

ECP 3000 - OWNERS MANUAL

PRELIMINARY

2

DUE TO CONSTANT RESEARCH, THE INFORMATION IN THIS MANUAL IS SUBJECT TO CHANGE AT ANY TIME WITHOUT NOTICE.

ECP is a registered trademark of Electrohome Limited.

## SERVICE WARNINGS

SERVICE DATA REFERENCE B09 CHASSIS  
120/240 Volts 50/60 Hz. 450 Watts  
A.C. operating Color Projector

This information is correct as of December, 1987

IMPORTANT: WHEN ORDERING SERVICE REPLACEMENT COMPONENTS, QUOTE THE PROJECTOR MODEL NUMBER (38-B09640-71), THE SERIAL NO. AND THE DATE OF MANUFACTURE. THIS INFORMATION IS AVAILABLE FROM THE SILVER LICENCE LABEL LOCATED ON THE FRONT BEZEL.

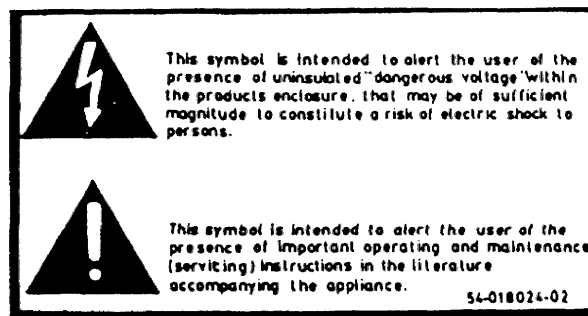
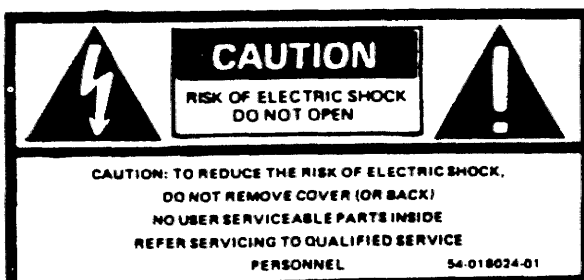
### 1. HIGH VOLTAGE MODULE

Due to critical safety circuitry to prevent x-ray radiation, the High Voltage Module must be serviced at the factory. If your module needs repair or adjustment, contact an authorized Electrohome Service Depot and a new module will be supplied in exchange.

### 2. VIDEO OUTPUT MODULE

Due to critical safety circuitry to prevent x-ray radiation, the circuitry inside the dotted lines must be serviced at the factory. If your module needs repair or adjustment, contact an authorized Electrohome Service Depot and a new module will be supplied in exchange.

Controls R43 and R47 have been sealed in epoxy and they must not be replaced or defeated.



## X-RAY, HIGH VOLTAGE AND CRT WARNINGS

### 1. X-RAY RADIATION

This projector has been designed for minimum x-ray radiation. However, to avoid possible exposure to soft x-ray radiation, ensure that the HIGH VOLTAGE is correctly set to 34KV.

### 2. HIGH VOLTAGE

This projector contains HIGH VOLTAGES derived from power supplies capable of delivering LETHAL quantities of energy. To avoid DANGER TO LIFE, do not attempt to service the projector until all precautions necessary for working on HIGH VOLTAGE equipment have been observed. In order to prevent damage to solid state devices, do not ark the picture tube anode lead to chassis or earth ground.

CAUTION: This projector employs EHT (34KV) picture tubes.

### 3. CRT HANDLING

The picture tube encloses a high vacuum. Care must be taken not to bump or scratch the picture tube as this may cause the tube to implode resulting in personal injury and property damage. Shatter proof goggles must always be worn while handling the CRT or installing it in the projector. DO NOT handle the CRT by the neck.

## WARNING

THE ECP 3000 PROJECTOR GENERATES, USES AND CAN RADIATE RADIO FREQUENCY ENERGY AND IF NOT INSTALLED AND USED IN ACCORDANCE WITH THIS USERS MANUAL, MAY CAUSE INTERFERENCE TO RADIO COMMUNICATIONS.

THE ECP 3000 PROJECTOR IS TESTED TO AND COMPLIES WITH THE LIMITS FOR CLASS A COMPUTING DEVICE PURSUANT TO SUBPART J OF PART 15 OF FCC RULES, WHICH ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST SUCH INTERFERENCE WHEN OPERATED IN A COMMERCIAL ENVIRONMENT.

OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA MAY CAUSE RADIO INTERFERENCE IN WHICH CASE THE USER WILL BE REQUIRED, AT HIS OWN EXPENSE, TO TAKE WHATEVER MEASURES MAY BE REQUIRED TO CORRECT THE INTERFERENCE.

## WARNING

TO PREVENT FIRE OR ELECTRICAL SHOCK, DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE. DO NOT USE THE POLARIZED POWER CORD WITH AN EXTENSION CORD, RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

CAUTION: KEEP OUT OF DIRECT SUNLIGHT. BECAUSE OF THE LARGE LENS, PROLONGED SUNLIGHT MAY CAUSE PERMANENT DAMAGE.

WARNING: DO NOT OPEN THE PROJECTOR'S CASE. REFER ALL SERVICING TO QUALIFIED SERVICE PERSONNEL.

CAUTION: ACRYLIC LENS. NEVER TOUCH THE LENS WITH FINGERS. CLEAN ONLY WHEN ABSOLUTELY NECESSARY. MOISTEN A SOFT FACIAL TISSUE WITH NON-ABRASIVE WINDOW CLEANER AND RUB VERY GENTLY. IN CIRCULAR MOTION.

CAUTION: FOLLOWING SHIPMENT IN COLD WEATHER THE PROJECTOR SHOULD BE UNPACKED AND ALLOWED TO SIT FOR ONE HOUR PRIOR TO OPERATING, IN ORDER THAT INTERNAL COMPONENTS MAY REACH ROOM TEMPERATURE. FAILURE TO DO SO MAY RESULT IN CRT BREAKAGE.

WARNING: IT IS RECOMMENDED THAT THE ORIGINAL PACKING BE RETAINED AND USED WHEN SHIPPING TO ANOTHER LOCATION. IF THE PROJECTOR IS TO BE SHIPPED FREQUENTLY AND A PERMANENT TYPE SHIPPING CONTAINER IS USED, IT IS RECOMMENDED THAT THE ORIGINAL FOAM PARTS SUPPLIED WITH THE PROJECTOR ARE USED. THE ORIGINAL PACKING IS CUSTOM DESIGNED WITH FOAMS OF DIFFERENT DENSITIES WHICH PREVENT CRT BREAKAGE WHEN DROPPED.

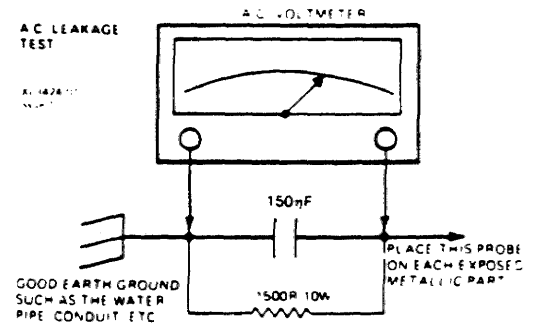
THIS PROJECTOR IS COVERED BY U.S. PATENTS 4414494, 4393336, 4607280 AND OTHER PATENTS PENDING.

# PRODUCT SAFETY SERVICING GUIDELINES.

CAUTION: NO MODIFICATION OF ANY CIRCUIT SHOULD BE ATTEMPTED. SERVICING SHOULD BE PERFORMED ONLY AFTER THOROUGHLY FAMILIAR WITH THE FOLLOWING SERVICING GUIDELINES. NONCOMPLIANCE WITH THE FOLLOWING SERVICING GUIDELINES INCREASES THE RISK OF POTENTIAL HAZARDS AND INJURY TO THE USER.

1. Do not install, remove or handle the picture tubes in any manner unless shatter-proof goggles are worn. People not wearing shatter-proof goggles must be kept away while picture tubes are handled. Keep the picture tube away from the body while handling.
2. Before servicing observe the original lead dress. Extra precaution must be taken to maintain original lead dress, especially in the high voltage circuitry areas. Replace the components that indicate evidence of overheating. Always use the manufacturer's replacement component.
3. Always check that the high voltage is at its correct value using an accurate high voltage meter. The calibration of such meter should be checked periodically.
4. After servicing always perform an A.C. leakage test on the exposed metallic parts, to ensure that the projector is safe to operate without danger of electric shock. First temporarily disable the ground connection of the line cord using a suitable adaptor. Do not use a line isolation transformer. Then measure the leakage current in the following manner:

- Connect a 1500 $\Omega$  10 watt resistor in parallel with a 150nF A.C. capacitor between a known good earth ground (for example a water pipe or metallic conduit) and each exposed metallic part, one at a time. Measure the rms voltage across the 1500 $\Omega$  resistor using an A.C. voltmeter having a sensitivity of 1000 $\Omega$  per volt or more. Reverse the A.C. plug on the projector and repeat the rms voltage measurements. Any rms voltage measured must not exceed .3V rms which is equivalent to .5mA rms current. Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.
5. Check for and replace any wire with frayed insulation including the line cord.
  6. Check across-the-line components and replace if necessary.



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## 1. SPECIFICATIONS

# ECP 3000 PERFORMANCE DATA and SPECIFICATIONS (PRELIMINARY)

### Resolution

- High definition F1.0 lens capable of resolving 1024 x 1280 pixels
- Electronics are capable of synchronizing 1000 TV lines vertical

### Brightness

#### Maximum

- 650 lumens peak light output
- 370 foot lamberts on a 6" diagonal 10 gain screen total light output

#### Focused Data

- 480 lumens peak light output
- 280 foot lamberts on a 6" diagonal 10 gain screen total light output

### Display

- Functional 3 lens design allows simple adjustment for flat, curved or rear screens from 5 to 25 feet diagonal
- Electronic pincushion circuits separately correct top, bottom and sides for flat, curved, or rear screen applications
- Aspect ratio 4:3
- Keystone circuitry to correct pictures for angles up to  $\pm 15$  degrees vertically from screen axis

### Video Circuits

#### Input

- Input level 0.5 to 2.0 volts p-p, 75ohms  $\pm 1\%$  terminated
- Automatically switches to separate sync or sync on green
- Separate sync is automatically accepted in either polarity

#### Frequency Response

- 60MHz bandwidth  $\pm 3$ dB
- Linear non-differential amplifier accommodates 8 nanosecond pixels and digital clock rates over 130MHz

#### D.C. Restoration

- Keyed clamp

#### Gain

- Minimum video gain 40dB or 100X
- Maximum video output 130 volts p-p-drive

### Deflection Circuits

#### Vertical Deflection

- Size: automatically regulated over frequency range and adjustable from 20% underscan to 10% overscan
- Frequency Range: automatically locks from 45 Hz to 120 Hz
- Retrace Time: less than 300 microseconds

#### Horizontal Deflection

- Size: automatically regulated over frequency range and adjustable to 10% overscan 10% underscan
- Frequency Range: automatically locks from 15KHz to 50KHz
- Retrace Time: 3.6 microseconds

### High Voltage

- 34.0Kv regulated to better than  $\pm 1\%$

### Power Requirements

- 90 VAC to 132 VAC can be externally reconnected for 180 VAC to 264 VAC
- Line frequency 50 to 60Hz nominal
- Power 450 watts maximum

### Operating and Service Controls

#### Infrared Remote Control

- Power
- Contrast
- Brightness
- Color
- Tint
- Detail
- Volume
- Mute
- Standby
- Reset
- Recall
- Help
- Source #
- Convergence
- Pincushion
- Bow
- Size
- Focus
- Keystone
- Move
- Vert. Blank
- Horiz. Hold
- Vert. Hold
- Fast/Slow Sync
- Projector #
- Exit
- Optional remote control receiver can be connected to projector for rear screen applications
- On screen display prompting assists set-up with step-by-step alphanumeric instructions and graphic focus aids

#### Service Controls

##### (Screwdriver Adjust)

- RGB Drive Levels
- RGB Screen Controls
- RGB Cut-Off Switches
- RGB Electrical Focus
- Vertical Linearity

#### Indicators

- Power On
- Ready
- Error
- Vertical Hold Manual
- Horizontal Hold Manual
- Vertical Scan Fail
- Horizontal Scan Fail

### Environment

#### Inputs

Unit comes with 1 input module allowing 2 RGB sources to be connected. Second empty slot allows an additional input module to be installed in the projector.

#### Optional Source Selection

The Electrohome IR Remote Video/Data Switcher allows use of 6 additional input modules and master control of projector.

#### Maximum Operating Range

- Temperature: 0 to 35 degrees C
- Humidity: 0 to 90% non-condensing
- Altitude: 0 to 3000m (0-10,000 ft.)

#### Storage

- Temperature -30C to 65 degrees C

### Mounting

- The ECP® 3000 can be ceiling mounted or its optional ceiling mount or on a castered cart for portable applications.

### Weight

- 105 lb./47.6 kg
- Shipping Weight 120 lb./54.4 kg

### Accessories Included

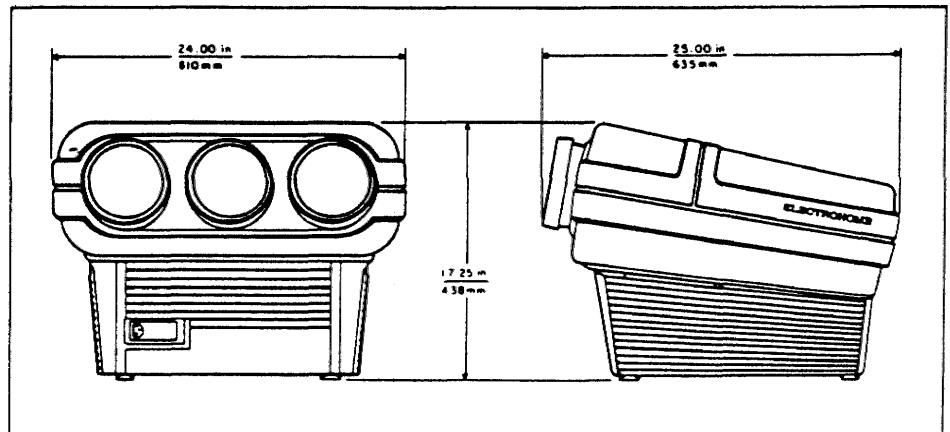
- 25' signal cable, 10 pin keyed
- RGB and Sync splitter for BNC connection

### Regulatory Approvals (Pending)

- Model #XX-B09640-XX
- Meets FCC Class A, DHHS and HWC requirements
- CSA certified

### One year parts and labour WARRANTY

Due to constant research, specifications are subject to change without notice.  
ECP is a registered trademark of Electrohome Limited.



## 2. DESCRIPTION

The ECP 3000 is a three lens high resolution high brightness video/data projector. The ECP 3000 automatically synchronizes to a wide range of input sources which extend from a video tape to high resolution CAD/CAM workstations.

### 2.1 OPTICS

The ECP 3000 can be focused within the projector-to-screen distances of 87.5 inches (2.22m) and 30 feet (9.1m). The image size obtainable is 48 to 240 inches wide and 36 to 180 inches high (1.22 to 6.1m wide by .91 to 4.57m high). To compensate for projector to screen tilt and for screen curvatures, alignment screws are provided on each lens.

The optical system consists of 3 hybrid lens assemblies. Each assembly consists of 3 glass and 7 acrylic elements. The optical system is capable of 2000 TV lines minimum resolution in the center of the image and 1600 TV lines in the corners.

### 2.2 ELECTRONICS

The electronics is of modular construction with a microprocessor to control all the projector functions. The user enters commands via the built-in keypad or an infrared remote keypad.

A nonvolatile memory stores all projector settings.

The video amplifiers are high performance analog amplifiers.

The horizontal deflection circuit employs automatic bandswitching and stacked FET output stages.

The convergence is all digital. It divides the image into 128 horizontal and 256 vertical segments for precise control of convergence. The image is preset for 25 user accessible points during convergence.

Protection circuits monitor the beam current on each CRT independently and limit the drive levels on all three equally if the operating conditions exceed the preset maximum values.

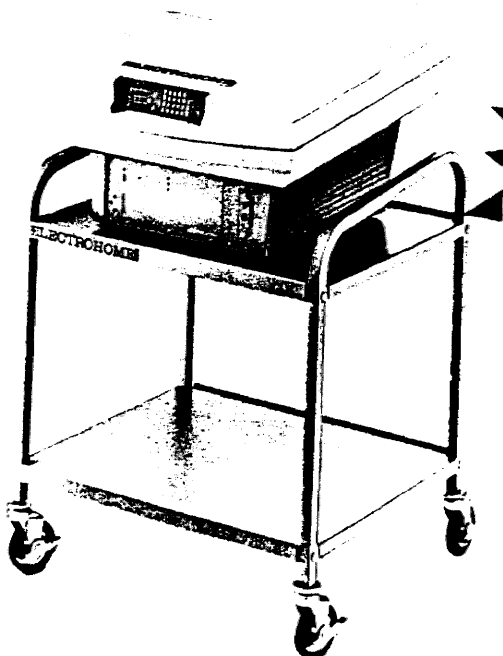


FIGURE 2.1 The ECP 3000

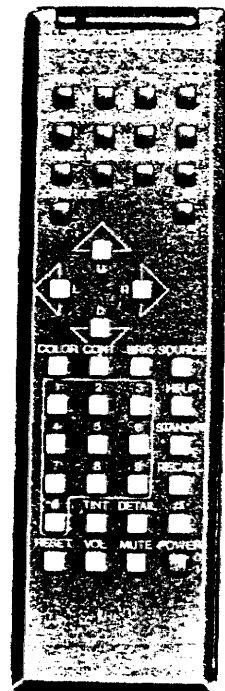


FIGURE 2.2 The remote keypad

### 3. INSTALLATION GUIDE

To optimize the installation of a projection system using the ECP 3000, optimize the following six areas of the installation:

1. Select a projection system: front screen ceiling or floor mount, rear screen ceiling or floor mount, with or without a mirror.
2. Determine the best screen location.
3. Select a screen that is best suited for the ambient lighting conditions: flat, curved, low or high gain.
4. Select a suitable screen size.
5. Determine the projector placement.
6. Interfacing

#### 3.1 TYPE OF PROJECTION SYSTEM

Front screen projection systems are usually less costly because they do not require a rear projection room. They may not be as aesthetically pleasing as rear screen systems. They are marginally brighter. There is a wider selection of available screens for front screen projection systems. Under controlled lighting a white wall may serve as a screen.

Rear screen projection systems are more costly to install and require a separate room to house the projector. The use of a mirror reduces the depth of the extra space required by as much as 50%.

Ceiling mount systems are more aesthetically pleasing and do not require any floor space. The installation and accessibility is more difficult. Floor mount systems are very mobile, easy to access, and easy to move to a new location.

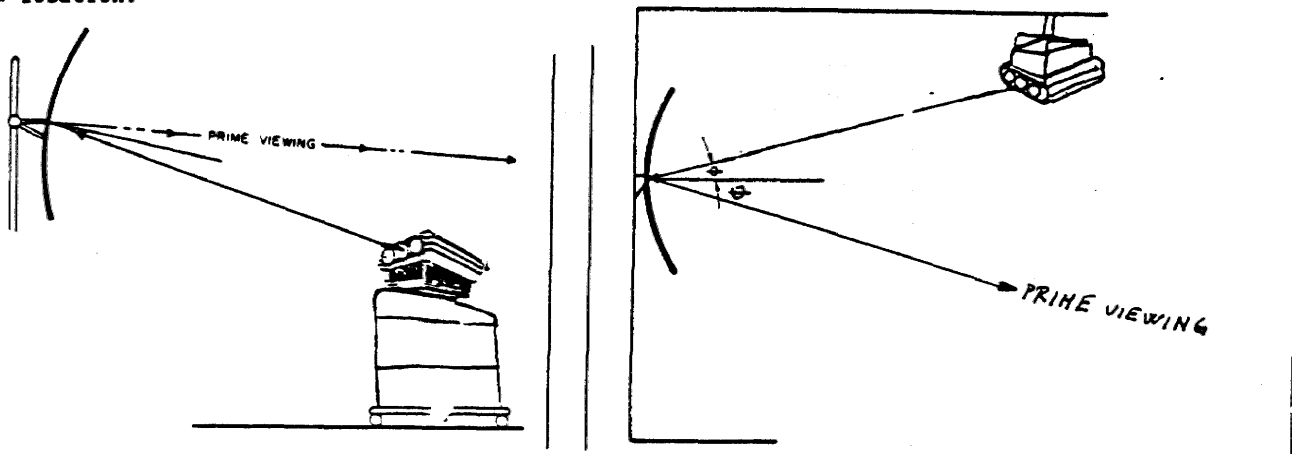


FIGURE 3.1 Front screen projection systems

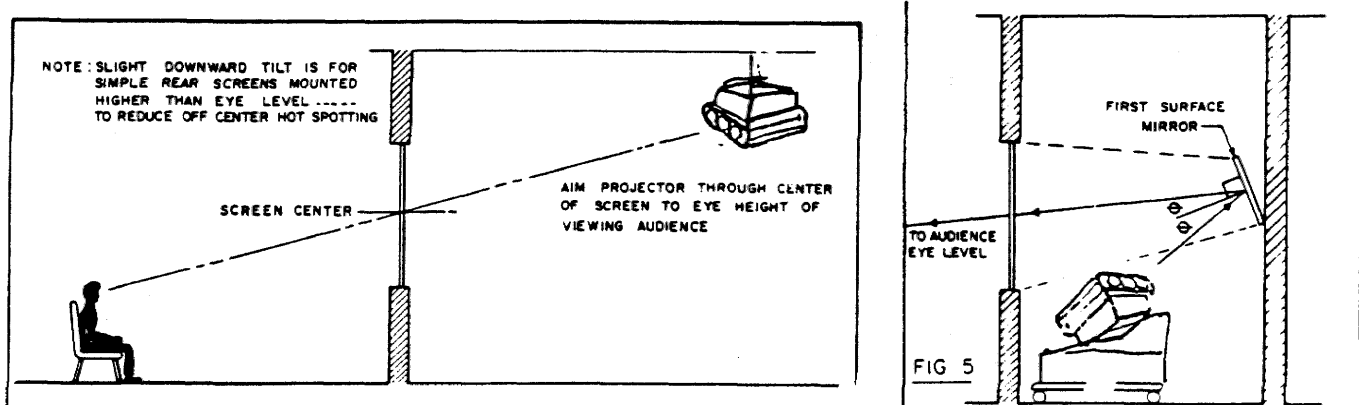


FIGURE 3.2 Rear screen projection systems



### 3.2 SCREEN LOCATION

Locate the screen such that it rejects ambient light and provides maximum audience coverage as shown on figures 3.3 and 3.4.

Tilt the projector and the screen such that the line of "prime viewing", shown in figures 3.1 and 3.2 points to the center of the audience.

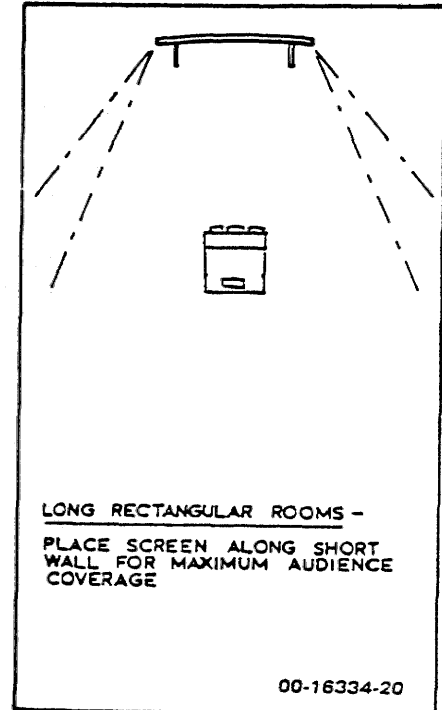
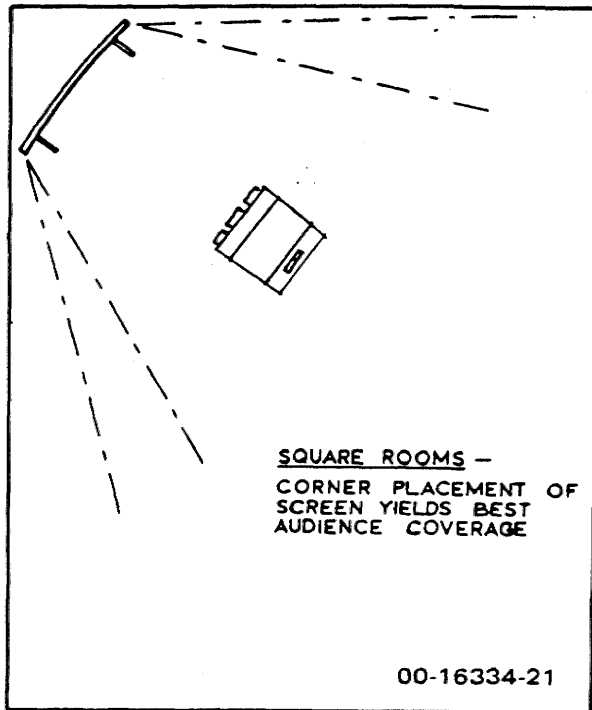


FIGURE 3.3 Screen locations for maximum audience coverage

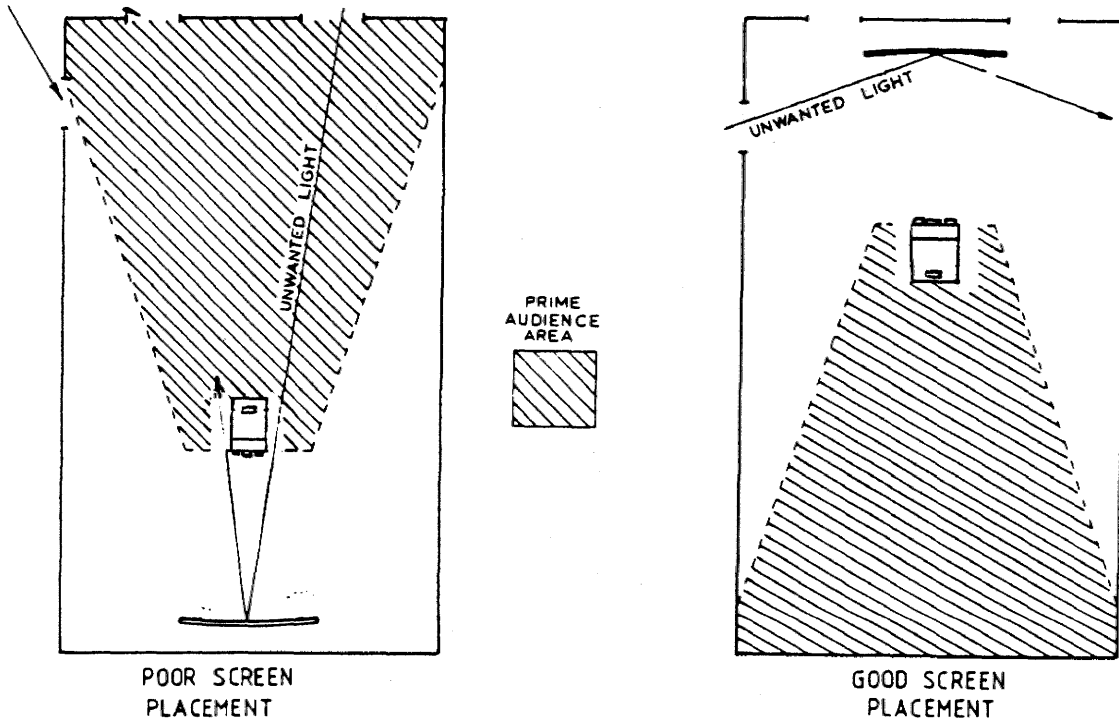


FIGURE 3.4 Screen locations for ambient light rejection

### 3.3 TYPE OF SCREEN

A flat wall painted with a matte white paint reflects almost all the incident light falling on it. The reflected light scatters equally in all directions in front of the screen. Therefore this wall is a flat screen of gain approximately 1 and viewing angle of  $180^\circ$ .

A curved screen resembles a section of the surface of a sphere. Incident light does not reflect equally in all directions from a curved screen. It concentrates in a conical volume. An audience located within this viewing cone will see a brighter image than if a flat screen of equal area was used. The audience outside of this viewing cone sees less light from the screen. Curved screens have gains larger than 1 and viewing angles less than  $180^\circ$ . The higher the gain of a curved screen the smaller the viewing cone.

Specially formulated screens, such as lenticular and lens screens, are geometrically flat but act as curved screens. They have gains larger than one and viewing angles less than  $180^\circ$ . Most curved screens have different horizontal and vertical viewing angles.

Most flat screens have  $180^\circ$  viewing angle. Curved screens have restricted viewing angles but they produce a brighter and sharper image. Curved screens when positioned correctly reject ambient light therefore well suited for rooms with high ambient lighting. Low gain screens accommodate a larger audience located closer to the screen but require lower levels of ambient lighting.

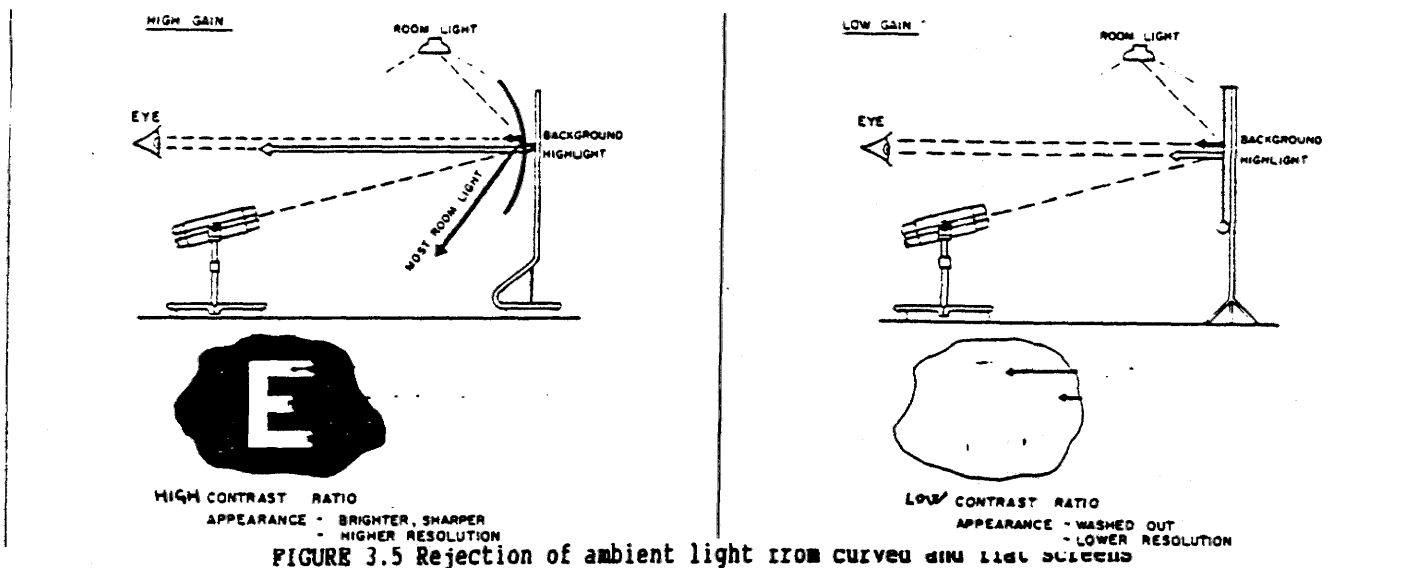


FIGURE 3.5 Rejection of ambient light from curved gain light screens

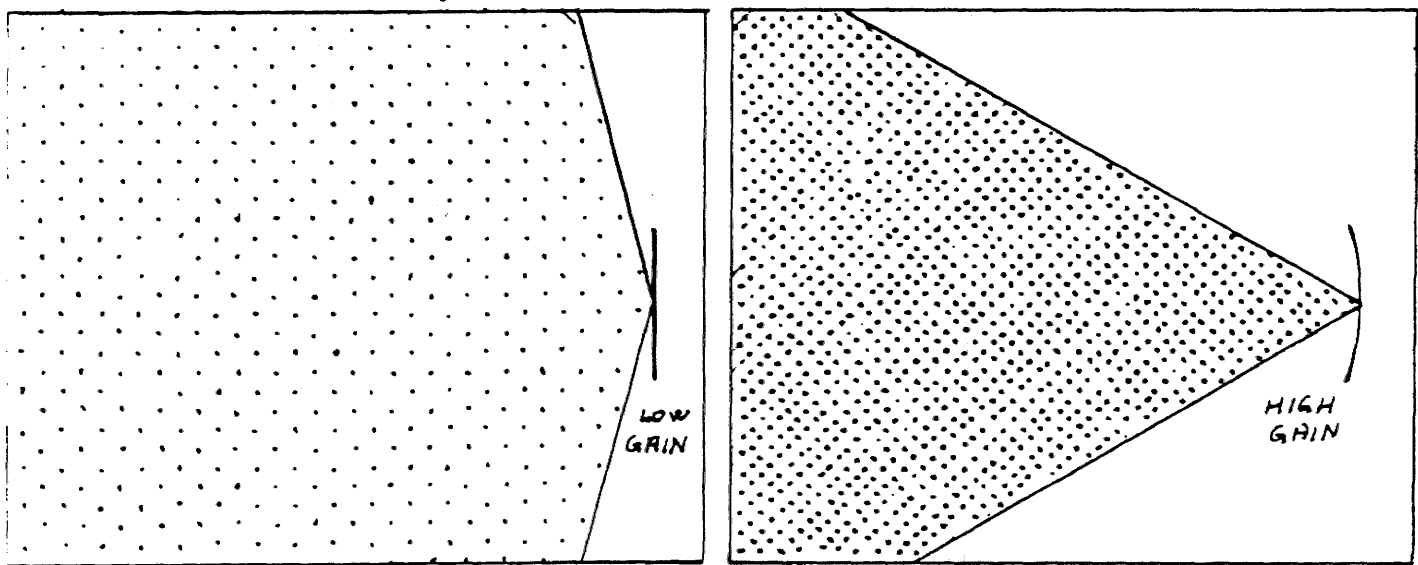


FIGURE 3.6 Audience coverage of low and high gain screens

**TABLE 1. PROJECTION SCREEN DATA**

### 3.4 SIZE OF SCREEN

The size of the screen must be equal to or larger than the size of the desired image.

#### 3.4.1 SIZE OF IMAGE

Select the size of the image such that the required smallest resolvable area is within the capabilities of the eye. The eye sees a letter clearly if its distance to the text is less than 250 times the height of that letter.

#### 3.4.2 ASPECT RATIO

The source that is generated by a computer or video tape has an aspect ratio which is the ratio of width to height. Standard video from a video tape has a 4:3 or 1.33 aspect ratio. Computer generated images have other aspect ratios. To completely fill a screen with an image the aspect ratio of the screen must be equal to the aspect ratio of the image. To display the image from an IBM CGA card that has an aspect ratio of 4:3 or 1.33 on a 45 inches high screen the width of the screen must be at least 60 inches. If the width is less than 60 inches a 45 inches high image would not fit entirely. If the width is greater than 60 inches part of the screen would be blank around the sides.

A video of different aspect ratio than a screen cannot fill the screen exactly in the horizontal and vertical directions simultaneously.

### 3.5 PROJECTOR LOCATION

Locate the projector out of the audience's direct view and aim it towards the center of the audience.

The distance between the front lens of the ECP 3000 and the center of the screen determines the size of the image.

The projector to screen distance is approximately two times the desired image height or 1.5 times the desired image width whichever is larger.

See appendix A to determine the exact relation between desired image size and projector location.

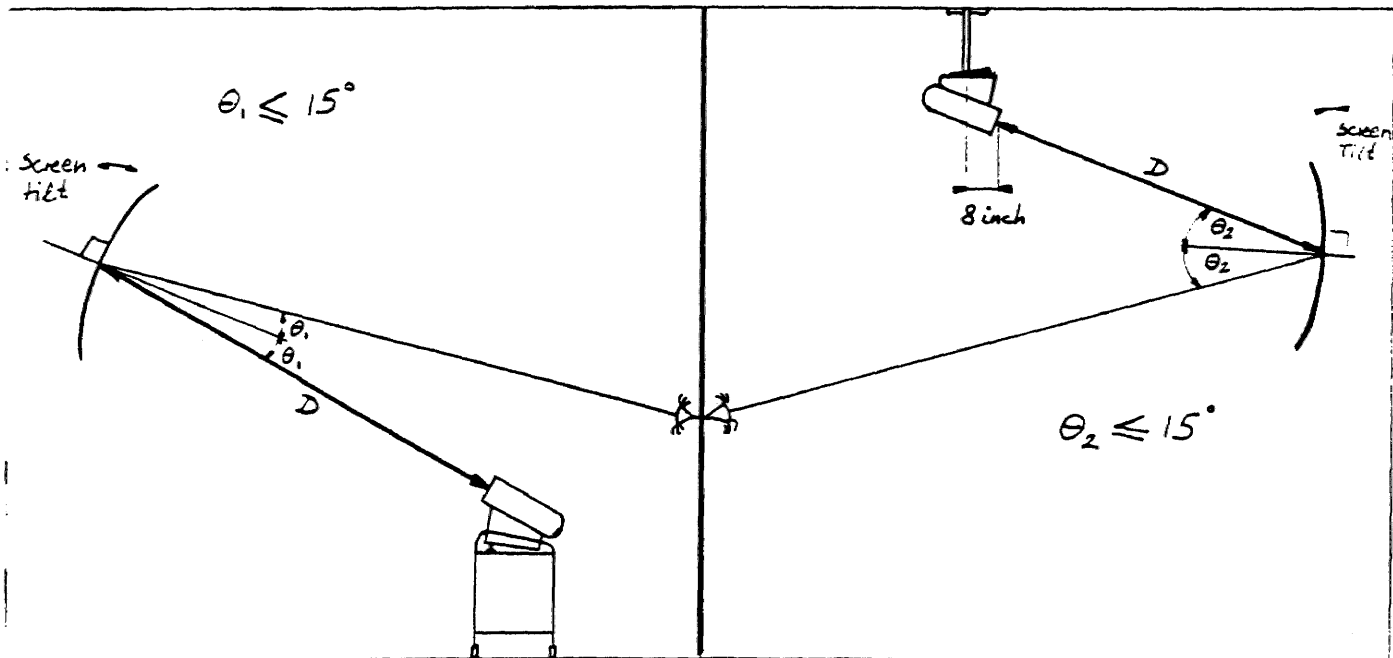


FIGURE 3.7 Projector locations

### 3.6 INTERFACING

The ECP 3000 interfaces to video sources through "INPUT MODULES". There are two types of input modules; analog and TTL. The length of the connecting cable between an analog video source and an analog input module may be as long as 25 feet (7.6m). The length of the connecting cable between a TTL video source and a TTL input module should not exceed 6 feet (2m). For the selection of input modules refer to section 4.

### NOTES

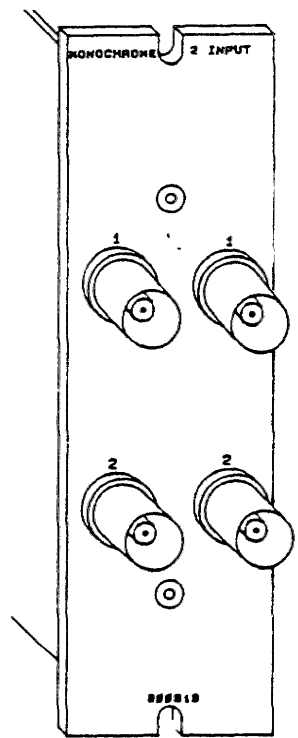
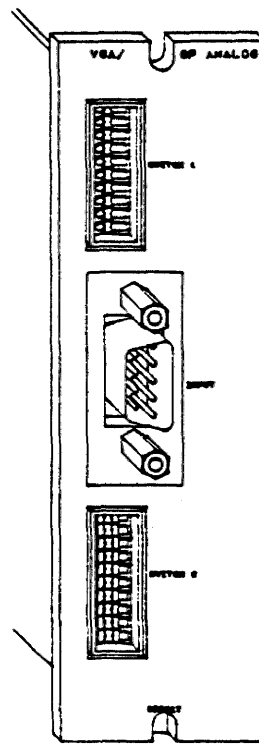
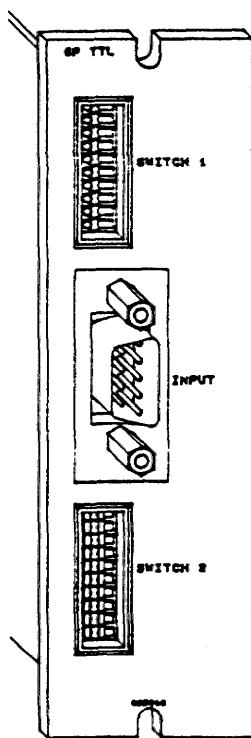
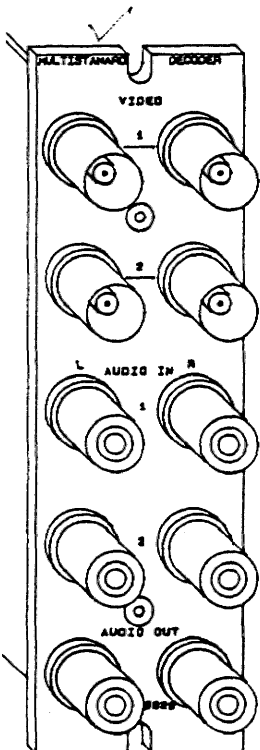
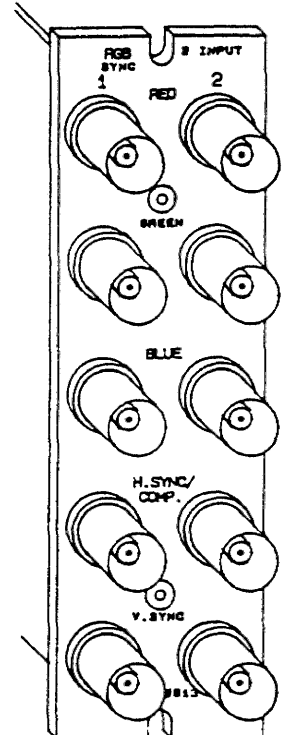
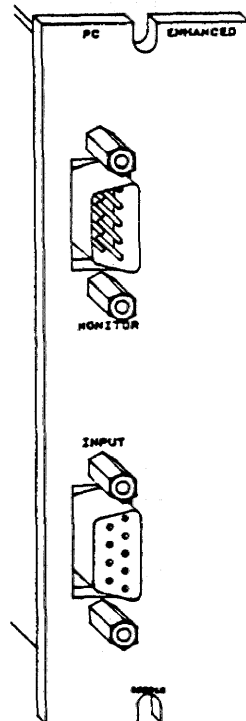
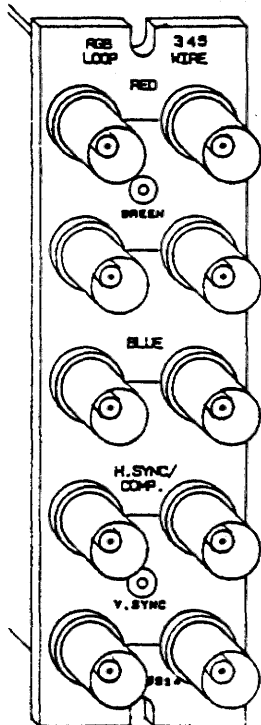
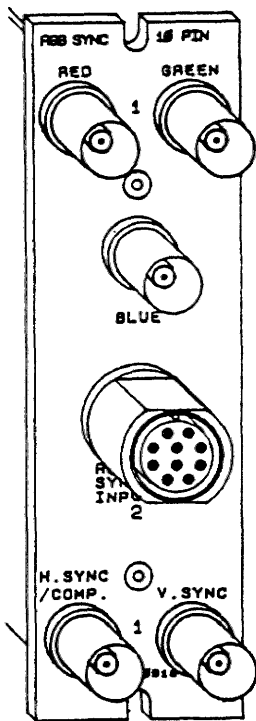
#### 4.0 INTERFACING

The ECP 3000 interfaces to video sources through INPUT MODULES.

The input modules available are the following:

Input module	Part Number	Number of inputs	Accepts
RGB SYNC/10 PIN	38-800916-01	2	input #1: one 3 or 4 wire analog input via the 10 pin video cable input #2: one 3, 4 or 5 wire analog input via BNC connectors OR one communication interface to the switcher. In this mode input #2 is disabled.
RGB LOOP/3,4,5 wire	38-800914-01	1	One 3,4 or 5 wire analog input that requires loopthrough to a monitor.
PC ENHANCED	38-800915-01	1	One TTL input through a 9 pin D connector. Requires a special harness available as a separate item. Intended to accept input from an IBM EGA or CGA card. Also accepts inputs from other terminals that generate 64 color TTL video.
RGB SYNC/2 INPUT	38-800913-01	2	Two 3,4, or 5 wire analog inputs using BNC connectors.
QUAD STANDARD DECODER	38-800920-01	2	Two inputs from a video tape or disk player together with audio. Accepts any standard video format: NTSC, PAL, SECAM, NTSC 4.43. Connect the video using BNC connectors and the audio using RCA connectors.
GENERAL PURPOSE TTL	38-800918-01	1	One TTL input using a 9 pin D connector. Requires a special cable.
VGA/GP ANALOG	38-800922-01	1	One IBM personal system 2 or one analog input using a 9 pin D connector. Requires a special cable.
MONOCHROME/2 INPUT	38-800-919-01	2	2 monochrome video inputs using BNC connectors.

# INPUT MODULES



There are two slots available on the ECP 3000 for input modules: SLOT 0 and SLOT 1. Any input module fits into either slot. For the installation of input modules refer to section 15.

The INFRARED REMOTE VIDEO/DATA SWITCHER expands the ECP GRAPHICS by accepting a maximum of 6 input modules simultaneously. The switcher and the projector interface through the RGB 10 pin input module installed in slot 1 on the projector.

When the projector is used without the switcher both slots are available for input modules.

When the projector is used with the switcher only slot 0 is available for inputs. Slot 1 on the projector is used for connection to the switcher. Input 2 on the RGB 10 pin input module installed in slot 1 is disabled in this mode of operation. Inputs can be connected to slot 0 on the projector and to slots 1 through 6 on the switcher.

The following diagram illustrates input connections to the ECP 3000.

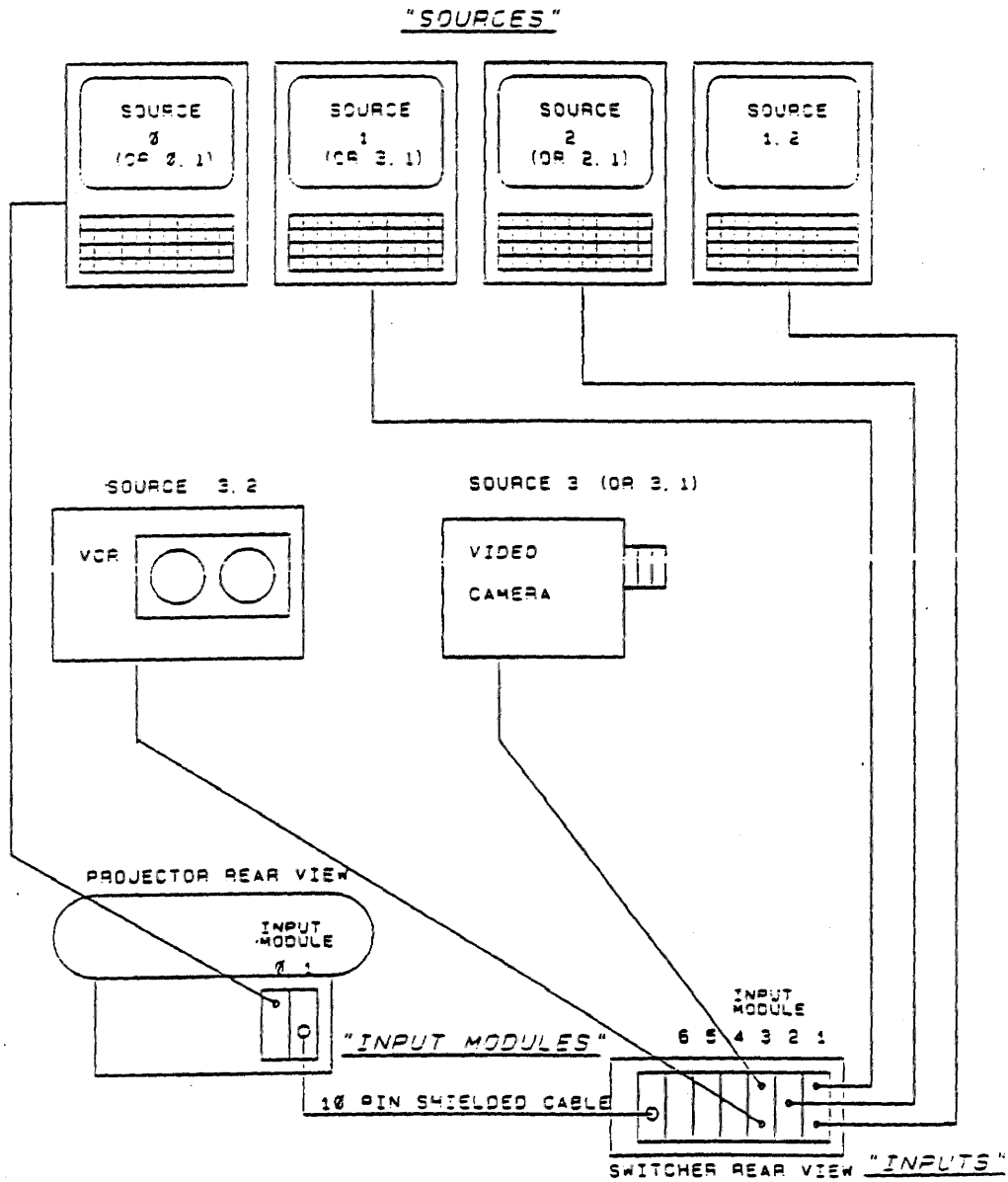


FIGURE 4.1 SIGNAL CONNECTIONS



**NOTES**

## 5. PROJECTOR MOUNTING

The ECP 3000 may be table, floor or ceiling mounted. The projector cart or the ceiling mount assembly designed for quick mounting is shown on figures 5.1 and 5.2.

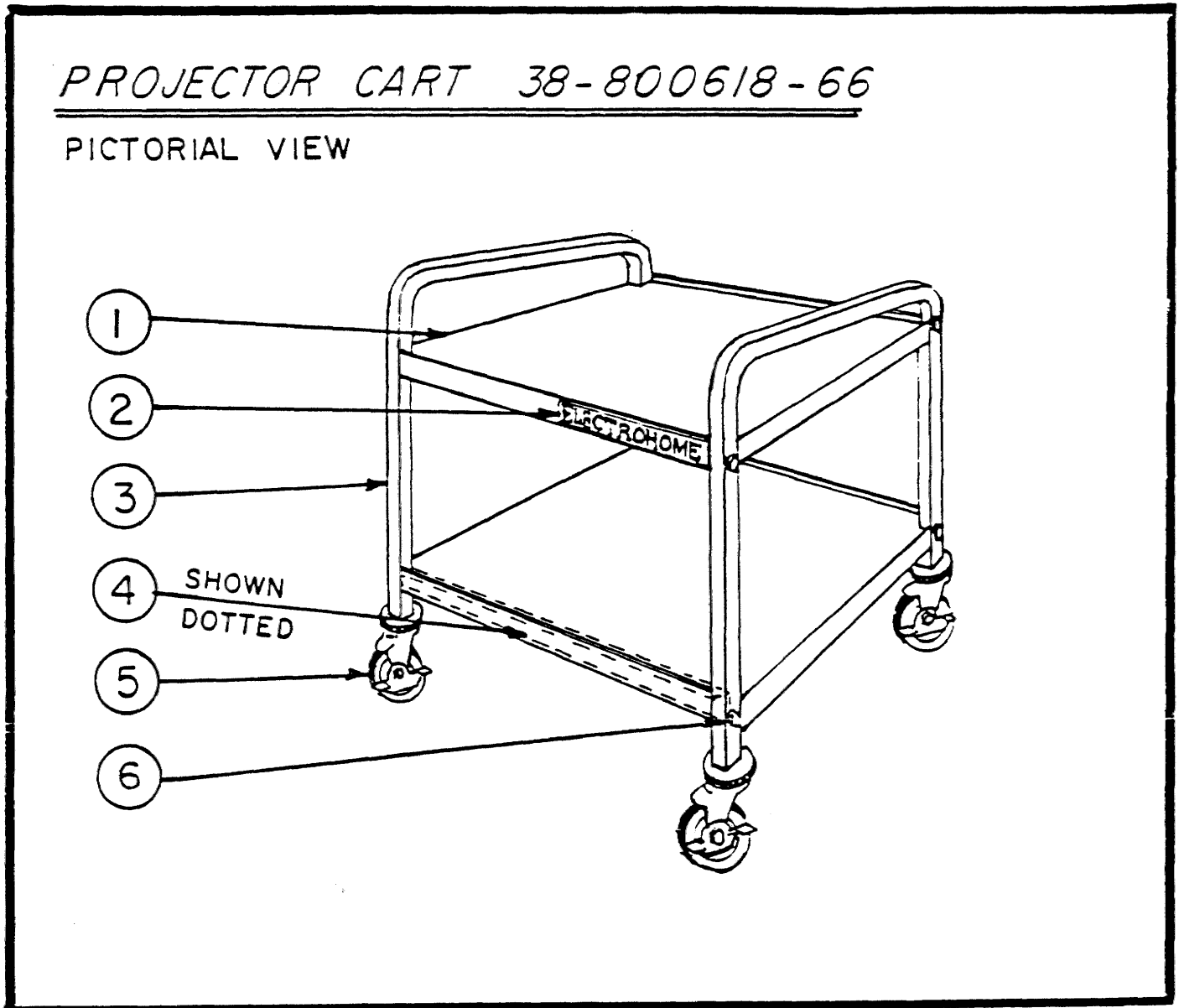
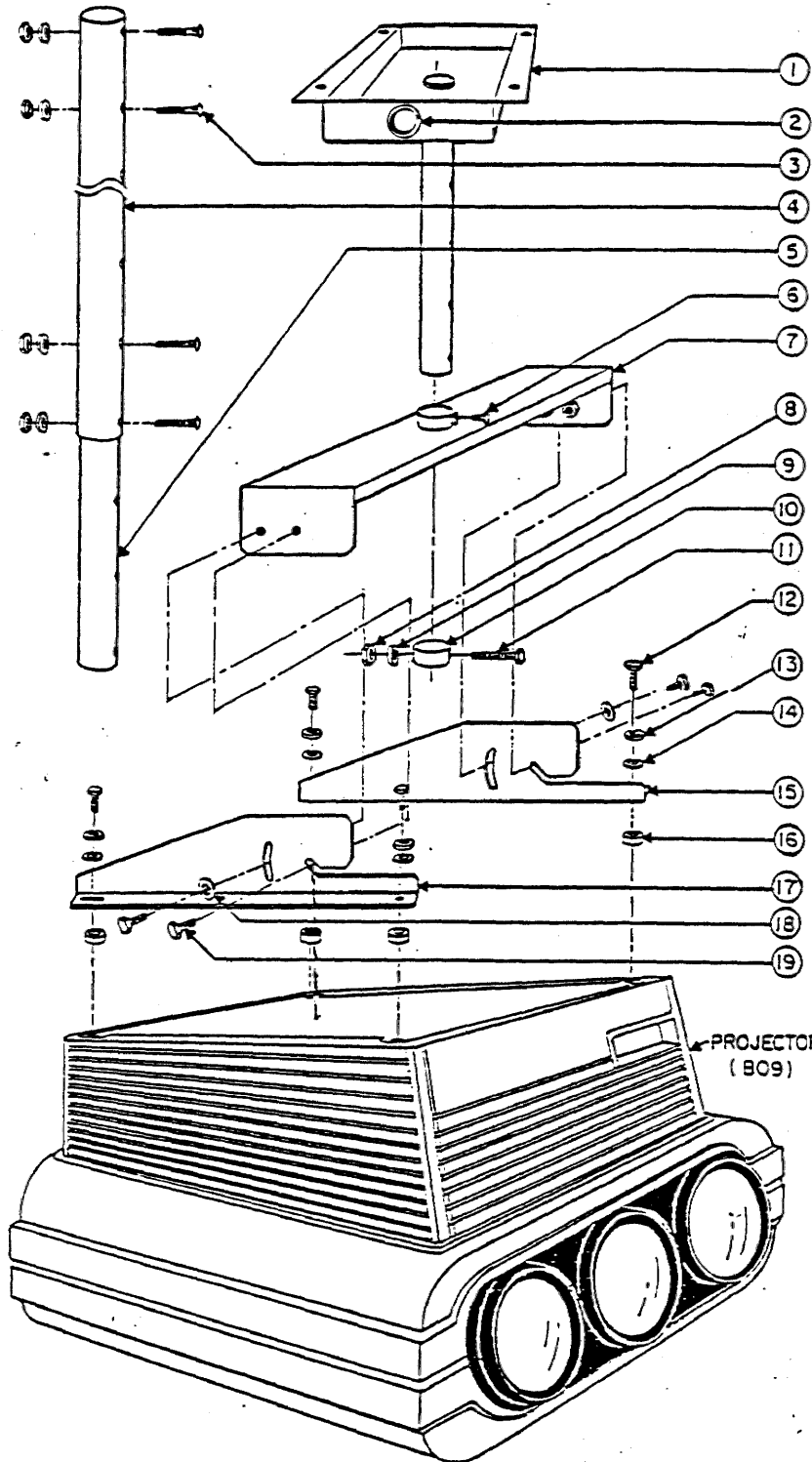


FIGURE 5.1 The ECP 3000 projector cart

**INSTALLATION INSTRUCTIONS  
FOR CEILING MOUNT 38-80069-66**



THIS CEILING MOUNT IS DESIGNED FOR USE WITH ELECTROHOME COLOR DATA PROJECTORS ONLY. USE WITH OTHER APPLIANCES MAY RESULT IN INSTABILITY CAUSING POSSIBLE INJURY.

NOTE: THE CEILING BRACKET (ITEM 1) IS TO BE MOUNTED TO THE CEILING, CUSTOMER'S OPTION — DUE TO DIFFERENT TYPES OF CEILINGS THERE IS NO HARDWARE SUPPLIED. CEILING BRACKET WHEN MOUNTED MUST BE CAPABLE OF SUPPORTING 500 POUNDS.

PARTS LIST		
ITEM	DESCRIPTION	QTY
1	CEILING BRACKET	1
2	RUBBER GROMMET	1
3	CARRIAGE BOLT, 3/8-16 X 1/2"	4
4	EXTENSION TUBE, 1.5" L.D.	1
5	EXTENSION TUBE, 1.5" O.D.	1
6	SCREW, 1/4-20 X 1/2"	1
7	MOUNTING YOKE	1
8	HEX. NUT, 3/8-16	5
9	LOCKWASHER, TO FIT 3/8 BOLT	5
10	COLLAR	1
11	HEX. BOLT, 3/8-16 X 2 1/2"	1
12	HEX. BOLT, 5/16-18 X 1 1/2"	4
13	LOCKWASHER, TO FIT 5/16 BOLT	4
14	FLAT WASHER, TO FIT 5/16 BOLT	4
15	MOUNTING BRKT. R.H.	1
16	SPACER	4
17	MOUNTING BRKT. L.H.	1
18	FLAT WASHER, TO FIT 3/8 BOLT	2
19	HEX. BOLT, 3/8-16 X 3/4"	4

**INSTALLATION INSTRUCTIONS**

- CUSTOMER TO INSTALL CEILING BRACKET (ITEM 1) FIRMLY TO CEILING (TO SUPPORT 500 LBS.) BY CUSTOMER'S METHOD (NO HARDWARE SUPPLIED). CUSTOMER MAY CUT TUBE TO DESIRED LENGTH TO ACCOMMODATE HEIGHT OF CEILING.
- EXTENSION TUBES (ITEMS 4 AND 5) MAY BE ADDED TO TUBE OF CEILING BRKT. IF THE CEILING IS TOO HIGH FOR EXISTING TUBE ON CEILING BRKT. THESE EXTENSION TUBES MAY BE CUT AT INCREMENTS OF 3" IF REQUIRED FOR DESIRED HEIGHT. TWO CARRIAGE BOLTS (ITEM 3) TO BE FASTENED THROUGH 2 TOP HOLES AND ALSO 2 TO BE FASTENED THROUGH 2 BOTTOM HOLES ON OUTSIDE EXTENSION TUBE. PLACE 4 LOCKWASHERS (ITEM 9) OVER 4 CARRIAGE BOLT ENDS AND SECURE WITH 4 HEX NUTS (ITEM 8).
- PLACE MOUNTING YOKE (ITEM 7) OVER BOTTOM END OF CEILING BRACKET TUBE OR EXTENSION TUBE.
- PLACE COLLAR (ITEM 10) OVER BOTTOM END OF CEILING MTS. BRKT. TUBE OR EXTENSION TUBE. FASTEN WITH HEX. BOLT (ITEM 11) THROUGH COLLAR AND BOTTOM HOLE IN TUBE. PLACE LOCKWASHER (ITEM 9) OVER END OF BOLT AND FASTEN TIGHTLY WITH HEX. NUT (ITEM 8).
- HEX. BOLT (ITEM 6) MAY BE TIGHTENED LOOSELY TO STOP THE MOUNTING YOKE FROM TURNING.
- REMOVE 4 FEET FROM BASE OF PROJECTOR. MOUNT R.H. MTS. BRKT. (ITEM 15) AND L.H. MTS. BRKT. (ITEM 17) TIGHTLY TO BOTTOM OF PROJECTOR (MAKE SURE BRKTS. ARE FACING AS SHOWN IN DWG.). PLACE 4 SPACERS (ITEM 16) BETWEEN BRKTS. AND PROJECTOR. PLACE 4 WASHERS (ITEM 14) AND 4 LOCKWASHERS (ITEM 13) OVER 4 BOLTS (ITEM 12) AND PLACE INTO 4 THREADED HOLES ON BOTTOM OF PROJECTOR.
- MOUNT 2 HEX. BOLTS (ITEM 19) INTO 2 HOLES NEAR CENTER OF YOKE (ITEM 7) AND LET THEM PROTRUDE APPROX. 1/2 INCH. WITH 2 PEOPLE, HOOK PROJECTOR ONTO THE 2 BOLTS IN THE MTS. YOKE. MOUNT WITH 2 BOLTS (ITEM 19) AND 2 WASHERS (ITEM 18). WASHERS ARE REQUIRED ONLY ON THE SLOTTED HOLES IN BRKTS. ADJUST ANGLE AND TIGHTEN 4 BOLTS.
- BOLT (ITEM 6) MAY BE LOOSENER TO ADJUST PROJECTOR TO CORRECT POSITION AND THEN TIGHTENED.

54-7587-01P

FIGURE 5.2 The ECP 3000 ceiling mount yoke

## 6. PROJECTOR INSTALLATION

### 6.1 UNPACK THE PROJECTOR

Open the carton. The foam lining surrounding the projector protects it during transportation by absorbing any vibrations and shocks. Remove the projector, the line cord, and the box that contains the infrared remote keypad. Save the carton, and the foam for future repackaging and shipping.

### 6.2 DETERMINE PROJECTOR TO SCREEN DISTANCE

Determine the height (H) and the width (W) of the desired image. The aspect ratio of the desired image must be equal to the aspect ratio of the video source.

Calculate the projector to screen distance:

See the appendix for calculations. The approximate projector to screen distance is 2 times the desired height or 1.5 times the desired width of the image.

NOTE: The minimum projector to screen distance is 87.5 inches (2.2m) and the maximum projector to screen distance is 30 feet (9.1m).

### 6.3 POSITION THE SCREEN AND THE MOUNT

Determine the correct position of the screen and the projector. See section 3.5 for guidelines. Position the cart or secure the ceiling mount at the correct distance.

### 6.4 MOUNT THE PROJECTOR

When the ECP 3000 is floor mounted place it on a suitable stand, for example the projector cart. When the ECP 3000 is ceiling mounted invert the projector and unscrew the four feet. Fasten the two metal brackets supplied with the ceiling mount to the projector. Reverse the yokes as described in section 6.5. Attach the projector to the ceiling mount using the two handwheels supplied with the ceiling mount assembly.

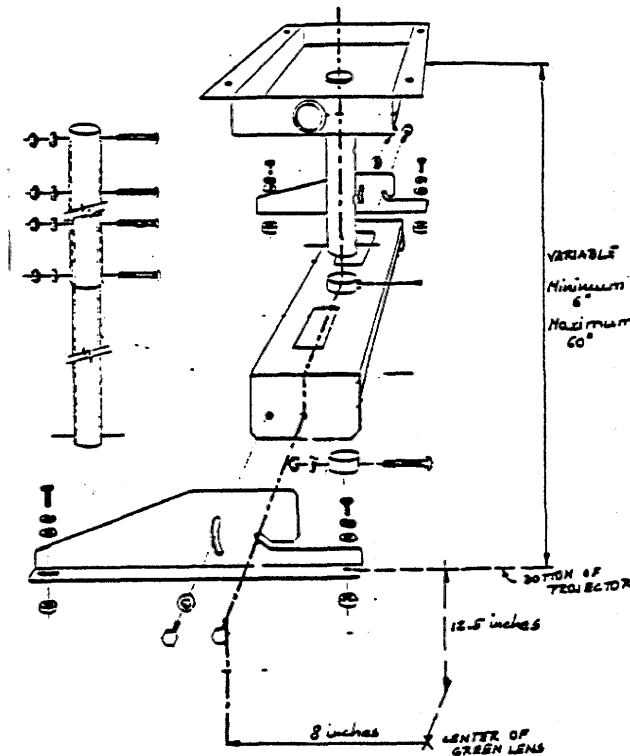


FIGURE 6.1 PROJECTOR MOUNT LOCATION

### 6.5 REVERSE THE YOKES

**NOTE!** To reverse the yokes refer to a qualified service technician!

The yoke plugs are located at the top rear of the projector. For access remove the front top cover by pulling on it. The front top cover is snap fit. Remove the rear top cover by removing the phillips head screws which become visible after the front top cover is removed. Lift the front end of the rear top cover to remove it.

The location of the yoke plugs is shown on Figure 6.2.

When a yoke plug is in the reverse position the label "REVERSE SCAN" is visible on the plug. In normal position no marking on is visible.

Arrange the yoke plugs according to the following table.

PROJECTOR MOUNTED				YOKES			
UPRIGHT or Floor	INVERTED or Ceiling	Front	Rear	H	V	H	V
				Normal		Reverse	
X		X		X	X		
X			X		X	X	
	X	X				X	X
	X		X	X			X

**NOTE!** For rear screen systems that use a mirror, reverse the horizontal yokes from the orientation shown in the table above.

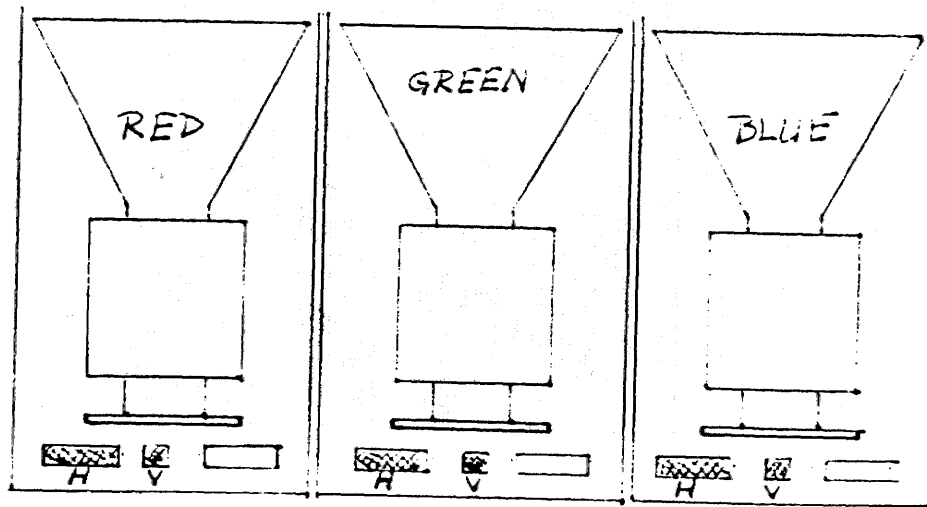
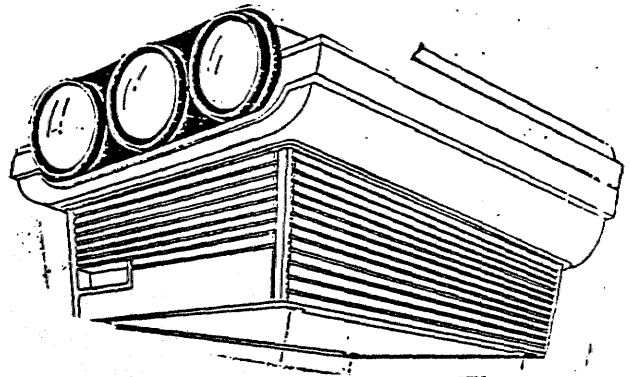
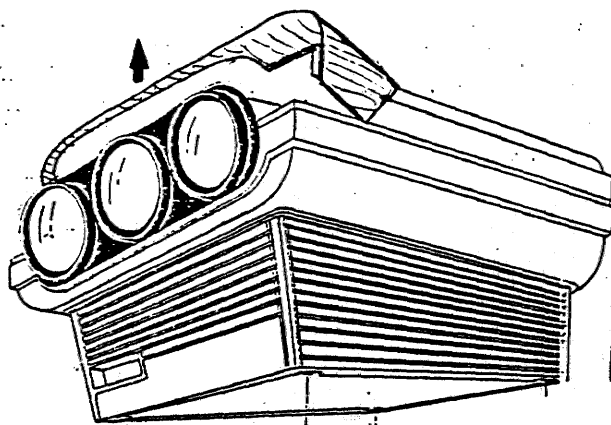


FIGURE 6.2 ECP 3000 YOKE LOCATIONS

## 6.6 CONNECT A COMPUTER SOURCE TO THE PROJECTOR

Refer to section 4 to select an input module. Refer to section 15 for installation.

## 6.7 POWER UP THE PROJECTOR

Locate the line cord, and plug the projector into a power outlet. The green LED on the back of the projector marked "READY" turns on and shows that the projector is ready.

Locate the built-in keypad on the projector. Push the red key marked **POWER**, hold it down for a second then release it. The projector turns on. Wait 10 seconds to allow the projector to execute a self test routine and the high voltage to turn on.

All the green LED's will be on and all the red LED's will be off.

The screen is either blank or shows the computer image depending on the state of the projector at the last power down.

Push the **↓** key on the keypad to display the internal crosshatch. Push the **↓** key again to return to the image. Push the **±** key to superimpose the projector identification on the image. Push the **±** key again to remove the projector identification from the image.

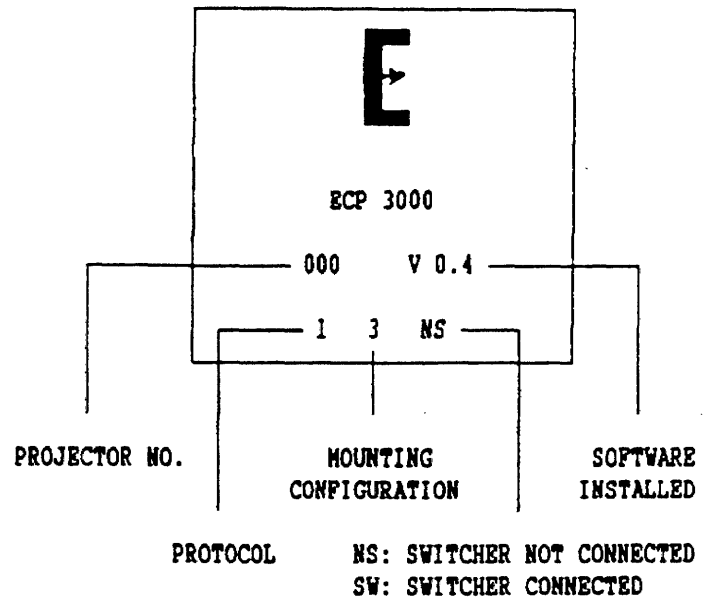


FIGURE 6.3 THE ECP 3000 identification screen

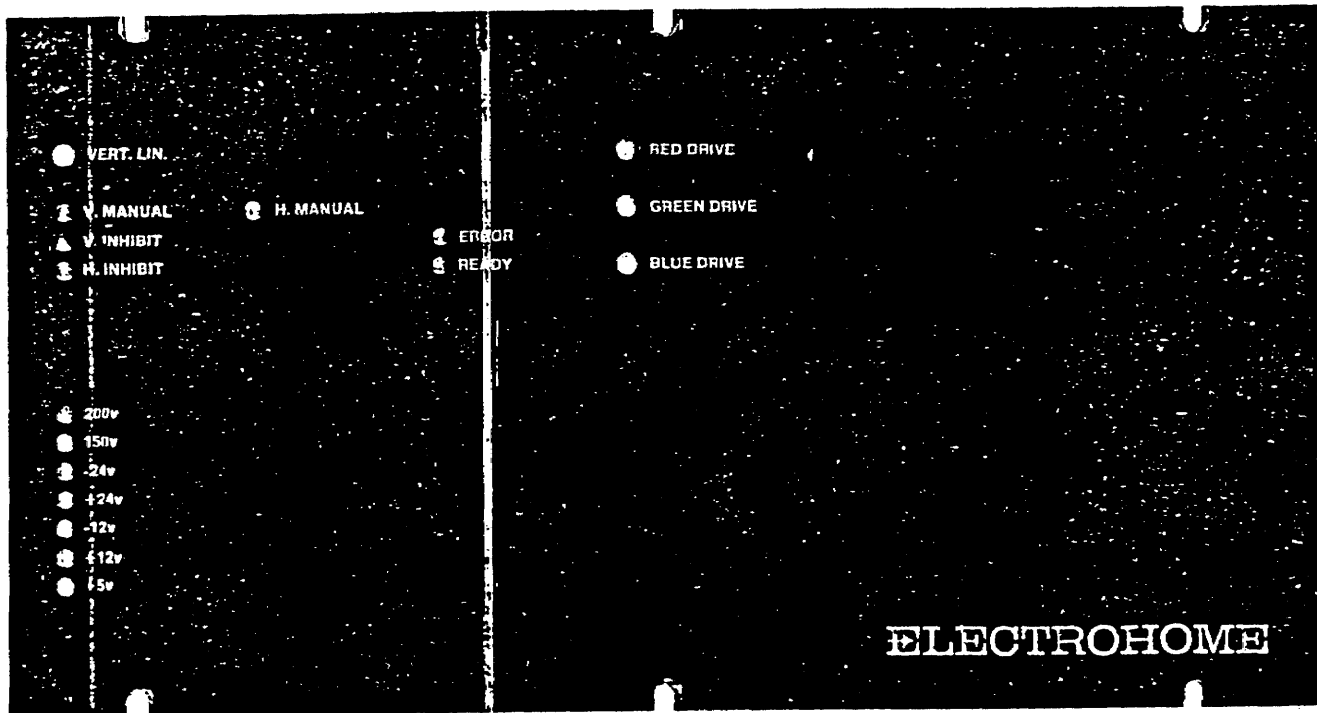


FIGURE 6.4 The ECP 3000 back panel

**NOTES**

## 7. THE KEYPAD

### 7.1 DESCRIPTION

The keypad controls all projector functions (except the optical focus). There are two keypads supplied with each projector. An infrared remote keypad and a built-in keypad. Both keypads are functionally the same. The remote keypad uses a 9V battery as its power source. To install the battery slide the battery compartment cover off, install the battery and replace the battery compartment cover.

There are three sets of colored keys on the keypad:

**Setup keys:** These keys are dark grey and used during set up.

**Control keys:** These keys are light grey and used frequently during normal use. The three colored keys belong here. They are highlighted to emphasize their position when locating them.

**Arrow keys:** The four arrow keys provide smooth control when used in conjunction with both the setup and the function keys.

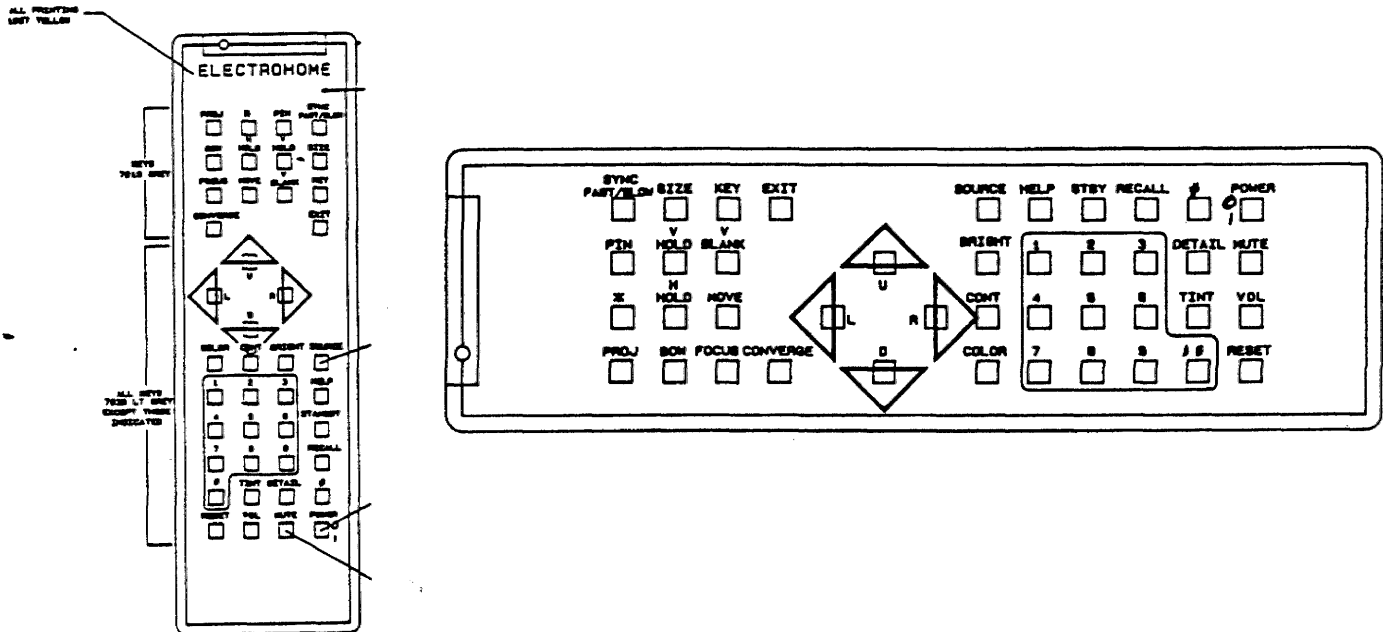


FIGURE 7.1 THE REMOTE and BUILT-IN KEYPADS



## 7.2 OPERATION

The user adjusts the projector via a keypad. A keypad command may be a single keystroke or two or three keystrokes in a specific sequence. Most keypad commands are two keystroke.

Single keystroke commands are those which initiate simple on off switching. For example push the I key to display the internal crosshatch. Push the I key again to turn off the crosshatch.

Two keystroke commands are those which require two specific keystrokes in a specific sequence. For example push the CONT key then the U key to increase the contrast. The CONT key alone does nothing.

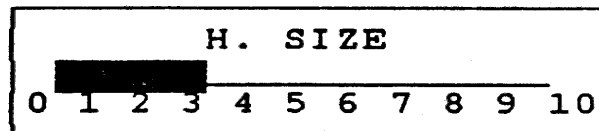
Three keystroke commands are those which require three specific keystrokes in a specific sequence. For example: Enter the SOURCE 1 2 sequence to display the source connected to input #2 on the input module installed in slot 1.

There are two types of keypad commands: immediate action and continuously variable.

Continuously variable commands change a projector setting smoothly as long as an arrow key is held down. Two keystroke commands using the arrow keys are continuously variable. For example: push the CONT key then push and hold the U arrow to increase the contrast.

Immediate action commands change a projector setting immediately after a keypad entry. Single keystroke commands or multikeystroke commands using the numeric keys are immediate action commands. For example push the POWER key to turn the projector on or off.

When a function key is pressed a bargraph will be superimposed on the bottom right hand corner of the image. The bargraph names the function and shows the current setting on a scale of 0 to 10. If no key is pressed within a 5 second period the bargraph is removed from the image. For example: push the SIZE key. The following bargraph will be superimposed on the image.



This shows that the H. size is at 30% of the maximum. While an arrow key is depressed the picture width changes. The bargraph follows the picture change. If no keys are pushed for 5 seconds the bargraph will be removed. To enable or disable the bargraph function enter the RECALL HELP key sequence. A menu will be displayed. Push the 1 key to enable the bargraph function or push the 2 key to disable it.

When the bargraph is enabled it is normally off the image. When a function key is pressed the bargraph is superimposed on the image. If no key is pressed for 5 seconds the bargraph is removed from the image.

When the bargraph function is disabled the bargraph will not be superimposed on the image at all. To check a particular projector function setting push RECALL then push the function key. The bargraph will be displayed once only.

## 8. PROJECTOR ALIGNMENT

### 8.1 GETTING STARTED

The ECP 3000 is factory preset to focus on a flat wall when the projector is table mounted and its distance to the wall is 87.5 inches (2.2m). At this setting the image is 60 inches (1.52m) wide and 45 inches (1.14m) high when a video source with an aspect ratio of 4:3 is displayed.

Optical realignment of the ECP 3000 is necessary when the position of the projector has changed from its previous setting.

Attempt an optical realignment only on a properly installed system. The distance between the center of the green front lens and the center of the screen must be within 87.5 inches (2.2m) and 30 feet (9.1m). The tilt between the projector and the screen must be within  $\pm 15^\circ$ .

The electrical focus and the geometry is adjusted with the remote keypad or the built in keypad. The optical focus is adjusted manually at the projector.

The special tools required for focusing are supplied with the projector and located under the front lens cover. To access the lenses and the tools remove the front top cover.

Remove the extender card by unhooking the two springs securing it to the projector. Remove all the tools; a hex head ballnose driver, an allen key, a combination wrench, a PCB puller and an adjusting tool. Set the PCB puller, the extender card and the adjusting tool aside. They are not required for optical alignment.

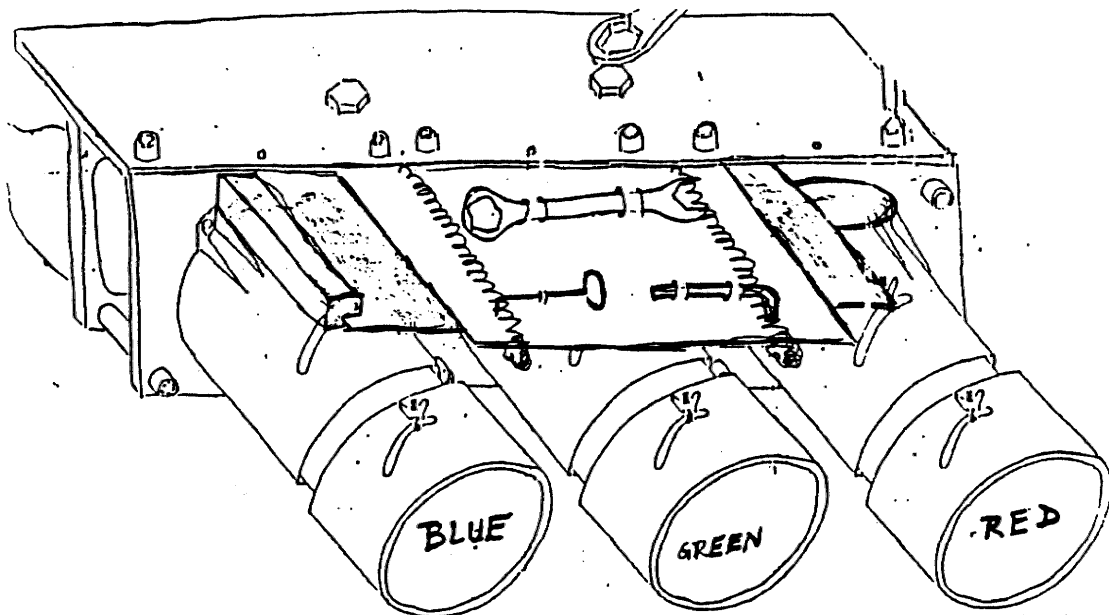


FIGURE 8.1 THE ECP 3000 TOOL KIT LOCATION

Each lens consists of two sections. The rear section sets the optical focus at the center of the image and the front section sets the focus at the corners. The rear section is secured to the lens body and the front section is secured to the rear section by wing nuts located on the top of the lens assembly.

Each CRT is attached to its lens by 3 allen head bolts located at the base of the lens assembly. The three lens assemblies are secured to the projector chassis by the top plate and two hex head bolts, marked "A" and "C".

Each lens assembly is held in place on the top plate by a pin and secured to the top plate by two allen head bolts. The allen head bolts for the red assembly are both marked "B" and for the blue assembly both marked "D". The allen head bolts for the green assembly have no markings.

Locate all these parts before continuing. See the diagram below.

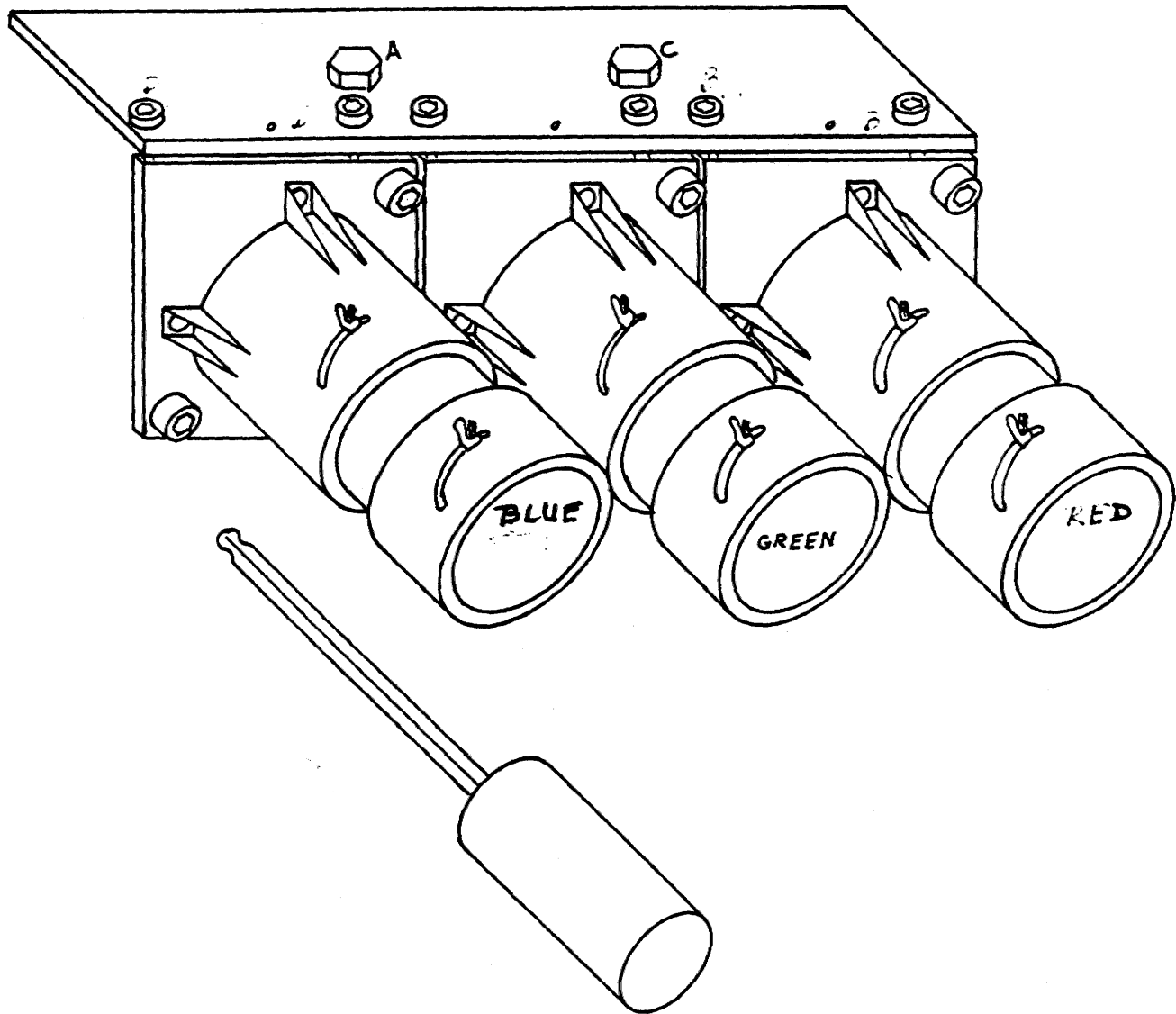


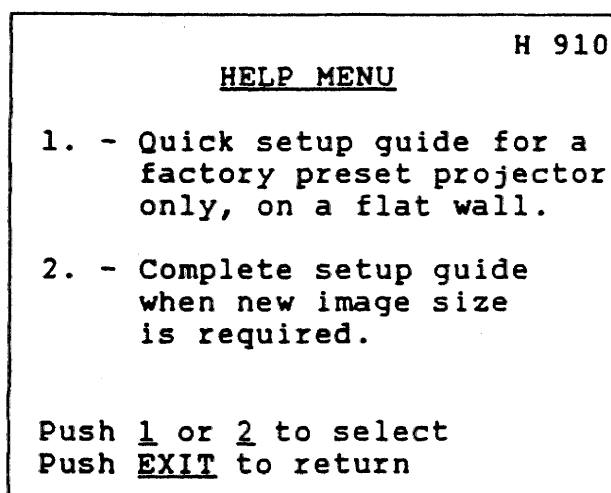
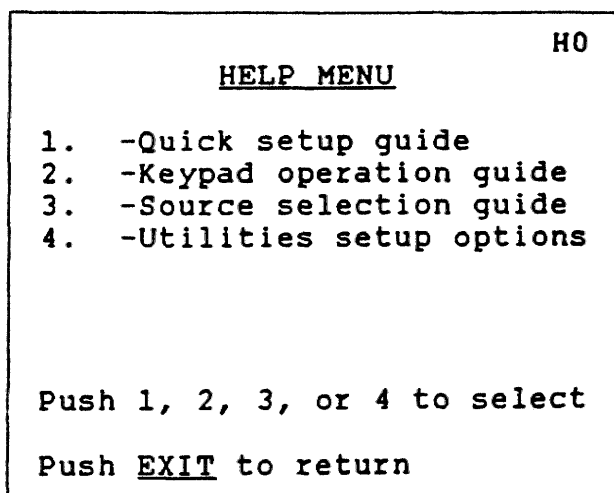
FIGURE 8.2 THE ECP 3000 LENS ASSEMBLY

When the projector is inverted or ceiling mounted reverse the vertical yokes before continuing. Refer to section 6.5 to access the yoke plugs.

Power up the projector: push the key marked **POWER**. Select a source. Push **SOURCE** m n where m is the slot number and n is the input number on that slot to which an input is connected.

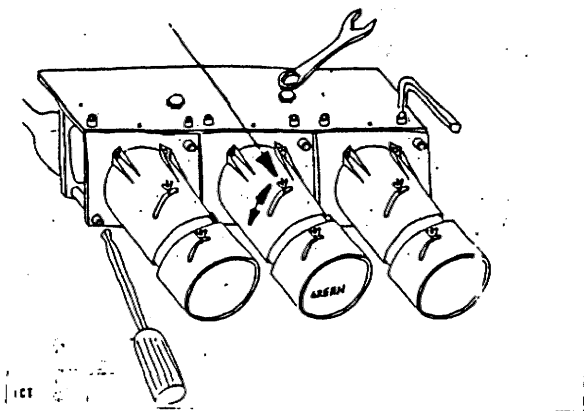
Push the **HELP** key. The menu shown below will be displayed on the screen in green only.

Select option 1 "Quick setup guide". A new menu shown below will be displayed.



If this menu is out of focus and not readable proceed as follows:

Loosen the rear wing nut on the green lens and rotate the lens using its wing nut until the image is focused at the center and becomes readable.



Select option 2 "Complete setup guide" from the above menu.

Instructions will be displayed, initially in green only. Follow these instructions step by step for proper optical and geometry alignment.

These instructions are summarized in the following section.

**NOTE:** The instructions are for table mount projection systems only.

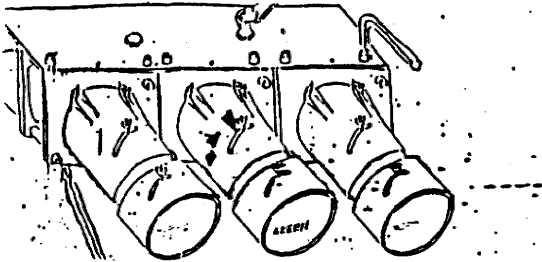
For ceiling mount systems: when the instructions refer to the **TOP** and **LEFT** edge of the image, during optical alignment only, they should read **BOTTOM** and **RIGHT** edge. Similarly the **BOTTOM** and **RIGHT** sides should read **TOP** and **LEFT**.

For rear screen setups the image should be viewed on the back of the rear screen from inside the rear projection room.

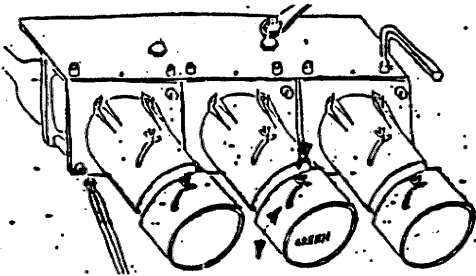
## 8.2 FOCUS AND GEOMETRY ALIGNMENT

This section explains the instructions contained in the "Complete setup guide". These instructions outline the steps necessary to realign the BCP 3000, table mounted, to display a new image size on a selected front screen.

1. Check and realign the projector-to-screen distance. Refer to section 6.2 for the correct distance.
2. Focus the center of the image. Loosen the wing nut on the rear section of the green lens and rotate the lens, using the wing nut, until the center of the image is focused.

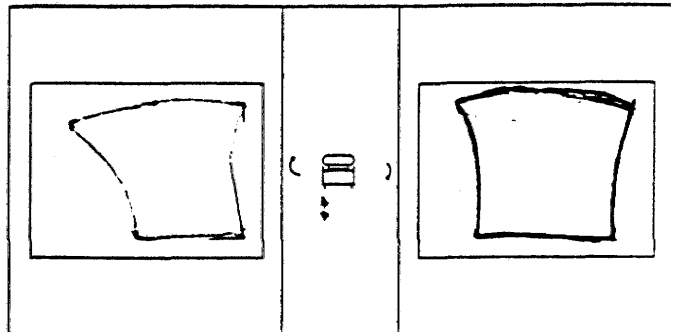


3. Adjust the electrical focus. Push the **FOCUS** key then push and hold the **U** or **D** key to optimize the focus at the center of the image.
4. Focus the corners of the image. Tighten the rear wing nut and loosen the front wing nut on the green lens. Rotate the front lens, using the lens, to optimize the focus at the corners of the image.

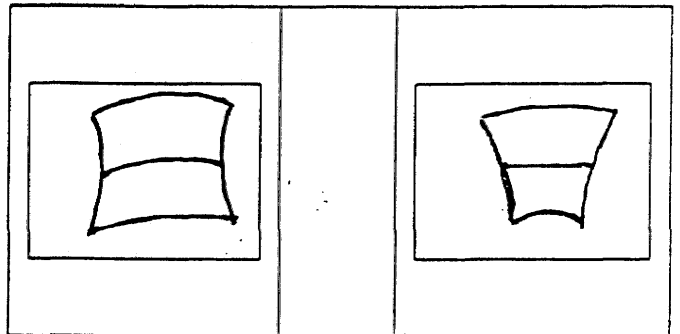


5. Lift the projector on one side and adjust the legs on that side until the bottom two corners of the image are the same distance from the bottom of the screen.

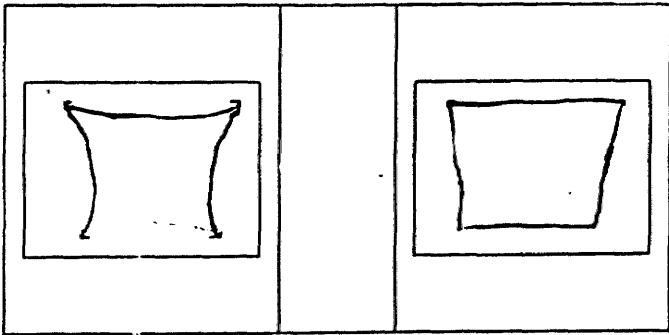
6. Rotate the projector side to side (and move it to keep the image on the screen) until the top two corners of the image are the same distance from the top of the screen.



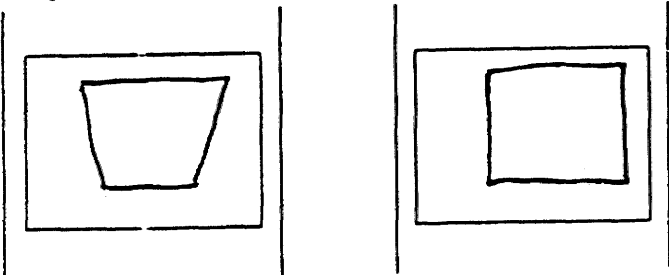
7. Is the center of the image still focused? If not then refocus it by repeating Steps 1 and 2.
8. Push **HELP** for a new image (as instructed) and observe the horizontal line across the center of the image. Is it straight? If it is not then correct any bow on this line as follows: Push the **BOW** key then push and hold the **U** arrow key to move the center of the line up or push and hold the **D** key to move the center of the line down until the line is straight.



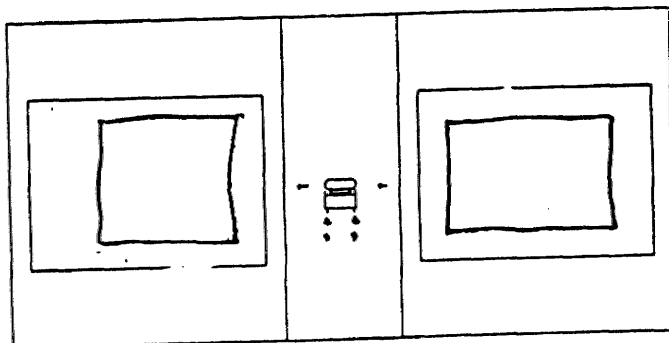
9. Push **HELP** for a new image and observe the borders of the image. Are they straight? If not then correct any pincushion as follows: Push the **PIN** key then push and hold the **U** or the **D** arrow key until the top line on the image is straight. Push the **PIN** key again and push and hold the **U** or the **D** key until the bottom line on the image is straight. Push and hold the **L** or the **R** key until the sides of the image are straight.



10. Observe the border on the left and right edges of the image. Are they parallel to the edges of the screen? If not then correct any keystone as follows: Push the **KEY** key then push and hold the **U** or the **D** key until the two sides of the image are parallel to the sides of the screen.



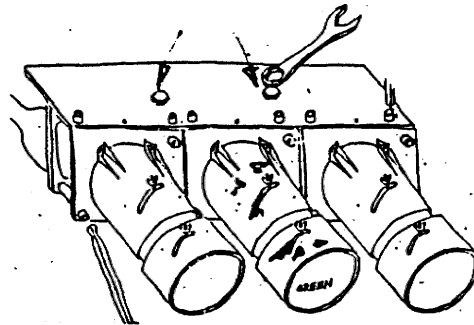
11. Move the projector side to side to center the image on the screen horizontally.
12. Adjust the two front legs on the projector to center the image on the screen vertically. Realign the keystone if necessary.



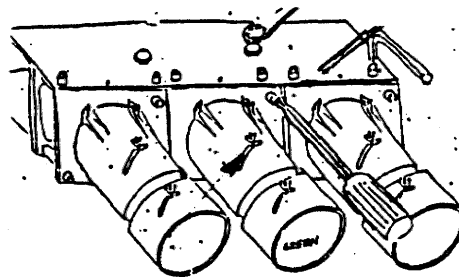
The image now should be rectangular, its borders parallel to the borders of the screen and it should be centered on the screen. If not then repeat steps 2 through 12. (The image may not necessarily be focused everywhere)

Adjust the top to bottom focus on the green as follows:

13. Loosen the two hex head bolts marked "A" and "C" using the combination wrench supplied.
14. Loosen the rear wing nut on the green lens and rotate the rear section of the lens, using the wing nut, to focus the TOP of the image.
15. Tighten the rear wing nut and loosen the front wing nut. Rotate the front section of the lens to optimize the focus at the TOP of the image.



16. Observe the **BOTTOM CENTER** of the image. If it is out of focus adjust the allen head bolt on the base of the lens (shown below) using the ballnose driver until focused.



17. Repeat steps 14, 15 and 16.

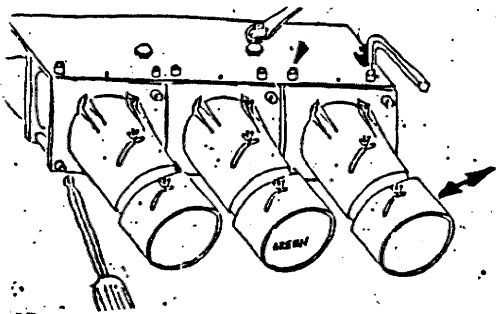
The image (green only) should now be in focus everywhere, centered on the screen and have the correct geometry.

Check the green focus as follows:

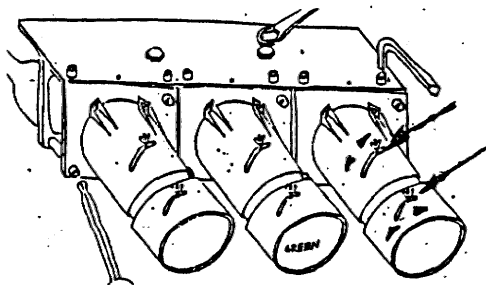
18. Loosen the rear wing nut on the green lens and slightly defocus then focus the green image. Observe the center and the edges. All the edges and the center should defocus together. If not then repeat steps 14, 15 and 16.
19. Check the center and corner focus and readjust if necessary by rotating the rear and front sections of the lens.
20. Tighten the wing nuts on the green lens.

Push HELP for a new image in red only.

21. Loosen the two allen head bolts marked "B" and pivot the red lens until the whole image is on the screen. Tighten the allen head bolts marked "B".

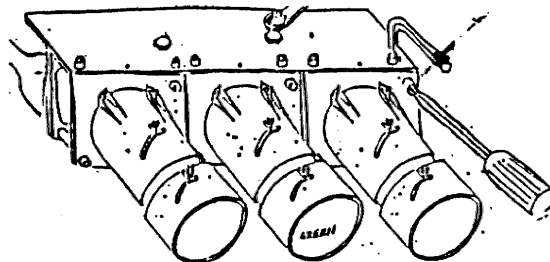


22. Loosen the rear wing nut on the red lens and rotate the lens by the wing nut to focus the TOP RIGHT CORNER of the image.
23. Tighten the rear wing nut and loosen the front wing nut on the red lens. Rotate the front section of the lens, holding the lens, to optimize the focus at the TOP RIGHT CORNER of the image.



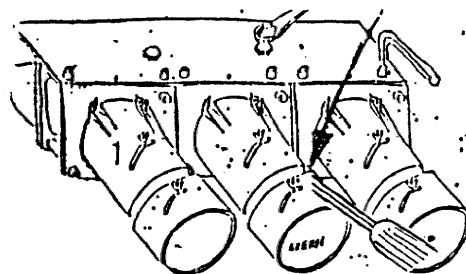
Adjust the top to bottom focus on the red lens as follows:

24. Observe the BOTTOM RIGHT CORNER of the image. If it is out of focus adjust the allen head bolt on the lens base (shown below) until it is focused.



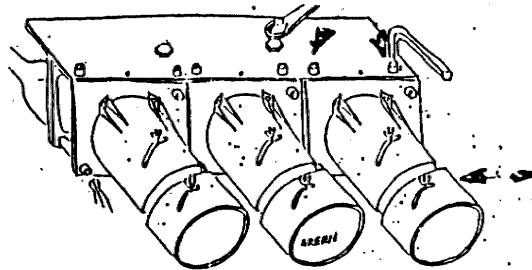
Adjust the side to side focus on the red lens as follows:

25. Observe the LEFT EDGE of the image. If it is out of focus adjust the allen head bolt on the lens base (shown below) until the LEFT EDGE is focused.



Adjust the red lens side to side tilt as follows:

26. Push HELP for a new screen. A red-green cross will be displayed on the center. Loosen the two allen head bolts marked "B".
27. Pivot the red lens until the red cross aligns with the green cross.



28. Tighten the allen head bolts marked "B".
29. Repeat steps 22, 23, 24, and 25.

The red image should be focused everywhere and the red and green crosses at the center of the image should be converged and one yellow cross should be visible.

Check the red focus as follows:

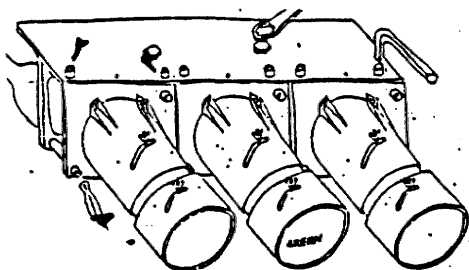
30. Loosen the red rear wing nut and slightly defocus then focus the image. The edges and the center should defocus and focus together. If not repeat steps 22, 23, 24, and 25.

31. Check the center and corner focus and realign if necessary by rotating the rear and front sections of the lens.

32. Tighten the two wing nuts on the red lens.

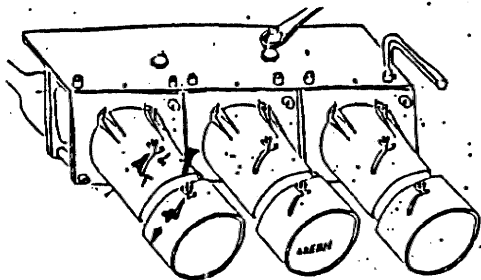
Push HELP for a new image in blue only.

33. Loosen the two allen head bolts marked "D" and pivot the blue lens until the whole image is on the screen. Tighten the allen head bolts marked "D".



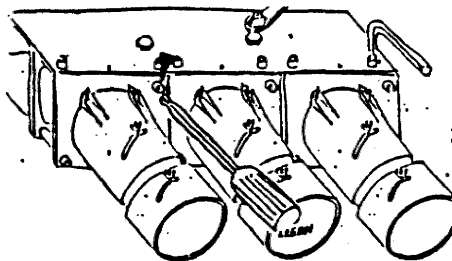
34. Loosen the rear wing nut on the blue lens and rotate the lens by the wing nut to focus the TOP RIGHT CORNER of the image.

35. Tighten the rear wing nut and loosen the front wing nut on the blue lens. Rotate the front section of the lens, holding the lens, to optimize the focus at the TOP RIGHT CORNER of the image.



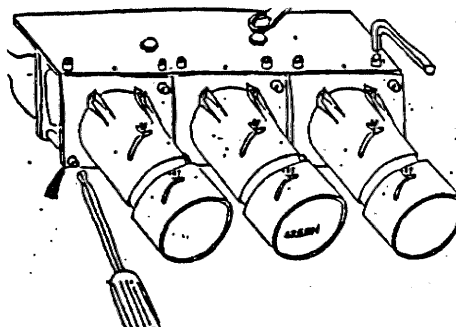
Adjust the top to bottom focus on the blue lens as follows:

36. Observe the image at the BOTTOM RIGHT CORNER. If it is out of focus adjust the allen head bolt on the lens base (shown below) until focused.



Adjust the side to side focus on the blue lens as follows:

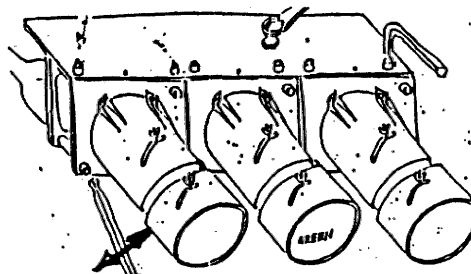
37. Observe the LEFT EDGE of the image. If it is out of focus adjust the allen head bolt on the lens base (shown below) until the LEFT EDGE is focused.



Adjust the side tilt of the blue lens as follows:

38. Push HELP for a new screen. A blue and a green crosshatch will be displayed on the center of the screen. Loosen the two allen head bolts marked "D".

39. Pivot the blue lens until the blue cross aligns with the green cross.



40. Tighten the allen head bolts marked "D".

41. Repeat steps 34, 35, 36 and 37.



The blue image now should be focused everywhere and the blue and green crosses at the center of the image should be converged and one cyan cross should be visible.

Check the blue focus as follows:

42. Loosen the blue rear wing nut and slightly defocus and focus the image. The edges and the center should defocus and focus together. If not repeat steps 34, 35, 36 and 37.
43. Check the center and corner focus and realign if necessary by rotating the rear and front sections of the lens.
44. Tighten the two wing nuts on the blue lens.

45. Tighten the two hex head bolts marked "A" and "C".

46. Push HELP for a new screen. A crosshatch will be displayed in white. The colors may not be converged. Use this crosshatch to check the focus alignment for all three colors. Push the COLOR key repeatedly to cycle through the colors. If focus realignment is required for any color repeat the appropriate steps.

47. When finished push EXIT to return to the image then proceed to the convergence alignment described in the next section.

#### NOTES

### 8.3 CONVERGENCE ALIGNMENT

The convergence values are stored separately for each input of each source. Select an input before starting convergence. When finished select a new input and repeat the convergence for best results.

NOTE! The projector requires a 45 minute warmup time. Do not converge unless the projector has been turned on for at least 45 minutes.

The convergence subroutine displays an internal crosshatch at the same frequency as the video source. The convergence subroutine divides the crosshatch into 25 zones and draws a box around the zone that is being converged. The size of the zones around the perimeter are half the size of the other zones.

There are two convergence subroutines available; guided and random access.

In guided convergence the box is advanced to the next zone by the microprocessor every time the CONVERGE key is pushed.

In random access convergence the box may be positioned anywhere on the screen by pushing the MOVE key then one of the arrow keys.

Both convergence routines use two colors to converge. In guided convergence the green is the reference. The microprocessor selects the red first then the blue for converging to the green.

In random access convergence the two colors can be selected with the COLOR key as follows:

	reference color	convergence color
push COLOR	green	red
push again	green	blue
push again	red	blue
push again	a white crosshatch for reference	
push again	repeat starting at green - red	

Push the CONVERGE key to enter the convergence routine. The projector will display the menu shown below in green only.

If guided convergence is selected the projector will display the following menu:

CONVERGENCE

1. GUIDED CONVERGENCE
2. ADVANCED RANDOM ACCESS
3. CROSSHATCH TEST PATTERN
4. DOT TEST PATTERN

PUSH 1, 2, 3, OR 4 TO SELECT

PUSH HELP FOR INSTRUCTIONS  
PUSH EXIT TO RETURN

GUIDED CONVERGENCE

Area in box is converged

Push the arrow keys to converge red on green

Push the arrow keys to converge blue on green

Push CONVERGE to advance box to next zone

Push CONVERGE to start  
Push EXIT to return

Push 3 or 4 to view a crosshatch or a dot pattern only. Push EXIT to return to the picture. If the image needs converging push CONVERGE to enter the convergence routine. Then select guided or random access method by pushing 1 or 2.

Push CONVERGE to start. A crosshatch will be displayed in red and green only with a box at the center.

If random access convergence is selected no instructions will be shown. A crosshatch will be displayed in red and green only with a box at the center.

For both guided and random access methods adjust the static convergence or the centering as follows: Use the arrow keys to converge the red on the green inside the box. When finished push CONVERGE again. A green and blue crosshatch will be displayed with the box in the center. Use the arrow keys to converge the blue on the green inside the box. When finished push CONVERGE again.

**NOTE!** Static convergence moves the whole picture. Dynamic convergence moves the picture inside the box only. The dynamic or zone convergence adjustment is different for the two methods of convergence. Adjust it as described below.

When guided convergence is selected proceed as follows:

The red and green crosshatch will be displayed with the box at the top left corner. Use the arrow keys to converge the red on the green in the box. When finished push CONVERGE. The box will advance one zone down. Continue using the arrow keys to converge and the CONVERGE key to advance the box. When the box reaches the bottom right corner and the CONVERGE key is pushed the crosshatch will change colors to green and blue. Use the arrow keys to converge the blue on the green in the box and use the CONVERGE key to advance the box to the next zone. When the box is at the bottom right corner and the CONVERGE key is pushed the exit menu shown below will be displayed.

When random access convergence is selected proceed as follows:

A red and green crosshatch will be displayed with the box at the center. Push the MOVE key then use the arrow keys to move the box to any zone. When the box is in the desired zone push CONVERGE then use the arrow keys to converge the red on the green in the box. Use this sequence to converge the red on the green in any zone.

Push the COLOR key to switch to blue and green. Use the MOVE and the arrow keys to position the box at a desired zone then use the CONVERGE and the arrow keys to converge the blue on the green in the box. If the blue and green are difficult to see push the COLOR key to change the colors to red and blue. Use the above steps to converge the red on the blue.

**NOTE!** Use the red and blue to converge the blue with caution. If the red is not converged to the green properly and used as the reference color to converge the blue the final convergence may not be satisfactory.

Push the COLOR key any time to change the colors.

When the box is in the center zone the convergence is static. When the box is in any other zone the convergence is dynamic.

When finished push the EXIT key. The exit menu shown below will be displayed.

SAVE CURRENT VALUES?  
  
PUSH EXIT TO SAVE  
  
PUSH Q NOT TO SAVE

Push the EXIT key to store the convergence pattern just readjusted. Push the Q key if the just readjusted convergence is not as satisfactory as the convergence before the readjustment.

## 8.4 OTHER ALIGNMENT FUNCTIONS

Values for the following alignment functions are stored separately for each input of each source. Select an input before making any alignments. When finished select another input and repeat the alignments for the new input.

### 8.4.1 PICTURE CENTERING

Check the position of the image on the background. Push BRITE then push and hold the U key until a grey background is visible. If the picture is not centered on the background move it using the MOVE key.

Push MOVE then push and hold the L or the R key to move the picture side to side.

Push MOVE again then push and hold the U or D key to move the picture up and down.

Push MOVE again then push and hold any one of the four arrow keys to move the picture horizontally or vertically.

Push MOVE again to cancel any move.

### 8.4.2 MANUAL/AUTOMATIC LOCK

In automatic mode the projector locks to the frequency of the input and displays a stationary image. In this mode the two amber LED's, located on the back of the projector and marked "H.HOLD" and "V.HOLD", are off.

In manual mode the projector is set to lock to one certain frequency which is variable. If the frequency of the input does not match the preset frequency of the projector the image may roll horizontally or vertically. In this mode the two amber LED's are on.

The horizontal and vertical manual/automatic mode is controlled separately using the V.HOLD and H.HOLD keys.

To enter the automatic mode check the amber LED. If it is on then push the H.HOLD or the V.HOLD key. If the amber LED is off the projector is in the automatic mode.

To enter the manual mode push the H.HOLD or V.HOLD key. If the picture rolls then push and hold the U or D key until the picture becomes stable.

### 8.4.3 VERTICAL BLANKING

Video from video tapes often has timing information placed on the top of the picture. Distracting head switching occurs at the bottom of the picture. These are not part of the picture and are usually over scanned in a normal television. If visible on the screen they may degrade the picture. Use the V BLANK function to blank off this unwanted information. Push the V BLANK key then push and hold the D key until the top of the picture is clean. Push V BLANK again then push and hold the U key until the bottom of the picture is clean.

To unblank push V BLANK then push and hold the U key all the information on the top is visible. Push V BLANK again then push and hold the D key until all information on the bottom of the picture is visible. **NOTE!** When displaying computer generated images the picture should be unblanked.

### 8.4.4 SLOW/FAST SYNC

Push the FAST/SLOW SYNC key to correct the bent or distorted lines at the top of the picture caused by poor time base correction on some sources especially VCR's.

### 8.4.5 ADJUST PICTURE SIZE

Push the SIZE key then push and hold the U or the D key to adjust the picture height.

Push the SIZE key again then push and hold the L or the R key to adjust the width of the picture.

**NOTES**

## 9. PROJECTOR CONTROL

### 9.1 INPUT SELECTION

The projector can hold two input modules at any one time. An input module installed in SLOT 1 becomes SOURCE 1. An input module installed in SLOT 0 becomes SOURCE 0.

The REMOTE VIDEO/DATA SWITCHER can expand the maximum number of input modules to a total of 7.

To display an input use the SOURCE function followed by two digits. The first digit identifies the slot number. The second digit identifies the input number on that input module.

For example: Slot 0 contains an RGB SYNC 10 PIN input module. A computer source is connected to the RGB SYNC input. To display this source enter SOURCE 0 2.

The key sequence SOURCE 0 or SOURCE 1 without the second digit will always access input 1 for that source by default after a 1.5 second wait for a second digit.

To view all available inputs sequentially proceed as follows: Push the HELP key then select option 4. UTILITIES. Select option 1. "SOURCE U&D" on the new menu displayed and enter the desired source sequence. Exit the menu.

Use the following key sequence to view the sources in the programmed sequence. Push SOURCE then push the U arrow key to view the next input in the sequence. Push U again to view the next input etc. Push SOURCE then push the D arrow key to view the previous input in the programmed sequence.

### 9.2 CONTRAST AND BRIGHTNESS CONTROL

To set the contrast and the brightness use the following key sequence.

Push the CONT key then push and hold the D key until the contrast is zero. Push the BRITE key then push and hold the U key until the raster is visible. Push and hold the D key until the raster becomes just invisible.

Push the CONT key then push and hold the U key until the image is visible and as bright as required.

### 9.3 VIDEOTAPES OR VIDEODISC

To use the projector with video tapes or disks install a quad standard decoder. Connect one video source to INPUT 1, and if required, another video source to INPUT 2 on the decoder. Connect both audio channels from each source to the AUDIO IN 1 and AUDIO IN 2 inputs. Note: if the audio is mono then use only one audio channel. Connect both AUDIO OUT outputs to an amplifier.

Select an input using the SOURCE n 1 or SOURCE n 2 key sequence. Push the FAST/SLOW SYNC key to correct the distortion often present on the top of the picture when using a videotape. Adjust the picture using the COLOR, TINT, and DETAIL keys and the U or the D arrow key. Adjust the volume using the VOL key with U or D arrow keys. Push MUTE to turn off the sound. Push MUTE again to restore the sound.

### 9.4 STORAGE AND RECALL OF PROJECTOR SETTINGS

A nonvolatile battery backed up memory stores all projector settings. A specific memory segment stores the settings for each input of each source.

One working memory segment holds all the settings for the source presently being displayed.

The projector updates all memories automatically. During a power down or a power failure, the projector stores the source number and all the settings before it powers down.

During a power up the projector turns on displaying the same source that it displayed just before the last power down.

## 9.5 RECALL MEMORIES

There are ten memory locations which do not relate to any input on any source. They are called RECALL MEMORIES and are user programmable.

Store a frequently used projector settings in a RECALL MEMORY and recall one when required for quick setup.

To store a complete set of projector parameters in a recall memory push the HELP key, select option 4. UTILITIES, select option 3 "SOURCE RECALL MEMORY" on the new menu and follow the instructions.

To recall a recall memory push SOURCE RECALL n where n is the recall memory number(0-9). When a recall memory is recalled it overwrites the settings stored in the working memory thus the projector settings change. When the projector is switched to a new source or it is powered down the settings are stored in the same recall memory where it was recalled from. If the settings recalled from the recall memory are not satisfactory and returning to the original settings is required recall the same source to which the display is connected.

For example: A video tape and an IBM PC are frequently used but often disconnected and replaced with other computers.

To preserve the projector settings store them in a recall memory. To store the video tape setting in say recall memory 8, make sure the video tape is displayed. Push the HELP key, select option 4. UTILITIES, select option 3. RECALL MEMORIES and enter the SOURCE RECALL 8 sequence.

When the video tape is used again and connected to say source 1,1 then display it first by pushing the SOURCE 1 1 sequence. Then enter the SOURCE RECALL 8 sequence.

## 9.6 THE RESET FUNCTION

The RESET function temporarily resets the convergence to zero.

When in random access convergence mode push RESET to reset the convergence to zero. Push EXIT to return to the converged picture.

## 9.7 THE EXIT KEY

Use the exit key to exit any subroutine such as convergence or a menu and to cancel an active function. For example to cancel the CONTRAST as an active function push the EXIT key.

## 9.8 HELP MENUS

The help menus, stored in the memory, provide on-screen information and access to some functions.

There are 4 categories of help menus: setup guide, keypad operation guide, source selection guide and utilities.

To access any one of these four categories push the HELP key. The projector displays a menu in green only and lists the above four categories. Access any one of the categories by following the instructions on the menu.

The setup guide provides the user with step by step setup procedure displaying instructions and comments. To access the setup guide push the HELP key then push the 1 key and follow the instructions displayed.

The keypad operation guide explains the use of each key on the keypad. To access push the HELP key then push the 2 key and follow the displayed instructions.

The source selection guide explains how to select a source. To access push the HELP key then push the 3 and follow the displayed instructions.

The utilities contains 5 options. To access push the HELP key then push the 4 key to display these options.

Use option 1. SOURCE U & D PROGRAMMING to program the sequence of sources.

Use option 2. MOUNTING CONFIGURATION if the arrow keys act in the wrong direction.

Use option 3. RECALL MEMORY to store settings in a recall memory.

Use option 4. IR KEYPAD PROTOCOL 1&2 to set projector protocol.

Option 5. MULTIPROJECTOR SYSTEMS is a menu that explains how to program each projector with an ID number in a multiprojector application.

## 10. KEYPAD COMMANDS

Following is a list of all commands and their uses. These commands may change any time without prior notice. The commands listed here are for software version V 0.4. See appendix B at the end of this manual for updates for later version projectors.

### SINGLE KEYSTROKE COMMANDS

COMMAND	Push TO
<u>*</u>	Superimpose the projector identification on the image. Push again to remove the identification from the image.
<u>FAST/SLOW SYNC</u>	Correct flagwaving or distortion at the top of the image.
<u>CONVERGE</u>	Enter the convergence routine.
<u>COLOR</u>	Switch colors in the convergence routine.
<u>EXIT</u>	End current command.
<u>HELP</u>	Display a help menu.
<u>I</u>	Display an internal crosshatch test pattern. Push again to return to the image.
<u>RESET</u>	Temporarily reset the convergence to zero when in convergence routine.
<u>MUTE</u>	Turn the audio off when using a multistandard decoder. Push again to turn the audio on.
<u>POWER</u>	Turn power on. Push again to turn power off.
<u>STANDBY</u>	Turn off the image (and the audio). Push again to return the image (and the audio).

### DOUBLE KEYSTROKE COMMANDS

Immediate action commands. Push the key shown then push a numeric key. The n is a numeric key 0 - 9.

<u>PROJ</u> <u>n</u>	Call projector <u>n</u> to respond to the next command.
<u>STANDBY</u> <u>n</u>	Turn off the image displayed on projector <u>n</u> . Repeat to display the image.
<u>SOURCE</u> <u>n</u>	Display input connected to input 1 of slot <u>n</u> .
<u>VBLANK</u> <u>n</u>	Turn on selected colors.

n	colors turned on	n	colors turned on
1	red	5	green - blue
2	green	6	red - blue
3	blue	7	none
4	red - green	8	all



Continuously variable commands. Push the key shown then push and hold one of the arrow keys, U, D, L or R. Release the arrow key when ready. The a is one of the arrow keys.

<u>PIN</u> <u>a</u>	Pincushion	Push <u>PIN</u> then use an arrow key to correct top half and sides of image. Push <u>PIN</u> again then use an arrow key to correct bottom half and sides of image.
<u>BOW</u> <u>a</u>	Bow	Push <u>BOW</u> then use the <u>U</u> or the <u>D</u> arrow key to correct a bow.
<u>H HOLD</u> <u>a</u>	Hor. Hold	Push <u>H HOLD</u> then use the <u>U</u> or the <u>D</u> arrow key to lock projector to input. Push <u>H HOLD</u> again to return to automatic lock mode.
<u>V HOLD</u> <u>a</u>	Vertical Hold	Push <u>V HOLD</u> then use the <u>U</u> or the <u>D</u> arrow key to synchronize the projector to input. Push <u>V HOLD</u> again to return to automatic lock mode.
<u>SIZE</u> <u>a</u>		Push <u>SIZE</u> then use an arrow key to adjust picture size.
<u>FOCUS</u> <u>a</u>		Push <u>FOCUS</u> then use the <u>U</u> or the <u>D</u> arrow key to adjust electronic focus.
<u>MOVE</u> <u>a</u>		Push once to enable centering horizontally only. Push again to enable centering vertically only. Push again to enable horizontal and vertical centering. Use the arrow keys to move the image in the desired direction. Push again to disable centering.
<u>MOVE</u> <u>a</u>		In the convergence routine push <u>MOVE</u> then use the arrow key to move box to desired area.
<u>V BLANK</u> <u>a</u>		Push to enable blanking at the top of the image. Push again to enable blanking at the bottom of the image. Use the <u>U</u> or the <u>D</u> arrow key to blank the required area.
<u>KEY</u> <u>a</u>	Keystone	Push <u>KEY</u> then use the <u>U</u> or the <u>D</u> arrow to correct keystone.
<u>CONVERGE</u> <u>a</u>		In the convergence routine push <u>CONVERGE</u> then push an arrow key to match the lines of the two colors.
<u>CONT</u> <u>a</u>	Contrast	Push <u>CONT</u> then use the <u>U</u> or the <u>D</u> arrow key to adjust contrast of the foreground or brightest areas to desired level.
<u>BRITE</u> <u>a</u>	Brightness	Push <u>BRITE</u> then use the <u>U</u> or the <u>D</u> arrow key to set the brightness of the background or black areas.

The following four commands are for the quad standard decoder only.

<u>COLOR</u> <u>a</u>		Push <u>COLOR</u> then use the <u>U</u> or the <u>D</u> arrow key to adjust the color saturation.
<u>TINT</u> <u>a</u>		Push <u>TINT</u> then use the <u>U</u> or the <u>D</u> arrow key to adjust the hue for NTSC standard.
<u>DETAIL</u> <u>a</u>		Push <u>DETAIL</u> then use the <u>U</u> or the <u>D</u> arrow key to adjust the sharpness.
<u>VOLUME</u> <u>a</u>		Push <u>VOLUME</u> then use the <u>U</u> or the <u>D</u> arrow key to adjust the volume.

TRIPLE KEYSTROKE COMMANDS n and m are two numeric keys 0 - 9.

<u>SOURCE</u> <u>n</u> <u>m</u>		Display the input connected to INPUT m on an input module installed in SLOT n.
<u>SOURCE RECALL</u> <u>n</u>		Use recall memory n to display the current image.

## 11. SPECIAL PURPOSE KEYPADS

The following special keypads are available as optional items.

### WIRED REMOTE KEYPAD (optional)

This keypad is equipped with a 25 feet (7.6m) cable. Use it to replace the infrared remote keypad. The cable plugs into the remote jack on the projector.

### PROTOCOL 2 INFRARED REMOTE KEYPAD (optional)

Use this keypad when two projectors are in the same room and must operate independently of each other each with its own keypad. Program each projector to respond to one protocol only.

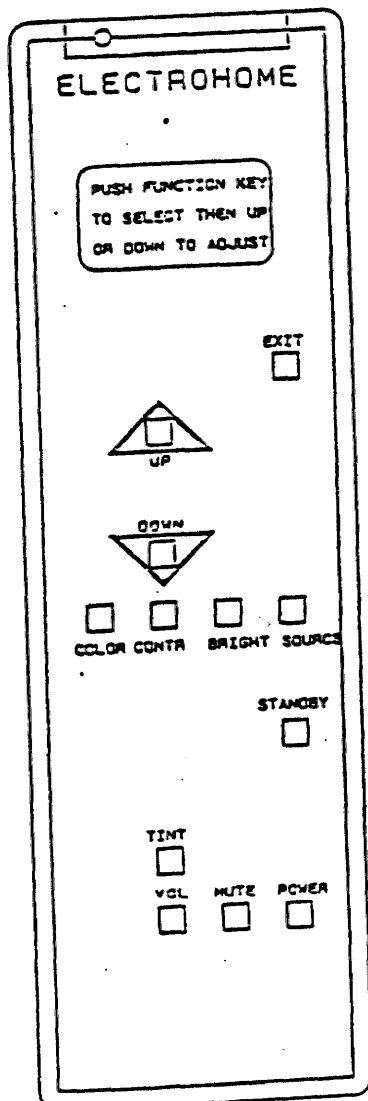
To program a projector for protocol 1 or 2 push the HELP key, select option 4 UTILITIES, select option 4 IR 1 & 2 from the new menu and follow the instructions.

A projector programmed for protocol 2 will respond to a protocol 2 remote keypad only.

To check the protocol of the projector push the 1 key. The number positioned at the center of the screen in the last row is the protocol number.

### EXECUTIVE KEYPAD

This is a simplified keypad containing essential control functions for presentations only.



"EXECUTIVE"  
REMOTE KEYPAD

## 12. MULTIPLE PROJECTOR USE

There are two multiprojector configurations with remote keypad control. Several projectors, controlled by one remote keypad, and several projectors, each controlled separately by one distinct keypad.

### 1. One keypad controls more than one projector.

Identify each projector. Use its built in keypad. Push the HELP key, select option 4. UTILITIES, select option 5. MULTIPROJECTOR SYSTEMS on the new menu and enter PROJ n where n is the projector number.

To access one individual projector in a multiprojector environment enter PROJ n using the remote keypad.

To access all projectors at the same time enter the PROJ EXIT sequence.

For example there are 10 projectors, aligned to show a very large composite image. The contrast on projector 4 is too high and the keystone on projector 7 needs adjustment.

To correct these problems using one remote keypad proceed as follows.

Enter PROJ 4 CONT then push and hold the D arrow until the contrast on projector 4 is at the correct level.

Then enter PROJ 7 KEY, push and hold the D arrow until the keystone distortion on projector 7 is correct.

To increase the contrast on all projectors at the same time enter PROJ EXIT then push the CONT key and push and hold the U arrow key until the contrast on all the projectors is at the desired level.

### 2. More than one projector operates in the same room at the same time. Each projector must operate via its own remote keypad independent of any other.

For two projectors use two 1-2 protocol special remote keypads to operate the two projectors. Program one projector as protocol 1 and the other as protocol 2 as follows: Push the HELP key, select option 4. UTILITIES, select option 4. IR 1&2 PROTOCOL on the new menu and follow the instructions on the menu.

NOTE: All projectors are factory preset to protocol 1.

For more than two projectors use wired remote keypads or use the built in keypads only.

To check the projector number of the projector push the \* key. The three digit number positioned in the second last row is the programmed projector number.

### 13. THE USE OF IR REMOTE KEYPAD FOR REAR SCREEN APPLICATIONS

Most rear screens are transparent to infrared light used by the remote keypad. Thus operating the projector by aiming the remote keypad towards the rear screen may in most cases be satisfactory. If the response of the projector to the remote keypad is poor install an external IR receiver as follows: Install the external receiver in the wall that separates the rear projection booth from the viewing room, such that the face of the receiver protrudes into the viewing room. Plug the external receiver into the plug on the projector marked "REMOTE SENSOR". Aim the remote keypad in the direction of the remote receiver.

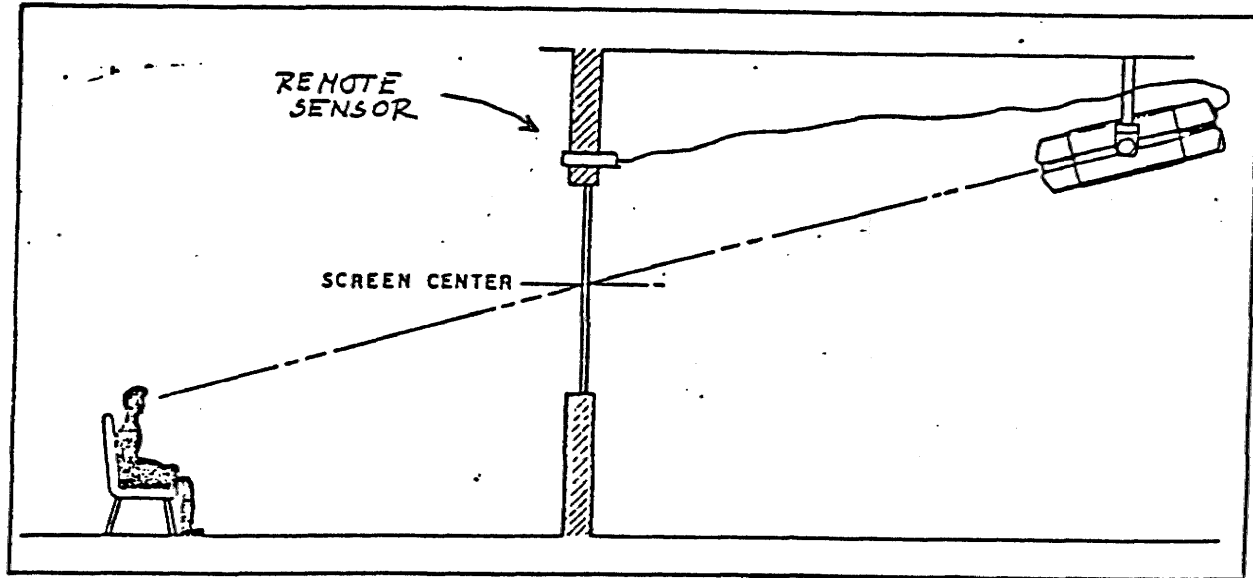


FIGURE 13.1 REMOTE IR RECEIVER PLACEMENT

## 14. FUSE REPLACEMENT AND LINE VOLTAGE SELECTION

Replace a blown fuse as follows:

Locate the fuse assembly on the front of the projector.

Remove the cover using a small blade screwdriver or similar tool. The fuse block is secured to the back of the cover by a phillips screw.

Locate the fuse or fuses. For 120V systems one 6A fuse and a jumper bar is visible. For 240V systems two 3.15A fuses are visible. Replace the blown fuse. Replace the cover and make sure the voltage indicator pin indicates the correct line voltage.

Line voltage selection.

Check the line voltage selected. The indicator pin shows 120V or 240V selected line voltages only. Change the selected line voltage as follows:

Remove the cover and remove the fuse block from the cover by removing the phillips screw. Flip the fuse block over and replace it on the cover. Make sure one fuse is visible for 120V and two fuses are visible for 240V mains.

Pull out the voltage selector card using a needle nose pliers. Rotate the pin such that it points away from the desired line voltage.

Replace the voltage selector card and replace the cover. Check that the pin indicates the correct line voltage.

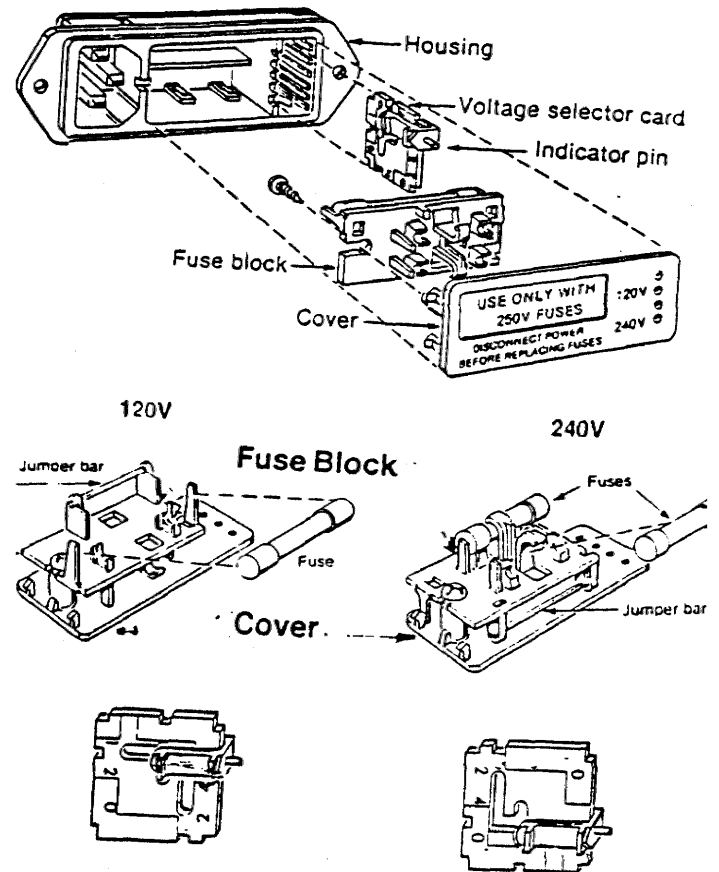


FIGURE 14.1 Fuse assembly

## 15. INPUT MODULE INSTALLATION

To install an input module select the slot. Remove the two screws that hold the cover plate or an input module in place. Remove the cover plate or pull out the input module using the tool supplied. Retain the plate for future use.

Slide the new input module in the tracks until it is flush with the adjacent cover plates. Secure it to the projector using the two screws.

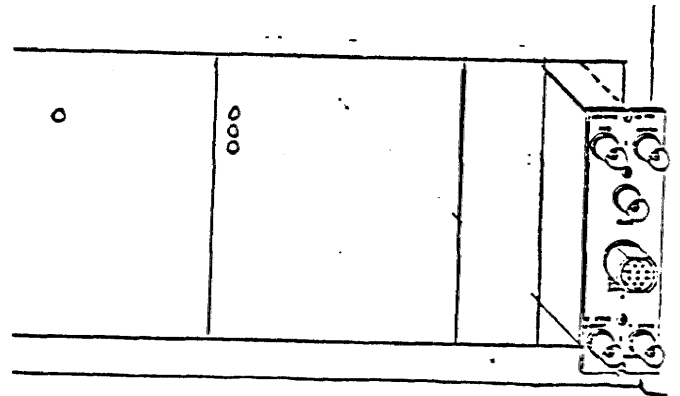


FIGURE 15.1 Input module installation

## 16. TROUBLE SHOOTING

SYMPTOM	POSSIBLE CAUSE	POSSIBLE REMEDIES
The line cord is connected to an A.C. outlet. The green LED, located on the back panel and marked "READY" is off.	Faulty line cord.	Replace the line cord.
	Blown mains fuse.	Replace the mains fuse.
	Blown fuse in the projector.	Replace the projector fuse.
The projector does not turn on when the POWER key is pressed.	The red LED marked "ERROR" is on.	Call a service technician.
	Power key was not held down long enough.	Push the POWER key again and hold it down for two seconds.
	Wrong protocol setting.	Use built in keypad to turn on the projector then switch the protocol setting (See section 11).
	Dead battery in remote keypad.	Replace battery.
	One or more green LED's are off.	Call a service technician.
The projector is on. All the green LED's on the back panel are on and all the red LED's are off. No display is visible.	A red LED is on.	Call a service technician.
	The computer is off.	Turn on the computer.
	Wrong source is selected.	Check the slot number and the input number to which the video is connected. Enter the correct source code.
	Projector is in the standby mode.	Push the STANDBY key.
	Contrast set too low.	Increase the contrast.
	Wrong or faulty input module.	Replace the input module.
The arrow keys act in the opposite direction.	Wrong projector setup selection.	Push the HELP key. Select option 4 then option 2 and answer the questions.
Projector does not lock.	One or both amber LED's are on.	Push the V.HOLD and/or the H.HOLD key.
Display is bent on the top or the bottom.	FAST/SLOW SYNC set incorrectly.	Push the FAST/SLOW SYNC key.

**NOTES**

17. LIST OF AVAILABLE ITEMS

NAME	ELECTROHOME PART NUMBER
ECP 3000	38-B09640-71
PROJECTOR CART	38-800618-71
CEILING MOUNT YOKE	38-800619-00
CURVED SCREEN	38-800002-61
SCREEN LEGS	38-800403-66
KEYPADS	IR REMOTE 38-
	EXECUTIVE 38-
	WIRED 38-800624-01
	PROTOCOL 2 38-800625-01
EXTERNAL INFRARED RECEIVER	38-800617-00
IR REMOTE VIDEO/DATA SWITCHER	38-800410-61
INPUT MODULES	
	RGB SYNC 2 INPUT 38-800913-01
	RGB 3,4,5 WIRE LOOP 38-800914-01
	PC ENHANCED 38-800915-01
	RGB SYNC 10 PIN 38-800916-01
	VGA/GP ANALOG 38-800917-01
	GP TTL 38-800918-01
	MONOCHROME 2 INPUT 38-800919-01
	QUAD STANDARD DECODER 38-800920-01
INPUT MODULE CASE/POWER SUPPLY	38-800921-01
INPUT CABLE EXTENSION	38-800614-71



**NOTES**

## 18. APPENDIX

### A. DETERMINE PROJECTOR TO SCREEN DISTANCE

1. Determine the desired image width or image height.
2. Calculate the required distance:  $D_1 = 1.32W + 8.3$  inches, where  $W$  is the desired image width.
3. Calculate the required distance:  $D_2 = 1.76H + 8.3$  inches, where  $H$  is the desired image height.
4. The correct projector to screen distance is the larger of  $D_1$  and  $D_2$ .
5. Mount the projector such that the distance between the center of the screen and the front lens of the projector is the value determined in step 4 above.

### B. SOFTWARE UPDATES (Original version is V 0.4.)

- V 0.4      Source up/down program not implemented. (Section 9.1 paragraph 4)
- Recall memories not implemented. (Section 9.5 and Section 10 SOURCE RECALL n)
- Multiprojector use not implemented. (Section 12. and Section 10 PROJ n and STANDBY n)

**NOTES**

#### INTERFACE

A device that converts any type of video into RGB video. (RGB video is used by the projector.)

#### INTERLACE

A method used to double the scan lines in video sources.

#### LINEARITY

This term describes the ability of a projector to reproduce a geometrical shape anywhere on the screen.

#### LINE OF BEST VIEWING or ON AXIS

The light from a projector is incident on a screen with an angle of incidence of  $\theta^{\circ}$ . The light reflects from the projector such that the angle of reflection is equal to the angle of incidence. The LINE OF BEST VIEWING is along the line of reflection.

#### LINE TIME

The time it takes to generate one scan line.

#### LOOPTHROUGH

Wires connecting one video source with two or more display devices must be unterminated at each display device except the last one. The unterminated connections are referred to as loopthrough. The last display device should be terminated.

#### LUMEN

The amount of visible light emitted by a light source (for example a projector) or reflected by a screen is measured in lumens.

The lumen is used to specify the light output of a projector.

#### LUX

The amount of visible light per square meter.

1 lux = 1 lumen / square meter.

1 lux = 10.76 foot-lambert

1 lux = 3.42 foot-candle

#### NTSC DECODER

A device that converts NTSC video into RGB video.

#### NTSC VIDEO

This term refers to the video output of video tape or video disk players used mainly in N. America.

#### NTSC 4.43 VIDEO

This term refers to the video output of video tape or video disk players used mainly in the Middle East countries.

#### PAL DECODER

A device that converts PAL video into RGB video.

#### PAL VIDEO

This term refers to the video output of video tape or video disk players used mainly in Europe.

#### PIXEL

Specifies the number of addressable locations in the video generating circuitry of the computer. It may also be used to assess the picture quality. Large number of pixels may result in finer lines on the picture. Small number of pixels usually result in jagged diagonal lines. Pixel numbers should not be used alone to determine the projector resolution required.

#### QUAD STANDARD DECODER

A device that converts NTSC, PAL, SECAM or NTSC 4.43 video into RGB video.

#### REAR SCREEN

A translucent panel or lens array. Incident light travels through the incident surface of a rear screen and forms an image on the other surface.

#### RESOLUTION

**OF THE LENS:** The maximum number of alternate white and black horizontal lines that can be distinguished on a screen when a photographic target is placed in front of the lens and illuminated by a light source.

**OF THE CRT:** (Resolution) = (height of the active CRT face) / (spot size)

**OF THE PROJECTOR:** The smaller number of the above two resolutions.

#### RETRACE TIME

The minimum time required for the projector to retrace from the right edge to the left edge. The video source must have a minimum blanking time equal to or more than the retrace time.

#### RISE TIME

The minimum time required by the video amplifier of the projector to increase its output to 90% of the maximum value.

Computer generated image is optimum if its pixel clock frequency is not higher than  $1/(\text{Rise time})$ .

#### RGB VIDEO

This term refers to the video output of computers. It can be analog or digital. Analog RGB video has 3, 4, or 5 wires; one for the red, one for the green, one for the blue VIDEOS and one or two for the SYNC.

Digital RGB video always has 4 or 5 wires.

#### SECAM

This term refers to the output of video tape or video disk players used mainly in France.

#### SCAN LINE

One scan line is one horizontal line.

#### SPOT SIZE

The diameter of the smallest dot that can be generated on the face of the CRT.

#### SYNC

This term refers to a part of a video signal that is used by projectors to stabilize the picture.

SYNC can be in three forms: When the sync is part of the green video it is called "SYNC on green". When the sync is on one separate channel it is called "Separate composite sync" and when the horizontal and vertical components of the sync are on two separate channels it is called "Separate sync" or "H.SYNC and V. SYNC".

#### SYNC WIDTH

The duration of each sync pulse generated by the computer. The sync width is part of the blanking time.

#### TERMINATED

A wire connecting the computer to a display device such as a projector must be terminated by a resistor (in projection this resistor has a value of  $75\Omega$ ) when one display device is operated off of one video source.

#### TTL VIDEO

This term refers to the video output of certain computers (for example IBM PC). TTL video can generate a definite number of colors (8, 16, 64). TTL video cannot be connected to projectors through long wires.

TTL video is one type of RGB video.

#### VARIABLE SCAN

The ability of a projector to synchronize to inputs with frequencies within a specified range.

#### VIDEO

This term describes the signal that is used by display devices, such as projectors, to generate a picture. This term also refers to the output of video tapes or computers which when connected to a suitable display device generates a picture.

#### VIEWING ANGLE

Screens do not reflect equally in all directions. Most reflected light is reflected in a conical volume. This cone is centered around the "LINE OF BEST VIEWING" or along the "ON AXIS" line. The apex of this cone is at the surface of the screen and its base is elliptical. A viewer located in front of the screen "ON AXIS" sees maximum brightness. A viewer located along the surface of the cone sees only 50% of the maximum brightness. A viewer located outside of this cone sees less than 50% of maximum brightness. The HORIZONTAL and VERTICAL VIEWING ANGLES are the horizontal and vertical angles of the cone. Curved screens usually have smaller viewing angles than flat screens.

#### WHITE FIELD

A white field is an area of the image that is white only. For example a full white field is an image that is white everywhere. A 10% white field is a white area (usually rectangular) that occupies 10% of the image. The remaining 90% is black.

