

Service Procedures

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The procedures in sections 4.1 through 4.9 are typically performed at projector installation time. It is important that they be performed in the sequence presented. For example, Raster Centering is done before Optical Alignment. The procedures in sections 4.7 through 4.16 are typically performed if a module is replaced.




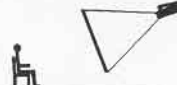

- WARNINGS:** 1) Perform servicing only after becoming thoroughly familiar with the service warnings and guidelines covered in section 3.1 of this manual. Noncompliance increases the risk of hazards and injury to the user.
- 2) Do not modify any circuit.
- 3) Always perform an AC leakage test on exposed metallic parts after each servicing. Refer to section 3.2 for leakage test instructions.



4.1 Reverse Scan Setup

The projector is shipped from the factory for use in a front screen, floor mount configuration. Both the horizontal and vertical scan directions are set to Normal. The scan direction may be modified using the following procedure. Refer to Table 4-1 to determine if scan direction modification is required.

Table 4-1. *Operating Configurations*

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

Tools & Equipment Required:

- large slot screwdriver

Modules affected:

- Power Deflection Module

Step 1 - Lift Cover and Ready the Projector

- Turn off the projector then unplug it.
- Unscrew the two top cover screws then lift the cover. Lift or remove the plastic shield located above the CRT assemblies. (Refer to section 5, *Parts and Disassembly* for removal instructions).

STEP 2 - Modify Yoke Plug Orientations

- The horizontal and vertical yoke plugs are located at the Power Deflection Module, below the CRT necks. For each CRT, the orientation of the P6 yoke plug sets the horizontal scan direction. The orientation of the P8 yoke plug sets the vertical scan direction. If the scan direction is Reversed, a "REV SCAN" label is visible on the plug. If the scan direction is Normal, no label is visible. For each CRT, remove and reinsert the P6 and P8 yoke plugs as required to achieve the desired operating configuration. For example, Figure 4-2 illustrates two possible configurations.

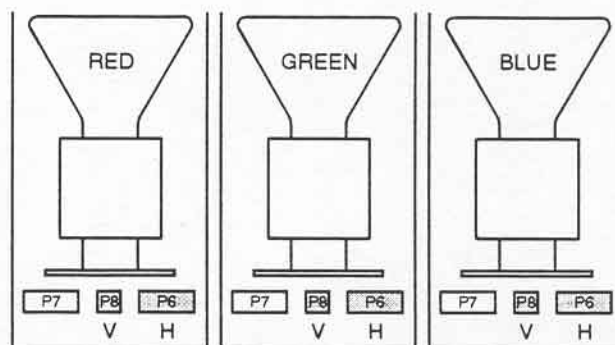


Figure 4-1. Yoke Plug Locations

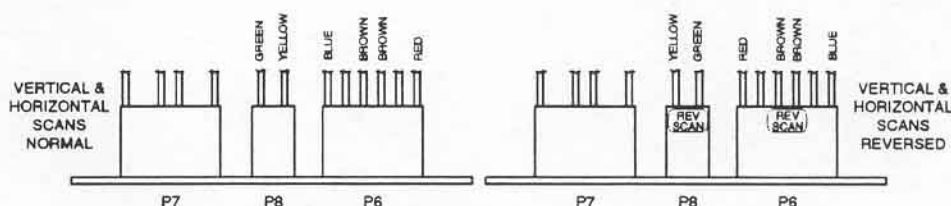


Figure 4-2. Normal and Reversed Configurations

4.2 Master Reset

Step 3 - Reassemble the Projector & Set Configuration

- a) Reassemble the projector. Turn it on then press **HELP** **5** to go to the Utilities menu. Press **2** then select the mounting configuration that you are set up for.

The Master Reset function initializes the levels of all projector settings (except Communications Interface settings) to their default values.

CAUTION: Master Reset is a non-recoverable memory operation. All setup memory settings including Source, Recall, and Zone memories are lost. This includes convergence settings.

Tools & Equipment Required:

- Phillips screwdriver

Modules affected:

- Remote Control Module

Step 1 - Ready the Projector

- a) Make sure the projector is turned off.
- b) Remove the screws which secure the rear panel. Remove the panel. (Refer to section 5, *Parts and Disassembly* for removal instructions).
- c) Press **POWER** to turn on the projector then use **SOURCE** to select the generator.

WARNING: High voltages are exposed. Use extreme caution!

Step 2 - Perform the Reset Operation

- a) Plug the projector then press **POWER** to turn it on.

- b) Press **RESET**. A "READY TO RESET" message appears on the screen. Within 5 seconds of pressing the Reset key, press the red reset button on the Remote Control Module as shown in Figure 4-3. The projector should turn off.

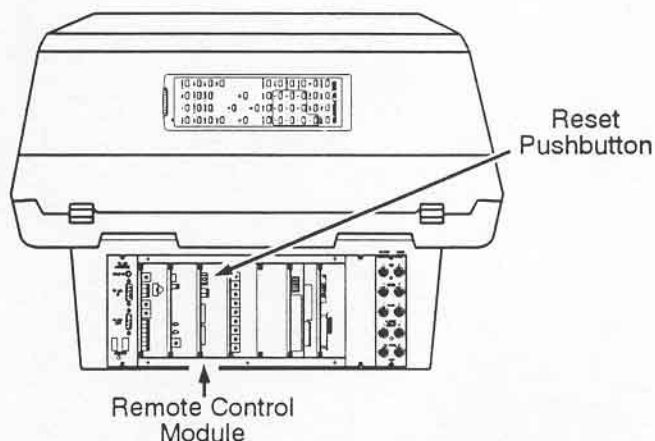


Figure 4-3. Reset Push Button

Note: The Master Reset function will be aborted if you wait longer than 5 seconds to press the reset button on the Remote Control module after pressing.

Step 3 - Verify that Master Reset has Occurred

- a) Press **POWER** on the keypad. After power-up, verify that at least one of the projector settings has been updated to the factory default settings. (Factory default settings are listed in the projector user's manual).

Step 4 - Install Rear Panel

- a) Press **POWER** to turn the projector off. Unplug the projector.
- b) Install the rear panel with the removed securing screws.

4.3 Raster Centering

About the Raster ...

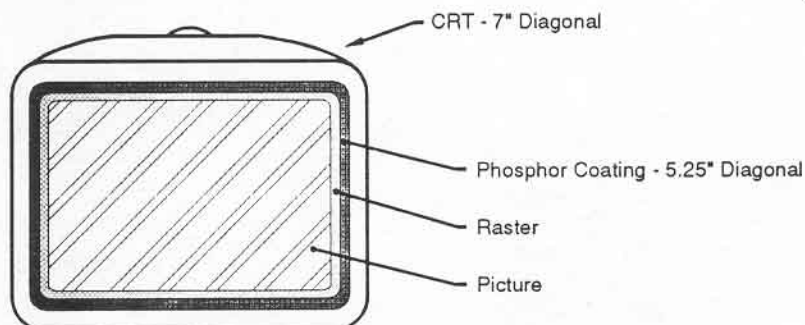


Figure 4-4. CRT Face

The face of a CRT (Cathode Ray Tube) contains a picture area and a raster area. The picture area is the actual area where the picture is projected through to the lens. The raster area is the area around the picture and is defined by the sync pulses. It is larger than the picture because it includes the extra blanking time before and after the picture content of the video. The phosphor area is slightly larger than the raster area. There should be at least 0.25" of extra phosphor area beyond the raster area limits. The area beyond the phosphor area is not coated and is unusable.

It is important that the raster and the image are centered within the CRT face. Here are the main reasons:

- 1) The lens is sharpest and brightest at the center.
- 2) The CRT is brightest at the center.
- 3) It is possible to cut off part of the image if it is close to the phosphor's edge.

Note: The complete raster is occupied when displaying the internal crosshatch.

Raster and image centering is very easy to perform and should be performed prior to most other setups, including optical alignment and convergence. Vertical centering of the image is controlled through the vertical deflection circuit and can be adjusted using the convergence procedure. Horizontal position is controlled by an adjustment to the Power Deflection Module for each CRT. It is also possible to make adjustments through the convergence procedure, but this is susceptible to drift and should be avoided. Use the following procedure.

Note: There are two methods for raster centering; one requires the use of an extender card and a voltmeter or oscilloscope, the other uses the image display. Earlier versions of the ECP service manual provided the voltmeter/oscilloscope method. The current recommended method (covered here) is the image display method; it is faster and easier to perform with comparable results.

Tools & Equipment Required:

- long shafted, fine tip, insulated potentiometer adjust tool (tweezer)
- slot screw driver

Modules affected:

- Power Deflection Module

Step 1 - Lift Cover and Ready the Projector

- a) Turn off the projector then unplug it.
- b) Unscrew the two top cover screws then lift the cover. Remove the plastic shield located above the CRT assemblies. (Refer to section 5, *Parts and Disassembly* for removal instructions).
- c) Connect a source to the projector (optional). It is recommended that the source be same as that normally used. If you do not connect a source, the projector will use its internal generator for the setup – operating at about 22 kHz. (The factory setup is 15.75 kHz).

- d) Plug in the projector then press **POWER** to turn it on. Use **SOURCE** to select the source.

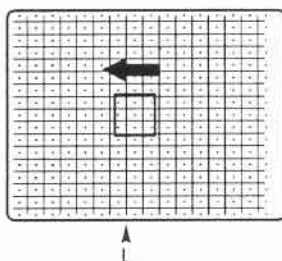
WARNING: High voltages are exposed. Use extreme caution!

Step 2 - Reset Green Convergence and Adjust Centering

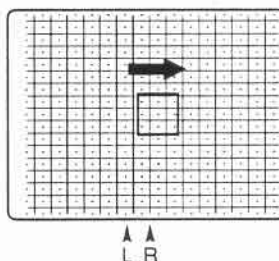
- a) Press **CONV** **5** to display the Convergence Service Menu. Now press **2** to select *Green Convergence*. A crosshatch is displayed with a box at the center. Press **0** to reset the convergence.
- b) When green convergence is reset the horizontal and vertical positions of the crosshatch do not center. Vertical positioning is not critical at this stage and will be handled later on. Horizontal positioning can cause drift and should be reset. Use the following process to reset the horizontal positioning:

Immediately after **0** has been pressed to reset the convergence, press and hold **4**. The crosshatch will move to the left hand side until it reaches its limit. Select a vertical reference point on the screen (e.g., a vertical line). Place a marker on the screen to record the position of the reference point. Now press and hold **6**. The crosshatch will move to the right hand side until it reaches its limit. Place a marker at the new position of the reference point. Now press **4** to move the crosshatch so that the reference point is centered between the two markers. See Figure 4-5.

1. Image MOVED maximum to left then position marked.



2. Image MOVED maximum to right then position marked.



3. Image MOVED to center point between markers.

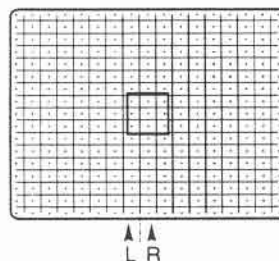
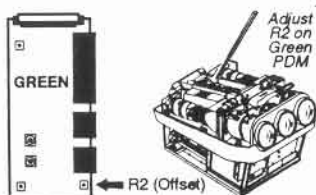


Figure 4-5. Horizontal Centering



Note: You can perform horizontal and vertical centering by performing a Master Reset (section 4.2) but this is not recommended since it clears ALL settings.

Step 3 - Check Green Raster Centering and Adjust as Necessary

- a) Lower the contrast level to a very low setting (e.g., contrast level = 1 or 2).
- b) Look directly into the green CRT at the green lens. Check the gap at the left and right edges of the crosshatch. It may be easiest to compare the gaps at the two bottom or top corners. If they are not the same width, take the potentiometer adjustment tool (tweezer) then adjust R2 (DC Offset) on the Power Deflection Module (located below the green CRT) for the green until the width of the gaps at each side are the same.

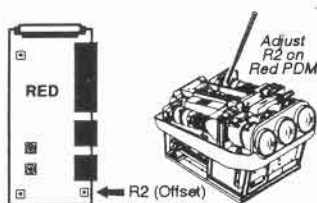


Note: If the crosshatch size is too large, simply use the Size function to reduce its size.

- c) Again, look directly into the green CRT. Check the gap at the top and bottom of the crosshatch. If necessary, use  and  to adjust the vertical position so that the image is centered. This centers the vertical for the green convergence.
- d) Increase the contrast level to a normal setting.
- e) Press **EXIT** to leave *Green Convergence*. When the Exit confirmation screen is displayed, press **EXIT** to save the new convergence settings.

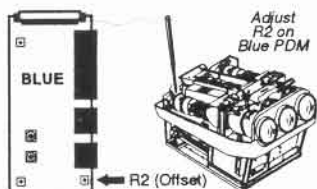
Step 4 - Adjust Raster Centering for the Red and Blue Colors

- a) Select item 2, *Random Access Convergence* from the Convergence menu. When the crosshatch is first displayed press **0** to reset the red and blue convergence. The static position of the red and blue are now reset. Keep the box at the center of the crosshatch for all adjustments.
- b) Lower the contrast level to a very low setting.



- c) Look directly into the red CRT at the red lens. Check the gap at the left and right edges of the crosshatch. If they are not the same width, take the potentiometer adjustment tool (tweezer) then adjust R2 (DC Offset) on the Power Deflection Module for the red until the width of the gaps at each side are the same.

- d) Use **CONV** to change the convergence color to blue.



- e) Look directly into the blue CRT at the blue lens. Check the gap at the left and right edges of the crosshatch. If they are not the same width, take the potentiometer adjustment tool (tweezer) then adjust R2 (DC Offset) on the Power Deflection Module for the blue until the width of the gaps at each side are the same.

- f) Increase the contrast level to a normal setting.
- g) Press **EXIT** to leave *Random Access Convergence*. When the Exit confirmation screen is displayed, press **EXIT** to save the new convergence settings.

Step 5 - Reassemble the Projector

- a) Turn the projector off, unplug it, then reassemble.

4.4 Optical Alignment

Optical alignment is required when the projector-to-screen distance changes, the screen type has changed (curved versus flat), or the projector cannot be focused using the focus controls. The projector is optically aligned at the factory for use with a 4:3 aspect ratio input video source, a 6 foot diagonal screen, and a projector-to-screen distance of 87.5 inches (2.22 metres). If it has been determined that optical alignment is required, use the following procedure.

Notes: 1) The projector should be warmed up prior to performing optical alignment. 2) Optical alignment requires both mechanical and electrical adjustments. 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 because optical alignment affects geometry and convergence. Memory setup is explained in the user's manual.

Tools & Equipment Required:

- large slot screwdriver
- allen key (provided in tool kit)
- lens adjustment wrench (provided in tool kit)
- large ball-nose driver (located under projector cover)

Modules affected:

- CRT Assemblies and Lenses

Step 1 - Position the Projector

- a) Make sure the projector is turned off. Unplug it. If you have not already done so, calculate the throw (projector-to-screen) distance using the calculation below. You can also use the tables provided in the user's manual.

$$\text{Throw Distance} = 1.515 \times \text{Screen Width} + 9.0" (23\text{cm})$$

Position the projector at that distance.

STEP 2 - Remove Top Cover

- a) Unscrew the two top cover screws then lift the cover. (Refer to section 5, *Parts and Disassembly* for removal instructions).
- b) Examine the lenses and the lens mounting hardware. See Figure 4-6. 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 of the image; it is secured to the rear section by a wing nut at the top front of the lens assembly.

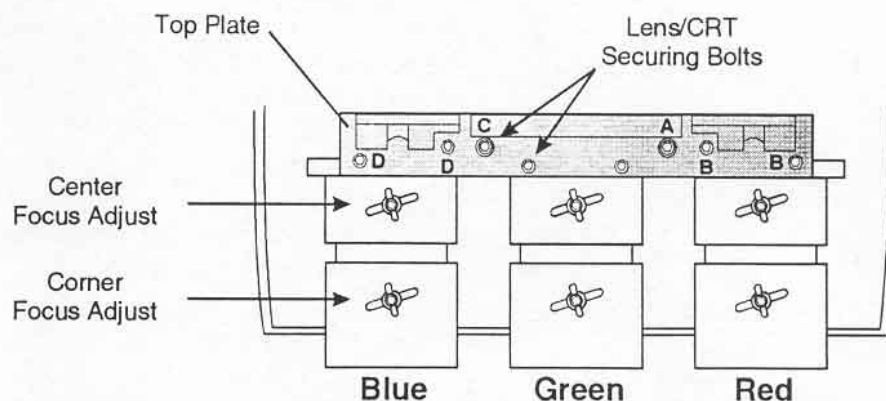


Figure 4-6. Lens Assemblies - Top View

Each CRT is attached to its lens by 3 socket head allen screws located at the base of the lens assembly. See Figure 4-7 below. The top plate and two hex-head bolts marked "A" and "C" secure the three lens assemblies to the projector chassis. Each lens assembly is held in place on the top plate by a pin, and secured to the top plate by two socket head allen screws. The socket head allen screws for the red assembly are marked "B" and those for the blue assembly are marked "D." The socket head allen screws for the green assembly are not marked.

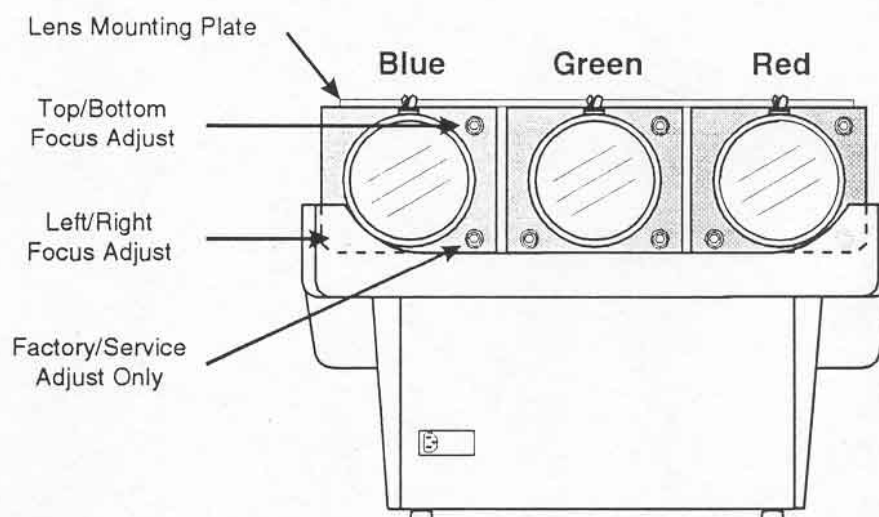


Figure 4-7. Lens Assemblies - Front View

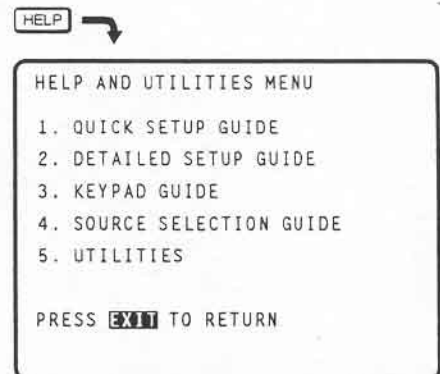
- c) Plug in the projector. Press **POWER** to turn the projector on then select a source which will normally be used. For example, if you will normally use the source connected to slot 1, input 2, press **SOURCE** **1** **2**.



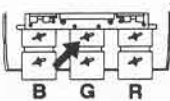
HIGH VOLTAGES ARE EXPOSED.

- d) Reset the convergence by pressing **[0]** while in one of the convergence routines. For example, press **[CONV]** **[1]** to select Guided Convergence then press **[0]** to reset convergence. Press **[EXIT]** **[EXIT]** to save and exit.

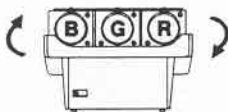
It is recommended that optical alignment be performed using the projector's Detailed Setup Guide. The Detailed Setup Guide displays step-by-step instructions during the alignment. The instructions in this section require use of the setup guide. Each of the steps on the following pages correspond to a similarly numbered step in the Detailed Setup Guide. To access and use the setup guide, press **[HELP]**. The Help and Utilities menu is displayed. Press **[2]** to select 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. When complete, press **[EXIT]** to return to the Help menu.



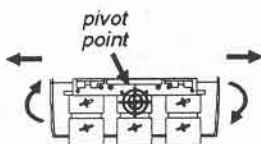
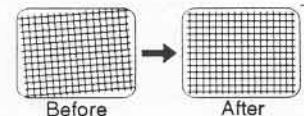
STEPS 3 to 32 - Perform the Alignment per Detailed Setup Guide



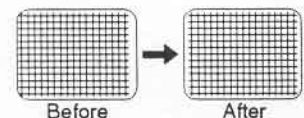
3. Loosen the rear wing nut on the green lens. At this point a green crosshatch is displayed. Rotate the lens using the wing nut until the picture is focused in the center. Tighten the rear wing nut.



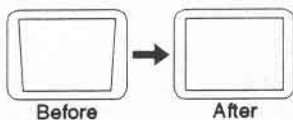
4. Tilt the projector so that the image is level and centered with the screen. Adjust the feet of the projector or ceiling mount as required.



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.



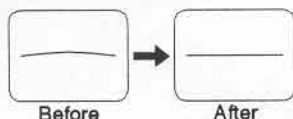
5. Adjust the keystone, bow and pincushion geometry as follows:



Keystone

Observe the borders on the left and right edges of the image. Are they even with the edges of the screen? If not, correct any keystone as follows:

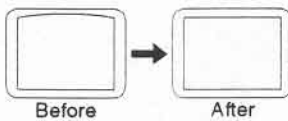
Press **[KEY]** then press and hold **[▲]** or **[▼]** until the two sides of the image are even with the sides of the screen.



Bow

Observe the line across the center of the image. Is it straight? If not, correct any bow on the line as follows:

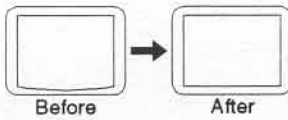
Press **[BOW]** then press and hold **[▲]** to move the center of the line up. Press and hold **[▼]** to move the center of the line down. Continue until the line is straight.



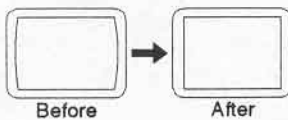
Pincushion

Observe the borders of the image. Are they straight? If not, correct any pincushion as follows:

Press **[PIN]** then press and hold **[▲]** or **[▼]** until the top line on the image is straight.



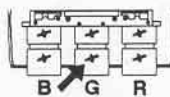
Press **[PIN]** again and press and hold **[▲]** or **[▼]** until the bottom line on the image is straight.



Press and hold **[◀]** or **[▶]** until the sides of the image are straight.

The image should now be rectangular and centered, with its borders parallel to the borders of the screen.

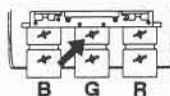
Note: The image may not necessarily be focused everywhere.



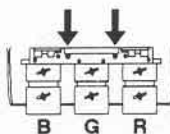
6. Loosen the front wing nut on the green lens. Rotate the front lens to optimize the focus at the corners of the image. Tighten the front wing nut.

7. Adjust the electrical focus for the best overall image. Press **[FOCUS]** then use the **[▲]** and **[▼]** arrow keys.

8. If the center focus requires adjustment, loosen the rear wing nut on the green lens. Rotate the lens, using the wing nut, until the image is focused at the center. Check the corner focus and re-adjust if necessary.



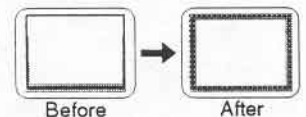
9. Loosen the rear wing nut on the green lens. Adjust the rear section of the lens until the center of the display is defocused.



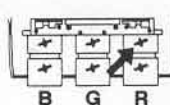
10. Loosen the two hex-head bolts labeled "A" and "C" using the combination wrench supplied. Note: Do not tighten until step 31.



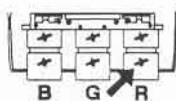
11. Adjust the large allen head bolt located at the upper right corner of the green lens mounting plate. Turn the bolt head until the top and bottom areas of the picture are equally defocused. You may need to adjust the lens' rear wing nut to keep the center defocused.



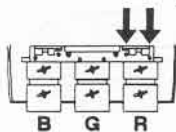
12. Adjust the rear section of the green lens until the center of the display is focused. Tighten the rear wing nut. Check the corner focus and readjust if necessary.



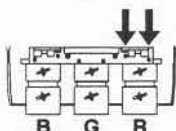
13. Loosen the rear wing nut on the red lens. Rotate the lens, using the wing nut, to focus the center of the image. Tighten the wing nut.



14. Loosen the front wing nut on the red lens. Rotate the front section of the lens to optimize the focus at the corners of the image. Tighten the front wing nut.



15. Loosen the two socket head allen screws labeled "B". The menus change to red and green (yellow in appearance) at this point. Note: The two colors may not be converged.



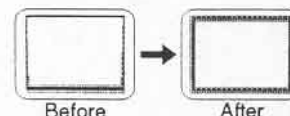
16. Pivot the red CRT/lens assembly to match the red to the green.
17. Tighten the two socket head allen screws marked "B".



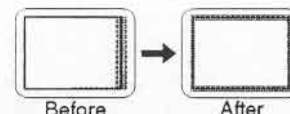
18. Loosen the rear wing nut on the red lens. Adjust the rear section of the lens until the center of the display is defocused.



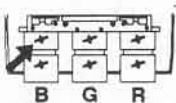
19. Adjust the large allen head bolt located at the upper right corner of the red lens mounting plate. Turn the bolt head until the top and bottom areas of the picture are equally defocused. You may need to adjust the lens' rear wing nut to keep the center defocused.



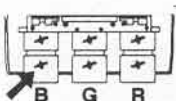
20. Adjust the large allen head bolt located at the lower left corner of the red lens mounting plate. Turn the bolt head until the left and right sides of the picture are equally defocused. You may need to adjust the lens' rear wing nut to keep the center defocused.



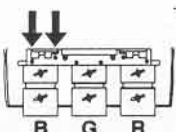
21. Rotate the red lens using the rear wing nut until the picture is focused in the center. Tighten the rear wing nut. Readjust corner focus if necessary.



22. Loosen the rear wing nut on the blue lens. Rotate the lens, using the wing nut, to obtain the best center focus. Tighten the rear wing nut.

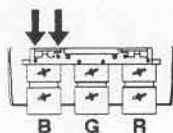


23. Loosen the front wing nut on the blue lens. Rotate the front section of the lens to optimize the focus at the corners of the image. Tighten the front wing nut.

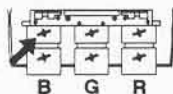


24. Loosen the two socket head allen screws labeled "D". The menus change to red and green (yellow in appearance) at this point. Note: The two colors may not be converged.

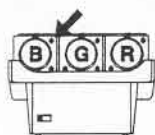
25. Pivot the blue CRT/lens assembly to match the red to the green.



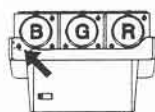
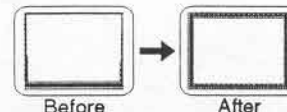
26. Tighten the two socket head allen screws marked "D".



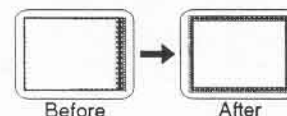
27. Loosen the rear wing nut on the blue lens. Adjust the rear section of the lens until the center of the display is defocused.



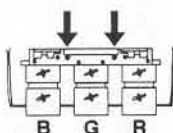
28. Adjust the large allen head bolt located at the upper right corner of the blue lens mounting plate. Turn the bolt head until the top and bottom areas of the picture are equally defocused. You may need to adjust the lens' rear wing nut to keep the center defocused.



29. 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. You may need to adjust the lens' rear wing nut to keep the center defocused.



30. 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.



31. Tighten the two hex head bolts labeled "A" and "C".

32. Check that the wing nuts on all three lenses are tight. Press **EXIT** to exit.

Turn the projector off and set the top cover in place. Tighten the two securing screws then turn the projector on. To complete the setup of the current source, make the following adjustments:

- MOVE
- VBLANK
- SLOW/FAST SYNC
- SIZE
- Convergence

Refer to Section 3, *Operation* in the user's manual for details. Note that adjustment settings apply only to the active setup memory.

4.5 Input Interface Setup

Many of the input interfaces available for ECP projectors include horizontal and vertical phase controls. This section includes phase setup details for the following input interface modules: RGB Sync 2 Input (800913), RGB Sync 10 Pin (800916), and Loop Thru (800914).

Tools & Equipment Required:

- Phillips screwdriver

Modules affected:

- Input Interface Module

Step 1 - Pull out the Input Interface Module

- Turn off the projector then unplug it.
- Remove the two screws which secure the input interface module to the projector frame. See Figure 4-8.

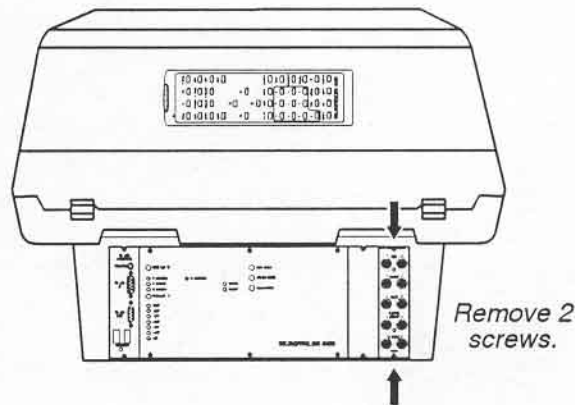
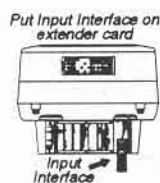


Figure 4-8. Input Interface Screws



- Pull out the input interface module and install an extender card. Plug the module into the extender card.

- Connect a source to the module. Press **POWER** to turn on the projector. Use **SOURCE** to select the source.

Step 2 - Make Phase Adjustments

- First locate jumpers P14, P15, P16 and P17. To enable the horizontal phase control, make sure P15 is jumpered between pins 2 and 3. To enable the vertical phase control, make sure P14 is jumpered between pins 1 and 2 and P17 is jumpered between pins 2 and 3. To bypass phase control (for signals with narrow pulse widths such as IBM XGA, SUN, Silicon Graphics), remove jumper J14, jumper P15 between pins 1 and 2, jumper P16 between pins 2 and 3, and jumper P17 between pins 1 and 2.

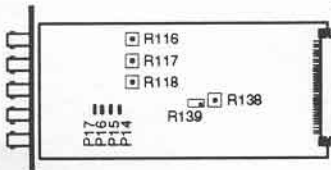


Table 4-2 . Jumper Plug Settings

| PLUG | FUNCTION | JUMPER BETWEEN: | |
|------|-------------------------------------|---------------------------|---------------------------|
| | | Pins 1 & 2 | Pins 2 & 3 |
| P12 | Forced Back Porch Clamp | Forced On | Sync-on-Green Only |
| P14 | Vertical Sync Delay | Delay On (R138 active) | No Delay |
| P15 | Horizontal Sync Delay | No Delay | Delay On (R139 active) |
| P16 | Horizontal Regenerated Sync Control | Sync Regeneration | Bypass Sync Regeneration |
| P17 | Vertical Regenerated Sync Control | Bypass Sync Regeneration | Sync Regeneration |

If the horizontal phase control is enabled per above, adjust R139 to adjust horizontal phase. If the vertical phase control is enabled per above, adjust R138 to adjust vertical phase.

Step 3 - Re-install the Input Interface Module

- Turn off the projector then unplug it.
- Secure the interface to the projector frame using the two previously removed Phillips head screws.

4.6 Comm. Interface Setup

The Communications Interface allows multiple projectors to be electrically linked (or networked), and also allows one or more projectors to be controlled by a computer or programmable controller. These instructions explain how to modify the parameter settings of the communications interface, if required.

The following parameter settings are modifiable: Network Address, Baud Rate, Protocol, and Broadcast Mode. Each of these settings are explained in the following paragraphs. Read through these paragraphs to determine if modifications are required and how to make them.

Tools & Equipment Required:

- Phillips screwdriver

Modules affected:

- Communications Interface Module

Step 1 - Pull out the Communications Interface

- Turn off the projector then unplug it.
- Remove the two screws which secure the Communications Interface to the projector frame. See Figure 4-9.

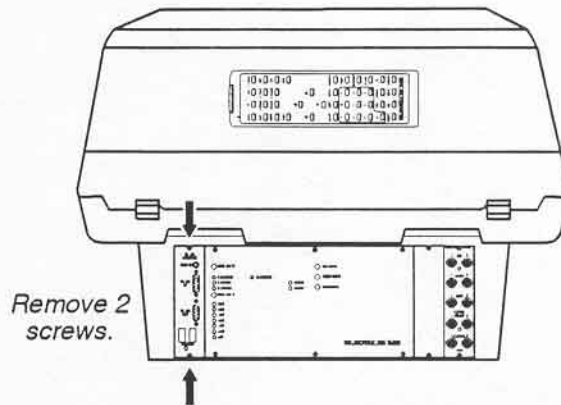
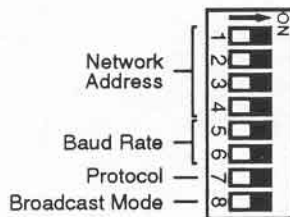


Figure 4-9. Communications Interface Screws

- c) Pull the interface out about 4 inches (10 cm). **Do not** unplug the connection at the back of the interface.

Step 2 - Locate and Set the DIP Switches

- a) With the interface pulled away you can easily identify the DIP switch unit. See Figure 4-10. The DIP switch unit sets the communication parameters when the projector is plugged in.



- b) Using the tip of a ballpoint pen or that of a small slot screw driver, modify the DIP switch settings as required. Switches 1 to 4 control the network address. Switches 5 and 6 control the communications baud rate. Switch 7 sets the interface protocol setting to match that of the projector. Switch 8 controls the broadcast mode setting.

Network Address

The projector's network address is derived from the two digit settings on the front panel of the Communications Interface, and the DIP switch settings. The two digit address on the front panel is the last two digits of a three digit address. The first digit of the address is determined by the DIP switch settings. The first digit is set to 0 at the factory. Using the default setting, the front panel push buttons can be used to change the address to any number between 000 and 099. For most installations, the factory default DIP switch settings will not require modification. Modification is required if there are more than 100 projectors in the installation.

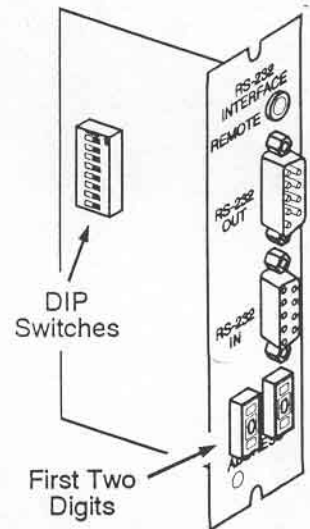






Figure 4-10. DIP Switches

Table 4-3. Network Address DIP Switch Settings

| ADDRESS RANGE | 0-99 | 100-199 | 200-299 | 300-399 | 400-499 |
|---------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| DIP SWITCHES | 1 <input type="checkbox"/> ON | 1 <input type="checkbox"/> OFF | 1 <input type="checkbox"/> ON | 1 <input type="checkbox"/> OFF | 1 <input type="checkbox"/> ON |
| | 2 <input type="checkbox"/> ON | 2 <input type="checkbox"/> ON | 2 <input type="checkbox"/> OFF | 2 <input type="checkbox"/> OFF | 2 <input type="checkbox"/> ON |
| | 3 <input type="checkbox"/> ON | 3 <input type="checkbox"/> ON | 3 <input type="checkbox"/> ON | 3 <input type="checkbox"/> ON | 3 <input type="checkbox"/> OFF |
| | 4 <input type="checkbox"/> ON | 4 <input type="checkbox"/> ON | 4 <input type="checkbox"/> ON | 4 <input type="checkbox"/> ON | 4 <input type="checkbox"/> ON |
| ADDRESS RANGE | 500-599 | 600-699 | 700-799 | 800-899 | 900-999 |
| DIP SWITCHES | 1 <input type="checkbox"/> OFF | 1 <input type="checkbox"/> ON | 1 <input type="checkbox"/> OFF | 1 <input type="checkbox"/> ON | 1 <input type="checkbox"/> OFF |
| | 2 <input type="checkbox"/> ON | 2 <input type="checkbox"/> OFF | 2 <input type="checkbox"/> OFF | 2 <input type="checkbox"/> ON | 2 <input type="checkbox"/> ON |
| | 3 <input type="checkbox"/> OFF | 3 <input type="checkbox"/> OFF | 3 <input type="checkbox"/> OFF | 3 <input type="checkbox"/> ON | 3 <input type="checkbox"/> ON |
| | 4 <input type="checkbox"/> ON | 4 <input type="checkbox"/> ON | 4 <input type="checkbox"/> ON | 4 <input type="checkbox"/> OFF | 4 <input type="checkbox"/> OFF |

(Factory Setting = 0-99)

For example, if the projector's network address is to be 468, DIP switches 1 to 4 should be set to: ON, ON, OFF, ON respectively. Also, the front panel address must be set to 68.

Notes: 1) Other possible switch combinations not shown in Table 4-3 are considered invalid and should not be used. 2) The two digit address on the front panel may be modified while the projector is on but it will not take effect until AC power to the projector is removed and reapplied, or the following key sequence is pressed on a wired keypad connected to the projector:   
 0

Baud Rate

Table 4-4. Baud Rate DIP Switch Settings

| BAUD RATE | 9600 | 4800 | 2400 | 1200 |
|--------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|
| DIP SWITCHES | 1 <input type="checkbox"/> ON | 1 <input type="checkbox"/> OFF | 1 <input type="checkbox"/> ON | 1 <input type="checkbox"/> OFF |
| | 2 <input type="checkbox"/> ON | 2 <input type="checkbox"/> ON | 2 <input type="checkbox"/> OFF | 2 <input type="checkbox"/> OFF |

(Factory Setting = 9600)

The RS-232 communications port is set at the factory to transfer communications data at 9600 baud (bits per second). 9600 baud is recommended for most installations. However, a lower baud rate may be required to reduce the likelihood of transmission errors should the distance between adjoining projectors be greater than 50 feet (15.2 meters). Also, a lower baud rate may be required if the controlling device, for example a computer or programmable controller, cannot operate at 9600 baud. Use Table 4-4 to determine the required DIP switch settings.

Protocol


To assure proper communications, the protocol DIP switch setting must match that of the projector's keypad protocol setting (1 or 2). The projector's keypad protocol setting can be displayed by pressing  while at presentation level.

Table 4-5. Protocol Setting



| PROTOCOL | 1 | 2 |
|------------|-----------------------------|------------------------------|
| DIP SWITCH | <input type="checkbox"/> ON | <input type="checkbox"/> OFF |

(Factory Setting = NORMAL)






Broadcast Mode

DIP switch 8 sets the broadcast mode (On or Off). If broadcast mode is set to Off, commands received from a wired keypad will only be used by that projector. If set to On, keypad commands will also be broadcast to other projectors connected in the chain. You may use this feature to assign one projector in the group to be the control hub of the network.


Table 4-6. Broadcast Mode Setting

| BROADCAST MODE | ON | OFF |
|----------------|--|---|
| DIP SWITCH 8 |  ON |  OFF |

(Factory Setting = ON)

Note: The DIP switch settings are copied to memory each time AC power is applied to the projector. The broadcast mode memory setting can be toggled by pressing      on a wired keypad connected to the projector. The current setting remains in memory until AC power is removed.

Step 3 - Re-install the Communications Interface

- a) Turn off the projector then unplug it.
- a) Secure the Communications Interface to the projector frame using the two previously removed Phillips head screws. Plug the projector back in then press  to turn it on. The new DIP switch settings will be in effect.

4.7 Color Balance and Video Alignment

This procedure sets color balance and optimizes the setup of the video modules.

Tools & Equipment Required:

- long shafted, fine tip, insulated potentiometer adjust tool
- slot screw driver
- RGB generator, 1Vpp, 1% matched with:
 - gray scale test pattern (stair step)
 - white field test pattern
- dc voltmeter (minimum 100MΩ/V impedance)

Note: A proper white field generator must be used to assure a good setup. It should be an RGB source, not a video source.

Modules affected:

- Bias Module
- Video Control Module
- Waveform Module

Step 1 - Lift Cover and Ready the Projector

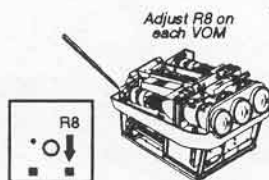
- a) Turn off the projector then unplug it.
- b) Unscrew the two top cover screws then lift the cover. Remove the plastic shield located above the CRT assemblies. (Refer to section 5, *Parts and Disassembly* for removal instructions).
- c) Remove the screws which secure the rear panel then set the panel aside. (Refer to section 5, *Parts and Disassembly* for removal instructions).

- d) Connect the RGB generator with a white field test pattern to the projector. It is recommended that you use the same horizontal frequency as that normally used.
- e) Press **[POWER]** to turn on the projector then use **[SOURCE]** to select the generator.

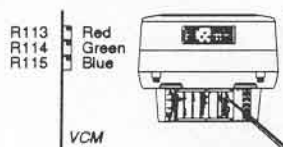
WARNING: High voltages are exposed. Use extreme caution!

Step 2 - Alignment

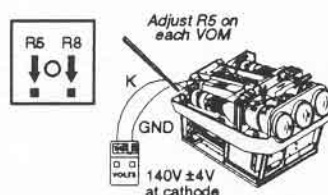
- a) Turn off all room lighting then set Brightness (**[BRITE]**) to 0 and Contrast (**[CONT]**) to 1.



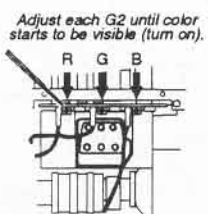
- b) For each color, locate potentiometer R8 on the Video Output Module. Adjust R8 to the position which produces the brightest image for the color being adjusted. If possible, use a mirror and look into the CRT to view the crosshatch image during the adjustment.



- c) Set Brightness (**[BRITE]**) to 10 and Contrast (**[CONT]**) to 0. Press **[#]** to display a crosshatch.
- d) Locate the Red, Green and Blue Offset Null potentiometers on the Video Control Module (R113, R114, and R115 respectively). Look at the projected display and for each color, adjust the potentiometer so that the crosshatch is halfway between black and bright.



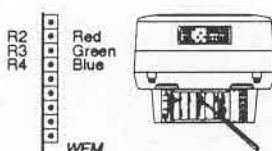
- e) Set Brightness (**[BRITE]**) to 5 and Contrast (**[CONT]**) to 0. You may leave the crosshatch displayed for this step.
- f) Use a dc voltmeter set at the 200 Vdc range. Connect the negative input to the projector ground. You may clip to one of the screws or holes on the bulkhead top plate. Connect the positive input to the terminal marked "K" (for cathode) on one of the Video Output Modules. Adjust R5 on the module so that the voltmeter reads 140.0 ± 3 Vdc. Repeat this for the other two Video Output Modules.



- g) Locate the Red, Green and Blue G2 potentiometers (R20, R45 and R19 respectively) on the Bias Module — which is located above and between the Green and Blue CRTs. Look into the lenses and adjust each G2 to the point where the color just starts to turn on. Each color should be glowing slightly.

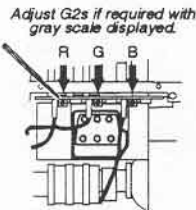
- h) Set the Contrast and Brightness to normal settings (about level 4 for both). Display a gray scale test pattern and view the image on the screen.

Note: It is best to have the room lighting at the levels normally used for projection, especially during the next few steps.

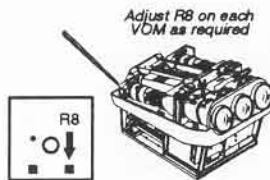


- i) With a gray scale test pattern displayed, set the Red, Green, and Blue Drive potentiometers (R2, R3 and R4 respectively) on the Waveform Module to their maximum positions.

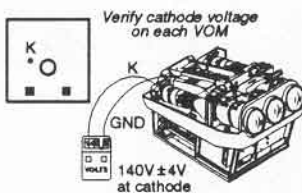
- j) Now look at the maximum white bar of the gray scale test pattern. Reduce the drive levels for the colors which are over-powering. For example, if the red and blue are too strong, reduce them accordingly. One of the three drive potentiometers should remain at its maximum position



- k) Reduce the contrast to a low level (about 1) and change the image to a white field. The image should appear gray. If it is not a good quality gray, touch up the image by making the necessary adjustments to the G2 potentiometers on the Bias Module. For example, if the image is a murky green and blue, there is probably not enough red in the image. In this case, make a slight adjustment to the Red G2 potentiometer.



- l) Set Brightness to 10 and Contrast to 0. Under these conditions, the image should still be gray. If it is not, make fine adjustments, as required, to potentiometer R8 on the Red, Green, and Blue Video Output Modules. For example, if there is too much red in the image, slightly reduce red by adjusting R8 on the Red Video Output Module. If there is too much blue, slightly reduce blue by adjusting R8 on the Blue Video Output Module.



- m) Set Brightness (**BRITE**) to 5 and Contrast (**CONT**) to 0.

- n) Using the voltmeter, connect the negative input to projector ground. For each VOM connect the positive input to the terminal marked "K". Verify that the cathode voltage is still 140.0 ± 3 Vdc. If it is not, go back to f) in this procedure.

Step 3 - Reassemble the Projector

- a) Turn the projector off, unplug it, then reassemble.

4.8 Color Correction Adjustment

This procedure is used to correct for horizontal color imbalance of the red and blue colors.

Tools & Equipment Required:

- insulated potentiometer adjust tool
- slot screw driver
- RGB generator, 1Vpp, 1% matched with white field test pattern

Note: A proper white field generator must be used to assure a good setup. It should be an RGB source, not a video source.

Modules affected:

- Waveform Module

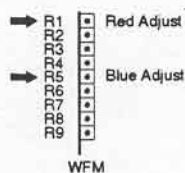
Step 1 - Remove Rear Panel and Ready the Projector

- a) Turn off the projector then unplug it.
- b) Remove the screws which secure the rear panel then set the panel aside. (Refer to section 5, *Parts and Disassembly* for removal instructions).

- c) Connect the RGB generator with white field test pattern to the projector. It is recommended that you use the same horizontal frequency as that normally used.
- d) Plug in the projector then press **POWER** to turn it on. Use **SOURCE** to select the generator source.

Step 2 - Alignment

*Note: Make sure the mounting configuration setting (displayed by pressing *****) is set correctly for the installation before making the following adjustments. To change the mounting configuration setting, press **HELP** **5** **2**.*



- a) Turn off all room lighting.
- b) Locate potentiometer R1 on the Waveform Module. Adjust R1 for optimum color balance of the red color between the left and right sides of the displayed image. Increase the projector's contrast setting if necessary. You may want to display a completely red field for the adjustment (by turning off the green and blue colors by pressing **V BLANK** **1**). You may also try the adjustment with only red and green displayed (**V BLANK** **4**). Do what works best for you.
- c) Locate potentiometer R5 on the Waveform Module. Adjust R5 for optimum color balance of the blue color between the left and right sides of the displayed image. Increase the projector's contrast setting if necessary. You may want to display a completely blue field for the adjustment (by turning off the red and green colors by pressing **V BLANK** **3**).
- d) Repeat b) and c) as necessary until optimum color balance is achieved with a white field displayed.

*Note: **V BLANK** **8** turns all three colors (RGB) on.*

Step 3 - Reassemble the Projector

- a) Turn the projector off, unplug it, then reassemble.

To know for sure if flare and stigmator adjustments are required, display a crosshatch then examine the dots. Flare adjustment is required if the flair around the dots is not uniform. Stigmator adjustment is required if the dots are oval, not round..

Tools & Equipment Required:

- Needle-nose pliers or tweezers
- slot screw driver

Modules affected:

- CRT Assembly

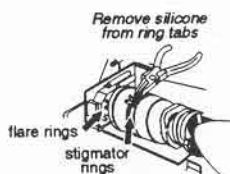
Step 1 - Lift Cover and Ready the Projector

- a) Turn off the projector then unplug it.

4.9 Flare & Stigmator Adjustment

- b) Unscrew the two top cover screws then lift the cover. Lift or remove the plastic shield located above the CRT assemblies. (Refer to section 5, *Parts and Disassembly* for removal instructions).
- c) Have a high resolution source (or the source normally used with the projector) ready to use but do not have it connected at this time.

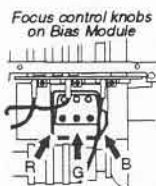
Step 2- Make Adjustments



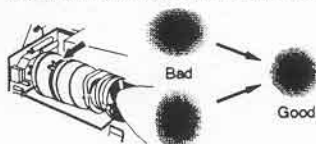
- a) Locate the flare and stigmator rings on the CRT Assembly. With a pair of tweezers or small needle-nose pliers, carefully remove the silicone which holds the rings in place. The silicone breaks apart in pieces. Be careful not to damage the ring tabs.
- b) Press **[POWER]** to turn on the projector then use **[SOURCE]** to select an inactive source so that the projector will display its crosshatch at 15.75 kHz. Press **[#]** to display the crosshatch. A high resolution source will be used later in the procedure. Allow the projector to warm up.

WARNING: High voltages are exposed. Use extreme caution!

- c) Set Contrast to 7 or 8.. Use the VBlank command to display the color to be adjusted. For Red press **[V BLANK] [1]**; for Green press **[V BLANK] [2]**; for Blue press **[V BLANK] [3]**. (Later, to return the display to all three colors, press **[V BLANK] [8]**.)
- d) On the Bias Module turn the electrical focus control knob clockwise for the color to produce an out-of-focus image.

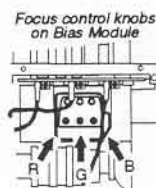


Adjust stigmator rings so that dots are round

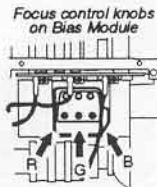
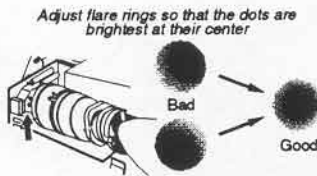


- e) Move the tabs on the stigmator rings until the dots are round, not oval. A proper adjustment could take up to 5 minutes per CRT. It is usually easy to adjust the dots at the center, but it can be more difficult to have the dots at all four corners round as well. Continue until the overall display is the best it can be.

Note the position of the rings then temporarily connect and select a higher resolution source. Play with the rings to see if the image can be improved. If it does not, return to the previous noted position. Disconnect the source.



- f) On the Bias Module turn the electrical focus control knob counter-clockwise for the color to produce an out-of-focus image.



- g) Move the tabs on the flare rings until the dots are brightest at the center. Also, the crosshatch lines should be brightest at the center. Go close to the screen to get a better view of the dots and lines to check how well your adjustments are.
- h) On the Bias Module turn the electrical focus control knob until the image is back in focus. If you notice the dots have changed slightly you may want to repeat d) to h) until the best image is produced.
- i) Turn off the projector.
- j) Apply a small dab of silicone sealant to the stigmator and flare ring tabs so that their positions will remain locked in place. Do not apply too much sealant. Look at the other two CRT assemblies to see how much to apply. It is usually best to put a small dab onto a screwdriver then place the sealant onto the ring tabs.

Step 3 - Reassemble the Projector

- a) Turn the projector off then reassemble.

Dynamic focus adjustment may be required if focus is not consistent across the screen.

Tools & Equipment Required:

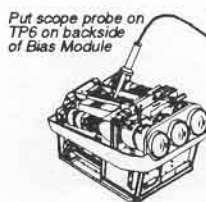
- oscilloscope
- fine tip, insulated potentiometer adjust tool
- slot screw driver
- Phillips screw driver

Modules affected:

- Bias Module
- Waveform Module

Step 1 - Lift Cover and Ready the Projector

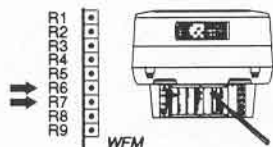
- a) Turn off the projector then unplug it.
- b) Unscrew the two top cover screws then lift the cover. Lift or remove the plastic shield located above the CRT assemblies. (Refer to section 5, *Parts and Disassembly* for removal instructions).
- c) Remove the screws which secure the rear panel. Remove the panel for access to the Waveform Module. (Refer to section 5, *Parts and Disassembly* for removal instructions).
- d) Connect a source which is normally used with the projector. Press **POWER** to turn on the projector then use **SOURCE** to select the source. Press **#** to display a crosshatch.



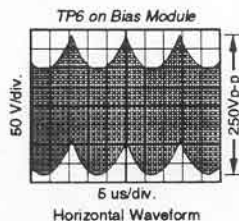
4.10 Dynamic Focus Adjustment

Step 2- Set Horizontal and Vertical Dynamic Focus

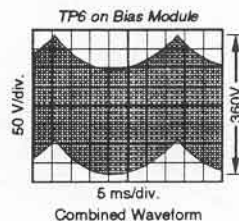
- Connect the ground of the oscilloscope probe to the projector chassis close to the Bias Module. Locate TP6 on the Bias Module PCB. Connect the probe to it at the backside of the board.



- At the Waveform Module, adjust R6 (vertical dynamic range) counter-clockwise to its minimum position. A 250V symmetrical and undistorted parabola should be displayed on the oscilloscope. If adjustment is required, adjust R7. As you perform the adjustment watch the screen to see its effect at the left and right.



- Adjust R6 (vertical dynamic range) to achieve a 360 volt peak-peak parabola (250V horizontal plus 110V vertical). The parabola should be symmetrical and undistorted. As you perform the adjustment watch the screen to see its effect at the top and bottom.



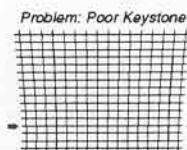
- To check for correct dynamic focus, adjust electrical focus and verify that best focus can be achieved at both the center and the corners.

Step 3 - Reassemble the Projector

- Turn the projector off, unplug it, then reassemble.

4.11 Waveform Module Keystone & Pincushion Adjustment

This procedure allows you to calibrate the Waveform Module for proper Keystone and Pincushion. Perform Keystone calibration if Keystone adjustment is not satisfactory using the Keystone command. A problem may be that Keystone is "kinked" as shown at the diagram on the right. Perform a Pincushion calibration if Pincushion adjustment is not satisfactory using the Pincushion command.



Tools & Equipment Required:

- 15.75 kHz video source
- 90 kHz video source
- voltmeter
- fine tip, insulated potentiometer adjust tool
- extender card
- Phillips screwdriver

Modules affected:

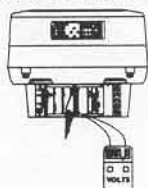
- Waveform Module

Step 1 - Remove Rear Panel and Ready the Projector

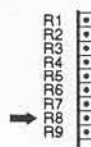
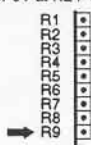
- Turn off the projector then unplug it.
- Remove the screws which secure the rear panel. Remove the panel. (Refer to section 5, *Parts and Disassembly* for removal instructions).



Connect voltmeter to row B, pin 14 on extender card



Adjust R9 on WFM for 0V at KEY WFM



- c) Pull out the Waveform Module and install an extender card. Plug the module into the extender card.
- d) Connect a 15.75 kHz source to the projector. Set the vertical frequency to 45.0 Hz. Press **POWER** to turn on the projector. Use **SOURCE** to select the source. Press **#** to display a crosshatch.

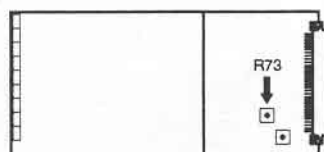
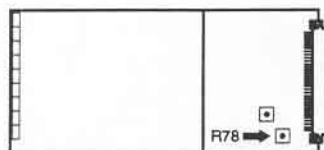
Step 2- Calibrate Keystone

- a) Connect the negative lead of the voltmeter to ground on the extender board. Connect the positive lead to row B, pin 14 (KEY WFM). Press **KEY** on the keypad then use **▲** and **▼** to set Keystone to a level of 5.
- b) Adjust R9 on the Waveform Module until KEY WFM reads 0 volts.

- c) Press **KEY** on the keypad then use **▲** and **▼** to set Keystone to a level of 2.
- d) Adjust R8 until the image sides appear straight (when the projection angle is 15°).

Step 3- Calibrate Pincushion

This step calibrates the phase setting of the Pincushion control. This procedure is performed to achieve geometrical top/bottom pincushion action at all frequencies



- a) Connect a 90 kHz source to the projector. Use **SOURCE** to select the source. Have a crosshatch displayed and increase Top Pincushion (**PIN**) to maximum..
- b) Adjust R78 on the Pincushion PCB (located on the Waveform Module), so that the effect caused by using the Pincushion control (**PIN**) is centered within the image. Remember, this is a Pincushion phase adjustment.
- c) Connect a 15.75 kHz source to the projector. Use **SOURCE** to select the source.
- d) Adjust R73 on the Pincushion PCB (located on the Waveform Module) so that the effect caused by using the Pincushion control (**PIN**) is centered within the image. Remember, this is a Pincushion phase adjustment.
- e) Repeat a) through d) until optimal phasing is achieved at both frequencies. Note that both controls are interactive.

Step 4 - Reassemble the Projector

- a) Turn the projector off, unplug it, then reassemble.

4.12 Convergence Module Setup

This procedure is for set up of the Convergence Module. The Convergence Module includes a digital phase control which must set correctly.

Tools & Equipment Required:

- small slot screw driver
- Phillips screwdriver

Modules affected:

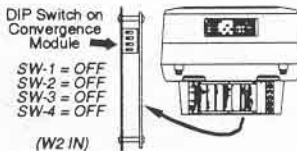
- Convergence Module

Step 1 - Remove Rear Panel and Ready the Projector

- Turn off the projector then unplug it.
- Remove the screws which secure the rear panel. Remove the panel. (Refer to section 5, *Parts and Disassembly* for removal instructions).

Step 2- Check/Perform Setup

- Check the DIP switch settings on the Convergence Module. Make sure the switch settings are as shown in the diagram. Also, check the W2 wire jumper located next to the switch to make sure it is IN (not cut).
- Press **POWER** to turn on the projector then press **#** to display a crosshatch. Verify that there is no droop at the edges of the crosshatch.



Step 3 - Reassemble the Projector

- Turn the projector off, unplug it, then reassemble.

4.13 Horizontal Deflection Module Setup

This procedure is for set up of the Horizontal Deflection Module. Setup may be required for newly installed modules and when the projector has problems locking to the horizontal signal.

Tools & Equipment Required:

- multi-frequency video source/generator
- voltmeter
- fine tip, insulated potentiometer adjust tool
- extender card
- Phillips screwdriver

Modules affected:

- Horizontal Deflection Module

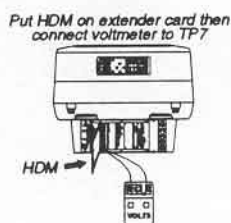
Step 1 - Remove Rear Panel and Ready the Projector

- Turn off the projector then unplug it.
- Remove the screws which secure the rear panel. Remove the panel. (Refer to section 5, *Parts and Disassembly* for removal instructions).
- Pull out the Horizontal Deflection Module and install an extender card. Plug the module into the extender card.

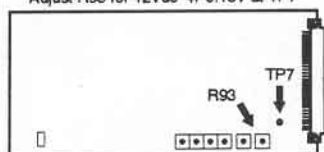
- d) Plug in the projector then press **POWER** to turn it on

Step 2 - 12V Regulator Adjustment

- a) Connect the negative lead of the voltmeter to ground on the extender board. Connect the positive lead to TP7 on the Horizontal Deflection Module.



Adjust R93 for 12Vdc $\pm 0.15V$ at TP7



- b) Adjust R93 (regulator adjust) on the Horizontal Deflection Module until TP7 reads 12Vdc $\pm 0.15V$.

Note: If you find that the 12V regulation voltage has decreased significantly over time, this may indicate that the low voltage power supply is not performing as it should. You should check the +24Vdc output (at the extender card) to see if it is much below +24Vdc. If lower than +23Vdc it is recommended that the supply be replaced.

Adjust R98 to bandswitch point



Step 3 - Bandswitch Adjustment

- a) Connect a 36 kHz source to the projector. Use **SOURCE** to select the source.
- b) Adjust R98 to the point where bandswitch occurs. The green bandswitch LED on the board should illuminate.

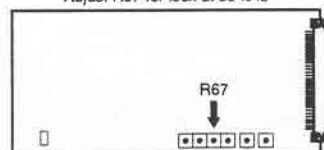
Step 4 - Autolock Adjustments - Highband (36 kHz to 90 kHz)

- a) Connect a 37 kHz source to the projector.
- b) Adjust R87 (high band - low frequency) for lock.

Adjust R87 for lock at 24 kHz



Adjust R67 for lock at 55 kHz

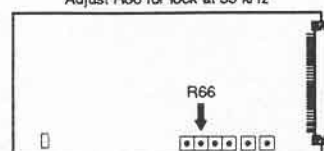


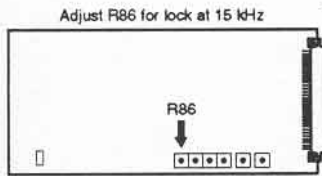
- c) Connect a 90 kHz source to the projector.
- d) Adjust R67 (high band - high frequency) for lock.
- e) Repeat a) to d) until correct auto-locking is achieved.

Step 5 - Autolock Adjustments - Lowband (15 kHz to 36 kHz)

- a) Connect a 35 kHz source to the projector.
- b) Adjust R66 (low band - high frequency) for lock.

Adjust R66 for lock at 35 kHz





- c) Connect a 15 kHz source to the projector.
- d) Adjust R86 (low band - low frequency) for lock.
- e) Repeat a) to d) until correct auto-locking is achieved.

Step 6 - Reassemble the Projector

- a) Turn the projector off then unplug it. Remove the extender card then install the module. Reassemble the projector.

4.14 Vertical Deflection & Horizontal Regulation Module Setup

This procedure is for used for set up of the Vertical Deflection & Horizontal Regulation Module. Setup may be required for newly installed modules and when the projector has problems locking to the vertical signal.

Tools & Equipment Required:

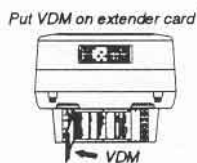
- multi-frequency video source/generator
- voltmeter
- fine tip, insulated potentiometer adjust tool
- extender card
- Phillips screwdriver

Modules affected:

- Vertical Deflection & Horizontal Regulation Module

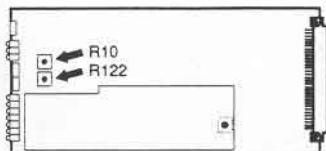
Step 1 - Remove Rear Panel and Ready the Projector

- a) Turn off the projector then unplug it.
- b) Remove the screws which secure the rear panel. Remove the panel. (Refer to section 5, *Parts and Disassembly* for removal instructions).
- c) Pull out the Vertical Deflection & Horizontal Regulation Module and install an extender card. Plug the module into the extender card.
- d) Plug in the projector then press **POWER** to turn it on



Step 2 - Autolock Adjustment for Vertical Circuits

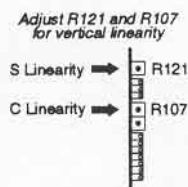
- a) Connect a source signal generator to the projector and set the vertical frequency to 45Hz. The horizontal frequency can be at a frequency which is normally used with the projector. Use **SOURCE** to select the source. Make sure the projector is set for vertical auto locking (**V HOLD**).
- b) Set R122 to a 2/3 clockwise position.
- c) Adjust R10 for lock.
- d) Change the vertical source frequency to 120Hz.
- e) Adjust R122 for lock.



- f) Change the vertical source frequency to 75 Hz.
- g) Verify vertical locking. If vertical locking is not stable, repeat a) to g) until vertical locking is stable at all three frequencies.

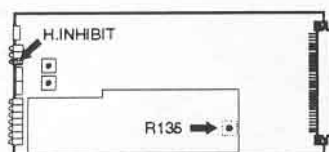
Step 3 - Adjust Vertical Position and Linearity

- a) Set V Size (**SIZE**) to normal viewing level.
- b) Press (**#**) to display a crosshatch.
- c) Set Contrast (**CONT**) to a normal level.
- d) While viewing the projected image, adjust S and C Linearity using R121 and R107 (respectively) until the height of each crosshatch box is the same from top to bottom.



Step 4 - Over-current Shutdown (for H Regulator / Buck Converter)

- a) Set H Size (**SIZE**) to 10 (max.) and Keystone (**KEY**) to 10 (max.). Verify that the H INHIBIT LED does not turn on. If it does, make a small clockwise adjustment to R135. Lower H Size and Keystone then increase H Size and Keystone then check the H INHIBIT LED. Repeat until the LED does not turn on with H Size and Keystone at their maximum positions.



Note: R135 is factory set. Adjust only if absolutely necessary.

Step 5 - Reassemble the Projector

- a) Turn the projector off then unplug it. Remove the extender card then install the module. Reassemble the projector.

4.15 Power Deflection Module Setup

Use this procedure to calibrate the Power Deflection Module. This is only required if the vertical and horizontal widths of the image for a color are not close to that of the other two colors.

Notes: 1) There are three Power Deflection Modules, one for each color. Adjust only the module that need calibration. If all three modules need adjustment, start with the Green module. 2) In November 1995, the design of the MOSFET board (located on the PDM) changed due to component availability. The newer version board (included with Power Deflection Module #02-270003-06P/03-270003-06P) is not interchangeable with the older board (included with Power Deflection Module #02-270003-05P/03-270003-02P). It is important that all three MOSFET boards are the same, otherwise linearity problems may occur. If replacing an older version Power Deflection Module that has a good MOSFET board, use the old MOSFET board instead of the one supplied on the new Power Deflection Module. If you must replace an older version module with a completely new one (Power Deflection PCB and MOSFET PCB), the other two Power Deflection Modules should also be replaced.

Tools & Equipment Required:

- multi-frequency video source/generator
- long shafted, fine tip, insulated potentiometer adjust tool
- slot screw driver

Modules affected:

- Power Deflection Module

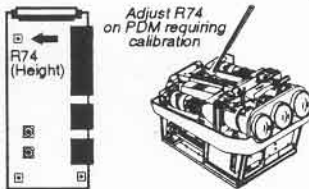
Step 1 - Lift Cover and Ready the Projector

- Make sure the projector is turned off.
- Unscrew the two top cover screws then lift the cover. Remove the plastic shield located above the CRT assemblies. (Refer to section 5, *Parts and Disassembly* for removal instructions).
- Press **POWER** to turn on the projector.

WARNING: High voltages are exposed. Use extreme caution!

Step 2 - Set Vertical Size

- Press **CONV** **2** **0** to reset convergence.
- Use the arrow keys to center the green (static). Use **CONV** to change colors.. Center the blue and red colors to the green.
- Adjust R74 on the Power Deflection Module so that the vertical size of the color matches that of the green. (This is assuming the other two colors are already proper and do not require adjustment.)

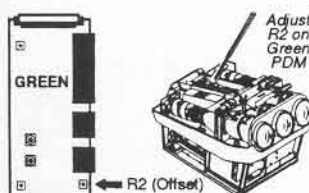


Note: If all three modules need adjustment, start with the green. For the green only, set R74 to its mechanical center. Set the other two colors to match the green.

- Press **EXIT** to leave *Green Convergence*. When the Exit confirmation screen is displayed, press **EXIT** to save the new convergence settings.

Step 3 - Set Horizontal Position and Size (Green Only)

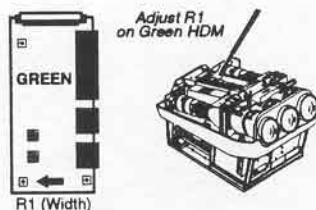
- Press **#** to set display a crosshatch.
- Use **SIZE** to set the horizontal size to 5.
- Lower the contrast level to a very low setting.



- Look directly into the green CRT at the green lens. Check the gap at the left and right edges of the crosshatch. It may be easiest to compare the gaps at the two bottom or top corners. If they are not the same width, take the potentiometer adjustment tool (twecker) then adjust R2 (DC Offset) on the Power Deflection Module (located below the green CRT) for the green until the width of the gaps at each side are the same.

Vert. Deflection Module (02-270009-01P / 03-270009-01P) - continued

| ID | Description | Electrohome # |
|------|--|---------------|
| C60 | Capacitor ELR-MIN 22UF 250V 20% | 85-010004-01P |
| C61 | Capacitor ELR-MIN 22UF 250V 20% | 85-010004-01P |
| C62 | Capacitor ELR-MIN 22UF 250V 20% | 85-010004-01P |
| C63 | Capacitor CER DISC Z5P 390P 500V 10% | 86-339113-02P |
| C64 | Capacitor ELR-MIN 470UF 16V 20% | 85-010007-01P |
| C65 | Capacitor CRR-NPO 100P 100V 2% | 85-112210-01P |
| C66 | Capacitor MYR---5 47N 100V 10% | 85-101708-01P |
| C67 | Capacitor CRR-Y5P 220P 100V 10% | 85-200210-01P |
| C68 | Capacitor CRR-Y5P 220P 100V 10% | 85-200210-01P |
| C69 | Capacitor CRR-Y5P 220P 100V 10% | 85-200210-01P |
| C71 | Capacitor MYR---5 4N7 100V 10% | 85-100710-01P |
| C72 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| D14 | Diode REC BYV26 .5A 350V | 14-000525-07P |
| D20 | Diode REC BYV26 .5A 350V | 14-000525-07P |
| D21 | RECTIFIER BARRIER 1N5817 | 14-000533-02P |
| D22 | RECTIFIER BARRIER 1N5817 | 14-000533-02P |
| D23 | RECTIFIER BARRIER 1N5817 | 14-000533-02P |
| D24 | RECTIFIER BARRIER 1N5817 | 14-000533-02P |
| IC1 | IC TL084CN LIN OP-AMP QUAD BI | 14-002104-01P |
| IC2 | IC CD4098B TRIP 2-CH MUX/DE MU | 14-A04021-01P |
| IC3 | IC TDA1170S LIN VERT DEF | 14-002084-02P |
| IC4 | IC CA339 LIN COMP QUAD-VOLT | 14-002154-01P |
| IC5 | IC CA339 LIN COMP QUAD-VOLT | 14-002154-01P |
| IC7 | IC DG307CJ ANALOG SWITCH | 14-A03009-01P |
| IC8 | IC TDA4716C SMPS CONTROLLER | 14-002830-01P |
| IC9 | IC MC14049UB HEX BUFFER INV | 14-A03014-01P |
| IC10 | IC TL084CN LIN OP-AMP QUAD BI | 14-002104-01P |
| L1 | Choke RF 5.6 UH | 21-001400-09P |
| L3 | Choke 5.6UH | 21-001400-24P |
| LD1 | LED RED 3V .09A | 14-001016-02P |
| LD2 | LED RED 3V .09A | 14-001016-02P |
| LD3 | LED YELLOW 3V .06A | 14-001016-03P |
| LD4 | LED GREEN 3V .09A | 14-001016-01P |
| LD5 | LED GREEN 3V .09A | 14-001016-01P |
| LD6 | LED GREEN 3V .09A | 14-001016-01P |
| LD7 | LED GREEN 3V .09A | 14-001016-01P |
| LD8 | LED GREEN 3V .09A | 14-001016-01P |
| LD9 | LED GREEN 3V .09A | 14-001016-01P |
| LD10 | LED GREEN 3V .09A | 14-001016-01P |
| P1 | Connector 64 Pin RA PLUG DIN | 34-001057-02P |
| Q1 | Transistor 2N3904 40V .2A 35W NPN | 14-000881-06P |
| Q4 | Transistor 2N3904 40V .2A 35W NPN | 14-000881-06P |
| Q6 | Transistor MPSU10 300V .5A 1W NPN D | 14-000982-14P |
| Q7 | Transistor IRF731 350V HEXFET | 14-A00704-01P |
| Q9 | Transistor 2N3906 SMALL SIGNAL | 14-000873-82P |
| Q10 | Transistor 2N3906 SMALL SIGNAL | 14-000873-82P |



- d) Now adjust R1 so that the crosshatch is approximately 1/4 inches away from the left and right edges of the CRT face. Repeat c) if necessary.

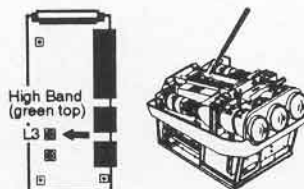
Step 4 - Adjust Width Coils

- a) Press **CONV** **2** **0** to reset convergence.

Note: This reset is temporary. Do not store (save) it.

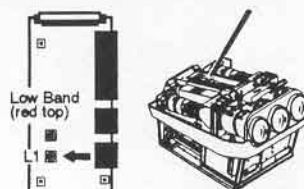
- b) Connect a signal which forces the projector into highband (64 kHz recommended).

- c) Adjust the highband inductance coil (with green top) so that the width for the color matches the green.



- d) Connect a signal which forces the projector into lowband (31.5 kHz recommended).

- e) Adjust the lowband inductance coil (with red top) so that the width for the color matches the green.



- f) Press **EXIT** **0** to exit without saving the convergence.

Step 5 - Reassemble the Projector

- a) Turn the projector off, unplug it, then reassemble.

4.16 CRT Replacem't & Realignm't

This procedure provides instructions for replacement and realignment of a CRT. There are essentially two methods for CRT replacement. The first method involves removing the bulkhead (above the CRT assemblies) and the CRT's lens then replacing the CRT. The second method removes and replaces the CRT with the bulkhead and lens still in place. Only the second method is covered here. This method is preferred because it is less time consuming and usually easier to perform.

The Red and Blue CRT Assemblies are easiest to replace. The Green CRT takes a little longer since it is surrounded by the other two CRTs and additional components (such as the Keypad Assembly and bracket).

Notes: 1) Diagrams show replacement of the Blue CRT. 2) In some cases when a CRT has become faulty the Video Output Module is also faulty. Check the Video Output Module to determine if it also needs replacement.

Tools & Equipment Required:

- large ball-nose driver (located under projector cover)
- 1/4" hex head socket driver
- slot screw driver

Modules affected:

- CRT Assembly

**Vertical
Deflection &
Horizontal
Regulation
Module**
Vert. Deflection & Horiz. Reg. Module (02-270009-01P / 03-270009-01P)

| ID | Description | Electrohome # |
|-----|-------------------------------------|---------------|
| C1 | Capacitor ELR-MIN 100U 25V 20% | 85-011005-02P |
| C2 | Capacitor ELR-MIN 100U 25V 20% | 85-011005-02P |
| C4 | Capacitor ELR-MIN 100U 25V 20% | 85-011005-02P |
| C5 | Capacitor MYR---5 10N 100V 10% | 85-101108-01P |
| C6 | Capacitor MYR---5 100N 100V 10% | 85-102110-02P |
| C9 | Capacitor MYR---5 100N 100V 10% | 85-102110-02P |
| C10 | Capacitor MYR---5 100N 100V 10% | 85-102110-02P |
| C11 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C12 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C13 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C15 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C16 | Capacitor MYR---5 100N 100V 10% | 85-102110-02P |
| C17 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C19 | Capacitor ELR-MIN 10U 50V 20% | 85-010608-01P |
| C20 | Capacitor ELR-MIN 10U 50V 20% | 85-010608-01P |
| C22 | Capacitor ELR-MIN 10U 50V 20% | 85-010608-01P |
| C23 | Capacitor ELR-MIN 4U7 50V 20% | 85-010508-01P |
| C24 | Capacitor ELR-MIN 4U7 50V 20% | 85-010508-01P |
| C25 | Capacitor ELR-MIN 4U7 50V 20% | 85-010508-01P |
| C26 | Capacitor ELEC 22U 25V 20% | 84-422004-01P |
| C28 | Capacitor ELR-MIN 3U3 50V 20% | 85-010408-01P |
| C29 | Capacitor ELR-MIN 3U3 50V 20% | 85-010408-01P |
| C30 | Capacitor ELR-MIN 3U3 50V 20% | 85-010408-01P |
| C31 | Capacitor MYR---5 15N 50V 10% | 85-100001-01P |
| C32 | Capacitor MYR---5 220N 50V 10% | 85-102308-01P |
| C33 | Capacitor MYR---5 220N 50V 10% | 85-102308-01P |
| C34 | Capacitor ELR-MIN 220U 25V 20% | 85-011105-04P |
| C35 | Capacitor MLC-NPO RD 1N0 50V 1% | 85-131408-01P |
| C36 | Capacitor MLC-NPO RD 1N0 50V 1% | 85-131408-01P |
| C37 | Capacitor ELEC 22U 25V 20% | 84-422004-01P |
| C38 | Capacitor ELEC 22U 25V 20% | 84-422004-01P |
| C39 | Capacitor MLR-Z5U 470N 50V 20% | 85-170708-02P |
| C40 | Capacitor CER DISC Z5P 1N0 500V 10% | 86-310213-02P |
| C41 | Capacitor CER DISC Z5P 1N0 500V 10% | 86-310213-02P |
| C47 | Capacitor 10NF 500V 20% | 46-310327-11P |
| C48 | Capacitor MYR---5 330N 63V 10% | 85-102509-03P |
| C49 | Capacitor ELR-MIN 100U 25V 20% | 85-011005-02P |
| C50 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C51 | Capacitor ELR-MIN 100U 25V 20% | 85-011005-02P |
| C53 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C54 | Capacitor ELR-MIN 10U 50V 20% | 85-010608-01P |
| C55 | Capacitor CRR-NPO 100P 100V 2% | 85-112210-01P |
| C56 | Capacitor CRR-NPO 100P 100V 2% | 85-112210-01P |
| C57 | Capacitor CRR-NPO 100P 100V 2% | 85-112210-01P |
| C58 | Capacitor ELR-MIN 470UF 16V 20% | 85-010007-01P |
| C59 | Capacitor ELR-MIN 22UF 250V 20% | 85-010004-01P |

Step 1 - Lift Cover and Ready the Projector

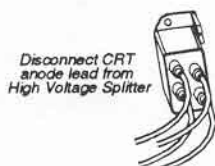
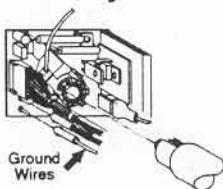
- a) Make sure the projector is turned off and unplug it.
- b) Unscrew the two top cover screws then lift the cover. Remove the plastic shield located above the CRT assemblies. (Refer to section 5, *Parts and Disassembly* for removal instructions).
- c) If the Green CRT requires removal, remove the Keypad Assembly, its mounting bracket, the Bias Module and its support bracket. Refer to section 5, *Parts and Disassembly* for removal instructions. Note that electrical connections may remain in place but the assemblies must be secured such that there is no stress on the cables and leads.

If the Blue CRT requires removal, remove the Bias Module support bracket. (It has two screws located next to the Bias Module, towards the front of the projector).

Step 2 - Remove the CRT Assembly

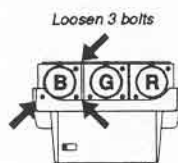
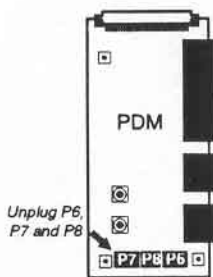
- a) Gently pull the Video Output Module away from the CRT. Again, be cautious of charged voltages.

Pull VOM away from CRT and disconnect ground wires



Note: the Video Output Module is secured to the CRT by a small amount of hot melt glue. The joint between the glue and the CRT should break from the CRT without difficulty. Upon reassembly, new hot melt glue is not required. The purpose of the original glue is to secure the module during shipping.

- b) At the High Voltage Splitter, disconnect the anode lead which leads to the CRT. Be careful since the lead may still have some charge. Short it to ground through a low value resistor.
- c) Unplug the two ground plugs (P3 and P10) from the Video Output Module.
- d) Unplug the yoke plugs (P6, P7, P8) from the Horizontal Deflection Module (located below the Video Output Module).

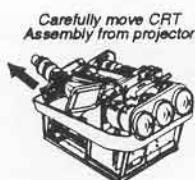


- e) Locate the three large socket head Allen bolts located at the base of the lens assembly. Each bolt must be loosened until it is free of the CRT Assembly. It is best to loosen each bolt about 4 or 5 turns then proceed to the next bolt. Continue until all three bolts are free.

Note: Closely watch the springs.

Remote Control Module (02-270010-35P / 03-270010-35P) - continued

| ID | Description | Electrohome # |
|------|--------------------------------------|---------------|
| R71 | Resistor 100R .5W 5% MET FILM | 80-110005-11P |
| R72 | Resistor 100R .5W 5% MET FILM | 80-110005-11P |
| R73 | Resistor 10K .5W 5% MET FILM | 80-110025-11P |
| R74 | Resistor 100R .5W 5% MET FILM | 80-110005-11P |
| R75 | Resistor 10K .5W 5% MET FILM | 80-110025-11P |
| R76 | Resistor 10K .5W 5% MET FILM | 80-110025-11P |
| R77 | Resistor 10K .5W 5% MET FILM | 80-110025-11P |
| R78 | Resistor 10K .5W 5% MET FILM | 80-110025-11P |
| RN1 | Resistor NTRK 10Pin 27K BUS | 43-000053-03P |
| RN2 | Resistor NTRK 10Pin 10K BUS | 43-000053-02P |
| RN3 | Resistor NTRK 10Pin 4K7 BUS | 43-000053-01P |
| RN4 | Resistor NTRK 10Pin 27K BUS | 43-000053-03P |
| RN5 | Resistor NTRK 10Pin 10K BUS | 43-000053-02P |
| RN6 | Resistor NTRK 10Pin 4K7 BUS | 43-000053-01P |
| RN7 | Resistor NTRK 10Pin 10K BUS | 43-000053-02P |
| RN8 | Resistor NTRK 10Pin 10K BUS | 43-000053-02P |
| RN9 | Resistor NTRK 10Pin 10K BUS | 43-000053-02P |
| RN10 | Resistor NTRK 10Pin 10K BUS | 43-000053-02P |
| RN11 | Resistor NTRK 10Pin 10K BUS | 43-000053-02P |
| RN12 | Resistor NTRK 10Pin 10K BUS | 43-000053-02P |
| RN13 | Resistor NTRK 10Pin 10K BUS | 43-000053-02P |
| SW10 | Switch MOMENTARY CONTACT NO. | 26-000343-01P |
| Y1 | Crystal 16.0MHZ PARALLEL | 37-000020-04P |
| ZD1 | Diode Zener 1N5231C 5.1V 2% | 14-000515-98P |
| ZD2 | Diode Zener 1N5231C 5.1V 2% | 14-000515-98P |
| ZD4 | Diode Zener 1N4735A 6.2V 5% 1W | 14-000531-38P |
| ZD5 | Diode Zener 1N5231C 5.1V 2% | 14-000515-98P |

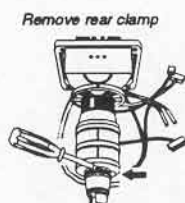


- f) Grasp the CRT by its yokes then carefully back it away from the projection bulk head.

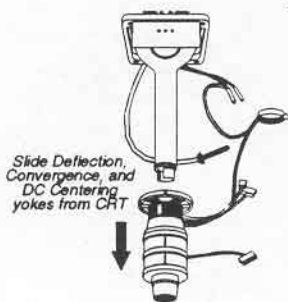
Step 3 - Disassemble the CRT Assembly



- a) Set the CRT Assembly down and take a close look at it. The assembly includes the CRT mounting plate, a deflection yoke, a convergence winding section and a dc centering winding section. The yoke and windings can be removed as one assembly from the CRT. Before you begin, notice that the yoke and winding components have a seam at their top. When you reassemble, the seam must again be at the top of the assembly.

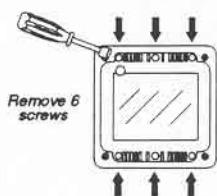


- b) Locate the rear clamp next to the CRT connection end. Loosen the clamp screw then slide the clamp away from the CRT. Make sure not to place unnecessary stress on the lead wires.



- c) Carefully slide the yoke assembly from the neck of the CRT. Note that a few wires are attached between the CRT and the yoke/windings.

Note: Be careful not to damage the tape on the CRT.



- d) Lastly, remove the six screws which secure the CRT to its mounting plate. Set the plate aside. The CRT is now complete free of its mounting components and the projector.

Note: Before removing the plate, note its orientation with respect to the CRT. For reassembly, the ground strip on the plate remains down. The anode on the CRT is positioned at the top.

Step 4 - Reassemble the CRT Assembly

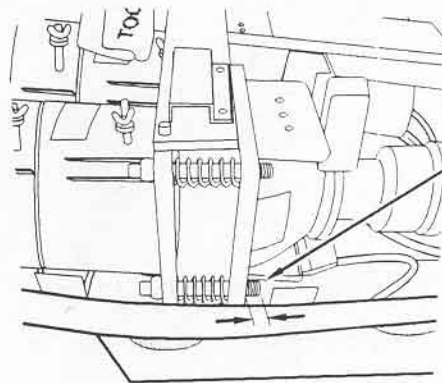
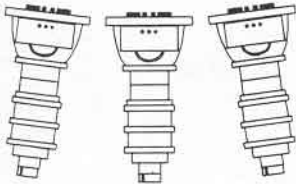
- a) With the new CRT install the six screws which secure the CRT to its mounting plate. (See the note above.)
- b) Carefully slide the yoke assembly onto the neck of the CRT. Make sure the seams of the yoke and winding components are positioned at the top
- c) Slide the rear clamp onto the neck of the CRT. Tighten it so that the assembly is snug. Do not over tighten.

Remote Control Module (02-270010-35P / 03-270010-35P) - continued

| ID | Description | Electrohome # |
|-----|-------------------------------------|---------------|
| R27 | Resistor 24K .5W 5% MET FILM | 80-124025-11P |
| R28 | Resistor 24K .5W 5% MET FILM | 80-124025-11P |
| R29 | Resistor 300K .5W 5% MET FILM | 80-130035-11P |
| R30 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R31 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R32 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R33 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R34 | Resistor 300K .5W 5% MET FILM | 80-130035-11P |
| R35 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R36 | Resistor 300K .5W 5% MET FILM | 80-130035-11P |
| R37 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R38 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R39 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R40 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R41 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R42 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R43 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R44 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R45 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R46 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R47 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R48 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R49 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R50 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R51 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R52 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R53 | Resistor 1K .5W 5% MET FILM | 80-110015-11P |
| R54 | Resistor 2K .5W 5% MET FILM | 80-120015-11P |
| R55 | Resistor 10K .5W 5% MET FILM | 80-110025-11P |
| R56 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R57 | Resistor 300K .5W 5% MET FILM | 80-130035-11P |
| R58 | Resistor 100R .5W 5% MET FILM | 80-110005-11P |
| R59 | Resistor 5K6 .5W 5% MET FILM | 80-156015-11P |
| R60 | Resistor 10K .5W 5% MET FILM | 80-110025-11P |
| R61 | Resistor 56K .5W 5% MET FILM | 80-156025-11P |
| R62 | Resistor 1K5 .5W 5% MET FILM | 80-115015-11P |
| R63 | Resistor 100R .5W 5% MET FILM | 80-110005-11P |
| R64 | Resistor 10K .5W 5% MET FILM | 80-110025-11P |
| R65 | Resistor 10K .5W 5% MET FILM | 80-110025-11P |
| R66 | Resistor 100R .5W 5% MET FILM | 80-110005-11P |
| R67 | Resistor 100R .5W 5% MET FILM | 80-110005-11P |
| R68 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R69 | Resistor 10K .5W 5% MET FILM | 80-110025-11P |
| R70 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |

Step 5 - Install the CRT Assembly into the Projector

- a) Place the CRT Assembly back into its original position.
- b) Align the three large socket head allen bolts located at the base of the lens assembly with the holes on the CRT mounting plate. Make sure the springs are still intact. Screw in one of the bolts enough to grab its mating threads. Do the same for the other two bolts. Tighten each bolt 4 or 5 turns at a time until the assembly is roughly in its final position. You can judge what the position should be by looking at the position of the other two CRTs. Also, for the Red and Blue, look at the reference bolt (lower bolt) on the green assembly. Notice how far it protrudes from the CRT mounting plate. The reference bolt of the Red and Blue assemblies should protrude by approximately the same distance. See Figure 4-11.



Reference bolt for the red and blue assemblies protrudes the same distance from their mounting plate as that of the green assembly (red shown).

Figure 4-11. Reference Bolt

- c) Plug connectors P6, P7, and P8 onto the Power Deflection Module.
- d) Plug the two ground plugs (P3 and P10) onto the Video Output Module. P3 goes to the clips on the yoke clamps. P10 goes to the bulkhead.
- e) Gently plug the Video Output Module onto the CRT. Watch out for bent pins on the CRT. They bend very easily.
- f) Connect the anode lead to the High Voltage Splitter.

Note: Make sure all wires are reconnected before continuing! Check that the 2 grounds are on, the high tension is on, all 3 deflection plugs are in, and the Video Output Module (neck board) is on.

- g) For the Green and Blue, reassemble the components removed in part c) of step 1.

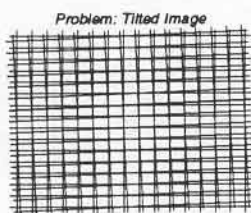
Remote Control Module (02-270010-35P / 03-270010-35P) - continued

| ID | Description | Electrohome # |
|------|--------------------------------------|---------------|
| IC22 | IC DS1232 MICRO MONITOR | 14-004702-01P |
| IC23 | IC 74AC373 OCT AL D-LATCH 3-ST | 14-A04010-02P |
| IC24 | IC PROG 27C512-170 V3.4 | 14-P01024-40P |
| IC25 | IC PROG 27C512-170 V3.4 | 14-P01025-40P |
| IC26 | IC PROG 27C512-170 V3.4 | 14-P01026-40P |
| IC27 | IC 74AC540 OCT BUS/BUT 3-ST/IN | 14-A04065-02P |
| IC28 | IC 74AC245 OCT BUS XCVR 3-ST | 14-A04055-02P |
| IC29 | IC DS1230Y-150 256K N-V SRAM | 14-A05045-03P |
| IC30 | IC PCF8574 8 BIT REM I/O ECPND | 14-A03036-01P |
| IC31 | IC PCF8574 8 BIT REM I/O ECPND | 14-A03036-01P |
| IC32 | IC PCF8574 8 BIT REM I/O ECPND | 14-A03036-01P |
| IC33 | IC 74AC540 OCT BUS/BUT 3-ST/IN | 14-A04065-02P |
| IC34 | IC 74AC245 OCT BUS XCVR 3-ST | 14-A04055-02P |
| IC35 | IC 74AHCT640 OCT BUS XCVR | 14-A04076-01P |
| IC36 | IC 74AHCT640 OCT BUS XCVR | 14-A04076-01P |
| IC37 | IC 74AC245 OCT BUS XCVR 3-ST | 14-A04055-02P |
| LD1 | LED RED 3V .09A | 14-001016-02P |
| LD2 | LED GREEN 3V .09A | 14-001016-01P |
| P1 | Connector 96 Pin RA PLUG DIN | 34-001057-03P |
| R1 | Resistor 1M .5W 5% MET FILM | 80-110045-11P |
| R2 | Resistor 1M .5W 5% MET FILM | 80-110045-11P |
| R3 | Resistor 470R .5W 5% MET FILM | 80-147005-11P |
| R4 | Resistor 470R .5W 5% MET FILM | 80-147005-11P |
| R5 | Resistor 470R .5W 5% MET FILM | 80-147005-11P |
| R6 | Resistor 24K .5W 5% MET FILM | 80-124025-11P |
| R7 | Resistor 24K .5W 5% MET FILM | 80-124025-11P |
| R8 | Resistor 24K .5W 5% MET FILM | 80-124025-11P |
| R9 | Resistor 100R .5W 5% MET FILM | 80-110005-11P |
| R10 | Resistor 100R .5W 5% MET FILM | 80-110005-11P |
| R11 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R12 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R13 | Resistor 24K .5W 5% MET FILM | 80-124025-11P |
| R14 | Resistor 300K .5W 5% MET FILM | 80-130035-11P |
| R15 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R17 | Resistor 24K .5W 5% MET FILM | 80-124025-11P |
| R18 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| R19 | Resistor 24K .5W 5% MET FILM | 80-124025-11P |
| R20 | Resistor 100R .5W 5% MET FILM | 80-110005-11P |
| R21 | Resistor 300K .5W 5% MET FILM | 80-130035-11P |
| R22 | Resistor 300K .5W 5% MET FILM | 80-130035-11P |
| R23 | Resistor 300K .5W 5% MET FILM | 80-130035-11P |
| R24 | Resistor 24K .5W 5% MET FILM | 80-124025-11P |
| R25 | Resistor 24K .5W 5% MET FILM | 80-124025-11P |
| R26 | Resistor 24K .5W 5% MET FILM | 80-124025-11P |

Step 6 - Setup and Adjustment

- a) Plug in the projector then press **POWER** to turn it on.
- b) Press **#** to display a crosshatch. (You may want to have the source which is normally used connected and selected, but this is not absolutely necessary.) Have the projector set at normal Contrast, Brightness, and Focus levels. Note that the focus will most likely be out for the color which had the CRT replaced.

Note: The projector should be at the correct throw distance for these steps. If it is not, a complete optical alignment is also required.

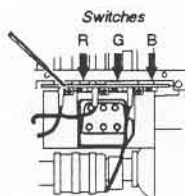


- c) If you notice that the crosshatch for the replacement tube is tilted with respect to the green, carefully grasp the yoke/windings for the assembly and slightly rotate it so that the horizontal lines are horizontal. Loosen the rear clamp if necessary. Once it is properly set, tighten the clamp enough to ensure the yoke/windings will not move out of place. Do not over tighten the clamp!

WARNING

**Do not wrap your hand around the yoke and windings.
HIGH VOLTAGE!**

If you notice that "toe-in" of the assembly is out (meaning that the color does not reasonably align horizontally with the other two colors, you should then proceed to perform a full optical alignment per the procedure in section 4.4. If this is necessary, perform the alignment and skip d) and e) below.



- d) Turn off the other two colors. You can easily do this using the G2 switches on the Bias Module.
- e) Once the CRT is in place it will be necessary to do an optical focus. First make sure the projector is positioned at the throw distance and angle as it would normally be. Now adjust the top/bottom and side/side bolts so that approximately 3/4" of their threads are protruding. Display a crosshatch for this color and adjust the center focus control (see Figure 4-12) on the lens so that the crosshatch is slightly out of focus. Do the top/bottom and side/side focus adjustments to focus the lens. Now compare the adjustment position of the center focus adjust to that of the other lenses. If the others are in a different position, move the reference bolt (lower bolt) out then refocus top/bottom and side/side then see if the position is correct. Repeat until the center focus adjust is at the same relative position as the other two lenses.

Remote Control Module (02-270010-35P / 03-270010-35P) - continued

| ID | Description | Electrohome # |
|------|--------------------------------------|---------------|
| C28 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C29 | Capacitor CRR-NPO 100P 100V 2% | 85-112210-01P |
| C30 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C31 | Capacitor CRR-NPO 100P 100V 2% | 85-112210-01P |
| C32 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C33 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C34 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C35 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C36 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C37 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C38 | Capacitor CRR-NPO 22P 100V 2% | 85-111410-01P |
| C39 | Capacitor 10NF 100V BOX TYPE | 88-171031-12P |
| C40 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C41 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C42 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C43 | Capacitor 10NF 100V BOX TYPE | 88-171031-12P |
| C44 | Capacitor ELR-MIN 100U 25V 20% | 85-011005-02P |
| C45 | Capacitor ELR-MIN 100U 25V 20% | 85-011005-02P |
| C46 | Capacitor ELR-MIN 100U 25V 20% | 85-011005-02P |
| D1 | Diode BAT 81 SCHOTTKY BARRIER | 14-000533-01P |
| D2 | Diode BAT 81 SCHOTTKY BARRIER | 14-000533-01P |
| D8 | Diode BAT 81 SCHOTTKY BARRIER | 14-000533-01P |
| D9 | Diode 1N914 A .075A 75V T | 14-000513-01P |
| D10 | Diode 1N914 A .075A 75V T | 14-000513-01P |
| IC1 | IC M5216L DUAL LARGE CURRENT | 14-002836-01P |
| IC2 | IC M5216L DUAL LARGE CURRENT | 14-002836-01P |
| IC3 | IC M5216L DUAL LARGE CURRENT | 14-002836-01P |
| IC4 | IC M5216L DUAL LARGE CURRENT | 14-002836-01P |
| IC5 | IC M5216L DUAL LARGE CURRENT | 14-002836-01P |
| IC6 | IC M5216L DUAL LARGE CURRENT | 14-002836-01P |
| IC7 | IC M5216L DUAL LARGE CURRENT | 14-002836-01P |
| IC8 | IC M5216L DUAL LARGE CURRENT | 14-002836-01P |
| IC9 | IC M5216L DUAL LARGE CURRENT | 14-002836-01P |
| IC10 | IC M5216L DUAL LARGE CURRENT | 14-002836-01P |
| IC11 | IC M5216L DUAL LARGE CURRENT | 14-002836-01P |
| IC12 | IC M5216L DUAL LARGE CURRENT | 14-002836-01P |
| IC13 | IC 74HC4538 DUAL MONO MULTI VI | 14-A04041-01P |
| IC14 | IC PCF8574 8 BIT REM I/O ECPND | 14-A03036-01P |
| IC15 | IC TDA8444 OCTAL 6-BIT DAC | 14-A03037-01P |
| IC16 | IC TDA8444 OCTAL 6-BIT DAC | 14-A03037-01P |
| IC17 | IC TDA8444 OCTAL 6-BIT DAC | 14-A03037-01P |
| IC18 | IC TDA8444 OCTAL 6-BIT DAC | 14-A03037-01P |
| IC19 | IC 74AC00 QUAD 2-I/P NAND | 14-A04074-02P |
| IC20 | IC 74AC10 TRIPLE 3 I/P NAND | 14-A04085-01P |
| IC21 | IC SM 80C154 8-BIT MICROCTRLR | 72-A06011-01P |

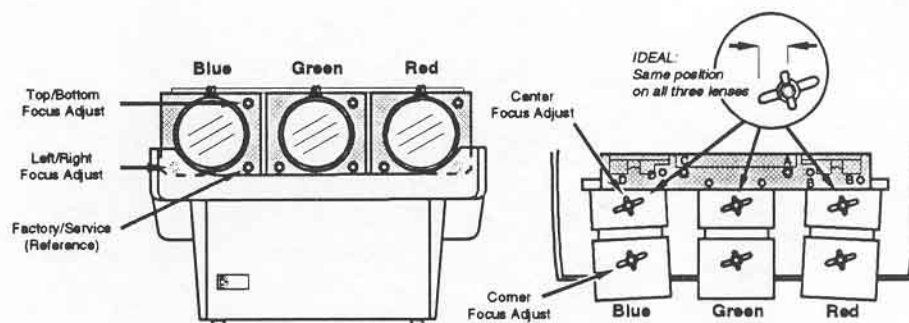


Figure 4-12. Mechanical Focus Adjustments

Mechanical focusing can sometimes be tricky to perform. It gets easier with experience. If you are having difficulty setting up the focus, it may be better to perform a full optical alignment per the procedure in section 4.4, *Optical Alignment*.

Note: It is desired, but not absolutely necessary, that the center and corner focus controls (located above each Lens Assembly) be roughly in the same position as the other two colors.

- f) Perform a raster centering per section 4.3.
- g) Perform a full convergence for the current source ().
- h) Perform flare and stigmator adjustments per section 4.9.
- i) Perform an dynamic focus for the color per section 4.10.

Step 7 - Reassemble the Projector

- a) Turn the projector off, unplug it, then reassemble.
- b) Plug in the projector then press to turn it on. Use to select sources. For each source perform a convergence and make the necessary display adjustments using the keypad.

RS-232 Comm. Module (02-270115-02P / 03-270115-01P)- continued

| | | |
|-----|--------------------------------------|---------------|
| R7 | Resistor 2M2 .5W 5% MET FILM | 80-122045-11P |
| R8 | Resistor 1K .5W 5% MET FILM | 80-110015-11P |
| R9 | Resistor 100R .5W 5% MET FILM | 80-110005-11P |
| R10 | Resistor 10K .5W 5% MET FILM | 80-110025-11P |
| R11 | Resistor 10K .5W 5% MET FILM | 80-110025-11P |
| R12 | Resistor 1K .5W 5% MET FILM | 80-110015-11P |
| R13 | Resistor 4K7 .5W 5% MET FILM | 80-147015-11P |
| RN1 | Resistor NTRWK 10Pin 4K7 BUS | 43-000053-01P |
| RN2 | Resistor NTRWK 10Pin 4K7 BUS | 43-000053-01P |
| SW3 | SWI DIP RSD RCKR SPST STR 8POS | 26-000355-08P |
| U1 | IC MC34064P TTL UNDDRVL T SENS. | 14-002853-01P |
| U2 | MC68HC711D3 V1.1 | 14-P11502-02P |
| U3 | IC DS14C232C RS232 RCVR/DRVR | 14-A05063-01P |
| U4 | IC MC7805CT REG FIXED POS VOLT | 14-002032-01P |
| U5 | IC 74HC08 QUAD 2 I/R ANDINPUT | 14-A04016-01P |
| Y1 | Crystal 8 MHZ PARALLEL | 37-000020-02P |

**Remote Control
Module***Remote Control Module (02-270010-35P / 03-270010-35P)*

| ID | Description | Electrohome # |
|-----|---------------------------------------|---------------|
| C1 | Capacitor TTR-MIN 33UF 10V 20% | 85-060002-01P |
| C2 | Capacitor MYR---5 100N 100V 10% | 85-102110-02P |
| C3 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C4 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C5 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C6 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C7 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C8 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C9 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C10 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C11 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C12 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C13 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C14 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C15 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C16 | Capacitor ELR-MIN 10U 50V 20% | 85-010608-01P |
| C17 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C18 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C19 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C20 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C21 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C22 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C23 | Capacitor CRR-NPO 27PF 100V 2% | 85-110003-01P |
| C24 | Capacitor CRR-NPO 27PF 100V 2% | 85-110003-01P |
| C25 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C26 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |
| C27 | Capacitor MLR-Z5U 100N 50V 20% | 85-170308-01P |