SERVICE MANUAL

Model 100 Projector

HUGHES JVC TECHNOLOGY

2310 Camino Vida Roble
Carlsbad, California 92009

Phone: (760) 929-5300
Fax: (760) 929-5410

DECLARATION OF CONFORMITY

PER ISO/IEC GUIDE 22 AND EN 45014

Manufacturer: Hughes JVC
2310 Camino Vida Roble
Carlsbad, Ca 92009
USA

Hughes-JVC declares that this product conforms to the following Product Specifications (Directive/Standard):

Safety: EN 60950
IEC 950 (1992)

EMC: EN 55022 (1988) / CISPR-22 (1986) Class "A"
EN 50082-1 (1992) / IEC 801-2(1991)
EN 50082-1 (1992) / IEC 801-3(1984)
EN 50082-1 (1992) / IEC 801-4(1988)

ANSI C63.4-1992, FCC, Part 15, Class A

In addition, the above product complies with the requirements of the Low Voltage Directive 73/23 EEC and the EMC Directive 89/336/EEC.

105827 First Edition	February 1999
Revision A	July 1999

Table of Contents

Safety Information

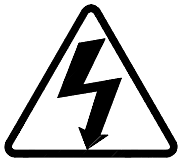
Introduction

Read entire Safety Chapter thoroughly before performing any maintenance or service on the projector. Only qualified service personnel should perform procedures and adjustments.

Safety Equipment: Use safety equipment specified in the projector's maintenance training and certification program.

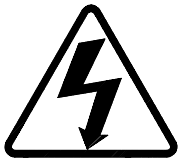
Warnings and Cautions!

Warnings and Cautions in this manual should be read thoroughly and strictly adhered to. Warning and Caution definitions and symbols are as follows:

 **WARNING SYMBOL!!!** Warns user of a potential electric shock hazard in a procedure or situation that could result in personal injury if improperly performed.

 **CAUTION SYMBOL!** Warns user of a potential safety hazard or potential light hazard from ultraviolet, infrared or bright light that could cause severe eye injury or a situation that could result in damage to the equipment if improperly used.

Installation Safeguards

 **WARNING!!!** Procedures in this service manual require removing the projector's covers to access internal component to remove, replace, service and adjust the projector. Only Hughes-JVC Certified Technicians are qualified to perform these procedures. Before removing or replacing any internal components or subassemblies, verify that the circuit breaker on the back panel is in the Off position **and** remove the power plug. Any adjustments

performed that require covers off and power on should be performed with extreme care. Be especially aware of all hazardous areas indicated by warning and caution labels.

 **CAUTION!** Do not use a forklift to lift the projector without using a safe shipping pallet. Lifting the projector without supporting the weight at the foot locations can cause severe damage to the projector.

If there is any visible damage to the power cable, disconnect power to the projector until the damaged cable is replaced. Install the projector on a smooth, vibration-resistant level surface, or ceiling mount, in an area free from dust and moisture. Do not place the equipment in direct sunlight or near heat-radiating appliances. Smoke, steam and exposure to direct sunlight could adversely affect the internal components.

If mounting the projector, use hardware that can handle a minimum of three (3) times the projector weight.

Heat Safeguards

Fans and Ventilation: The projector has multiple fans to cool the system. **Do not block the intake or outflow of any fans.** Heat is emitted within the system and must be properly dissipated to keep the system running correctly. Blocking air intake or exhaust ports can lead to projector overheating. Do not enclose the unit in a restricted space (refer to the physical access and thermal clearance illustration guidelines).

 **CAUTION!** Do not unplug the power cord until after the arc lamp fan has stopped running. This fan protects the arc lamp from overheating. Disconnecting power before the cooling fans have stopped running can shorten Arc Lamp life.

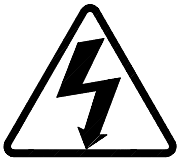
Light Safeguards

Dangerous high voltage, bright light, ultraviolet, and infrared radiation can be hazardous to personnel. Access must remain restricted to certified engineers and technicians.

Ultra Violet and Infrared Light

Protect eyes and face from ultra violet light and infrared light by using the following protective eyewear:

1. X3 (up to 375 nanometers), ANSI approved, shade goggles must be worn by anyone near the projector when it is lit and the cover is off.
2. X5 (375 to 700 nanometers), ANSI approved, shade goggles when actually working on the projector near the arc lamp source.

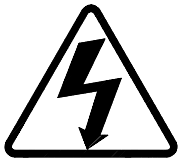


WARNING, BRIGHT LIGHT!!!

Never look directly at the Arc Lamp, the lighted Projection Lens or into the lamp housing, from any distance, when the projector is on. Direct exposure to light of this brightness can cause severe eye injury.

Dangerous levels of ultraviolet and infrared radiation, dangerous glare, very high temperatures and high internal gas pressure are present at the Xenon Arc Lamp. The lamp is contained in a protective reflector housing module and should not be operated outside this housing or outside of the projector. When replacement is needed, the arc lamp must be replaced as an entire module, as shown in this manual. Do not open the lamp housing or attempt to replace the Arc Lamp inside its module! Do not touch the Arc Lamp, or any connections, when the lamp is ignited or is arcing. Any servicing of the Arc Lamp must remain restricted to Hughes-JVC certified maintenance personnel.

Electrical Safeguards



High voltage access. The front cover contains a safety interlock. Defeat restricted to certified service personnel!

WARNING!!! High Voltage points up to 40,000 volts are exposed inside the covers. Allow at least one minute for the high voltage to bleed off, even after power is turned off.

Due to high voltage danger, **DO NOT TOUCH**

- CRT cables. These cables can cause severe shock from a tiny, invisible crack or hole and should never be touched while projector power is on.
- CRT anodes.
- Main power ± supply posts.
- Arc Lamp main power ± posts
- CRT yoke assemblies and other proximity electrical assemblies, components and wiring. If performing the ILA® Back Focus, Overlap

adjustment, always use an ANSI/ASTM 10,000 volt rated glove. Periodically check the condition of the gloves for cracks.

Power Supply

The Model 100 projector operates from a 90V - 264V, 20 Amp, single-phase, 50/60 Hz AC power source. **Verify that local power source matches these requirements before operating!** Installation should be performed by an electrician with current knowledge of electrical codes in the country of use.

For continued safe and reliable operation, only use cables supplied by the manufacturer for power and signal connections.

Ventilation and Foreign Object Retrieval

CAUTION! Ensure the projector's multiple fans are free from obstructions and operating properly. Air filters are located at vent ports on the cover. Air filters require periodic cleaning to ensure adequate cooling of the projector (*Section 4.4*). Ensure that all vent ports are clear of obstructions.

Keep the inside of the projector free from foreign objects, such as hairpins, nails, paper, etc. Do not attempt to retrieve any object or insert metal objects such as wire and screwdrivers inside the unit. If an object falls inside the projector, immediately unplug the projector and call a certified technician to remove object.

1.0 Introduction

Contents

This Service Manual is designed to be used with the Model 100 User's Guide. This Service Manual provides information on the:

- Projector functional description;
- Service adjustments
- Removal and replacement of subassemblies;
- Troubleshooting.

The User's Guide covers the projector's installation, operation, setup adjustments, and specifications. Together the Service Manual and User's Guide provide a qualified service person with information to operate and maintain the projector.

1.1 Safety

This projector contains high voltages and high intensity light sources in its internal system and power supplies. Read the entire Safety Chapter at the front of this manual before performing any adjustments or maintenance.

When performing procedures that call for the projector's power to be on, always wear high voltage gloves (ANSI/ASTM 10,000 volt rated) when working around the CRTs, Arc Lamp or power supplies. Wear safety goggles (rated X5) when working anywhere near the light path from the Arc Lamp or the projection lens at all times.

1.2 Updates

Hughes-JVC will periodically provide Service Bulletins and /or manual supplements to ensure the accuracy of this service manual.

1.3 Tool List

The following tools are required to perform service adjustments:

All Purpose Tools=Diagonal Sidecutters, Wirestrippers, Slot Adjustment Screwdriver (Tweeker), Mirror/Magnet Pick-Up Tool, Flashlight, 6” Crescent Wrench, Needlenose pliers, 6” Vise Grips

Balldriver, 1.5mm
Balldriver, 3mm
Balldriver, 3mm, Long
Balldriver, 4mm
Balldriver, 5mm, Long, T-handle
Balldriver, 6mm
Balldriver, 8mm
Ballpoint L-Wrench Set, 1.5-5mm
Delrin .100 Hex Alignment Tool
Gloves, ANSI/ASTM 10,000 volt rated, Safety
Goggles, Safety, x3(covers on) and x5(covers off)
Hex Ballpoint Driver, 3mm
Hex Ballpoint Driver, 5mm
Nutdriver, 10mm
Nutdriver, 11mm (or 7/16”)
Nutdriver, 5mm
Nutdriver, 7mm
Nutdriver, 8mm
Screwdriver, Phillips, #1
Screwdriver, Phillips, #2
Screwdriver, Pozidrive, #1
Screwdriver, Pozidrive, #2
Screwdriver, Slot ¼”
Screwdriver, Slot, ½”
Screwdriver, Slot, 3/16”
Socket, ¼” drive, 7mm-deep

1.4 Acronyms Used in this manual

ALPS	Arc Lamp Power Supply
CDB	Convergence/Deflection Board
CH	Channel
CPU	Central Processing Unit
CRT	Cathode Ray Tube
DP PCB	Deflection Processor Printed Circuit Board
EMI	Electromagnetic Interference
EPROM	Erasable Programmable Read-Only Memory
FPGA	Field Programmable Gate Array
F to V	Frequency to Voltage
G_1	CRT Grid 1

G_2	CRT Grid 2
HD PCB	Horizontal Deflection Printed Circuit Board
Hz	Hertz
HSYNC	Horizontal Sync
VCD PCB	Vertical Convergence Deflection Printed Circuit Board
HVPS	High Voltage Power Supply
IIC	Inter-Integrated Circuit
ILA®	Image Light Amplifier
I/O	Input/Output
I/R	Infrared
kHz	Kilohertz
LED	Light Emitting Diode
LVPS	Low Voltage Power Supply
PC	Personal Computer
PCB	Printed Circuit Board
PLL	Phase Lock Loop
RAM	Random Access Memory
REG PCB	Regulator Printed Circuit Board
RGB	Red, Green and Blue
RGBHV	Red, Green, Blue, Horizontal, Vertical
ROM	Read Only Memory
SC/RTG PCB	System Controller/ Raster Timing Generator Printed Circuit Board
SYNC	Synchronization
TTL	Transistor-Transistor Logic
UL	Underwriter Laboratories
UV	Ultraviolet
VA PCB	Video Amplifier Printed Circuit Board
VCO	Voltage Controlled Oscillator
VIC	Video Input Card
VIN	Video Input
VP PCB	Video Processor Printed Circuit Board
VSYNC	Vertical Sync

2.0 System Description

Contents

2.1 Introduction

The Model 100 Projector consists of assemblies and components, which are grouped into the three main sections listed below. Included in each of the sections is a list of the main components found in that section and a brief description of their function (*see Figure 4-1 for physical locations of assemblies and components*).

- The Optics Assembly Section sits toward the front of the projector. It consists of an Arc Lamp Module, the Illumination Path, the CRT/ILA® Modules and the Front Lens. The Arc Lamp Module provides the 750 Watt high intensity light source for the projected image. The illumination path consists of optics that filter, polarize, separate the beam into red, green, and blue light and direct it to the ILA® and then to the Front Lens Assembly. The ILA® \CRT Modules supply the image and modulate the light to create the projected image. The Front Lens sends the image to the screen.

- The Power Supply Section consists of three power supplies: the Arc Lamp Power Supply, the Low Voltage Power Supply and the High Voltage Power Supply. The Arc Lamp Power Supply supplies constant adjustable current to the arc lamp. The High Voltage Power Supply drives the CRTs with anode voltage, G_2 voltage, the focus voltage and the G_1 voltage. The Low Voltage Power Supply provides the standby voltages and bias voltage for all the digital and analog circuits. It also supplies the CRT filament voltage and some supply voltages for the Horizontal Deflection PCB, and the Video Amp PCBs.
- The Projector Electronics Section is located mainly in the back half of the projector. It consists of the Electronics Module that houses 6 of the electronics printed circuit boards used in the projector, and their associated cabling. It also contains the Backplane PCB which is used to electrically interconnect the printed circuit boards, power supplies and other units in the projector, the Video Amp PCBs and Regulator PCB, and the Video Input Cards that interface with different kinds of input signals.

2.2 Optical System

The Arc Lamp Module

The Arc Lamp Module includes a 750-Watt Xenon Arc Lamp that is located directly below the Front Projector Lens in the front of the projector. The Arc Lamp is driven by the Arc Lamp Power Supply, which sits in the front of the projector opposite the Arc Lamp Module.

The Illumination Path

The illumination path is a very complex optical system of condensing lenses and integrator lenses, reflective steering mirrors and Dichroic Filters, polarizing optics, beamsplitters and combining prisms (*see Figure 2-1 for physical layout*). The illumination path actually consists of two sections: the light path and the image path. The light path begins with a light source, the Arc Lamp, then passes through Primary Condensing Lens and is reflected off the #1IR Filter/Cold Mirror where the infrared heat radiation is filtered out.

CAUTION! The term "cold mirror" is used because the mirror passes infrared light and its reflection contains only "cold' light that does not transmit appreciable heat. As a result of the absorption of infrared heat radiation, "cold" mirrors can get very hot.

From the #1 Cold Mirror the high intensity light passes through the Secondary Focusing Lens, a UV Filter and into the Integrator, which consists of two “fly’s eye” integrating lenses. The Primary Condensing Lens collects all the light from

the Arc Lamp and begins to bend the light rays into a straight path. The Secondary Focusing Lens works with the Primary Condensing Lens to collimate or "straighten" the light path before it enters the Integrator. The UV Filter filters out unwanted ultravioltet light.

After leaving the UV Filter the light passes through the Integrator. The function of the Integrator is to spread out the beam so that it will have a more uniform distribution of light across the face of the ILA®. This will result in a more uniform image on the screen. After leaving the Integrator the white light is reflected off the #2 IR Filter/Cold Mirror where more IR light is removed. The white light then travels out to the Secondary Condensing lens and onto the Dichroic Filters.

The Dichroic Filters divide the white light from the Arc Lamp into its three color components, Red, Green and Blue. The first filter reflects the green and red light and allows the blue light to pass through the beamsplitter and continue on to the Blue Dichroic filter. The red and green light travel on to a second Dichroic Filter where the red light is separated from the green light. The Blue Dichroic Filter Mirror reflects the blue light into a Feedthru Beamsplitter. The red light is also reflected from a Dichroic Filter into a Feedthru Steering Mirror and the green light is transmitted through the beamsplitter into its respective Feedthru Beamsplitter. All three light beams are reflected up into the Polarizing Beam Splitter.

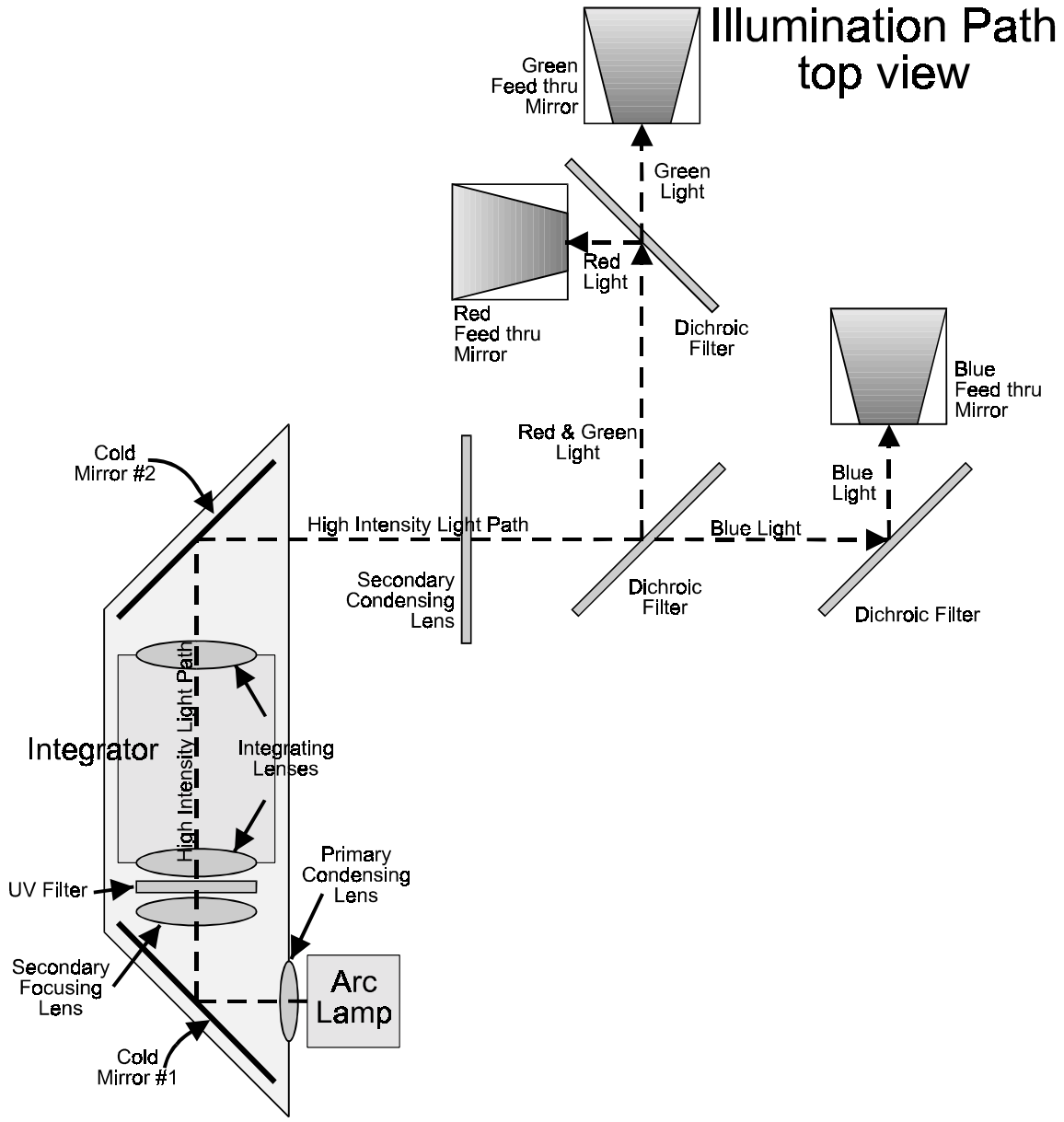


Figure 2-1 Top View of lower level of Illumination Path for the Model 100.

The Polarizing Beam Splitter (PBS) actually consists of a Pre-Polarizer and a main Polarizer. The process of polarizing light is discussed in the following paragraph.

Light can be viewed as having two electromagnetic components: a S-electric field and a P-electric field. These fields are perpendicular to each other. When unpolarized light travels through a polarizing beamsplitter one of these fields is reflected and one is transmitted or passes through the beamsplitter. Upon striking the Pre-Polarizer, the S-electric field is reflected and is wasted, the P-electric field is passed through the Pre-Polarizing Beamsplitter and continues on to the Main Polarizer. The Main Polarizing Beamsplitter is rotated 90° from the Pre-Polarizing Beamsplitter so the P-electric field that was transmitted through the Pre-Polarizer becomes the S-electric field and is reflected by the Main Polarizer. The reflected polarized light, either red, green or blue, leaves the PBS and goes directly into the ILA® device.

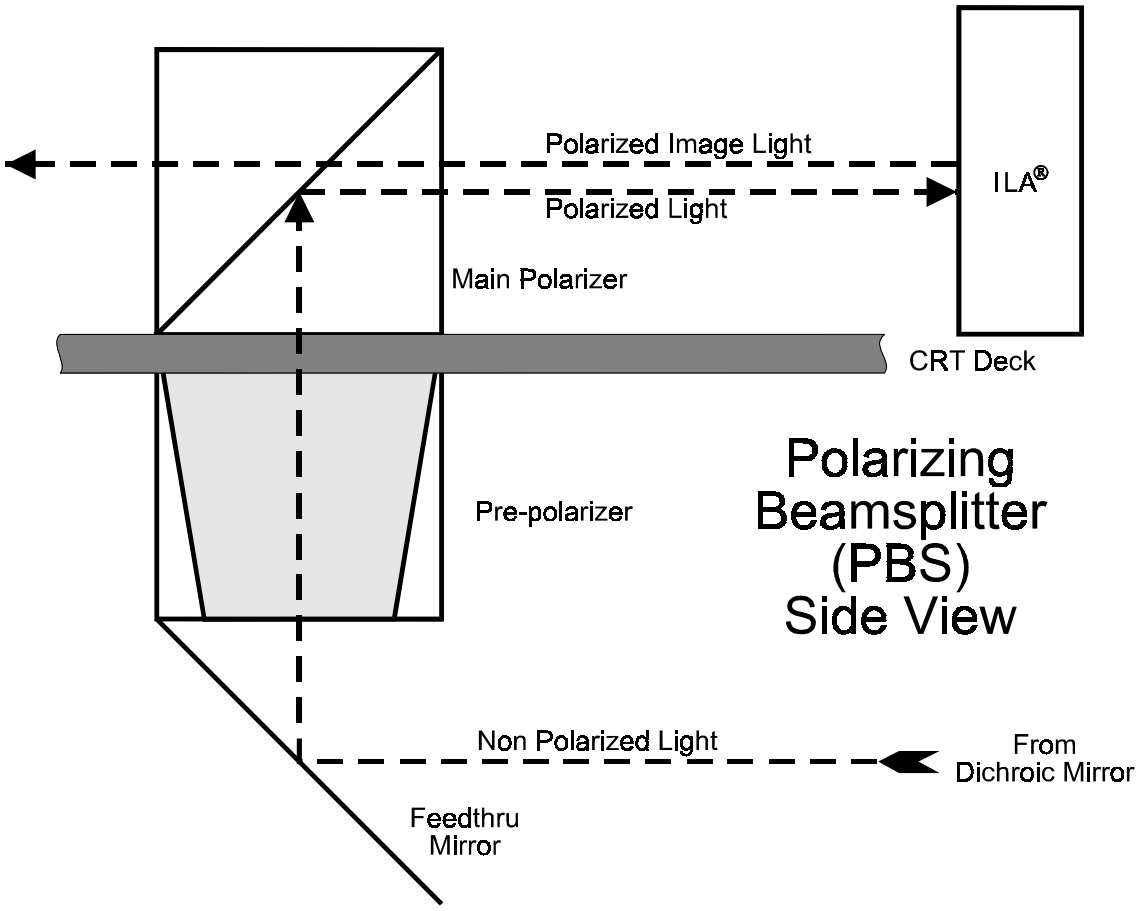


Figure 2-2 Side view of a Feedthru Beamsplitter and the Polarizing Beamsplitter (PBS).

The polarized light from each of the PBS's enters the ILA® and is rotated and modulated with the image signal. The amount the polarized light is rotated is controlled by the ILA® bias and the amount of CRT light hitting the input side of the ILA®, and translates directly to the brightness of the image on the screen.

The image light from each of the ILA®s is then sent back through the Main Polarizer portion of the PBS. The polarized blue image light continues on to a Turning Prism where it is reflected into the 2P Combining Prism. The red and green light come from their respective PBSs and are combined in the1P Combining Prism. From the 1P Combining Prism, the red and green image light go into the 2P Combining Prism to combine with the blue image light, where the RGB image light goes through the Front Projection Lens and out onto the screen. This completes the Illumination Path.

CAUTION! The alignment of system optical components is critical. Replacement of individual mirrors or prisms requires removing the projector cover and must be performed only by Hughes-JVC Certified technicians. Consult the factory before removing or aligning any mirrors or prisms.

CRT \ ILA® Module

The three CRT/ILA® assemblies are located in the main body of the projector above the Dichroic Filters and in front of the Electronics Module card cage. The red CRT is separated and perpendicular to the green and blue CRT. Two exhaust fans at the rear help cool the green and blue CRT assemblies. Each CRT is sent a red, green, or blue image signal, but they do not emit a red, green, or blue color, as in traditional CRT projectors. The CRTs are not used as a primary light source. The light output to the screen is the function of the Arc Lamp, ILA® bias, and CRT output. The purpose of the CRT is to generate an image and to control the amount of modulation the ILA® assemblies introduce on the light coming from the Arc Lamp. The Red, Green, and Blue image signals are routed to the CRTs from the Video Amplifier Board through the CRT socket connectors. The CRT image passes through a thin fiber-optic coating on the CRT face and another fiber-optic on the back surface of the ILA®. There is a thin layer of optical fluid between the two fiber optic coatings. The input and output sides of the ILA® assembly are isolated from each other electrically and optically but are coupled electrostatically.

At the same time the image is received at the input side of the ILA®, the output side of the ILA® is receiving high intensity polarized light from the arc lamp through the PBS. This high intensity polarized light is modulated by the image from the CRT and the light polarization is rotated (90° at 100% CRT output) by the liquid crystal on the output side of the ILA®. The light is then reflected back

from the output side of the ILA®, and travels through the 1 and 2 Combining Prisms (red and green). The blue polarized image light goes through the Turning Mirror and combines with the red and green light in the #2 Combining Prism to be picked up by the projection lens.

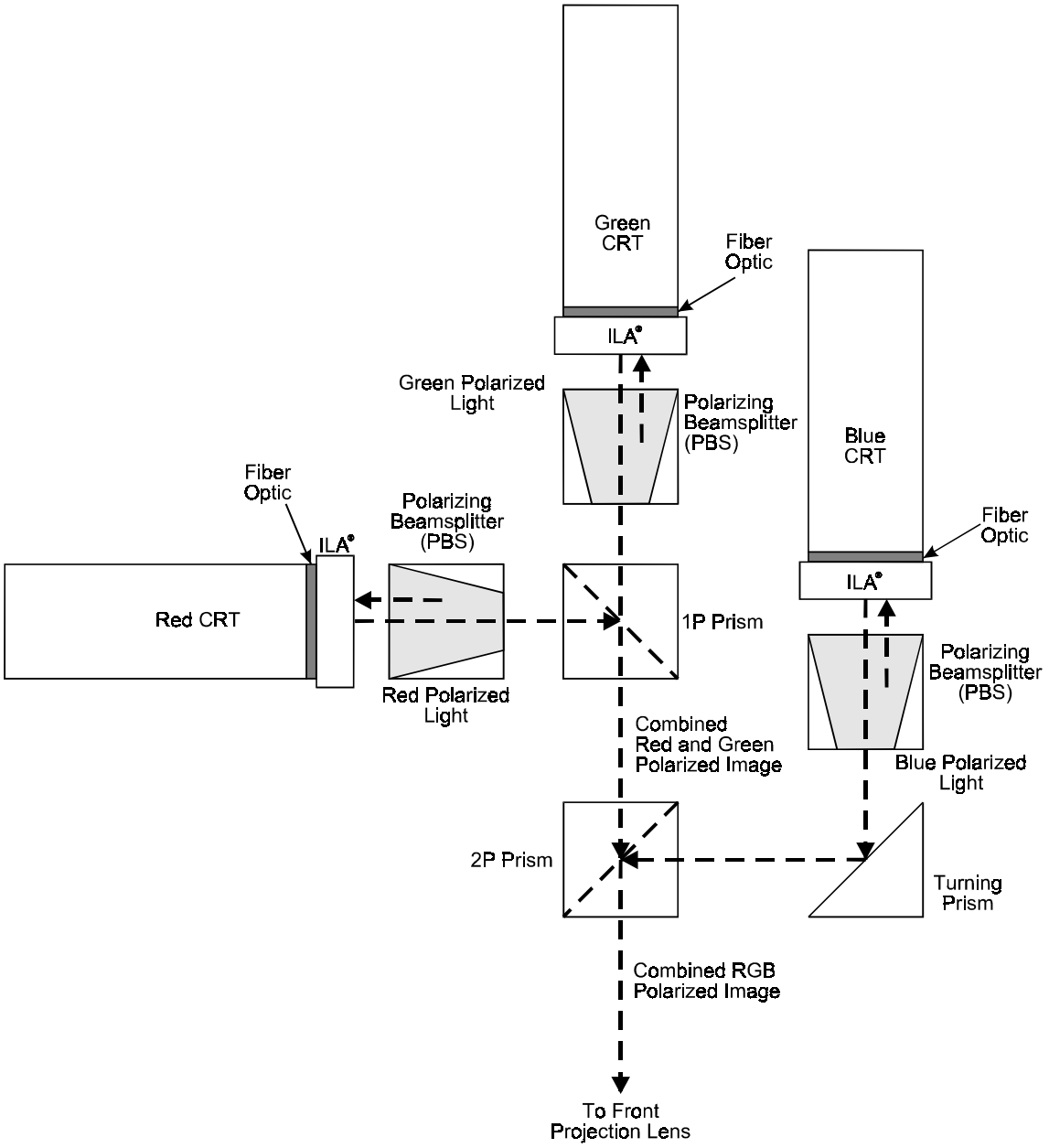
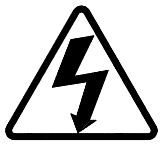


Figure 2-3 Overhead view of top-level optical path.

Front Projection Lens

The Front Projection Lens picks up the high intensity image from the 2P Combining Prism and transmits it to the projector screen. The Front Lens options are:

- Zoom Lens with a 3:1 to 8:1 range
- 1.5:1 Fixed Range Lens with a variable offset that can be set to 50% of screen height above or below the centerline of the screen
- 1.1:1 Fixed Range Lens

 **WARNING!!!** The Xenon Arc Lamp produces high intensity white, ultraviolet and infrared light capable of severe eye injury. **Never look directly at or touch the Xenon Arc Lamp. Service should be performed by Hughes-JVC certified** technicians only.

2.3 Electronics System

General Description

The Model 100 Electronics System includes nine printed circuit assemblies. They provide all the controlling voltages and signals to adjust and correct picture settings, geometry, convergence, and shading (*see Chapter 4 of the User's Guide*). The Electronics System also controls video and sync input signals, LED displays on PCBs on the side of the projector, two RS-232 communications ports, and two IR receivers for remote control of the projector.

The descriptions in this portion of the manual are based on an overall Electronics System block diagram and simplified block diagrams for each of the nine printed circuit assemblies. The diagrams and descriptions serve two purposes; first, to provide the technician with an overall grasp of how the system works and how each assembly works with other assemblies in the system, second, to provide the technician with enough information to troubleshoot to the assembly level, if needed.

Figure 2-2 provides an overall System Block Diagram to show how the Optical System, Arc Lamp, and Electronics System combine to provide the bright screen image.

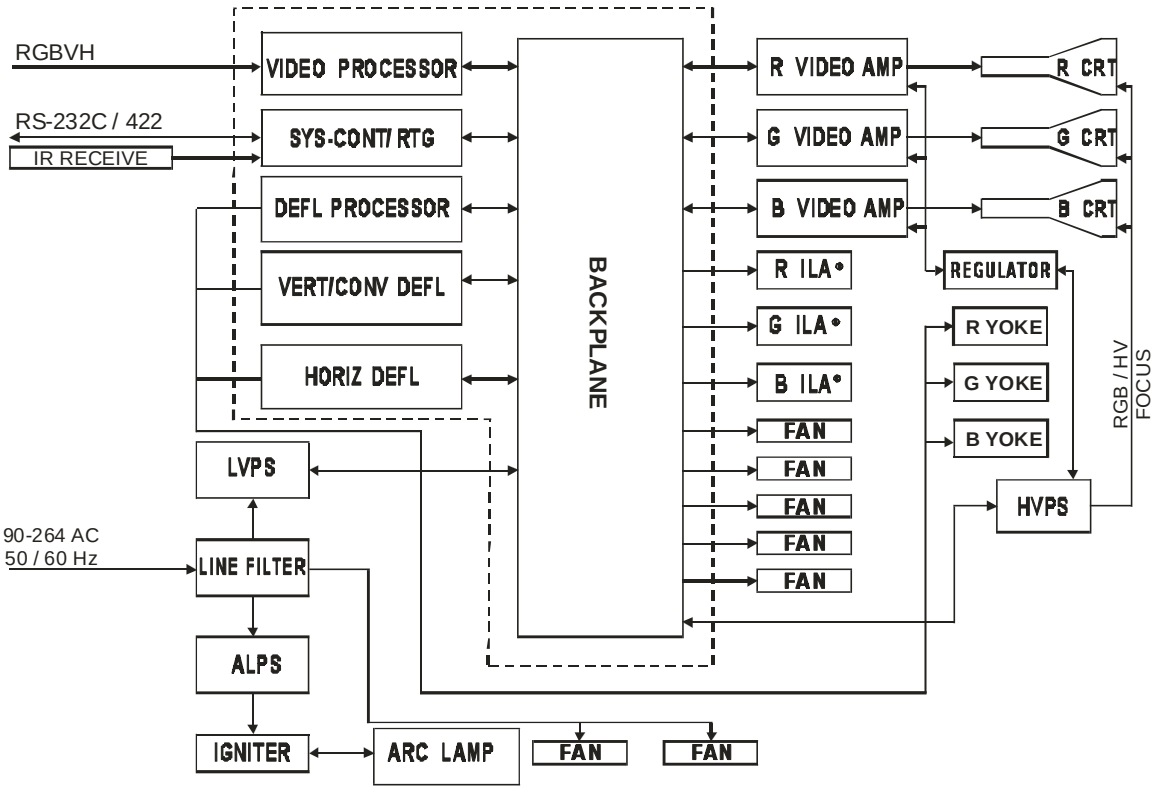


Figure 2-4 Model 100 Electronics System Block Diagram.

Power Supplies

The Model 100 includes three power supply assemblies.

- Low Voltage Power Supply
- Arc Lamp Power Supply
- High Voltage Power Supply

Low Voltage Power Supply (LVPS)

Main Functions:

- Provides all of the analog, digital, and voltages needed by the projector.
- Provides standby power when the projector is OFF.
- Provides power for all cooling fans.

Operation:

The main power is filtered via the input filter to prevent radiation from escaping back to the power line. From the line filter, AC power is fed into the Low Voltage Power Supply module where AC is rectified, filtered, and compensated for power factor correction.

The +5.1V Standby is on whenever AC power is connected to the projector and the circuit breaker, next to AC power connection, is in the On position. The +24V standby power for the fans turns on when the /FAN_ENA signal is received from the System Controller (this turns off in 5-8 minutes if power is not turned on by the remote control or a PC). All other voltages supplied by the LVPS are activated when power is turned on at the remote or PC. These include +5.1V for digital components, +6.2V for CRT filaments, ±15V for analog circuits, and the +80V supply which is used by the High Voltage Power Supply, Video Amplifier PCB, and the Horizontal Deflection PCB.

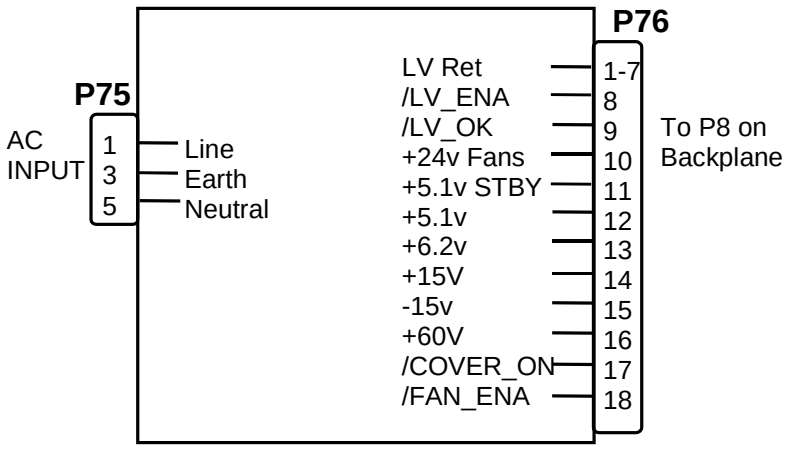


Figure 2-5 LVPS Input/Output Diagram.

Table 2-1 Inputs and Outputs for the LVPS

Inputs	
/ LV_ENA	From System Controller/ RTG PCB - enables the LVPS when the System Controller receives a Power-On command.
/ COVER ON	Indicates the front cover is in place or the Interlock is in the Service Mode. Enables the non-standby outputs. Also includes Arc Lamp Thermal Shutdown Sensor signal.
/ FAN_ENA	From System Controller/ RTG PCB - enables the +24 V Standby voltage for the projector cooling fans.
Outputs	
+24V	To cooling fans
+5.1V	+5.1 Stdby for CPU and remote operation.
+6.2V	For CRT Filaments
+15V	For analog circuitry
-15V	For analog circuitry
+60V	For Horizontal power Supply section of Horizontal Deflection PCB and Video Amplifiers PCB.
/ LV_OK	Feedback signal indicating to the System Controller, the status of the non-standby supply (working or not working).

NOTE: a "/"in front of signal name means "active low". This means the signal will enable a device such as the LVPS in / LV_ENA. A high = 5V and low = 0V.

The /COVER_ON signal from the cover interlock switch tells the Low Voltage Power Supply that the front cover is in place and the interlock switch is pressed in. The /COVER ON signal also includes the Thermal Shutdown signal that comes from a thermocouple attached to the Arc Lamp. If the Arc Lamp exceeds $130 \pm 5^{\circ}$ C or the Interlock Switch is not pushed in (or pulled out) the Low Voltage Power Supply shuts down the projector.

Arc Lamp Power Supply (ALPS)

Main Functions:

- Provides a boost voltage of 150 Volts to Igniter Assembly. The Igniter then delivers a 32 kV pulse to turn the Xenon Arc Lamp on.
- Provides steady state power to maintain the lamp ON (approx. 19V at 39 Amps)
- Current adjustable power supply (located on top of the power supply).

Operation:

The System Controller sends the /LAMP_ENA signal to the ALPS. The /LAMP_ENA signal turns on the ALPS. The Arc Lamp Power Supply then provides the +150 VDC boost voltage to the Laser Power Supply The Laser Power Supply provides the spark gap to the Igniter Transformer (Igniter). The Igniter steps up the +150 VDC boost voltage to approximately 32KV and ignites the Xenon Arc Lamp. After the Arc Lamp is lit, it is maintained on by the ALPS at a constant 19 volts and 39 amps. The /LAMP_LIT output signal informs the System Controller if the lamp is lit or not. The Arc Lamp Power Supply is shielded electrically and magnetically to prevent noise or disturbances in the CRTs or other circuitry.

The / Cover On signal goes to the Arc Lamp Power Supply as well as the Low Voltage Power Supply. If the Arc Lamp exceeds 130 ± 5° C or the Interlock Switch is not pushed in (or pulled out) the Arc Lamp Power Supply shuts down.

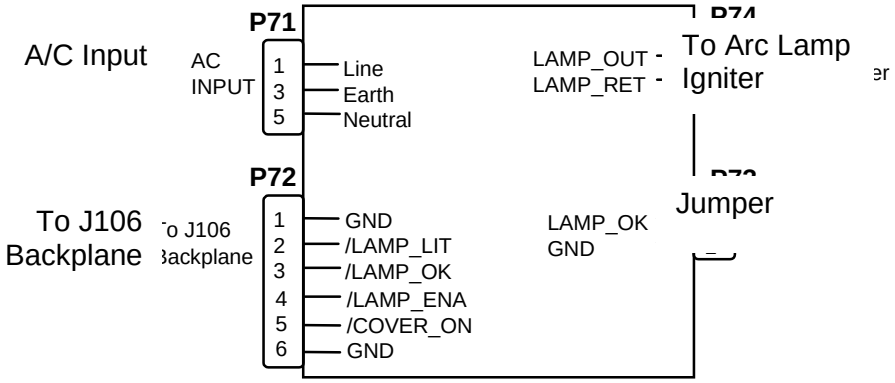


Figure 2-6 Arc Lamp Power Supply, Block Diagram.

Table 2-2 Inputs and Outputs for the ALPS

A/C Inputs	
LINE	90-132 Vac to 200-264 Vac at 50-60 Hz
EARTH	Ground
NUETRAL	Return
Inputs	
/ COVER ON	Indicates the front cover is in place or the Interlock is in the Service Mode. Also includes Arc Lamp Thermal Shutdown Sensor signal.
/ LAMP ENA	Signal from System Controller/ RTG to turn on Arc Lamp Power Supply
/ LAMP OK	Jumpered to ground
Outputs	
ARC LAMP OUT	+150 V boost voltage to Igniter to start Arc Lamp
	Normal Operation: +19 Volts at 39 Amps
ARC LAMP IN	Arc Lamp return
/ LAMP LIT	Feedback signal to System Controller/ RTG that Arc Lamp is lit

High Voltage Power Supply (HVPS)

The High Voltage Power Supply (HVPS) is located in front of the LVPS on the left side of projector (as viewed from rear). This supply provides the anode, focus, and screen voltages required for the three CRTs in the Model 100 projector.

The following functions are provided by HVPS:

- Phase locked loop circuit for synchronization to the horizontal sync
- Generation of anode voltages (15kV) for all three CRTs (RGB)
- Generation of G3 focus voltage (3.5 to 4.5kV) for all three CRTs (RGB)
- Generation of the G2 (supply-Black Level voltage for all three CRTs
- Generation of G1 supply (Blanking) voltage
- Dynamic focus amplifier using H and V parabolas
- External ON/OFF and generation of /HV_OK signal

The High Voltage Power Supply I/O diagram (*see Figure 2-7*) and the list of inputs and outputs (*see Table 2-3*), provide an understanding of the operation of the HVPS to allow the technician to perform module level troubleshooting.

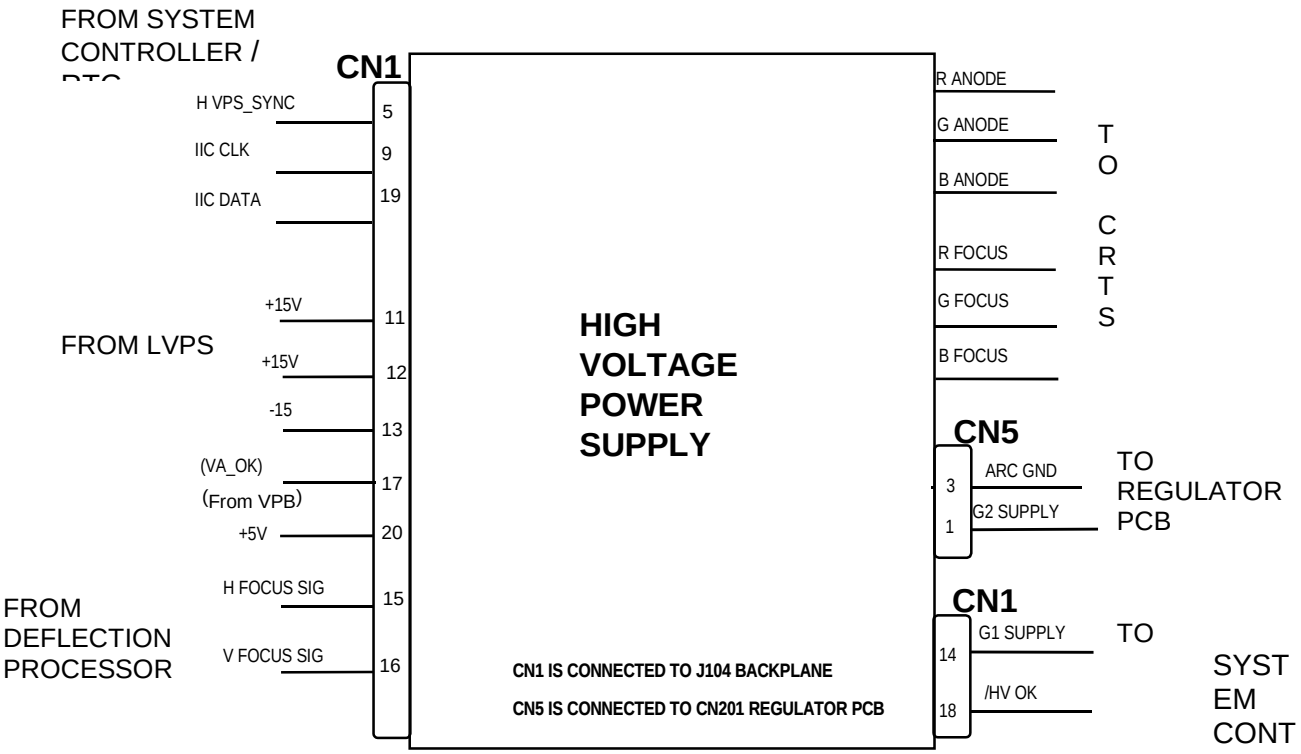


Figure 2-7 High Voltage Power Supply, I/O Diagram.

The HVPS Input/Output

This section provides a comprehensive description of the inputs to and outputs from the HVPS. The I/O descriptions are arranged by the source/destination of the signal. The format used is such that the assembly communicated with is used as the primary heading of each output. Input refers to an input to the HVPS. Output refers to an output from the HVPS. In each case the signals direction is noted.

Table 2-3 Inputs and Outputs for the HVPS

Inputs	
LVPS	
+15V	Power for analog circuitry.
-15V	Power for analog circuitry.
+5.1V	Power for digital circuitry.
SC/RTG	
HVPS SYNC	Synchronization pulse for the HVPS, synchronized with the selected Horiz. Sync at either same, half or on third the frequency.
IIC DATA	IIC data line. Bi-directional serial line for synchronous data transfer between the SCB/RTG, the HVPS, video processing and deflection processing PCBs.

IIC CLK	IIC clock line. Unidirectional clock line for control of synchronous data transfer over the IIC bus interface.
Video Processor	
/ VA OK (HV ENABLE)	Low enables HVPS
Deflection Processor	
H FOCUS SIG	Horizontal focus parabola.
V FOCUS SIG	Vertical Focus parabola.
Outputs	
SC/RTG	
/HV OK	High Voltage status line. Low = HVPS operating normal.
Regulator	
G1 SUPPLY	-75V
G2 SUPPLY	1kV

Video Input Cards (VIC)

There is only one optional video input card slot on the Model 100. It is located immediately to the right of the Video Processor PCB on the right side of the projector. There are five Optional Video Input Cards that can be used with the Model 100 Projector.

- RGBHV Wide-Band VIC used as a second input card.
- Graphics Enhancer RGB VIC
- Four-Input RGB MUX VIC used in a similar manner as a switcher.
- HDTV VIC used for High Definition Television.
- Quad Standard Decoder/ Line Doubler VIC used for NTSC, PAL SECAM and other composite sources.

RGBHV Wide-Band VIC

The RGBHV Wide-Band VIC has five BNC inputs. It provides the RGB and HV sync interface for the projector. This RGB VIC provides a high bandwidth interface for the three color video signals. The video signals are routed to the Backplane Board. The sync signals (horizontal and vertical) are also directly connected to the Backplane Board.

The following functions are provided by the RGB VIC:

- Video and sync interface for red, green and blue
- LED indication
- IIC serial bus interface

LED indication

The RGB VIC includes an LED which is illuminated when the board is selected (i.e. when the /SEL_CH line is low) as the input for the Model 100 Projector.

IIC serial bus interface section

The RGBHV Wide Band VIC is controlled by the serial bus interface. The IIC bus comes from the System Controller Board through the Backplane Board. The information transferred over the IIC bus is indicated below (I = input to the RGB VIC, and O = output from the RGB VIC). The RGB VIC does not use the interrupt line of the IIC bus interface:

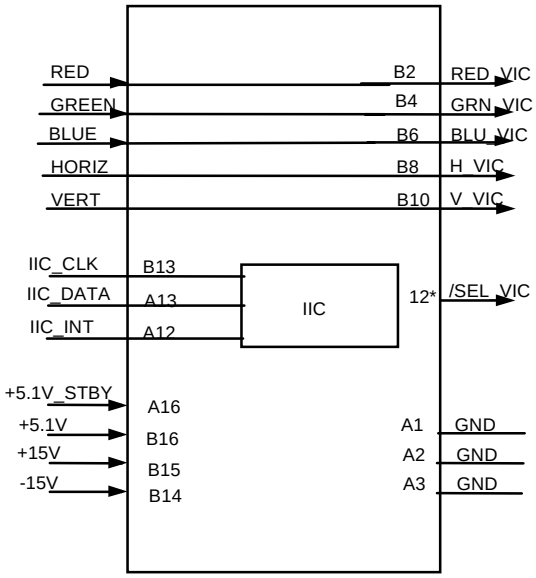


Figure 2-8 RGBHV Wide-Band VIC I/O.

The RGBHV Wide-Band_VIC I/O

This section provides a description of the inputs to and outputs from the RGB_VIC. The I/O descriptions are arranged by the source/destination of the signal. The format used is such that the assembly communicated with is used as the primary heading of each group of signals. Those signals are further subdivided into inputs and outputs. Input refers to an Input to the RGB_VIC, output refers to an output from the RGB_VIC.

Table 2-4 RGBHV Wide-Band VIC I/O signals

Projector Inputs	
Inputs	Description
RED GREEN BLUE	Video input signals. about 0.7 to 1VPP
HORIZ.	Horizontal or composite sync signal
VERTICAL	Vertical sync signal
Video Processor PCB	
Outputs	Description
/SEL_VIC	Select line for VIC. A low indicates the RGB_VIC is selected.
RED_VIC GRN_VIC BLU_VIC	Video signals. about 0.7 to 1VPP
H_VIC	Horizontal or composite sync signals
V_VIC	Vertical sync signals
System Controller / RTG PCB	
Inputs	Description
IIC_CLK	IIC clock line. Unidirectional clock line for control of synchronous data transfer over the IIC bus interface.
IIC_DATA	IIC data line. Bi-directional serial line for synchronous data transfer between System Controller/ RTG PCB and the RGB_VIC.
Outputs	Description
/IIC_INT	IIC interrupt line. RGB_VIC does not initiate an interrupt.
Low Voltage Power Supply	
Inputs	Description
+5.1V	+5.1V supply for use by RGB_VIC.
+15V	+ 15V supply for use by RGB_VIC.
-15V	-15V supply for use by RGB_VIC.
+ 5.1 V_STBY	+ 5.1V standby supply for use by RGB_VIC.

Graphics Enhancer RGB VIC

The Graphics Enhancer RGB VIC is the same as the RGBHV Wide-Band VIC except that it has a Graphics Enhancer chip that allows some adjustment to enhance small black text on a white background. This adjustment is discussed in section 3.18 of this manual. Refer to the RGBHV Wide-Band VIC section for inputs and outputs.

Four-Input RGB VIC

The Four-Input RGB VIC consists of four sets of RGBHV inputs and operates in a manner similar to a switcher. The four inputs are multiplexed so that only one is enabled at a specific time. Software selects the desired input channel through the IIC bus and ensures that only one RGB VIC is enabled. When one of the channels assigned to the Four-Input RGB VIC is selected, the /SEL_VIC line to the Video Processor is enabled.

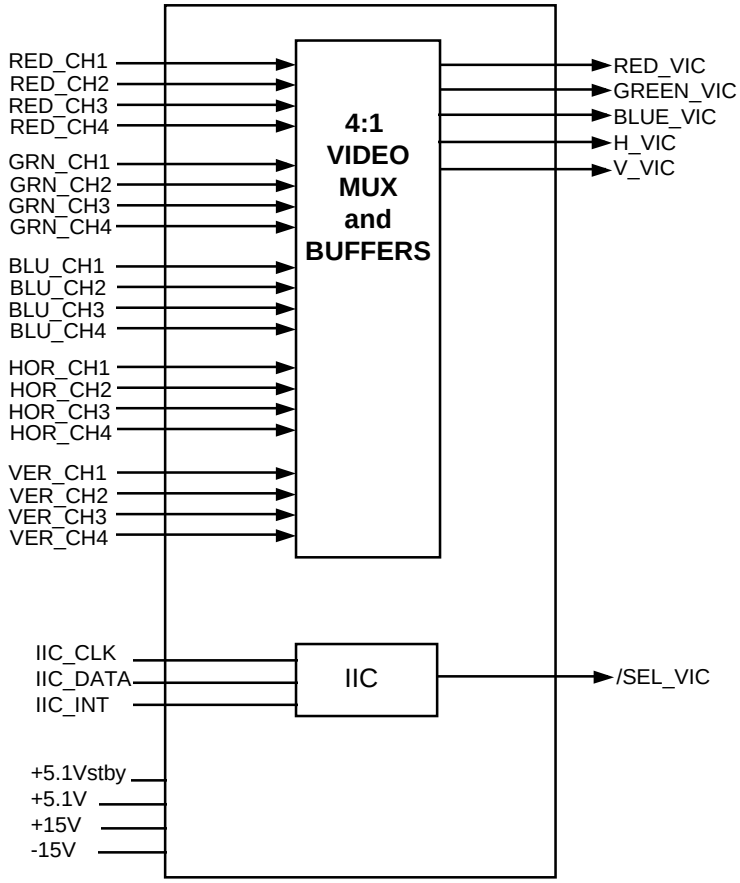


Figure 2-9 Four-Input RGB VIC I.O Diagram.

The same functions performed by the RGB VIC are performed by the Four-Input RGB VIC. The description of operation and pinouts are the same as the Graphics

Enhancer RGB VIC. One of four LEDs indicates which of the four RGB inputs is currently active.

YPbPr VIC

YPbPr is a high-end video signal standard. The HDTV YPbPr VIC converts the YPbPr component signal to a RGBHV type video signal. It contains three BNC input connectors that can be used for two different inputs, YPbPr or GBR.

The following functions are provided by YPbPr_VIC:

- Video input and output buffers
- Conversion of YPbPr signal format to RGB signals format
- Separation of syncs from the Y/G input signal
- Hue, sharpness, gamma, and color adjustment
- Selection of RGB component input or YPbPr input
- LED indication
- IIC serial bus interface

This VIC accepts two types of video signals, color components (YPbPr) and RGB signals. In either case, the output of this VIC is RGB type signal. If the inputs are color components they will be converted to RGB type signals.

The selection between color component input mode and RGB input mode is controlled by an input. This input is controlled by the System Controller/RTG PCB via the IIC serial bus interface.

LED indication

There are two LEDs on this VIC. The RGB LED is illuminated when the YPbPr_VIC is selected and is in RGB input mode. The YPbPr LED is illuminated when the YPbPr_VIC is selected and is in YPbPr input mode. Both LEDs are off when the YPbPr_VIC is not selected as the input to projector. Only one LED can be on at one time.

IIC Interface

The YPbPr_VIC is controlled by the serial bus interface. The IIC bus comes from the System Controller Board through the Backplane Board. All required adjustments for this board are provided via the IIC serial bus interface. The information transferred over the IIC bus is indicated below (I = input to YPbPr_VIC, and O = output of YPbPr_VIC). The selection of this VIC is accomplished through the IIC control bus which provides the /SEL_VIC signal.

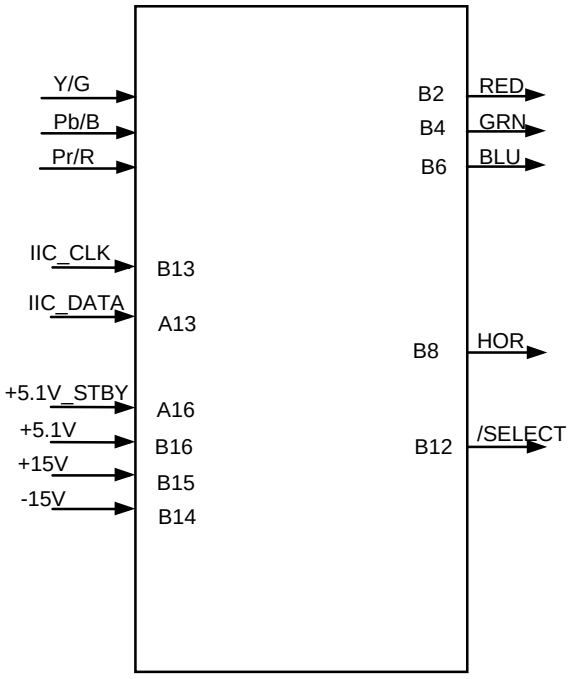


Figure 2-10 YPbPr VIC I/O Diagram.

The YPbPr_VIC I/O

This section provides a comprehensive description of the inputs to and outputs from the YPbPr_VIC. The I/O descriptions are arranged by the source/destination of the signal. The format used is such that the assembly communicated with is used as the primary heading of each group of signals. Those signals are further subdivided into inputs and outputs. Input refers to an Input to the YPbPr_VIC, output refers to an output from the YPbPr_VIC.

Table 2-5 YPbPr VIC Signals

Projector Inputs	
Input	Description
Y/G Pb/B Pr/R	Video input signals-about 0.7 to 1 VPP
Video Processor PCB	
Output	Description
/SELECT	Selection indicator for VIC. Low indicates the selected YPbPr_VIC.

RED GRN BLU	Video signals. about 0.7 to 1 VPP
HOR	Composite horizontal / vertical sync signal
System Controller Board / RTG PCB	
Inputs	Description
IIC_CLK	IIC clock line. Unidirectional clock line for control of synchronous data transfer over the IIC bus interface.
IIC_DATA	IIC data line. Bi-directional serial line for synchronous data transfer between system control board and the YPbPr_VIC.
Outputs	Description
/IIC_INT	IIC interrupt line. YPbPr_VIC does not initiate any interrupt
Low Voltage Power Supply	
Inputs	Description
+5.1V	+5.1V supply for use by YPbPr_VIC.
+15V	+ 15V supply for use by YPbPr_VIC.
-15V	-15V supply for use by YPbPr_VIC.

Quad Standard Decoder/ Line Doubler VIC

The Quad Standard Decoder/ Line Doubler VIC has two basic functions. The Quad Decoder accepts C-Vid and S-Vid signals in four different formats PAL, SECAM NTSC and 4.43NTSC and converts them to a RGBHV signal. It contains one BNC input connector for C-Video and two BNC connections for Luminance (Y) and Chrominance (C) for S-Video. The Model 100 projector does not accept sources with horizontal scan frequencies lower than 30 kHz. The Line Doubler takes scan frequencies like NTSC (~15 kHz) and doubles it to ~31 kHz, which the Model 100 can use.

The following functions are provided by the Quad Standard Decoder/ Line Doubler VIC:

- Select input source - Composite or S-video
- Select standard-AUTO/NTSC/PAL/SECAM/4.43NTSC
- Conversion of composite and S-video signals to RGB video signals
- Separation of syncs from the input signal
- Doubles the Horizontal Scan Frequency
- Tint, sharpness, and color adjustment

- LED indication of Composite or S-video
- IIC serial bus interface

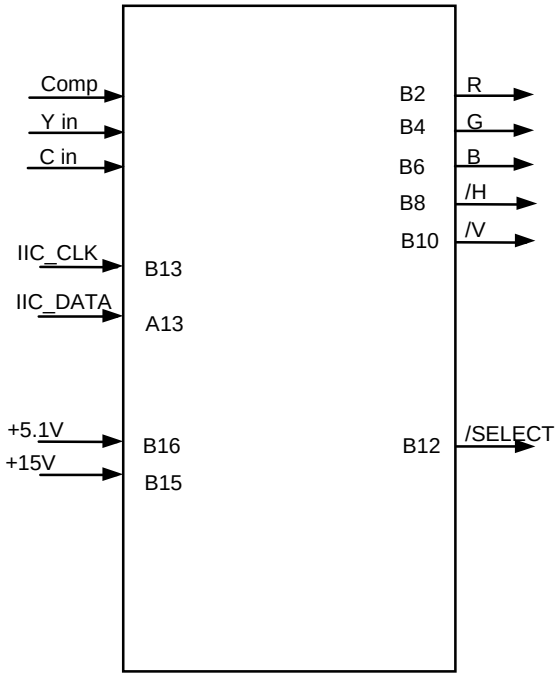


Figure 2-11 Quad Standard Decoder/ Line Doubler I/O Diagram.

LED Indication

There are two LEDs on this VIC. The LED on the right side of the board is illuminated when Composite Video is selected and the LED on the left is illuminated when S-Video is selected. Only one LED can be illuminated at one time.

IIC Interface

The Quad Standard Decoder/ Line Doubler VIC is controlled by the serial bus interface. The IIC bus comes from the System Controller Board through the Backplane Board. All required adjustments for this board are provided via the IIC serial bus interface. The information transferred over the IIC bus is indicated below (I = input to YPbPr_VIC, and O = output of YPbPr_VIC). The selection of this VIC is accomplished through the IIC control bus which provides the /SEL_VIC signal.

Quad Standard Decoder/ Line Doubler VIC I/O

This section provides a description of the inputs to and outputs from the Quad Standard Decoder VIC. The I/O descriptions are arranged by the source/destination of the signal. The format used is such that the assembly communicated with is used as the primary heading of each group of signals. Those signals are further subdivided into inputs and outputs. Input refers to an Input to the VIC, output refers to an output from the VIC.

Table 2-6 Quad Standard Decoder/ Line Doubler VIC Signals

Projector Inputs	
Input	Description
Composite Video	Video input signals-about 0.7 to 1VPP
S-Video Y, C,	Video input signal-about 0.7 to 1VPP for Luminance and about .3-.6 VPP for Chrominance (C)
System Controller Board	
Inputs	Description
IIC_CLK	IIC clock line. Unidirectional clock line for control of synchronous data transfer over the IIC bus interface.
IIC_DATA	IIC data line. Bi-directional serial line for synchronous data transfer between SC/ RTG PCB and the VIC.
/ IIC_SINT	IIC Interrupt (Output
Low Voltage Power Supply	
Inputs	Description
+5.1V	+5.1V supply for use by The Quad Decoder VIC.
+15V	+ 15V supply for use by the Quad Decoder VIC.
-15V	- 15V supply for use by the Quad Decoder VIC.
GND	Ground
Video Processor Board	
Output	Description
/SELECT	Selection indicator for VIC. Low indicates the Quad VIC is selected.
RED GRN BLU	Video signals. about 0.7 to 1VPP
H / C	Horizontal Composite input signal, about 1-1.25VPP
V_VIC	Vertical sync input signal to Video Processor.

Video Processor PCB

The Video Processor PCB (VP PCB) is the bottom-most card (*see Figure 4-10*) in the card cage. It is connected directly to the Backplane board through 2 connectors. When an external signal is being received, the VP-PCB provides Horizontal Sync, Vertical Sync, and Green Sync signals to the System Controller / Raster Timing Generator (SC/RTG) Printed Circuit Board (PCB). It also provides three primary color signals, and G2 Control, and DC RESTORE signals to the Video Amplifier PCBs (VA PCBs).

The following functions are provided by the VP PCB:

- Video signal input and multiplexing
- Sync signal stripping
- Overlay signal multiplexing
- Brightness and Contrast control, and DC RESTORE
- On-screen Switching
- Video signal gamma correction
- Sensitivity and Threshold signal input and control
- Automatic CRT Protection by limiting Contrast Amplifiers.

The Video Processor I/O diagram and the list of inputs and outputs provide information to allow the technician to perform module-level troubleshooting.

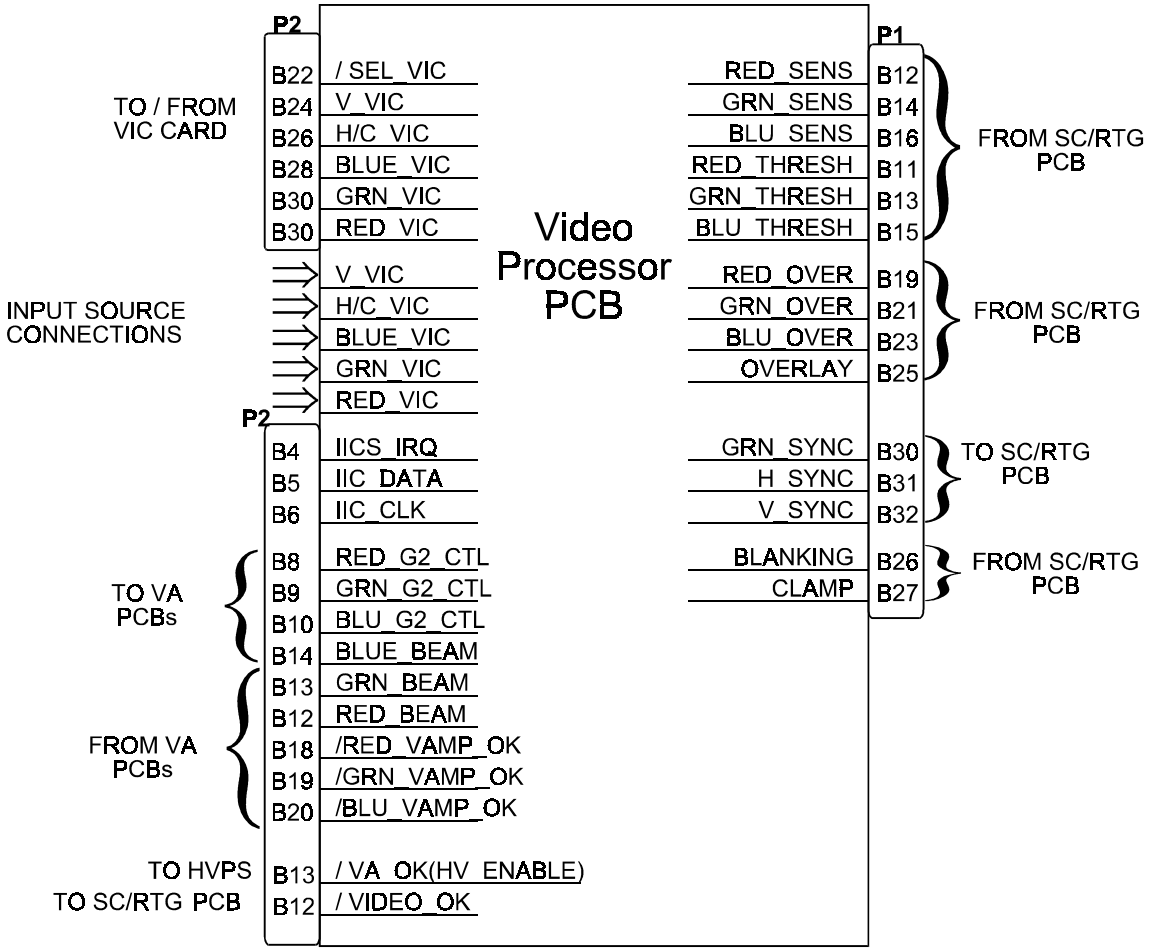


Figure 2-12 Video Processor I/O Diagram.

Video Processor I/O

This section provides a comprehensive description of the inputs to and outputs from the Video Processor PCB. The I/O descriptions in Table 2-7 are arranged by the source/destination of the signal. The format used is such that the assembly communicated with is used as the primary heading of each group of signals. Those signals are further subdivided into inputs and outputs. Inputs refers to an input to the Video Processor PCB, while output refers to an output from the Video Processor PCB.

Table 2-7 Video Processor I/O signals

Video Processor PCB	
2.4 Inputs	Description
+15V	Power for analog circuitry.

Video Processor PCB	
-15V	Power for analog circuitry.
+5.1V	Power for digital circuitry.
SC/RTG	
Red Sens.	Sensitivity correction information for Blu. Real time data at 0 volt to 1 volt.
Grn Sens.	Similar to Red Sens.
Blu Sens.	Similar to Red Sens.
Red Thres.	Threshold correction information for blue. Real time data at 0 volt to 1 volt.
Grn Thres.	Similar to Red Thres.
Blu Thres.	Similar to Red Thres.
Red Over	Red signal of on-screen menu and/or internal test pattern.
Grn Over	Similar to Red Over.
Blu Over	Similar to Red Over.
Overlay	Overlay control signal.
IIC DATA	IIC data line. Bi-directional serial line for synchronous data transfer between the SCB/RTG, HVPS, video processing and deflection processing PCBs.
IIC CLK	IIC clock line. Unidirectional clock line for control of synchronous data transfer over the IIC bus interface.
IICS IRQ	Interrupt line.
Video Processor PCB	
BLANKING	Blanking signal composed of right, left, top and bottom blanking.
CLAMP	A negative-going video clamp signal with about 3 % duty cycle.
Video Amplifier PCB	
/Red VAMP_OK	Signal from the Regulator that the Red Video Amplifier is working.
/Grn VAMP_OK	Similar to Red VA OK.
/Blu VAMP_OK	Similar to Red VA OK.
Red Beam	Voltage signal proportional to cathode current averaged over several horizontal lines in the red CRT. Voltage level is + mV/mA.

Video Processor PCB	
Grn Beam	Similar to Red Beam.
Blu Beam	Similar to Red Beam.
Video Input Card	
/Sel VIC	Input signal from RGB VIC that is used to select input video source.
V VIC	Vertical sync input signal from VIC.
H/C VIC	Horizontal Composite input signal.
Red VIC	Red video input from VIC.
Grn VIC	Green video input from VIC.
Blu VIC	Blue video input from VIC.
/VA OK (HV ENABLE)	After signal is received that the Video Amplifiers are functional, this signal is sent to enable the HVPS.
Outputs	
Video Amplifiers	
Red Video	Red video output. 0 Volt to 1 Volt.
Grn Video	Similar to Red Video.
Blue Video	Similar to Red Video.
Restore	DC Restore control signal.
SC/RTG	
Grn sync	Input vertical sync.
H sync	Input Horizontal or composite sync.
V sync	Sync on green signal that is stripped from the green video.
/IIC Sint	IIC interrupt line.
Regulator	
Red G_2	Red CRT G_2 voltage adjust control signal.
Grn G_2	Similar to Red G_2.
Blu G2	Similar to Red G_2.
/ Video Ok	Signal sent to Regulator and Video Amplifier that a video signal is present at the VIC.

System Controller/ Raster Timing Generator PCB

The System Controller/ Raster Timing Generator (SC/RTG) is located in the electronic card cage (*see Figure 4-1*).

The Electronics System is controlled by the SC/RTG PCB. The SC/RTG PCB uses digital and analog circuits to direct the operation of image and raster generation circuits and to control the input/output of power supply operation. The SC/RTG can be viewed in two sections: the System Controller section and the Raster Timing Generator section

The System Controller section sets the operating parameters of the image, such as brightness and contrast. It also produces internal test patterns and generates on-screen display overlays. The SC/RTG PCB sets the timing for the raster generation to adjust phase, geometric corrections, shading corrections, and convergence. The program memory and the memory for all convergence and shading maps are located on the SC/RTG PCB.

The following functions are performed or controlled by the System Controller section of the System Controller / Raster Timing Generator PCB:

- Enables control for the Low Voltage Power Supply, Arc Lamp and cooling fans.
- Fault monitors the HVPS, LVPS, Arc Lamp, and fans and most of the other PCBs.
- Provides interface communication via the IIC serial bus.
- Controls Zoom and Focus of the Projection Lens.
- IIC Interface control
- Provides Video Overlays such as Menus and Internal Test Patterns
- X and Y convergence control
- Threshold and Sensitivity for shading
- I/O control
- Two RS-232 serial interface ports
- Infrared (IR) remote control interface. Accepts input from front or rear IR detectors.
- A 5-wire JTAG interface port for CPU emulation support.
- External 3 color system status LEDs. Green indicates normal, yellow is standby and red indicates a fault condition.
- External Service Mode Switch (*see Figure 3-12*). Pressing this switch while turning on Circuit Breaker allows the technician to get into the Buffer Memory. This allows the loading of new operation software and boot manager.

- System Reset Switch. Resets the entire projector must be turned back on. No data loss.
- Front Lens control (Focus, Zoom, and Memory Position).
- ILA® Shutter control.
- CCD Camera control for Autoshading (future use).

The following functions are performed or controlled by the Raster Timing Generator section of the System Controller / Raster Timing Generator PCB:

- Provides the ability to handle sources with the following horizontal and vertical scan frequencies
  - Horiz. (30-135 kHz)
  - Vert. (50-150 Hz)
- Selects the proper sync from the source (Separate H&V, Comp sync, and SOG).
- Removes the serration and equalization pulses from the Composite. and Sync On Green syncs.
- Generates the back porch clamping signal.
- Detects Non-interlaced and Interlaced sources.
- Separates horizontal and vertical syncs and provides horizontal and vertical phase adjustment.
- Generates blanking signals (left, right, top, and bottom).
- Provides internal sync generation
- Provides timing signals used by the System Controller section, and the Horizontal and Vertical Deflection areas.

The SC/RTG I/O diagram (*see Figure 2-13*) and the list of Inputs and Outputs (*see Table 2-8*) provide information for the technician to perform module-level troubleshooting.

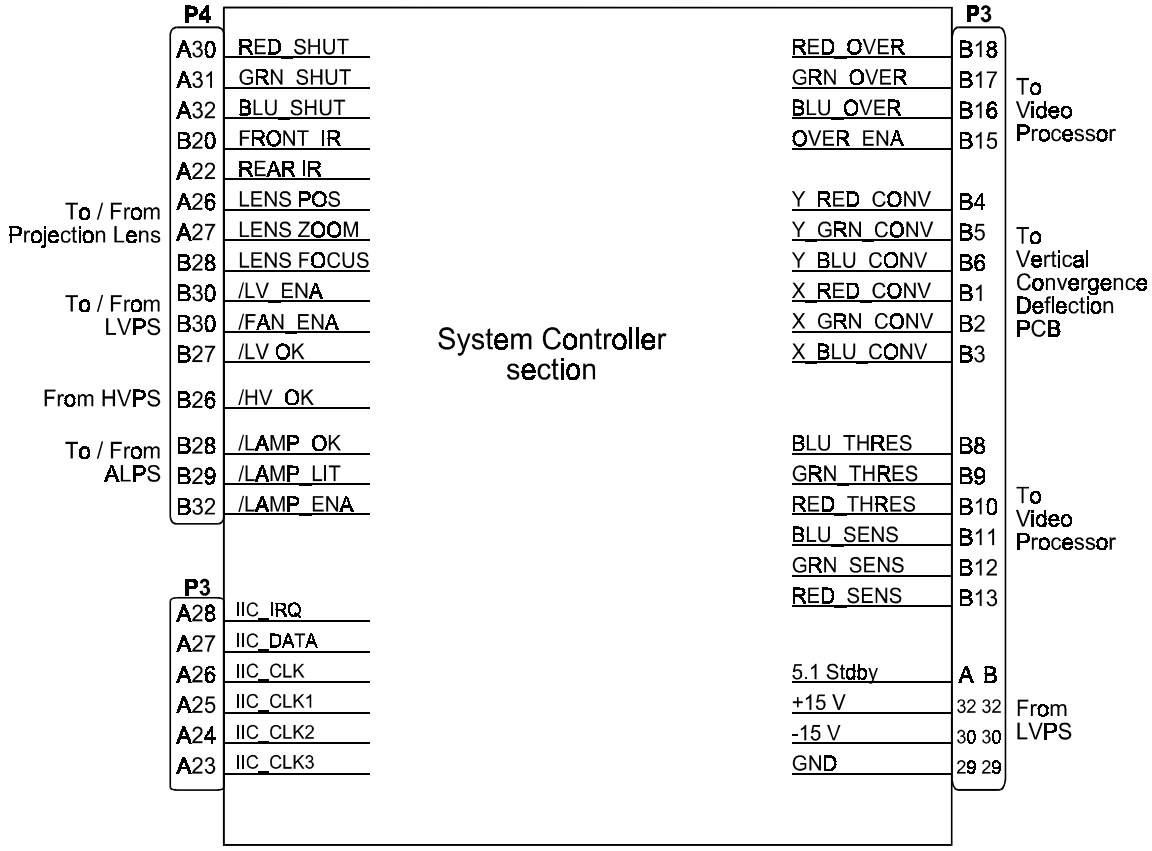


Figure 2-13 I/O Diagram of System Controller section of SC/RTG PCB.

IIC Interface

Communications are performed through the IIC bus to the other PCBs in the system. This three-wire bus interface consists of clock line, data line and interrupt line. The System Controller PCB controls the IIC bus and tells the other PCB when to send and receive data over the IIC bus.

System Controller / Raster Timing Generator Input/Output

This section provides a description of the inputs to and outputs from the SC/RTG. The I/O descriptions are arranged by the source/destination of the signal. The format used is such that the assembly communicated with is used as the primary heading of each output. Input refers to an input to the SC/RTG, output refers to an output from the SC/RTG.

Table 2-8 System Controller/ RTG PCB input/output signals

System Controller/Raster Timing Generator PCB	
Inputs	
LVPS	Description
+5.1V Stdby	Standby voltage for microprocessor control and remote operation.
+15V	Power for analog circuitry.
-15V	Power for analog circuitry.
/LV OK	Feedback signal from the LVPS that it has powered up.
HVPS	
HV OK	High Voltage status line. Low = operation HVPS.
ALPS	
/LAMP OK	Jumpered (not used).
/LAMP LIT	Signal from ALPS that the Arc Lamp is lit.
Video Processor	
V Sync	Input vertical sync.
H Sync	Input Horizontal or composite sync.
Grn Sync	Sync on grn signal that is stripped from the green video.
Misc.	
/FRONT IR	Input signal from Front IR Detector.
/REAR IR	Input signal from Rear IR Detector.
LENS POS	
CCD LINE	Power to CCD AST camera.
CCD DATA	Data from CCD AST camera.
Outputs	
LVPS	
/LV ENA	Signal to enable the LVPS.
/FAN_ENA	Signal to enable the 24V standby power.

System Controller/Raster Timing Generator PCB	
HVPS	
HVPS SYNC	Synchronization pulse for the HVPS, synchronized wit the selected Horiz. Sync at either same, half or on third the frequency.
ALPS	
/LAMP ENA	Enables the ALPS power.
Video Processor	
OVERLAY	Overlay control signal.
Red_Over	Red signal of on-screen menu and/or internal test pattern.
Grn_Over	Similar to Red_Over.
Blu_Over	Similar to Red_Over.
Blu_Thres	Threshold correction information for blue. Real time data at 0 volt to 1 volt.
Grn_Thres	Similar to Blu_Thres.
Red_Thres	Similar to Blu_Thres.
Blu_Sens	Sensitivity correction information for Blu. Real time data at 0 volt to 1 volt.
Grn_Sens	Similar to Blu_Sens.
Red_Sens	Similar to Blu_Sens.
BLANKING	Blanking signal composed of right, left, top and bottom blanking.
CLAMP	A negative-going video clamp signal wit about 3 % duty cycle.
Vertical Convergence Deflection	
X_Red Conv	Red X convergence waveform. The amplitude for full scale correction is about 1 VPP.
X_Red Conv	Grn X convergence waveform. The amplitude for full scale correction is about 1 VPP.
X_Red Conv	Blue X convergence waveform. The amplitude for full scale correction is about 1 VPP.
Y_Red Conv	Red Y convergence waveform. The amplitude for full scale correction is about 1 VPP.
Y_Grn Conv	Grn Y convergence waveform. The amplitude for full scale correction is about 1 VPP.

System Controller/Raster Timing Generator PCB	
Y_Blu Conv	Blue Y convergence waveform. The amplitude for full-scale correction is about 1 VPP.
Deflection Processor	
CORR SYNC	Square wave HCT level synchronous signal for Horiz. Axis.
V DRIVE	Square wave negative going pulse synchronized to the selected vertical sync with a pulse width of about 4 horizontal periods.
Horizontal Deflection	
H DRIVE	Square wave 50 % duty cycle synchronized to the selected horizontal sync.
H BAND:0	Horizontal frequency band lines.
H BAND:1	Band A = 00, Band B = 01, Band C = 11.
/H ENABLE	Low = enabled deflection and high = disabled deflection.
H_F2V	A DC voltage proportional to horizontal frequency.
CCD Camera	
CCD_EXP	Signal to CCD Shading camera to control shutter exposure time.
CCD_CLK	Clock pulse for CCD Shading camera.
CCD_ZOOM	Signal to CCD Shading camera for zoom control.
CCD_FOCUS	Signal to CCD Shading camera for focus control.
CCD_IRIS	Signal to CCD Shading camera for aperture control.
Front Lens	
LENS_ZOOM	Signal to lens zoom motor.
LENS_FOCUS	Signal to lens focus motor.
Shutters	
Red Shutter	Signal to actuate the Red Shutter Motor.
Grn Shutter	Signal to actuate the Green Shutter Motor.
Blue Shutter	Signal to actuate the Blue Shutter Motor.
IIC	
/IIC_SINT	IIC interrupt line.
IIC_DATA	IIC data line. Bi-directional serial line for synchronous data transfer between the SCB/RTG and the Horizontal Deflection PCB.

System Controller/Raster Timing Generator PCB	
IIC_CLK	IIC clock line. Unidirectional clock line for control of synchronous data transfer over the IIC bus interface.

Raster Timing Generator Section

Horizontal frequency band selection and LED logic.

The RTG section produces a voltage that is proportional to the horizontal frequency, which is used by the Horizontal Deflection PCB, and the phase locked loop (PLL) section of the RTG board. This DC voltage is used to create the following frequency bands:

Band A: from 30 kHz to 45 kHz.

Band B: from 45 kHz to 90 kHz

Band C: from 90 kHz to 135 kHz

These bands are outputted through the IIC interface to be used by the System Controller Board. Backplane Board. The Horizontal Deflection Board uses these lines for proper selection of retrace times.

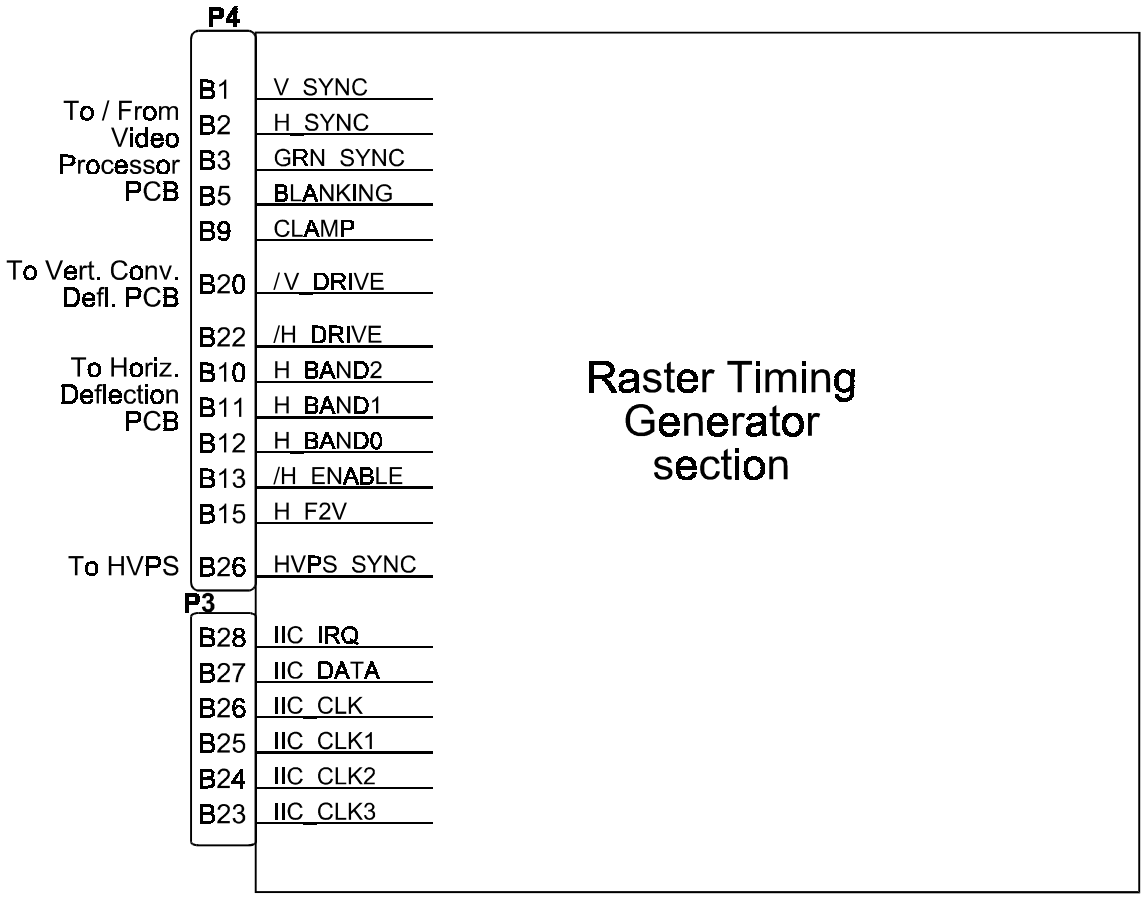


Figure 2-14 I/O diagram of Raster Timing Generator section of SC/RTG PCB.

Output

The RTG will disable the Horizontal Deflection Board by placing a high on the /H_ENABLE line during any of following events:

- A. During and about 2 seconds after the programming period of the FPGA.
- B. During frequency band change period.
- C. During the period that the phase locked loop is out of lock.

Deflection Processor PCB

The Deflection Processor PCB is the circuit board directly above the System Controller/ Raster Timing Generator in the Electronics Module card cage (*see figure 4-10*). The following functions are performed by or controlled by the Deflection PCB:

- Controls the ILA® Bias and Frequency
- Combines Focus and Dynamic Focus signals to one signal (Focus_sig) for both the horizontal and vertical for each color
- L/R and T/B Pincushion

- L/R and T/B Keystone
- L/R and T/B Bow
- Horizontal and Vertical Linearity
- Horizontal and Vertical Edge Linearity
- Red and Blue Horizontal Size
- Red and Blue Vertical Size

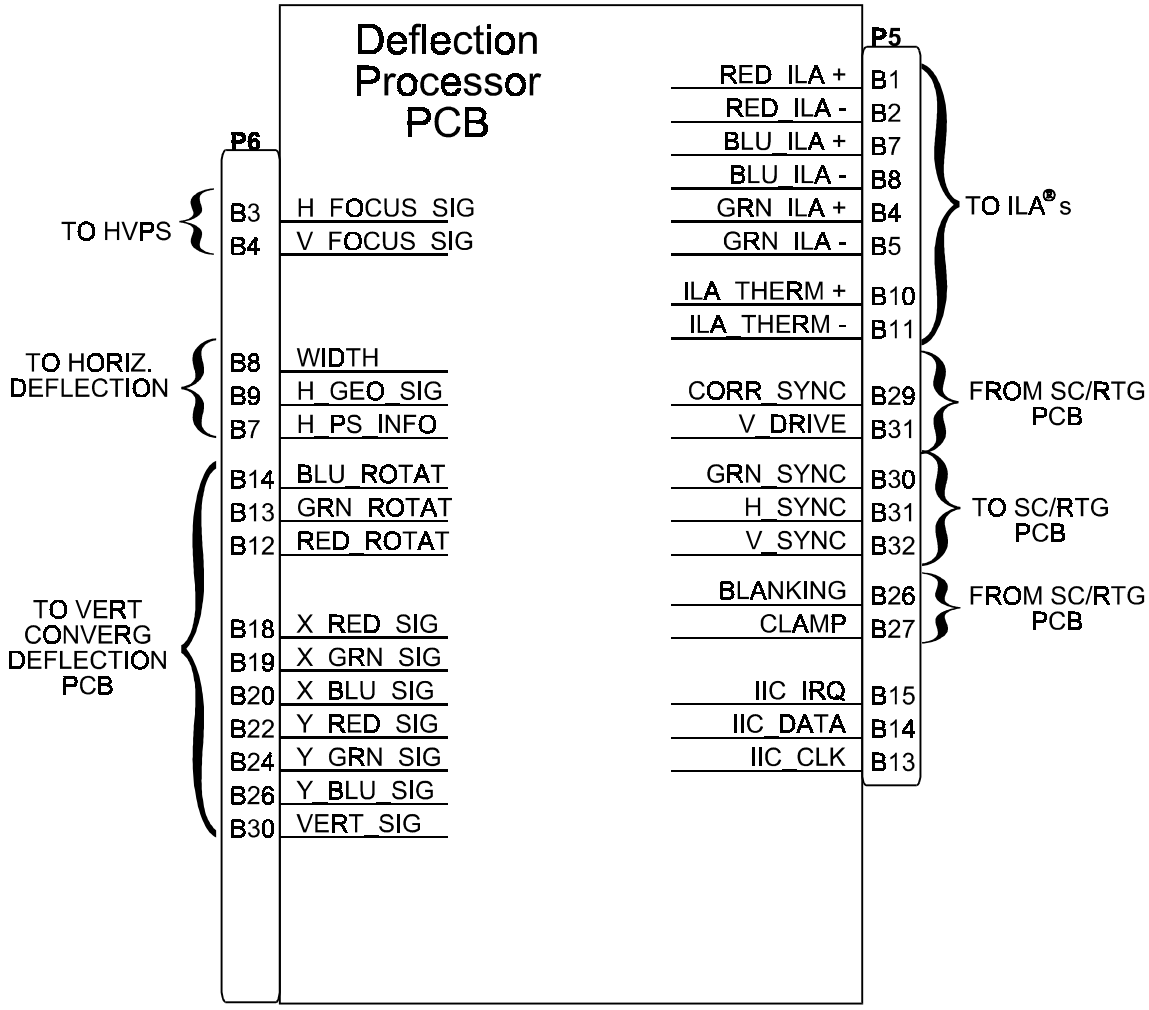


Figure 2-15 I/O diagram of Deflection Processor PCB.

The Deflection Processor PCB I/O diagram (*see Figure 2-14*) and the list of inputs and outputs (*see Table 2-9*) provide information for the technician to perform module level troubleshooting.

Table 2-9 Deflection Processor input/outputs signals

Deflection Processor PCB	
2.5 Inputs	
+15V	Power for analog circuitry.
-15V	Power for analog circuitry.
+5.1V	Power for digital circuitry.
SC/RTG	
IIC_CLK	IIC data line. Bi-directional serial line for synchronous data transfer between the SCB/RTG.
IIC_DATA	IIC data line. Bi-directional serial line for synchronous data transfer between the SCB/RTG.
IIC_CLK	IIC clock line. Unidirectional clock line for control of synchronous data transfer over the IIC bus interface.
CORR_SYNC	Square wave HCT level synchronous signal for Horiz. Axis.
V_DRIVE	Square wave negative going pulse synchronized to the selected vertical sync with a pulse width of about 4 horizontal periods.
Outputs	
SC/RTG	
IICS_IRQ	Interrupt line.
BLANKING	Blanking signal composed of right, left, top and bottom blanking.
CLAMP	A negative-going video clamp signal wit about 3 % duty cycle.
V_Sync	Input vertical sync.
H_Sync	Input Horizontal or composite sync.
Grn_Sync	Sync on grn signal that is stripped from the green video.
Vertical Convergence Deflection	
RED_ROTATE	Signal to rotate the image for convergence alignment.
GRN_ROTATE	Similar to RED ROTATE.
BLU_ROTATE	Similar to RED ROTATE.
X RED_SIG	Red X-axis geometry correction data and also L/R Bow, L/R Skew, Horiz. Edge Linearity, and width
X GRN_SIG	Similar to X RED SIG except without the width signal.

Deflection Processor PCB	
X BLU_SIG	Similar to X RED SIG.
Y RED_SIG	Red Y-axis geometry correction data.
Y GRN_SIG	Similar to Y RED SIG.
Y BLU_SIG	Similar to Y RED SIG.
VERT. SIG	Vertical sync signal
Horizontal Deflection	
H_PS_INFO	Horizontal sweep feedback signal.
WIDTH	Controls the green image width.
H_GEO_SIG	L/R Pincushion and Keystone combined into one signal.
HVPS	
H_FOCUS_SIG	Horizontal focus parabola.
V_FOCUS_SIG	Vertical Focus parabola.

Vertical Convergence Deflection PCB

The Vertical Convergence Deflection PCB is the middle circuit board, above the Deflection Processor PCB and below the shorter Horizontal Deflection PCB, in the Electronics Module card cage (*see Figure 4-10*).

The Vertical Convergence Deflection PCB I/O diagram (*see Figure 2-15*) and the list of inputs and outputs (*see Table 2-10*) provide information for the technician to perform module level troubleshooting.

The following functions are provided by the Vertical Convergence Deflection PCB:

- Horizontal raster centering for all three colors
- Combines Convergence data from the System Controller/ RTG PCB with Geometry data signals (X_RGB_SIG and Y_RGB_SIG)
- Scan reversal via jumper positioning
- RGB Rotation
- Drive for Vertical Deflection Coils
- Vertical Sweep Failure (Vert_OK)
- Interlock Status for all the Yoke connections

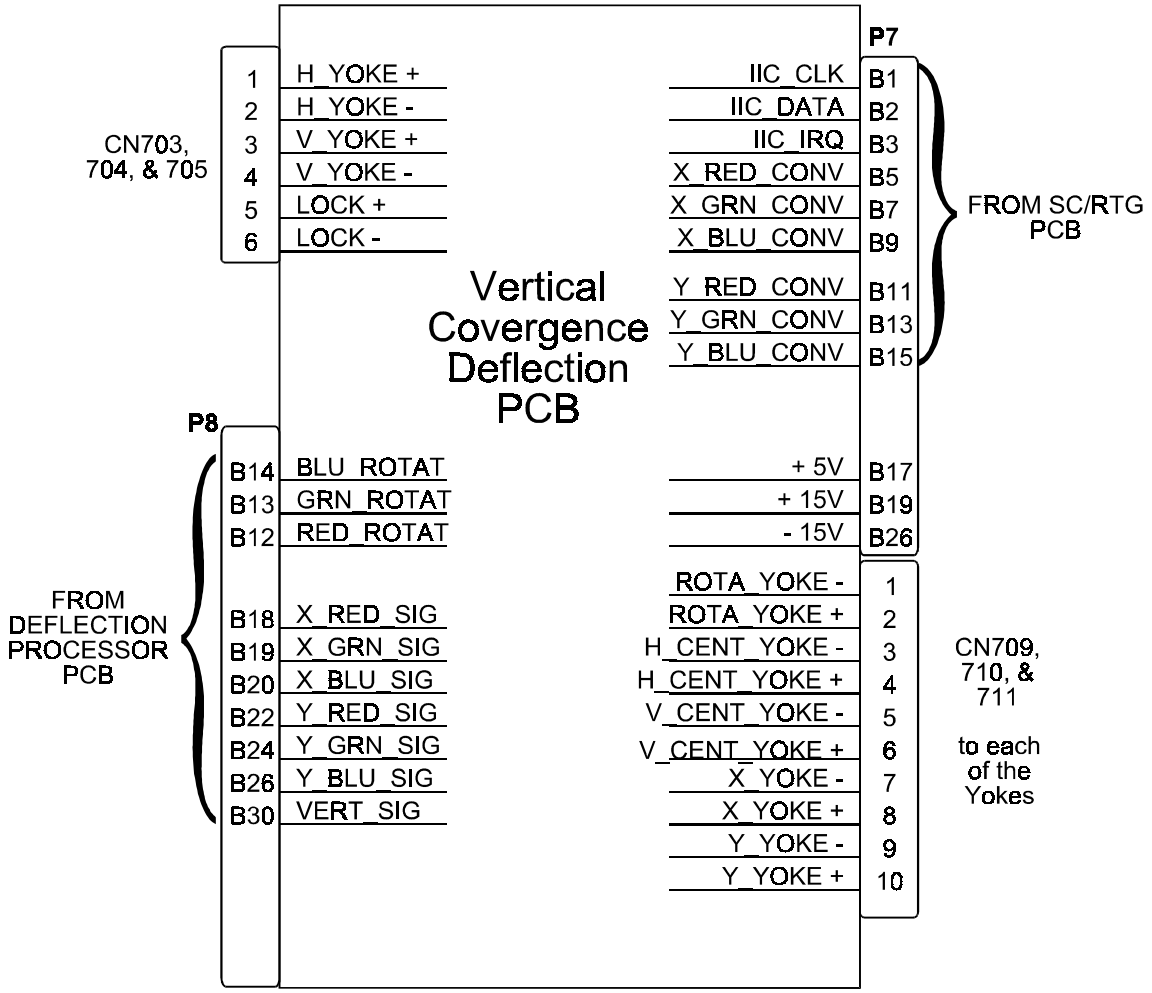


Figure 2-16 I/O diagram of Vertical Convergence Deflection PCB.

IIC Interface

All adjustments for the Vertical Convergence Deflection PCB are performed by the System Controller via the IIC serial bus interface. This three-wire bus interface consists of a clock line, a data line, and an interrupt line. The Vertical Convergence Deflection PCB does not create any interrupt and the interrupt line is not used for this application.

Vertical Convergence Deflection Board I/O

This section provides a description of the inputs to and outputs from the Vertical Convergence Deflection PCB. The I/O descriptions are arranged by the source/destination of the signal. The assembly communicated with is used as the primary heading of each group of signals. Those signals are subdivided into inputs and outputs. Input refers to an Input to the, output refers to an output from the Vertical Convergence Deflection PCB.

Table 2-10 Vertical Convergence Deflection input/output signals.

Vertical Convergence Deflection PCB	
Inputs	Description
+5.1V	Power for digital circuitry.
+15V	Power for analog circuitry.
+15V	Power for analog circuitry.
+15V	Power for analog circuitry.
+15V	Power for analog circuitry.
-15V	Power for analog circuitry.
-15V	Power for analog circuitry.
-15V	Power for analog circuitry.
-15V	Power for analog circuitry.
SC/RTG	
X_Red_Conv	Red X convergence waveform. The amplitude for full scale correction is about 1 VPP.
X_Red_Conv	Grn X convergence waveform. The amplitude for full scale correction is about 1 VPP.
X_Red_Conv	Blue X convergence waveform. The amplitude for full scale correction is about 1 VPP.
Y_Red_Conv	Red Y convergence waveform. The amplitude for full scale correction is about 1 VPP.
Y_Grn_Conv	Green Y convergence waveform. The amplitude for full scale correction is about 1 VPP.
Y_Blu_Conv	Blue Y convergence waveform. The amplitude for full scale correction is about 1 VPP.
IIC_CLK	IIC data line. Bi-directional serial line for synchronous data transfer between the SCB/RTG and the Horizontal Deflection PCB.
IIC_DATA	IIC data line. Bi-directional serial line for synchronous data transfer between the SCB/RTG and the Horizontal Deflection PCB.
IIC_CLK	IIC clock line. Unidirectional clock line for control of synchronous data transfer over the IIC bus interface.
Deflection Processor	
RED_ROTAT	Signal to rotate the image for convergence alignment.
GRN_ROTAT	Similar to RED ROTATE.
BLU_ROTAT	Similar to RED ROTATE.

Vertical Convergence Deflection PCB	
X RED_SIG	Red X-axis geometry correction data and also L/R Bow, L/R Skew, Horiz. Edge Linearity, and width
X GRN SIG	Similar to X RED SIG except without the width signal.
X BLU SIG	Similar to X RED SIG.
Y RED_SIG	Red Y-axis geometry correction data.
Y GRN_SIG	Similar to Y RED SIG.
Y BLU_SIG	Similar to Y RED SIG.
VERT_SIG	Vertical sync signal
2.6 Outputs	
/IIC Sint	IIC interrupt line.
VERT_OK	Vertical Sweep detect signal to Horizontal Deflection PCB

Outputs

H_LOCK + and H_LOCK-: Used to shut down the switching power supply of the horizontal deflection amplifier in the event of a loose yoke or loose scan reverse connector. This prevents the power supply section of the Horizontal/Vertical Deflection Board from operating when 1 or more yoke connectors are disconnected.

/SWEEP_OK: Shuts down the video amplifiers in the event of deflection failure (if DEFL_OK or /H_ENABLE are not present).

Horizontal Deflection PCB

The Horizontal Deflection PCB is the smaller circuit on the top of the Electronics Module card cage (*see Figure 4-10*). This board drives the convergence coils of the projectors.

The following functions are provided by Horizontal Deflection PCB:

- Power failure detection for the +15V, -15V, and +60V
- Switching for the three different Flyback modes
- Processing the Horizontal Frequency to provide the Horizontal Gate Drive circuitry for timing control of the Horizontal Deflection Coil
- Horizontal Drive for the Horizontal Deflection Coils
- Horizontal Size adjustment

The Horizontal Deflection Input/Output diagram (*see Figure 2-17*) and the list of inputs and outputs (*see Table 2-11*) provide information for the technician to perform module level troubleshooting.

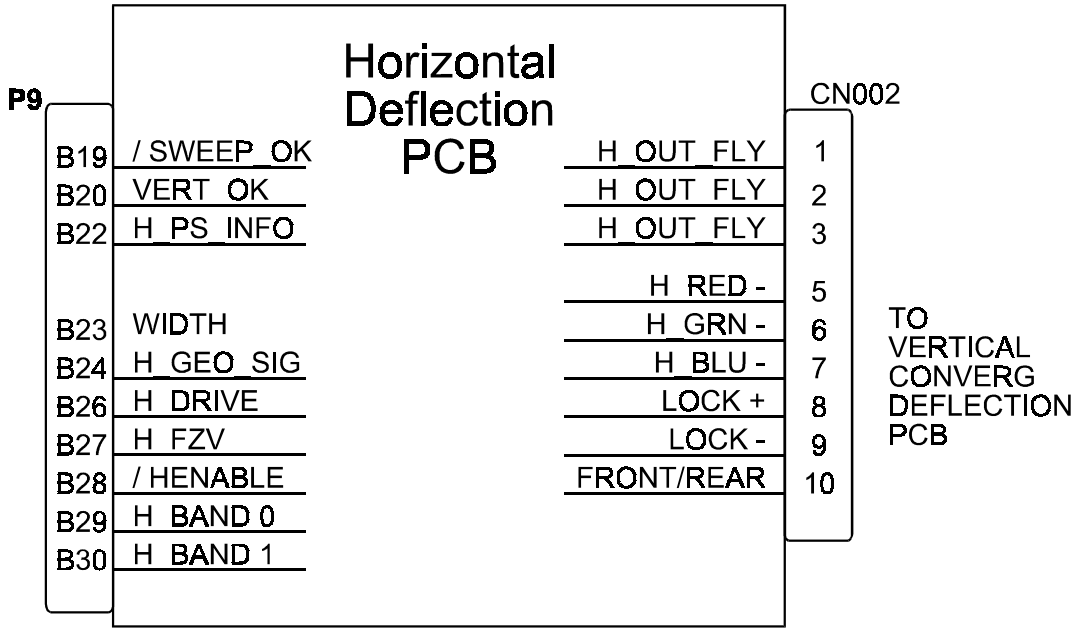


Figure 2-17 I/O diagram of Horizontal Deflection PCB.

IIC interface

Adjustments for this board are performed by the System Controller via the IIC serial bus interface. This three-wire bus interface consists of a clock line, a data line and an interrupt line. The C/D Board does not create any IIC interrupt.

The Horizontal Deflection Board I/O

This section describes the inputs to and outputs from the C/D Board. The I/O descriptions are arranged by the source and destination of the signal. The assembly communicated with is the primary heading of each group of signals. Those signals are subdivided into inputs and outputs. Input refers to an Input to the C/D Board, output refers to an output from the C/D Board.

Table 2-11 Horizontal Deflection input/output signals

Horizontal Deflection PCB	
Inputs	
+5.1V	Power for digital circuitry.
+15V	Power for analog circuitry.
+15V	Power for analog circuitry.

Horizontal Deflection PCB	
-15V	Power for analog circuitry.
-15V	Power for analog circuitry.
+ 60 V	for Horizontal sweep generation
+ 60 V	for Horizontal sweep generation
Vertical Convergence Deflection	
VERT_OK	Vertical Sweep OK
Deflection Processor	
WIDTH	Controls the green image width.
H_GEO_SIG	L/R Pincushion and Keystone combined into one signal.
SC/RTG	
H_DRIVE	Square wave 50 % duty cycle synchronized to the selected horizontal sync.
H_BAND:0	Horizontal frequency band lines.
H_BAND:1	Band A = 00, Band B = 01, Band C = 11.
/H_ENABLE	Low = enabled deflection and high = disabled deflection.
H_F2V	A DC voltage proportional to horizontal frequency.
IIC_DATA	IIC data line. Bi-directional serial line for synchronous data transfer between the SCB/RTG and the Horizontal Deflection PCB.
IIC_CLK	IIC clock line. Unidirectional clock line for control of synchronous data transfer over the IIC bus interface.
Outputs	
/IIC_INT	IIC interrupt line.
Regulator PCB	
/SWEEP_OK	Sweep Failure detect signal to Regulator PCB
Deflection Processor	
H PS INFO	Horizontal sweep feedback signal

Regulator for three CRTs

The Regulator PCB is located just behind the Green and Blue CRTs and sits next to the Green Video Amplifier PCB. The Regulator performs the following functions:

- Regulates the G_2 supply from the HVPS and distributes the regulated Voltage (+900V) to each of the three Video Amplifier PCBs
- Regulates the G_1 supply from the HVPS and distributes the regulated Voltage (-75V) to each of the three Video Amplifier PCBs
- Monitors the status of the Video Amplifier PCBs (VA_OK_1,2,3)
- Monitors the status of the sweeps (/ Sweeps_OK) and shuts down the G_1 and G_2 circuits if there is a failure
- Regulates the Video Amplifier Supply Voltage (+60V)

CRT Protection

The Regulator PCB provides CRT protection, in three ways:

- Sweep Failure Protection - If a Vertical Sweep failure is detected by the Vertical Convergence Deflection PCB, the VERT_OK signal goes high. This signal goes to the Horizontal Deflection PCB. If either the VERT_OK signal is high or there is a Horizontal Sweep failure, the /SWEEP_OK signal goes high. This signal goes to the Regulator PCB where it shuts down the G_2 supply voltage.
- Beamcurrent Limiting – If the Contrast or G_2 is adjusted too high a BEAM signal is sent to the Video Processor PCB. The CRT beam current limit is 40µA. If the Contrast adjustment causes a CRT beam current limit the Video Processor will reduce the Contrast. If this doesn't work, the Video Processor PCB will reduce the G_2 shutdown voltage.
- Video Amplifier Failure Protection – If the Video Amplifier does not receive its supply voltage REG_VP from the Regulator PCB, it sends a high / VAMP_OK signal to the Video Processor PCB. The Video Processor PCB combines the three / VAMP_OK signals from each of the three Video Amplifier PCBs and sends a / VIDEO_OK signal to the Regulator PCB. The Regulator PCB takes the / VIDEO_OK signal and combines this with a check of the incoming G_1 and G_2 supply voltages and sends this signal back to the Video Processor PCB as / VA_OK. The Video Processor PCB combines this signal with the CRT beam current limiting signal and to shutdown the G_2 control signal going to **all** the Video Amplifier PCBs. A high input to any of these signals will shutdown the G_2 controls to all the Video Amplifier PCBs.

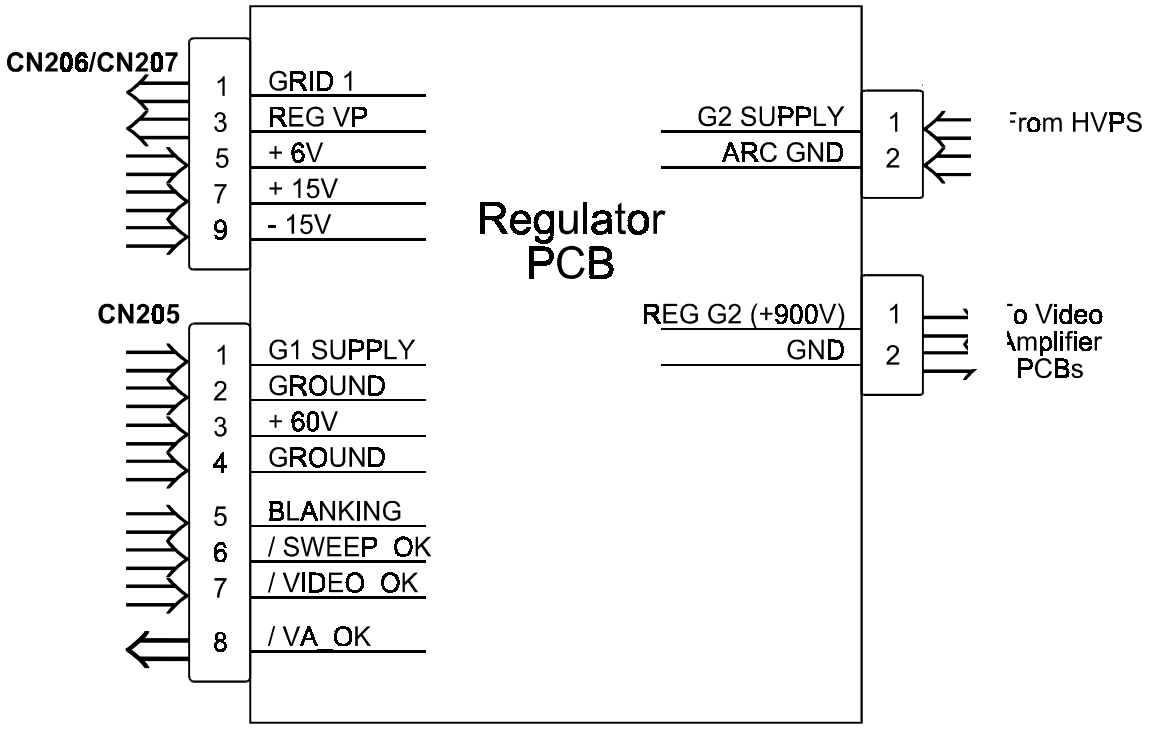


Figure 2-18 I/O diagram of Regulator PCB.

Table 2-12 Regulator Inputs and Outputs

Regulator PCB	
2.7 Inputs	
LVPS	
+15V	Power for analog circuitry.
-15V	Power for analog circuitry.
+ 6.2 V	CRT Filaments
+ 60 V	Video Output drive supply
HVPS	
G2 SUPPLY	G2 Supply Voltage 1 kV.
ARC_GND	Ground
G1_SUPPLY	G1 Supply Voltage -75V.
GROUND	Ground
BLANKING	Blanking signal composed of right, left, top and bottom blanking.

Regulator PCB	
/SWEEP_OK	Monitors sweep signals from the Video Amplifier PCB
/VIDEO_OK	Monitors Video Amplifier status.

2.8 Outputs

Video Processor	
/ VAMP_OK	Feedback signal to Video Processor.
Video Amplifier	
REG_G2	+ 900V TO Video Amplifier PCBs
GND	Ground
G1	DC Bias + Blanking
REG_VP	Supply voltage to Video Amplifier PCB

Video Amplifier PCBs

There are three separate Video Amplifier PCBs, one each for the Red, Green, and Blue Channels. The Video Amplifier PCBs (VA PCBs) are located under the necks of each of the three CRTs. The outputs from these video amplifiers connect directly to the CRTs and provide all electrical connections to the CRTs except for the anode voltages.

The following functions are provided by VA PCB:

- Amplification of video signals and driving the cathode of all three CRTs
- Sensing the cathode beam current for all three CRTs
- G1 regulator for all three CRTs
- Blanking drive section
- DC restoration for the video signals
- CRT interface for focus, heater voltage and ARC ground

The Video Amplifier Board I/O diagram (*see Figure 2-19*) and the list of Inputs and Outputs (*see Table 2-13*) provide information for the technician to perform module level troubleshooting.

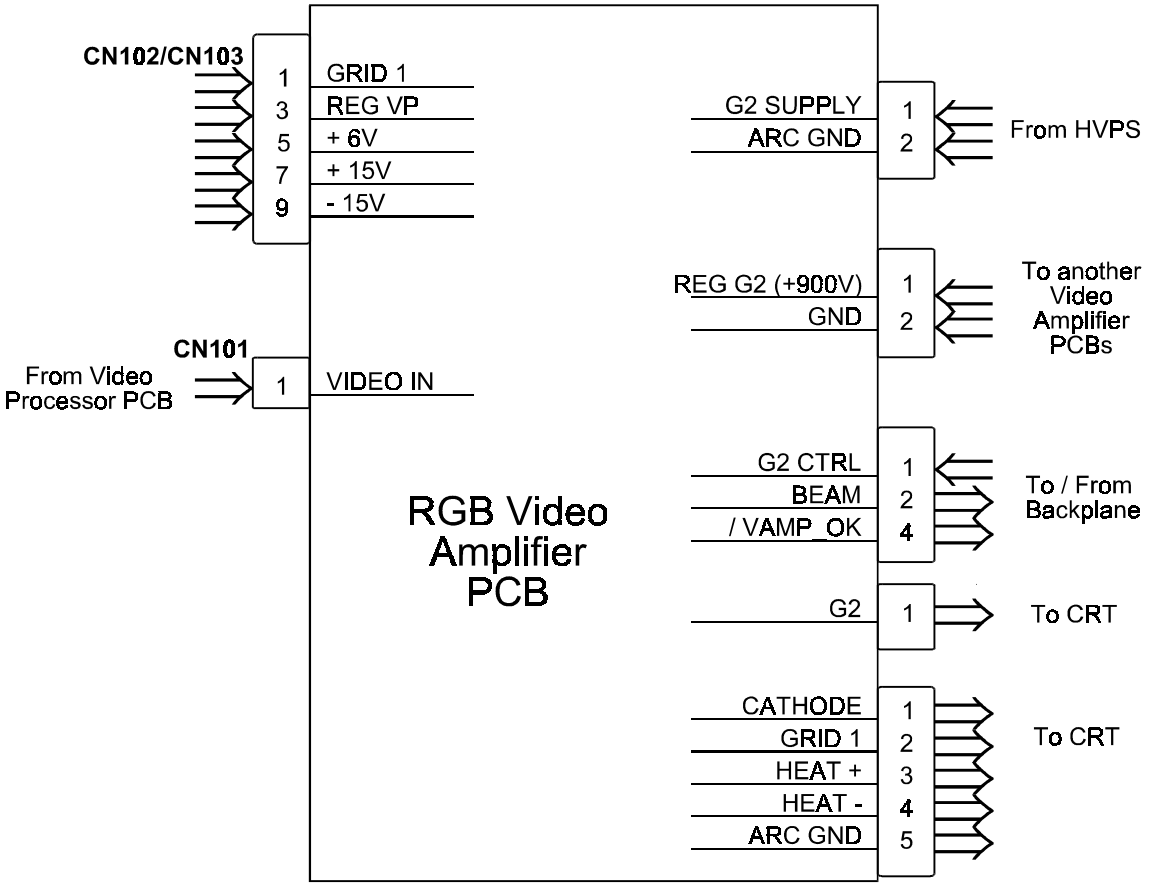


Figure 2-19 Video Amplifier PCB, Block Diagram.

CRT interfaces for Focus, heater voltages and ARC ground

Each of the three CRTs has a socket permanently attached to the back of it. This socket is connected to a Video Amplifier PCB by a wire harness. They provide the necessary interface for the input of the three CRTs. The Focus voltage for each color is connected directly to the socket of each CRT.

The Video Amplifier PCBs provides ARC grounds for each CRT, which are used to protect against arcing of the CRT anode supply.

IIC Interface

The Video Amplifier PCBs does not use the IIC interface. All adjustments are accomplished by the control lines coming from the Video Processor Board.

The Video Amplifier Board I/O

This section provides a description of the inputs to and outputs from the Video Amplifier PCB. The I/O descriptions are arranged by the source/destination of the signal. The assembly communicated with is used as the primary heading of each group of signals. Those signals are subdivided into inputs and outputs. Input refers to an Input to the Video Amplifier PCB, output refers to an output from the Video Amplifier PCB.

Table 2-13 Video Amplifier I/O signals.

Video Amplifier PCB	
Inputs	Description
+15V	Power for analog circuitry
-15V	Power for analog circuitry
+6.2V	CRT Filament voltage
G_1	DC Bias + Blanking
REG_VP	Supply voltage for Video Amplifier PCB.
RESTORE	DC Restore after blanking
Video Processor	
VIDEO IN	Video signal in
Regulator	
G_2 CTRL	Control signal to adjust G_2
REG_G_2	+900 V to other Video Amplifier PCBs
GND	Ground
HVPS	
G_2 SUPPLY	G_2 supply voltage = 1 kV
ARC GND	Ground
Outputs	
Video Processor	
/ VAMP_OK	VA PCB status line. Low = good VA PCB. High = Bad VA PCB (This signal is called /HV_ENABLE at the HVPS).
BEAM	CRT beam current. Feedback to Video Processor PCB for beam current limiting. About 1 volt per 100 UA
CRT	
CATHODE	Video drive signal to CRT
G_1	DC bias + Blanking
HEAT +	+ 6.2V CRT Filament Voltage
HEAT -	Ground
ARC GND	Ground

Backplane PCB

The Backplane PCB is the interface that connects the Power Supplies, VICs, PCBs, and other components together, either through a direct connection to a connector on the Backplane or through cables to connectors on the Backplane PCB. Signals are not modified in any way by the Backplane. It serves only as an interconnecting point. Refer to Figure 2-20 for a general idea of how the projector wiring is interconnected through the Backplane PCB.

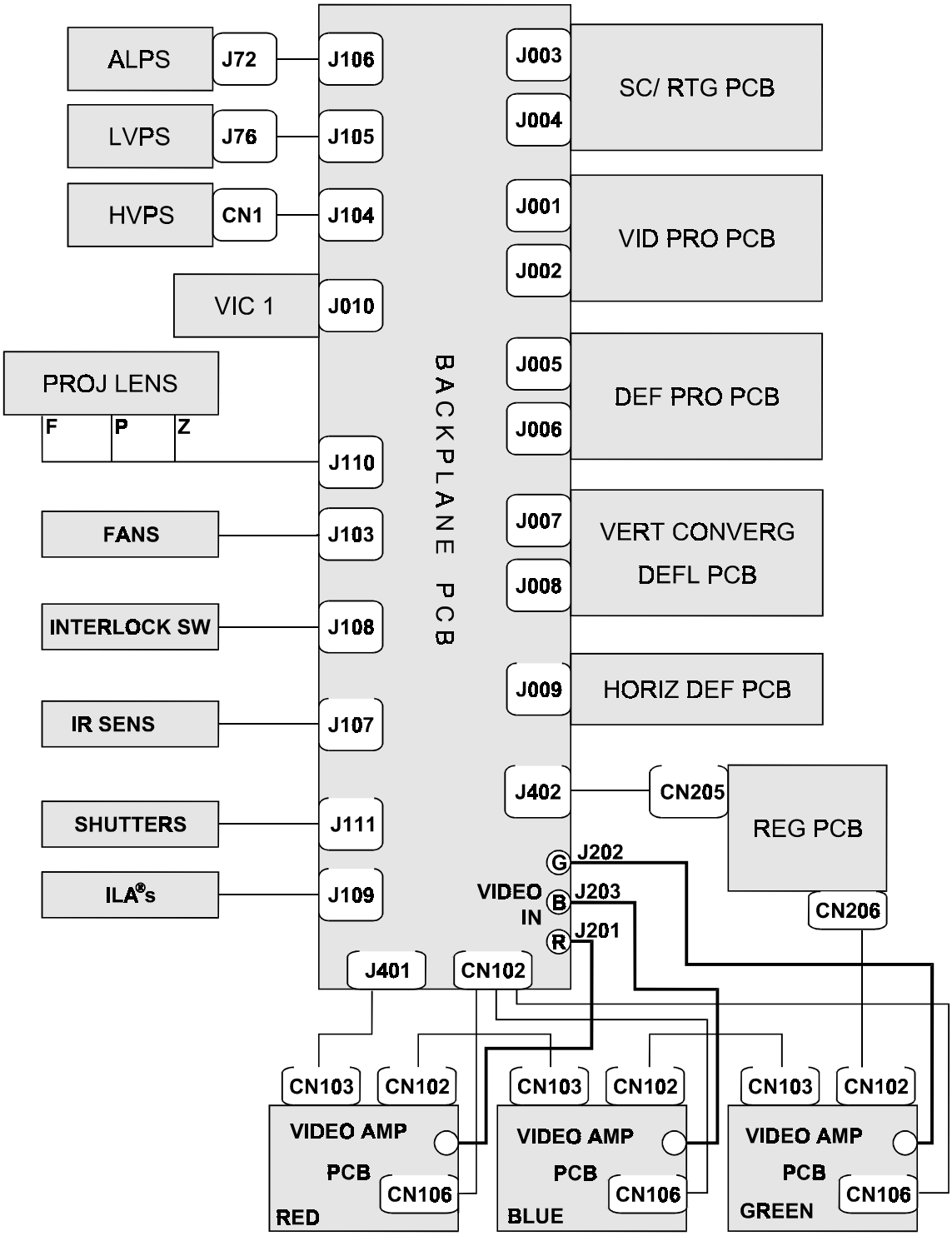


Figure 2-20 Backplane Board Interface Block Diagram.

3.0 Service Adjustments

Contents

3.1 Introduction

This chapter details adjustment procedures required to maintain the Model 100. Refer to Figure 3-1 and Figure 3-2 to locate assemblies and components. A tool list, required to perform adjustments, is in Chapter 1.

CAUTION! Before performing procedures in this chapter, review the chapter on Safety at the beginning of this manual.

WARNING!!! When performing procedures in this chapter that require projector covers to be off, **wear high voltage gloves (ANSI/ASTM 10,000 volt rated) when working near the CRTs, Arc Lamp, or power supplies**. **Wear safety goggles (rated X5) when working anywhere near the light path from the arc lamp or the projection lens**.

 **CAUTION!** If the projector is to be powered on with the front cover removed, pull out the power interlock switch. This allows power to be applied to the projector for maintainence. Do not use the interlock switch to power-off the projector because it maintains power to the fans to cool the Arc Lamp. The power interlock switches for front cover are attached to the chassis frame.

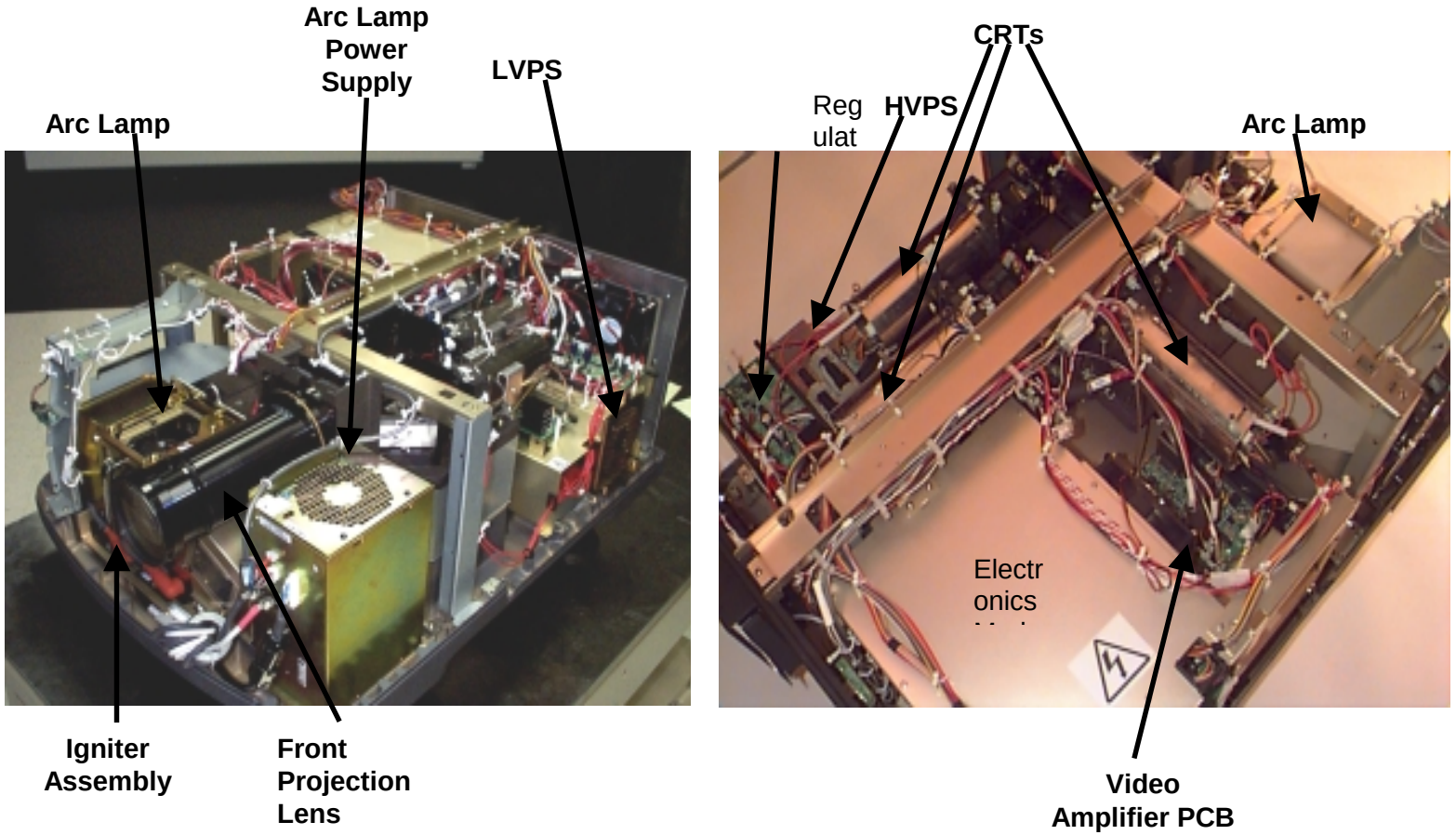


Figure 3-1 Major components of the Model 100 Projector.

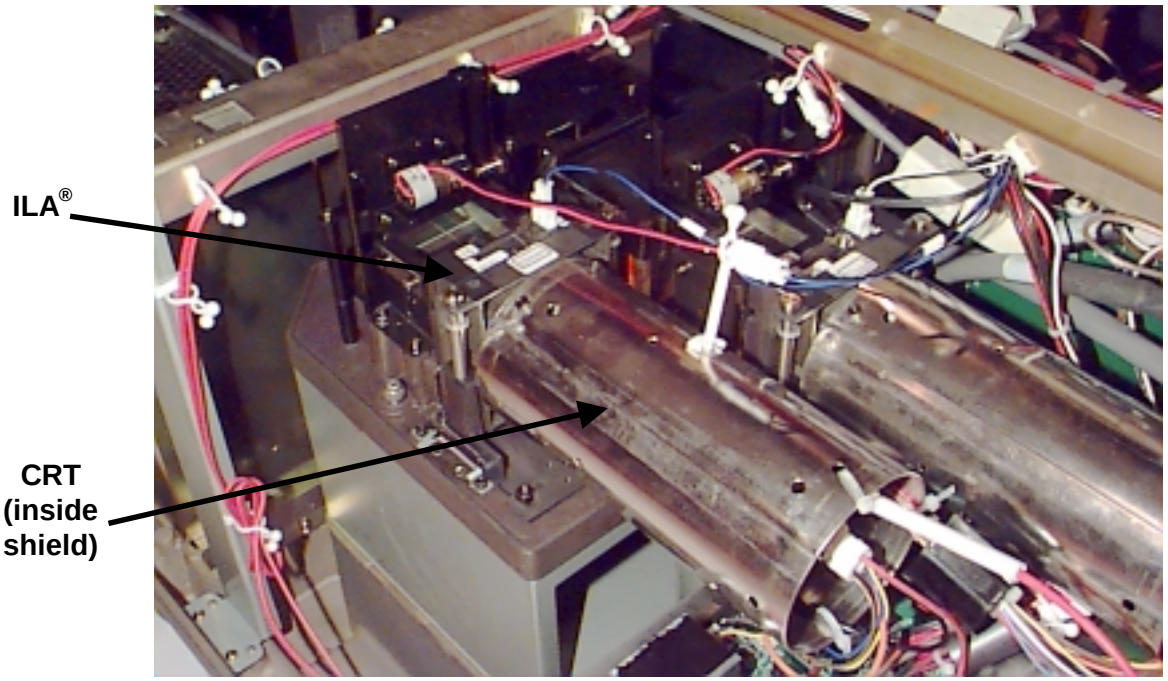


Figure 3-2 View of Green and Blue CRT and ILA® Assemblies.

3.2 Arc Lamp Adjustment

Arc Lamp adjustment must be performed whenever an Arc Lamp is replaced and *may* be needed if the projector is heavily jarred during shipment. The Arc Lamp Adjustment consists of 2 separate adjustment procedures; Arc Lamp Current adjustment and Arc Lamp Alignment.

Arc Lamp Current Adjustment

The Arc Lamp Current Adjustment must be performed whenever the Arc Lamp Power Supply is replaced.

1. Remove the front cover.
1. Apply power to the projector and allow it to operate for a minimum of 15 minutes.
2. Measure the voltage across the Arc Lamp Power Supply ± output terminals using a DVM (*see Figure 3-3*).

CAUTION: Do Not place DVM leads across Igniter Terminals ± during projector power up because there is a 32 kV pulse that lights the Arc Lamp that is present across these leads during power up.

3. Use a clamp-on type ammeter such as AMPROBE Model AC/DC 1000, or equivalent, and measure the Arc Lamp current around the Ignitor cable. Place the clamp-on current meter around either end of the white cable that goes from the Ignitor to the Arc Lamp and measure the current going to the lamp (*see Figure 3-3*).

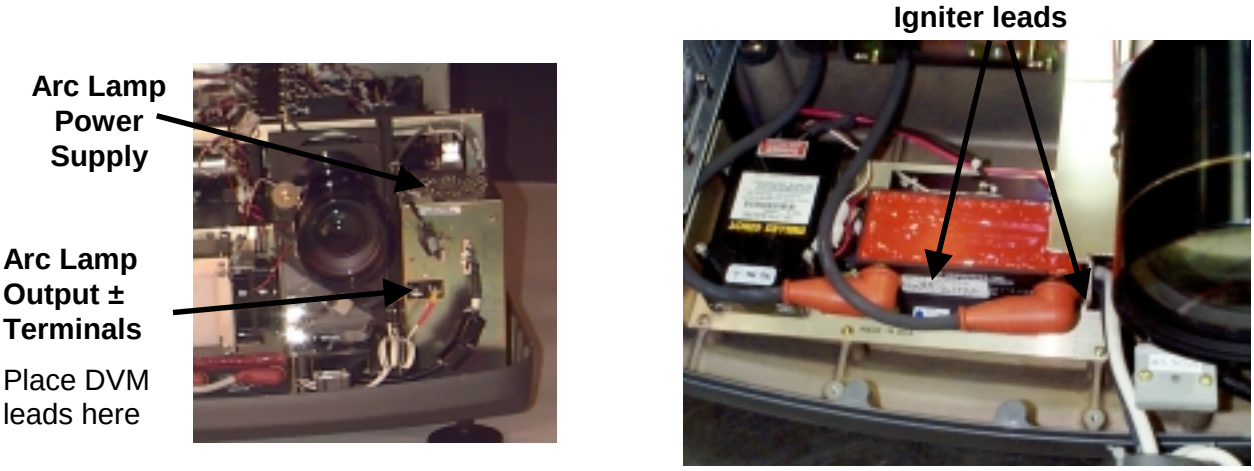


Figure 3-3 Arc Lamp current adjustment.

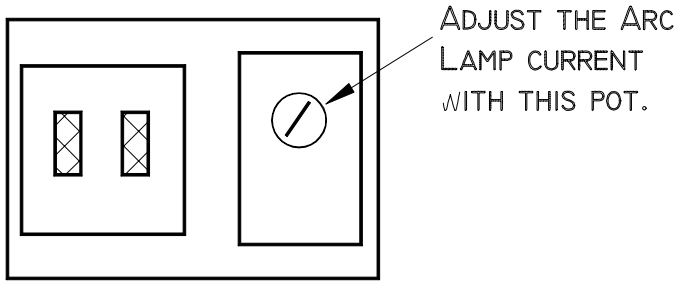


Figure 3-4 Zoom view of aperture on top of Arc Lamp Power Supply cover.

5. Multiply the voltage by the current. The result should be 750 ±25 watts.
6. If the result is not 750 ±25 watts, adjust the trimmer pot (*see Figure 3-4*) until the result is 750 ±25. If increasing the current, observe that the voltage may increase slightly.
7. Wait approximately 10 minutes, then recheck the current and voltage and make final adjustments, if necessary. Leave the front cover off to perform the Arc Lamp Alignment procedure.

Arc Lamp Alignment

Arc Lamp Alignment insures the brightest area of the Arc Lamp is in the center of the screen.

For best results, perform ILA® Back Focus procedure with 2 people. One person to watch the screen close-up and the other to move the CRT/ ILA® assemblies back and forth. The adjustment is factory-set but may need some touch-up in the field.

1. Remove the front cover.
2. Apply power to the projector and allow it to operate for a minimum of 15 minutes.
3. Verify that the "Shutters on Hide" box is checked in the System-Preferences menu, then use the RGB key and the HIDE key to hide Red and Blue. This blocks the light coming from the Red and Blue ILA®s.
4. Access the "Shutters on Hide" box again from the System-Preferences menu and uncheck the box, then use the RGB and HIDE keys to hide Green. This mutes the image from the Green ILA® but leaves the Green shutter open to allow Arc Lamp light from the Green ILA® on the screen.
5. Select ILA® Bias from the System-Factory Adjustments menu. Record this current ILA® bias level. This bias level will be returned to when this adjustment is complete. The Green value only need be recorded because Red and Blue will return to their original levels when Green is reset.
6. Use the up arrow key and adjust the ILA® bias for Green for maximum light output.
7. Measure the light output in the center of the screen using a calibrated light meter (Minolta Illuminance Meter T-1 or equivalent).
8. Loosen the 4 Phillips-head retaining screws on the top of the Arc Lamp Module (*see Figure 3-5*) to allow the Arc Lamp to move.
9. Turn the 5mm Hex nut on the **side of the Arc Lamp Module**. Maximize the center screen brightness **in the X-axis** on the screen.
10. When the center-screen brightness is maximized in the X-Axis, tighten the 4 Phillips-head retaining retaining screws (see Figure 3-5).
11. Loosen the 4 Phillips-head retaining screws on the side of the Arc Lamp Module (*see Figure 3-5*) to allow the Arc Lamp to move.
12. Turn the 5mm Hex nut on the **top of the Arc Lamp Module** back and forth(*see Figure 3-5*) while another person continues to monitor the center screen brightness with the light meter. Maximize the center screen brightness **in the Y-axis** on the screen.
13. When the center screen brightness is maximized in the Y-Axis, tighten the 4 Phillips-head retaining screws (*see Figure 3-5*).

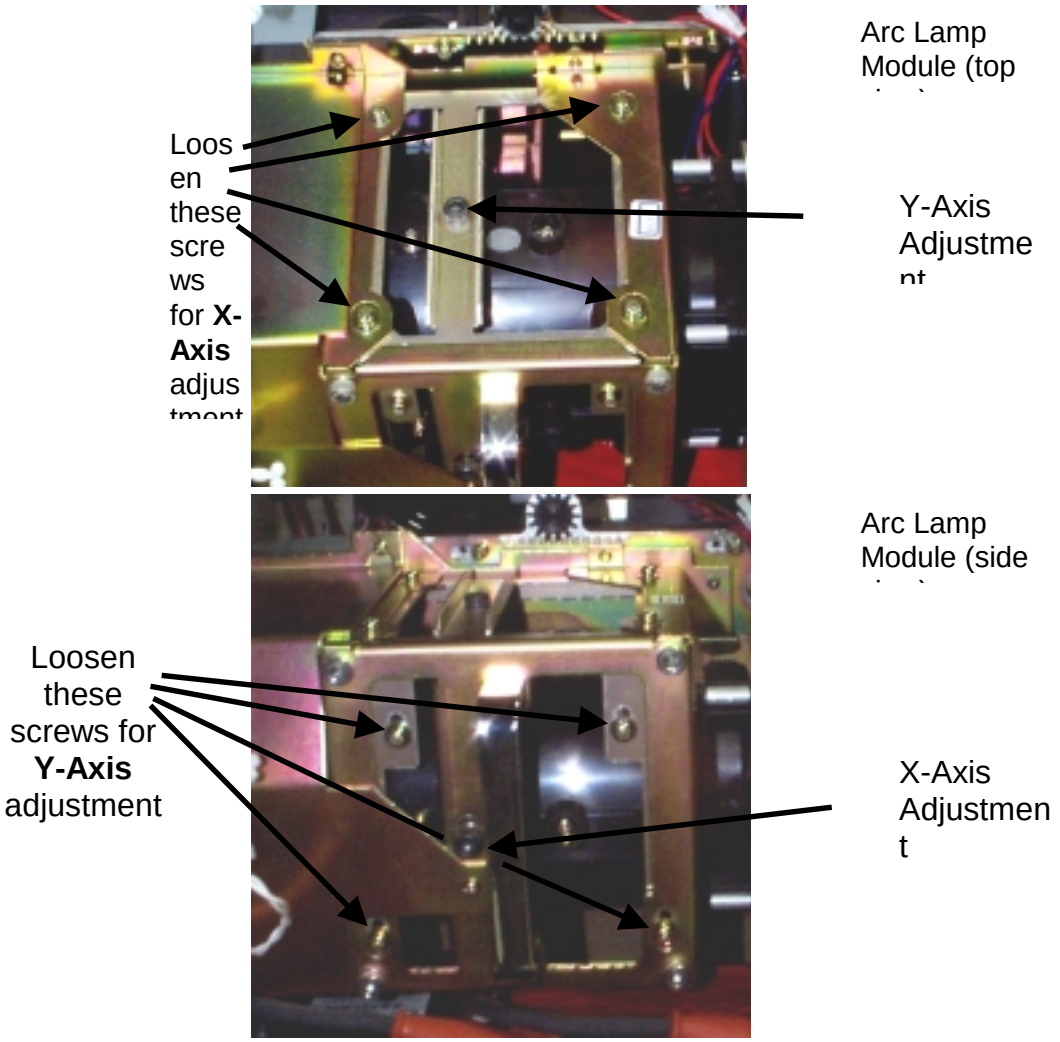


Figure 3-5 Arc Lamp X and Y-Axis adjustment screws.

14. With the center-screen brightness maximized, measure the light output at the center of the screen and each corner with the light meter to determine the screen rolloff. Screen rolloff is the gradual decrease in brightness from the screen center to the screen corners, expressed as a ratio i.e. 3:1.
15. Divide each corner brightness into the center-screen brightness. The screen rolloff should be less than 3:1 from center to corners. Each corner should be balanced evenly so that no corner is excessively brighter or darker than any other corner.
16. Recheck rolloff with the light meter again. Readjust, recheck, and readjust until a rolloff of 3:1 from screen center to screen corners is obtained
17. Loosen the 4 Phillips-head retaining screws (*see Figure 3-6*) to allow the Arc Lamp Module to move. Use a Phillips screw driver with a long shank to get to the 2 screws (not visible in photo in Figure 3-6) on the bottom of the Arc Lamp Module.

18. Adjust the Z-Axis to increase light output. Use either a 10mm socket or a 5mm hex wrench (*see Figure 3-6*).
19. When the desired light output is achieved, tighten the 4 retaining screws.
20. When proper rolloff is obtained, return the ILA® bias adjustment to the level from Step 4, and recheck the "Shutters on Hide" box.

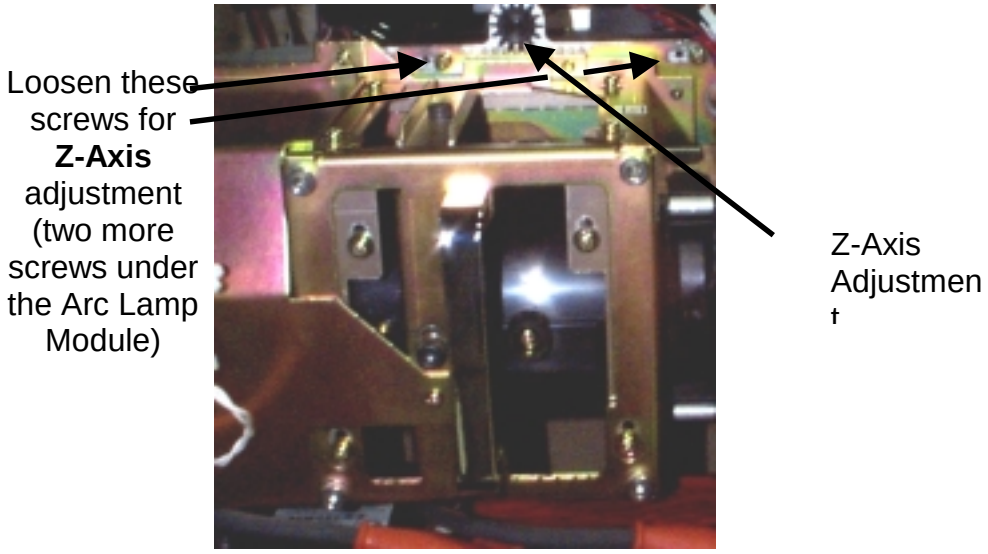


Figure 3-6 Arc Lamp Z-Axis adjustment.

3.3 ILA® Back Focus

The ILA® Back Focus adjustment moves the CRT/ ILA® assemblies together to adjust the focal length so that the image will be focused on the screen. When using a zoom lens this adjustment allows the zoom lens' tracking to remain focused throughout the entire range. Use the Pluge/Grey test pattern to perform this adjustment one color at a time. The procedures below perform the ILA® Back Focus for the Green lens. The first procedure is for a zoom lens. The second procedure is for a fixed lens.

To adjust the ILA® Back Focus for a Zoom Lens:

1. Remove all the covers (*seeSection 4.2*).
2. View the Green Channel. Hide the Red and Blue Channels.
3. Select Test Pattern #7 (the Pluge/Grey test pattern).
4. Select Projection Lens from the menu.
5. Use the up/down arrow keys to zoom the Projection Lens to smallest image.
6. Use left and right arrows to focus the projection lens to get sharply focused spacer balls.

   NOTE: Spacer balls are used inside the ILA® Assembly to separate the layers. They are tiny, random, irregularly-shaped spots that are

visible (looks like pepper spray) throughout the image. Stand directly in front of the screen and look in the white areas of the image. From throw distances shorter than 4 meters, spacer balls are difficult to see.

7. Zoom the lens to the largest image.
8. Put on safety gloves (*see Safety section for gloves type*) then loosen the 2 Phillips screws on the Green ILA® Assembly base (or whichever lens is being focused).
9. Stick a small flat-blade screwdriver in the adjustment slot and move the ILA® Assembly back and forth until the spacer balls are in focus (*see Figure 3-7*).

   NOTE: Do not use the zoom lens focus while performing this step.

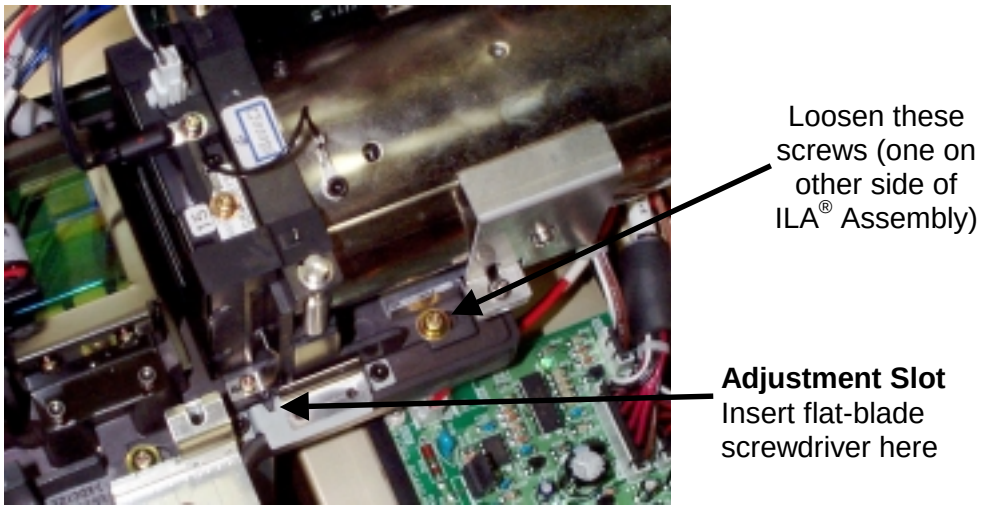


Figure 3-7 ILA® Back Focus Adjustment.

10. Repeat Steps 5-9 until the spacer balls stay in focus through the entire zoom range. The spacer balls may go slightly out of focus in spots while zooming up or down, but they should be in focus at the smallest and largest images.
11. Tighten the 2 phillips on the Green ILA® Assembly (*see Figure 3-7*).
12. Once the Green ILA® is properly focused, loosen the 2 ILA® screws for the Red Channel. Move the ILA® back and forth until the Red Channel spacerballs are in focus.
13. Repeat Step 12 for the Blue ILA®.

To adjust the ILA® Back Focus for a Fixed Lens:

1. Remove all the covers (*see Section 4.2*).
2. View the Green Channels. Hide the Red and Blue Channels.
3. Select Test Pattern #7 (the Pluge/grey test pattern).

4. Put on safety gloves (*see Safety section for gloves type*) and loosen the 2 Phillips screws on the Green ILA® Assembly base (or whichever channel is being focused) (*see Figure 3-7*).
5. Manually position the Front Lens Focus Adjust at the mid position. Grasp the end of the Front Projection Lens and turn until the Adjustment Pin in the Adjustment Slot is at midpoint (*see Figure 3-8*).
6. Stick a flat-blade screwdriver in the adjustment slot and move the ILA® Assembly back and forth until the spacer balls are in focus (*see Figure 3-7*).
7. Tighten the 2 Phillips-head screws (*see Figure 3-7*) on the Green ILA® Assembly base.
8. Repeat Steps 4-6 above for other Red and Blue Channels as need. Be sure to hide the other 2 colors.

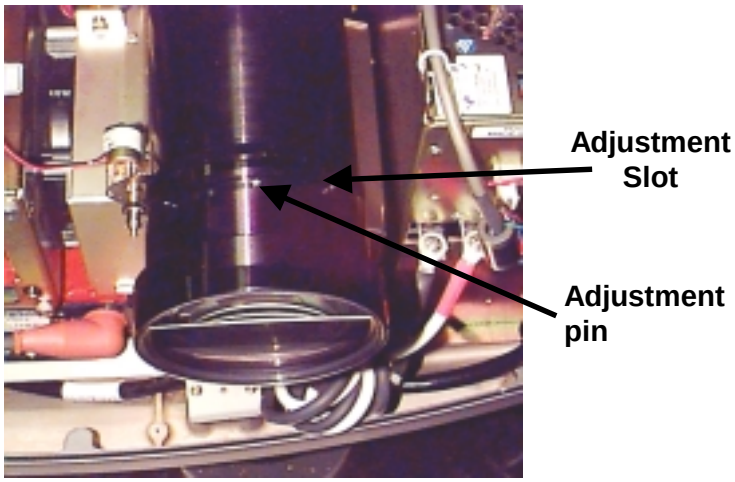


Figure 3-8 Front Projection Lens Adjust

3.4 CRT Electronic Focus

The CRT Electronic Focus is factory-set and will not normally need to be adjusted except after component replacement, maintenance, or if wide temperature variations exist between the factory and the field location. View one color at a time.

1. Select the Test Pattern #6 (the Focus test pattern).
2. Attach a non-interlaced source, approximately 31.5 kHz X 60 Hz (this makes it easier to see the raster lines).
3. Maximize the size on all three colors.
4. Hide the channels that are not being adjusted.
5. Zoom the Projection Lens to the widest angle and adjust the Projection Lens focus for the sharpest image (ensure Spacerballs are properly focused).

6. Adjust the Electronic Focus (located under the Factory Settings Menu) until the center of the H pattern at the center of the screen is as sharp as possible.
7. Adjust the Dynamic Focus (located under the Factory Settings Menu) until the edges are as sharp as possible (Dynamic Focus affects all three colors).
8. Repeat the above steps for Red and Blue.

3.5 ILA® Overlap

This adjustment positions the ILA® assemblies in their sockets so that the Red, Green and Blue images will be aligned on the screen. Adjustment should only be made once or whenever an ILA® is replaced.

To determine if this adjustment is necessary:

1. Note the value of the ILA® bias for red, green and blue so they can be returned to these levels when this procedure is complete.
2. Hide all three channels (make sure the shutter mode is off).
3. Increase the ILA® biases to maximum for all 3 colors. With all colors at maximum, the image on the screen should be a white screen with some colors at the edges.
4. Observe the right, left, top, and bottom of the screen. Normally, green is the reference to which blue and red will be matched.

   NOTE: If the green ILA® has been replaced, the blue or red image should be used as the reference to match green to. If a red or blue border is present on either side the ILA® overlap needs adjustment. If both red and blue overlap, the border will be yellow. In either case, proceed with the adjustment below. If there is no overlap, reset the ILA® biases to their previous levels from Step 1.

To perform an ILA® Overlap adjustment:

1. Remove all the covers (*see Section 4.2).*
2. Continue with all three colors hidden.
3. Loosen the 2 slotted screws at the top of the ILA® assembly to be adjusted (*see Figure 3-9*).
4. If the overlap is at the left or right, grasp the ILA® assembly and slide it to the right or left so that the edges coincide with the edges of the other two ILA® assemblies.

   CAUTION! To avoid damaging the connector, grasp the ILA® assembly itself, **not** the connector at the top.

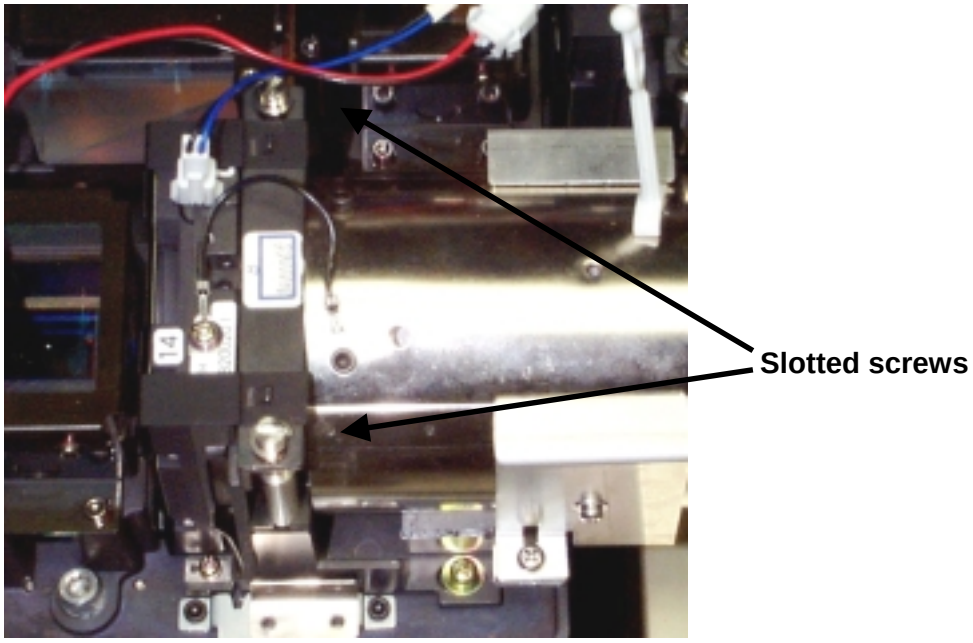


Figure 3-9 ILA® Assembly top view.

5. If the overlap is at the top or bottom, make sure the projector is level. If there is still excessive ILA® overlap replace the CRT/ILA®, there is no adjustment for top and bottom overlap.
6. Retighten the slotted nuts.
7. Reset the ILA® biases to their previous levels from Step 1.

3.6 Front/Rear or Inverted Projection Jumper Settings

NOTE: In the procedures below each of the jumpers mentioned have a specific purpose: CN702 and CN701 are for the horizontal scanning jumper, CN713 and CN714 are for the vertical scanning jumper, and CN708 and CN707 are for the convergence jumper.

Front / Rear Jumper Setting (Horizontal Scan Reverse)

The Horizontal Scan Reversal Jumper reverses the image projection for front or rear projection. Figure 3-13 illustrates the jumpers' location on the Vertical Convergence Deflection PCB.

NOTE: When the Horizontal Scan Reversal Jumper is changed, the Front/Rear Convergence Jumper must also be changed.

The Model 100 Projector is shipped with the Horizontal Front / Rear jumper plug is in CN702 for front/upright projection. The Front / Rear Convergence jumper plug is in CN708. For other orientations refer to Table 3-1.

To change the Horizontal Scan Jumper:

1. Turn power off at the projector and wait 10 minutes for the arc lamp to cool.

2. Remove the Electronics Module cover (Section 4.2).
3. Verify the Horizontal Front/Rear jumper is plugged into CN702 for front/upright projection. Remove the connector from CN702 and insert it into CN701 (*see Figure 3-10*).
4. Verify the Front/Rear Convergence jumper is plugged into CN708. Remove the jumper from CN708 and insert it into CN707. Refer to Table 3-1 for other orientations.

   NOTE: The Vertical Convergence Deflection PCB does not need to be removed from the Electronics Module to change these connections.
5. Replace the Electronic Module cover.
6. Restart the projector.
7. When changing jumpers for front or rear screen projection, Centering, convergence and shading must be rechecked.

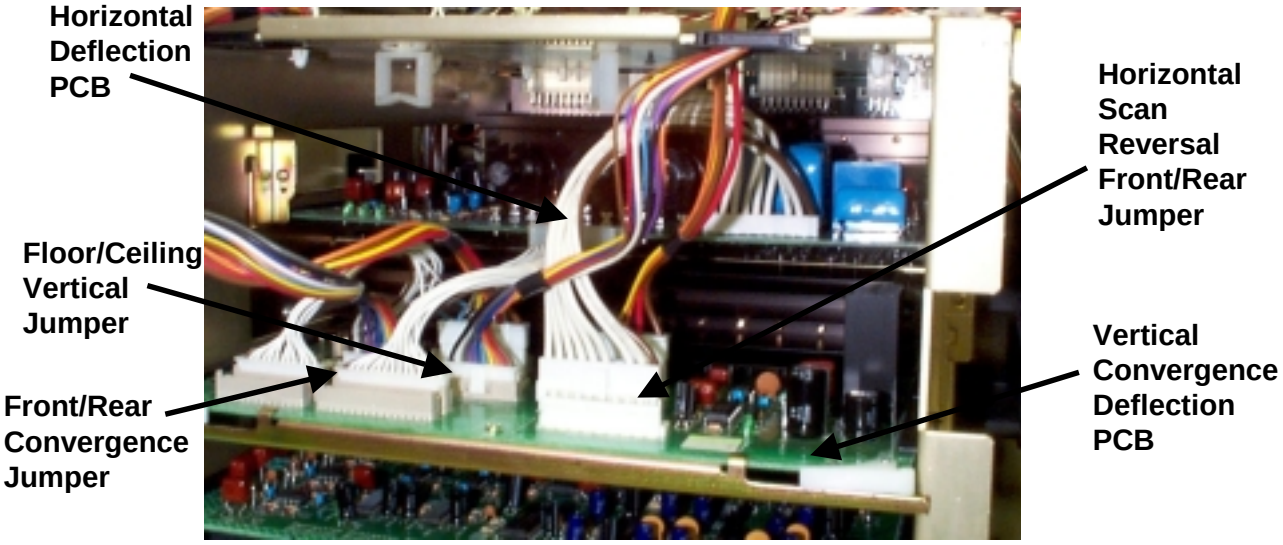


Figure 3-10 Vertical Convergence Deflection PCB

Table 3-1 Projection orientation jumper settings.

ORIENTATION	Front / Rear Convergence. Jumper	Floor / Ceiling Vertical. Jumper	Horizontal Scan Reversal Jumper
Front / Floor Upright	CN708	CN713	CN702
Front / Ceiling Upside Down	CN707	CN714	CN701
Rear / Floor Upright	CN707	CN713	CN701
Rear / Ceiling Upside Down	CN708	CN714	CN702

Floor/ Ceiling Jumper Setting (Vertical Scan Reverse)

The Ceiling/Floor jumpers invert the image vertically for use in some situations that use mirrors or ceiling projections. Figure 3-10 illustrates the location of the jumpers on the Vertical Convergence Deflection PCB. The Model 100 Projector is shipped in the upright vertical projection position with the jumper plug inserted into CN713. For an upside down vertical setup this jumper plug must be inserted into CN714. (*see Table 3-1 for other orientations*).

To invert the vertical image:

1. Turn power off at the projector and wait for the arc lamp to cool.
2. Remove the Electronics Module cover (*see Section 3.2*).
3. Verify that the vertical jumper is inserted into CN713 for upright vertical operation (*see Figure 3-10 and Table 3-1*). Remove the connector from CN713 and insert it into CN714.

   NOTE: The Vertical Convergence Deflection PCB does not need to be removed from the Electronics Module to change these connections.
4. Replace the Electronic Module cover.
5. Restart the projector.
6. When changing jumpers for floor or ceiling screen projection, Centering, Convergence and Shading must be rechecked.

3.7 Horizontal Size Settings

The Horizontal Adjustment Coils are located on the front of the Horizontal Deflection PCB. These coils are used to make **coarse adjustments** for horizontal size. Adjust the horizontal size coils when replacing the Horizontal Deflection PCB, or CRT Assembly. These adjustments may also be needed when the convergence adjustment procedures fail to bring the colors into convergence.

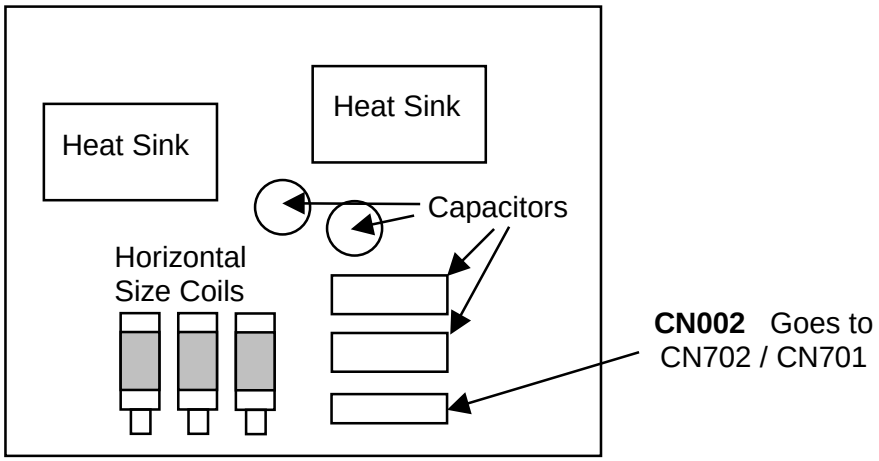


Figure 3-11 Horizontal Deflection Board.

To adjust the horizontal size coils (*see Figure 3-11*):

1. Remove the Electronics Module cover.
2. Apply power to the projector and allow to warm up for a minimum of 15 minutes.
3. Use Test Pattern #5 (the X-hatch test pattern).
4. Clear X and Y Convergence Data (Convergence Menu / Reset / Registration).
5. Set all the Horizontal Sizes to 128 (Geometry Menu / Size).
6. Hide the Blue Channel. View the Red and Green Channel.
7. If Red is outside of Green on both sides, or inside of Green on both sides, use a Delrin .100 hex alignment tool to adjust the Red horizontal size coil to correct the error. If Red is outside of Green on one side and inside of Green on the other side, this is most likely caused by Red not being centered correctly and can be corrected with the centering adjustment (*User's Guide, Chapter 5*).
   If the Red horizontal size coil does not completely eliminate the size error between Red and Green, balance the error on both sides to allow for easier convergence.
8. Repeat Steps 2 and 3 above for Blue while hiding Red.
9. Recheck all Geometry and Convergence settings and readjust wherever necessary.
10. Replace the Electronic Module cover.

3.8 Software Updating

The Model 100 software resides in Flash Memory and is updated via the projector's serial Port A. To perform an update, a disk containing the updated Boot Software (boot.hex) and/or System Software (zsys.hex) and a PC with Windows 3.1 (Windows 95/98 with Procomm Plus fax/modem software) is required to perform update.

Boot Manager Software and System Software are separate files. Each may be updated independently. The System Software will depend on a specific version of the Boot Manager. Refer to the System Software release bulletin for Boot Manager version dependencies.

To setup the PC terminal (Windows 3.1):

1. Verify that the projector circuit breaker is off. Use a Null Modem cable to connect a PC to the projector's Serial Port A.
2. Start Windows 3.1.
3. Click on the terminal icon from the Accessories Directory.
4. From the Terminal menu, select Settings-Terminal Emulation, click on DEC-VT-100(ANSI) and select OK.
5. Under Settings choose Terminal Preferences.
6. Under Terminal Preferences the following selections are appropriate;
   - Terminal Modes=Sound, CR->CR/LF=Both off
   - Columns=80, Cursor=Block & Blink
   - Terminal Font=Fixedsys 15, Translation=None, Show Scroll Bars=On, Buffer Lines=100
   - Use Function Arrow & Control Keys for Windows=Off.
7. Select OK.
8. Under Settings, select Text Transfer=Standard Flow Control. Select OK.
9. Under Settings select Communications and choose:
   - Connector=select the PC port being used
   - Baud Rate=9600 or 19200 (depending on the System Controller Switch block Pos 4-see note below this step)
   - Data Bits=8, Stop Bits=1, Parity=None, Parity Check=Off, Carrier Detect=Off, Flow Control=XON/XOFF
10. Select OK.

To setup the Model 100 Projector:

1. Remove the System Controller/Raster Timing Generator and **verify that all the DIPswitches are in the up position.** The switch in position 4 on the switch block (*see Figure 3-12*) controls the baud rate for Serial Port A for the Boot Manager and System Software. Up=9600, Down=19200. The switch in position 4 should be in the up position.

2. Reinstall the System Controller/ Raster Timing Generator PCB.

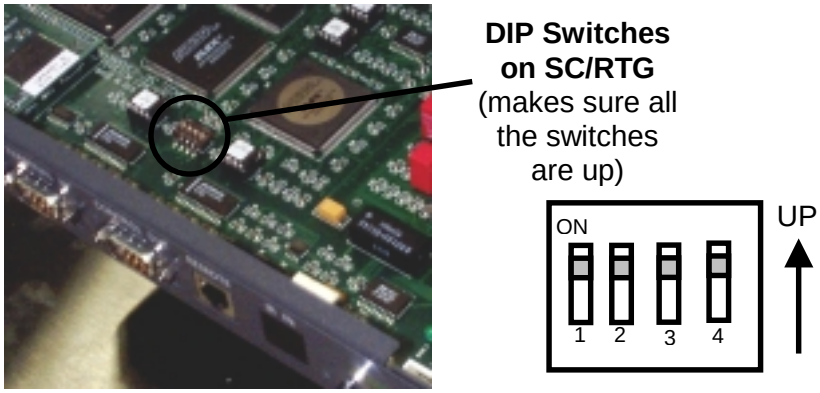


Figure 3-12 DIP Switches on SC/ RTG PCB.

3. Apply power to the projector.
4. In the Main Menu, go to System.
5. In System, go to Comm Setup.
6. In Comm Setup, go to Port A Device.
7. In Port A Device, go to ANSI Terminal and select OK.
8. Press ESC.
9. Power off the Projector.
10. Cycle off the A/C Main Circuit Breaker. This serves to reset the software.
11. Insert a small screwdriver into the Service Mode Switch Access hole on on the SC/RTG PCB (*see Figure 3-13*). Depress and hold down the Service Mode Switch. While holding down the switch, turn the projector A/C circuit breaker on.

Figure 3-13 Service Mode Switch access hole.

12. Verify that "Boot Manager" appears on the terminal monitor. The Power On LED on the projector, stays Red and the cooling fans do not come on. Alternate for Step 9: In "Power Off" Standby mode, Press "Control, Shift + _ (underscore), hex "IF (international keyboard may vary in key placement).
13. The following should be displayed on the Windows Terminal screen (where x.x.0 is the currently loaded Boot Manager version (e.g. 0.9.0 or 1.1.0).

```
            *Power Off*
Boot Manager Ver x.x.0 (Service Mode Startup)
Copyright (c) 1994 Hughes JVC Technology
Command: _
```

To Update the Boot Manager:

14. Verify that the Boot Manager version is correct. If it is necessary to update the Boot Manager, perform the following steps. If the Boot Manager is already up to date, skip to Update the System Software.

15. Enter the command "loadboot" at the prompt. You should see the following output:

```
Command: loadboot (to update Boot Manager)
<Enter>
Boot Manager software update procedure
***WARNING: IMPROPER USE MAY MAKE THIS SYSTEM
   UNBOOTABLE*** (This warning relates to the Flash
Memory  updating that occurs in Step 11D. Do not turn
projector   power off while the Flash Memory is
updating)
Memory buffer reset to 0xff
Begin your S-Record upload now (Esc to abort).
```

16. From the Windows Terminal Menu (normally in Accessories window), select "Transfers/Send Text File", then select "List Files of Type:All Files", and select the disk and/or directory with the Model 100 software. You should see a file named "boot.hex". Select this file and press the OK button to begin the upload.
17. During upload, a progress indicator updates the number of records received. At the completion of the upload, the system will display the following (numerical values are for example only and depend on the Boot Manager version):

```
S-Records processed: 823
Upload Successful
Address Range: 0x00000000-0x00006687
Bytes Loaded:  26248
***WARNING: FLASH WILL NOW BE UPDATED***
Press Enter to continue, Esc to abort.
```

18. The system has verified that the load module is correct and is ready to update the Flash.
19. Press Enter to perform the update (press Esc now to abort the update with no changes). While the Flash memory is being updated (15-30 seconds),

CAUTION: DO NOT turn off the projector circuit breaker or the machine could be made unbootable, requiring a new set of flash chips to be installed. When the update is complete, the system will display the following:

```
Reprogramming Flash Sector 0 1
   Boot Manager software update successful
Command: _
```

20. The Boot software has been successfully updated. To restart the projector under control of the updated boot manager, enter the "reboot" command while depressing the service mode switch (see Figure 5-1). The projector will now restart with the updated boot manager software. (NOTE: If normal software starts, see Step 9 to reenter Boot Manager.) You should see the following displayed, where y.y.0 is the updated Boot Manager's version.

```
Boot Manager Ver y.y.0 (Service Mode Startup)
   Copyright (c) 1994-1996 Hughes-JVC Technology
Command: _
```

To update the System Software:

21. From the Boot Manager prompt, type in the command “loadsys”. At the prompt, the following should be displayed:

```
Command: loadsys
System software update procedure
   ***WARNING: IMPROPER USE MAY MAKE THIS SYSTEM
   UNBOOTABLE*** (NOTE: This warning relates to the
Flash  Memory updating that occurs in Step 12D
below. Do not    turn projector power off while the
Flash Memory is  updating.)
Memory buffer reset to Oxff
Begin your S-Record upload now (Esc to abort)
```

22. Select “Transfers/Send Text File” from the Windows Terminal Menu (normally in Accessories window). In the “Send Text File Dialog” box, select “List Files of Type: All Files *.*” and select the disk and/or directory with the Model 100 software. Select file named “zsys.hex”. Press OK to start upload.
23. During upload, a progress indicator updates the number of records received. When the upload is complete, the system will display the following

(numerical values are for example only and depend on the System Software version):

```
S-Records processed:11282
   Upload Successful
   Address Range: 0x00020000-0x000781cf
   Bytes Loaded:360912
***WARNING: FLASH WILL NOW BE UPDATED***
Press Enter to continue, Esc to abort
```

24. At this point the system has verified that the load module is correct and is ready to update the Flash memory. Press Enter to perform the update (Esc will abort the update process with no changes). While the Flash is being updated (approx 15-30 seconds),

CAUTION: DO NOT turn off the projector circuit breaker, this may make the machine unbootable, requiring a new set of flash chips to be installed. When the update is complete, the system will display the following:

```
Reprogramming Flash Sector 2 3 4 5 6 7 8 9
System software update successful
Command: _
```

The software update is complete. To restart the projector, type in the “sys” command and press Enter. The projector will now go back to the standard mode in standby, ready to power up with the updated System Software.

3.9 Graphic Enhancement Adjustment

The optional Graphic Enhancer RGBHV VIC has a very small adjustable pot (*see Figure 3-14*) that was designed primarily to improve the visibility of computer black text on white background (such as spreadsheets). This pot is factory-set at mid-range to provide an appreciable enhancement of small black text on white background. HJT recommends this pot be left at the factory mid-range setting.

If it is absolutely necessary to adjust this pot to optimize a specific type of graphic image, be sure to check that other sources viewed from the Graphic Enhancer VIC are not adversely affected. This enhancement adjustment only affects computer graphics and does not appreciably affect images from VCRs, DVDs etc.

Increasing (clockwise) sharpens the appearance of black on white text but overadjustment will adversely affect other types of graphics. This is a fixed adjustment and a compromise setting may be needed for best overall performance.

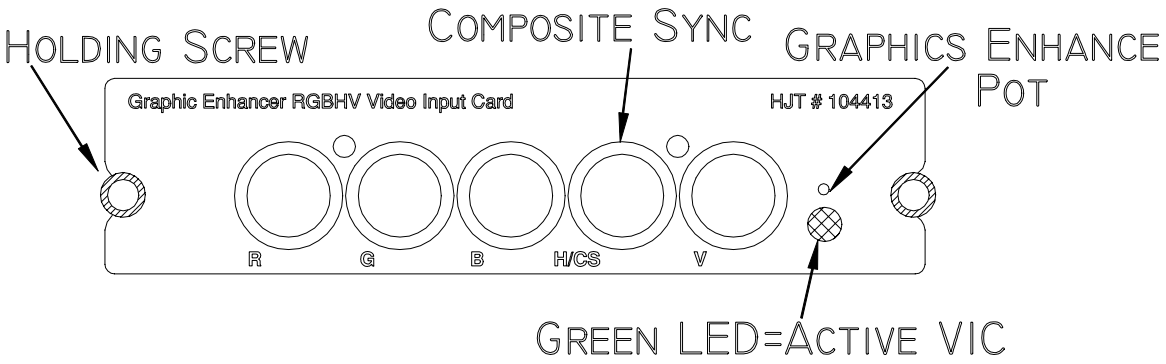


Figure 3-14 Graphic Enhancer Video Input Card.

3.10 Cleaning Lenses, CRT, ILA® Assemblies and Mirrors

The projection lens is the only item that requires periodic cleaning. Other assemblies are covered to prevent dust entering or finger smudging. Cleaning may be needed for special circumstances such as replacing an assembly. Cleaning should only require removing excessive dust (use canned air such as “Office Duster” or "Aero Duster") or removing fingerprint smudges (use “Kodak Lens paper”, or equivalent) from the projection lens. As much as possible, clean the optics only when absolutely necessary.

Projection Lens

Use lens paper and wipe the lens clean in a vertical motion from top to bottom. Use compressed air to blow excess dust from the lens. An optical lens cleaning solution can also be used to remove finger smudges.

CRT/ ILA® Assembly

The CRTand ILA® should be treated as one unit. The CRT has a fiber optic on its output.The ILA® also has a fiber optic on its input. These fiber optics are separated by optical fluid. Separating the CRT and ILA® should be performed by a trained technician in a clean room environment.

Mirrors and Polarizing Beam Splitter Windows.

Normally cleaning is not needed. Clean only if absolutely necessary using compressed air. Do not wipe mirrors.

4.0 Maintenance (Remove/Replace)

Contents

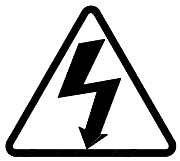
4.1 Introduction

NOTE: Before removing the front, top or side covers or replacing any components or subassemblies, please review the Safety Chapter at the front of this manual. Removal and replacement procedures in this chapter must be performed by factory certified technicians and engineers only.

When performing any maintenance, protect yourself and the equipment by following these guidelines:

- Turn the projector off with the remote.
- After the cooling fans have automatically stopped running, turn off the circuit breaker.
- Allow a discharge time of at least one minute for the high voltage to bleed off, then unplug the power cord from the AC wall outlet.
- Observe all Cautions and Warnings

Tools required to perform removal and replacement of projector components and subassemblies are listed in Chapter 1, Introduction.



WARNING!!! Various procedures in this chapter involve the removal and replacement of system subassemblies. Ensure that the projector circuit breaker is turned off *and* the AC power plug is removed from the AC outlet PRIOR to attempting any of these procedures.

When performing any maintenance procedures in this chapter, follow the guidelines below:

Left/Right Orientation: When left and right is mentioned in this chapter, it is with reference to standing at the rear of the projector, facing the screen.

Connectors on subassemblies and PCBs have tabs that must be released first before pulling on the connector. The proper procedure is to push slightly *IN* on the connector, then squeeze the tab, then pull the connector out.

NOTE: While performing any maintenance procedures, check the optics for crazing (peeling or cracking of layers), or cracking. If any problems are observed, call the factory (800-392-9666).

When references are made in this chapter to assemblies and components, refer to Figure 4-1 for their locations.

CAUTION!!! It is very strongly recommended that setup data be downloaded (*Exported, see Model 100 Data Import/Export Procedure section A-1*) before performing any of the following procedures. Exporting baseline source setup data to disk is an excellent precautionary measure. It will save the time of having to re-setup a new source file(s) in the case of an unexpected problem.

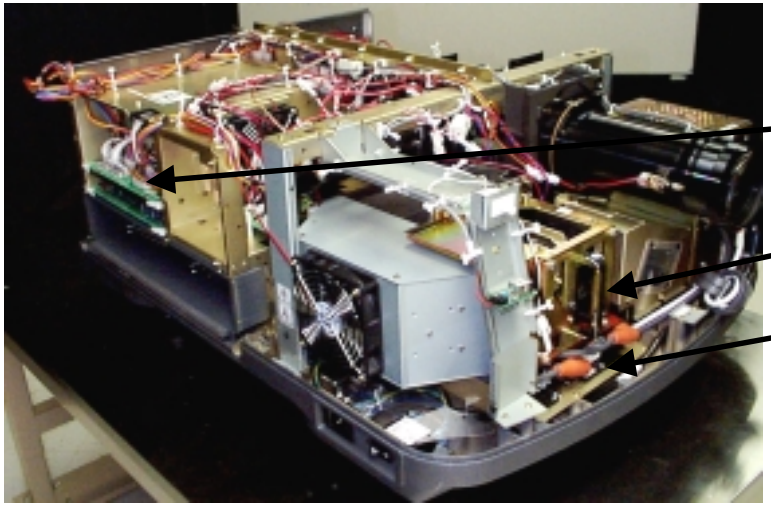
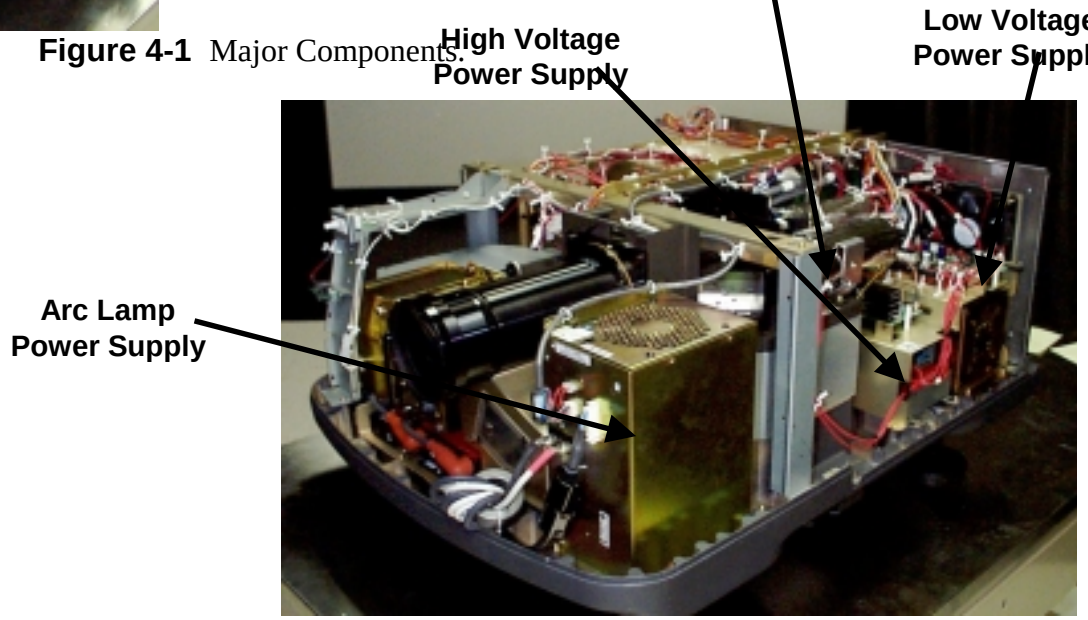


Figure 4-1 Major Components.



4.2 Projector Covers

Prior to removing any of the four covers, review the chapter on Safety and adhere to all warnings and cautions.

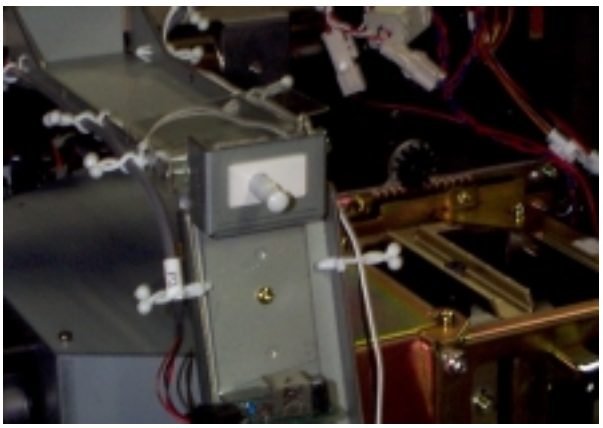


Figure 4-2 Front Cover Interlock Switch.

To remove the front, top or side covers:

1. Disconnect the projector power plug.
2. The two side covers can be removed independently of any other cover. They are removed by unscrewing six Phillips-head screws. There are two small cables connecting the side covers to the top cover. The purpose of these cables is to hold the side covers and allow them to flip over, out of the way, for projectors mounted upside down in the ceiling. These cables can be unclipped when removing covers for floor mounted projectors.
3. The front cover can also be removed without removing any other covers. It also has two retaining cables. It can be removed by unscrewing three Phillips-head screws, one on top and one on each side.

   NOTE: When the Front Cover is removed, it disengages the Interlock Switch (*see Figure 4-2*). To operate the projector with the Front Cover removed, pull the Interlock Switch out.
4. The top cover can be removed only after all the other covers have been removed. After the front and side covers have been removed, there are two additional screws in the center to be removed. After the screws are removed, Slide the cover forward and lift and the cover will come off.
5. Replace the covers in reverse order.

4.3 Air Filters

There are 2 air filters in the Model 100. They should be checked and cleaned whenever necessary. Both filters can be easily removed for periodic cleaning by sliding the filter element out of it's tray. In extremely dusty or dirty conditions, the

filters should be cleaned more frequently. To clean the filters, remove, vacuum out or blow the filters with compressed air.

- One filter is a foam filter located in the rear of the projector.
- The other filter is located on the on the bottom left side of the projector, just in front of the HVPS.

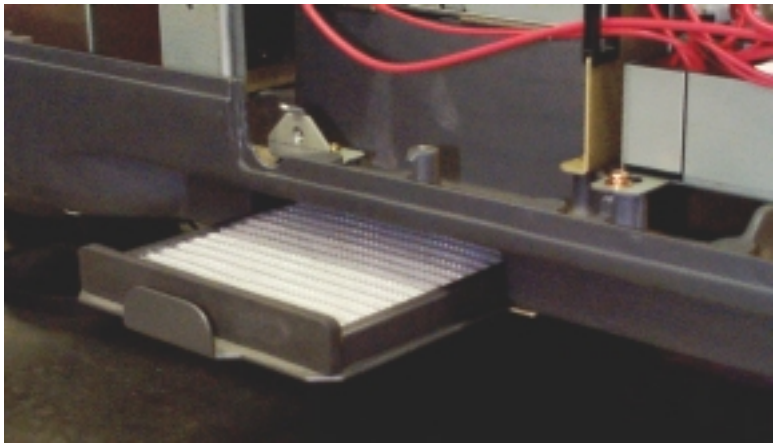


Figure 4-3 Air Filter (bottom left side).

4.4 Arc Lamp Assembly

The Arc Lamp Assembly consists of a Xenon Arc Lamp, a Docking Module, a light shield and an Arc Lamp cooling duct. The Arc Lamp fits inside the Docking Module.

CAUTION!: It is strongly recommended that the Arc Lamp current be turned down (*see Section 3.1*) before installing a new Arc Lamp to help prevent possible damage that could reduce the life of the new lamp.

WARNING!!! Dangerous light exists in this area of the projector. Before proceeding with the removal of any subassemblies below, always:

- Turn the projector off, allow the projector to cool for 5 minutes.
- Power off the main ac circuit breaker at the front right corner of the projector
- Remove the power plug from the AC outlet.

To remove the Arc Lamp Docking Module:

1. Remove the front cover (see *Section 4.2*).
2. Disconnect Heat Sensor cable.
3. Remove the 2 Phillips-head screws from the light shield on the left side of the Arc Lamp Module and carefully remove shield. The top screw can just be loosened.

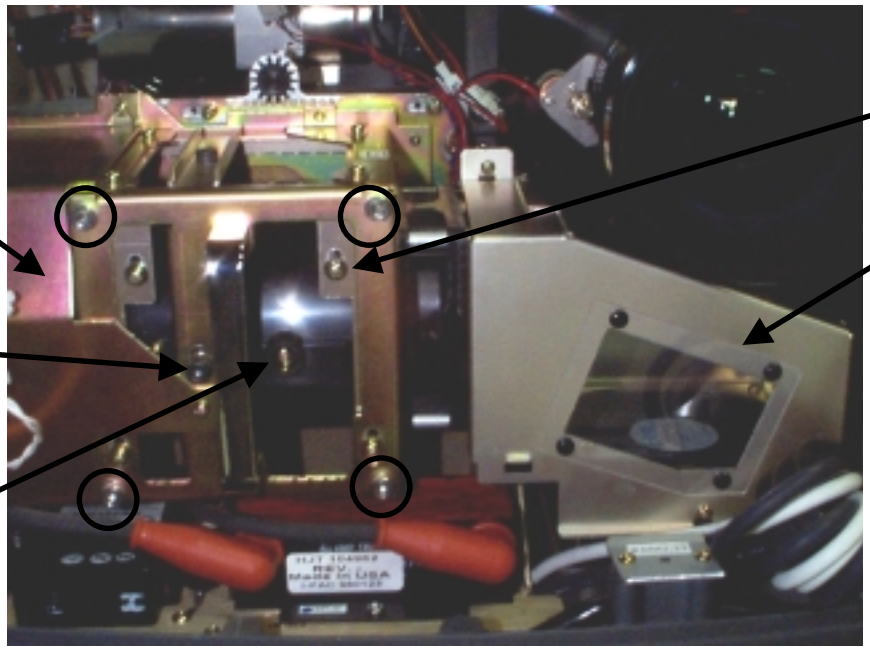


Figure 4-4 Arc Lamp Module with air duct and light shield.

4. Disconnect the Arc Lamp cooling fan cable.
5. Loosen the screw on the bottom of the Arc Lamp cooling duct and remove the top screw. Lift and slide the air duct out.
6. Remove the 4 mounting bolts that secure the Arc Lamp Module to the projector (*see Figure 4-4*).
7. Carefully slide the Arc Lamp Docking Module Assembly out.
8. To replace the Arc Lamp, the lamp must be removed from the Docking Module.
9. Once the Docking Module is removed from the projector, remove the 4 Arc Lamp Housing Phillips-head clamp screws, two on the top and two on the side of the Arc Lamp Housing.
10. Remove and retain the Heat Sensor from the Arc Lamp.

    NOTE: The Thermal Sensor attached to the Arc Lamp must be removed from the old Arc Lamp and installed on the Anode of the new Arc Lamp. Do not allow it to be shipped with the old Arc Lamp. If the Thermal Sensor is not installed properly, the Arc Lamp will not light.
11. Remove the two Connector Plugs (*see Figure 4-5*) using a slotted screwdriver. The Arc Lamp should be loose now and slide out.

NOTE: The old Arc Lamp is returned to factory. Do not return the Docking Module with the Arc Lamp.

12. Reinstall the Arc Lamp into Arc Lamp Docking Module and the Docking Module into the projector in the reverse order from above.
13. After reinstalling the Arc Lamp, perform the Arc Lamp adjustment procedure as shown in Chapter 3.

CAUTION!: Do not touch the front glass window on the Arc Lamp with your bare fingers. Oil from your skin will damage the optic and cause the Arc Lamp to fail.

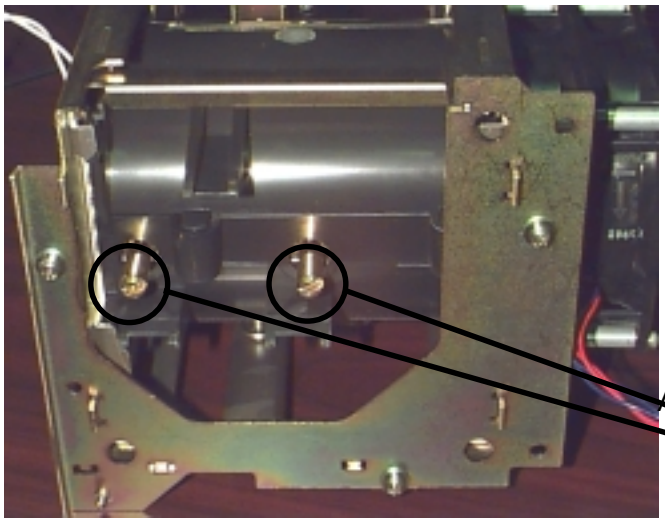


Figure 4-5 Arc Lamp Module Power Terminals (Arc Lamp removed from projector)**.**

4.5 Ignitor Assembly

The Igniter Assembly consists of the Igniter and the Laser Power Supply. When either of these two components require replacing, the Ignitor Assembly is returned and replaced as a unit. The Igniter sits directly underneath the Arc Lamp Module.

To remove the Ignitor Assembly:

1. Remove the front cover (*see Section 4.2*).
2. Disconnect the Arc Lamp ouput cables from the ALPS (*see Figure 4-7*).
3. Disconnect and label the cables attached to the Ignitor (*see Figure 4-6*).
4. Remove the 3 screws securing the Ignitor Assembly (*see Figure 4-6*).
5. Replace the Ignitor Assembly in reverse order.

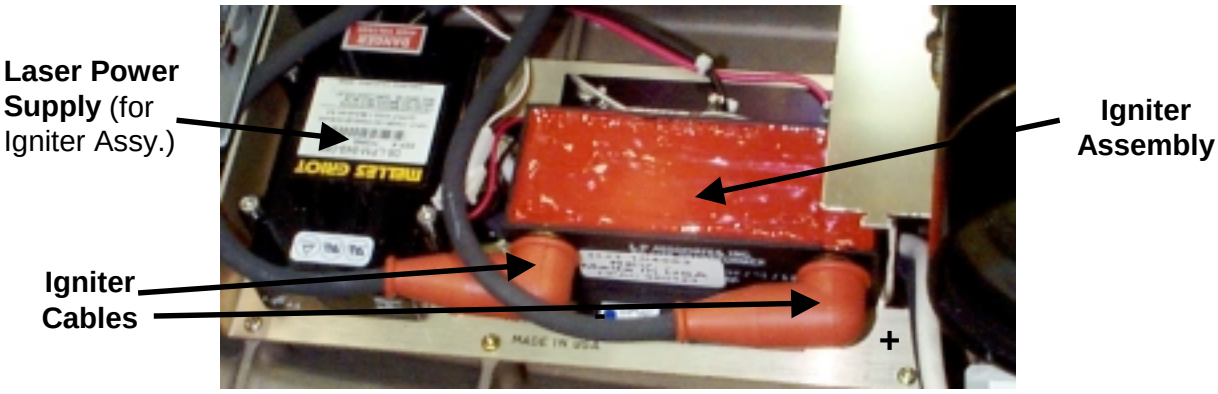


Figure 4-6 Ignitor Assembly (Arc Lamp Docking Module removed).

4.6 Arc Lamp Power Supply

To remove the Arc Lamp Power Supply (ALPS):

1. Remove the front cover (*see Section 4.2*).

CAUTION!: It is strongly recommended that the Arc Lamp current be turned down (*see Section 3.1*) before installing a new Arc Lamp to help prevent possible damage that could reduce the life of the new lamp.

2. Disconnect the control cable (P11) from (J72) and remove the cable from the cable ties.
3. Disconnect the ALPS Ouput cables from the (+) and (-) terminals on (J74).

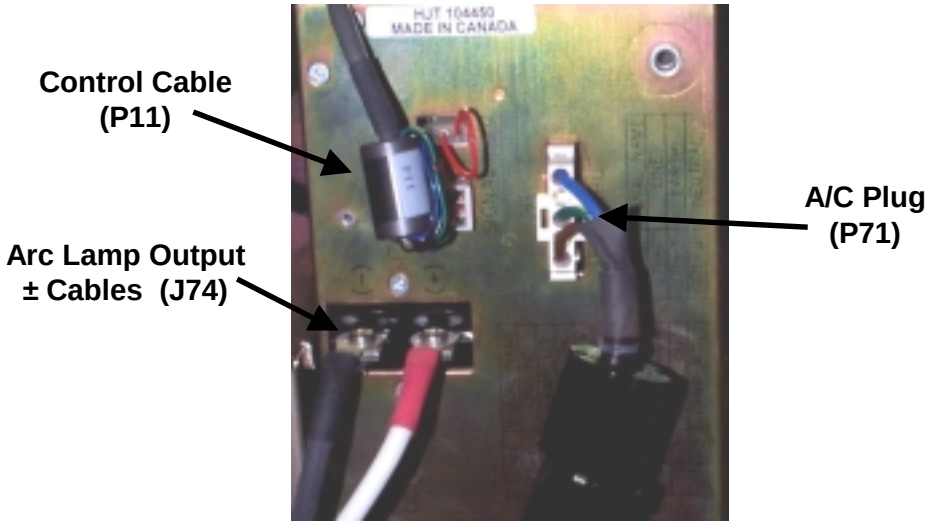


Figure 4-7 Arc Lamp Power Supply connections.

4. Disconnect the A/C plug (P71) from (J71).

5. Remove the 2 Phillips-head screws from the front of the ALPS.
6. Loosen the 3 Phillips-heads screws at the rear of the ALPS.
7. Slide the ALPS forward and out.
8. Replace the power supply in the reverse order.
9. Reset the power setting (*see section 3.1*).

4.7 Low Voltage Power Supply

To remove the Low Voltage Power Supply (LVPS):

1. Remove all the covers.
2. Remove the High Voltage Power Supply (*see Section 4.8*).
3. Remove the 2 Phillips-head screws from the base of the LVPS.
4. Slide the LVPS out slowly.
5. Reach behind the LVPS and disconnect the A/C cable (P79 from (J75). Also disconnect the control cable (P07) from (J76).
6. Reinstall the LVPS in reverse order. After the LVPS is installed, recheck Timing, Geometry, Electronic Focus, ILA® Bias/Sensitivity, Convergence, G2, and Shading.

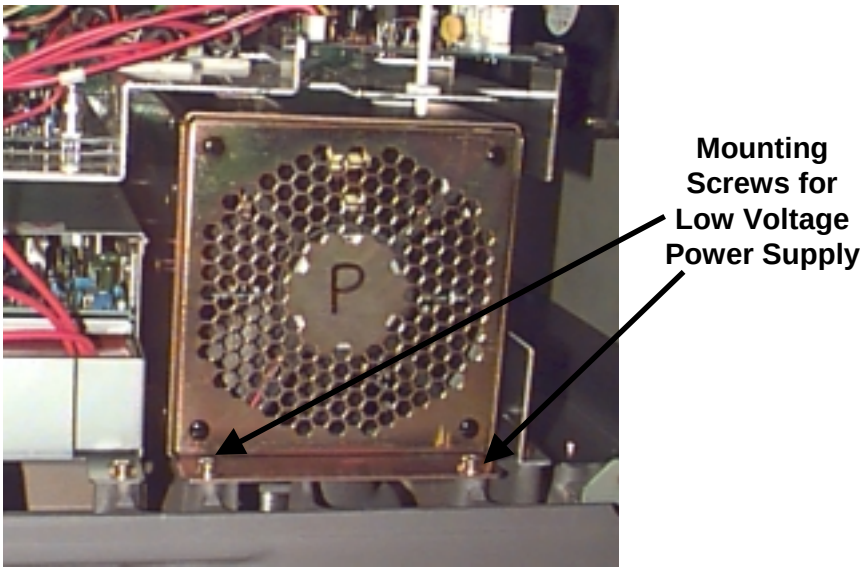


Figure 4-8 Low Voltage Power Supply.

4.8 High Voltage Power Supply

To remove the High Voltage Power Supply (HVPS):

1. Remove all the covers (see *Section 4.2*).
2. Disconnect the 3 CRT Anode leads(unscrew black connector).

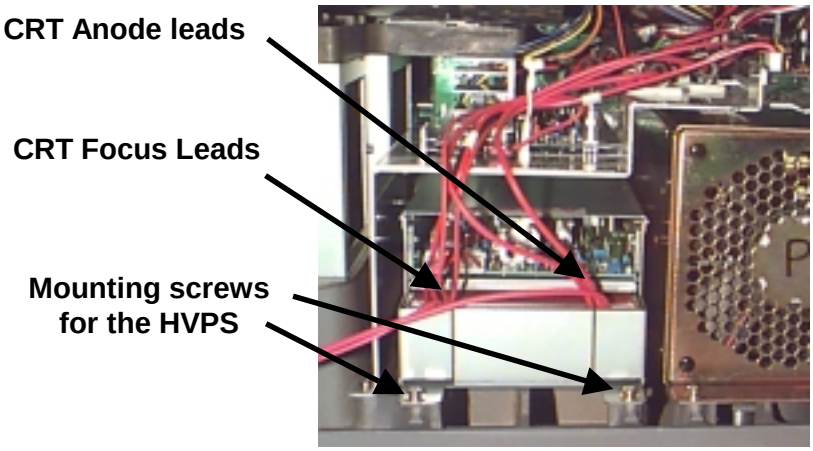


Figure 4-9 High Voltage Power Supply.

3. Disconnect the 3 grey CRT focus leads.
4. Disconnect the G_2 supply cable from (CN5) on the HVPS.
5. Remove the 2 Phillips-head screws from the base of the HVPS.
6. Carefully slide the HVPS slowly out.
7. Unplug the I/O cable (CN1) in the rear of the power supply.
8. Reinstall the HVPS in the reverse order from above.
9. Replace the projector covers.

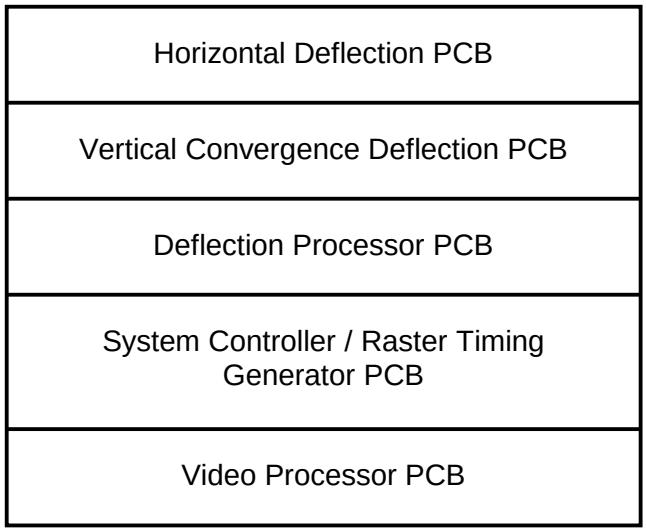


Figure 4-10 Printed Circuit Board orientation inside Electronics Module.

4.9 System Controller / Raster Timing Generator PCB

NOTE: It is strongly recommended to download (Export) setup data to a Laptop or PC prior to replacing the SC/RTG PCB, to retain data otherwise all the setup data will stay will the old SC/RTG PCB (*see Appendix A Import/Export*).

When replacing any printed circuit boards (PCB), always:

- Turn the projector off and allow to cool off for 5 minutes.
- Verify that the power is off at the circuit breaker and the power plug is disconnected.
- Verify there are no bent pins on any connectors before installing the PCB.
- Make sure the PCB is properly and securely seated before reapplying power.

The System Controller / Raster Timing Generator PCB is located just above the Video Processor PCB and can be identified by the external control connections on it (*see Figure 4-10*). All internal electrical connections to the System Controller / Raster Timing Generator PCB, are routed through the backplane board. There are only the external interface cables to remove.

To remove the System Controller / Raster Timing Generator (SC/RTG),:

1. Disconnect the control cables.
2. Remove the right side cover (optional).
3. Use a small, flat-head screwdriver to loosen the retaining screws
4. Grasp the D-handle and pull out the SC/RTG PCB.
5. Reverse the order to install SC/RTG PCB.

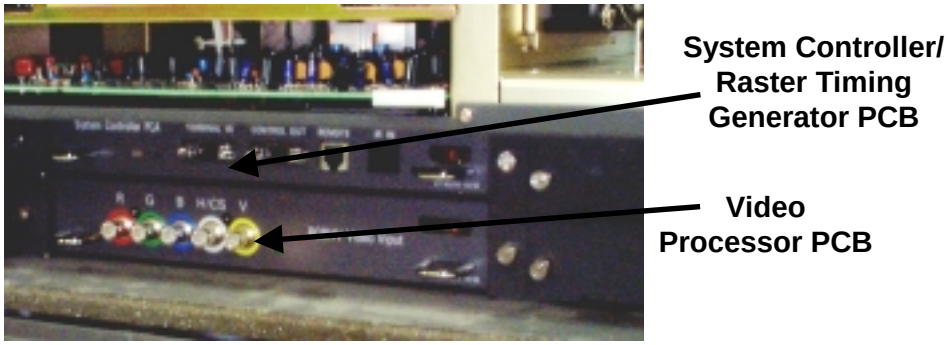


Figure 4-11 System Controller/ RTG and Video Processor PCBs.

4.10 Video Processor PCB

The Video Processor, VIC PCB is located below all the other circuit boards and can be identified by the Video Input BNC connectors on it (*see Figure 4-10*). All internal electrical connections to the Video Processor PCB are routed through the backplane board. There are only the external Video Input cables to remove.

To remove the Video Processor PCB :

1. Disconnect the Video Input cables.
2. Remove the right side cover (optional).
3. Use a small, flat-blade screwdriver to remove the retaining screws
4. Grasp the D-handle and pull out the.

5. Reverse the order to install Video Processor PCB.

4.11 Deflection Processor PCB.

The Deflection Processor PCB is located above the SC/ RTG PCB of the Electronic Module card cage (*see Figure 4-10*).

To remove the Deflection Processor PCB.

1. Remove the right side cover.
2. Remove the panel covering the top three circuit boards.
3. Grab the PCB by edges and pull it out of the Electronics Module card cage.
4. Replace the Deflection PCB in the reverse order.

4.12 Vertical Convergence Deflection PCB.

The Vertical Convergence/Deflection PCB is located just above the Deflection Processor (*see Figure 4-10*).

To remove the Vertical Convergence Deflection PCB:

1. Remove the right side cover.
2. Remove the panel covering the top three circuit boards.
3. Pull the PCB out about 2 inches in order to get access to the plugs and jacks.
4. Remove the Horizontal Scan Reversal Jumper cable from either (CN702 or CN701). This the cable that runs from the Horizontal Deflection PCB to the Vertical Convergence Deflection PCB (*see Figure 4-12*).

   NOTE: To remove connectors on the printed circuit boards in the sections below, push the connector in slightly, then squeeze the tab and pull the connector out.

5. Remove the Red (CN711), Green (CN710), and Blue (CN709) Convergence cables from their connections and move them out of the way.
6. Remove the Red (CN705), Green (CN704), and Blue (CN703) Yoke cables from their connections and move them out of the way.
7. Grab the PCB by the edges and pull it out of the Electronics Module card cage.
8. Replace the Vertical Convergence Deflection PCB in the reverse order.

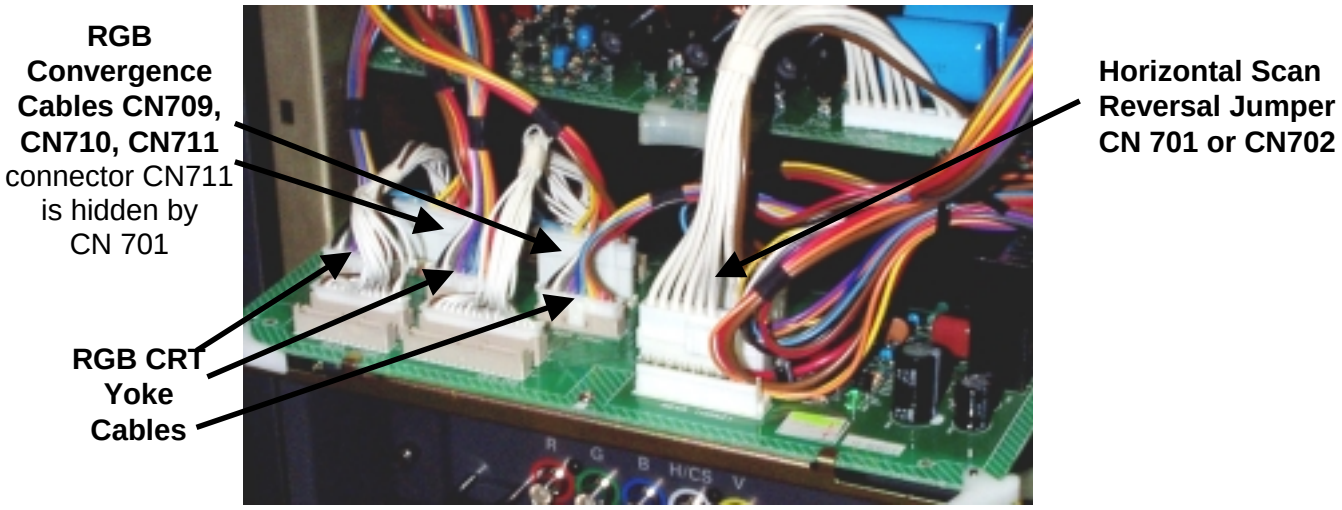


Figure 4-12 Vertical Convergence Deflection PCB.

4.13 Horizontal Deflection PCB

The Horizontal Deflection PCB is the smaller PCB on the top level of the Electronic Module card cage (*see Figure 4-10*).

To remove the Horizontal Deflection PCB:

1. Remove the right side cover (*Section 4.2*).
2. Remove the panel covering the top three circuit boards.
3. Remove the Horizontal Scan Reversal Jumper from either (CN702) on the Vertical Convergence Deflection PCB.
4. Loosen the Phillips-head screw on the slide in front of the Horizontal PCB and push the slide up.
5. Grab the PCB by the edges and pull it out of the Electronics Module card cage.
6. Replace the Horizontal Deflection PCB in the reverse order.

4.14 Video Input Cards (VICs)

Instructions for installing, removing, editing and VIC Settings are covered in Chapter 4 Section 4.11.1 of the Model 100 User's Guide.

4.15 Regulator PCB

The Regulator PCB is located next to the Green Video Amplifier PCB. These two circuit boards appear to be just one board. They sit just above the LVPS.

1. Remove the left side cover.
2. Remove the G2 Input (CN201) from connector CN5 (on HVPS).

3. Remove the three G2 Output cables from connectors CN202 (to the blue Video Amplifier), CN203 (to the red Video Amplifier), and CN204 (to the green Video Amplifier).
4. Remove the P10REG cables from connector CN205 and connector CN206.
5. Remove the white standoff retainer from in front of the PCB.
6. Slide the Regulator PCB out.
7. Replace the PCB in the reverse.

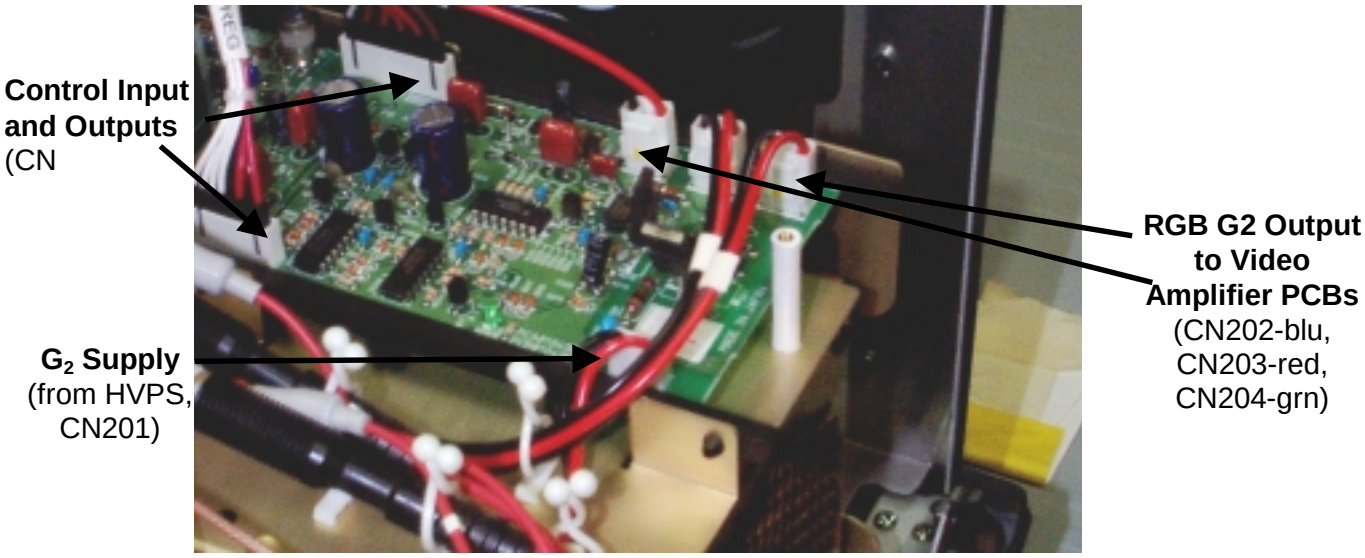


Figure 4-13 Regulator PCB.

4.16 Video Amplifier PCB

On the Model 100, there are three Video Amplifier PCBs, one for each of the 3 CRTs. Each VA PCB is located directly under its respective CRT.

To remove a Video Amplifier PCB:

1. To remove any of the Video Amplifier PCBs it will make the job easier to remove all the covers from the projector (Section 4.2). To remove the Video Amplifier for the green CRT, remove the Regulator PCB first (Section 4.15).
2. Disconnect the Video Input cable from connector CN101.
3. Disconnect the G2 Output connector fron connector CN107.
4. Disconnect the ground connector from connector CN109.
5. Disconnect the G1 Cathode and Filament cable from connector CN108.
6. Disconnect the Power/Control cable from connector CN102 (and connector CN103 if it is daisy chained).
7. Disconnect the cable from connector CN106.

8. Remove the white standoff retainer from in front of the PCB.
9. Slide the Video Amplifier PCB out.
10. Replace the PCB in the reverse order.

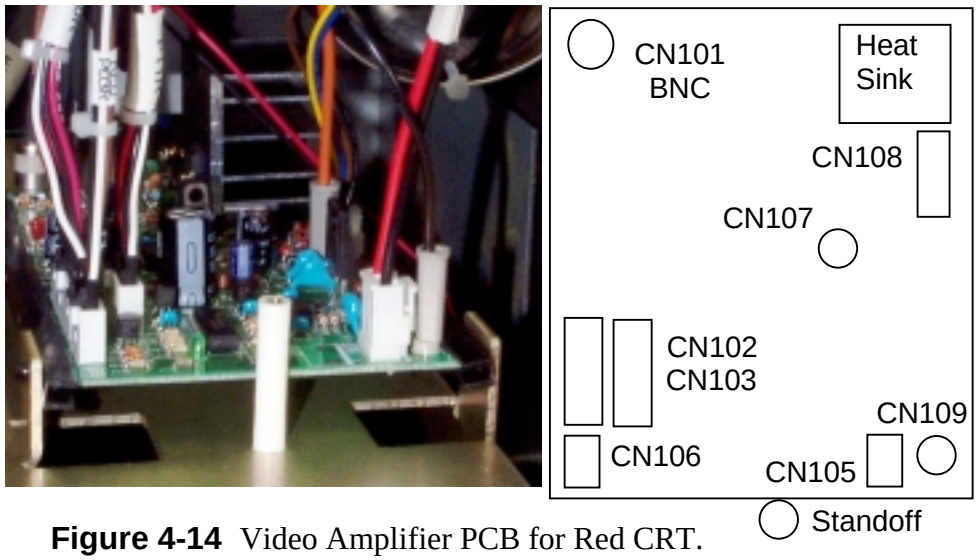


Figure 4-14 Video Amplifier PCB for Red CRT.

11. Green and Blue Video Amps are turned around 180°.

4.17 CRT/ ILA® Assembly

In the Model 100 the CRT and ILA® are removed from the projector and replaced as one part.

NOTE: The CRTand ILA® should be treated as one unit. The CRT has a fiber optic on its output.The ILA® also has a fiber optic on its input. These fiber optics are separated by a thin film of optical fluid. Disassembly of the CRT/ILA® Assembly should not be attempted except by Hughes-JVC trained technicians in a clean room environment.

WARNING!!! The CRT/ILA® Assemblies should be handled with extreme caution. If dropped, they can implode and flying glass can cause severe injury to personnel. Be careful not to bump or drop the CRT. Place in a safe area immediately after removal.

The CRT/ILA® Assemblies are located in the main body of the projector. The Red CRT/ILA® assembly is turned perpendicular to the Green and Blue CRT/ILA® assemblies

To remove a CRT/ILA® Assembly (*see Figure 4-15*):

1. Remove all the covers. (Section 4.2).

NOTE: The connectors CN107, CN108, and CN109 are found on the Video Amplifier PCB respective to the CRT/ ILA® being replaced.

2. Disconnect the G1, Cathode, and Filament cable from connector CN108.
3. Disconnect the Ground connector from connector CN109.
4. Disconnect the G2 Output connector from connector CN107.
5. Disconnect the Focus Lead (*grey connector, see Figure 4-15*).
6. Disconnect the Anode Lead (*large black connector, see Figure 4-15*).
7. Disconnect the Deflection cable that is plugged into the Vertical Convergence Deflection PCB.
8. Remove the Deflection cable from all the tie wraps.
9. Disconnect the ILA® Bias connector
10. Remove the 2 slotted head screws near the rear of the ILA® Assembly.

    NOTE: If removing the Green CRT/ILA®, remove the Thermistor attached to the Green ILA®.
11. Loosen the 2 Phillips-head screws holding the clamp on the CRT shield.
12. Pull the CRT/ILA® Assembly out of the projector.
13. Replace the CRT/ILA® Assembly in the reverse order.

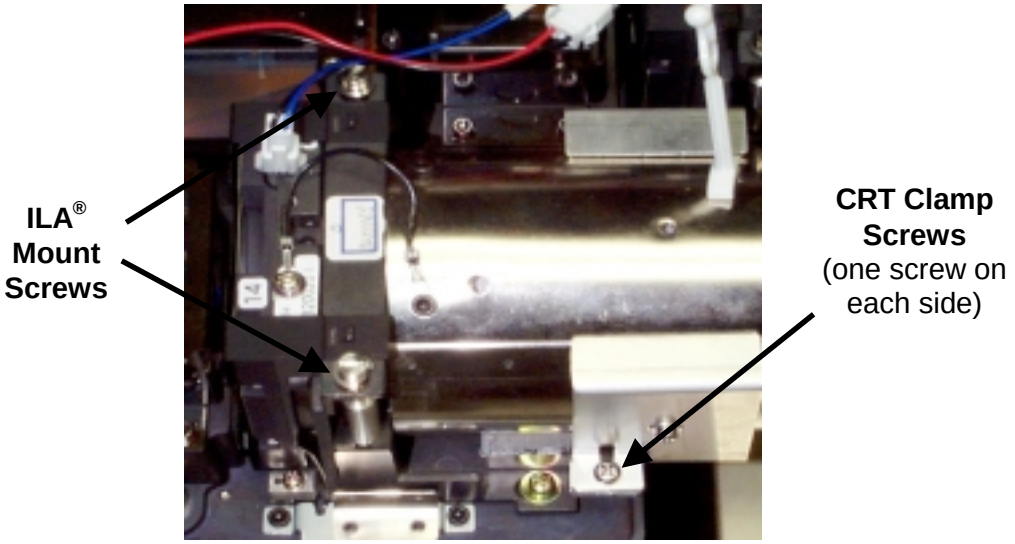


Figure 4-15 ILA® Assembly top view.

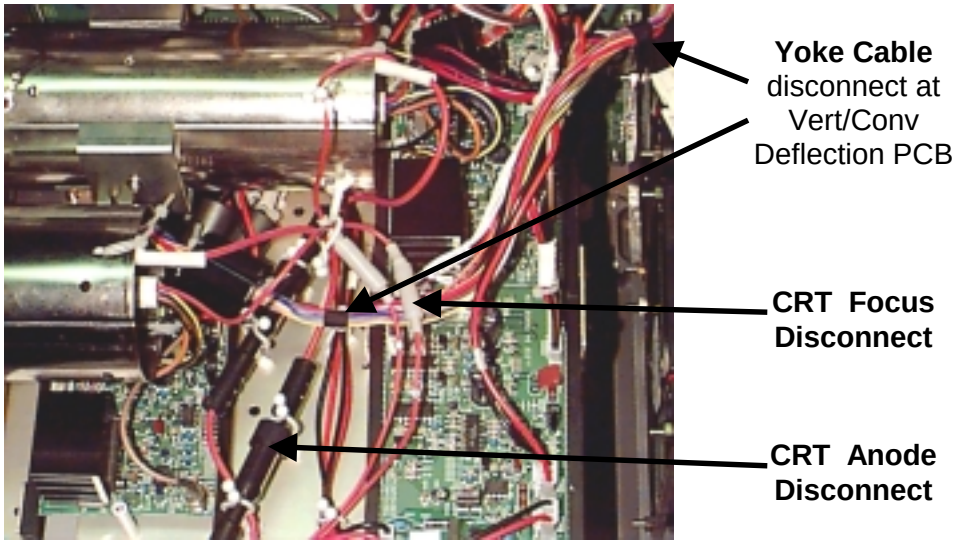


Figure 4-16 CRT/ ILA® connections.

4.18 Projection Lens

To remove the Projection Lens

1. Remove the Front Cover (*Section 4.2*).
2. Remove the sponge cover from around the front of the Projection Lens.
3. Disconnect the Projection Lens Focus, Position, and Zoom motor cables (for Zoom Lens). The connectors for these motors are marked F, P, and Z, respectively.
4. Remove the 3 mounting bolts (3mm) on the Lens Support Bracket (*see Figure 4-17*).

   CAUTION! Cradle the Front Lens with one hand while removing the last 2 bolts so that it does not fall and get damaged or damage other components in the projector.
5. Replace the Projection Lens in reverse order.
6. When changing from a Zoom Lens to a 1:1 Wide Angle Lens the installation is the same as the removal as stated above. When changing from a Zoom or 1:1 Wide Angle to a 1.5:1 (with offset), or vice versa, the Lens Support Bracket must be changed. The appropriate Lens Support Bracket will come with the Projection Lens.
7. Remove the Lens Support Bracket by removing the 4 hex-head mounting bolts (4mm).

   NOTE: To remove one of the bottom mounting bolts, it may be necessary to remove the Arc Lamp Air Duct. Remove the 2 Phillips-head screws and lift the Air Duct and pull out.

8. Install the new Lens Support Bracket by installing the 4 hex-head mounting bolts. Reinstall the Arc Lamp Air Duct by installing the Air Duct and installing the 2 philips-head screws.

   NOTE: The 1.5:1 Fixed Lens allows for an offset of the projector to the screen without introducing any keystone error. This is accomplished with vertical slots in the Lens Support Bracket Mounting Bolt holes. This offset depends on the screen image and how the screen is oriented vertically with respect to the projector. Adjusting the Lens Support Bracket all the way up (screws at the bottom of slots) produces a 100% offset, while adjusting the Bracket all the way down (screws at the top of slots) produces 0% offset. Some offset may be necessary to compensate for a screen that is slightly higher vertically than the projector. After installation is completed, the lens offset may need to be adjusted to produce an image tha is vertically centered on the screen,

9. The ILA® Back Focus (Section 3.3) may need readjustment.

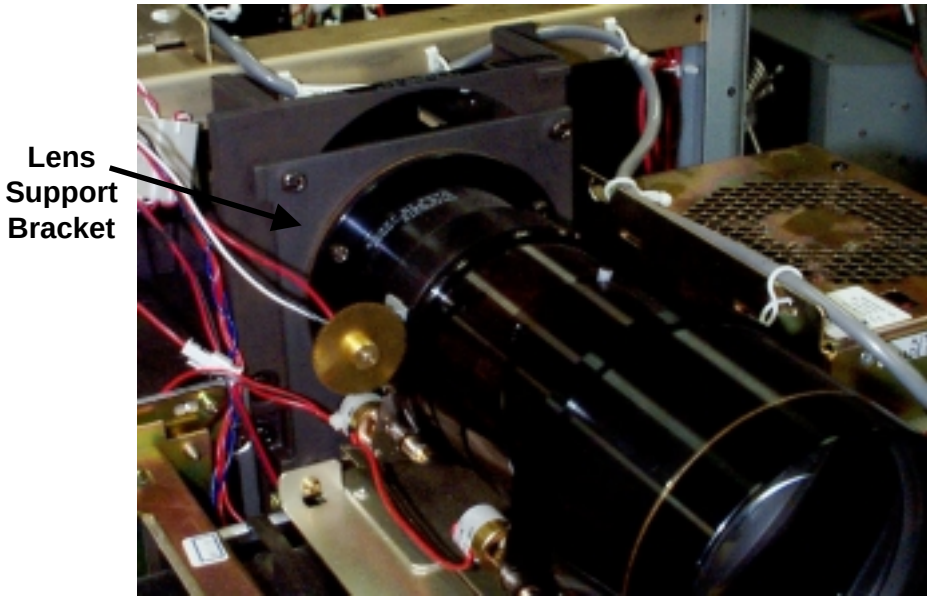


Figure 4-17 Front Lens (Zoom Lens) Assembly.

4.19 Recommended Spares

It may be advisable to maintain a supply of spares for the projector to maximize performance. This is particularly important when projectors are being operated on a continuous basis or when multiple projectors are needed. Table 4-1, below, provides a list of the spares that HJT recommends for one to four projectors.

Table 4-1 Recommended minimum spares

PART NO.	DESCRIPTION	QUANTITY
104515	PCA Vertical Convergence Deflection	1
104595	PCA Horizontal Deflection	1
104610	PCA Video Amplifier	1
104963	PCA Regulator	1
104510	PCA Video Processor	1
104425	PCA System Controller/ Raster Timing Gen	1
104520	PCA Deflection Processor	1
104413	PCA Graphics Enhancer VIC	1
104450	Arc Lamp Power Supply	1
104451	Low Voltage Power Supply	1
104502	High Voltage Power Supply	1
104450	Arc Lamp Power Supply	1
106124	Arc Lamp Module	1-4

5.0 Troubleshooting

Contents

5.1 Status LEDs

The illustrations below indicate where various LEDs are located that indicate proper or improper operation of the System Controller/ Raster Timing Generator, the Video Processor PCB, the Deflection Processor the Vertical Convergence Deflection PCB, the Horizontal Deflection PCB, the Regulator and Video Amplifier PCB.

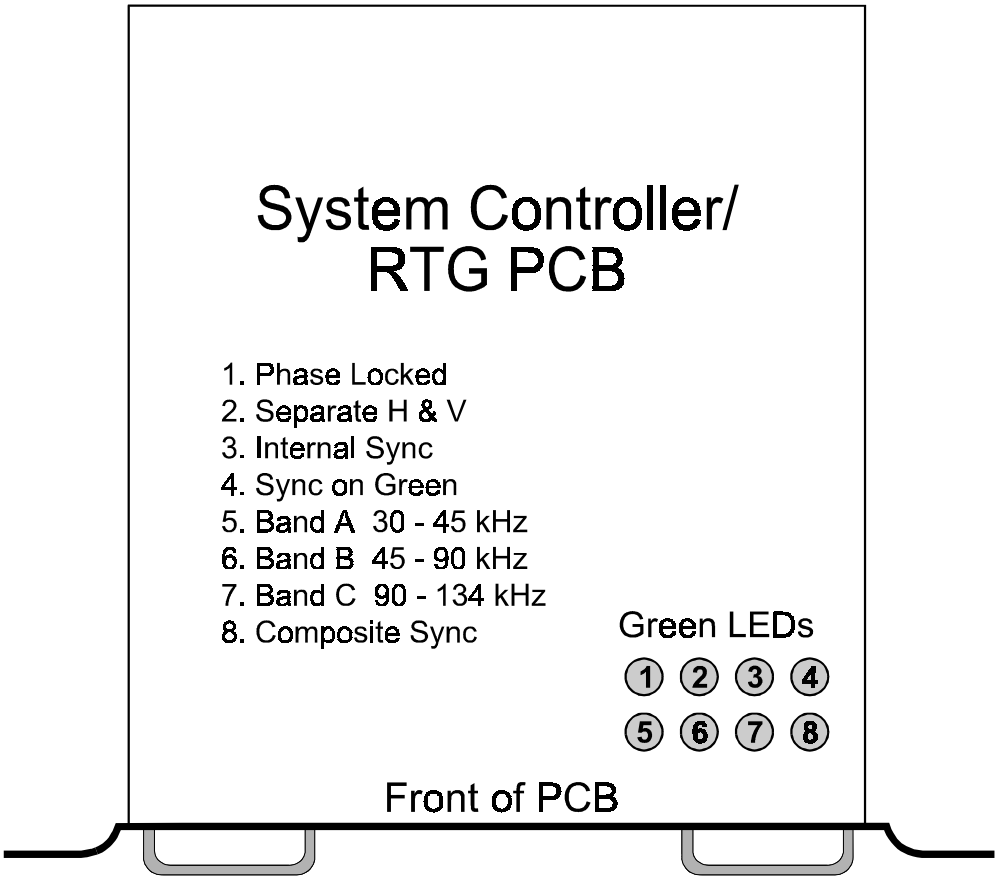


Figure 5-1 Location of LEDs on System Controller/ RTG PCB.

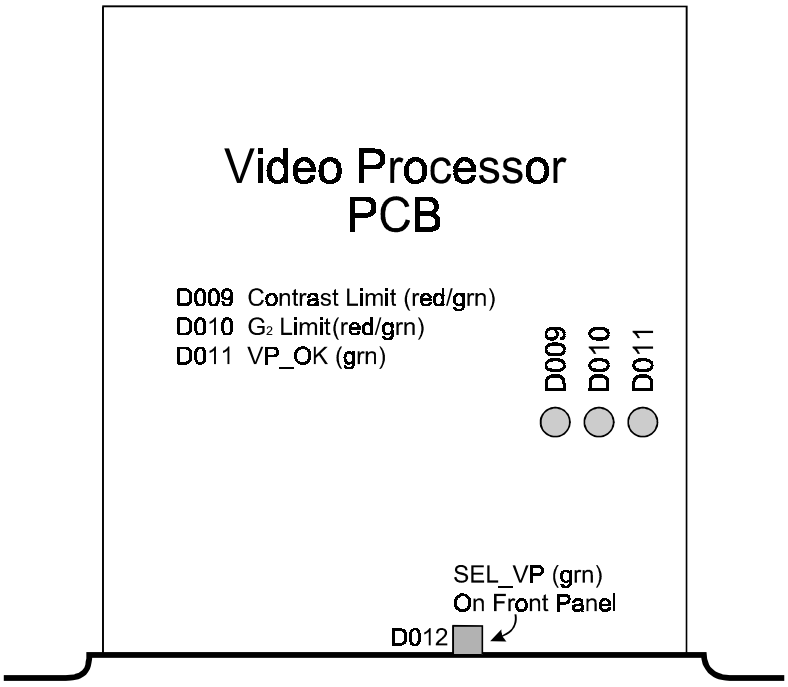


Figure 5-2 Location of LEDs on the Video Processor PCB.

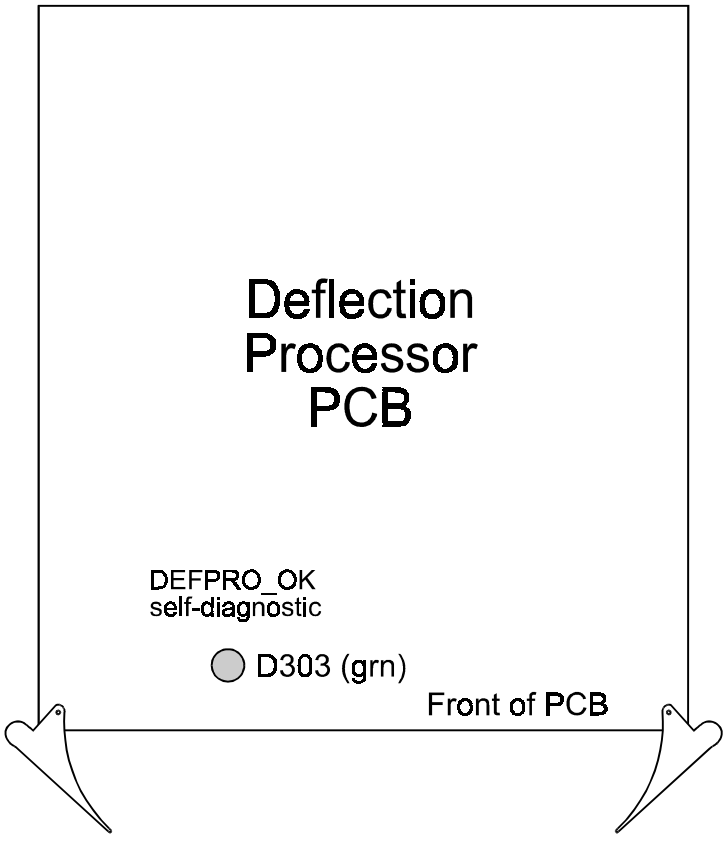


Figure 5-3 Location of LEDs on the Deflection Processor PCB.

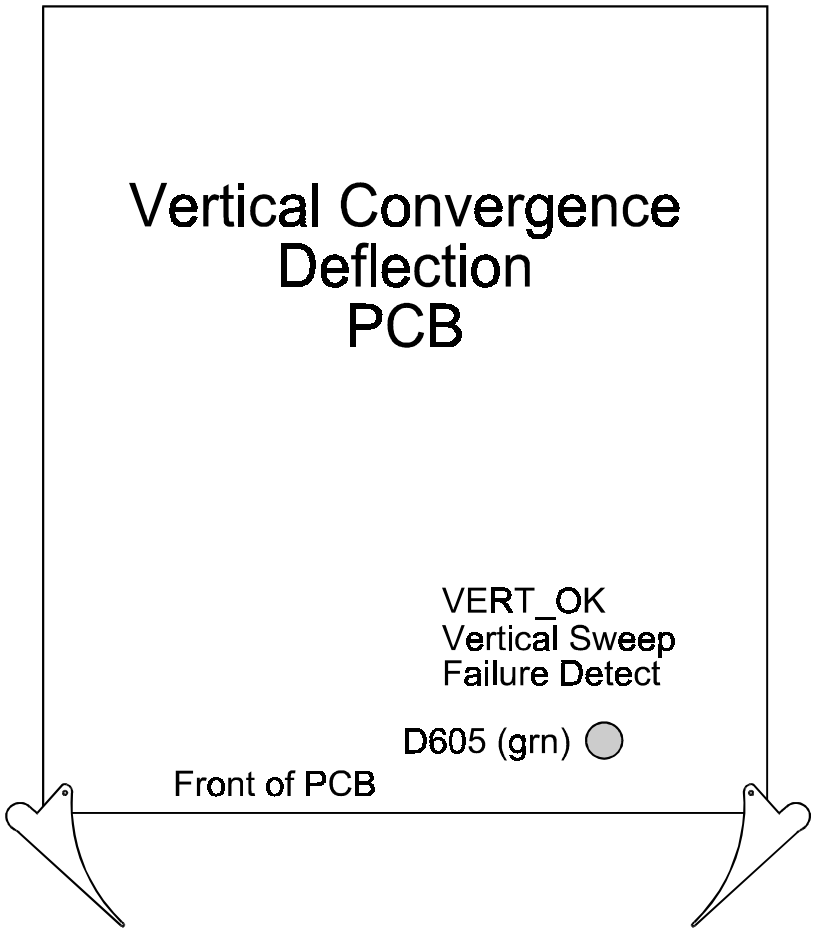


Figure 5-4 Location of LEDs on the Vertical Convergence Deflection PCB.

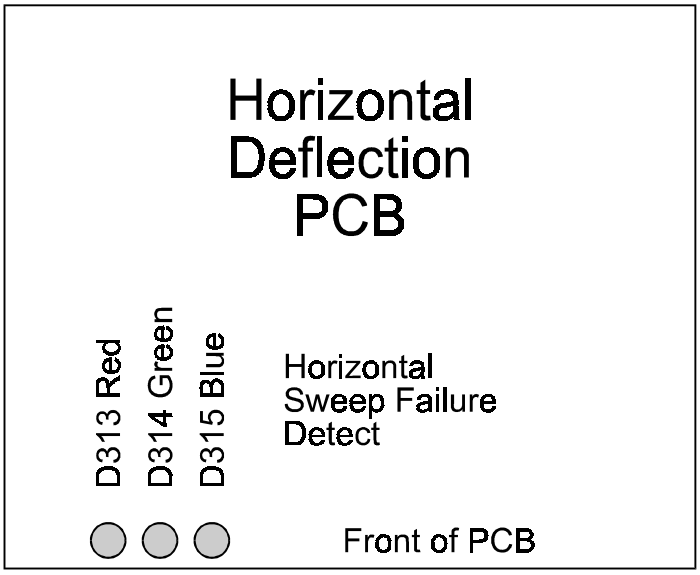


Figure 5-5 Location of LEDs on the Horizontal Deflection PCB**.**

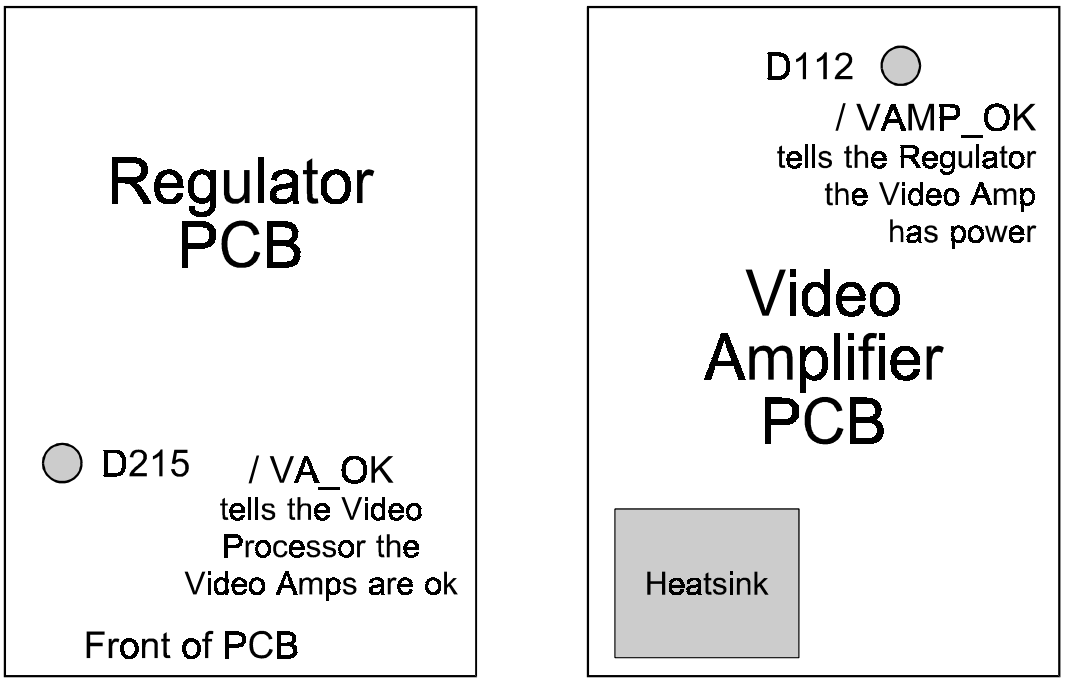


Figure 5-6 Location of LEDs on the Regulator and Video Amplifier PCBs.

5.2 Error Codes

For certain errors that may occur in the Model 100 Projector the software provides error codes that are helpful in determining the nature of the problem.

Note: Use a computer terminal connected to Port A or Port B for troubleshooting because most error codes and messages will be displayed only on a terminal screen. These error codes can be seen on the left side of the screen.

Table 5-1 Error Categories

No.	Error Category	Description
1	CEXEC	Operating System. Usually System Controller failure or LVLPS voltage level.
2	FLASH HW	Flash Memory HW driver.Flash memory component failure of System Controller/RTG.
3	IIC HANDLER	IIC Handler for System Controller/RTG PCB, Deflection Processor PCB, Vertical Convergence Deflection PCB, Video Processor PCB. IIC is noisy, shorted, or grounded.
4	POWER ON/OFF	Power On Sequencing.
5	FLASH MANAGER	Flash Memory Data Manager (software).
6	VIDEO SWITCHER	EXTRON or JVC Video Switcher Handler.
7	ANSI OUTPUT	Ansi Output Display process (RS232).
8	UI CHAN/SRC	User Interface SW for Channel/SRC Data.
9	VIDEO INPUT CARD	VIC Card Handler.
10	HARDWARE	Misc HW (shutters, etc.).

The error codes listed in Table 5-2 describe problems associated with software (Version 2.0.0) and hardware while the projector is operating. The first column of the table lists the error number code that appears on the PC screen. The second column describes the on-screen text. The third column provides a description of the problem and any other pertinent information.

Table 5-2 Error Codes.

Error No.	On-Screen Text	Description	When Expected
1.5	“Invalid read/wrt”	//Software error-mismatch. Open mode vs. Write or Read command.	Never
1.12	“Ser parity error”	//Serial Port Parity error-not currently used.	Never
1.13	“Bad dev I/O	//Software error-invalid I/O request.	Never

Error No.	On-Screen Text	Description	When Expected
	oper"		
1.27	"Timeout on Read"	//Software error-unexpected timeout on Read.	Never
1.34	"No mem available"	//Software error-no heap available for memory allocation.	Never
2.1	"Invalid Sector"	//Software error-invalid Flash sector number.	Never
2.2	"Write Timeout"	//Flash Memory Write Failure.	Save Data
2.3	"Erase Timeout"	//Flash Memory Erase Sector Failure.	Save Data
2.4	"Verify Error"	//Flash Memory Write Verify Failure.	Save Data
NOTE: Category 3 error codes may occur when power is interrupted by opening the cover interlock switches or during power brown-outs.			
3.1	"Pin Timeout"	//IIC Slave HW protocol error-possible on each byte transfer.	Channel or Source Change Adjustment
3.2	"BB Timeout"	//IIC Slave HW protocol error-1st error possible on Read or Write.	Channel or Source Change Adjustment
3.3	"No Slave Ack"	//IIC Slave HW protocol error-missing acknowledgement on byte transfer. NOTE: This error occurs if the slave is missing. During Power On, this error is reported in the POWER category.	Channel or Source Change Adjust-ment
4.5	"VA PCA Missing"	// "No Slave Ack" status on first poll of Video Processor.	Power On
4.6	"VA PCA Not OK"	// / VA_OK is High (BAD).	Power On
4.7	"VP PCA Missing"	// "No Slave Ack" status on first poll of VP.	Power On
4.8	"VP PCA Not OK"	// VP_OK is High (BAD)	Power On
4.14	"Lamp Startup"	//Lamp Failed to light (/LAMP_LIT_B not Low for 3 seconds out of 20 seconds.)	Power On or Cover off

ERROR NO.	ON-SCREEN TEXT	DESCRIPTION	WHEN EXPECTED
4.15	“Low Voltage PS”	//Low Voltage PS failed (/LV_OK_B is High).	Power On or Cover off
4.16	“High Voltage PS”	//High Voltage PS failed (/HV_OK_B is High).	Power On or Cover off
4.17	“VIC Board Not OK”	/VIC_OK is High (BAD) on VIC Slot 1.	Power On
4.20	“VIC Invalid Type”	//Software does not support VIC_ID in Slot 1	Power On
4.23	“Shutters Missing”	//One or more shutters not installed (BAD)	Power On
4.24	"Lamp Start Not On"	// /LAMP_OK is high, lamp module not installed, jumper missing, ALPS bad.	Power On or Cover off
No error codes in Category 5 (Flash Manager)			
Most Category 6 error codes indicate RS232 communication errors and apply to Switchers only.			
6.1	“Sync Timeout”	//No Header found in data stream - possible baud rate error.	Switcher Command
6.2	“No Char Repeat”	//Expected data characters to be repeated - failed.	Switcher Command
6.3	“Invalid Format”	//Data not in Extron or JVC Switcher format.	Switcher Command
7.1	“Write Len Error”	//Ansi Output to RS232 port was interrupted - incomplete.	Any RS232 Output
8.1	“VIC Slot is empty”	//User has selected a Channel - VIC is not present.	Channel Change
8.2	“VIC Type Changed”	//User has selected a Channel - VIC type has changed. User may have swapped a VIC into an incorrect slot.	Channel Change
8.3	“Interpol Blocked”	//Software process error - Interpolation Process not allowed to run by higher priority processes.	Source Change
9.1	“Quad Dec Not Init”	//HW: Quad Decoder failed Startup Sequence.	Channel Change to Std Decoder
10.1	“Shutter Stat BAD”	//One or more shutters reading wrong status.	Hide RGB w/Shutter Preference

Note: One other error may appear on the monitor screen with the statement **"Assertion Failed"** (only if the PC is connected to Port A). This is a very rare but serious error. If it occurs, *copy* the 3 lines that appear on the screen, *note* what occured just prior to this failure, and *call* Hughes-JVC.

5.3 Troubleshooting Guide

Table 5-3 shows some common projector problems, what to check when problems occur, possible solutions and the section in this Service Manual (If User's Guide contains pertinent information, the appropriate section will be given) that provides some related information on the problem.

Table 5-3 Troubleshooting Guide.

Problem	Check	Possible Solution	Section
No Power	Main Circuit Breaker on Projector right front corner.	Reset Circuit Breaker.	User's Guide 3.6
	Main Circuit Breaker fails when reset.	Verify input power is correct. Replace defective Low Voltage Power Supply or Arc Lamp Power Supply.	4.6 and 4.7
	Power Interlock Switch	Test switch operation. If defective, replace switch.	
	Projector cover not enabling interlock switch?	Reposition projector cover.	
No Picture	Correct channel input & VIC selected?	Select correct channel and VIC.	User's Guide 3.8.
	Arc Lamp turned off.	Restart projector.	User's Guide 3.6.
	System power turned off.	Restart projector.	User's Guide 3.6.
	Signal source	Verify signal source is turned on and properly connected.	User's Guide 2.7.
	HIDE command invoked?	Unhide image with the HIDE key on the remote.	User's Guide 3.11
	One color is missing.	Turn on the missing color with the HIDE key.	User's Guide 3.11
	No image or raster on one CRT.	Replace defective CRT/ ILA® or Video Amplifier Board.	4.16, 4.17
Arc Lamp	Arc Lamp will not light. Clicking noise is heard when projector is turned on.	Replace worn out Arc Lamp.	4.4

Problem	Check	Possible Solution	Section
	Clicking noise not audible when projector is turned on.	LVPS, ALPS, or Ignitor faulty. Replace LVPS, ALPS, or Ignitor.	4.7, 4.4, 4.5
	Arc Lamp ignites but will not stay lit.	Replace defective Ignitor.	4.5
Arc Lamp	Brightness flicker or picture is very dim.	Arc Lamp may have too many hours of usage. Replace Arc Lamp.	4.4
Image out of focus	Spacer balls not visible.	Perform the Projection Lens Focus procedure.	User's Guide 5.5.15
	ILA® "spacer balls" are visible but the image is fuzzy.	Perform ILA® Back Focus Procedure.	3.2
	CRT focus range is limited and the image is fuzzy.	Adjust the Electronic focus.	3.3
	CRT focus is not effective.	Ensure the CRT/ ILA® assembly is installed correctly.	4.17
	Image blurry with shadow on right edge.	Replace CRT/ ILA® assembly.	4.17
	Characters do not appear legible.	Replace CRT/ ILA® assembly.	4.17
	CRT focus problem is limited to one color.	Replace CRT/ ILA® .	4.17
	Sensitivity Offset is set too high.	Reset Sensitivity Offset.	User's Guide 4.7.2
Picture Geometry	Picture not centered or sized correctly.	Repeat the Blanking, Phase, Size, and Centering procedures.	User's Guide 4.2.3, 4.2.4, 4.3.2, 4.3.1.
	Picture "wraparound" at left or right edge.	Readjust Blanking and Phase.	User's Guide 4.2.3, 4.2.4.
	Retrace lines on raster.	Adjust TOP Blanking.	User's Guide 4.2.3.
	Image not squared.	Check Geometry and readjust if necessary.	User's Guide 4.3.1, through 4.3.12.
	Image bowed at left/right edge or top/bottom.	Check Bow and Pincushion, adjustments.	User's Guide 4.3.3, 4.3.8.
	Picture Linearity.	Readjust Horizontal, Vertical, or Edge Linearity.	User's Guide 4.3.5, 4.3.6.

XY Converge	Linearity is different between colors. Unable to converge.	Adjust Red and Blue linearity. Check CRT Rotation.	User's Guide 4.3.10, 4.3.11.
	Horizontal size is different between colors.	Adjust Horizontal Size Coils on Horizontal Deflection PCB.	3.6
	Vertical size is different between colors.	Adjust vertical size with software.	User's Guide 4.3.2.
	Not enough range in Red or Blue XY convergence.	Adjust Red or Blue CENTERING to match Green.	User's Guide 4.3.1
Picture Color Balance	Red, Green, or Blue is missing in the image.	ILA® Bias voltage is too low or there is no video signal. Check video signal and G_2 setting	4.13
	Red, Green, or Blue lacks color.	Check ILA® assembly or Video Amplifier Board.	4.16, 4.13
	Grey scale test pattern is correct but image color is incorrect.	Readjust Contrast.	User's Guide 4.9.2
	Black image is overdriven.	Adjust Threshold, Black level, and Brightness.	User's Guide 4.7.3, 4.7.1, 4.7.2
	Bright Red, Green, or Blue area on screen limited to corners or edge.	Adjust ILA® bias and shading.	User's Guide 4.5, 4.8
	Grey scale is Green in bright areas.	Subtract Green Sensitivity Offset and add Red and Blue.	User's Guide 4.7.2
	Grey scale is Red in bright areas.	Subtract Red Sensitivity Offset and add Green and Blue.	User's Guide 4.7.2
	Grey scale is Blue in bright areas.	Subtract Blue Sensitivity Offset and add Green and Red.	User's Guide 4.7.2
Picture-Various Problems	Small, dark line or dot in Red, Green, or Blue image.	Scratch in optics or CRT burn. Replace CRT/ ILA® assembly.	4.17.
	Bubbles in Red, Green, or Blue image.	Replace affected CRT/ ILA® assembly.	4.17.
	Image ghost in picture.	Replace burn-in CRT/ ILA® assembly	4.17.
	Reversed ghost image on screen.	If projecting through glass, prevent light from reflecting back into the lens.	
Picture-	Picture lacks depth of field.	Adjust Contrast or Brightness.	User's Guide 4.9.1, 4.9.2.

Various Problems			

PROBLEM	CHECK	POSSIBLE SOLUTION	SECTION
Picture-Various Problems	Image jitter and noise.	Replace Video Processor Board.	4.10
	Image jitter present at one source only.	Replace System Controller/ RTG	4.9
	Image is not level.	Level the projector or rotate the CRT Yoke.	User's Guide 4.3.11
	"Flagwaving" at top of picture or top of image is skewed.	VTR mode checked in Timing menu. Deselect VTR mode.	User's Guide 4.2.2
No Response when using Tether cable on the Remote.	Possible defective tether cable. Terminal port not set up correctly.	Replace tether cable. Select "Tethered Remote and correct baud rate from menu.	
No Response when using IR remote.	Intermittent operation.	Replace remote battery or move closer to the projector. Stay in the "Line of sight" of the projector IR Receiver.	
New Software won't load properly	Switch position 4 on switch block on System Controller board is in incorrect position.	Switch position 4 on System Controller switch block sets the speed for Port A. This speed is reported in the Comm Setup menu for Port A. Switch position 4 must be in the UP position for 9600 baud and DOWN for a baud speed of 19200.	See menu under Comm Setup, Section 4.12 of User Guide, Figure 3-11 of this manual, and Appendix B, page B-1, of this manual.

6.0 Parts List

DESCRIPTION	PART NO.
Arc Lamp Module	106124
Ignitor Assembly, 1600W (Ignitor & Laser P.S.)	104962
CRT/ ILA® Assy - Add for Blue -14, for Green -15, for Red -16.	106650
Manual, Operation (User's Guide)	104927
PCA Vertical Convergence Deflection	104515
PCA Horizontal Deflection	104595
PCA Deflection Processor	104520
PCA System Controller / Raster Timing Generator	104425
PCA Regulator	104963
PCA Video Amplifier	104610
PCA Video Processor	104510
PCA, Backplane	104604
PCA, Graphics Enhancer RGB VIC (Option)	104413
PCA, RGBHV VIC (Option)	102597
PCA, HDTV VIC (Option)	103765
PCA, 4-RGB Input VIC (Option)	103545
PCA, MUX VIC (Option)	103668
PCA, Quad Line Doubler VIC (Option)	105305
Power Cord (USA)	103253
Power Cord (Europe)	103939
Power Supply, Arc Lamp	104450
Power Supply, High Voltage	104502
Power Supply, Low Voltage	104451
Projection Lens, 1:1, Fixed	105377
Projection Lens, 1.5:1, Fixed	105378
Projection Lens, Zoom	105379
Remote Control, Standard	105576
Remote Control, Technician	105575

Glossary Of Terms

Amorphous	Without definite form; not crystallized.
Arc Lamp	The xenon arc lamp in the Model 100 projector. It operates at high temperatures (160° to 200°) and produces dangerously intensive light with hazardous levels of ultraviolet and infrared radiation.
Aspect Ratio	The ratio of the picture width to picture height. The standard U.S. television aspect ratio is four units wide to three units high (4:3). High Definition Television (HDTV) is 16:9.
Bandwidth	The transmission or reception capacity of a computer or communications channel measured in bits per second in digital and in Hertz in communications. Bandwidth is the difference between the lowest and highest frequencies transmitted or received. Wider bandwidth provides more information or picture detail capability.
Chrominance	Abbreviated as "C." Color information signal or signals.
Cold Mirror	Mirror that absorbs infrared light so that its reflection contains only "cold' light that does not transmit appreciable heat. As a result of this absorption of infrared heat radiation, "cold" mirrors get quite hot.
CRT (Cathode Ray Tube)	The vacuum tube used as a display screen in video terminals or television sets. Commonly called the picture tube.
Dichroic Mirrors	The white light of the xenon arc lamp is separated into red, green and blue by means of *dichroic mirrors* which reflect only one color and pass all others.

Field	One half of a complete video frame. Odd lines in one field and even lines in another make up one frame.
Frame	One complete TV picture or screen of information. It is composed of two fields and has a total of 525 scanning lines in NTSC transmission.
Horizontal Scan Reversal Jumper	Reverses the image projection for front or rear projection. Located on the Vertical Convergence Deflection PCB.
Horizontal Size Coils	Adjusting coils on the Horizontal Deflection PCB. Used to coarse adjust the horizontal size (width).
Hot Spot	The Arc Lamp's brightest area on the screen. Used to align and focus the Arc Lamp.
Hue	Also referred to as tint. A specific color such a blue, pink or aqua. Hue or tint control on a display device adjusts red/green balance.
Ignitor	Provides a momentary high voltage to excite the gases in the Xenon Arc Lamp to ignite.
Image Light Amplifier ILA®	A device that uses low-intensity images to phase modulate a high-intensity light through a liquid crystal layer. It is a key component in producing very bright, high resolution images from Hughes-JVC large-screen projectors.
Image Mirror	Directs the blue and red images toward the Combining Prism.
Interlacing	The technique that refreshes a display screen by alternately displaying all the odd lines (field one) and then all the even lines (field two) of one frame.
I/R Windows	The Model100 Projector has two I/R windows, one in front, one in back. These windows receive projector control signals from the I/R remotes.
Lamp Docking Module	The housing that contains the Arc Lamp assembly.

Laser Power Supply	Provides boost voltage through a spark gap to the Ignitor.
Lumen	A unit of measure of the flow, or rate of emission, of light. An ordinary wax candle generates 13 lumens while a 100 watt bulb generates 1,200 lumens.
Luminance	Abbreviated as "Y." The portion of the signal that contains the black and white information, which affects brightness.
Noise	An undesirable electrical interference of a signal.
Overscanning	Displaying less than the complete area of an image to a viewer (i.e., scanning beyond the visible area). All TV sets are overscanned at least slightly, so that viewers do not see blanking.
PCB	Printed Circuit Board
Raster	The area illuminated by the scan lines on a CRT.
Resolution	The degree of sharpness of a displayed or printed character or image; the amount of detail in a picture. On a display screen, resolution is expressed as the number of horizontal dots (columns) by the number of vertical lines (rows). For example, a 680 x 400 resolution means 680 dots across each of 400 lines.
Retrace	The blanked-out line traced by the scanning beam of a picture tube as it travels from the end of any horizontal line to the beginning of either the next horizontal line or field. The beam is turned "off" during retrace.
RGB (Red, Green, Blue)	Refers to the method of recording and generating colors in a video system. On a television or color monitor, colors are displayed as varying intensities of red, green and blue dots. When red, green and blue are all turned on high, white is produced. When all dots are turned off, the base color of the screen appears.
S-VHS	A high band video recording process for VHS that increases picture quality and resolution capability.

	S-VHS tape machines use a special output terminal which allows separate output of luminance (Y) and chrominance (C) picture information to monitors equipped with S-Video inputs.
S-Video	A video signal that has the luminance (Y) information separated from chrominance (C) information.
Saturated Color	1) A color as far from white, black or gray as it can be (i.e., vermilion rather than pink). 2) A display misadjustment that results in unnaturally bright colors.
Scan	To scan is to move across a picture frame a line at a time, either to detect the image, as in an analog or digital camera, or to refresh a CRT-based video screen.
Scan Line	One of many horizontal lines in a graphics frame.
Scan Rate	The frequency of line scanning for a monitor or projector.
Synchronization	Also called "sync" for short. Working together. At the same time, horizontal and vertical sync signals from the signal source control the monitor's scan circuits to properly time the lines and frames of a picture.
Technician Remote	Remote control used during Model 100 setup and adjustment. Alternative to Standard Remote. Provides access to many of the setup functions by direct keys instead of by menu maneuvering.
Throw	Distance to the screen from the projector.
Underscan	Decrease raster size H and V so that all four edges of the picture are visible on the display.
Vertical Resolution	The amount of detail that can be perceived in the vertical direction; the maximum number of alternating white and black horizontal lines that can be counted from the top of the picture to the bottom.

Vertical Scan Frequency (V-Freq)	The vertical scan frequency of the input signal.
Vertical Scan Reversal Jumper	Reverses the image vertically for use with ceiling displays or mirror-bounced displays. Located on the Vertical Convergence Deflection PCB.
Vertical Synchronization Frequency	The number of times per second a frame is transmitted to a video display screen.
Xenon Arc Lamp	See Arc Lamp.

Model 100 Configuration Data Export / Import Procedure

Rev 1.0.0

This appendix defines the steps to perform a Configuration Data Export & Import from the Model 100 projector to a Host Computer. The Host Computer can be any system that has RS232 download and upload capability, including an IBM-PC compatible, an Apple MacIntosh, or a UNIX system. This paper describes the procedures for an IBM-PC running the Windows 3.1 OS. We will use the Windows "TERMINAL" application for communication with the projector. Other Terminal emulation programs can be used (ProComm, .), but all testing has been done with the TERMINAL application.

Note 1: The TERMINAL application setup is the same as for controlling the projector via an ANSI TERMINAL (see Model 230 User's Guide, Section 4.11).

Note 2: Export/Import can be performed on either Port A or Port B. The Port must be configured for ANSI Terminal. Port A speed is determined by DIP SWITCH #4 on the System Controller board. UP is 9600 baud, DOWN is 19200 Baud. Port B can be configured for 2400, 9600 (default), or 19200 through the Comm Setup Menu. If both Port A and Port B are ANSI Terminals, PORT A must be used for Export/Import, so to use Port B, set Port A Device = None or Switcher, Port B Device = ANSI.

Remember to Power Off (Control+P) and HW RESET (Push RESET button -*figure 5-1 in Service Manual*- or Circuit Breaker-*on rear panel*) after changing any configuration parameters.

WARNING: If you use 19200 Baud, your computer must have a 16550 UART installed on the Comm Port. An unbuffered 8550 UART will lose data during EXPORT. This data loss cannot be detected until a later IMPORT is attempted. Use 9600 if you are not sure. In all cases use SOFTWARE FLOW CONTROL (XON/XOFF).

WARNING: Laptop computer users must disable Advance Power Management (APM) during an Export. APM power pulling causes loss of data.

EXPORT

1. Make sure the Windows TERMINAL program is configured for SOFTWARE FLOW CONTROL (XON/XOFF). A corrupt Export file will result if SW flow control is not used.
2. Choose the directory and filename for saving the Export Data. The Windows TERMINAL: *Transfers: Receive Text File...* dialog box will default to the c:\windows directory and no file. Create a directory (like \TEMP) (or have an existing one in mind) before starting the export process.
3. Model 100 Menu: **`7. System + 5. Maintenance + 5. Export`**

```
================================
|     Export Configuration     |
| Start RECEIVE TEXT Download  |
| to Host on Serial PORT A     |
|                              |
|      <ENTER> to Continue     |
|       < ESC> to Cancel       |
================================
```

4. Windows TERMINAL: ***Transfers* + *Receive Text File...***.

   4.1. Directories - set directory to desired download directory (C:\TEMP)

   4.2. File Name: - Type desired File Name (for example: export1.txt)

4.3. Select ***OK*** with mouse or press ***Enter*** key (dialog will be removed)

4.4. Verify TERMINAL screen shows status line at bottom:
Stop, Pause, Bytes: 0, Receiving: EXPORT1.TXT

5. Model 100 Menu:

Press **ENTER** key to start export download. NOTE: Some VT100 Emulator programs (ProComm) will send the ENTER automatically when step 4.3 above is performed. Expect 10 minutes to export 20 sources (500,000 bytes) at 9600 baud).

Data Transfer will begin and continue until all source, channel, channel-source combination, and system data has been exported. The following dialog is displayed on the projector screen during the transfer.

```
================================
|     Export Configuration     |
|  EXPORT IN PROGRESS ... wait  |
| - Press ESC to Abort          |
================================
```

The following message is sent at the end of the export data.

```
##########################
# Export Complete        #
# STOP Host Download Now #
# Then, Press ESC        #
##########################
.END
```

A similar message is displayed on the projector screen :

```
================================
|     Export Configuration     |
| EXPORT COMPLETE              |
| -> STOP Host Download        |
| -> THEN Press ESC            |
================================
```

6. Windows TERMINAL:

Select the Windows TERMINAL ***STOP*** button with the mouse to end the *Receive Text File...* transfer.

7. Model 100 Menu:

Press **Esc** to exit the projector Export operation and return to the Maintenance Menu.

IMPORT

1. Know the directory and filename for uploading the Import Data. The Windows TERMINAL: *Transfers: Send Text File...* dialog box will default to the C:\windows directory which contains several *.txt files - SETUP.TXT is NOT a Projector EXPORT file!

2. Import will alter all projector setup data. Prior to starting, several warnings are displayed to prevent unintentional loss of setup data.

3. Model 100 Menu: **`7. System + 5. Maintenance + 6. Import`**

```
================================
|          WARNING             |
|  Importing New Configuration  |
|  ALL SETUP DATA WILL BE
      |  CHANGED!                      |
|                                |
|      <ENTER> to Continue       |
|       < ESC> to Cancel         |
================================
```

4. Press **ENTER** to continue with the Import.

```
================================
|     Import Configuration       |
|  Old Configuration will be     |
|  restored if import is Aborted |
|                                |
|      <ENTER> to Continue       |
|       < ESC> to Cancel         |
================================
```

5. Press **ENTER** to continue with the Import.

```
================================
|     Import Configuration       |
|  Start SEND TEXT Upload from   |
|  Host on Serial PORT A         |
|  -To Abort:                    |
|  ->Stop Host Upload,           |
|  ->THEN Press ESC to Abort     |
================================
```

6. Windows TERMINAL: ***Transfers + Send Text File...***.

   6.1. Directories - set directory to desired upload directory (C:\TEMP)

   6.2. File Name: - Type desired File Name (for example: import1.txt)

   6.3. Select ***OK*** with mouse or press ***Enter*** key (upload begins)

   6.4. Verify TERMINAL screen shows status line at bottom:
   Stop, Pause, "% complete bar", Sending: EXPORT1.TXT

6.5 Data transfer will continue until complete or an arror occurs or the User Aborts:
Expect 10 minutes to import 20 sources (500,000 bytes) at 9600 baud.

6.6 At successful end, TERMINAL will remove the bottom line.

7. Model 100 Menu:

When the projector detects the successful end of the transfer the following screen is displayed:

```
================================
|     Import Configuration      |
|  IMPORT COMPLETE              |
|  New Configuration is active  |
```

```
|                                |
| - Press ESC to Continue        |
==================================
```

Press ESC to exit the projector Import operation and return to the Maintenance Menu. There is a 10 second pause before the screen is redrawn.

8. USER ABORT:

Windows TERMINAL: **FIRST** press STOP to end the Host Upload transfer.

Model 100 Menu: **THEN** press **ESC** to abort the projector Import operation.

```
==================================
|     Import Failed              |
|  IMPORT ABORTED BY USER        |
|    Old Data was Restored.      |
| - STOP Host SEND DATA,         |
|   THEN Press ESC               |
==================================
```

FINALLY, press **ESC** to exit the projector Import operation and return to the Maintenance Menu. There is a 10 second pause before the screen is redrawn.

9. DATA TRANSFER ERROR (Example)

Model 100 Menu will display:

```
==================================
|     Import Failed              |
|  Bad EXPORT File Format        |
|   Old Data was Restored.       |
| -> STOP Host SEND DATA,        |
| -> THEN Press ESC              |
==================================
```

9.1. Windows TERMINAL: **FIRST** press STOP to end the Host Upload transfer.

9.2. Model 100 Menu: **THEN** press **ESC** to exit the projector Import operation and return to the Maintenance Menu. There is a 10 second pause before the screen is redrawn.