

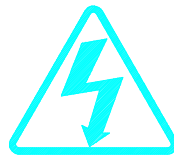
## 6.0 Maintenance and Factory Settings

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The Hughes-JVC Series 300 Projector has been designed and built to give years of trouble-free service. For the projector to operate optimally, some periodic maintenance will be needed and some readjustments of factory settings may be required. The factory settings should not be readjusted without first consulting with Hughes-JVC service personnel.

**Use Hughes-JVC Authorized Service Only.** This protects your equipment and keeps its warranty in force.



**WARNING!!!**



**To prevent injury to personnel and damage to the equipment,** projector covers should be removed and maintenance procedures performed by Hughes-JVC Certified Maintenance Technicians only. Prior to removing covers review the chapter on Safety and adhere to all warnings.

**When performing maintenance, protect yourself by:**

- Turning the projector off and disconnecting the power cord.

- Observing all precautions printed on warning labels.
- Observing proper electrostatic discharge procedures.
- Wait about a minute after turning power off and removing the power plug for the high voltage to bleed off.

To insure continuous reliable performance, follow the procedures recommended in this chapter.

## 6.1 Preventive Maintenance

- Avoid direct sunlight, moisture, heat and improper mounting.
- Avoid using in a dusty environment.
- Provide sufficient ventilation to the fans to avoid overheating of internal components.
- Clean and maintain the fans and air filters to avoid restriction of air flow and overheating of the projector.
- Do not place magnetic equipment near the projector.
- Disconnect AC power from the projector before cleaning.

### Cleaning the Cabinet

Clean the cabinet periodically with a soft cloth. If the cabinet is heavily stained, use a mild detergent solution. Never use strong detergents or solvents such as alcohol or thinner to clean any part of the projector.

### Cleaning the Lenses

Under normal environmental circumstances, lenses require cleaning only when accumulated dust makes the picture fuzzy.

Do not clean the inside lenses. Clean the projection lenses with camel hair brush to remove dust or use dry air to blow dust off, then dampen a lint free cloth with lens cleaning fluid or isopropyl alcohol and quickly drag the cloth from the top of the lens to the bottom. Clean the lens only when absolutely necessary-too frequent cleaning can destroy the lens coating. Refer to Hughes-JVC Service Bulletin 9308, at the back of this manual, for more details on cleaning procedures for the lenses, **ILA**<sup>®</sup> assemblies, mirrors etc.

### Cleaning Air Filters

Air filters should be cleaned every 500 hours or sooner, depending on the environment the projector is operating in.

Be sure the projector is unplugged and has had time to cool off before cleaning the air filters. Remove the filters and soak them in soapy water, then rinse them well and blow them dry. Do not re-install them until they are *thoroughly* dry. For details on removing and replacing air filters, refer to the Series 300 Service Manual, Section 4.3

### WARNING!!!

The procedures that follow involve maintenance requiring the projector cover to be off. **Dangerous, high voltages** are present in the projector. These procedures should be performed by Hughes-JVC Certified technicians only. Review the Safety Information chapter at the front of this manual prior to attempting any of these procedures.

## 6.2 Maintenance (Cover-Off) Power-On Sequence

Before applying power to the Series 300 Projector, verify that the projector is connected to a 176-264 VAC, (20 Amp source for Models 310E, 315, 320 and a 30 Amp source for Model 335) 50/60 Hz, single phase power source. If there is any visible damage to any of the cables do not power on the projector until the damaged cable is replaced.

To turn on projector power:

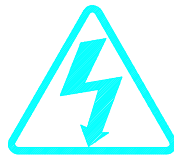
1. If using a terminal or tethered remote control, connect one or the other to the input jack marked "Terminal In" on the rear panel of the projector card cage.
2. Remove the rear cover from the projector.

### CAUTION!!!

If the projector has been operating, and the rear cover must be removed, be sure to set the power interlock switch (*see Figure 6-1*) to the UP position **immediately** and turn the projector back on with the remote. Then turn the projector power back off with the remote. This allows power to be re-applied to the fans to cool the arc lamp which remains very hot even after power is removed.

During a normal power shutdown the fans will continue to run for several minutes to cool the arc lamp.

3. Turn on the main circuit breaker (marked INPUT BREAKER) located on the right side of the main power supply inside the projector. This switch turns on the +5V standby power supply for the main processor.
4. Replace the rear cover on the projector or set the power interlock switch, on top of the system power supply, to the full UP position (See *Figure 6-1*).



**WARNING!!!**



With the cover off the projector, be careful not to touch any open parts of the projector. Be particularly careful of any high voltage wires (large, red wires) which, although heavily insulated could still cause severe electrical shock if the insulation is pinched or damaged. **NEVER** look into the Xenon Arc Lamp light path or directly at any of the projection lens light paths-the light intensity is strong enough to cause injury to eyes.

**NOTE:** If using a tethered remote or a terminal for projector control, an active display should now be visible on the LCD or screen. This is the Standby Power mode. The projector is now ready for a power "ON" command.

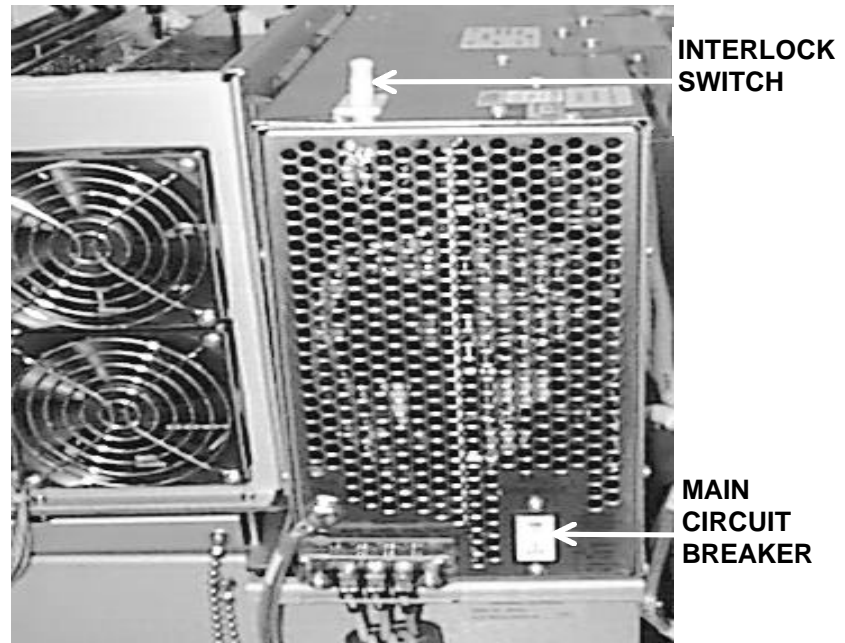


Figure 6-1. Set interlock switch to full UP position to power projector with rear cover removed.

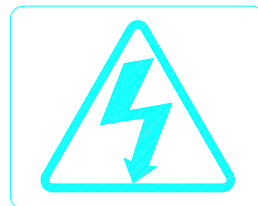
5. Press the Power ON key to turn on the projector (press both Power keys simultaneously if using the tethered remote). The ignitor circuit will ignite the arc lamp and power will be applied to the electronics system.

**NOTE:** If using a terminal or PC, turn full power on by typing CTRL-P. To power up the electronics only, type CTRL-E. To power up the lamp only, type CTRL-L. These are toggle commands; repeated issuance of the commands toggles these power sources on and off. The lamp and electronics cannot be powered up separately with the remote controls.

For procedures 6.3 through 6.6 below, use Test Pattern #2, White X-Hatch.

### 6.3 CRT Yoke Rotation

The CRT deflection yokes are factory set. If the CRT image is not level, adjust the individual CRT deflection yoke as required. (See *Figure 6-2*).



### **WARNING!!!**

To prevent possible electrical shock when performing the yoke rotation always wear ANSI/ASTM 10,000 volt rated safety gloves for protection from the dangerous high yoke voltages that are present. Make sure the gloves are not cracked!

To adjust the deflection yokes:

1. Press TEST 2 to display the White X-hatch pattern, (Use this test pattern for all procedures through 6.6).
2. Cutoff R and B and view G.
3. Remove the rear projector cover.

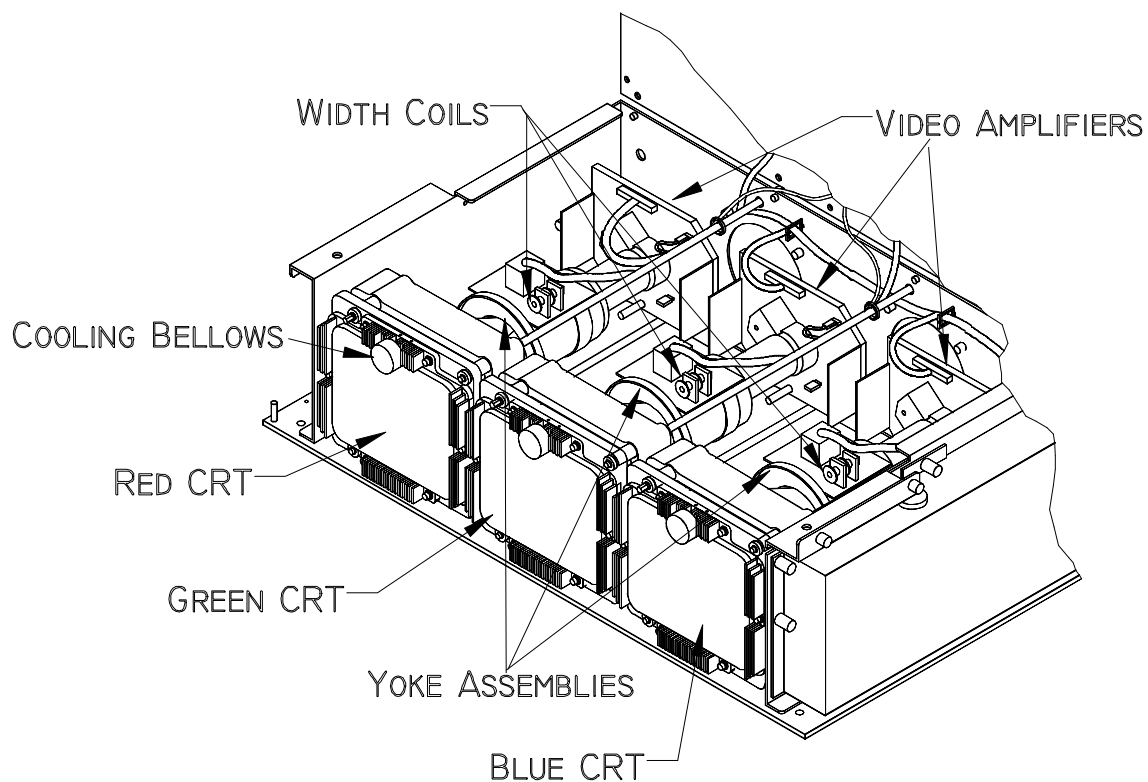


Figure 6-2. View of the CRT Assembly with System Power Supply removed showing deflection yokes and width coils.

4. Remove the 2.5mm allen screw holding the electronics module in place and tilt the electronics module (see WARNING below) back to expose the CRT necks and yoke.

### **CAUTION!!!**

Remove anything plugged into the rear electronics jacks or the plugs could be badly damaged when you tilt the electronics module back.

5. While observing the center horizontal line on the grid pattern, rotate the green CRT deflection yoke, (the green CRT is in the middle), to achieve a level image at the center of the screen. (You may have to loosen the yoke clamp slightly to adjust it.)

**NOTE:** Whenever adjusting the CRT yoke, push forward on the yoke while rotating it to ensure the yoke remains properly positioned on the CRT.

6. View R.

7. Rotate the red CRT deflection yoke (on the right of the projector-from the rear) to achieve a level image at the center of the screen (it should be parallel to the green central horizontal line).

8. View B.

9. Rotate the blue CRT deflection yoke to achieve a level image at the center of the screen (it should be parallel to the green and red grid center lines).

10. Retighten the yoke clamp so it is secure. Be careful not to overtighten it.

11. Tilt the electronics module back into place.

12. Replace the allen screw from step 4 above.

13. Replace the rear cover.

14. After Yoke rotation, readjust only Geometry, Convergence and CRT Mechanical focus.

## 6.4 Vertical Size Tracking

If the R or B vertical size does not match G, adjust the R and B vertical size pots on the Vertical Deflection Board (Figure 6-3).

**NOTE:** The tracking pots are factory adjusted and should **not** normally need adjustment. The Green Vertical Size control (R-228) in particular, should **never** be adjusted unless the Green Yoke or Green CRT has been replaced.

- The Red Vertical Size control is R-428.
- The Blue Vertical Size control is R-328.

To adjust the vertical size controls:

1. Remove the rear projector cover.
2. Remove the eight screws holding the electronics module cover and remove the cover.
3. Position R and B over G (using the POS and arrow keys on the remote-refer to Section 4.9.10) so that the R and B lines at the center match the G lines.
4. Adjust R328 and R428 so that the Red and Blue vertical sizes match the Green vertical size.
5. If unable to match Red or Blue to Green, balance the error on the right and left or top and bottom.
6. Replace the electronics module cover.
7. Replace the rear projector cover.

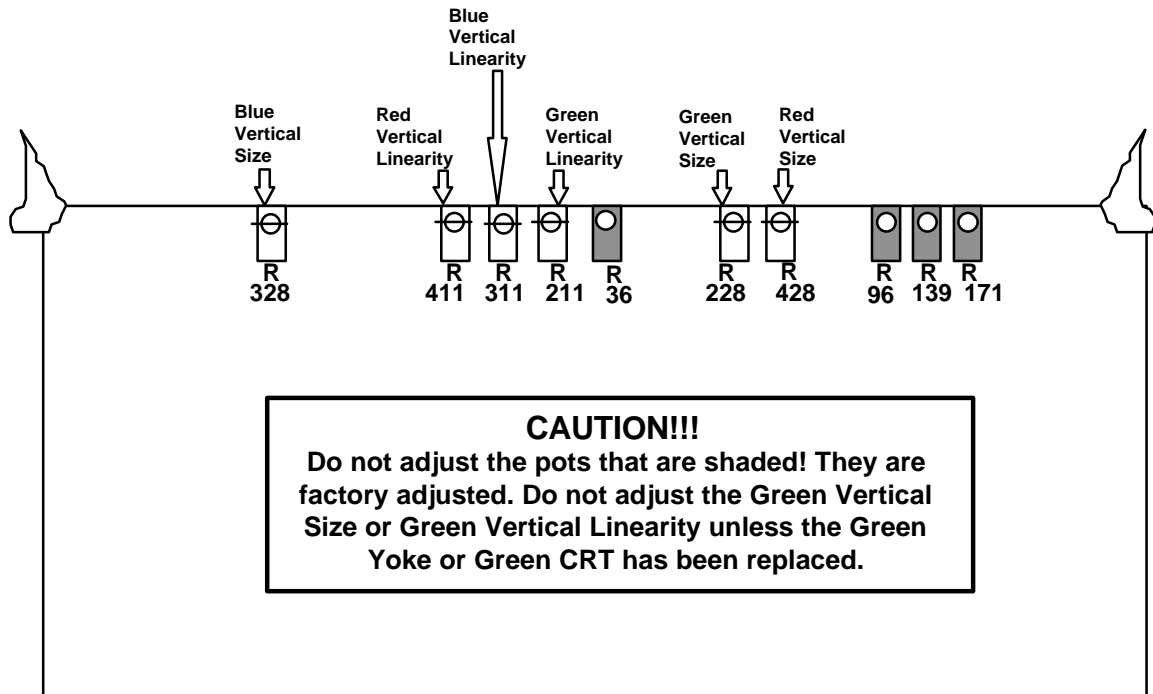


Figure 6-3. Vertical size and Linearity controls are on the Vertical Deflection Board.

## 6.5 Vertical Linearity Tracking

If the vertical linearity is not completely linear, use a small slot screwdriver and adjust the following linearity controls on the Vertical Deflection Board: (See *Figure 6-3*). First remove the projector cover and the electronics module cover. Follow steps 1 and 2 in Section 6.4.

**NOTE:** The Vertical Linearity pots are factory adjusted and will not normally need adjustment. The Green Vertical Linearity pot (R-211) in particular, should **never** be adjusted unless the Green Yoke or Green CRT has been replaced.

Using TEST 2, view Red over Green and position Red (use the POS control and the arrow keys on the remote) so that the Red lines at the center match the Green lines then adjust the Red Vertical Linearity pot R-411 so that Red linearity matches Green. Repeat the same procedure for Blue (R-311). Replace the electronics module cover and the projector cover.

## 6.6 Horizontal Size Tracking

The horizontal width coils are factory adjusted and will not normally need adjustment. In general, if the R and B vertical lines are within 2 crosshatch lines of each other, they can be brought in line with the Convergence procedure. If the R or B horizontal size does not match G within 2 crosshatch lines, adjust the Horizontal Width coils on the R and B Deflection Yokes (*Figure 6-2*). The width coils are mounted on a small circuit board on top of the Yoke assembly inside a white ceramic holder and the adjustment is accessed from the opening at the end of the ceramic holder.

### **WARNING!!!**

To prevent possible electrical shock when performing the width coil adjustment always wear ANSI/ASTM 10,000 volt rated safety gloves for protection from the high yoke voltages that are present. Make sure the gloves are not cracked.

To adjust the horizontal size tracking:

1. Follow procedure 6.3, steps 3 and 4 to gain access to the yoke.
2. View G and R.
3. Position Red over Green at the center of the screen with the POS and arrow keys (refer to Section 4.9.10) and observe the screen edges. If the Red lines on both edges are either outside *or* inside the Green lines, adjust the Red width coil as shown below. If Red is outside Green on one side *and* inside Green on the other side, balance the error on each side with the width coil.
4. Use a small plastic screwdriver to turn the red coil core (the red CRT is on the right side looking from the rear) clockwise or counterclockwise until the Red horizontal size matches Green.
5. Cutoff R and view G and B.

6. Use a small plastic screwdriver to turn the blue coil core (the blue CRT is on the left side looking from the rear) clockwise or counterclockwise until the Blue horizontal size matches Green.
7. Repeat steps 11, 12 and 13 from Section 6.3.

## 6.7 ILA<sup>®</sup> (Image Light Amplifier) Bias Settings

The ILA<sup>®</sup> Bias settings are factory set and should not normally need adjustment unless specific maintenance has been performed that requires an ILA<sup>®</sup> Bias readjustment. Avoid readjusting the ILA<sup>®</sup> Bias settings unless absolutely necessary.

The ILA<sup>®</sup> Bias settings adjust the electrical bias levels to each ILA<sup>®</sup> assembly to a "just off" threshold point so that even the smallest incoming light from the CRT makes the ILA<sup>®</sup> assembly react. When properly set, this adjustment will put each ILA<sup>®</sup> assembly at the threshold of operation. If not properly set, image black level will be adversely affected and the ILA<sup>®</sup> assembly won't react properly to incoming light. ILA<sup>®</sup> Bias adjustments should be done in a darkened room.

**NOTE:** If the room cannot be darkened enough to set the ILA<sup>®</sup> Biases using the screen, try holding a piece of paper a few inches from the lens of the color you are adjusting. Adjust the bias in the usual manner while viewing the entire ILA<sup>®</sup> assembly area on the paper.

The CRTs will automatically cut off when you enter the ILA<sup>®</sup> Bias mode and any light on the screen is being reflected by the ILA<sup>®</sup> assembly.

To set the ILA<sup>®</sup> Bias levels:

1. Press MENU on the remote and select #3 ILA<sup>®</sup> SETUP, from the MAIN MENU.
2. Enter passcode 123 and press ENTER.
3. Select 3, ILA<sup>®</sup> FREQUENCY ADJUST from the ILA<sup>®</sup> ADJUSTMENTS MENU.
4. A frequency of 2KHz is acceptable for general video viewing. A lower frequency (as low as 1.5KHz) will provide a brighter image but with less resolution and an increase in

image lag. For HDTV a frequency of 2.5-3KHz provides higher resolution with less image lag at the expense of some brightness. Use the UP/DOWN keys to adjust the **ILA**<sup>®</sup> frequency for the type of video you will be working with. As a general rule 2KHz will work well with most video sources. When the frequency desired is shown, press ENTER.

5. Press MENU again to get the **ILA**<sup>®</sup> ADJUSTMENTS MENU.
6. From the **ILA**<sup>®</sup> BIAS ADJUSTMENT MENU, select 2, BIAS W/O VIDEO. Do not attempt **ILA**<sup>®</sup> Bias adjustments on Bias W/ Video. This feature is used for factory quality control only.
7. Press G on the remote, to select Green. Place lens caps over the Red and Blue lenses.
8. Use the Up/Down arrows to adjust the Green **ILA**<sup>®</sup> Bias until the brightest area of the **ILA**<sup>®</sup> image is just extinguished and any further adjustment does not make the screen any darker. Then raise the bias level until the **ILA**<sup>®</sup> image just starts to illuminate the screen at any point. Finally, slowly lower the bias level again to the threshold point where the **ILA**<sup>®</sup> image is just extinguished. Make sure the MENU hasn't "timed out", as it will if a 30 second period has elapsed without a key being pressed. If this happens, make the menu selections again by repeating steps 5, 6 and 7 for the active color.

**NOTE:** It's crucial for the optimum operation of the projector to set the bias level to the point where the selected color *just begins* to appear on the screen. Find the spot on the screen where the active color first begins to get brighter and use that as the reference point. Go below and above this point to find the setting where one click on the UP key causes an increase in brightness and stop at that point. This will insure that the weakest video signal will cause the **ILA**<sup>®</sup> assembly to respond.

9. Cover the Green lens and uncover the Red lens. Press R to select Red.
10. Repeat Step 8 for the Red **ILA**<sup>®</sup> Bias.
11. Cover the Red lens and uncover the Blue lens. Press B to select Blue.
12. Repeat Step 8 for the Blue **ILA**<sup>®</sup> Bias.
13. Press Enter on the remote to save the settings.

**NOTE:** The **ILA**<sup>®</sup> Bias adjustments affect other projector settings. When completing the **ILA**<sup>®</sup> Bias adjustments, verify

and readjust, if necessary, all projector adjustments from Chapter 4.

## 6.8 CRT Mechanical Focus (RGB)

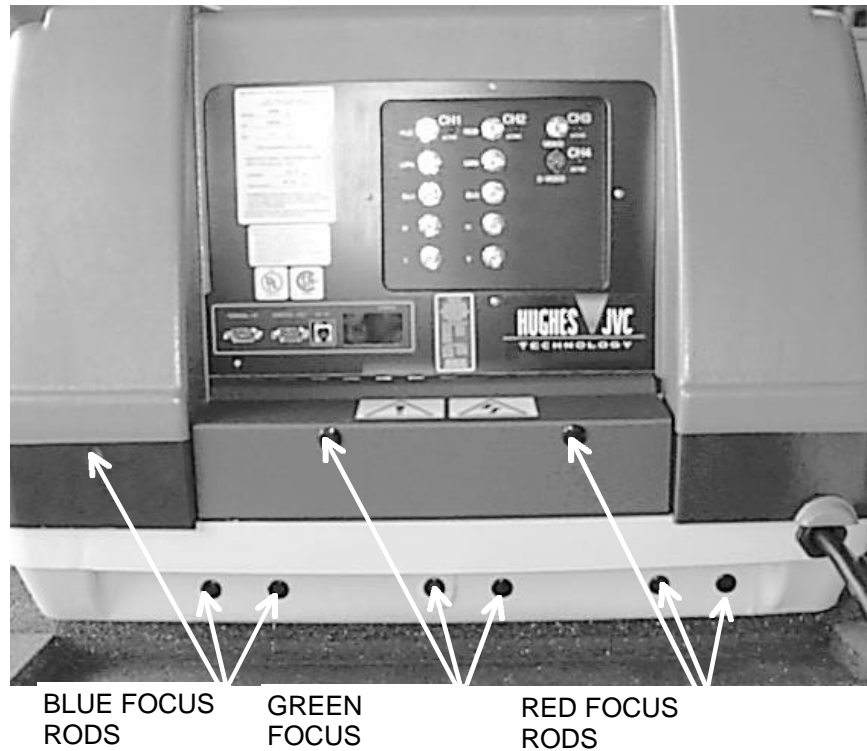
The CRT mechanical focus is factory set and will normally not need to be adjusted. Whenever a major component has been replaced (like a CRT) or repaired the CRT mechanical focus will have to be reset. Use the same test pattern as in the projection lens focus above (TEST PATTERN 8, H-Grid) and observe the corners of the screen. If the corners are all in sharp focus, the mechanical CRT focus should not be adjusted. If the image is not sharp enough, proceed with the mechanical focus adjustment below.

There are three adjustment rods for each CRT. The rods are accessed through holes in the base and fan casing at the rear of the projector (See *Figure 6-4*).

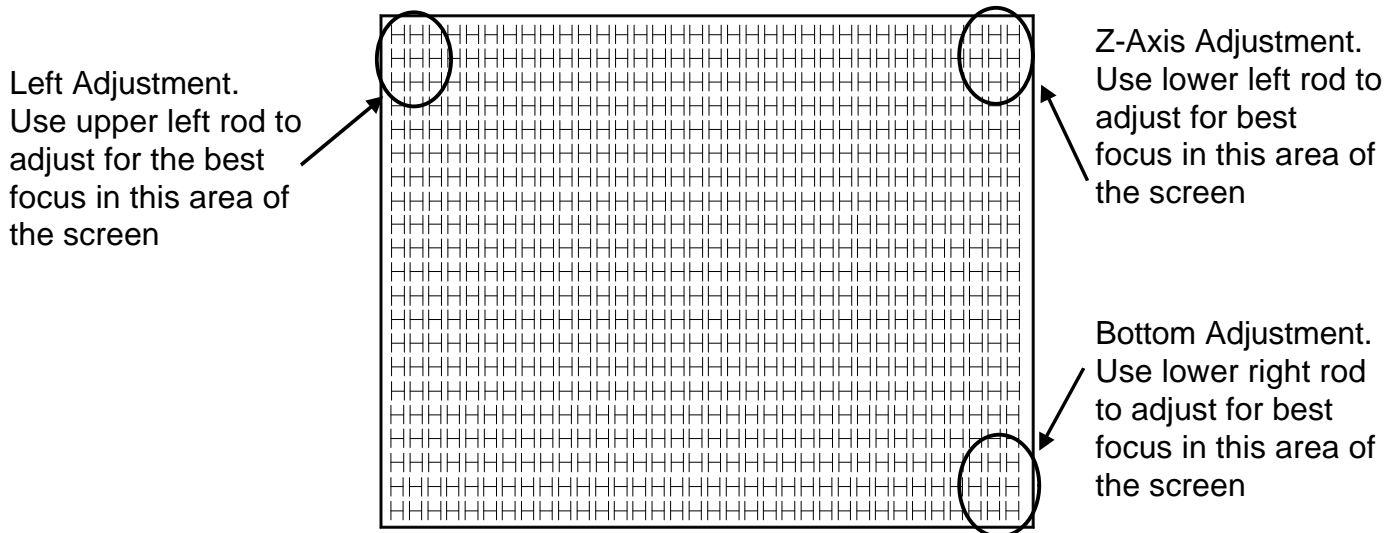
The focus rods will be adjusted so that each CRT face is completely parallel to its respective **ILA**<sup>®</sup> assembly, (i.e. positioning the CRT screen face planar with the **ILA**<sup>®</sup> along the x, y and z axes).

**Each** CRT has three focus rods; lower-left, lower-right and upper-left. The focus rods for **each** CRT work as follows (see *Figures 6-4 and 6-5*):

- The lower left rod adjusts the CRT to **ILA**<sup>®</sup> distance (z-axis) for upper right corner and overall focus.
- The lower-right rod adjusts the bottom position of the CRT
- The upper-left rod adjusts left-side position of the CRT.



**Figure 6-4.** CRT focus adjustment rods. Use a 5mm nutdriver to adjust the focus rods.



**Figure 6-5.** Adjust the focus rods (*Fig 6-4*) for best focus at these points on the screen.

Use Test Pattern 8, H-Grid, and adjust the focus rods for the best mechanical focus as follows:

1. Cutoff R and B and view G. Verify G highlighted on the screen.
2. Remove the hole caps to gain access to the focus rods. For the Green CRT, use a 5 mm nut driver to adjust the lower-left rod of the Green focus rods (see *Figure 6-4*). Have another person watch the **upper-right** corner of the screen for the sharpest focus as you adjust the rod. This focus rod is the CRT z-axis position and affects the overall focus. Observe the upper right corner because it is the pivot point for the other two focus rods.
3. Adjust the lower right focus rod of the Green focus rods and look for the sharpest focus at the **bottom right** of the screen in the same manner as in Step 2 above.
4. Adjust the upper left focus rod of the G CRT focus rods for the sharpest focus at the **upper left** of the screen in the same manner as in Step 2 above.
5. Cut off G and view Red.
6. Repeat Steps 2-4 for Red.
7. Cutoff R and view B.
8. Repeat Steps 2-4 for Blue.

## 6.9 Electronic Focus(RGB)

This focus adjustment is factory set and should not need to be adjusted. Whenever a major component has been replaced, like a CRT, or if the high voltage power supply has been repaired the electronic focus will normally have to be readjusted. To do this, select test pattern 8, H-GRID, and observe the screen for a sharp focus at the center of the screen. If the center appears sharply focused, there is no need to perform the electronic focus. If readjustment of the electronic focus is necessary, follow the procedure below:

**NOTE:** The electronic focus adjustment focuses the electron beam in the CRT. View one color at a time for these adjustments. Recheck the focus of each color because some interaction between R, G and B may occur. The electronic focus adjustment panel, is located on the High Voltage Power Supply on the left-rear side of the projector (see *Figure 6-6*).

To adjust the electronic focus:

1. Press TEST 1, Test Pattern 8, H-GRID.
2. Cutoff R and B.
3. Using a small plastic screwdriver, adjust the electronic focus for Green and observe the center of the screen. Have another person watch the center of the screen up close while adjusting.

**NOTE:** Be careful to adjust the Electronic Focus and not G2. They are in the same area and could be mistaken for each other. (Refer to Figure 6-6).

4. Cutoff G and view R.
5. Repeat Step 3 for R electronic focus.
6. Cutoff R and view B.
7. Repeat Step 3 for B electronic focus.

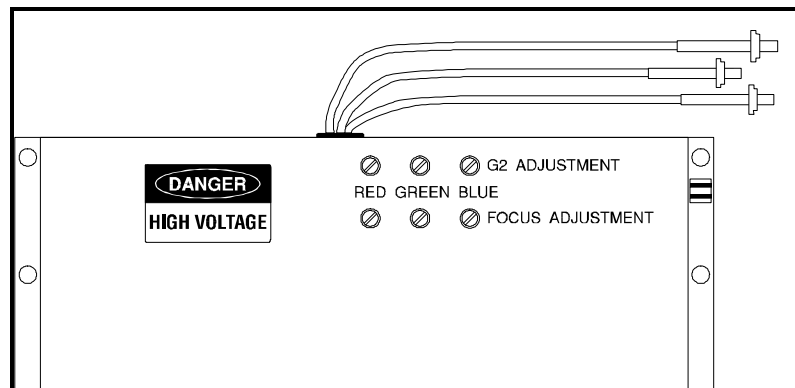


Figure 6-6. The Electronic focus and G2 adjustments are located on the high voltage power supply on the rear-left side of the projector under the cover.

## 6.10 G2 Adjustment

The G2 adjustment is factory set and should not need to be readjusted. Whenever a major component like a CRT or **ILA**<sup>®</sup> has been replaced *or* the high voltage power supply has been repaired *or* if the picture size or aspect ratio changes significantly (e.g. going to an HDTV signal), G2 must be reset. G2 sets the threshold of the CRT image and is located on the high voltage power supply on the rear-left side of the projector, in the row above the electrical focus adjustments (*see Figure 6-6*).

If new channels are set up the G2 setting itself shouldn't need adjustment but the THRESHOLD OFFSET must be set to 50.

### 6.10.1 Threshold Offset Adjustment

To set the THRESHOLD OFFSET for a new channel:

1. Press POS/CONV to go into the Convergence mode.
2. Press HIDE/MODE and toggle to THRESHOLD.
3. Press MENU to get the Convergence menu.
4. Select #3 CLEAR ALL AXES (also clears XY Convergence).
5. Press MENU to put the Convergence Menu back on the screen and select #1 OFFSET AXIS DATA. "THRESH OFFSET" appears on the screen.
6. Verify G is the active (highlighted on screen) color and use the arrow keys to set a THRESH OFFSET of 50. Repeat for R and B.

### 6.10.2 G2 Setting

**NOTE:** The following preliminary steps are required prior to setting G2:

#### **CAUTION!!!**

The channel selected for this procedure will lose all its data for Convergence and Shading.

A. Select a channel from the channel list. (*Refer to Channel Selection instructions in Section 4.2.1*).

B. CLEAR ALL AXES as shown in Section 6.10.1, steps 1-4, above.

C. Adjust for full size image on the screen. (*Refer to Position and Phase, Section 4.9.1 and Size, Section 4.9.2*).

D. Adjust Menu Position using Test 9 and the Timing Setup Menu. (Refer to Section 4.9.10.

E. Set the THRESHOLD OFFSET to 50 for R, G and B. (See section 6.10.1 above).

To set G2:

1. Cut off R and B and view G.
2. Using Test Pattern 9, adjust Green G2 (be sure you are adjusting G2-refer to Figure 6-6 or read the label on the panel.) on the left side of the projector. TEST PATTERN #9 has four identical sections of nine color bars each (see Figure 6-7), going from black to full brightness (white). Use the **dark** bars in the **brightest** of the four sections and adjust for a distinct line between the two **darkest** bars and a *normal transition* from one bar to the other.
3. Press TEST 4 (Dot Pattern) and toggle the HIDE/MODE key. Verify there is no change in the background raster brightness while toggling. (The Dot Pattern will turn on and off as the HIDE/MODE key is toggled but the *background brightness* should not change while toggling.) If the background brightness changes as the HIDE/MODE key is toggled it is an indication that G2 is set too high and the procedure should be repeated. When *readjusting* G2, look for a *slightly less* distinct line between the same two dark bars used on the first G2 adjustment.
4. Press TEST 9 to go back to the Grey Scale pattern.
5. Cut off G and view R.

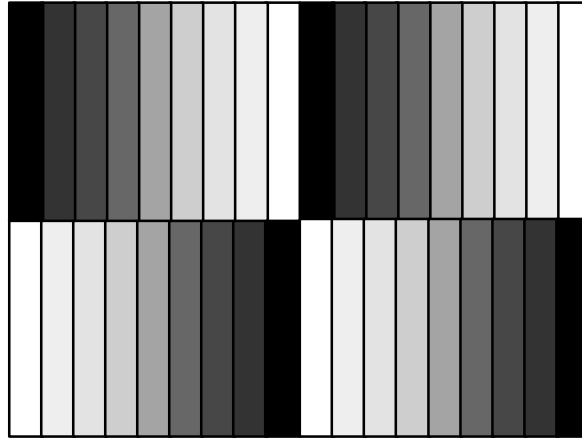


Figure 6-7. Test Pattern 9 has four sections of 9 color bars each. Use the two darkest bars in the brightest section to set G2.

6. Repeat steps 2, 3 and 4 for the Red G2 level.
7. Cut off R and view B.
8. Repeat Steps 2, 3 and 4 for the Blue G2 level.

**NOTE:** The G-2 adjustment affects various projector settings. When completing the G-2 adjustment, verify and readjust, if necessary, all projector adjustments from Chapter 4.

