GraphXMaster C50

Installation and Maintenance Manual

Table of Contents

NOTE: Due to constant research, the information in this manual is subject to change without notice

Section 1

Overview

Section Contents:

Using this Manual

The information contained in this manual will assist you during installation and setup of the *GraphXMaster C50 (*1Chip XGA DLP 50" Cube). It will also assist you in troubleshooting and maintaining the projector. It is recommended that you make reference to the available user manual, which describes all standard keypad commands available to a typical user.

Typographical Conventions

The following typographical conventions are used in this manual:

- **WARNING**
  Warning messages alert readers to situations that may result in serious injury or death such as the presence of non-insulated "dangerous voltage with the projector.
- **CAUTION**
  Caution messages alert readers to situations that may result in minor or moderate injury.
- **CAUTION**
  Caution messages with an exclamation mark alert the readers to situations that may result in equipment damage.
- *NOTE: messages provide supplementary information, emphasize a point or provide a tip for easier operation.*
- **Bold text** and/or *Italic text* emphasize important information or terms.
- Numbered items indicate a step by step procedure.
- Bullets indicate listed items where order is of no significance.
- Software and on-screen messages appear in Ottawa font.
- BUTTON AND KEY names appear in SMALL CAPS or boxed [ENTER] .
- The physical state of an item (ON, OFF) appear in LARGE CAPS.

Disclaimer

Every effort has been made to ensure that the information in this manual is accurate and reliable. Due to constant research, however, information is subject to change without notice. Christie Digital Systems assumes no responsibility for omissions or inaccuracies.

1.1 Component Identification

The following components are included when purchasing a *GraphXMaster* C50 cube:

- Cube (complete with *GraphXMaster* 1Chip XGA DLP projector , optical mirror and multi-access adjuster)
- Warranty Registration Card

Ensure all items are present when unpacking cube. Immediately fill out the Warranty Registration Card and mail it directly to Christie Digital Systems, Inc.

Available with each system:

- *GraphXMaster* C50 User's Kit, includes:
  - User manual (54-017113-01P)
  - *GraphXMaster* C50 Installation and Maintenance Manual (54-017111-03P)
  - Remote keypad and 30ft. extension cable
  - 3 mm , 5mm and 6mm Allen keys
  - 13 x 10 mm wrench
  - Lint free cotton gloves

1.2 Purchase Record and Servicing

Fully trained Christie Digital Systems service technicians are available to quickly diagnose and correct projector malfunctions. If you encounter problems with your projector and require assistance, contact the authorized Christie Digital Systems dealer from which the projector was purchased.

Fill out the information below for your records.

Purchase Record

Dealer:	
Dealer Phone Number:	
Projector Serial Number:	
Purchase Date:	
Installation Date:	

Section 2

Installation and Setup

Section Contents:

2.1 Introduction

This section provides easy to follow, step-by-step instructions for installing and setting up a *GraphXMaster C50* videowall.

The instructions in this section make reference to a 2 X 2 videowall. Although videowalls can vary in size, the sequence of instructions and precautions do apply to all *GraphXMaster C50* installations.

Only qualified and trained setup technicians should attempt to install and setup a *GraphXMaster C50* videowall. Read and follow the instructions as they appear in this section.

! CAUTION

The cube is heavy and hard to lift by a single person. A minimum of two people required to install (lift) the cubes on the first row. It is recommended that lift equipment or at least 4 individuals install additional rows.

2.2 Tools Required for Installation and Setup

The following tools are required during installation:

- GraphXMaster User's Kit, includes *(13 X 10 mm wrench, 3mm, 5mm & 6mm Allen keys and a pair of lint free gloves, User's Manual and Installation and Maintenance Manual*)
  - Level
  - 1mm plastic spacers

2.3 Unpacking the Cube

Pre-assembled cubes are packaged in a manner to prevent damage during shipping. Five screws, a foam pad and a bracket have been used strictly for shipping purposes and must be removed from the cube prior to setup. See Figure 2.1. It is necessary to remove the rear access panel to gain access to the projector and multi-axis adjuster. Refer to 2.6 Removing Rear Access Panel.

Five screws are used to prevent the plates of the multi-axis adjuster from banging together during shipping, which could cause warping. Refer to the diagram below and remove the four screws located on the front bottom of the multi-access adjuster and the one screw located on the top right.

The foam pad provides support to the optical unit and multi-axis adjuster during shipping. It is located under the multi-axis adjuster. See Figure 2.1. To remove the foam pad, gently pull it out from under the multi-axis adjuster.

A secondary support bracket, located on the right side of the lamp module is used to prevent damage to the lamp module during shipping. See Figure 2.1. To remove the bracket supporting the lamp module, unscrew the two screws securing it to a permanent cube bracket. Grasp the bracket and slide it out from the unit. Do not use excessive force. If the bracket doesn't remove easily, adjust the horizontal position of the adjuster by turning the far-left adjustment screw clockwise.

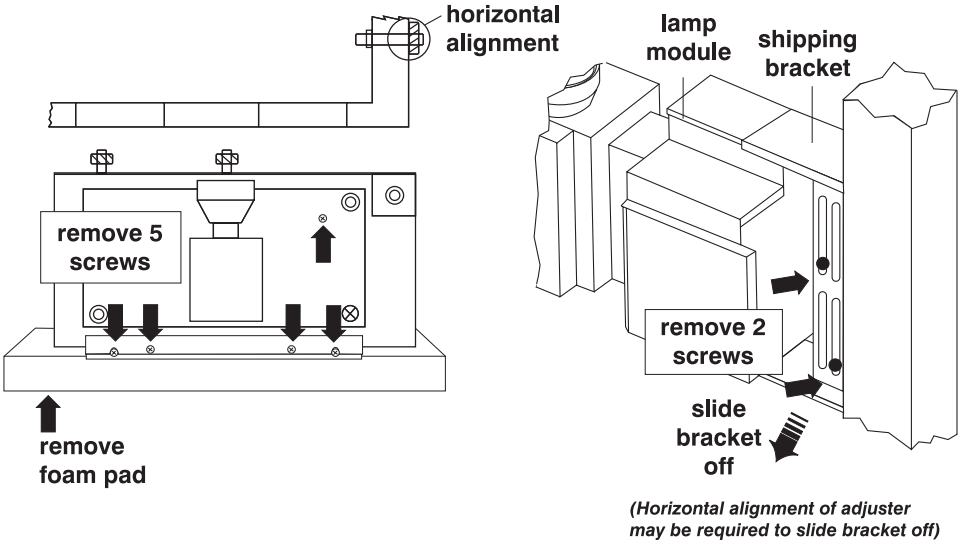


Figure 2.1. Remove shipping material

2.4 Unpacking the Base (Base Optional)

Each base is shipped with a front panel, rear panel and side panel. The side panel is not required on all bases and can be removed. It also can be used as either a right or left side panel. A typical videowall installation requires that only the two outer bases have a side panel. Center bases do not require side panels and should be removed prior to base assembly.

TIP: Wait to install side panels until after bases have been assembled to prevent unnecessary surface scratches.

To remove a side panel and secure it to the opposite side of the base:

1) Remove the 8 screws (with washers) securing the panel to the base.

2) Move the panel to the opposite side of the base.

3) Align the mounting holes between the panel and the base and re-attach it using the same screws removed in Step 1.

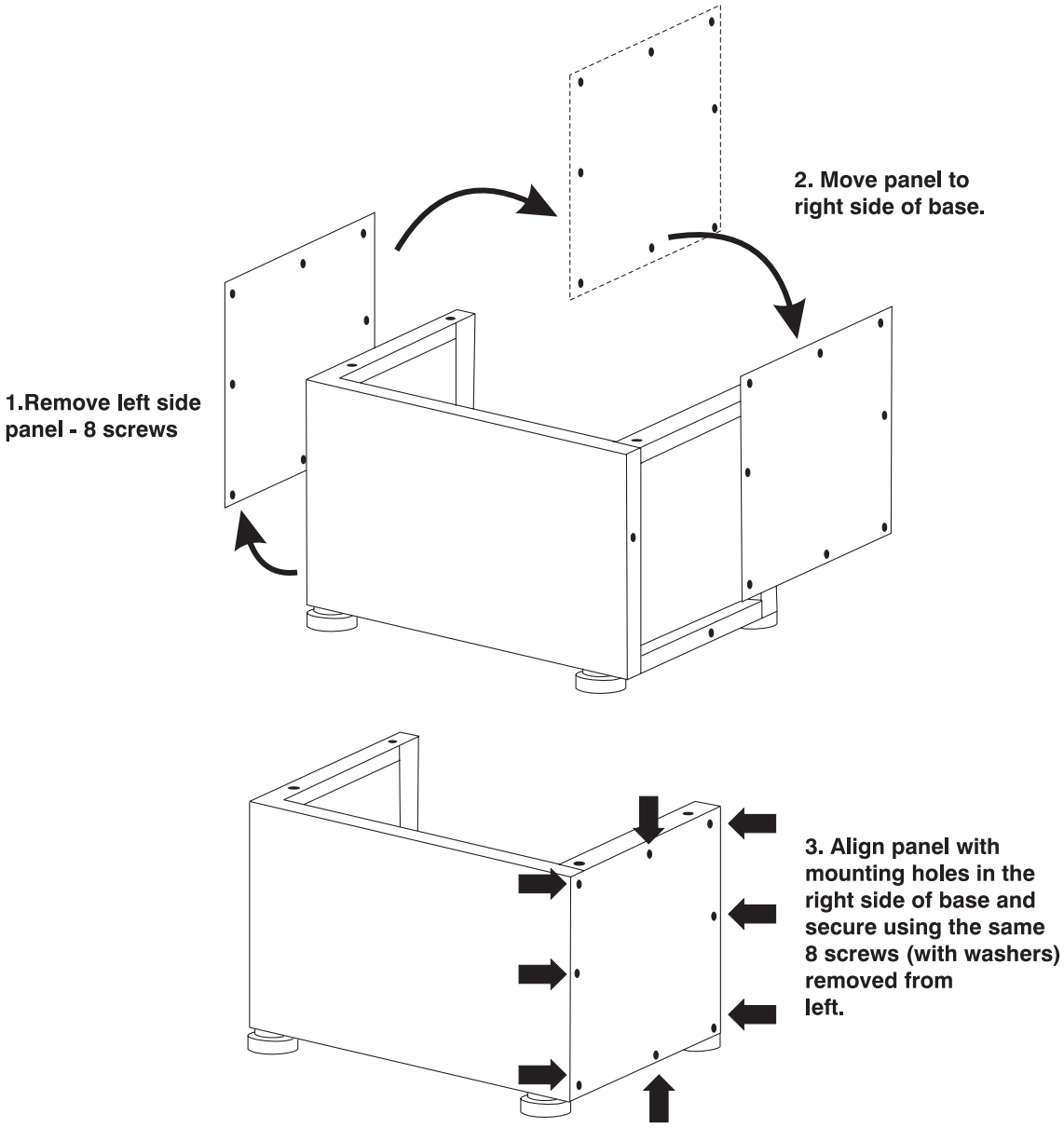


Figure 2.2. Changing base side panels

Mounting Hardware

When mounting two bases or two cubes together use a bolt, 3 washers and hex nut. When mounting a cube to a base or a top cube to a bottom cube, use a bolt with a spring and flat washer only. Top to bottom mounting doesn't require the third washer or hex nut. See Figure 2.3.

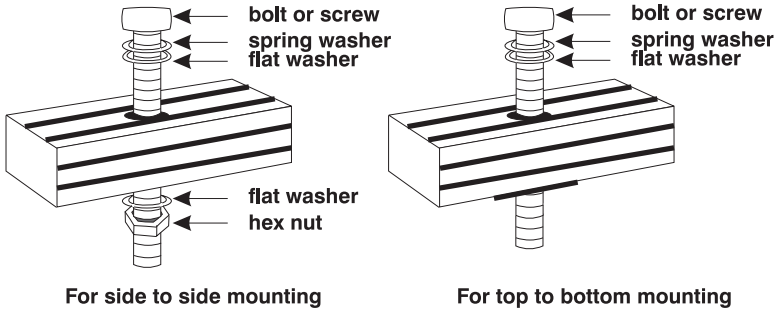


Figure 2.3. Mounting hardware

2.5 Removing the Screen

It is important that screens (or "dummy screens") are removed from the cube before installation begins.

! CAUTION

Two people are required to remove the screen. Wear gloves provided in the user's kit when handling the screen to prevent damage.

To remove a screen:

1) Have one person hold the screen from the front.

2) Unscrew the four M8 adjustment screws securing the screen to the cube frame, located at the rear of the cube. See Figure 2.4.

3) Gently, pull the screen off and set aside.

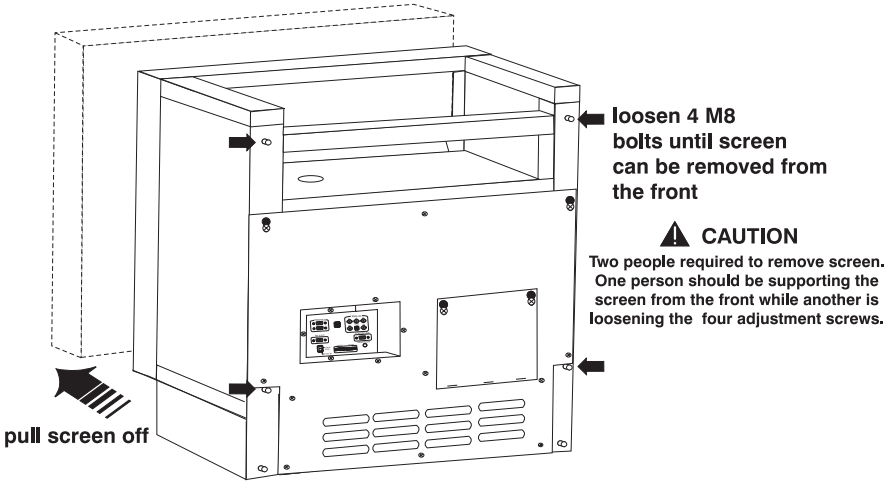


Figure 2.4. Remove screen

2.6 Removing Rear Access Panel

After screens are removed from the cube it is necessary to remove the rear access panel. See Figure 2.5.

1) Loosen the screws (2) located in the top right and left corners.

2) Remove the 6 screws surrounding the control unit.

3) Remove the 9 screws securing the rear access panel to the cube.

4) Lift the rear access panel slightly and pull forward to remove.

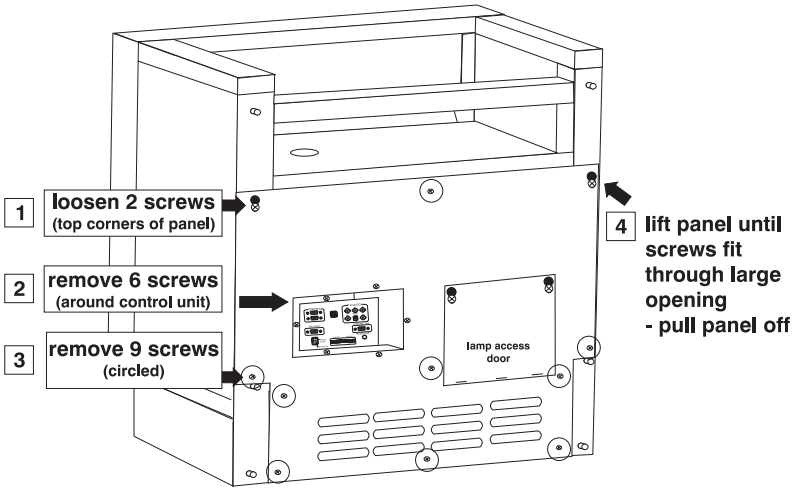


Figure 2.5. Remove rear access panel

2.7 Assembling Bases

Completed cubes are of significant weight and cannot easily be moved. Therefore, assemble bases in the location they are intended to be within the room.

IMPORTANT

Ensure the cubes are mounted to/within a secure structure that can adequately support the weight of the cubes, if the optional base (available from Christie Digital Systems) is not used.

To assemble bases:

1) Ensure center bases have their side panels removed. (Refer to 2.4)

2) Move bases to the location designated for the videowall. This is important because it would be difficult to move an entire videowall once it has been built due to its extreme weight.

3) Turn bases over so they rest on their top frame and the adjustable feet are facing up. This step allows for easy base adjustment. See Figure 2.6.

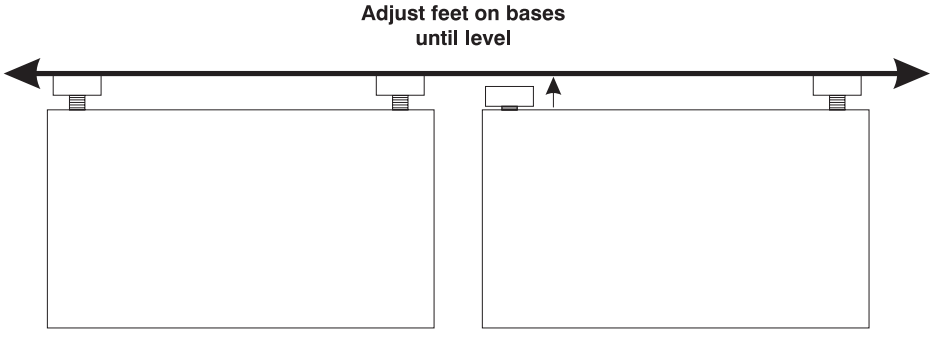


Figure 2.6. Level Base Feet

4) Using the 10 mm wrench adjust the four (4) adjustable feet of each base, turning clockwise or counter-clockwise. Make sure the threaded feet are fully engaged into the hex nut above the base. If not, you have adjusted the feet

too much. Using a level, ensure that all feet on a single base are level and that all bases measure level. See Figure 2.7.

TIP: Consider the height of the bases at this step. This will determine how visible the feet will be to the audience. The closer the feet are to the base the less visible they will be.

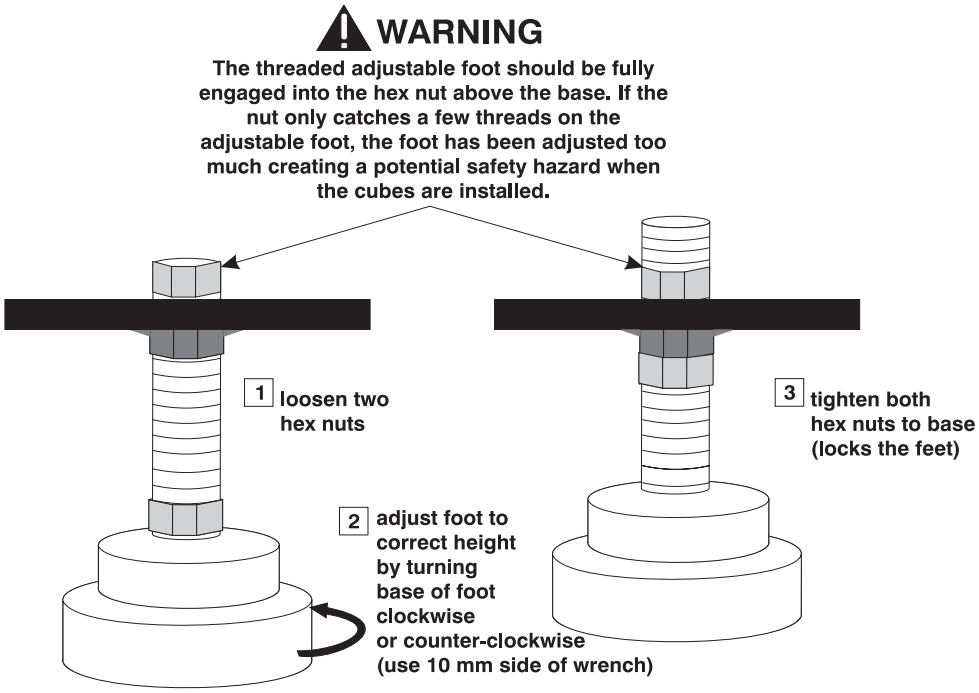


Figure 2.7. Adjusting Base Feet

5) Once bases are level turn them right side up.

6) Slide bases together. (Figure 2.8.)

7) Fine adjust the height of the bases, if required. (Figure 2.9) Make sure the threaded feet are fully engaged into the base and visible. If not, you have adjusted the feet too much.

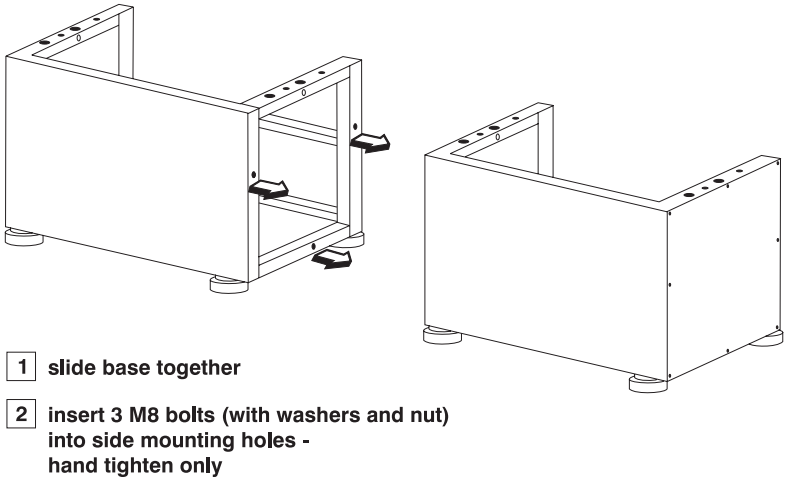


Figure 2.8. Slide bases together

8) Insert the bolts provided with the base into the mounting holes at the adjoining sides of each frame (3 on each side). Install washers and hex nuts

over the bolts and hand tighten until snug (should be able to move bases slightly).

9) Align the back and front edges of the base so they are flush with one another. (Figure 2.9.)

10) Once bases are level and edges are flush, tighten the bolts and re-check that bases are level.

NOTE: Leveling and aligning the bases both vertically and horizontally, before cubes are installed, is extremely important and determines how well the videowall screens will match. If this is overlooked, screen matching will be difficult to achieve.

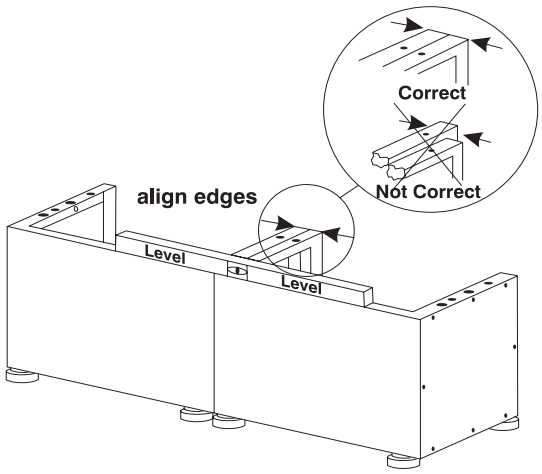


Figure 2.9. Level bases

2.8 Installing Cubes

WARNING

Cubes can be stacked to a maximum of 4 high using *GraphXMaster* C50 bases. (Horizontally the number of cubes used must be equal to or greater than the number of cubes stacked vertically.)

A videowall built more than four cubes high lacks stability and could cause bases to buckle.

CAUTION

A minimum of two people required to install (lift) cubes on the first row. It is recommended that lift equipment or at least 4 individuals install additional rows.

To install a row of cubes:

1) Ensure cubes have their screens and rear access panels removed. Refer to *2.5 Removing the Screen* and *2.6 Removing Rear Access Panel*.

2) Beginning with the lower left cube, lift and set it on top of the base.

3) Align the cube with the mounting holes on the base. Using four M8 bolts and washers, mount the cube to the base. Hand-tighten bolts.

CAUTION

Use caution when lowering the cube so fingers don't get caught in between the units.

4) Slide in the next lower cube and repeat Step 3. Repeat until all lower cubes are in place.

5) Make sure cubes are square, centered and level on the base. Check the alignment between the top corners of two cubes – ensure they are flush. If not, a small shim may be needed.

6) Tighten the bolts between cubes and bases on the first row.

7) Insert four (4) M8 bolts (washers and nuts) between each cube and tighten.

8) Lift and slide the upper left cube on top of the lower left cube from the rear.

9) Align the four mounting holes between the upper and lower cubes. Mount the upper cube to the lower cube with four (4) M8 bolts and washers. Hand-tighten bolts.

10) Slide in the next cube and repeat Step 9. Repeat until all cubes are in place.

11) Make sure upper cubes are square, centered and level on the cubes below.

12) Tighten the bolts between upper and lower cube.

13) Insert four (4) M8 bolts between each upper cube and tighten.

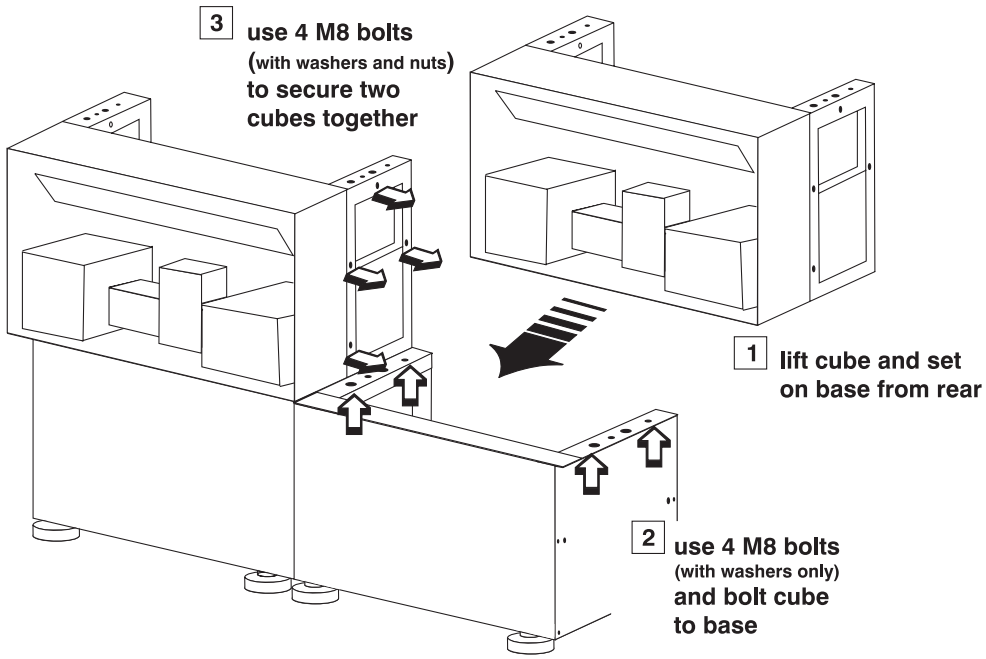


Figure 2.10. Securing cubes together

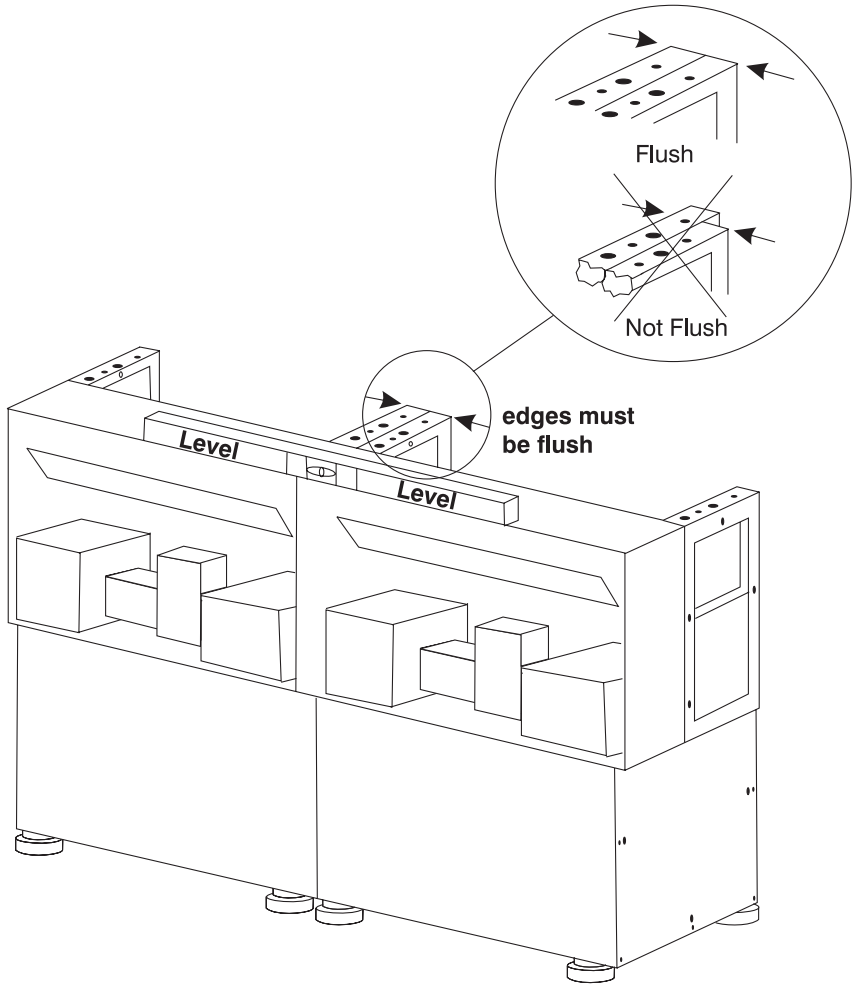


Figure 2.11. Level first row of cubes

2.9 Install and Space Screens

! CAUTION

A minimum of two people required to install screens.

Wear cotton gloves provided in the User's kit whenever handling the screen to prevent damage

1) **Remove plastic protective sheet from the screens** - Starting at one corner, peel back the plastic sheet from the screen. Remove the protective sheet from all screens prior to installation, otherwise it may affect screen spacing and may be difficult to remove altogether.
2) **Install and space screens** - Install screens from left to right, starting with the bottom far left cube.

Ist Row (bottom)

a) Carefully, lift the screen into position and secure it with the same 4 M8 screen bolts used to mount the "dummy" screen. Hand-tighten the bolts enough to safely and securely keep the screens in place.

! CAUTION

Do not bump the optical mirror when lifting the screen into position.

b) Repeat (a) with the next cube (in the same row).
c) Slide 1mm plastic spacers between the two screens. The screens should be square and even with a 1mm gap. To adjust spacing, loosen and re-tighten the bolts.

! CAUTION

Do not over-tighten bolts - they could break and damage the screen. Tighten screen bolts to torque spec 8.5 ft·lbs.

Don't loosen bolts too much when adjusting the space between screens – the screen could fall off.

d) Repeat steps a,b, and c with the remaining lower cubes.

2nd Row

Make sure the bolts securing the bottom screens are tightened to spec before installing screens to the next row of cubes.

e) Place two (2) 1mm plastic spacers on top of each screen installed to the first row of cubes. Spacers should be at equal distances from the edge of the cube. See Figure 2.13.
f) Carefully, lift the next screen into position and secure it to the upper left cube with the same 4 M8 bolts used to secure the "dummy" screen. This screen should rest on the screen and spacers below. (The two spacers should be sticking out from in between the top and bottom screen.) Hand-tighten the bolts enough to safely and securely keep the screen in place.
g) Repeat step f, with the next screen.
h) Slide two (2) additional 1mm spacers between the two upper screens. The screens should be square and even with a 1mm gap. Loosen and re-tighten the bolts to adjust spacing. Follow the same precautions indicated in step c. See Figure 2.13.

Additional Rows

i) Repeat steps e - h for the next row of screens. (if applicable)

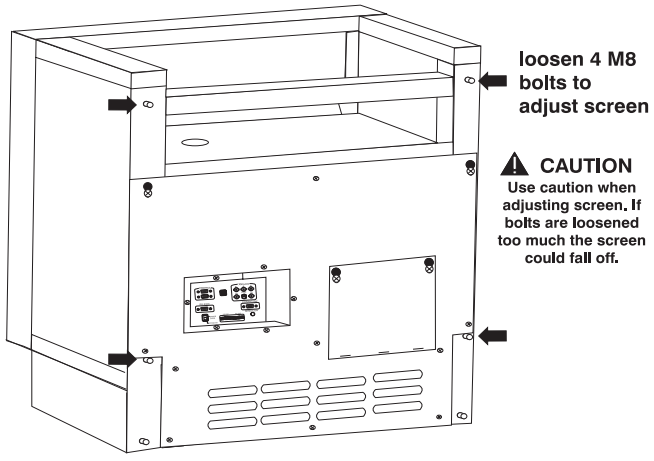


Figure 2.12. Screen adjustment screws

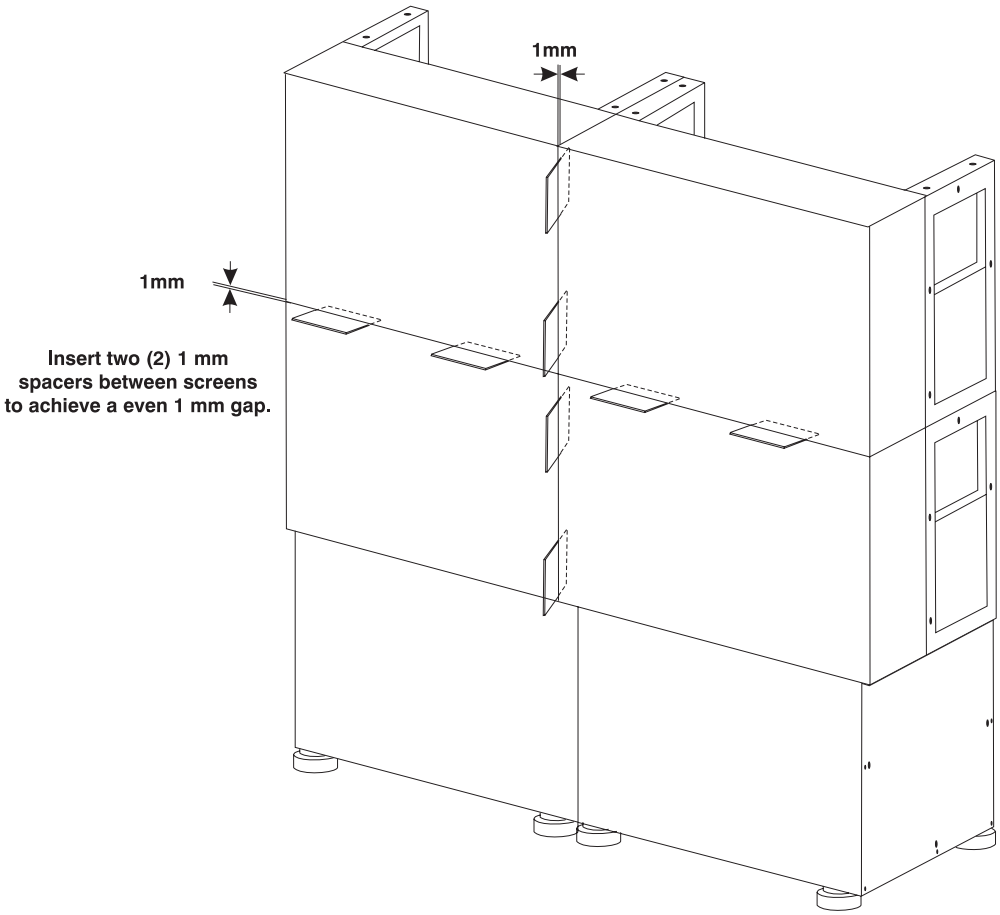


Figure 2.13. Spacing screens

j) Remove plastic spacers from between the screens when spacing is complete.

! CAUTION

Don't jam spacers between screens when adjustment is complete – this could damage the screen and they would be difficult to remove unless the screen is removed first.

2.10 External Support

The *GraphXMaster* C50 videowall can be built to a maximum of four (4) cube units in height. It is highly recommended that a videowall, two (2) cubes high, incorporate some method of external support. ***It is a requirement for any installation greater than two cubes high to use external support.*** The type of external support should be based on the installation and should be designed and implemented by a qualified installer.

The diagram below (Figure 2.14.) illustrates two possible methods of external support for a 2 X 2 videowall such as using threaded rods, as a possible ceiling mount, and rectangular bars as a possible wall mount.

There are several things to consider when designing external support for a videowall installation:

- The size of the installation (number of stacked cubes (max. 4 high))
- Physical characteristics of the cube installation (weight, center of gravity, mounting hole location)
- Are you using Christie Digital Systems designed *GraphXMaster* C50 bases?

Use the technical information in Appendix A when designing an external support method.

CAUTION

The *GraphXMaster* C50 bases have been designed to vertically support the *GraphXMaster* C50 cubes (to a max. of 4 high). If your installation uses a base system other than that available through Christie Digital Systems, ensure that it is adequate to support the weight of the cubes and that it provides at least four mounting holes (for the cubes). It is very important that the bases used are level to allow for screen matching.

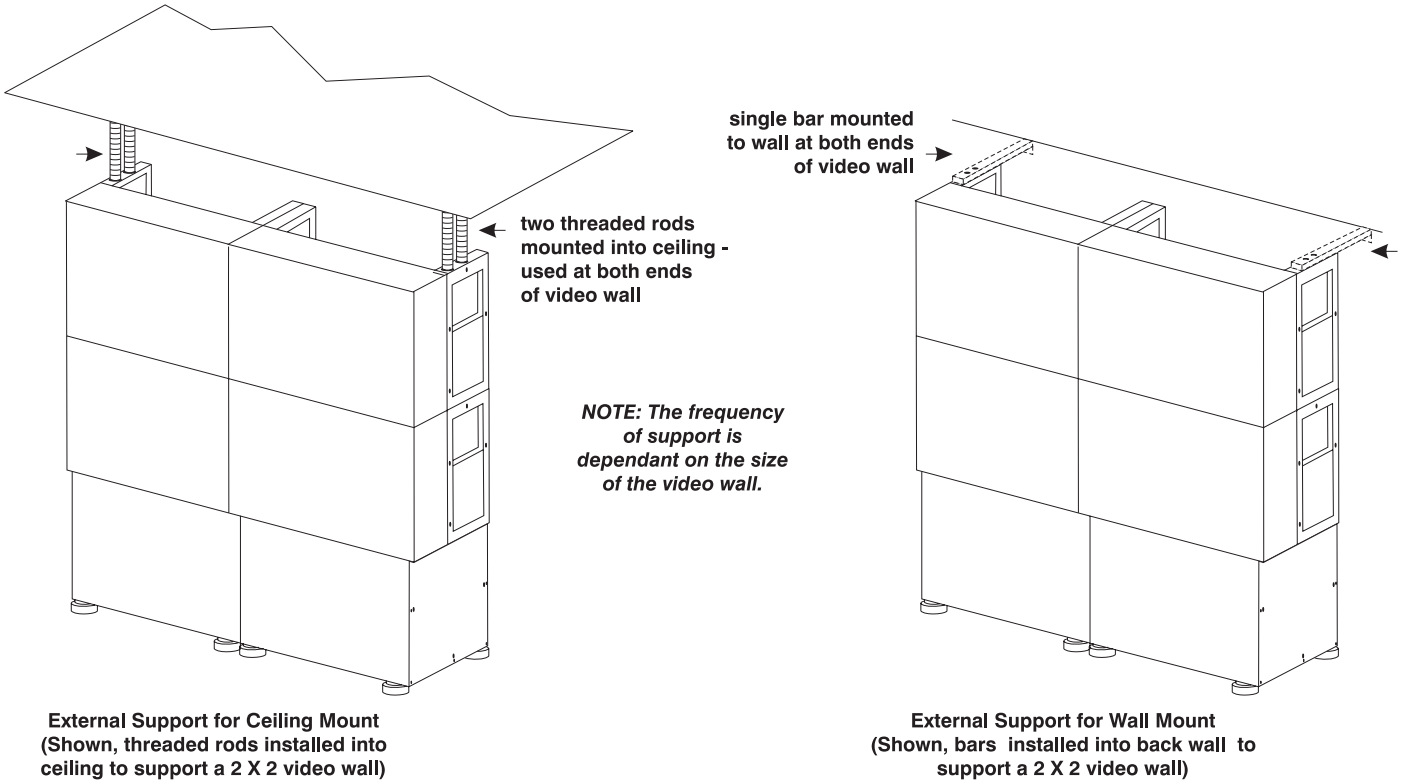


Figure 2.14. External Support

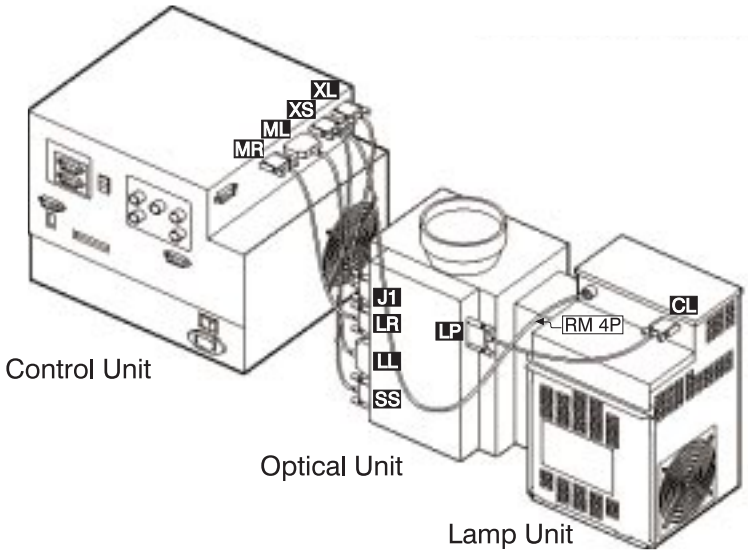
Once installation is complete it is necessary that you check the internal connections of the projector within the cube. They may have come loose during shipping.

The instructions in the remainder of this section are required to setup the projector, and adjust the geometry of the image. Once all the adjustments have been made, the rear access panel should be replaced. Refer to *2.6 Removing Rear Access Panel*, and follow instructions in reverse.

2.11 Internal Connections

The projector, located within the cube, is completely assembled when it is shipped. It is possible however, that a connection between the control unit and

the light engine becomes loose during shipping. Verify all connections are secure before proceeding with the installation process. See Figure 2.15.



Control Unit		Optical Unit		Lamp Unit	Wiring
MR	TO	LR			D-sub 15 Pin cable
ML	TO	LL			MDR 40 Pin cable
XS	TO	SS			D-sub 9 Pin cable
XL	TO	J1			D-sub 9 Pin cable
4-Pin	TO			4-Pin	RM 4 Pin cable
		LP	TO	CL	D-sub 9 Pin cable

Figure 2.15. Verify Internal Connections

2.12 Connecting a Source

All external connections are made to the control unit. The standard RGBHV analogue input with BNC connectors is located in the top-right corner of the input panel. All connector are labeled and easily identifiable. Connect the horizontal (H) and the vertical (V) sync cables first and follow by connecting the red (R), green (G), and blue (B) cables. See Figure 2.16.

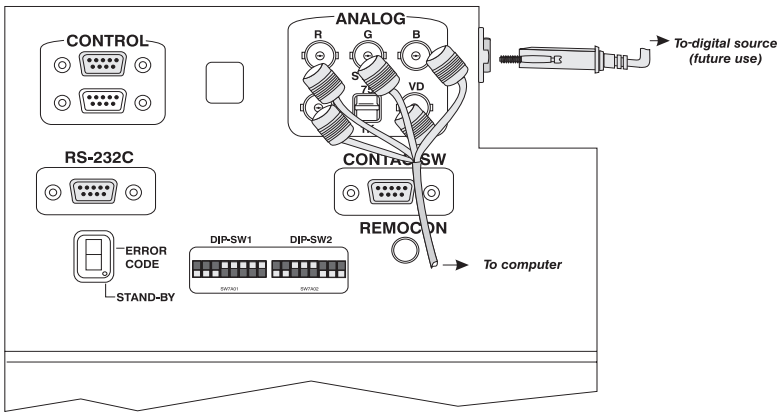


Figure 2.16. Connect a Source

There is also a 10-pin connector on the side of the control unit to connect a digital source intended for future use only.

Sync Switch

Located between the H and V inputs is a single switch labeled Sync 75 ohm/1kohm. Depending on the input signal, you can set the terminating resistance value of the separate sync signal input terminal to 75 ohm or 1 kohms.

2.13 External Communication

Single or multiple projectors can be controlled without the use of the keypad through RS-232 commands. The equipment used to control the projector (computer or controller) must be compatible for this type of serial communication. Refer to *Section 3 – RS-232C Serial Communication* for instructions on setup and the use of control commands.

Located on the control panel is a contact switch which can be set for external control of certain projector functions such as power ON/OFF, Pic Mute ON/OFF, and analog or digital input switching.

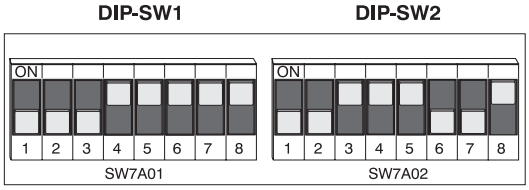
See *Appendix C* for more information on the Contact Switch.

2.14 DIP-switch Settings

Two DIP-switches are located on the input panel that allow you to:

- enable/disable the remote control of projectors.
- enable/disable simultaneous RS-232 and keypad control.
- set baud rate.
- select an input.
- assign a projector ID number.
- enable/disable serial communication.
- enable remote control power on.

These DIP-switches operate in binary code. Each DIP-switch contains 8 mini switches each representing a bit. You can select certain projector functions by turning these mini switches ON or OFF.



Default Settings

When a mini switch is in the UP position it is ON and when a mini switch is in the DOWN position it is OFF. Use Table 2.1. and Table 2.2. to set the mini switches to reflect the required settings.

NOTE: 1) It is recommended that you use a fine tipped screwdriver to turn the mini switches ON or OFF. 2) These settings can be changed at any time to suit the needs of the user.

Table 2.1. DIP-switch 1

Bit Number	Switch Name	ON (up)	OFF (down)	Notes:
1	422TERM1	Terminator Effective	Terminator Ineffective	For networking control set the last projector in a chain to ON and all other sets to OFF.
2	422TERM2	Terminator Effective	Terminator Ineffective	For networking control set the last projector in a chain to ON and all other sets to OFF.
3	RS-232C	RS-232C Ineffective	RS-232C Effective	For RS-232C control, set the projector connected to the computer to OFF – all other projectors to ON.
4	ID1			Use these bits to set the projector ID number. Refer to Table 2.3.
5	ID2			
6	ID3			
7	ID4			
8	ID5			

Table 2.2. DIP-switch 2

Bit Number	Switch Name	ON (up)	OFF (down)	Notes:
1	Wired	To control projector on/off feature with DIPSW2-bit2 or the contact switch	No external control	When bit1 is ON you can turn the projector on or off with bit2 as well as the contact switch. When bit1 is OFF, bit2 has no capability.
2	W-Power	Turns projector ON when bit1 is ON	Turns projector OFF when bit1 is ON	When bit1 is ON you can turn the projector on by setting bit2 to ON or off by setting bit2 to OFF – most keypad functions are still enabled except power on/off. Must use bit2 for power on/off.
3	Factory	Set to ON	Invalid	Factory setting. Do not adjust.
4	INS1	Input switch (analog)	Input switch (digital)	Switch between analog and digital input when bit1 is ON.
5	Baud Rate	19200bps	9600bps	Use to set baud rate.
6	Factory	Set to OFF	Invalid	Factory setting. Do not adjust.
7	Factory	Set to OFF	Invalid	Factory setting. Do not adjust.
8	Remote	Remote keypad control operable	Remote keypad control inoperable	Use to set keypad control.

Baud Rate

The baud rate is the speed of communication to and from the projector. Baud rates between the controlling device (computer, controller, switcher) and the projector must be the same. The projector's baud rate is set by DIP-switch 2, bit 5. When bit 5 is ON (UP position) the baud rate is set to 19200bps and when bit 5 is OFF (DOWN position) the baud rate is set to 9600bps.

Keypad Setup

The keypad supplied in the User's kit can be configured for use as a wired keypad or an IR remote keypad.

1) Set DIP-switch 2, bit8 ON for the projector to respond to the commands sent by the keypad.

2a) For wired remote control, take the extension cable and plug one end into the keypad jack and the other end into the REMOCON jack on the input panel.

OR

2b) For IR remote control, simply remove the extension cable from both the jack on the keypad and the input panel. Do not adjust the DIP-switch setting.

2.15 Assigning Projector ID Numbers

To control individual projectors within a network, each projector must be given a unique two-digit set address or projector ID number. A valid ID number is assigned to a projector by adjusting the state of DIP-switch 1, bits 4 to 8. A valid projector ID number is any two-digit number between 01 and 31.

Each projector is assigned 0 0 as a default ID number. When this two-digit ID number is entered the user gains broadcast control of all projectors in the system. This ID number is set in the factory and cannot be changed. Refer to Table 2.3., for valid ID DIP-switch 1 settings.

To assign a valid ID number and enable remote control of individual projectors:

1) Select an ID number and set DIP-switch 1. Refer to Table 2.3.

2) Verify the projector ID number by selecting FUNCTION + DISPLAY on the keypad. A small window appears that displays the ID number and identifies whether remote control is enabled or disabled.

3) Press ESC to return to presentation level.

Table 2.3. Valid ID#'s

ID#	Bit4 ID1	Bit5 ID2	Bit6 ID3	Bit7 ID4	Bit8 ID8
1	OFF	ON	ON	ON	ON
2	ON	OFF	ON	ON	ON
3	OFF	OFF	ON	ON	ON
4	ON	ON	OFF	ON	ON
5	OFF	ON	OFF	ON	ON
6	ON	OFF	OFF	ON	ON
7	OFF	OFF	OFF	ON	ON
8	ON	ON	ON	OFF	ON
9	OFF	ON	ON	OFF	ON
10	ON	OFF	ON	OFF	ON
11	OFF	OFF	ON	OFF	ON
12	ON	ON	OFF	OFF	ON
13	OFF	ON	OFF	OFF	ON
14	ON	OFF	OFF	OFF	ON

ID#	Bit4 ID1	Bit5 ID2	Bit6 ID3	Bit7 ID4	Bit8 ID8
15	OFF	OFF	OFF	OFF	ON
16	ON	ON	ON	ON	OFF
17	OFF	ON	ON	ON	OFF
18	ON	OFF	ON	ON	OFF
19	OFF	OFF	ON	ON	OFF
20	ON	ON	OFF	ON	OFF
21	OFF	ON	OFF	ON	OFF
22	ON	OFF	ON	OFF	OFF
23	OFF	OFF	OFF	ON	OFF
24	ON	ON	ON	OFF	OFF
25	OFF	ON	ON	OFF	OFF
26	ON	OFF	ON	OFF	OFF
27	OFF	OFF	ON	OFF	OFF
28	ON	ON	OFF	OFF	OFF
29	OFF	ON	OFF	OFF	OFF
30	ON	OFF	OFF	OFF	OFF
31	OFF	OFF	OFF	OFF	OFF

2.16 Connect Power

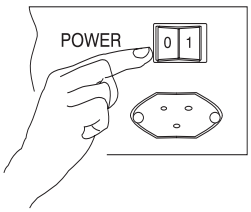
The AC outlet is located on the bottom-right of the input panel. When all other connections have been made, connect the three-pronged end of the AC power cable to the labeled AC outlet and the other end into the wall outlet.

The power requirement for *GraphXMaster* is 100 VAC to 240 VAC +/- 10% or 50 to 60 Hz.

! CAUTION

Do not operate the projector if the input voltage is not within the specified range. This could damage the projector.

2.17 Turning the Projector ON



To turn main power ON:

1) Press the Main power switch in the ON position (1).
You will notice:

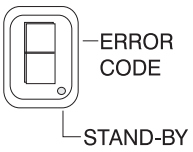
- the STAND-BY LED illuminates solid red.

To turn the projector ON:

1) Press and hold the power on button on the keypad for approximately 2 seconds.
You will notice:

- the cooling fans turn on immediately.
- the product logo is displayed on screen for approximately 30 seconds before it disappears and the image is displayed.

2.18 Error Codes and Status LEDs



STAND-BY and ERROR CODE are the two LEDs (light emitting diodes) located on the projector. The STAND-BY LED illuminates solid red when the MAIN POWER switch is first turned ON and remains that way until the user turns the projector on.

The error code indicator displays 1 of 11 numbered codes. If an internal error occurs during operation, the error code led will illuminate displaying the code. The error code is not displayed on screen or through the RS-232C or RS-422A interface. It may be necessary to access the input panel to view the error code.

Therefore it is recommended that users are aware of how the projector is operating. If during use, the performance of the projector seriously deteriorates, request a technician to look at the projector before an internal error occurs.

A complete list of error codes is included in *Appendix D.*

2.19 Adjust Image Size, Position and Quality

You can electronically and mechanically adjust the projector to improve the focus, size and position of the image on the screen.

Orient the Image

The image may be in the incorrect orientation when the projector is first turned on.

To display image in the correct orientation:

1) Press ENTER + B + ESC to access the Service menu.
2) Use the ▲ and ▼ arrow keys to highlight the raster setting which orients the image correctly. *NOTE: The display will change as you navigate through the four options.*
3) Press ENTER to accept a raster setting and exit to the Service menu. This setting is now saved into the internal memory of the projector.

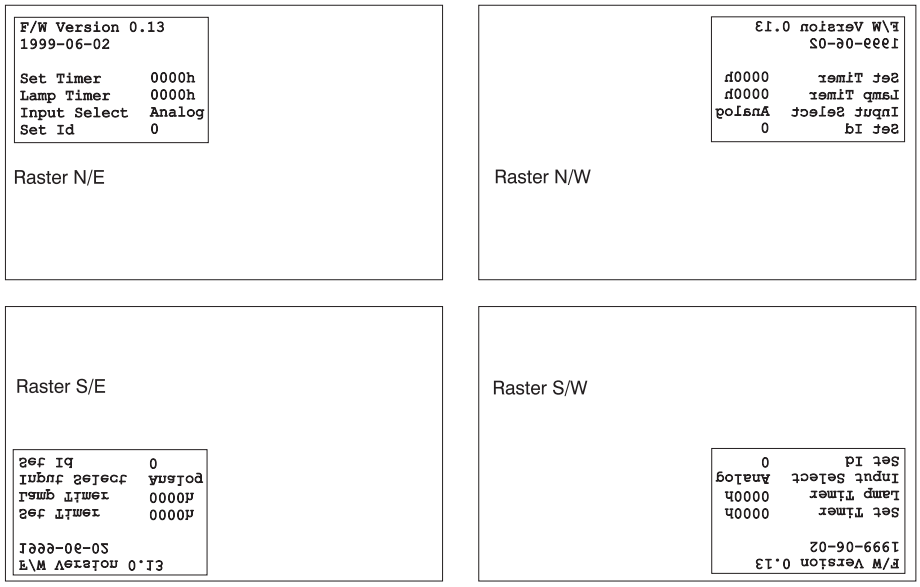
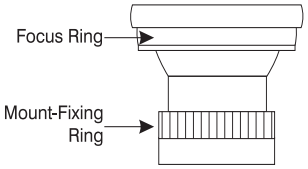


Figure 2.17. Raster Options (for a typical rear screen installation)

Focus Adjustment

The display may require manual focus adjustment at this point. It is recommended that two individuals perform this procedure; one to view the screen from an audience perspective and the other to focus the image. By adjusting the lens, each edge and center of the screen should be evenly and clearly focused.



To adjust image focus:

1) Loosen the mount-fixing ring around the barrel of the lens.
2) Rotate the lens until the center and all four edges of the screen are focused.
3) When the image is focused, tighten the mount-fixing ring.

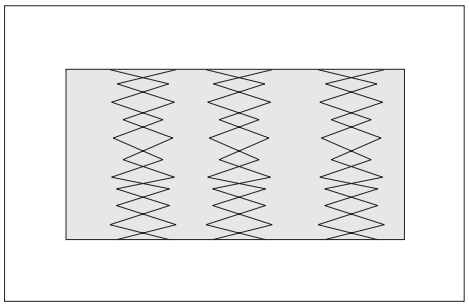
Clock

Clock is a menu option commonly used to adjust RGB inputs. When you adjust clock you are adjusting the timing of the pixel sampling clock to match the timing of the incoming signal. Clock adjustment is typically required when the image seems unstable with strong vertical banding.

Use a test pattern that has strong vertical lines when performing this adjustment.

To adjust Clock:

1) Press MENU2, to access User Menu2.
2) Use the ▲ and ▼ arrow keys and highlight menu item Clock.
3) Press ENTER . A smaller window appears with DIV and FINE options.
4) Use the ◄ and ► keys to increase of decrease the setting. Adjust the DIV setting until the vertical bands are as far apart as they can be – the image appears to be clearing. Remember this setting. If you keep adjusting Div, you will find that the vertical bands reappear and the image is at its original state. Use the first setting as DIV.
5) Press the ▼ key to highlight the FINE option.
6) Use ◄ and ► keys to increase or decrease the setting. Adjust the FINE setting until the image is free from any noise. Note this setting. Keep adjusting FINE, you will notice the noise reappears. Note this setting.
7) Set the FINE setting to any value between the two noted settings.
8) Press ESC to return to Menu2 options. Menu settings are saved into memory when you exit the menu.



Original Display - strong vertical banding

Figure 2.18. Image with Strong Vertical Banding

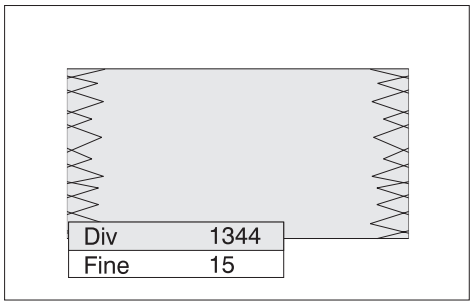


Figure 2.19. Adjust DIV setting

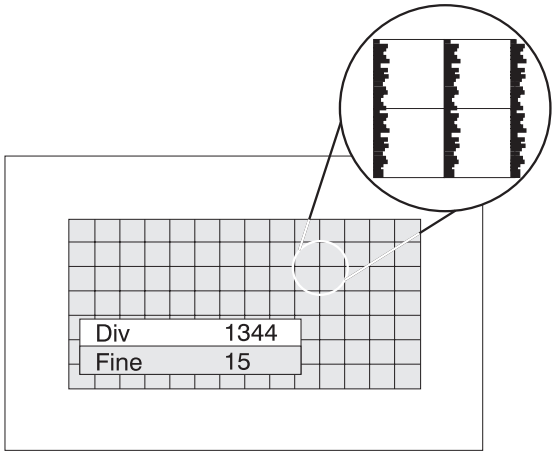


Figure 2.20. Adjust FINE setting

Phase

Phase adjustment allows you to position the image so it is centered on the screen. To move the image from side to side adjust H-Position. To move the image up or down adjust V-Position. See Figure 2.21.

To adjust phase:

1) Press MENU2, to access user Menu2.
2) Use the ▲ and ▼ arrow keys and highlight menu item Phase.
3) Press ENTER. A smaller window appears with H-Position and V-Position options.
4) Use ▲ and ▼ keys to highlight H-Position option.
5) Use the ◀ and ▶ keys to increase or decrease the setting until the image is centered horizontally on screen.
6) Press the ▼ key to highlight the V-Position option.
7) Use ◀ and ▶ keys to increase or decrease the setting until the image is centered vertically on screen.
8) Keep adjusting horizontal and vertical position until the entire image is positioned correctly on screen.

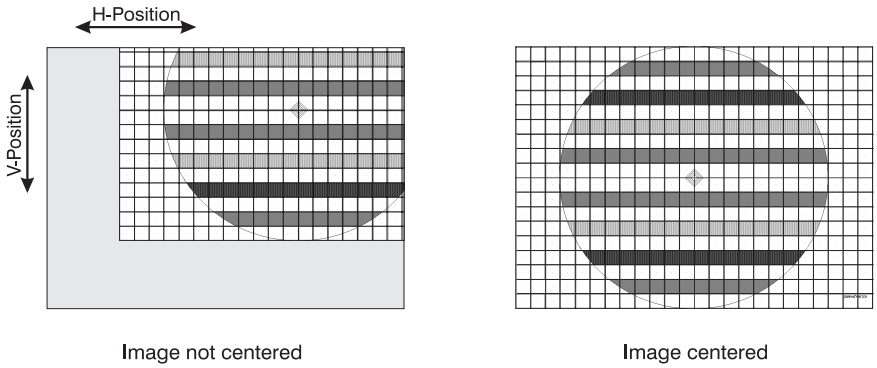


Figure 2.21. Adjust Horizontal and Vertical Phase

2.20 Multi-Axis Adjustment

Follow the steps provided to quickly and effectively correct image geometry and sizing on screen. To perform this procedure two people are required: one to view the screen from an audience perspective and the other to make adjustments.

Use a test pattern that has vertical and horizontal lines, squares and an outer border. Display the same test pattern on each of the screens.

Figure 2.22. identifies the various adjustment knobs of the multi-axis adjuster.

To adjust an image:

1) FOCUS – Focus image using the Focus Adjustment procedure outlined in 2.19.
2) Loosen the **black** lock screws before making any adjustments. DO NOT loosen the lock screws found on the silver collars – this will affect the original reference point of the adjuster.
3) ZOOM OUT – Zoom the image out until it is smaller than the screen.
4) HORIZONTAL and VERTICAL POSITION – Center the image on the screen.
5) Adjust TILT – Use the edges of the screen as reference. The outer edges of the image should be parallel to the edge of the screen.

6) Adjust HORIZONTAL and VERTICAL KEYSTONE – Adjust the image so it is perfectly rectangular to fit the screen – no distortion in picture geometry.

7) Adjust ZOOM and HORIZONTAL and VERTICAL POSITION – Enlarge the image by turning the front adjustment knob in a clockwise direction until it fills the screen. Center the image by adjusting horizontal and vertical position. The outer border of the image should be clearly visible.

8) Lock the **black** lock screws on each adjustment collar. This prevents the multi-axis adjuster from drifting over a period of time.

NOTE: If matched screens cannot be achieved at this point, try re-focusing the image. This will cause a small shift in image position. After focusing, re-attempt to adjust the image using the steps outlined above.

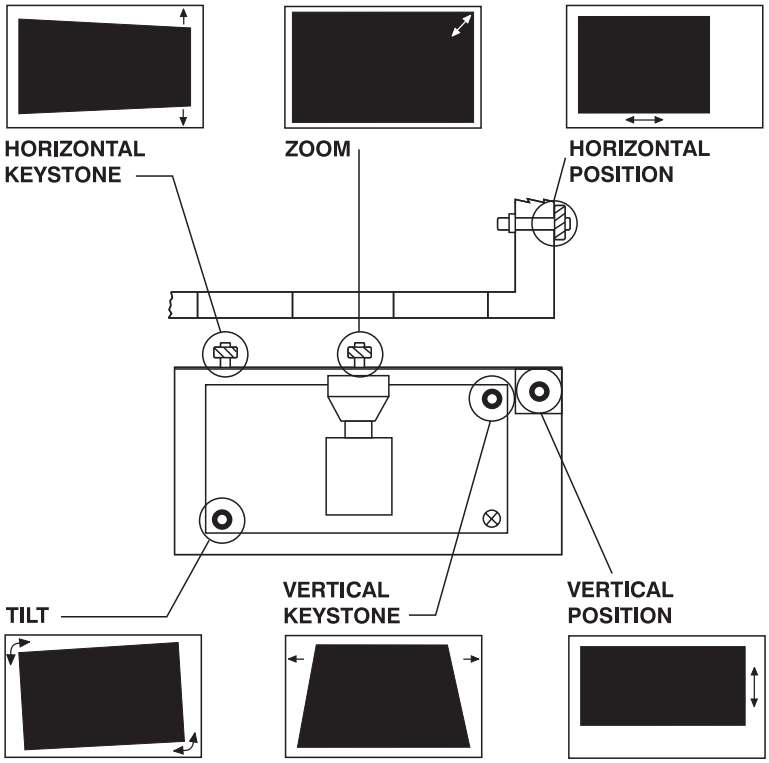


Figure 2.22. Multi-axis adjustments

2.21 Adjusting the Image – The Service Menu

Once the projector is properly installed it can be setup using the functions available in the Service Menu. There are eight items that can be adjusted to create the best quality image: Set CSC, W-Gradation, R,B, and B-Gradation, Set White Balance, Raster, Set Dither, Logo and Lamp Timer Reset.

Refer to *Appendix F* for a complete overview of the Service Menu. The menu tree will assist you in navigating the Service Menu and adjusting the various service options.

To access the Service Menu:

- Press ENTER + B + ESC

You must enter the Service menu code within one second to gain menu access. Only the first item in the menu will be displayed on screen. Use the ▲ and ▼ keys to advance or go back to a previous menu item.

You can temporarily exit the Service menu by pressing the [ESC] key. This allows you to access a user menu, adjust user menu items, turn R,G,B on/off etc To quickly return to the Service menu, press [ESC] again. This feature is useful during CSC and Gradation setup because it's necessary to access User Menu1 to select different presets.

To completely exit the Service menu and restrict its access from a user you must re-enter the Service menu code [ENTER] + (B) + [ESC].

WARNING

Verify that the Service menu cannot be accessed, by pressing the [ESC] key after completing a service menu procedure and before the keypad is given to a user. This will prevent unauthorized access to the Service menu and setting changes.

Set CSC

Set CSC is the first item in the Service menu, which stands for Color Space Control. In User Menu1 there are three CSC settings (Normal, White and RGB) that provide various color purity variations for a user to select. From the Service Menu, you can adjust the variation of color purity for each of the three user-defined CSC settings. This function is useful when you are trying to match the colors between several screens in a system. Colors can vary between images when they are from a different source.

To adjust Set CSC:

1) Supply a 100% white signal.
2) Press [ENTER] + (B) + [ESC] to access the Service Menu.
3) "Set CSC" is displayed on screen.
4) Press [ENTER] to select. The preset currently selected in the user menu will be displayed. For example, if Normal is the CSC setting in user Menu1 then Normal is the preset that will be adjusted. If you want to adjust the settings for White or RGB, you must first select them through user Menu1. Press [ESC]. Press [MENU1]. Use the ▼ key until CSC is highlighted. Press [ENTER]. Use the ▶ and /or ◀ arrow key and select Normal, RGB or White.
5) Press [ESC] to exit the user menu.
6) Set all projectors to broadcast control (ID 00).
7) Before you re-enter the service menu turn (B) and (G) off and display only monochrome red on all screens.
8) Press [ESC] to quickly re-enter the Service menu.
9) Check each screen to determine if a difference in brightness of red exists between screens.
10) If there is a difference, use the ◀ key and reduce the brightness of the brightest screen to that of the darkest screen.
11) Repeat Step 10 until all screens match in brightness.
12) Check each screen to determine if a difference in chromaticity exists between screens. Pick the screen which you believe displays the most correct red colors.
13) Use the ▼ key and highlight R-G.
14) Use the ◀ or ▶ keys to adjust the amount of red that should appear in the color green.
15) Repeat Step 13 and Step 14 for R-B.

16) Repeat Step 7 to Step 14 for the other two monochrome colors (G)(green) and (B) (blue).
17) Check that each screen has the same brightness and chromaticity in monochrome white (original signal). If there is a noticeable difference between screens repeat Step 9 to Step 16 again.
18) After you have successfully completed the adjustment for CSC – NORMAL, repeat this procedure for CSC - WHITE and CSC – RGB.
19) Press ESC to return to presentation level.

Gradation Adjustment

You can adjust the brightness and the difference of color tone between adjoining segments of the screen independently. It is recommended that you adjust R, G and B-Gradation first and only if required adjust W-Gradation.

Although settings can be adjusted between –128 to 127, it is recommended that you try to keep gradation settings in the range of –50 to 50. Figure 2.23 identifies the segments of the screen that will be affected during adjustment.

To adjust gradation:

1) Supply an 80% white signal.
2) Press ENTER + (B) + ESC to access the Service Menu.
3) Press ▼ until R-Gradation is highlighted.
4) Press ENTER to select.
5) Use ◄ and ► keys to adjust the difference in color tone and brightness for each segment of the screen starting with R-TOP. (Use the ▼ key to move to the next segment R-BOTTOM etc.)
6) Repeat Step 5 for each segment of the screen.
7) Repeat Step 3 to Step 6 for G-Gradation and B-Gradation. Must exit the Service menu, ESC, and turn (R), (G) or (B) on or off to display each color OR change input signal to display each color.
8) As you are making the adjustments check the color tone and brightness of the whole picture so that the screens are unified as a multi-screen system.

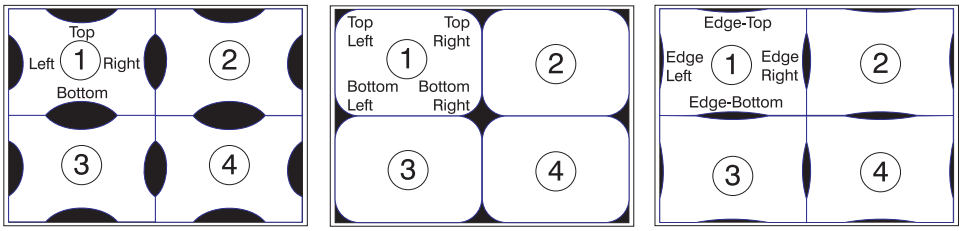


Figure 2.23. Adjusting Gradation

Set White Balance

This function allows you to adjust the amount of color added to white. Low, Middle and High are the three pre-defined settings available to the user through User Menu1. These settings can be adjusted through the Service Menu. Use the ◄ and ► arrow keys to increase or decrease the percentage of RED, GREEN and BLUE in a pure color.

To adjust Set White Balance:

1) Supply an 80% white signal.
2) Press ENTER + (B) + ESC to access the Service Menu.

3) Press ▼ until Set WHITE BALANCE is displayed.
4) Press ENTER to select – White Balance – Low is displayed.
5) Use the ◄ and ► keys to adjust the amount of red that appears in white. Press the ▼ key to adjust the amount of green that appears in white. Repeat for blue. NOTE: When making these adjustments check to see that the color of white is uniform on all screens.
6) Press ▼ to select White Balance – Middle.
7) Repeat Step 5 for White Balance – Middle.
8) Press ▼ to select White Balance – High.
9) Repeat Step 5 for White Balance – High.

Raster

This function allows you to orient the image correctly. Raster settings can be reversed vertically or horizontally with ◄ , ► , ▲ and ▼ keys. This is necessary to orient the image correctly in direct rear screen projection and rear screen projection with folded optics. See *Orient the Image* earlier in this section.

Set Dither

This is a factory testing function. The default setting should be sufficient for any image that appears normal.

The default setting is:

DARK/BRIGHT	Dark
FIELD FIX	On
FIELD SELECT	Even

The following dither settings can be adjusted:

FIELD FIX

ON – Field Fix should be ON when you want to fix the dither pattern processing in the field direction.

OFF – Field Fix should be OFF when you want to perform dither pattern processing in the FIELD direction.

FIELD SELECT – this is only effective when the FIELD FIX setting is ON.

EVEN – used to select an even dither pattern.

ODD – used to select and odd dither pattern.

DARK/BRIGHT – this is only effective when the FIELD FIX setting is OFF.

DARK – used to fix the processing of the dither pattern of the left side of the screen in the FIELD direction (approximately 30 pixels).

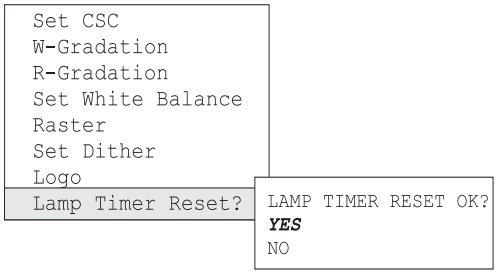
BRIGHT – used to perform the processing of the dither pattern of the left side of the screen in the FIELD direction (approximately 30 pixels).

Logo

This function allows you to turn the logo on or off. If the logo setting is ON, the logo will appear for approximately 30 seconds from the time power is turned on. There will be a blank screen for approximately 30 seconds if the logo setting is OFF.

Lamp Timer Reset

Use this function to reset the lamp timer to 0000 hours when the lamp has been replaced. You can view the current number of hours the lamp has been used by pressing the DISPLAY key.



To reset the lamp timer:

1) Press ENTER + B + ESC to access the Service Menu.
2) Press ▼ until Lamp Timer Reset is highlighted. A smaller window appears with the message "Lamp Timer Reset OK?"
3) Use the ▲ and ▼ keys and highlight option YES to reset. (If NO is selected the operation is cancelled.)
4) Press ENTER to begin resetting.
5) Press DISPLAY and verify the lamp timer is set to 0000hrs.

REMINDER:
Don't forget to completely exit the Service menu by re-entering the service menu code ENTER + B + ESC. Press ESC to verify the service menu is locked and cannot be accessed by users.

Section 3

RS-232C Serial Communication

Section Contents:

3.1 Introduction

GraphXMaster serial communications allow simultaneous interfacing and control of one or more projectors and accessories by an external controller. Once connected to the RS-232 port of the projector, controllers can access projector controls and setups, issue commands or queries and receive replies.

This type of communication is useful for:

- downloading projector software upgrades
- controlling one or multiple projectors
- automating events on the projector (external custom software required)

3.2 Connection

Standard serial communication cables are required to connect a PC or controller to the projector. Use a null modem cable (wires 2 and 3 are crossed) to connect the controller to the first projector in a network and straight through cables for connecting all remaining projectors.

To control a single projector using RS-232C serial communications:

1) Connect one end of the "null modem" serial communication cable to the source (computer or controller) and the other end to the RS-232C port. See Figure 3.1.

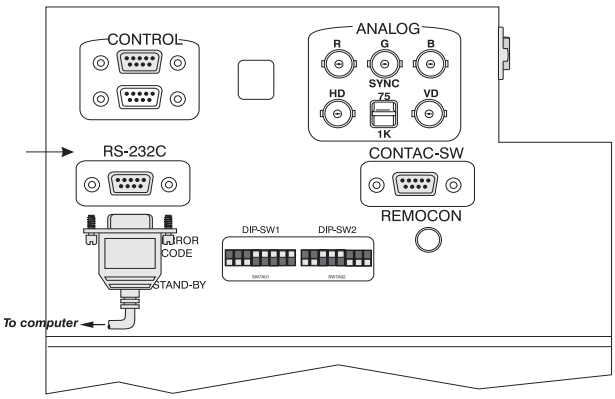


Figure 3.1. RS-232C Port

To control a network of projectors using RS-232C serial communications:

1) Connect one end of the "null-modem" serial communication cable to the source (computer or controller) and the other end to the RS-232C port of the first projector in the chain.

2) Take a "straight through" serial communication cable and connect it to the CONTROL OUT port of projector1 and connect the other end to the CONTROL IN port of the next projector (projector2) in the chain.

3) Continue connecting each projector in the chain. The last projector will have a connection to the CONTROL IN port only.

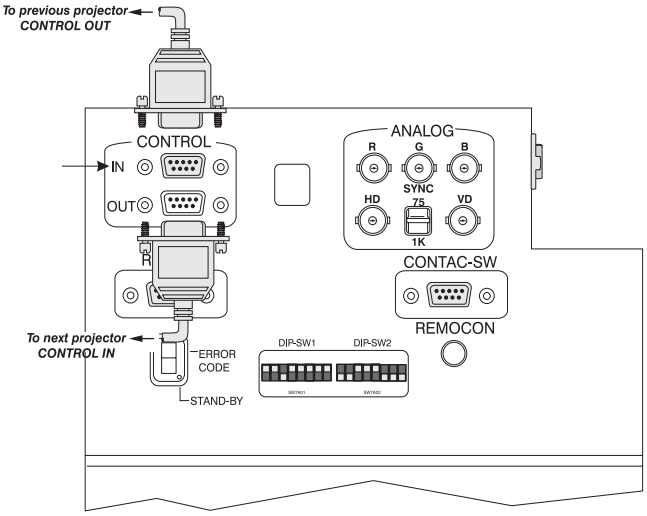


Figure 3.2. Control In and Out Ports

IMPORTANT: Refer to Section 2 when setting Dip-switches for serial communication.

For RS-422 serial communication: The maximum distance projectors can be from one another and successfully communicate is 600 feet.

For RS-232 serial communication: The maximum distance between the controller and the first projector must be less than 50 feet.

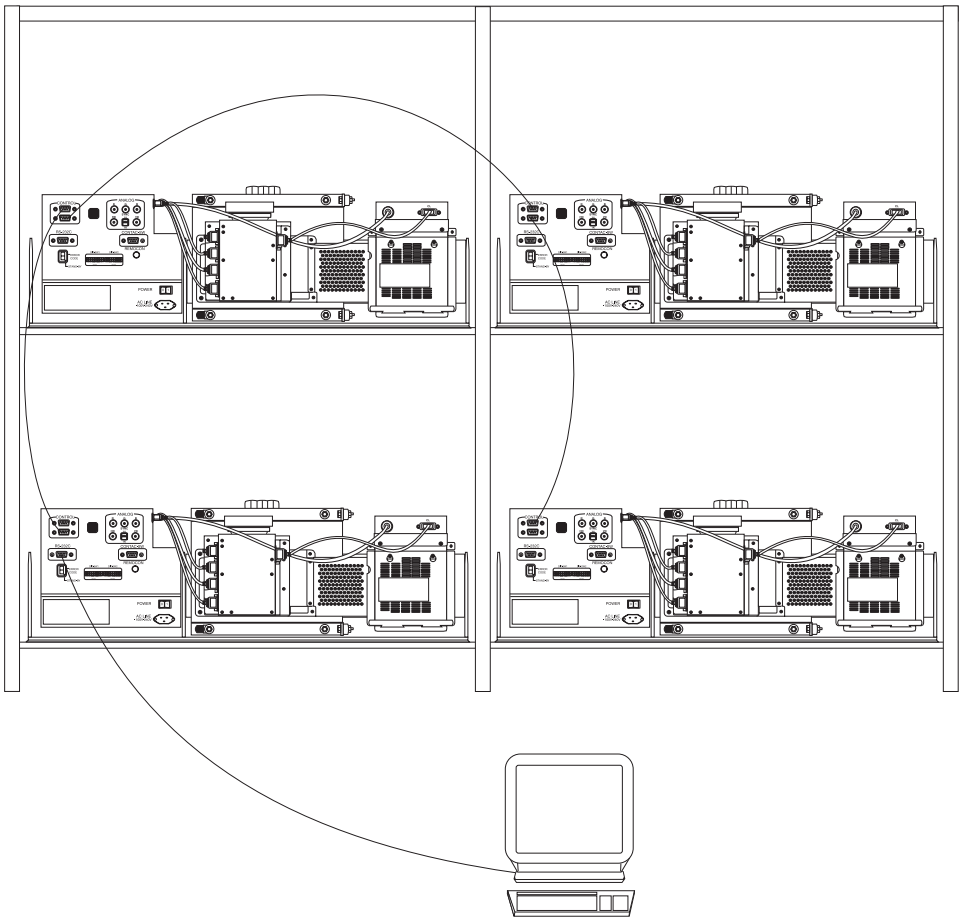


Figure 3.3. Connecting Multiple Projectors for Serial Communication

3.3 Types of Commands

There are two types of commands: READ and WRITE. READ commands allow you to request the return data on the unit's status and WRITE commands allow you to control the unit. Return data is issued each time a write command is successfully received by the projector.

3.4 Message Format

Write Command

Use the following format when transmitting RS-232C codes to "set" a projector function to a specific setting:

##nnndddEN

where:

is the two-digit set ID number given to the projector. This ID number can be any number between 00-31 (set using DIP-switch 1, bits 4 – 8, see *Section 2 – Operation*). Note: 00 is the ID number to use for broadcast control.

nnn is the ASCII code (refer to Table 3.1.). The maximum number of characters will vary depending on the function and the parameters available.

dddd is the data entered for a function or save a setting to memory command in ASCII code. The number of characters will vary depending on the function and the parameters available.

EN is the end message byte in binary format 0D hex - equivalent to a carriage return (CR) or enter.

All bytes that comprise a complete serial command (including the end message byte) must be sent simultaneously.

TIP: Use a terminal software package that simulates "block send" mode, which allows you to store typed keys to a buffer and only sends the complete message after the "enter" key is pressed. Another method would be to set up a "hotkey" so that the complete message is sent at one time.

Save Settings

There is a unique save command associated with some parameters, which saves the new setting entered through the RS-232C interface – listed in Table 3.1. However, there are ten functions that do not have associated save commands – new settings are automatically saved when the write command is issued to change a setting. These functions are: CSC, W-Gradation, R-Gradation, G-Gradation, B-Gradation, White Balance, Raster, Dither Dark/Bright, Dither Fixed Field, Dither Field Select and Logo.

Read Command

A request can be made of the projector to reply with the current status or setting of a specific projector function.

For example: To request the current setting for *brightness* in projector #3 send **03bcr** (where 03 is the projector ID number, b is the ASCII code for brightness and cr is the end message byte equal to a carriage return).The projector will reply by sending the current setting for brightness.
NOTE: You can only make a request of individual projectors, using their specific projector ID number. Sending a request with a projector address of 00 will not return a reply.

3.5 Messages

The following table of messages (Table 3.1) lists the RS-232 messages used for communicating with the projector and gives examples of each.

Table 3.1. RS-232C Commands

NOTE: In the examples given, the end byte message is cr (equivalent to a carriage return).

FUNCTION	ASCII CODE	PARAMETER	DESCRIPTION	Broadcast 00	Projector 01	Projector 02
Control						
Input Select	i	0,1	To select analog or digital input 0: Analog 1: Digital	00i0cr	01i0cr	02i1cr
Lamp Timer	STR1		To reset and save the Lamp Timer value	00STR1cr	01STR1cr	02STR1cr
	ST2		To read the value of the Lamp Timer, where Time = hexadecimal 6-BYTE	00ST2cr	01ST2cr	02ST2cr
Memory Channel (Location)	n	0 - 16	To create or select a memory location	00n0cr	01n16cr	02n16cr
Mute	NP	0,1	Turns the image ON or OFF 0: MUTE OFF 1: MUTE ON	00NP0cr	01NP1cr	02NP1cr
Power Status	vP	0,1	Returns the status of the projector 1: Power On 0: Power Off	00vP0cr	01vP1cr	02vP1cr
PowerOff	“		Turns Power OFF	00“cr	01“cr	02“cr
PowerOn	!		Turns Power ON	00!cr	01!cr	02!cr
Set Timer	ST3		To read the value for the Set Timer, where Time = hexadecimal 6-BYTE	00ST3cr	01ST3cr	02ST3cr
	HR		To reset the Set Timer	00HRcr	01HRcr	02HRcr
	HE		To save the Set Timer value	00HEcr	01HEcr	02HEcr
Picture Adjustment Menu1						
Bright	b	0 -127	To adjust brightness	00b0cr	01b127cr	02b127cr
	bE		To save brightness setting	00bEcr	01bEcr	02bEcr
CSC	Js	0 – 2	To adjust Color Space Control setting	00Js0cr	01Js2cr	02Js2cr
	JsE		To save Color Space Control setting	00JsEcr	01JsEcr	02JsEcr
Contrast	Y	0 - 150	To adjust contrast	00Y0cr	01Y150cr	02Y150cr
	YE		To save contrast setting	00YEcr	01YEcr	02YEcr
Dither	RN	0 – 1	Turn dither ON (1) or OFF (0)	00RN0cr	01RN1cr	02RN1cr
	RE		To save dither setting	00REcr	01REcr	02REcr
Gamma	k	1 – 6	To adjust gamma setting	00k1cr	01k6cr	02k6cr
	kE		To save gamma setting	00kEcr	01kEcr	02kEcr
White Balance	mT	0 - 2	To select white balance setting 0: Low, 1: Middle, 2: High	00mT0cr	01mT1cr	02mT2cr
	mTE		To save white setting	00mTEcr	01mTEcr	02mTEcr

FUNCTION	ASCII CODE	PARAMETER	DESCRIPTION	Broadcast 00	Projector 01	Projector 02
Picture Adjustment Menu2						
Auto White	Aw		To start Auto-White function	00Awcr	01Awcr	02Awcr
CLAMP						
Clamp-Start	wS	1 - 228	To adjust Clamp-Start setting	00wS1cr	01wS2cr	02wS128cr
	wSE		To save Clamp-Start setting	00wSEcr	01wSEcr	02wSEcr
Clamp-End	wW	28 - 255	To adjust Clamp-End setting	00wW28cr	01wW28cr	02wW255cr
	wWE		To save Clamp-End setting	00wWEcr	01wWEcr	02wWEcr
CLOCK						
Div	CD	1200 - 1600	To adjust clock sampling frequency-dividing setting	00CD1200cr	01CD1250cr	02CD1600cr
Fine	CF	0 - 31	To adjust clock sampling phase adjustment setting	00CF0cr	01CF10cr	02CF31cr
Save	CE		To save CD and CF settings	00CEcr	01CEcr	02CEcr
PHASE						
V-Position	rH	50 - 200	To adjust horizontal position setting	00rH50cr	01rH200cr	02rH200cr
	rHE		To save H-position and V-position settings	00rHEcr	01rHEcr	02rHEcr
H-Position	rV	3 – 60	To adjust vertical position setting	00rV3cr	01rV60cr	02rV60cr
	rHE		To save H-position and V-position setting	00rHEcr	01rHEcr	02rHEcr
Service Menu						
SET CSC						
CSC R-R	JEAX	0 - 1023	To adjust color purity.	00JEAX0cr	01JEAX1000cr	02JEAX1023cr
CSC R-G	JEAY	-255 - 255		00JEAY-255cr	01JEAY0cr	02JEAY255cr
CSC R-B	JEAZ	-255 - 255		00JEAZ-255cr	01JEAZ0cr	02JEAZ255cr
CSC G-R	JEBX	-255 - 255		00JEBX-255cr	01JEBX0cr	02JEBX23cr
CSC G-G	JEBY	0 - 1023		00JEBY0cr	01JEBY1000cr	02JEBY1023cr
CSC G-B	JEBZ	-255 - 255		00JEBZ-255cr	01JEBZ0cr	02JEBZ255cr
CSC B-R	JECX	-255 - 255		00JECX-255cr	01JECX0cr	02JECX255cr
CSC B-G	JECY	-255 - 255		00JECY-255cr	01JECY0cr	02JECY255cr
CSC B-B	JECZ	0 - 1023		00JECZ0cr	01JECZ1000cr	02JECZ1023cr
W-GRADATION						
W-Top	GWVT	-128 - 127	To adjust white-gradation.	00GWVT-128cr	01GWVT0cr	02GWVT127cr
W-Bottom	GWVB	-128 - 127		00GWVB-128cr	01GWVB0cr	02GWVB127cr
W-Left	GWHL	-128 - 127		00GWHL-128cr	01GWHL0cr	02GWHL127cr
W-Right	GWHR	-128 - 127		00GWHR-128cr	01GWHR0cr	02GWHR127cr
W-Top/Left	GWTL	-128 - 127		00GWTL-128cr	01GWTL0cr	02GWTL127cr
W-Top/Right	GWTR	-128 - 127		00GWTR-128cr	01GWTR0cr	02GWTR127cr
W-Bottom/Left	GWBL	-128 - 127		00GWBL-128cr	01GWBL0cr	02GWBL127cr
W-Bottom/Right	GWBR	-128 - 127		00GWBR-128cr	01GWBR0cr	02GWBR127cr
W-Edge/Top	GWYT	-128 - 127		00GWYT-128cr	01GWYT0cr	02GWYT127cr
W-Edge/Bottom	GWYB	-128 - 127		00GWYB-128cr	01GWYB0cr	02GWYB127cr

FUNCTION	ASCII CODE	PARAMETER	DESCRIPTION	Broadcast 00	Projector 01	Projector 02
W-Edge/Left	GWXL	-128 - 127		00GWXL-128cr	01GWXL0cr	02GWXL127cr
W-Edge/Right	GWXR	-128 - 127		00GWXR-128cr	01GWXR0cr	02GWXR127cr
R-GRADATION						
R-Top	GRVT	-128 - 127	To adjust red-gradation.	00GRVT-128cr	01GRVT0cr	02GRVT127cr
R-Bottom	GRVB	-128 - 127		00GRVB-128cr	01GRVB0cr	02GRVB127cr
R-Left	GRHL	-128 - 127		00GRHL-128cr	01GRHL0cr	02GRHL127cr
R-Right	GRHR	-128 - 127		00GRHR-128cr	01GRHR0cr	02GRHR127cr
R-Top/Left	GRTL	-128 - 127		00GRTL-128cr	01GRTL0cr	02GRTL127cr
R-Top/Right	GRTR	-128 - 127		00GRTR-128cr	01GRTR0cr	02GRTR127cr
R-Bottom/Left	GRBL	-128 - 127		00GRBL-128cr	01GRBL0cr	02GRBL127cr
R-Bottom/Right	GRBR	-128 - 127		00GRBR-128cr	01GRBR0cr	02GRBR127cr
R-Edge/Top	GRYT	-128 - 127		00GRYT-128cr	01GRYT0cr	02GRYT127cr
R-Edge/Bottom	GRYB	-128 - 127		00GRYB-128cr	01GRYB0cr	02GRYB127cr
R-Edge/Left	GRXL	-128 - 127		00GRXL-128cr	01GRXL0cr	02GRXL127cr
R-Edge/Right	GRXR	-128 - 127		00GRXR-128cr	01GRXR0cr	02GRXR127cr
G-GRADATION						
G-Top	GGVT	-128 - 127	To adjust green-gradation.	00GGVT-128cr	01GGVT0cr	02GGVT127cr
G-Bottom	GGVB	-128 - 127		00GGVB-128cr	01GGVB0cr	02GGVB127cr
G-Left	GGHL	-128 - 127		00GGHL-128cr	01GGHL0cr	02GGHL127cr
G-Right	GGHR	-128 - 127		00GGHR-128cr	01GGHR0cr	02GGHR127cr
G-Top/Left	GGTL	-128 - 127		00GGTL-128cr	01GGTL0cr	02GGTL127cr
G- Top/Right	GGTR	-128 - 127		00GGTR-128cr	01GGTR0cr	02GGTR127cr
G-Bottom/Left	GGBL	-128 - 127		00GGBL-128cr	01GGBL0cr	02GGBL127cr
G-Bottom/Right	GGBR	-128 - 127		00GGBR-128cr	01GGBR0cr	02GGBR127cr
G-Edge/Top	GGYT	-128 - 127		00GGYT-128cr	01GGYT0cr	02GGYT127cr
G-Edge/Bottom	GGYB	-128 - 127		00GGYB-128cr	01GGYB0cr	02GGYB127cr
G-Edge/Left	GGXL	-128 - 127		00GGXL-128cr	01GGXL0cr	02GGXL127cr
G-Edge/Right	GGXR	-128 - 127		00GGXR-128cr	01GGXR0cr	02GGXR127cr
B-GRADATION						
B-Top	GBVT	-128 - 127	To adjust blue-gradation.	00GBVT-128cr	01GBVT0cr	02GBVT127cr
B-Bottom	GBVB	-128 - 127		00GBVB-128cr	01GBVB0cr	02GBVB127cr
B-Left	GBHL	-128 - 127		00GBHL-128cr	01GBHL0cr	02GBHL127cr
B-Right	GBHR	-128 - 127		00GBHR-128cr	01GBHR0cr	02GBHR127cr
B-Top/Left	GBTL	-128 - 127		00GBTL-128cr	01GBTL0cr	02GBTL127cr
B-Top/Right	GBTR	-128 - 127		00GBTR-128cr	01GBTR0cr	02GBTR127cr
B-Bottom/Left	GBBL	-128 - 127		00GBBL-128cr	01GBBL0cr	02GBBL127cr
B-Bottom/Right	GBBR	-128 - 127		00GBBR-128cr	01GBBR0cr	02GBBR127cr
B-Edge/Top	GBYT	-128 - 127		00GBYT-128cr	01GBYT0cr	02GBYT127cr
B-Edge/Bottom	GBYB	-128 - 127		00GBYB-128cr	01GBYB0cr	02GBYB127cr
B-Edge/Left	GBXL	-128 - 127		00GBXL-128cr	01GBXL0cr	02GBXL127cr
B-Edge/Right	GBXR	-128 - 127		00GBXR-128cr	01GBXR0cr	02GBXR127cr

FUNCTION	ASCII CODE	PARAMETER	DESCRIPTION	Broadcast 00	Projector 01	Projector 02
RASTER	O	0 - 3	To adjust raster setting	00O1cr	01O1cr	02O3cr
SET DITHER						
Dither Dark/Bright	Ud	0,1	To adjust dither dark/bright setting 0: Dark 1: Bright	00Ud0cr	00Ud1cr	02Ud1cr
Dither Fixed Field	Uf	0,1	To adjust dither field fix setting 0: ON 1: OFF	00Uf0cr	00Uf1cr	02Uf1cr
Dither Field Select	Us	0,1	To adjust dither field selection 0: Even 1: Odd	00Us0cr	00Us1cr	02Us1cr
SET WHITE BALANCE						
White Balance Low Red	mLR	0 - 100	To adjust Low, Middle and High White Balance settings.	00mLR0cr	01mLR50cr	02mLR100cr
White Balance Low Green	mLG	0 - 100		00mLG0cr	01mLG50cr	02mLG100cr
White Balance Low Blue	mLB	0 - 100		00mLB0cr	01mLB50cr	02mLB100cr
White Balance Middle Red	mMR	0 - 100		00mMR0cr	01mMR50cr	02mMR100cr
White Balance Middle Green	mMG	0 - 100		00mMG0cr	01mMG50cr	02mMG100cr
White Balance Middle Blue	mMB	0 - 100		00mMB0cr	01mMB50cr	02mMB100cr
White Balance High Red	mHR	0 - 100		00mHR0cr	01mHR50cr	02mHR100cr
White Balance High Green	mHG	0 - 100		00mHG0cr	01mHG50cr	02mHG100cr
White Balance High Blue	mHB	0 - 100		00mHB0cr	01mHB50cr	02mHB100cr
LOGO	yS	0,1	To turn the logo on or off when power is turned on. 0: OFF 1: ON	00yS0cr	01yS1cr	02yS1cr

Section 4

Maintenance and Troubleshooting

Section Contents:

4.1 Introduction

This section describes all safety warnings and maintenance procedures associated with the projector. It is important that you read through this section and understand these warnings and guidelines.

4.2 Maintenance Safety Guidelines

GraphX Master C50 is CSA approved and is designed for safe and reliable operation. It should be operated in a controlled environment, which meets environmental specification.

Refer to the following guidelines when using the *GraphXMaster C50* projector:

- Always operate the projector with all its covers in place.
- Always operate the projector in a proper controlled environment.
- Always operate the projector at the voltage indicated on the AC input. Do not overload the power outlets and extension cords. This can result in fire or shock hazards.
- Use only a sturdy cart when transporting the projector.
- Always turn the MAIN POWER ON/OFF switch to the OFF position and unplug the projector before performing any parts or module replacement procedures.
- Do not operate the projector near water.
- Never operate a projection unit that has been exposed to moisture.
- Do not use a projector with a damaged power cord.
- Do not use a projection unit that has been dropped.
- Do not use a projection unit where drastic performance deterioration is noticed.
- Do not drink while performing maintenance on the projector.

- Never touch the surface of the lens. This could scratch and damage the lens.
- Never remove the lamp from its housing soon after the projector has been turned off. The lamp can reach extreme temperatures, which could cause severe burns.
- Do not block the sensors or air vents. This will ensure the projection unit does not overheat during operation.
- Do not force any objects through the vents of the projector. This will prevent contact with dangerous voltage levels, which could lead to severe physical injury or fire.
- Always use Christie Digital Systems approved parts when servicing.

4.3 Environmental Specification

See the User's manual, Specification section.

4.4 General Cleaning and Inspection Guide

The following table indicates the general cleaning requirements of the projector. The table describes the component, the frequency of maintenance and any procedures associated.

Component	Frequency	Action
Lens	As required.	Only clean the lens if image quality is affected. Do not touch the surface of the lens with bare hands to prevent scratches. Use a clean lint-free cloth to clean the lens.
Lamp	The lamp does not require cleaning during its 8000 hour lamp life.	Do not touch the surface of the lamp. A small imprint could compromise the quality and lifetime of the image. Refer to 4.5 Lamp Replacement for lamp replacement instructions.
Screen	As required.	It is recommended that the screen is cleaned with non-condensing compressed air and a static free lint-free cloth. Another option would be to use a good quality optical cleaning solution **applied to** clean, lint-free optical paper wipes. **! CAUTION** **Do not** apply the cleaning solution directly to the screen. Liquid could enter the hole located at the center of the

Component	Frequency	Action
Screen con't		screen and potentially damage the screen.
Optical Mirror	As required.	Use non-condensing compressed air and a clean lint-free cloth to remove dust or dirt from the mirror.
Sensors	As required.	Keep sensors clear of any obstruction. Ensure cables are not in the way.
Projector Housing	As required.	If there is an accumulation of dust on the projector and cables. Ensure the projector is powered down and unplugged. Place the lens cap on. Use a clean lint-free cloth and wipe the components. Do not use liquid cleaners or aerosols. Do not use forced air to remove the dust. This will cause dust particles to move into the projector
Module Replacement	As required.	Module replacement procedures should be performed by qualified service technicians.
Power Cords	As required.	Ensure cables are not unusually worn.

4.5 Lamp Replacement

The lamp requires replacement when it has reached its 8000 hour lamp life. Press DISPLAY on the keypad to display the total number of hours the lamp has been in use.

⚠ WARNING

Let the lamp cool down approximately 20 minutes after the projector has been turned off before attempting this procedure. The temperature of the lamp during and soon after operation is very high and can cause severe burns.

Wear cotton gloves when performing the Lamp Replacement procedure to prevent injury.

Lamp replacement should be performed by qualified service personnel.

To replace the lamp:

1) Loosen the two (2) screws at the top of the lamp access door (on the rear access panel). Lift the door to unhook the 3 tabs on the bottom and remove. See Figure 4.1.)

2) Press Power OFF on the keypad. This will turn the projector off. The lamp fan will continue to operate until the lamp has cooled (approximately 5 minutes).

3) Turn the MAIN POWER ON/OFF switch to the projector OFF only when the lamp fan has turned OFF.

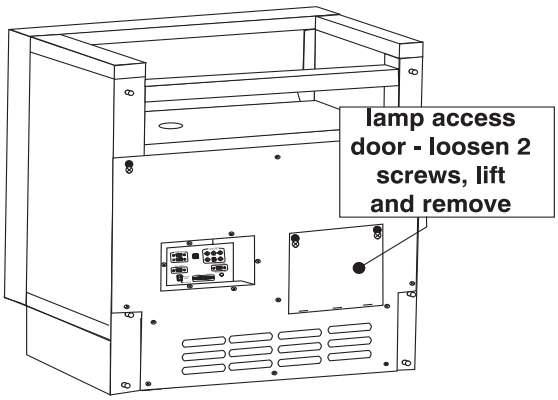


Figure 4.1. Remove lamp access door

⚠ WARNING

Wait at least 20 minutes for the lamp module to cool down, to prevent physical injury. Wear cotton gloves when removing and installing the lamp.

4) Loosen two screws at the top of the lamp door. Lift the lamp door until the two screws fit into the larger part of the opening and pull out to remove. (Figure 4.2.)

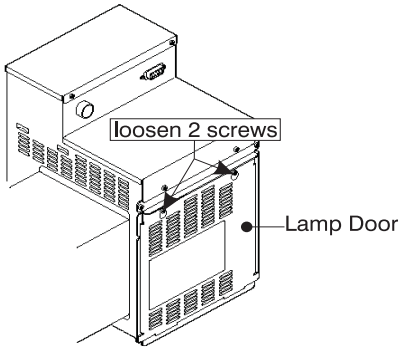


Figure 4.2. Loosen lamp door screws

⚠ WARNING

Do not handle the lamp by its glass surface. Intense heat can accumulate in those areas where fingerprints are present which could potentially cause an explosion.

5) Grasp the lamp module, by its housing and slide it along the side rails until it is free from the module. To prevent damaging the lamp, DO NOT use force when removing. (Figure 4.3.)

6) Align the grooved edges of the new lamp with the slide rails in the lamp compartment. Gently, push the lamp until it is seated in the socket located at the bottom of the lamp compartment.
If the lamp does not seat properly when inserting:

a) Loosen the 2 socket screws located on the lamp power side of the compartment.

b) Seat the lamp into the socket, located on the side cover. This ensures the socket is in the correct position.

c) Gently, slide the lamp out of the compartment and set it aside (glass surface facing up).

d) Tighten the socket screws.

e) Re-insert the lamp into the compartment by sliding along the slide rails until it is properly seated in the socket.

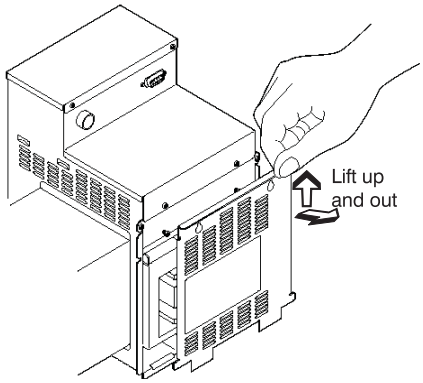


Figure 4.3. Remove lamp door

7) Replace the lamp door. Hold the door at an angle and hook the bottom part of the door into the edge of the lamp housing. Slowly, lift the door over the two screws that were loosened in Step 6. Slide the door down into place.

8) Tighten the two screws loosened in Step 6.

9) Replace the lamp access door to the rear access panel.

NOTE: There are two limit switches within the lamp unit. If the lamp module is not seated properly or if the door is not attached correctly, the limit switches will not work and the projector cannot be turned on.

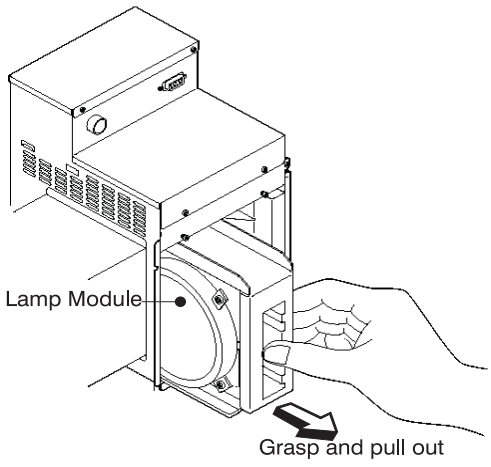


Figure 4.4. Remove lamp module

10) Adjust CSC, if necessary. Refer to *Section 2 – Set CSC*.

11) Reset the lamp timer. Refer to *Section 2 – Lamp Timer Reset.*

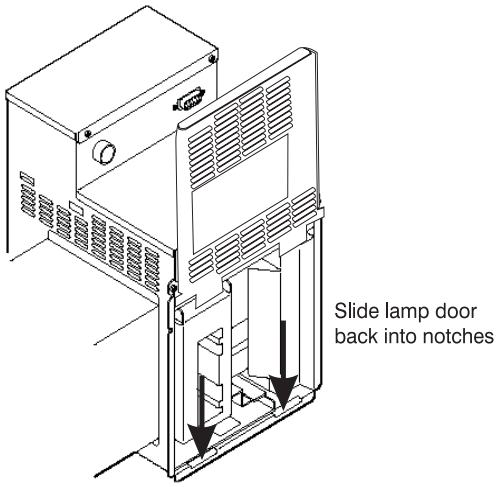


Figure 4.5. Replace lamp door

4.6 Troubleshooting Guide

Use the information in this section as a guide to assist you in correcting common problems associated with installation, setup and maintenance. It is recommended that you note all the symptoms of the problem before attempting to correct it. If you are unable to resolve the problem yourself, contact a technician or dealer for technical support.
NOTE: Some of the symptom descriptions include the possible state of the LED indicators, although they can't be seen unless you access the projectors control unit.

Symptom: **The projection unit will not turn ON when POWER ON is pressed. The STAND-BY indicator is not lit.**

Cause/Action: **1)** The power cord may be disconnected. Check the power connection at the wall outlet and the projector. Ensure the MAIN POWER ON/OFF switch is ON before you press Power ON.

Symptom: **The projector will not turn ON when POWER ON is pressed. The stand-by LED is lit and red.**

Cause/Action: **1)** The batteries in the keypad may be weak. Check and if necessary, replace the batteries.

2) The sensors may be blocked and no signal is being transmitted. Ensure the sensors are not blocked.

3) The keypad may be damaged. Try using a different keypad, if available.

4) The lamp cover may not be in place. Check to see that the lamp cover is on and secured correctly.

Symptom: **The projector will not turn ON when POWER ON is pressed. An error code is displayed.**

Cause/Action: **1)** Not enough time has passed between powering the projector down and up again. Wait approximately 5 minutes after the lamp fan has turned off before attempting to turn the projector on again.

2) There is an error code LED on the control unit of the projector. It is possible that an internal error has occurred which requires the attention of a technician. Call the technician for support.

Symptom: **The image is projected on the screen in the wrong orientation.**

Cause/Action: **1)** Incorrect Raster setting. Access the Service menu and change the raster setting. Refer to *Section 2 – Orient the Image*.

Symptom: **The image doesn't fit on screen.**

Cause/Action: **1)** Image is too large. Turn the large adjustment knob in a clockwise direction.

2) Image is too small. Turn the large adjustment knob in a counter-clock-wise direction.

Symptom: **The image is not centered on screen.**

Cause/Action: **1)** Incorrect H-Phase and V-Phase. Refer to *Section 2 - Adjust Phase.*

Symptom: **The colors are different between screens.**

Cause/Action: **1)** Incorrect CSC, W-gradation and R,G,B-gradation settings. Access the Service menu and adjust. Refer to *Section 2 – Adjusting the Image*.

Sympton*:* **No image is displayed**.

Cause/Action: **1)** The main power is ON, but the Power ON key has not been pressed yet. Press Power ON, projector fans should immediately turn on.

2) An incorrect source has been selected**.** For analog input press the VIDEO key.

3) Verify the RGB cable is connected to the external source.

4) The contrast level may be set too low. Press MENU1 to access the user menu and adjust the contrast level using the ▲ key.

5) Lamp life has expired. Lamp replacement is required. Call a technician for support.

6) Have a technician check to ensure the lens cap is not on.

Symptom: **Keypad doesn't work.**

Cause/Action: **1)** Wrong projector ID entered. If you're trying to control a single projector, make sure the ID you have entered is correct and DIP-SW1 Bits 4 – 8 should reflect this.

2) Wired cable plugged into the REMOCON jack. If you are using the remote the wired keypad cable should no be plugged into the jack. Make sure the DIP-SW2 bits 1 and 8 are set correctly. Refer to *Section 2 – DIP-switch settings*.

Appendix A

External Support

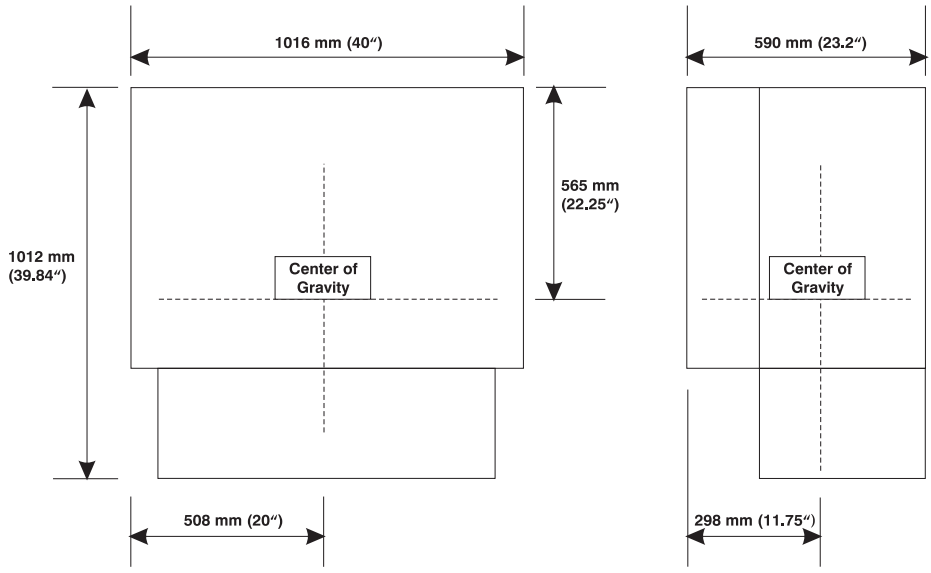
Technical Information

Consider the following technical information when designing and implementing an external support method for a *GraphXMaster* C50 videowall installation.

Physical Characteristics of a Cube:

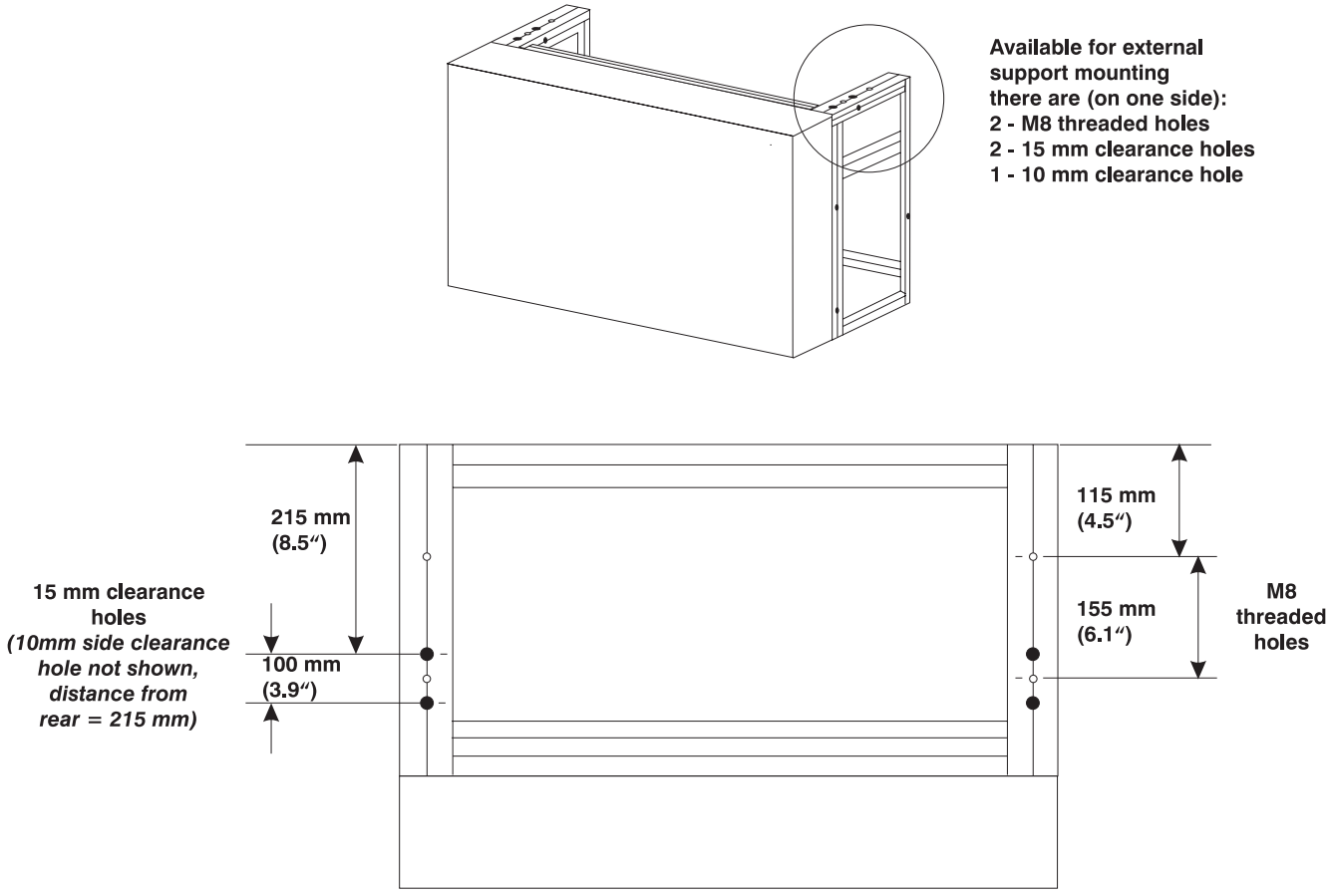
Weight (*includes 50" cube frame, projector, mirror and screen*) 91 kg 200 lbs

Center of Gravity (*see illustration*)



Mounting Information *(50" cube)*

The following illustration identifies the mounting holes available on the cube frame, which can be used to secure external support to the videowall.



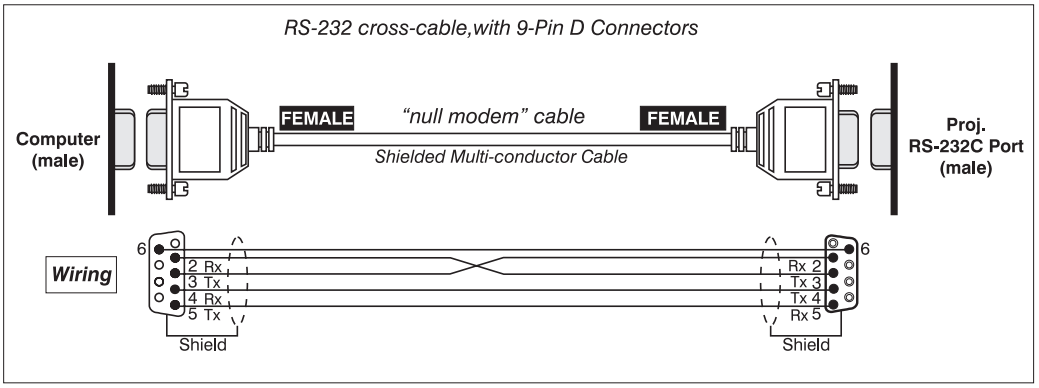
Top View
(shown mounting holes for external support)

Appendix B

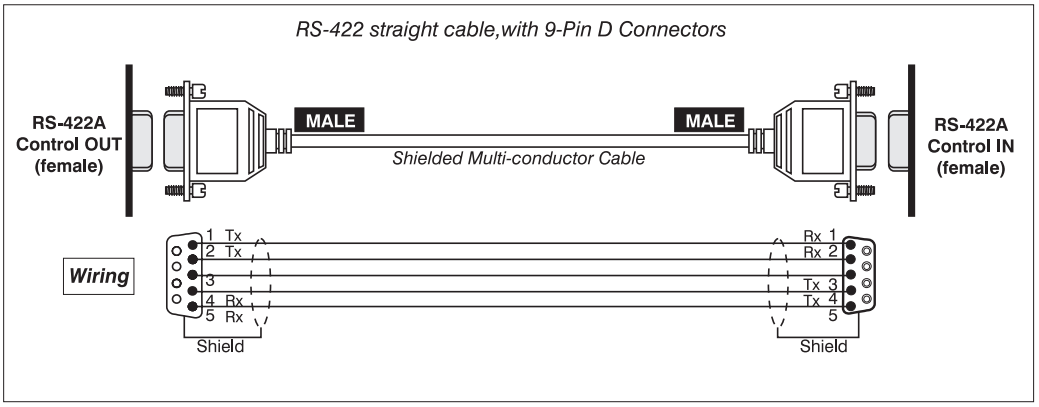
Serial Communication Cables

❑ ***From computer to projector***

For computers having a 9-pin "AT" type serial port



❑ ***From projector to projector***

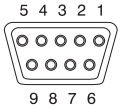


Appendix C

External Control – Contact SW

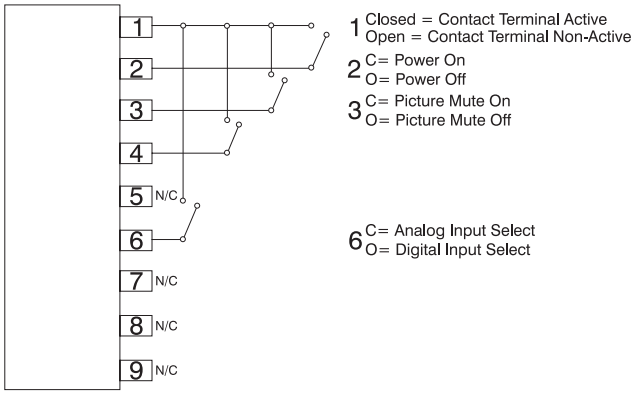
The contact switch port can be wired for use as another method of external control using external hardware switches. The control features available are limited to turning projector power on/off, picture mute and input switching.

Pins 2, 3 and 6 are connected in parallel to DIP-switch 2, bit1. Set bit1 to OFF when using the contact switch. Pin 2 must be connected to the ground before you have control of pin 3 and pin 6.



Connector Type: D-Sub 9pin (male)

Pin number	Signal	Explanation
1	Ground	
2	Wired	Contact switch active or non-active
3	W-Power	To turn projector power ON/OFF
4	W-Mute	To turn Picture Mute ON/OFF
5	Reserved	Not used
6	INS1	To switch between analog and digital inputs.
7	Reserved	Not used
8	Reserved	Not used
9	Not used	



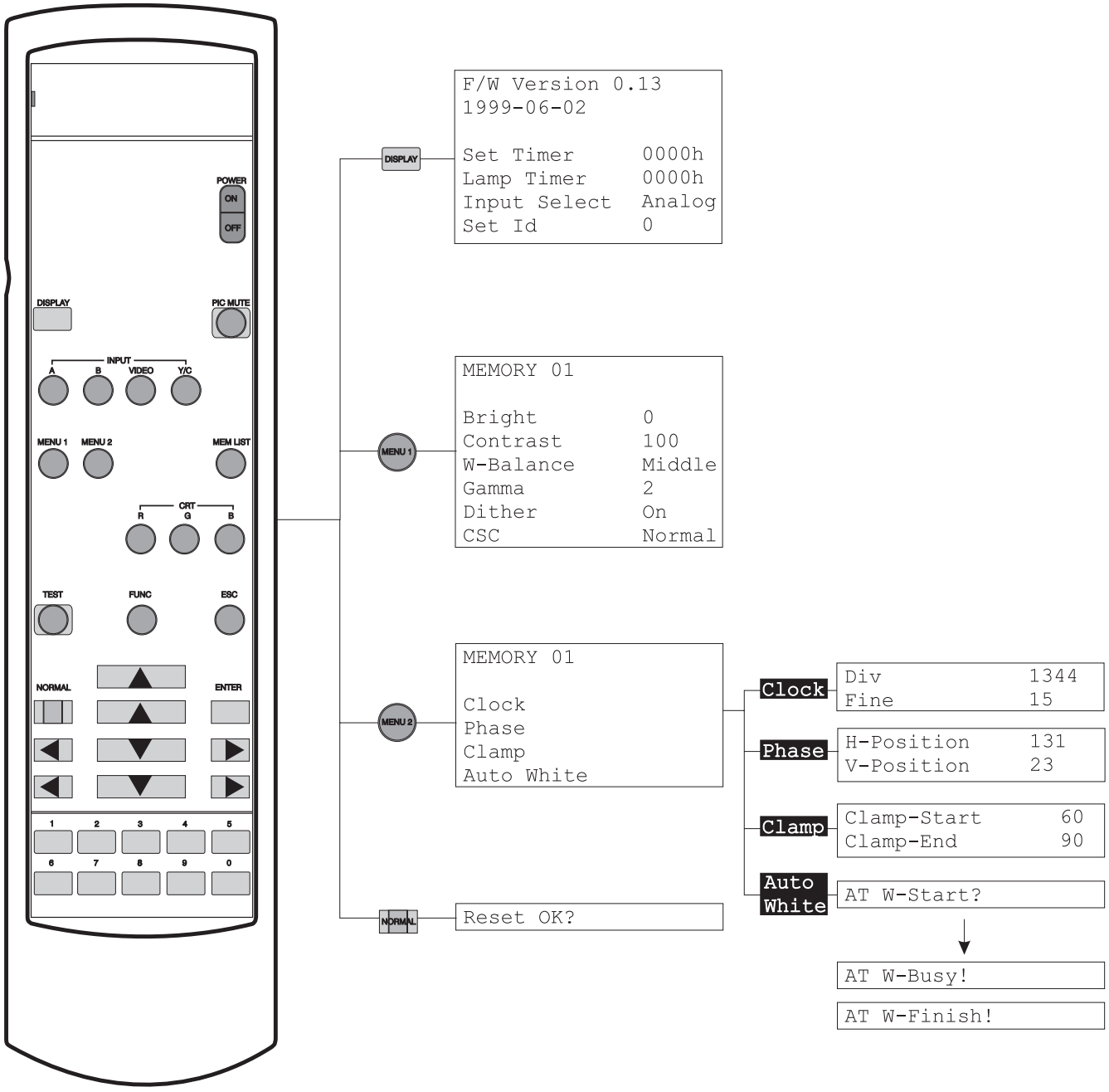
Appendix D

Error Codes

Error Code	Problem Description	Recommended Action
None	Power Off – The power is off.	Turn power on.
0	Fan Error - The cooling fans are no longer working	Call a service technician.
1	Lamp life has expired or attempting to strike the lamp has failed 5 times consecutively.	Lamp module needs replacement, call a qualified technician.
2	C Communication Error – An error in C communications with the DMD has failed.	Call a service technician.
3	DMD Status Error – The reply " Good_Status was not returned during DMD status monitoring by C communications.	Call a service technician.
4	Lamp Box Error – The lamp is not seated correctly.	The lamp module replacement procedure should be redone until the lamp is seated properly. Call a qualified technician.
5	Gradation SRAM error – An error has occurred in SRAM test to write gradation data.	Call a service technician.
6	Reserved	
7	Analog Power Error – An error in the Analog power system occurred.	Call a service technician.
8	Digital Power Error – An error in the Digital power system occurred.	Call a service technician.
9	Lamp Power Error – An error in lamp power has occurred.	Call a service technician.

Appendix E

User Menu Tree



The Service Menu