

Service Procedures

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The *Marquee 8000* projector is unique in that many of its service adjustments are not hardware setups but rather software setups performed using the projector's built-in or remote keypad. This section explains the service setups which are available.

4.1 Software Setups

To perform software service adjustments you must be familiar with the operation of the projector and its keypad. If your experience with the *Marquee* projector is limited, it is recommend that you read through the User's manual supplied with the projector. For servicing it is best that the built-in keypad be used. The built-in keypad is connected to the projector by a three foot extension cable and is located below the front top cover. The keypad can be accessed as follows:

Position your hands above the red and blue lenses and grasp the front top cover of the projector. Gently lift it until it is released from its securing latch. Slide the cover away from the projector as shown in Figure 4-1. The keypad is then available for use. When servicing is complete, simply position the front top cover back in place.

Note: The built-in keypad can slide out of it securing bracket but it is recommended that it remain in place for use.

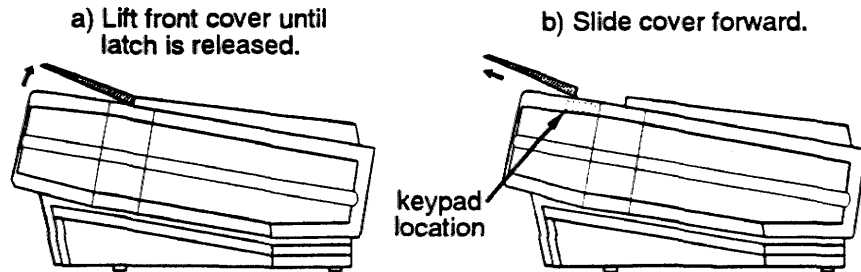


Figure 4-1. Front Top Cover Removal / Keypad Access

The built-in keypad and its functions are shown below.

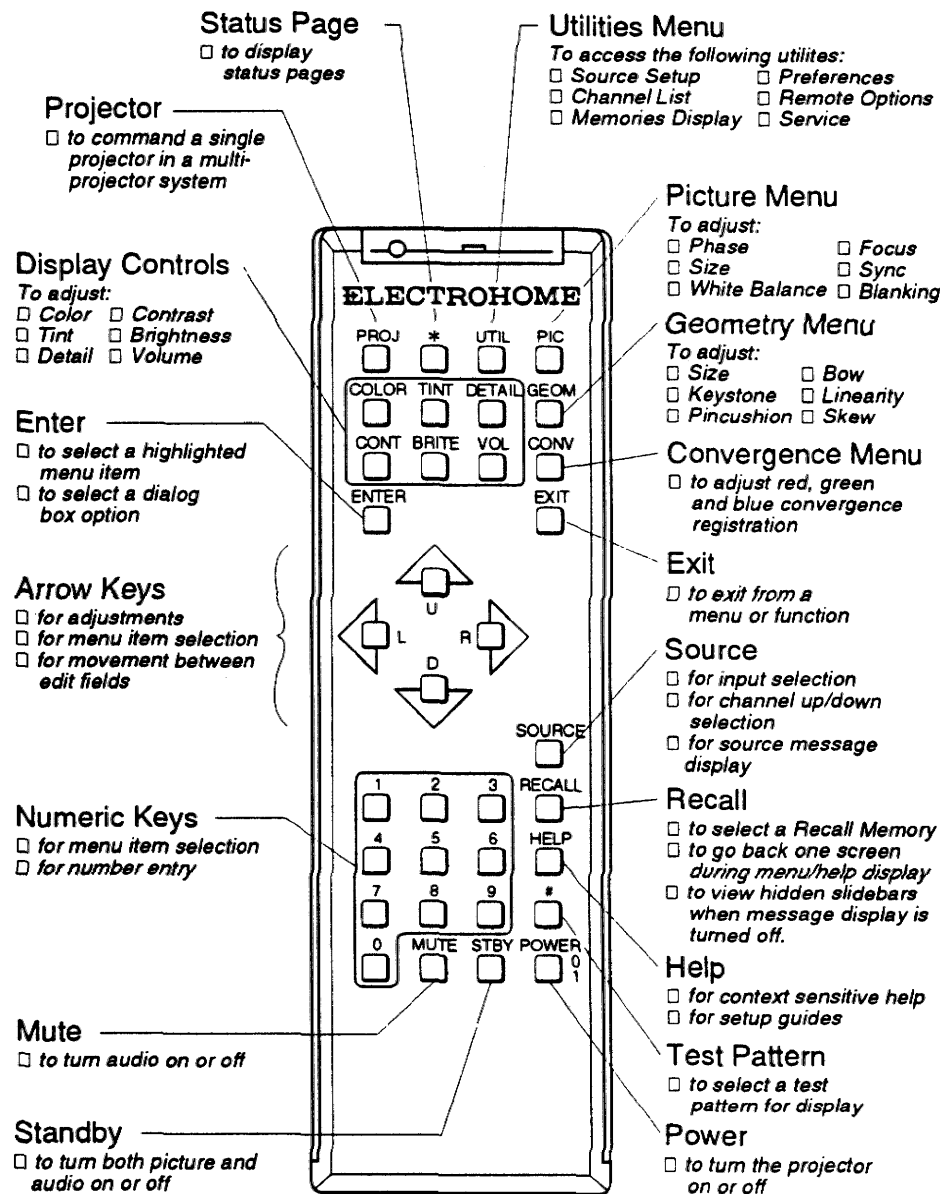


Figure 4-2. Built-in Keypad

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

- 1) All key presses are in sequence; no functions require simultaneous key presses.
- 2) **POWER** and **STBY** are the only keys which require an extended hold-down for activation (about one second). For all other keys, a momentary press will activate the key's function.
- 3) **▲**, **▼**, **◀**, 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.
- 4) Key presses are not buffered; that is, if keys are pressed at a time when the projector is busy (such as during power-up), the key presses may not take effect.

As you may notice from Figure 4-2, 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. All service related functions are accessed through on-screen menus.

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 made, 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.
- Selection Box - to display and change control settings.
- Confirmation Box - to confirm or cancel an indicated action.
- Message Box - to display messages.
- Help Page - to display help and provide assistance.
- Test Pattern - to assist during setup.

For an explanation of each of the above, refer to the projector User's manual. While using the keypad, keep the following in mind:



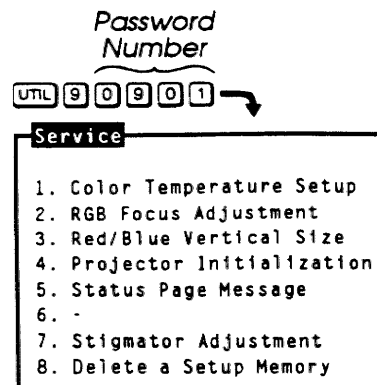
In most cases ...

- 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.

The Service Menu

The Service menu provides access to all software service adjustments except green convergence. Green convergence adjustments may be made through the Convergence menu (explained later).

When the projector is at presentation level, the main Service menu can be displayed on the screen by pressing **UTIL** **9** **0** **9** **0** **1**. 0901 is a 4 digit password which allows access to the service menus. As the password is entered, x's are displayed on the screen. Selections from the Service menu may be made by entering item numbers or using **▲**, **▼** then **ENTER**. To exit for the Service menu or one of its service routines, press **EXIT**.

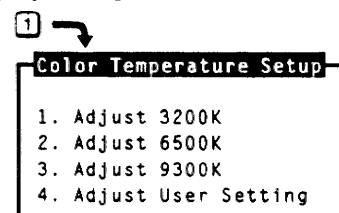


Note: Item 7, Stigmator Adjustment, has no effect on 8000 series projectors.

Color Temperature Setup

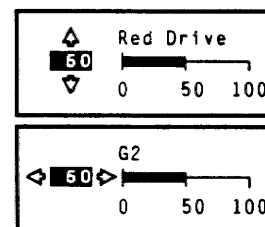
The Color Temperature Setup option allows you to calibrate and adjust the color temperature settings available from the White Balance menu (**PIC** **3**). Before making color temperature adjustments, change the projector's brightness setting (**BRITE**) to 50% then display a greyscale pattern (**#** **#** **#**).

Press **1** from the Service menu to display the Color Temperature Setup menu. Items 1, 2, and 3 are for calibration of the three standard color temperatures. Item 4 allows you to customize the "user setting" for the current setup memory.



Whichever item is selected, the setup procedure is essentially the same. When 1, 2, or 3 is selected, a warning message is first displayed to indicate that a color analyzer is required; to proceed, move the cursor bar to "Proceed" then press **ENTER**. A color analyzer assures an accurate (true) calibration. If a color analyzer is not available and/or you are not experienced at color temperature setup, it is recommended that settings for items 1 to 3 be left alone.

During color temperature setup, two color temperature slidebars are displayed for the red, green, or blue color. **▲** and **▼** adjust the drive (gain) level for the color. **◀** and **▶** adjust the G2 (cutoff) level for the color. To change adjustment colors, press **COLOR**. Every fourth press of **COLOR** changes the image to white (RGB). When the image is white, all three colors are displayed at the same time with one color (indicated by the slidebars) being the adjustment color. You can change the adjustment color while maintaining the white display by pressing **TINT**. To switch back to single color display, press **COLOR**.



When finished making adjustments, press **[EXIT]** to display an Exit confirmation box. Within the box the cursor is positioned on "Save". Press **[ENTER]** or **[EXIT]** to save the new settings. To re-perform the setup, move the cursor to "Continue Adjust" then press **[ENTER]** or **[EXIT]**. To discard your changes, move the cursor to "No Save" then press **[ENTER]** or **[EXIT]**.

Exit Color Temperature		
Save	No Save	Continue Adjust

When adjusting the "user setting" color temperature, you should adjust the G2's so that the dimmest bars of the greyscale are barely visible. The drive levels should be adjusted so that the brightest bars of the greyscale are white. It is recommended that the following sequence be used:

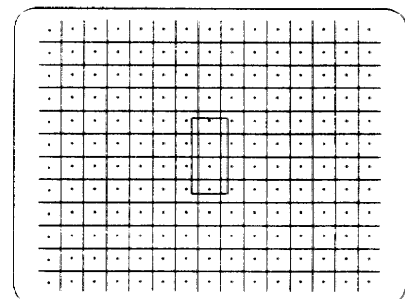
- Adjust Red G2 with only red displayed.
- Adjust Green G2 with only green displayed.
- Adjust Blue G2 with only blue displayed.
- Repeat steps a to c with white (RGB) displayed to fine tune the G2s.
- Adjust Red Drive with only red displayed.
- Adjust Green Drive with only green displayed.
- Adjust Blue Drive with only blue displayed.
- Repeat steps d to g (if necessary) until an optimal display is reached for all three colors.

Tip: It is usually best to begin by first setting the G2 and Drive levels of one of the colors (red for example) to 50%.

RGB Focus Adjustment ►

The RGB Focus Adjustment option allows you to statically and dynamically adjust the red, green, and blue focus. Before following this procedure, an optical alignment should first be performed and the user adjustable focus control (**[PIC]** **[4]**) should be set to 50%.

Press **[2]** from the Service menu to begin the focus procedure. A red crosshatch is displayed with a rectangular box at the center zone. There are five adjustment zones in total; center, top, bottom, left, and right. At the center zone, focus adjustments affect the entire screen for the current setup memory only. At the remaining four zones, focus adjustments affect the area where the box is positioned



and the setup applies to all setup memories (global). To make adjustments, use **[▲]** or **[▼]** until the crosshatch lines within the box are best focused. A number representing the amount of adjustment is displayed when adjustment begins. Press **[ENTER]** to change display colors and/or move to the next zone. Continue making adjustments until all zones are completed. An Exit confirmation box is displayed. (If you wish to exit prior to making all adjustments, **[EXIT]** will immediately display the Exit confirmation box).

When the Exit confirmation box is displayed, the cursor is positioned on "Save". Press **ENTER** or **EXIT** to save the new settings. To continue making adjustments from where you exited the procedure, move the cursor bar to "Continue Adjust" then press **ENTER** or **EXIT**. To discard your changes, move the cursor to "No Save" then press **ENTER** or **EXIT**.

Exit Focus		
Save	No	Continue
	Save	Adjust

Red/Blue Vertical Size

The Red/Blue Vertical Size option allows you to adjust the vertical size of the red and blue images. Vertical size adjustment may be required if it is difficult to perform RGB convergence.



Notes: Red and blue vertical size settings are stored in "global" memory and apply to all setups. If adjusted, convergence adjustments will be required for each setup. It is recommended that a crosshatch test pattern be displayed for vertical size adjustment.

Press **3** from the Service menu to begin vertical size adjustment. Red and blue vertical size sliders are displayed. Use **▲** or **▼** to adjust the vertical size of the red image until it best matches the green. Use **◀** or **▶** to adjust the vertical size of the blue image until it best matches the green. Press **EXIT** when complete.

▲	R Vert Size	
50		
▼		0 50 100

◀	B Vert Size	
50		
▶		0 50 100

Projector Initialization

Press **4** from the Service menu to display the Projector Initialization menu. This menu allows you to delete entire groups of setup memories and clear projector operating settings.

4

Projector Initialization
1. Remove All Recall Memories
2. Remove All Memories
3. Reset Everything

Remove All Recall Memories

Select item 1 from the Projector Initialization menu to remove all Recall memories from the projector's Recall memory database. A confirmation box is displayed. Move the cursor to "Do It" then press **ENTER** or **EXIT**. To cancel, press **ENTER** or **EXIT** when the cursor is positioned on "Cancel".

Removal all Recall memories	
Do It	Cancel

Note that this function does not simply reset the display settings of all Recall memories, but actually deletes them from the database. If the projector contains many Recall memories but none are actually used, it is a good idea to perform this function. Once performed, you will notice that when the Recall memory list is selected via the Utilities menu (**UTIL** **3**), no Recall memories are displayed.

Remove All Memories

Select item 2 from the Projector Initialization menu to remove all Input and Recall memories from the projector's setup memory database.

A confirmation box is displayed. Move the cursor to "Do It" then press **ENTER** or **EXIT**. To cancel or abort, press **ENTER** or **EXIT** when the cursor is positioned on "Cancel".

Remove all memories	
Do It	Cancel

Note again that this function does not simply reset the display settings of all setup memories but actually deletes them from the database. Once performed, the Recall and Input memory listings available through the Utilities menu will show no memories except the current input memory (which does not get deleted).

Reset Everything

Select item 3 from the Projector Initialization menu to delete all Input and Recall memories and set projector operating settings to default values.

This function should only be selected if for some reason the stored settings in the projector have become corrupt. When selected, a confirmation box is displayed as shown.

Move the cursor to "Do It" then press **ENTER** or **EXIT**. The projector will prepare for reset then power down. Press **POWER** to turn the projector back on.

To cancel or abort the reset, press **ENTER** or **EXIT** with the cursor positioned on "Cancel".

Warning! All data will be lost. Projector will power off.	
Do It	Cancel

Note: The following parameters are NOT reset by this function: Red and Blue Vertical Size; Top, Bottom, Left, and Right RGB Focus; 3200K, 6500K, and 9300K Color Temperatures.

Status Page Message

Press **5** from the Service menu to edit the status message displayed at the bottom line of the first status page (**5**). The status message can be up to 45 characters in length and can include alpha and number characters.

Enter or edit a message as follows. Use the **←** or **→** keys to change the character at the position of the flashing cursor. **→** changes to the next character in the alphabet. **←** changes to the prior character.

5 →

Status Page Message
Marquee Dealer XYZ

E Electrophase Projection Systems	
Marquee X000	Serial No: 123456789
Projector No: 000	Software: V1.1
IR Sensor: On	
Remote Jack: On	
IR Protocol: A	
Auto Power-up: Off	Horiz Scan: Normal
Messages: On	Vert Scan: Normal
Mute: Off	Switchers: 1
	Options: Decoder
Marquee Dealer XYZ	

.
C
B
A
space
9
8
7
.
.



Numbers and punctuation marks are also available. You may hold down the arrow key to quickly change the highlighted character to the one you want.

To move the cursor to the previous or next character in the field, press **←** or **→** respectively. To erase the characters in the field which follow the highlighted character, press *****.

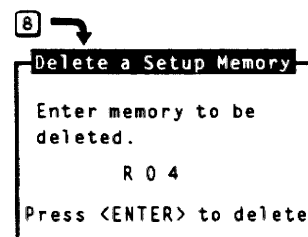
Programmable Status Message

Delete a Setup Memory ➤

Press **[8]** from the Service menu to delete one of the projector's Input or Recall memories. Memories that contain setups which are currently not used may have to be deleted to make room for new memories in the event that memory space has become full. Space is available for up to 80 setup memories (Input and Recall combined). It may also be desirable to delete older unused memories so that the memory display lists (accessible through the Utilities menu) only show memories which are currently in use.



When the selection box is displayed, enter the setup memory you want to delete. Input memories are entered by pressing **[SOURCE]** followed by a switcher number and a slot number. Recall memories are entered by pressing **[RECALL]** followed by a two digit Recall memory number (01 to 99). When complete, press **[ENTER]** to proceed with the deletion. You may continue to delete other memories or press **[EXIT]** or **[RECALL]** to leave the selection box.

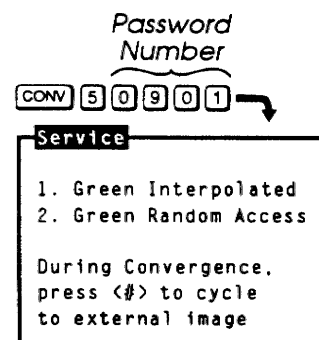


Note: You cannot delete the currently active memory.

Green Convergence ➤

Green Convergence allows you to adjust the geometry of the green color for the current setup memory. Green convergence alignment options are accessed by first displaying the Convergence menu (**[CONV]**). From the menu press **[5][0][9][0]** **[1]** to display the convergence Service menu. (0901 is the 4 digit password which must be entered to access the Service menu.)

From the convergence Service menu, you can select Green Interpolated Convergence or Green Random Access Convergence. Green Interpolated Convergence provides a complete guided green geometry alignment in all 45 convergence zones. Use this option if alignment is required in many areas of the image. Green Random Access Convergence allows you to align a particular area of the display; zones may be selected for alignment.



Warning: Green convergence should be performed before RGB convergence is attempted for any setup memories.

The following options are available while performing either of the above alignments:

Convergence on Image

When Green Convergence is first selected, an internally generated crosshatch test pattern is displayed. At this time you may select the external image for display. Press **[#]** repeatedly to cycle to the external image.

Convergence Reset

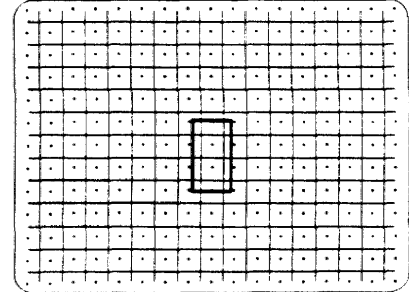
During convergence, the following reset options are available:

- ▣ Press **[0]** to reset static and dynamic green.
- ▣ Press **[1]** to reset static green (only).
- ▣ Press **[2]** to reset dynamic green (only).

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

Green Interpolated Convergence

Press **[1]** from the convergence Service menu to select Green Interpolated Convergence. An internally generated green crosshatch is displayed for the alignment. If you prefer to converge the projector using the external input, press **[#]** to cycle to the external image. Initially, a rectangular box surrounds the center convergence zone. When the box is at the center zone, adjustments are "static" and move the entire raster. Use **[▲]**, **[▼]**, **[◀]**, or **[▶]** to adjust the position of the image on the screen. Press **[ENTER]** to move the box to the next zone and begin dynamic adjustments. After each adjustment press **[ENTER]** to move to the next zone. If you wish to go back to a previous zone, press **[*]**. Once all 45 zones have been set up, an Exit confirmation box is displayed. (If you wish to exit prior to converging all 45 zones, **[EXIT]** will immediately display the Exit confirmation box.)



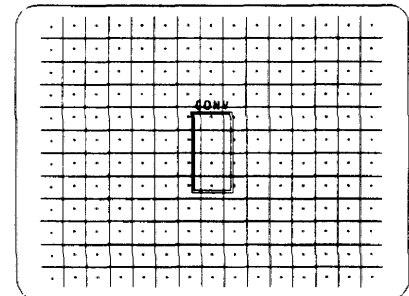
Note: **[CONV]** may be used instead of **[ENTER]** to change zones, if preferred.

When the Exit confirmation box is first displayed, the cursor is positioned on "Save". Press **[ENTER]** or **[EXIT]** to save the new settings. To continue convergence from where you left off upon exit, move the cursor to "Continue Adjust" then press **[ENTER]** or **[EXIT]**. To discard your changes, move the cursor to "No Save" then press **[ENTER]** or **[EXIT]**.

Exit Convergence		
Save	No	Continue
	Save	Adjust

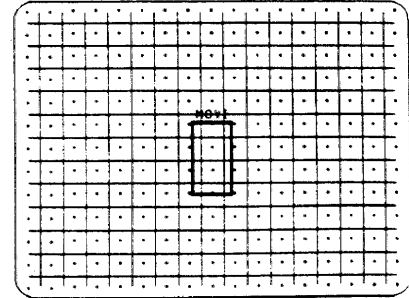
Green Random Access Convergence

Press **[2]** from the convergence Service menu to select Green Random Access Convergence. An internally generated green crosshatch is displayed for the alignment. If you prefer to converge the projector using the external input, press **[#]** to cycle to the external image. Initially, a rectangular box surrounds the center convergence zone. When the box is at the center zone, adjustments are "static" and move the entire raster. Above the box, "CONV" indicates that the zone is ready for convergence. Use **[▲]**, **[▼]**, **[◀]**, or **[▶]** to adjust the position of the image on the screen.



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.

When convergence is complete, press **EXIT** to display the Exit confirmation box. Press **ENTER** or **EXIT** to save the new settings. To continue convergence from where you left off upon exit, move the cursor to "Continue Adjust" then press **ENTER** or **EXIT**. To discard your changes, select "No Save".



4.2 Hardware Setup

Reverse Scan Installation ►

To set up the hardware as described in this section, the front and rear top covers of the projector must be removed. Refer to Section 5, *Parts & Disassembly*, for cover removal instructions.

Reverse Scan Installation is required when the projector operation configuration changes, for example — from floor mount to ceiling mount. The following reverse scan procedure allows you to change the horizontal and/or vertical scan direction to match the operating configuration of your new installation. If the scan directions are not set correctly, the displayed image will be upside down or reversed. Table 4-1 (next page) shows five common operating configurations and the scan directions for each.

The projector is shipped from the factory ready for a front screen, floor mount installation. If the projector's scan settings do not match the settings you need, proceed as follows:

HIGH VOLTAGES MAY BE EXPOSED



**THIS PROCEDURE SHOULD BE PERFORMED
BY QUALIFIED PERSONNEL ONLY**

Step 1 - Remove Power

Unplug the projector from the wall outlet or power source.



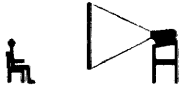


Step 2 - Remove the Front and Rear Top Covers

Remove the snap-in front top cover and a rear top cover. (See Section 5, *Parts & Disassembly*, for removal instructions.)

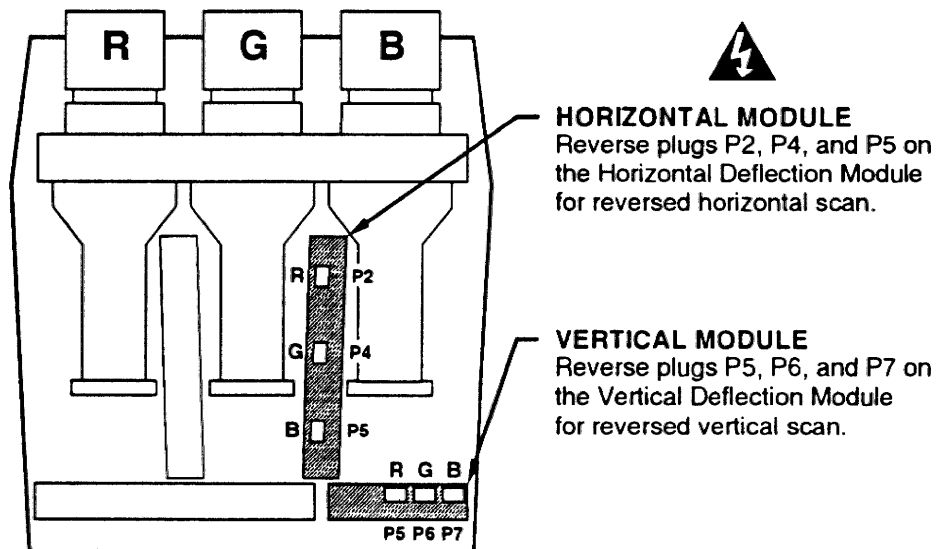
Step 3 - Reverse Scan

From Table 4-1, determine the scan configuration required for your installation.

Table 4-1. Operating Configurations

OPERATING CONFIGURATION	HORIZONTAL SCAN	VERTICAL SCAN
 Front Screen, Floor Mount	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

(Default configuration is front screen, floor mount.)

**Figure 4-3. Reverse Scan Connectors**

To reverse horizontal scan, remove the snap-in cover from the Horizontal Deflection Module. Pull out the module to expose plugs P2, P4, and P5. Plug locations are shown in Figure 4-3. Reverse the orientation of each plug so that the "REVERSED" labels are facing down. Next, plug in the module then snap the top cover back in place (with the vent hole near the front).

Note: Earlier version modules are different than that shown. For reverse horizontal scan, plugs P1, P3, and P5 are reversed with the "REVERSED" labels facing the back of the projector. Also, the plugs are orientated RBG, not RGB as shown. Refer to the scan label on the blue CRT shield.

To reverse the direction of the vertical scan, unplug each plug located at the top of the Vertical Deflection Module. Reverse the plug orientation so that the "REVERSED" labels are facing up.

Step 4 - Verify Connector Positions

Double check to verify correct placement and orientation of all connectors.

Step 5 - Install Top Covers

Install the two top covers.

Step 6 - Apply Power and Verify Scan Reversal

Plug the projector line cord back into the wall outlet or power source. Press **POWER** for at least one second to turn the projector on. Display an image on the screen. Are the red, green, and blue colors orientated correctly? Press ***** to display the main status display screen. Does the status screen indicate the correct horizontal and vertical scan configuration? If an error is detected, "Error ###" is displayed. "###" contains three digits to indicate the orientation of the red, green, and blue plugs. A "0" indicates normal orientation. A "1" indicates reversed orientation.

Width Coil Alignment ►

The *Marquee 8000* uses a dual band horizontal deflection circuit. The switching point between the two bands is set at 59.0 kHz. Because of the two different bands, the following procedure must be used for width coil adjustment:

HIGH VOLTAGES MAY BE EXPOSED



**THIS PROCEDURE SHOULD BE PERFORMED
BY QUALIFIED PERSONNEL ONLY**

Tools and Equipment Required:

- Phillips head screw driver
- small slot screw driver

Step 1 - Remove Power

Unplug the projector from the wall outlet or power source.

Step 2 - Remove the Front and Rear Top Covers

The projector has two top covers: a snap-in front top cover and a rear top cover. Remove both covers then remove the shield cover from the Horizontal Deflection Module.

Step 3 - Reapply Power**Step 4 - Perform Width Coil Adjustments**

The Horizontal Deflection Module has six width coils. The width coils on earlier version modules extend horizontally. The width coils on later version modules extend vertically as shown in Figure 4-4 below. Inspect the module to determine whether it is an earlier version or later version module.

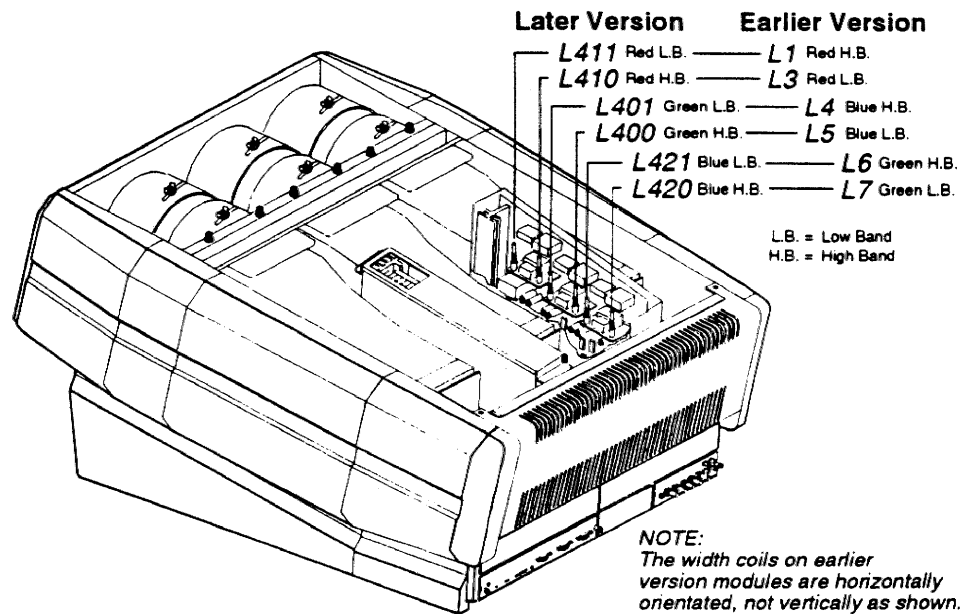


Figure 4-4. Horizontal Deflection Width Coils

- a) Set the input signal to approximately 60 kHz (i.e., high band).
- b) Remove all dynamic convergence by pressing **CONV** **1** **2** **EXIT** **EXIT**. Note that dynamic reset is for the current setup memory only.
- c) Preset all 6 width coils such that the ferrite cores are at the top of each.
- d) If the green width is not the smallest, adjust L400 (L6) until it matches the smallest width.
- e) Adjust L410 (L1) until the red width matches the green.
- f) Adjust L420 (L4) until the blue width matches the green.
- g) Set the input signal to approximately 31 kHz (i.e., low band).
- h) If the green width is not the smallest, adjust L401 (L7) until it matches the smallest width.
- i) Adjust L411 (L3) until the red width matches the green.
- j) Adjust L421 (L5) until the blue width matches the green.

Note: When adjusting the green yoke, L400 and L401 (L6 and L7), the green raster does not move; the red and blue raster moves instead.

Step 5 - Remove Power then Add Covers

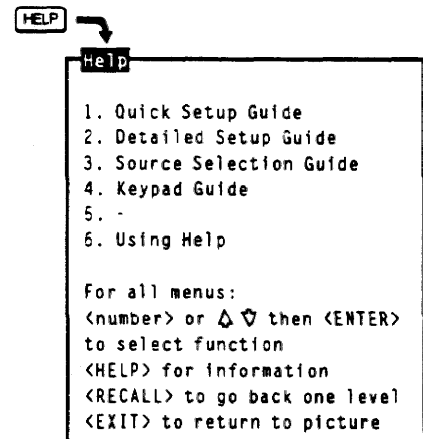
Optical Alignment

Optical alignment is required when the projector-to-screen (throw) distance changes or the projector cannot be focused using the focus controls. The projector is optically aligned at the factory for use with a 6 foot diagonal screen and a projector-to-screen distance of 80 inches (2 metres). If this distance has changed since the last setup, proceed as follows:

Notes: 1) The projector must be warmed up for at least 45 minutes prior to performing optical alignment. 2) 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.

It is recommended that optical alignment be performed using the projector's Detailed Setup Guide. The Detailed Setup Guide displays step-by-step instructions during the alignment. The instructions in this section follow those provided in the setup guide.

To access and use the setup guide, turn on the projector (**POWER**) then press **HELP** at presentation level. The Help menu is displayed. Next press **2** to select the Detailed Setup Guide. 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 return to the Help menu.



Step 1 ➤ If you have not already done so, calculate the projector-to-screen distance and mount the projector at that distance. Screen distance calculations are in section 4.3. Be sure to turn power off before moving the projector.

Step 2 ➤ Remove the snap-in front top cover. 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.

Examine the lenses and the lens hardware. See Figure 4-5. Each lens consists of two sections: a rear section and a front section. The rear section sets the optical focus at the center of the image. This section 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; it is secured to the rear section by a wing nut at the top front of the lens assembly. The lenses are secured to the projector frame by a top plate as shown. During optical alignment, the securing bolts must be loosened and tightened as instructed. Each securing bolt is labelled (A-D) to assist you.

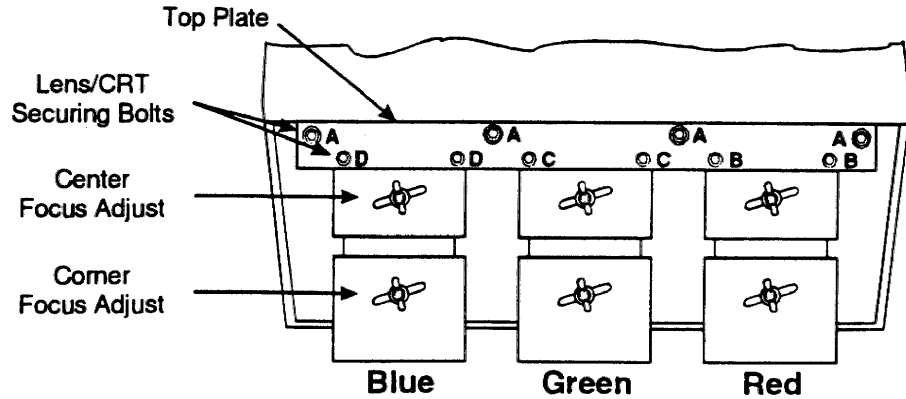


Figure 4-5. Lens Assemblies - Top View

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 4-6.

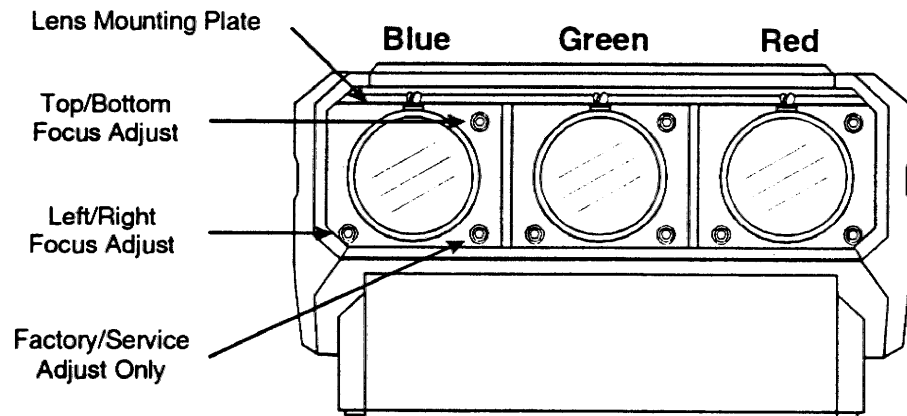
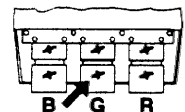
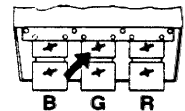















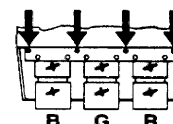
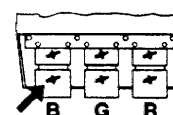
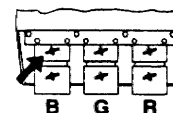
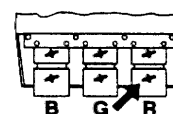
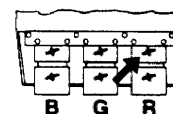
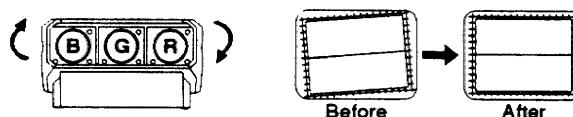
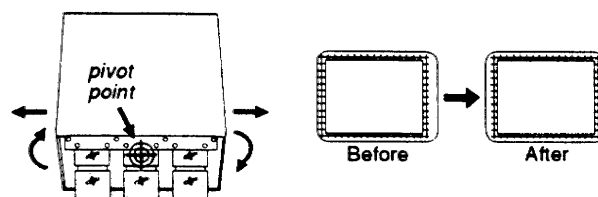


Figure 4-6. Lens Assemblies - Front View

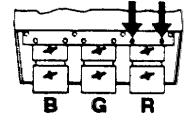
- Step 3** ➤ Loosen the rear wing nut on the green lens. Rotate the lens using the wing nut until the picture is focused in the center. Tighten the rear wing nut.
- Step 4** ➤ Loosen the front wing nut on the green lens. Rotate the front lens barrel until the picture is focused in the corners. Tighten the front wing nut.
- Step 5** ➤ Steps 6 to 8 require that you look directly into the lenses for adjustment. Before you continue, press **CONT** and use **▼** to reduce contrast to a low level (less than 10%).



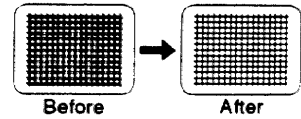
- Step 6** ➤ Look directly into the red lens and use , , , and  to center the displayed crosshatch on the face of the picture tube.
- Step 7** ➤ Look directly into the green lens and use , , , and  to center the displayed crosshatch on the face of the picture tube.
- Step 8** ➤ Look directly into the blue lens and use , , , and  to center the displayed crosshatch on the face of the picture tube.
- Step 9** ➤ Press **CONT** and use  to increase contrast to a normal viewing level.
- Step 10** ➤ Pivot the projector and move it side to side as required to center the crosshatch side-to-side on the screen. The pivot point should be at the rear wing nut of the green lens to avoid changing the projector-to-screen distance.
- Step 11** ➤ Tilt the projector so that 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** ➤ Loosen the four bolts labelled "A"



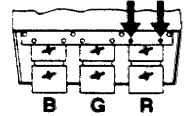
Step 18 ➤ Loosen the two bolts labelled "B".



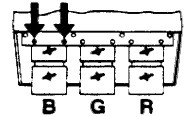
Step 19 ➤ A red and green crosshatch is displayed. Move the red lens so that the left and right edges of the red crosshatch match the green.



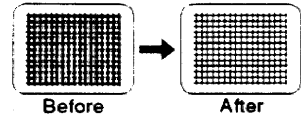
Step 20 ➤ Tighten the two bolts labelled "B".



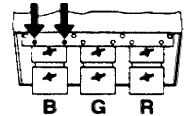
Step 21 ➤ Loosen the two bolts labelled "D".



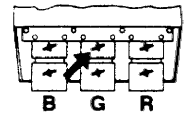
Step 22 ➤ A blue and green crosshatch is displayed. Move the blue lens so that the left and right edges of the blue crosshatch match the green.



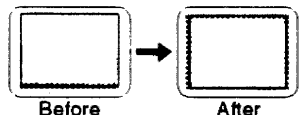
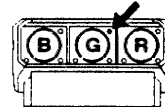
Step 23 ➤ Tighten the two bolts labelled "D".



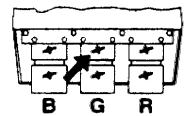
Step 24 ➤ A green image is displayed. Loosen the rear wing nut on the green lens and slightly defocus the center of the picture.



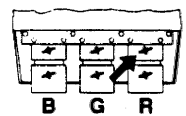
Step 25 ➤ Adjust the large allen head bolt located at the upper right corner of the green lens mounting plate. Turn the bolt head until the top and bottom areas of the picture are equally defocused. You may need to adjust the lens' rear wing nut to keep the center defocused.



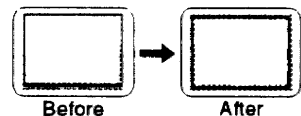
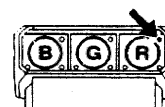
Step 26 ➤ Rotate the green lens using the rear wing nut until the picture is focused in the center. Tighten the rear wing nut.


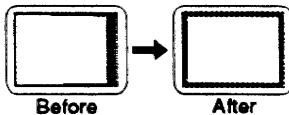
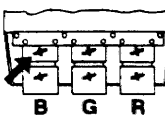

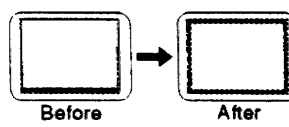
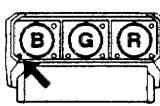
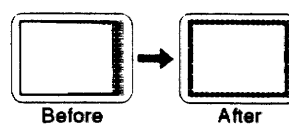
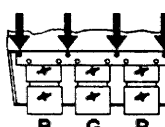
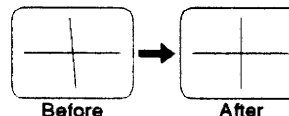
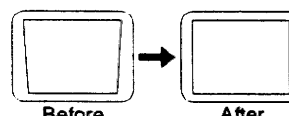
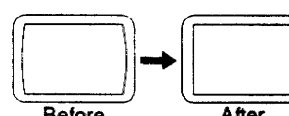




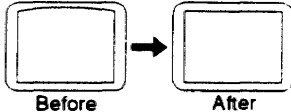


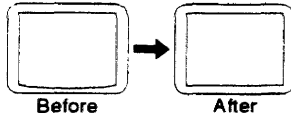


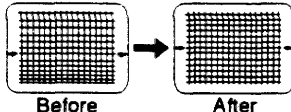


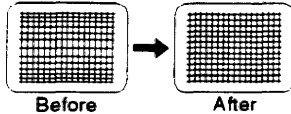




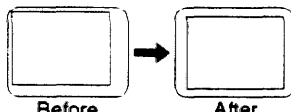




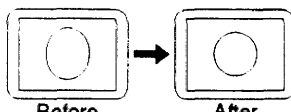
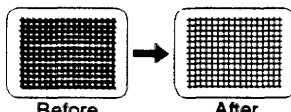
Step 27 ➤ A red image is displayed. Loosen the rear wing nut on the red lens and slightly defocus the center of the picture.



Step 28 ➤ 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. You may need to adjust the lens' rear wing nut to keep the center defocused.



- Step 29** ➤ 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. You may need to adjust the lens' rear wing nut to keep the center defocused.
- 
- 
- Step 30** ➤ Rotate the red lens using the rear wing nut until the picture is focused in the center. Tighten the rear wing nut. Readjust corner focus if necessary (see step 13).
- 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** ➤ 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 areas of the picture are equally defocused. You may need to adjust the lens' rear wing nut to keep the center defocused.
- 
- 
- Step 33** ➤ 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.
- 
- 
- Step 34** ➤ Rotate the blue lens using the rear wing nut until the picture is focused in the center. Tighten the rear wing nut. Readjust corner focus if necessary (see step 15).
- Step 35** ➤ Tighten the bolts labelled "A". Mechanical alignment is now complete.
- 
- Step 36** ➤ Press ⬆ or ⬇ to adjust skew so that the vertical line through the center of the image is not tilted (perpendicular to the horizontal line).
- 
- Step 37** ➤ Press ⬆ or ⬇ to adjust keystone so that the width at the top of the picture is equal to the width at the bottom.
- 
- Step 38** ➤ Press ⬆ or ⬇ to adjust side pincushion so that the left and right sides of the picture are straight and not curved.
- 
- Step 39** ➤ Press ⬆ or ⬇ to adjust bow so that the horizontal line at the middle of the picture is straight.

- Step 40** ➤ Press  or  to adjust top pincushion so that the horizontal line at the top of the picture is straight and not curved.
- 
- Step 41** ➤ Press  or  to adjust bottom pincushion so that the horizontal line at the bottom of the picture is straight and not curved.
- 
- Step 42** ➤ Press  or  to adjust C linearity so that the horizontal line and the center of the crosshatch (7th from the top) is equally distant from the lines at the very top and bottom.
- 
- Step 43** ➤ Press  or  to adjust S linearity so that the vertical size of each crosshatch square is equal from top to bottom.
- 
- 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.
- Step 44** ➤ Press , ,  or  to adjust phase so that the picture is centered on the screen.
- 
- Step 45** ➤ Press , ,  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 so that the circle is round, not oval.
- 
- Step 46** ➤ The last step is convergence. To begin a convergence, press **EXIT** **CONV** **1**. Convergence is described in the user's manual.
- 

*Note: Remember that all electrical adjustments (steps 36 to 46) should be repeated for other setups in the system. You can re-perform the detailed setup - skipping steps 1 to 35, or select each adjustment function individually from the **PIC**, **GEOM**, or **CONV** menus.*

4.3 Projector to Screen Distance

Projector-to-screen (throw) distance is the distance between the projector's green lens and the center of the screen; it is determined by screen size. Once your screen size is known, you can calculate projector-to-screen distance using the following calculation. Table 4-2 provides some typical projector-to-screen distances for common screen sizes.

Calculate projector-to-screen distance as follows:

$$D = 1.22 \times \text{Screen Width} + 10"$$

or

$$D = 0.98 \times \text{Diagonal Screen Size} + 10"$$

Table 4-2. Projector to Screen Distance Chart

SCREEN SIZE inches (cm)			PROJECTOR TO SCREEN DISTANCE (D) inches (cm)
diagonal	height*	width*	
72 (183)	43.2 (110)	57.6 (146)	80.3 (204)
96 (244)	57.6 (146)	76.8 (195)	103.7 (264)
120 (305)	72.0 (183)	96.0 (244)	127.1 (323)
240 (610)	144.0 (366)	192.0 (488)	244.2 (621)
300 (762)	180.0 (457)	240.0 (610)	302.8 (769)

* Based on a 4:3 aspect ratio.

Notes: 1) Calculated values and the values in the table are for reference only. Before designing a permanent installation it is good practice to simulate the setup to determine the necessary projector-to-screen distance. 2) Display size is affected by input signal frequency. Once the projector position is set, use the Size function to fine tune display size.