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AMPRO 3600 / 4600 Service Manual

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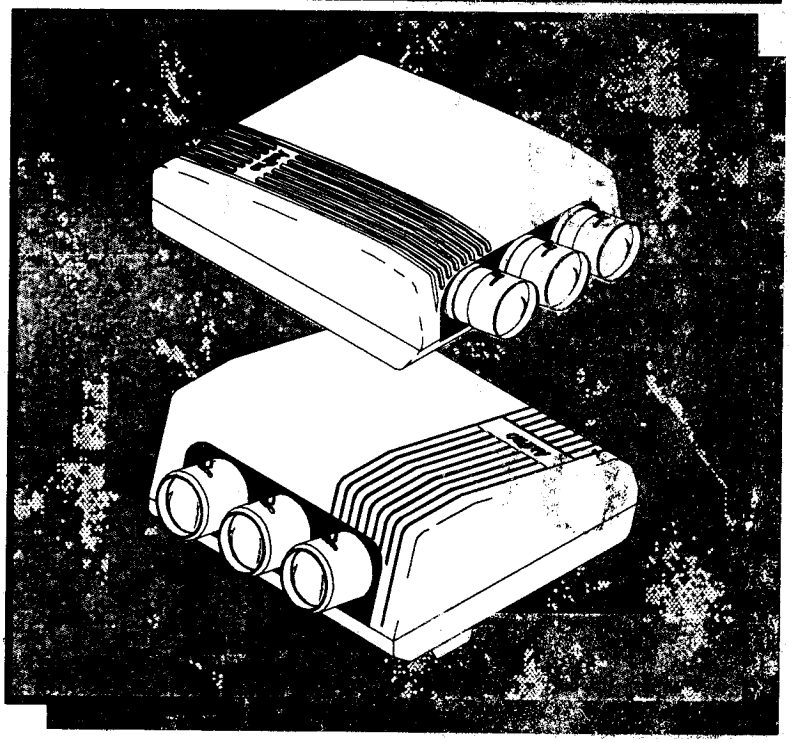

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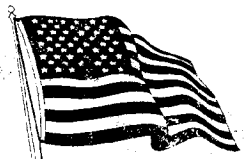

MADE IN THE U.S.A.

PLEASE FOLLOW ALL NOTES AND WARNINGS.	
BEFORE	Operating this Video/Computer Graphics Display System, please read this manual carefully and completely. This manual will provide you with a full understanding of the many functions and special features, and the necessary instructions for adjustments and operation of this equipment.

NOTE	Data presented in this manual has been carefully reviewed for accuracy and reliability; however, no responsibility is assumed for inaccuracies. The information contained in this manual is subject to change without prior notice. All material contained in this manual is proprietary data and may not be used or disclosed without written permission from AMPRO Corporation.

WARNING	This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CAUTION	Shielded interconnect cables must be employed with this equipment to insure compliance with the pertinent RF emission limits governing this device.

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NOTES

Section 1

Features / Specifications / Warnings and Precautions

The AMPRO 4600 Series of Computer Data/Graphics display systems offers superior resolution of 2000 X 2500 RGB lines. It includes three 9" (22.8 cm) magnetically focused CRTs, liquid-cooled / liquid coupled and the AMPRO 3600 Series of Computer Data/Graphics displays systems utilizes 8" (17.8 cm) liquid-cooled CRTs which provide resolution capability of 1600 X 1280 RGB lines. Both systems incorporate "Scheimpflug" focal plane adjustment which allows precise edge-to-edge resolution. Some of the features incorporated in the AMPRO 3600 and AMPRO 4600 are listed below.

1.1 ..... Features:

1.1.1 ..... Auto-lock:

The auto-lock feature is the ability to automatically lock the horizontal and vertical circuits to the input sync signals. This capability is invaluable in any system where more than one signal will be utilized.

1.1.2 .....Remote Control:

The remote control is extremely user friendly, for all AMPRO Computer Data/Graphics display systems. The microprocessor used in the system allows a vast array of information to be controlled by the remote control. Within the standard remote control is a large 4 X 20 character LCD read-out which gives the operating and diagnostics status of the unit. Additionally, both the LCD read-out and Remote Keypad have backlighting as standard. The remote control is available in three versions: a full function hard-wired with an LCD read-out, a infrared TECHNICIAN, and an infrared EXECUTIVE with On/Off/Standby and eight channel selection only.

1.1.3 ..... System Diagnostic:

The system constantly monitors all major voltages and signals (57 separate diagnostic messages) and provides a plain English operational status on a large 4 x 20 LCD backlit display located on the standard hard-wired remote control.

1.1.4 .....On-Screen Display (OSD):

The AMPRO 3600/4600 Series of display systems provide the ability to display the system status on-screen. This on-screen display emulates or is a LCD read-out repeater, meaning what is displayed on the remote control LCD read-out can be displayed on-screen. This feature can be enabled or disabled by the user with a simple system code.

1.1.5 .....RS232C:

The AMPRO Series Computer Data/Graphics display systems offers full duplex, bi-directional RS232C communications and networking capability. The systems can be controlled from the remote control, a computer terminal or through a third party control system using RS232C. Systems can be looped through so that multiple systems can be addressed individually or globally (as one) and controlled by one central source.

1.1.6 .....System Auto On/Off Operation:

The AMPRO 3600/4600 display systems have an internal timer which is capable of turning the system on and /or off at a predetermined time. Additionally, the timer may be programmed to operate in either a 5 or 7 day occurrence.

1

1.1.7 . . . . Overdrive:

This features allows the user to increase the image brightness by ≈ 25% more lumens. This feature is useful for the occasional times when the circumstances, i.e., ambient lighting conditions, requires a brighter image. Overdrive may be temporarily evoked or permanently assigned to a channel location.

! Overdrive feature is not available on the HD Series Projectors.

1.1.8 . . . . . .Store/Recall:

The AMPRO series of Computer Data/Graphics display systems can automatically store and recall (< 1 second switching time) each of the image raster alignment, phasing settings, picture settings, mode of operation and all registration settings via the remote control for ANALOG RGB, and VIDEO inputs. Any combination of up to **50** ANALOG RGB and VIDEO inputs may be stored in memory locations designated as "CHANNELS" and recalled by the remote control. Channel status may be displayed on screen by using an internal code command to display the setup status of all 50 channels, such as channel validation, horizontal and vertical setup frequencies, channel name and more. See Section 7 and Appendix C.

1.1.8.1 . . . . . .Channel Auto-Search Mode (ASM):

The Auto-Search Mode (ASM) of operation is a toggle function which allows the system to operate in an auto channel selection mode. As the incoming video signal, i.e., RGB, changes horizontal and/or vertical rates the system will automatically detect the change and re-configure the display parameters to optimize the displayed image.

1.1.9 . . . . . Lenses:

AMPRO 3600: incorporates f/1.0 high resolution, 10 lp/mm full field @ >50% MTF, reflective coated hybrid lenses, which can be used for screen sizes from 48 in. (1.2m) to 240 in. (6.1m) picture widths. **AMPRO 4600:** has as standard the f/1.1 high resolution (12 lp/mm full field @ >50% MTF), reflective coated, optically-coupled lenses (HD-10GT17), which can be used with screen sizes from 75 in. (1.9m) to 107in. (2.7m) picture width. Optional lenses are available which include screen width capabilities ranging from screen widths as small as 43.0in. (1.2m) up to 241.0in. (6.1m)

1.1.10 . . . . . .Internal Help Screens:

The firmware incorporated into the AMPRO system allows the user the capability of using the internal help system for instruction on the step-by-step setup, alignment, registration, operation and special features of the AmPro Computer Data/Graphics display systems.

1.1.11 . . . . . .Temperature Sensing:

The AMPRO 3600/4600 constantly monitors the systems' internal temperature at two separate points, one for the chassis temperature and the second for the low voltage power supply The temperature readings may be accessed by entering 26 [CODE]. If the internal temperature exceeds the maximum limit of 158° F (70° C), then the system will automatically shut down and display "OVER TEMPERATURE" on the remote control LCD read-out. The over temperature condition may be a result of ambient room temperature condition, possible failure of the cooling fans (3 each) or dirty/clogged fan filter media.

1.1.12 . . . . Digital Registration:

The AMPRO systems electronic alignment and registration is totally controlled by remote control. The firmware incorporated in the AMPRO Computer Data/Graphics display systems permits either a controlled (guided) or random static and dynamic registration of the system. An internal HELP MENU guides the first time user through a step-by-step procedure. All registration settings are channel sensitive, meaning that each individual source may be precisely aligned to its particular parameters and stored in a designated location.

1.1.12.1 . . . . .Automatic Convergence Scaling (A.C.S.):

"A.C.S", Automatic Convergence Scaling provides the Display System with the ability to calculate registration settings of a new source based upon existing previously setup and validated channels settings. The command interprets between the closest lower "validated" channel and the closest higher "validated" channel . The "A.C.S." greatly reduces setup time for new sources. Refer to Section 7 (CODEs) and Section 8 for additional information on A.C.S.

1.1.12.2 . . . . .Intensity Mapping (OPTIONAL):

Intensity mapping allows the contrast and color balance of the top, bottom, left, right and all four quadrants (corners) of the projected image to be adjusted individually. Intensity mapping is useful to overcome possible shading of the image when using curve or high gain screens, which may cause "hot spots" or when overlaying multiple projected images.

1.1.13 . . . . . .User Adjustable Color Temperatures:

Remote user adjustable color temperature with factory pre-set(s) of 3600°K, 6500°K, 9300°K and user custom settings available. User custom setting allows user variation of the red, green and blue sub-bright and gain controls for an infinite range of color temperature settings. Color temperature is saved as a channel parameter.

1.1.14 . . . . . .Gamma Correction (OPTIONAL):

This optional feature electronically compensates for differences in beam current vs. light output differences between the red, green and blue CRT phosphors. Provides accurate grayscale tracking at all image brightness settings.

1.2 . . . . . .Optional Inputs:

1.2.1 . . . . . Quad Video Decoder / S-Video - 1 and Quad Video Decoder / S-Video - 2 :

The AMPRO 3600/4600 have the capability to include one or two Quad Video Decoder modules. These *optional modules* have a built in capability which automatically senses and decodes any of the four international standards of video information that is applied to the composite video input. The auto select capability can be manually overridden, if desired, via the remote control. Another feature of the Quad Standard Module is the S-Video input. Selection between the Composite Video input and the S-Video input is accomplished via the remote control.

1.2.2 . . . . . .Analog RGB - 2 and Analog RGB - 3:

The AMPRO 3600/4600 systems have the provision to include two additional Analog RGB/S modules. The second Analog RGB2 and third Analog RGB3 modules enable you to switch between three separate Analog RGB sources (3 or 4 wire operation) via the remote control.

! The AMPRO 3600/4600 Systems can accommodate a total of three input modules, the standard RGB and any combination of the optional modules listed above.

1

1.3 . . . . . Specification Chart:

SPECIFICATIONS		AMPRO 3600	AMPRO 4600
CRTs:		8" magnetically focused, liquid-cooled CRTs with focal plane adjustments.	9" magnetically focused liquid-cooled/coupled CRTs with focal plane adjustments.
Resolution:	RGB	1600 x 1280 lines	2500 x 2000 lines
	Video	650 lines	
	MTF	Modulation depth > 15% in horiz. and vert. resolution at 1280 x 1024 (3600) and 2500 x 2000 (4600)	
Light Output (ANSI lumens):		220 (OVERDRIVE)	270 (OVERDRIVE)
Screen Size:		4ft. (1.2m) to 20ft. (6.1m) picture width	4ft. (1.2m) to 20ft. (6.1m) picture width (see lens specification)
Scan Frequencies:	Horizontal	15kHz - 105kHz	
	Vertical	40 - 150Hz	
Bandwidth:		< 100 MHz	
Minimum Retrace:	Horizontal	<2.8µS	
	Vertical	400µS	
Inputs: (module)	Standard	Analog RGB1	
	Optional	(1) Quad Video Decoder w/S-Video1, (2) Quad Video Decoder w/S-Video2 (3) Analog RGB2, (4) Analog RGB3	
Remote Control:	Standard	Hardwired with 25ft. (7.6m) cable with back-lit LCD read-out and Keypad.	
	Optional	Infrared Executive or Technician Remote Control Kits	
Remote Control Operates:		Image Quality adjustments, raster alignment, on/off, stand-by, blanking, test patterns, and all static and dynamic registration. Store and recall (< 1 second switching time) of all settings (50 channels) of any one of the mode of operations. Optional 8 channel RS232C switcher.	
Special Features:		Bi-directional RS232C Communications and networking, digital registration, Automatic Convergence Scaling (linearity interpolation) of new sources, Channel Auto-Search mode, Automatic timer operation (auto-on/off) with user selected 5 or 7 day operation. User selectable "OVERDRIVE" mode; enables the temporary use of increase light output when the environment requires it. Fifty-seven diagnostic message. On-screen status display (user controllable).	
Power Source:		110 (90 to 130) Vac / 220 (185 to 240) Vac 50/60Hz	
Maximum Power:		800 watts (1800 BTUs)	
Weight/Ship Wt.:		120/163 lb. (54/74 kg)	180/240 lb. (82/109 kg.)
Operating Ambient Temp.:		+32°F to 97°F (0°C to 36°C)	
Operating Ambient Humidity:		20% to 80% (Non-condensing)	
Model / Lens Specification:		69581	69582 (4600 w/HD-10GT17) (standard)
		69581HD (HDTV version)	69582.10L (4600 w/HD-10L Lenses)
			69582.10 (4600 w/HD-10 Lenses)
			69582.26 (4600 w/HD-10GT26 Lenses)
			69582HD (4600-HDTV Series)

TABLE 1-1

1.4 . . . . . Shipping Carton Contents:

Save the shipping carton, surrounding foam inserts and lens covers. The original carton and foam inserts must be used for shipping. It is specifically designed to minimize potential damage during shipment.

☐ NOTE: An optional shipping / carrying case is available for mobile applications.

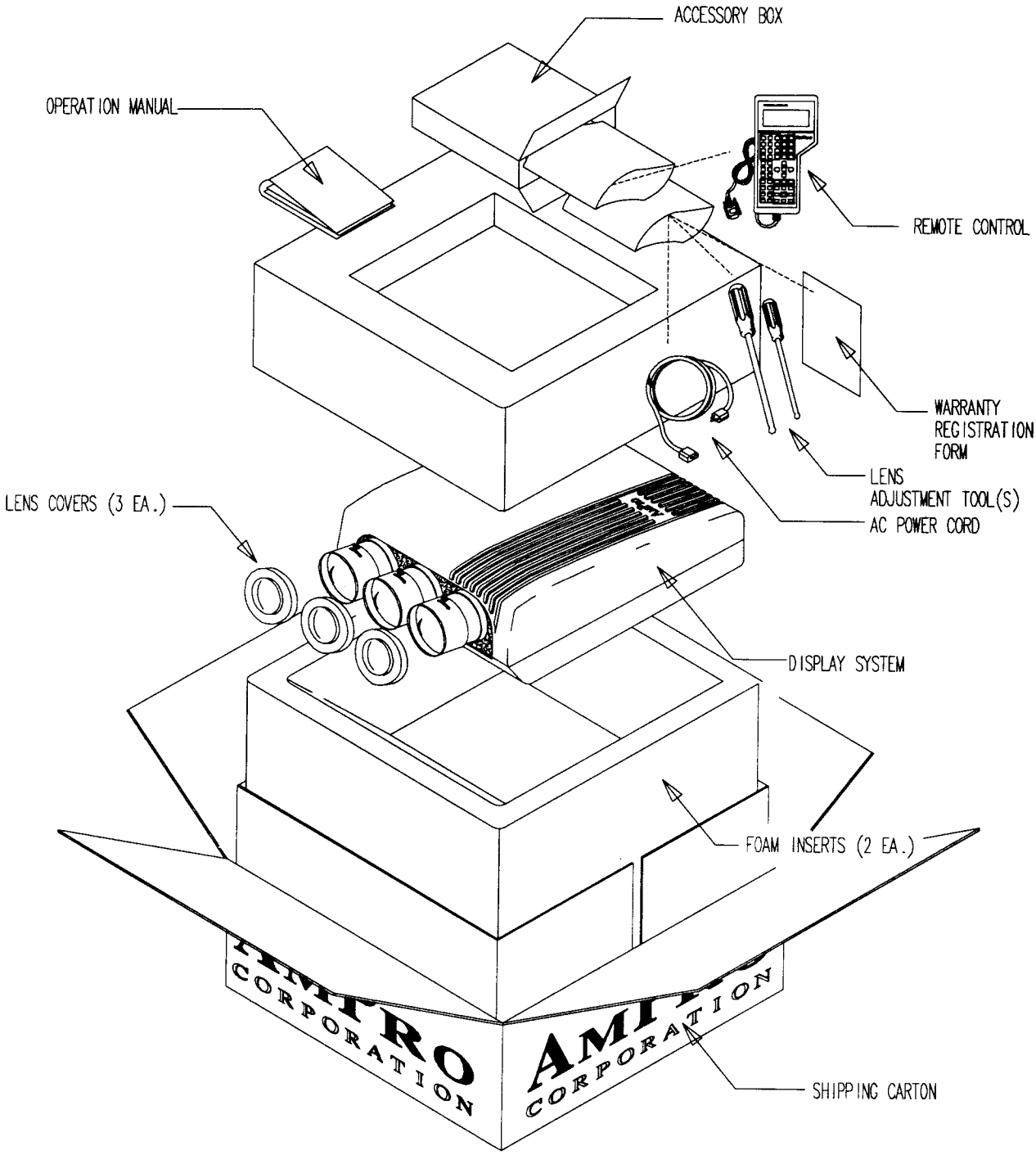


FIGURE 1-1. SHIPPING CARTON CONTENTS.

1

1.5 . . . . . Warnings and Precautions

CAUTION
RISK OF ELECTRICAL SHOCK DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF ELECTRICAL SHOCK
DO NOT REMOVE COVER
NO USER SERVICEABLE PARTS INSIDE
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL

This symbol is intended to alert the user that parts inside this product are a risk of electrical shock to persons.

This symbol is intended to alert the user that important operating and servicing (maintenance) instructions are in the literature accompanying this product.

1.5.1 . . . . . X-Radiation:

During the operation of any solid state Data/Graphics display system, the picture tube is a primary source of x-radiation. The projection tubes in the AmPro 3300/4300 incorporate leaded glass to safeguard against the leakage of x-rays. AmPro projectors comply with all U.S. Department of Health and Human Services rules governing the emission of x-radiation. **FOR CONTINUED X-RADIATION PROTECTION THE USER SHOULD NEVER ATTEMPT TO REPLACE THE PROJECTION TUBES OR OTHER ELECTRONIC COMPONENTS.** Instead, all service to the system should be performed by a qualified service technician.

X-RAY SHIELD
DO NOT REMOVE

"WARNING"
COMPONENTS FOR X-RAY SAFETY ARE CONTAINED IN THIS POWER SUPPLY RETURN COMPLETE HIGH VOLTAGE MODULES TO FACTORY FOR REPLACEMENT AND CONTINUED SAFETY

NOTE

THE DEFLECTION YOKES MUST BE FIRMLY AGAINST THE BELL OF THE CRT TO PREVENT X-RADIATION.

"WARNING"
BACKWARD MOVEMENT OF THE YOKE RESULTS IN PICTURE DEGRADATION AND LOSS OF RADIATION PROTECTION

X-RAY WARNING!

DO NOT OPERATE THE SYSTEM WITH THE LENS(ES) REMOVED!

1.5.2 . . . . . .High Voltage:

The projection display system contains high voltage derived from supplies capable of delivering LETHAL **quantities of energy. To avoid serious personal injury, only a qualified technician should service and adjust the internal modules within the unit. There are no user serviceable parts in the AmPro system. All internal servicing must be performed by a qualified technician.**

HIGH VOLTAGE

THIS UNIT OPERATES AT 34KV

1.5.3 . . . . Exposure to Rain or Moisture:

To reduce FIRE or SHOCK HAZARD, never expose the system to rain or moisture. **If this happens inadvertently, do not use the system until it has been inspected and/or serviced by a qualified technician.**

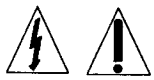
1.5.4 . . . . . .Projection Tubes:

The projection tubes inside the system enclose a high vacuum. Care must be taken to ensure that the system is not dropped or otherwise subject to violent blows.

WARNING !

ATTEMPTS TO ALTER THE SEALED FACTORY-SET INTERNAL CONTROLS OR TO CHANGE OTHER SETTINGS NOT SPECIFICALLY DISCUSSED IN THIS MANUAL CAN LEAD TO PERMANENT DAMAGE TO THE PROJECTION SYSTEM AND VOID THE WARRANTY.

1.5.5 . . . . . .A.C. Line / Electrical Grounding of Equipment:



The AMPRO projection system is configured for 115V or 230V operation and supplied with one of four standard power cords, as specified at the time the system is ordered. To change configurations, refer to Section 4. For your safety and proper operation, the system **MUST** be connected to a properly wired and grounded outlet. An improperly grounded system can place **HAZARDOUS VOLTAGES** on accessible metal parts of the system chassis and voids the Warranty due to potential damage to the system.

FOR INTERNAL ADJUSTMENTS OR SERVICE REFER TO QUALIFIED PERSONNEL. THE POWER CORD PROTECTIVE GROUNDING CONDUCTOR MUST BE CONNECTED TO EARTH GROUND. FOR CONTINUED SAFETY AND PROTECTION REPLACE FUSE WITH SPECIFIED TYPE: 110-120V 10 AMP AGC SLO-BLO 220-240V 5 AMP AGC SLO-BLO

1.5.6 . . . . . CRT Phosphor Life Criteria:

The phosphor coating on the face of the CRT has a given useful life and will provide satisfactory performance under normal usage. Since the phosphor efficiency decreases throughout its use at a rate which is a function of the beam intensity, the useful life of the CRT is determined by the application and the usage at high intensities.

Consequently, the continuous use at high brightness, and in particular prolonged use of a fixed pattern at high intensity, will adversely affect the useful life of the CRT. Continuous or repetitive use with a high-intensity fixed pattern will ultimately result in the "*etching*" of that pattern into the phosphor as a result of accelerated degradation in the area of the pattern. In the case of fixed pattern applications, the life is optimized by repositioning the pattern from time to time or by limiting the brightness when not in active use.

1.5.7 . . . . . .Ceiling Mount Precaution:

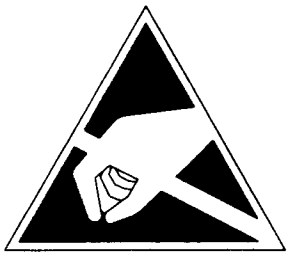
In a ceiling-mount application, the strength and rigidity of the ceiling are very important. The location should be carefully checked before hand to determine that the installation will safely support the weight of the system.

NOTE

AMPRO Corporation IS NOT RESPONSIBLE FOR INJURY OR DAMAGE CAUSED BY AN IMPROPERLY INSTALLED SYSTEM.

1

1.5.8 . . . . Electrostatic Discharge "ESD":



CAUTION
ELECTROSTATIC
SENSITIVE
DEVICES

For most of the components used in today's electronics, static electricity can zap and destroy some semiconductors, particularly MOSFET and CMOS ICs.

Use the following procedures when troubleshooting, repairing and handling electronic printed circuit boards.

- 1. Before handling these devices, the user or the equipment should momentarily contact a metal object at electrical ground potential so that any static charges will be removed.
- 2. Soldering-iron tips should be electrically grounded before soldering any wire or metal objects that are directly or indirectly connected to the device.
- 3. The same electrical ground potential should be applied to any lead-shorting and device shrouding materials and to the device case when possible.
- 4. Use properly grounded conductive table tops, floor mats, and chairs.
- 5. Provide personnel grounding to the extent that grounding wrist straps and heel protectors are used to achieve the required electrical ground.
- 6. In the handling for assembly into printed circuit boards, transportation of parts and PCBs, storage, assemblies into the systems and package of MOSFET and CMOS devices, use electrically conductive bags or packages.

WARNING!

When using conductive materials, clothing, straps, grounding leads to avoid static discharge, be particularly careful to prevent electrical shock from conventional sources as the extensive use of conductive material increases the possibility of shock.

Section 2
Limited Warranty

AMPRO Corporation warrants this product to be free from defects in material and workmanship under normal use, subject to the limitations provided below.

2.1 . . . . . Warranty Period:

For the first twelve (12) months after the date of installation, but limited to a maximum of 15 months from date of shipment from the factory, AMPRO Corporation will repair or replace any defective part, exclusive of the CRT for degradation of the phosphor coating, without charge for labor or parts. Replacement parts will be covered by this limited warranty for the remainder of the warranty period. This Limited Warranty applies only to parts supplied or designed by AMPRO Corporation.

2.2 . . . . . Date of Installation:

To establish the date of installation, the AMPRO Corporation Certificate of Registration should be completed, signed and returned to AMPRO Corporation, postmarked no later than thirty (30) days from the date of installation. If the AMPRO Corporation Certificate of Registration is not returned within such time, AMPRO Corporation will use the date that the system was shipped from the factory as the date of installation.

2.3 . . . . . .Original Purchaser:

This Limited Warranty is limited to the original purchaser (end user) of this product from either AMPRO Corporation or AMPRO Corporation authorized dealer, distributor or agent.

2.4 . . . . . Warranty Service:

For servicing under this Limited Warranty, this product must be presented to AMPRO Corporation, an authorized AMPRO Corporation service center or the authorized AMPRO Corporation selling dealer.

2.5 . . . . . .Shipping:

Prior to shipping this product or any sub-assembly to AMPRO Corporation, a Return Authorization Number must be obtained from the AMPRO Corporation Customer Service Department. The product must be shipped in the manufacturer's original shipping carton or other AMPRO Corporation approved packaging. All freight and shipping charges to AMPRO Corporation must be prepaid by the purchaser. Damage resulting from abuse in shipment of this product is not covered by this Limited Warranty. AMPRO Corporation approved shipping cartons are available from AMPRO Corporation for a nominal charge.

2.6 . . . . . .Environmental Damage:

This Limited Warranty does not cover damage or repairs that are necessary due to floods, winds, fires, lightning, accidents, corrosive atmosphere, excessive exposure to water (moisture) or heat, or any other conditions beyond the control of AMPRO Corporation.

2.7 . . . . . .Serial Number Defacement:

This Limited Warranty is void for the product if the serial number has been changed, removed or defaced.

2.8 . . . . . Misuse:

2

This Limited Warranty does not cover repairs that are necessary due to:

- incorrect installation;
- voltage conditions, blown fuses, open circuit breakers or any other inadequacy or interruption of properly grounded electrical service;
- misapplication, abuse, improper servicing, or any other improper operation, including mis-adjustments of any control;
- defects in or caused by associated equipment; or
- repair and/or modification of a sub-assembly performed by other than AMPRO Corporation factory personnel.

Normal maintenance as outlined in the installation and servicing instructions of this Operator's Manual will be the responsibility of the purchaser.

AMPRO CORPORATION MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, IN CONNECTION WITH THIS PRODUCT EXCEPT AS HEREINABOVE PROVIDED. IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ARISING FROM A COURSE OF DEALING OR USAGE OF TRADE ARE SPECIFICALLY EXCLUDED. SHOULD THIS PRODUCT PROVE TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP, THE PURCHASER'S SOLE REMEDY SHALL BE SUCH REPAIR OR REPLACEMENT AS HEREINABOVE EXPRESSLY PROVIDED AND UNDER NO CIRCUMSTANCES SHALL AMPRO CORPORATION BE LIABLE FOR ANY LOSS, OR DAMAGE, DIRECT, INCIDENTAL OR CONSEQUENTIAL, INCLUDING LOSS, OR LOSS OF PROFITS OR BUSINESS OPPORTUNITIES, RESULTING FROM DEALER OR DISTRIBUTOR INSTALLATION OR SERVICES.

Some states do not allow the exclusion of incidental or consequential damages, so the above limitation may not apply to you. This Limited Warranty gives you specific legal rights, and you may also have other rights which may vary from state to state or country. NO other person is authorized to assume for AMPRO Corporation any additional obligations beyond those provided herein.

Section 3
Rear Panel Description

3.1 . . . . . General:

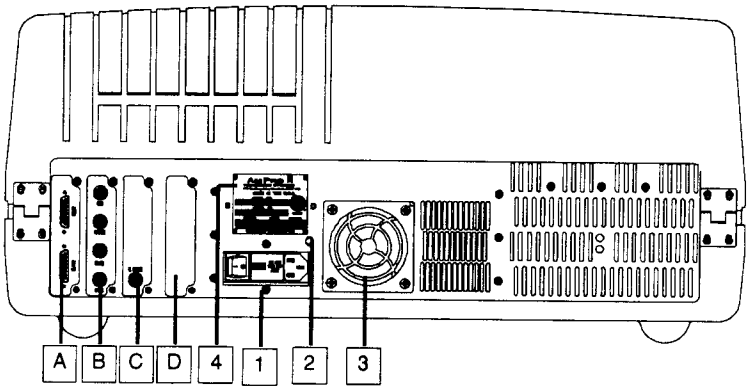
This section of the manual will familiarize you with the connections, controls and parameters available for operation of your system. It should be all you need to operate your system once it has been installed and set up (focused and registered).

The way in which your system operates will, in some ways, depend on the application. This means, for instance, that a system installed with direct signal inputs will not operate exactly the same as a system with a special options such as an RGB/VIDEO Switcher. If your installation has special options, refer to the technical data furnished with the options for additional information.

3.2 . . . . . Rear Panel Description:

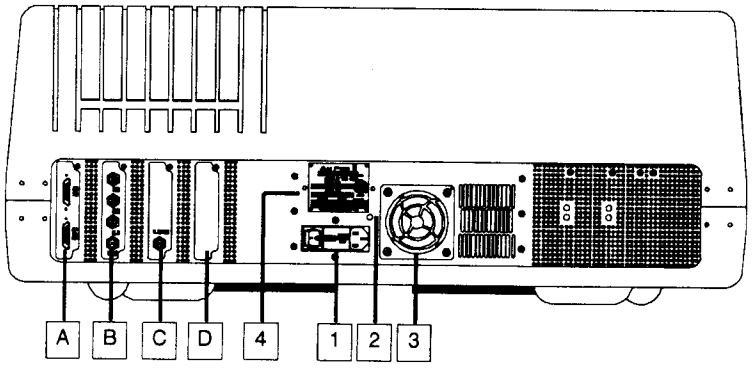
The rear panel of the system is where all connectors are located. Also located on the rear panel are several other devices, such as, the power rocker switch and access to the main power fuse and voltage select barrel , etc. Refer to Figure 3-1.

AMPRO 3600 Rear Panel



REAR PANEL DESCRIPTION				
SLOT	MODULE		ITEM	DESCRIPTION
	STANDARD	OPTIONAL		
A	CPU	NONE	1	MAIN AC LINE/FUSE
B	ANALOG RGB1	NONE	2	RUNNING INDICATOR (LED)
C	VERTICAL DRIVE PANEL	SEE BELOW	3	REAR FAN
D	BLANK	SEE BELOW	4	SERIAL / MODEL NUMBER

AMPRO 4600 Rear Panel



OPTIONAL SLOT(S) CONFIGURATION	
SLOT C	SLOT D
VERTICAL DRIVE PANEL (STANDARD)	QUAD VIDEO DECODER MODULE 1 (QVD1)
ANALOG RGB2 MODULE	VERTICAL DRIVE PANEL FROM SLOT C
QUAD VIDEO DECODER MODULE 2 (QVD2)	QUAD VIDEO DECODER MODULE 1 (QVD1)
ANALOG RGB2 MODULE	QUAD VIDEO DECODER MODULE 1 (QVD1)
ANALOG RGB2 MODULE	ANALOG RGB3 MODULE

FIGURE 3-1. Rear panel illustrations.

3.3 . . . . . Input Signals:

3.3.1 . . . . . .CPU Module (Slot A):

3

RS232 Communication: All RS232 communication both to and from the projector is processed by the CPU via the "HOST" and "SLAVE" ports located at the rear panel. Serial data arriving at the projector from the remote control or alternative external RS232 control system enters the CPU for processing through the "HOST" port and is simultaneously echoed through buffers to the "SLAVE" port for additional projectors or RS232 controlled accessories. Please refer to Section 4 for additional information about the projector's RS232 control and communications.

Storage Of Channel Data: One of the functions performed by the CPU is channel storage and recalling. The CPU uses battery backed up memory for storing the adjustment values for each of the 50 channel locations. These values are automatically recalled each and every time a channel location ("**n**" **[CHANNEL]**) has been selected.

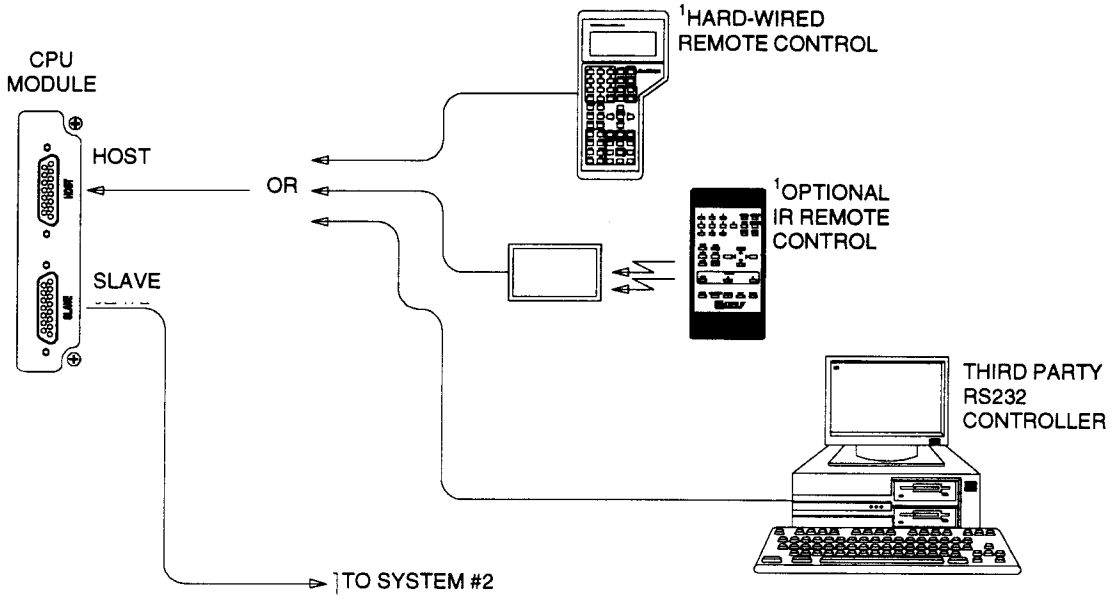


FIGURE 3-2. Remote control (RS-232) connections.

[1]The standard wired remote control and IR remote control may be simutaneously connected via the "Y" adapter. See Figure 3-3.

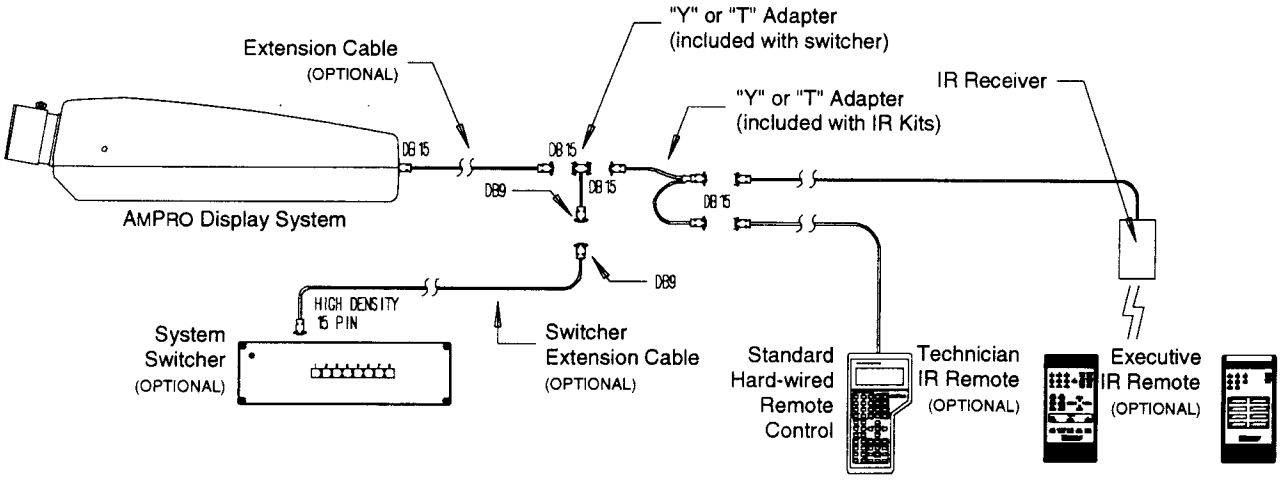


FIGURE 3-3. RS232C Communication Example.

3.3.2 . . . . RGB1 Module / RGB Analog Input (Slot B):

The Analog RGB sources are connected to the RGB1 module via BNC connectors. There are connectors for Red, Green, Blue video input signals, plus separate connectors for Composite / Horizontal Sync. A connector is provided for separate Vertical Sync and is located on the Vertical Drive panel, which is right next to the Analog RGB1 module.

The Analog RGB1 input falls into three major categories, three- wire, (sync on green), four-wire (composite sync), and five-wire (separate horizontal and vertical sync). The AmPro Display System will automatically configure itself properly for any one of the above conditions, including sync input and polarity.

A optional Analog RGB2 and RGB3 module are available and can be installed into Slot C and Slot D respectfully . The second and third Analog RGB inputs can only be used with three or four - wire RGB sources.

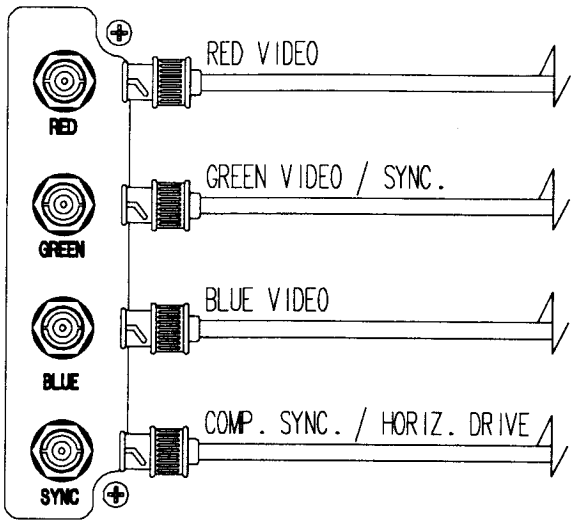


FIGURE 3-4. Analog RGB1 module.

! If both universal slots are being used for RGB, the Analog RGB1 will operate only in the 3 or 4 wire RGB mode of operation. If 5-wire operation is required while both universal slots are being used, a sync combiner will be required.

! To access the Analog RGB1 mode of operation press, [RGB], to access the optional RGB2 mode of operation press, [A] and to access the optional RGB3 mode of operation press, [B].

3.3.2.1 . . . . . .RGB Signal Specifications

VIDEO: RS-170 COMPATIBLE, 0.7vp-p ~ 5vp-p, 75 Ω TERMINATED

SYNC: COMPOSITE H/V, SEPARATE H/V, OR SYNC ON GREEN; AUTO DETECT, 0.3vp-p ~ TTL LEVELS, 75 Ω TERMINATED. USER SELECTED SYNC TIP OR BACK-PORCH CLAMPING

3.3.2.2 . . . . .RGB Brightness Clamping:

The Analog RGB1, RGB2 and the RGB3 have the ability to toggle the black level clamp point from "back-porch" to "sync- tip" by entering 48 [CODE], and may be preset into a channel location. Typically "back-porch" clamping is used and is the factory default settings for all channel locations. Refer to Section 6 for additional information on this and other codes.

3.3.2.3 . . . . . RGB Level Adjustments:

The typical operator controls that affect the Analog RGB1, RGB2 and the RGB3 levels are brightness [BRIGHT] and contrast [CONT] controls via the remote control and are usually set to the desired light output.

Color Balance: The AMPRO 3600/4600 have the capability to set the individual color levels for the Red, Green and Blue inputs for all three Analog RGB input modules and may be set and selected on a channel-to-channel basis for a custom or desired color balance setting of the particular input, or if so desired select one of the internal color temperatures of 9300 °Kelvin, 6500 °Kelvin or 3600 °Kelvin.

3.3.3 . . . . Optional Source Module Configurations:

3

3.3.3.1 . . . . . Slot C :

Standard Configuration: If no optional source modules are to be used with the AMPRO 3600/4600 a Vertical Drive Panel (VDP) is provided and is used in combination with the Analog RGB1 module when 5-wire RGB operations are required.

Optional Configuration 1: The Vertical Drive Panel may be removed and the optional Analog RGB2 module may be installed in its place. The Vertical Drive Panel may then be reinstalled into the Slot D position to maintain the 5-wire capability of the Analog RGB1 module.

Optional Configuration 2: If the optional Quad Video Decoder 1 (QVD1) is installed in the Slot D location then Slot C may be used as an additional Quad Video input and is designated as Quad Video Decoder 2 (QVD2). The optional QVD2 source module may only be used in the Quad Auto select mode of operation, whereas manual selection of the various video modes is not possible. Refer to Section 3.3.4 for additional information.

Source Selection: Regardless of the module installed in the Slot C position, source selection (module selection) is accomplished by pressing the [SOURCE] button on the remote control until the appropriate mode, i.e. RGB2 or VIDEO2, is displayed on the LCD read-out or on-screen (if "OSD" is enabled).

3.3.3.2 . . . . . .Slot D:

Standard Configuration: Blank Panel.

Optional Configuration 1: Slot D may be used for the optional Quad Video Decoder 1 (QVD1) module regardless of what module is being used in the Slot C position. Refer to section 3.4 for information regarding the operation of the Quad Video Decoders.

Optional Configuration 2: With the optional Analog RGB2 installed in the Slot C position, Slot D may be used for the Analog RGB3 mode of operation. With both of the optional Analog RGB2 and RGB3 modules installed the system can only operate with 3 or 4-wire RGsB/S operations.

Source Selection: Regardless of the module being used in the Slot D position, source selection (module selection) is accomplished by pressing the [SOURCE] button on the remote control until the appropriate mode, i.e. RGB3 or VIDEO1, is displayed on the LCD read-out or on-screen (if "OSD" is enabled).

3.3.4 . . . . Quad Video Decoder Module 1 and 2 Description:

3.3.4.1 . . . . . Input 1: Composite Video Input:

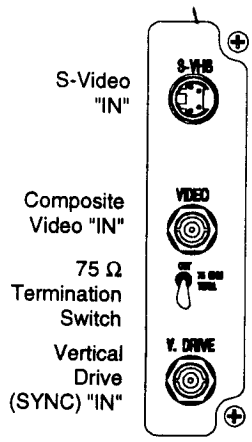


FIGURE 3-5. QVD1 and QVD2 module.

The selection of the Video modes is accomplished by pressing the [SOURCE] button until the appropriate mode is displayed, i.e. VIDEO1 or VIDEO2. The composite video input will automatically decode any of the quad standards. The four standards are NTSC 3.58, NTSC 4.43, PAL and SECAM. For the Quad Video Decoder 1 (QVD1) module the automatic selection process may be overridden via the remote control by pressing [SOURCE], for the initial mode selection, then the appropriate numeric key followed by the [SOURCE] button a second time.

The composite video input for either of the QVD modules is a standard BNC connector with loop through capability. To loop a signal through the system, install a BNC "T" connector to the Video "IN" BNC, switch the termination switch located beneath the Video "IN" BNC from "IN" (down) to "OUT" (up) and connect to any 75 Ω terminated load. If the loop through is not being used, the termination switch must remain in the "IN" position or loss of the picture quality will occur. Refer to Figure 3-5.

3.3.4.2 . . . . . Input 2: S-Video Input:

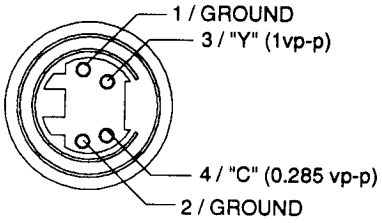


FIG. 3-6. S-Video connector.

The S-Video input for either the QVD1 or QVD2 module, utilizes a mini "D" 4 pin connector which is the standard for this input. The connector and plug are keyed to ensure proper connection. The switching between the S-Video and the composite video input is accomplished by the remote control. Refer to Figure 3-6 for the pin-out /description for the female (rear panel) S-Video connector and Figure 3-5 for location.

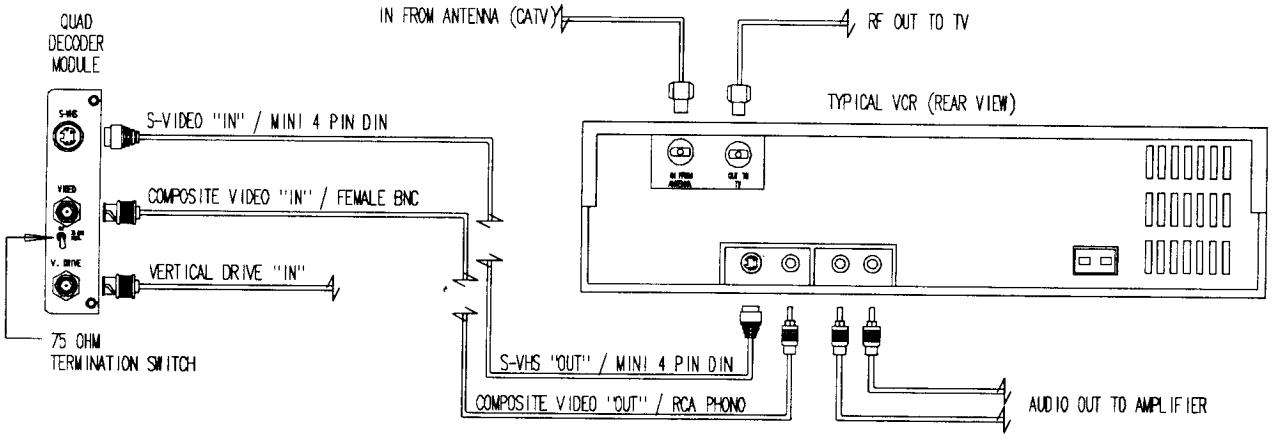


FIGURE 3-7. VCR - Composite Video/S-Video (typ.).

3.3.4.3 . . . . . Vertical Drive Input:

This connector is used with an RGB analog input in Slot B that requires a separate vertical sync input (i.e., five - wire RGB). Refer to Figure 3-5 for location information. If both the QVD1 or QVD2 modules are installed at the same time, only one active Vertical Drive may be applied to either of the two modules. If the Quad Video Decoder 1 or 2 module or the Analog RGB2 module is **not** being utilized, a module with the VERTICAL DRIVE input is provided.

NOTES:

Section 4

System Configuration / Installation

4.1 .....Changing A.C. Line Operation (115V - 230V):

Unless specified at the time ordered, all AMPRO systems are shipped from the factory configured for 115 Volt, 50/60 Hz operation with a standard US power cord. To change the system so that you can apply a different line voltage, perform the following steps and refer to Figure 4-1.

- ☐ STEP 1. Remove the power cord from the back of the unit.
- ☐ STEP 2. Using a small flat blade screwdriver, gently pry open the panel and pop it out to access the fuses and voltage select card.
- ☐ STEP 3. The voltage select card will indicate the present voltage selected. If it is not the desired voltage, slide the card straight out to the right , rotate it and slide it back so that it reads the correct voltage.
- ☐ STEP 4. Replace the fuse(s) with the proper size (5mm x 20mm) and correct rating for the voltage selected. (10 Amp Slo-blo for 115Vac and 5 Amp Slo-blo for 230Vac). NOTE: When replacing fuse/voltage selection assembly, ensure arrows line up.
- ☐ STEP 5. Ensure that the correct power plug is installed for the respective country.

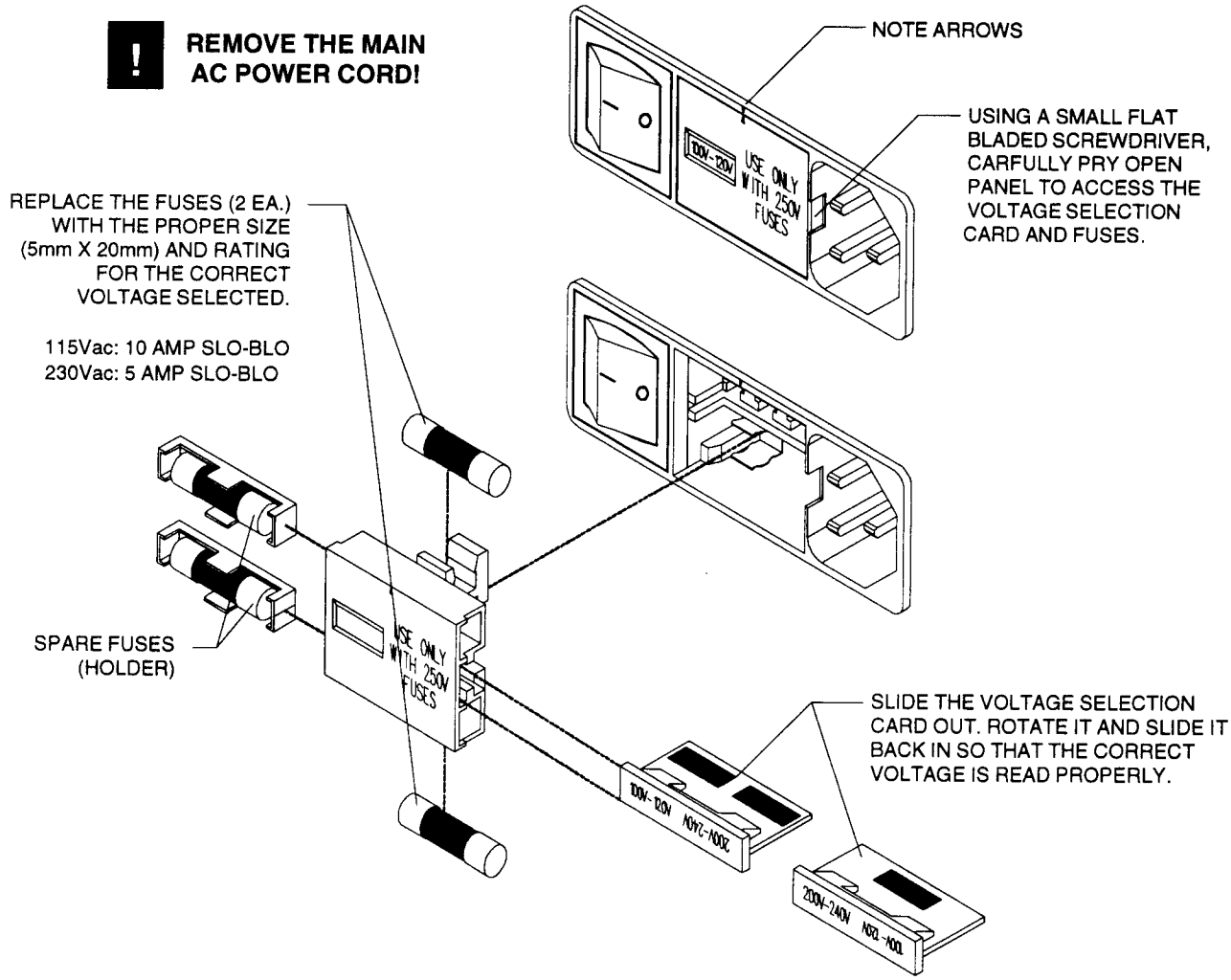


FIGURE 4-1. MAIN FUSE(S) AND LINE VOLTAGE CHANGE.

4.2 . . . . . Sweep Reversal Procedures:

4.2.1 . . . . . Accessing The Sweep Reverse Card:

WARNING

DO NOT PERFORM THE SWEEP REVERSAL PROCEDURE WHILE THE SYSTEM IS ENERGIZED. IF THE SWEEP CARD(S) ARE REMOVED WHILE THE SYSTEM IS ENERGIZED, HIGH VOLTAGE SHOCK WILL RESULT AND THE SYSTEM WILL BE DAMAGED.

4

- STEP 1. Open the top cover. The top cover may be lifted by (1): turning 2 ea. 1/4 turn fasteners located on both sides of the bottom cover towards the front of the system. (2): pull and lock the hinges located on both sides of the top towards the rear of the system. See Figure 4-2.

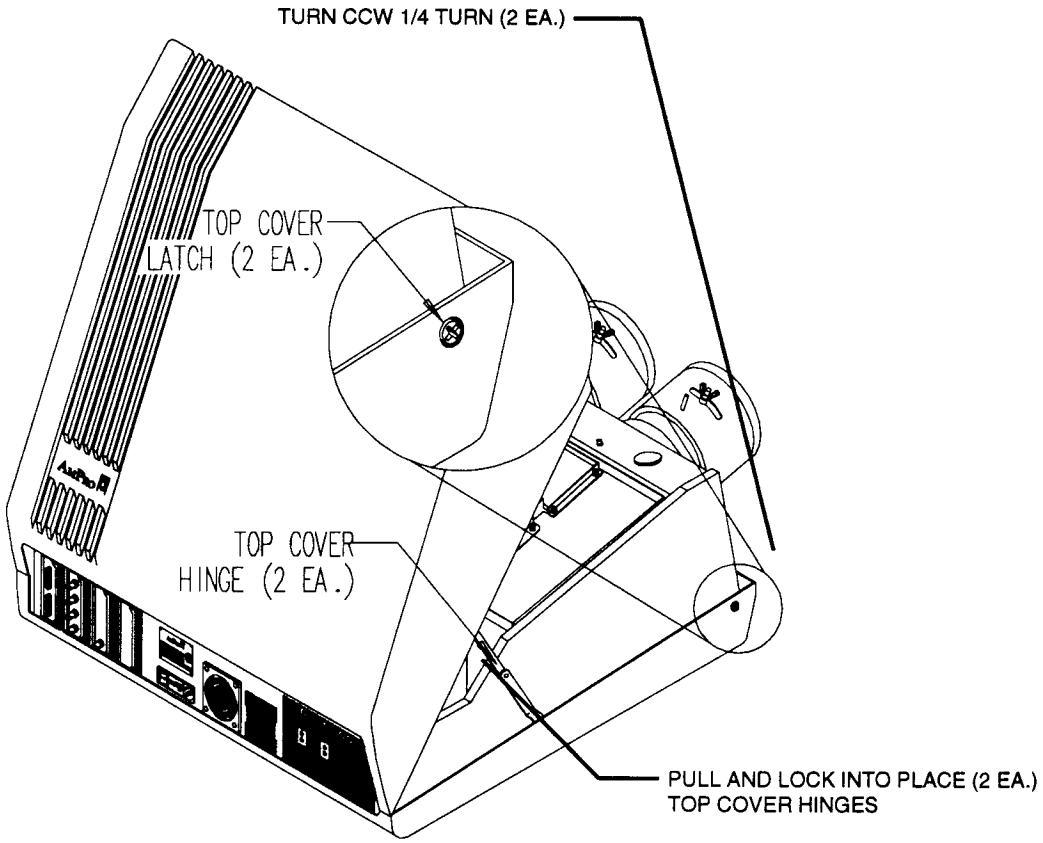


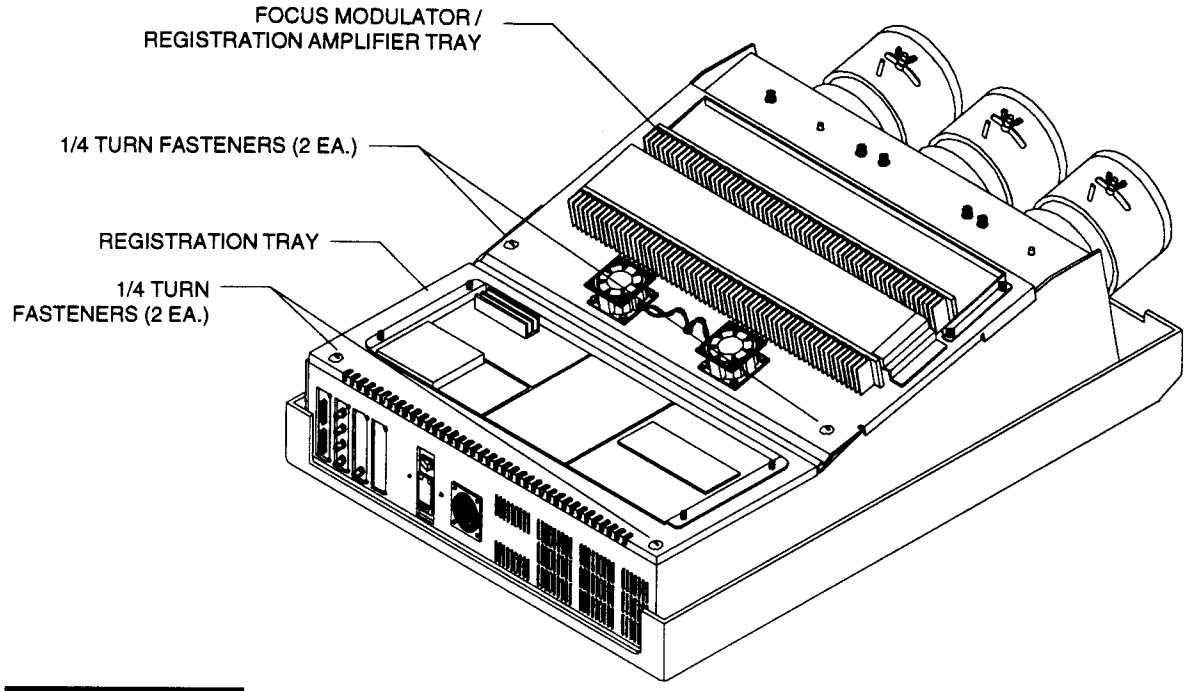
FIGURE 4-2. OPENING THE TOP COVER.

(AMPRO 4600 shown)

4.2.1 . . . . Accessing The Sweep Reverse Card: (continued)

- STEP 2. Unlock and tilt up the registration tray assembly and the registration amplifier / focus modulator tray assembly. See Figure 4-3.

AMPRO 3600



AMPRO 4600

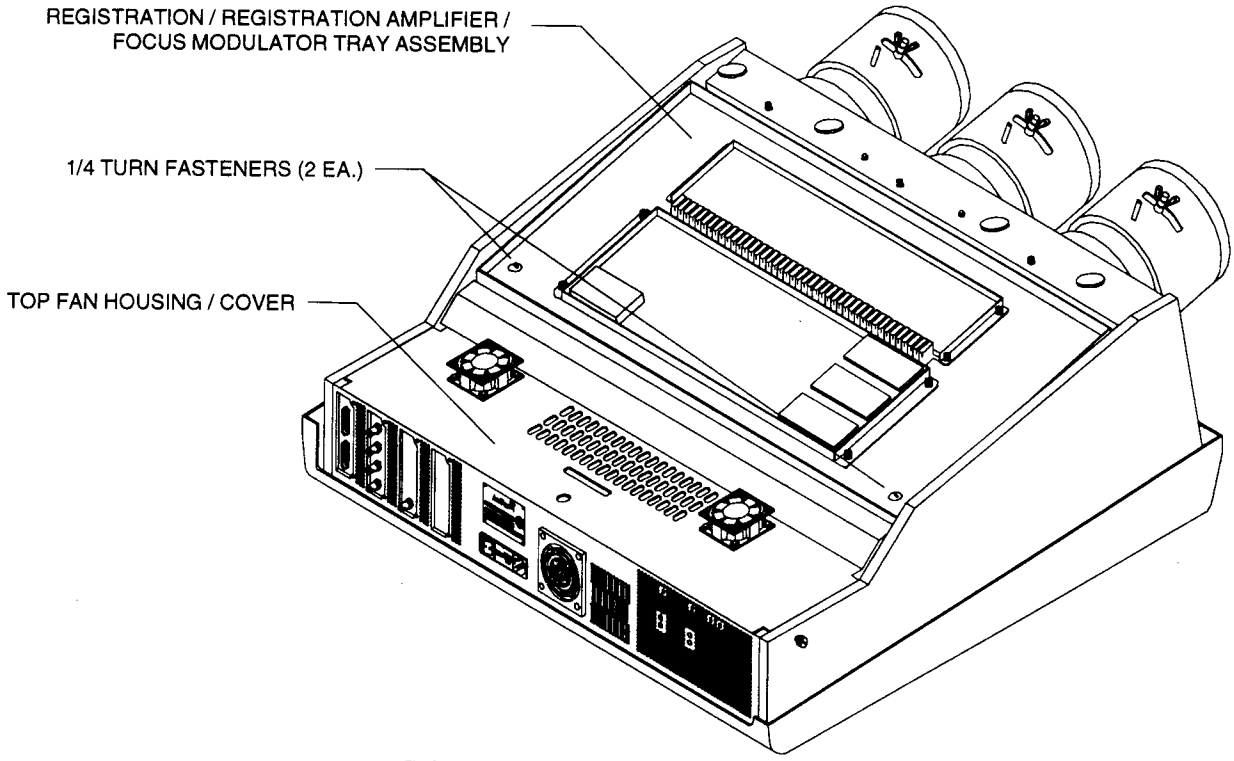


FIGURE 4-3. ACCESSING THE YOKE INTERFACE BOARD.

4.3 . . . . . AMPRO 3600/4600 Sweep Reversal Procedures:

WARNING

DO NOT SERVICE THE HORIZONTAL OR VERTICAL SWEEPS WHILE THE SYSTEM IS ENERGIZED. IF THE SWEEP CARD(S) ARE REMOVED WHILE THE SYSTEM IS ENERGIZED, HIGH VOLTAGE SHOCK WILL RESULT AND THE SYSTEM WILL BE DAMAGED.

4

4.3.1 . . . . . Horizontal Sweep Reversal Procedure:

TO REVERSE THE HORIZONTAL SWEEP / REGISTRATION, DE-ENERGIZE THE SYSTEM AND DISCONNECT THE POWER CORD.

- STEP 1. Horizontal sweep and registration reversal is accomplished by reversing the configuration of the horizontal sweep/registration reverse card located on the Yoke Interface board which is located inside the system, between the Green and Red CRTs..
- STEP 2. Note the position of the "O" and "X" located on the reversal card, see Figure 4-4. Pull the horizontal sweep/registration reverse card out, turn it end-for-end (180°) and plug it back in. See Figure 4-5. Note: the sweep reverse card connector is keyed between pins 4 and 5.

¤ NOTE 1: Recheck the raster centering. If re-adjustment is required, refer to Chapter 7, Master STATIC **shift operations.**

¤ NOTE 2: If necessary, refer to Section 4.3.2 (below) for the Vertical Sweep reversal procedure.

- STEP 3. If Vertical sweep reversal is not required, lower and lock the registration trays and then lower and lock the top cover into place.

4.3.2 . . . . . .Vertical Sweep Reversal Procedure:

TO REVERSE THE VERTICAL SWEEP / REGISTRATION, DE-ENERGIZE THE SYSTEM AND DISCONNECT THE POWER CORD.

- STEP 1. Vertical sweep and registration reversal is accomplished by reversing the configuration of the Vertical sweep/registration card located on the Yoke Interface board.
- STEP 2. Note the position of the "O" and "X" located on the reversal card, see Figure 4-4. Pull the vertical sweep/registration card out, turn it end-for-end (180°) and plug it back in. Refer to Figure 4-5. Note: the sweep reverse card connector is keyed between pins 4 and 5.

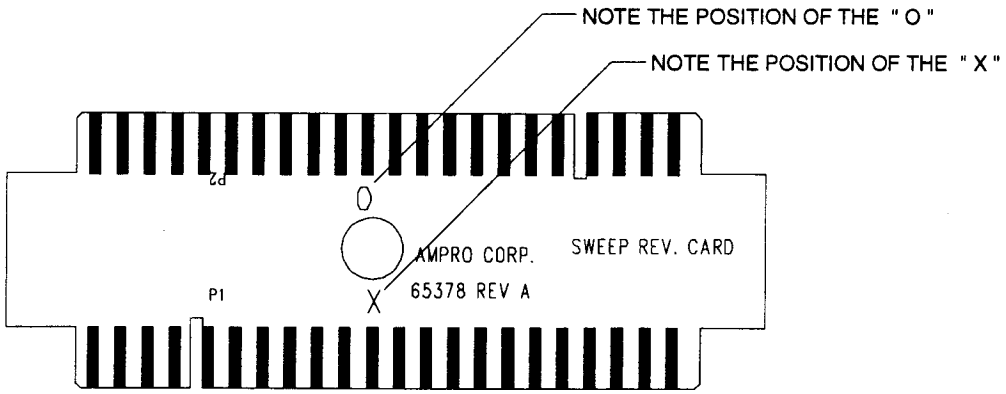
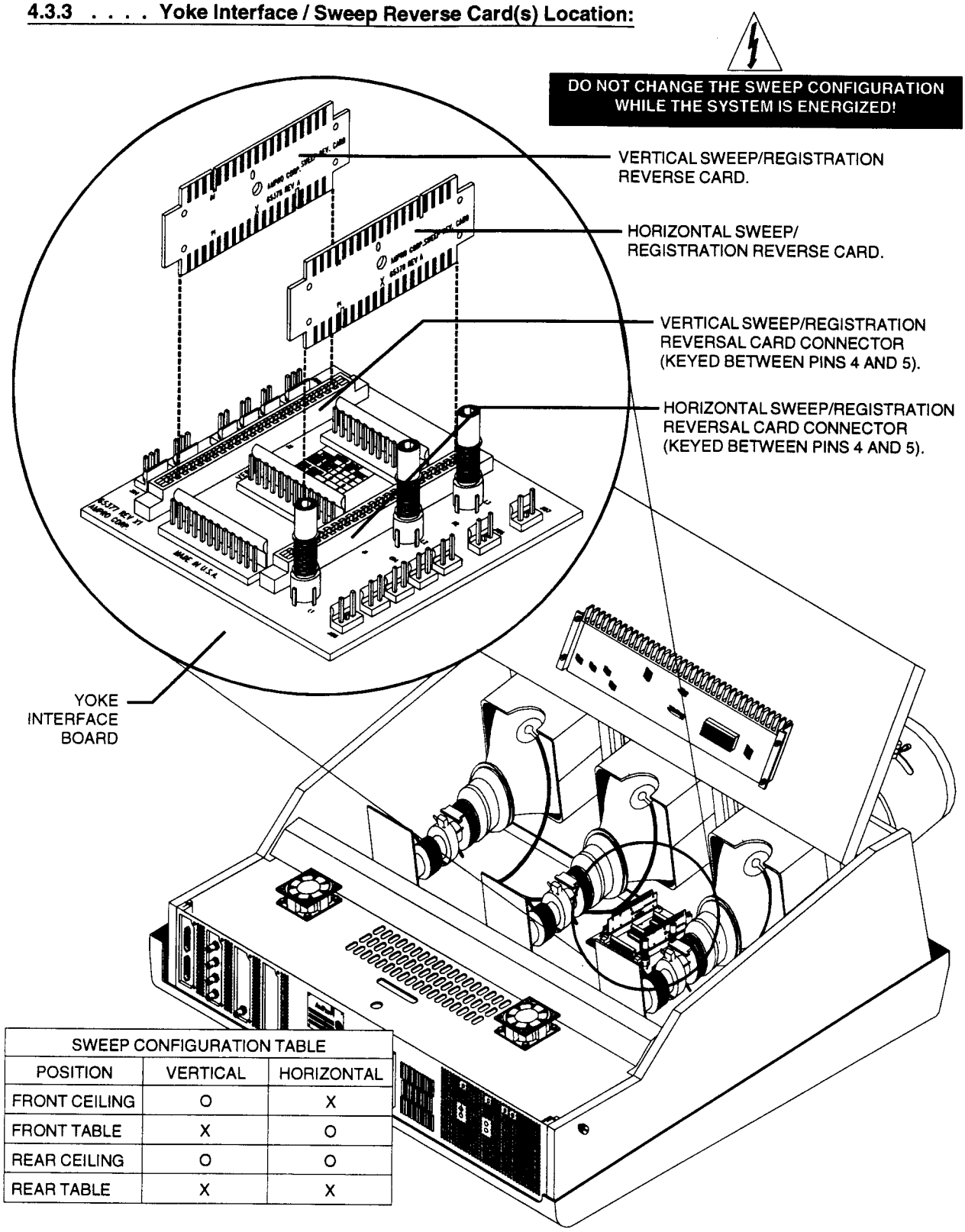


FIGURE 4-4. SWEEP/REGISTRATION REVERSAL CARD EXAMPLE.

4.3.3 . . . . Yoke Interface / Sweep Reverse Card(s) Location:



SWEEP CONFIGURATION TABLE		
POSITION	VERTICAL	HORIZONTAL
FRONT CEILING	O	X
FRONT TABLE	X	O
REAR CEILING	O	O
REAR TABLE	X	X

FIGURE 4-5. SWEEP/REGISTRATION REVERSAL CARD LOCATION.

(AMPRO 4600 shown.)

4.4 . . . . . .AMPRO 3600 Installation Guidelines:

4.4.1 . . . . . .AMPRO 3600 Dimensions:

4

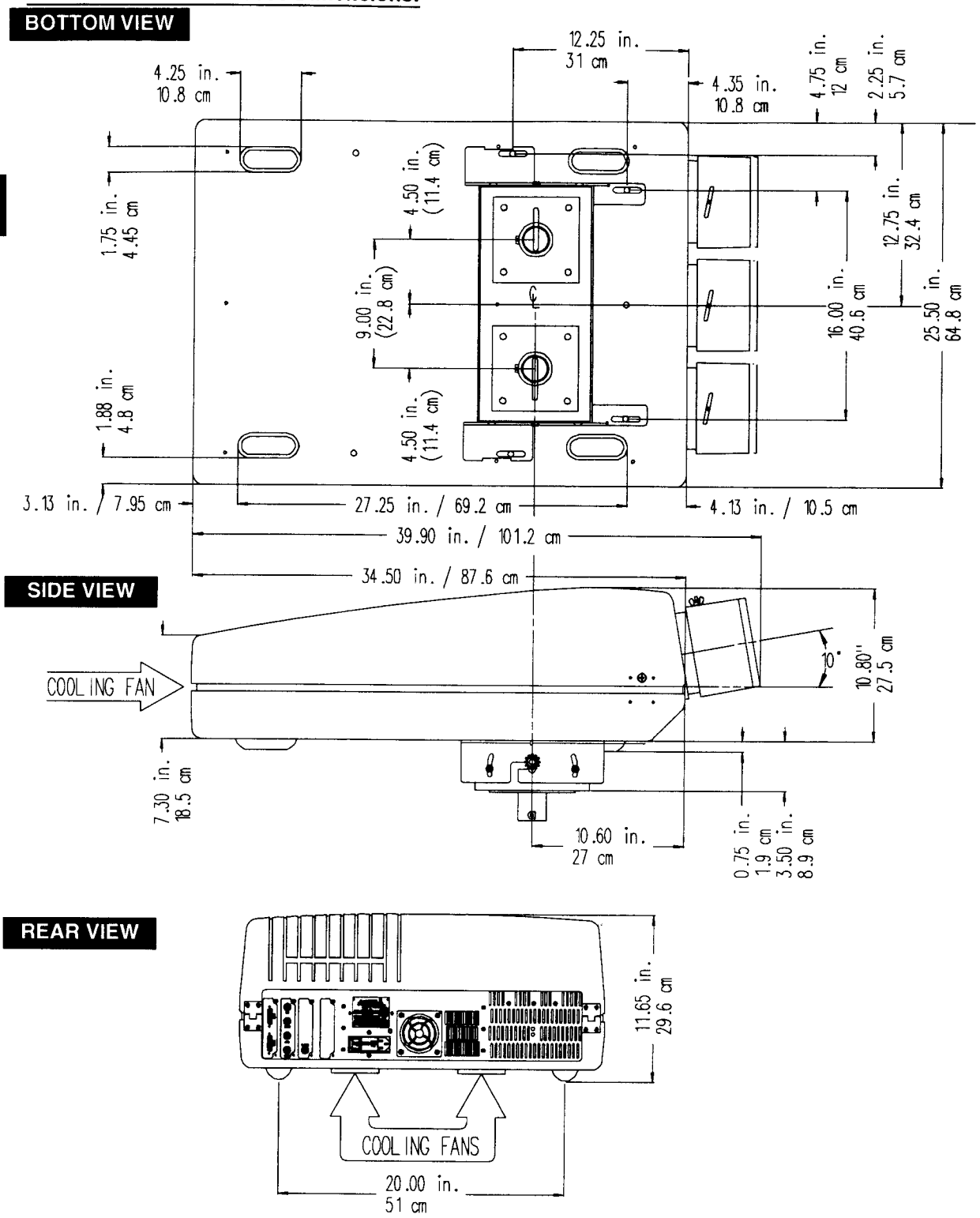


FIGURE 4-6. AMPRO 3600 CASE DIMENSIONS.

4.4.2 . . . . AMPRO 3600 Ceiling Mount Parts List:

3600 CEILING MOUNT P/N 69512			
ITEM	DESCRIPTION	P/N	QTY.
1	BASE PLATE	62466	1
2	L/R MOUNTING BRACKETS	69408	2
3	PIPE FLANGE (COUPLER)	62467	4
4	2" IMC RIGID PLUMBING PIPE (NOT INCLUDED)	N/A	2
5	5/16-18 X 1" HEX BOLT	52126	6
6	3/8 X 7/8 X .10 THK WASHER	53085	6
7	9/16 X 1-3/8 X .25 THK WASHER	53086	2
8	1/4 X 1/2 X .06 FLAT WASHER	53068	4
9	1/4-20 X 1/2 HEX BOLT	52143	8
10	5/16 SPLIT LOCK WASHER	53088	4
11	3/8-16 X 1" HEX BOLT STEEL	52218	12
12	7/16 X 1" X .09 THK WASHER	53087	24
13	3/8 SPLIT LOCK WASHER	53067	12
14	3/8 HEX NUT STEEL	54030	12

WARNING

For proper installation, the ceiling for mounting the AMPRO 3600 Series must be capable of supporting at least 575 lbs. (261 kg). If it cannot, the ceiling must be reinforced. Improper installation may result in serious personal injury.

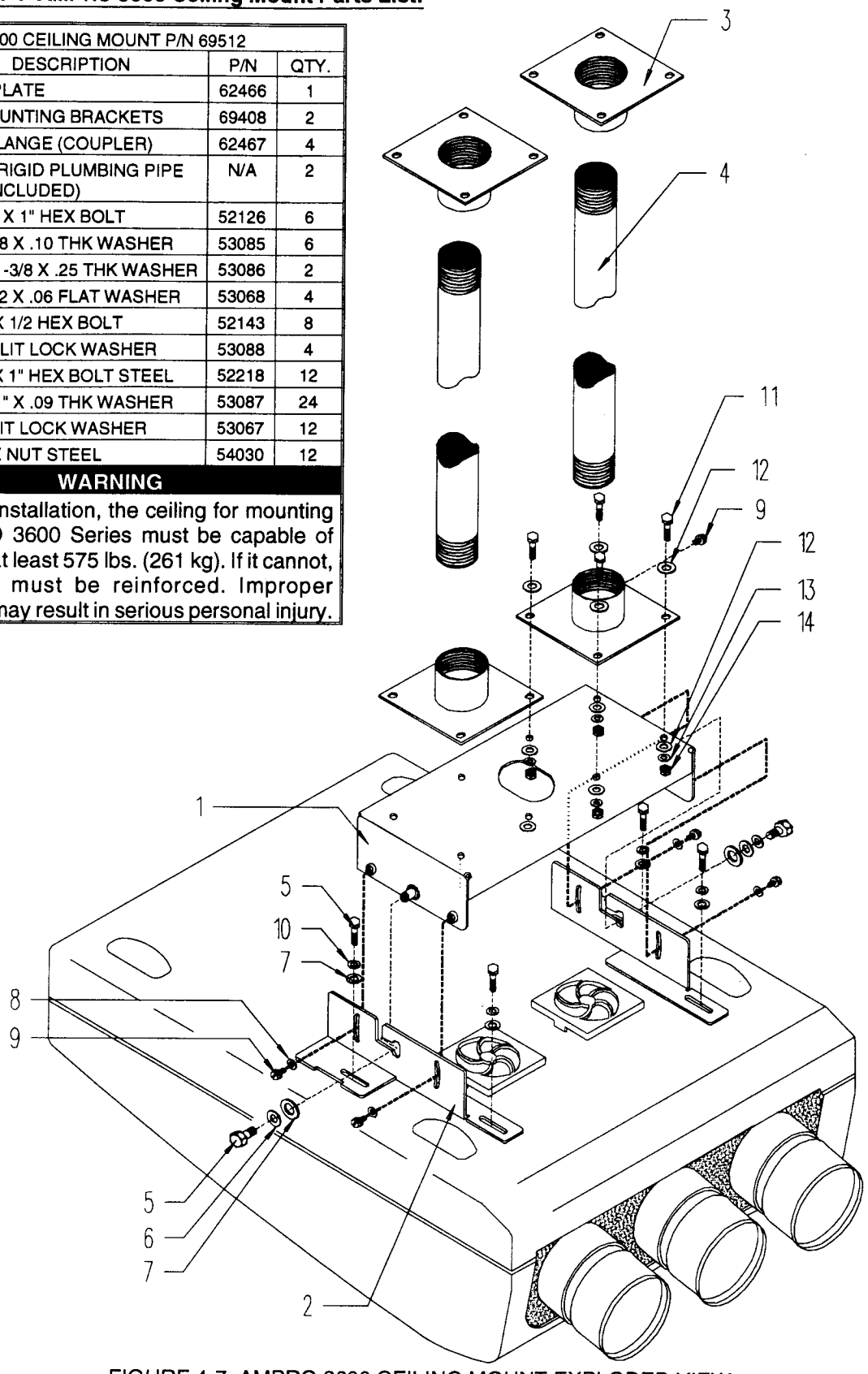
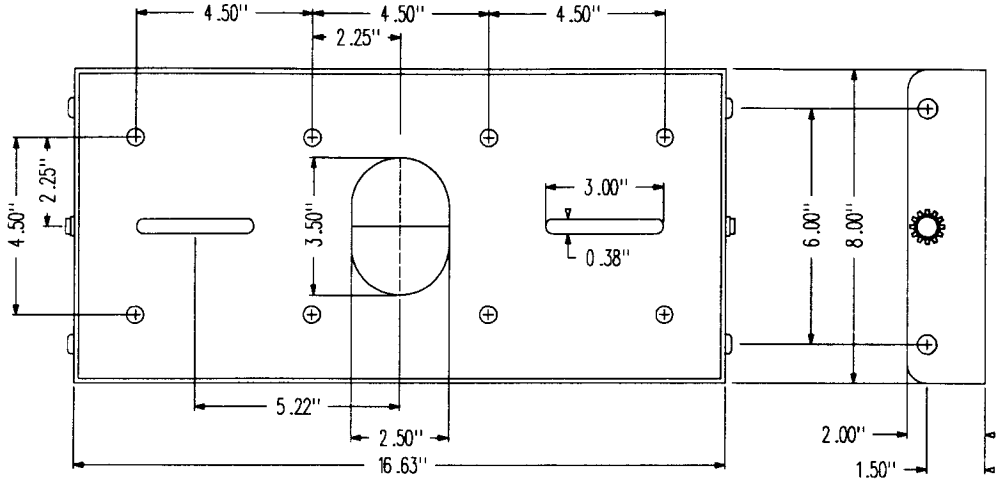


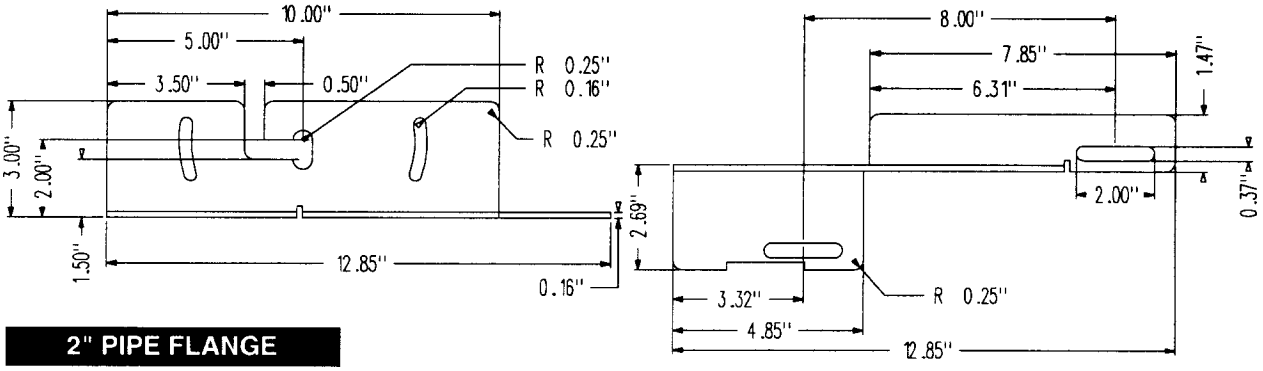
FIGURE 4-7. AMPRO 3600 CEILING MOUNT EXPLODED VIEW.

4.4.3 . . . . AMPRO 3600 Ceiling Mount Dimensions:

BASE PLATE



MOUNTING BRACKETS



2" PIPE FLANGE

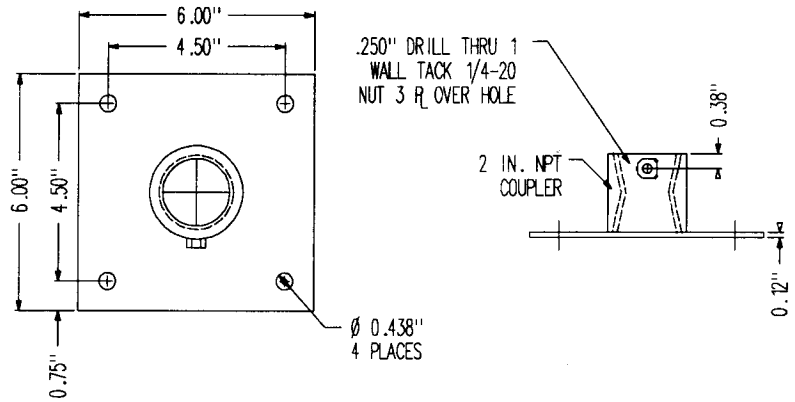


FIGURE 4-8. AMPRO 3600 CEILING MOUNT DIMENSIONS.

4.4.4 . . . . AMPRO 3600 Installation Guidelines:

The 3600 Series projectors have been designed as high resolution devices which are compatible with many video/computer sources, including standard 4:3, data and graphic output from most computers as well as IDTV (scan doubled video) and HDTV 16:9. The following installation data is based on a 4:3 aspect ratio, and a projection axis of 10° (standard projection axis).

! Due to different aspect ratios and/or the difference between "active write time (video information)" verses "available write time (raster time)" and your particular projection screen size, it may not always be possible to fill the entire projection screen with your image(s).

4.4.5 . . . . . .Definitions (AMPRO 3600):

☐ **A**, refers to the mounting distance, ("throw distance") required.

¤ **NOTE 1:** For table mount configuration, The "throw distance" is measured from the screen surface to the front of the system.

¤ **NOTE 2:** For ceiling mount configuration, The "throw distance" is measured from the screen surface to the ceiling mount pipe placement (system's center line of gravity).

☐ **B**, refers to the distance measured from the floor to the screen center, or for ceiling mount, B refers to the distance from the screen center to the ceiling.

☐ **C**, refers to the required table height for floor mounting or for ceiling mount configuration the required pipe length. Note for ceiling mount applications, dimension C allows for 0.75in. (19mm) top and bottom for pipe insertion.

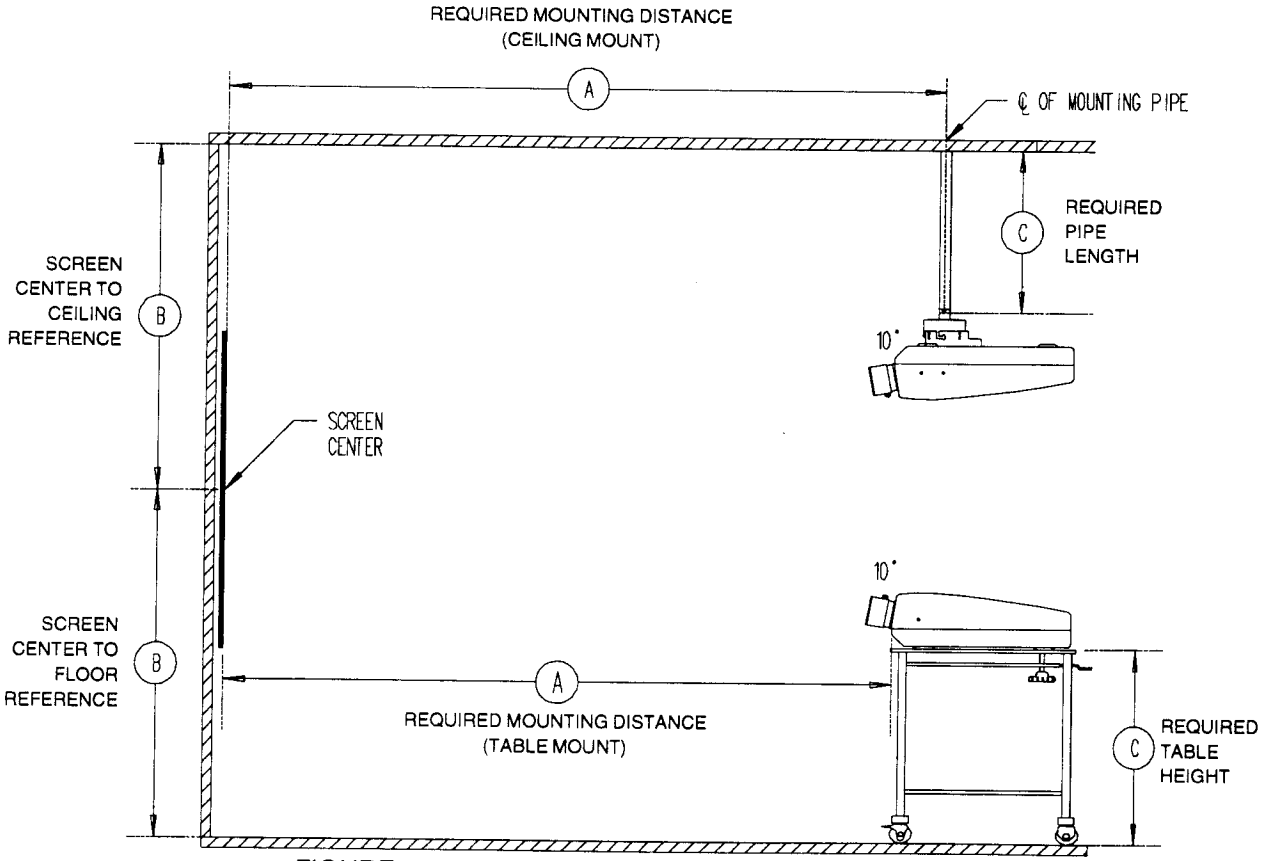
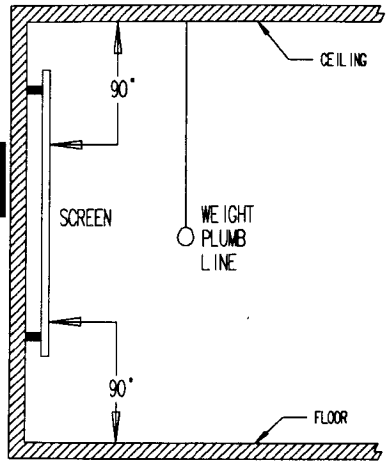


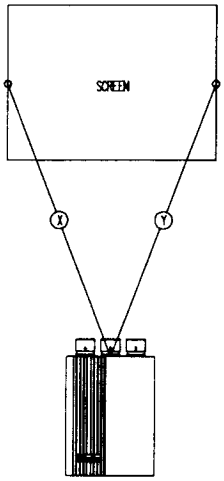
FIGURE 4-9. AMPRO 3600 INSTALLATION PARAMETERS.

4.4.6 . . . . System Placement:

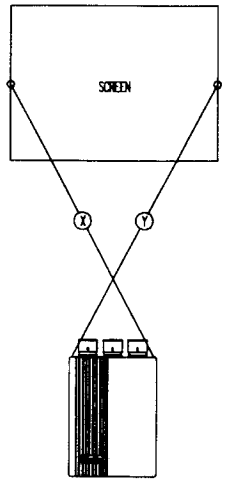
ENSURE THE SCREEN IS INSTALLED AT A 90° ANGLE RELATIVE TO THE CEILING AND FLOOR.



ENSURE THE SYSTEM IS CENTERED ON THE SCREEN. DIMENSIONS X AND Y SHOULD BE EQUAL IN LENGTH.



ENSURE THE SYSTEM IS PARALLEL TO THE SCREEN. DIMENSIONS X AND Y SHOULD BE EQUAL IN LENGTH.

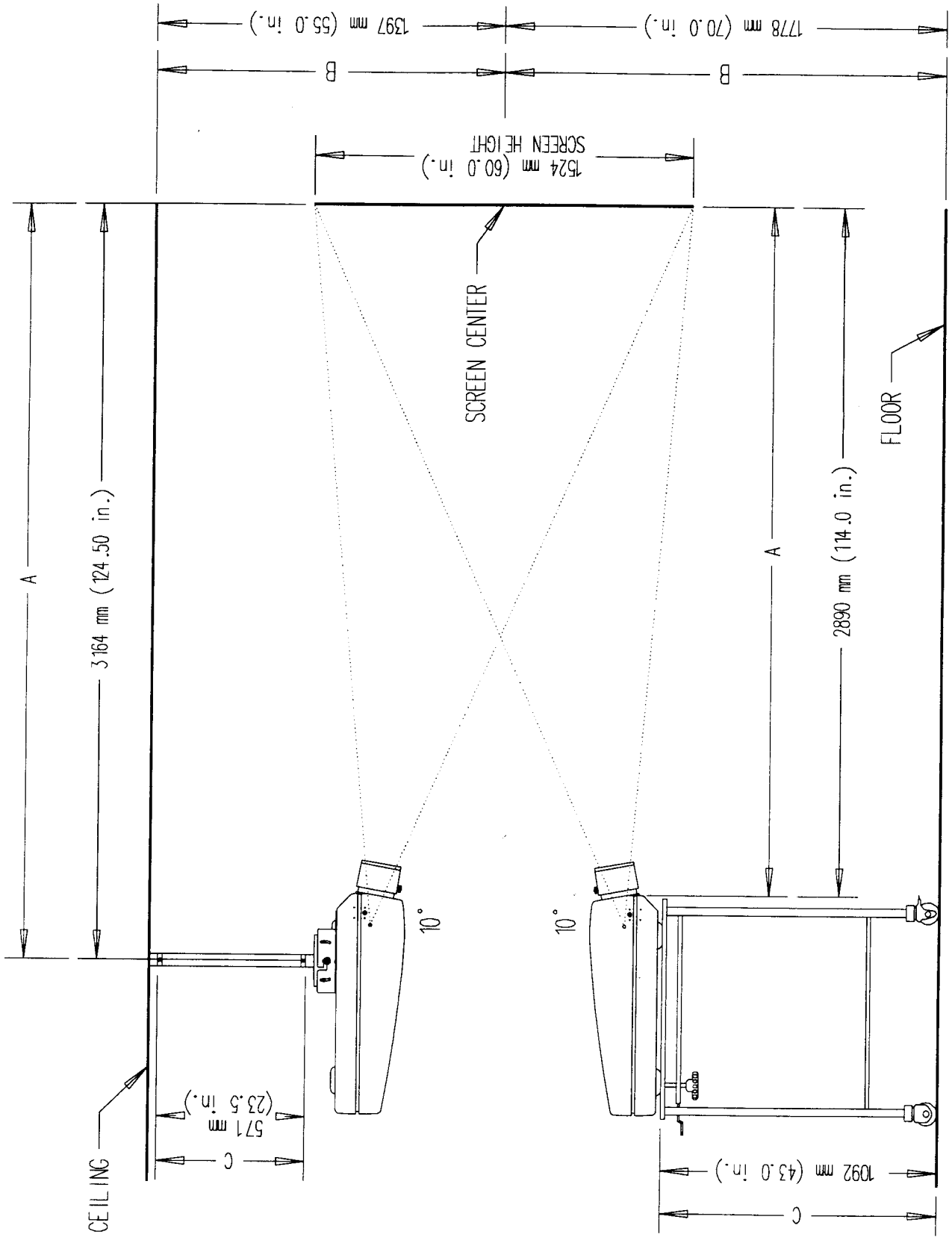


4.4.7 . . . . . .AMPRO 3600: Installation Data:

SPECIFICATIONS	
MODEL NUMBER: 69581 / 69581HD	
MAGNIFICATION: 9.5X to 52X	
SCREEN WIDTHS: 1.0m (42 in.) to 5.9m (233 in.)	
RESOLUTION: 10 lp/mm / Air coupled	
TABLE MOUNT CONFIGURATIONS	
MILLIMETERS	INCHES
Amm = 1.26 X SWmm + 333mm	Ain = 1.26 X SWin. + 13.0in.
Bmm = Distance from screen center to floor in millimeters.	Bin = Distance from screen center to floor in inches.
Cmm = Bmm - [0.222 X SWmm] - 235mm	Cin = Bin. - [0.222 X SWin.] - 9.25in.
CEILING MOUNT CONFIGURATIONS	
MILLIMETERS	INCHES
Amm = 1.26 X SWmm + 602mm	Ain = 1.26 X SWin. + 23.75in.
Bmm = Distance from screen center to ceiling in millimeters.	Bin = Distance from screen center to ceiling in inches.
Cmm = Bmm - [0.222 X SWmm] - 374mm	Cin = Bin - [0.222 X SWin.] - 14.75in.
NOTE: SW refers to Screen Width	

MOUNTING DISTANCE TABLE					
SCREEN WIDTH		MOUNTING DISTANCE			
		TABLE		CEILING	
mm	in	mm	in	mm	in
1219	48	1771	69.75	2138	84.00
1524	60	2253	88.75	2522	99.50
1829	72	2638	104.00	2907	114.5
2032	80	2893	114.00	3162	124.50
2134	84	3022	119.00	3291	129.50
2438	96	3405	134.00	3674	144.75
2743	108	3789	149.00	4058	159.75
3048	120	4173	164.50	4442	175.00
3353	132	4558	179.50	4827	190.00
3658	144	4942	194.50	5211	205.00
3962	156	5325	209.75	5594	220.25
4267	168	5709	224.75	5978	235.50
4572	180	6094	240.00	6363	250.50
4877	192	6478	255.00	6747	265.75
5182	204	6862	270.00	7131	280.75
5486	216	7245	285.25	7514	296.00
THE MOUNTING DISTANCE IS BASED ON AN ASPECT RATIO OF 4:3, 10° OFF-AXIS.					

4.4.7.1 . . . Installation Example: (60in. (1524mm)(H) x 80in. (2032mm) (W)):



INSTALLATION NOTES

4

4.8 . . . . . .AMPRO 4600 Installation Guidelines:

4.8.1 . . . . . .AMPRO 4600 Dimensions:

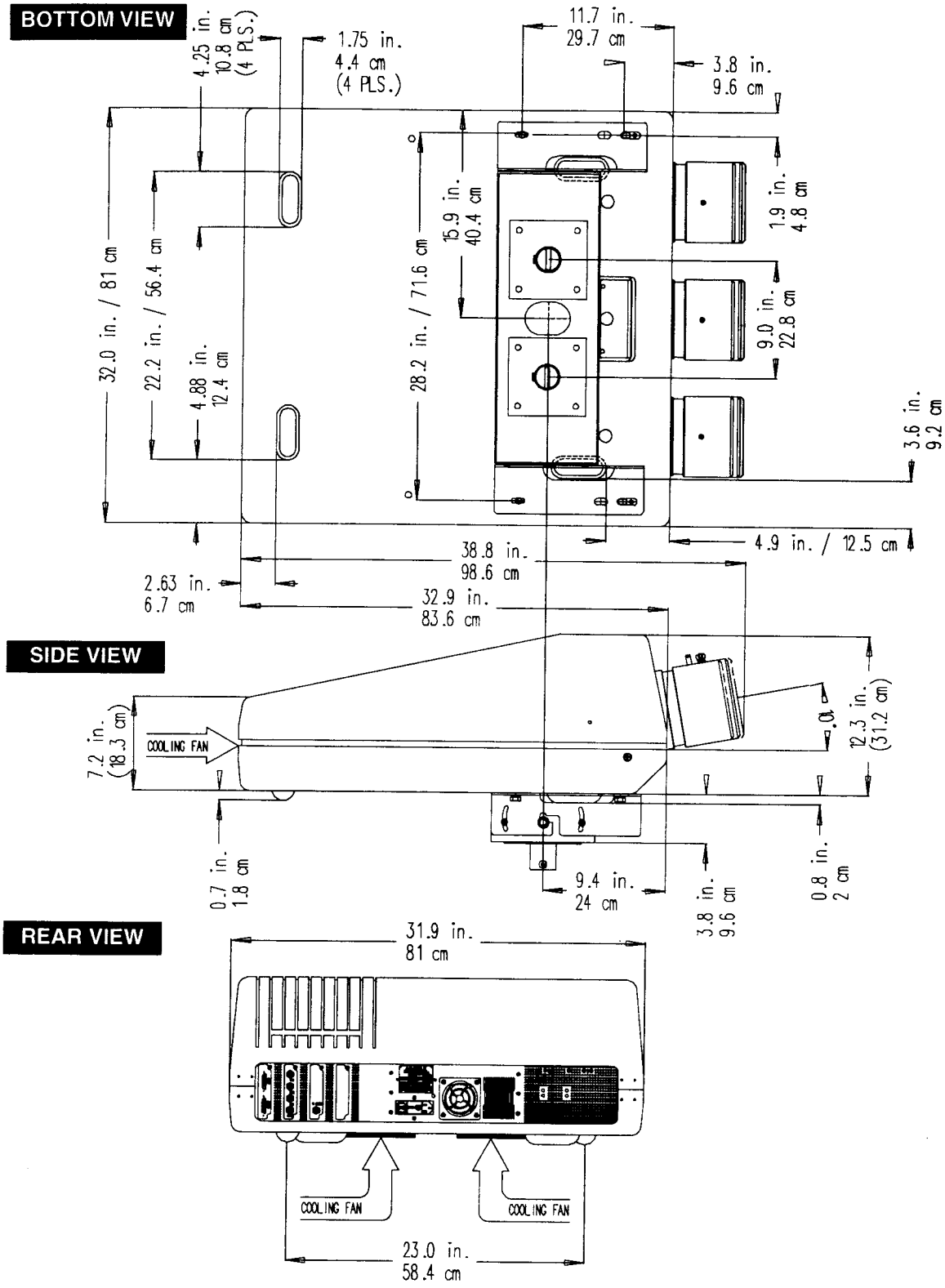


FIGURE 4-11. AMPRO 4600 CASE DIMENSIONS.

4.8.2 . . . . AMPRO 4600 Ceiling Mount Parts List:

4600 CEILING MOUNT P/N 69362			
ITEM	DESCRIPTION	P/N	QTY.
1	BASE PLATE	N/A	1
2	L/R MOUNTING BRACKETS	N/A	2
3	PIPE FLANGE (COUPLER)	62467	4
4	2" IMC RIGID PLUMBING PIPE (NOT INCLUDED)	N/A	2
5	5/16-18 X 1" HEX BOLT	52126	6
6	3/8 X 7/8 X .10 THK WASHER	53085	6
7	9/16 X 1-3/8 X .25 THK WASHER	53086	2
8	1/4 X 1/2 X .06 FLAT WASHER	53068	4
9	1/4-20 X 1/2 HEX BOLT	52143	8
10	5/16 SPLIT LOCK WASHER	53088	4
11	3/8-16 X 1" HEX BOLT STEEL	52218	12
12	7/16 X 1" X .09 THK WASHER	53087	24
13	3/8 SPLIT LOCK WASHER	53067	12
14	3/8 HEX NUT STEEL	54030	12

WARNING

For proper installation, the ceiling for mounting the AMPRO 4600 Series must be capable of supporting at least 1200 lbs. (544 kg). If it cannot, the ceiling must be reinforced. Improper installation may result in serious personal injury.

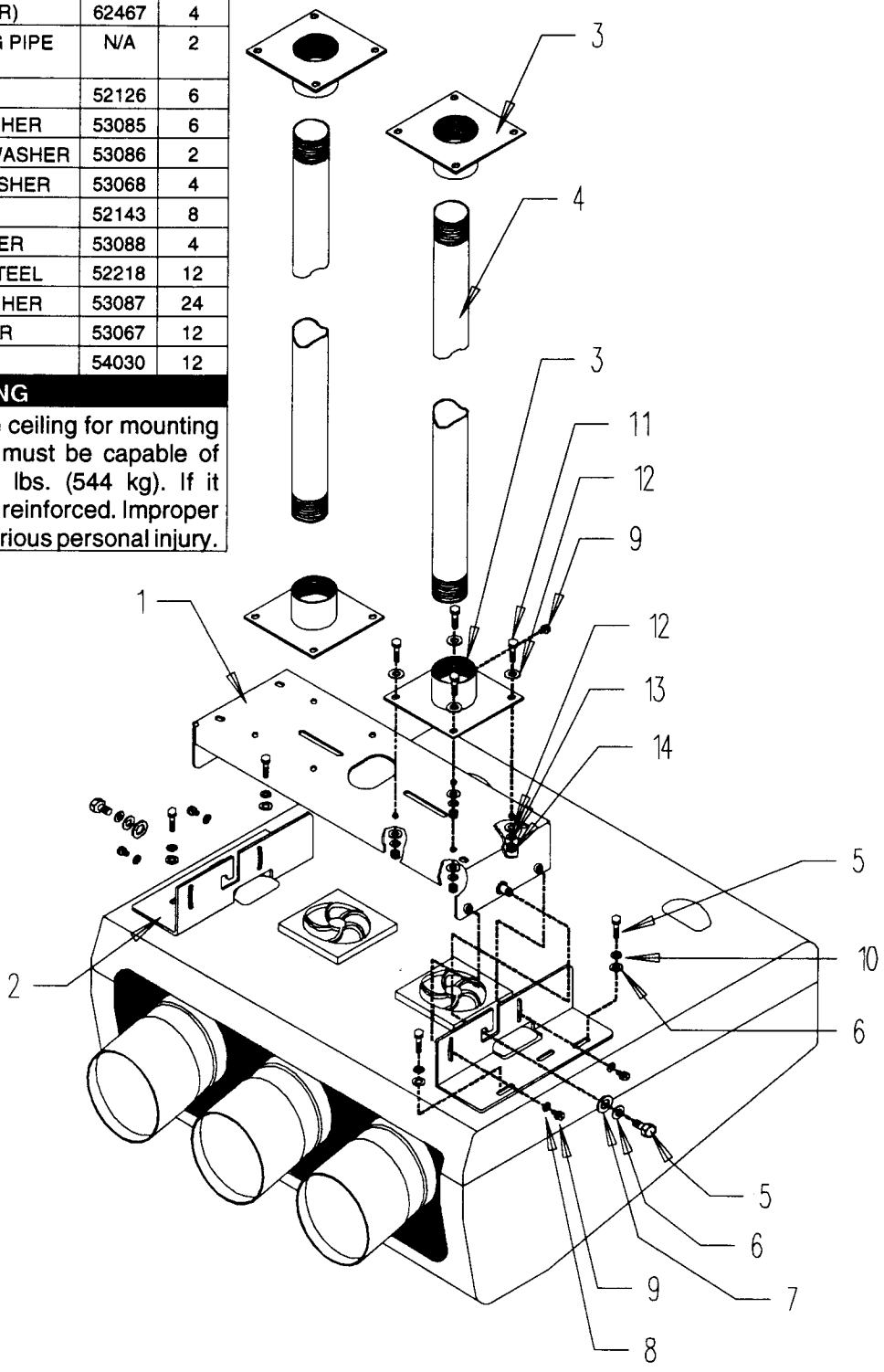


FIGURE 4-12. AMPRO 4600 CEILING MOUNT EXPLODED VIEW.

4.8.3 . . . . AMPRO 4600 Ceiling Mount Dimension:

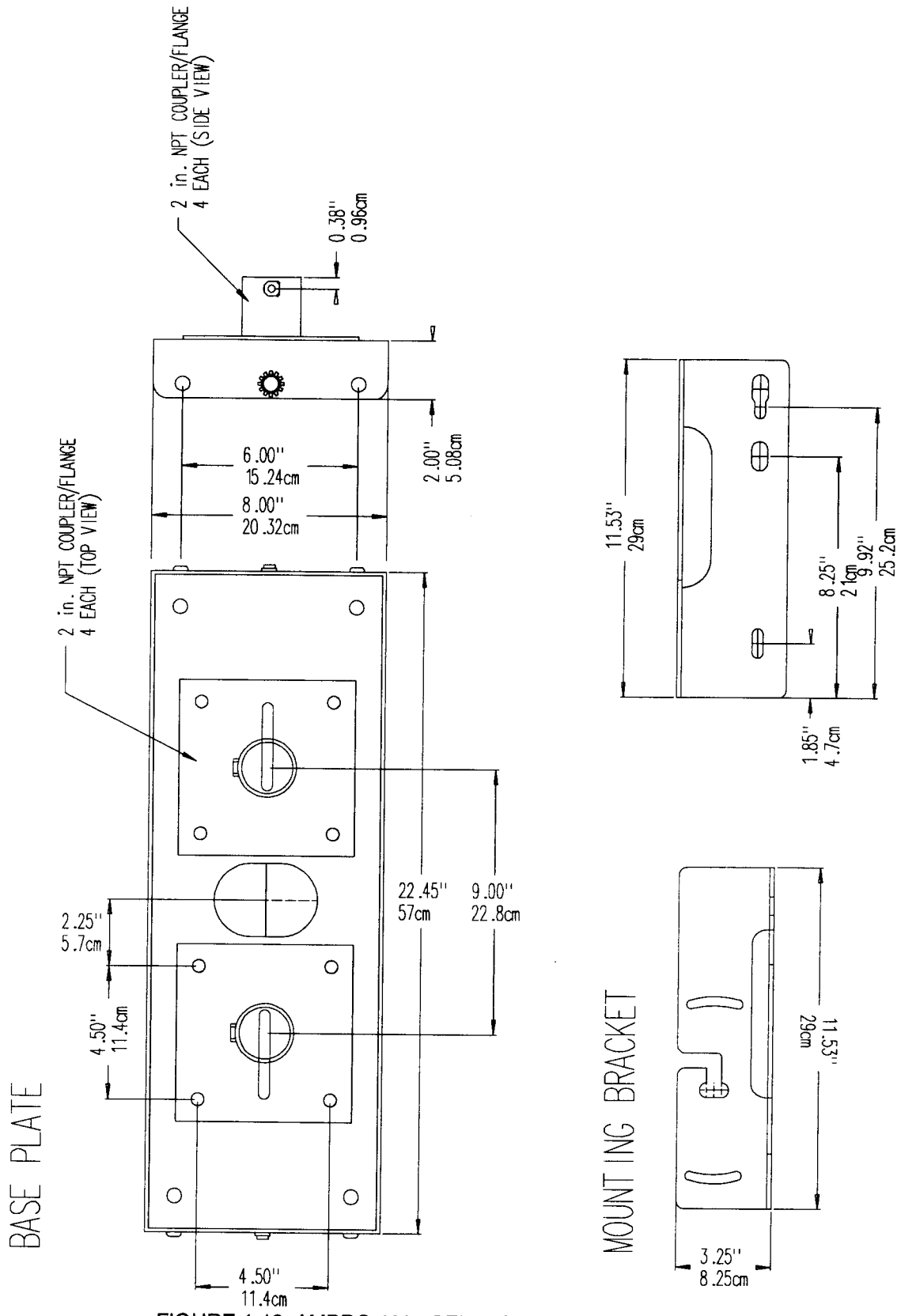


FIGURE 4-13. AMPRO 4600 CEILING MOUNT DIMENSIONS.

4.8.4 . . . . AMPRO 4600 Installation Guidelines:

The 4600 Series projectors have been designed as high resolution devices which are compatible with many video/computer sources, including standard 4:3, data and graphic output from most computers as well as IDTV (scan doubled video) and HDTV 16:9. The following installation data is based on a 4:3 aspect ratio and a projection angle of 10˚.

! Due to different aspect ratios and/or the difference between "active video time (video information)" verses "available video time (raster)" and your particular projection screen size, it may not always be possible to fill the entire projection screen with your image(s).

4

4.8.5 . . . . . .Definitions (AMPRO 4600):

☐ **A**, refers to the mounting distance, ("throw distance") required.

¤ NOTE 1: For table mount configuration, The "throw distance" is measured from the screen surface to the front of the system.

¤ NOTE 2: For ceiling mount configuration, The "throw distance" is measured from the screen surface to the ceiling mount pipe placement (system's center line of gravity).

☐ **B**, refers to the distance measured from the floor to the screen center, or for ceiling mount, B refers to the distance from the screen center to the ceiling.

☐ **C**, refers to the required table height for floor mounting or for ceiling mount configuration the required pipe length. NOTE: For ceiling mount applications, dimension C allows for .75 in. (19 mm) top and bottom for pipe insertion.

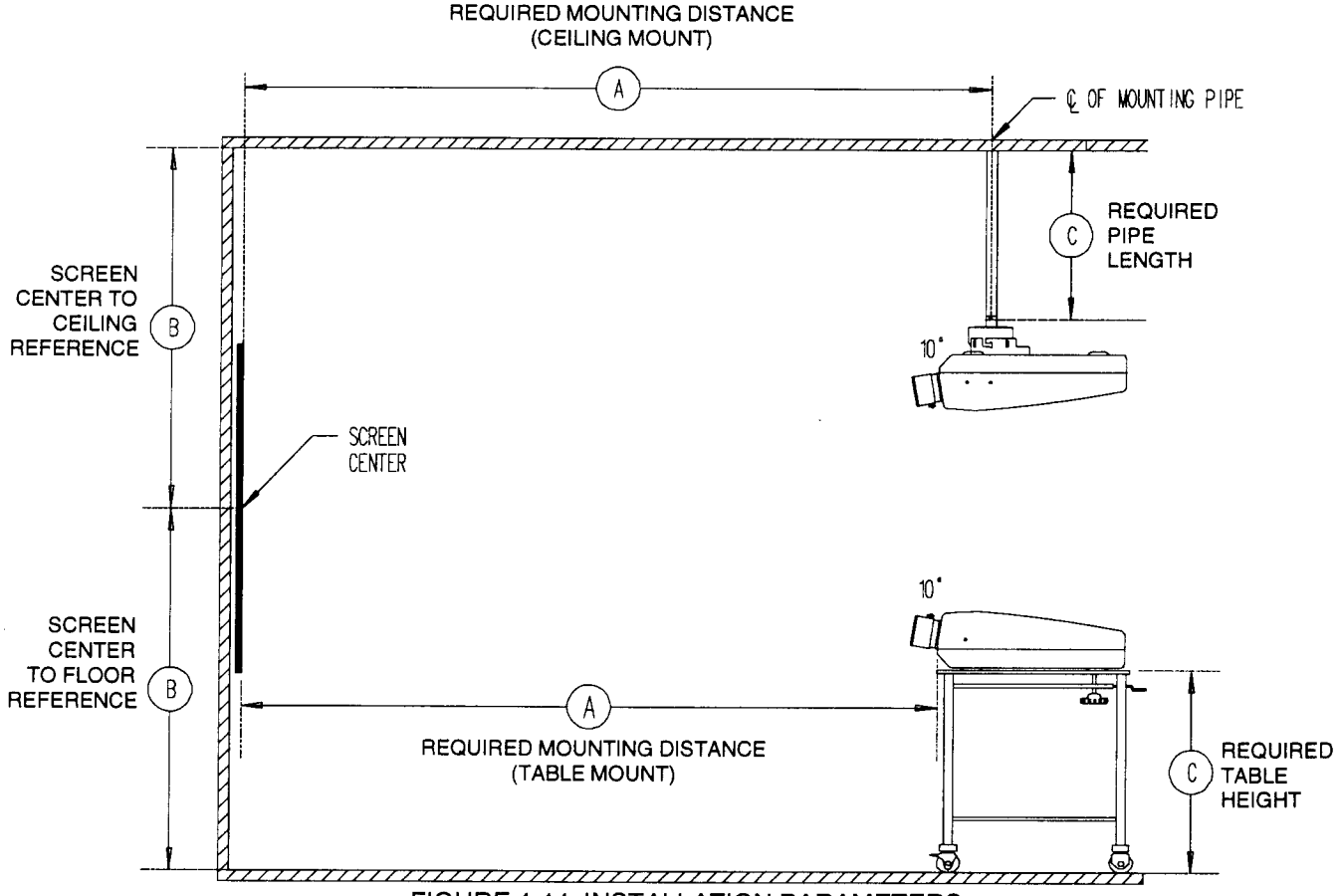


FIGURE 4-14. INSTALLATION PARAMETERS.

4.8.6 . . . . AMPRO 4600: HD-10L Installation Guidelines:

SPECIFICATIONS	
Model Number: 69582.10L	
Magnification: 9X to 11X , **Screen Widths:** 1.2m (46.0in.) to 1.5m (60.0in.)	
TABLE MOUNT CONFIGURATIONS	
MILLIMETERS	INCHES
Amm = 1.46 X SWmm + 163mm	Ain = 1.46 X SWin. + 6.5in.
Bmm = Distance from screen center to floor in millimeters.	Bin = Distance from screen center to floor in inches.
Cmm = Bmm - [0.257 X SWmm] - 214mm	Cin = Bin. - [0.257 X SWin.] - 8.5in.
CEILING MOUNT CONFIGURATIONS	
MILLIMETERS	INCHES
Amm = 1.46 X SWmm + 402mm	Ain = 1.46 X SWin. + 15.75in.
Bmm = Distance from screen center to ceiling in millimeters.	Bin = Distance from screen center to ceiling in inches.
Cmm = Bmm - [0.257 X SWmm] - 360mm	Cin = Bin - [0.257 X SWin.] - 14.0in.
NOTE: SW refers to Screen Width	

MOUNTING DISTANCE TABLE					
SCREEN WIDTH		MOUNTING DISTANCE			
		TABLE		CEILING	
mm	in	mm	in	mm	in
1270	50	2017	79.50	2256	89.00
1524	60	2383	93.75	2617	103.00

4.8.6.1 . . . . . .HD10L Installation Example: 45.0in.(1143mm)(H) x 60.0in (1524mm)(W):

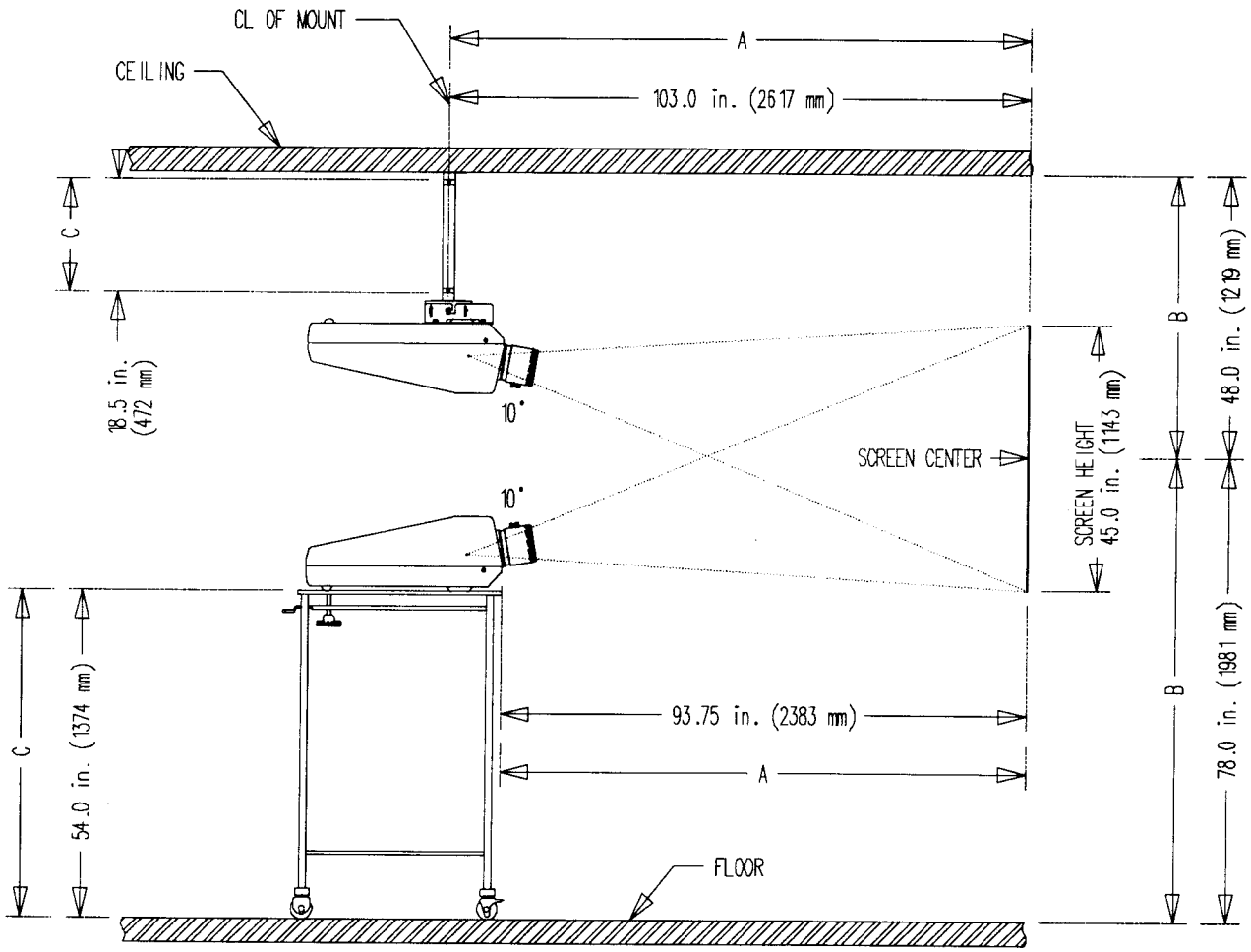


FIGURE 4-15. HD-10L INSTALLATION EXAMPLE.

4.8.7. . . . . AMPRO 4600: HD-10 /GT17/GT26 Installation Guidelines:

SPECIFICATIONS	
Magnification: Model 69582 (HD-10GT17): 14X to 20X, optimum @ 16X, **Screen Widths:** 72in. (1.8m) to 102in (2.6m)	
Magnification: Model 69582.10 (HD-10): 14X to 45X, **Screen Widths:** 72in. (1.8m) to 230in. (5.8m)	
Magnification: Model 69582.26 (HD-10GT26): 21X to 30X, optimum @ 26X **Screen Widths:** 107in. (2.7m) to 154in. (3.9m)	
TABLE MOUNT CONFIGURATIONS	
MILLIMETERS	INCHES
Amm = 1.366 x SWmm + 230mm	Ain = 1.366 x SWin. + 9.0in.
Bmm = Distance from screen center to floor in millimeters.	Bin = Distance from screen center to floor in inches.
Cmm = Bmm - [0.241 x SWmm] - 226mm	Cin = Bin. - [0.241 x SWin.] - 9.0in.
CEILING MOUNT CONFIGURATIONS	
MILLIMETERS	INCHES
Amm = 1.366 x SWmm + 470mm	Ain = 1.366 x SWin. + 18.5in.
Bmm = Distance from screen center to ceiling in millimeters.	Bin = Distance from screen center to ceiling in inches.
Cmm = Bmm - [0.241 x SWmm] - 372mm	Cin = Bin - [0.241 x SWin.] - 14.6in.

MOUNTING DISTANCE TABLE

SCREEN WIDTH (SW)		MOUNTING DISTANCE			
		TABLE		CEILING	
mm	in	mm	in	mm	in
[1,2]2032	80	3006	118.50	3246	127.75
[1,2]2438	96	3560	140.00	3800	149.75
[1,3]3048	120	4394	173.00	4634	182.50
[1,3]3353	132	4810	189.50	5050	199.00
[1,3]3658	144	5227	205.75	5467	215.25
[1]3962	156	5642	222.00	5882	231.50
[1]4267	168	6059	238.50	6299	248.00
[1]4572	180	6475	255.00	6715	264.50
[1]4877	192	6892	271.50	7132	280.75

[1]INDICATES HD-10 APPLICATIONS / [2]INDICATES HD-10GT17 APPLICATIONS / [3]INDICATES HD-10GT26 APPLICATIONS

4.8.7.1 . . . . . .HD10/GT17 Installation Example : 60.0in. (1524mm)(H) x 80.0in. (2032mm)(W):

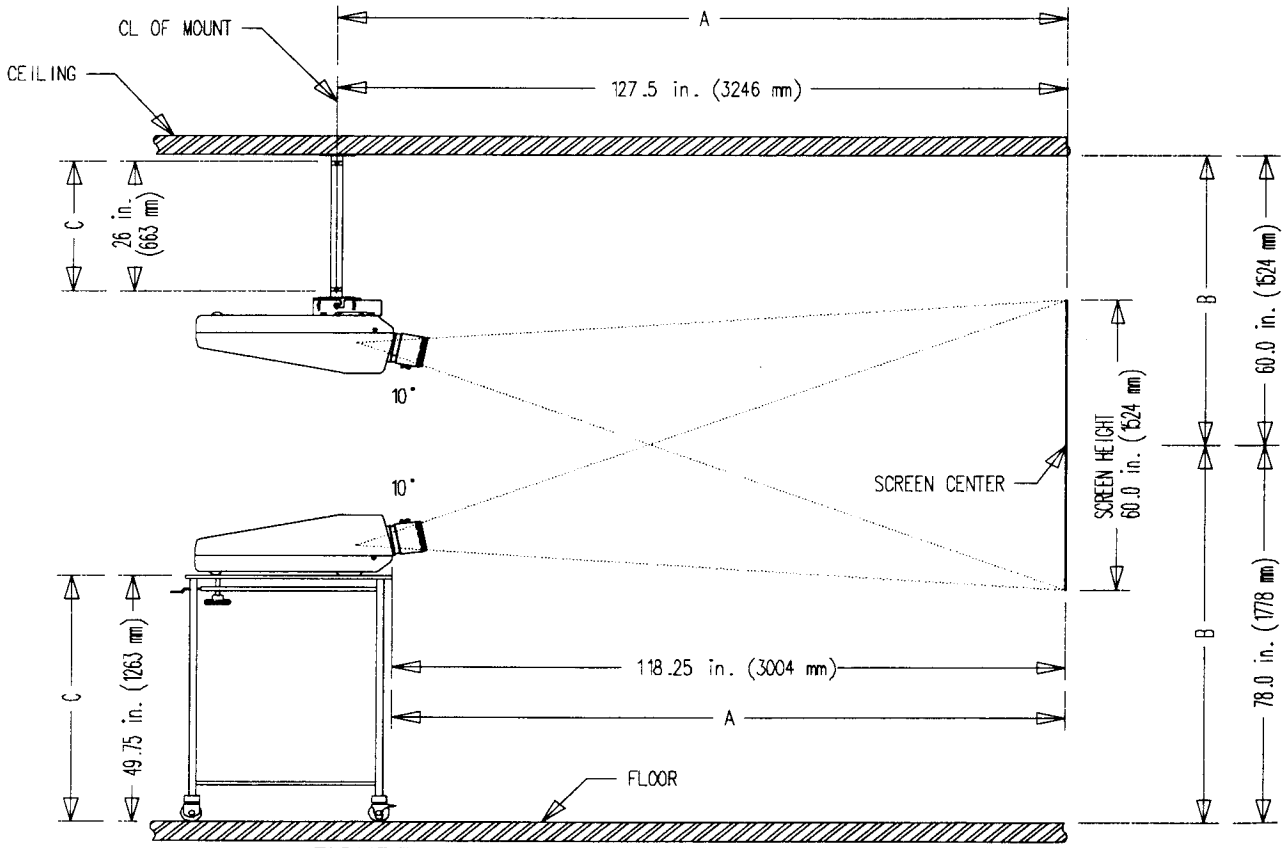


FIGURE 4-16. HD-10/GT17 INSTALLATION EXAMPLE.

Section 5
Lens Focusing and Positioning

5.1 .....Getting Started:

In order to focus and position the lenses it will be necessary to unlock and tilt-up the top cover, which is secured with two ¼ turn fasteners located on the front of the bottom cover.

- STEP 1. To unlock, simply turn the fasteners ¼ turn counterclockwise with a phillps blade screwdriver.
- STEP 2. Lift the top cover upward and lock into place using the two locking hinges located on both sides.
- STEP 3. Once the top cover has been lifted and locked, the lenses will be exposed.

¤ NOTE: The tool(s) required to focus and position the lenses is provided and located within the accessory box.

5.2 .....Required Test Patterns / Using The Help Programs:

To focus and position the lenses you will use the crosshatch and crosshair test patterns or utilize the internal Help System and screens. See Section 6 for more information on the Help System.

If you are not using the internal help system perform the following steps .

- Each lens should be focused individually.
- Use the **[CUTOFF]** , then the **[GREEN]**, **[RED]**and **[BLUE]**buttons to cutoff the images not being focused.
- Use the **[TEST]** and **[STEP]** buttons for selecting the internal test patterns and frequency (see Section 6). Turn registration "OFF" using 55 **[CODE]** .

Or enter the Internal Help System for a step-by-step instruction, perform the following:

- Press the **[HELP]** button, then
- Enter SYSTEM SETUP MENU, subject 2, then;
- Select either one of the Guided Setup Programs (1 or 2). NOTE: In either case the programs will automatically turn Registration "OFF."

Once your unit has been installed for your particular requirements, you are now ready to perform the first stage of alignment, lens focusing and positioning.

5.3 . . . . . .Lens Types:

There are several different types of lenses that may be used on your display system. The lenses used on the AMPRO 3600/4600 are determined by the magnification factor in which the system will be used. The lens may be identified by the label located on the top of each lens assembly.

5.3.1 . . . . . .AMPRO 3600 Lens Type / Specifications:

HD-8B: f/number: 1.15 ± 2% @ ∞, Magnification factor: 9.5X to 52X, Screen Widths: 42 in (1066 mm) to 233 in. (5918 mm), Resolution: 10 lp/mm - air coupled.

5.3.2 . . . . . .AMPRO 4600 Lens Types / Specifications:

HD-10L: f/number: f/1.15 ± 2%, Magnification factor: 9X to 11X, 43.0in. (1.1m) to 53.0in. (1.3m) picture width. Resolution: 10 lp/mm full field @ >50% MTF.

HD-10: f/number: 1.15 ± 7% @ infinity, Magnification range: 14X to 45X, 67.0in. (1.7m) to 216.0in (5.5m) picture width. Resolution: 10 lp/mm @ >50% MTF.

HD-10GT17: f/number: 1.15 ± 7% @ infinity, Magnification range: 14X to 20X, 67.0in. (1.7m) to 96.0in (2.4m) picture width, optimum at 16X, 77.0in (1.9m) picture width. Resolution: 12 lp/mm @ >50% MTF.

HD-10GT26: f/number: 1.15 ± 7% @ infinity, Magnification range: 21X to 30X, 100.0in. (2.5m) to 145.0in (3.7m) picture width, optimum at 26X, 125.0in. (3.2m) picture width. Resolution: 12 lp/mm @ >50% MTF.

☐ Regardless, of the type of lens being used, the focus procedure remains the same.

5.3.3 . . . . . Focus Procedure/Lenses:

When using the dual adjustment type lenses, adjust the primary and secondary focus adjustment for the best focus as outlined in Table 5-1, Step 1 for your particular configuration. You may be required to go back and forth between the two adjustments.

- STEP 1. Loosen the rearmost wingnut, located on the top of the lens.

  STEP 2. Using the wingnut (knob), rotate the focus barrel until the center of the image appears to be in focus.

- STEP 3. Following the same method described in Step 2, repeat for the outermost focus barrel until the edges of the image appear to be in focus.....Repeat for each lens.

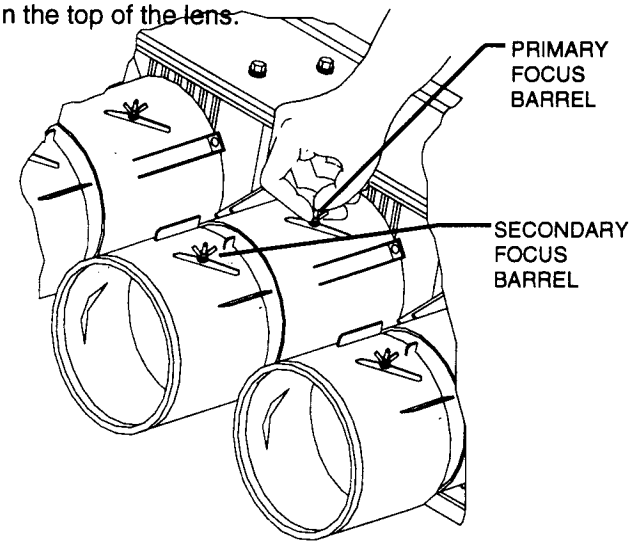


FIGURE 5-1. LENS FOCUS (INITIAL).

5.4 . . . . . Initial CRT Focus Procedure:

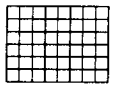
Prior to performing the mechanical lens adjustment, ensure that the CRT magnetic focus has been pre-set to approximately 50% for the STATIC adjustments and 77% for the dynamic adjustments. Perform the following Steps;

- STEP 1. **STATIC FOCUS**: Enter **[98] [CODE]**, select one color at a time and using the [RED], [GREEN] or [BLUE] BUTTONS. Using the UP or DOWN arrow keys adjust the static focus for 50% of its range for each color.
- STEP 2. **DYNAMIC FOCUS**: Enter **[99] [CODE]**, then select a color. Using the LEFT and RIGHT arrow keys adjust the horizontal (left-to-right) dynamic focus for 77% and using the UP and DOWN arrow keys adjust the vertical (top-to-bottom) dynamic focus for 77% for each color.

Once the above procedure has been performed, you may proceed to the lens focusing and positioning procedure.

5.5 . . . . . .Lens Focus and Positioning:

! The following procedure is outlined for a **FRONT/CEILING MOUNT INSTALLATION.** Reference is as viewed from the front of the unit. Refer to Table 5-1 page 5-5 for procedures on other installation configurations.

CROSSHATCH PATTERN REQUIRED. 

- STEP 1. Tighten all three lens adjustments, then turn counterclockwise ¾ of a turn. Refer to Figure 5-2.
- STEP 2. Adjust the primary and secondary lens barrel until the lower right corner of the projected image is focused.
- STEP 3. Repeat step 1 and 2 for each color.
- STEP 4. **GREEN ONLY !** Adjust the lower right lens adjustment until the upper right corner of the image is focused. See Figure 5-2. Repeat lens focus procedure if necessary at this time.
- STEP 5. **GREEN ONLY !** Adjust the upper left lens adjustment for side to side focus. See Figure 5-2

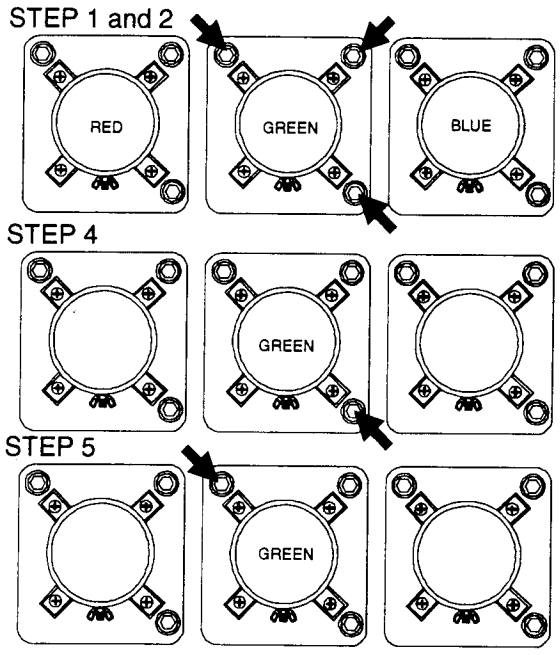


FIGURE 5-2.

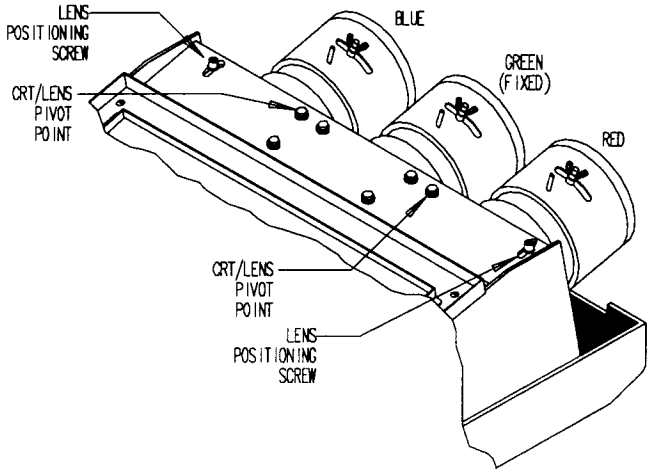
5.5 . . . . . Lens Focus and Positioning: (continued)

¤ CROSSHAIR PATTERN REQUIRED.

- STEP 6. RED to GREEN lens positioning. **3600**: Loosen the 3/16 lens positioning hex head screw **4600:** loosen the two lens positioning knobs, located directly behind the RED LENS/CRT assembly. Figure 5-3.
- STEP 7. Carefully pivot the RED LENS/CRT assembly until the center vertical line in the RED image exactly overlays the center vertical line in the GREEN image.
- STEP 8. Once the lens is in the proper position, tighten the 3/16 lens positioning hex head screw or knobs.

5

3600



4600

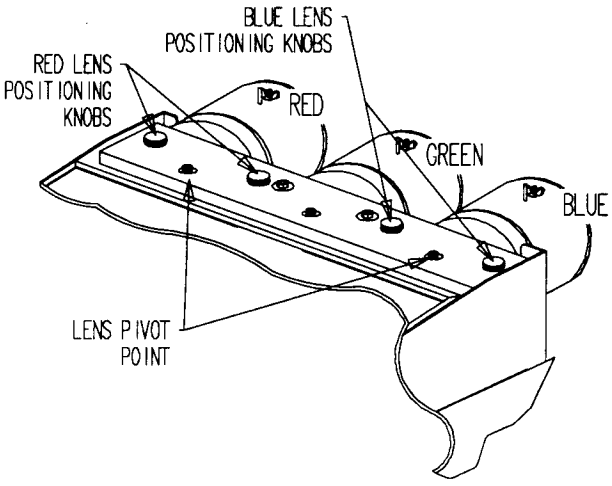


FIGURE 5-3. POSITIONING THE LENSES.

- STEP 9. With Registration "off" and using the crosshatch pattern, perform the STATIC Red and Blue shift operations as required until the center horizontal line of the selected color overlays the center horizontal line of the reference color. Use the following CODES to perform the STATIC shift operations.

¤ 40 [CODE]-Red Vertical Shift (STATIC) AND 41 [CODE] -Blue Vertical Shift (STATIC).

¤ CROSSHATCH PATTERN REQUIRED.

- STEP 10. RED ONLY ! Adjust the lower right lens adjustment until the upper right corner of the image is focused. See Figure 5-4.
- STEP 11. RED ONLY ! Adjust the upper left lens adjustment for side to side focus. See Figure 5-4.
- STEP 12. Re-focus and pivot the lens as required.
- NOTE: Perform the Static Red and Blue Shift operations as often as necessary.

! REPEAT STEPS 6 THROUGH 12 FOR **BLUE** TO **RED** ALIGNMENT.

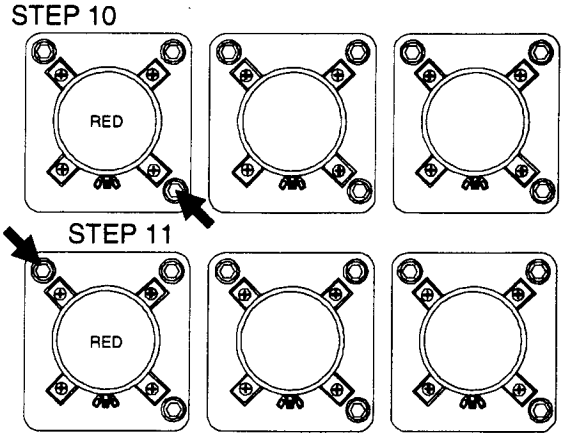


FIGURE 5-4.

5.6 . . . . . Magnetic CRT Focus Procedure:

To best achieve a precise CRT focus, the AMPRO 3600/4600 incorporates magnetically focused CRTs which are controlled and set by the remote control. Each channel (source) may have independent focusing settings.

The magnetic focus is set for each individual color and for each channel location or source being used. Perform the following Steps to optimize the CRT focus.

5.6.1 . . . . . .CRT Static Focus:

- STEP 1. Select a channel location, i.e., **[1] [CHANNEL]**. **ENSURE** channel brightness and contrast have been set to the desired operating levels.
- STEP 2. Cutoff two of the three colors.
- STEP 3. Displaying the external source, enter **[98] [CODE]** and select the color to be adjusted.
- STEP 4. Use the UP and DOWN arrow keys to adjust the static focus for best overall (primarily center) focus. REPEAT.....Steps 3 through 5 for each color.

5.6.2 . . . . . .CRT Dynamic Focus:

Like the static focus, the dynamic focus is set for each individual color on a channel-to-channel basis. Additionally, the dynamic focus provides both horizontal (side-to-side) and vertical (top-to-bottom) focusing capabilities.

- STEP 1. Perform Steps 1 and 2 from above.
- STEP 2. Enter **[99] [CODE]**, select the color under adjustment, and use the UP and DOWN arrow keys for the vertical (top-to-bottom) dynamic focus and use the LEFT and RIGHT arrow keys for the horizontal (side-to-side) dynamic focus. REPEAT..... Step 2 for each color.

¤ NOTE: Repeat both the Static and Dynamic focus procedures as often as necessary to optimize the projected image.

S2.7 ..... LENS FOCUS / ADJUSTMENT REFERENCE TABLE:

The following table will indicate the relationship in mounting configurations and lens focus adjustments. Using the following table, "look up" your particular installation. Note the adjustment locations indicated and follow procedure outlined in section 5.5

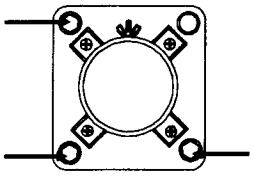
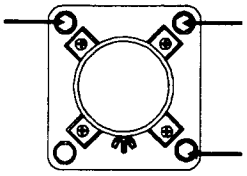
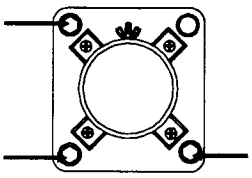
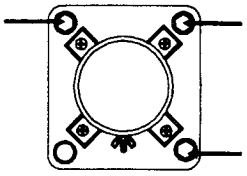
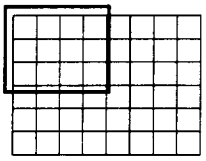
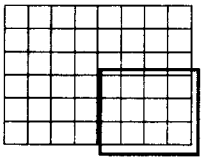
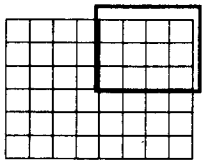
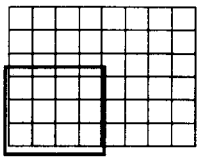
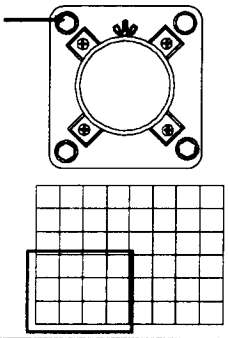
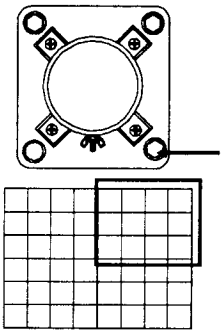
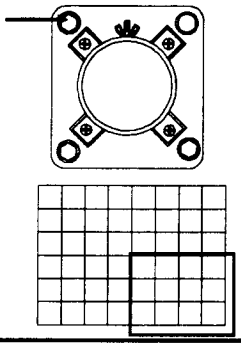
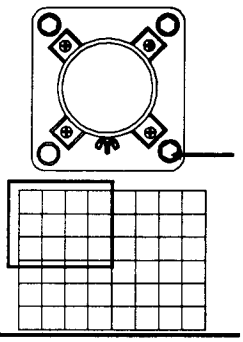
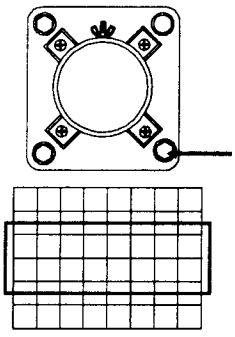
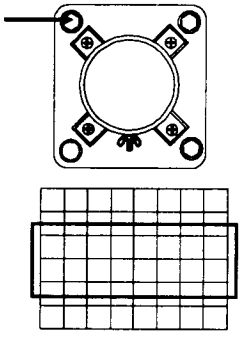
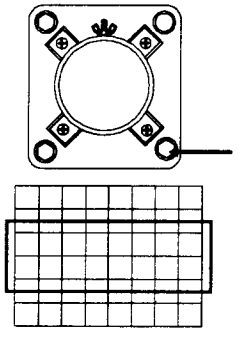
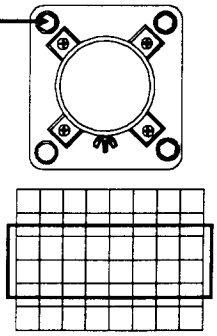
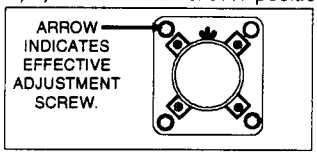
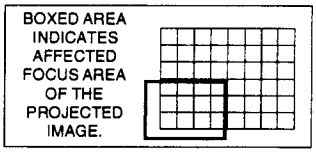
STEP	FRONT/TABLE	FRONT/CEILING	REAR/TABLE[1]	REAR/CEILING[1]
1. Tighten ALL three lens adjustments. Then turn (CCW) 3/4 of a turn.				
2. Adjust lens focus barrel(s) until the indicated corner of the projected image is optimized				
3. Adjust indicated screw to optimize corner focus of figure shown below.				
4. Adjust indicated screw to optimize focus from side to side of figure shown below.				

TABLE S5-1. LENS FOCUS/ADJUSTMENT REFERENCE TABLE.

NOTES:

1. [1]Rear screen reference of affected focus area is as viewed from the adjustment point; from the rear of the screen area.
2. Repeat above steps for all three colors.
3. Refer to section S2.2, steps 6, 7, and 8 for LENS/CRT positioning.





NOTES:

Section 6

Remote Control/ Codes / Quick Registration Guide/Special Features

6.1 . . . . . .Remote Control Summary:

The hard-wired remote control unit incorporates a 4 X 20 LCD read-out which indicates the operation and diagnostics status of the system. The hard-wired remote comes standard with a cable length of 25ft. (7.6m), which can be extended in increments of 50ft. (15.2m) or 100ft. (30.5m). For your convenience, the remote control keys are back-lit.

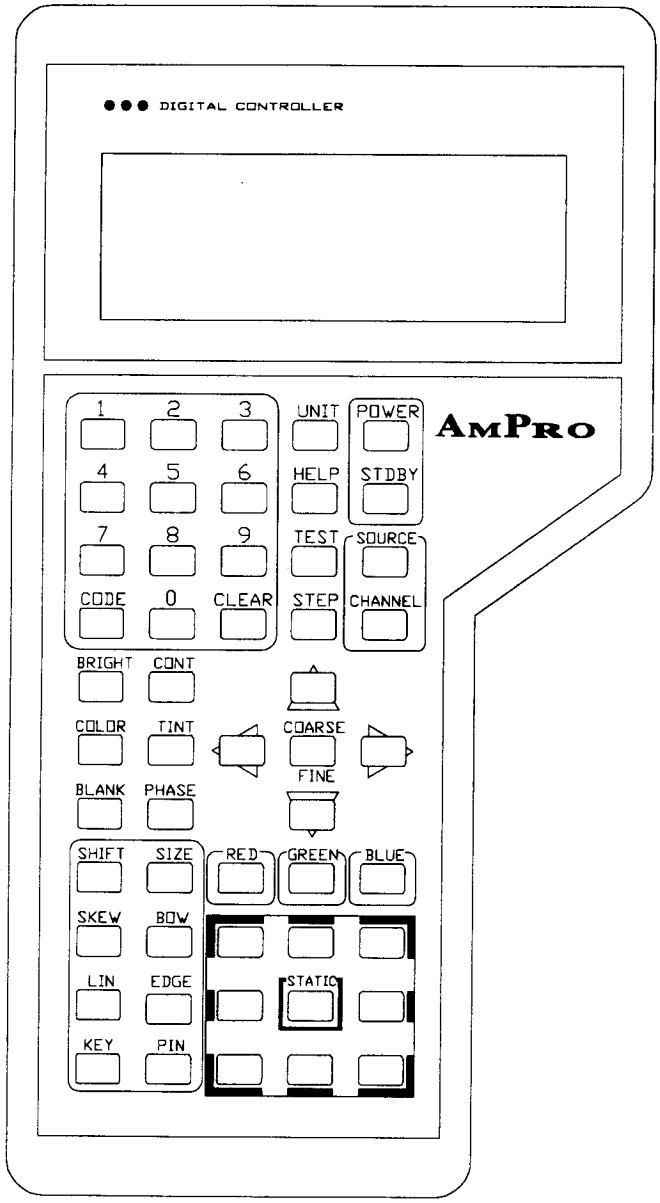


FIGURE 6-1.

BUTTON	DESCRIPTION
POWER	Toggles power On/Off.
STDBY	Toggles the projected image On/Off.
CHANNEL	Inputs/selects channel designations.
UNIT	Inputs/selects unit numbers.
BRIGHT	Selects brightness function.
CONT	Selects contrast function.
COLOR	Selects color function.
TINT	Selects tint (hue) function.
PHASE	Selects phase function.
BLANK	Enables blanking, top, bottom, left or right.
HELP	Selects internal help mode of operation.
TEST	Toggles into/out of internal test mode of operation.
STEP	Cycles through test pattern selection. While in HELP, advances pages.
SOURCE	Cycles throughs available modes of operation, e.g. RGB, VIDEO1, RGB2, etc.
CODE	Inputs code (system commands) assignments.
CLEAR	Removes an incorrect entry. Reset functionality of arrow keys in HELP.
NUMERIC KEYS	Used to set/select channels, and percentage settings of image controls.
ARROWS	Used to adjust image and registration settings.
AREA KEYS	Quadrants or Edge selection.
STATIC	Selects the static registration functions.
COARSE FINE	Toggles between FINE or COURSE registration adjustment mode.
RED	Enables red only functions, i.e., Cutoff Red.
GREEN	Enables green only functions, i.e., Cutoff Green.
BLUE	Enables blue only functions, i.e., Cutoff Blue.
SHIFT	Enables shift functions.
SKEW	Enables skew functions.
BOW	Enables bow functions.
KEY	Enables keystone functions.
PIN	Enables pincushion functions.
SIZE	Enables size functions.
LIN	Enables linearity functions.
EDGE	Enables edge linearity functions, left or right only.

6.2 . . . . . AMPRO 3600/4600 Code Summary:

CODE	FUNCTION	LCD READ-OUT : OPERATION
10	DISPLAY DAY/TIME[1]	DAY / 00:00 : Displays Day and time
11	SET TIME[1] OF DAY	ENTER TIME: Enter H:M: (Hour:Min.)
12	ENABLE TIMER	ALARM ENABLE : Enables the timer function
13	DISABLE TIMER	ALARM DISABLE : Disable the timer function
14	DISPLAY "ON" TIME[1]	TIME 00:00 : Displays the time set for auto-on operation.
15	SET TIMER "ON" TIME[1]	00:00 : Enter "auto-on" time
16	DISPLAY "OFF" TIME	TIME 00:00 : Displays the time set for auto-off operation
17	SET TIMER "OFF" TIME[1]	00:00 : Enter "auto-off" time
18	SET DATE (DAY)	IS TODAY MONDAY: Use the UP arrow to scroll through the days of the week and press [CODE] to select proper day.
19	SELECT 5 OR 7 DAY OPERATION (TOGGLE)	TIMER SETTINGS 5 DAYS SETTING (7 DAYS SETTING): Use the UP arrow to toggle between the two day setting modes and press [CODE] to select.
20	CHANNEL WRITE-PROTECT (TOGGLE)	CHANNEL WRITE PROTECT ON or OFF: Protects a channel from changes being made to channel of pre-set adjustments.
21	ACTIVATE "A.C.S." **A**utomatic **C**onvergence **S**caling	LCD PROMPT: ACTIVATE ACS ARE YOU SURE? Press **[CODE]** for *YES*, any other key for *NO*. Automatically searches through the pre-set "validated" channel table and copies the channel that matches the active channel signal parameters (within ± 30Hz- Horizontal and ± 3Hz.-Vertical). In the event that there are no validated channels lower or higher or no validated channels then the new channel, A.C.S. will respond with "NO VALIDATED DATA".
22	COPY CHANNEL "TO"[2]	COPY CHANNEL TO (ENTER 1-50): Copies the active channel settings into the desired channel.
23	COPY CHANNEL "FROM"[2]	COPY CHANNEL FROM (ENTER 1-50): Copies channel settings from the selected channel into the active channel.
24	VALIDATE CHANNEL	FREQ VALIDATED: This command is used to confirm that a channel has been set and adjusted. Once validated, this command writes the channel's horizontal and vertical frequency into a "look-up" table for the A.C.S. command (21 CODE) and A.S.M. (see below) to use. If a channel has not been validated, it can not be used with the A.C.S. or A.S.M. command. NOTE; 24 CODE additionally activates the channel write-protect command - 20 CODE.
25	TEST CHANNEL FOR VALIDATION	Displays the frequency validated (stored) within the selected channel location. **NOTE**; if the channel has not been validated a "NOT VALIDATED" message will be displayed on the LCD.
26	DISPLAY SYSTEM / CHANNEL / INFO PAGES	Once activated, the system will display four (4) informational pages which include data on channel setup, timer enabled / disabled, internal temperature, etc.
27	ACTIVATE AUTO-SEARCH MODE "A.S.M." (TOGGLE)	AUTO SEARCH ON: This command allows the system to constantly monitor the incoming signal for changes. If a change is detected, such as the horizontal and/or vertical frequency, the system uses the table of validated channels and automatically re-configures the channel parameters for the best possible display. Helpful when changing between video modes (VGA - SVGA) from a signal source. Works in all modes of operation.
28	COPY CHANNEL "ALL"	LCD PROMPT: COPY CHAN ALL ARE YOU SURE?: Press **[CODE]** for *YES* or any other key for *NO*. Copies the active channel into ALL 50 channel locations.
29	CLEAR ACTIVE CHANNEL	LCD PROMPT: CLEAR CHAN ARE YOU SURE?: Press **[CODE]** for *YES* or any other key for *NO*. Clears or nulls all settings of the active channel location.
30	DISPLAY DIAGNOSTICS	ENABLES ERROR DIAGNOSTICS: Display all appropriate error messages or simply "SYSTEM OK".
31	DISPLAY "TOT"	Displays the "Total Operating Time" in, DAYS:HOURS:MINUTES
32	DISPLAY CRT TIME	Displays the CRTs total elapsed time in, DAYS:HOURS:MINUTES
33	DISPLAY ORIENTATION	Displays the projection mode, i.e., Floor Mount / Front Projection
34	DISPLAY BOARD STATUS	Displays the available input modules installed.
35	DISPLAY ROM REVISION AND SERIAL NUMBER	Displays the current revision level of the operating system and the serial number of the system..
36	DISPLAY FREQ COUNTER	Displays the horizontal scan rate and vertical period of the incoming signal for the active channel.
37	ENABLE EXECUTIVE MODE	EXEC MODE ON: This command limits the operation of the system to; Power, Standby, and 8 channel selections.
39	DISPLAY INTERNAL TEMPERATURE	"xxx F": On the first line of the read-out is displayed the system temperature and on the second line, the power supply temperature.
40	ADJUST RVS	Activates the Red Static Vertical Shift operation. RVS must be performed with registration "off".

[1]The internal timer operates in the 24 hour clock mode, i.e. 2:00p.m. is entered as 14:00. Refer to the special features section of Section 6.

[2] When using 22 and 23 [CODE], and a single digit channel number is entered, [CODE] must be pressed to active the command or enter a single digit entry as, 01, 02, 03, etc.

6.2 . . . . . AMPRO 3600/4600 Code Summary: (continued)

CODE	FUNCTION	LCD READ-OUT : OPERATION
41	ADJUST BVS	Activates the Blue Static Vertical Shift operation. BVS must be performed with registration "off".
42	ADJUST LCD BACK LIGHT	LCD PROMPT: ENTER LITE LEVEL: Enter 0 (off) through 4 (max.).
43	TEST REMOTE CONTROL	Test/verify remote control LCD operation.
44	READ SWITCHES	Reads/displays settings of the baud rate and address switches.
45	DISABLE REG. KEYS	KEYS DISABLED: This command allows the user to lock-out the convergence keys.
46	ENABLE REG. KEYS	KEYS ENABLED: Activates keys placed inactive by 45 CODE.
47	ENABLE GUIDED REG.	Enters the complete guided registration mode of operation. Use CODE to exit at any time.
48	TOGGLE BLACK LEVEL CLAMP POINT	Toggle the black level clamp point from "back-porch" to "sync-tip" mode of operation on a channel- by-channel basis. System will default to "back-porch" clamping.
49	TOGGLE MONOCHROME	MONOCHROME MODE or COLOR RESTORED: Turns the color level on or off (Video Mode Only).
50	N-S CORNER PINCUSHION	N-S CORNER PIN : Special corner pincushion.
54	ENABLE ON-SCREEN DISPLAY (OSD)	Enables the on-screen display, which emulates the LCD read-out. Provides on-screen status of all remote control functions. See 56 CODE.
!	When the keypad is idled, the OSD will remain on for ≈ 3 seconds.	
55	TOGGLE REGISTRATION ON/OFF	REGISTRATION ON or REGISTRATION OFF: Turns registration off when performing the mechanical (STATIC) alignments and turn registration on when performing the dynamic alignment functions.
56	DISABLE OSD	turn off the OSD function. See 54 CODE.
70	UPDATE MODULE STATUS	Use this command in conjunction with Supplement 5 when adding or removing an input module.
77	INITIALIZE INTERNAL TEST / HELP SCREENS	Used to establish screen parameters for the internal test and help screens.
79	RESET INTERNAL SCREENS	Used to reset the test and help screens settings to factory preset conditions for brightness, contrast, size, etc..
85	OVERDRIVE MODE "OFF"	Disable overdrive mode for active channel.
86	OVERDRIVE MODE "ON"	[CHANNEL DESIGNATION] Allows the user to permanently designate a particular channel location as a "overdrive" channel. Whereas, every time a designated "overdrive channel is entered, the overdrive mode will be active.
!	To temporarily turn off overdrive mode of a designated channel, press and hold the [BRIGHT] key. Likewise, to cancel the temporary disabled overdrive channel, press and hold [BRIGHT] key a second time.	
88	FLYBACK WIDE	This function is useful for when the active video information does not utilize the entire raster area, limiting the effective image width. Particularly useful with HDTV and IDTV (Scan Double) sources. Active for horizontal scan rates of up to 48kHz.
89	FLYBACK NARROW	This command actives the standard flyback time, which is depended on the horizontal frequency of the source.
90	DISABLE HDTV (HD Series)	Used to disable the HDTV mode of operation.
91	ENABLE HDTV (HD Series)	Used to enable the HDTV mode of operation.
92	ENABLE INTENSITY MODULATION (Optional)	Used to activate the intensity modulation mode of operation. Acts as an intensity modulation key.
93	CLEAR INTENSITY SETTINGS (Optional)	LCD PROMPT: NULL INTENSITY ARE YOU SURE? Enter **[CODE]** for *YES* or any other key for *NO*. This code will reset intensity modulation settings to 50%.
94	ENABLE SUB-CONTRAST ADJUST MODE	This command will re-map some of the remote control keys and enable the user to adjust for individual contrast level. Which may be adjusted for each channel location.
95	ENABLE SUB-BRITE ADJUST MODE	This command is like the above command accept it will enable the user to adjust for individual brightness levels.
96	SELECT COLOR TEMPERATURE	This command will enable you to choose between three factory preset values for color temperatures. See Appendix B for more information on setting and selecting color temperatures.
97	GAMMA CORRECTION ON/OFF (TOGGLE) (Optional)	GAMMA ON or OFF. This internal optional feature corrects for the inherent non-linearity between the incoming signal (source) and the output of the CRT (light output).
98	ENABLE STATIC FOCUS	SELECT COLOR: Enables the static focus control which provides an overall focus adjustment (primarily center) for individual color and channel locations.
99	ENABLE DYNAMIC FOCUS	SELECT COLOR: Enables the dynamic focus control which provides for a side-to-side and top-to-bottom focus for individual color and channel location.
900	DISABLE QUIET MODE	Disables the quiet mode of operation and returns the system back to its normal communication mode of operation.
901	ENABLE QUIET MODE	Enables the quiet mode of operation and disables the normal "remote messages" .
909	DISABLE EXECUTIVE MODE	EXEC MODE OFF: Exits the executive mode of operation and resumes normal (full) remote control operation.

6.3 . . . . . Internal Help Menus:

Incorporated in the AMPRO projectors are several on-board help menus. The internal menus are provided to inform and guide you through the operation and set-up of the system. To enable the internal help system, simply press **[HELP]** and select one of the five topics shown on the main menu.

6.3.1 . . . . . .Main Menu Index

The main menu is provide to select one of the following subjects; (see Figure 6-2).

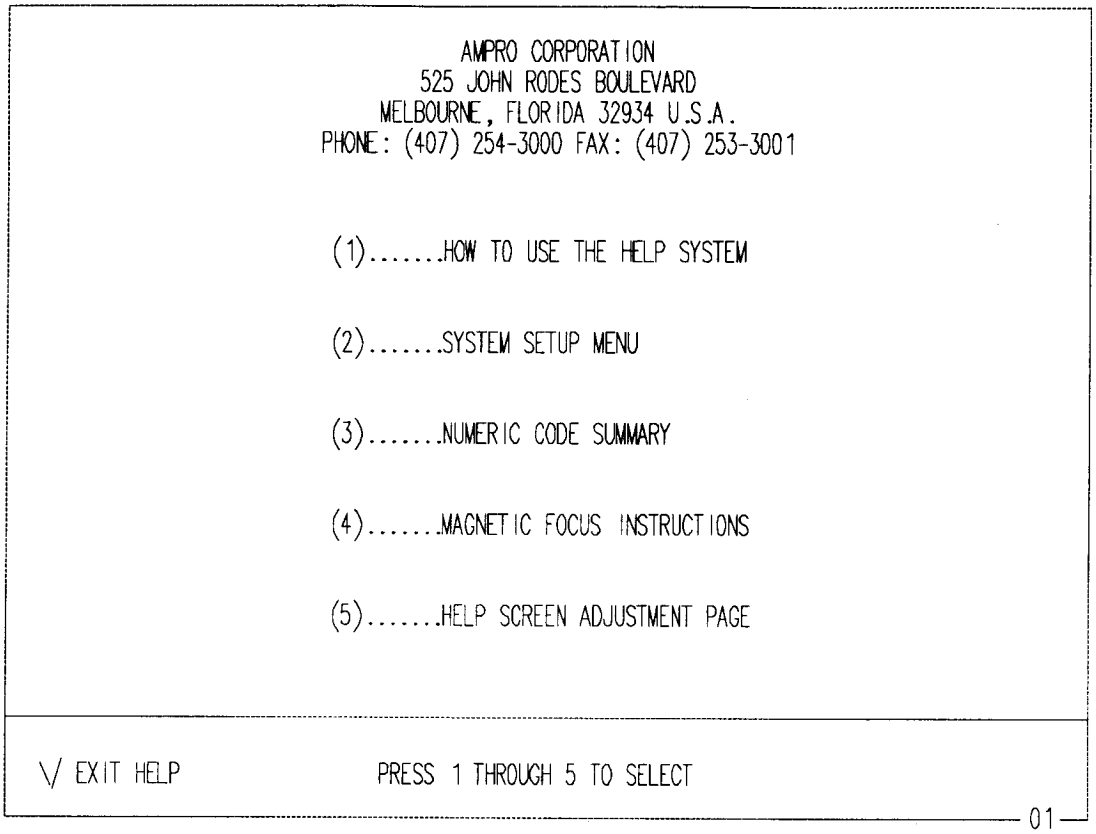


FIGURE 6-2. HELP SCREEN - MAIN MENU.

- (1) HOW TO USE THE HELP SYSTEM: This selection provides the basic instructions on how to use the help system, the active keys while in help, etc...
- (2) SYSTEM SETUP MENU: This selection will provide an additional menu for the selections of the various setup programs.
- (3) NUMERIC CODE SUMMARY: This selection will provide two on-screen pages for a quick reference of the internal code commands.
- (4) MAGNETIC FOCUS INSTRUCTIONS: The magnetic focus pages provides on-screen instruction on how to best set-up or perform the STATIC and DYNAMIC focus procedures.
- (5) HELP SCREEN ADJUSTEMENT PAGE: This screen is required to perform the image quality adjustments, i.e., brightness, contrast, phase, blanking and green geometry. All adjustments are made using the random setup mode.

6.3.2 . . . . Internal Help System Flow Chart 1: Main Menu Selections:

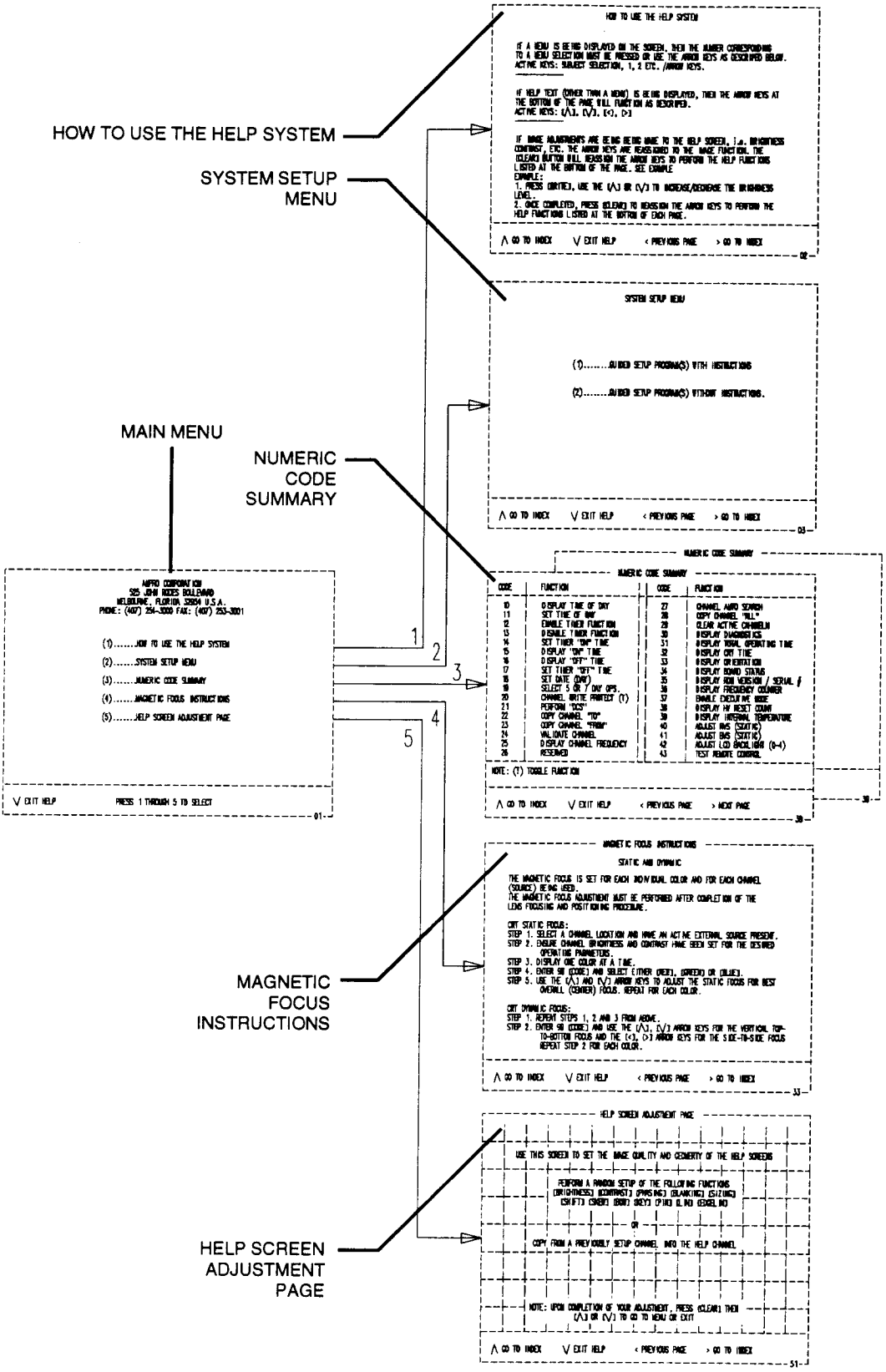
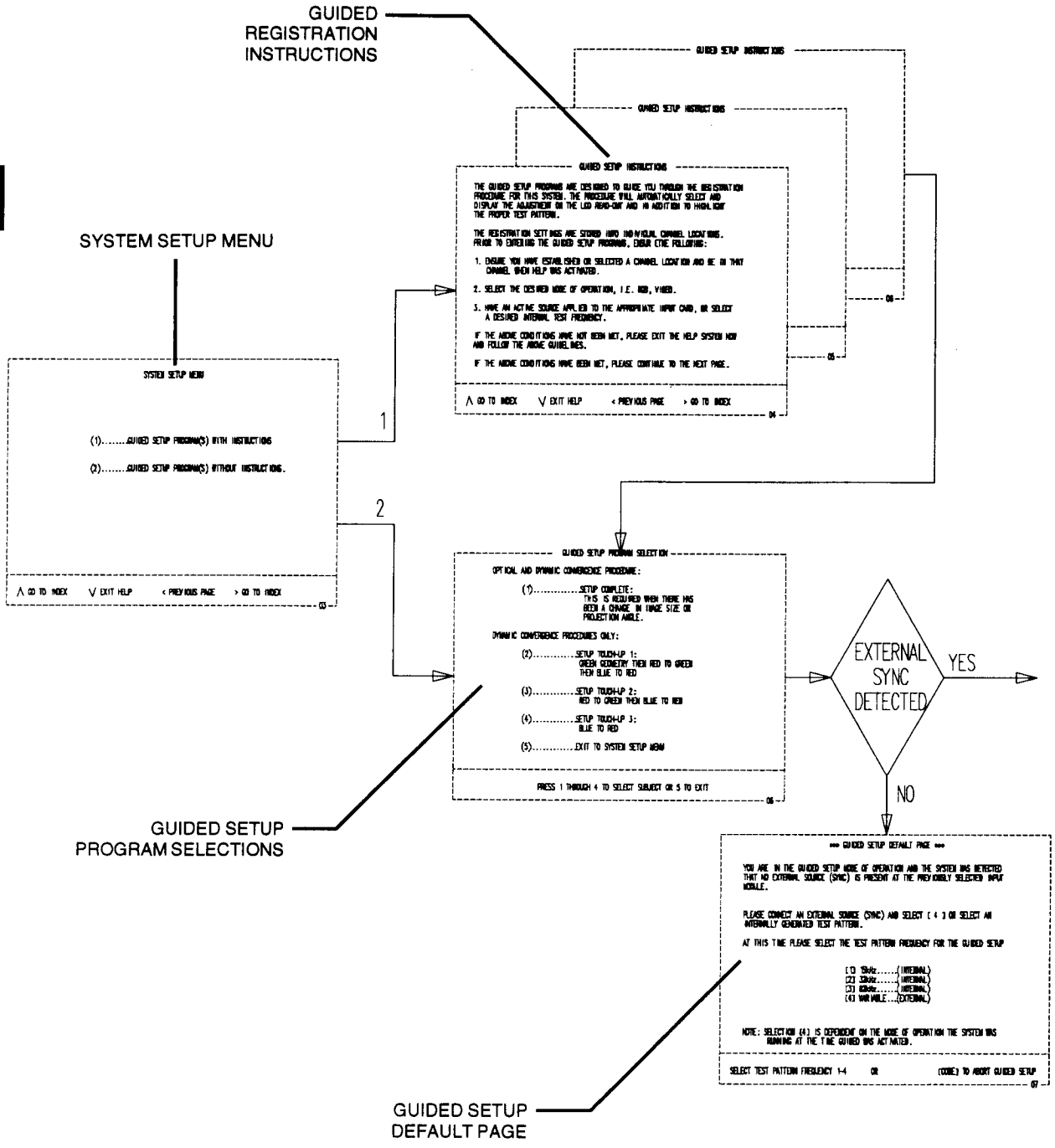
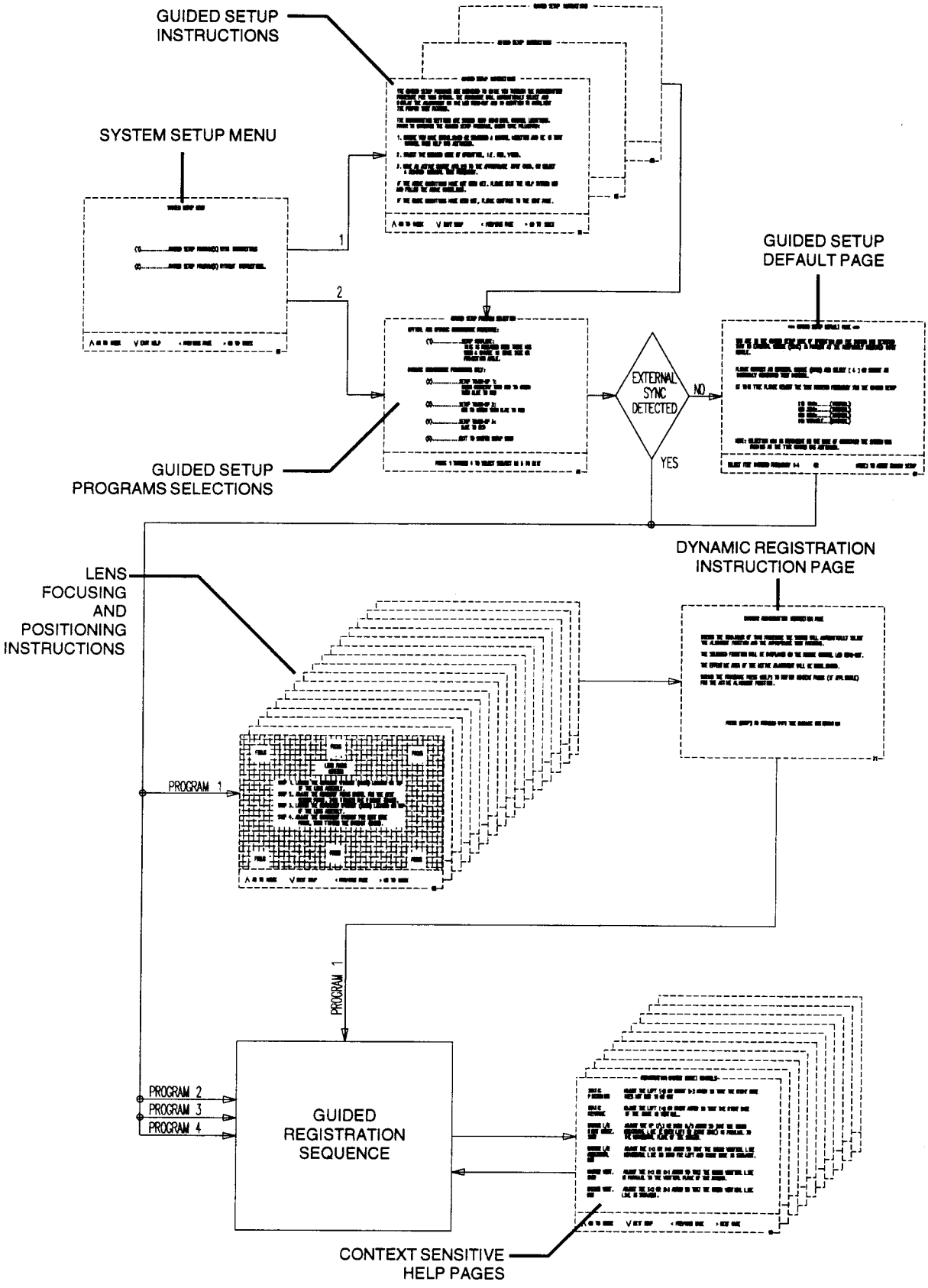


FIGURE 6-3. HELP FLOW 1.

6.3.3 . . . . Internal Help System Flow Chart 2: System Set-up Menu:



6.3.4 . . . . Internal Help System Flow Chart 3: Guided Set-up Programs:



6.4 . . . . . Registration as a Channel Parameter:

All registration functions are handled as individual channel parameters. This will allow you to precisely set each individual source for optimum registration. To perform a random setup of a new, or modify an existing channel location, the following conditions must exist prior to building or changing parameters of a channel.

- STEP 1. Select the channel you wish to adjust, i.e., **[1] [CHAN], [2] [CHAN], [3] [CHAN]** etc.
- STEP 2. For building a new channel, select the appropriate mode of operation, i.e., RGB, VIDEO etc.
- STEP 3. If the channel had been previously built and write-protected, enter **[20] [CODE]** to toggle the write- protect "OFF" , this will allow you to make the adjustments you want to make.
- STEP 4. Set channel parameters such as brightness, contrast, blanking and phasing prior to performing channel registration. If the internally generated/external sync test mode is to be used, set brightness and contrast to ≈ 70/50 respectfully.
- STEP 5. Select the test function method, i.e. Internal Test/Internal Sync or Internal Test/External Sync or an independent test pattern externally generated applied to the appropriate card (slot).
- STEP 6. Perform the necessary changes or setup, or use one of the copy channel commands, or the "A.C.S." command, refer to Section 6.
- NOTE: If the sweep reversal procedure(s) have been performed, it may be necessary (or easier) to perform a "null" channel command.....29 **[CODE]**.

6.4.1 . . . . . .Factory Aligned Channel Settings

To provide a quick start with your registration alignment and channel settings, several Video/RGB formats have been pre-aligned at the factory. All pre-aligned channels are based on a 60in.(H) x 80in. (W) screen size and have been validated and write-protected (24 [CODE]). You can use these pre-aligned channels with the various copy channel commands, such as "Activate A.C.S." or the copy "TO" and "FROM" commands.

CHANNEL	MODE	CHANNEL	MODE	CHANNEL	MODE	CHANNEL	MODE
1 - 39 and 48	RGB (31.5kHz)	42	Optional Input	44	RGB (15kHz)	47	RGB (54kHz)
40	Optional Input	43	RGB (90kHz)	45	RGB (80kHz)	49	RGB (21kHz)
41	Optional Input	44	RGB (86kHz)	46	RGB (64kHz)	50	Video (NTSC)

6.4.2 . . . . . .Automatic Convergence Scaling (A.C.S.):

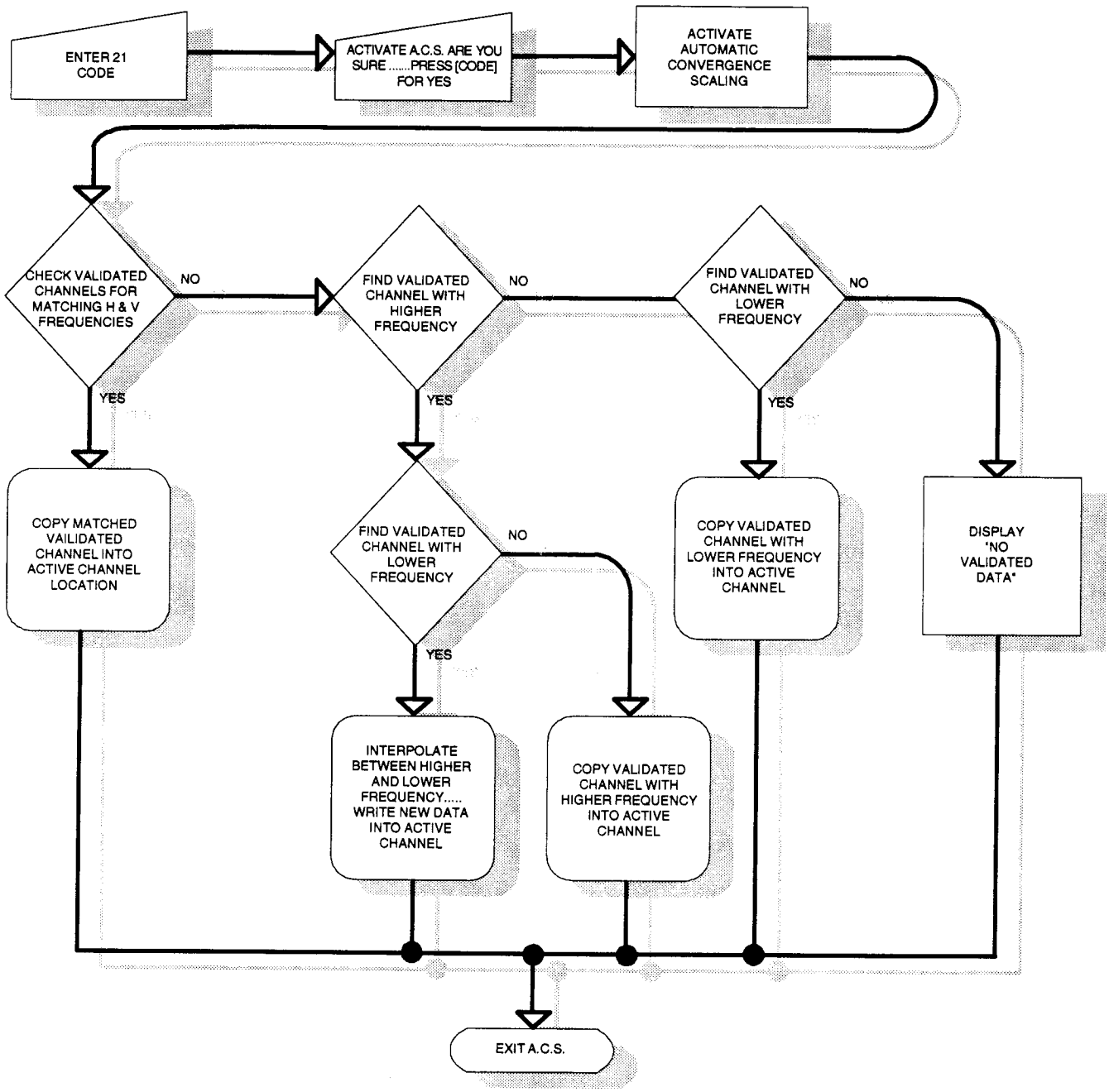
A.C.S. provides the display system with the ability to calculate registration settings for a new channel setup by interpolating between existing data of higher "validated channels"[1] and lower validated channels.

A.C.S. fist scans the table of validated channels for a matching horizontal and vertical frequencies of the new source. If a match exist, A.C.S. will copy the matched channel data into the new channel location. If no matches exist, then A.C.S. uses the horizontal frequency of validated channels directly lower and higher than the new or present channel to interpolate the new setup data. In the event that the table of validated channels contains more than one validated channel with the same horizontal frequency, A.C.S. will then reference the vertical frequency of the new source against the vertical frequency of the validated channels to decide on the best channel to use. If no matches or higher/lower validated channels exist, A.C.S. will display "NO VALIDATED DATA. See flow chart opposite page. NOTE: The greater the number of validated channels, the more accurate A.C.S. will work.

[1]Validated Channels; are channels that has been previously setup and saved by using **24 [CODE].**

6.4.3 . . . . Using A.C.S.:

To use the A.C.S., establish or select a new channel location, i.e. 5 [CHAN], select mode of operation, connect your source to the appropriate input video model and enter 21 [CODE], activate A.C.S.. Once the translation is completed, you may be required to fine tune the registration by performing a random or guided setup. See flow chart below.



6.5 . . . . . Fundamental Registration Guide:

Registration Procedures:

The registration of the system (channel) can be divided into four basis stages in the following order; ① Focus and Positioning of the lenses ② Sizing and optimizing the geometry of the GREEN image ③ Aligning the RED image to exactly overlay the GREEN image and ④ Aligning the BLUE image to exactly overlay the RED image. To accomplish a random setup of a new or existing channel location, perform the following operation;

IMPORTANT: Allow the system to run and stabilize for approximately 15 minutes before performing any adjustments.

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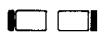
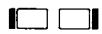
Pre-adjustment Requirements	
KEYSTROKE(S)	FUNCTION
[nn], [CHAN]	SELECTS DESIRED CHANNEL TO SETUP OR MODIFY
[SOURCE]	SELECTS DESIRED CHANNEL MODE OF OPERATION
[1] OR [2] OR [3]OR [4] [TEST]	[1]SELECTS DESIRED TEST MODE FOR SETUP
[1]NOTE: TO ACHIEVE THE MOST ACCURATE SETUP, IT IS RECOMMENDED TO HAVE AN ACTIVE SOURCE APPLIED TO THE ABOVE SELECTED INPUT MODULE AND USE THE [4] [TEST] MODE FOR YOUR SETUP.	

Green Geometry Adjustments			
KEYSTROKES	ADJUST	FUNCTION	PATTERN
[STATIC] [SIZE]	[⇑] [⇓] [⇐] [⇒]	ADJUST UNTIL PROPER HEIGHT AND WIDTH IS ACHIEVED.	EXTERNAL VIDEO SIGNAL
[STATIC] [SHIFT]	[⇑] [⇓] [⇐] [⇒]	ADJUST UNTIL THE IMAGE IS VERTICALLY AND HORIZONTALLY CENTERED ON THE SCREEN (DO NOT OVER-SCAN THE CRT).	
[PHASE]	[⇑] [⇓] [⇐] [⇒]	ADJUST UNTIL THE IMAGE IS VERTICALLY AND HORIZONTALLY CENTERED ON THE SCREEN (DO NOT OVER-SCAN THE CRT).	
[BLANKING] 	[⇑] [⇓] [⇐] [⇒]	ADJUST UNTIL THE ACTIVE VIDEO IS VISIBLE OR TO CUTOFF ANY UNWANTED VIDEO IN THE TOP, BOTTOM LEFT AND RIGHT EDGES OF THE VIDEO IMAGE.	
[STATIC] [LIN]	[⇑] [⇓]	**"REGISTRATION OFF"** ADJUST UNTIL THE SQUARES FROM TOP TO BOTTOM ARE EQUAL IN HEIGHT.	CROSSHATCH
[STATIC] [SHIFT]	[⇑] [⇓] [⇐] [⇒]	REPEAT SHIFT OPERATIONS.	EXTERNAL VIDEO SIGNAL
[STATIC] [PIN]	[⇐] [⇒]	**"REGISTRATION OFF"** ADJUST UNTIL THE RIGHT EDGE DOES NOT BOW IN OR OUT	CROSSHATCH
[STATIC] [KEY]	[⇐] [⇒]	**"REGISTRATION OFF"** ADJUST UNTIL THE RIGHT EDGE IS PARALLEL TO THE VERTICAL PLANE OF THE SCREEN.	
[STATIC] [SIZE]	[⇑] [⇓] [⇐] [⇒]	REPEAT SIZE OPERATIONS	EXTERNAL VIDEO SIGNAL
[GREEN] [SKEW]	[⇑] [⇓] [⇐] [⇒]	ADJUST UNTIL THE CENTER HORIZONTAL AND VERTICAL LINE IS PARALLEL TO THE HORIZONTAL / VERTICAL PLANE OF THE SCREEN	CROSSHAIR
[GREEN] [BOW] 	[⇑] [⇓] [⇐] [⇒]	ADJUST UNTIL THE CENTER HORIZONTAL AND VERTICAL LINE IS STRAIGHT AND DOES NOT BOW UP/DOWN OR LEFT/RIGHT.	CROSSHAIR

6.5 . . . . . Fundamental Registration Guide: (continued)

Green Geometry Adjustments (continued)			
KEYSTROKES	ADJUST	FUNCTION	PATTERN
[GREEN] [PIN] 	[⇑] [⇓] [⇐] [⇒]	ADJUST UNTIL THE TOP/BOTTOM HORIZONTAL LINE DOES NOT BOW UP OR DOWN AND THE OUTERMOST LEFT/RIGHT VERTICAL LINES DO NOT BOW IN OR OUT	CROSSHATCH
[GREEN] KEY] 	[⇑] [⇓] [⇐] [⇒]	ADJUST UNTIL THE TOP/BOTTOM HORIZONTAL LINES AND THE OUTERMOST LEFT/RIGHT VERTICAL LINES ARE PARALLEL TO THE SCREEN	
[5] [0] [CODE] (N-S CORNER PIN)	[⇑] [⇓]	**"REGISTRATION ON"** : N-S CORNER PINCUSHION: OBSERVE THE UPPER LEFT/RIGHT AND LOWER LEFT/RIGHT CORNERS. USING THE UP AND DOWN ARROW KEYS, ADJUST UNTIL THE CORNERS OF THE PROJECTED IMAGE APPEAR TO BE STRAIGHT AND FLAT OR PRODUCES A GEOMETRICAL PINCUSHION, THEN READJUST USING THE [STATIC] [PIN] FUNCTION TO STRAIGHT THE TOP AND BOTTOM EDGES.	
Green, Red and Blue Adjustments			
[1,2][GREEN] [RED] [BLUE] [SHIFT]	[⇑] [⇓] [⇐] [⇒]	ADJUST UNTIL THE CENTER HORIZONTAL LINE AND VERTICAL LINE EXACTLY OVERLAYS THE REFERENCE COLOR.	CROSSHAIR
[GREEN] [RED] [BLUE] [SKEW]	[⇐] [⇒]	ADJUST UNTIL THE CENTER VERTICAL LINE EXACTLY OVERLAYS THE REFERENCE COLOR.	
[GREEN] [RED] [BLUE] [BOW] 	[⇐] [⇒]	ADJUST UNTIL THE CENTER VERTICAL LINE IS STRAIGHT AND OVERLAYS THE REFERENCE COLOR	
[GREEN] [RED] [BLUE] [SKEW] 	[⇑] [⇓]	ADJUST UNTIL THE CENTER HORIZONTAL LINE IS STRAIGHT AND OVERLAYS THE REFERENCE COLOR IN EACH EDGE.	
[GREEN] [RED] [BLUE] [SIZE] 	[⇑] [⇓] [⇐] [⇒]	ADJUST UNTIL THE TOP/BOTTOM INNER 2/3 OVERLAYS THE REFERENCE COLOR AND ADJUST UNTIL THE LEFT/RIGHT INNER 2/3 OVERLAYS THE REFERENCE COLOR.	CROSSHATCH
[GREEN] [RED] [BLUE] [LIN] 	[⇑] [⇓] [⇐] [⇒]	ADJUST UNTIL THE TOP/BOTTOM, LEFT/RIGHT EDGES OVERLAY THE REFERENCE COLOR.	
[GREEN] [RED] [BLUE] [EDGE] 	[⇐] [⇒]	ADJUST UNTIL THE OUTER MOST LEFT/RIGHT EDGES EXACTLY OVERLAY THE REFERENCE COLOR	
[GREEN] [RED] [BLUE] [PIN] 	[⇑] [⇓] [⇐] [⇒]	ADJUST UNTIL THE TOP/BOTTOM HORIZONTAL, OR THE OUTER MOST LEFT/RIGHT VERTICAL LINES DO NOT BOW UP/DOWN, LEFT/RIGHT AND OVERLAY THE REFERENCE COLOR IS THEIR RESPECTIVE CORNERS.	
[GREEN] [RED] [BLUE] [KEY] 	[⇑] [⇓] [⇐] [⇒]	ADJUST UNTIL THE TOP/BOTTOM OUTER MOST HORIZONTAL AND THE OUTER MOST VERTICAL LINES ARE STRAIGHT AND OVERLAY THE REFERENCE COLOR IN THEIR RESPECTIVE CORNERS.	
[1]NOTE: [GREEN] OR [RED] OR [BLUE] NEED ONLY BE PRESSED ONCE, UNLESS ANOTHER COLOR KEY IS PRESSED.			
[2]NOTE: ADJUSTMENTS BEING MADE TO THE GREEN IMAGE WILL SIMULTANEOUSLY EFFECT RED AND BLUE.			

6.6 . . . . . Special Features:

6.6.1 . . . . . Internal Timer Operation:

The internal timer is capable of turning the projection system "on" and/or "off" at a predetermined time according to your particular requirements. The internal timer operation is based on the 24 hour clock format and either a 5 or 7 day occurrence. If no internal timer operation is desired, the timer may be totally disabled. The three modes of operation are explained below.

To use this special feature, you must first verify the setting of the internal clock for the appropriate time according to your particular time zone.

! The internal clock is factory pre-set for Eastern Time (ET.).

6.6.1.1 . . . . .Display Time of Day:

- STEP 1. Using the numeric keypad, enter **[10] [CODE]** to verify the time of day.

¤ If incorrect, refer to the set time of day procedure.

¤ If the time of day is correct, please refer to the desired mode of operation and perform the steps listed.

6.6.1.2 . . . . .Set Time Of Day / Day / 5 or 7 Day Operation:

- **Set Time Of Day:** Enter **[11] [CODE]**. At the LCD prompt, enter Hour : Min, i.e., 2:00 p.m. will be entered as 14:00.
- **Set Day:** If required, set the day of the week by entering **[18] [CODE]**. LCD. prompt, IS TODAY MONDAY, use the UP arrow key to scroll through the days of the week and press **[CODE]** to select proper day.
- **Select 5 Or 7 Day Operation:** Enter **[19] [CODE]**. At the LCD prompt, use the UP arrow to toggle between 5 or 7 day operation, press **[CODE]** to select.

6.6.1.3 . . . . . .Timer Modes of Operation:

6.6.1.3.1 . . . .Auto "ON" Operation:

- STEP 1. Set timer "on" time. Enter **[15] [CODE]** and at the LCD prompt, enter desired time, i.e., for a turn-on time of 8:00a.m., enter 08:00.
- STEP 2. Set timer "off" time. Enter **[17] [CODE]** and at the LCD prompt, enter 0000 or simply press the [CLEAR] button to reset the display to 00:00.
- STEP 3. Enable timer operation. Enter **[12] [CODE]**.

6.6.1.3.2 . . . .Auto "OFF" Operation:

- STEP 1. Set timer "on" time. Enter **[15] [CODE]**. At the LCD prompt, enter 0000 or press **[CLEAR]** to reset the display to 00:00.
- STEP 2. Set timer "off" time. Enter **[17] [CODE]** and at the LCD prompt, enter desired time. i.e., for a turn off time of 5:00 p.m., enter 1700 (17:00).
- STEP 3. Enable timer operation. Enter **[12] [CODE]**.

6.6.1.3.3 . . Auto "ON/OFF" Operation.

- STEP 1. Set timer "on" time. Enter **[15] [CODE]** and at the LCD prompt, enter desired turn on time, i.e. 8:00 a.m. is entered as 0800.
- STEP 2. Set timer "off" time. Enter **[17] [CODE]** and at the LCD prompt, enter desired "off" time, i.e., 5:00 p.m. is entered as 1700.
- STEP 3. Enable timer operation. Enter **[12] [CODE]**.

6.6.1.4 . . . . .Verifying Your Settings:

- STEP 1. Display time/day. Enter **[10] [CODE]**.
- STEP 2. Display timer "on" time. Enter **[14] [CODE]**.
- STEP 3. Display timer "off" time. Enter **[16] [CODE]**.

> OR <

- Enter **[26] [CODE]**, display system / channel status information page.

6.6.1.5 . . . . . .Notes:

! To disable the timer operation, enter **[13] [CODE]**.

! Be sure to leave the main ac power switch located on the rear panel in the "ON" position.

6.6.1.6 . . . . . .Timer Quick Reference Table:

CODE	FUNCTION
10	DISPLAY TIME/DAY
11	SET TIME OF DAY
12	ENABLE TIMER OPERATION
13	DISABLE TIMER OPERATION
14	DISPLAY "ON" TIME
15	SET TIMER "ON" TIME
16	DISPLAY "OFF" TIME
17	SET TIMER "OFF" TIME
18	SET DAY
19	TOGGLE 5 OR 7 DAY OPERATION

6.6.2 . . . . Channel Color Balance:

The AMPRO 3600/4600 provides the capability to pre-set the color balance for each external source being used. The black and white levels may be controlled by the remote control and pre-set into individual channel locations.

Along with the capability to pre-set custom color temperatures, the AMPRO 3600/4600 has three factory pre-set color temperature values, 9300°K, 6500°K and 3600°K. These factory pre-sets may be used with anyone of your external sources providing they are at the 1vp-p. (700mvp-p) signal level. Additionally, the factory pre-sets may be modified to conform to your requirements.

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! The control of the contrast (signal level) is restricted to attenuating signal level and provides no signal gain capability.

! This procedure makes the assumption that the AMPRO system has been properly installed and correctly aligned.

Perform the following steps to setup and save color temperatures

6.6.2.1 . . . . .Pre-adjustment Requirements:

- INPUT: Desired external source (displaying multiple colors or grayscale pattern).
- CLAMPING: Set to or select Back-porch clamping (48 [CODE]).
- CHANNEL: Any channel setup for your particular source, i.e., mode of operation, convergence, etc..
- REMOTE SETTINGS: Set brightness [BRIGHT] and contrast [CONT] to desired operating level.

6.6.2.2 . . . . .Adjustment Procedure:

This procedure is based on a visual acceptance of the black and white levels. As mentioned previously the level controls are provided to balance and/or attenuate any signal level above 1Vp-p (700mvp- p), and are factory pre-set for unity drive (1v "in" / 1v "out").

- STEP 1. Perform a visual evaluation of the displayed image.
- EXAMPLE: If the black level of the displayed image appears to be red in color, adjust the Red brightness by entering **95 [CODE]** (Enable Sub-Brite), then select **[RED]**. Use the up and down arrow keys to increase or decrease the Red black level. NOTE: To select a different color, simply press the desired color button. Perform this process for each color until desired results are achieved.
- STEP 2. To set or reset the master brightness while in the Sub- Brite mode, simply press **[BRIGHT]**, and again using the up/down arrow keys increase or decrease the master brightness level.
- STEP 3. As with the black level adjust, the individual contrast levels are set using a similar method, enter **94 [CODE]** (Enable Sub-Contrast), select the desired color and use the up/down arrows to adjust.
- STEP 4. Adjust the individual contrast levels for desired white or color levels without causing the de-focusing of the adjusted color or the entire displayed image.
- STEP 5. To adjust master contrast while in the Sub-Contrast mode, press the **[CONT]** button and adjust using the up/down arrow keys.

Continue with the above steps until a visually acceptable color balance is achieved.

6.6.2.3 . . . Using The Factory Presets:

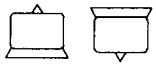
There are three commonly used settings that have been factory pre-set and may be accessed without losing any previously set custom or user defined color balance.

! The factory presets are based on input signals of 1vp-p (700mvp- p) and effect only the contrast level of the signal.

- STEP 1. Enter the channel you wish to adjust and have an active source applied to appropriate module.
- STEP 2. With the image being displayed, enter **96 [CODE]** (Select Color Temperature). Once activated, the channel location will be automatically set to the 9300°K settings and the previous channel values will be moved into the "USERS COLOR TEMP" selection.
- STEP 3. Use the up/down arrow keys to scroll through the available selections. NOTE: Every time you scroll through the listings of the available values the channel will be updated to that value.
- STEP 4. With the desired value being displayed in the LCD read- out, press the **[CODE]** button to select.

! Once the **[CODE]** button has been pressed and the user defined value was not the value selected (the value currently being displayed in the LCD read-out), any user defined or custom channel settings will be lost.

6.6.2.4 . . . . . .Color Temperature Command(s) Summary

COMMAND	FUNCTION
48 [CODE]	TOGGLES BLACK LEVEL CLAMP POINT FROM BACK-PORCH TO SYNC-TIP
94 [CODE]	ENABLE SUB-CONTRAST MODE
95 [CODE]	ENABLE SUB-BRITE (BRIGHTNESS) MODE
96 [CODE]	ENABLE COLOR TEMPERATURE SELECTION
[CODE]	SELECTS DESIRED COLOR TEMPERATURE
[RED], [GREEN], [BLUE]	SELECTS COLOR TO BE ADJUSTED
[BRIGHT]	SELECTS MASTER BRIGHTNESS CONTROL
[CONT]	SELECTS MASTER CONTRAST CONTROL
	INCREASE/DECREASE SELECTED FUNCTION, SCROLL THROUGH AVAILABLE COLOR TEMPERATURES.

6.6.3 . . . . System/Channel Status Pages:

6.6.3.1 . . . . . .General:

The internal system status pages are accessed by entering [26] [CODE] and contain four (4) informational pages, which indicate the operational status and condition of the various system features. The four internal pages are described below. NOTE: To move between status pages use the UP, DOWN, LEFT and RIGHT arrow keys. See legend at bottom of information pages.

6.6.3.2 . . . . . .Current Channel Information:

The first status page consist of current channel information. This page will indicate all of the configuration parameters associated with the current (active) channel. The active channel being the channel the system was in when 26 CODE was initiated. Refer to Figure 6-4.

CURRENT CHANNEL INFORMATION

CHANNEL:	1
HORIZONTAL FREQUENCY (Hz):	31750
VERTICAL FREQUENCY (Hz):	59
VALIDATED AT:	31750 59
SWEEP CONFIGURATION:	FRONT PROJECTION CEILING MOUNT
INPUT MODE:	RGB1 MODE
WRITE PROTECT STATUS:	WRITE PROT OFF
COLOR TEMPERATURE:	6500 DEGREES
CLAMP SET:	BACK PORCH CLAMP
OVERDRIVE:	ON

/\ GO TO FIRST PAGE \/ EXIT DISPLAY < PREVIOUS PAGE > NEXT PAGE

1

FIGURE 6-4. STATUS PAGE 1. CURRENT CHANNEL DATA.

REFERENCE	DESCRIPTION	REFERENCE CODE (KEY)
CHANNEL	Indicates the active channel number.	[CHANNEL]
HORIZONTAL FREQUENCY (Hz)	Display the horizontal frequency of the incoming signal for the active channel.	36
VERTICAL FREQUENCY (Hz)	Displays the vertical frequency of the incoming signal for the active channel.	36
VALIDATED AT	Indicates the horizontal and vertical frequencies that have been validated (stored) for the active channel. If not validated, then "NOT VALIDATED" will be indicated.	25
SWEEP CONFIGURATION	Displays the projection mode, i.e. FRONT PROJECTION CEILING MOUNTED.	33
INPUT MODE	Indicates the mode of operation for above channel location.	[CHANNEL]
WRITE PROTECT STATUS	Indicates whether channel write-protect is on or off. The write-protect features prevents changes from being made to a previously established channel location.	20
COLOR TEMPERATURE	Displays the current color temperature for the active channel. Select from either 3600°K, 6500°K, 9300°K or user's custom setup.	96
CLAMP SET	Signifies whether back porch or sync tip black level clamp is selected	48
OVERDRIVE	Indicates whether "overdrive" mode is on or off.	86/85

6.6.3.3 . . . Channel Validation Status:

The second page of the system/channel status page(s) is the "CHANNEL VALIDATION STATUS". This page provides a quick reference whether a channel is validated or not validated.

There are two methods to validate a channel;

1.) Enter **24 [CODE]** at the end of your setup and alignment.

2.) Perform a complete guided setup in which at the end of the guided setup sequence, the system will automatically "VALIDATE" the channel.

Once a channel is validated, the horizontal and vertical frequencies are written into a "look-up" or channel reference table. The look-up table provides reference setups for the A.C.S. command to use. Additionally, the "AUTO-SEARCH" mode utilizes the same "look-up" table to perform it's routine.

Channel location that indicate the horizontal scan rate / vertical frame rate, e.g. 31250 / 60 are VALIDATED channels. Channels that are not validate will be left blank with no indication. Although, a channel that is not validated does not indicated whether the channel is in use or not. Refer to Figure 6-5.

! An "OD" succeeding the horizontal and vertical scan rates indicates that the channel is designated as an "overdrive" channel and overdrive mode is "ON".

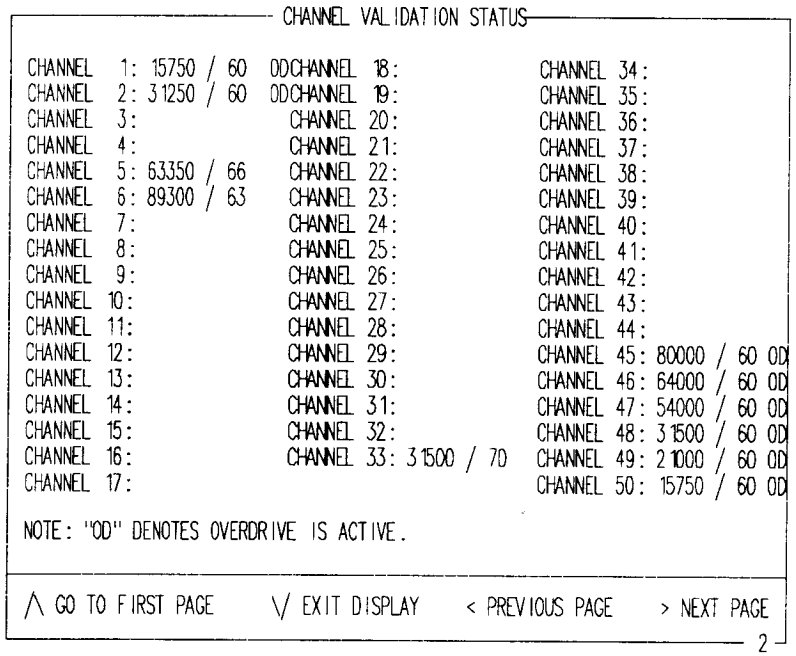


FIGURE 6-5. STATUS PAGE 2. CHANNEL(S) VALIDATION

6.6.3.4 . . . Unit Information Page:

The third status page consist of general unit information, which include system identification, firmware revision level, communication baud rate and available source input modules. Refer to Figure 6-6 for additional information.

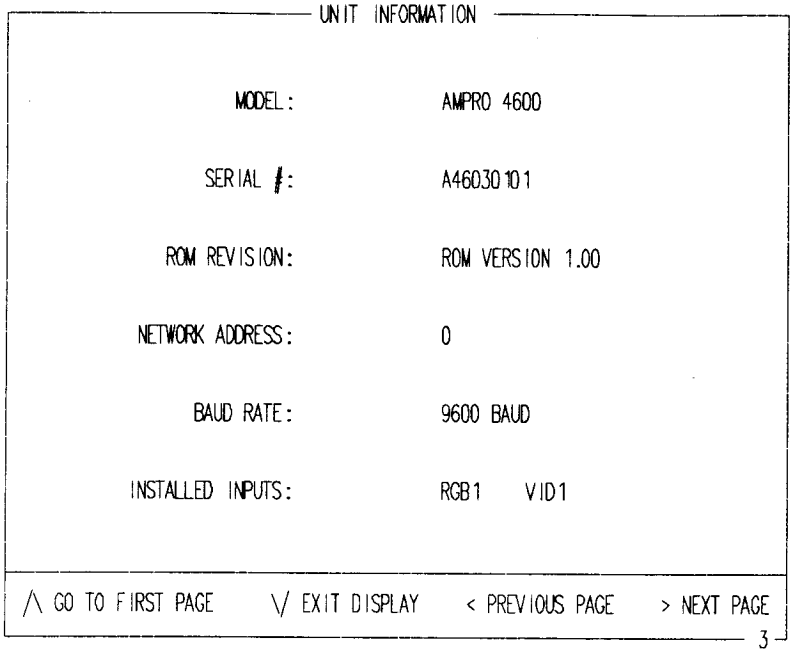


FIGURE 6-6. STATUS PAGE 3, UNIT INFORMATION.

REFERENCE	DESCRIPTION	REFERENCE CODE (KEY)
MODEL	Refers to the model (make) of the AMPRO display system	N/A
SERIAL #	Refers to the serial number of this particular AMPRO display system.	35
ROM REVISION	Indicates the current revision level of the CPU operating system.	35
NETWORK ADDRESS	Indicates the Unit address number. Network Address 0 indicates UNIT # 1	44
BAUD RATE	Display the communication baud rate the system is set at.	44
INSTALLED INPUTS	This will indicate the available standard and optional input modules.	34

6.6.3.5 . . . System Status Page

The fourth and final status page indicates the operating condition, internal temperature and the status for the special features of the display system. See Figure 6-7.

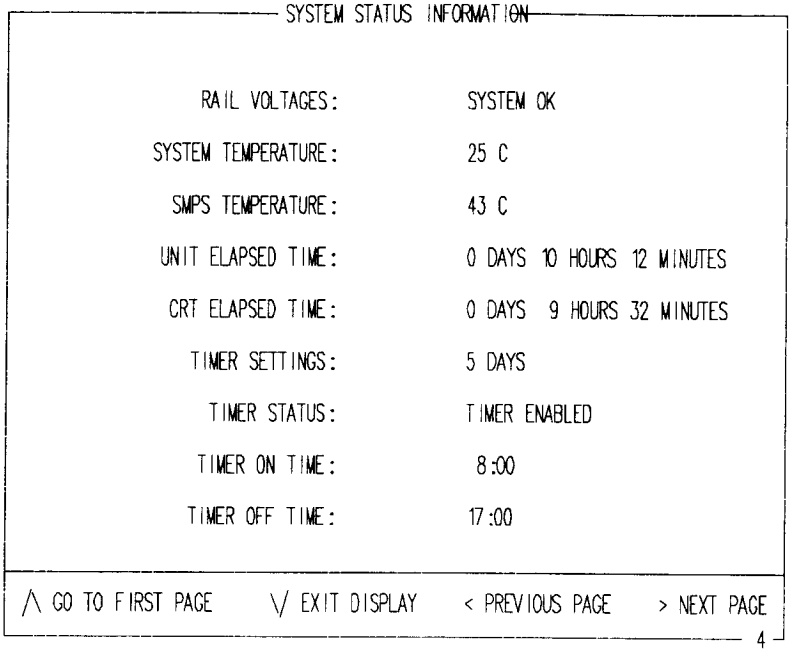


FIGURE 6-7. STATUS PAGE 4, SYSTEM STATUS

REFERENCE	DESCRIPTION	REFERENCE CODE (KEY)
RAIL VOLTAGES	This will indicate the operational status of the system. If no failure is detected, the response will be simply "SYSTEM OK". If an error is detected the message will read "ERROR FOUND CHECK 30 CODE.	30
SYSTEM TEMPERATURE	Displays the housing temperature in degrees Celsius (°C)	39
SMPS TEMPERATURE	Displays the low voltage power supply (SMPS) internal operating temperature. NOTE: SMPS maximum temperature limitation of (70 °C). Please contact the factory in SMPS temperature exceeds 70°C (158 °F).	39
UNIT ELAPSED TIME	Display the total operating system "on" time in DAYS:HOURS:MINUTES	31
CRT ELAPSED TIME	Displays the total operating CRT "on" time in DAYS:HOURS:MINUTES	32
TIMER SETTINGS	Indicates whether the 5 or 7 day operation has been selected for the internal timer setup.	19
TIMER STATUS	Indicates whether the internal timer is enabled or disabled	12 / 13
TIMER ON TIME	Indicates the desired time set for auto-on operation.	14
TIMER OFF TIME	Indicates the desired time set for auto-off operation.	16
Fahrenheit Conversion	°F = 1.8 x °C + 32	

6.6.4 . . . . Intensity Mapping:

Intensity mapping provides the ability to increase or decrease the contrast/color level over the entire image or just portions of the projected image presenting an "even field" of white from the center to the edges of the image. Intensity mapping is useful to overcome possible shading of the image, when using curved, high gain screens causing "hot spots" and overlaying of multiple projected images.

Intensity mapping allows the contrast and color balance of the top, bottom, left, right and all four corners of the projected image to be adjusted individually. The center of the image serves as a reference point for the surrounding zones and can only be adjusted with the master contrast control. As with the other adjustments on the AMPRO systems, intensity mapping is designated within a channel location. Each channel may have unique intensity mapping settings. Use the following procedure to perform intensity mapping adjustments for the active channel.

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! The following procedure makes the assumption that the system has been completely and correctly installed , aligned and an acceptable grayscale has been achieved.

☐ PATTERN REQUIRED: White field at the desired frequency.

☐ TEST EQUIPMENT: Light meter /photometer i.e., Tektronix® J16 photometer , Photo Research® PR650 SpectraColorimeter™ or equivalent.

6.6.4.1 . . . . . .Procedure:

- STEP 1. Divide the white field pattern into 9 zones. Refer to Figure 6-8. Note the area selection keys and the affected zone.
- STEP 2. Select desired mode of operation with a white field input.
- STEP 3. Using the remote control set brightness to 75% and contrast to 65%

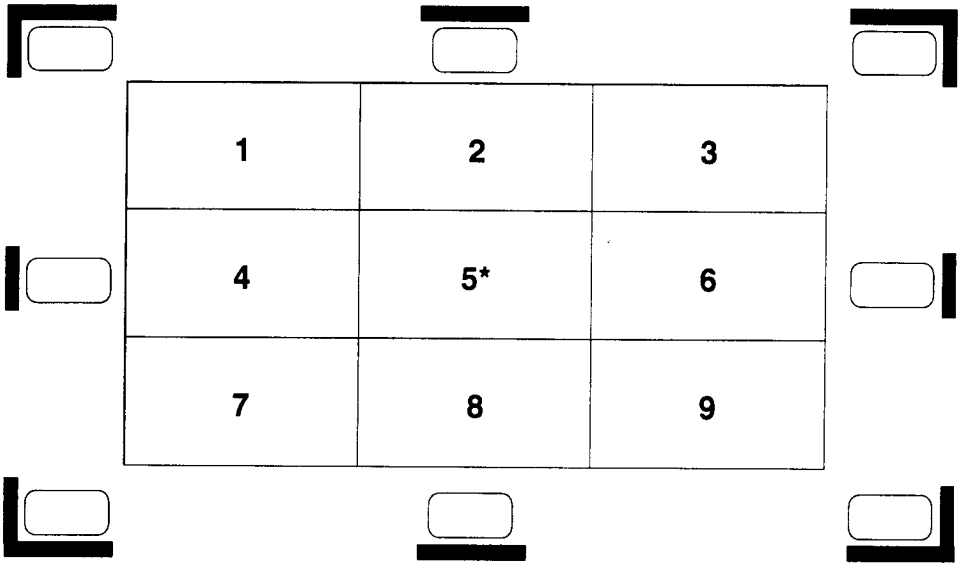

FIGURE 6-8.

¤ *** ZONE 5 (CENTER OF IMAGE) SERVES AS A REFERENCE POINT FOR THE SURROUNDING ZONES AND CAN ONLY BE ADJUSTED BY THE MASTER CONTRAST CONTROL.**

6.6.4.1 . . . Procedure: (CONTINUED)

- STEP 4. Turn the Red and Blue CRTs "OFF".
- STEP 5. GREEN ONLY! Measure and record the readings of each zone indicated in Figure 6-8.
- STEP 6. Set zone 5 (Figure D-1) to the lowest reading (recorded above), with the **[CONT]** button.
- STEP 7. Enter 92 **[CODE]** , to enable intensity mapping operation.
- STEP 8. Select **[GREEN]**, then select an EDGE and use the [↑] and [↓] down arrow keys to adjust zone 2, 4, 6, and 8 light levels to equal the light level of zone 5.
- STEP 9. Once the edges have been set, select and adjust the QUADRANTS for zones 1, 3 , 7 and 9 to equal that of zone 5 as in Step 8.
- STEP 10. RED ONLY then BLUE ONLY . Measure the light level of zone 5 of the red and set all other zones of the red image to equal zone 5. Repeat the process for the blue image.

¤ Start your adjustments with the edge controls for zones 2, 4, 6 and 8, as the settings of these edges will affect the light level of the quadrants (corners), i.e., the setting of zone 2 will affect the levels of zone 1 and zone 3 and always finish your adjustments with the quadrant controls for zones 1, 3, 7, and 9.

6.6.5 .....Notes:

- Enter 92 **[CODE]** to enable intensity mapping adjustment for the active channel. If any other adjustment other than Master brightness and contrast is made , 92 **[CODE]** will have to be re-entered.
- Pressing the **[GREEN]** (MASTER) button will select simultaneous adjustment of RED, GREEN and BLUE intensity. Press the **[RED]** or **[BLUE]** button to select individual adjustment of the RED or BLUE intensity.
- Use the edge and quadrant keys to select the desired side or corner of the projected image to be adjusted. Always start your adjustments with the edge controls and finish with the quadrant controls.
- Use the Up or Down arrow key to increase or decrease the level of the selected intensity mapping adjustment.
- Enter 93 **[CODE]** to null the process or reset (set to 50%)the settings for the intensity mapping

Use the following template to record your readings.

R= G= B=	R= G= B=	R= G= B=
R= G= B=	R= G= B=	R= G= B=
R= G= B=	R= G= B=	R= G= B=

NOTES

Section 7
RS- 232C Interface Data

7.1 .....General:

The AMPRO 3600/4600 Series Display Systems, features duplex RS232C communication network capability. The projectors can be controlled from a remote, a computer or a third party controller using RS-232C and ASCII characters. Display systems can be looped together so that multiple display systems and switchers can be addressed and controlled by one central source. Refer to Figure 7-1 for network configuration example.

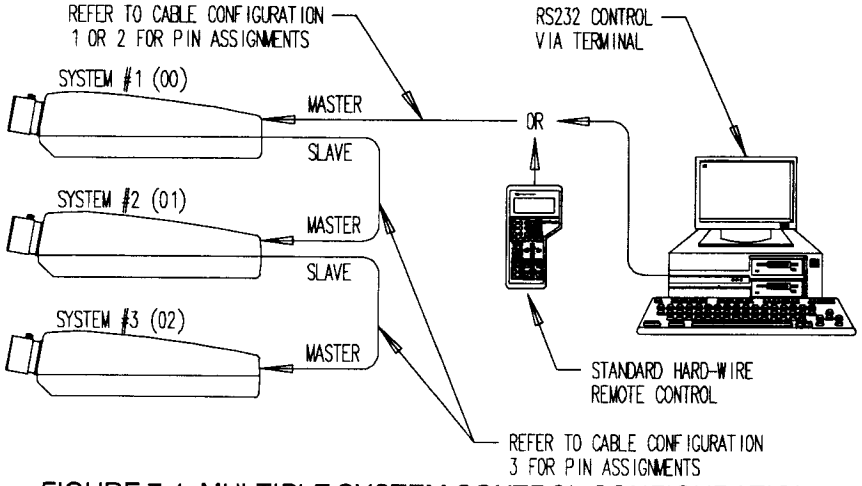

FIGURE 7-1. MULTIPLE SYSTEM CONTROL CONFIGURATION.

7.2 .....Hexadecimal Switch Configurations:

7.2.1 .....Hexadecimal Switch Locations:

The system has two hexadecimal rotary switches and an 8 position DIP switch located on the CPU module, (Figure 7-2), and are accessed by lifting the top cover and the top fan housing/cover. The switches are marked SW1, SW2 and SW3. The two rotary switches closest to the rear panel (SW1 and SW2) are used to assign the individual projector number to each unit installed within a network of projectors. Refer to Table 7-2 for setting SW1 and SW2. The third switch from the rear panel is SW3 (DIP). Position 7 and 8 will determine the communication baud rate, while position 2 will enable or disable the handshaking. See Table 7-1 for baud rate information.

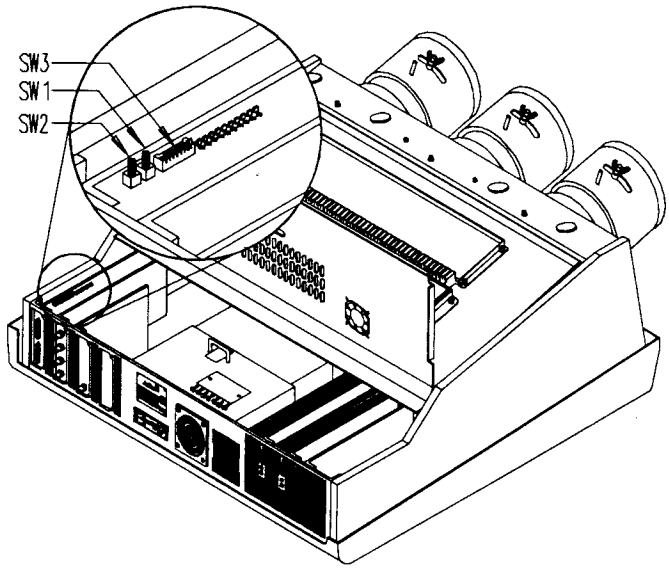

FIGURE 7-2. SW1, SW2 AND SW3 LOCATIONS.
(AMPRO 4600 SHOWN)

7.2.2 .....Baud Rate Switches SW3-7 and SW3-8 Configuration:

The table (7-1) shows the projector (CPU) baud rate switch settings for a variety of baud rates. Under normal conditions (default), the remote control and CPU should always be set to communicate at 9600 baud. However, limitations of the overall RS232C network, i.e., slower devices connected to the network or lengthy cabling, may require that the baud rate of the CPU and remote control be reduced.

SYSTEM (CPU) BAUD RATES		
BAUD	SW3-7	SW3-8
9600	OFF	OFF
4800	OFF	ON
2400	ON	OFF
1200	ON	ON

TABLE 7-1.

The top cover and the top fan housing/cover of the 4600 display system or the Registration Tray assembly of the 3600, must be lifted to access the multi-purpose 8 position DIP switch SW3. SW3 position 7 and 8 will select the operating baud rate while SW3 position 2 will select either handshaking enable or disable, see Figure 7-1. If the baud rate for the 3600/4600 display system has been changed, please refer to Section 7.2.3 for information on changing the remote control baud rate to match that of the CPU. The system has two hexadecimal rotary switches (SW1 and SW2) and an 8 switch DIP(SW3) located on the CPU module. These switches are used to establish the individual system address and operating baud rate.

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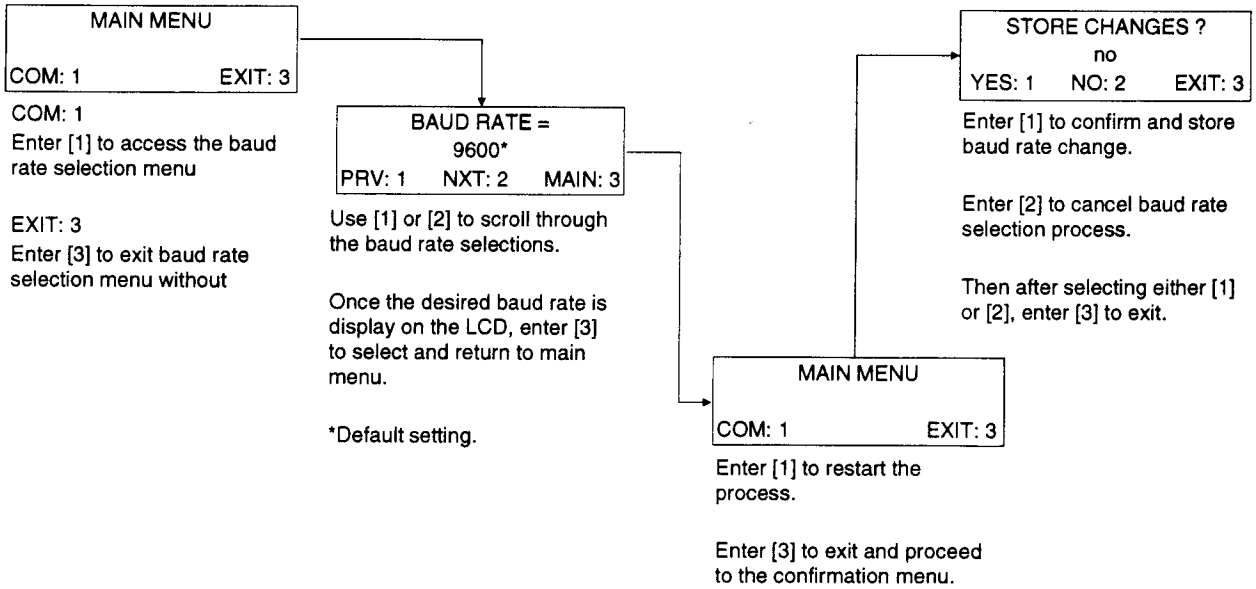
7.2.3 .....Remote Control Baud Rate:

To change the operating baud rate of the remote control perform the following;

- STEP 1. Apply AC power to the system, toggle the rear panel rocker switch to "on". It is NOT necessary to energize the display system at this time.
- STEP 2. Enter 808 **[CODE]**. This will activate the remote control baud rate selection menu(s) which are displayed on the LCD read-out. See below.
- STEP 3. Upon completion of the procedure, toggle the rocker switch (rear panel) to the "off" position and refer to Section 7.2.2 to change the baud rate of the system (CPU).

! To reset the remote control to the factory presets, enter 808 then press the **[KEY]** button.



7.3 . . . . . Host/Slave Port and RS-232C Cable Pin Assignments:

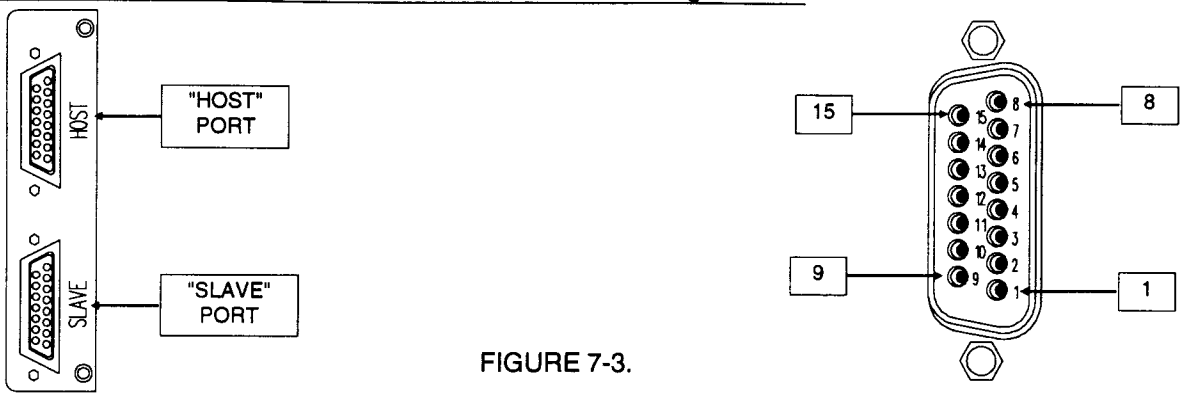


FIGURE 7-3.

PIN	HOST	SLAVE	PIN	HOST	SLAVE
1	GND	GND	9	N/C	N/C
2	TXD	RXD	10	N/C	N/C
3	RXD	TXD	11	Vraw	N/C
4	RTS	CTS	12	Vraw	N/C
5	CTS	RTS	13	N/C	N/C
6	DTR	N/C	14	N/C	N/C
7	GND	GND	15	DSR	DSR
8	DCD	DCD			

TABLE 7-1

7.3.1 . . . . . Cable Configuration 1: Host to Projector:

HOST DESCRIPTION	HOST PIN	AMPRO SYSTEM PIN	AMPRO SYSTEM DESCRIPTION
GND	1	1	GND
TXD	2	2	TXD
RXD	3	3	RXD
RTS	4	4	RTS
CTS	5	5	CTS
DSR	6	6	DTR
GND	7	7	GND
DCD	8	8	DCD
DTR	20	15	DSR

TABLE 7-2. DB25 (HOST) TO DB15 (PROJECTOR) CABLE.

7.3.2 . . . . . .Cable Configuration 2: IBM® PC to Projector:

HOST DESCRIPTION	HOST PIN	AMPRO SYSTEM PIN	AMPRO SYSTEM DESCRIPTION
RXD	2	2	TXD
TXD	3	3	RXD
CTS	8	4	RTS
RTS	7	5	CTS
DSR	6	6	DTR
GND	5	7	GND
DCD	1	8	DCD
DTR	4	15	DSR

TABLE 7-3. DB9 (HOST) TO DB15 (PROJECTOR) CABLE.

7.3.3 . . . . Cable Configuration 3: Projector to Projector

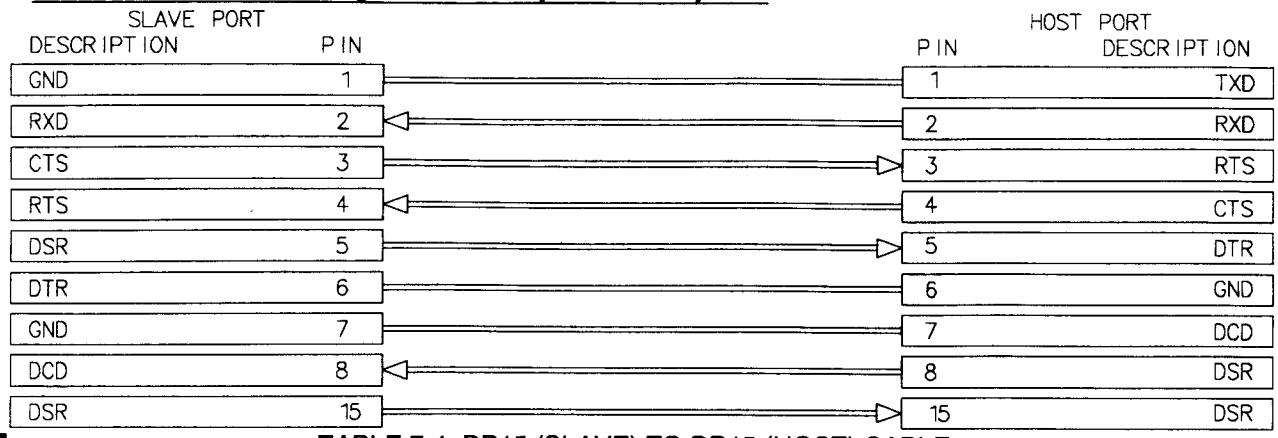


TABLE 7-4. DB15 (SLAVE) TO DB15 (HOST) CABLE.

7

7.3.4 . . . . . .Alternative 3-Wire Cable Configuration:

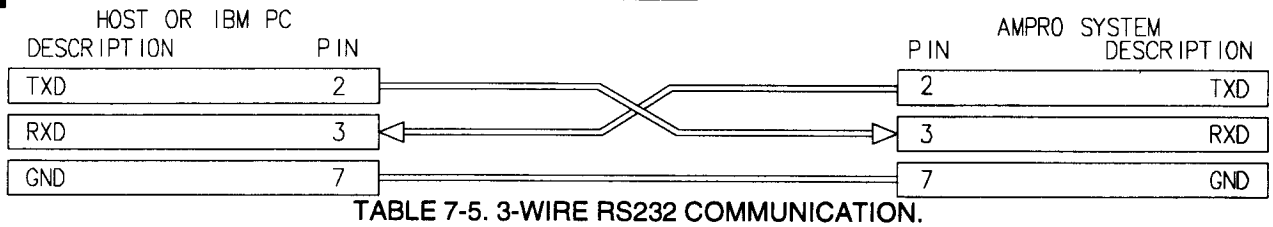


TABLE 7-5. 3-WIRE RS232 COMMUNICATION.

7.4 . . . . . RS-232C Operation:

7.4.1 . . . . . .Protocol:

The AMPRO 3600/4600 Series utilizes the standard RS232C communication format; 8 Data Bits, No Parity, 1 Stop Bit

7.4.2 . . . . . Mode Selection Commands:

COMMAND	FUNCTION	COMMAND	FUNCTION
A	Source command	V	QVD[2] or RGB[2] mode select command
@	Analog RGB mode select command	R	Test mode select command
T	QVD[1] or RGB[3] mode select command	$	Help mode select command

7.4.3 . . . . . Adjustment Mode Commands:

COMMAND	FUNCTION	COMMAND	FUNCTION
B	Brightness adjust mode command	P	Contrast adjust mode command
C	Color adjust mode command	+	Up arrow command
D	Detail adjust mode command	<	Left arrow command
E	Phase adjust mode command	-	Down arrow command
H	Tint adjust mode command	>	Right arrow command

The adjustment mode commands have two types of operation. The first uses the arrow keys to increment or decrement the adjustment which has been selected previously by one of the above keys. For example, if you wish to increase the brightness level, transmit a B, then transmit + until you have the desired brightness level. **NOTE:** When one of the adjustment mode select commands is received, the system responds by transmitting the present level of the desired adjustment.

7.4.3 . . . . Adjustment Mode Commands: (CONTINUED)

The second mode of operation allows you to set the level of the desired adjustment directly by transmitting an integer value in the range 0 - 100 followed by the appropriate adjustment character. For example, to set the tint level to a 75% level, you would transmit **75H**.

7.4.4 . . . . . .Toggle Commands:

COMMAND	FUNCTION
c	Cutoff command. This command is used in conjunction with one of the color keys e.g. **cd**, Cutoff Red CRT. To restore the Red CRT transmit **cd** a second time. Use **ce** for green and **cf** for blue cutoff commands.
K	Registration ON/OFF command. With registration on, the first **K** will turn registration "OFF" and the second **K** will turn registration "ON."
O	Power ON/OFF command. If the system is "OFF": the first **O** will turn the system "ON" and the second **O** will turn the system "OFF."
Q	Channel protect command. This allows the user to protect the settings stored in a particular channel location. Refer to Section 8, page 8-3, for information on setting channel parameters.
S	Standby On/Off. This command can toggle the projected image on and/or off.
X	RED CUTOFF command. This command is similar to the previous command cd. The first **X** will turn the RED CRT "OFF", presuming it was on, and the second **X** will turn the RED CRT "ON."
Y	GREEN CUTOFF command. This is similar to using the **ce** command. Use the **Y** character to toggle the GREEN CRT "ON and OFF."
Z	BLUE CUTOFF command. This command is the same as using the **cf** command. Toggle the BLUE CRT "ON and OFF" using the **Z** character.
?	Display diagnostic status. This command is used to display the diagnostic capability of the system. Transmit the **?** character a second time to disable the diagnostic display.

7.4.5 . . . . . .Numeric Commands:

COMMAND	FUNCTION
!	CHANNEL command. This command is preceded by an individual channel location number.
#	CODE command. This command is preceded by an specific code. Refer to Section 6, for code identification and operation, e.g. to display the ROM revision, transmit **35#**.
=	UNIT command. This command is used to address an individual unit number or use command **256=** to address all systems in a network.

7.4.6 . . . . . .Network Commands:

COMMAND	FUNCTION
:	Global listen command. Causes all projectors in a network to listen and respond to commands at the same time. This mode of operation continues until another projector is selected to listen, or until a global un-listen command is received. When in the global mode, only the projector with address "01" (switch settings "00") will respond with messages.
;	Global un-listen command. All projectors are commanded to not respond until a unit number has been selected or a global listen command is given.

7.4.7 . . . . Explicit Commands:

COMMAND	FUNCTION
(	STANDBY "ON" command. This character is used to place the system into a standby mode of operation.
)	STANDBY "OFF" command. This character is used in conjunction with the STANDBY "ON" command).
[	POWER "ON" command. This command will enable you to turn "ON" the system.
]	POWER "OFF" command. This command is used in conjunction with the POWER "ON" command [.
^	Auto-Search mode OFF. This character allows the user to turn channel auto-search mode "OFF". Useful with third party controllers, such as switchers.
_ (underscore)	Auto-Search mode ON. This character allows the user to turn channel auto-search mode "ON" Useful with third party controllers, such as switchers.
{	Channel write protect OFF. This command allows the user to turn the channel write protect mode off. Useful with third party controllers, such as switchers.
}	Channel write protect ON. This command allows the user to turn the channel write protect mode off. Useful with third party controllers, such as switchers.

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7.4.8 . . . . . .Registration Commands:

The registration commands listed in RS-232C Command table, page 7-6, are used in the same manner as outlined in Section 6. The lower case letters from "**a**" through "**w**" are assigned for registration commands.

The adjustment method is performed by using the +, -, < or > characters, e.g. to adjust the right edge linearity of the red image transmit "**dms**", then adjust by transmitting "<" or ">" characters (dms<) or (dms>).

! When using the registration commands, the system will respond with the selected area of adjustment, selected color and selected function.

7.4.9 . . . . . .Miscellaneous Commands:

COMMAND	FUNCTION
L	Display ROM revision level and date of the operating system and system's serial number.
N	Next test pattern command. This command is used in conjunction with the "**R**" command.
U	Display active unit number. See [UNIT] command.
\n	CLEAR command (LINEFEED). This character emulates the CLEAR key on the remote control.

7.5 . . . . . RS-232C Commands Table :

ASCII	COMMAND	REMOTE KEY
A	SOURCE SELECT	[SOURCE]
B	BRIGHTNESS	[BRIGHT]
C	COLOR	[COLOR]
D	DETAIL	68 [CODE]
E	PHASE	[PHASE]
F	RED SHIFT	[RED] [SHIFT]
G	BLUE SHIFT	[BLUE] [SHIFT]
H	TINT	[TINT]
I	BLUE STATIC VERTICAL SHIFT	40 [CODE]
J	RED STATIC VERTICAL SHIFT	41 [CODE]
K	REGISTRATION ON/OFF (toggle)	55 [CODE]
L	DISPLAY ROM REVISION & S/N	35 [CODE]
M	MONOCHROME MODE (toggle)	49 [CODE]
N	NEXT TEST PATTERN	[STEP]
O	POWER ON/OFF (toggle)	[POWER]
P	CONTRAST	[CONT]
Q	CHANNEL WRITE-PROTECT (toggle)	20 [CODE]
R	TEST MODE	[TEST]
S	STANDBY (toggle)	[STDBY]
T	QVD1 or RGB3	[SOURCE]
U	DISPLAY ACTIVE UNIT	[UNIT]
V	QVD2 or RGB2	[SOURCE]
W	NOT USED	NOT USED
X	RED CUTOFF (toggle)	*HOLD* [RED]
Y	GREEN CUTOFF (toggle)	*HOLD* [GREEN]
Z	BLUE CUTOFF (toggle)	*HOLD* [BLUE]
a	STATIC	[STATIC]
b	COARSE or FINE ADJUST MODE	[COARSE/FINE]
c	CUTOFF	HOLD + *COLOR*
d	RED	[RED]
e	GREEN	[GREEN]
f	BLUE	[BLUE]
g	SHIFT	[SHIFT]
h	SKEW	[SKEW]
i	BOW	[BOW]
j	KEYSTONE	[KEY]
k	PINCUSHION	[PIN]
l	SIZE	[SIZE]
m	EDGE LINEARITY	[EDGE]
n	LINEARITY	[LIN]
o	BLANKING	[BLANK]
p	TOP EDGE	

ASCII	COMMAND	REMOTE KEY
q	BOTTOM EDGE	
r	LEFT EDGE	
s	RIGHT EDGE	
t	TOP LEFT QUADRANT	
u	TOP RIGHT QUADRANT	
v	BOTTOM LEFT QUADRANT	
w	BOTTOM RIGHT QUADRANT	
x	VOLUME (RETRO ONLY)	N/A
y	BASS (RETRO ONLY)	N/A
z	TREBLE (RETRO ONLY)	N/A
\n	CLEAR	[CLEAR]
@	RGB MODE	[SOURCE]
!	CHANNEL	[CHANNEL]
#	CODE	[CODE]
$	HELP	[HELP]
(	STANDBY "ON"	N/A
)	STANDBY "OFF"	N/A
+	UP ARROW	
-	DOWN ARROW	
<	LEFT ARROW	
>	RIGHT ARROW	
:	GLOBAL LISTEN	256 [UNIT]
;	GLOBAL UN-LISTEN	[UNIT]
=	UNIT	[UNIT]
?	DISPLAY DIAGNOSTIC (toggle)	30 [CODE]
[	POWER "ON"	N/A
]	POWER "OFF"	N/A
~	AUDIO MUTE OFF (RETRO ONLY)	N/A
|	TOGGLE MUTE (RETRO ONLY)	N/A
^	AUTO-SEARCH OFF	N/A
_	AUTOSEARCH ON (under-score)	N/A
{	WRITE PROTECT OFF	N/A
}	WRITE PROTECT ON	N/A

NOTES

Section 8
Preventative Maintenance And System Error Diagnostics

8.1 .....Preventative Maintenance:

- 1. Avoid direct sunlight, moisture, heat and improper mounting.
- 2. Provide sufficient ventilation to the rear and bottom two fans to avoid overheating of internal components.
- 3. The Data/Graphic Display System may be kept in good condition by wiping it with a clean, soft, dry cloth. See section 8.2 for special lens care and cleaning.
- 4. For general safety, the system should be cleaned internally only by an authorized AMPRO corporation service technician. Especially clean the fan inlet areas.
- 5. Adjust your cleaning schedule according to your particular environment.
- 6. Do not place magnetic equipment near the system.

8.1.1 .....Precautions:

- 1. Secure service any time the Data/Graphics display system is damaged or fails. An obvious change in performance may also indicate a need for service.
- 2. Do not attempt to service this system yourself by opening or removing covers that may expose you to dangerous voltages or other hazards. Refer all servicing to qualified service personnel.
- 3. Remove the power plug from the wall socket when the Data/Graphics Display System is not functioning properly.

8.2 .....Lens Care And Cleaning:

When your Data/Graphics Display System is not being used for prolong periods of time, please cover the lenses with the lens covers provided with the system.

To minimize the possibility of damage to the optical coating or scratching the exposed lens surface, we recommend you first try to remove any material from the lens by blowing it off with deionized air or lightly brushing it with a soft camel's hair brush.

8.2.1 .....Lens Cleaning:

- 1. Do not spray any type of fluid directly on the lens surface.
- 2. Do not use any dry material to clean the surface (dry rag, tissue, etc.)
- 3. Use a commercial liquid window cleaner (e.g. Windex, Easy Off or Glass Plus). Do not use an aerosol. Other cleaning agents, such as laboratory grade acetone or ethyl-ether (70% - 30%) may also be used. If you are not sure of the cleaning agent, experiment with a small area of the lens first.
- 4. Use a lens tissue, a soft cotton cloth, or any soft facial tissue.
- 5. When using a window cleaner, moisten the tissue or cloth and lightly wipe the surface. Then dry with a new tissue.

8.2 . . . . . Lens Care And Cleaning: (CONTINUED)

- 6. When using acetone or ethyl-ether mixture, proceed as follows:

Fold the tissue or cloth several times to form a pad. Soak the folded end of the pad in the acetone. Starting at the diameter opposite to you immediately wipe the coated lens, with very little pressure, toward you in a straight line equal to the evaporation rate. This is important to prevent streaking and spotting. Start your wiping at one side of the lens and, with successive wipes, move to the other side. Turn the pad over for each wipe, then inside out. Do not make more than one wipe per clean area of pad. Be careful of the painted edge of the lens, since acetone will soften it.

8.3 . . . . . .Trouble Shooting:

Symptom	Possible Cause	Solution
The unit is connected to an active AC outlet, the rocker switch is in the "ON" position, but there is no LCD read-out and no LCD backlight.	Faulty line cord	Replace line cord
	Open main fuse	Check and/or replace main fuse
	Wrong voltage selected	Check and/or select proper voltage and main fuse.
	Hard-wired remote control is not connected.	Connect hard-wired remote control to "HOST" port on the CPU.
	Faulty remote control or cable.	If available, replace remote control/cable.
No LCD read-out on the remote control, but the LCD back light functions properly.	Unit's address switches are not set properly.	Refer to Supplement 3 (operation manual) for proper switch configuration.
	Baud rate switch is not set properly.	Refer to Supplement 3 (operation manual) for proper switch configuration.
	System is in the "Quiet" mode of operation.	Enter 900 [CODE] and press any key....repeat if necessary.
	CPU lock-up	Toggle the main AC rocker switch and retry....repeat if necessary.
The LCD indicates the model, but the system does not turn on when the [POWER] button is depressed.	Remote control may be faulty.	If available, try another remote control.
	If an extended cable is being used.	Remove extension cable from the system and retry.
The system is on, no error messages are displayed, but no image is projected.	Lens covers are still installed.	Remove lens covers.
	Unit is in the standby mode of operation.	Depress the [STANDBY] button.
	Wrong mode of operation selected.	Select the proper mode of operation.
	Source is not turned on.	Enable source or select internal test.
	Contrast and/or brightness levels are too low.	Increase contrast and brightness levels.
	Blanking is not set properly.	Enable and set top, bottom, left and right blanking.
	System needs to be in the diagnostics mode.	Enter 30 [CODE] to enable error messages.

TABLE 9-1

8.4 . . . . . Error Messages:

The AMPRO 3600/4600 systems provide three sets of diagnostics messages which are displayed on the LCD read-out located on the standard hard-wired remote control to provide information about the internal communications between modules, projector mode and operational status.

One set of error messages that may be displayed are mode status error messages. Mode status error messages indicate a wrong function has been selected for the current mode of operation or the selected function can not be entered. An example of a mode status error message is as follows. When a particular channel number has been selected and an attempt to adjust brightness is made, an error message "WRITE PROTECTED" is displayed. This error message refers to a particular channel location and that the parameters of this channel have been established and placed inactive to avoid unwanted adjustments. Refer to section 8.4.1, Table 8-2 for additional mode status error messages.

The second set of error messages provided are operational status messages. This type of message provides information about the projector in case of a malfunction for either a voltage or wave form error.

When the system is connected to an active A.C. source and the rocker switch on the rear panel is turned on, the LCD will display "AMPRO 3600 (AMPRO 4600) ". When the [POWER] button on the remote control is pressed, the system's LCD read-out will display "INITIALIZING," then display the last mode of operation used when the system was de-energized, if there are no malfunctions.

If there is a malfunction of the equipment the system will display an error message. An example of the sequence of messages you would get if the - 20V rail was missing is as follows. After the power button on the remote control is pressed, the first read-out would be "INITIALIZING" then "-20 VOLTS LO". This error process continues to cycle through all error messages applicable.

If for some reason the system has been turned on, the desired mode of operation has been selected and the appropriate source is active; however, no image is being projected and there are no diagnostic error messages being displayed on the LCD, use the enable diagnostics command **30 [CODE]**. Refer to section 8.5.2 for additional operational status error messages.

The last type of error messages that made be displayed are I^2C error messages. These type of messages indicate some type of communication failure between internal modules, typical the CPU (master) and another module (slave), and are displayed on the LCD read-out such as; ERROR 20 AT 4E. The first number indicates the type of communication error and the second numeric/alpha indications the address of the failed device. Refer to Section 8.4.3, for address identification.

8.4.1 . . . . . .Mode Status Error Messages:

ERROR MESSAGE	POSSIBLE CAUSE	SOLUTION
ACCESS DENIED	The system is in the factory mode and a password entry has been tried.	Turn SW3-3 "0ff" and enter 44 [CODE] to exit the factory mode.
AUTO RESTART	System has momentarily loss A.C. line voltage or system was de-energized by main rocker switch.	System should power up as normal.
BAD NUMERIC CODE	Numeric code outside of range entered.	Enter numeric code within range.
BAD VIDEO MODE	Video mode of operation outside of range entered.	Enter proper Video mode of operation.

TABLE 8-2

8.4.1 . . . . Mode Status Error Messages:

ERROR MESSAGE	POSSIBLE CAUSE	SOLUTION
CASE OVER TEMP	The interior of the system has reached its maximum operating temperature.	Check fan operation, fan air inlet ports (3 each).
CHOOSE EDGE	Wrong area of adjustment selected for desired function.	Select proper area key for desired function.
DYNAMIC FUNCTION	Wrong operation for selected function.	Select proper function.
ENTER PASSWORD	SW#-3 is in the "on" position placing the projector into the factory mode.	Turn SW3-3 "off" and enter 44 [CODE] to re-initialize the switch settings and exit the factory mode.
ERROR # AT # (I^2C ERROR)	Communication failure between internal modules.	See Section 8.5.3, Table 8-3.
ERROR CODE 1000	In-compatibility between internal modules has occurred.	Call factory
ERROR CODE 1001	In-compatibility between internal modules has occurred.	Call factory
ERROR CODE 1002	In-compatibility between internal modules has occurred.	Call factory
HI BEAM CURRENT	CRT protection mode of operation.	Toggle main power rocker switch OFF/ON. Restart system. If continuous, contact a service technician.
HVPS RESTART	Momentary protection from high voltage arcing occurred.	If continuous, contact a service technician.
HVPS SHUTDOWN	Loss of high voltage has occurred.	Contact a service technician.
INVALID	Unrecognized command.	Retry command.
INVALID CHANNEL	Channel number outside of range (1-50) entered.	Enter channel number within given range.
INVALID TEST	Test number outside of range entered.	Select proper test mode (1 - 4)
INVALID TIME	Time outside of range entered.	Enter time within range (24 hour clock)
INVALID VALUE	Value outside of range (0-100) entered.	Enter value between 0-100.
KEYS DISABLED	Registration adjustments are being attempted with "lock-out" feature activated.	To enable registration keys, enter 46 [CODE].
MEMORY FAILURE	Loss of data occurred.	Re-enter all settings, channel numbers, registration settings, etc.
MUST BE IN NTSC	Function entered operates in the NTSC modes only.	Select Video (NTSC) mode of operation
MUST BE IN RGB	Function entered pertains to the RGB mode of operation only.	Enter RGB and retry function.

TABLE 8-2 (continued)

8.4.1 . . . . Mode Status Error Messages: (CONTINUED)

ERROR MESSAGE	POSSIBLE CAUSE	SOLUTION
MUST BE IN VIDEO	Function entered operates in the Video modes of operation only.	Enter Video mode and retry.
NETWORK DISABLED	Unit number other than 1 has been entered, with the network capability disabled.	See Section 7.
NO VALIDATED CHANNEL	The A.C.S. command has been entered and no "validated" channel(s) have been found.	
NO VALIDATED DATA	A.C.S. has been activated and no validated channel were found.	
NOT INSTALLED	Optional mode selected with no optional module installed.	Refer to the respective replacement procedure, Section
OPEN INTERLOCK	Missing or loose module/connector.	Verify or re-seat all modules / connectors.
OVER FREQUENCY	Source selected outside of specified frequency range.	System in operating out of specified range.
RED OR BLUE ONLY	Wrong area of adjustment selected for desired color.	Select proper area key for desired function.
RIGHT OR LEFT ONLY	Wrong area of adjustment selected for desired function.	Select proper area key for desired function.
SELECT QUADRANT	Wrong area of adjustment selected for desired function.	Select one of four quadrant keys.
SMPS OVER TEMP	The interior of the SMPS box has reached its maximum operating temperature.	Check rear fan operation, and/or clean air inlet.
SYSTEM OVER TEMP	The projector has detected the interior operating temperature has reached a critical condition.	Check rear (1) and bottom fans (2) operation, air inlets for cleanness.
WRITE PROTECTED	Attempts to adjust predetermined parameters are being made to a channel location.	Enter 20 [CODE] to disable write-protect function
WRONG DIRECTION	Wrong adjustment arrow selected for desired function	Select correct arrow key for desired function.

TABLE 8-2 (continued)

8.4.2 . . . . Operational Status Error Messages "VOLTAGE ERROR":

The following low voltages are generated by the SMPS (Switch Mode Power Supply) and may be verified by removing the fuse cover plate. See Illustration 8-1, Page 8-14 for L.E.D. layout and assignments. Grid 1, Grid 2 and High Voltage are developed on the HVPS (High Voltage Power Supply).

FUSE / VOLTAGE			MODULE														NOMINAL RESISTANCE Ω	
	FUSE	VOLT	CPU	ANALOG RGB1	OPTION SLOT 1	OPTION SLOT 2	CRT AMP CARD and CRT	VERTICAL DEFLECTION	H.O.T. POWER	HORIZONTAL CONTROL	H.O.T. OUTPUT	REGISTRATION	REGISTRATION AMP	FOCUS MODULATOR	HVPS	FANS		
	F1	FIL					■										170k	88k
	F2	-9	■	■				■				■					1k	269
	F3	-20	■	■	■	■	■	■		■		■		■	■	■	393	398
	F4	-25	■										■				10k	2k8
	F5	+9	■	■				■		■		■					28k	32k
	F6	+20	■	■	■	■	■	■	■	■	■	■		■	■		1k	978
	F7	+25	■								■		■				9k9	9k9
	F8	+40	■											■			205k	197k
	F9	+180	■						■		■						9k2	9k2
	N/A	-50												■			N/A	
	N/A	G1					■										N/A	
	N/A	G2					■										N/A	
	N/A	HV					■										N/A	

ISOLATE SHORTED RAILS BY DE-ENERGIZING UNIT, REMOVING THE POWER PLUG AND REPLACING ANY BLOWN FUSES. MEASURE RESISTANCE TO GROUND, THEN REMOVE THE APPROPRIATE MODULE(S) ONE AT A TIME UNTIL THE SHORT CLEARS.

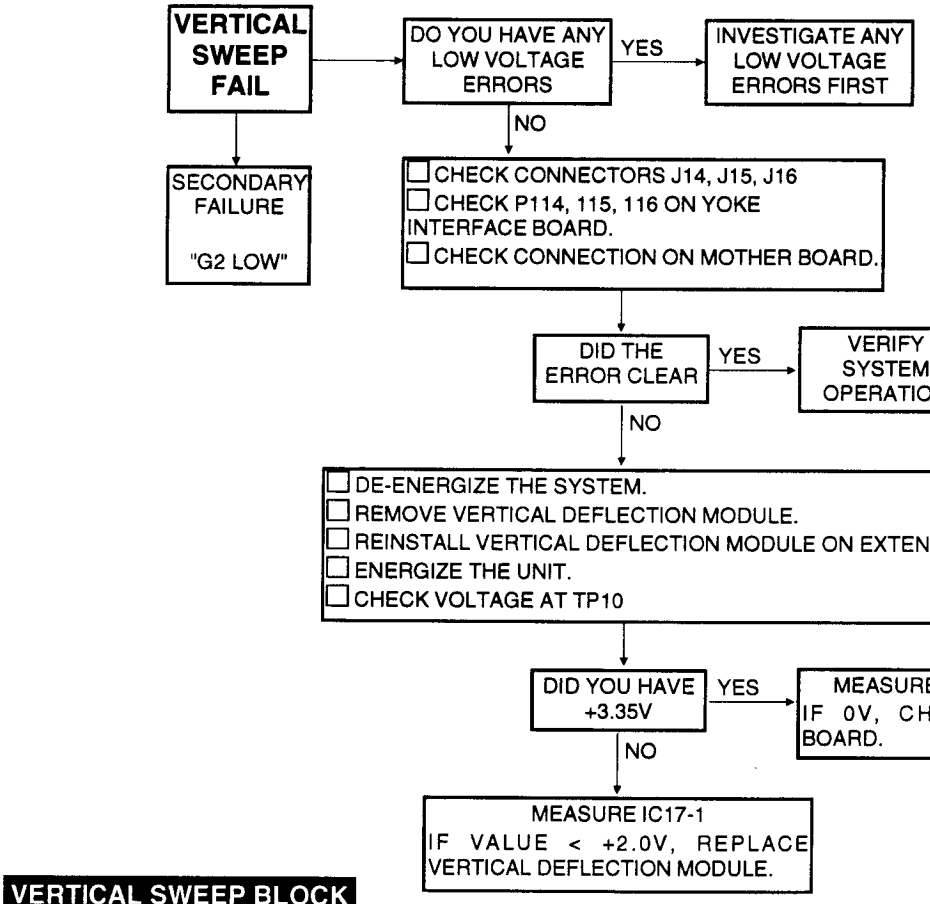
8.4.3 . . . . Operational Status Error Messages: "WAVE FORM ERRORS"

The following is a list of possible wave form error messages that may appear on the LCD readout and the related trouble shooting guide for each.

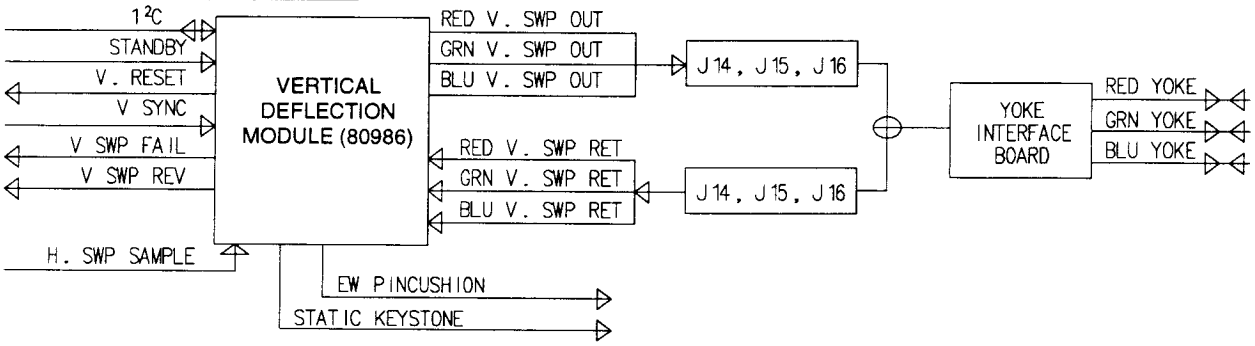
WAVE FORM ERROR MESSAGES	
"NO H SYNC" (No Horizontal Sync)	"NO H RESET" (No Horizontal Reset Pulse).
"NO V SYNC" (No Vertical Sync)	"NO V RESET" (No Vertical Reset Pulse)
"H SWEEP FAIL" (Horizontal Sweep Fail)	"G1 FAIL LOW" (Grid 1 Voltage Low).
"V SWEEP FAIL" (Vertical Sweep Fail)	NO INPUT (Check Source).

8.4.3.1 . . . . .Vertical Sweep Failure:

VERTICAL SWEEP FAIL

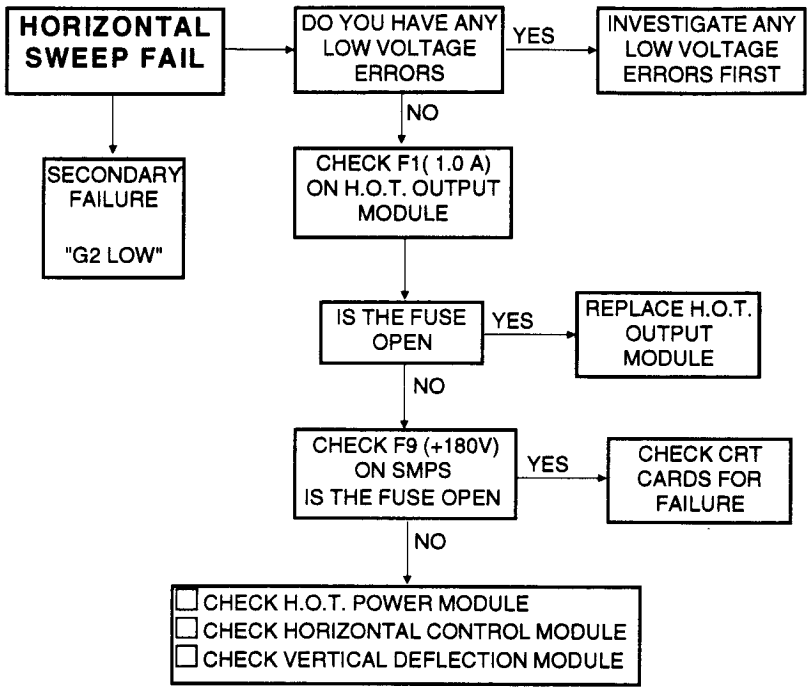


VERTICAL SWEEP BLOCK



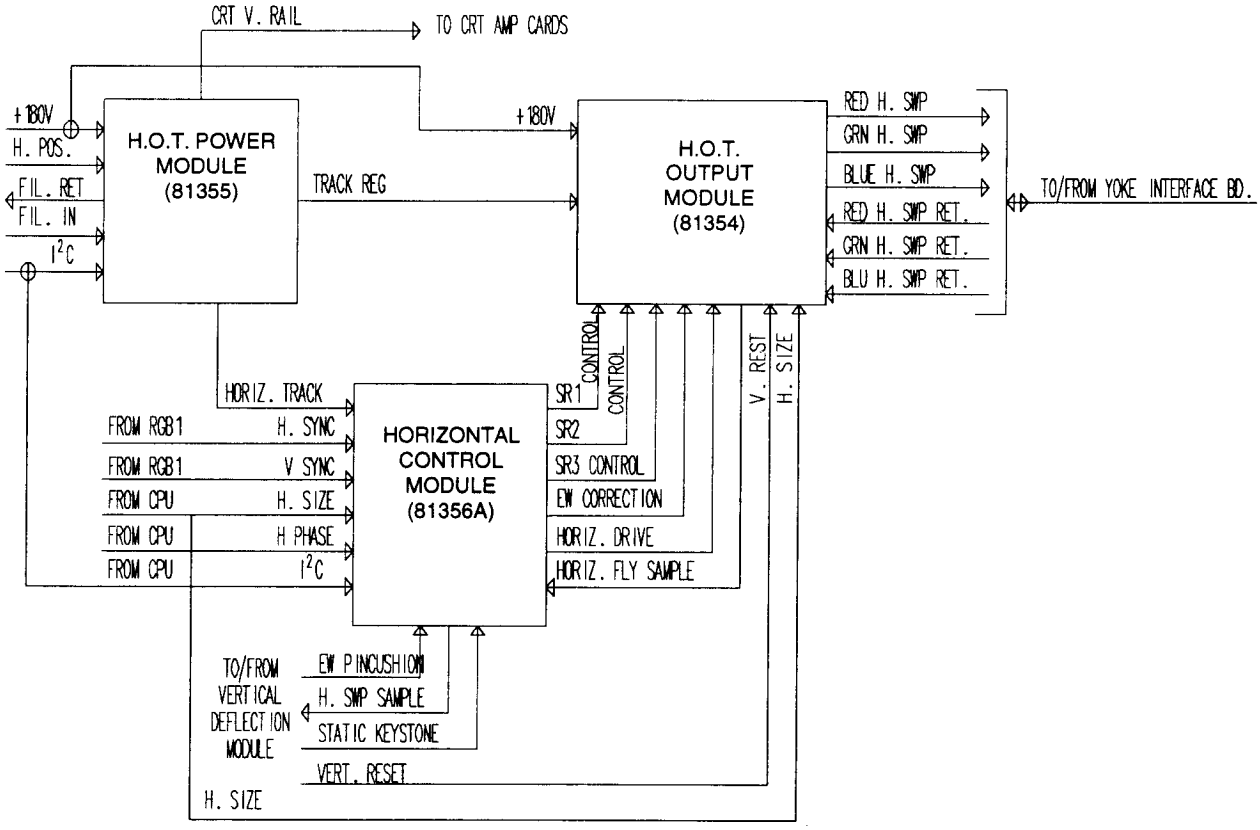
8.4.3.2 . . . Horizontal Sweep Failure:

HORIZONTAL SWEEP FAIL



8

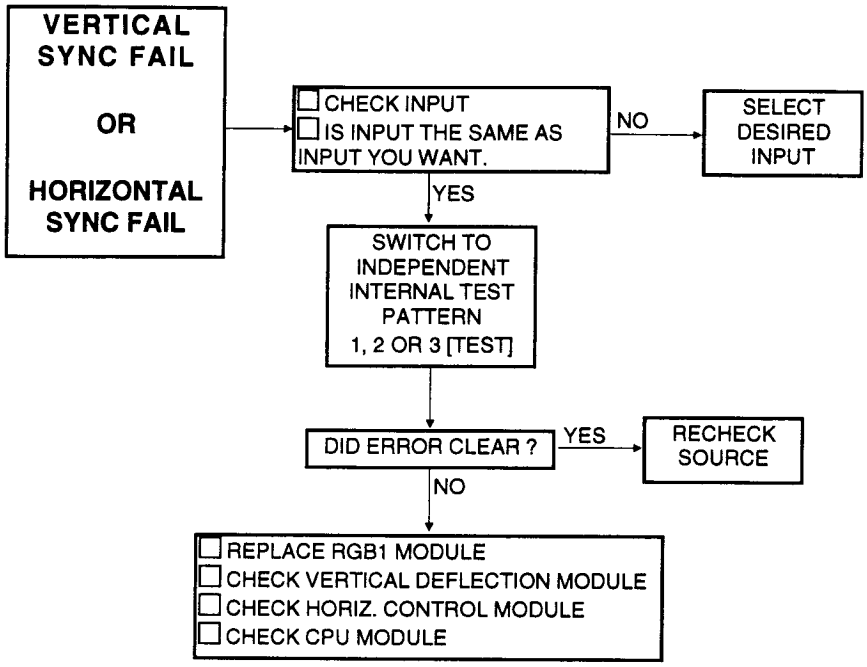
HORIZONTAL SWEEP BLOCK



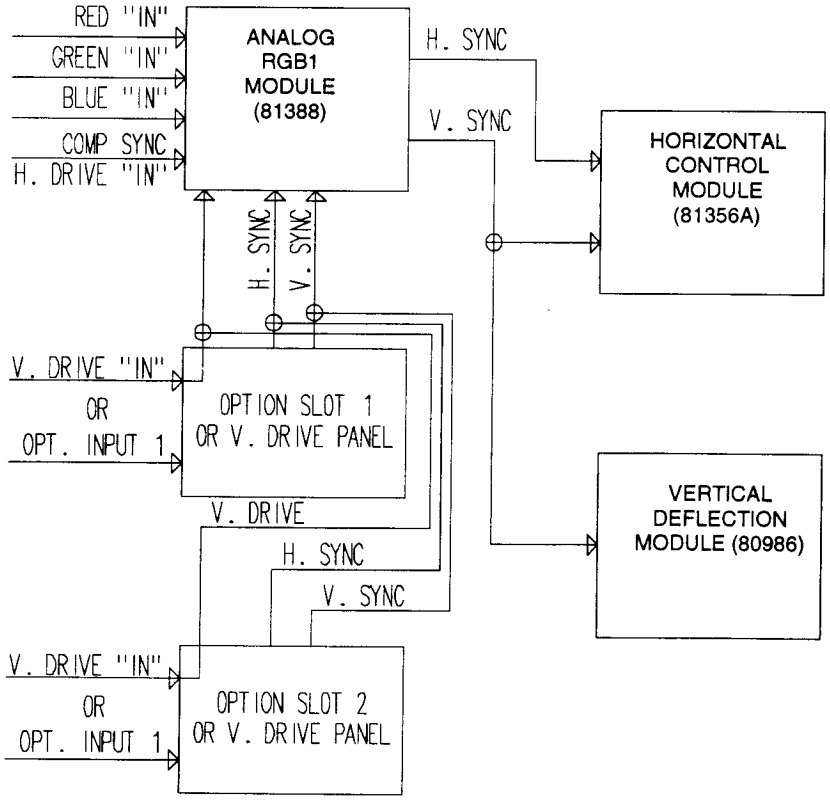
8.4.3.3 . . . No Horizontal or Vertical Sync:

NO VERTICAL SYNC

NO HORIZONTAL SYNC

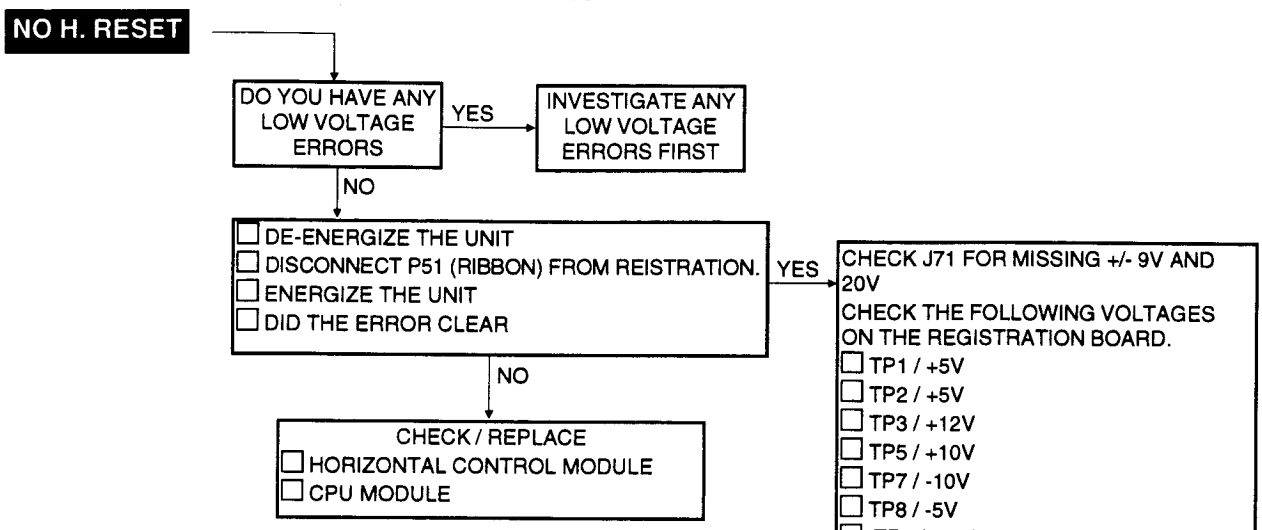


H&V SYNC BLOCK

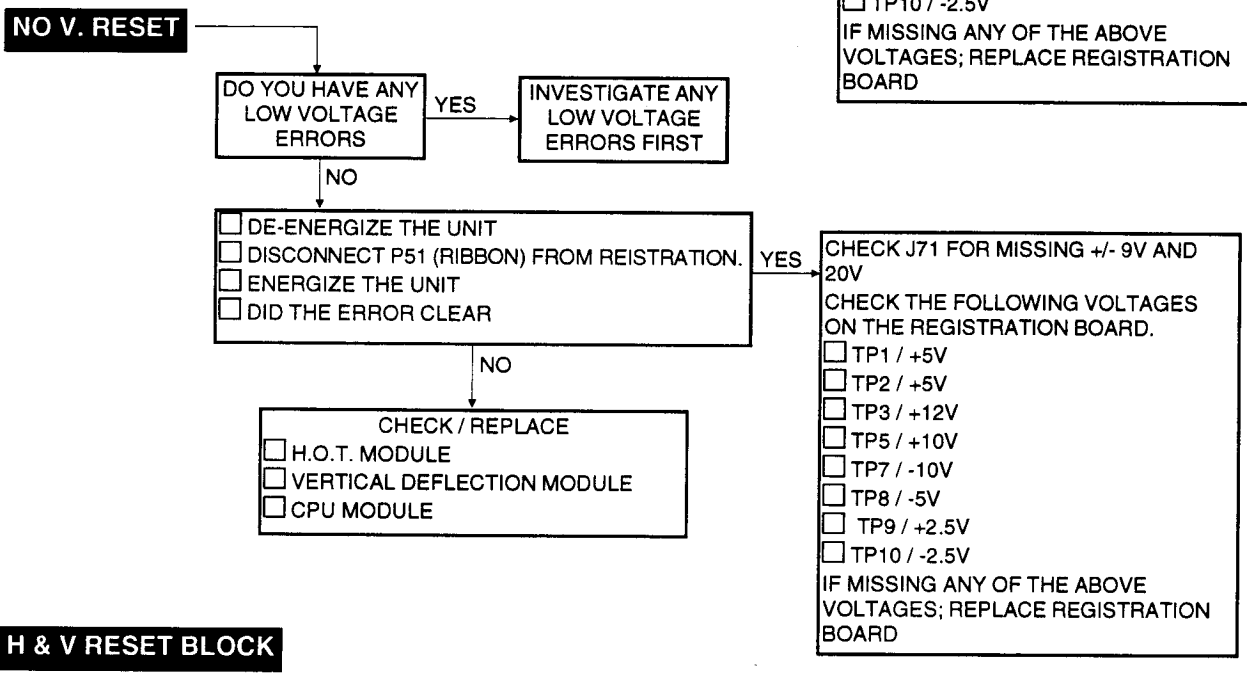


8.4.3.4 . . . No Horizontal or Vertical Reset:

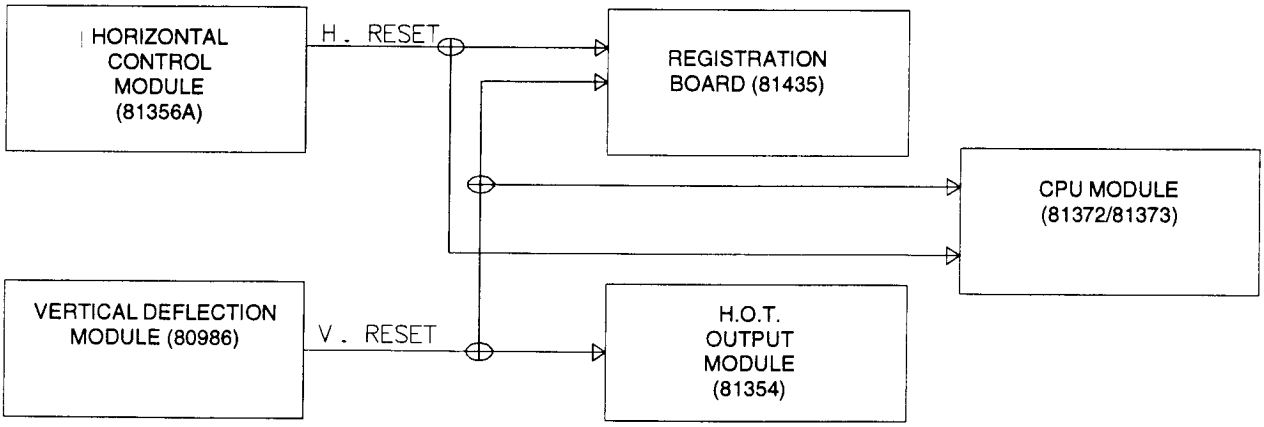
NO H. RESET



NO V. RESET

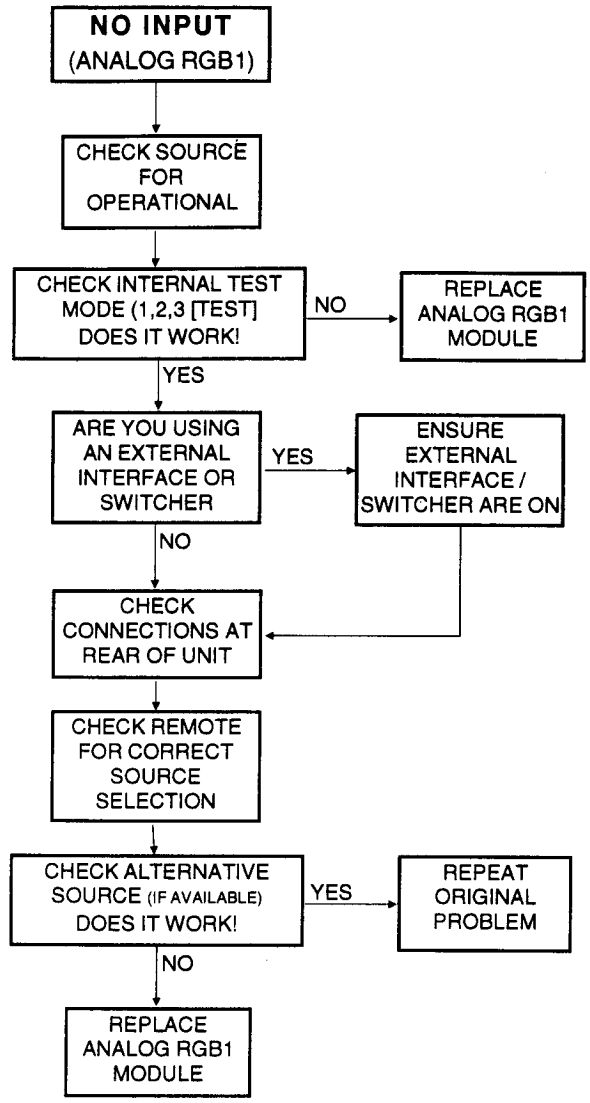


H & V RESET BLOCK

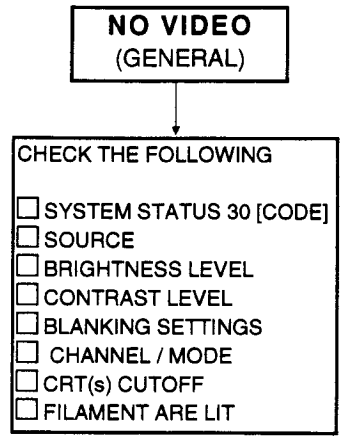


8.4.3.5 . . . No Input / No Video:

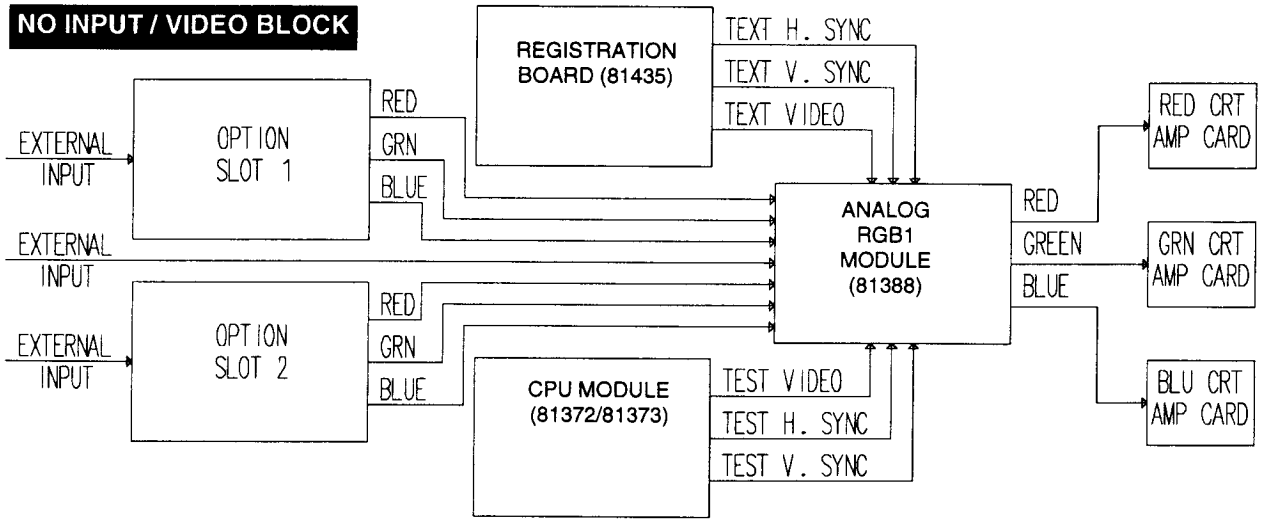
NO INPUT



NO VIDEO

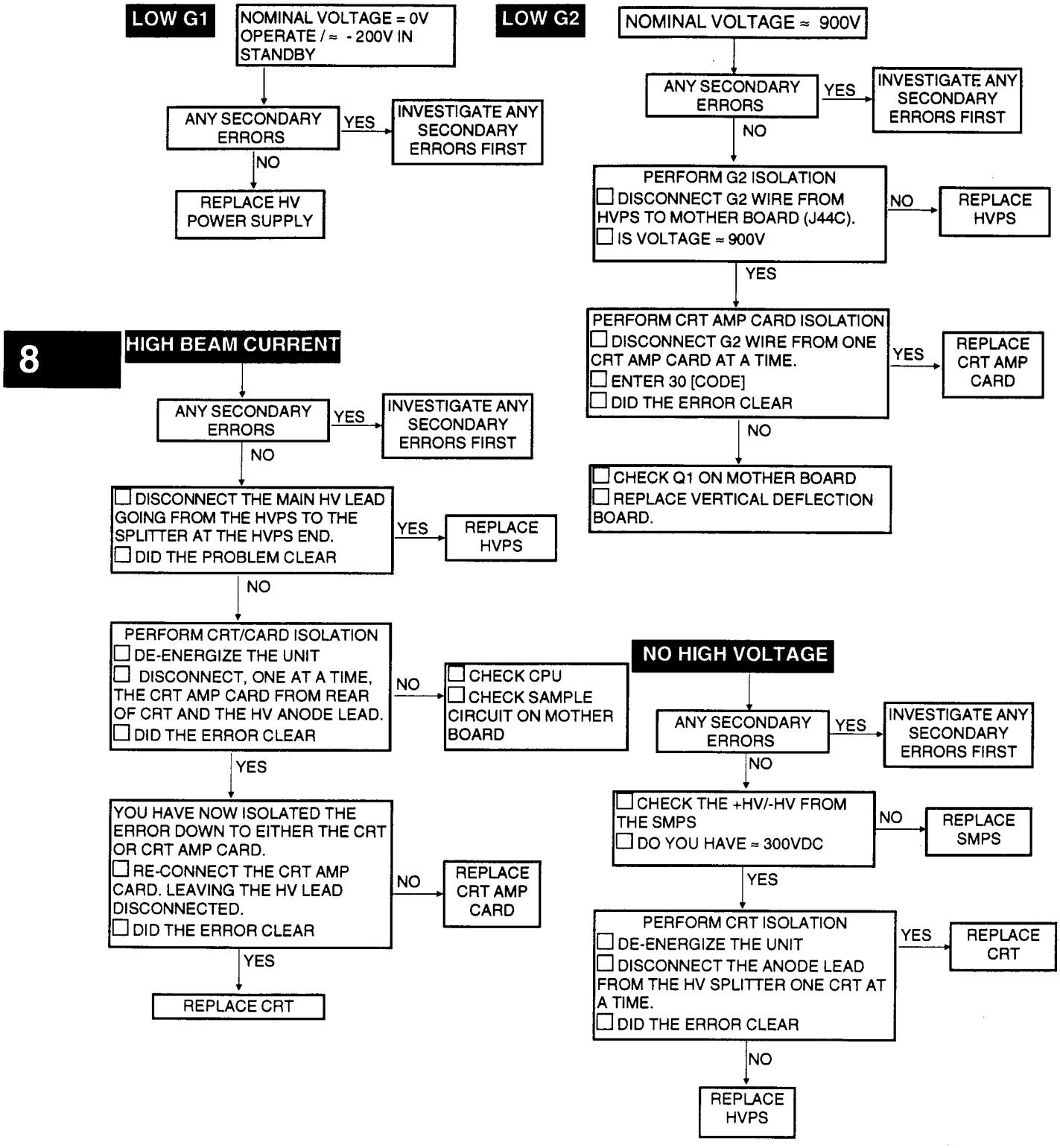


NO INPUT / VIDEO BLOCK



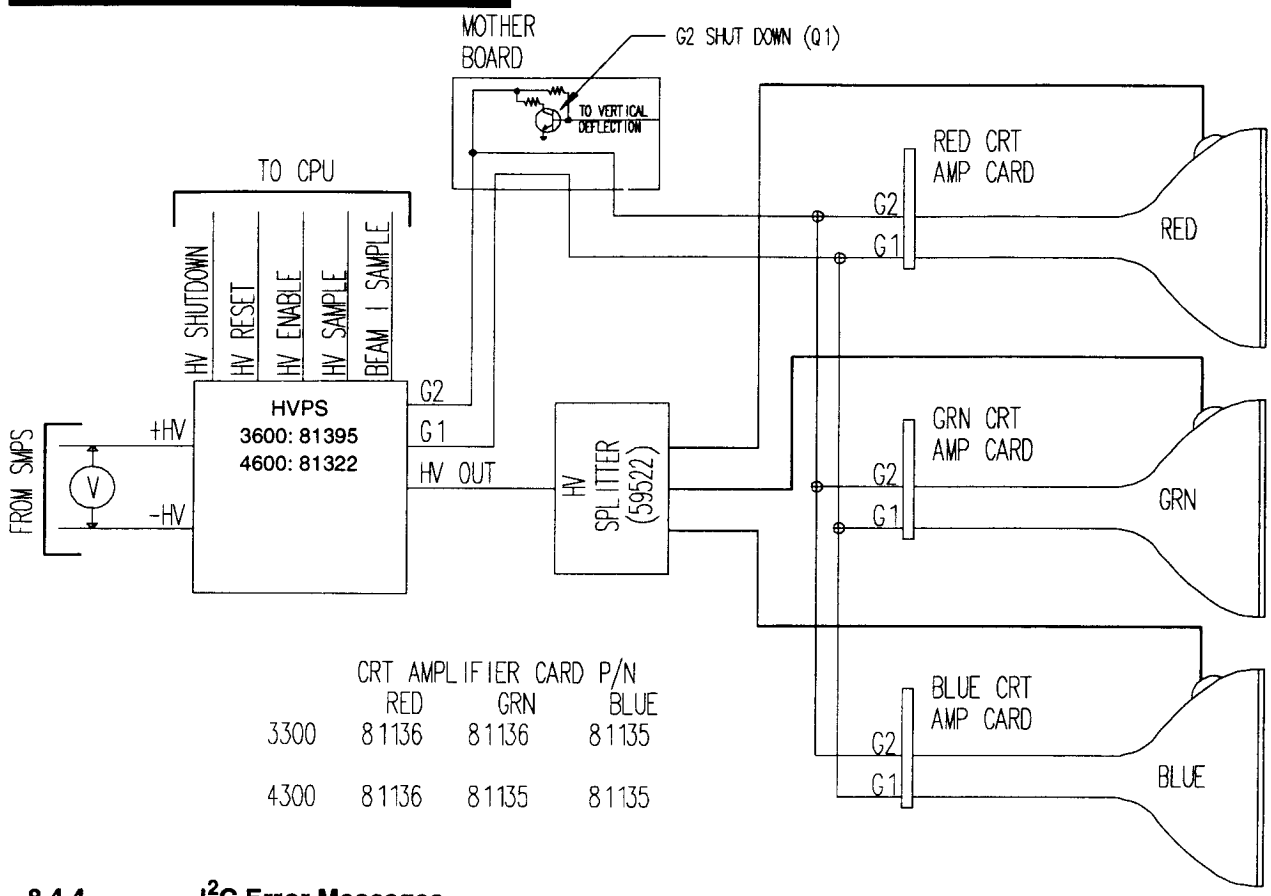
8.4.3.6 . . . Low or No G1 , G2 and/or High Voltage / High Beam Current (SEE BLOCK NEXT PAGE):

Remember! When disconnecting and reconnecting components, ALWAYS de-energize the system



8.4.3.6 . . . Low or No G1 , G2 and/or High Voltage / High Beam Current (CONTINUED):

LOW G1 / G2 / HV / HI BEAM I BLOCK



CRT AMPLIFIER CARD P/N

	RED	GRN	BLUE
3300	81136	81136	81135
4300	81136	81135	81135

8.4.4 . . . . . I^2C Error Messages

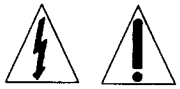
I^2C ADDRESS REFERENCE TABLE				
ADDRESS	MODULE	REFERENCE	DEVICE	DESCRIPTION
A0	CPU	IC5	PCF8583D	RAM/CLOCK
A2	CPU	IC7	24C02AT	SERIAL EEPROM
40	CPU	IC37	TDA8444AT	OCTAL DAC
A6	MOTHER	IC1	24CO2	SERIAL EEPROM
A4	HORIZONTAL	IC15	X2402	SERIAL EEPROM
44	VERTICAL	IC8	TDA8444	OCTAL DAC
54	RGB1	IC15	87c751	MICROPROSSOR
74-30,32,34,36	REGISTRATION	IC21	PCF8577	LCD CONTROLLER
74-38,3A,3C,3E	REGISTRATION	IC28	PCF8577	LCD CONTROLLER
56	REGISTRATION	IC69	87c751	MICROPROSSOR
46	FOCUS MODULATOR	IC6	TDA8444	OCTAL DAC
48	FOCUS MODULATOR	IC7	TDA8444	OCTAL DAC
ERROR TYPE	DESCRIPTION			
08	NO ACKNOWLEDGE FROM I^2C DEVICE			
00	OTHER ERRORS			

8.5 . . . . . Internal LED Error Indicators:

8.5.1 . . . . . .SMPS Low Voltage Indicators:

The DC outputs of the switch mode power supply are fused and indicated by the LEDs located on the upper cover of the module. Additionally, these voltages are monitored by the CPU's diagnostics routine and may be addressed by entering **[30] [CODE]**. See Figure 8-3. NOTE: All LEDs are normally "ON".

8.5.2 . . . . . .CPU LED Error Indicators:



Located on the CPU Module is a row of ten (10) mini LEDs. (CR35 through CR44) which indicate any CPU related problems, such as failure of the internal I^2C or external RS232 communications. CR43 and CR44 indicate the standby voltage conditions which are illuminated when the main AC is applied and the main toggle switch is in the "ON" position. Refer to Figure 8-3 for the operating conditions of the remaining LEDs.

8

CR35 - CR44 DESCRIPTION		
CR	FUNCTION	NORM
35	REGISTRATION ON/OFF	ON
36	RS232 HALT	OFF
37	RS232 FAULT	OFF
38	I^2C FAULT	OFF
39	I^2C BUSY	FLASH
40	RESERVED	OFF
41	RESERVED	OFF
42	RESERVED	OFF
43	+5V ALWAYS	ON
44	+12V ALWAYS	ON

SW3 FUNCTION DESCRIPTION		
POS	FUNCTION	NORM
1	NETWORK ENABLE/DISABLE	OFF
2	HANDSHAKE ENABLE/DISABLE	OFF
3	FACTORY MODE (PASSWORD REQUIRED)	OFF
4	INTERLOCK ENABLE/ DISABLE	OFF
5	I2C ENABLED/DISABLE	OFF
6	MODULE INSTALLATION (USE WITH 70 [CODE])	OFF
7	BAUD RATE SELECT (WORKS COLLECTIVELY WITH SWITCH 8 (BELOW))	OFF
8	BAUD RATE SELECT (ABOVE)	OFF

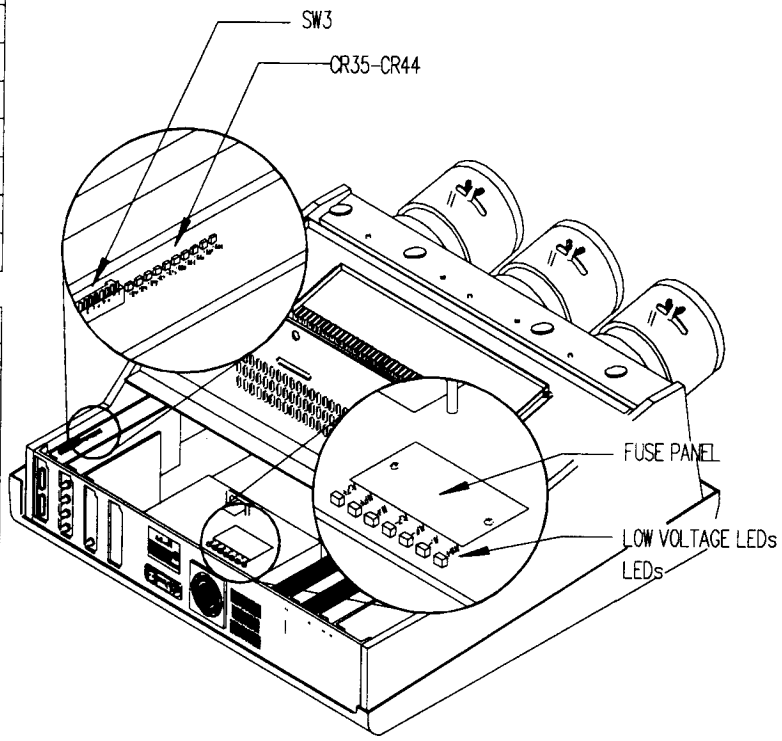


FIGURE 8-1.

8.6 . . . . . Servicing Policy:

Repair of the AMPRO modular designed systems shall be accomplished exclusively through a factory sub-assembly module exchange program. Servicing by a AMPRO Corporation Service Center or by an AMPRO Corporation selling dealer, is limited to failure diagnostics, registration alignment, and replacement of CRT assemblies, lenses, and sub-assembly modules.

No material and/or labor credit will be granted for an exchange sub-assembly, if it has been repaired, reworked or modified. The warranty is voided if a repair, rework and/or modification of a sub-assembly module is performed other than by AMPRO Corporation.

To return a sub-assembly module for exchange a Return Authorization number (RA number) must be obtained from the AMPRO Corporation Customer Service Department. To obtain an RA number for exchange of a sub-assembly module it will be necessary to have the following for the Customer Service Representative.

- ☐ Particular Symptom(s)
- ☐ Model Number
- ☐ Serial Number

AMPRO
CORPORATION
TECHNICAL SERVICE DEPARTMENT
525 JOHN RODES BOULEVARD
MELBOURNE, FLORIDA 32934
VOICE (407) 254-3000 ♦ FAX (407)253-3001 ♦ 800-254-3001

NOTES

8

Section 9

Module Identification / Replacement

9.1 . . . . . Opening the Top Cover:

To access the internal modules and perform the various procedures, the top cover of the system must be unlocked and tilted up, see Figure 9-1. In addition to the opening the top cover, Tray 1 and or Tray 2 will have to be unlocked and tilted-up, see Section 9.2.

- STEP 1. The top cover is lifted by; (1) turning the two each 1/4 turn fasteners located on both sides of the bottom cover, towards the lens end of the system. (2) pull and lock the two top cover hinges located on both sides towards the rear of the system.

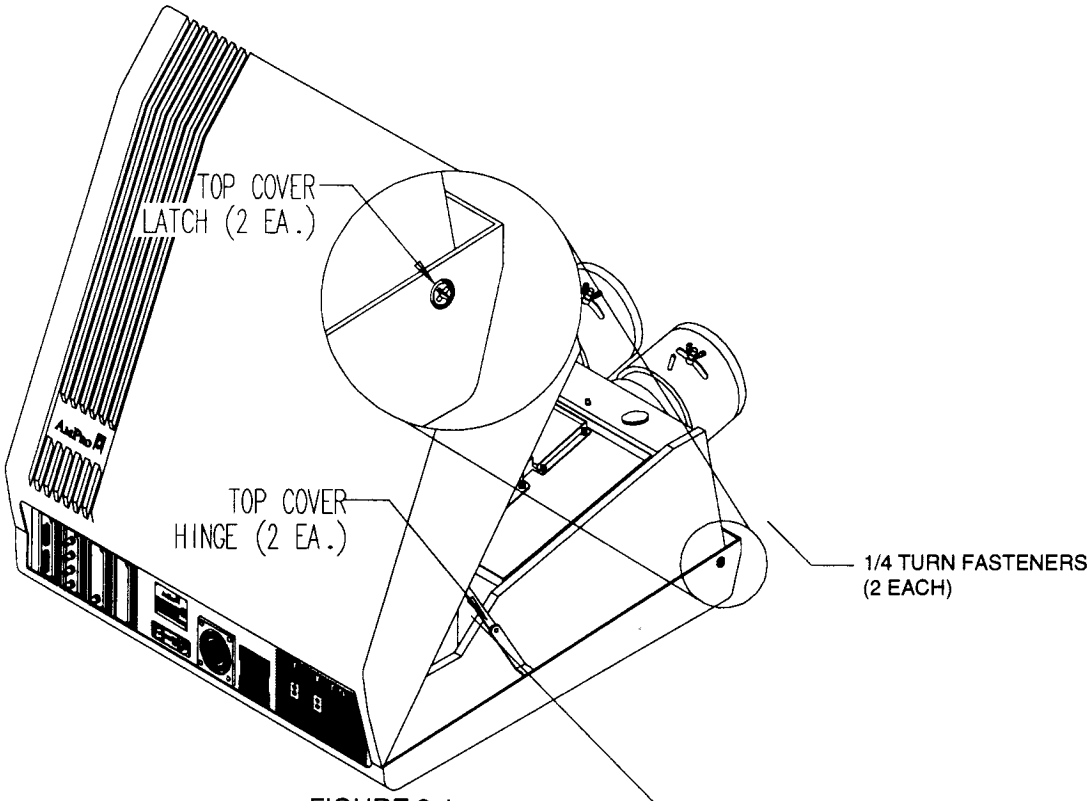
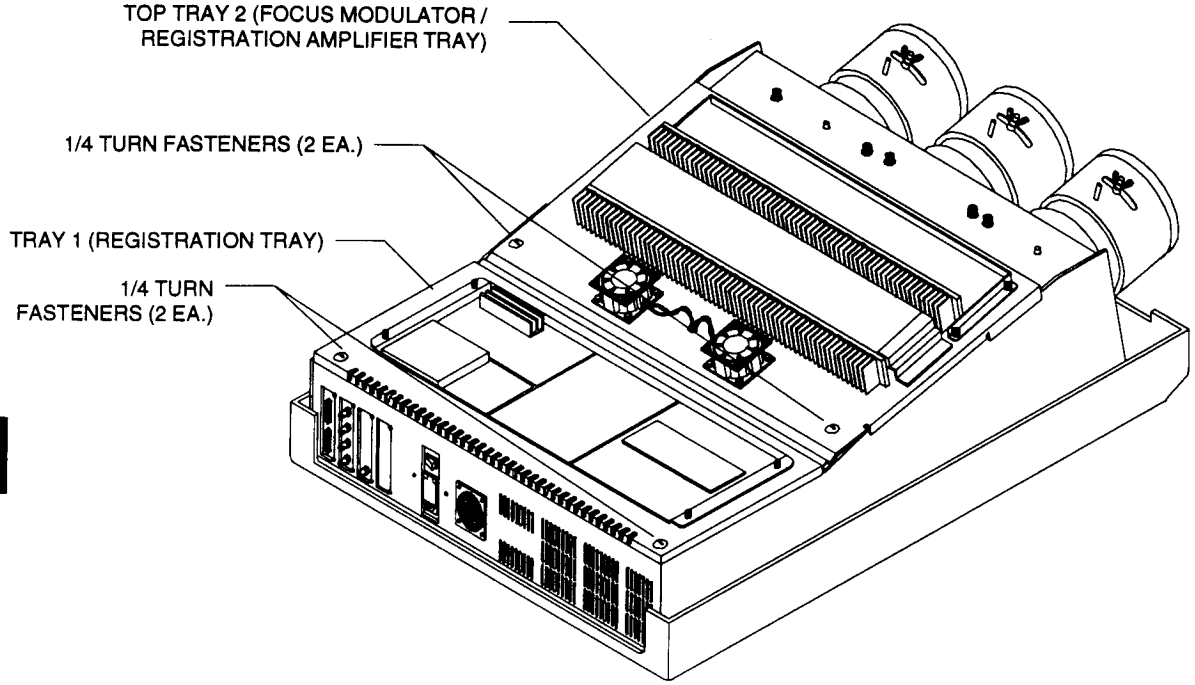


FIGURE 9-1.
(4600 SHOWN)

9.2 . . . . . Top Tray 1 and Tray 2 Assemblies.

- STEP 2. Unlock and tilt up the registration tray assembly and the registration amplifier / focus modulator tray assembly. See Figure 9-2.

AMPRO 3600



AMPRO 4600

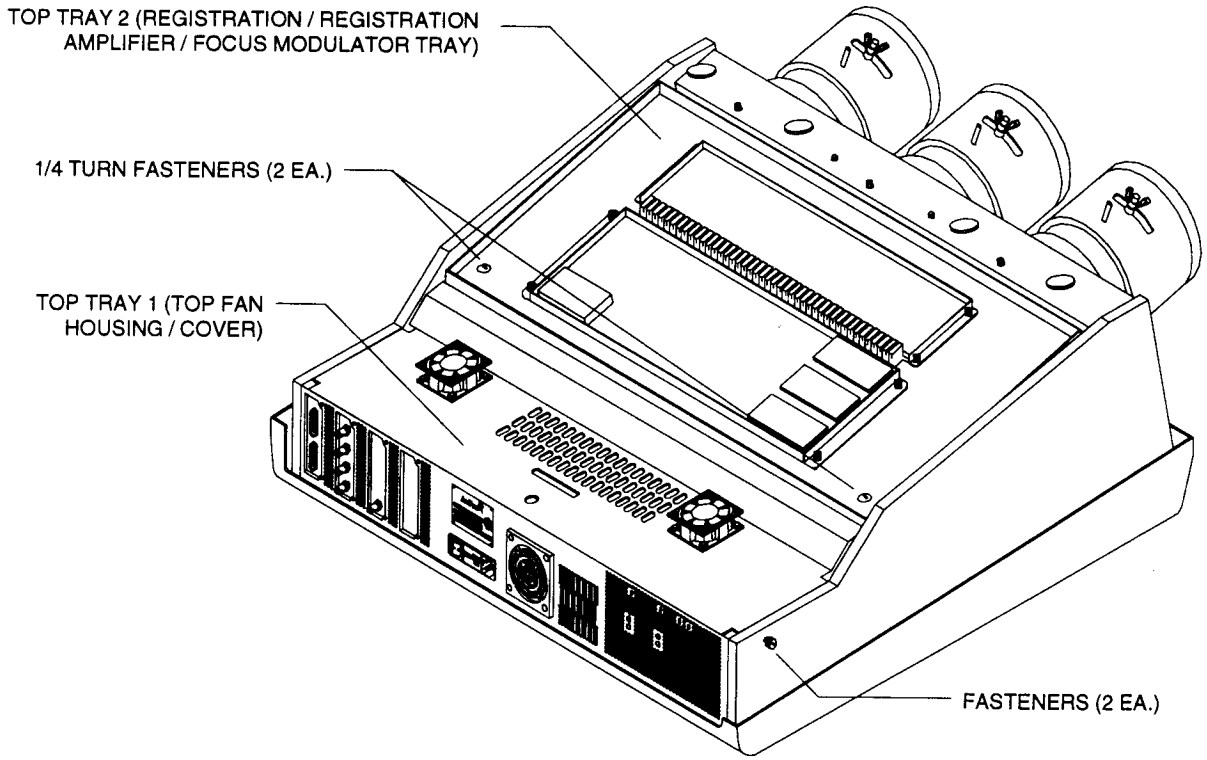
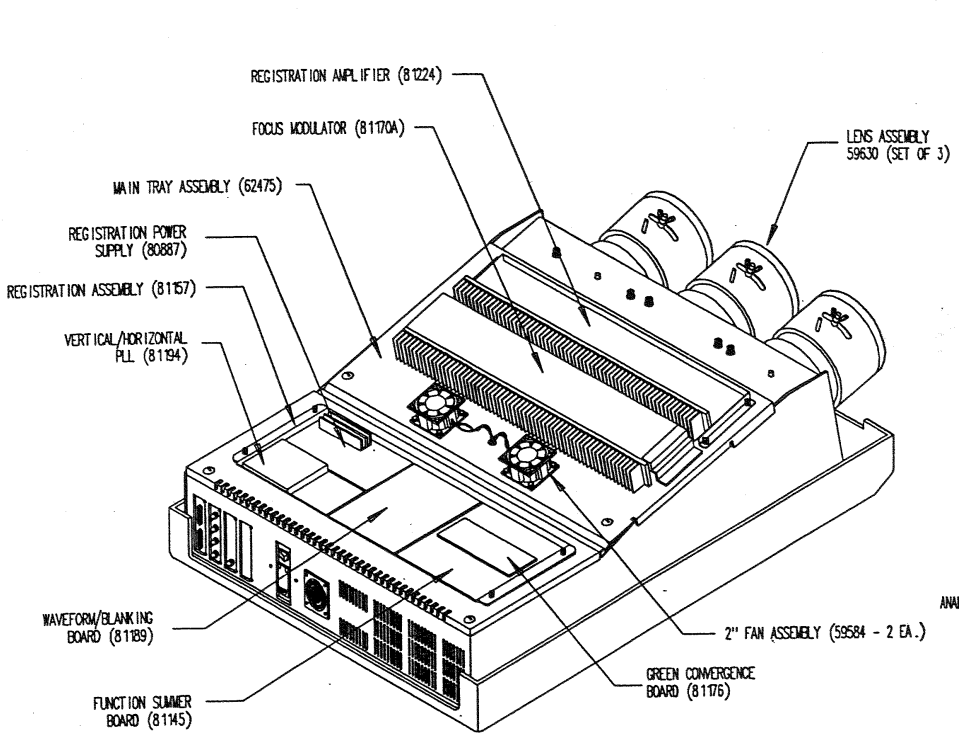
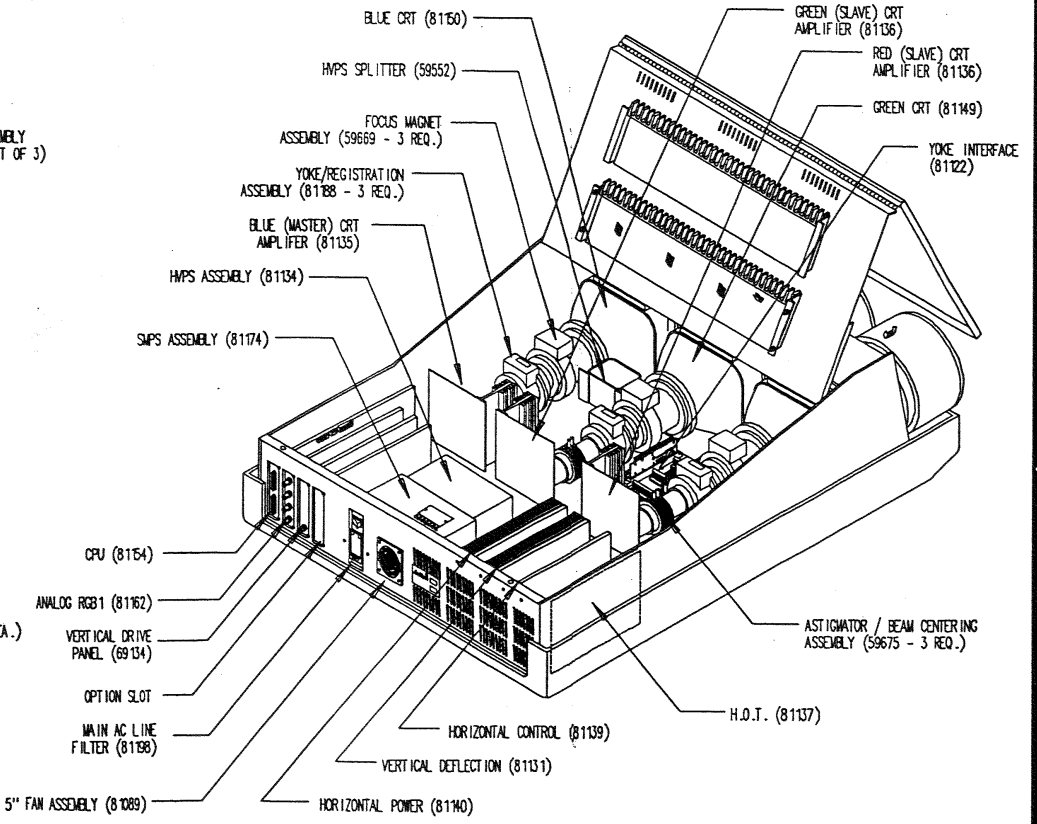


FIGURE 9-2. LOCATION/ACCESSING TOP TRAY 1 AND 2.

10.3 . . . . . .Module Identification: AMPRO 3300:



*81157 ASSEMBLY INCLUDES: 80887, 81145, 81176, 81189 AND 81194



9.5 Module Replacement Procedures:

CAUTION!
ELECTROSTATIC
SENSITIVE
DEVICE

9.5.1 CPU Module: 3600 (81372) / 4600 (81373):

Tools Required

☐ Slotted Screwdriver ☐ Small Phillips Screwdriver ☐ ESD grounding paraphernalia

Replacement Procedure

! NOTE 1: Do not place the foil side of the either the defective or replacement CPU module on any electrically conductive material. If failure to comply, module damage will result

- STEP 1. Disconnect the main A.C. power cord, and lift the top cover up.
- STEP 2. Disconnect all connectors from the "HOST" and "SLAVE" ports on the CPU module.
- STEP 3A. On the 3600, Unlock and tilt-up the back half of the main tray assembly.
- STEP 3B. On the 4600, unlock and tilt-up the fan housing/cover assembly.
- STEP 4. Remove the single 4-40 phillips screw securing the CPU module to the left side of the chassis, as viewed from the rear.
- STEP 5. Remove the two (2 each) 4-40 phillips screws, mounting the CPU module to the rear panel.
- STEP 6. Carefully remove the CPU from the chassis.
- STEP 7. Install the replacement module and secure with the previously removed hardware. Perform Steps 1 through 3A/3B in reverse order.

! NOTE 2: Ensure the address switches (SW1/SW2) and the baud rate switch (SW3-7/SW3-8) and handshaking enable/disable (SW3-2) and networking switch (SW3-1) are set to the default or desired positions.

NOTE 3: Refer to the technical data furnished with the upload/download program for restoring pre-established channel data

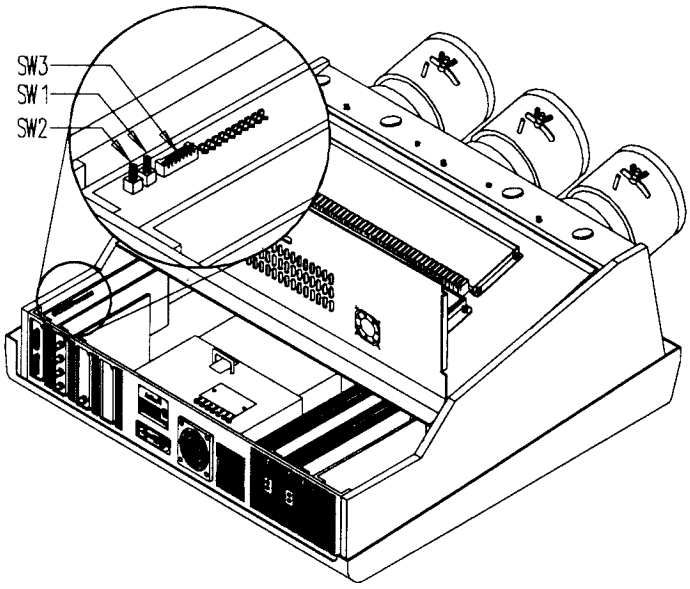


FIGURE 9-3. CPU REPLACEMENT.

NOTES

9.5.2 . . . . Analog RGB1 Module (81388) Replacement Procedure:

Tools Required

☐ Small Slotted and Phillips screwdriver ☐ 120MHz dual trace oscilloscope and probes

☐ NTSC color bar video generator ☐ 1 "in" / 3 "out" distribution amplifier

Replacement Procedure

- STEP 1. Disconnect the main A.C. power cord and unlock/tilt-up the top cover assembly.
- STEP 2. Unlock and tilt-up the main tray assembly.
- STEP 3. On the RGB1 module (second module from the left, as viewed from the rear). Remove the three (3) mini coax cables located midway on the module. See Figure 9-4.
- STEP 4. Remove the two (2) each 4-40 phillips screws securing the RGB1 module to the rear panel, lift the RGB1 module straight up and out.
- STEP 5. Install the replacement RGB1 module and secure with the hardware previously removed.
- STEP 6. Re-connect the three (3) mini coax cables, in their proper order to their respective connectors on the RGB1 module. See Figure 9-4.

! NOTE: White dot on side of P6, P7 and P8 faces board.

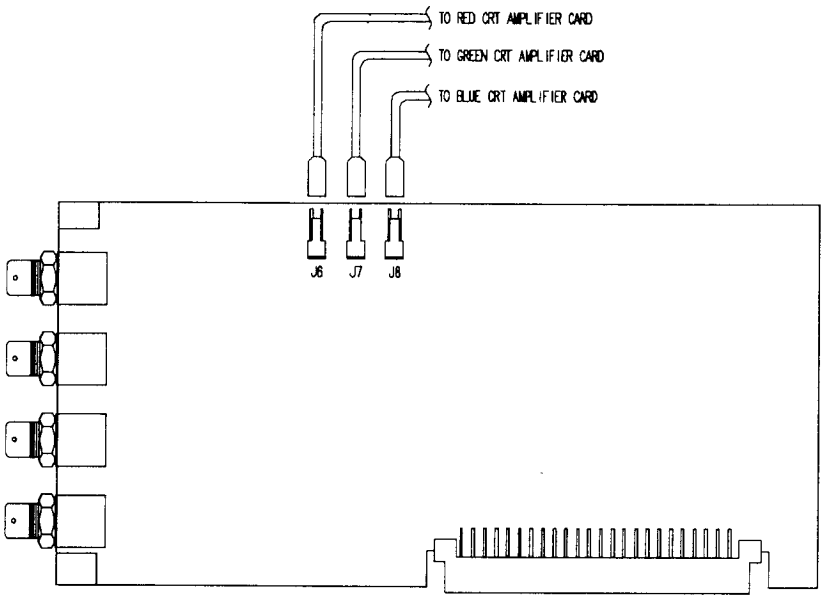


FIGURE 9-4. RGB1 module replacement.

Analog RGB1 Verification Test

Since the operating parameters of the RGB1 module are digitally controlled by the remote and stored on the CPU module within individual channel locations, it is not required to set-up the operating parameters of the RGB1 module. A verification of operation is only required.

Analog RGB1 Operation Verification Prerequisites

- ☐ INPUT: 1vp-p color bars w/IWQ, burst and chroma off.....into a 1 "in" - 3 "out" video distribution amplifier, connected to the Red, Green and Blue inputs located on the rear panel of the RGB1 module.
- ☐ CLAMPING: select back-porch clamping, [48] [CODE].
- ☐ CHANNEL: any channel not presently assigned or used.
- ☐ MODE: RGB mode of operation, preferable set (converged) for 15kHz.
- ☐ REMOTE SETTINGS: brightness [BRIGHT] and contrast [CONT] at 95%. Set left blanking to 5% and right blanking to 95%

Analog RGB1Operation Verification Procedure: (Refer to Figures 9-5 and 9-6)

- STEP 1. Set the CRT cutoffs;

  A.) Cutoff all three CRTs using the remote control [CUTOFF] [RED] [GREEN] [BLUE].

  B.) Look into each lens and adjust the CRT G2 control R2, on each CRT Amplifier Card so that there is no raster visible, restore CRT cutoffs.

- STEP 2. Verify grayscale or operation of the RGB1 module. NOTE: all test points (TP) reference in the procedure are located on each individual CRT Amplifier Card.

  A.) GREEN VIDEO: With the oscilloscope, probe TP4 on the Green CRT amplifier Card, set Green Sub-brite (black level) to +170V above ground (zero) reference using [95] [CODE] [GREEN]. Set green Sub-contrast for peak white of +40v above ground (zero) reference using [94] [CODE] [GREEN]. Toggle Green CRT off.

  B.) RED VIDEO: probe TP4 on the Red CRT Amplifier Card, set Red Sub-brite [95] [CODE] [RED], to +170v above ground and Sub- contrast [94] [CODE] [RED] for peak white of +40V above ground. Toggle the Red CRT off.

  C.) BLUE VIDEO: probe TP4 on the Blue CRT Amplifier Card, set Blue Sub-brite [95] [CODE] [BLUE], to +170v above ground and Sub- contrast [94] [CODE] [BLUE] for peak white of +40V above ground.

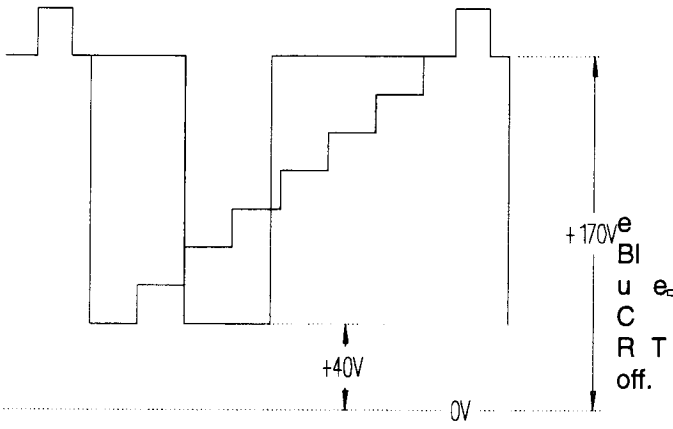


FIGURE 9-5. Video setup waveform.

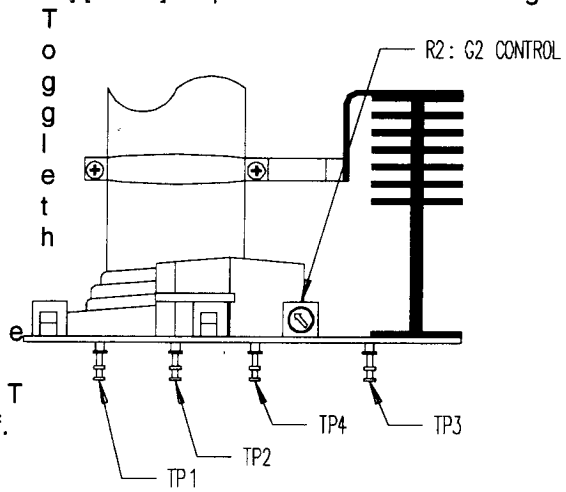


FIGURE 9-6. CRT card (top view). (Blue CRT card shown)

9.5.3 . . . . Quad Video Decoder 1(69409) Replacement Procedure:

Tools Required

☐ Small Slotted Screwdriver ☐ Small Phillips Screwdriver

☐ Dual Trace Oscilloscope w/probes ☐ NTSC Color Bar Generator

Replacement Procedure

- STEP 1. Disconnect the main AC power cord, unlock and tilt up the Registration Tray assembly.
- STEP 2. Remove the two each 4-40 phillips screws and washers securing the QVD module to the rear panel and lift this module straight up and out.
- STEP 3. Install the replacement QVD module and secure with the hardware previously removed.

Pre-adjustments Requirements

☐ INPUT: 1vp-p color bars with IWQ, burst and chroma "off".

☐ CHANNEL: Any channel setup for NTSC 3.58 video operation, write protect "off" [20] [CODE].

☐ REMOTE SETTINGS: Set brightness [[BRIGHT]] and contrast [CONT] to 95%.

! NOTE: On the QVD module, ensure that the 75 ohm termination switch placed to the "IN" position.

Adjustment Procedure: (Refer to Figures 9-5, 9-6 and 9-7)

IMPORTANT

ENSURE THAT THE ANALOG RGB1 MODULE HAS BEEN PROPERLY ADJUSTED BEFORE CONTINUING WITH THIS PROCEDURE.

- STEP 1. Apply AC power and energize the system.
- STEP 2. GREEN VIDEO: probe TP4 on the CRT Amplifier Card.
- STEP 3. Set Master Sub-brite (R111) to +170V above ground reference and Master Sub-contrast (R91) for peak white of +40v above ground reference.
- STEP 4. RED VIDEO: probe TP4 on the Red CRT amplifier Card, set Red Sub-brite (R86) for peak white of +40v above ground reference.
- STEP 5. BLUE VIDEO: probe TP4 on the Blue CRT Amplifier card and set Blue Sub-brite (R98) for peak white of +40v above ground reference.
- STEP 6. ALL COLORS ON: select an "off-the-air" composite video signal and enable monochrome mode of operation (no color) by entering [49] [CODE].
- STEP 7. Optimize the grayscale as necessary by further adjustments of the Red and Blue Sub-brite(s).

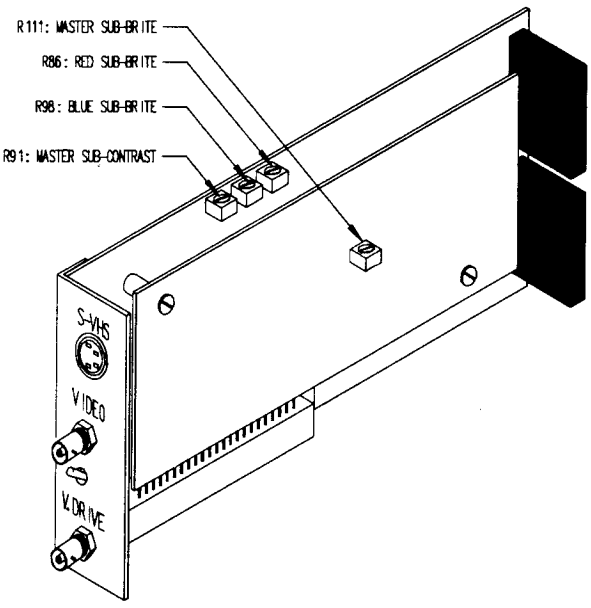


FIGURE 9-7. QVD adjustments.

9.5.3.1 . . . QVD1 (69409) Module Installation Supplement:

This section provides the necessary information for installing, as a new addition, the optional Quad Video Decoder 1 module for the AMPRO 3600 and 4600 Display Systems.

For the following procedure the top cover and the Registration Tray (Main Tray) assembly must be unlocked and tilted up.

Refer to Section 3 for the installation location of the Quad Video Decoder 1 (QVD1) module.

Installation Procedure

- STEP 1. De-energize the system and remove the main AC power cord.

¤ If the third slot is empty, then;

- STEP 2. Remove the existing module or panel from the third slot from the left, as viewed from the rear-table mounted, by removing the two each 4-40 phillip screws and washers.
- STEP 3. With the third slot empty, install the QVD1 module and secure with the hardware previously removed.

9

¤ If the third slot is used, then perform Steps 2 and 3 using the fourth slot from the left, as viewed from the rear - table mounted.

- STEP 4. Locate SW3 (8 position DIP) on the CPU module. Switch SW3-6 to the "on" position. Replace the power cord and energize the system. Refer to Figure 9-8
- STEP 5. Once the system has been initialized, use the numeric keypad and enter [70] [CODE].
- STEP 6. Upon entering 70 CODE, the LCD read-out will display the current module configuration. Use the [⇑] and [⇓] arrow keys to scroll through the module listings until the proper (new) module configuration is display in the LCD read-out. Press [CODE] to select.

! **NOTE**: All 50 channels locations will be automatically reset to operate in the Analog RGB1 mode, Channel "mode" reassignment may be required.

- STEP 7. Return SW3-6 to the "off" position and enter [44] [CODE], (READ SWITCHES).
- STEP 8. To verify your installation enter [34] [CODE], and view the LCD read-out.
- STEP 9. Lower and lock the Registration Tray (Main Tray) and top cover assemblies into place.

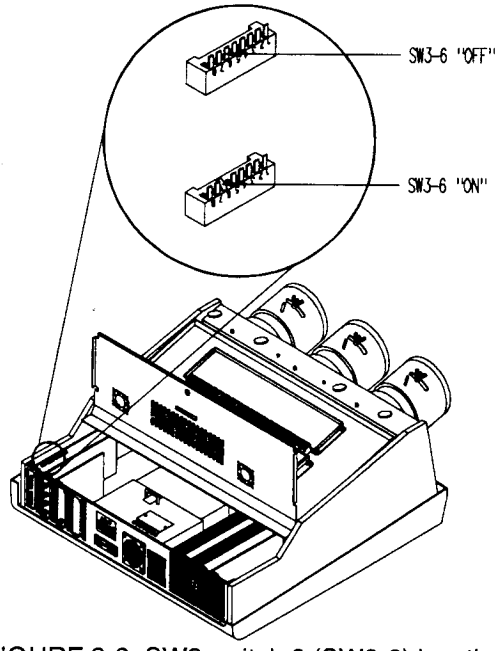


FIGURE 9-8. SW3 switch 6 (SW3-6) location. (4600 shown)

9.5.4 . . . . CRT Amplifier Card (81135A)/(81136A) Replacement Procedure:

Tools Required

☐ Phillips Screwdriver

☐ Small Slotted/Phillips Alignment Tool

☐ Multi-frequency RGB Video Generator w/High Frequency Resolution Pattern - SMPTE 133.

Replacement Procedure

- STEP 1. De-energize the system, remove the main AC power cord.
- STEP 2. Unlock and tilt-up the top cover assembly.
- STEP 3. 3600: unlock and tilt-up the main tray assembly, 4600: unlock and tilt-up the Main tray and Tray 1 assembly.
- STEP 4. On the CRT Amplifier Card to be replaced; disconnect J7, J8, the ground lead and the G2 in-line connectors.
- STEP 5. Loosen the CRT Amplifier clamp screws (2 each) which secures the card to the tube.
- STEP 6. Carefully slide the Amplifier Card back and off the CRT.
- STEP 7. Install the replacement CRT Amplifier Card reversing steps 6 through 4.

Adjustment Procedures

- STEP 1. Apply the main AC power and initialize the system.
- STEP 2 Cutoff ([CUTOFF]) CRT under test.
- STEP 3. G2 ADJUSTMENT: Looking into the lens of the CRT under test, adjust the respective G2 control until a raster is barely visible, then turn the control CCW until the raster just goes black.

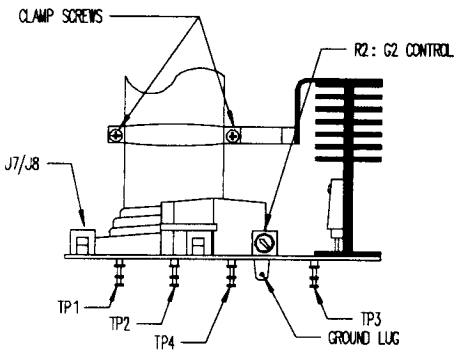
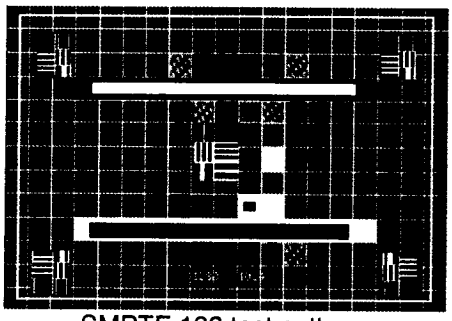


FIGURE 9-9. CRT Amplifier Card (top view).

CRT Amplifier Card Adjustment Procedures: (If Required)

The CRT Amplifiers cards are preset at the factory for optimum frequency response. If it becomes necessary to adjust the CRT Amplifier Card follow Step 4.

- STEP 4. Verify High Frequency Response:
  - ¤ Select the SMPTE 133 high resolution test pattern - 1280 X 1024 at 64kHz. Observe the resolution blocks in the middle of the test pattern. Verify that the black resolution lines in the high frequency resolution blocks black levels are equal.
  - ¤ **If necessary,** adjust trimmer capacitor, C28 on the Amplifier Card (component side) under test to obtain equal levels (balance) of the black resolution lines in both the vertical and horizontal resolution blocks. See FIGURE 9-12.


SMPTE 133 test pattern.

- STEP 5. De-energize the system, and remove the main AC power cord.
- STEP 6. Lower and lock the tray assemblies into place.

NOTES

9.5.5 . . . . Vertical Deflection Module (80986) Replacement:

Tools Required

☐ Small Slotted Screwdriver ☐ Small Phillips Screwdriver

☐ Small Slotted Alignment Tool

Replacement Procedure

- STEP 1. De-energize the system and remove the main AC power cord.
- STEP 2. Unlock and tilt-up the top cover assembly
- STEP 3. 3600: Unlock and tilt-up the rear section of the main tray. 4600: Unlock and tilt-up the main tray assembly (Registration board).

¤ The Vertical Deflection Module is located in the third slot from the right, as viewed from the rear, table mounted.

- STEP 4. Remove the single 4-40 phillips screw and lock securing the Vertical Deflection Module to the rear panel.
- STEP 5. Install the replacement Vertical Deflection Module and secure with the hardware previously removed.
- STEP 6. Lower and lock the tray and top cover assemblies in place.

Adjustment Procedure

- STEP 1. Connect the main AC power cord and initialize the system.
- STEP 2. Select the internal 15kHz crosshatch test pattern - ([1] [TEST]).
- STEP 3. Disable Registration - [55] [CODE].
- STEP 4. Cutoff the Blue image, (leaving only Red and Green "on").
- STEP 5. Using the Green image as your reference, adjust the Red Vertical Height control to overlay or equal but opposite the error from top to bottom, concentrating on the top and bottom outermost horizontal lines. See Figure 9-13.
- STEP 6. Using Green or Red as your reference color, adjust the Blue Vertical Height control as described in STEP 5. See Figure 9-10

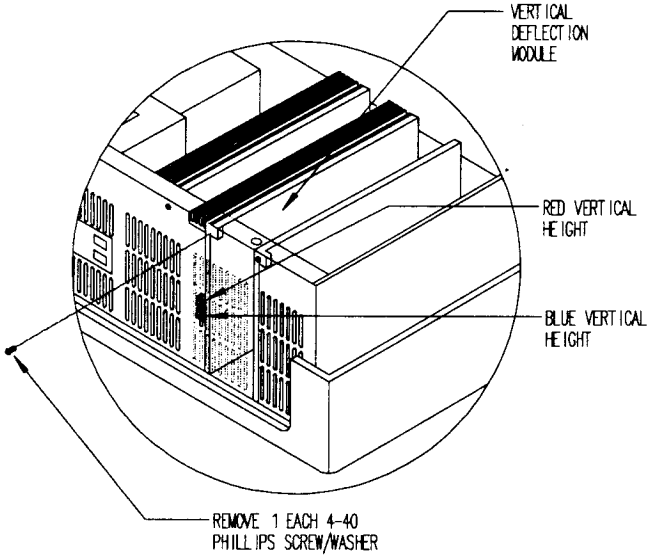


FIGURE 9-10. Vertical Deflection module replacement.

NOTES

9.5.6 . . . . H.O.T. Power Module (81355) Replacement Procedure:

Tools Required

☐ Small Phillips Screwdriver

Replacement Procedure

- STEP 1. De-energize the system and remove the main AC power cord.

CAUTION

THE MAIN AC POWER CORD MUST BE REMOVED PRIOR TO REMOVING AND REPLACING THE H.O.T. MODULE.

- STEP 2. Unlock and tilt-up the top cover tray assemblies.

¤ The H.O.T. Power Module is located in the fourth slot from the right as viewed from the rear, table mounted.

- STEP 3. Remove the single 4-40 phillips screw and lock washer securing the H.O.T. Module to the rear panel. See Figure 9-11 below.
- STEP 4. Pull the H.O.T. module straight up and out of the chassis.
- STEP 5. Install the replacement module and secure with the hardware previously removed.
- STEP 6. Lower and lock into place the Tray assemblies and the top cover.
- STEP 7. Apply main AC power and initialize the system.

Adjustment Procedure

- None required.

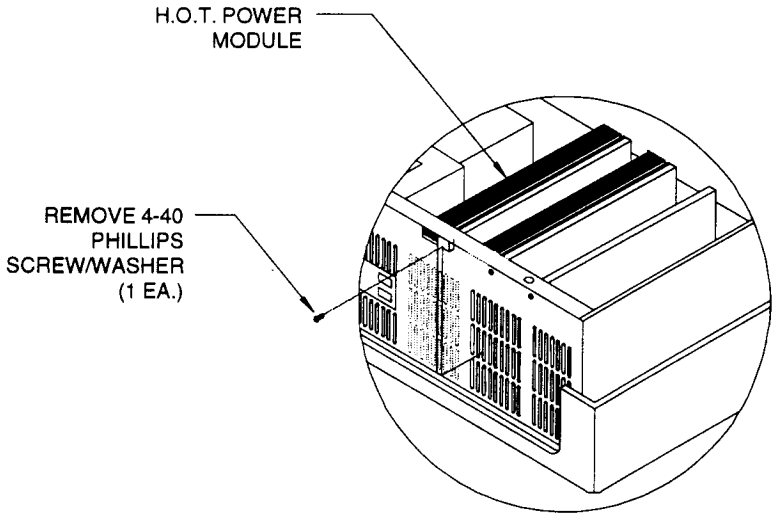


FIGURE 9-11. H.O.T. Power module replacement.

NOTES

9.5.7 . . . . Horizontal Control Module (81356A) Replacement Procedure:

Tools Required

Slotted Screwdriver Small Phillips Screwdriver

Replacement Procedure

- STEP 1. De-energize the system and unlock/tilt-up the top cover and Tray Assemblies.

¤ The Horizontal Control Module is located in the second slot from the right, as viewed from the rear, table mounted.

- STEP 2. Remove the single 4-40 phillips screw and lock washer securing the Horizontal Control Module to the rear panel. See Figure 9-12
- STEP 3. Carefully lift the module up and out of the chassis.
- STEP 4. Install the replacement module and secure with the hardware previously removed.
- STEP 5. Lower and lock the Tray assemblies and top cover in place.
- STEP 6. Connect the main AC and initialize the system.

Adjustment Procedure

- None required.

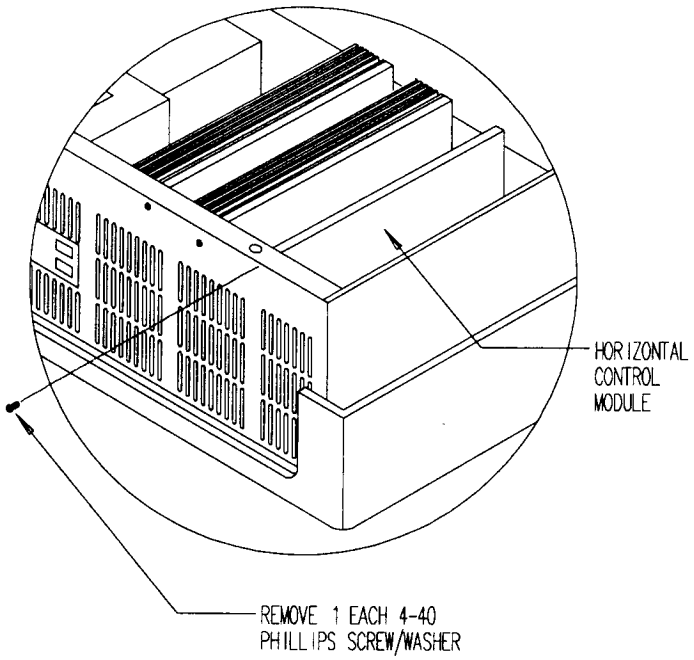


FIGURE 9-12. H.O.T. Control module replacement.

NOTES

9.5.8 . . . . H.O.T. Output Module (81354) Replacement Procedure:

Tools Required

☐ Standard Phillips Screwdriver ☐ Small Phillps Screwdriver

☐ Multi-Frequency RGB Video Generator w/Standard Linearity Pattern

Replacement Procedure

- STEP 1. De-energize the system and remove the main AC power cord.
- STEP 2. Unlock and tilt-up the top cover and tray assemblies.
- STEP 3. The H.O.T. Output module is located to the extreme right of the main chassis as viewed form the rear, table mounted. See Figure 9-13.
- STEP 4. Disconnect the four following plugs for the H.O.T. Output Module; **P55**: Blue horizontal output, **P56**: Green horizontal output, **P57**: Red horizontal output and **P58:** Horizontal sweep reverse sense. See Figure 9-14
- STEP 5. Remove the 3 each 4-40 phillips screws and washers which fasten the H.O.T. Output module to the right side of the main chassis. See Figure 9-14
- STEP 6. Install and firmly seat the H.O.T. Output module to the mother board connector and fasten with the hardware previously removed.

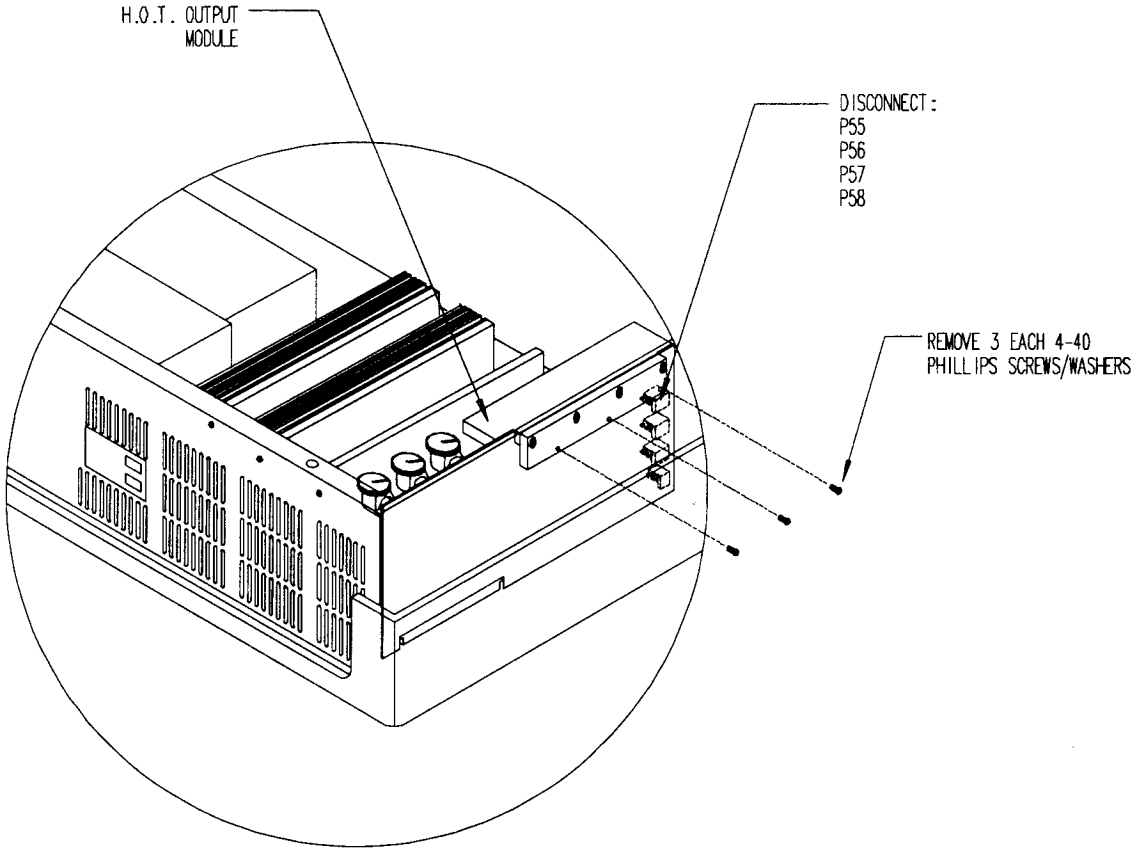


FIGURE 9-13. H.O.T. Output module replacement.

H.O.T. Output Module Adjustment Procedure

- STEP 1. Once the H.O.T. Output module has been firmly seated and properly connected, energize and initialize the system.
- STEP 2. Select the RGB mode of operation, display green only and turn Registration "off", [55] [CODE].
- STEP 3. Select an external **64kHz** linearity pattern w/circles and using the adjustment wheel, carefully adjust **SR3** for optimum round circles.
- STEP 4. Select an external **21kHz** linearity pattern w/circles and using the adjustment wheel, carefully adjust **SR2** for optimum round circles.
- STEP 5. Select an external **15kHz** linearity pattern w/circles and using the adjustment wheel, carefully adjust **SR1** for optimum round circles.....Repeat Step 3 through 5 for optimum overall horizontal linearity.

! NOTE: Do not adjust a saturable reactor (SR) outside of it's specified range.

9

CAUTION

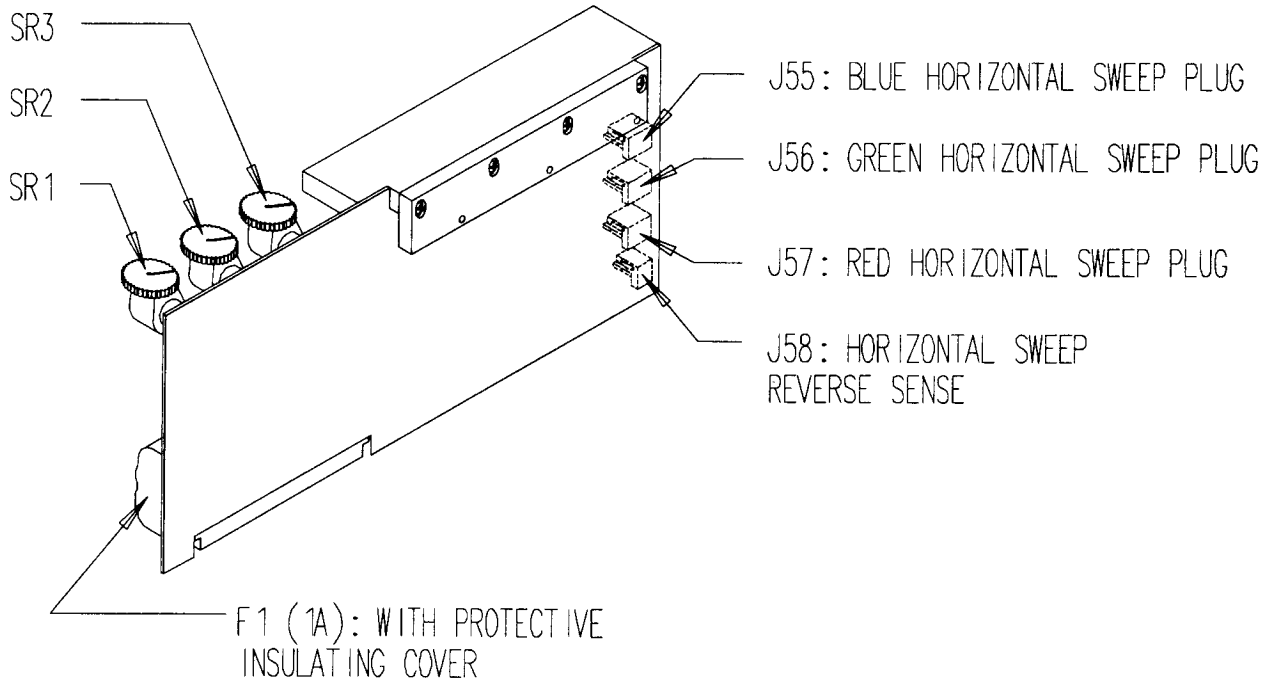


FIGURE 9-14. H.O.T Output module adjustments.

9.5.9 .....Switch Mode Power Supply (SMPS) (81207) Replacement Procedure:

Tools Required

☐ Slotted Screwdriver ☐ Stubby Phillips Screwdriver

Replacement Procedure

- STEP 1. De-energize and disconnect the main AC plug from the system.
- STEP 2. Unlock and tilt-up the top cover and tray assemblies.
- STEP 3. As required; remove the two 4-40 phillips screws/washers securing any one of the optional modules located in the fourth slot from the left, as viewed from the rear, table mounted and remove module.
- STEP 4. If required, remove the Horizontal Power module from the fourth slot from the right, as viewed from the rear, table mounted.
- STEP 5. Loosen, do not remove, the four each phillips screws located at both sides of the SMPS. Gently lift the SMPS straight up and out of the SMPS housing.
- STEP 6. Remove the four phillips screws and washer from the old SMPS and install into the replacement SMPS.
- STEP 7. Install and firmly seat the SMPS back into the housing and secure with the four mounting screws previously loosened.
- STEP 8. If required, reverse Steps 3 and 4.
- STEP 9. Apply the main AC power cord and energize the system.

! Ensure that all low voltage LEDs located on the top of the SMPS are illuminated.

- STEP 10. Lower and lock into place the tray and top cover assemblies.

Adjustment Procedure

- None Required

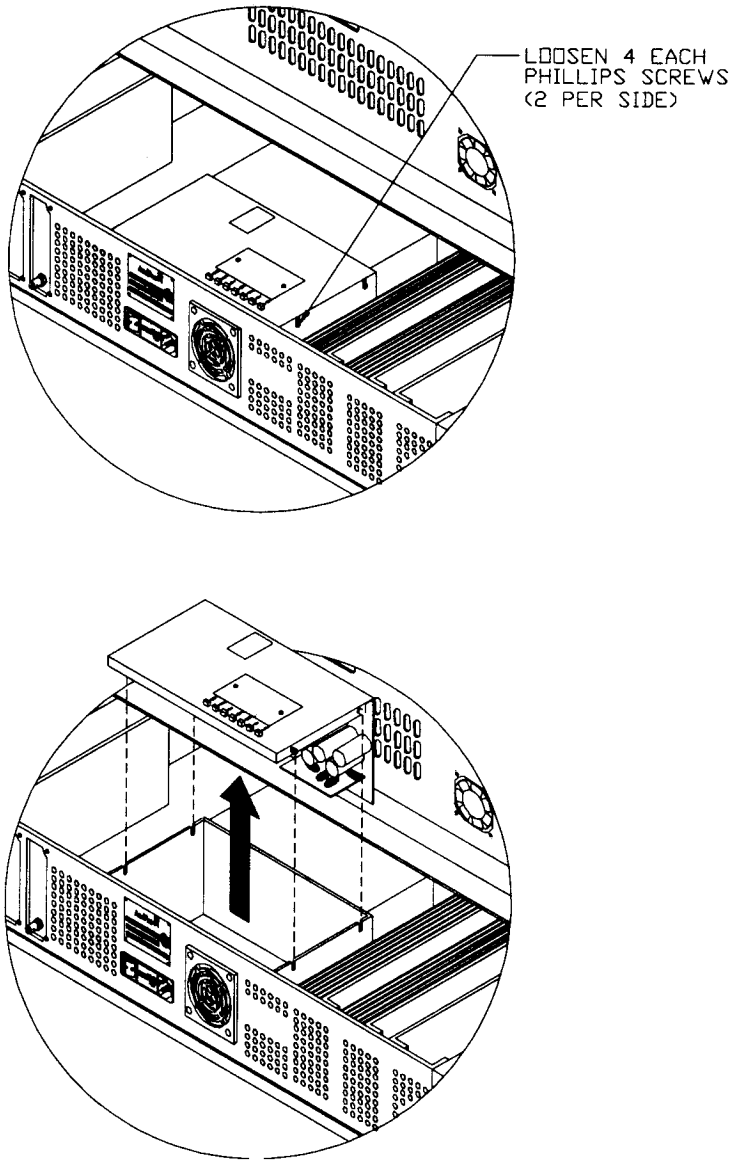


FIGURE 9-15. SMPS REPLACEMENT.

NOTES

9.5.10 . . . . High Voltage Power Supply (HVPS) (3600:81395/4600:81322) Replacement Procedure:

Tools Required

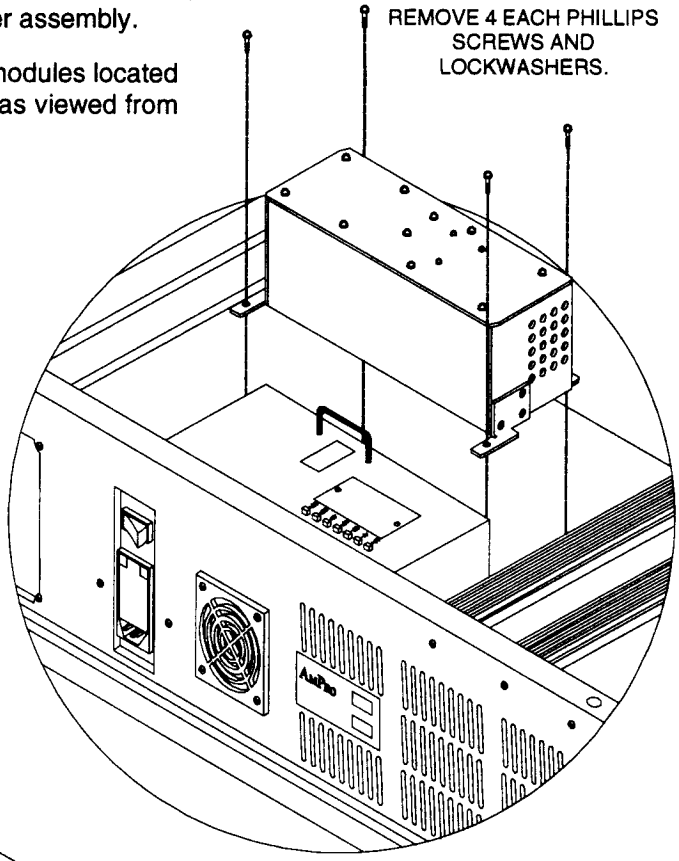
☐ Standard Phillips Screwdriver ☐ Small Phillips Screwdriver

Replacement Procedure

- STEP 1. De-energize and remove the main AC power cord form the system.
- STEP 2. Unlock and tilt-up the top cover and tray assemblies.
- STEP 3. Disconnect the following connectors; J42, J44A, J44B, J44C and the HV lead from the splitter assembly.

! It may become necessary to remove the modules located in the fourth slots from both left and right as viewed from the rear, table mounted.

- STEP 4. Remove the four (4) each phillips screws and lock washer located at the front of and at the sides(rear) of the HVPS. Lift out the HVPS
- STEP 5. Install the replacement HVPS and secure with the hardware previously removed.
- STEP 6. Reconnect; J42, J44A, J44C, J44C and the HV lead to the splitter.
- STEP 7. Lower and lock the tray and top cover assemblies into place.
- STEP 8. Connect the main AC plug and energize the system.



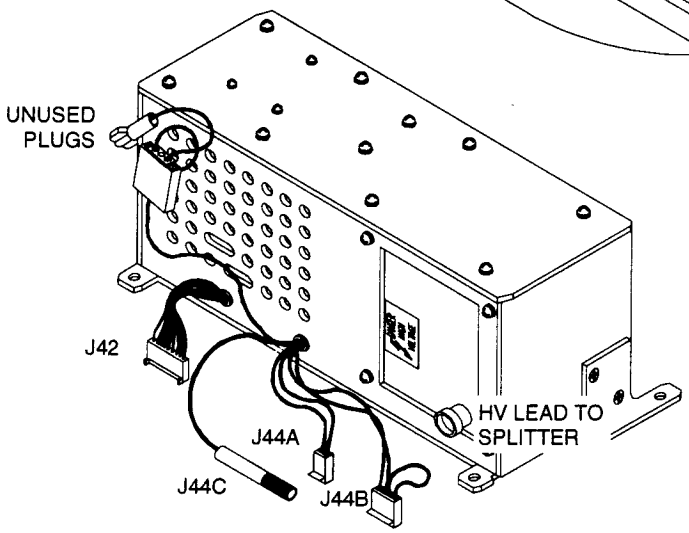


FIGURE 9-16. HVPS removal/connectors.

NOTES

9.5.11 . . . . Registration Board (81435) Replacement Procedure:

Tools Required

☐ Slotted Screwdriver ☐ Small Phillips Screwdriver

Replacement Procedure

- STEP 1. De-energize the system and remove the main AC power cord and unlock and tilt-up the top cover assembly.
- STEP 2. Unlock and tilt-up the Registration Tray assembly; The Registration tray assembly is secured by two ¼ turn fasteners located at the rear of this assembly. See Figure 9-17A and 9-17B.
- STEP 3. On the underside of the Registration assembly, disconnect J51, J72, the ground lead (via spade lug, and the ground lead secured by the 4-40 phillips screw. See Figure 9-18A and 9-18B.
- STEP 4. 3600: Loosen the two ¼ turn fasteners located at the rear of the Main Tray assembly and tilt-up. See Figure 9-17A. 4600: Loosen the two ¼ at the rear of Tray assembly 1, see Figure 9-17B.
- STEP 5. On the Focus Modulator board, disconnect J1, J2 and J3. See Figure 9-19A (3600) and Figure 9-19B (4600).
- STEP 6. Lower the tray assemblies, loosen the four captive thumb screws located on both sides of the Registration assembly (Figure 9-17A-3600 and Figure 9-17B-4600), and lift the assembly out
- STEP 7. Install the replacement assembly reversing the replacement procedure.
- STEP 8. Lower and lock the top cover in place.

3600

DO NOT DISCONNECT J1 AND J3 HERE!

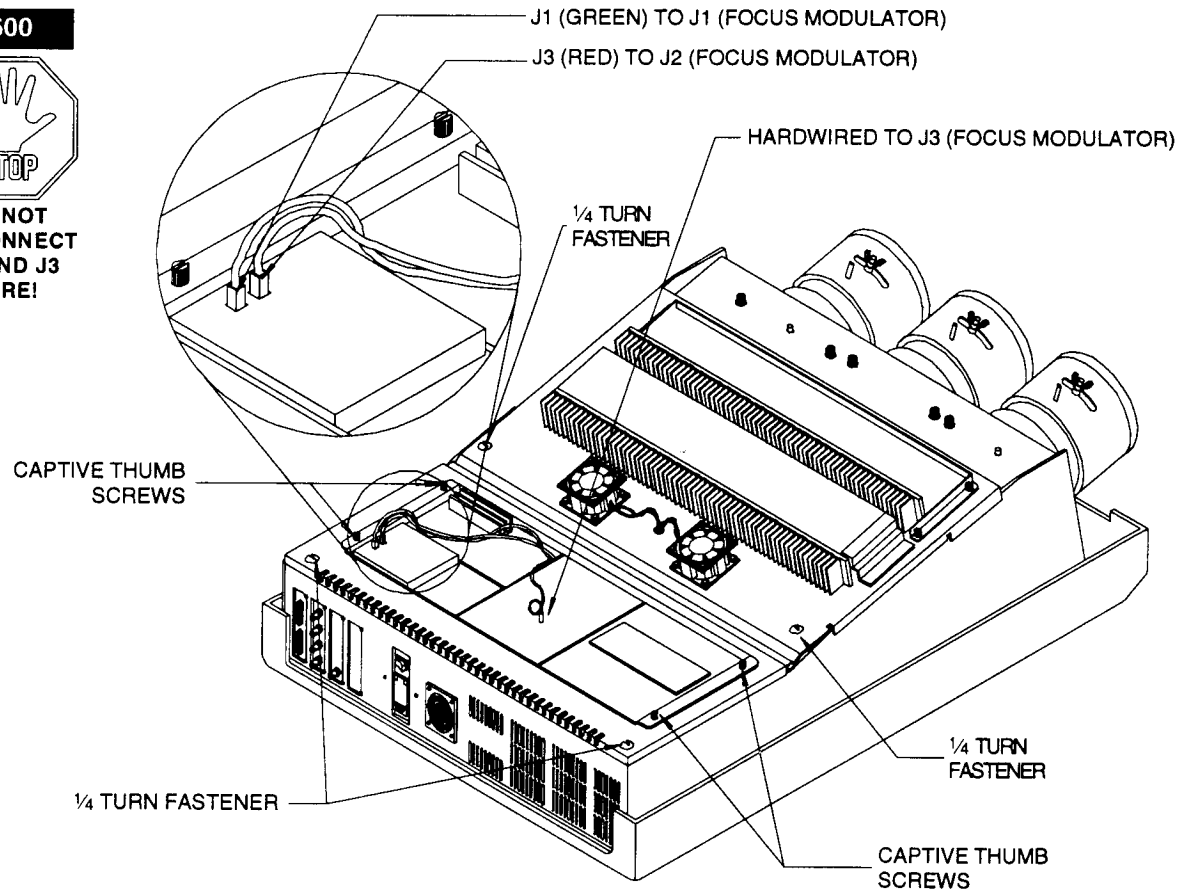


FIGURE 9-17A. Registration repalcement-3600.

9.5.11 . . . . Registration Replacement:(CONTINUED)

4600

DO NOT DISCONNECT J1 AND J3 HERE!

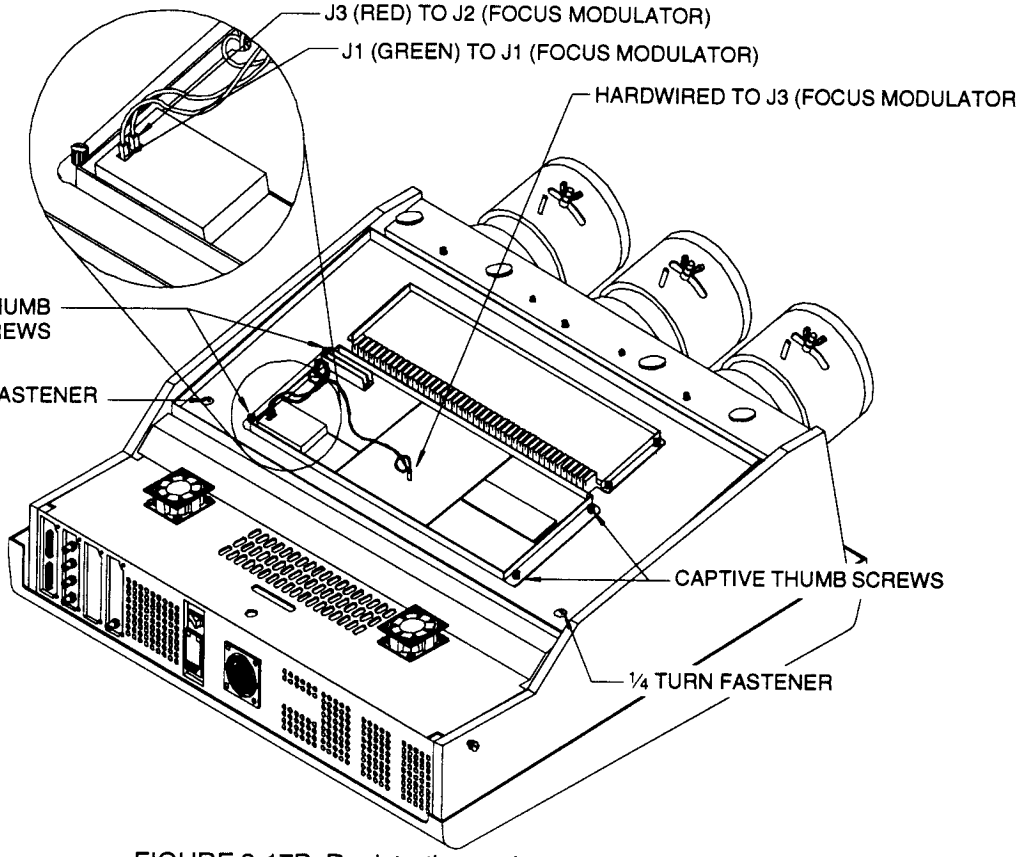


FIGURE 9-17B. Registration replacement-4600.

3600

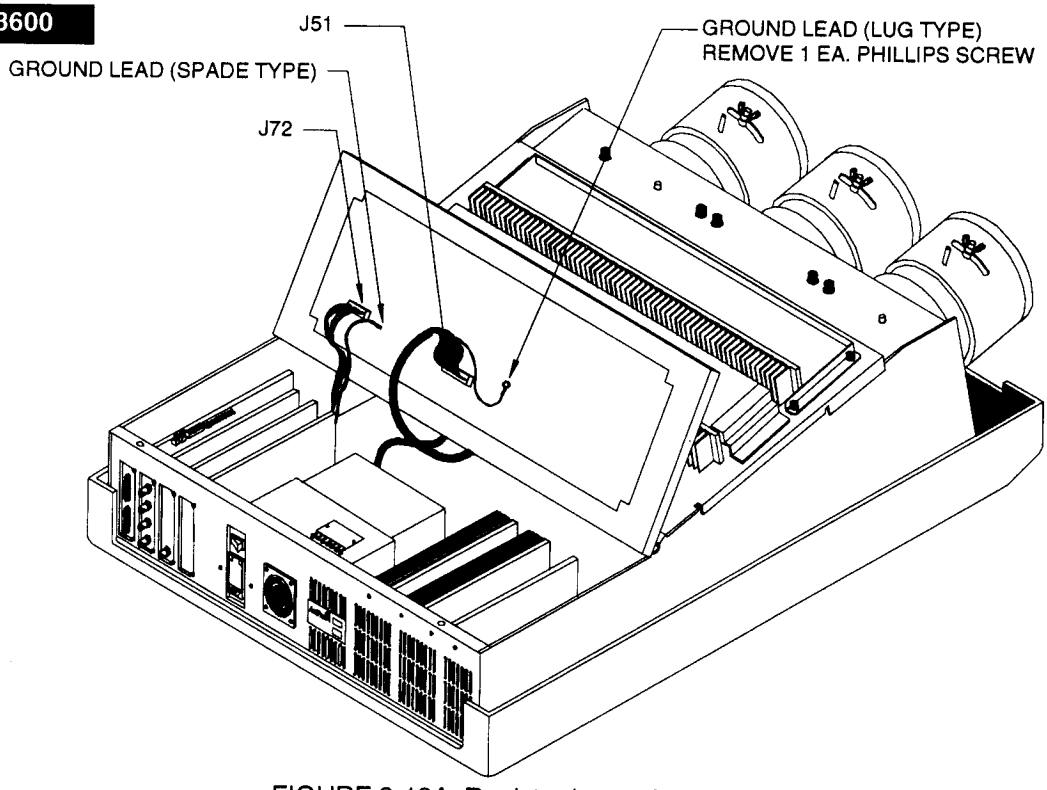


FIGURE 9-18A. Registration replacement (3600).

9.5.11 . . . . Registration Replacement (continued):

4600

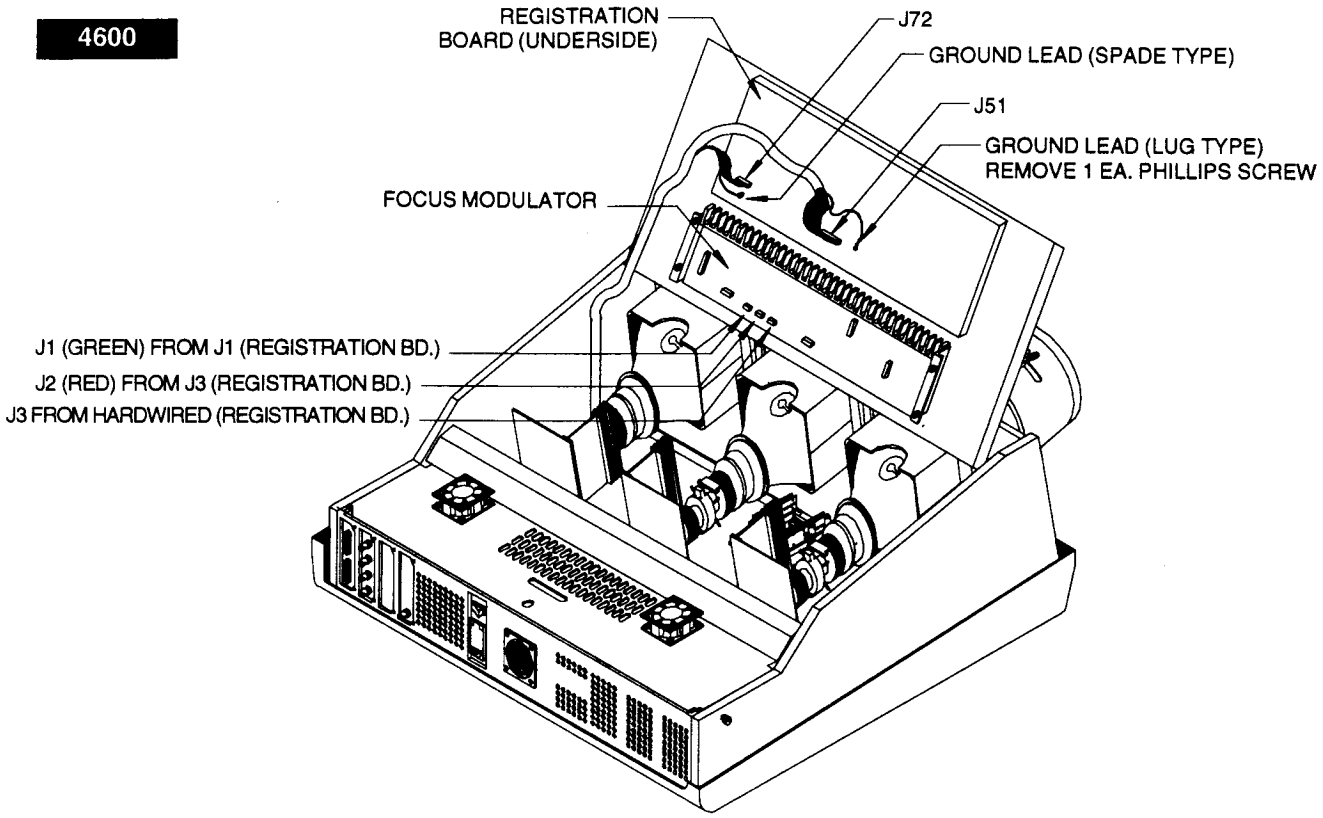


FIGURE 9-18B. Registration replacement - 4600.

3600

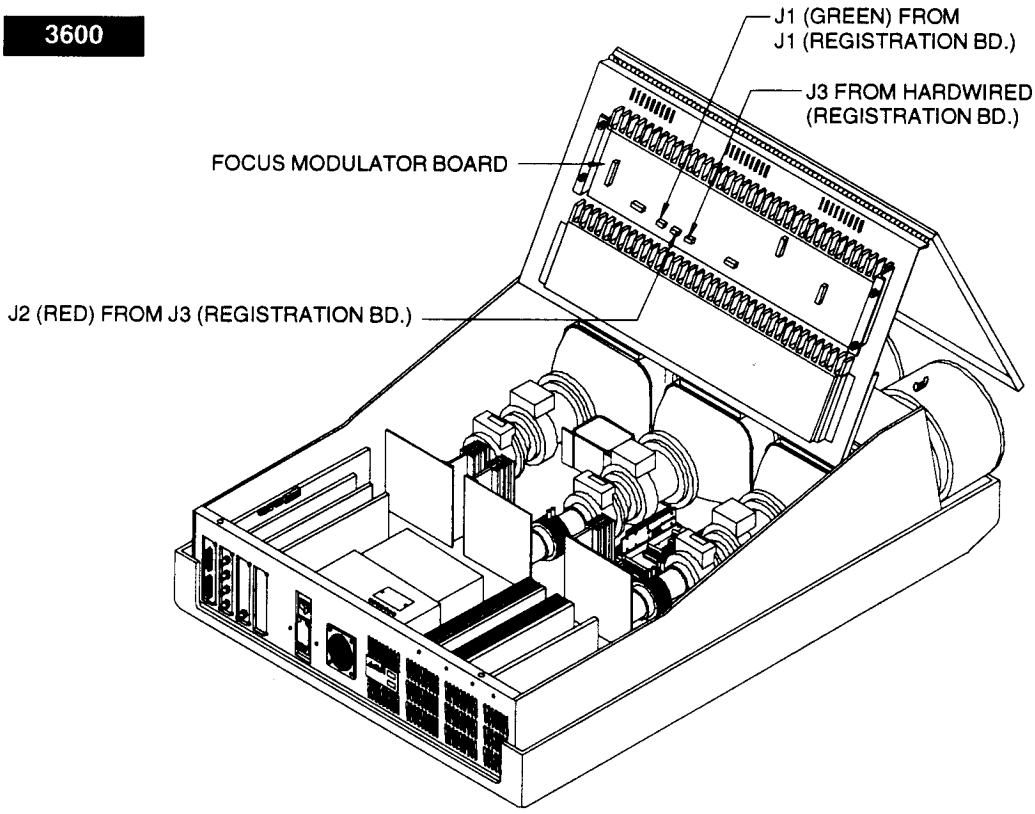


FIGURE 9-19. Registration replacement - 3600.

9.5.11.1 . . . Registration and Focus Phasing Adjustments: (3600 and 4600)

Registration Phasing

Prerequisites

- ¤ Unlock and open the top cover assembly.
- ¤ Remove the four (4) phillips screws securing the shield covering the PLL board and locate R4 and R44, see Figure 9-20, (PLL board is a smaller assembly of the Registration board and is located in the lower left corner of this assembly, as viewed from the rear when table mounted).
- ¤ Energize the system.
- ¤ Select an unused channel location.
- ¤ Null the channel.....[29] [CODE]. At the LCD prompt enter [CODE].
- ¤ Select internal 62kHz crosshair pattern.....[3] [TEST]
- ¤ Adjust left and right blanking for full raster, [LEFT EDGE] [BLANK] [⇐] / [RIGHT EDGE], [BLANK] [⇒].
- ¤ Adjust Master skew fully up, [GREEN] [SKEW] [⇑], adjust Red left skew fully up [RED] [SKEW] [⇑], and adjust Red right skew fully down [RED] [SKEW] [⇓]
- ¤ Cutoff the green and blue images....[CUTOFF] [BLUE] / [CUTOFF] [GREEN].

9

Adjustment Procedure

- STEP 1. While observing the projected image, adjust R4 (Figure 9-20) until a upward bow is produced in the red horizontal center line on the right side of the image, then adjust R4 in the opposite direction until the bow or curvature is minimized on the left and right sides of the projected image.
- STEP 2. Select a preset channel and verify that the image has no undesired curvatures on either the left or the right sides of the projected image.....If necessary repeat this procedure.

Focus Phasing

Prerequisite / Adjustment

- ¤ Select 62kHz internal crosshatch pattern.
- ¤ Cutoff the Red and Blue images. [CUTOFF] [RED], [CUTOFF] [BLUE].

- STEP 1. Slightly defocus the green image [98] [CODE] [⇑], until the center horizontal line is about ¾ inch thick at the widest spot.
- STEP 2. Adjust R44 (Figure 9-20) on the registration PLL board so that the line is of equal thickness from left to right.
- STEP 3. De-energize the system and replace and secure the shield for the PLL board.

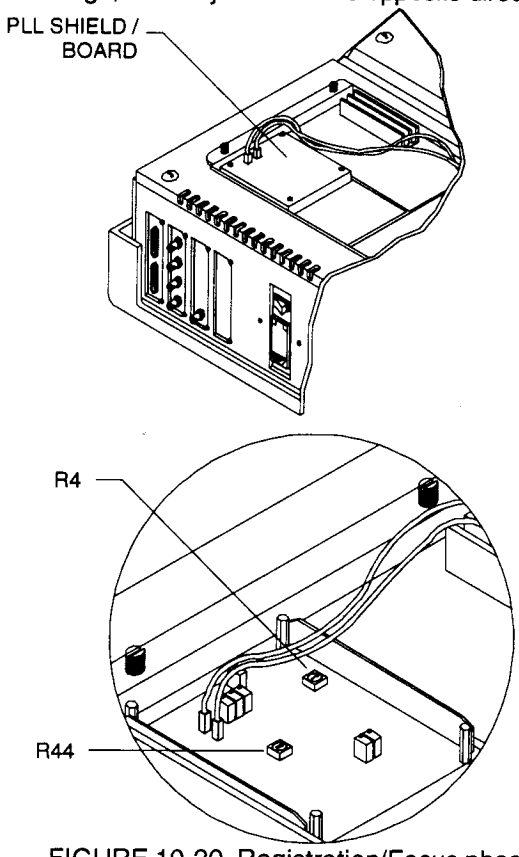


FIGURE 10-20. Registration/Focus phasing.

9.5.12 . . . . Registration Amplifier (81010) Replacement Procedure:

Tools Required

☐ Slotted Screwdriver

Replacement Procedure

- STEP 1. De-energize the system and remove the main AC power cord.
- STEP 2. Unlock and tilt-up the top cover assembly.
- STEP 3. On the Registration Amplifier board disconnect the following plugs; J4, J46, J48, J49, J50 and the ground lead. See Figure 9-21 (3600) and/or Figure 9-22 (4600).
- STEP 4. Loosen the four (4) each captive thumb screws located on both sides of the Registration Amplifier board and lift this assembly out.
- STEP 5. Install the replacement procedure and secure with the four (4) captive thumb screws.
- STEP 6. Reconnect the above mentioned plugs.
- STEP 7. Lower and lock the top cover into place.

3600

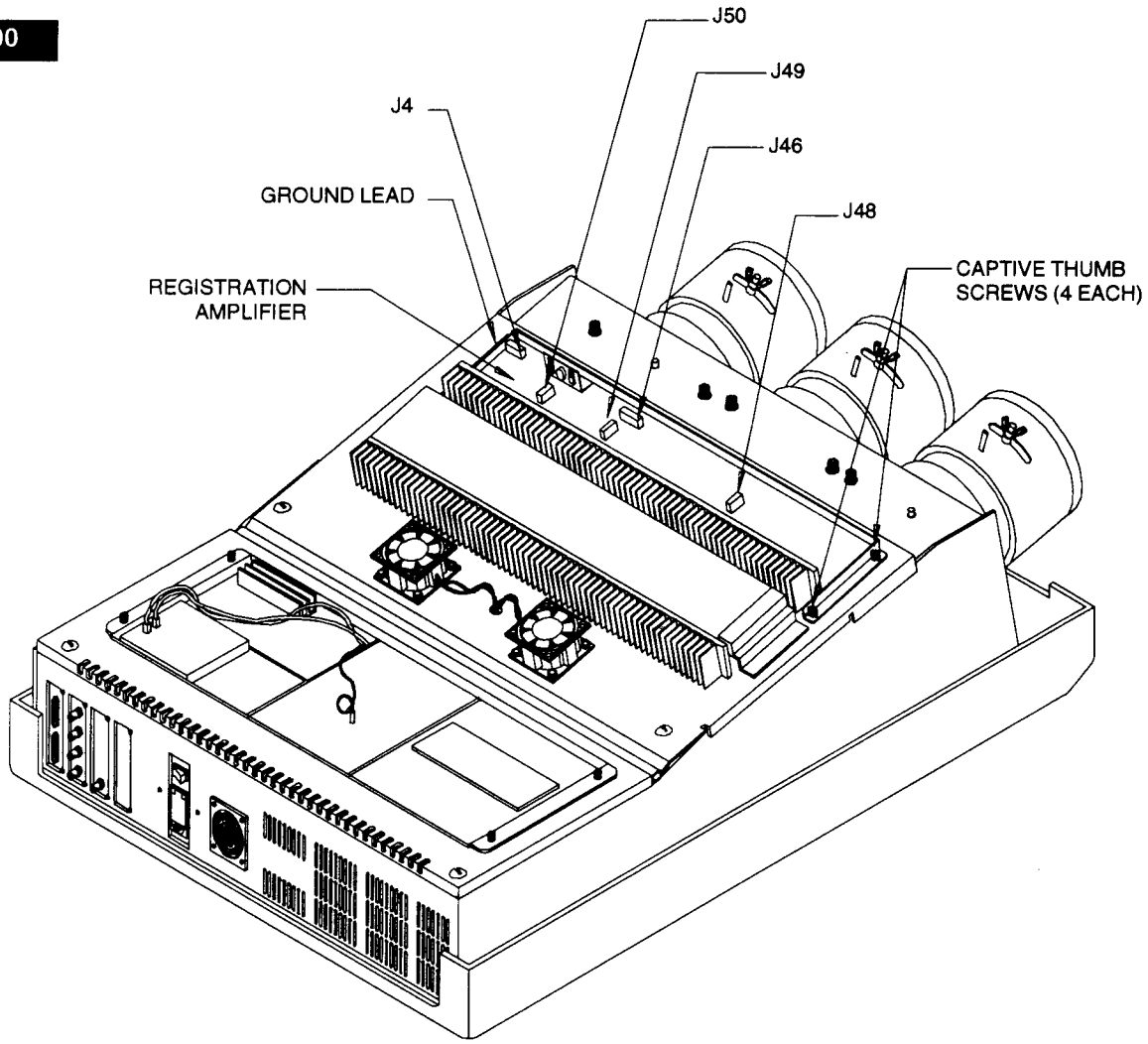


FIG. 9-21. 3600 Registration Amplifier remove/replace.

9.5.12 . . . . Registration Amplifier (81010) Replacement Procedure: (CONTINUED)

4600

9

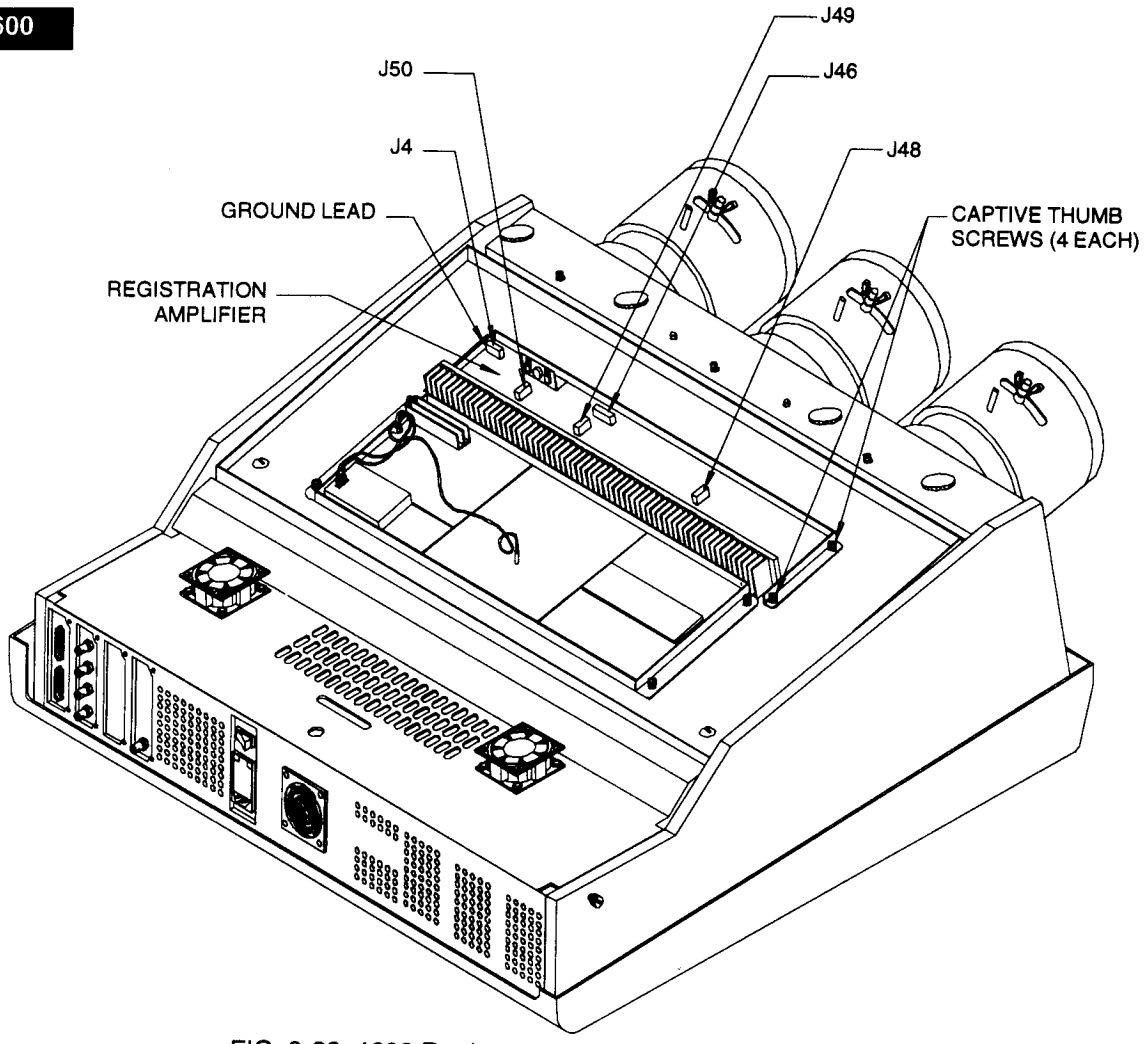


FIG. 9-22. 4600 Registration Amplifier remove/replace.

9.5.13 . . . . Focus Modulator (81389A) Replacement Procedure:

Tools Required

☐ Slotted Screwdriver

Replacement Procedure

- STEP 1. De-energize the system and remove the main AC power cord.
- STEP 2. Unlock and tilt-up the top cover and tray assembly 1 for both the models 3600 and 4600.
- STEP 3. On the component side of the Focus Modulator board, disconnect the following; J1 through J8 and the ground lead. See Figure 9-23 (3600) and/or 9-24 (4600).
- STEP 4. Loosen the four (4) captive thumb screws located on both sides of this assembly.
- STEP 6. Install the replacement board, secure and reconnect all plugs.
- STEP 7. Lower and lock the tray and top cover assembly.

3600

Disconnect the following connections;

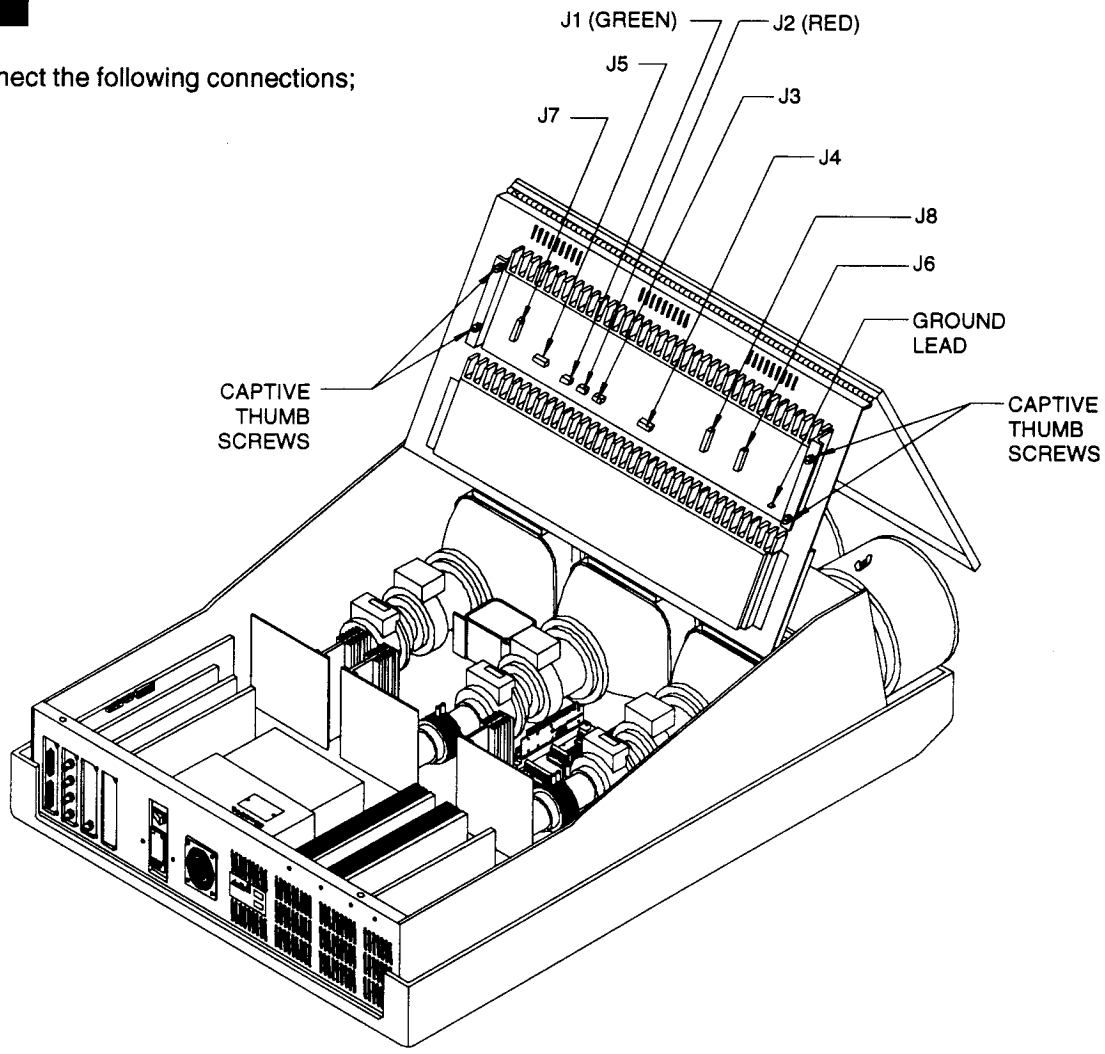


FIGURE. 9-23. 3600 Mag Focus board replacment.

9.5.13 . . . . Focus Modulator (81389A) Replacement Procedure: (continued)

4600

Disconnect the following connections;

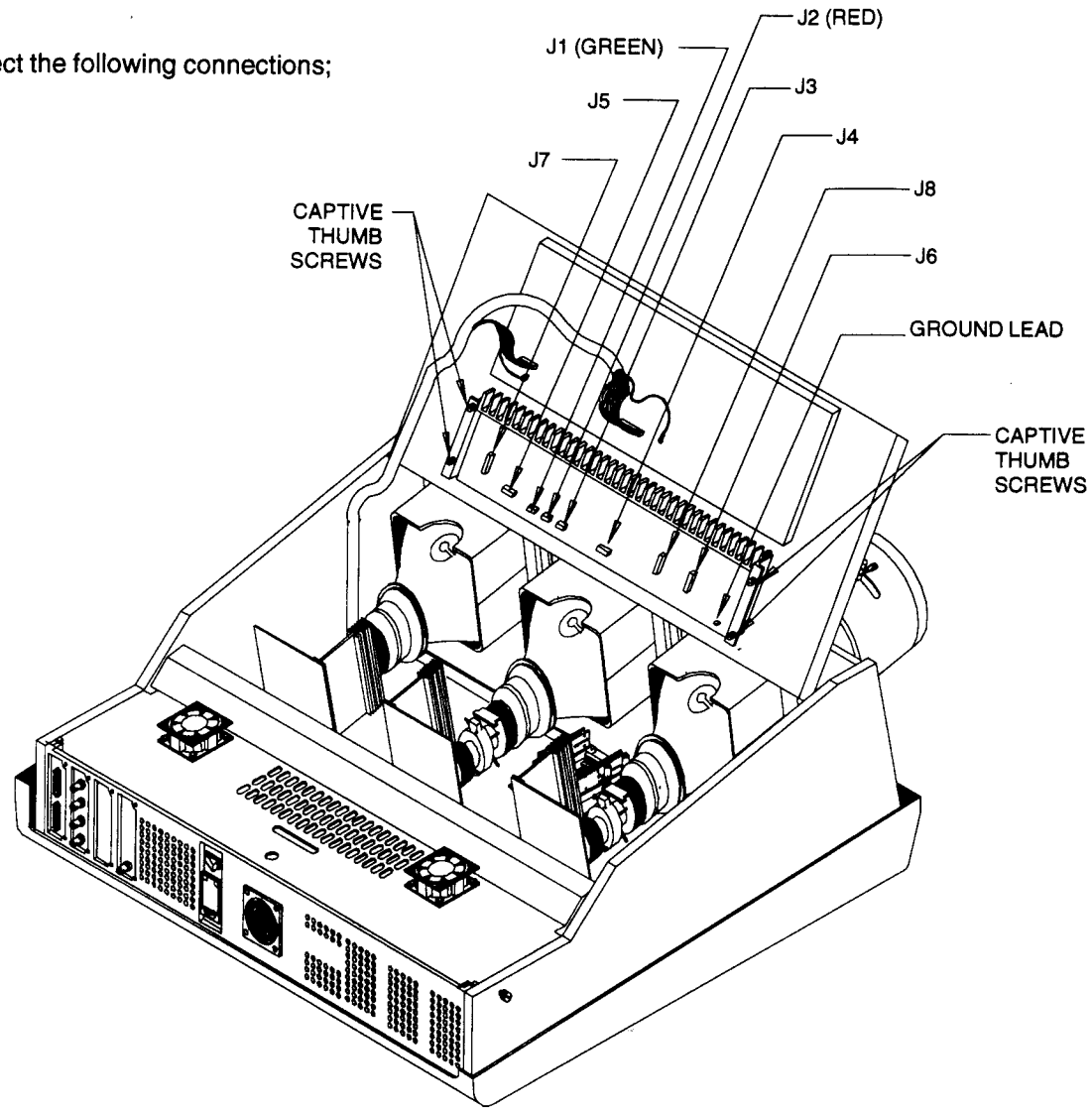


FIG. 9-24. 4300 Focus modulator board replacement.

9.6 . . . . . .AMPRO 3600 8" Magnetic Focus CRT Removal/ Replacement Procedure:

9.6.1 . . . . . .8" CRT Removal Procedure:

Tools Required

- ☐ Protective eyeglasses / gloves
- ☐ 3/16 Ball Hexdriver (lens adjustment tool)
- ☐ Phillips / slotted screwdriver
- ☐ 9/16 Hex wrench/socket

Replacement Procedure

- STEP 1. De-energize the system and remove the main A.C. power cord.
- STEP 2. Unlock and tilt-up the top cover and tray assemblies.
- STEP 3. On the CRT to be replaced, disconnect the following CRT ground connections from the magnetic focus assembly clamp, astigmator assembly clamp and the amplifier card. Loosen or remove the top section of the amplifier clamp, then carefully slide the amplifier card off the CRT. See Figure 9-25.

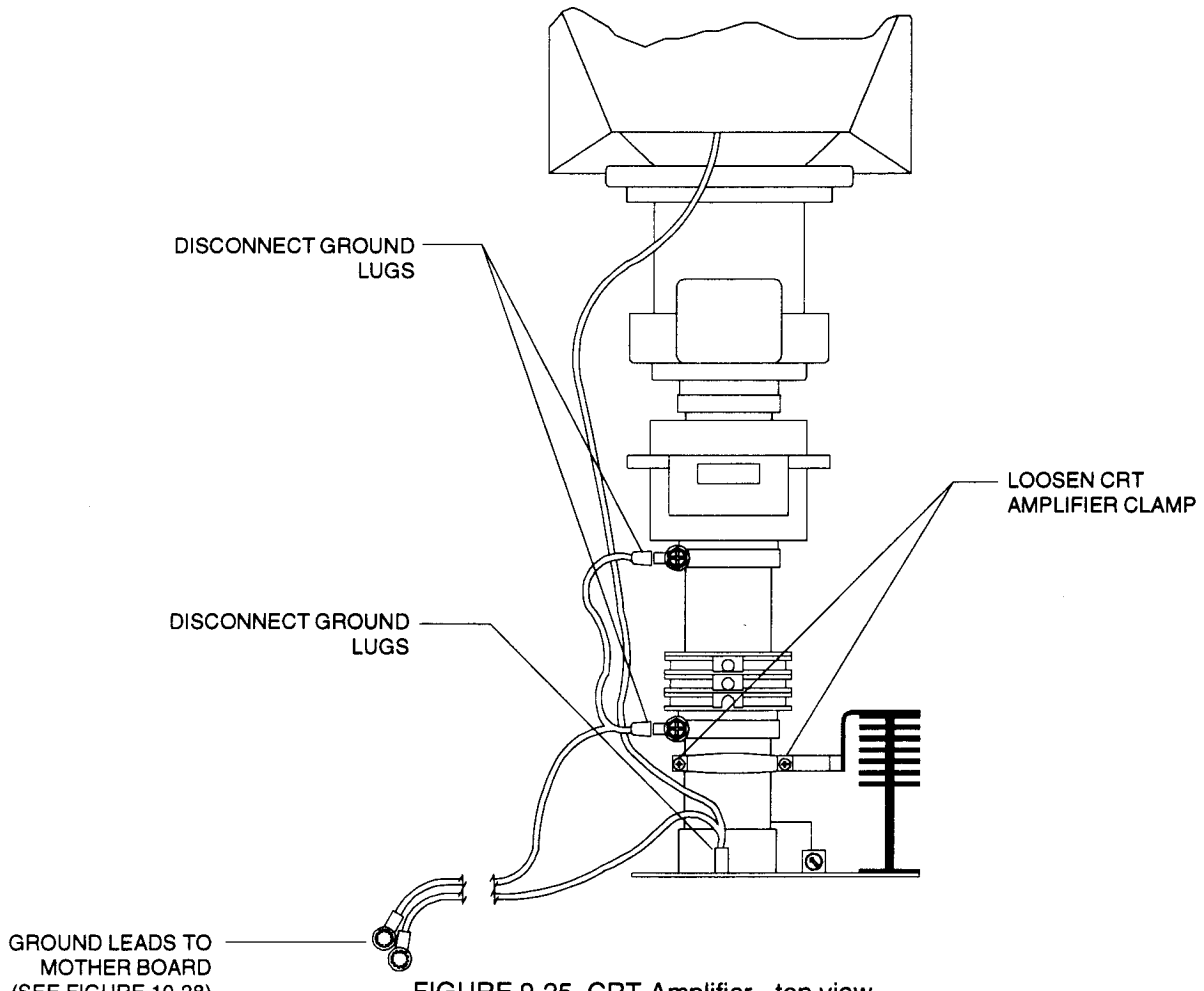


FIGURE 9-25. CRT Amplifier - top view.

9.6.1 . . . . 8" CRT Removal Procedure: (CONTINUED)

- STEP 4. On the defective CRT disconnect the following; ① High Voltage anode lead, ② Focus magnet cable connector, ③ ground harness from the mother board location and ④ the respective sweep/convergence plug from the yoke interface board. See Figure 9-26.

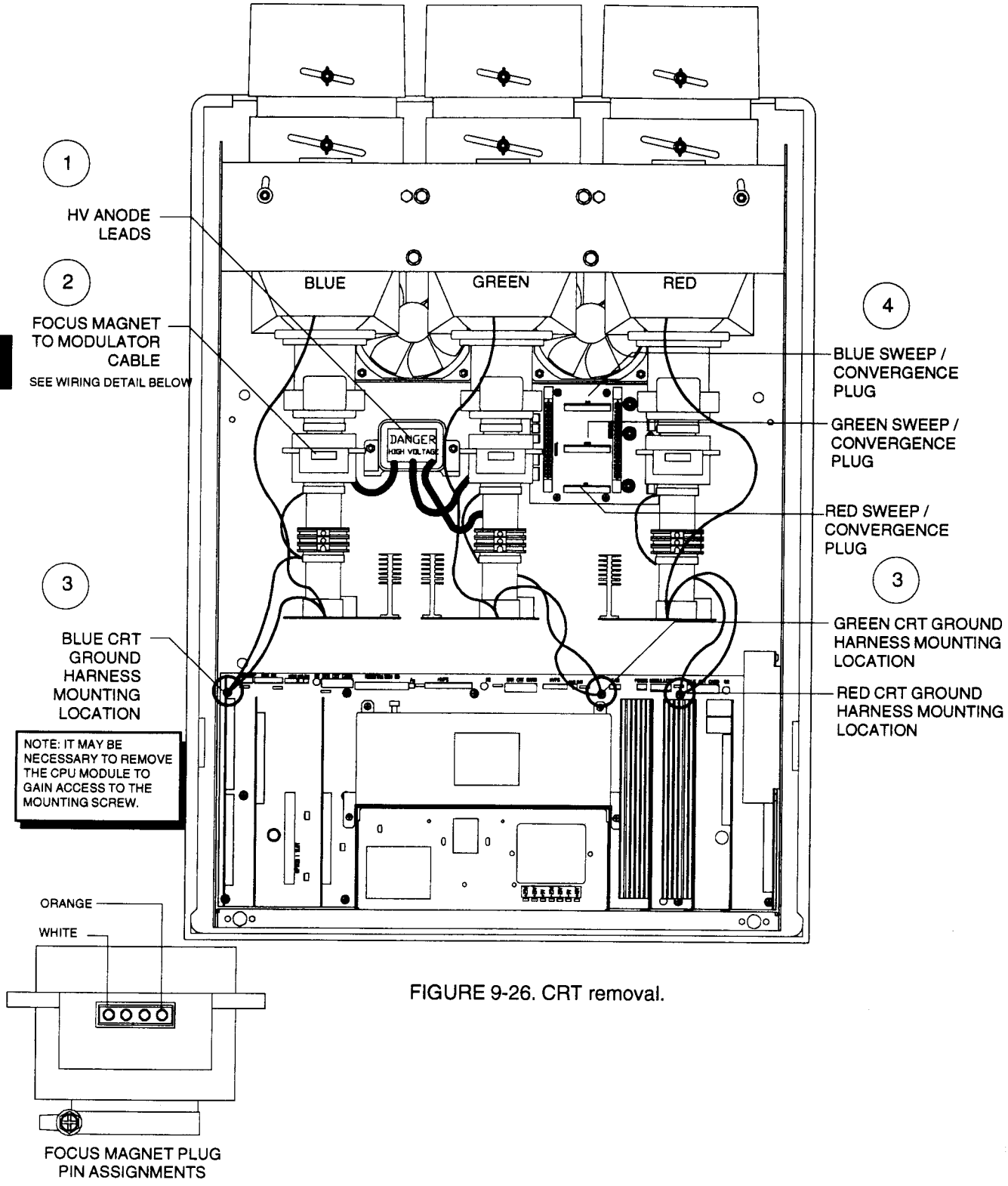
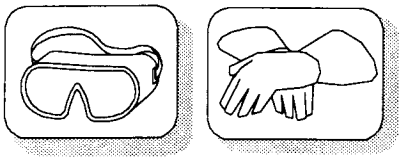


FIGURE 9-26. CRT removal.

9.6.1 . . . . 8" CRT Removal Procedure: (CONTINUED)

- STEP 5. Remove the CRT mounting head hardware on the CRT to be replaced. See Figure 9-27.
- STEP 6. With the appropriate protective eye wear and gloves on, carefully slide the defective Lens/CRT assembly through the head and out of the chassis.



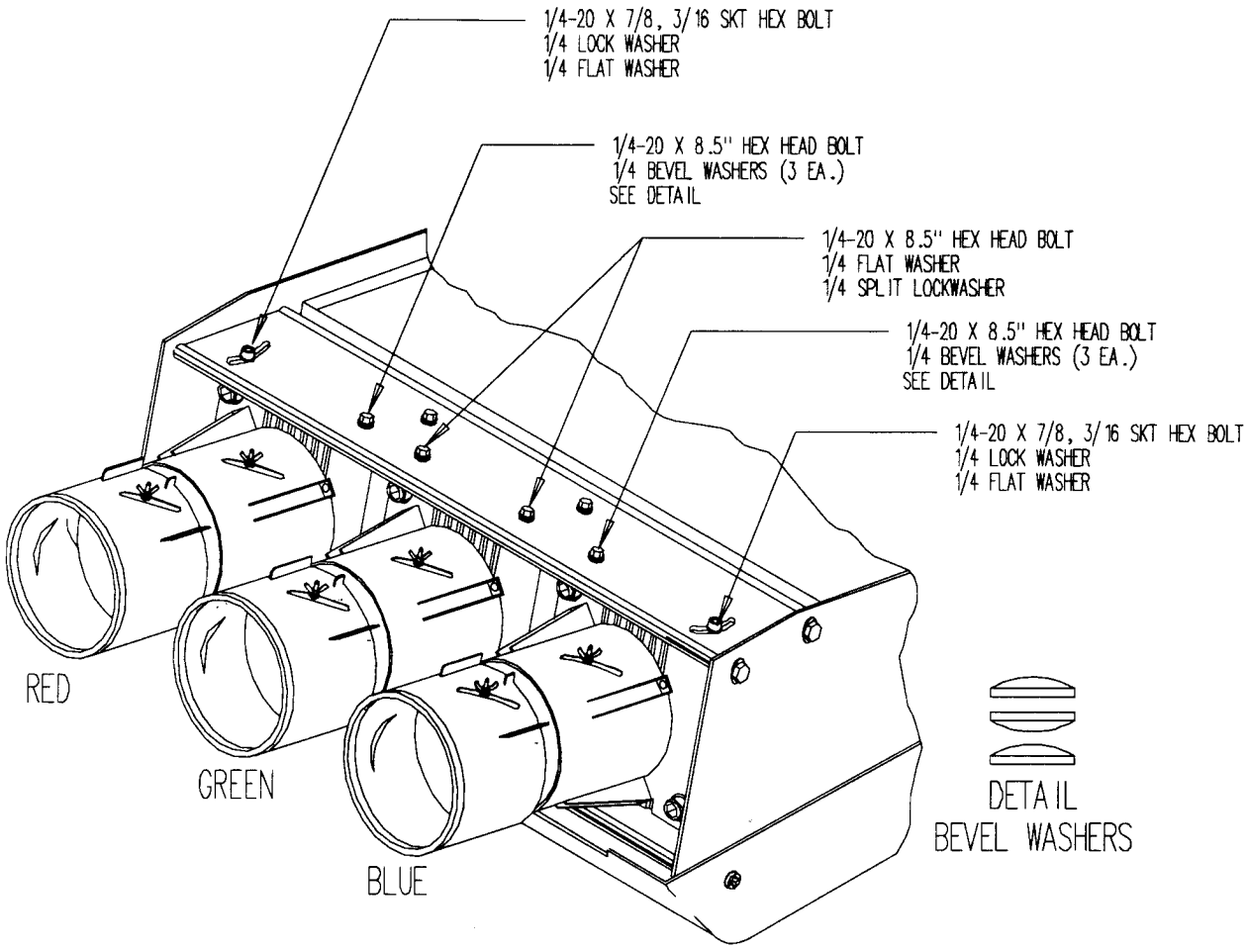


FIGURE 9-27. CRT mounting hardware.

9.6.1 . . . . 8" CRT Removal Procedure: (CONTINUED)

- STEP 7. **REMOVE LENS ASSEMBLY:** Using a 3/16 lens adjustment tool and a 9/16 wrench, remove the three (3) swivel screws, three (3) bevel washer sets, three (3) springs and the three (3) 9/16 self-locking nuts. See Figure 9-28.

- STEP 8. **CRT NECK COMPONENTS:** Loosen the Yoke/Convergence assembly clamp, Focus magnet assembly clamp and retainer ring and the Astigmator assembly clamp. Slide each component off the neck of the CRT. See Figure 9-28.

! The Yoke/Convergence coils are mated with epoxy, ensure that the Yoke/Convergence assembly remains mated.

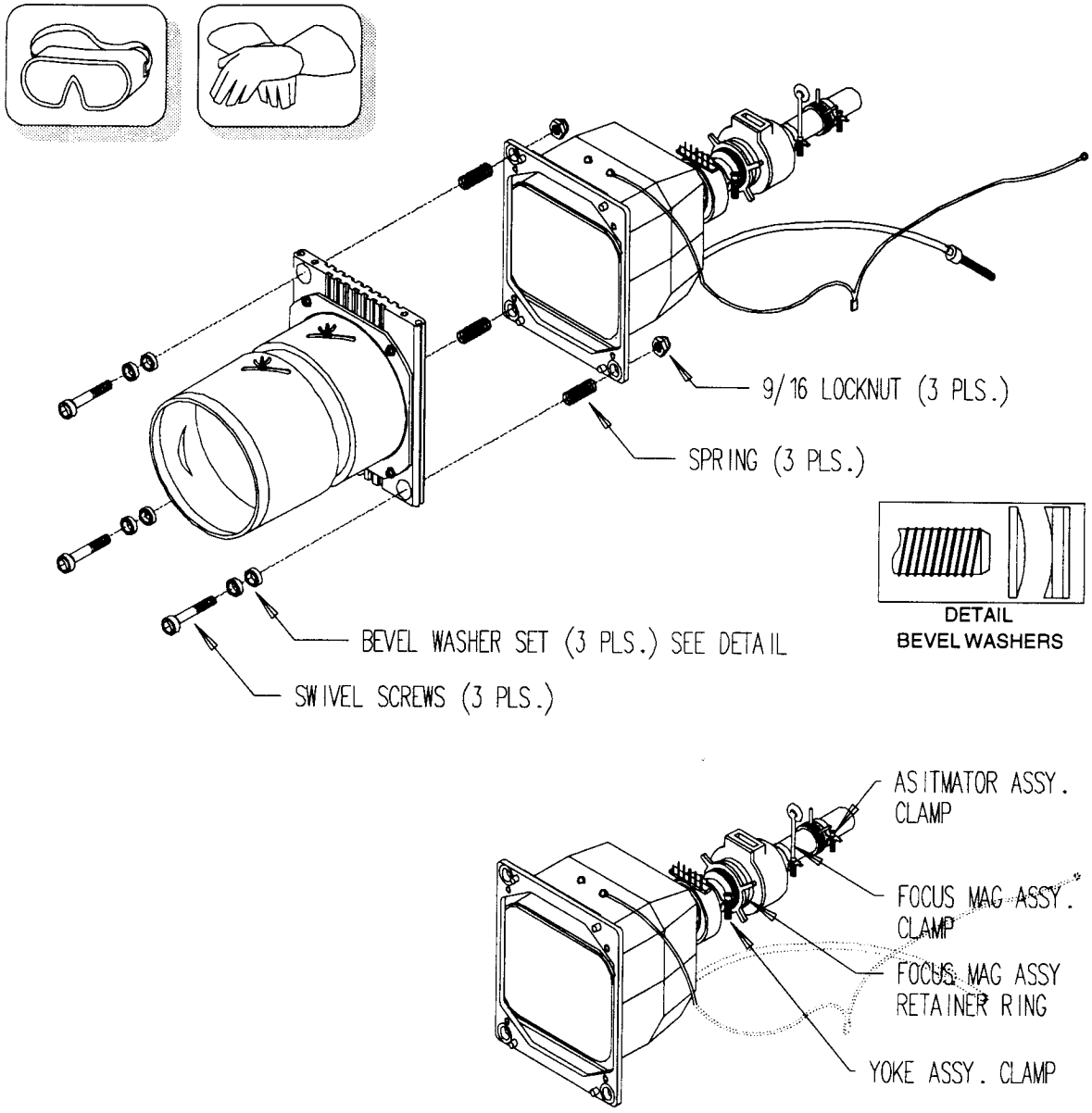


FIGURE 9-28. AMPRO 3600 CRT replacement procedure.

9.6.2 . . . . 8" CRT Replacement Procedure:

9.6.2.1 . . . . . .Replacement Notes:

☐ Reverse the order of the removal procedure when installing the replacement CRT.

☐ Ensure the Yoke/Convergence assembly is pushed as far up onto the bell of the CRT.

☐ Slide Focus Magnet assembly up to Yoke/Convergence assembly and tighten retainer ring and clamp.

☐ Ensure all ground connections have been re-established.

✸ WARNING ✸

TO PREVENT X-RAY LEAKAGE, DEFLECTION YOKES MUST ALWAYS REMAIN FIRMLY AGAINST THE BELL OF THE CRT.

☐ Prior to installing the lens assembly, remove any smudges or finger prints from the face of the CRT, using Windex and a clean soft cloth.

☐ **DO NOT** touch or try to clean the coated rear element of the lens assembly !

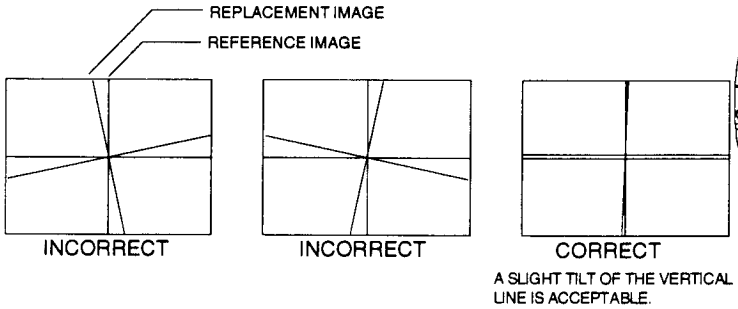
☐ **DO NOT** operate the system with the lens assembly(ies) removed !

☐ **RECHECK YOUR WORK !!!**

Once all connections have been re-established and verified, apply the appropriate A.C. power to the system and energize the system.

9.6.2.2 . . . . . .Yoke Rotation Adjustment:

- STEP 1. Select external or internal 32kHz crosshair pattern.
- STEP 2. Ensure Registration is "off".....55 [CODE]
- STEP 3. Cutoff one of the CRTs not under test. Leaving the replacement CRT and a reference color "on".
- STEP 4. Loosen the Yoke clamp of the replacement CRT.
- STEP 5. "CAREFULLY " rotate the yoke assembly under adjustment until the center horizontal line is parallel to the center horizontal line of the reference color or adjust until the center horizontal line is level. Tighten Yoke clamp.



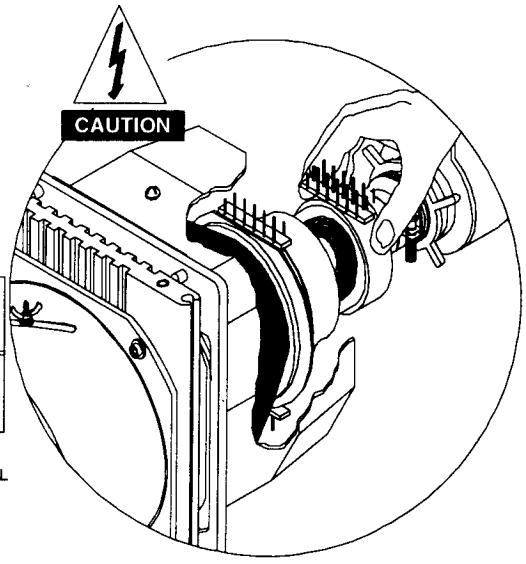


FIGURE 9-29. CRT replacement / yoke rotation.

9.6.2.3 . . . Focus Magnet Position and Lens Focus:

- STEP 1. Position Focus magnet under adjustment fully forward, straight up and down and tighten.
- STEP 2. Select internal 15kHz. crosshatch pattern.
- STEP 3. Using the remote control set the following controls for the color under adjustment;
  - ¤ Brightness [[BRIGHT]]75%
  - ¤ Contrast [CONT]65%
  - ¤ Static Focus 98 [CODE]50%
  - ¤ Dynamic Focus 99 [CODE]87% (horizontal - [↔]) / 15% (vertical - [↕])
- STEP 4. Ensure G2 cutoff is adjusted properly;
  - ¤ Select internal 62kHz crosshatch.
  - ¤ Cutoff CRT under test.
  - ¤ Set contrast and brightness to minimum.
  - ¤ Looking into the lens of the CRT under adjustment, adjust R2 on the CRT amplifier card so that the raster is just barely visible.
  - ¤ Restore CRT cutoff.
- STEP 5. Perform a lens focus and focal plane (*scheimpflug*) adjustment. For detail instructions refer to Section 5.
- STEP 6. **IF REQUIRED!:** Generally the Focus Magnet assembly is positioned straight up and down, fully forward up against the Yoke/Convergence assembly, but if necessary perform the following.
  - ¤ Loosen the focus magnet under adjustment.
  - ¤ Slide the focus magnet on the CRT until preliminary focus is achieved in the center of the projected image. Note, recheck lens focus.
  - ¤ Tighten the focus magnet clamp(s). **BE CAREFUL** not to rotate or slide the focus magnet.

9.6.2.4 . . . Astigmator/Beam Centering Prerequisites and Adjustments:

- STEP 1. Check and position the astigmator/beam centering assembly. The clamp used for securing the assembly should be in-line with the end of the G1 electrode located inside and at the rear of the CRT neck. See Figure 9-30.

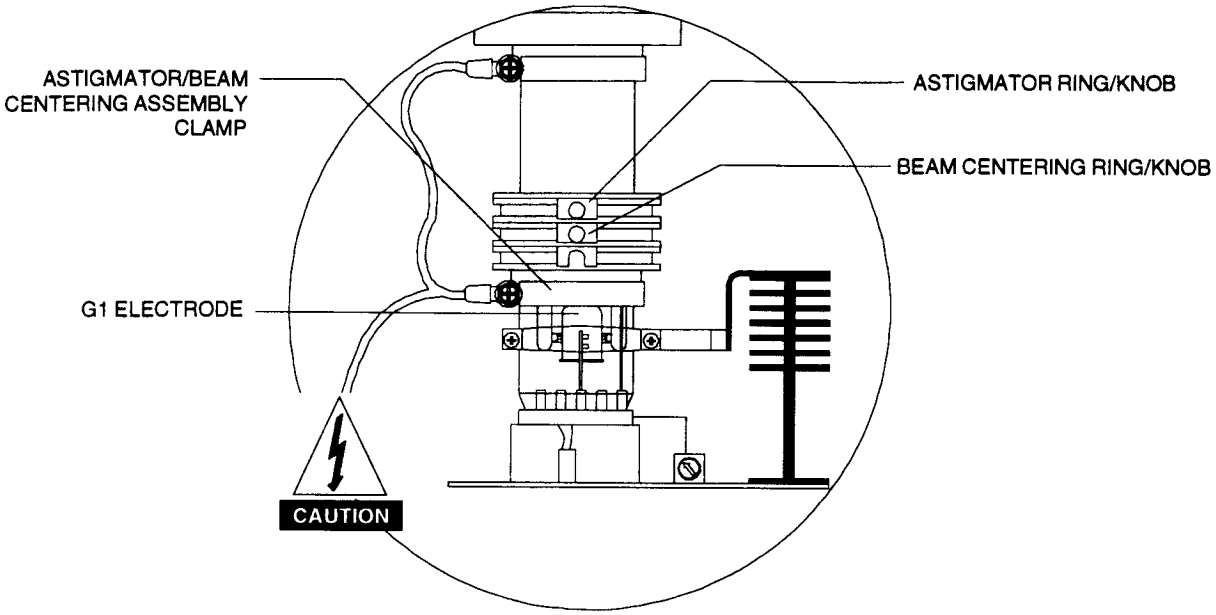


FIGURE 9-30. Asigmator/Beam centering assembly poistion

- STEP 2. Using the remote control perform and set the following;
  - ¤ Select internal 15kHz crosshatch pattern
  - ¤ Brightness to 95%.....Contrast to 95%
  - ¤ Sub-brightness (95 [CODE]) to 50%.....Sub-contrast (94 [CODE]) to 80%
  - ¤ Static Focus (98 [CODE]) to 50%,
- STEP 3. **BEAM CENTERING:** Decrease Static Focus (98 [CODE].....⇓) until a bright line is visible within the de-focused line, then;
  - ¤ Adjust the beam center ring, closest to the CRT amplifier (Figure 9-30), by rotating and turning the knob until the bright vertical and horizontal lines in the crosshatch pattern are centered within the de-focused crosshatch pattern or halo. See Figure 9-31.

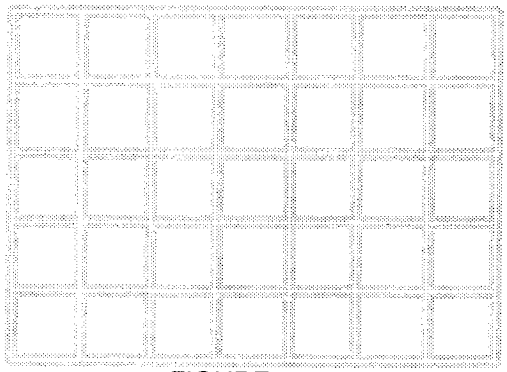


FIGURE 9-31.

Beam centering adjustement pattern.

9.6.2.4 . . . Astigmator/Beam Centering Prerequisites and Adjustments: (CONTINUED)

- STEP 4. Select internal 15kHz dot pattern.
- STEP 5. **ASTIGMATOR ADJUSTMENT**: Increase static focus (98 [CODE] / ⇑) until the dots are uniformly de-focused.
  - ¤ Adjust the astigmator ring, (one closest to the lens end), by rotating and turning the knob for best roundness of the dots. See Figure 9-32
  - ¤ Repeat Steps 2 through 5 until optimum results are achieved.
- STEP 6. Re-focus the image.

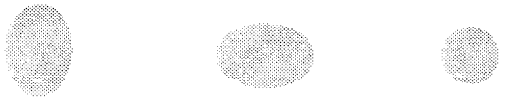


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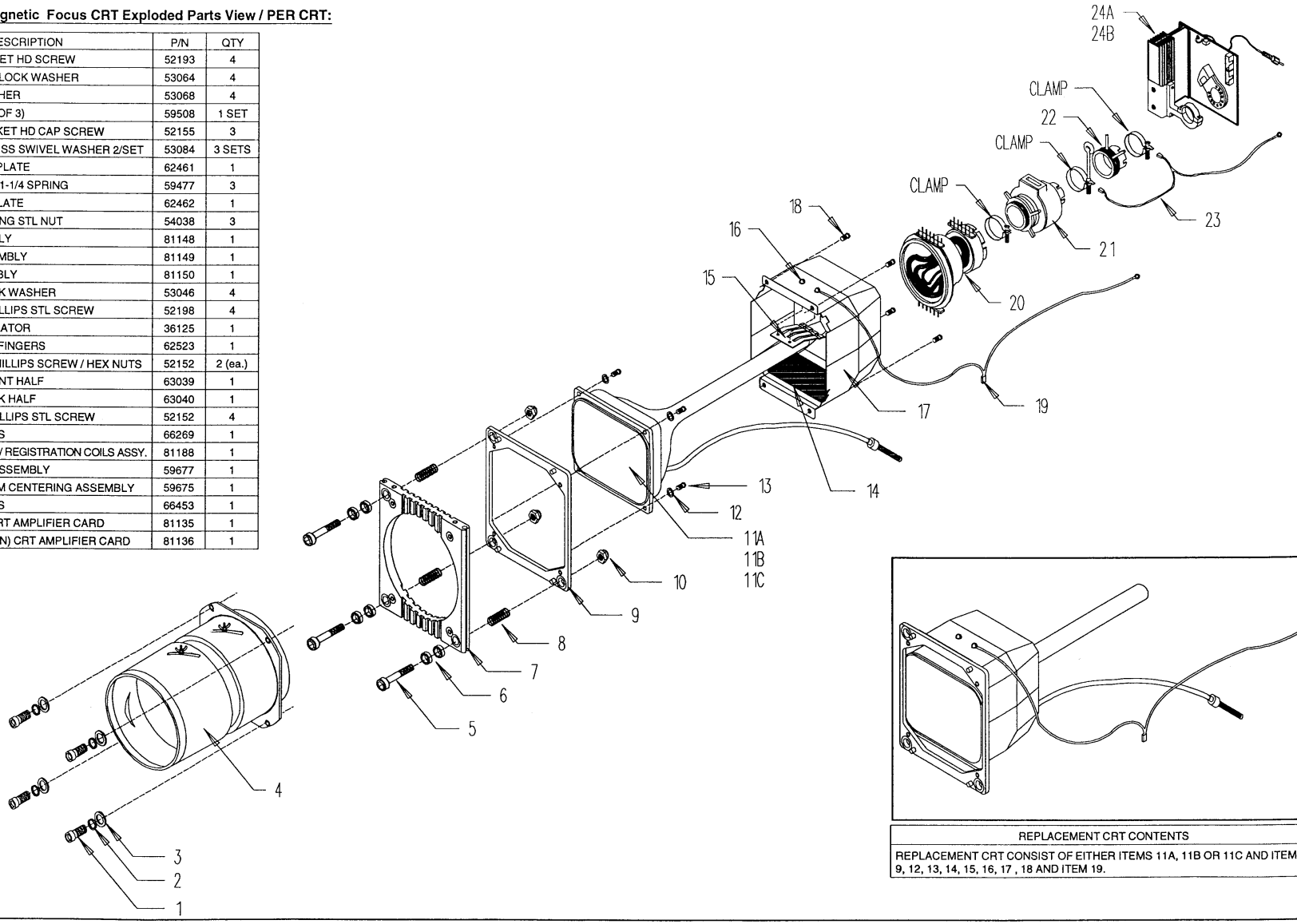
FIGURE 9-32. Asigmator adjustment pattern.

! Once all aspects of the replacement CRT testing and adjustments have been satisfied, perform a complete mechanical and electronic setup for all sources and channels used as outlined in Sections 5 and 6 of this manual.

9.6.3 . . . . . .8" Magnetic Focus CRT Exploded Parts View / PER CRT:

ITEM	DESCRIPTION	P/N	QTY
1	1/4 - 20 x 7/8 SOCKET HD SCREW	52193	4
2	1/4 I.D. x .375 O.D. LOCK WASHER	53064	4
3	1/4 STL FLAT WASHER	53068	4
4	HD8-B LENS (SET OF 3)	59508	1 SET
5	3/8-24 x 2-1/2 SOCKET HD CAP SCREW	52155	3
6	3/8 I.D x 11/16 O.D. SS SWIVEL WASHER 2/SET	53084	3 SETS
7	LENS MOUNTING PLATE	62461	1
8	.38 I.D x .75 O.D. X 1-1/4 SPRING	59477	3
9	CRT MOUNTING PLATE	62462	1
10	3/8-24 SELF LOCKING STL NUT	54038	3
11A	RED CRT ASSEMBLY	81148	1
11B	GREEN CRT ASSEMBLY	81149	1
11C	BLUE CRT ASSEMBLY	81150	1
12	1/4 STL SPLIT LOCK WASHER	53046	4
13	6-32 x 1-1/2 FH PHILLIPS STL SCREW	52198	4
14	CRT ANODE INSULATOR	36125	1
15	CRT GROUNDING FINGERS	62523	1
16	6-32 x .25 PNHD PHILLIPS SCREW / HEX NUTS	52152	2 (ea.)
17	CRT SHIELD - FRONT HALF	63039	1
	CRT SHIELD - BACK HALF	63040	1
18	6-32 X 1/4 SEM PHILLIPS STL SCREW	52152	4
19	GROUND HARNESS	66269	1
20	DEFLECTION YOKE / REGISTRATION COILS ASSY.	81188	1
21	FOCUS MAGNET ASSEMBLY	59677	1
22	ASIGMATOR / BEAM CENTERING ASSEMBLY	59675	1
23	GROUND HARNESS	66453	1
24A	MASTER (BLUE) CRT AMPLIFIER CARD	81135	1
24B	SLAVE (RED/GREEN) CRT AMPLIFIER CARD	81136	1



REPLACEMENT CRT CONTENTS
REPLACEMENT CRT CONSIST OF EITHER ITEMS 11A, 11B OR 11C AND ITEMS 9, 12, 13, 14, 15, 16, 17 , 18 AND ITEM 19.

9.7 .....AMPRO 4600 9" Magnetic Focus CRT Removal/ Replacement Procedure:

9.7.1 .....9" CRT Removal Procedure:

Tools Required

- ☐ Protective eyeglasses / gloves
- ☐ Phillips / slotted screwdriver
- ☐ 5/16 Ball Hexdriver (lens adjustment tool)
- ☐ 3/16 Ball Hexdriver or 3/16 Allen Wrench

Replacement Procedure

- STEP 1. De-energize the system and remove the main A.C. power cord.
- STEP 2. Unlock and tilt-up the top cover and top tray assemblies.
- STEP 3. On the front of the 4600, remove the four (4) each phillips screws securing the front plate to the chassis. See Figure 9-33

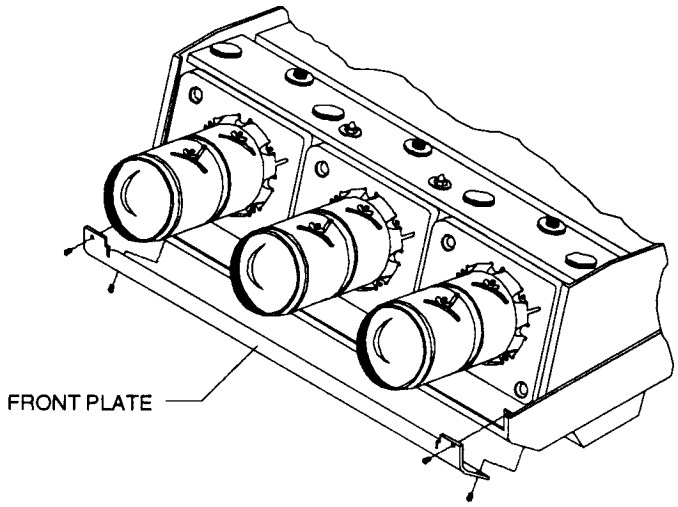


FIGURE 9-33. AMPRO 4600 front plate removal.

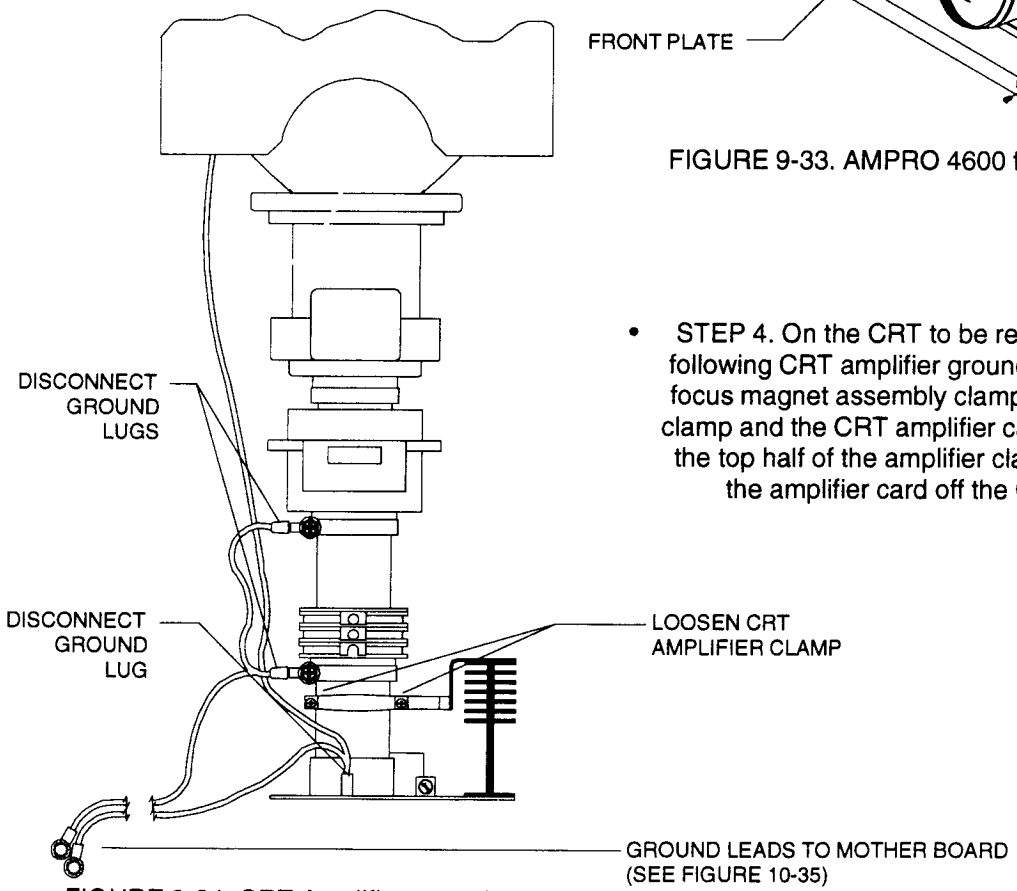


FIGURE 9-34. CRT Amplifier - top view.

- STEP 4. On the CRT to be replaced, disconnect the following CRT amplifier ground connections from the focus magnet assembly clamp, astigmator assembly clamp and the CRT amplifier card. Loosen or remove the top half of the amplifier clamp and carefully slide the amplifier card off the CRT. See Figure 9-34.

9.7.1 . . . . 9" CRT Removal Procedure: (CONTINUED)

- STEP 5. On the defective CRT disconnect the following; ① High Voltage anode lead, ② Focus magnet connector, ③ ground harness from the mother board location and ④ the respective sweep/convergence plug from the yoke interface board. See Figure 9-35.

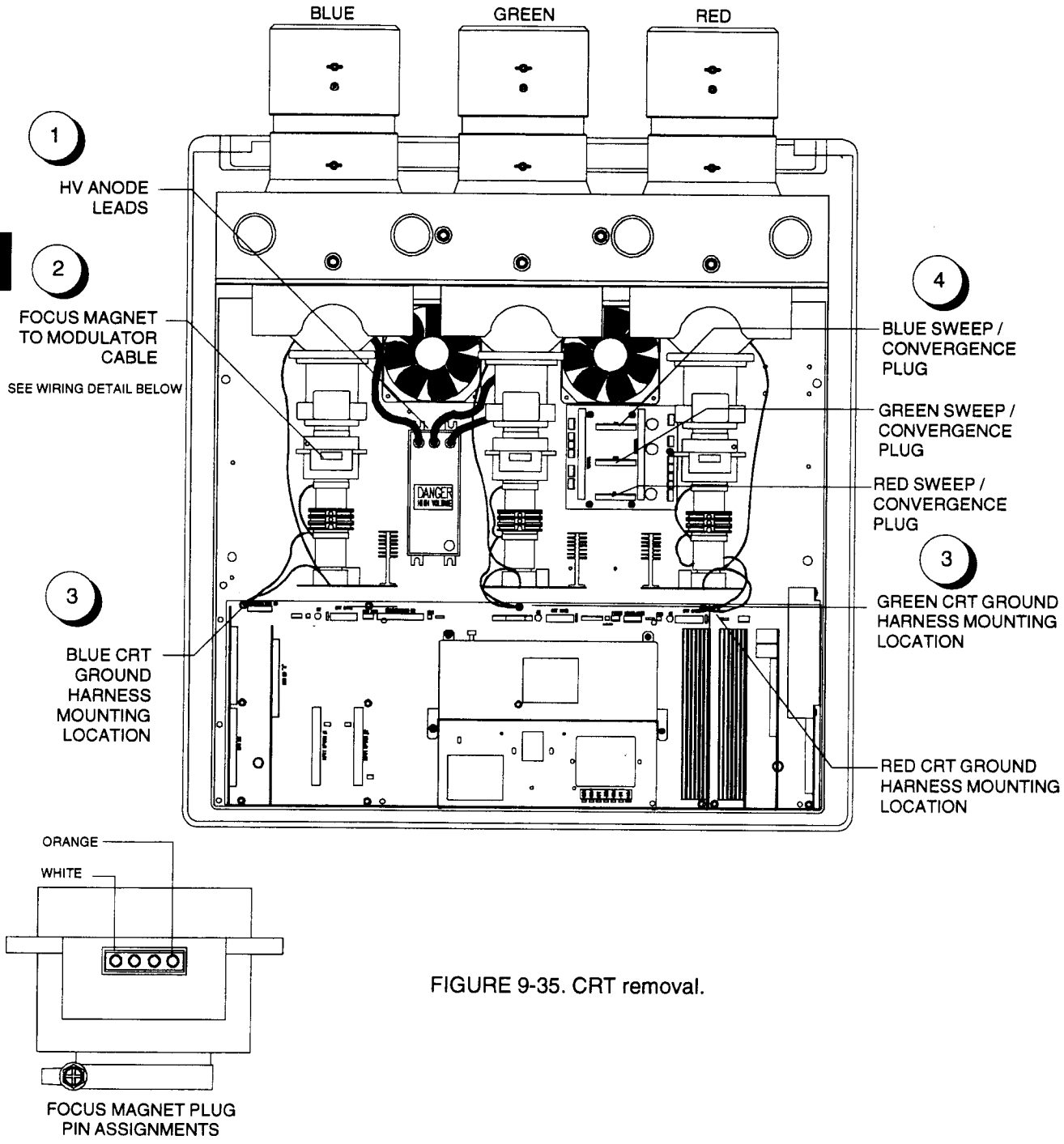
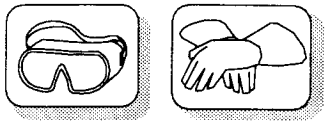


FIGURE 9-35. CRT removal.

9.7.1 . . . . 9" CRT Removal Procedure: (CONTINUED): Refer to Figure 9-36

- STEP 6. **LENS/CRT ASSEMBLY REMOVAL:** Remove the Lens/CRT mounting hardware of the CRT to be replaced.

- STEP 7. With the appropriate protective eye wear and gloves on, carefully slide the Lens/CRT assembly through the head and out of the chassis.



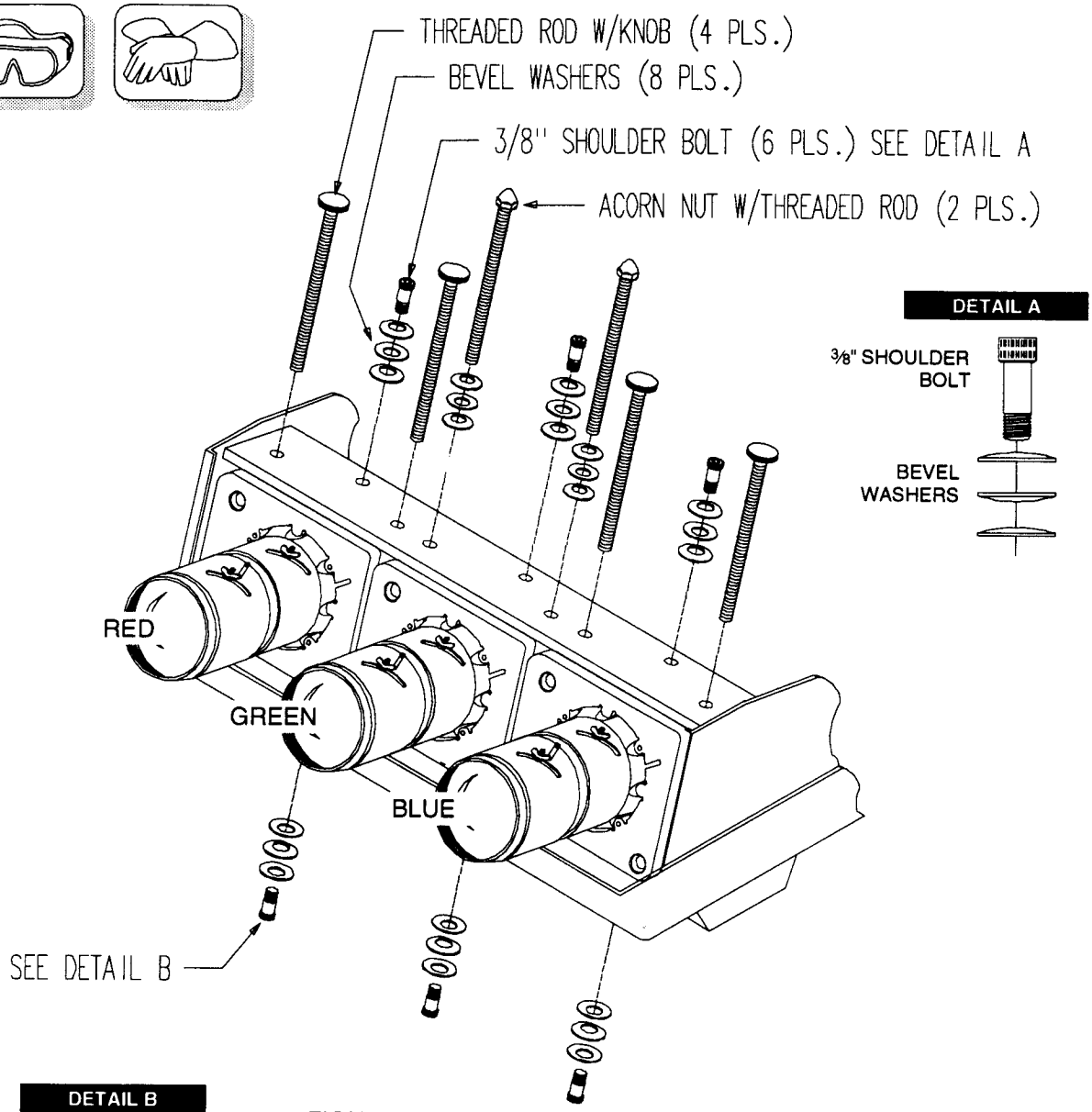


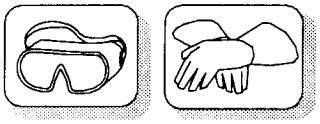
FIGURE 9-36. CRT mounting hardware.

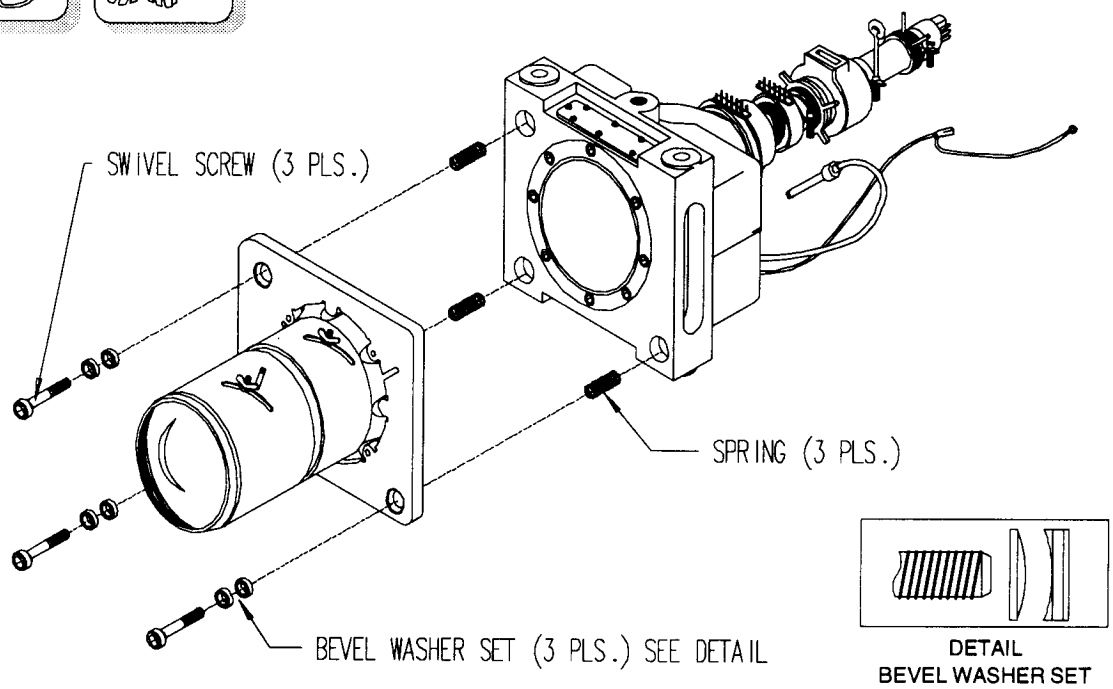
9.7.1 . . . . 9" CRT Removal Procedure: (CONTINUED)

- STEP 8. **REMOVE LENS ASSEMBLY**: Using a 5/16" lens adjustment tool, remove the three (3) swivel screws, the three (3) bevel washer sets and the three (3) springs. NOTE: DO NOT TOUCH or attempt to clean the coated rear element of the lens. See Figure 9-37

- STEP 9. **REMOVE CRT NECK COMPONENTS**: Loosen the Yoke/Convergence assembly clamp, Focus magnet retainer ring and clamp and the Astigmator assembly clamp. Slide each component off the neck of the defective CRT. See Figure 9-37

! The Yoke/Convergence coils have been nulled and are mated with epoxy, ENSURE that this assembly remains together as one piece.





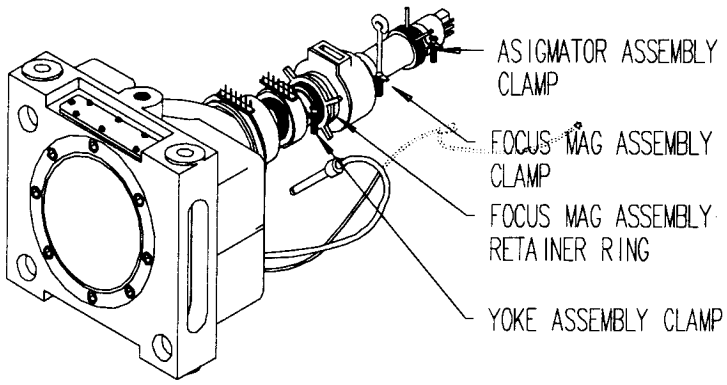


FIGURE 9-37. AMPRO 4600 CRT replacement procedure.

9.7.2 . . . . 9" CRT Replacement Procedure:

9.7.2.1 . . . . . .Replacement Notes:

☐ Reverse the order of the removal procedure when installing the replacement CRT.

☐ Ensure the Yoke/Convergence assembly is pushed as far up onto the bell of the CRT as possible.

☐ Slide the Focus Magnet assembly up to Yoke assembly and tighten the retainer ring and clamp.

☐ Ensure all ground connections have been re-established.

WARNING!

TO PREVENT X-RAY LEAKAGE, DEFLECTION YOKES MUST ALWAYS REMAIN FIRMLY AGAINST THE BELL OF THE CRT.

☐ **DO NOT** touch or try to clean the coated rear element of the lens assembly !

☐ **DO NOT** operate the system with the lens assembly(ies) removed !

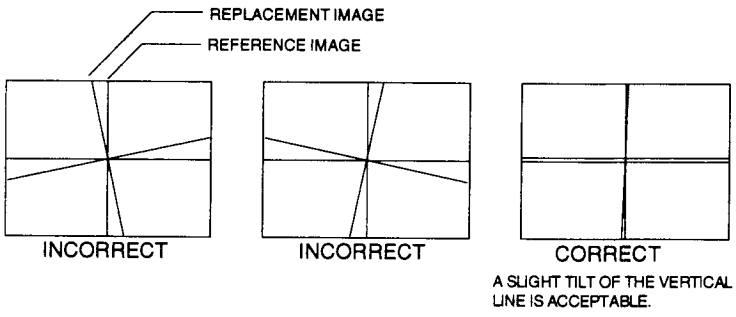
☐ Refer to Figure 9-36, detail A and B when installing the top/bottom ⅜" shoulder bolts and bevel washers, install bottom bolt/washers. Firmly tighten then back-off ¼ to ½ of a turn. Install top bolt/washers in the same manner allowing the CRT assembly to swing in and out smoothly.

☐ **RECHECK YOUR WORK !!!**

Once all connections have been re-established and verified, apply the appropriate A.C. power to the system and energize the system.

9.7.2.2 . . . . . .Yoke Rotation Adjustment:

- STEP 1. Select external or internal 32kHz crosshair pattern.
- STEP 2. Ensure Registration is "off".....55 [CODE]
- STEP 3. Cutoff one of the CRTs not under test. Leaving the replacement CRT and a reference color "on".
- STEP 4. Loosen the Yoke clamp of the replacement CRT.
- STEP 5. "CAREFULLY " rotate the yoke assembly under adjustment until the center horizontal line is parallel to the center horizontal line of the reference color or adjust until the center horizontal line is level. Tighten Yoke clamp.



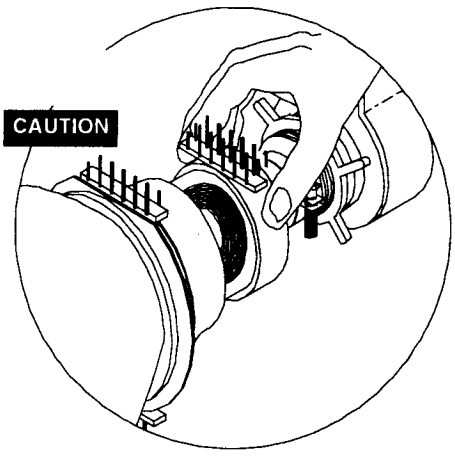


FIGURE 9-38. CRT replacement / yoke rotation.

9.7.2.3 . . . Focus Magnet Position and Lens Focus:

- STEP 1. Position Focus magnet under adjustment fully forward, straight up and down and tighten.
- STEP 2. Select internal 15kHz. crosshatch pattern.
- STEP 3. Using the remote control set the following controls for the color under adjustment;
  - ¤ Brightness [[BRIGHT]].....75%
  - ¤ Contrast [CONT].....65%
  - ¤ Static Focus 98 [CODE].....50%
- Dynamic Focus 99 [CODE]horizontal - [↔].....87% and vertical - [↕]..... 15%
- STEP 4. Ensure G2 cutoff is adjusted properly;
  - ¤ Select internal 62kHz crosshatch.
  - ¤ Cutoff CRT under test.
  - ¤ Set contrast and brightness to minimum.
  - ¤ Looking into the lens of the CRT under adjustment, adjust R2 on the CRT amplifier card so that the raster is just barely visible.
  - ¤ Restore CRT cutoff.
- STEP 5. Perform a preliminary lens focus and focal plane (*scheimpflug*) adjustment. Refer to Section 5 for detailed instructions
- STEP 6. **IF REQUIRED!** Typically the Focus Magnet assembly is position straight up and down, fully forward up against the Yoke/Convergence assembly. If necessary, perform the following procedure;
  - ¤ Loosen the focus magnet under adjustment.
  - ¤ Slide the focus magnet on the CRT until preliminary focus is achieved in the center of the projected image. Note, recheck lens focus.
  - ¤ Tighten the focus magnet clamp(s). **BE CAREFUL** not to rotate or slide the focus magnet.

9.7.2.4 . . . Astigmator/Beam Centering Prerequisites and Adjustments:

- STEP 1. Check and position the astigmator/beam centering assembly. The clamp used for securing the assembly should be in-line with the end of the G1 electrode located inside and at the rear of the CRT neck. See Figure 9-39.

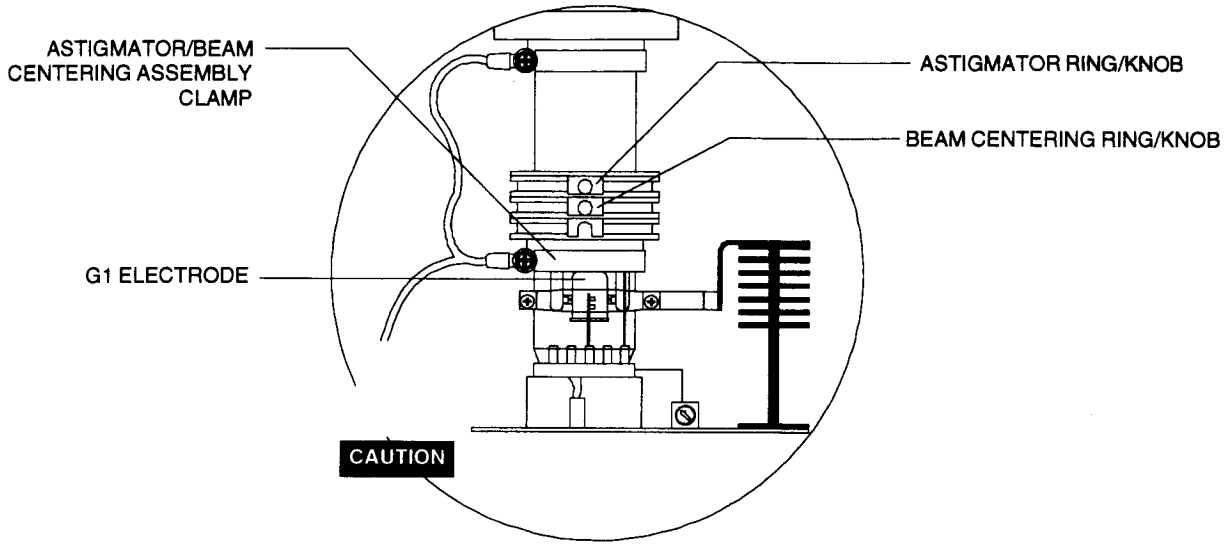


FIGURE 9-39. Asigmator/Beam centering assembly poistion

- STEP 2. Using the remote control, perform and set the following;
  - ¤ Select internal 15kHz crosshatch pattern
  - ¤ Set Brightness to.....80% and Contrast to.....95%
  - ¤ Static Focus (98 [CODE]) to.....50%
  - ¤ Sub-brightness (95 [CODE]) to.....50% and Sub-contrast to.....80%
- STEP 3. **BEAM CENTERING:** Decrease Static Focus (98 [CODE].....⇓) until a bright line is visible within the de-focused line.
  - ¤ Adjust the beam center ring, closest to the CRT amplifier (Figure 9-39), by rotating and turning the knob until the bright vertical and horizontal lines in the crosshatch pattern are centered within the de-focused crosshatch pattern or halo. See Figure 9-40.

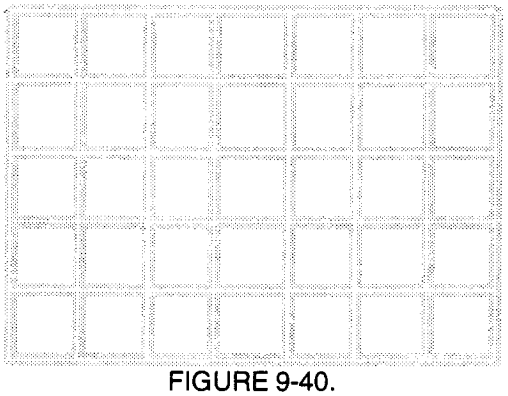


FIGURE 9-40.

Beam centering adjustement pattern.

9.7.2.4 . . . Astigmator/Beam Centering Prerequisites and Adjustments: (CONTINUED)

- STEP 4. Select internal 15kHz dot pattern.
- STEP 5. **ASTIGMATOR ADJUSTMENT**: Increase Static Focus (99 [CODE]..... ⇑) until the dots are uniformly de-focused.
  - ¤ Adjust the astigmator ring, (one closest to the lens end), by rotating and turning the knob for best roundness of the dots. See Figure 9-41
  - ¤ Repeat Steps 2 through 5 until optimum results are achieved.
- STEP 6. Re-focus the image.

FIGURE 9-41. Asigmator adjustment pattern.

Once all aspects of the replacement CRT testing and adjustments have been satisfied, perform a complete mechanical and electronic setup for all sources and channels used. Refer to Sections 5 and 6 as required.

9.7.3 .....9" Magnetic Focus CRT Exploded Parts View / PER CRT:

ITEM	DESCRIPTION	P/N	QTY
1	SWIVEL SCREW 3/8-24 X 2.5 SPECIAL	52155	3
2	BEVEL WASHER SET (2/SET)	53069	3 SETS
*3	HD-10L LENS ASSEMBLY (SET OF 3)	80856	1
	HD-10 LENS ASSEMBLY (SET OF 3)	80825	1
	HD-10GT17 LENS ASSEMBLY (SET OF 3)	80979	1
	HD-10GT26 LENS ASSEMBLY (SET OF 3)	80980	1
4	LENS MOUNTING PLATE	62289	1
5	SPRING 3/4 X 3/8 X .093 X .156	59477	3
6	RED CRT/COUPLER (ALL LENS SERIES)	81163	1
	GREEN CRT/COUPLER (ALL LENS SERIES)	81164	1
	BLUE CRT/COUPLER (ALL LENS SERIES)	81165	1
7	CRT/COUPLER GROUND HARNESS	59546	1
8	DEFLECTION YOKE/CONVERGENCE ASSEMBLY	81187	1
9	FOCUS MAGNET ASSEMBLY	59669	1
10	ASTIGMATOR/BEAM CENTERING ASSEMBLY	59675	1
11	GROUND HARNESS	66453	1
12A	BLUE/GREEN CRT AMPLIFIER CARD	81135	**2
12B	RED CRT AMPLIFIER CARD	81136	**1
*DEPENDS ON LENS OPTION INSTALLED			
**PER SYSTEM