the built-in interface are then connected to external audio amplification equipment for sound output. All audio connection cables require standard RCA type phono plugs.

2.8 Serial Port Connections

Serial port connections are required when:

- Using a MARQUEE® signal switcher with the projector or
- The projector is to be controlled by a computer/controller.

The projector's serial ports are located on the back panel. See Figure 2-18.

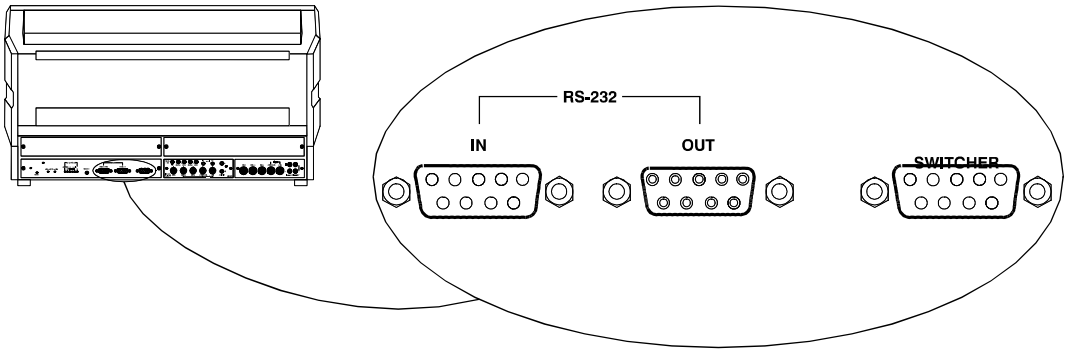


Figure 2-18. Serial Port Connections

If using the projector with a MARQUEE® signal switcher, connect an RS-232 serial communication cable between the switcher and the projector serial port labeled "SWITCHER". If the projector is to be controlled by a computer or controller which has an RS-232 serial port, connect an RS-232 serial cable between the computer and the projector serial port labeled "IN". After the connection is made, set the serial port baud rate as described in the Projector Setup entry in Section 3.7, Utility Features.

Note: All serial connections require a 9 pin D connector at the projector end. Refer to Appendix C for cable wiring requirements.

Note: For computer/controller control, PC software is required.

Note: The RS-232 serial port labeled "OUT" is provided for projector networking applications.

2.9 Optical Alignment

Optical alignment is required when the throw distance changes or the projector cannot be focused using the focus controls. The projector is optically aligned at the factory at a fixed screen size and a fixed projector-to-screen distance. See Appendices F and G for the specific details needed for your projector model and lens. If the throw distance has changed since the last setup, proceed as follows:

Note: The projector must be warmed up for at least 45 minutes prior to performing optical alignment.

Note: Optical alignment is both a mechanical and electrical adjustment. Electrical adjustments are stored in the current setup memory. After alignment is complete, setup memories which were previously set up (if any) must be set up again. Memory setup is explained in Section 2.11.

Note: Factory alignment is performed using the internal crosshatch with a 61.8 kHz signal applied.

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It is recommended that optical alignment be performed using the projector's Guided Mechanical Setup tutorial. This tutorial displays step-by-step instructions during the alignment. The instructions in this section require use of the Guided Mechanical Setup tutorial.

To access and use the Guided Mechanical Setup tutorial, turn on the projector [**POWER**] then press [**HELP**] at presentation level. The Help menu is displayed. Next press [**2**] to select Guided Mechanical Setup. The first page of the guide will be displayed on the projection screen. When using the guide, press [**HELP**] to display the next page, press [**RECALL**] to display the previous page. When complete, press [**EXIT**] to end Help.

HELP

```
Help

1. Guided Source Setup
2. Guided Mechanical Setup
3. Source Selection Guide
4. Keypad Guide
5. -
6. Using Help

For all menus:
Press a number or use △ ▽
then <ENTER> to select item.
<HELP> for assistance
<RECALL> to go back one level
<EXIT> to return to picture
```

Step 1. If you have not already done so, calculate the throw distance and set the projector position as explained in Section 2.5, Mounting and Appendix B. Turn power off before moving the projector.

Step 2. Locate the front top cover of the projector. See Figure 2-19. Next, position your hands above the red and blue lenses then grasp the cover. Gently lift it until it is released from its securing latch. Slide the cover away from the projector as shown in Figure 2-19 below.

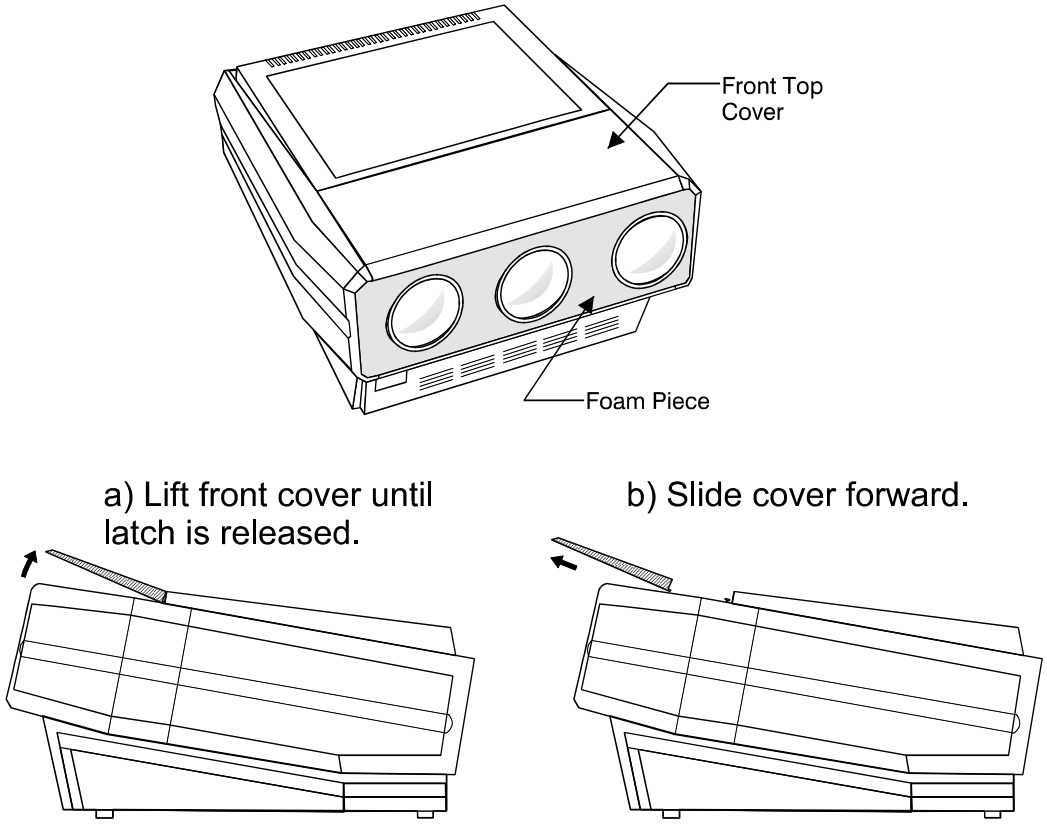


Figure 2-19. Front Top Cover Location and Removal

Also remove the black decorative foam piece at the front of the lenses (removal is optional). Remove the large Allen head driver from the tool kit provided with the projector. The driver is used for lens alignment.

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Examine the lenses and hardware as shown in Figure 2-20(or, for the 8500/8520 model, see Figure 2-21). Each lens consists of a rear section and a front section. The rear section sets the optical focus at the center of the image and is secured to the lens body by a wing nut at the top rear of the lens assembly. The front section sets the focus at the corners and is secured to the front section by a wing nut at the top front of the lens assembly.

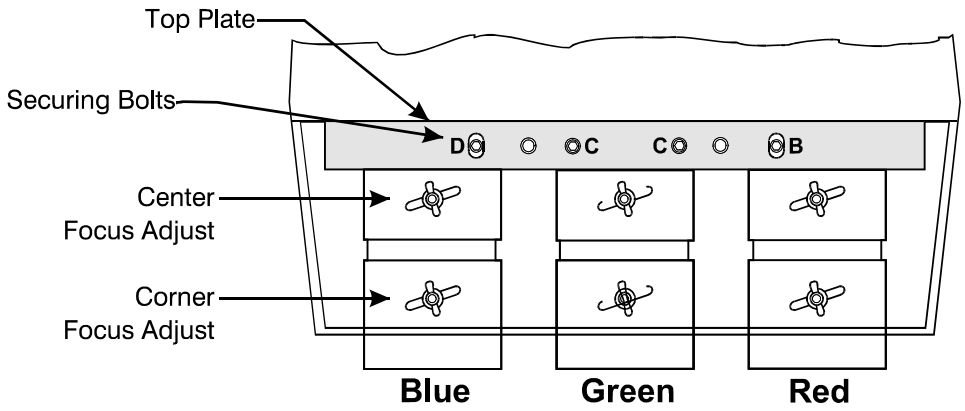


Figure 2-20. 8500LC/9500LC Lens Assemblies - Top View

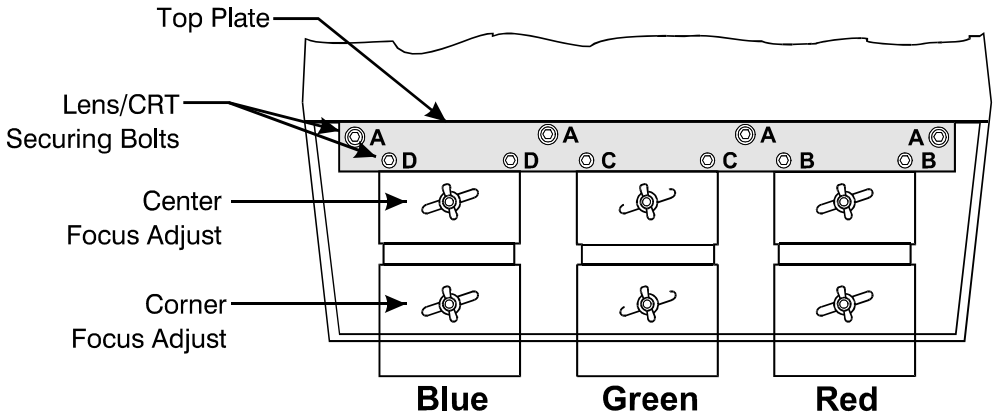
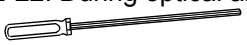
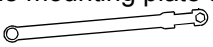


Figure 2-21. 8500/8520 Lens Assemblies - Top View

For the 8500LC/9500LC: The lenses are secured to the projector frame by a top plate and individual mounting plates as shown in Figure 2-21 and Figure 2-22. During optical alignment, adjust the top plate securing bolts using the ball nose screw driver () supplied with the projector. Adjust the mounting plate securing bolts using either the ball nose screwdriver or the projector wrench () supplied, as necessary. The securing bolts are labeled B-C-D.

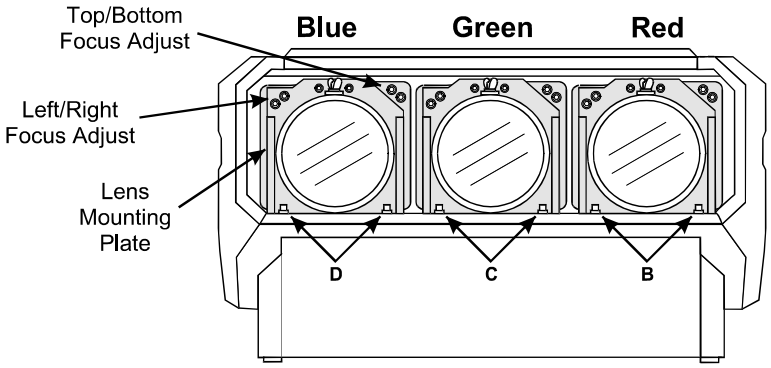


Figure 2-22. 8500LC/9500LC Lens Assemblies - Front View

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For the 8500/8520: The lenses are secured to the projector frame by a top plate as shown. During optical alignment, adjust the securing bolts as instructed--refer to Figure 2-21and Figure 2-22 . The securing bolts are labeled A-B-C-D.

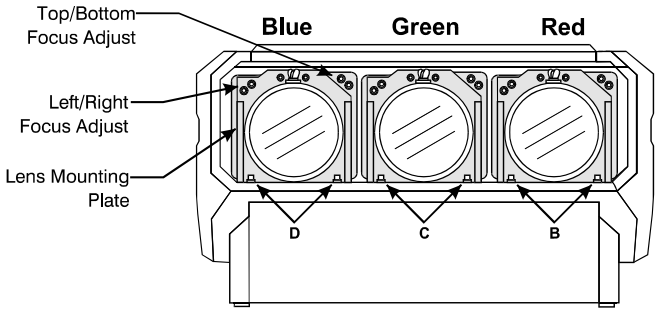


Figure 2-23. 8500LC/9500LC Lens Assemblies – Top View

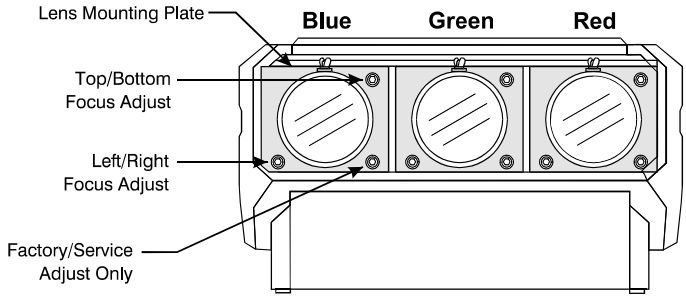


Figure 2-24. 8500/8520 Lens Assemblies - Front View

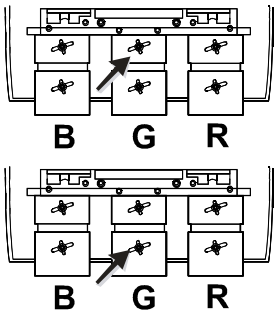
For the 8500LC/9500LC, each CRT is attached to its lens by socket head Allen screws located at each lens mounting plate. For each lens, the upper left screws (when facing the lens) adjust the focus between the left and right sides of the picture and the upper right screws adjust the focus between the top and bottom of the picture. Use the supplied ball nose screw driver for these adjustments.

For the 8500/8520, each CRT is attached to its lens by 3 socket head Allen screws located at each lens mounting plate. For each lens, the upper right screw (when facing the lens) adjusts the focus between the top and bottom of the picture, and the lower left screw adjusts the focus between the left and right sides of the picture. See Figure 2-24.

Step 3. Loosen the rear wing nut on the green lens. Rotate the lens using the wing nut until the picture is focused in the center. Tighten the rear wing nut.

Step 4. Loosen the front wing nut on the green lens. Rotate the front lens barrel until the picture is focused in the corners. Tighten the front wing nut.

Step 5. Steps 6 to 8 require that you look directly into the lenses for adjustment. Before you continue, press [▼] to reduce contrast to a low level (less than 10%).



! WARNING: DO NOT LOOK INTO THE LENSES IF CONTRAST IS SET TO NORMAL VIEWING LEVEL.

Step 6. Look directly into the red lens. Press [▲], [▼], [◄] or [►] to center the displayed crosshatch on the face of the picture tube.

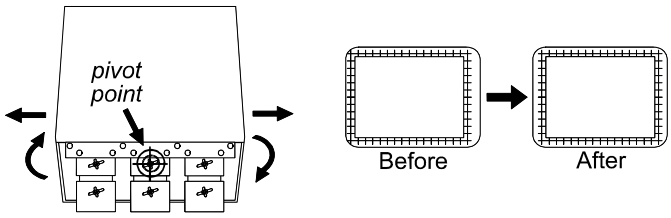
Step 7. Look directly into the green lens. Press [▲], [▼], [◄] or [►] to center the displayed crosshatch on the face of the picture tube.

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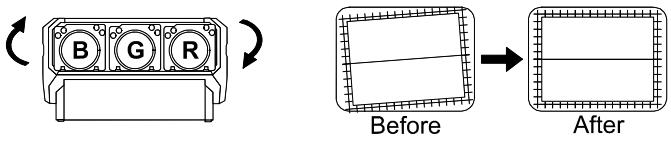
Step 8. Look directly into the blue lens. Press [▲], [▼], [◄] or [►] to center the displayed crosshatch on the face of the picture tube.

Step 9. Press [▲] to increase contrast to a normal viewing level.

Step 10. Pivot the projector and move it side to side as necessary to display a symmetrical crosshatch centered left-to-right on the screen. The pivot point should be at the rear wing nut of the green lens to avoid changing the throw distance.



Step 11. Tilt the projector until the center horizontal line is level and centered with the screen. Adjust the feet of the projector or ceiling mount as required.

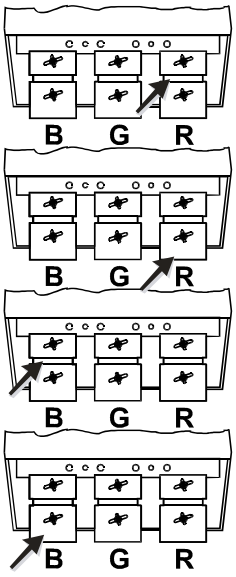


Step 12. A red image is displayed. Loosen the rear wing nut on the red lens. Rotate the lens using the wing nut until the picture is focused in the center. Tighten the rear wing nut.

Step 13. Loosen the front wing nut on the red lens. Rotate the front lens barrel until the picture is focused in the corners. Tighten the front wing nut.

Step 14. A blue image is displayed. Loosen the rear wing nut on the blue lens. Rotate the lens using the wing nut until the picture is focused in the center. Tighten the rear wing nut.

Step 15. Loosen the front wing nut on the blue lens. Rotate the front lens barrel until the picture is focused in the corners. Tighten the front wing nut.

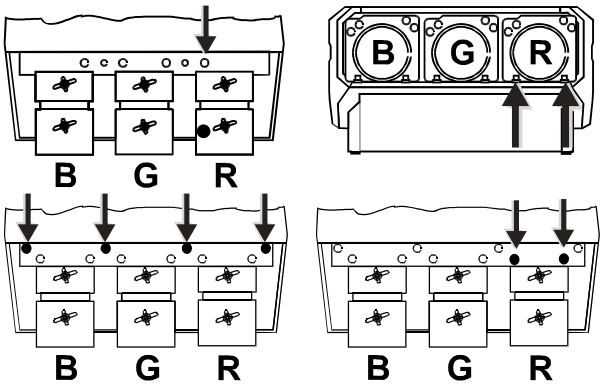


Step 16. Press [▲] or [▼] to adjust for best electrical focus at the center of the picture.

Step 17. On the 8500LC/9500LC, loosen the three bolts labeled "B". One is located on the top plate. The other two are below the red lens.

⇒ On the 8500/8520, loosen the four bolts labeled "A".

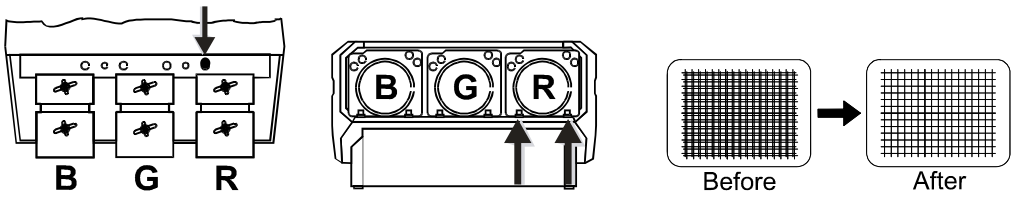
⇒ Loosen the two bolts labeled "B".



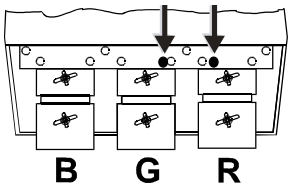
Step 18. A red and green crosshatch is displayed. Move the red lens so that the left and right edges of the red crosshatch match the green.

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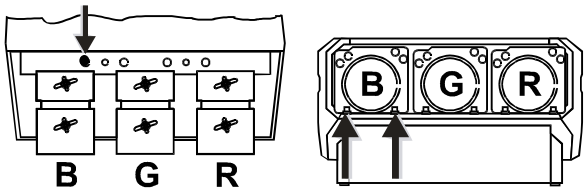
Step 19. On the 8500LC/9500LC, tighten the three bolts labeled "B".



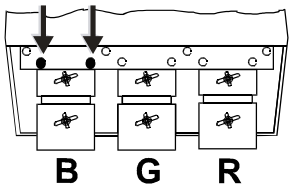
Step 20. On the 8500/8520, tighten the two bolts labeled "B".



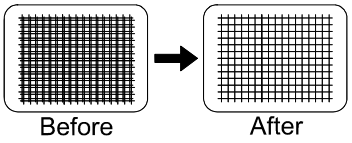
Step 21. On the 8500LC/9500LC, loosen the three bolts labeled "D". One is located on the top plate. The other two are below the blue lens.



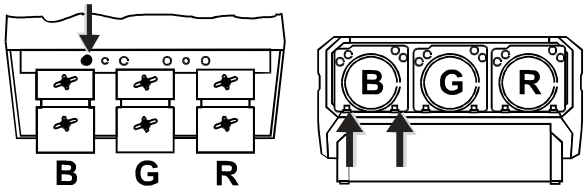
⇒ On the 8500/8520, loosen the two bolts labeled "D".



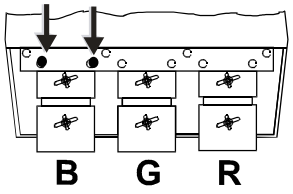
Step 22. A blue and green crosshatch is displayed. Move the blue lens so that the left and right edges of the blue crosshatch match the green.



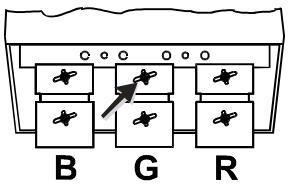
Step 23. On the 8500LC/9500LC, tighten the three bolts labeled "D".



⇒ On the 8500/8520, tighten the two bolts labeled "D".

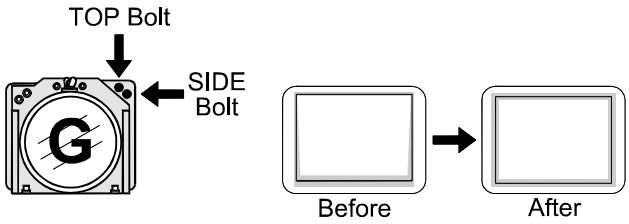


Step 24. A green image is displayed. Loosen the rear wing nut on the green lens and slightly defocus the center of the picture.

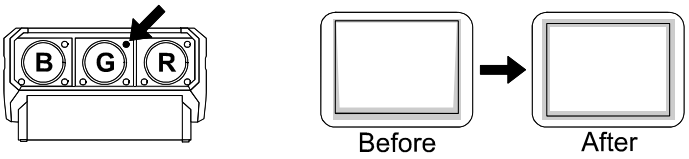


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Step 25. On the 8500LC/9500LC, locate the two adjustment bolts at the upper right corner of the green lens mounting plate (viewed from the front). Adjust the two bolts until the top and bottom areas of the picture are equally defocused. Use the following technique for the adjustment: Turn the SIDE bolt 1/8 turn CCW. Turn the TOP bolt about 1/8 turn CW until it stops. If defocus at the top and bottom are equalizing, repeat until equal. If the top and bottom are not becoming equally defocused, use the same technique but instead turn the TOP bolt CCW then turn the SIDE bolt CW until it stops. Repeat until defocus is equal.



⇒ On the 8500/8520, adjust the large Allen head bolt located at the upper right corner of the green lens mounting plate. Turn the bolt head until the top and bottom areas of the picture are equally defocused.



! On all models, it may be necessary to readjust the lens' rear wing nut to keep the center defocused.

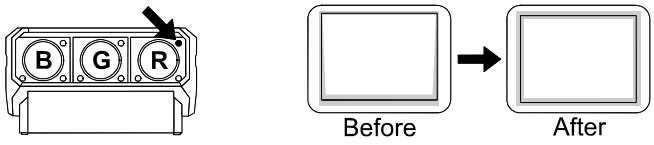
Step 26. Rotate the green lens using the rear wing nut until the picture is focused in the center. Tighten the rear wing nut. If necessary, loosen the front wing nut, rotate the front lens barrel to readjust the focus in the corners, and then re-tighten the wing nut.

Step 27. A red image is displayed. Loosen the rear wing nut on the red lens and slightly defocus the center of the picture.

Step 28. On the "LC" models, locate the two adjustment bolts at the upper right corner of the red lens mounting plate (viewed from the front).

Adjust the two bolts until the top and bottom areas of the picture are equally defocused. Use the same technique as that used for the green adjustment (Step 25).

On the 8500/8520, adjust the large Allen head bolt located at the upper right corner of the red lens mounting plate. Turn the bolt head until the top and bottom areas of the picture are equally defocused.

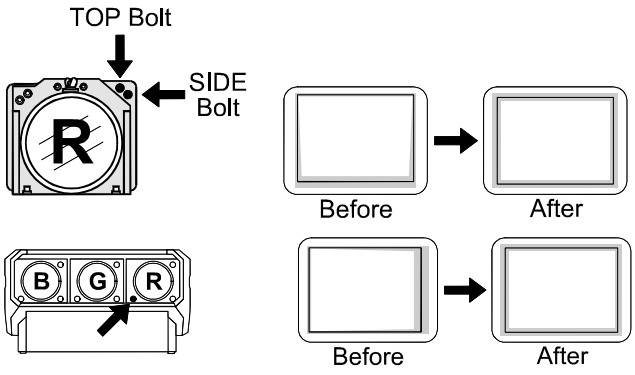


! On all models, it may be necessary to readjust the lens' rear wing nut to keep the center defocused

Step 29. On the 8500LC/9500LC, locate the two adjustment bolts at the upper left corner of the red lens mounting plate (viewed from the front).

Adjust the two bolts until the left and right areas of the picture are equally defocused. Use the same technique as that used for the previous adjustment (Step 28).

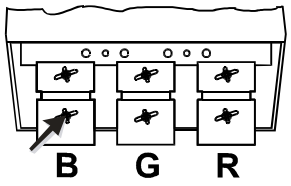
On the 8500/8520, adjust the large Allen head bolt located at the lower left corner of the red lens mounting plate. Turn the bolt head until the left and right sides of the picture are equally defocused.



! On all models, it may be necessary to readjust the lens' rear wing nut to keep the center defocused.

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Step 30. Rotate the red lens using the rear wing nut until the picture is focused in the center. Tighten the rear wing nut. If necessary, loosen the front wing nut, rotate the front lens barrel to readjust the focus in the corners, and then re-tighten the wing nut.

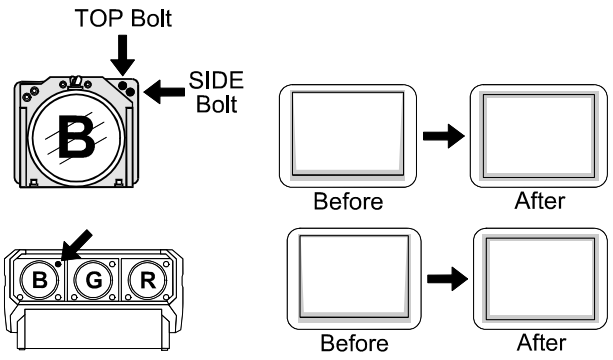


Step 31. A blue image is displayed. Loosen the rear wing nut on the blue lens and slightly defocus the center of the picture.

Step 32. On the 8500LC/9500LC, locate the two adjustment bolts at the upper right corner of the blue lens mounting plate (viewed from the front).

Adjust the two bolts until the top and bottom areas of the picture are equally defocused. Use the same technique as that used for the green and red adjustments.

On the 8500/8520, adjust the large Allen head bolt located at the upper right corner of the blue lens mounting plate. Turn the bolt head until the top and bottom sides of the picture are equally defocused.

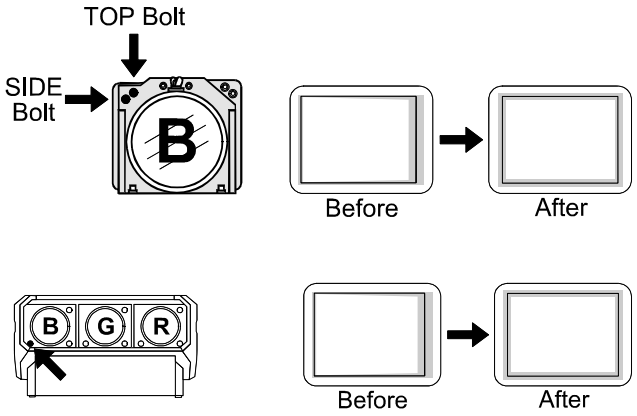


! On all models, it may be necessary to readjust the lens' rear wing nut to keep the center defocused.

Step 33. On the 8500LC/9500LC, locate the two adjustment bolts at the upper left corner of the blue lens mounting plate (viewed from the front).

Adjust the two bolts until the left and right areas of the picture are equally defocused. Use the same technique as that used for the previous adjustment (step 31).

On the 8500/8520, adjust the large Allen head bolt located at the lower left corner of the blue lens mounting plate. Turn the bolt head until the left and right sides of the picture are equally defocused.

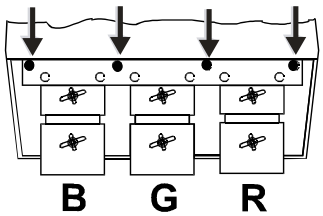


! On all models, it may be necessary to readjust the lens' rear wing nut to keep the center defocused.

Step 34. Rotate the blue lens using the rear wing nut until the picture is focused in the center. Tighten the rear wing nut. If necessary, loosen the front wing nut, rotate the front lens barrel to readjust the focus in the corners, and then re-tighten the wing nut. See Step 16.

Step 35. For the 8500LC/9500LC, optical alignment is now complete. If you had removed the foam insert, reinstall it now. Install the front top cover. Proceed to set up each source by following the source setup procedure in Section 2.10, Source Setup.

On the 8500/8520, tighten the bolts labeled "A". Optical alignment is now complete. If you had removed the foam insert, reinstall it now. Install the front top cover. Proceed to set up each source by following the source setup procedure in Section 2.10, Source Setup.



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2.10 Source Setup

This section gives step-by-step instructions for quick setup of the projector for a selected external source. For a complete setup, repeat these steps as required for each source connected to the projector.

HELP

Help

```
1. Guided Source Setup
2. Guided Mechanical Setup
3. Source Selection Guide
4. Keypad Guide
5. -
6. Using Help

For all menus:
Press a number or use ▲ ▼
then <ENTER> to select item.
<HELP> for assistance
<RECALL> to go back one level
<EXIT> to return to picture
```

Before starting, ensure that the projector is optically and mechanically aligned. If optical alignment is required, follow the setup instructions in Section 2.9, Optical Alignment. Select the source to be set up using the Source command, and make sure it is visible on the projection screen.

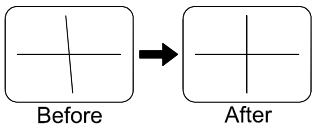
To make setup easier, it is recommended that you use the projector's Guided Source Setup tutorial. It provides source setup instructions on screen to guide you through the adjustments. To access the tutorial, first press [**HELP**] at presentation level. The Help menu is displayed. Next press [**1**] to select Guided Source Setup. The first page of the guide will be displayed on the projection screen. When using the guide, press [**HELP**] to display the next page, press [**RECALL**] to display the previous page. When complete, press [**EXIT**].

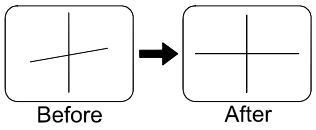
Step 1. Press [BRITE] then [▲] or [▼] to increase or decrease the brightness setting until black areas in the image just disappear.

Step 2. Press [CONT] then [▲] or [▼] to adjust the contrast of the image to a suitable level.

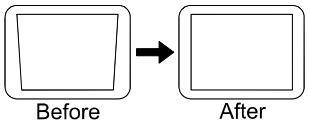
Step 3. Press [▲] or [▼] to adjust electrical focus for best overall sharpness.

Step 4. Press [▲] or [▼] to adjust skew until the vertical line through the center of the image is not tilted (perpendicular to the horizontal line). Press [◄] or [►] until the center horizontal line is perpendicular to the vertical.

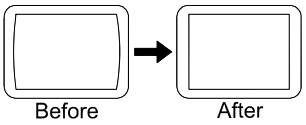




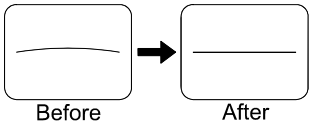
Step 5. Press [◄] or [►] to adjust keystone until the width at the top of the picture is equal to the width at the bottom.

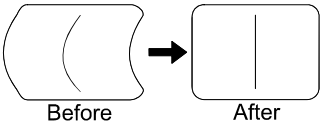


Step 6. Press [◄] or [►] to adjust side pincushion until the left and right sides of the picture are straight and not curved.



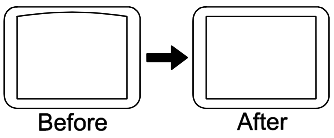
Step 7. Press [▲] or [▼] to adjust vertical bow until the horizontal line at the middle of the picture is straight. Press [◄] or [►] to adjust horizontal bow so that the vertical line at the middle of the picture is straight.

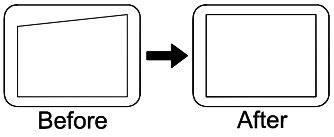




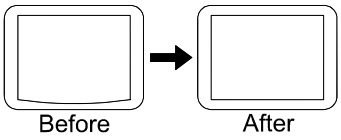
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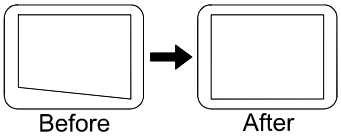
Step 8. Press [▲] or [▼] to adjust top pincushion until the horizontal line at the top of the picture is straight and not curved. Press [◄] or [►] to adjust top keystone so that the top edge is level.





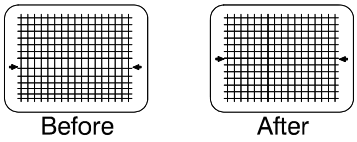
Step 9. Press [▲] or [▼] to adjust bottom pincushion until the horizontal line at the bottom of the picture is straight and not curved. Press [◄] or [►] to adjust bottom keystone so that the bottom edge is level.

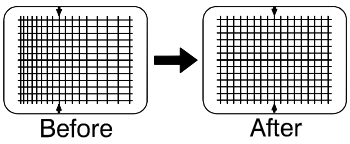




Step 10. Adjust C linearity as follows:

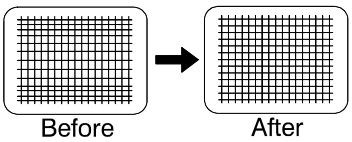
- Press [▲] or [▼] until the horizontal line through the center of the crosshatch is equally distant from the lines at the very top and bottom.
- Press [◄] or [►] until the center of the crosshatch is equally distant from the vertical lines at the left and right edges.

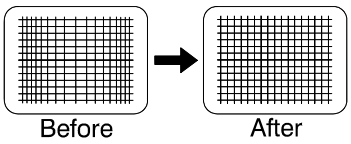




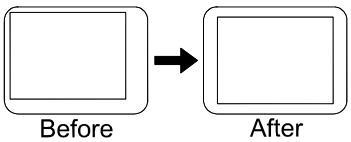
Step 11. Adjust S linearity as follows:

- Press [▲] or [▼] until the height of each crosshatch square is equal from the top to the bottom.
- Press [◄] or [►] until the width of each crosshatch square is equal from the left to the right.

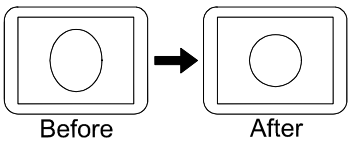




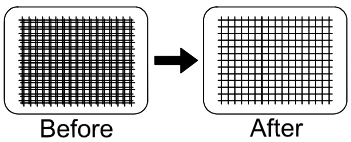
Step 12. The source connected to the currently selected input should now be visible. If there is no picture, check to see if the source is active. Press [▲] or [▼], [◄] or [►] to adjust phase until the picture is centered on the screen.



Step 13. Press [▲] or [▼], [◄] or [►] to adjust the size of the picture. Ensure that objects in your picture have the correct shape. For example, if there is a circle in your picture, size should be adjusted until the circle is round, not oval.



Step 14. The final step is convergence. If the projector includes the ACON option, press [**EXIT**] [**CONV**] [**4**] to exit the guide and allow ACON to converge the system. Otherwise, press [**EXIT** [**CONV**] [**1**] to enter Guided Convergence.



Reminder: ***Remember that all of the adjustments above should be repeated for other sources in the system.***

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2.11 Memory Setup

This section explains how to set up projector memories to improve the performance of the projector's ASI and ASR features. If you are not familiar with setup memories, read Section 3, Operation, prior to memory setup; in particular, read Section **Error! Reference source not found.**, **Error! Reference source not found.** and the ASI with Save and Turn ASR On/Off entries in Section 3.7, Utility Features. If the projector's setup memories are properly set up, the projector will be easier to use and operate.

Note: Memory setup should be performed when the projector is in its final operating position. If the physical position of the projector changes, memory setup must be repeated.

Here is a brief summary of the setup memory, ASR, and ASI discussions in Section 2.

2.11.1 About Setup Memories

The projector has 80 setup memories for storing display settings of different sources. Multiple setup memories are required since display settings usually vary amongst sources. There are two types of setup memories: Input and Recall. Both memory types store the same parameters. The only difference is that Input memories store display settings for a particular physical input (e.g., switcher 0, slot 1) while Recall memories can be used with any input.

At any one time, one setup memory is the current setup memory. The display settings in the current setup memory are used for the current display. When a source is selected by entering its input number, the Input memory for the selected input becomes the current setup memory*. If a Recall memory is selected, it becomes the current setup memory*. Display adjustments are automatically saved in the setup memory which is current at the time of adjustment (unless the setup memory is locked).

Note: If the ASR feature (explained below) is turned on during setup memory selection, the selected memory may not be the current setup memory.

To display the Recall memories stored in the projector, press [**UTIL**] [**3**]. Press [**UTIL**] [**4**] to display the Input memories. (Unused setup memories are not displayed).

2.11.2 About ASI and ASR

ASI (Automatic Source Interpolation) is a feature which automatically adjusts display settings based on the settings of other setup memories stored in the projector. When a setup memory is first created, ASI automatically generates its initial display settings. These settings will be created by copying another setup memory or by interpolating multiple setup memories.

ASI is activated when:

- A new setup memory is created.
- An ASR is performed and its logic has activated an ASI.
- An "ASI with Save" is specified by the user (see Section 3.7).

ASR (Automatic Source Recall) is a feature which, when turned on for a given input, provides automatic Recall memory selection or ASI adjustment. ASR processing can activate when: 1) a change in scan frequencies is detected at the input, 2) an input is selected, 3) a Recall memory is selected, or 4) a channel is selected. This feature is primarily intended for use when many different sources must share the same input (via a third party switcher, for example) or when a signal source can output several different scan frequencies (e.g., a SVGA card). When a source switch is made, the projector may automatically select a Recall memory with matching scan frequencies or create the display settings based on the settings in other setup memories.

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2.11.3 Input Memory Setup

Follow these steps to prepare an Input memory for a source.

Note: To assure proper setup of an existing Input memory, ASR must be off (default) for the memory.

Step 1. Connect the source to the input to be set up, and then select the input using the Source command. For example, if the source is connected to slot 1 of the projector, press [**SOURCE**] [**0**] [**1**]. If the Input memory did not previously exist, it will be created automatically.

Step 2. The source should be displayed on the projection screen. If much adjustment is required, press [**UTIL**] [**1**] [**2**] to perform an ASI with Save. The display appearance may improve based on the settings stored in other setup memories. (If the Input memory is new, ASI with Save will have automatically been performed when the input was selected.)

Step 3. Make display adjustments as required. Adjustment changes will automatically be saved in the Input Memory.

2.11.4 Recall Memory Setup

Follow these steps to prepare a Recall memory.

Step 1. Select the input connected to the source. For example, if the source is connected to switcher 1, slot 5, press [SOURCE] [1] [5]. The source should be displayed on the projection screen.

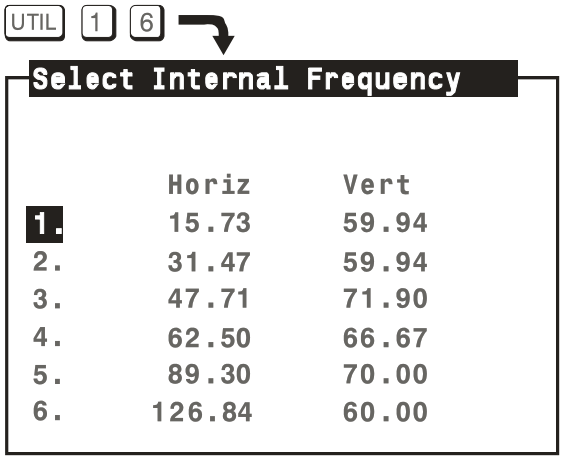
Step 2. To assure proper setup of a Recall memory, ASR must be off (default) for the current input.

Step 3. Select a Recall memory as the current setup memory. For example, to make Recall memory 03 the current setup memory, press [RECALL] [0] [3]. If the Recall memory did not previously exist, it will be created automatically.

Step 4. If much adjustment is required, press [UTIL] [1] [2] to perform an "ASI with Save". (If the Recall memory is new, ASI with Save will have already been performed when the memory was

Step 5. Make display adjustments as required. Adjustment changes will automatically be saved in the Recall memory.

2.11.5 ASI Improvement



If the projector will be used with many sources, or new sources will be frequently added to the system, it is recommended that five or six setup memories be created expressly for the purpose of improving ASI accuracy. ASI accuracy improves as more setup memories are created and stored, and the variations amongst horizontal and vertical scan frequencies increases. For example, if you always use the same input and you never use Recall memories (thus only one setup memory has ever been created), ASI will not be effective. However, if many Input and Recall memories have been used and adjusted for a variety of sources, the projector has more "knowledge" in its database for performing an ASI. As this "knowledge" increases, ASI accuracy improves.

An easy way to add setup memories at various scan frequencies is to use the projector's internal frequency generator. The internal frequency generator can display a test pattern using the scan frequencies you select. When display adjustments are made, the display settings are stored in the current setup memory. Prepare a Recall memory using the generator as follows:

Step 1. Select a Recall memory to be the current setup memory. For example, to make Recall memory 90 the current setup memory, press [**RECALL**] [**9**] [**0**]. (Recall memory numbers may be any number from 01 to 99). If the selected Recall memory did not previously exist, it will be created automatically.

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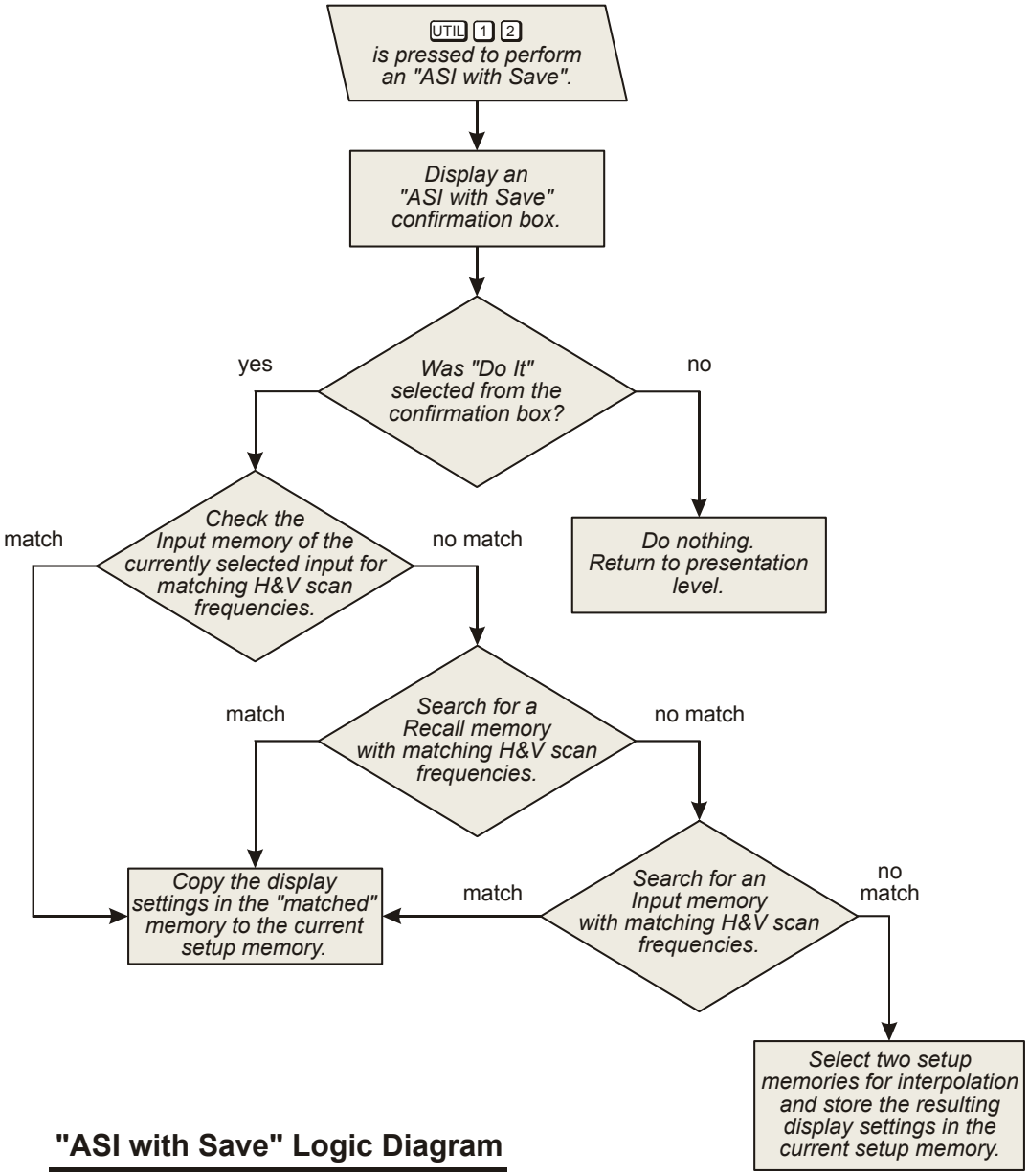
Step 2. Press [**UTIL**] [**1**] [**6**] to access the Internal Frequency Selection menu. Items one to six contain preset scan frequencies covering the scan range of the projector. It is recommended that Recall memories be created for each. To make a selection, enter an item number or use [▲] and [▼] to move the cursor bar to the item you want, then press [**ENTER**].

It is recommended that Recall memories for the two extreme frequencies be set up first (Step 1 and 4). When other Recall memories are created, their initial display settings will be based on the settings already stored in memory.

Step 3. At this point, a test pattern is displayed. Make display adjustments as required. All display settings will be stored in the Recall memory. To create another Recall memory, repeat the above steps. To return to the external source, press [**EXIT**] while only the test pattern is displayed.

(*You may notice that as new Recall memories are created, fewer display adjustments are required. This is because ASI is using other setup memories to create the initial settings of the new memories.)*

2.11.5.1 *ASI with Save Logic Diagram*



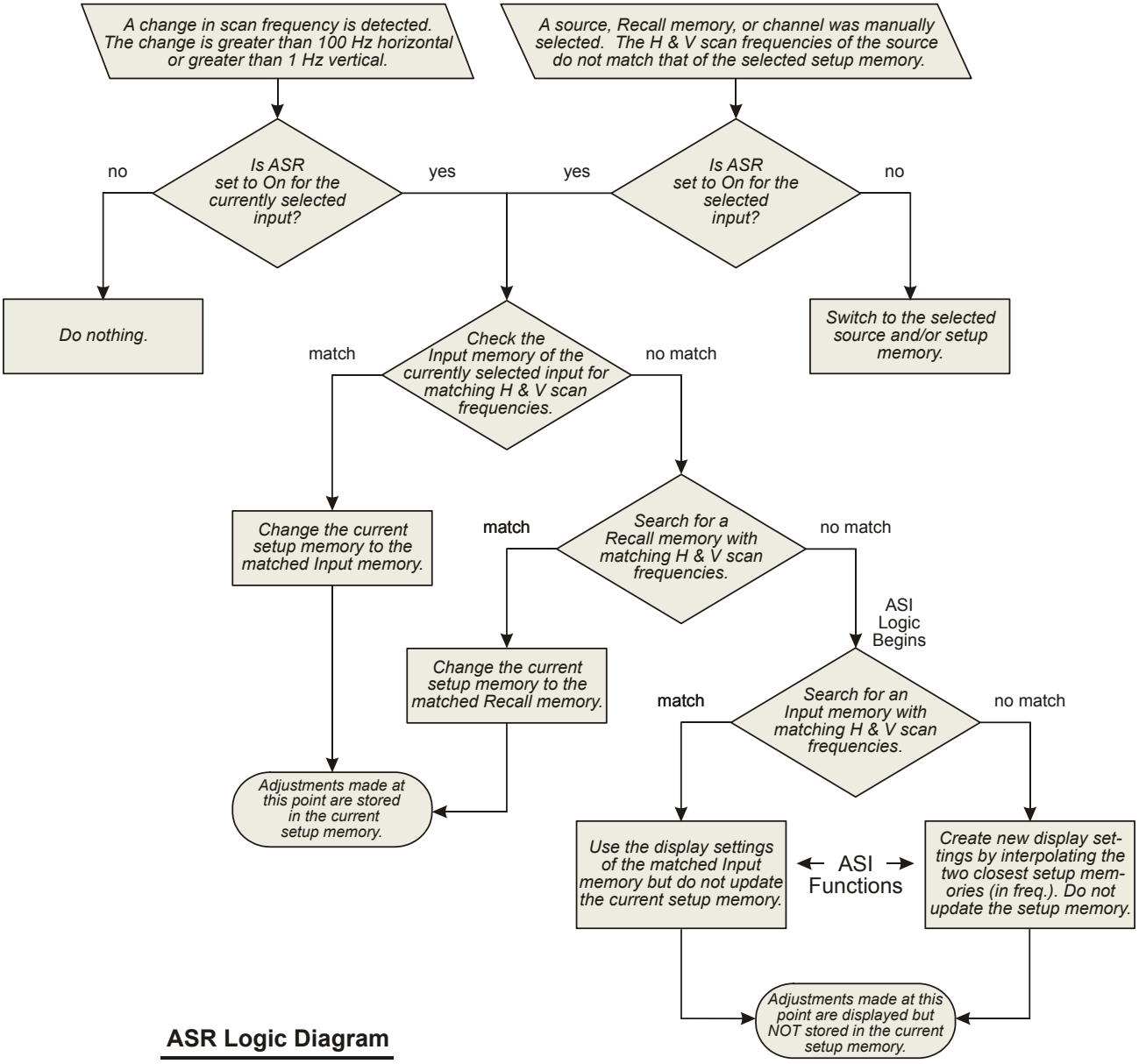
"ASI with Save" Logic Diagram

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2.11.6 ASR Setup

This subsection provides two examples of how the ASR feature may by used and set up.

2.11.6.1 *ASR Logic Diagram*



ASR Logic Diagram

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2.11.6.2 *ASR Example #1*

Refer to the system illustrated in Figure 2-25. A computer is connected to slot 1 of the projector as shown. The graphics adapter in the computer can operate at different frequency modes to accommodate various software applications. The ASR feature may be used until when the frequency mode of the computer changes, the projector setup also changes to match that of the new mode.

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OPERATING MODES

MODE	TYPE	FREQ. (H)	RECALL#
1	Text	31.5kHz	01
2	Graphics	35.6kHz	02
3	Graphics	64.0kHz	03
4	Graphics	110.0kHz	04

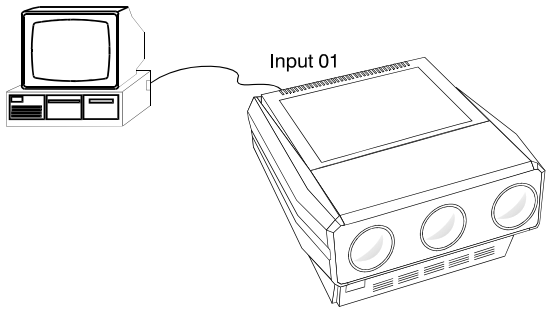


Figure 2-25. ASR System Example #1

To prepare setup memories for the above system, follow these steps:

Step 1. Select the input using the Source command. Press [**SOURCE**] [**0**] [**1**] to select projector slot 1.

Step 2. Press [✶] twice to display the Current Input Parameters status page. Check to see if ASR is off for the current input. If it is on, press [**UTIL**] [**1**] [**b**] to turn ASR off for the input. (It is usually easier to prepare setup memories when ASR is turned off.)

Step 3. At the computer, switch to an application which uses one of the graphics adapter operating modes. Select an unused Recall memory as the current setup memory. For example, to make Recall memory 01 the current setup memory, press [**RECALL**] [**0**] [**1**]. Make display adjustments as required. The display settings for the current graphics mode will be stored in the Recall memory. Repeat this step for the remaining graphics adapter operating modes, storing adjustments for them in Recall memories 02, 03 and 04. It is recommended that the two extreme frequencies be set up first.

Step 4. Press [**SOURCE**] [**0**] [**1**] to make Input memory 01 the current setup memory then press [**UTIL**] [**1**] [**5**] to display the Clear Setup dialog box. Move the cursor to "Do It" then press [**ENTER**] to clear the display and frequency settings of the input. Now Input memory 01 will not be used during an ASR search.

Step 5. Press [**UTIL**] [**1**] [**3**] to lock Input memory 01 to prevent display or frequency changes to the Input memory.

Step 6. Press [**UTIL**] [**1**] [**4**] to turn ASR on for the input. Now, each time the computer's graphics adapter switches operating modes, the projector will automatically adjust its display settings to suit the new mode.

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2.11.6.3 *ASR Example #2*

Refer to the system illustrated in Figure 2-26. Six different sources are connected to a third party (non-Reseller) signal switcher. Unlike the MARQUEE® signal switcher, this third party switcher is not controlled by the keypad. Under normal circumstances, the projector is not aware of source switches made by the switcher. However, if ASR is turned on for the input, and a Recall memory has been set up for each source device, the projector will detect the external source switch and automatically select the appropriate Recall memory. Even if Recall memories have not been set up but ASR is on, ASR will try to adjust the display settings based on the settings of other Input or Recall memories.

To prepare setup memories for this system, follow these steps:

Step 1. Connect the output of the signal switcher to a projector input or a MARQUEE® signal switcher input. Select the input using the Source command. For this example, press [**SOURCE**] [**0**] [**1**] to select projector slot 1.

Step 2. Press [✶] twice to display the Current Input Parameters status page. Check to see if ASR is off for the current input. If it is on, press [**EXIT**] then press [**UTIL**] [**1**] [**4**] to turn ASR off for the input.

Step 3. At the switcher, switch in one of the source devices. Select an unused Recall memory as the current setup memory. For example, to make Recall memory 01 the current setup memory, press [**RECALL**] [**0**] [**1**]. Make display adjustments as required. The display settings for the selected device will be stored in the Recall memory. Repeat this step for the remaining devices.

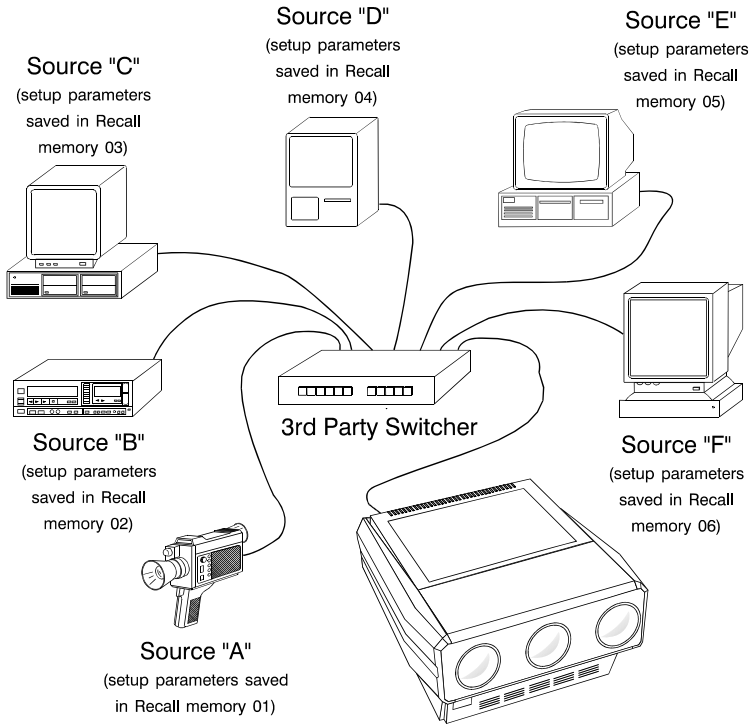


Figure 2-26. ASR System Example #2

Step 4. Press [**UTIL**] [**1**] [**5**] to display the Clear Setup dialog box. Move the cursor to "Do It" then press [**ENTER**] to clear the display settings and frequency settings of the input. By doing this, Input memory 01 will not be used during an ASR search.

Step 5. Press [**UTIL**] [**1**] [**3**] to lock Input memory 01 to prevent display or frequency changes to the Input memory.

Step 6. Press [**UTIL**] [**1**] [**4**] to turn ASR on for the input. The projector's display settings will automatically adjust to match the source selected by the switcher.

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Section 3

OPERATION

3.1 Overview

This section explains how to operate the projector once it has been installed and is ready for use. If you have not yet set up the projector, refer to Section 2, Installation and Setup.

Before using the projector for the first time, it is recommended that you read through this section of the manual. Although the projector is easy to use, there are many advanced features which allow you to enhance performance and operation. By understanding these features, and how to use them, you will soon be able to take full advantage of the projector's extensive capabilities.

Organization of this section is as follows:

3.1 Overview
3.3 Source Selection
3.3 Setup Memories
3.5 Display Adjustments
3.6 Convergence Registration
3.7 Utility Features
3.8 Multi-projector Functions

3.1.1 Projector Basics

Notice that the projector has no knobs or moving parts to make adjustments or change control settings. This is because all user adjustments are digitally controlled via the projector's keypad. Adjustment settings are retained in the projector's internal memory, even when the projector is unplugged.

3.1.2 Keypads

Four types of keypads may be used with the projector: built-in, IR remote, wired remote, and Presenter's. The projector includes a multi-use, full function, backlit keypad which is factory configured for use as a built-in keypad. It can easily be reconfigured for use as an IR remote keypad or a wired remote keypad. Use the keypad type which is most appropriate for your application. Refer to Appendix A for additional information on the keypad and menu system.

Note: For information on how to reconfigure the keypad, refer to Section 2.3, Hardware Setup.

Note: To convert the keypad to a wired remote keypad, an optional accessory cable (#03-001106-02P) is required.

Note: Additional keypads are available from your reseller and VDCDS.

3.1.3 Built-in Keypad

When the keypad is configured for built-in use (factory default), it is connected to the projector by a 3 foot extension cable, located below the front top cover. This configuration is intended for initial setup of the projector and applications where it is desirable to keep the keypad with the projector.

The keypad can be accessed as follows:

Locate the front top cover of the projector. Position your hands above the red and blue lenses then grasp the cover. Lift the cover until the keypad is exposed. Slide the cover away from the projector. The keypad is mounted to a securing bracket located above the lens assemblies as shown in Figure 3-1.

The built-in keypad can slide out of it securing bracket but it is recommended that it remain in place for use. When finished using the keypad, position the front top cover back in place.

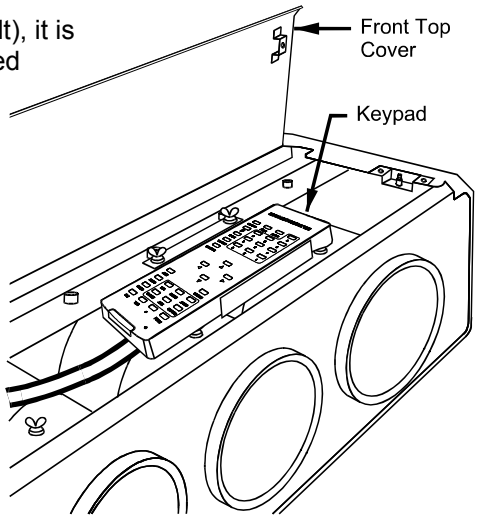


Figure 3-1. Built-in Keypad Access

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3.2 IR Remote Keypad

When the keypad is configured for IR remote operation, you can control the projector from a distance without a wired connection to the projector. The keypad includes a battery powered infrared (IR) transmitter.

3.2.1 Wired Remote Keypad

When the keypad is configured as a wired remote keypad, you can control the projector from a distance by way of a 25 ft extension cable (accessory cable required). Wired remote keypad operation is recommended when:

- The location of the keypad with respect to the projector or screen is inadequate for IR remote keypad operation.
- the projector is in a lighting environment which is unsuitable for IR remote keypad operation, or
- there are multiple projectors in the same room and you want each projector to be controlled by its own remote keypad

3.2.2 Presenter's Keypad (optional)

The Presenter's Keypad is similar to the IR remote keypad (above) except that it is not a full function keypad; it contains only frequently used keys. Presenters may find this keypad is easier to use than a full function keypad. For more information about the Presenter's Keypad, call your reseller or VDCDS.

Figure 3-2 shows the projector functions which are accessible from the multi-use (full function) keypad. As you may notice from the illustration, some keys provide direct access to specific functions (such as [**POWER**] to turn the projector on or off), and some keys provide indirect function access via menus. Functions which are less frequently accessed are provided through on-screen menus.

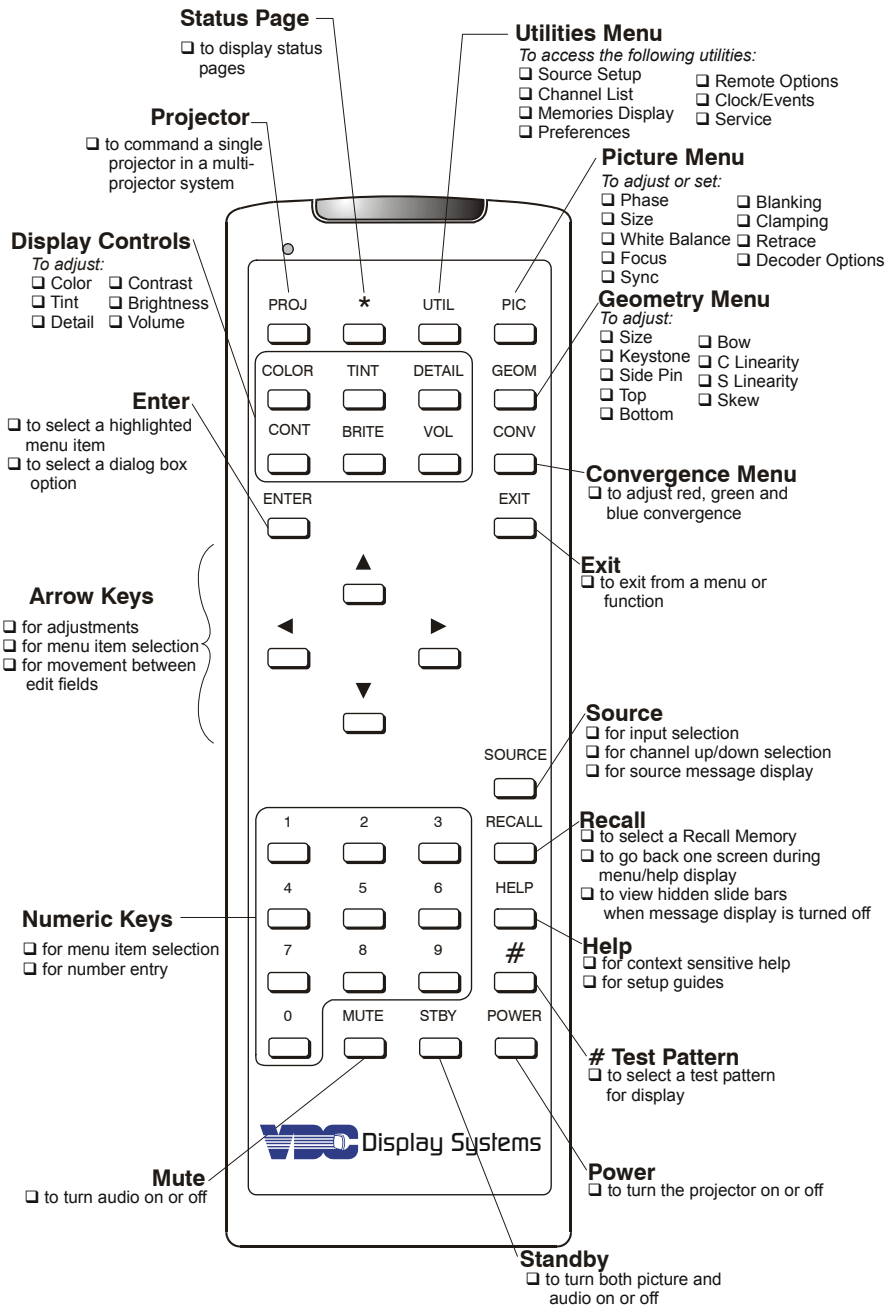


Figure 3-2. Full Function Keypad

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3.2.3 Keypad Usage

The keypad is used the same way you would use a remote keypad supplied with a TV or VCR. There are only a few general key press rules to keep in mind:

Key Press Rules

- All key presses are in sequence; no functions require simultaneous key presses.
- [**POWER**] and [**STBY**] are the only keys which require an extended hold-down for function activation (about one second). For all other keys, a momentary press will activate the key's function.
- [▲], [▼], [◄] and [►] are the only keys which repeat when held down. For all other keys, the key must first be released then pressed again for repeated activation.
- Pressing [**EXIT**] always exits the current function, operation, menu, or dialog box.

To toggle the keypad's backlit display (enable or disable), press [✶] [**BRITE**] [**TINT**] [**DETAIL**] [**3**] See Section 2.3 for details.

If keys are pressed at a time when the projector is busy (such as during power-up), the key presses may not take effect.

When the projector is turned on, it begins operation at Presentation Level. Presentation level is the normal level of operation at which a source image is (or may be) displayed. The projector temporarily leaves presentation level when menus are displayed, control settings are changed, or online help is accessed. The screen display changes to reflect the operation or function being performed. One or more of the following may be displayed:

- Slidebar - to make adjustments to display settings.
- Menu - to select projector functions or change projector settings.
- Dialog Box - to select an action such as confirm or cancel an operation.
- Message Box - to display messages.
- Help Page - to display help and provide assistance.
- Test Pattern - to assist during setup.

Note: The display of slidebars and messages can be suppressed if desired. For more information, refer to Section 3.7, Utility Features).

Each of the above are explained in the following entries. As you read through the explanations, note the following:

In most cases...

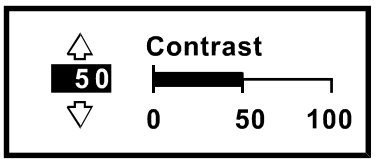
[**EXIT**] brings you back to presentation level,

[**RECALL**] brings you back to the previous page or menu,

[**ENTER**] is pressed to make a selection, and

[**HELP**] provides context-sensitive help.

3.2.4 Slidebars

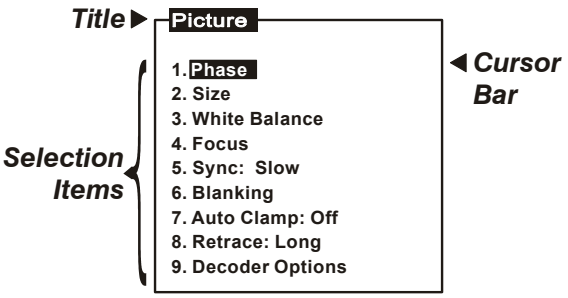


When an adjustment is made, a slidebar is superimposed on the projection screen. The slidebar displays the adjustment setting on a percentage scale. To make an adjustment, use the arrow keys indicated by the slidebar. Press [**EXIT**] to end an adjustment or, for a slidebar accessed from a menu, press [**ENTER**]. If no keys are pressed within 5 seconds while a slidebar is displayed, the slidebar disappears.

For example, if [**CONT**] is pressed, the Contrast slidebar is superimposed on the image. The slidebar shows that contrast is set to 50%. Press [▲] or [▼] on the keypad to change the contrast level. When complete, press [**EXIT**].

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3.2.5 Menus



When a menu key is pressed or a menu is selected, a menu with a list of selection items is superimposed on the projection screen. Each menu consists of a title, selection items, and a cursor bar. Selection items may include adjustment functions, control settings or other menus.

To make a selection from the menu, either:

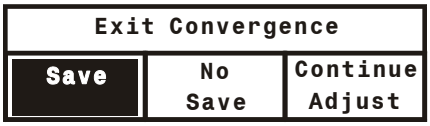
Note: press the number key corresponding to the item number, or

Note: press [▲] or [▼] to move the cursor bar to the desired item, then press [**ENTER**]

If a menu item includes control options, for example, items 5, 7 and 8 above, the control option setting can be changed by pressing the number key or by pressing [**ENTER**] when the item is highlighted.

Note: Pressing [**RECALL**] while in a sub-menu returns you to the previous menu.

3.2.6 Dialog Boxes



Dialog boxes are displayed when the projector requires an action to be chosen by the user.

For example, after a convergence registration is performed, a dialog box is displayed to confirm that the new convergence settings are to be saved in memory. Press [◄] or [►] to highlight one of the actions then press [**ENTER**] or [**EXIT**] to perform the action. If [**ENTER**] is pressed, the previous menu is then displayed. If [**EXIT**] is pressed, the projector returns to presentation level.

3.2.7 Message Boxes

Message boxes display brief messages on the screen to indicate a status, condition, or error. Messages are overlayed on the displayed source image and in most cases remain on the screen for about five seconds. To remove a message box prior to the five second display period, press [**EXIT**].

3.2.8 Help Pages

Help pages provide assistance when you need it. There are various forms of help available, all accessible by pressing [HELP]. For information about using help, refer to the Using Help entry in this section.

To advance one page when using help, press [HELP].To go back one help page, press [RECALL]. To exit from a help page, press [EXIT].

3.2.9 Test Patterns

The projector has an internal generator which can display several different types of test patterns to assist you during projector setup. Press [**#**] to display the first test pattern – a crosshatch. Each subsequent press of [**#**] changes the test pattern as shown below. If a test pattern is the only graphic displayed (i.e., no overlayed text), pressing [**EXIT**] returns the display to the external image.

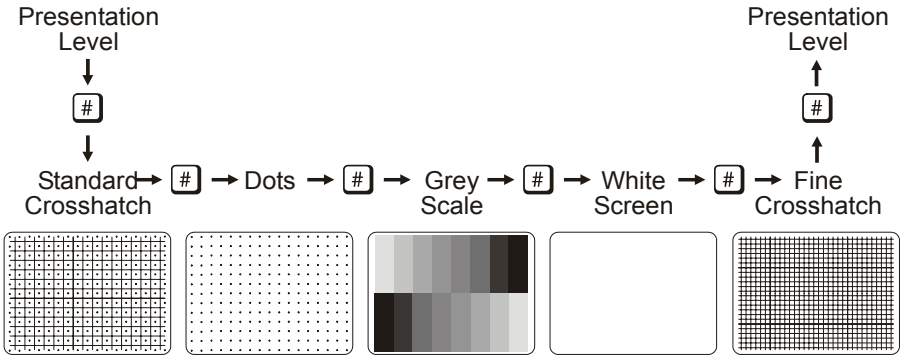


Figure 3-3. Test Patterns and Selection

Note: Test patterns are normally generated at the scan frequencies of the current input signal.

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3.2.10 Using Help

The projector includes an extensive online help system. The help system provides operation guidance and assistance. There are two types of online help: Context Sensitive Help and Guided Help.

3.2.10.1 *Context Sensitive Help*

Context Sensitive Help provides help on how to use a specific function.

To view help pertaining to a dedicated key function, press the key then press [**HELP**]. For example, to view a help page which describes how to use the brightness function, press [**BRITE**] [**HELP**].

To view help pertaining to a menu selectable function select the function then press [**HELP**].

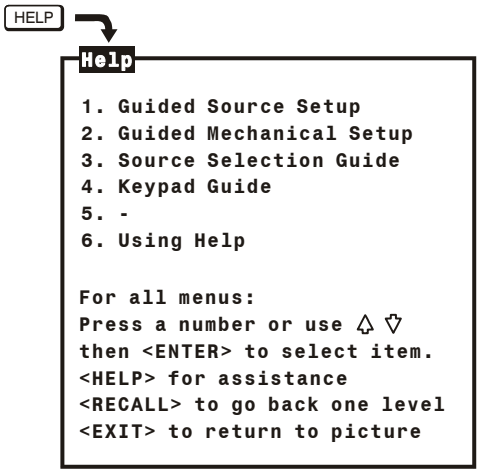
To view help describing a menu, press [**HELP**] while the menu is displayed.

If multiple pages are available, press [**HELP**] to advance to the next page. Press [**RECALL**] to go back to the previous page. To end help, press [**EXIT**].

3.2.10.2 *Guided Help*

Guided Help provides several online tutorials which explain how to operate the projector and assist you during installation and setup.

To access the tutorials, press [**HELP**] at presentation level. The Help menu is displayed. When using tutorials, press [**HELP**] to display the next tutorial page, press [**RECALL**] to display the previous page, press [**EXIT**] to end help.



1. Guided Source Setup

   The Guided Source Setup tutorial provides step-by-step instructions for quick setup of the projector with the currently selected external source. Setup may be performed while proceeding through the tutorial.

   Note: During the tutorial, [RECALL] displays the previous page and [EXIT] returns you to presentation level (this includes when slidebars are displayed).

   Note: If the display cannot be focused, ensure that the throw distance is correct (see Section 2.2). If the screen distance is correct but the display cannot be focused, follow the Guided Mechanical Setup tutorial.

2. Guided Mechanical Setup

   - The Guided Mechanical Setup tutorial provides step-by-step instructions for mechanical and optical setup of the projector. This setup is necessary during initial installation and also when the screen size changes, the throw distance changes, or the display image does not focus using the focus control. For more details, refer to Section 2.9, Optical Alignment.

3. Source Selection Guide

   - The Source Selection Guide explains various source selection methods.

4. Keypad Guide

   - The Keypad Guide explains how to use the keypad.

5. Using Help

   - Using Help provides instructions on how to use the help system.

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3.2.11 Power-on

To turn on the projector, press [**POWER**] on the keypad. Hold [**POWER**] down for about one second. If using an IR remote keypad, point the keypad at the projection screen or the front of the projector. During power-on, the projector proceeds through a series of internal diagnostic tests which last approximately 9 seconds. Once complete, an input image should be displayed on the projection screen. If no image is displayed, press [**SOURCE**] to display the source message. The source message displays the currently selected input. Check that the correct source is indicated on the display.

If there is no display when [✶] is pressed, check the LEDs (Light Emitting Diodes) on the projector back panel. Only the green POWER LED should be lit. If any of the red diagnostics LEDs are lit, call your dealer for assistance.

Allow the projector to warm up for 45 minutes before use. Critical adjustments should be performed after the warm-up period.

Turning the projector off via a remote or built-in keypad places the projector in a "wait to operate" mode. To remove power from the projector, unplug the power cord.

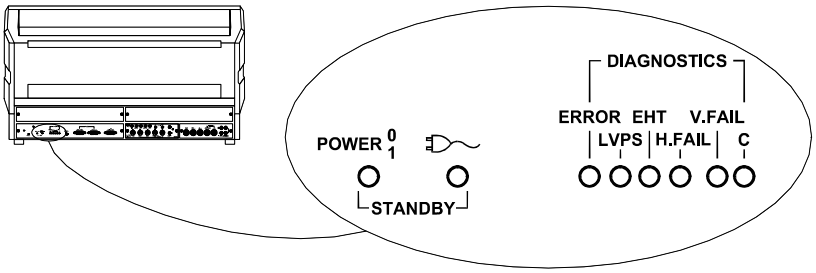


Figure 3-4. Rear Panel LEDs

3.2.12 Standby Mode

Standby Mode allows you to blank the display and mute the audio output while keeping the projector in a warmed-up and ready state.

To enter standby mode, hold down [**STBY**] for about one second while at presentation level. The display blanks and audio is muted. Both the green POWER LED and the yellow LED are lit. To leave standby mode, hold down [**STBY**] or [**EXIT**] for one second. The display and audio are then restored and the ⏻ LED is turned off.

Note: During presentations, the standby feature is useful when you want to direct audience attention away from the projection screen.

Note: To prolong CRT life, it is recommended that the standby feature be used when the display is not required.

3.2.13 Audio Functions

3.2.13.1 *Mute*

The Mute function is used to silence audio output.

To disable the audio output, press [**MUTE**]. Press [**MUTE**] again to enable (restore) the audio.

3.2.13.2 *Volume*

The Volume function is used to adjust the audio output level.

To adjust Volume, press [VOL] then [▲]or [▼]until the desired audio level is attained.

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3.2.14 System Status Pages

The projector's current operating settings may be displayed by pressing [✶] while at presentation level. Each time [✶] is pressed, one of three main status pages is displayed. To return to presentation level, press [**EXIT**].

Page 1; displays general projector information and operating settings which include identity, software version, date and time, keypad type, scan configuration, auto power-up setting, message display setting, switchers (numbers) connected, installed options, and mute setting. Operating settings are explained in the following entries in this section.

Page 2; displays current input parameters. These parameters (defined later in this section), relate specifically to the currently selected input.

Page 3; lists the display settings currently in use. Note: If the current setup memory is locked or an ASI has occurred, the display settings shown may not be identical to those stored in the setup memory.

Note: To view help pages pertaining to the status pages and their contents, press [**HELP**] during status page display. "Time" does not update on-screen.

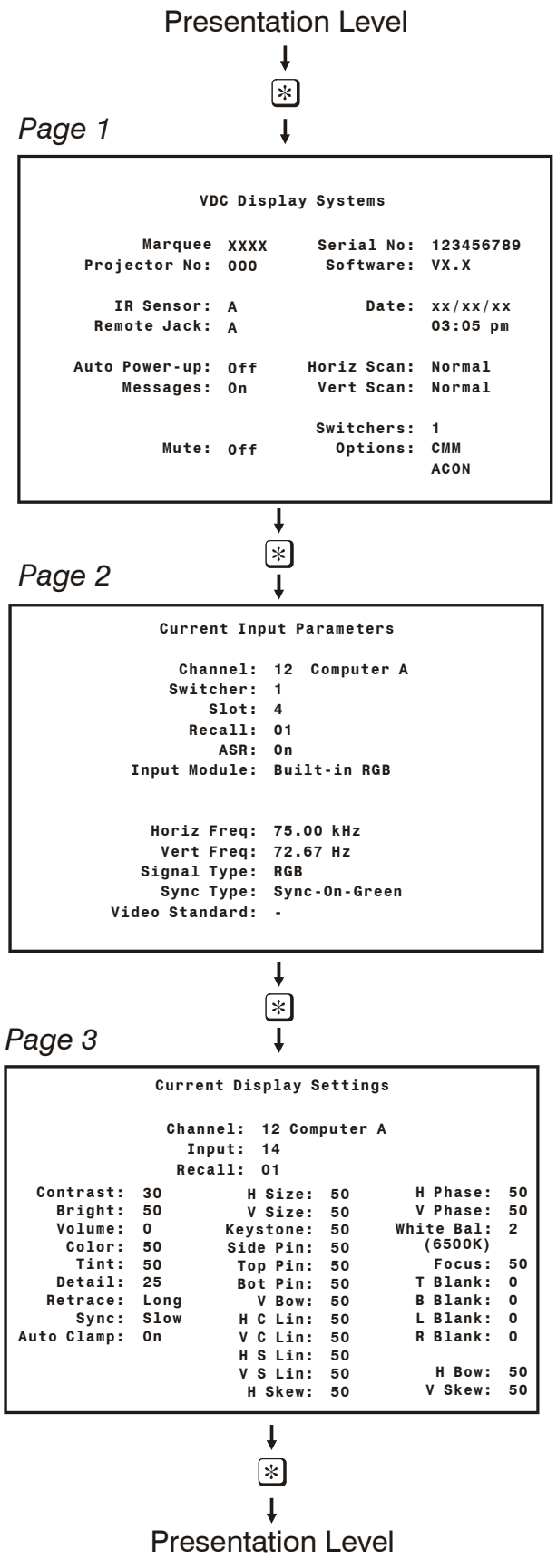


Figure 3-5. System Status Pages

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3.3 Source Selection

The projector includes a built-in RGB input interface to accept a single input. With optional accessories such as a MARQUEE® Multi-standard Decoder, and the use of one or more external switchers, the number of inputs can be significantly increased. Because of this large capability, three source selection methods are available: Input Selection, Direct Channel Selection, and Up/Down Channel Selection. Sources are selected at presentation level.

For systems with only one or two source connections, direct input selection may be the only method you will use. If your system includes many sources, all methods will be of interest.

Internal sources are also selectable for use during setup and testing. To select an internal source, refer to Section 2.11 Memory Setup, and Section 3.7, Utility Features.

3.3.1.1 *Input Selection*

This method is the most basic of the three source selection methods. A source is selected by specifying the input to which the source is connected, defined by a switcher number and slot number. For the purposes of input selection, the projector is considered to be a type of switcher. Projector and switcher slots are illustrated in Figure 3-6 and Figure 3-7 below. Each slot can accept one external input signal for display.

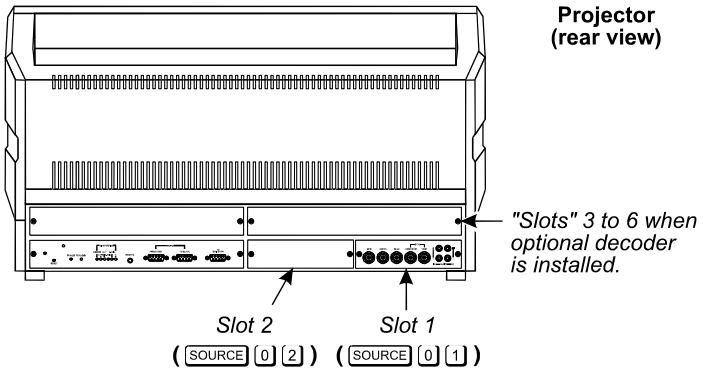


Figure 3-6. Projector Slots

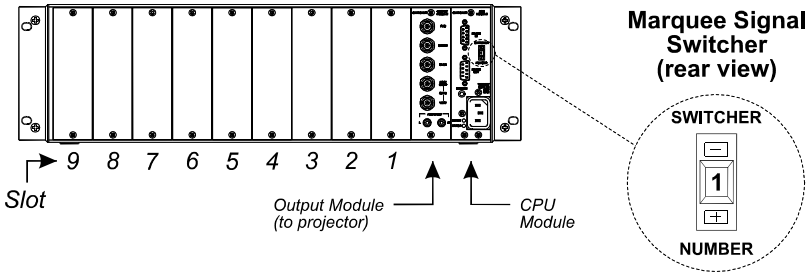


Figure 3-7. Switcher Slots

To select an input:

Press [**SOURCE**] [***m***] [***n***] at presentation level.

where: ***m*** = 0 (projector) or 1-9 (switcher 1, 2, ... 9)

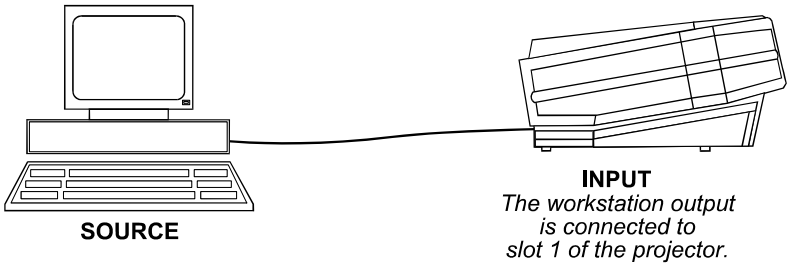
n = 1-9 (slot number)

The projector switches to, and displays, the source connected to the input selected. The projector also uses the display settings previously set in memory for that input. If the selected input is invalid, a warning message is displayed. An example of an invalid input might be "0 1" when a switcher is connected to slot 1 of the projector. Another example of an invalid input would be to select a switcher which does not physically exist.

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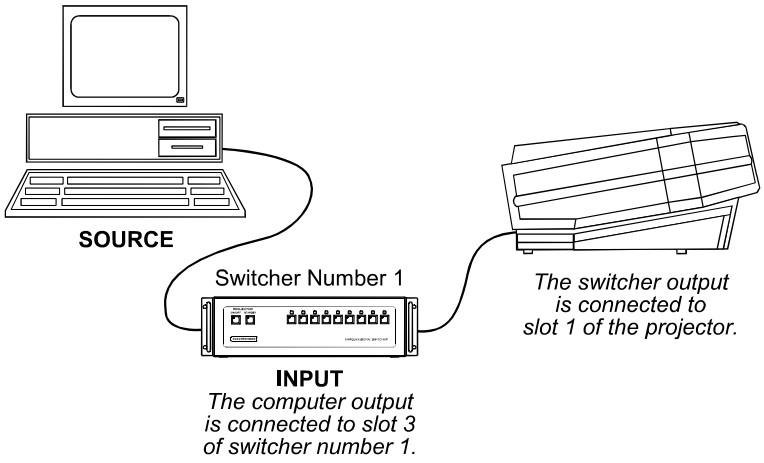
Example 1

Slot 1 on the projector has the output from a computer workstation connected to it. To display the workstation output, press [**SOURCE**] [**0**] [**1**].



Example 2

A single MARQUEE® signal switcher is connected to the projector and a computer is connected to slot 3 of the switcher. To display the computer output, press [**SOURCE**] [**1**] [**3**].



Note: If a switcher is connected to the projector, its inputs can be selected using the switcher's front panel push buttons.

3.3.1.2 *Direct Channel Selection*

This method of source selection takes advantage of the Channel List feature explained in Section 3.7, Utility Features. The Channel List allows you to assign a source to a 2-digit number, from 01 to 99.

Once you have assigned channel numbers to your sources, and the projector is at presentation level, you can select a source by pressing the 2-digit channel number associated with it.

To select a channel, press [***m***] [***n***].

where: ***m*** = the 1st digit of the channel number

n = the 2nd digit of the channel number

The projector switches to, and displays, the source assigned to the channel number. If an invalid switcher or slot number is assigned to the channel, a warning message is displayed.

Example

Channel 08 in the Channel List was programmed to select a source connected to slot 5 on switcher 3. To select this source, simply press [**0**] [**8**].

Note: If the Channel Select option in the Preferences menu ([**UTIL**] [**5**] [**4**]) is set to either "1 digit only " or "1 or 2 Digits", the preceding zero shown in the example above does not have to be entered. For more information, refer to the Preferences entry in Section 3.7.

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3.3.1.3 *Up/Down Channel Selection*

This method of source selection also takes advantage of the Channel List feature. It lets you quickly switch between channels programmed in the Channel List by using the up and down arrow keys on the keypad.

To make a selection:

Press [**SOURCE**] followed by [▲] or [▼].

Each time an arrow key is pressed, a channel number (and name) is displayed on the screen. When the channel number you want is displayed, simply wait to allow the projector to switch to the source defined by the channel.

Note: If a channel specifies a switcher which does not exist, the channel is considered invalid.

Note: The Channel List utility allows you to flag the channels to be used by the Up/Down Channel selection feature. For more information, refer to the Channel List entry in Section 3.7, Utility Features.

3.3.1.4 *The Source Message*

When [**SOURCE**] or [**RECALL**] is pressed at presentation level, and/or a source switch is made, a source message is briefly overlaid on the projection screen. The source message displays current source information.

Note: If screen messages are turned off via the Preferences menu ([**UTIL**] [**5**] [**2**]), the source message is not displayed. 2) During input selection or Recall memory selection (explained later), the message box displays numeric keypad entries as they occur. In both cases, two digits must be entered. If only one digit is entered, the message box will remain displayed until a second digit is entered or the selection is cancelled by pressing [**EXIT**]. 3) When an internal source is in use, an internal source message is displayed.

Channel Number

If a channel has been selected, the channel number is displayed; otherwise this line is blank.

Source Name

If a channel was selected and a source name was defined for it in the Channel List, the name is displayed here; otherwise this line is blank.

Input Number

The switcher and slot number of the active input is displayed. If the switcher number is 0, the input is on the projector (versus on a switcher). The slot number may indicate a projector slot or a switcher slot.

If the Input memory for the input is in use and locked, a key icon ( ) is displayed. Setup memories which are locked are not affected by adjustments to display settings. For an explanation of Input memories and locked memories, refer to Section **Error! Reference source not found.**3.4, Setup Memories.

Recall Memory Number

When a Recall memory is in use, the Recall memory number is displayed; otherwise this line is blank.

If the Recall memory is locked, a key icon ( ) is displayed. Setup memories which are locked are not affected by display adjustment changes. For an explanation of Recall memories and locked memories, refer to Section 3.4, Setup Memories.

ASI Message

If the ASR feature is set to ON for the Input memory, and an ASI has occurred, an ASI message is displayed; otherwise this line is blank. The message indicates which memories were used for interpolation to produce the current display settings. When this line is visible, adjustments to display settings will NOT be stored in the current setup memory. For more information about the ASR feature and ASI, refer to the Source Setup entry in Section 3.7.

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3.4 Setup Memories

The projector has 80 setup memories which store display settings. Multiple setup memories are needed because display settings are usually different for different sources. For example, the display settings (brightness, contrast, convergence, etc.) when using a VCR may be very different than the settings for a high resolution computer output. When display adjustments are made, the new settings are automatically saved in one of the projector's setup memories.

There are two types of setup memories: Input and Recall. Both memory types store the same parameters. The only difference is that Input memories store display settings for a particular physical input (e.g., switcher 0, slot 1) while Recall memories can be used with any input.

At any one time, one setup memory is the current setup memory. The display settings in the current setup memory are used for the current display. When a source is selected by entering its input number, the Input memory for the selected input becomes the current setup memory (unless ASR is on and is triggered). If a Recall memory is selected, it becomes the current setup memory. Display adjustments are automatically saved in the setup memory which is current at the time of adjustment (unless the setup memory is locked – explained later).

3.4.1 Input Memories

As mentioned above, Input memories store display settings for each physical input (i.e., switcher 0, slot 1). When an input is selected, the Input memory for that input becomes the current setup memory and its display settings are used (unless ASR is on and is triggered). If the input is being selected for the first time, a new Input memory is created.

Setup Memory Parameters

Memory Identification
- Input or Recall
- Switcher No & Slot No., or Recall Switch

Memory Status
- Locked or Unlocked
- ASR last used

Signal Frequencies
- Horizontal Frequency
- Vertical Frequency

Picture Parameters
- Phase
- Size
- White Balance
- Focus
- Sync
- Blanking

Primary Display Parameters
- Color
- Tint
- Detail
- Contrast
- Brightness

Geometry Parameters
- Size
- Keystone
- Side Pin
- Top
- Bottom
- Bow
- Linearity
- Skew

Convergence Parameters
- Convergence settings at all 45 zones

Control Settings
- ASR On/Off (input memories)
- Video Format (decoder only)
- Signal Route
- Volume (audio
- Clamping and Retrace

3.4.2 Recall Memories

Recall memories provide an alternative to using the display settings stored in the Input memory of the selected source. For example, you may want to temporarily disconnect a computer connected to the projector's RGB input and in its place, connect another computer with different signal characteristics. Since the connection is only temporary you don't want to change the display settings stored in the Input memory. Instead, you can select a Recall memory which has the settings you want for the new input. If there are many devices which will be sharing the same input, many Recall memories can be created to store the display settings for each. On the other hand, if there are many sources on different inputs with exactly the same signal characteristics, it may be possible for them to share the same Recall memory.

Recall memories are identified by a two digit number. Any number from 01 to 99 can be assigned, although only 80 memory spaces exist.

To select or create a Recall memory:

Press [**RECALL**] [***m***] [***n***].

where: ***m*** = the 1st digit of the Recall memory number

n = the 2nd digit of the Recall memory number

For example, to select Recall memory 01, press [**RECALL**] [**0**] [**1**]. Recall memory 01 will then be the current setup memory and its settings will be used for the currently selected source. If this is the first time that the Recall memory number is used, a new Recall memory is created. Any display adjustments you make will be stored in the Recall memory.

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3.4.3 Memory Allocation

Each time a setup memory is selected the projector checks its memory bank to see if the selected memory exists. If it does exist, it uses the memory and its display settings. If it does not exist, a small portion of memory is allocated for the new setup. Space is available for up to 80 setup memories. When the last space is used up, a warning message is displayed. If this happens, call for servicing to delete memories which you no longer use to make room for new memories.

3.4.4 Locking Setup Memories

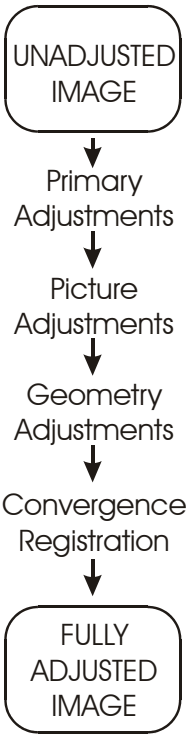
Setup memories may be locked or unlocked. Locking a setup memory prevents adjustments to display settings from being saved in that memory. For example, if Recall memory 08 is locked and selected, then brightness is adjusted, the new brightness setting is only temporary. If the setup memory is then reselected, the original brightness setting will be restored.

Note: When a locked setup memory is selected, a key icon ( ) is displayed in the Source Message.

To lock or unlock the current setup memory, select option 3 from the Source Setup menu ([**UTIL**] [**1**] [**3**]). Option 3 indicates the current setting.

3.5 Display Adjustments

Normal Adjustment Sequence



This section describes the projector's display adjustment functions. To access all display functions, a full function keypad is required. If you are using the optional Presenter's Keypad, only the primary display functions are available. There are four types of display adjustment functions: Primary, Picture, Geometry, and Convergence.

1. Primary Display functions include Brightness, Contrast, Detail, Color and Tint. These functions are accessed directly from the keypad.
2. Picture functions are used to adjust display settings that affect the projected image. These functions include Phase, Size, White Balance, Focus, Sync, Blanking, Clamping, Retrace, and Decoding. Picture functions are accessed via the Picture menu which is selected by pressing [PIC] on the keypad.
3. Geometry functions adjust geometric distortions of the display such as its size, keystone, pincushion, bow, linearity, and skew. Access Geometry functions via the Geometry menu—press [GEOM] on the keypad.
4. Convergence is used to align the red, green, and blue color components of the image. It is described in Section 3.6, Convergence Registration.

Most adjustment functions, when selected, display a slidebar overlaid on the source image. The slidebar displays the current setting and indicates which arrow keys to use for making the adjustment. Adjustment settings are stored in the current setup memory (Input or Recall). There are two exceptions: 1) If the current setup memory is locked, new adjustment settings are shown but not stored; they are discarded when another setup memory is selected. 2) If ASR is on for the current input and an ASI is performed, the settings are only temporary and are not saved in the current setup memory.

For new images, where much adjustment is required, it is recommended that adjustments be made using the sequence illustrated above. When making picture or geometry adjustments, follow the sequence displayed in the adjustment menu.

When making many picture or geometry adjustments, press [**ENTER**] after each adjustment to return the cursor back to its previous menu item position.

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3.5.1 Primary Display Adjustments

3.5.1.1 *Brightness*

The Brightness function is used to adjust the black level of the image.

- To adjust brightness, press [**BRITE**] then [▲] or [▼]. If video or data is displayed with a black background, adjust until the background just disappears (black becomes a very dark grey).

Note: If room lighting changes, it may be necessary to re-adjust brightness.

3.5.1.2 *Contrast*

The Contrast function is used to adjust the contrast between the light and dark areas of the display image.

To adjust contrast, press [**CONT**] then [▲] or [▼]. If contrast is set too high, the image loses detail and clarity. If set too low, it may be difficult to distinguish between foreground and background information.

Note: For best results, adjust brightness before contrast.

Note: If room lighting changes, it may be necessary to re-adjust contrast and brightness.

Note: An excessively high contrast level can reduce the life of the CRTs.

3.5.1.3 *Detail*

The Detail function is used to adjust the picture sharpness of video signals when using the optional MARQUEE® Multi-standard Decoder.

To adjust detail, press [**DETAIL**] then [▲] or [▼] until the sharpest display is attained. Detail level should be roughly proportional to input signal quality. Higher levels of detail improve good quality signals. Lower levels of detail reduce noise in poor quality signals.

3.5.1.4 *Color*

Note: The Color function is used to adjust color saturation levels when using the optional MARQUEE® Multi-standard Decoder.

To adjust color, press [**COLOR**] then [▲] or [▼] until the desired color saturation level is displayed. If Color is set to a 0% level, the result will be a black and white picture. If Color is set too high, the color levels in the picture will be over-powering.

Note: The Color function also allows you to turn on or off the red, green and/or blue color components of the picture.

Press [**COLOR**] followed by a number (***n***) to select the color components you want turned on. The chart shown here shows the selection variations.

3.5.1.5 *Tint*

The Tint function is used to adjust color hue to obtain true color reproduction of NTSC signals when using the optional MARQUEE® Multi-standard Decoder.

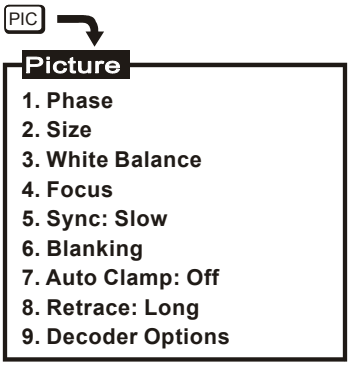
To adjust tint, press [**TINT**] then [▲] or [▼] until an optimum display is attained. It is best to adjust tint while displaying an image with natural flesh tones.

Note: Tint is not adjustable for PAL or SECAM video sources.

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3.5.2 Picture Functions

Picture functions are accessed through the Picture menu. To display this menu, press [**PIC**].



3.5.2.1 *Phase [**PIC**] [**1**]*

The Phase function is used to move the picture up, down, left, or right within the picture display area.

To adjust phase, select Phase from the Picture menu. Two slidebars are displayed: a Horizontal Phase slidebar and a Vertical Phase slidebar.

Press [▲], [▼], [◄] or [►] to move the picture in the direction of the arrows so that the entire picture is visible and centered.

Note: If the picture cannot be made entirely visible, an adjustment to blanking or retrace time may be required; refer to the blanking and retrace entries in this section.

3.5.2.2 *Size [**PIC**] [**2**]*

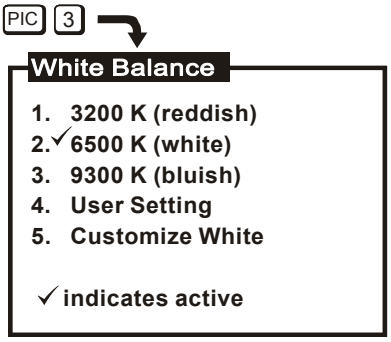
The Size function is used to adjust the horizontal and vertical size of the display image. (This adjustment is also available through the Geometry menu.)

To adjust size, select Size from the Picture menu. Two slidebars are displayed: a Horizontal Size slidebar and a Vertical Size slidebar. Press [▲] or [▼] to adjust vertical size and [◄] or [►]to adjust horizontal size until the objects within your picture have the proper shape. For example, if there is a circle in your picture, size should be adjusted so that the circle is round, not oval.

Note: The Size function should not be used to compensate for aspect ratio mismatches between source images and the projection screen. Not all sources use the same aspect ratio therefore it may not always be possible to fill the entire screen. ("Aspect Ratio" is defined in Appendix G).

White Balance [PIC] [3]

The White Balance function is used to select or adjust the color temperature (or shade) of white used by the projector. For most applications, the white balance setting set by the factory is satisfactory.



To select or adjust the white balance, select White Balance from the Picture menu. From the White Balance menu, select item 1, 2 or 3 to use a standard color temperature. Select option 4 to use the service adjusted user setting. Select option 5 to make a custom white balance adjustment. The current selection is indicated by a check mark. If option 5 is selected, a White Balance slidebar is displayed. Press [▲] or [▼] to adjust white balance. 0% is 3200K, 50% is 6500K, and 100% is 9300K.

3.5.2.4 *Focus [**PIC**] [**4**]*

The Focus function is used to adjust the electrical focus of the combined red, green, and blue color components.

To adjust focus, select Focus from the Picture menu then use [▲] and [▼] until the center of the display appears the sharpest. If the displayed image cannot be adequately focused, a service adjustment to the electrical focus may be required or an optical focus adjustment is necessary. Refer to the Section 2.9, Optical Alignment for optical focus instructions.

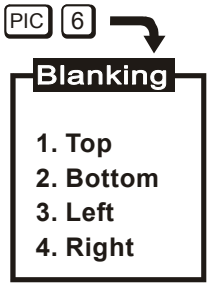
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3.5.2.5 *Sync (Fast/Slow) [**PIC**] [**5**]*

The Sync function is used to minimize horizontal jittering, "flag waving" or tearing at the top of the display image. This effect sometimes occurs when the source is a VCR or video signal. The function changes the synchronization mode of the projector from fast to slow, or slow to fast.

To toggle between fast and slow sync, select item 5 from the Picture menu. Item 5 indicates the current synchronization mode.

3.5.2.6 *Blanking (Top/Bottom/Left/Right) [**PIC**] [**6**]*



The Blanking selection item is used to hide or blank out unwanted information or noise at the top, bottom, left, or right of the display image. Blanking adjustments may be required when the source is a VCR or video signal.

To adjust blanking, select Blanking from the Picture menu. From the Blanking menu, select item 1, 2, 3 or 4 to adjust the amount of blanking at the top, bottom, left, or right of the display (respectively). A blanking slidebar is displayed for each adjustment. A 0% level on the slidebar indicates no blanking. For top and bottom adjustments, use [▲] and [▼] to adjust the amount of blanking. For left and right adjustments, use [◄] and [►] to adjust the amount of blanking. After completing each adjustment, press [**ENTER**] to return to the Blanking menu, or press [**EXIT**] to return to the picture.

3.5.2.7 *Auto Clamp (On/Off) [**PIC**] [**7**]*

The Auto Clamp function is used to turn automatic signal clamping on or off. For most input signals, auto clamp should be on. However, if one or more of the red, green, or blue color components is abnormally bright, turn auto clamp off. An abnormally bright color component can occur if the input signal contains more than one sync type (e.g., both sync on green, and composite sync). If you are using a composite video source with ASR and are connected to an RGB interface, turn the Auto Clamp off.

To toggle auto clamp on or off, select item 7 from the Picture menu. Item 7 indicates the current Auto Clamp setting.

3.5.2.8 *Retrace (Short/Long) [**PIC**] [**8**]*

This function is used to set the projector's horizontal retrace time. Retrace time affects the width and display of the picture. A short retrace time may be required if information is missing or "cut off" at the left or right sides of the picture. A long retrace time may be desired if the picture is significantly smaller than the raster.

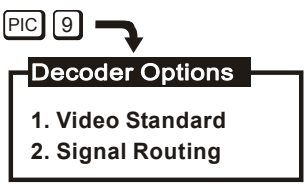
To toggle between short and long retrace, select item 8 from the Picture menu. Item 8 indicates the current retrace setting.

Note: Check phase, left blanking, and right blanking from the Picture menu before changing retrace time.

Note: Long retrace is not available at all scan frequencies.

3.5.2.9 *Decoder Options [**PIC**] [**9**]*

The Decoder Options menu item allows you to control the operation of the optional MARQUEE® Multi-standard Decoder.



To modify decoder operation, select Decoder Options from the Picture menu. From the Decoder Options menu, select item 1 to set the decoding method to use for the current source signal input to the decoder. Select item 2 to set the routing of the current source signal within the projector.

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3.5.2.10 *Video Standard **[PIC] [9] [1]***

PIC 9 1

Video Standard

1. ✓**Auto-detect**
2. **NTSC 3.58**
3. **NTSC 4.43**
4. **PAL**
5. **SECAM**
6. **PAL M**
7. **PAL N**
8. **PAL 60**

✓**indicates active**

When item 1 is selected from the Decoder Options menu, the Video Standard menu is displayed. It contains up to eight video standard options: Auto-detect, NTSC 3.58, NTSC 4.43, PAL, SECAM and, depending on which version of the decoder is installed, three more PAL options (see right). The current option is indicated by a check mark. Auto-detect is the default. When "Auto-detect" is selected, the decoder automatically determines the video standard of the input signal and processes it accordingly. Alternatively, you can force the decoder to use a particular decoding method by selecting one of the other menu options. This should only be necessary for poor quality input signals.

3.5.2.10.1 *Signal Routing **[PIC] [9] [2]***

When item 2 is selected from the Decoder Options menu, the Signal Routing menu is displayed. It contains four signal routing options: Auto-detect, As Composite, As S-Video, and As RGB. The current selection is indicated by a check mark. Auto-detect is the default. When "Auto-detect" is the selected option, the projector determines whether the input signal requires routing through the decoder according to the type of interface used. For example, if the source is an RGB input connected to the RGB interface, the signal will bypass the decoder since video decoding is not required. However, if the input is a composite signal connected to a composite/S-video interface, the projector will route the signal through the decoder for processing.

If "As Composite" is the selected option, the projector assumes the input signal is composite video and processes it through the decoder. If "As S-Video" is the selected option, the projector expects the input signal in the form of separate Y and C signals. If "As RGB" is the selected option, the projector assumes the signal at the current input is always RGB and the decoder is bypassed. One reason for not using Auto-detect is to allow connection of a composite or S-Video signal to a standard RGB interface and still have the projector process the input correctly through an installed decoder; otherwise, a composite/S-video interface would be required. Figure 3-8 illustrates the connection of a composite or S-Video signal to an RGB input (the projector's built-in RGB input is shown as an example).

PIC 9 2

Signal Routing

1. ✓**Auto-detect**
2. **As Composite**
3. **As S-Video**
4. **As RGB**

✓ **indicates active**

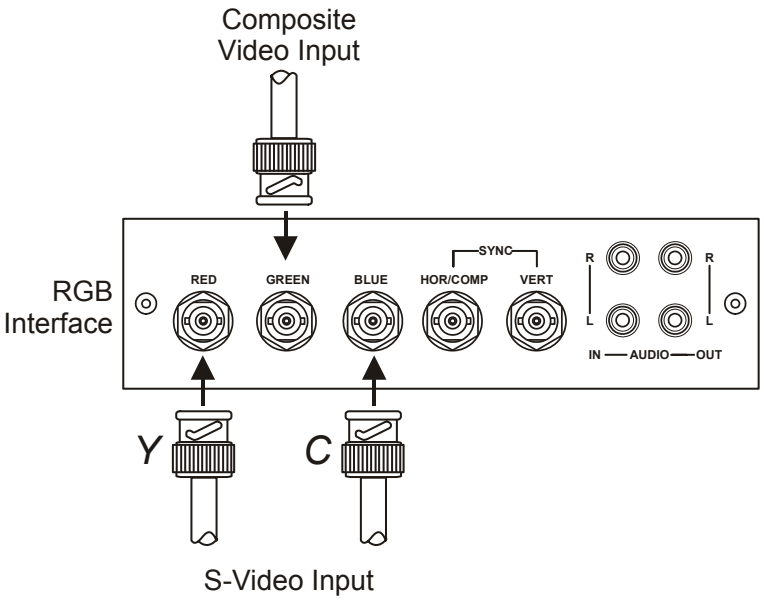


Figure 3-8. Connection of Composite Video or S-Video to RGB Input (Multi-Standard Decoder Option Required)

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About the MARQUEE® Sync Routing System

The MARQUEE® Sync Routing System allows various sync and video combinations to be made to the Input 01 or 02 on the VIM. You can connect Video signals with Separate sync (R-G-B-H/C-V), Composite sync (R-G-B-H/C) or Sync-On-Green (R-Gs-B).

As well, the routing system allow Composite Video signals to be connected through the Green BNC and routed to the MARQUEE® Decoder as long as the Recall (or Input) memory assigned to the Composite Video source is set for routing as Composite Video. From the PIC menu, select "Signal Routing" (item 9), then select "As Composite" (item 2) in order to force the routing to the MARQUEE® Decoder.

Similarly, the system allows you to connect S-Video (Y/C) signals to the Red (for Y) and Blue (for C) BNCs, where they are routed to the MARQUEE® Decoder if the Recall (or Input) memory assigned to the S-Video source is set for routing as S-Video. From the PIC menu, select "Signal Routing" (item 9). Then select "As S-Video" (item 3) in order to force the routing to the MARQUEE® Decoder.

The IC at the U41 location on the Video Input Module (VIM) determines the priority and routing of incoming and outgoing sync. The VIM also includes Sync-On-Green circuitry which strips sync information from signals connected to the Green BNC. The IC then outputs the appropriate sync from the VIM to the Deflection Processor Board (DPB), which locks the operating frequency of the projector to the sync it receives. Set "Auto Clamp" in one of two ways, as described below.

If the routing is set to either "As Composite" or "As S-Video", setting "Auto Clamp" to "On" routes the sync to the DPB from the Decoder. This setting is required for S-Video to operate properly. It also allows Composite Video to operate. Setting "Auto Clamp" to "Off" routes the sync to the DPB from the Sync-On-Green circuitry. This is valid for Composite Video operation only, since the Composite Video is connected to the Green BNC. (NOTE: If using a Composite Video source with ASR, "Auto Clamp" must be set to "off. This is required for source change detection which is an integral part of ASR operation. When "Auto Clamp" is set to "Off", you must set the "Horiz Phase" slidebar to approximately 25. This is due to a phase delay between the sync from the decoder and the sync from the Sync-On-Green circuitry.)

In all other cases--that is, when NOT routing the signal to the decoder--setting "Auto Clamp" to "On" results in back-porch clamping. If Sync-Tip clamping is required, set "Auto Clamp" to "Off".

3.5.3 Geometry Functions [GEOM]

Geometry functions are accessed through the Geometry menu. To display this menu, press [**GEOM**].



It is usually easier to adjust display geometry while a test pattern ([**#**]) is displayed.

3.5.3.1 *Size [**GEOM**] [**1**]*

The Size function is used to adjust the horizontal and vertical size of the display image. (This adjustment is also available through the Picture menu).

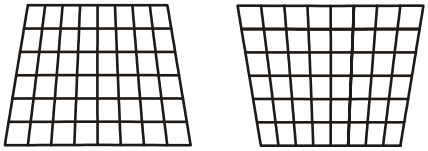
To adjust size, select Size from the Geometry menu. Two slidebars are displayed: a Horizontal Size slidebar and a Vertical Size slidebar. Press [▲]or [▼] to adjust vertical size, and [◄] or [►] to adjust horizontal size until the objects within your picture have the proper shape. For example, if there is a circle in your picture, size should be adjusted so that the circle is round, not oval.

The Size function should not be used to compensate for aspect ratio mismatches between source images and the projection screen. Not all sources use the same aspect ratio therefore it may not always be possible to fill the entire screen. ("Aspect Ratio" is defined in Appendix G).

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3.5.3.2 *Keystone [**GEOM**] [**2**]*

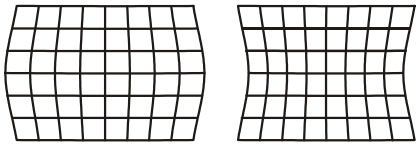
The Keystone function adjusts side keystone geometry distortion. Adjust keystone to change the width at the top of the display in relation to the width at the bottom. The displays below demonstrate keystone adjustment.



To adjust keystone, select Keystone from the Geometry menu then press [◄] or [►] to adjust the top and bottom widths of the display as desired.

3.5.3.3 *Side Pin [**GEOM**] [**3**]*

The Side Pincushion function adjusts pincushion of the sides of the display image.

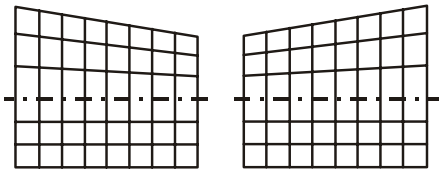


The two displays shown below demonstrate side pincushion adjustment.

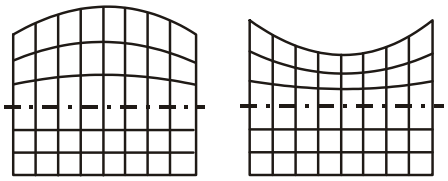
To adjust side pincushion, select Side Pin from the Geometry menu then press [◄] or [►] until the sides of the image are as curved or as straight as desired.

3.5.3.4 *Top [**GEOM**] [**4**]*

The Top function adjusts the level (Top Key) and pincushion (Top Pin) of the top half of the display image. The four displays shown here demonstrate Top adjustments.

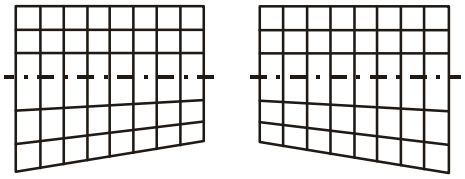


To stretch the upper left or right corner up or down, select Top from the Geometry menu and press [◄] or [►]. To adjust top pincushion, press [▲] and [▼] until the top half of the image is as curved or as straight as desired.

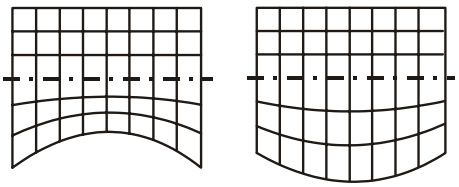


3.5.3.5 *Bottom [**GEOM**] [**5**]*

The Bottom function adjusts the level (Bottom Key) and pincushion (Bottom Pin) of the bottom half of the display image. The four displays shown at right demonstrate Bottom adjustments.

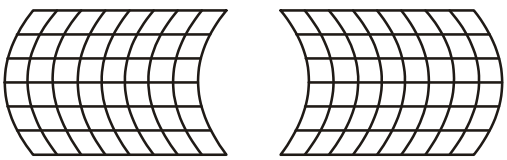


To stretch the lower left or right corner up or down, select Bottom from the Geometry menu and press [◄] or [►]. To adjust bottom pincushion, press [▲] and [▼] until the bottom half of the image is as curved or as straight as desired.

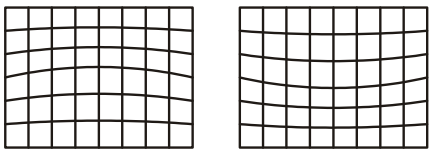


3.5.3.6 *Bow [**GEOM**] [**6**]*

The Bow function adjusts horizontal bowing (H Bow) across an image. It also adjusts vertical curvature (V Bow) in the middle of the picture. The four displays at right demonstrate H Bow and V Bow adjustments.



To adjust H bow, select Bow from the Geometry menu then press [◄] or [►] until the image appears as desired. To adjust V Bow, press [▲] and [▼] until the center of the picture is as curved or as straight as desired.

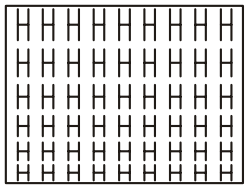


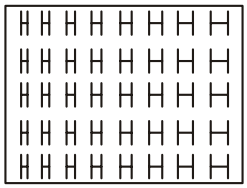
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3.5.3.7 *C Linearity [**GEOM**] [**7**]*

The C Linearity function corrects for gradual non-linearity between the top and bottom or left and right sides of the display image. Examples are shown below. In the first example the top of the image increases in vertical size while the bottom decreases in vertical size. In the second example the right side of the image increases in horizontal size while the left side decreases in horizontal size.

Select C Linearity from the Geometry menu. It is best to have a screen full of characters displayed. Or use one of the internal test patterns available by pressing [**#**]. If there is a vertical non-linearity, press [▲] and [▼] until the characters at the top, middle, and bottom of the screen have the same vertical size. If there is a horizontal non-linearity, press [◄] or [►] until the characters at the left, middle, and right of the screen have the same horizontal size.

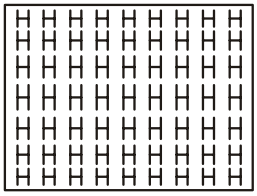


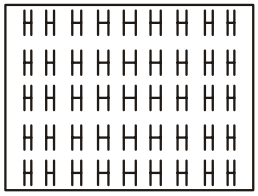


3.5.3.8 *S Linearity [**GEOM**] [**8**]*

The S Linearity function corrects for vertical and horizontal non-linearities which extend from the center of the display to the top and bottom or left and right. Examples are shown below. Notice how the top and bottom or left and right characters are much smaller in size than the center characters.

Select S Linearity from the Geometry menu. It is best to have a screen full of characters displayed. Or use one of the internal test patterns available by pressing [**#**]. If there is a vertical non-linearity, press [▲] and [▼] until the characters at the top, middle, and bottom of the screen have the same vertical size. If there is a horizontal non-linearity, press [◄] or [►] until the characters at the left, middle, and right of the screen have the same horizontal size.

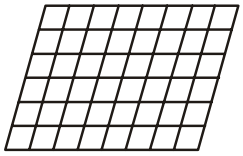


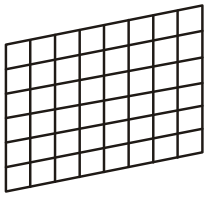


3.5.3.9 *Skew [**GEOM**] [**9**]*

The Skew function adjusts the display image so that the sides of an image appear to be leaning to one side and/or shifted up or down. The two displays below demonstrate skew adjustment.

To adjust H Skew, select Skew from the Geometry menu then use [▲] and [▼] until the image is slanted from side to side as desired. For V Skew, press [▲] and [▼] to slant up or down.





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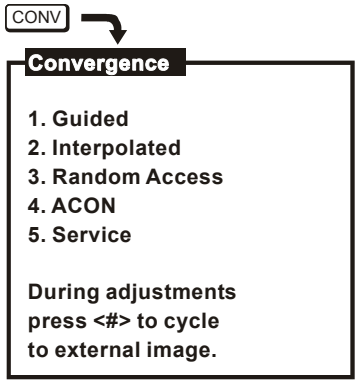
3.6 Convergence Registration

Convergence Registration is the process of aligning the red, green, and blue color components on the projection screen. The projector's convergence system provides accurate color registration in 45 discrete convergence zones configured in a 9 by 5 array on the projection screen. Since the projector must converge colors differently for each source (due to varying scan frequencies), convergence settings are saved for each input. Convergence settings can also be saved in Recall memories.

There are three basic convergence methods available: Guided, Interpolated, and Random Access. Any one of these can be selected for performing a registration adjustment. All are easy to use and context-sensitive help is available if needed. If the projector includes the optional ACON feature, the convergence process is completely automated. ACON is recommended in situations where fast, accurate convergence must be performed, or when many inputs must be converged, or when the projector installation position frequently changes.

3.6.1 To Perform a Convergence:

Begin by selecting the input source to be converged. Convergence settings will be saved in the current setup memory. Next, press [**CONV**] to display the Convergence menu. Select one of the convergence options from the menu.



Note: If the projector does not include the ACON automatic convergence feature, item 4 is "ACON (not installed)".

Guided Convergence provides a complete guided convergence of the red and blue images onto the green image in all 45 convergence zones. Use this option if the image requires minor convergence alignment and you wish to be guided through the 45 convergence zones.

Interpolated Convergence provides a complete convergence similar to Guided but is recommended when the image requires major convergence alignment (and should be used the first time a source is converged).

Random Access Convergence allows convergence of a particular area of the display. Any zone may be quickly selected and converged. This option also allows convergence of the blue on the red image (if preferred to the normal blue on green).



ACON is an optional feature which provides fast, accurate automatic convergence in all 45 convergence zones. Minimal user intervention is required. If the projector does not include ACON, item 4 in the menu reads "ACON (not installed)". Refer to VDCDS document number; 790072101 for complete installation and use of the ACON option.

The Service selection is used to access the convergence service utilities. These utilities are provided for qualified service personnel only. (Password access is required).

The following options are available while performing any of the manual convergence routines:

3.6.1.1 *Convergence on Image*

When a convergence method is first selected, an internally generated crosshatch test pattern is displayed. Alternatively, you may override the use of the test pattern and have the external image displayed. Press [**#**] to cycle to the external image.

3.6.1.2 *Convergence Reset*

During convergence, the following reset options are available:

- Press [**0**] to reset red and blue convergence – static and dynamic.
- Press [**1**] to reset red and blue convergence – static only.
- Press [**2**] to reset red and blue convergence – dynamic only.

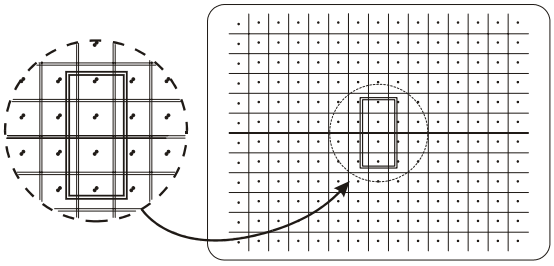
"Static" refers to the complete image. "Dynamic" refers to a zonal area.

Note: Allow the projector to warm up for at least forty five minutes prior to convergence registration.

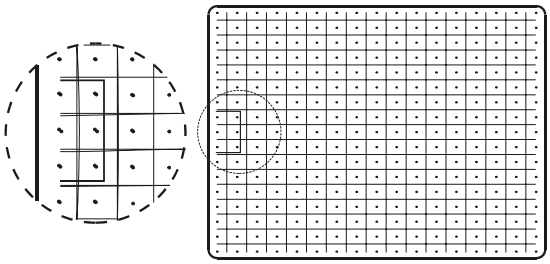
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3.6.1.3 *Guided Convergence*

Press [**1**] from the Convergence menu to select Guided Convergence. An internally generated crosshatch is displayed for the alignment. Initially, a red and green crosshatch is displayed and a rectangular box surrounds the center convergence zone. Use [▲], [▼] [◄] and [►] to move the red onto the green in the zone. Press [**ENTER**] to similarly move the blue onto the green. These first two adjustments adjust the position of the red and blue images with respect to the green over the entire screen (static adjustments). The adjustments to follow (dynamic), modify color positioning within individual zones.



Press [**ENTER**] to move the rectangular box to the next convergence zone. Again, use the arrow keys to adjust the red on the green. Press [**ENTER**] to adjust the blue on the green.



Within each zone, a central control point defines the position of each color within the zone. You will notice that the center position within the box is most sensitive to the adjustment. This is where the control point is located. Continue using [**ENTER**] to move to the next zone/color for adjustment, press [✶] to go back to a previous zone. Once all 45 zones have been converged, an Exit dialog box is displayed, as shown below. If you wish to exit prior to converging all 45 zones, [**EXIT**] will immediately display the Exit dialog box.

[**CONV**] may be used instead of [**ENTER**] to change zones/colors, if preferred.

When the Exit dialog box is first displayed, the cursor bar is positioned on "Save". Press [**ENTER**], [**EXIT**] or [**RECALL**] to save the new settings. To re-perform the convergence, move the cursor bar to "Continue Adjust" then press [**ENTER**]. To discard your changes, move the cursor bar to "No Save" then press [**ENTER**], [**EXIT**] or [**RECALL**].

Exit Convergence		
Save	No Save	Continue Adjust

3.6.1.4 *Interpolated Convergence*

Press [**2**] from the Convergence Menu to select Interpolated Convergence. Interpolated Convergence is performed in the same way as that described for Guided convergence. The primary difference between Guided Convergence and Interpolated Convergence is noticed during adjustment. In Interpolated convergence, adjustments are not limited to single zones, but will affect larger regions of the raster. Response is greatest within the displayed box and decreases linearity towards zones which have already been converged in the sequence. Interpolated convergence is recommended when converging a source for the first time. This method can be much faster than guided convergence. However, it is not recommended if only minor convergence alignment is required.

3.6.1.5 *Random Access Convergence*

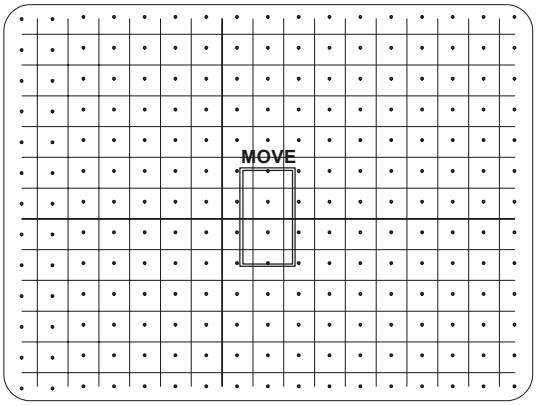
Press [**3**] from the Convergence menu to select Random Access Convergence. A red and green crosshatch is displayed with a rectangular box at the center zone. Above the box, "CONV" indicates that the zone is ready for convergence. Use the arrow keys to move the red onto the green within the box. This affects the position of the red with respect to the green over the entire screen (static convergence).

Sequence Press:	Reference Color	Convergence Color
1st COLOR	green	blue
2nd COLOR	red	blue
3rd COLOR	a white crosshatch for reference	
4th COLOR	repeat starting at green-red	

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To change the convergence color, press [**COLOR**]. Each press of the Color key changes the color as shown.

To move to another control point, press [**ENTER**]. The caption above the box changes to "MOVE". Use the arrow keys to move to another zone for convergence. Press [**ENTER**] to converge the zone. When all zones requiring adjustment are converged, press [**EXIT**] to display the Exit dialog box. Press [**ENTER**] to save the new convergence settings. To go back to the convergence screen, move the cursor bar to "Continue Adjust", then press [**ENTER**]. To discard your changes, select "No Save".



Note: [**CONV**] may be used instead of [**ENTER**] to alternate between converge and move functions, if preferred.

3.7 Utility Features

UTIL

Utilities

1. Source Setup
2. Channel List
3. Recall Memories
4. Input Memories
5. Preferences
6. Remote Control Options
7. Clock / Events
8. -
9. Service

The projector's utility features allow you to customize operation of the projector to suit your application and preferences. To access these features, press [**UTIL**]. The Utilities menu is displayed.

- Item 1, Source Setup, provides utilities for setup memory manipulation and selection of internal sources.
- Item 2, Channel List, allows you to program the Channel List.
- Item 3, Recall Memories, displays a listing of the Recall memories stored in the projector.
- Item 4, Input Memories, displays a listing of the Input memories stored in the projector.
- Item 5, Preferences, lets you set various operational settings which affect the behavior of the projector, according to your preferences.
- Item 6, Remote Control Options, allows you to modify the projector's communication settings for communication with external control devices such as remote keypads.
- Item 7, Clock/Events, allows you to set the projector's real-time clock/calendar and program up to twelve individual projector control events to be automatically executed at specified times or intervals.
- Item 8, N/A
- Item 9, Service, provides service utilities for use by authorized service personnel. (Password access is required.)

3.7.1 Source Setup [UTIL] [1]

UTIL 1

Source Setup

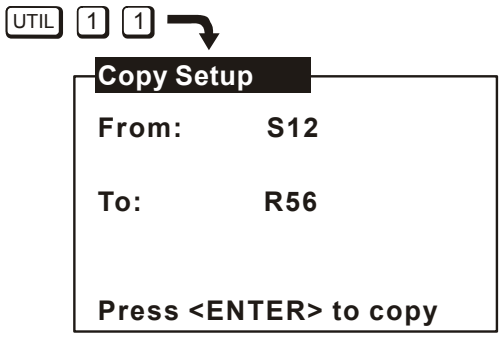
1. Copy Setup
2. ASI with Save
3. Current Setup: Unlocked
4. ASR: Off
5. Clear Current Setup
6. Select Internal Frequency

Current Setup Memory:
Input: 12
Recall: 01

Source Setup utilities are accessed by pressing [**1**] from the Utilities menu. Six source related utilities are available.

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3.7.1.1 *Copy Setup **[UTIL] [1] [1]***



The Copy Setup utility is used to copy stored display settings from one setup memory to another. When a copy is made, the originating memory remains unchanged and the destination memory is overwritten with the settings of the originating memory.

To copy a setup memory, press [**1**] from the Source Setup menu. A dialog box is displayed. Enter the setup memory you want to copy from and the setup memory you want to copy to. Input memories are entered by pressing [**SOURCE**] followed by a switcher and slot number. Recall memories are entered by pressing [**RECALL**] followed by a two digit Recall memory number (01 to 99).

Once complete, press [**ENTER**] to proceed with the copy. A "Copy Complete" message is briefly displayed to indicate a successful copy. When you are finished copying setup memories, press [**EXIT**] to return to presentation level.

3.7.1.2 *ASI with Save **[UTIL] [1] [2]***

ASI (Automatic Source Interpolation) is a feature which automatically adjusts display settings based on the settings of other setup memories stored in the projector. The "ASI with Save" utility performs an immediate ASI on the current source and saves the resulting display settings in the current setup memory. The new settings are created by either copying the settings from another setup memory which has matching scan frequencies or by interpolating between "the two closest" setup memories. This feature is very useful when adding a new source to the system and/or when much adjustment is required. By using the "ASI with Save" feature, the projector can do most of the required adjustments for you.



To perform an "ASI with Save", press [**2**] from the Source Setup menu. A dialog box is displayed. Press [◄] to move the cursor bar to "Do It" then press [**ENTER**]. New display settings will immediately be calculated and saved in the current setup memory. The only exception is when the current setup memory is locked. If locked, display settings will not be modified. If "Cancel" is selected from the dialog box, the operation is stopped. For more information about the ASI logic process, refer to Section 2.11.5, ASR/ASI Logic Diagrams.

Notes about the ASI feature...

ASI works better when there are many setup memories in the system. For example, if you always use the same input and you never use Recall memories (thus only one setup memory has ever been created), ASI will not be effective. However, if many Input and Recall memories have been used and adjusted for a variety of sources, the projector has more "knowledge" in its database for performing an ASI. As this "knowledge" increases, ASI accuracy improves.

3.7.1.3 *Current Setup (Locked/Unlocked) **[UTIL] [1] [3]***

This utility allows you to lock or unlock the current setup memory. Locking a setup memory prevents changes to display settings from being saved in that memory. For example, if a locked Recall memory is selected and then brightness is adjusted, the new brightness setting is only temporary. If the Recall memory is reselected, the original brightness setting will be restored.

Note: When a locked setup memory is selected, a key icon (🔑) is displayed in the Source Message.

To lock or unlock the current setup memory, press [**3**] from the Source Setup menu. Item 3 in the menu indicates the current setting.

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3.7.1.4 *ASR (On/Off) [UTIL] [1] [4]*

The ASR (Automatic Source Recall) feature provides automatic Recall memory selection or ASI (Automatic Source Interpolation) for inputs which have ASR set to On.

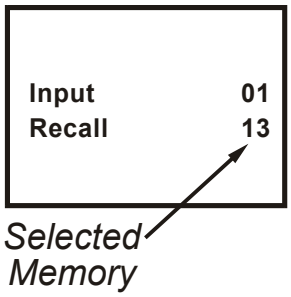
To turn ASR on or off for the current input, press [**4**] from the Source Setup menu. Item 4 in the menu indicates the current setting.

When ASR is on, the projector monitors the current input for horizontal and vertical scan frequency changes. When a frequency change occurs, the current Input memory and all Recall memories are scanned in search of a memory with matching scan frequencies. If one exists, this memory becomes the current setup memory. If a matching memory is not found, an ASI is performed. ASI automatically adjusts display settings based on the settings of other setup memories stored in the projector. The new settings created by ASI are either a copy of the settings from another setup memory which has matching scan frequencies or an interpolation between "the two closest" setup memories.

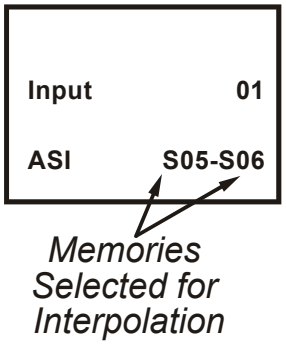
ASR is also performed when:

- You switch to an input which has ASR set to On.
- You select a Recall memory and ASR is set to On for the current input.
- A channel is selected which specifies an input which has ASR set to On.
- The source frequencies are different than the frequencies in the setup being selected.

When ASR selects a setup memory, a source message is briefly displayed to indicate which memory was selected. If the new memory settings (Input and Recall) match that of one of the channels in the Channel List, the matching channel is used and displayed in the source message. Display adjustments, if made, are stored in the new memory (unless it is locked).



If, on the other hand, an ASI is performed, a source message is briefly displayed which includes an ASI message to indicate the action taken. If an Input memory with matching scan frequencies was found by ASI, its settings are used and its identity is displayed. If an interpolation was performed, the two setup memories selected for the interpolation are displayed and the resulting settings are used. If adjustments are made to settings created by the ASI feature, the new settings will NOT be saved in the current setup memory; a message is displayed to indicate this. To perform an ASI and have the adjustments saved in the current setup memory; press [**UTIL**] [**1**] [**2**] to select the ASI with Save utility.



Note: To avoid selection/use of the current Input memory settings when it is desired that Recall memories be ASR selected when a source change occurs, clear the current Input memory ([**UTIL**] [**1**] [**2**]) to reset its scan frequency settings to null values, then immediately lock the memory ([**UTIL**] [**1**] [**2**]) so that its settings cannot be modified.

For more information on ASI/ASR refer to Section 2.11.5

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When to use the ASR feature...

The ASR feature is intended for use when many different sources must share the same input (via a third party switcher, for example) or when a signal source can output several different scan frequencies (e.g., a SVGA card).

Example

A system has six different sources as shown in Figure 3-9. Source "A" is a video camera. Source "B" is a VCR. Sources "C" through "F" are various computers. All sources are connected to a 3rd party (non-Electrohome) signal switcher. The switcher is connected to projector slot 1. For each source, a Recall memory is created to store its display settings. No two sources have the same frequencies.

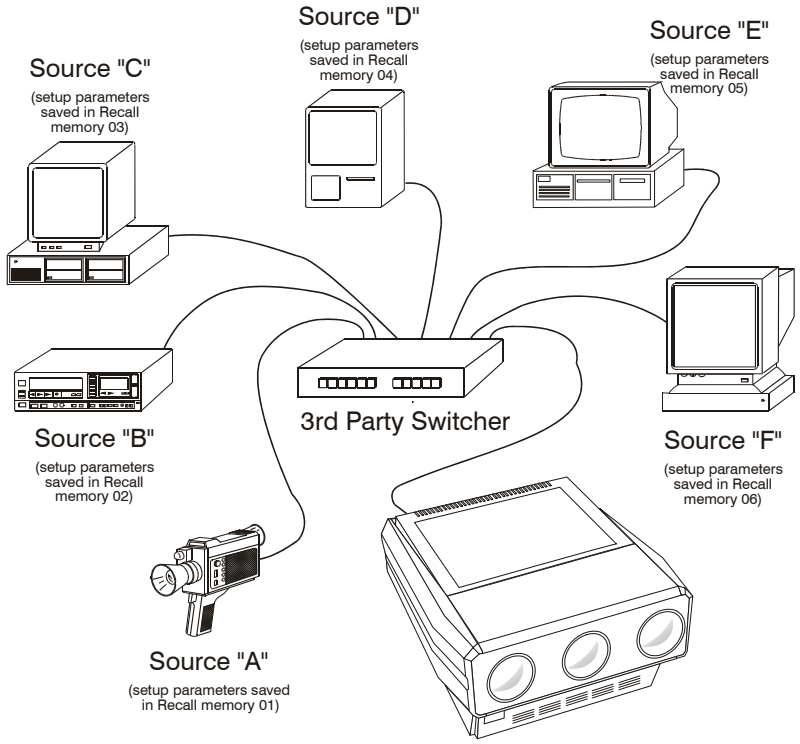


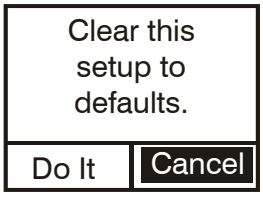
Figure 3-9. An Installation using the ASR Feature

[**UTIL**] [**1**] [**4**] is pressed to turn on the ASR feature for the projector's slot 1 input. When ASR is on and a source is selected by the switcher, the projector automatically adjusts its display settings for the new source by switching to the Recall memory set up for that source.

For additional information, see "About the MARQUEE® Sync Routing System" in Section 3.5, subsection Decoder Options.

3.7.1.5 *Clear Channel Setup **[UTIL] [1] [5]***

This utility is used to clear the current setup memory to the factory default display settings.



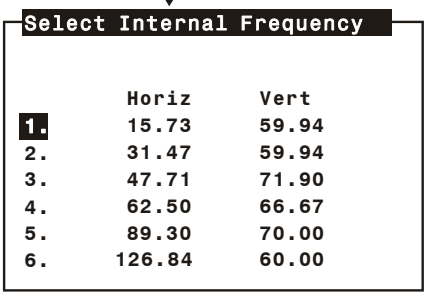
To clear the current setup memory, press [**5**] from the Source Setup menu. A dialog box is displayed. Move the cursor to "Do It" then press [**ENTER**] to clear the memory. If you press [**ENTER**] with the edit cursor on "Cancel", the clear operation is not performed. When the clear operation is complete, the Source Setup menu is returned.

Note: Clearing a setup memory does not "delete" it from the system. If the projector's 80 memory spaces are used up, and you need to delete unused memories to make room for new memories, call your dealer for assistance.

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3.7.1.6 *Select Internal Frequency [UTIL] [1] [6]*

UTIL 1 6



This utility allows you to use the projector's internal signal generator. The internal signal generator is provided to assist users and technicians during projector setup. By using the internal generator, a setup memory can be adjusted for a particular set of horizontal and vertical scan frequencies without requiring an external source. Six preset horizontal and vertical frequencies are provided.

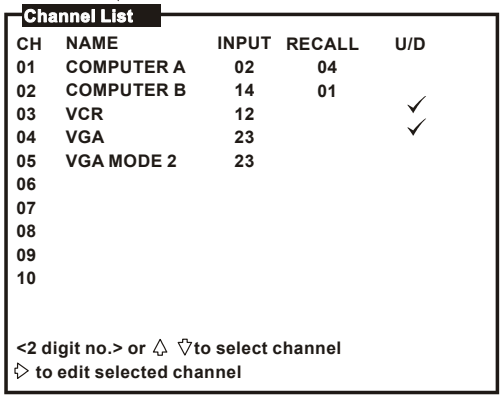
If one of the preset frequency sets closely match a source you will be using, you can set up an Input or Recall memory for the source before it is available for connection to the projector. When the source becomes available, few adjustments will be required. Another reason to use the internal generator is to improve the accuracy of the ASI feature. By setting up various memories at different scan frequencies, ASI has more information to choose from when making interpolations between setups.

To select an internal frequency, press [**6**], "Select Internal Frequency" from the Source Setup menu. The resulting menu allows you to choose the scan frequencies of the internal generator. Select one of the displayed items.

To make a selection, enter an item number or use [▲] and [▼] to move the cursor bar to the item you want then press [**ENTER**]. When a selection is made, a crosshatch test pattern is displayed. All subsequent adjustments are saved in the current setup memory. To select one of the projector's other test patterns, press [**#**]. Each press of [**#**]produces a different test pattern. To return to the current external source, press [**EXIT**] while only the test pattern is displayed.

3.7.2 Channel List [UTIL] [2]

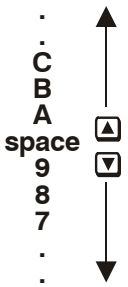
UTIL 2



The Channel List utility allows you to display and program the projector's Channel List. The Channel List is a user-programmable list of sources and projector setups. Sources added to the list can be quickly switched to and displayed by entering their assigned two-digit channel number. Channels may also be selected using the keypad's up and down arrow keys. Channel selection is described in Section 3.3, Source Selection.

To display and/or program the Channel List, press [**2**] from the Utilities menu. The initial display shows the first ten channels in the list. Up to 99 channels can be displayed. For each channel a name, input number (switcher and slot number), Recall memory number, and up/down list may be programmed.

Program a channel as follows:



When the Channel List is first displayed, the cursor is positioned in the channel number column. While in the channel number column, press [▲] or [▼] to highlight the channel you want. Alternatively, you can highlight the channel you want by entering the channel number on the keypad. Entering the channel number also allows you to select/display/edit channels beyond the first ten.

Next, press [►] to move the cursor to the Name field. While in the Name column, [▲] and [▼] change the character at the cursor position and [▲] and [▼] move the position of the cursor. Once a source name has been entered, move the cursor to the Input field by pressing [**ENTER**] or by using [►]. Edit the Input, Recall, and Up/Down (U/D) fields. See below for field definitions. To exit the channel list, press [**RECALL**] or [**EXIT**].

Note: When the cursor is positioned on an edit field, the field may be cleared by pressing [✶].

If a channel is selected and ASR is on for the same input, and the incoming frequency does not match the selected setup memories frequency, it may cause the following: ASR may be triggered, the setup memory may change and the channel number may be changed to reflect the new memory.

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Example: If Channel 4 shows input (1,3) and no recall number and input (1,3) switcher 1 slot 3 is selected and recall memory 55 is currently selected then the Source Message box will show that Channel 4 is selected unless there is another channel with input (1,3) and recall 55.

The Name Field

The Name field stores the names of the sources in the list. Source names may be up to 11 characters in length. It is recommended that source names be entered to make it easier to keep track of the sources. Source names are briefly displayed when channels are selected.

Note: Digits may be entered using the number keys on the keypad or selected using the [▲] and [▼] keys.

Note: If [✶] is pressed during name editing, all characters in the field to the right of the cursor will be cleared.

The Input Field

The Input field contains the switcher and slot number of the input to be switched to when the channel is selected. If the input is a direct projector input, the input number is a 0 followed by the projector slot number. If the input is from a switcher, the input number is a number from 1 to 9 (switcher number) followed by the switcher slot number.

The Recall Memory Field

The Recall Memory field contains the number of the Recall memory to be used when the channel is selected. If the field does not contain a number (a blank or dash is shown), no Recall memory will be used.

The Up/Down Field (U/D)

The Up/Down field specifies the channels which are accessible when using up/down channel selection (explained in Section 3.3). If the field does not contain a check mark, the channel is ignored. To enter a check mark, press a number key (0-9). To clear a check mark, press [✶].

Note: Channels should contain valid inputs. For example, do not specify switcher 1 if switcher 1 does not exist in the system.

3.7.3 Recall Memories (Listing) [UTIL] [3]

The Recall Memories utility provides a list of the Recall memories stored in the projector. (Recall memories are explained in Section **Error! Reference source not found.**). The list includes the scan frequencies of each Recall memory. A check mark (✓) is displayed in the ASR column next to the memories which ASR may use. If two or more Recall memories have identical scan frequencies, only the memory last adjusted will have a check mark.

To list the Recall Memories, press [**3**] from the Utilities menu. If more than 30 Recall memories exist, press [**ENTER**] to display the remaining memories.

UTIL 3

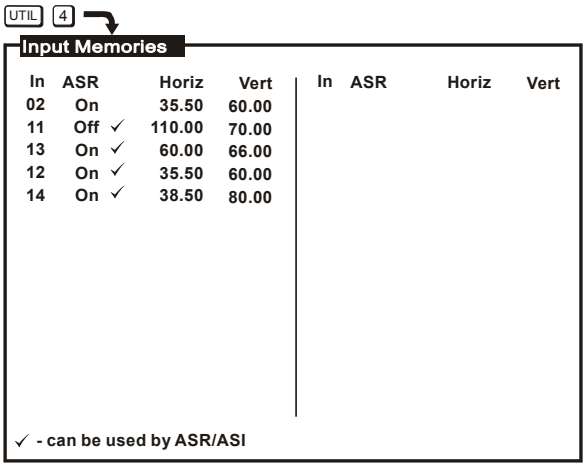
Recall Memories

Re	Horiz	Vert	ASR	Re	Horiz	Vert	ASR
01	31.50	60.00	✓	16	105.50	66.00	✓
02	50.80	66.00	✓	17	93.00	83.00	✓
03	110.00	71.90	✓	18	43.20	50.00	✓
04	45.56	75.00	✓	19	24.00	60.00	✓
05	50.00	60.00	✓				
06	67.50	70.00	✓				
07	55.00	60.00	✓				
08	54.00	66.00	✓				
09	69.10	71.90	✓				
10	31.50	60.00					
11	110.00	60.00	✓				
12	94.00	70.00	✓				
13	96.50	66.00	✓				
14	54.00	71.90	✓				
15	28.75	75.00	✓				

✓ - can be used by ASR.

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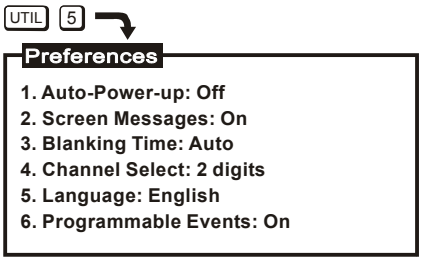
3.7.4 Input Memories (Listing) [UTIL] [4]



The Input Memories utility provides a list of the Input memories stored in the projector. (Input memories are explained in Section 3.4.1). The list includes the scan frequencies of each Input memory. The ASR column indicates if the ASR feature is on or off for each memory. A check mark (✓) is displayed in the ASR column next to the memories which may be chosen for use by ASI during an ASR. If two or more Input memories have identical scan frequencies, only the memory last adjusted will have a check mark. (ASR is explained in Section 3.7, Utility Features.)

To list the projector's Input Memories, press [**4**] from the Utilities menu. If more than 30 Input memories exist, press [**ENTER**]to display the remaining memories.

3.7.5 Preferences [UTIL] [5]



The Preferences utility allows you to set various preferences which affect the behaviour of the projector.

Six preference items are displayed with their current settings. Select an item to change its setting. (Defaults shown.)

3.7.5.1 *Auto Power-up (On/Off) **[UTIL] [5] [1]***

If Auto Power-up is set to On, the projector automatically powers itself up when line power is removed then re-applied. For example, if power is temporarily interrupted due to a storm, the projector will automatically power back up when power returns. If Auto Power-up were set to Off, the projector would require a manual power-on.

> **Note:** Upon automatic power-up, the most recent display adjustments may be lost if they were not yet saved in the current setup memory.

3.7.5.2 *Screen Messages (On/Off) **[UTIL] [5] [2]***

The Screen Messages preference allows you to choose whether screen messages will be displayed, such as slidebars, error and warning messages, the [**SOURCE**]. [**RECALL**], [**PROJ**], and [**MUTE**] messages, and the [**PIC**] and [**GEOM**] menus. For most applications, it is recommended that Screen Messages be left on. However, if during a presentation you want to make subtle display adjustments without drawing attention to your actions, Screen Messages should be set to Off.

> **Note:** It is still possible to display a screen message, such as a slidebar, while Screen Messages is set to Off. To do this, press [**RECALL**] just before selecting the function.

3.7.5.3 *Blanking Time (Auto, 0.5s to 5.0s) **[UTIL] [5] [3]***

When a source is selected, the projector blanks the screen for a short period of time. You can set the blanking time to Auto, which allows the projector to determine the best blanking time automatically, or program a particular blanking time. Time periods from 0.5 second to 5.0 seconds are available. Select the Blanking Time item in the menu to change its setting.

3.7.5.4 *Channel Select (1 Digit Only, 2 Digits, 1 or 2 Digits) **[UTIL] [5] [4]***

There are three different ways the projector can respond to channel numbers entered during direct channel selection: 1 Digit Only, 2 Digits, and 1 or 2 Digits. Select the Channel Select item in the menu to change its setting.

"1 Digit Only" allows only one digit to be entered after which the projector switches immediately to the selected channel. This method can select only channels 1 to 9. "2 Digits" requires two digits to be entered. Both digits must be entered within 5 seconds. Channel 1 is entered as 01, etc.

"1 or 2 Digits" allows either one or two digits to be entered. If a second digit is not entered within 5 seconds of the first, the first digit is accepted as the channel number.

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3.7.5.5 *Language (English, French, German, Spanish, Italian) **[UTIL] [5] [5]***

Menus and text can be displayed in English, French, German, Spanish or Italian. To change the language, select the Language item in the menu until the desired language is shown.

3.7.5.6 *Programmable Events (On/Off) **[UTIL] [5] [6]***

This item allows you to enable or disable the Programmable Events feature. If Programmable Events is set to On, the events flagged as "ENABLED" in the Programmable Events feature box ([**UTIL**] [**7**] [**2**]) are automatically executed at the dates and times specified. If Programmable Events is set to Off, programmable event execution is disabled.

(For information about event programming, refer to the Clock/Events entry in this subsection.)

3.7.6 Remote Control Options [UTIL] [6]

UTIL 6

Remote Control Options

1. Keypad Options
2. Communication Setup

Remote Control Options allow you to modify the projector's communication settings for operation with remote keypads and control devices.

To select the Remote Control Options menu, press [**6**] from the Utilities menu. Two selection items are displayed: Keypad Options and Communication Setup.

UTIL 6 1

Keypad Options

1. IR Sensor: A or B
2. Remote Jack: A or B

<ENTER> or <no.> cycles through protocols or Off

WARNING:
If both IR sensor and remote jack are disabled, only the built-in keypad can be used to re-enable.

3.7.6.1 *Keypad Options **[UTIL] [6] [1]***

Press [**1**] from the Remote Control Options menu to display the Keypad Options menu. Use the menu to select the keypad protocol type the projector will respond.

3.7.6.1.1 *IR Sensor*

This setting determines how the projector responds to IR remote keypads aimed at the projector's built-in IR sensor. Select the IR Sensor menu item to change the current setting. Four settings are available: A or B, A, B, and Off. If set to A, the projector will only respond if the keypad is set for protocol A operation. If set to B, the projector will only respond if the keypad is set for protocol B operation. If set to "A or B", the projector will respond to both protocol settings. If set to Off, the projector will not respond to IR keypad commands.

The reason for having two protocols available is to allow two projectors in the same room to be independently controlled by separate remote keypads. See Figure 3-10.

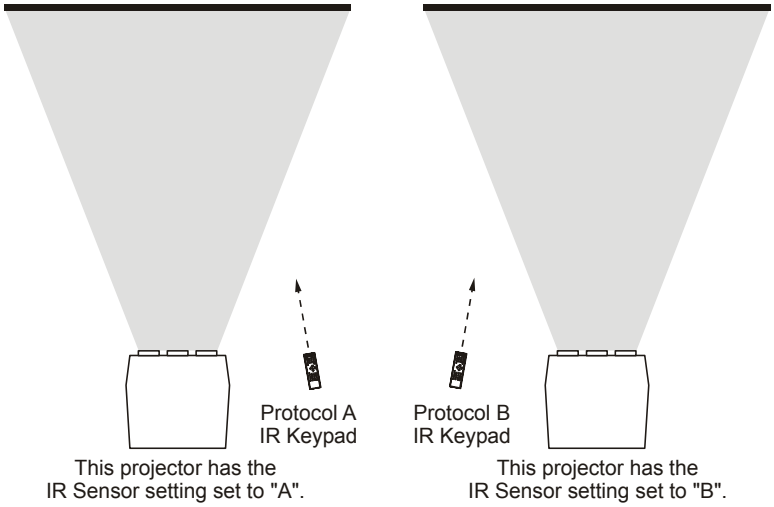


Figure 3-10. Independent IR Keypad Control

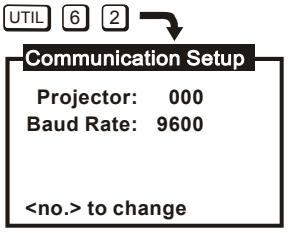
CAUTION: The keypad you are using may become inoperative if its protocol does not match its setting in the menu.

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3.7.6.1.2 *Remote Jack*

This setting determines how the projector responds to devices connected to the REMOTE jack on the projector's rear panel. This jack can accept input from a wired keypad or remote IR sensor. Four settings are available: A or B, A, B, and Off. If set to A, the projector will only respond if the keypad using the REMOTE jack is set for protocol A operation. If set to B, the projector will only respond if the keypad using the REMOTE jack is set for protocol B operation. If set to "A or B", the projector will respond to both protocol settings for keypads using the REMOTE jack. If set to Off, the REMOTE jack is disabled.

3.7.6.2 *Communication Setup **[UTIL] [6] [2]***



Press [**2**] from the Remote Control Options menu to set the projector identification number and the RS-232 serial port baud rate.

Projector

This item contains the projector's identification number. The projector's identification number allows IR remote control of a single projector in a multi-projector installation. To set the projector identification number, select item 1 then enter a three digit number from 000 to 999. If there is only one projector in the installation, 000 is the recommended projector number. For more information about multi-projector control, refer to Section 3.8, Multi-projector Functions.

Baud Rate

This item contains the projector's RS-232 serial port baud rate. The RS-232 serial port, located at the back of the projector, provides a means to control the projector using a computer or another projector. The serial port baud rate setting must match the operating baud rate of the controlling device. Baud rate may be set to 300, 600, 1200, 2400, 4800, or 9600. To set the baud rate, select item 2 from the menu until the desired baud rate is displayed.

Note: If unsure of your computer's baud rate setting, refer to the system documentation provided with the computer.

Note: For information about cable connections between devices, refer to Appendix C.

3.7.6.3 *Clock/Events **[UTIL] [7]***

Clock/Events allows you to set the projector's real-time clock/calendar and program up to twelve individual projector control events to be automatically executed at specified times or intervals.

To select the Clock/Events menu, press [**7**] from the Utilities menu. Two selection items are available: Set Clock and Programmable Events. The current time and date setting is displayed at the bottom of the menu.

3.7.6.3.1 *Set Clock **[UTIL] [7] [1]***

Press [**1**] from the Clock/Events menu to display the Set Clock menu. Use the menu to set the current time and date and their format.

Time

To edit the time stored in the real time clock/calender, press [**1**] from the Set Clock menu. This puts you in time editing mode. A flashing cursor is positioned at the first digit of the time field. Use the number keys to enter the current time (hours and minutes), using the format displayed in item 3. For 12 hour format, enter "01" to "12" for the hours and use [▲] or [▼]to toggle between a.m. and p.m.. For 24 hour format, enter "00" to "23" for the hours. Enter "00" to "59" for the minutes. When the proper time has been entered and is displayed, press [**ENTER**] to accept the changes and leave time editing mode.

Note: On entry of the last digit of minutes, you automatically leave time editing mode

Note: Years from 1990 to 2089 are assumed and handled.

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Date

To edit the date stored in the real time clock/calendar, press [**2**] from the Set Clock menu. This puts you in date editing mode. A flashing cursor is positioned at the first digit of the date field. Use the number keys to enter the current date per the format displayed in item 4 (month/day/year, day/month/ year or year/month/day). When the proper date has been entered and is displayed, press [**ENTER**] to accept the changes and leave date editing mode.

On entry of the last digit, you automatically leave date editing mode.

Time Format

Press [**3**] from the Set Clock menu to change the time display format. The format may be 12 hours (12h) or 24 hours (24h). All references to time by the projector will use the format displayed (this includes the time displayed in item 1.)

Date Format

Press [**4**] from the Set Clock menu to change the date display format. The format may be month/day/year (MM/DD/YY), day/month/year (DD/MM/YY) or year/month/day (YY/MM/DD). All references to date by the projector will use the format displayed (this includes the date displayed in item 2).

3.7.6.4 *Programmable Events **[UTIL] [7] [2]***

Press [**2**] from the Clock/Events menu to display the Programmable Events feature box. The Programmable Events feature box allows you to program a list of up to twelve events to occur at specified times and intervals. For example, you can program the projector so that at the same time each day, standby mode is turned off and Source 01 is displayed. See the example below.

Each line contains a type of event, a frequency of occurrence (interval), a start time and an enable/disable flag.

To program or modify an event, first use the arrow keys to move the cursor to the field you want to modify (for example, the Type field). Next use [**ENTER**] and/or the number keys to modify that field. Details for field modification are provided on the following pages. Modify each field in the row as necessary making sure all fields for the event are valid and logical.

When all modifications have been made, press [**EXIT**] to display the Exit dialog box. When the Exit box is first displayed the cursor bar is positioned on "Save". Press [**ENTER**] or [**EXIT**] to save the new changes. To return to the Programmable Events feature box, move the cursor bar to "Continue Change" then press [**ENTER**]. To discard your changes, move the cursor bar to "No Save" then press [**ENTER**] or [**EXIT**]. [**ENTER**] returns you to the Clock/Events menu. [**EXIT**] returns you to presentation level.

The Type Field

The Type field shows the event to take place. With the cursor positioned on the Type field press [**ENTER**] to cycle through the available events. Press [✶] to clear the entire event line. Events are described in Table 3-1 below.

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Table 3-1. Type Field Events

EVENT	DESCRIPTION	NOTES
None	No programmed event.	
Standby On	Turn Standby mode on.	
Standby Off	Turn Standby mode off.	
Power Off	Turn Power off.	
channel selection	Select a channel from the Channel List.	* Use the number keys to enter the channel#.
source selection	Select an input.	* Use the number keys to enter the switcher# & slot#.
ACON (Full)	Perform an ACON (full) auto-convergence.	ACON option is required.
ACON (Touchup)	Perform an ACON (touchup) auto-convergence.	ACON option is required.
ACON (Center Only)	Perform an ACON (center only) auto-convergence.	ACON option is required.
Channels Up	Switch to the next available channel from the Channel List.	Cycles back to the first channel after last channel is selected.
Channels Down	Switch to the prior available channel from the Channel List.	Cycles to the last channel after the first channel is selected.
Warm up	Perform a warm-up sequence: 1. Turn Standby mode off (if on). 2. Set Contrast to 20%, Brightness to 50%, HSize to 80%, VSize to 80% and master static focus to 100%. 3. Display white field for 15 min. 4. Restore original display settings.	Exit from warm-up occurs after 15 minutes or when the EXIT key is pressed. Other keys which stop warm-up are PROJ, *, UTIL, CONV and RECALL. When warm-up stops, all original display settings are restored.

* Only valid entries are accepted.

The Interval Field

The Interval field shows a date or interval at which the event is to take place. With the cursor positioned on the Interval field press [**ENTER**] to cycle through the available options. See Table 3-2 below for details.

Table 3-2. Interval Field Options

EVENT INTERVAL	ACTIVATES THE EVENT	NOTES
specific date	At a specific calendar date	* Use number keys for date entry per the format defined by the Set Clock utility.
Daily	Every day.	
Mon-Fri	Monday through Friday.	
Sat-Sun	Saturday and Sunday.	
Mondays	Monday.	
Tuesdays	Tuesday.	
Wednesdays	Wednesday.	
Thursdays	Thursday.	
Fridays	Friday.	
Saturdays	Saturday.	
Sundays	Sunday	
min./sec. interval	Repeatedly at a specified time interval, in minutes and seconds, starting at the time set in the Start field. (Applies to Channel Up/Down events only.)	* Use the number keys to enter minutes and seconds. The seconds interval must be an even number, e.g., 02, 04, 06, etc.

* Only valid entries are accepted.

The Start Field

The Start field shows the start time of the event. With the cursor positioned on the Start field use the number keys to enter the start time. Use the notation previously defined by the Set Clock utility (12 hour or 24 hour). If using a 12 hour clock, press [**ENTER**] to toggle between a.m. and p.m.

Note: Only valid entries are accepted. For example, if "4" is entered as the first digit of the Start time it will not be accepted. The first digit must be either "0" or "1" when using a 12 hour clock, and "0", "1" or "2" when using a 24 hour clock.

The Enabled Field

The Enabled field allows you to enable or disable a programmable event. When enabled, the event is performed as programmed. When disabled, the programmed event is ignored. A check mark indicates that the event is enabled. With the cursor positioned on the Enabled field press [ENTER] to toggle display of the check mark.

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General Notes about Programmable Events

1. All events are ignored if Programmable Events is set to Off in the Preferences menu ([**UTIL**] [**5**]).
2. The projector must be turned on for programmable events to take place.
3. Be careful not to schedule two events so close to each other such that the second event is scheduled to begin before the first event is complete; otherwise the second event may be ignored. For example, do not schedule an event to take place one minute after a full ACON auto-convergence. A full ACON convergence takes longer than one minute to complete.
4. If the projector is not at presentation level when an event is scheduled to begin, that event will be ignored unless presentation level is returned within the minute that that event is to take place.
5. An error or "invalid" message is temporarily displayed at the bottom of the feature box when an entry is invalid or does not make sense.
6. "Error" in an Enabled field indicates an invalid entry for that event.
7. Events scheduled at the same time are performed in the order listed in the Programmable Events feature box. Events never occur simultaneously.

About Channel Up/Down Events...

Channel Up/Down events are handled differently than other events. A Channel Up or Channel Down event is continuously repeated at the time interval set by the Interval field. The process begins at the start time set by the Start field. This feature is provided for applications such as surveillance or status display systems where multiple sources are sharing one projection display. For example, a bus terminal may use this feature to display a number of different bus schedules, each displayed for ten seconds at a time.

To use this feature, a number of video sources must be fed to the projector or a connected switcher. Each source is assigned to a channel in the Channel List. The U/D status of each of these channels must be enabled in the list - see the Channel List entry in this section for details. Within the Programmable Events feature box, the event type is set to Channel Up or Channel Down. The interval and start time is entered and the event is enabled by setting a check mark in the Enabled field. When the event is enabled and the start time is reached, the projector begins cycling through the enabled channels in the Channel List. Each channel-defined source is displayed for the set interval period then the next lower or higher channel enabled in the Channel List is displayed. This continues until the event is disabled or the projector is turned off.

Note: If during Channel Up/Down cycling you press a key to make an adjustment or change a projector setting, the channel cycling process pauses until you return to presentation level. If you manually select a different channel, channel cycling will resume from that channel.

3.8 Multi-projector Functions

In a multi-projector installation it is usually desired to have a single IR keypad control all the projectors in the system. This section explains the special control functions available for such installations.

3.8.1.1 *The Projector*

The Projector function allows you to select which projector in a group will respond to IR keypad commands. To use this function, each projector in the installation must first be assigned a unique projector number. Projector numbers are assigned through the Communication Setup menu which is accessed by pressing [**UTIL**] [**6**] [**2**] on a built-in keypad or a wired remote keypad. Once each projector has its own unique projector number, projectors in the installation can be individually controlled using the same IR keypad.

To select a projector to solely respond to commands from an IR keypad, press [**PROJ**] followed by the projector's identity number. The specified projector will be the only projector which will respond to the keypad.

To enable ALL projectors to listen to the IR keypad, press [**PROJ**] [**✶**].

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Section 4

MAINTENANCE

4.1 Warnings and Guidelines

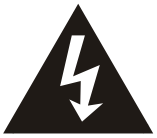
The MARQUEE® projection system is CSA approved and is designed for safe and reliable operation. However, safe operation cannot simply be assured by design; installers, maintainers, and users must maintain a safe operating environment for the system. This section covers warnings and guidelines which promote the safe usage of the projector. Please read through and understand these warnings and guidelines.

4.1.1 Labels and Markings

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



The exclamation point within the equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the projector.



The lightning flash with arrowhead symbol, within the equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the projector's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

4.1.2 Projector Location

Operate the projector in an environment which meets the operating range specifications in 0. Do not operate the projector close to water – for example, near a swimming pool.

Do not place the projector on an unstable cart, stand or table. If the projector is to be ceiling mounted, only use an VDCDS approved ceiling mount fixture.



The projector and cart combination should be used with care. Quick stops, excessive force, and uneven surfaces may cause the projector and cart combination to overturn.

4.1.3 Power Cord and Attachments

Only use attachments or accessories recommended by VDCDS. Use of others may result in the risk of fire, shock or personal injury.

Do not allow anything to rest on the power cord. Locate the projector where the cord cannot be abused by persons walking on it or objects rolling over it.

Operate the projector at the voltage indicated on the line voltage indicator. 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 the outlet, contact an electrician to have the outlet replaced. Do not defeat the safety purpose of the grounding-type plug.

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4.1.4 Ventilation Slots

Slots and openings in the projector provide ventilation. To ensure reliable operation of the projector and to prevent overheating, these openings must never be blocked or covered. The projector should never be placed near or over a radiator or heat register. The projector should not be placed in an enclosure unless proper ventilation is provided.

Do not push objects of any kind into the projector through the ventilation openings. They may touch dangerous voltages or short-out parts 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.

4.1.5 Servicing

If any of the following conditions exist, unplug the projector from the power outlet and refer service to qualified service personnel.

- The power cord has been damaged.
- Liquid has been spilled into the projector.
- The projector has been exposed to excessive moisture.
- The projector does not operate normally.
- The projector has been dropped or the case has been damaged.
- Projector performance has deteriorated.

Do not attempt to service the projector yourself. All servicing must be performed by a qualified VDC Display Systems service technician. If replacement parts are required, it is important that only VDC Display Systems approved parts are used. Other parts may result in fire, electric shock or risk of personal injury.



WARNING: THE PROJECTOR IS INTERNALLY SHIELDED TO PROTECT THE USER FROM EXPOSURE TO SOFT X-RAY RADIATION. IMPROPER SERVICING OR SHIELD REMOVAL MAY RESULT IN PERSONAL INJURY.



CAUTION: In rare instances, flashing lights can trigger an epileptic seizure. During ACON usage persons with epilepsy should look away from the screen.

4.2 Cleaning

Clean the projector when required. Before cleaning, always unplug the projector from the power outlet.

4.2.1 Lens Cleaning

To avoid the risk of scratching the lenses, only clean the lenses if absolutely required. A small amount of dust on the lenses will have very little effect on picture quality. If the lenses must be cleaned, use a DRY soft cotton cloth. Rub gently in a circular motion.

4.2.2 Case Cleaning

Clean the case with a soft dampened cloth. Use a mild commercial cleaner. Do not use liquid or aerosol cleaners.

4.2.3 ACON Cleaning

The lens on the ACON Locator Assembly is very tolerant to dust and should only be cleaned if ACON performance is affected. Cleaning of the lens (if required) must be performed with great care. Use a DRY soft cotton cloth. Rub gently in a circular motion.

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4.3 Trouble-shooting

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

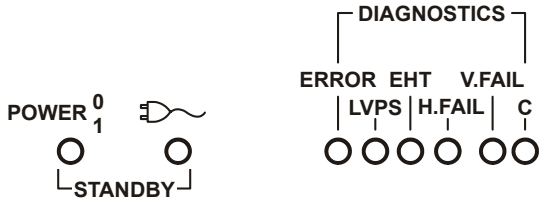


Figure 4-1. Rear Panel LEDs

4.3.1 Projector Response Problems

Refer to the following table if the projector is not responding to keypad commands.

Table 4-1. Projector Response Problems

Symptom	Cause/Remedy
The projector will not turn on when [**POWER**] is pressed. All back panel lights are off. See Figure 4-1.	• The power cord may be disconnected. Check the power cord connection at the wall outlet and the projector.
The projector will not turn on when [**POWER**] is pressed. Only the amber LED on the back panel is lit.	• [**POWER**] may not have been held down long enough to initiate projector power-up. Hold down [**POWER**] for at least one second to initiate power-up. • If using an IR keypad, ensure it is pointed at the screen or the front of the projector. If the keypad is configured for built-in or wired usage, make sure it is properly connected to the projector. • If using an IR keypad, the batteries may need replacement. Remove the batteries from the battery compartment on the back side of the keypad. Install new batteries as described in the Section 2.3. • The keypad may be damaged. If the back panel C LED does not flash when [**POWER**] is pressed, the projector is not responding to the keypad. Try using a different keypad. • If using a remote keypad (IR or wired), the keypad's protocol (A or B) might not match the projector's IR protocol setting. Refer to Section 2.3, Hardware Setup for instructions on how to check and change the keypad's protocol setting. However, if the projector's setting is "Off", the remote keypad will not respond. You may have to configure the keypad for built-in operation to gain control of the projector.
The projector will not turn on when [POWER] is pressed. One or more of the following red LEDs are lit: ERROR, LVPS, EHT, H.FAIL, V.FAIL.	• An internal failure has occurred. Projector servicing may be required. Contact your reseller or VDCDS for assistance.

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Symptom	Cause/Remedy
The projector's green *POWER LED* is lit and all other LEDs are off yet no picture is displayed.	• Contrast or brightness may be set too low. Press [✶]to activate the status screen. If there is no display, press [✶]then increase contrast ([**CONT**]) and brightness ([**BRITE**]) until the crosshatch is displayed. Adjust contrast and brightness to their proper settings. • The room lighting may be too bright. • The projector may be too far from the screen. Move the projector closer to the screen. The maximum throw distance is 25 feet. • Were the lens covers accidentally left on? Remove the lens covers.
While in use, the projector suddenly become non-responsive to keypad commands, even when using a built-in keypad.	• Although rare, it is possible that an internal software error occurred which has put the software in a non-ending loop. This might occur if a power spike interfered with the projector's internal processor system. To fix this problem, leave the projector plugged in and using a small screw driver or ball point pen, press the recessed RESET button on the back panel. This operation will reset the projector's processor without affecting memories or display settings.
The projector does not respond to the [**STBY**] or [**MUTE**] keys.	• You may not be holding down the key long enough to initiate the action. Like [**POWER**], [**STBY**] and [**MUTE**] must be pressed down for at least one second.
The projector does not respond to an IR Remote keypad.	• The projector's IR keypad listening status may be turned off. Press [**PROJ**] [✶]to turn on the listening status of all projectors, or press [**PROJ**] followed by the projector's identity number to turn on the listening status of the projector you want to respond. • The keypad's protocol (A or B) might not match the projector's IR protocol setting. Refer to Section 2.3, Hardware Setup for instructions on how to check and change the keypad's protocol setting. However, if the projector's setting is "Off", the remote keypad will not respond. You may have to configure the keypad for built-in operation to gain control of the projector. • The IR keypad may be too far away from the projector or screen. Use the IR keypad closer to the projector or screen. Also ensure the keypad is pointed directly at the screen or the front of the projector. • The viewing path between the IR keypad and the projector (or screen or switcher) may be restricted. Ensure there is a clear line-of-sight between the keypad and the projector (or screen or switcher). • The sensor may be disabled per the Keypad Options menu ([**UTIL**] [**6**] [**1**]). • The batteries in the IR keypad may be weak. Replace the batteries in the keypad. See Section 2.3 for battery installation instructions. • There may be unusual lighting conditions in the room which effect IR keypad operation. Determine if such conditions exist and correct.
The display is jittery or unstable.	• The horizontal or vertical scan frequency of the input signal may be out of range. Check the specifications in 0 for scan frequency ranges. • Synchronization signals from the source may be inadequate. Correct the source problem. • The input signal type may not match the signal type required by the input module. Install the correct input module/interface to match the signal type of the source.

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Symptom	Cause/Remedy
The upper portion of the display is waving, tearing, or jittering.	• This sometimes occurs when the source is a VCR or video signal. Change the sync mode by selecting the fast/slow sync option from the Picture Adjust menu ([**PIC**] [**5**]).
The upper or lower portions of the display are cut off.	• A top or bottom blanking adjustment may be required. Select the appropriate blanking adjustment option from the Picture Adjust Menu ([PIC]) then adjust the amount of blanking. • A 0% slidebar level indicates no blanking. • A phase adjustment may be required. Select Phase from the Picture Adjust menu ([PIC]). Adjust phase so that the entire picture is visible and centered.
One side of the display is cut off.	• A left or right blanking adjustment may be required. Select the appropriate blanking adjustment option from the Picture Adjust menu ([**PIC**]) then adjust the amount of blanking. A 0% slidebar level indicates no blanking. • A phase adjustment may be required. Select Phase from the Picture Adjust menu ([**PIC**]). Adjust phase so that the entire picture is visible and centered. • The retrace time of the projector may be longer than the horizontal blanking time of the signal. Press [**UTIL**] [**1**] [**8**] to change projector retrace time to Short.
Transitions between colors are fuzzy.	• Convergence may require adjustment. Perform a convergence on the selected source. • The projector may not be optically aligned for the installation. Has the throw distance changed significantly since the last optical alignment? If so, have the projector re-aligned. Refer to Section 2.9, Optical Alignment.
The display is very faint.	• Contrast or brightness settings may be set too low. • The projection room may be too bright. Lower the intensity of projection room lighting. Reduce light reflections as much as possible. • The projection room walls and ceilings may be too reflective. Reflective ceilings, walls, and floors should be kept to a minimum. The best projection rooms are dark with matte finishing. • The projector may be too far from the screen. • The location of the audience with respect to the screen may not be adequate. Make sure the audience is within the viewing angle set by the projector and screen position, and the screen type. • The phase setting may require adjustment. Select Phase from the Picture Adjust menu ([**PIC**]) then determine if adjustment improves the display. • The source may be double terminated. Ensure the source is terminated (75Ω) only once.
The display appears to be folded.	• The phase setting may require adjustment. Select Phase from the Picture Adjust menu ([PIC]) then determine if adjusting the phase improves the display.
The display is reversed or upside down.	• The projector scan configuration is not set correctly for the installation type. Refer to Section 2.3, Hardware Setup, to set the projector's scan configuration.

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Symptom	Cause/Remedy
The display is not sharp or "clean".	• Display adjustment may be required. Adjust the brightness, contrast, focus, and detail settings. • Is a BNC T connector being used? Use a distribution amplifier to boost signal levels. • Is the input signal properly terminated? • The screen size may be too large. As screen size increases, magnification increases which reduces brightness. This then reduces the contrast ratio which affects legibility. Sharp defined edges become soft and fuzzy. • The source input signal may be of low quality.
Display quality seems to drift (from good to bad, bad to good, etc.).	• The operating temperature of the projector may not be constant. Is the projector close to heating and/or air conditioning vents? The ambient temperature after warm-up should be kept constant below 35 °C (95 °F). Make sure none of the projector ventilation slots are obstructed. • The source input signal may be of low quality. • The horizontal or vertical frequency of the input may have changed at the source end. For the selected source, set ASR to on. The projector will then try to use display parameter settings which are best matched for the source.
Colors on the display are not accurate (when using the MARQUEE® Multi-standard Decoder).	• Color and tint settings may require adjustment.
The display is not rectangular in shape.	• The geometry settings may not be set correctly. Adjust the display geometry settings. (Press [**GEOM**] for the Geometry menu).
The display is "noisy".	• The input may not be terminated. Make sure the input is terminated (75Ω). If it is the last connection in a loop-through chain, it should be terminated at the projector (only). • The signal cables carrying the input signal may be of poor quality. Use only good quality signal cables. VDCDS cables are recommended. • 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. • There may be interference from other equipment. Keep the projector away from devices which radiate electromagnetic energy such as motors and transformers. Common sources of these are slide projectors, speakers, power amplifiers, elevators, etc. Keep 35 mm slide projectors at least 2 feet away from the projector. • The input signal may be of poor quality. • If the source is a VCR or off-air broadcast, detail may be set too high
Modified display settings are not being saved in the active setup memory.	• Is the active setup memory locked? Press [**SOURCE**] to display the Source Message. If a  is displayed, unlock the setup. (Press [**UTIL**] [**1**] [**3**]) • ASR is set to On for the current input memory and an ASI was automatically performed due to mismatched scan frequencies.

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Symptom	Cause/Remedy
The display is OK when displaying the crosshatch test pattern ([✶]) or status screen ([✶]) but when trying to display a source, nothing is visible.	• You may not be selecting the source correctly. Refer to Section 3.3, Source Selection, for source selection instructions. • The source may not be connected properly. Verify that the input source is active and check the cables between the source and the projector.

4.3.2 ACON Errors

If the projector includes the optional ACON feature and an error message occurs during automatic convergence or Learn Screen, proceed through the following checklist.

- Is the ambient lighting appropriate for projection? A number of problems could result during automatic convergence and/or Learn Screen if the ambient lighting is too bright. Dimmed incandescent lighting is preferred over fluorescent lighting. If error messages such as "Sensor Lock Failed: Low Signal" or "Learn Screen Failed: Insufficient Magnitude" result, lower the ambient lighting, especially at the projection screen.
- Is the view path of the Locator Assembly completely unobstructed? The view path between the photosensor lens of the Locator Assembly and the entire screen must be completely unobstructed for proper ACON operation.
- Has a Learn Screen been performed since the last projector configuration change? Learn Screen must be performed if:
- The throw distance has changed since the last time Learn Screen was performed.
- The ACON Locator Assembly mounting position has changed since the last time Learn Screen was performed.
- The screen type has changed.
- The source has changed.

If the problem cannot be resolved, call your reseller or VDCDS for servicing.

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Section 5

SPECIFICATIONS (8500 ULTRA / 8500LC ULTRA / 9500LC ULTRA)

Optics

- High definition Fl. 1 hybrid lens
- 10 line pairs per mm resolution
- MARQUEE® 8500 Ultra electromagnetic focus CRTs
- MARQUEE® 8500LC/8510LC Ultra liquid coupled electromagnetic focus CRTs
- MARQUEE® 9500LC Ultra liquid coupled electromagnetic focus CRTs
- Scheimpflug adjustment for top, bottom and side-to-side focus

Resolution

- 2500x2000 addressability
- MARQUEE® 8500/8500LC/8510LC Ultra 1600x1200 ANSI pixels
- MARQUEE® 9500LC Ultra: 2048x1536 ANSI pixels
- Adjustable 6-pole magnets for improved spot shape and reduced flare.

Brightness

- MARQUEE® 8500 Ultra/8500LC Ultra/ 8510LC Ultra: 225 ANSI lumens
- MARQUEE® 9500LC Ultra: 260 ANSI lumens (240 with filter on green: 900-1300 peak lumens)

ASR/ASI

- The projector will automatically update all parameters, including convergence contrast, brightness, keystone, phase, etc., when a new source is detected. The set-up is taken from a matching memory or interpolated from two adjacent memories.

Video Circuits

- 0.5 to 1.0 volts p-p, 75 ohms +/-1 % terminated
- Circuitry for improved video performance and gray-scale tracking MARQUEE® Ultra
- 150 MHz bandwidth (-3dB); (accommodates 3 nanosecond pixels and digital dock rates over 300 MHz),
- Keyed clamp, better than 1 % accuracy

Sync and Deflection Circuits

- Input level: 0.3 to 5.0 volts pp., 75 ohms terminated

Geometry

- Rectilinear accuracy: 1.0 % maximum of picture height
- Horizontal Linearity: 2.0 % maximum
- Vertical Linearity: 1.0% maximum
- Top and bottom keystone control
- Vertical and horizontal skew control
- Vertical and horizontal bow control
- Special Extended Geometry Distortion Option available

Power Requirements

- 90 VAC to 264 VAC universal input
- Power 650 watts maximum
- Line frequency 50 to 60 Hz nominal
- Power factor corrected

Image Shifter (optional)

- This interface moves the image slowly on the CRT phosphor surface to reduce static image

Control Features

- Multi-language software (user selectable)
- Built-in set-up tutorials
- 5 built-in test patterns
- Programmable Events and Real Time Clock
- Menu driven interface with on-screen help
- Auto power-up after interruption
- Internal frequency generator

Scope of Supply

- 1 IR multi-use, backlit, full function keypad.
- 1 Wired internal multi-use, backlit, full function keypad
- Users manual
- 10' AC line cord
- Tool Kit

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Display

- Electronic geometry circuits separately correct top, bottom and sides for flat, curved or rear screen applications from 60" to 25' (1.7m to 7.6m) diagonal, depending on lens options
- Keystone circuitry to correct pictures for angles up to +/- 15 degrees vertically from screen axis
- Color temperature adjustment for precise set-up
- Independent R, G and B sub-brite controls via remote control or RS-232 for improved uniformed black levels
- S and C vertical and horizontal linearity controls
- Top, bottom, and side blacking
- MARQUEE® Ultra projectors have 3D image capability with optional P43 short persistence phosphor.
- MARQUEE® Ultra has 9 zone electronic astigmatism correction and 8 zone contrast modulation control
- ACON II Automatic Convergence, an optional accessory, aligns the three CRTs to a sharp image in less than three minutes with three keystrokes
- ACON II has the ability to automatically converge two stacked projectors
- Automatically switches to separate Sync, composite sync or sync on green. Separate Sync and composite sync is automatically accepted in either polarity. (Sync on green limited to 180 Hz
- Smartlock™ processing circuitry for quick lock-in and ultra steady images

Vertical Deflection

- Frequency range: 39.5 Hz to 185 Hz. Size automatically regulated over frequency range and electronically adjustable over a 115 % range. Retrace time: less than 300 microseconds

Horizontal Deflection

- Frequency range: MARQUEE® Ultra Series: 30 kHz to 152 kHz (15-152 kHz with optional multi-decoder)
- Size automatically regulated over frequency range. Retrace time compatible with signals having horizontal blanking times below 1.5 microseconds

Inputs/Outputs

- Built-in RGB input, with stereo audio input. Optional input modules can install in interface slot
- Stereo audio inputs on all input modules, with audio-follow-video switching
- Built-in RS232 for computer control, with loop through for connection of multiple projectors
- HDTV compatible with optional interface module
- Stereo audio outputs with volume control

Contrast Modulation (Optional)

- 9-zone contrast modulation w/fixed center reference for optimal intensity uniformity

Gamma Correction (Optional)

- Gamma correction circuitry provided for enhanced low-level detail for night training simulation and grey-scale tracking

Maximum Operating Range

- Temperature: 0° to 35" (32" to 95°F)
- Altitude: 3000 m (0 to 10,000 ft)
- Heat Dissipation:. 2450 BTU/HR (approx.)
- Humidity: 0 to 90 % non-condensing
- Storage Temperature: -30° to 65"C (-22" to 149"F)

Weight

- MARQUEE® 8500 Ultra 65 kg/143 lbs (shipped) 89kg/196 lbs
- MARQUEE® 8500LC Ultra 80 kg/176 lbs (shipped) 104 kg/229 lbs
- MARQUEE® 9500LC Ultra 80 kg/176 lbs (shipped) 104 kg/229 lbs

Optional Accessories Available

- Interface Modules
- MARQUEE® Case/Power Supply
- Interconnecting cable
- Synchronization cable
- MARQUEE® Signal Switcher
- Wired keypad
- Gamma Correction
- Contrast Modulation
- MARQUEE® librarian
- Network cable Video Decoder
- Ceiling mount
- MARQUEE® encyclopedia
- Image shifter

Regulatory Approvals

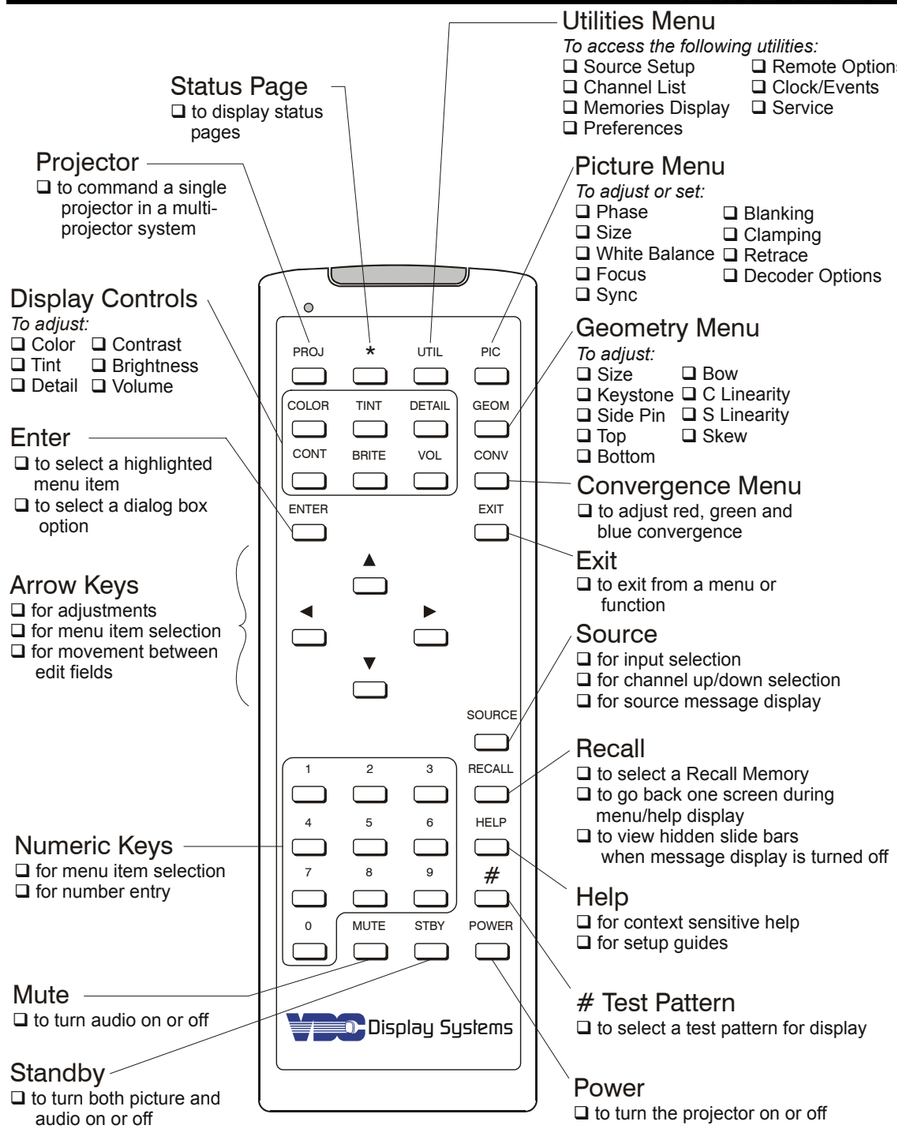
Meets FCC Class A, DHHS and HWC plus CSA / UL / EN 60 950 requirements
EN55022 Class B and EU directives 73/23/EEC, 89/336/EEC (CE marked)

Due to continuous engineering and improvements, specifications subject to change without notice.

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Appendix A

KEYPAD REFERENCE & MENU TREE



Status Page
- ❑ to display status pages

Projector
- ❑ to command a single projector in a multi-projector system

Display Controls
To adjust:
- ❑ Color ❑ Contrast
- ❑ Tint ❑ Brightness
- ❑ Detail ❑ Volume

Enter
- ❑ to select a highlighted menu item
- ❑ to select a dialog box option

Arrow Keys
- ❑ for adjustments
- ❑ for menu item selection
- ❑ for movement between edit fields

Numeric Keys
- ❑ for menu item selection
- ❑ for number entry

Mute
- ❑ to turn audio on or off

Standby
- ❑ to turn both picture and audio on or off

Utilities Menu
To access the following utilities:
- ❑ Source Setup ❑ Remote Options
- ❑ Channel List ❑ Clock/Events
- ❑ Memories Display ❑ Service
- ❑ Preferences

Picture Menu
To adjust or set:
- ❑ Phase ❑ Blanking
- ❑ Size ❑ Clamping
- ❑ White Balance ❑ Retrace
- ❑ Focus ❑ Decoder Options
- ❑ Sync

Geometry Menu
To adjust:
- ❑ Size ❑ Bow
- ❑ Keystone ❑ C Linearity
- ❑ Side Pin ❑ S Linearity
- ❑ Top ❑ Skew
- ❑ Bottom

Convergence Menu
- ❑ to adjust red, green and blue convergence

Exit
- ❑ to exit from a menu or function

Source
- ❑ for input selection
- ❑ for channel up/down selection
- ❑ for source message display

Recall
- ❑ to select a Recall Memory
- ❑ to go back one screen during menu/help display
- ❑ to view hidden slide bars when message display is turned off

Help
- ❑ for context sensitive help
- ❑ for setup guides

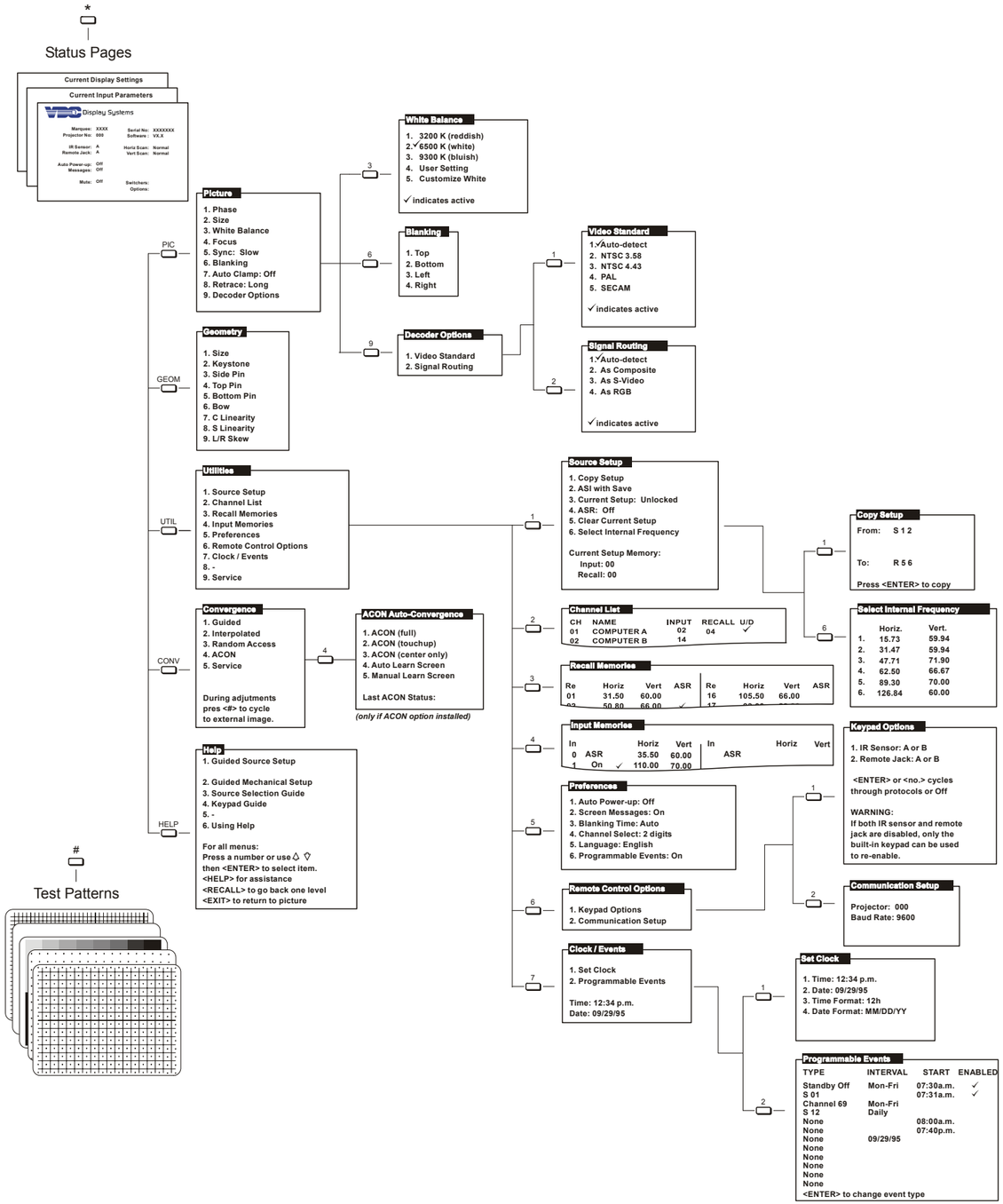
Test Pattern
- ❑ to select a test pattern for display

Power
- ❑ to turn the projector on or off

Figure APX A-1. MARQUEE® Keypad

To toggle the keypad's protocol setting (A or B), press [✶] [BRITE] [TINT] [DETAIL] [1]

To toggle the backlit feature (enable/disable), press [✶] [BRITE] [TINT] [DETAIL] [3]



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Appendix B

MARQUEE™ INSTALLATION INFORMATION

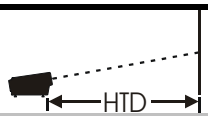
This appendix describes the relationship between lens types, screen size and throw distance as they apply to the MARQUEE™. Please contact your reseller or VDC Display Systems for additional information. Additionally, included with this manual is the VDC Projector Installation Program located on the accompany CD.

! All values and formulas are for reference only

B.1 8" Series MARQUEE™ Installation Reference Table

Table B-1. 8" Series Lens vs. Screen Range, Throw Distance and Formula

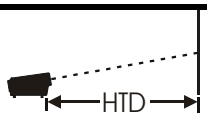
The Horizontal Throw Distance (HTD) is measured from the screen surface to the front of the projector at the standard 10° mechanical offset.

Lens 	Screen Width Range 				Throw Distance Range				Horizontal Throw Distance (HTD) Formulas 	
	Minimum		Maximum		Minimum		Maximum			
	in	mm	in	mm	in	mm	in	mm	In	mm
HD117 -12	44	1106	66	1687	50	1264	59	1493	1.06 X (SWin + 2.9in)	1.06 X (SWmm + 73mm)
HD117-24	65	1653	281	7125	73	1856	270	6849	1.063 X (SWin + 3.6in)	1.063 X (SWmm + 92mm)
HD145	40	1020	241	6120	62	1574	231	5859	1.144 X (SWin + 9.3in)	1.144 X (SWmm + 236mm)
HD8B	56	1425	214	5426	78	1994	204	5176	1.2 X (SWin + 9.4in)	1.2 X (SWmm + 238mm)
HD10L	45	1140	58	1482	74	1885	51	1291	1.465 X (SWin + 5.75in)	1.465 X (SWmm + 146mm)
HD10	64	1630	202	5141	103	2619	193	4895	1.503 X (SWin + 4.4in)	1.503 X (SWmm + 111mm)
HD10E	64	1630	204	5187	102	2603	194	4940	1.48 X (SWin + 5.12n)	1.48 X (SWmm + 130mm)
HD10 GT17	75	1904	94	2394	118	2998	86	2189	1.39 X (SWin + 10in)	1.39 X (SWmm + 256mm)
HD10 GT26	117	2964	164	4161	182	4626	155	3930	1.53 X (SWin + 2.6in)	1.53 X (SWmm + 67mm)
HD10 GT30 67	135	3420	301	7649	212	5393	290	7365	1.51 X (SWin + 5.8in)	1.51 X (SWmm + 148mm)

B.2 9" Series MARQUEE™ Installation Reference Table

Table B-2. 9" Series Lens vs. Screen Range, Throw Distance and Formula

The Horizontal Throw Distance (HTD) is measured from the screen surface to the front of the projector at the standard 10° mechanical offset.

Lens 	Screen Width Range 				Throw Distance Range				Horizontal Throw Distance (HTD) Formulas 	
	Minimum		Maximum		Minimum		Maximum			
	in	mm	in	mm	in	mm	in	mm	In	mm
HD10L	54	1380	71	1794	73	1856	93	2357	1.21*(SWin + 6.0in)	1.21*(SWmm + 153mm)
HD10	78	1973	245	6224	102	2590	310	7869	1.24*(SWin + 4.4in)	1.24*(SWmm + 111mm)
HD10E	78	1973	247	6279	101	2575	308	7831	1.22*(SWin + 5.3in)	1.22*(SWmm + 134mm)
HD10 GT17	91	2305	114	2898	117	2969	144	3650	1.15*(SWin + 11.2in)	1.15*(SWmm + 285mm)
HD10 GT26	141	3588	198	5037	181	4597	253	6424	1.26*(SWin + 2.4in)	1.26*(SWmm + 60mm)
HD10 GT30 67	163	4140	365	9260	211	5364	463	11757	1.25*(SWin + 6.0in)	1.25*(SWmm + 153mm)

! ***Calculated values are for reference only. It is best to simulate the setup to determine the necessary throw distance prior to the permanent installation of the projector.***

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B.3 8110 and 8500 Series HTD Information

B.3.1 8110 and 8500 Series HTD (Inches)

1. All dimensions are in inches
2. HTD is measured from the screen surface to the front of the projector.
3. Screen width is based on an aspect ratio of 4:3.

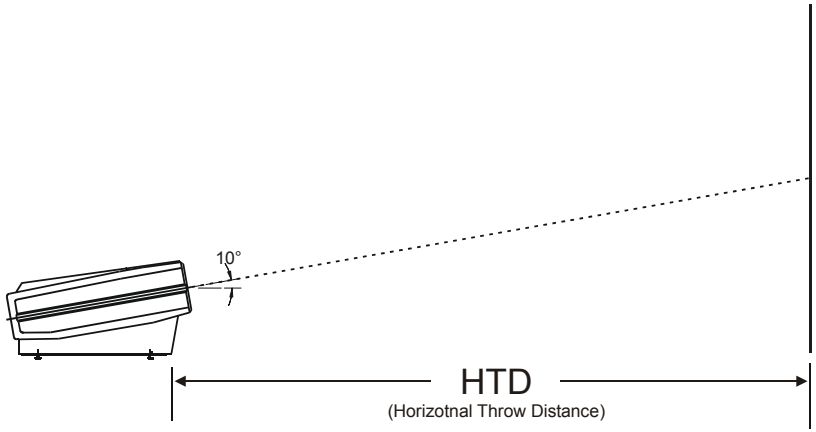


Table B-3. 8110/8500 Series Horizontal Throw Distance (HTD) Table (Inches)

	HD 117-12	HD 117-24	HD145	HD8B	HD10L	HD10	HD10E	HD10 GT17	HD10 GT26	HD10 GT30 67
54	61		72		88					
60	67		79	83						
66	74	74	86	90		106	105			
72		80	93	98		115	114			
78		87	100	105		124	123	122		
84		93	107	112		133	132	131		
90		100	114	119		142	141	139		
96		106	120	126		151	150			
102		112	127	133		160	158			
108		119	134	141		169	167			
114		125	141	148		178	176			
120		131	148	155		187	185		187	
126		138	155	162		196	194		196	
132		144	162	169		205	203		205	
138		151	168	177		214	212		215	217
144		157	175	184		223	220		224	227
150		163	182	191		232	229		233	236
156		170	189	198		241	238		242	245
162		176	196	205		250	247		251	254
168		182	203	213		259	256			263
174		189	210	220		268	265			272
180		195	216	227		277	274			281
186		202	223	234		286	283			290
192		208	230	241		295	291			299
198		214	237	249		304	300			308
204		221	244	256			309			317
210		227	251	263						326
216		233	258							335
222		240	264							344
228		246	271							354
234		253	278							363
240		259	285							372
246		265								381
252		272								390
258		278								399
264		284								408
270		291								417
276		297								426
282										435
288										444
294										453
300										462

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B.3.2 8110 and 8500 Series HTD (Millimeters)

4. All dimensions are in millimeters (mm)
5. HTD is measured from the screen surface to the front of the projector.
6. Screen width is based on an aspect ratio of 4:3.

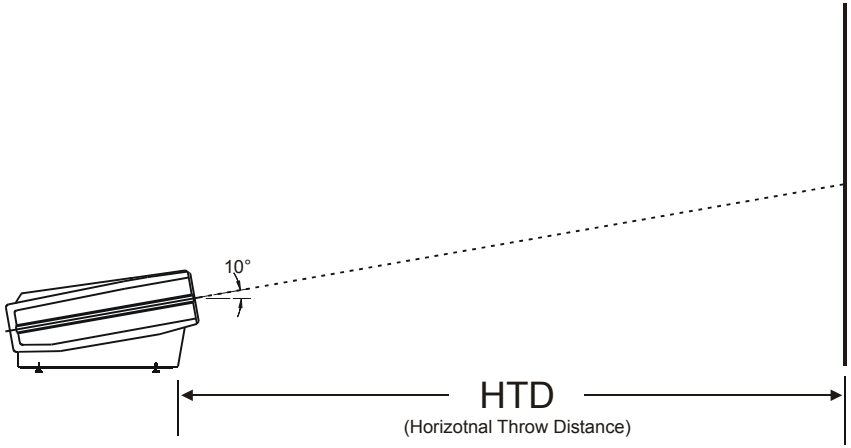


Table B-4. 8110/8500 Series Horizontal Throw Distance (HTD) Table (mm)

Screen Width	LENSES									
	HD 117 -12	HD 117 - 24	HD145	HD8B	HD10L	HD10	HD10E	HD10 GT17	HD10 GT26	HD10 GT30 67
	Horizontal Throw Distance (HTD									
1372	1545		1838		2223					
1524	1707		2012	2111						
1676	1869	1880	2186	2294		2688	2672			
1829		2042	2361	2477		2917	2897			
1981		2204	2535	2659		3147	3123	3105		
2134		2366	2709	2842		3376	3348	3317		
2286		2528	2883	3025		3605	3573	3528		
2438		2690	3058	3207		3834	3798			
2591		2852	3232	3390		4063	4024			
2743		3014	3406	3573		4292	4249			
2896		3175	3580	3755		4522	4474			
3048		3337	3755	3938		4751	4700		4753	
3200		3499	3929	4121		4980	4925		4985	
3353		3661	4103	4303		5209	5150		5218	
3505		3823	4277	4486		5438	5375		5450	5524
3658		3985	4452	4669		5668	5601		5683	5754
3810		4147	4626	4851		5897	5826		5915	5984
3962		4309	4800	5034		6126	6051		6148	6215
4115		4471	4974	5217		6355	6276		6380	6445
4267		4633	5149	5399		6584	6502			6676
4420		4795	5323	5582		6813	6727			6906
4572		4957	5497	5764		7043	6952			7136
4724		5119	5671	5947		7272	7178			7367
4877		5281	5846	6130		7501	7403			7597
5029		5443	6020	6312		7730	7628			7827
5182		5605	6194	6495			7853			8058
5334		5767	6368	6678						8288
5486		5928	6543							8519
5639		6090	6717							8749
5791		6252	6891							8979
5944		6414	7065							9210
6096		6576	7240							9440
6248		6738								9670
6401		6900								9901
6553		7062								10131
6706		7224								10362
6858		7386								10592
7010		7548								10822
7163										11053
7315										11283
7468										11514
7620										11744

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B.4 9500 Series HTD Information

B.4.1 9500 Series HTD (Inches)

1. All dimensions are in inches
2. Horizontal Throw Distance (HTD) is measured from the screen surface to the front of the projector.
3. Screen width is based on an aspect ratio of 4:3.

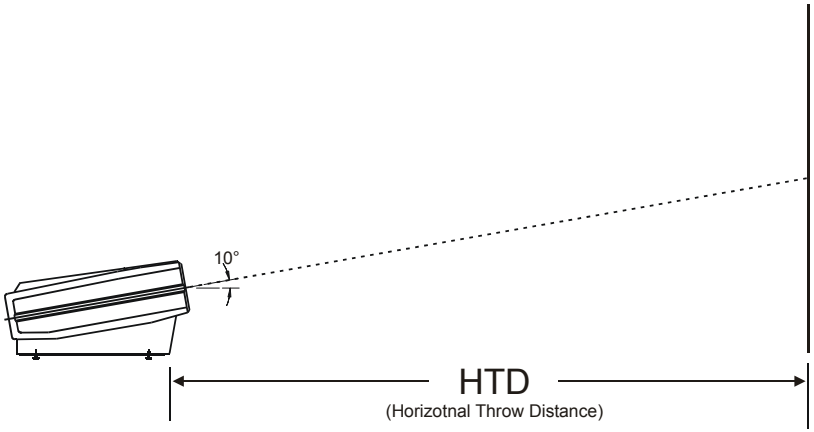


Table B-5. 9500 Series Horizontal Throw Distance (HTD) Table (in)

Screen Width	LENSES					
	HD10L	HD10	HD10E	HD10 GT17	HD10 GT26	HD10 GT30 67
	Horizontal Throw Distance (HTD) in					
54						
60	80					
66	87					
72						
78		102	102			
84		110	109			
90		117	116			
96		125	124	123		
102		132	131	130		
108		140	138	137		
114		147	146	144		
120		155	153			
126		162	160			
132		169	168			
138		177	175			
144		184	182		184	
150		192	190		192	
156		199	197		200	
162		207	204		207	
168		214	212		215	217
174		222	219		222	225
180		229	226		230	232
186		236	234		237	240
192		244	241		245	247
198		251	248		253	255
204		259	256			262
210		266	263			270
216		274	270			277
222		281	278			285
228		289	285			292
234		296	292			300
240		304	300			307
246			307			315
252						322
258						330
264						337
270						345
276						352
282						360
288						367
294						375
300						382

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B.4.2 9500 Series HTD (millimeters)

1. All dimensions are in millimeters
2. Horizontal Throw Distance (HTD) is measured from the screen surface to the front of the projector.
3. Screen width is based on an aspect ratio of 4:3.

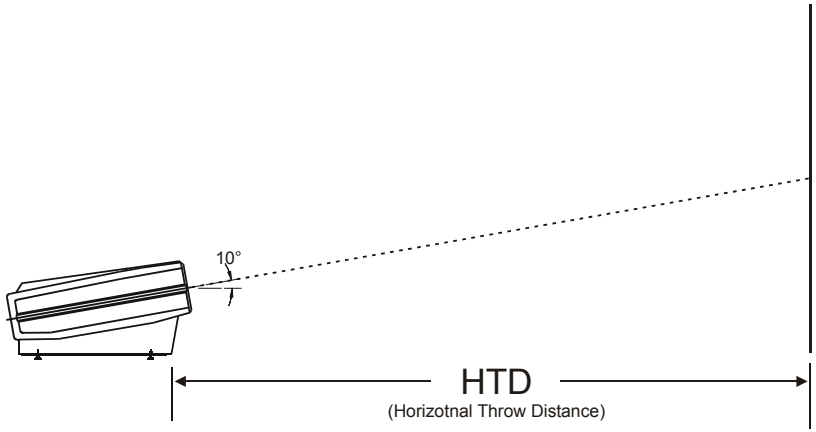


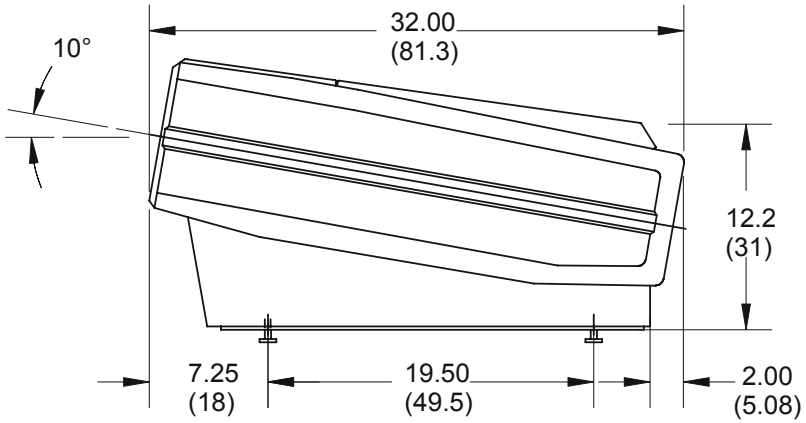
Table B-6. 9500 Series Horizontal Throw Distance (HTD) Table (mm)

Screen Width	Lens					
	HD10L	HD10	HD10E	HD10 GT17	HD10 GT26	HD10 GT30 67
	Horizontal Throw Distance (HTD) in					
1372						
1524	2030					
1676	2214					
1829						
1981		2599	2584			
2134		2789	2770			
2286		2978	2956			
2438		3167	3142	3123		
2591		3357	3328	3297		
2743		3546	3515	3472		
2896		3735	3701	3647		
3048		3924	3887			
3200		4114	4073			
3353		4303	4259			
3505		4492	4445			
3658		4682	4631		4685	
3810		4871	4817		4877	
3962		5060	5003		5069	
4115		5249	5189		5261	
4267		5439	5375		5453	5523
4420		5628	5561		5645	5713
4572		5817	5747		5838	5904
4724		6006	5933		6030	6094
4877		6196	6119		6222	6284
5029		6385	6306		6414	6475
5182		6574	6492			6665
5334		6764	6678			6855
5486		6953	6864			7045
5639		7142	7050			7236
5791		7331	7236			7426
5944		7521	7422			7616
6096		7710	7608			7807
6248			7794			7997
6401						8187
6553						8377
6706						8568
6858						8758
7010						8948
7163						9138
7315						9329
7468						9519
7620						9709

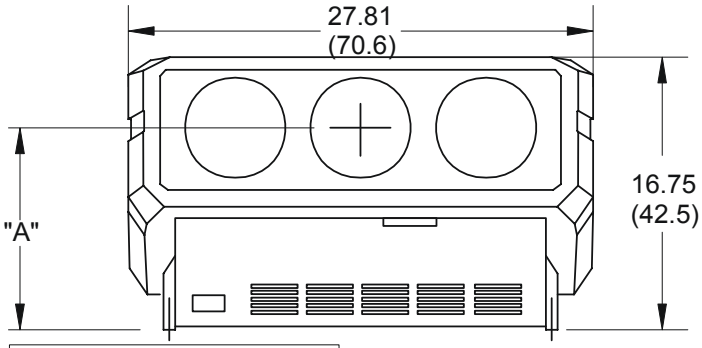
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B.5 MARQUEE™ Series Dimensions

SIDE VIEW

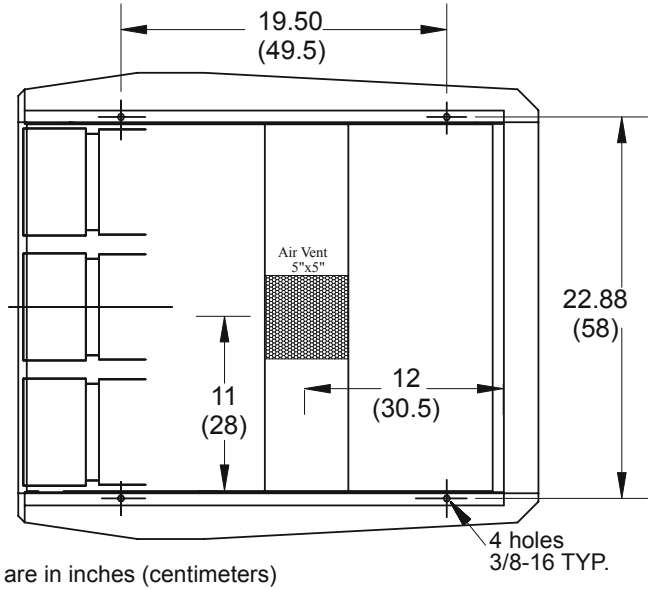


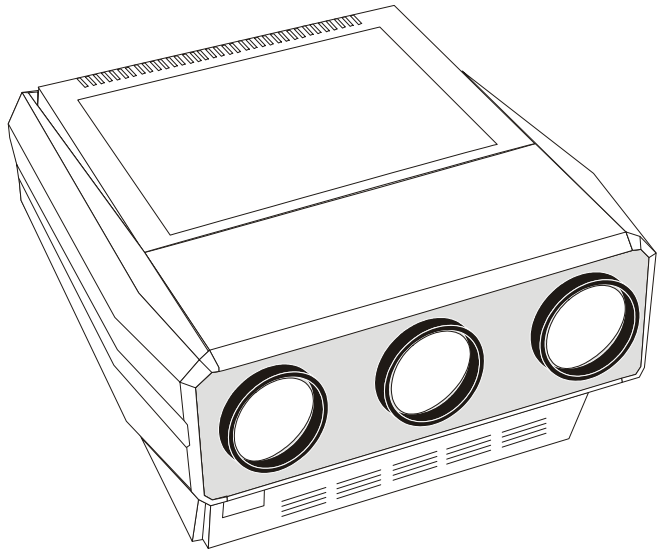
FRONT VIEW



"A" Dimension	
11.34 (28.8)	Liquid coupled
10.84 (27.5)	Air coupled

BOTTOM VIEW





Dimensions are in inches (centimeters)

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Appendix C
MARQUEE® PROJECTORS RS-232 CONTROL

C.1 *Brief History of MARQUEE® RS-232 Communications*

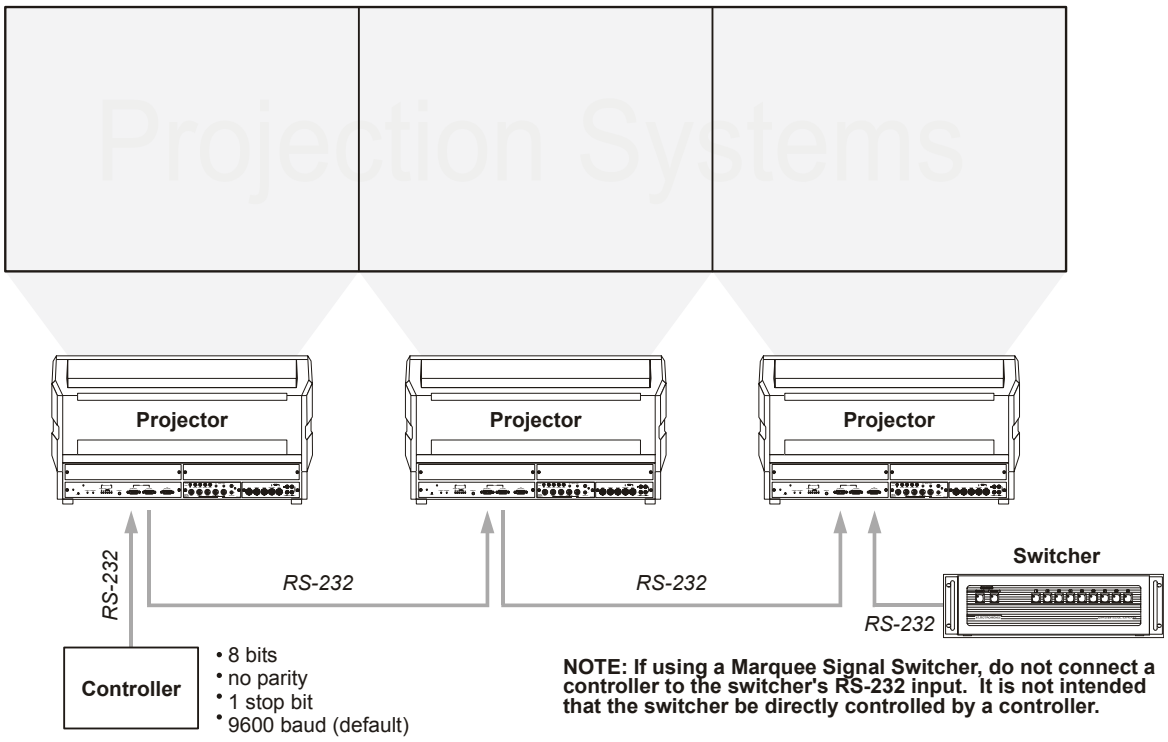
Connecting an external control device such as an AMX or Crestron controller to the RS-232 port on a MARQUEE® projector enables automated control of individual or multiple projectors according to custom requirements. The original RS-232 commands enable the controller to be programmed to emulate a projector keypad. The protocol (message structure) used for issuing these commands remains valid and usable for any MARQUEE® projector with software version 2.0 or higher. In addition, with software version 4.0 and higher, you can use a simpler RS-232 protocol to issue these original commands as well as several other new commands.

Note: This Section is intended for technicians familiar with controller applications and programming. For highly specialized applications beyond simple projector control, please contact VDCDS for additional technical assistance.

C.2 *System Requirements and Setup*

The RS-232 commands in main software V4.0 can be used with any MARQUEE® projector that has the Control Board #02-2x0336-0xP installed. The software is backwards compatible with existing MARQUEE® 8110 Plus, 8500 and 9500 projectors. As shown below, connect the controller only to the “IN” port of the MARQUEE® projector, never directly to a switcher. Use a quality cable of up to 100 feet in length.

In a typical application, a controller output is connected to the RS-232 “IN” port, and any additional projectors are networked by connecting the RS-232 “OUT” from one projector to the RS-232 “IN” of the next as shown below. The controller can then broadcast to all projectors or each individual projector as desired.



APX Figure C-1. Typical RS-232 Control Application

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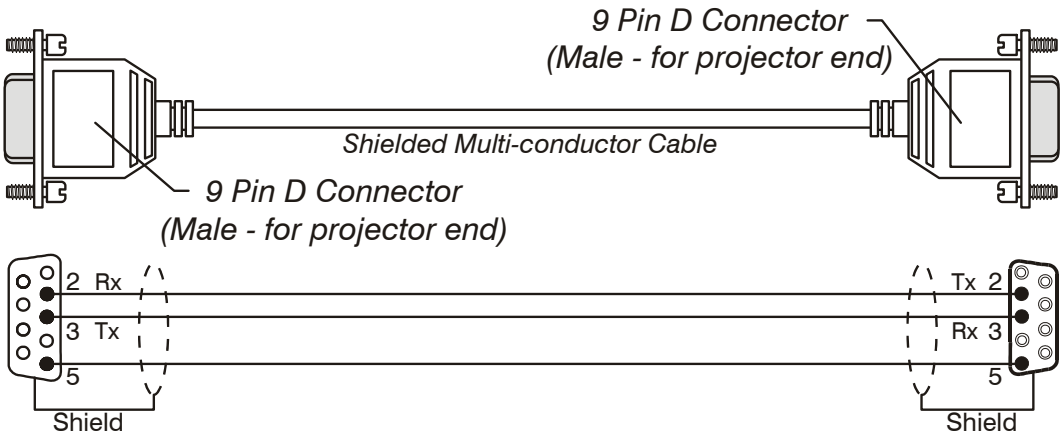
C.3 RS-232 Communication Cables

C.3.1 RS-232, 9-Pin Male to 9-Pin Female

Step 1. For connection between the projector and a seitcher

Step 2. For connection between projectors

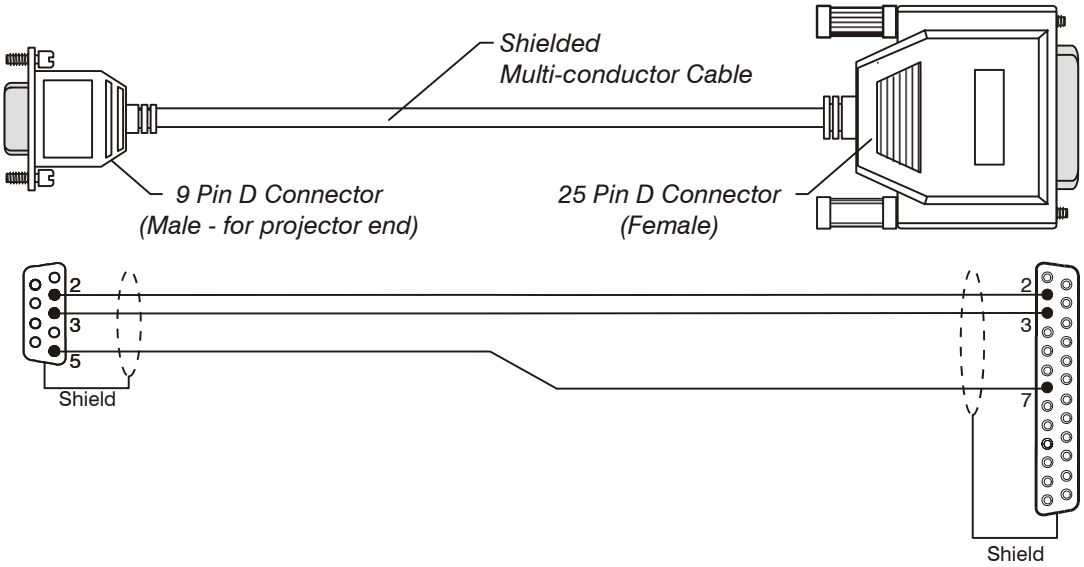
Step 3. For connection to a computer with a 9-pin “AT” type RS-232 port.



APX Figure C-2. Cable Wiring, RS-232, 9-Pin Male to 9-Pin Female

C.3.2 RS-232, 9-Pin Male to 25 Pin Female

Step 4. Use this cable if the computer's RS-232 serial port uses a 25 pin male D type connector.



APX Figure C-3. Cable Wiring, RS-232, 9-Pin Male to 25-Pin Female

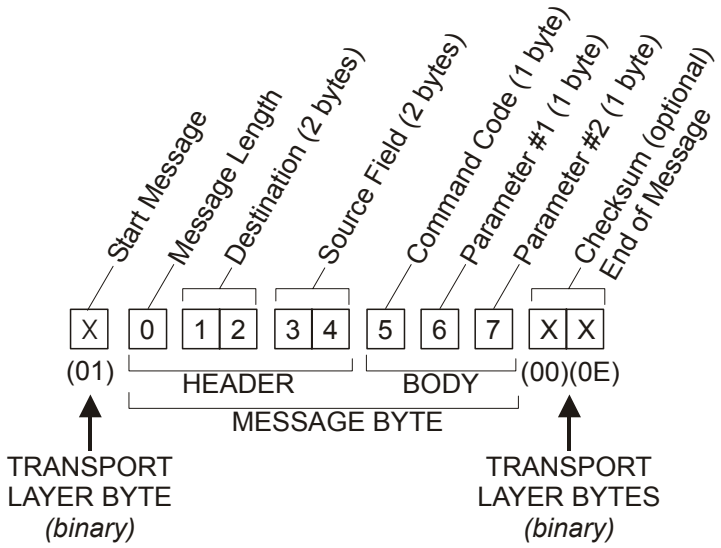
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C.4 Data Transmission Structure

A basic understanding of RS-232 data transmission structure enables you to begin programming automated controls for the MARQUEE® projector. Once you have become familiar with this structure, refer to the two tables later in this document. These tables list the specific binary codes required for all available commands and provide examples of commands most commonly used in typical applications. Use these tables to quickly begin programming the controller without having to determine each complete data stream yourself.

Every MARQUEE® serial communication consists of two parts: the transport layer and the message. In general, information in the transport layer determines how information is passed to and from the projector and the message contains the specific information being passed. Both parts are shown in APX Figure C-4 and are further described below.

Note: Throughout this document a number preceded by a "$" is a hexadecimal value.



APX Figure C-4. A Complete RS-232 Data Transmission

C.5 Transport Layer

Every message must include a transport layer in order to be recognized as a complete RS-232 data transmission. As shown in APX Figure C-4, transport code appears at the beginning and end of every RS-232 communication. A transport layer has three main functions:

1. To mark the start and finish of each message.
2. To prevent data overflow.
3. To separate transport layer codes from message data.

Special control codes reserved only for the transport layer are shown in Table C-1.

Table C-1. Transport Layer Special Control Codes

BINARY (HEX) VALUE	MNEMONIC	DESCRIPTION	FUNCTION
$01	SOH	start of header	start of message
$0E	SO	shift out	end of message
$13	XOFF	transmit off	stop transmission
$11	XON	transmit on	resume transmission
$1B	ESC	escape	next byte has been shifted

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C.5.1 $01 AND $0E (MESSAGE START AND END)

Use the **$01** control code to preface each and every transmission. This byte indicates to a network receiver that the next byte is the first byte of a new message. Any message which (for some reason) is partially received prior to the **$01** will be discarded.

The **$0E** control code signifies the end of each and every transmitted message. It signals to the receiving network software that the message has been completely transmitted.

C.5.2 $13 AND $11 (STOP AND RESUME)

Normally messages can be sent to the projector before processing of earlier messages has been completed — the projector will just store messages in a buffer until ready to process. However, if a series of messages is sent it is possible that the projector will not be able to process them as fast as they are being transmitted and the buffer will become full. If this happens, the projector will immediately send the **$13** (XOFF) code to halt further transmission. This instructs the controller (and any devices preparing to transmit) to cease transmission within three characters transmission time. At 9600 baud (the default baud rate), this gives the controller about three milliseconds to respond. The projector is able to accommodate the receipt of at least three more bytes after it sends **$13** (XOFF) — additional bytes may be lost. When the buffer is once again available, the projector will send a **$11** (XON) command to resume transmission.

Note: XON and XOFF controls apply to both directions of communication.

C.5.3 $1B (ESCAPE)

Occasionally a byte within a message may have the same value as one of the special control codes reserved for the transport layer. If this occurs, **$1B** must be used to "escape" the byte so that it is not mistaken for a transport layer control code. “Escape” a byte by inserting an ESC character (**$1B**) into the data stream just ahead of the message byte in question and then adding 128 (**$80**) to the value of the message byte. This effectively sets the MSB (most significant bit) high, moving the value of the byte out of the range of values reserved for transport control codes.

On the receiving end, the transport layer software recognizes the escape sequence and strips the **$1B** (ESC) from the stream. The next data byte will have its MSB reset which restores it back to its original value.

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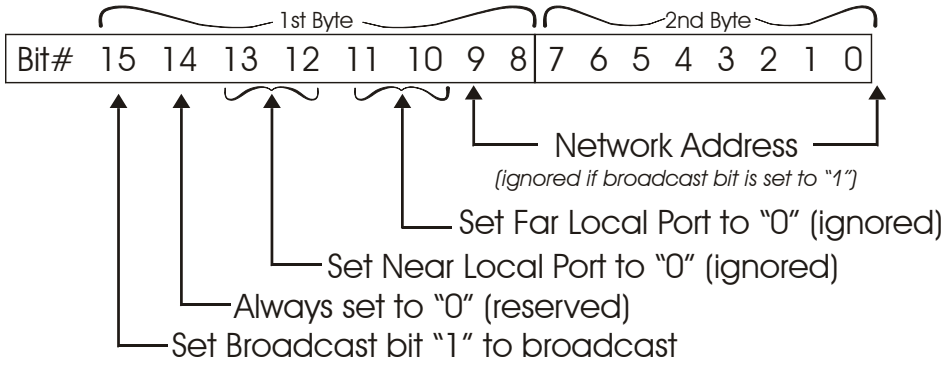
C.6 Message Format

The other portion of an RS-232 communication is the message itself (see APX Figure C-4 again). A message portion is a sequence of up to 64 bytes — always a five-byte header followed by a variable length body. The header supplies the information needed for routing the messages within the projector network, and the body contains the specific projector control data. These two message components are further described below.

C.6.1 HEADER (NETWORK/PROJECTOR ADDRESSING)

The message header consists of three main parts:

1. **Message Length:** This byte contains a value which declares the length of the message as a specific number of bytes. Note that message length does *not* include bytes from the transport layer.
2. **Destination** and **Return Address (Source) Fields:** These fields contain two sixteen-bit addresses — one for the message destination and one for the source. A breakdown of each address field is shown in APX Figure C-5. Note that Near and Far Port Address bits are now ignored — while it is strongly recommended that these bits be set to "0" to ensure compatibility with future releases of software, it is not yet mandatory to do so. Bit #14, however, *must* be set to 0.



APX Figure C-5. Format of Address Field

Set the Broadcast flag to "0" if a specific projector is to respond, set to "1" if all projectors are to respond. Always set Bit 14 to "0" and, if at all possible, set Bits 10, 11, 12 and 13 to "0" as well. Bits 0 through 9 contain the Network Address. Possible Network Addresses are shown in Table C-2 (decimal values shown). For the Destination Address field, you should use a projector number. For the Source field, use the network controller address (note that the value for a projector number may require an ESC — see Transport Layer codes, above).

Table C-2. Network Address Assignments

START	FINISH	DEVICE TYPE
0	999	projector
1000	1009	switcher
1010	1019	ACON
1020	1022	not assigned
1023	1023	network controller

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C.6.2 BODY

The body of a message can consist of one or more bytes, depending on the number of details required to complete the specific command at hand.

The first byte of the message body represents the type of message being issued. There are three types of messages: a ***Set*** message, a ***Request*** message, or a ***Reply*** message. For example, the first byte may be "***Set*** Power" (turn the projector on or off) or "***Request*** Channel" (find out what the channel is) or "***Reply*** with Signal Status" (relay the current channel number). The binary message codes for each possible command are listed in Table C-3.

The next byte(s) is the actual hex value for the parameter in question. For example, to set the volume to "0" this second byte must be "00". To set it to 64, this byte must be "$40". Each parameter (there may be more than one, depending on the command) requires at least one byte in the message. Refer to Table C-3 for a list of message codes and parameter codes. Examples of entire specific commands using these codes appear in Table C-4.

1. Most "Request" messages have no parameter data.
2. Do not broadcast a Request to more than one projector.
3. "Set" and "Reply" messages usually have the same data in the same format.

C.6.3 Optional Checksum

It is no longer necessary to calculate and include an eight-bit additive sum as the next-to-last byte in every data transmission. Note that you must still include the checksum *field* in each message stream, but if the value assigned is "$00" the checksum will be ignored. If you still wish to use an accurate checksum for maximum message security, calculate the checksum value as follows:

1. Take the message before the transport layer bytes have been added.
2. Add the bytes together.
3. Divide the sum by 256 and take the remainder. The remainder value is the checksum.

The receiving projector software collects all of the message bytes as defined in the first byte of the message, then creates its own checksum value for comparison with the received checksum. If the values match, the message is considered to have been correctly received—otherwise the message is discarded.

Note: Transport layer bytes including ESC (and the resultant top bit set) are NOT included in the checksum. See Transport Layer.

C.6.4 Command Codes

Table C-3 4 lists all 1-byte hex command codes now available on the MARQUEE®. The first column identifies each projector control, with the applicable set/request/reply command codes listed in the next two columns — one of these codes appears as the first byte after the header in any message. The fourth column lists any parameters that may apply to the function at hand, with P1 representing the first parameter of the data sent (such as switcher number), P2 representing the second parameter of the data sent (such as slot number) and P3 representing the third parameter (such as vertical frequency). These bytes follow the command code byte. The last column briefly describes what each "set" command does.

1. Each parameter allows a limited range of values — these values are shown in Table C-3 in decimal format.
2. The projector will convert any out-of-range value to the nearest maximum value allowed. For example, "set color to 100" will set the color to its maximum value of 63.
3. Values are treated as unsigned. So -1 in a byte is treated as 255.

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Table C-3. Command Codes and Descriptions

Note: Parameter values are shown in decimal format

Function	Command Code		Parameter(s) "Set" and "Reply" msg.	Description ("set" function)
	Set	**Request or Reply**		
Power ON/OFF	$08	$88	P1: 0 = Off 1 = On 2 = Between	Turn projector off or on. NOTE: If "2", the projector is currently in the process of powering up. In this state, any RS-232 commands (other than "Power Off") will be ignored and discarded.
Standby ON/OFF	$3D	$BD	P1: 0 = Off 1 = On	"On" blanks the picture and mutes the audio (and is same as sending separate commands to blank picture and mute audio). The projector remains operational while in standby. "Off" turns picture and audio back on. See page 15.
Picture Mute ON/OFF	$0E	$8E	P1: 0 = Off 1 = On	"On" blanks the picture only — the rest of the projector remains operational. You can go into this mode, then switch sources or change a setting, and then leave ("Off) to regain the picture. See page 15.
Audio Mute ON/OFF	$0D	$8D	P1: 0 = Off 1 = On	Turn the audio off or on. The rest of the projector remains operational.
Volume Level	$34	$B4	P1: 0-127	Set the volume level of the current slot.
Contrast Level	$56	$D6	P1: 0-127	Set the contrast level of the current slot.
Brightness Level	$55	$D5	P1: 0-255	Set the brightness level of the current slot.
Color Level	$57	$D7	P1: 0-63	Set the color level of the current slot.
Tint Level	$58	$D8	P1: 0-63	Set the tint level of the current slot.
Detail Level	$59	$D9	P1: 0-63	Set the detail level of the current slot.
Channel ##	$0B	$8B	P1: 1-99	Select channel ##. 0 = no channel
Input (Switcher, Slot)	$09	$89	P1 (switcher#): 0-9 P2 (slot#): 1-9	Select input. If P1 = 0 (projector) then: Slot 1 = standard RGB, VIM Slot 2 = optional interface card, into VIM Slot 3 = Composite (on decoder) Slot 4 = Composite (on decoder) Slot 5 = S-Video (on decoder) Slot 6 = S-Video (on decoder)
Recall Memory	$0C	$8C	P1: 0-99	Select recall memory. 0 = none
Internal Frequency	$35	$B5	P1: 0-6	Select internal frequency. 0 = current external signal. 1-6 = one of the internal frequencies from the MARQUEE® "Select Internal Frequency" menu.
Key Code	$63	n/a	P1 = Code	Emulate the function of a key on the keypad. Any additional parameters sent are ignored. See Technical Bulletin TB96-05 (June 1996).

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Function	Command Code		Parameter(s) "Set" and "Reply" msg."	Description ("set" function)
	Set	**Request or Reply**		
Projector Address	$02	$82	P1: 0-999	Set projector to a new address. NOTE: The next message sent must either contain the new address or it must be a broadcast message.
Signal Status	n/a	$91	P1: 3 options: 0 = frequency P2: Horizontal P3: Vertical 1 = state P2 = 0: Good P2 = 1: Changing P2 = 2: Error 2 = sync P2 = see right ➡	Request frequency, state, or sync of current input signal. Reply with frequency of current input signal. Reply with state of current input signal. Good = locked signal Changing = signal is currently changing, as in a source switch Error = signal is unstable or missing **NOTE:** sync errors cannot be detected if a signal has one of the following **vertical** frequencies (all ± 2.00 Hz) as well as one of the following **horizontal** frequencies (± .120 kHz): **vertical:** **horizontal:** 50.0 Hz 15.62*2 kHz 59.95 Hz 15.73*2 kHz 100 Hz 119.9 Hz Reply with sync type of current input signal. P2: 0 = no sync 1 = sync-on-green 2 = composite sync 3 = separate H sync 6 = sync from decoder 7 = sync on internal
Ping	n/a	$81	P1 = 2 (MARQUEE® 68k) P2 = 0-99 P3 = 0-99 P4 = a-z P5 = 0-999 P6 = 0	Request/read general projector information (type and software version) Software version, major Software version, minor Software version, maintenance Software version, beta number Software version, type (always 0 for now). See page 18 for additional information.

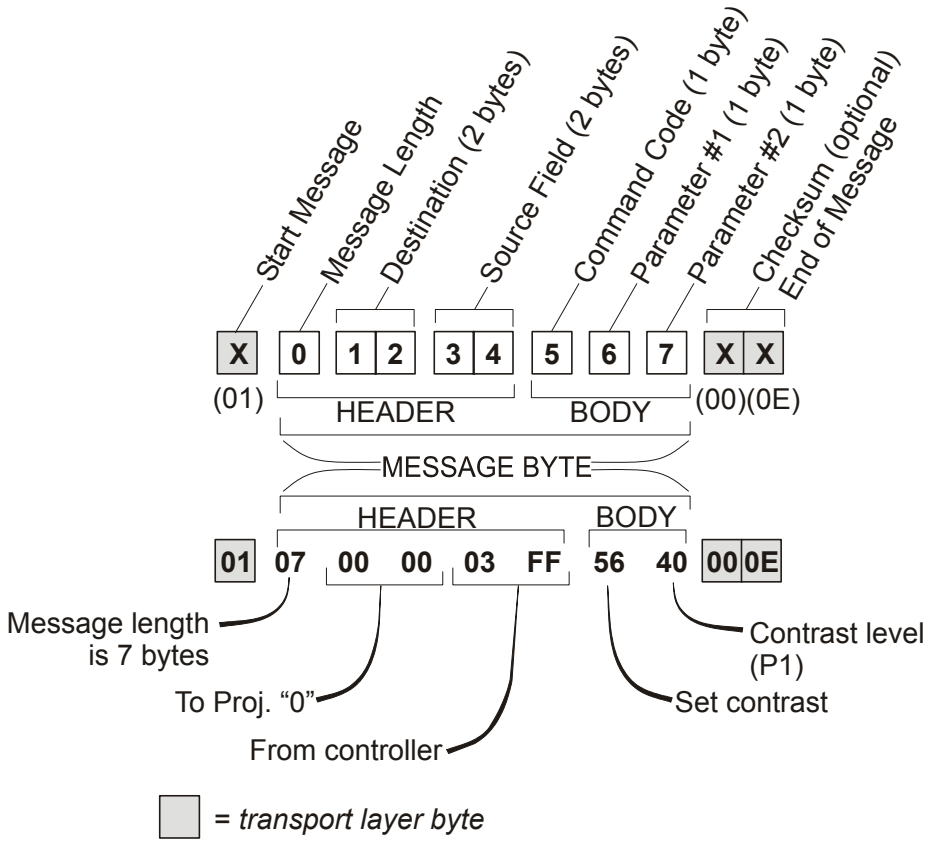
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Function	Command Code		Parameter(s) "Set" and "Reply" msg."	Description ("set" function)
	Set	**Request or Reply**		
Diagnostic: Internal Test Pattern	$7F	$FF	P1: 7 (test ptn.) P2: Various: 0 = external video 7 = black 19 = dots in xhatch 20 = dots only 21 = gray scale 17 = white field 22 = dbl. xhatch 23 = xhatch	Run a diagnostic, such as "Test Pattern". P1 = $07 (runs the "Test Pattern" diagnostic). In Replies to "set" command: 7 0 = OK 7 1 = pattern not available

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C.7 Creating Simple Messages

APX Figure C-6 below illustrates a complete RS-232 data transmission using the hex command codes from Table C-4. In this example, the projector is “0” and the message is coming from the controller (always 1023). Note that in this example contrast ***level*** is the only parameter involved.



APX Figure C-6. The “set contrast to 64” command

The above data transmission is one of the sample messages in Table C-4. A comparison with code in the other three “contrast” commands reveals how identically structured transmissions differ in content and function. For example, note that the request message has no data (P1), thus it is only 6 bytes in length. In the resulting reply message from the projector, the controller (03 FF) is now the destination and the projector (00 00) is the source, thus the codes for these two fields are likewise reversed. The “D6” byte signifying request or reply is drawn from the list of codes in Table C-3.

Note that several of the sample messages in Table 5 include escape ($1B) codes to prevent message bytes from being interpreted as transport layer bytes. For example, in the first four controls shown (power, standby, picture mute and audio mute), the normal “on” code of $01 must be escaped with the insertion of $1B and the addition of $80 to $01. Thus “$01” is replaced with “$1B $81”.

Commands that are more complex (standby, picture mute, projector address, signal status, ping, and the test pattern diagnostic) are described in detail on the pages following Table 5.

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C.7.1 Sample Data Transmissions

Table C-4 shows complete examples of common binary commands for projector control. All are for projector “0”.

Table C-4. RS-232 Commands in v.4.0

Set Power Off	01 07 00 00 03 FF 08 00 00 0E	
Set Power On	01 07 00 00 03 FF 08 1B 81 00 0E	
Request Power Status	01 06 00 00 03 FF 88 00 0E	
Reply with Power Status	01 07 03 FF 00 00 88 1B 81 00 0E	(On)
Set Standby Off	01 07 00 00 03 FF 3D 00 00 0E	
Set Standby On	01 07 00 00 03 FF 3D 1B 81 00 0E	
Request Standby Status	01 06 00 00 03 FF BD 00 0E	
Reply with Standby Status	01 07 03 FF 00 00 BD 1B 81 00 0E	(On)
Set Pic Mute Off	01 07 00 00 03 FF 1B 8E 00 00 0E	
Set Pic Mute On	01 07 00 00 03 FF 1B 8E 1B 81 00 0E	
Request Pic Mute Status	01 06 00 00 03 FF 8E 00 0E	
Reply with Pic Mute Status	01 07 03 FF 00 00 8E 1B 81 00 0E	(On)
Set Audio Mute Off	01 07 00 00 03 FF 0D 00 00 0E	
Set Audio Mute On	01 07 00 00 03 FF 0D 1B 81 00 0E	
Request Audio Mute Status	01 06 00 00 03 FF 8D 00 0E	
Reply with Audio Mute Status	01 07 03 FF 00 00 8D 1B 81 00 0E	(On)
Set Contrast to 0	01 07 00 00 03 FF 56 00 00 0E	
Set Contrast to 64	01 07 00 00 03 FF 56 40 00 0E	
Request Contrast Value	01 06 00 00 03 FF D6 00 0E	
Reply with Contrast Value	01 07 03 FF 00 00 D6 40 00 0E	(64, 50%)
Set Volume to 0	01 07 00 00 03 FF 34 00 00 0E	
Set Volume to 64	01 07 00 00 03 FF 34 40 00 0E	
Request Volume Value	01 06 00 00 03 FF B4 00 0E	
Reply Volume Value	01 07 03 FF 00 00 B4 40 00 0E	
Set Brightness to 0	01 07 00 00 03 FF 55 00 00 0E	
Set Brightness to 128	01 07 00 00 03 FF 55 80 00 0E	
Request Brightness Value	01 06 00 00 03 FF D5 00 0E	
Reply with Brightness Value	01 07 03 FF 00 00 D5 80 00 0E	(128, 50%)
Set Color to 0	01 07 00 00 03 FF 57 00 00 0E	
Set Color to 32	01 07 00 00 03 FF 57 20 00 0E	
Request Color Value	01 06 00 00 03 FF D7 00 0E	
Reply with Color Value	01 07 03 FF 00 00 D7 20 00 0E	(32, 50%)
Set Tint to 0	01 07 00 00 03 FF 58 00 00 0E	
Set Tint to 32	01 07 00 00 03 FF 58 20 00 0E	
Request Tint Value	01 06 00 00 03 FF D8 00 0E	
Reply with Tint Value	01 07 03 FF 00 00 D8 20 00 0E	(32, 50%)
Set Detail to 0	01 07 00 00 03 FF 59 00 00 0E	
Set Detail to 32	01 07 00 00 03 FF 59 20 00 0E	
Request Detail Value	01 06 00 00 03 FF D9 00 0E	
Reply with Detail Value	01 07 03 FF 00 00 D9 20 00 0E	(32, 50%)
Select Channel 1	01 07 00 00 03 FF 0B 1B 81 00 0E	
Select Channel 3	01 07 00 00 03 FF 0B 03 00 0E	
Request Current Channel	01 06 00 00 03 FF 8B 00 0E	
Reply with Channel	01 07 03 FF 00 00 8B 03 00 0E	(channel 3)
Select Input (0,1)	01 08 00 00 03 FF 09 00 1B 81 00 0E	
Select Input (1,5)	01 08 00 00 03 FF 09 1B 81 05 00 0E	
Request Current Input	01 06 00 00 03 FF 89 00 0E	
Reply with Input	01 08 03 FF 00 00 89 1B 81 05 00 0E (switcher 1, slot 5)	
Select Recall (00)	01 07 00 00 03 FF 0C 00 00 0E	
Select Recall (15)	01 07 00 00 03 FF 0C 0F 00 0E	
Request Current Recall	01 06 00 00 03 FF 8C 00 0E	

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Reply with Recall	01 07 03 FF 00 00 8C 0F 00 0E (recall 15)
Reply with Recall	01 07 03 FF 00 00 8C 00 00 0E (recall 0, i.e. using input memory)
Request Signal Status, Freq	01 07 00 00 03 FF 91 00 00 0E
Reply w/ Sig.Status,Freq	01 0B 03 FF 00 00 91 00 0C 4E 17 70 00 0E (31.5Khz,60.0Hz)
Request Sig. Status, State	01 07 00 00 03 FF 91 1B 81 00 0E
Reply w/ Sig. Status, State	01 08 03 FF 00 00 91 1B 81 00 00 0E (Good,SignalLocked)
Reply with Signal Status, State	01 08 03 FF 00 00 91 1B 81 1B 81 00 0E (Changing src)
Reply with Signal Status, State	01 08 03 FF 00 00 91 1B 81 02 00 0E (Error,sync err)
Request Signal Status, Sync On?	01 07 00 00 03 FF 91 02 00 0E
Reply with Signal Status, Sync	01 08 03 FF 00 00 91 02 00 00 0E (No sync)
Reply with Signal Status, Sync	01 08 03 FF 00 00 91 02 1B 81 00 0E (Sync On Green)
Reply with Signal Status, Sync	01 08 03 FF 00 00 91 02 02 00 0E (Composite Sync)
Reply with Signal Status, Sync	01 08 03 FF 00 00 91 02 03 00 0E (Sep.HSync on H.)
Reply with Signal Status, Sync	01 08 03 FF 00 00 91 02 06 00 0E (SyncfromDecoder)
Request Ping	01 06 00 00 03 FF 81 00 0E
Reply w/ Data	01 0D 03 FF 00 00 81 02 03 04 61 00 48 00 00 0E See page 18 for additional information

Select Internal Test Pattern	01 08 00 00 03 FF 7F 07 17 00 0E (crosshatch)
Select Internal Test Pattern (ext.)	01 08 00 00 03 FF 7F 07 00 00 0E
Request Current Test Pattern	01 07 00 00 03 FF FF 07 00 0E
Reply with Current Test Pattern	01 08 03 FF 00 00 FF 07 1B 93 00 0E (dots in crosshatch)
Reply with Current Test Pattern	01 08 03 FF 00 00 FF 07 00 00 0E (ext.)
Select Internal Frequency (1)	01 07 00 00 03 FF 35 1B 81 00 0E
Select External Freq (signal)	01 07 00 00 03 FF 35 00 00 0E
Request Current Internal Freq	01 06 00 00 03 FF B5 00 0E
Reply with Internal Freq	01 07 03 FF 00 00 B5 1B 81 00 0E (Int Freq 1, menu)
Set Proj Address to 0	01 08 00 00 03 FF 02 00 00 00 0E
Set Proj Address to 14	01 08 00 00 03 FF 02 00 1B 8E 00 0E
Request Proj Address (broadcast)	01 06 80 00 03 FF 82 00 0E
Reply with Proj Address	01 08 03 FF 80 00 82 00 1B 8E 00 0E (proj address 14)
If broadcasting: Same as above examples, except use “80 00” for destination	
Example:	
Set Tint to 0	01 07 80 00 03 FF 58 00 00 0E
Set Tint to 32	01 07 80 00 03 FF 58 20 00 0E
Request Tint Value (max. 1 proj.)*	01 06 80 00 03 FF D8 00 0E
Reply w/ Tint Value (max. 1 proj.)*	01 07 03 FF 80 00 D8 20 00 0E (32, 50%)

* Do not broadcast a request to more than one projector, as it may generate multiple attempts at replies that could collide on the network.

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This section includes additional notes about some of the more complex RS-232 messages.

C.7.2 "Standby" Command

During standby entered via normal keypad-projector operation, the picture is blanked, the audio is muted and you can perform no operation from the keypad except to "get out of standby". This type of standby occurs when you use the Standby key on either the keypad or MARQUEE® switcher (available only from Presentation level), when you use the Picture Mute key on the Extron switcher, or when you send RS-232 standby keycodes from a controller.

The RS-232 "set standby" command triggers a significantly different type of standby. This standby command blanks the picture and mutes the audio as usual, but you can still execute most other projector commands as well — you are not locked out. In addition, note that it is not necessary to be in presentation mode in order to enter standby via the RS-232 command.

WHILE IN STANDBY…

- the picture and audio are both off.
- you can issue other projector commands as desired.
- a request of Contrast, Brightness or Audio Mute reports the value that will be
- restored after coming out of standby.
- any Picture Mute command is ignored.
- switcher slot buttons do not function.
- commands causing an unblanked picture take effect only after leaving standby
- mode (exit via a key press or RS-232 methods).
- the amber LED status light is lit on the projector and connected switcher.

LEAVING STANDBY…

Exit standby via a key press or RS-232 method. The amber LED status light will go out.

C.7.3 "Picture Mute" Command

The RS-232 "set pic mute" command blanks only the picture — the audio is not affected. Otherwise, this command is similar to the RS-232 "set standby" command. You can use most other projector commands while in "pic mute" mode. Note that it is not necessary to be in presentation mode in order to enter Picture Mute via the RS-232 command. Note also that a Picture Mute command is ignored if you are already in any form of standby.

WHILE IN PICTURE MUTE…

- the picture is off but the audio is on
- you can issue other projector commands as desired.
- commands causing an unblanked picture take effect only after leaving picture
- mute mode (exit via a keypress or RS-232 methods).
- a request of Contrast or Brightness reports the value that will be restored after
- coming out of Picture Mute.
- the amber LED status light is lit on the projector and connected switcher.

LEAVING PICTURE MUTE …

- Exit Picture Mute via a key press or RS-232 method.

You have no way of knowing that a projector has only the picture muted rather than being in standby except if you hear audio from the current source. If you mistake Picture Mute for Standby and try to leave by pressing the standby key, you will enter standby rather than leave it. Press the standby key once again to leave standby and restore the picture.

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C.7.4 "Projector Address" Command

Make sure that if you change a projector's address, either change the address in all future messages as well or issue a command that is broadcast (set broadcast bit to "1").

C.7.5 "Signal Status" Command

The signal status command enables you to request and obtain specific information about the current signal, namely its ***frequency***, ***state*** or type of ***sync***. Note that one (only) of these descriptors must be included as P1 in every signal status request message. Resulting signal status replies will then include one or two additional parameters as necessary to fully describe the status of P1. Frequency, state and sync signal status messages are further described below.

Note: There is no "set" command for signal status information — you can issue requests and receive replies only.

P1 = FREQUENCY ($00)

If you want to determine the horizontal and vertical frequencies of the current signal, you can send a "request signal status/**frequency**" to the projector. Note that this message must include both the signal status code ($91) as well as the P1 frequency code ($00) as shown in the example from Table C-4.

01 07 00 00 03 FF **91 00** 00 0E

FREQUENCY REPLIES:

A reply to the "request signal status/**frequency**" message supplies the horizontal and vertical frequencies of the current signal. In the example from Table C-4, P2 is the horizontal frequency and P3 is the vertical frequency as shown in the following illustration. Convert to decimal format and assume two decimal places.

P1 = STATE ($01)

If you want to determine the state of the current signal, you can send a "request signal status/**state**" to the projector. Note that this message must include both the signal status code ($91) as well as the P1 state code ($01) as shown in the example from Table C-4. Note also the "escaped" $01 byte.

01 07 00 00 03 FF **91 00 81** 00 0E

STATE REPLIES:

A reply to the "request signal status/**state**" message includes another parameter (P2) whose value describes the state of the current signal as a good locked signal ($00), a changing signal ($01), or an error characterized by an unstable or missing signal ($02). See Table C-4 for an example of each.

Note: Errors are not detected or reported for NTSC and PAL frequencies or certain computer-generated sources having these frequencies. See Table C-4.

P1 = SYNC ON? ($02)

If you want to determine the sync of the current signal, you can send a "request signal status/**sync**" to the projector. Note that this message must include both the signal status code ($91) as well as the P1 sync code ($02) as shown in the example from Table C-4.

01 07 00 00 03 FF **91 02** 00 0E

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SYNC REPLIES:

A reply to the “request signal status/sync” message includes a second parameter (P2) to describe the sync. Possible values are defined in Table C-5.

Table C-5. Sync Replies

0	None, no sync present
1	Sync-on-green
2	Composite sync
3	Separate H sync on H
6	Sync from decoder
7	Sync on internal

C.7.6 “Ping” Command

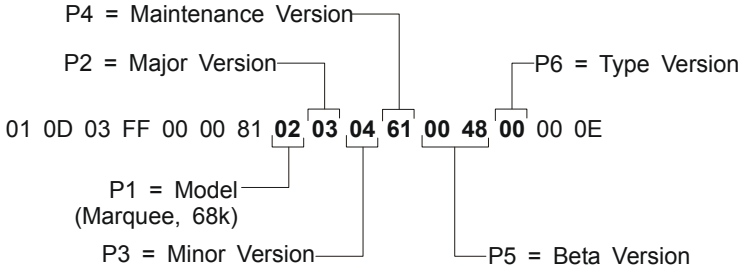
Use ping to request and obtain basic projector information, such as projector type and current software version. Like most RS-232 requests, a ping request contains no data (parameters):

01 06 00 00 03 FF **81** 00 0E

Note: There is no “set” command for ping — you can issue requests and receive replies *only*.

PING REPLIES

The Ping reply contains data for the six parameters necessary to fully answer the ping request, as shown in the example from Table C-4:



APX Figure C-7. Information in a Ping Reply

This reply represents V3.4.a.072 Beta of the main (68K) software.

C.7.7 “Test Pattern” Diagnostic Command

The “Diagnostic:Test Pattern” command enables you to select, request or obtain the number of a specific test pattern. Note that such commands must include both the “diagnostic” command code as well as the “test pattern” parameter (P1). This parameter represents the diagnostic to be run and ensures that the proper diagnostic is run (in this case “test pattern”). Shown below is the “request” example from Table C-4.

01 07 00 00 03 FF **FF 07** 00 0E

DIAGNOSTIC/TEST PATTERN REPLIES

Resulting replies will then include an additional parameter (P2) representing the number (name) of the test pattern. The example below shows that a “dots in crosshatch” pattern is present.

01 08 03 FF 00 00 **FF 07 1B 93** 00 0E

EXITING FROM A TEST PATTERN

Exit a test pattern by pressing the Exit key or by selecting test pattern “0”.

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C.7.8 Color Modulation (CNM) Command

Use this message to set or get the current contrast modulation values. There are 3 colors in each of 8 on-screen zones.

Table C-6. Color Modulation (CNM) Command

Message = Adjust Zonal Contrast			
Parameter	**Name**	**Description**	
P1	Which adjustment	P1 is made of three characters. The first specifies zone or command, and the second red, green or blue.	
(2 bytes)	byte 1: 0 = Left, 1 = Right, 2 = Top, 3 = Bottom, 4 = Top Left, 5 = Top Right, 6 = Bottom Left, 7 = Bottom Right, 8 = Save to Eeprom 9 = Restore from EEprom byte 2: 0 = red, 1 = green, 2 = blue	Example: 0,2 specifies an adjustment of blue left zone.	
P2 (1 byte)	value	0 - 255	(8 bits)
Message = Read Zonal Contrast			
P1	Which adjustment	Specifies which color and zone of zonal contrast adjustment to return.	
Reply to Read Zonal Contrast Message			
P1 (2 bytes)	Which adjustment	Specifies which color and zone of zonal contrast adjustment to return.	
P2 (1 byte)	value	The value of the specified adjustment	

Example – Contrast modulation message
01 09 00 00 03 ff 2e 1b 81 00 41 00 0e = set right red zone to 65.

Saving and Discarding Contrast Modulation Values
Writing to hardware will change values & save values in shadow EEPROM memory structure but will not save permanently to EEPROM for next power up. You must use the ***Save*** command to do this. When you use byte 1 of P1 for the save or restore operation, the rest of the message is unused.

Color Temperature (SCT) Command
Use this message to set or get the current color temperature, selecting from a list of color temperatures. Note that white balance must be selected in order to provide a color temperature between 3200°K and 9300°K.

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C.7.9 Color Temperature Modify Command (CTM)

Use this message to set (alter) or get the red, green and blue levels present for a defined color temperature. This command does ***not*** select a color temperature.

Table C-7. Color Temperature Command (CTM)

- Value Range: 0 = 3200K, 2 = 6500K, 3 = 9300K, 5 = source custom, 6 = white balance

Message = Adjust Color Temperature		
Parameter	**Name**	**Description**
P1 (3 bytes)	Which adjustment byte 1: 0 = G2, 1 = drive, 2 = white balance 8 = Save to Eeprom 9 = Restore from EEprom byte 2: 0 = red, 1 = green, 2 = blue byte 3: 0 = 3200K, 1 = 5400K(Future), 2 = 6500K, 3 = 9300K, 5 = source custom	P1 is made of three characters. The first specifies G2, drive or white balance, the second red, green or blue, and the third what to set. Example: 0,2,3 specifies an adjustment of blue G2 for the 9300K temperature setting. 2 specifies an adjustment to the white balance setting Bytes 2 & 3 are not relevant (but must be used anyway) when adjusting white balance
P2 (2 bytes)	value	0-4095, G2 (12 bits) (MSB,LSB) (most significant digit, least significant digit) 0 - 255, drive (8 bits) (0,LSB) 0 - 255, white balance (8 bits) (0,LSB)
Message = Read Color Temperature		
P1	Which adjustment	Specifies which color temperature adjustment to return.
Reply to Read Color Temperature Message		
P1	Which adjustment	Specifies which color temperature adjustment to return.
P2	value	The value of the specified adjustment

Example - Color Temperature Modify:
010b 00 00 03 ff 52 00 00 02 08 00 00 0e = set 6500K red G2 to 2048.

Saving and Discarding Modified Color Temperature Values
Writing to hardware will change values & save values in shadow EEPROM memory structure but will not save permanently to EEPROM for next power up. You must use the ***Save*** command to do this — this save applies only to the currently selected temperature, ***not*** all temperatures When byte 1 of P1 is used for the save or restore operation, the rest of the message is unused.
If the requested data is unrecognized, no message is returned. If the requested adjustment is invalid (out of range), no adjustment is made.
If you query a parameter for a color temperature other than what is currently selected, a switch to the queried temperature ***may*** occur.

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Appendix D

MARQUEE® CROSS-REFERENCE SPARE/REPLACEMENT PARTS TABLE AND ACCESSORIES LIST

D.1 MARQUEE®™ Cross-reference Parts Table

Part Number	Description	811x	850x	8500LC	8500 Ultra	8500LC Ultra	9500 LC	9500 LC Ultra
03-000229-03P	LOW VOLTAGE POWER SUPPLY	X	X	X	X	X	X	X
03-000229-05P	LVPS - REQUIRED FOR EUROPE	X	X	X	X	X	X	X
03-000232-01P	LENS ASSY HD-8 8"	X	X		X			
03-000238-01P	HD 10L LENS (3 USED)			X			X	
03-000254-01P	CRT 9" RED PANASONIC ASSY- W/ MAGS						X	X
03-000254-02P	CRT 9" GREEN PANASONIC ASSY W/ MACS						X	X
03-000254-03P	CRT 9" BLUE PANASONIC ASSY W/ MAGS						X	X
03-000255-01P	RED 8" CRT ASSY-8500LC			X		X		
03-000255-02P	GRN 8" CRT ASSY-WITH MAGNETICS			X		X		
03-000255-03P	BLUE 8" CRT ASY-WITH MAGNETICS			X		X		
03-000255-04P	GRN P43 8" CRT ASY-WITH MAGNETICS			X		X		
03-000255-05P	LC 8" RED-LESS MAGNETICS			X		X		
03-000255-06P	LC 8" GREEN-LESS MAGNETICS			X		X		
03-000255-07P	LC 8" BLUE CRT-LESS MAGNETICS			X		X		
03-000255-08P	LC 8" P43 GRN CRT-LESS MAGNETICS			X				
03-000310-02P	HIGH VOLTAGE POWER SUPPLY X5XX	X	X	X	X	X	X	X
03-007062-01P	CRT,8"RED ASY-WITH MAGNETICS	X						
03-007062-02P	CRT 8" BLUE ASY-WITH MAGNETICS	X						
03-007062-03P	CRT 8" GRN ASY-WITH MAGNETICS	X						
03-007062-04P	CRT 8" CRT,P43 GRN-WITH MAGNETICS	X						
03-007062-05P	8"RED CRT ASY-LESS MGNTICS	X	X		X			
03-007062-06P	8"GRN CRT ASY-LESS MGNTICS	X	X		X			
03-007062-07P	8"BLUE CRT ASY-LESS MGNTIC	X	X		X			
03-007062-08P	8" P43 GRN CRT-LESS MAGTCS	X	X					
03-007062-09P	CRT 8" RED WITH MAGNETICS		X		X			
03-007062-10P	CRT 8" GREEN WITH MAGNETICS		X		X			
03-007062-11P	CRT 8" BLUE WITH MAGNETICS		X		X			
03-007062-12P	8" GREEN P43 WITH MAGNETICS		X		X			
03-007064-04P	CRT 9" P43 GREEN - WITH MAGNETICS						X	X
03-007064-05P	CRT,9" RED - LESS MAGNETICS						X	X
03-007064-06P	CRT 9" GREEN - LESS MAGNETICS						X	X
03-007064-07P	CRT,9" BLUE - LESS MAGNETICS						X	X
03-007064-08P	SER 9" P43 GRN CRT-LESS MAGNETICS						X	
03-230211-01P	ACON LOCATOR ASSY	X	X	X	X	X	X	X
03-250306-08P	DPB D5.XX (SEE 03-270336-05P)	X	X	X			X	
03-260310-01P	STIG-WAVEFORM PCB ASSY		X	X	X	X	X	X
03-260314-02P	UPPER MOTHER PCB	X					X	

Part Number	Description	811x	850x	8500LC	8500 Ultra	8500LC Ultra	9500 LC	9500 LC Ultra
03-260315-04P	MOTHER 34KV BACKPLANE	X	X	X	X	X	X	X
03-260358-02P	UPPER MOTHER PCB ASSY		X	X	X	X		X
03-261330-01P	STIGMATOR		X	X	X	X	X	X
03-262330-01P	CONVERGENCE AMP	X	X	X			X	
03-262350-01P	CONVERGENCE AMP MODULE				X	X		X
03-263330-01P	VERTICAL MODULE	X	X	X			X	
03-263336-03P	CONTROL LESS DPB (See 03-270336-05P)	X	X	X			X	
03-263350-01P	VERTICAL DEFLECTION MODULE				X	X		X
03-270016-04P	ACON SENSOR	X	X	X	X	X	X	X
03-270303-08P	HORIZ.-MARQ [ALT TO -07P]	X	X	X			X	
03-270303-09P	HORIZONTAL DEFL MOD.				X	X		X
03-270307-01P	ACON CONTROL PCB	X	X	X	X	X	X	X
03-270334-01P	FOCUS MODULE	X	X	X			X	
03-270335-01P	VID INPUT MOD X5XX	X	X	X	X	X	X	X
03-270335-03P	VIM [ALT.TO -01P]				X	X		
03-270336-05P	CONTROL W/DBP	X	X	X	X	X	X	X
03-270337-01P	COLOR CORRECTION			X	X	X	X	X
03-270338-01P	VIDEO NECK (3 USED)	X	X	X	X	X		
03-270339-01P	VIDEO NECK BOARD (3 USED)						X	X
03-270354-02P	FOCUS & GEOMETRY MODULE				X	X		X
03-280336-05P	CONTROL/DPB/STIG-WAVEFORM		X	X	X	X	X	X
03-801062-93P	KEYPAD WIRED BK/LT SER ASSY	X	X	X	X	X	X	X
03-801067-01P	IR SENSOR BK/LT	X	X	X	X	X	X	X
03-EXTEND-01P	EXTENDER BOARD KIT	X	X	X	X	X	X	X
54-007049-01P	SERVICE MANUAL	X	X	X	X	X	X	X
54-017094-01P	USERS MANUAL	X	X	X	X	X	X	X

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D.2 MARQUEE® Accessories

Accessories	VDCDS Part Number
MARQUEE® High Frequency Signal Switcher	38-801000-93
RGB 500 Input Module	38-801001-96
RGB400 Loop Thru input Module	38-801002-96
MARQUEE® Composite Video/SVHS Input Module	38-801004-93
MARQUEE® High Definition HDTV Video Module	38-801005-93
PC250 Analog Input Module	38-801006-96
MARQUEE® Case Power Supply 120V	38-801023-96
Multi - Standard Single Scan Decoder	38-801025-97
MARQUEE® Case Power Supply 240V	38-801026-96
RGB 400 Buffered Amplifier	38-801033-96
MARQUEE® ACON kit	38-801040-93
MARQUEE® Interconnecting Cable (Computer to Projector)	38-801050-93
MARQUEE® Network Cable (Switcher To Projector)	38-801051-93
4 BNC/BNC Cable	38-801052-93
5 BNC/BNC Cable	38-801053-93
5 BNC/BNC Cable (Plenum Rated)	38-801054-93
IR Keypad	38-801061-93
Wired Remote keypad	38-801063-93
Presenters Remote Keypad	38-801064-93
Protocol B Keypad	38-801065-93
IR Sensor Remote	38-801066-93
MARQUEE® Librarian V1.8	38-801067-96
42" 9 Pin to 9 Pin	38-801072-93
MARQUEE® Encyclopedia	38-801090-94
Image Shifter Module	38-801100-96
Contrast Modulation upgrade kit	38-801102-96
Synchronization Cable	38-801105-95
MARQUEE® 152 KHz Upgrade Kit for 9500/8500 prior models	38-801120-01
Lens Options	
HD8 B	03-000232-01P
HD145.U	10-000477-01P
LOW MAGNIFICATION LENS 10-000238-01P (120 day lead time)	38-MHD10L-95
HD117-12	59581
HD117-24	59582
GT17 LENS 10-000237-01P	38-MQGT17-95
GT26 LENS 10-000239-01P	38-MQGT26-95
HD10-GT30-67 FOR DOME PROJECTOR (120 day lead time)	38-MQGT30-97
HD10E (120 day lead time)	59851
HD10K (120 day lead time)	59852
HD10R5 (120 days lead time)	59854
HD10R10 (120 days lead time)	59855
HD10RSM.ABU (large spheres) (120 days lead time)	59853

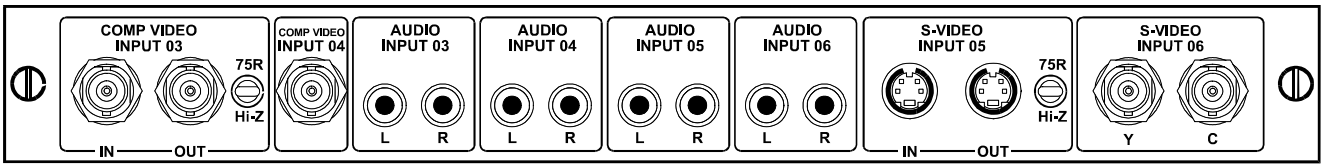
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Appendix E
MARQUEE® OPTIONAL INTERFACES

This appendix describes many of the optional interface modules and accessory devices available for use with all MARQUEE® projectors. Please note that not all accessories are covered here. For a complete, up-to-date listing of accessories available, contact your reseller or VDCDS.

E.1 MARQUEE® Multi-standard Decoder 38-801025-XX

The MARQUEE® Multi-standard Decoder installs above the MARQUEE® projector's built-in RGB input interface. It adds four keypad selectable inputs to the projector (03, 04, 05, and 06) and can process composite and S-video input signals in NTSC 3.58, NTSC 4.43, PAL, PAL M, PAL N, PAL 60 and SECAM video standard formats. The decoder provides automatic video standard identification and includes control features which are accessed through projector's user interface.

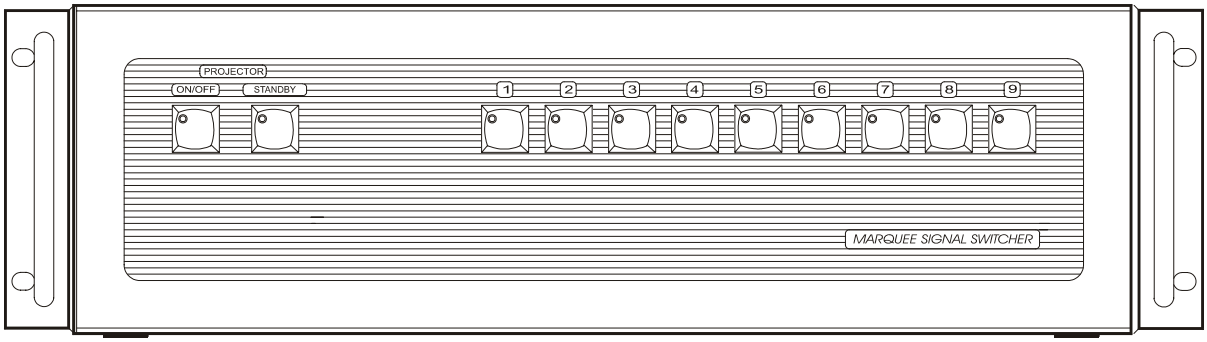


Features

- 2 composite video inputs
- 2 S-video inputs
- 4 audio inputs
- automatic video standard identification
- passive loop-through on composite (03) and S-video (05) inputs
- switchable termination for composite and S-video inputs
- luminance detail and color saturation control for all video standards
- hue control for NTSC 3.58 and NTSC 4.43
- adaptive comb filter to remove video noise and interference

E.2 MARQUEE® Signal Switcher 38-801000-XX

The MARQUEE® Signal Switcher is a rack-mountable signal selector which can extend the number of selectable inputs by the MARQUEE® projector. Connected to the RGB interface in projector slot 1, the switcher adds 8 more sources to the system. Other switchers can be connected to the first for a total of 78 keypad selectable inputs. Switcher inputs can also be selected by pressing the appropriate front panel push button.



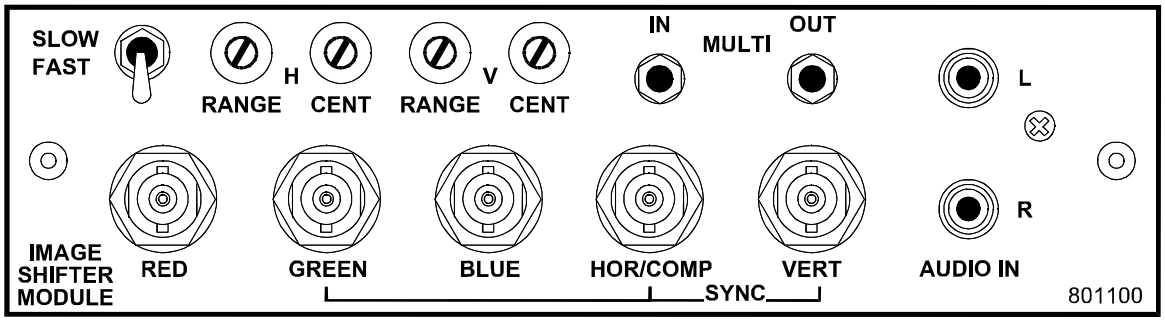
Features

- can be used with MARQUEE® projectors or other projection systems
- simple push-button control
- easy to see, illuminated indicators
- 9 expansion slots for interface modules
- RS-232 serial interface
- input for a wired remote keypad
- universal power input
- up to 9 switchers can be ganged together for use with a MARQUEE® projector

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E.3 Image Shifter Module 38-801100-XX

The Image Shifter Module is an RGB input interface designed for use with MARQUEE® projectors, MARQUEE® signal switchers, and other CRT (Cathode Ray Tube) based display devices such as display monitors and third party CRT projectors. Its purpose is to extend the useful life of the display device's CRT(s) by slowly shifting the displayed image over the phosphor coated area of the CRT face plate. By continuously shifting the image position, degradation of the phosphor is spread out thus reducing the noticeable effects of "phosphor burn".



Features

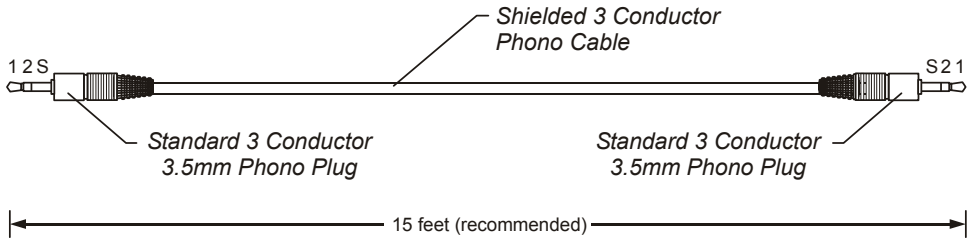
- accepts 3, 4, or 5 wire RGB video (sync on green, composite sync, or separate horizontal and vertical sync)
- vertical and horizontal range controls
- vertical and horizontal centering controls
- shift synchronization inputs and outputs for multi-display applications
- sync output polarity can be set to negative or positive
- left to right shift duration approximately 125 seconds
- top to bottom shift duration approximately 166 seconds
- BNC connectors for RGB signal inputs
- RCA connectors for left and right channel audio inputs

Note: The Image Shifter Module must be installed in a Case/Power Supply (38-801023-XX or 38-801026-XX) for use with non-MARQUEE® switching or display devices.

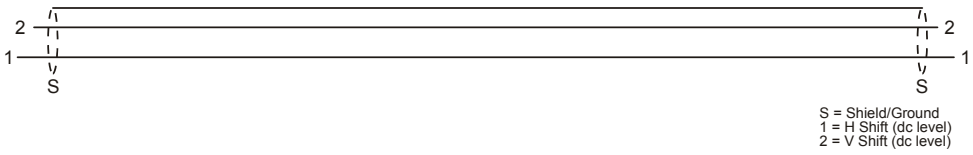
E.3.1 Image Shifter Cable Assembly

Used for connection between Image Shifter Modules for multi-display image shift synchronization.

Cable Type: *3 Conductor Phono*



Cable Wiring:

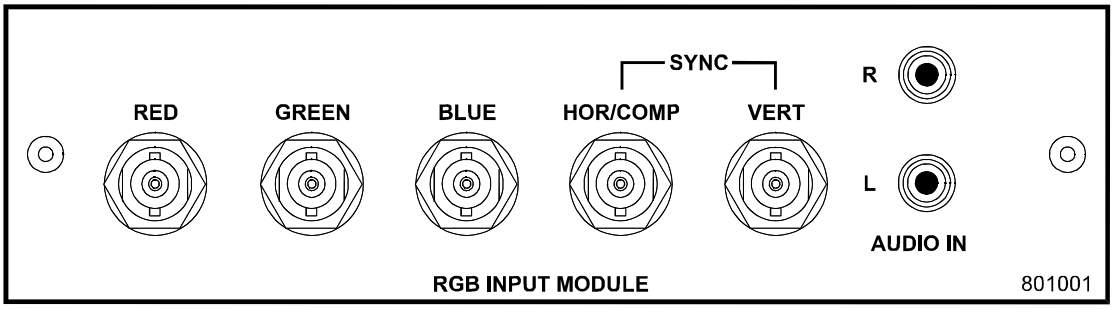


APX Figure E-1. Image Shift Cable for Multi-Projector Shift Synchronization.

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E.4 RGB Input Module 38-801001-XX

The RGB Input Module may be installed in a MARQUEE® projector or MARQUEE® signal switcher. It is designed to receive analog RGB input signals from computers or other RGB source devices.

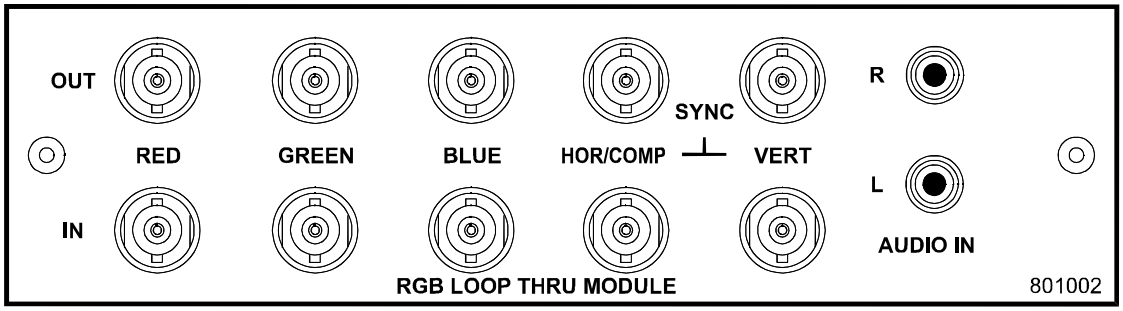


Features

- 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
- RCA connectors for left and right channel audio inputs

E.5 RGB Loop Thru Input Module 38-801002-XX

The RGB Loop Thru Input Module may be installed in a MARQUEE® projector, MARQUEE® signal switcher, or Case/Power Supply. It is designed to receive analog RGB input signals from computers or other RGB source devices. Video inputs are 75Ω terminated. Video outputs are provided for buffered loop-through to another display device.



Features

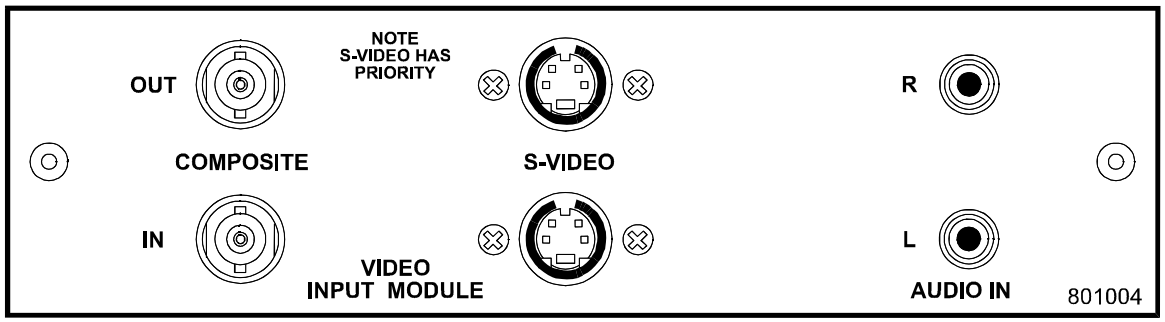
- accepts 3, 4, or 5 wire RGB video (sync on green, composite sync, or separate horizontal and vertical sync)
- BNC connectors for RGB signal inputs
- RCA connectors for left and right channel audio inputs
- buffered loop-through video outputs

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E.6 Composite/S-Video Input Module 38-801004-XX

The Composite/S-Video Input Module may be installed in a MARQUEE® projector or MARQUEE® signal switcher. It is designed to receive composite video or

S-video input signals from tape or disk players. Video inputs are 75Ω terminated. Video outputs are provided for buffered loop-through to another display device.



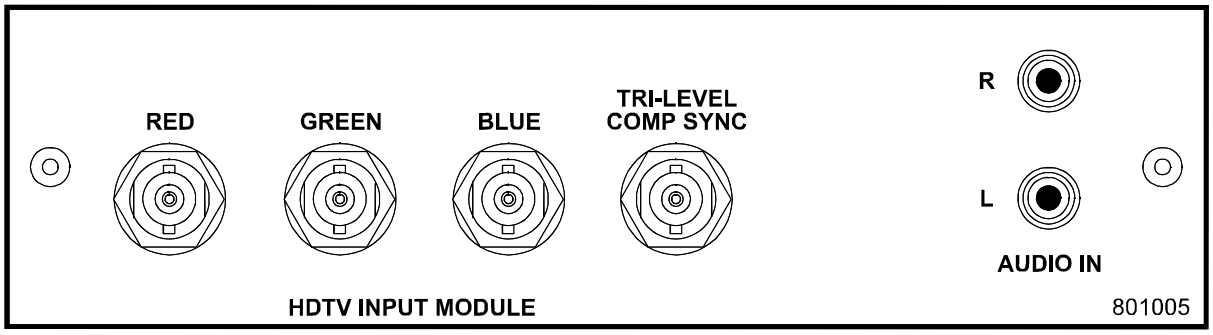
Features

- BNC connectors for composite RGB signals
- 4 pin mini-DIN connectors for S-video signals
- RCA connectors for left and right channel audio inputs
- buffered loop-through video outputs

Note: This interface is not a decoder. Proper display of NTSC, PAL, or SECAM signals requires that the projector include a MARQUEE® Multi-standard Decoder (38-801025-XX).

E.7 HDTV Input Module 38-801005-XX

The HDTV Input Module may be installed in a MARQUEE® projector, MARQUEE® signal switcher, or MARQUEE® Case/Power Supply. It is designed to receive HDTV analog RGB input signals with tri-level sync.



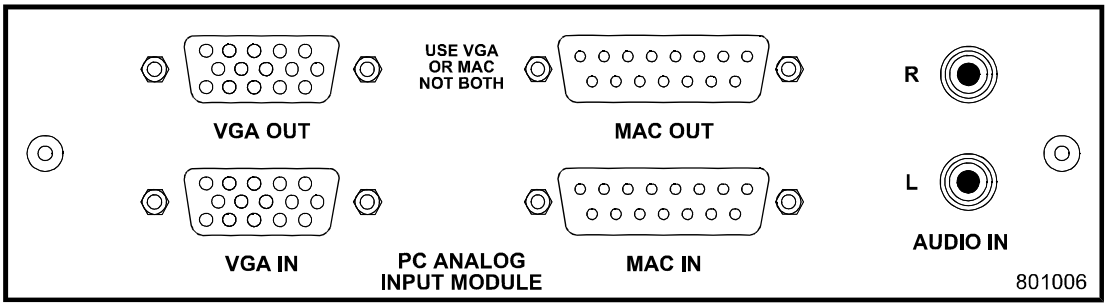
Features

- accepts 3, 4, or 5 wire RGB video (sync on green, or separate tri-level composite sync)
- BNC connectors for RGB signal inputs
- RCA connectors for left and right channel audio inputs

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E.8 PC Analog Input Module 38-801006-XX

The PC Analog Input Module may be installed in a MARQUEE® projector, MARQUEE® signal switcher, or MARQUEE® Case/Power Supply. It is designed to receive analog RGB input signals from IBM PC compatibles or Macintosh computers. Video inputs are 75Ω terminated. Video outputs are provided for buffered loop- through to another display.



Features

- accepts VGA or MAC RGB video
- 15 pin D connectors for video
- RCA connectors for left and right channel audio inputs
- passive loop-through video outputs

Note: This interface does not accept VGA and MAC signals simultaneously.

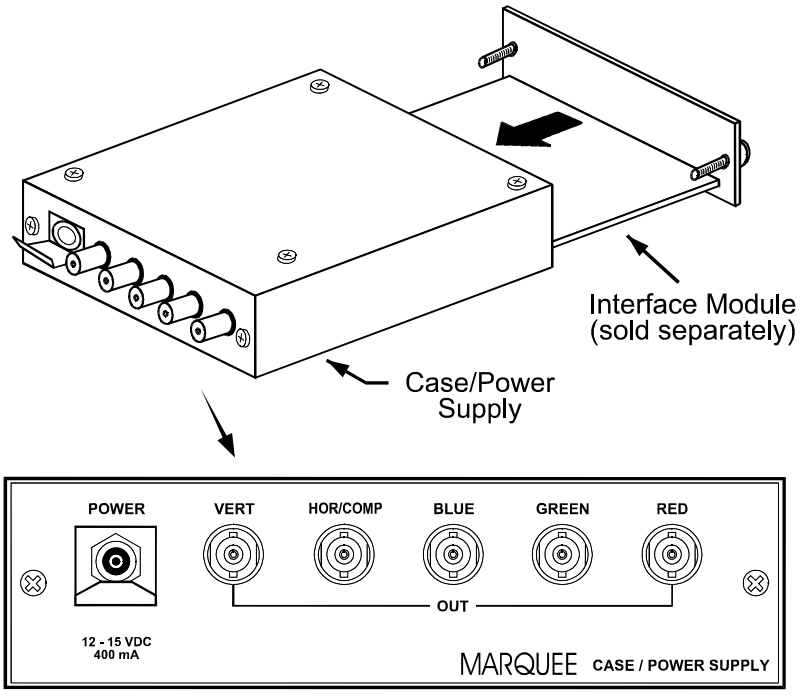
Note: Trademarks are the rights of their respective owners.

E.9 MARQUEE® Case/Power Supply 38-801023-96 / 38-801026-96

The Case/Power Supply allows specific MARQUEE® input modules to be used as stand-alone interfaces. Two modules are available: one for use with 120 volt line voltage (38-801023-96), and the other for use with 220 volt line voltage (38-801026-96). Both models include a 15 VDC, 500 mA AC adapter.

Features

- easy installation - no tools required
- can be used with the following MARQUEE® input modules: Image Shifter, RGB Loop Thru, PC TTL, Composite/S-Video, HDTV, and PC Analog
- retaining clip to secure AC adapter
- non-slip feet
- supplied with 110 or 220 volt AC adapter



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Appendix F

MARQUEE 8520 Series Supplement Information

The Marquee 8520 Ultra Series is a two-piece, extremely reliable projection system for the most demanding applications in simulation and virtual environments. The optics head of the projector is separated from the base electronics by a standard 10' connection cable. For installations requiring extended range, there is an option for a 15' cable. This innovative design allows for both horizontal and vertical arrays.

The Marquee 8520 series comes with three different lens options to accommodate short throw, high resolution displays needed in cockpit simulation as well as lens options for larger screens for dome and planetarium projection.

Ideal for soft edge matching, or 3D immersive environments, images created are consistently superb. Easy access, robust design, dependable operation and service/support second to none, the VDC Marquee 8520LC Ultra is the answer to your most demanding display requirements.

F.1 8520LC Specifications

Optics
- High definition Fl. 1 hybrid lens
- 10 line pairs per mm resolution
- Marquee 8520LC Ultra HD117-12 liquid coupled optical system, or
- Marquee 8520LC Ultra HD117-24 liquid coupled optical system
- Marquee 8520 Ultra w/ HD8 air coupled optical system
- Scheimpflug adjustment for top, bottom and side-to-side focus
- Resolution 2500x2000 addressability
- Marquee 8520LC Ultra: 2048 x 1536 pixels

Brightness
- 225 ANSI lumens
- The projector will automatically update all parameters, including convergence contrast, brightness, keystone, phase, etc., when a new source is detected. The set-up is taken from a matching memory or interpolated from two adjacent memories.

Video Circuits
- 0.5 to 1.0 volts p-p, 75 ohms +/-1 % terminated
- Circuitry for improved video performance and gray-scale tracking Marquee Ultra
- Keyed clamp, better than 1 % accuracy
- Series: 150 MHz bandwidth (-3dB); (accommodates 3 nanosecond pixels and digital dock rates over 300 MHz),

Sync and Deflection Circuits
- Input level: 0.3 to 5.0 volts pp., 75 ohms terminated

Geometry
- Rectilinear accuracy: 1.0 % maximum of picture height
- Horizontal Linearity: 2.0 % maximum
- Vertical Linearity: 1.0% maximum
- Top and bottom keystone control
- Vertical and horizontal skew control
- Vertical and horizontal bow control
- Special Extended Geometry Distortion Option available

Power Requirements
- 90 VAC to 264 VAC universal input
- Power 650 watts maximum
- Line frequency 50 to 60 Hz nominal
- Power factor corrected

Image Shifter
- This interface moves the image slowly on the CRT phosphor surface to reduce the harmful effects of a static image (optional on 8520Ultra)

Control Features
- Multi-language software (user selectable)
- Built-in set-up tutorials
- 5 built-in test patterns
- Programmable Events and Real Time Clock
- Menu driven interface with on-screen help
- Auto power-up after interruption
- Internal frequency generator

Scope of Supply
- Optics head: 3 CRTs and lenses
- 10' electronic cable with connectors
- Electronics base unit
- 2 full function programmable remote IR keypads.
- Users manual
- 10' AC line cord
- Tool Kit

Display
- Electronic geometry circuits separately correct top, bottom and sides for flat, curved or rear screen applications from 60" to 25' (1.7m to 7.6m) diagonal, depending on lens options
- Keystone circuitry to correct pictures for angles up to +/- 15 degrees vertically from screen axis
- Color temperature adjustment for precise set-up
- S&C vertical and horizontal linearity
- Top, bottom, and side blacking
- Scheimpflug adjustment for top, bottom and side to side focus
- Marquee Ultra projectors have 3D image capability with optional P43 short persistence phosphor
- Marquee Ultra has 9 zone electronic astigmatism correction and 8 zone contrast modulation control
- ACON II Automatic Convergence, an optional accessory, aligns the three CRTs to a sharp image in less than three minutes with three keystrokes
- ACON II has the ability to automatically converge two stacked projectors
- Automatically switches to separate Sync, composite sync or sync on green. Separate Sync and composite sync is automatically accepted in either polarity. (Sync on green limited to 180 kHz
- Smartlock™ processing circuitry for quick lock-in and ultra steady images

Vertical Deflection
- Frequency range: 39.5 Hz to 185 Hz. Size automatically regulated over frequency range and electronically adjustable over a 115 % range. Retrace time: less than 300 microseconds

Horizontal Deflection
- Frequency range: Marquee Ultra Series: 30 kHz to 152 kHz
- Size automatically regulated over frequency range. Retrace time compatible with signals having horizontal blanking times down to 1.5 microseconds

Inputs/Outputs
- Built-in RGB input, with stereo audio input. Optional input modules can install in interface slot
- Stereo audio inputs on all input modules, with audio-follow-video switching
- Built-in RS232 for computer control, with loop through for connection of multiple projectors
- HDTV compatible with optional interface module
- Stereo audio outputs with volume control

Contrast Modulation
- This feature adjusts the brightness in single or multiple zones for improved color and brightness uniformity. Standard on all Marquee Ultra models

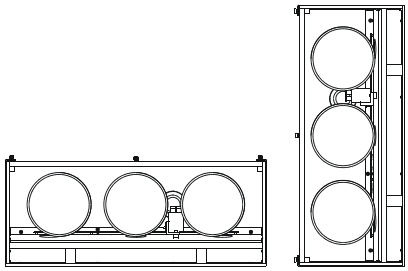
Maximum Operating
- Temperature: 0° to 35" (32" to 95°F)
- Altitude. 0 to 3000 m (0 to 10,000 ft)
- Heat Dissipation. 2450 BTU/HR (approx.)
- Humidity: 0 to 90 % non-condensing
- Storage Temperature: -30° to 65"C (-22" to 149"F)Weight
- Marquee 8520LC Ultra 80 kg / 176 lbs. (shipped) 104 kg / 229 lbs.

Due to continual improvement, specifications are subject to change without prior notice.

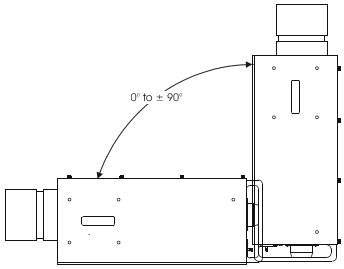
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F.2 Installation Information, Formulas and Reference Tables

The following information is for the installation of the 8520 Head Assembly. The Head Assembly may be installed in both the horizontal or vertical configuration and mounted on-axis (0°) or up to 90° from horizontal.



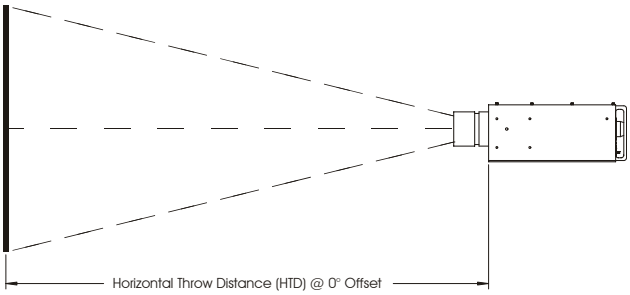
Horizontal or vertical Configuration

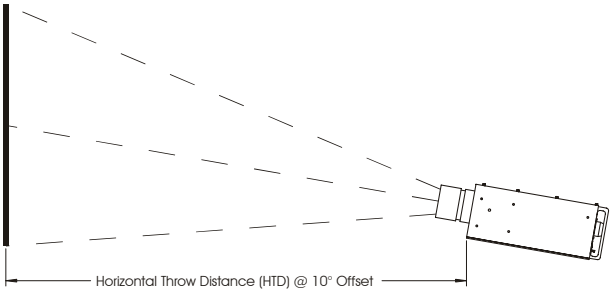


0° to 90° Mounting Configuration

F.2.1 8520 w/HD8B Lens Installation Data

The following tables include the Horizontal Throw Distance (HTD) formula for the MARQUEE® 8520 w/HD8B lenses at either 0° or 10° off-axis from center of screen. Greater projection angles may be accomplished with the use of a mirror or mirrors, the second table is a screen width to HTD reference table.





8520 w/HD8B Lens Installation Formulas

Projection Angle	HTD in Inches
0°	HTDin = 1.217 X (SWin + 12.2in)
10°	HTDin = 1.2 X (SWin + 11.25in)
Projection Angle	HTD in Millimeters
0°	HTDmm = 1.217 X (SWmm + 310mm)
10°	HTDmm = 1.2 X (SWmm + 286mm)

Screen Width vs. HTD Reference Table

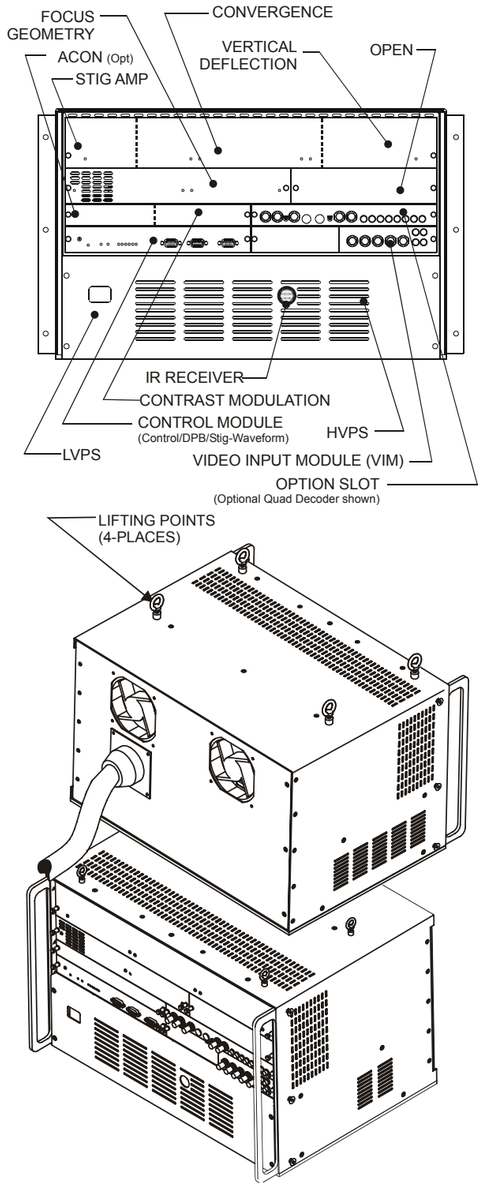
Screen Width		Horizontal Throw Distance			
		0° Projection Angle		10° Projection Angle	
mm	in	mm	in	mm	in
1524	60	2232	88	2172	86
1676	66	2418	95	2355	93
1829	72	2603	102	2538	100
1981	78	2789	110	2721	107
2134	84	2974	117	2904	114
2286	90	3160	124	3086	122
2438	96	3345	132	3269	129
2591	102	3531	139	3452	136
2743	108	3716	146	3635	143
2896	114	3902	154	3818	150
3048	120	4087	161	4001	158
3200	126	4273	168	4184	165
3353	132	4458	176	4367	172
3505	138	4644	183	4549	179
3658	144	4829	190	4732	186
3810	150	5015	197	4915	194
3962	156	5201	205	5098	201
4115	162	5386	212	5281	208
4267	168	5572	219	5464	215
4420	174	5757	227	5647	222
4572	180	5943	234	5830	230
4724	186	6128	241	6012	237
4877	192	6314	249	6195	244
5029	198	6499	256	6378	251
5182	204	6685	263	6561	258
5334	210	6870	270	6744	266

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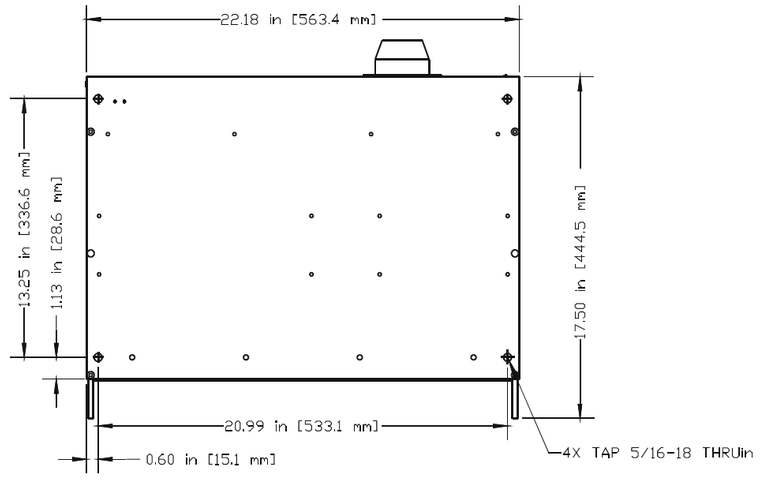
F.3 8520 Chassis Assembly Layout and Dimensions

The electronic assembly is where the bulk of the electronic modules are housed and the signals are tethered to the head assembly via a 10 ft. (3m) cable. The electronic chassis may be rack mounted horizontally in a standard 25” rack or rotated and mounted vertically in a standard 19” rack or place virtually anywhere. The illustration below shows the location of the modules found in the electronic chassis.

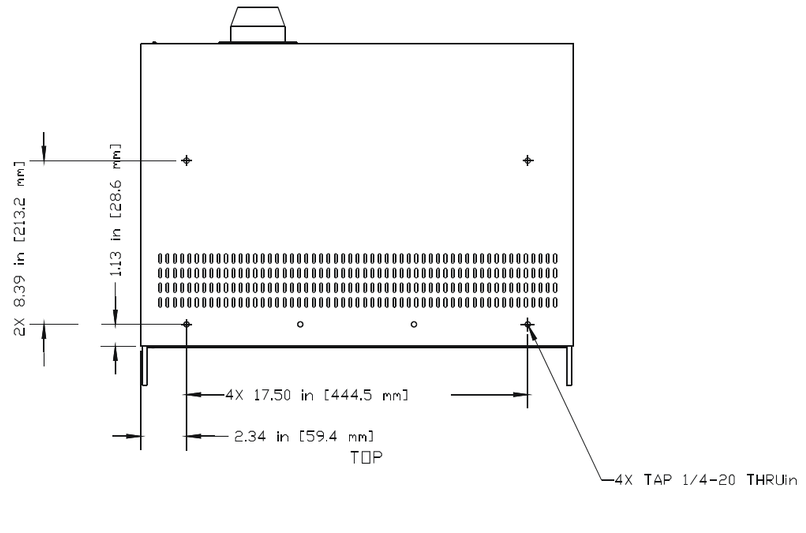
ELECTRONIC CHASSIS ASSEMBLY

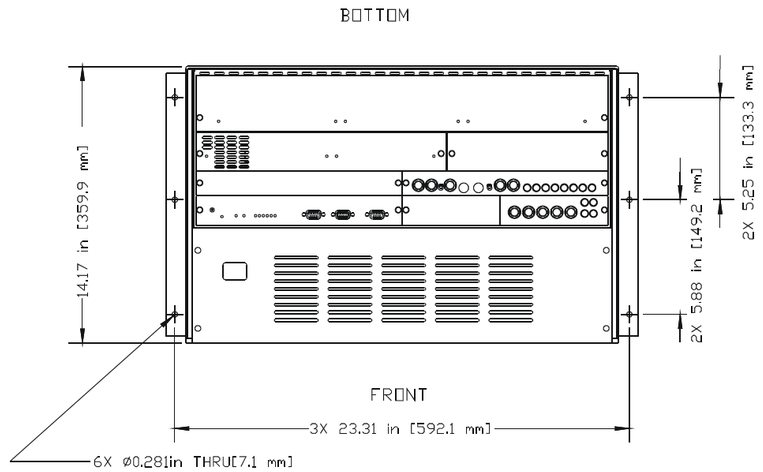


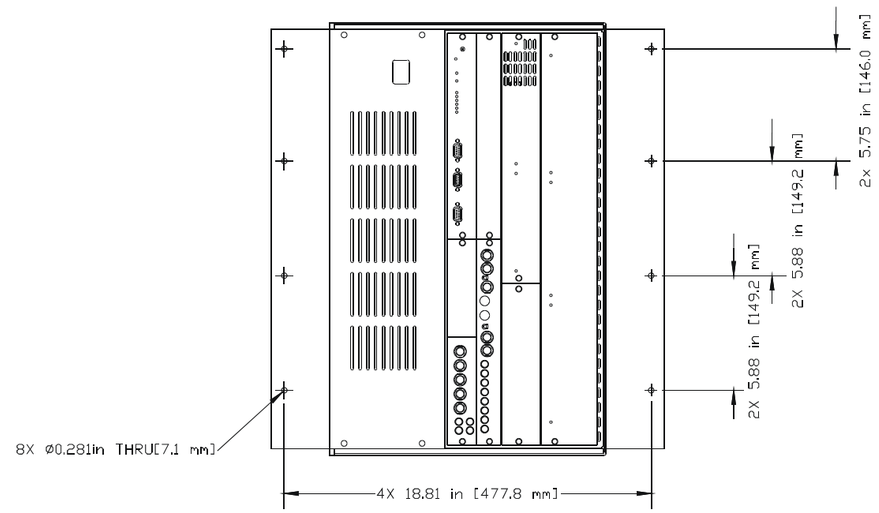
24" RACK MOUNT CONFIGURATION



19" RACK MOUNT CONFIGURATION



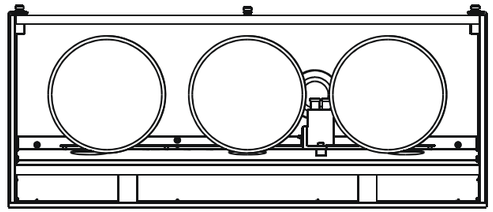


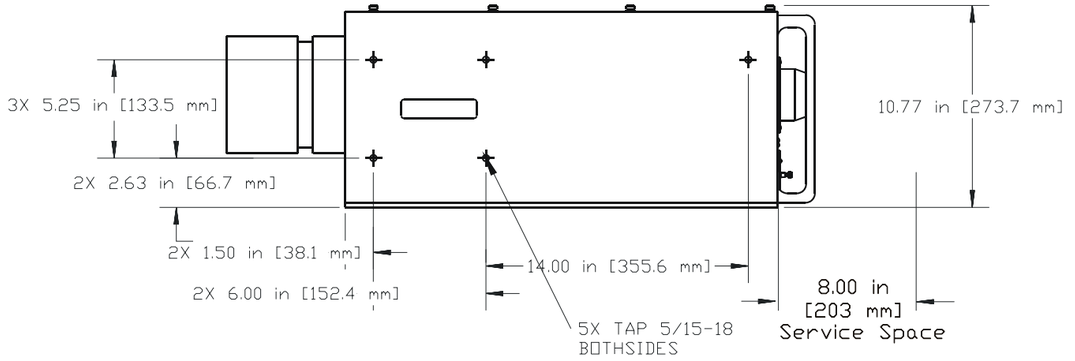


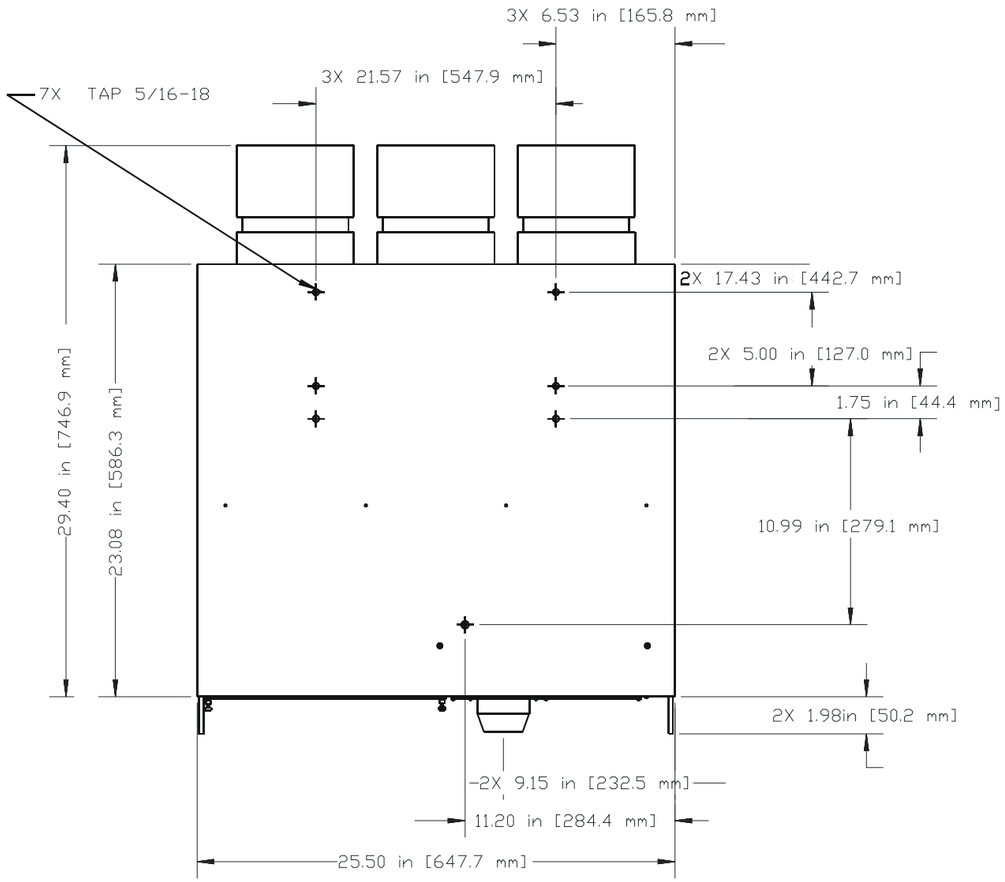
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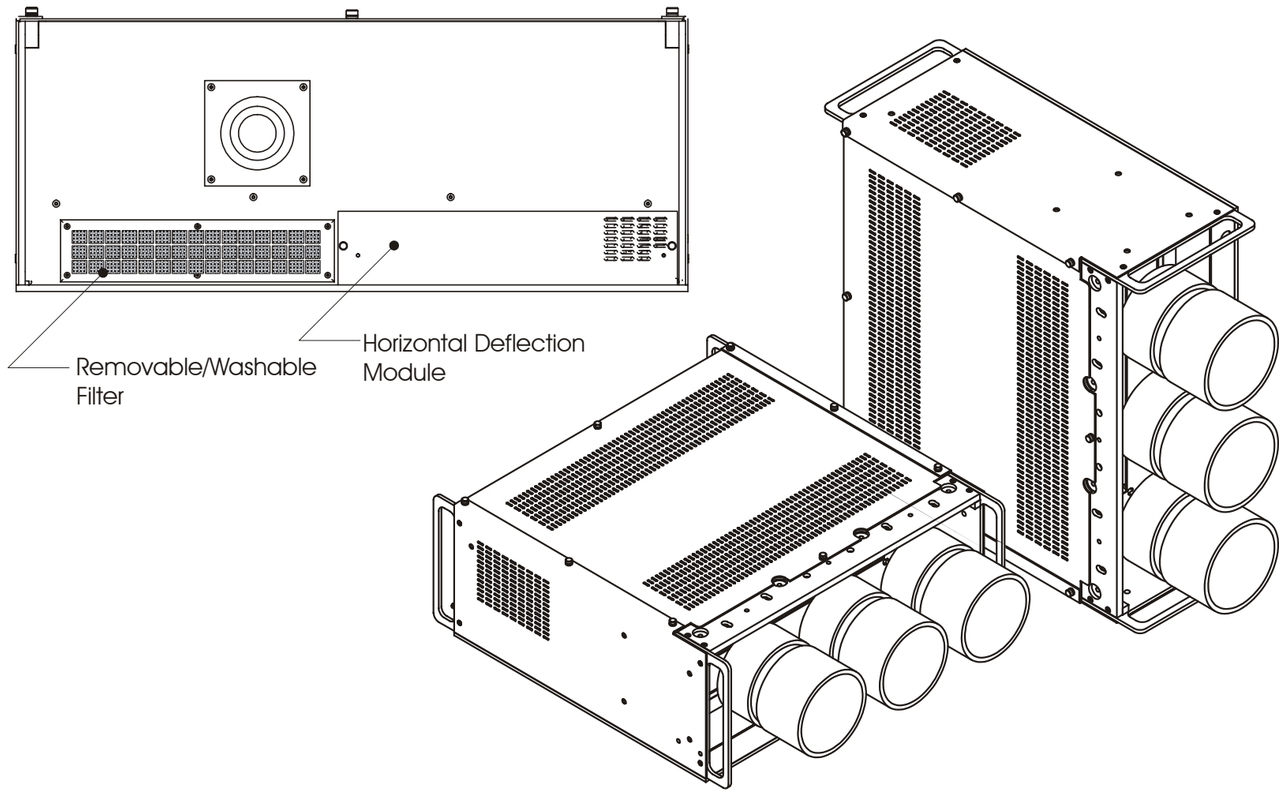
F.4 8520 Head Assembly Layout and Dimensions

The 8520 head (CRT) assembly allows flexibility in your installation, the assembly can be mounted either horizontal, upright or upside down or vertically on either side. Mounting holes are provided for all configurations.









Horizontal or Vertical Array Configuration

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Appendix G
GLOSSARY

This appendix defines many of the terms used in this manual as they apply to the MARQUEE® projection system.

ACON (Automatic Convergence)

ACON is an optional automatic convergence feature available for MARQUEE® series projectors. With ACON installed, convergence of the red, green and blue images is performed accurately and automatically with minimal user intervention.

ASI (Automatic Source Interpolation)

A process whereby a display setup for a given source is approximated from other setups already in memory. For more information about ASI, refer to the ASR entry in Section 3.7, Utility Features.

ASR (Automatic Source Recall)

A process whereby a display setup for a given source is chosen from memory according to its signal parameters (horizontal and vertical frequencies). For more information about ASR, refer to the ASR entry in Section 3.7, Utility Features.

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 video tape machines. Analog video can generate a large number of colors.

Aspect Ratio

The ratio of the width of an image to its height.

Automatic Convergence

The automatic alignment of the projected red, green and blue images on the projection screen.

Autolock

The ability of the projector to automatically synchronize to the horizontal and vertical scan frequencies of an input signal.

Bandwidth

The frequency range of the projector's video amplifier.

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.

Bow

A horizontal curve in the center of the image, and/or a vertical curve across an image.

Brightness

Brightness in projection usually describes the amount of light emitted from a surface such as a screen. Brightness is measured in lumens, foot-lamberts, foot-candles, or lux.

Candela or Candle

The intensity of light is measured in candelas.

Channel

A 2-digit number with user-assigned source input information. This information includes a physical input (switcher, slot), a setup memory (input or recall), and a name or description. Assignments are made through the Channel List.

Channel List

A list of up to 99 channels (explained above) which may be created, edited, or deleted by the user. The Channel List feature provides an alternative, and sometimes easier, way to select sources and their setups.

Color Shift

The change in the tint of a white field across an image.

Color Temperature

This term refers to the coloration (reddish, white, bluish, etc.) of a white image. (It does not refer to the brightness of a white image.) The Kelvin (K) temperature scale is used to measure color temperature.

Color Temperature Uniformity

The accuracy of color temperature at any location.

Composite Video

This term refers to the output of video tape players and some computers. Synchronization, luminance, and color signals are combined on one output cable.

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Contrast (ratio)

The ratio of brightness of the brightest possible area to the darkest possible area of an image.

Convergence

The alignment of the projected red, green and blue images on the projection screen.

Current Setup Memory

The setup memory which is currently being used to display a given source's image.

Curved Screen

A projection screen which is curved to improve screen gain. Curved screens usually have screen gains which are greater than 1 but viewing angles much less than 180°.

Decoder

A device that converts NTSC, PAL, PAL M, PAL N, PAL 60, SECAM or NTSC 4.43 video to RGB video (MARQUEE® Multi-standard Decoder).

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

The level of a display adjustment. Some display adjustments are: Contrast, Brightness, Blanking, Bow, Size, Keystone, Pincushion, Focus and Convergence.

Flicker

A rapid variation in brightness created when the frame rate is too slow. (See also 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 is one half of vertical frequency.

Foot-candle

The intensity of visible light per square foot.

1 foot-candle = 1 lumen/square foot = 10.76 lux

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.

Gamma Correction

A feature provided on MARQUEE® Ultra Series, 9500DM and 8500SM models which boosts the blue color output when required to provide improved picture intensity and color uniformity.

Geometry

The reproduction of a straight and rectangular image.

Help Page

A display of help information on the projection screen.

Horizontal Frequency

Also called horizontal scan rate or line rate, this is the frequency at which scan lines are generated. Horizontal frequencies vary amongst sources.

Hot Spot

A circular area of a screen where the image appears brighter than elsewhere on the screen. The hot spot always appears located 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.

Input

A physical connection route for a source signal defined by two numbers; a switcher number and a slot number. If the switcher number is 0, the input is a projector input.

Image Shifter Module

An optional interface module which can lengthen CRT life while maintaining a bright picture by slowly shifting the image about the CRT faceplate. Image shifting occurs both horizontally and vertically. Shift range is totally controllable by the user. NOTE: Standard on the 9500LC.

Input Memory

A setup memory which is associated with a particular projector or switcher input.

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Interface

A device 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 rate is too low, the image may flicker depending on the image content.

Keypad

A device which allows the user to control projector settings and operation. There are four different keypad types which may be used with the projector: built-in, IR remote, wired remote, and presenter's. For more information about these keypads, refer to the keypads entry in Section 3.1.2,.

Keystone

A distortion of the image which occurs when the top and bottom borders of the image are not equal in length. Side borders slant in or out, producing a keystone shaped image.

Learn Screen

An ACON function which stores screen position data in memory for future reference. Learn Screen is usually performed only once per projector installation. If the ACON Locator Assembly or screen is moved (i.e., the projector installation changes to ceiling mount), the Learn Screen function must be repeated.

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.

Locator Assembly

The Locator Assembly, situated on the front of projectors which include the ACON automatic convergence feature, is the "eye" of the ACON system. It includes a photosensor/lens component which mechanically scans the projected display at each convergence point while sensing relative positions of each projected color.

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 amount of visible light emitted by a light source is measured in lumens.

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 options which are displayed on the screen for selection by the user.

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

A video output format of some video tape and disk players (used primarily in Europe, China and some South American and African countries). All PAL (Phase Alternating Line) video is a 50 Hz standard with 768 x 576 resolutions.

Pincushion

A distortion of the image which occurs when the borders are concave or convex.

Pixel (Picture Element)

The smallest discernable element of a computer generated image.

Presentation Level

The projector is at presentation level when an image is (or may be) displayed and no control, dialog, error, or help messages are displayed. For example, if a help page is displayed, the projector is not at presentation level.

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Projector-to-Screen Distance

Also called "Throw Distance", the distance between the front of the projector's green lens and the screen.

Protocol

The type of code format utilized by IR keypad(s). The standard code is Protocol A. By using two different protocols, two projectors may be used side by side while being controlled independently by their remote IR keypads.

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.

Recall Memory

A setup memory which is not associated with any particular input.

Resolution - CRT

The maximum number of lines that can be distinguished on the face of a CRT.

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 light source.

Resolution - Projector

The smaller of CRT and Lens resolutions.

Retrace Time (Horizontal)

The minimum time required for the projector to move the position of the scanning spot from the right edge to the left edge of a CRT.

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 of most computers. It can be analog or digital. Analog RGB video has 3, 4, or 5 wires; one for red, one for green, one for blue, and none, one or two for sync. For three wire RGB, the green wire usually provides sync. (See also TTL Video).

Scan Frequency

The horizontal or vertical frequency at which images are generated.

Scan Line

One scan line is 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.

Setup Memory

A projector memory which stores user-adjustable display settings. There are two types of setup memories: Input and Recall. Both memory types store the same parameters. The only difference is that Input memories store display settings for a particular physical input (i.e., switcher 0, slot 1) and Recall memories can be used with any input.

Slidebar

A slidebar is a graphical display of an adjustment setting. The setting is displayed on a percentage scale.

Source

A device, such as a computer or VCR, which may be connected to the projector for display.

Spot Size

The diameter of the smallest dot that can be generated on the face of a CRT.

Sync

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

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

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Terminated

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

Throw Distance

Also called "Projector-to-Screen Distance", the distance between the front of the projector's green lens and the screen.

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. This term is also called vertical scan rate.

Video

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

Video Decoder

A device that converts NTSC, PAL, SECAM or NTSC 4.43 video to RGB video (MARQUEE® Multi-standard Decoder).

Viewing Angle

Screens do not reflect equally in all directions. Most light is reflected in a conical volume which is centered around the "line of best viewing". Maximum brightness is seen when you are positioned within the viewing cone. The horizontal and vertical viewing angles are the horizontal and vertical angles of the cone.

White Balance

White Balance refers to the color temperature of white used by the projector.

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