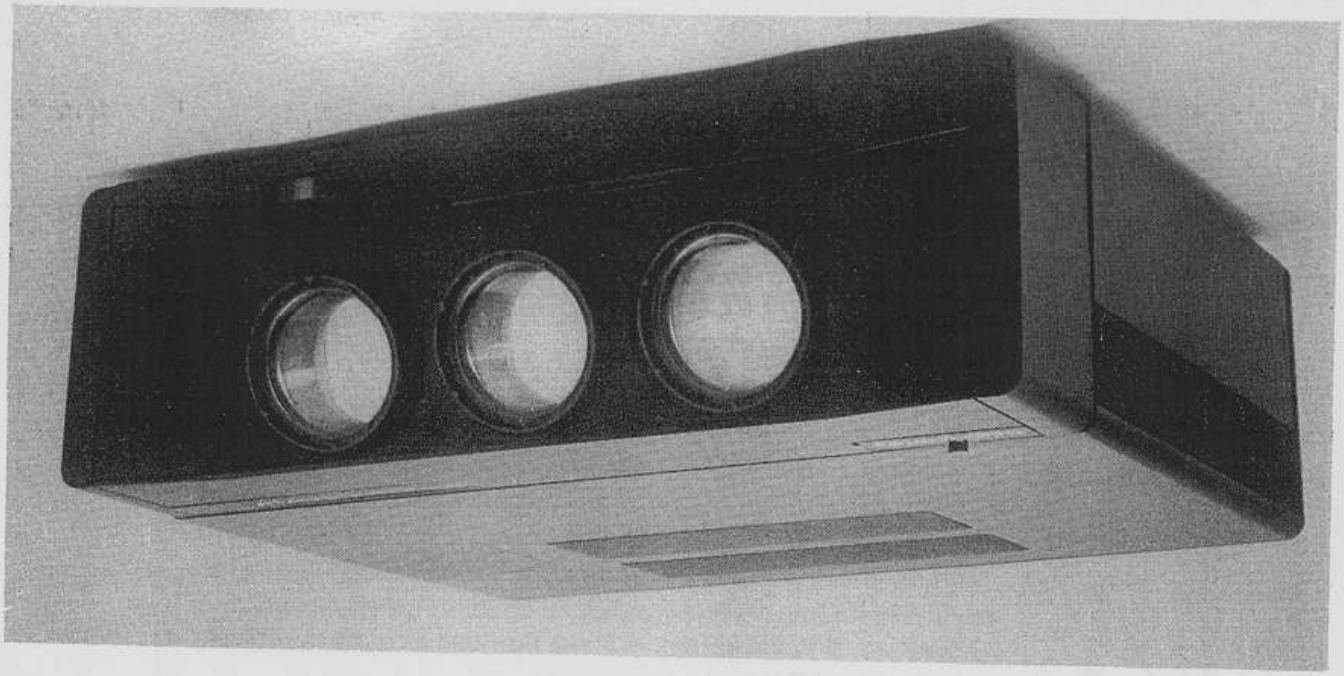
RUNCO

CinemaPro

DIGITAL/750 & 750T



SETUP
&
OPERATIONS
MANUAL

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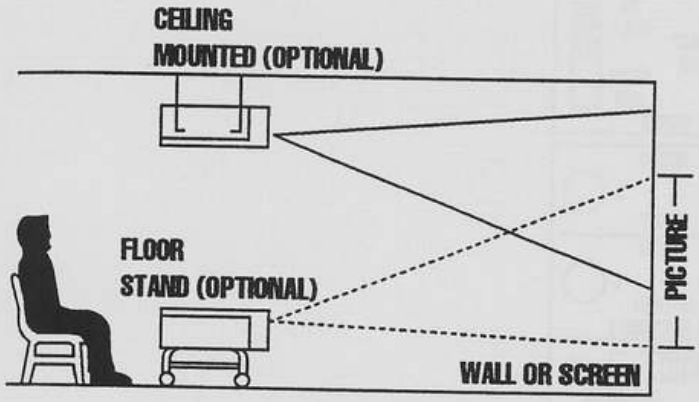
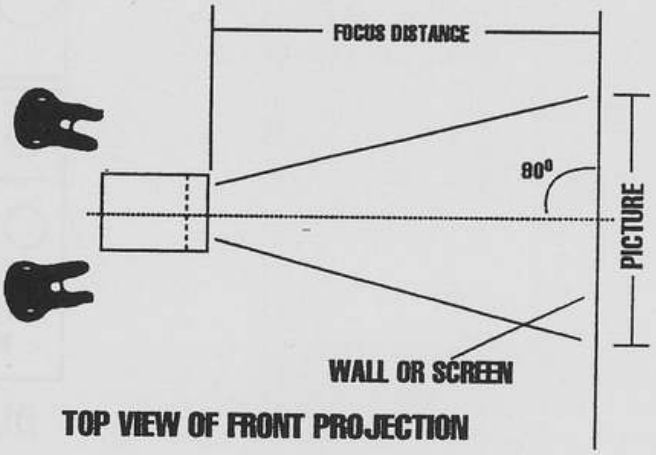
INTRODUCTION

The Runco CinemaPro CPD 750 video projector is designed to be a clear, bright source for high quality video projection. It accepts a standard NTSC composite video signal and will project any size picture from 5' to 20' diagonal. Your set has been preconfigured for a specific screen size to your specifications. Refer to diagrams 1 and 2 below for exact placement dimensions for your particular screen size.



SIDE VIEW OF
FRONT PROJECTOR

DIAGRAM 1



TOP VIEW OF FRONT PROJECTION

DIAGRAM 2

These setup specifications are critical and should be adhered to exactly, to obtain the best possible picture with your Runco Video Projector. The projector is ready to use out of the box. However, it may require some slight adjustments due to inexact placement during installation or settling during shipping.

This is your guide to performing these adjustments, followed by a more detailed instruction process for setup to other screen sizes or configurations. Any procedure which requires opening the projector will void the warranty unless performed by Runco authorized personnel. Please refer to the operator's manual also included with the projector for any other questions about the unit itself. Please read the operator's manual. It is necessary to do so to understand the many varied features your projector has to offer.

We at Runco recommend using a flat, matte white screen designed specifically for video projection. Other screens may also be appropriate for rear projection.

HOOKUP

For connecting the CPD 750 to a video source, refer to Diagram 3. It details the jack panel layout on the front of the set.

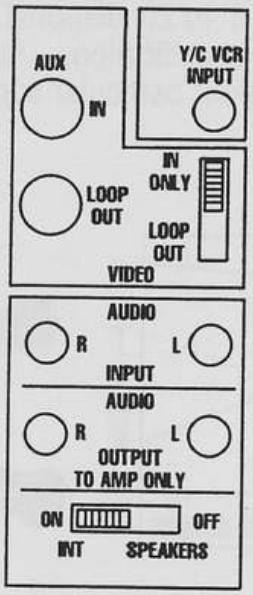


DIAGRAM 3

Use the BNC connector for the video input, marked "AUX". Note the slide switch to the side of the video "Loop Out" jack. It is important that it be placed in the "In Only" position, unless the "Loop Out" jack is used or terminated with a 75-Ohm BNC terminator. Failure to do this will cause the picture to "bloom" or lose contrast and may damage the internal circuitry.

The projector will accept stereo audio to accompany the video signal via the audio input jacks. It has two 5" oval speakers in the chassis which may be switched on or off with the slide switch placed directly by the audio "Loop Out" jacks. Refer to Diagram 4.

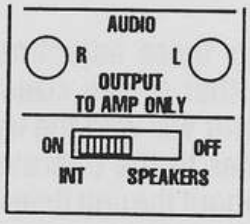


DIAGRAM 4

The audio "Loop Out" jacks are for providing stereo audio signal to an external amplifier. Refer to the appropriate diagrams in the operator's manual for several interface setups involving both video and audio for your projector.

HOOKUP

For connecting the CPD 750T to a video source, refer to diagrams 5 & 6 below. Diagram 5 shows the composite video and separate audio inputs for connecting the projector when used as a monitor. Diagram 6 shows the RF input jack panel for connecting the

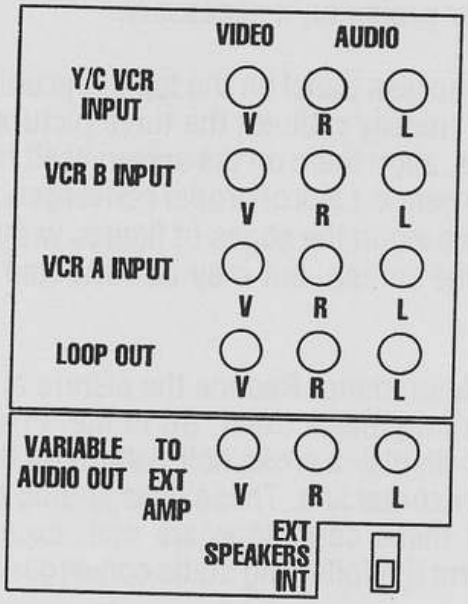


DIAGRAM 5

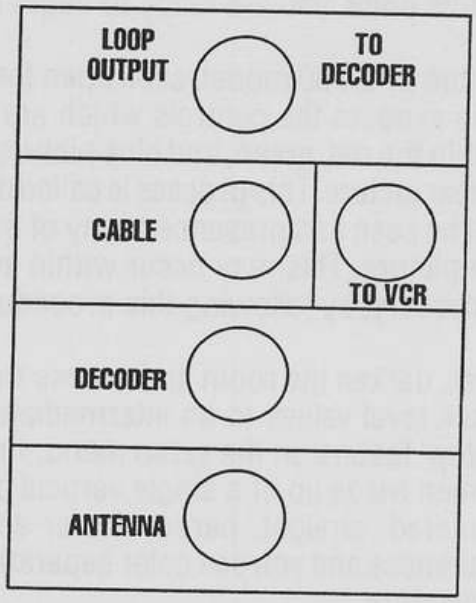


DIAGRAM 6

projector when using the tuner. Please refer to the CPD 750T operators manual for more detailed information and diagrams regarding hookup of the CPD 750T.

Now that you have connected your projector to a source, turn it on via the remote control or the touchpad on top of the unit and allow it to warm up for a few minutes. Familiarize yourself with the on-screen menus and features available by referring to the operator's manual.

At this point, you are ready to begin fine tuning your projector, if necessary.

On the CPD 750 model, slide open the convergence access panel on the top of the unit. This exposes the controls which are used to electronically redirect the three pictures within the red, green, and blue picture tubes and thus, align them on the screen itself for a clear picture. This process is called dynamic convergence. Lack of proper convergence will be seen as a presence of any of these three colors along the edges of figures within the picture. This may occur within any portion of the screen, but may be corrected if necessary, by following this procedure.

First, darken the room and access the on-screen video menu. Reduce the picture and black level values to an intermediate, yet viewable brightness. Next, go to the "Projo Setup" feature on the setup menu. Press "Adjust" to display a cross hair pattern on the screen made up of a single vertical and a single horizontal line. These lines should be centered, straight, perpendicular and white. If all these conditions are met, except whiteness and you see color separation, then perform the following static convergence procedure.

Open the small flap covering the "Static Convergence" or centering controls for red and blue on top of the unit. Refer to Diagram 5.

DIAGRAM 7

Cover the blue lens with a lens cap to allow only the red and green images to project onto the screen. Turn the "Left-Right" knobs for red to adjust the red vertical line so that it completely overlaps the green vertical line. Repeat this procedure with the "Down-Up" knob until the red horizontal line completely overlaps the green horizontal line.

Uncover the blue lens. Cover the green lens and align blue to red if necessary by repeating the above procedure, referencing blue to red. Uncover all three lenses. At this point you should see no color separation and a clear, focused, white cross hair, that is centered, straight and perpendicular.

If these conditions are met, remove the cross hair pattern from the screen by pressing "Enter" and recheck the picture itself. If you feel the picture needs further adjustment, then stop and rechec k the placement of the projector at this point. If it is correctly placed, then collect the following tools and begin the dynamic convergence procedure, starting on page 24. You will need a small plastic TV alignment tool or "tweaker" to be able to easily reach and turn the adjustment knobs, called "pots" on the 9-850 convergence board. The 9-850 convergence board may be accessed by sliding open the panel on the lid of the set. You will also need a cross-hatch test pattern.

This test pattern should be a standard NTSC composite video signal and is supplied to the projector though the "AUX" video input jack on the jack panel. You will also need to be able to refer to the actual source you will be watching with your projector, so that you can observe the results of the convergence procedure when you are done. Refer to Diagram 6 on the following page for a layout of the convergence board and a brief illustration of what each pot does.

CONVERGENCE BOARD LAYOUT

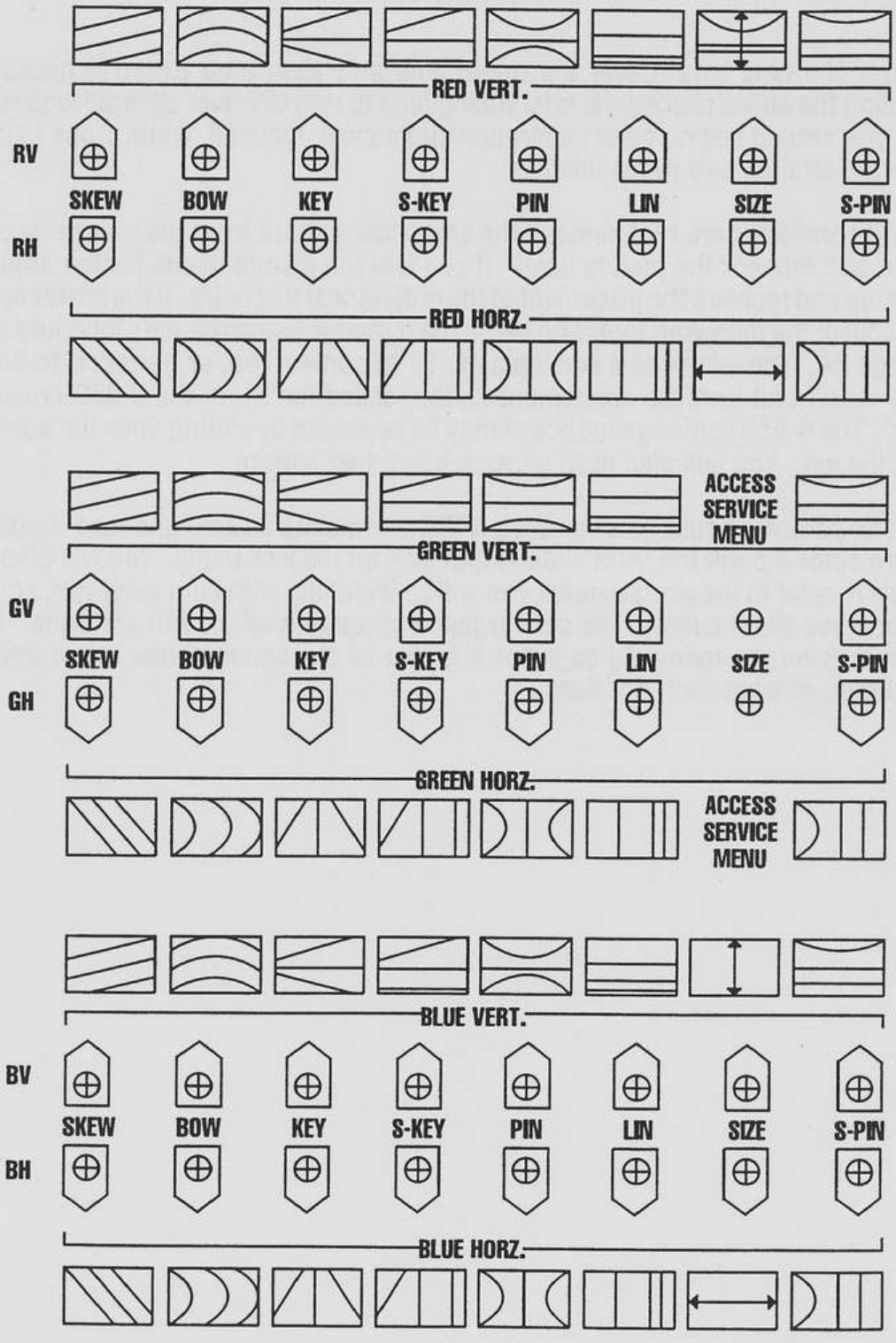


DIAGRAM 8

DETAILED SETUP

Should you wish to set up the unit for any other configuration, it is necessary to do the following procedures, in this order:

1. PLACEMENT
2. MOUNTING
3. OPENING THE PROJECTOR
4. SCAN CONVERSION
5. FACTORY SERVICE MENU
6. MECHANICAL CRT/LENS ASSEMBLY ADJUSTMENT
7. MECHANICAL AND ELECTRONIC FOCUS
8. YOKE ROTATION
9. YOKE MAGNET CENTERING
10. SIZING AND STATIC ADJUSTMENT
11. CONVERGENCE BOARD INITIALIZATION
12. DYNAMIC CONVERGENCE
13. COLOR/G2 BALANCING
14. CUSTOMER VIDEO MENU TOUCHUP

These thirteen procedures will be described in the following section in a clear, detailed manner in order to give you understanding of the entire setup procedure for the projector.

The tools needed are:

(One) #2 Phillips screwdriver
(One) 1/4" hex head driver
(One) 1/4" extended hex head driver OR
(One) extended #2 Phillips screwdriver (approximately 8" shaft).

(One) flat head screwdriver
(One) plastic TV alignment tool (tweaker)
(One) flashlight
(Two) lens caps (provided with set).

The test patterns needed are:

Pattern	Procedure
(One) white raster	sizing and static, convergence board initialization
(One) cross hatch	sizing and static, dynamic convergence, color/G2 balancing
(One) monoscope	yoke magnet centering
(One) cross-hair	sizing and static, yoke rotation, focus
(One) SMPTE color bars	color/G2 balancing
(One) grey scale	color/G2 balancing
(One) source video	scan conversion, sizing and static, video menu touchup

These patterns can be provided with a test pattern generator and should be standard NTSC 15-750 composite video. The cross-hair is on the "Projo Setup" feature in the on-screen setup menu of the projector.

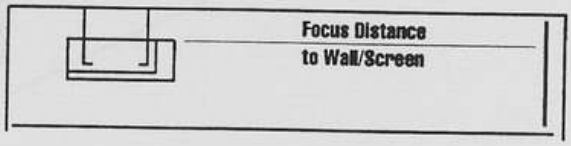
We also recommend using the laserdisc, A Video Standard as an alternative to a pattern generator. It is available from:

Reference Recordings
Box 77225X
San Francisco, CA 94107
415/355-1892

This disc is an excellent calibration tool and provides all the above test patterns as well as many other video and audio calibration procedures.

PLACEMENT

Refer to DIAGRAM 9 below to determine the appropriate focus distance for your screen size. Focus distance is the distance from the lenses to the screen surface itself



Diagonal Picture	Focus Distance to	Maximum Vertical Offset	Picture Height	Picture Width
5'	55"	11"	36"	48"
6'	66"	13"	43"	58"
7'	77"	15"	51"	68"
8'	87"	16"	58"	77"
9'	98"	18"	65"	87"
10'	109"	20"	72"	96"

NOTE: SCREEN SIZES OF GREATER THAN 10' DIAGONAL ARE ONLY FOR SETS WITH THE OPTIONAL LENS/TUBE ADJUSTERS

11'	120"	22"	79"	106"
12'	130"	24"	86"	115"
13'	141"	26"	94"	125"
14'	152"	28"	101"	135"
15'	162"	30"	107"	144"
16'	173"	32"	115"	154"
17'	183"	34"	122"	163"
18'	194"	35"	130"	173"
19'	204"	37"	137"	182"
20'	216"	39"	144"	192"
21'	227"	41"	151"	202"
22'	237"	43"	158"	211"
23'	247"	45"	166"	221"
24'	257"	47"	173"	230"
25	268	49"	180"	240"

DIAGRAM 9

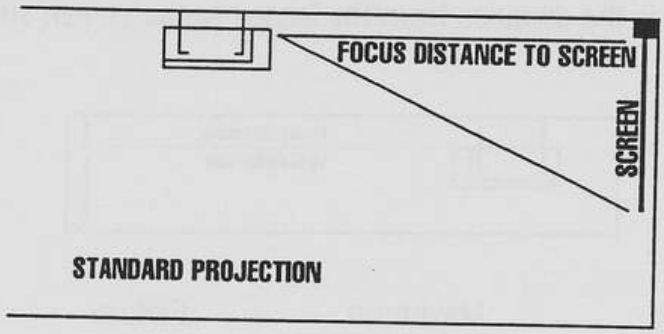


DIAGRAM 10

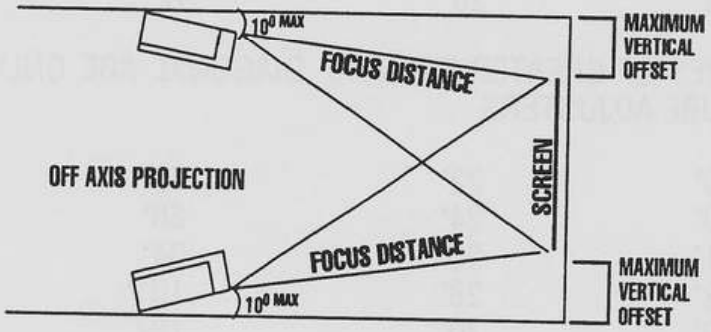


DIAGRAM 11

MOUNTING

Having determined the focus distance from the screen to the front of the projector using Diagram 9, mount the projector securely to the ceiling at the proper distance, centered exactly on the screen. Refer to Diagram 2 also for additional placement details.

If using the Runco ceiling mount, follow these directions.

The Runco mount may be used in two ways:

1) By attatching the support frame directly to a finished ceiling, parallel to the screen.

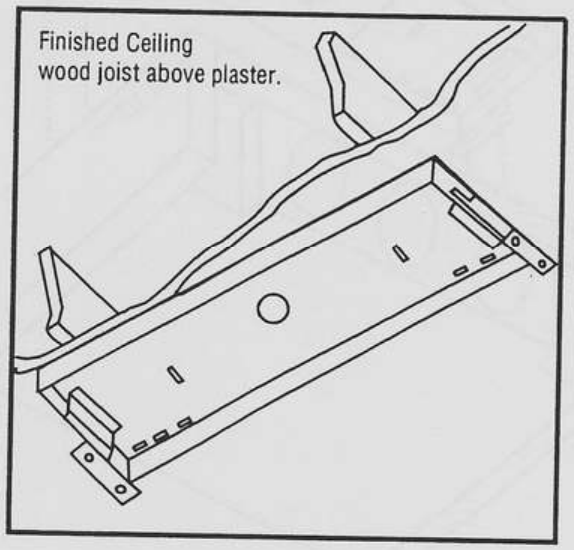


DIAGRAM 12

2) By using the extension column and ceiling plate if additional drop is needed.

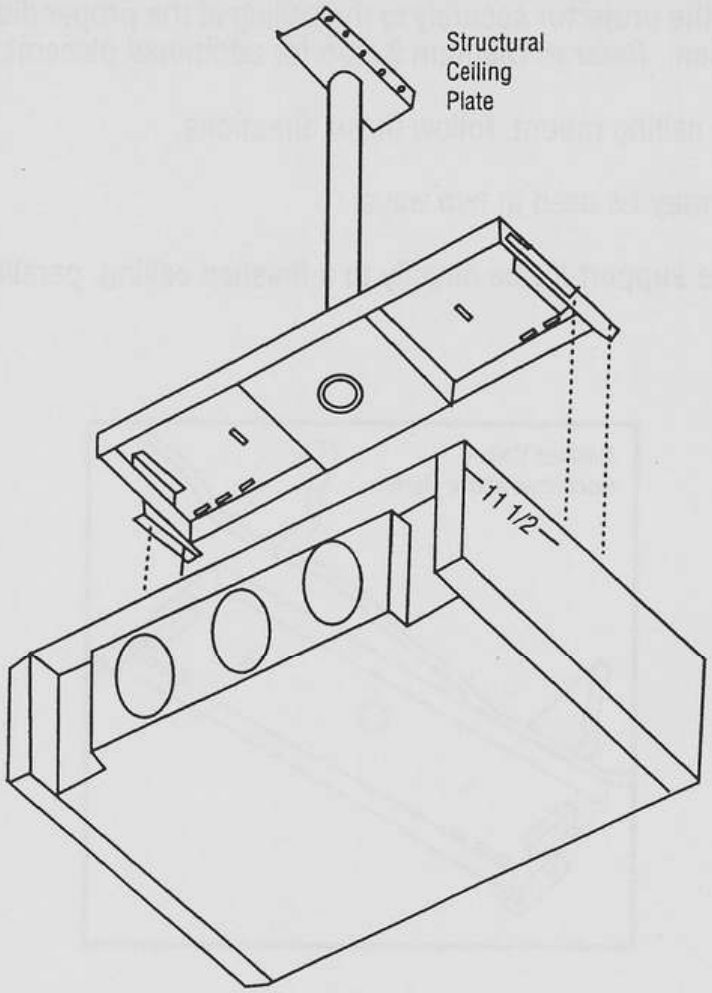


DIAGRAM 13

The projector is made witht the Lens/CRT Assemblies angled to allow it to be mounted level to the top of the screen for ceiling mount or level with the bottom of the screen for floor placement as in Diagram 1. If the screen is placed so that off axis projection is required as in Diagram 11, then refer to Diagram 9 for the maximum vertical offset distance.

Note: Exceeding this distance by angling the projector excessively will cause focussing and convergence problems during setup.

MOUNTING

Before beginning assembly.....

Please read entire instruction sheet and check the parts list to insure that all components have been included.

Before choosing the exact point at which the mount will attach to the ceiling, refer to Diagram 15 which illustrates the adjustment features.

Recommended tools: phillips screwdriver, 17mm box or socket wrench, 6mm allen wrench.

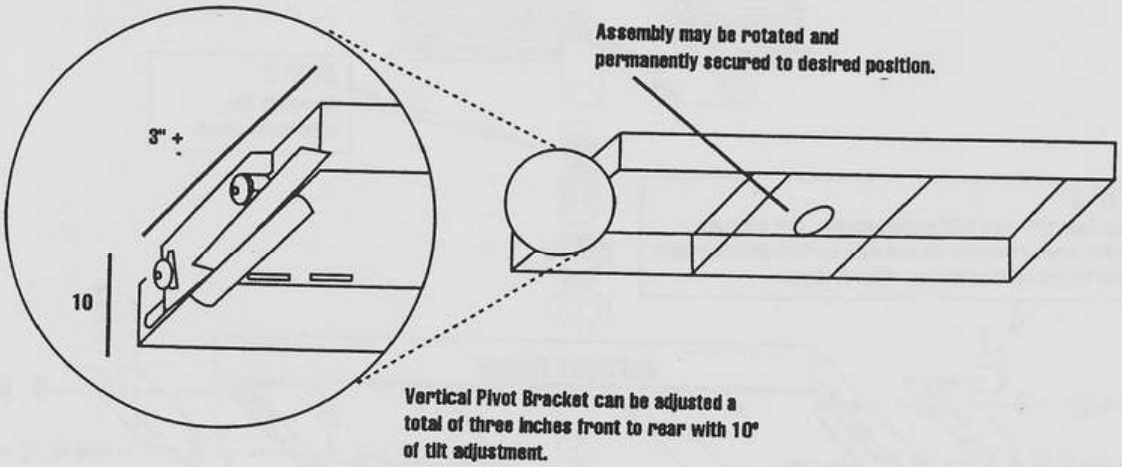


DIAGRAM 15

If the distance between the screen and the ceiling during mounting is greater than the maximum vertical offset distance, then lower the projector to within tolerance, preferably level to the top of the screen, using the extension column and finished ceiling plate.

Assemble the mount step by step as shown in Diagram 14 and 15. Skipping steps 1 and 2 if no additional drop is needed. Note: The distance from the front of the projector to the center of the support frame is 11 1/2".

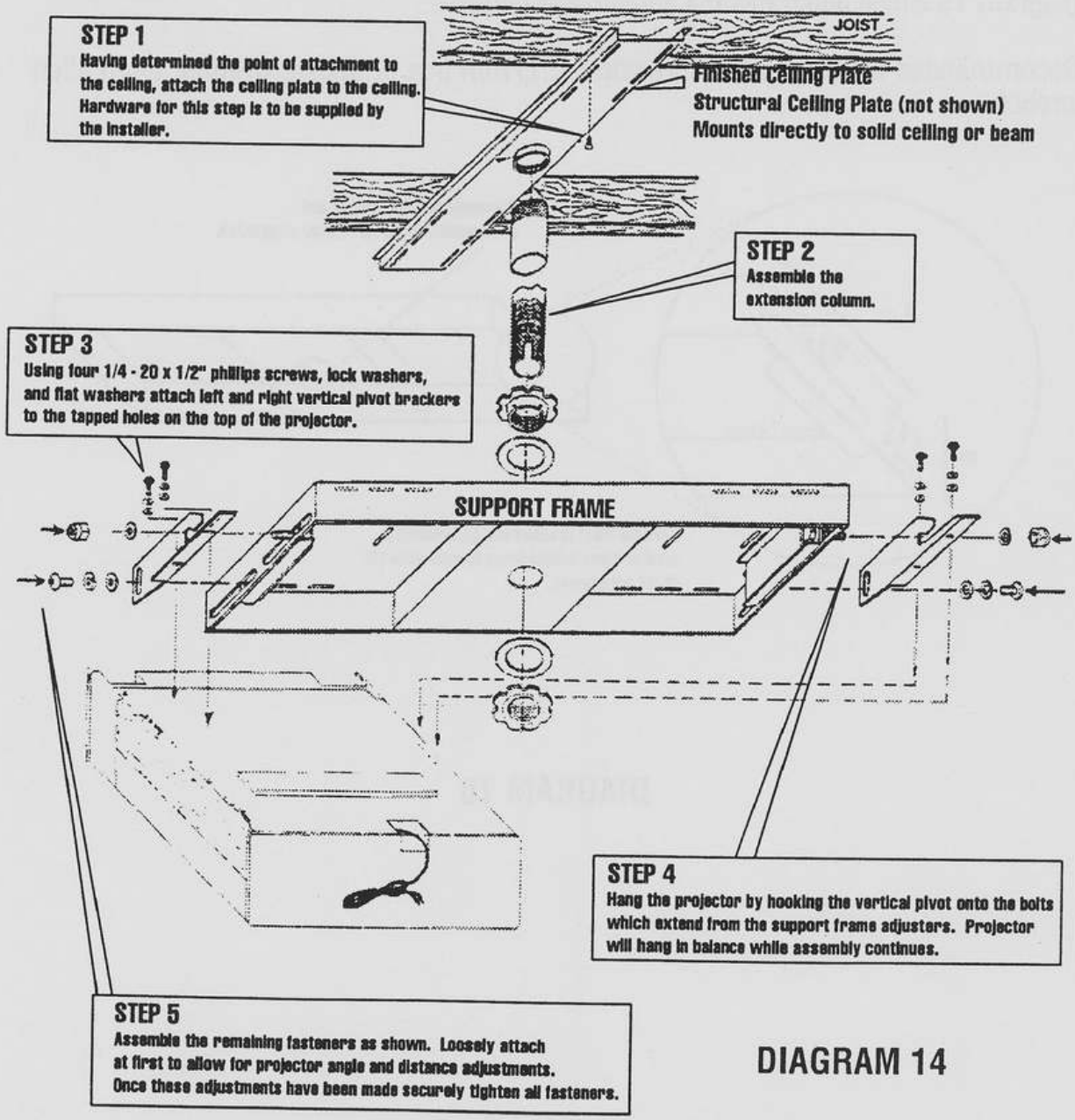


DIAGRAM 14

OPENING THE PROJECTOR

To change the projector from the existing setup to any other configuration, it is necessary to first remove the top and rear panels of the unit. NOTE: When the projector is hanging upside down on the ceiling, the top panel is now facing the floor.

First, remove the rear panel by unscrewing the six Phillips screws on the rear panel and releasing the three finger clamps affixing the rear panel to the underside of the unit (facing up in ceiling setup).

Next, remove the top panel by unscrewing the three 1/4" hex screws on the metal plate attaching it to the chassis of the set. Note that there are two center holes on the plate. When replacing the top panel, put the center 1/4" hex screw in the right center hole on the plate; as you face it from the rear with the unit on the floor. The other center hole is for a rear panel Phillips screw.

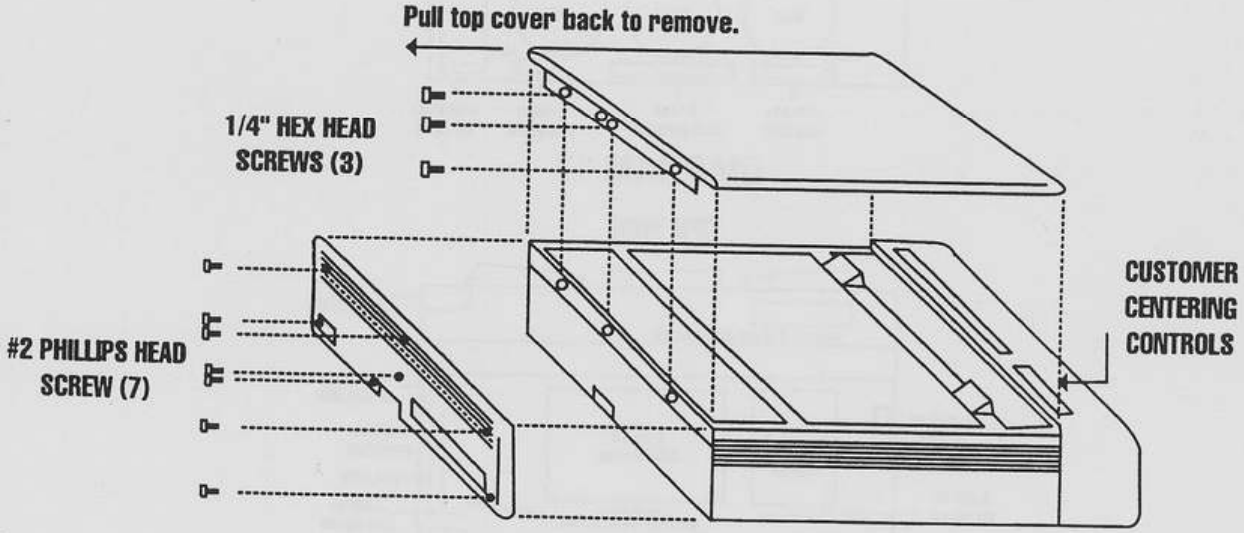


DIAGRAM 16

FAMILIARIZE YOURSELF WITH THE INTERNAL LAYOUT AND BOARD PLACEMENT IN THE SET BY REFERRING TO DIAGRAM 9.

CPD 750

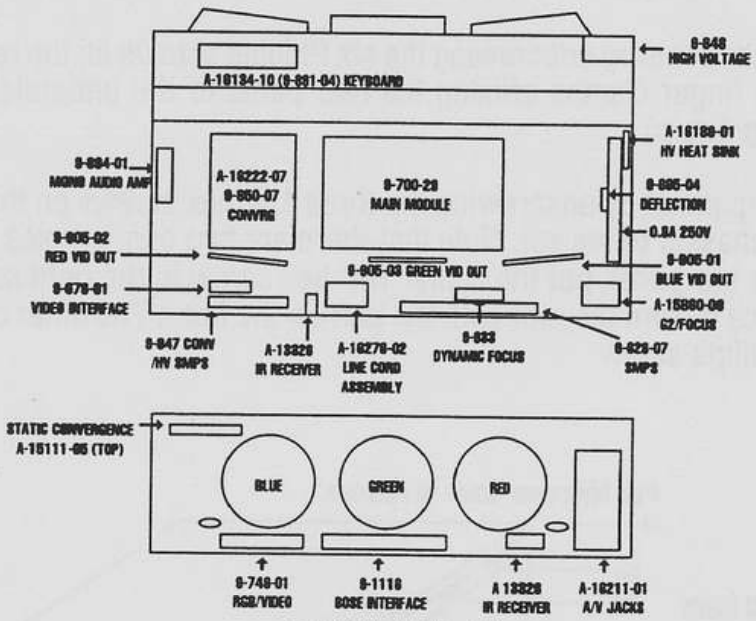


DIAGRAM 17

CPD 750T

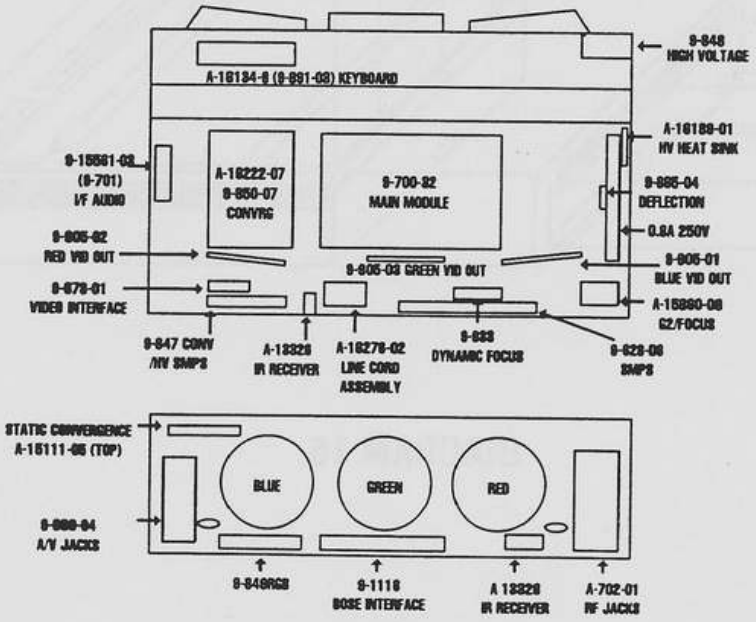


DIAGRAM 18

SCAN REVERSAL

The projector may be used in any of four scan configurations. These are front ceiling, front floor, rear ceiling and rear floor.

SETUP
CONVERTING PROJECTOR FROM FLOOR TO CEILING MOUNT

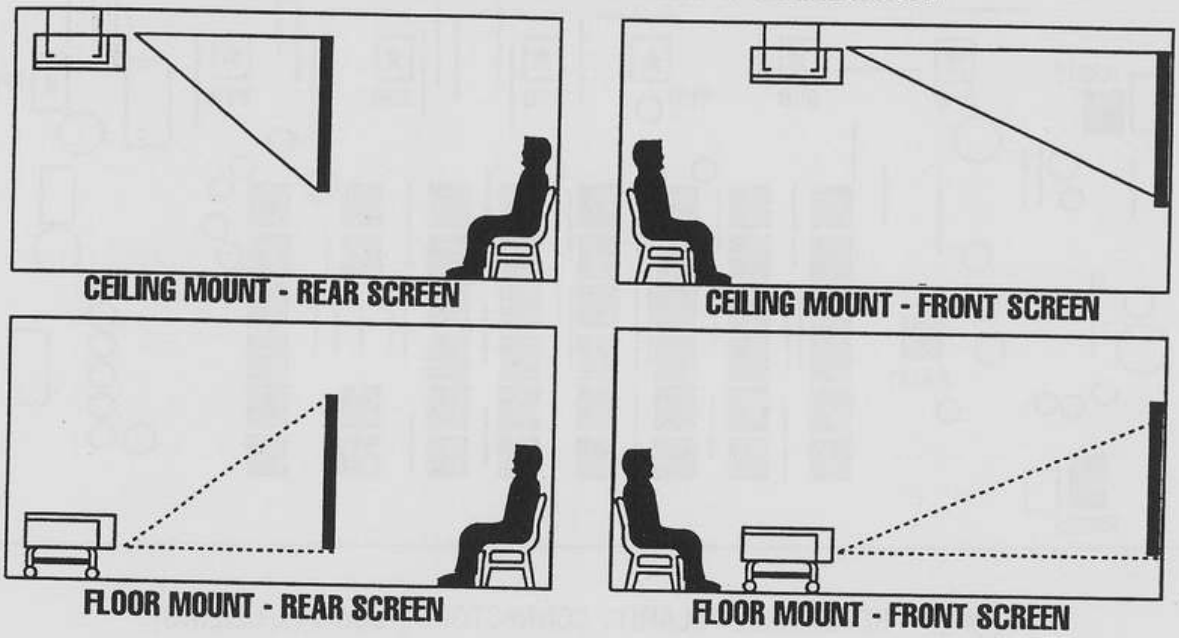


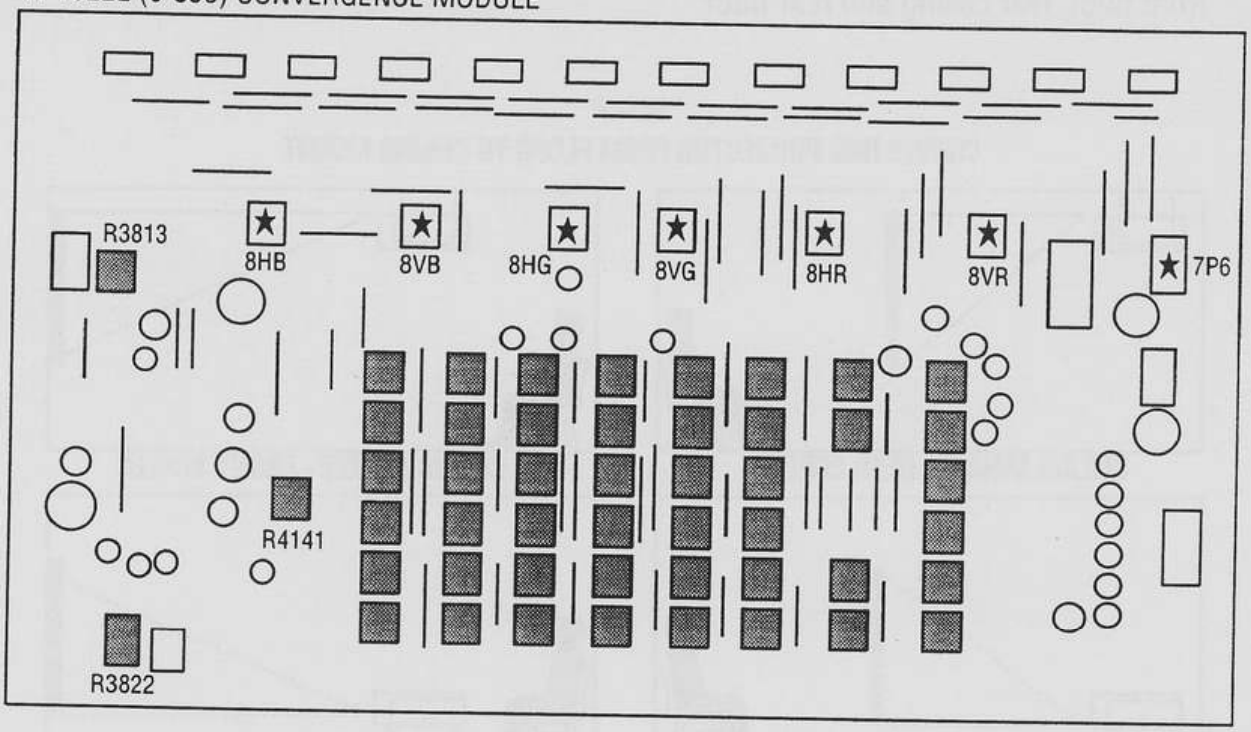
DIAGRAM 19

Before proceeding, make sure that the set is turned off and unplugged.
CAUTION: Failure to do this may damage your projector.

Locate the 9-865 horizontal sweep module and the A-16222 (9-850) convergence module. Using a 1/4" Hex Screwdriver, remove the silver Hex Head Securing Screw from the center of the 9-865 circuit board. Release the plastic security clips on either side of the 9-865 module and undo the cable securing rings nearest to the module so that it can be pulled several inches out of place.

There are seven jumpers on the 9-850 convergence module which must also be changed. Refer to DIAGRAM 20 and 21 for their location and function.

A-16222 (9-850) CONVERGENCE MODULE



★ - REVERSIBLE POLARITY CONNECTORS (FLOOR vs. CEILING)

▓ - CONVERGENCE SETUP CONTROLS

DIAGRAM 20

9-850 (A-16222) ASSEMBLY
TRAILER YOKES
(CONVERGENCE)

8HG□ HORIZONTAL GREEN YOKE
8VG□ VERTICAL GREEN YOKE
8HR□ HORIZONTAL RED YOKE
8VR□ VERTICAL RED YOKE
8HB□ HORIZONTAL BLUE YOKE
8VB□ VERTICAL BLUE YOKE
7P6□ CUSTOMER CONVERGENCE
□ CONTROL ORIENTATION

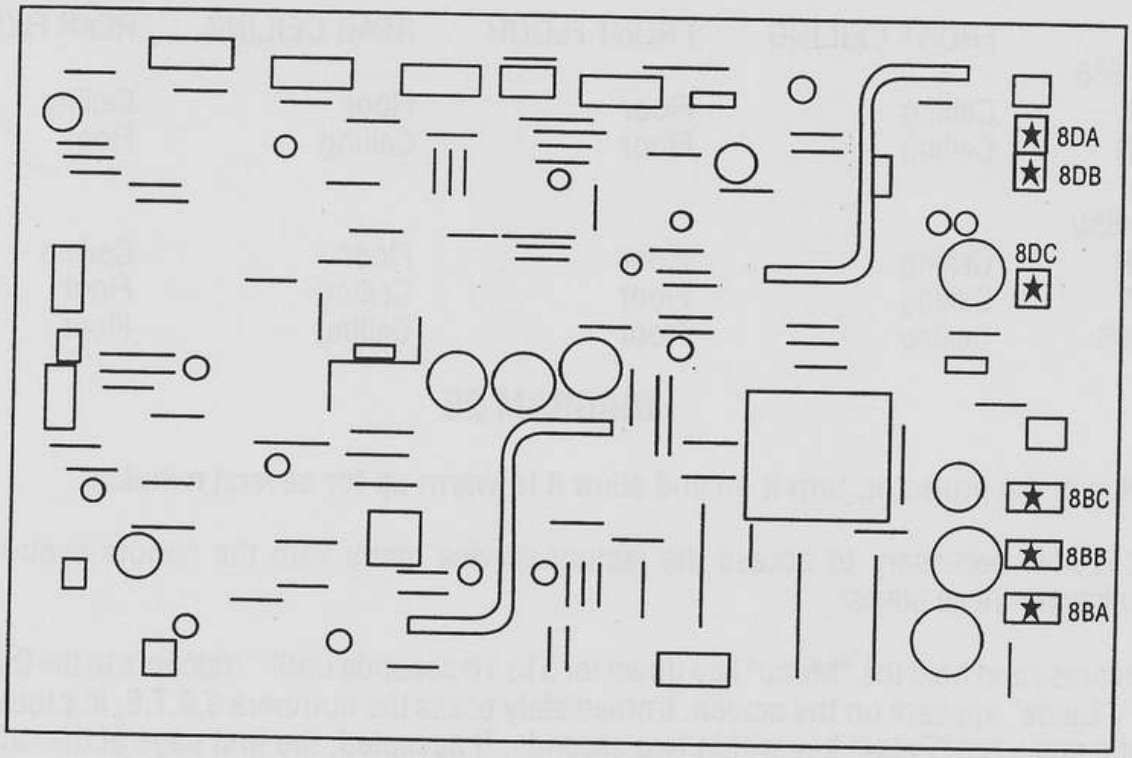
DIAGRAM 21

SCAN REVERSAL

These are six jumpers on the 9-865 module which must be changed during scan conversion to match the installation of the projector. Refer to DIAGRAMS 22,23, and 24 for their location and function.

P6

9-865 HORIZONTAL SWEEP MODULE



★ - REVERSIBLE POLARITY CONNECTORS (FLOOR vs. CEILING)

DIAGRAM 22

9-865 MODULE
MAIN YOKES
(SWEEP)

8BA□ HORIZONTAL BLUE YOKE
8BB□ HORIZONTAL GREEN YOKE
8BC□ HORIZONTAL RED YOKE
8DA□ VERTICAL BLUE YOKE
8DB□ VERTICAL GREEN YOKE
8DC□ VERTICAL BLUE YOKERED

DIGRAM 23

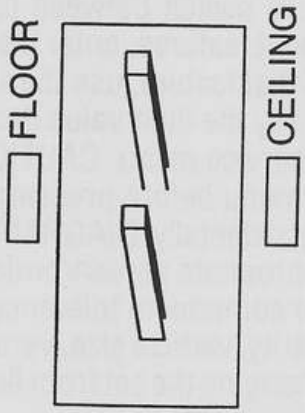


DIAGRAM 24

Change the position of all these jumpers to floor or ceiling to match the installation of the projector according to DIAGRAM 25 below. Replace the 9-865 module and reconnect the securing clips and rings. Unplug the 8S-4 connector on the 9-850 convergence module, removing power to it.

	FRONT CEILING	FRONT FLOOR	REAR CEILING	REAR FLOR
9-865				
8B	Ceiling	Floor	Floor	Ceiling
8D	Ceiling	Floor	Ceiling	Floor
9-850				
8H	Ceiling	Floor	Floor	Ceiling
8V	Ceiling	Floor	Ceiling	Floor
7P6	Ceiling	Floor	Ceiling	Floor

DIAGRAM 25

Plug in the projector, turn it on and allow it to warm up for several minutes.

It is now necessary to access the factory service menu with the remote control by following these steps:

Depress and hold the "Menu" key down for 5 to 10 seconds until "Welcome to the Digital TV Guide" appears on the screen. Immediately press the numbers 9,8,7,6, in sequence and press the "Enter" key within two seconds. If accepted, the first page of the factory service menu will now appear on the screen. If it doesn't, press enter and repeat the procudure with the remote control aimed more directly at the IR receiver on the projector. The first page of the factory service menu displays features one through sixteen. The second page of the factory service menu displays features seventeen and above. To switch between pages, press menu. To directly access any of the menu adjustment features, enter the digit key for that feature, then press enter. To change the value of that feature, use the adjust key to increment the value one number at a time, or directly key the digit value desired and press enter to store that value and return to the factory service menu. CAUTION: At this point, ensure that you are back to the factory/ service menu before pressing any other digits to avoid radically changing any feature values accidentally. DIAGRAM 26 is a table showing nominal factory/service settings for your appropriate screen/projector configuration. Actual values may deviate slightly to allow for component tolerance. Note that it is necessary to change the values for vertical top linearity, vertical size, vertical linearity, vertical symmetry, pin cushion and keystone when changing the set from floor to ceiling setup or vice versa. To exit the factory/service menu, press enter.

REMOTE CONTROL FACTORY SERVICE MENU

CODE	ADJUSTMENT	REAR	FLOOR	CEILING	COMMENTS
1	Color Sub	27	127	127	Color Osc
2	V Top Linearity	100	250	100	Top of Screen
3	V Height	179	170	180	Minimum - Max
4	V Linearity	060	055	150	Max - Minimum
5	V Symmetry	100	095	025	Max - Minimum
6	H Centering	041	041	041	Left 8 Rignt
7	H Width	188	188	188	Max - Minimum
8	Pincushion	050	040	030	Bow In - Bow Out
9	Keystone	125	180	020	In Bottom - In Top
10	Dark Red	063	063	063	Tracking Dark Picture
11	Dark Green	063	063	063	"
12	Dark Blue	063	063	063	"
13	Light Red	100	100	100	Tracking Light Picture
14	Light Green	080	080	080	"
15	LightBlue	100	100	100	"
16	Back Porch	007	007	007	Black Level Sample Time
17	Pll Filter	002	002	002	Hor AFC Response Time
18	PipColorSub	127	127	127	"PIP"ColorOSC
19	Environment	Rear	Front	Front	
20	BLE Threshold	050	050	050	
21	BLETiltPoint	007	007	007	
22	BLE Amount	006	006	006	
23	VerticalPeak	004	004	004	
24	Audio Display	OFF			
25	Menu Language	English - Spanish - French			
26	Audio Mode	Bose - No Bose			
27	Update Earom	None			
28	Store Customer Controls - "Enter" to store				
	DBX Sum	024	024	024	
	DBX Diff	018	018	018	
	DBX Diff SAP	013	013	013	

DIAGRAM 26

MECHANICAL CRT/LENS ASSEMBLY ADJUSTMENT

This procedure is necessary to mechanically align the red and blue crt/lens assemblies to the green assembly, before any electronic centering adjustments are made.

Remove the red lens cap and locate the upper and lower CRT lockscrews for the red CRT. Refer to DIAGRAM 27.

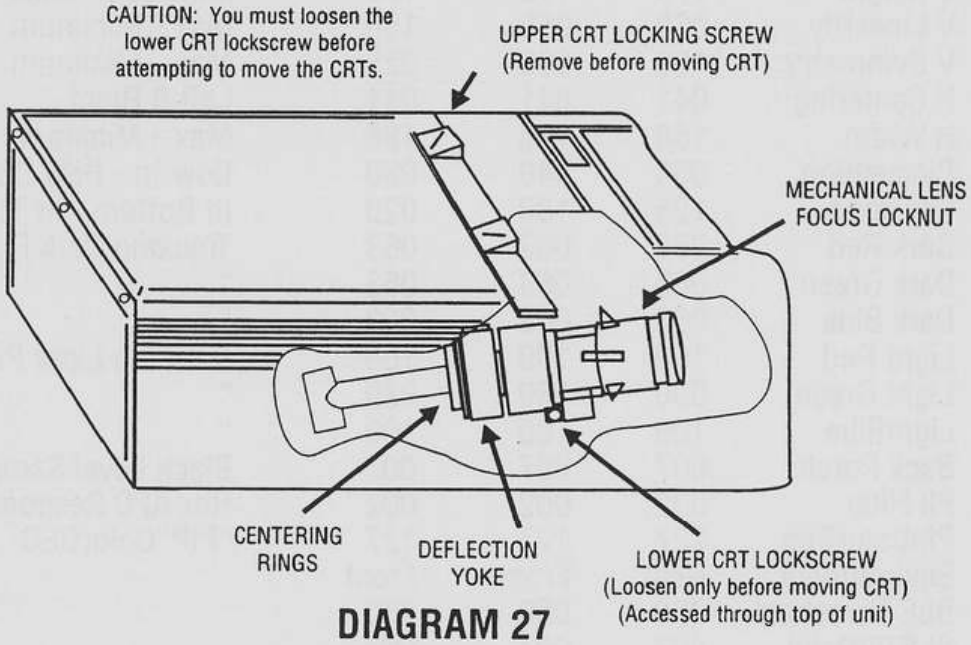


DIAGRAM 27

Confirm that the upper lockscrew is in the appropriate index hole for your screen size. See DIAGRAM 28.

DIAGONAL	OBD	INDEX HOLE
5'	4'7"	A
6'	5'6"	B
7'	6'5"	C
8'	7'3"	D
9'	8'2"	E
10'	9'1"	F

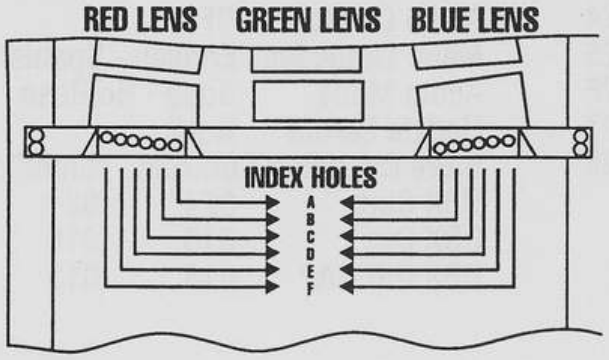


DIAGRAM 28

If not, adjust the CRT/lens assembly by removing the upper CRT lockscrew and carefully loosening the lower lockscrew. Next, move the CRT/lens assembly so that it aligns with the appropriate index hole. Replace the upper lockscrew and retighten the lower lockscrew. Repeat the procedure for the blue CRT/lens assembly.

MECH. CRT/LENS ASSEMBLY ADJUSTMENT WITH LENS/TUBE ADJUSTERS

MECHANICAL CRT/LENS ASSEMBLY ADJUSTMENT (FOR SETS WITH OPTIONAL LENS/TUBE ADJUSTERS)

First, turn off the projector. Reconnect the 8S-4 jumper on the 9-850 convergence board. Refer back to DIAGRAMS 7 and 16 to locate the customer centering controls. Adjust both the red and blue left-right centering controls to midrange position. Display the cross-hair test pattern from the projector setup menu and uncover only the red and green lenses. Refer to DIAGRAM 17 to locate the holes in the front cowl of the set below and outside the red and blue lenses. Insert a flat head screwdriver into the hole by the red lens and use it to turn the lens/tube adjuster screw clockwise or counter-clockvise so that the red vertical line of the cross-hair test patterns overlaps the green vertical line. Cover the green lens and uncover the blue lens. Repeat this process for the blue lens, referencing blue to red. Turn off the projector and disconnect the 8S-4 jumper from the 9-850 convergence board again.

MECHANICAL AND ELECTRONIC FOCUS

Access the customer video menu with the remote control control and reduce the "Contrast" and "Brightnessl" function values to approximately 1/3. Access the "ProjoSetup" feature on the customer setup menu to provide the projector with a cross-hair test pattern. Uncover only the green lens. Loosen the wing nut on the green lens and rotate the lens itself to obtain maximum focus of the cross-hair on the screen.

Locate the A-15860 G2/focus module. Adjust the electronic focus to further clarify the crosshair by rotating the green focus pot on the that module. Recheck both the mechanical and electronic focus and retighten the wing nut on the green lens. Repeat the focus procedure for both red and blue.

YOKE ROTATION

Substantially darken the room. Access the customer on-screen menu and display a crosshair pattern on the screen. The 8S-4 connector on the 9-850 convergence module should still be disconnected. Cover the red and blue lenses with a lens cap, leaving only the green lens exposed. Remove the two 1/4" hex screws attaching the rear of the 9-700 main module assembly to the chassis and rotate the module up toward the front of the set, exposing the green and blue CRTs. Note the yoke clamp on the neck of the green CRT. Refer to DIAGRAM 29.

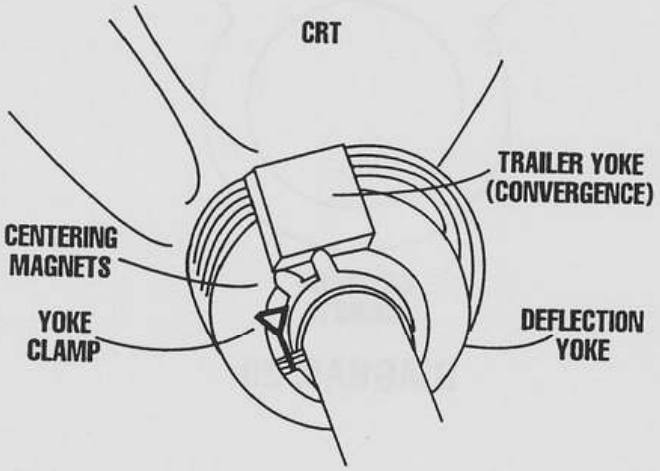


DIAGRAM 29

Loosen it to allow free rotation of the yoke on the neck of the green CRT and rotate the yoke to ensure that the horizontal axis of the cross-hair pattern is actually horizontal. Ideally, it should be level and parallel to both the top and bottom of the screen. Next, assure that the yoke is completely forward on the next of the CRT and gently retighten the yoke clamp. Uncover the blue lens and repeat the procedure for the blue CRT, referencing it to the green cross-hair.

Next, unscrew the two 1/4" hex screws attaching the left side of the convergence module assembly to the chassis and rotate it toward the side of the ext, exposing the red CRT. Cover the blue lens and uncover the red lens. Repeat the yoke rotation procedure for the red CRT.

YOKE MAGNET CENTERING

Preset the red and blue customer centering controls on the customer control panel to mechanical center. Display a monoscope test pattern and expose only the green lens. Refer again to DIAGRAM 29 to locate the two centering magnet rings on the yoke of the green CRT. Using the tabs on the magnets, gently pull them apart to free them so that they rotate independently of each other around the yoke. See DIAGRAM 21.

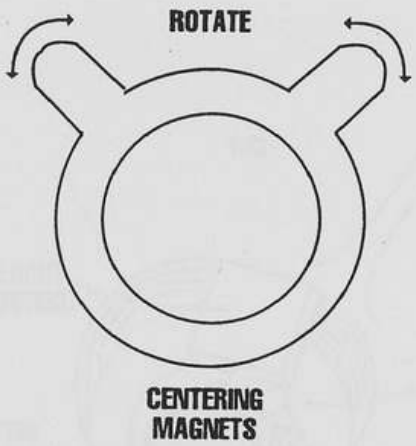


DIAGRAM 30

By rotating the magnets separately in relation to each other, steer the image on the screen to true screen center. Repeat this procedure for both red and blue, referencing them to green. Place the 9-700 main module and 9-850 convergence module assemblies back in position and retighten the screws attaching them to the chassis.

SIZING AND STATIC ADJUSTMENT

With the 8S-4 jumper still disconnected, expose only the green lens. The adjustments to be performed now affect all three colors simultaneously, yet are easiest to do referencing to green only.

First, provide the projector with a cross-hatch test pattern. Access the factory/service menu using the procedure on page 14. Adjust function 09 keystone so that the rightmost vertical line is parallel to the center vertical line on the test pattern. Adjust 08 pincushion so that the rightmost vertical line has no bow. Note that the left side will be adjusted during the dynamic convergence procedure. Next, adjust function 04 vertical linearity to achieve equal spacing between horizontal lines on the screen. Adjust function 02 vertical top linearity to further refine the spacing between horizontal lines on the top half of the screen, if necessary. Adjust function 05 vertical symmetry to achieve equal spacing in the center horizontal lines in relation to both top and bottom.

At this point, replace the cross hatch pattern with a video image from the most common source to be used with the projector. NOTE: During switching of sources, the factory menu temporarily loses clarity because the sync for the on-screen menus is derived from the video input to the projector. You will also need to exit and re-enter the factory/service menu at this point to actually reset the projector so that it will display the video source. Adjust for minimal overscan on the screen in both horizontal and vertical directions by accessing functions 03 Vertical Height and 07 Horizontal Width, and adjusting their values appropriately. Refer back to DIAGRAM 17 for nominal settings. NOTE: A change in value function of greater than 15% from nominal should not be necessary for vertical height and horizontal width and may damage the set if employed. No other controls on the factory/service menu need to be adjusted at this time. Exit the factory/service menu by pressing "Enter."

CONVERGENCE BOARD INITIALIZATION

Turn off and unplug the projector. Reconnect the 8S-4 jumper on the 9-850 convergence board. Plug in and turn on the projector. Allow it to warm up for two to three minutes. While displaying a cross-hatch pattern and still uncovering only the green lens, adjust the "Picture" and "Black Level" controls on the Customer Video Menu to a minimal viewable brightness. Familiarize yourself with the layout of the 9-850 convergence board and locate pots R4141, R3813 and R3822. Refer back to Diagram 16 for location of these pots. Adjust R3813 until an adjustment of the vertical side keystone pot "GVSKEY" or the green horizontal keystone pot "GH Key" yields an equal amount of change on both sides without moving the center vertical line. This may be easier to visualize by imagining that the topmost horizontal line is a lever which is moved by rotating pot R3813. With pot R3813 properly adjusted, the fulcrum of the lever is at the center of the line. Next, set R4141 to mid position delete. Uncover all lenses and display a white raster. Rotate R3822 very slowly until no horizontal white or black line appears in the center of the screen. Replace the raster with a cross-hatch pattern and proceed to the dynamic convergence procedure.

DYNAMIC CONVERGENCE PROCEDURE

Before beginning the dynamic convergence procedure, it will be necessary to gain an overall understanding of the process.

As green is the center CRT, it is necessary to first initialize it and then align red to green and blue to red. Blue is aligned to red rather than green because it is easier to see blue in relation to red.

Dynamic convergence is only a final adjustment. It is not intended to correct for misplacement of the projector. In general, with proper installation, it should not be necessary to move any pot on the 9-850 convergence board into an extreme position.

The general convergence procedure for all three colors involves first adjusting the center, then the edges, and then the linearity, size, and centering of the entire picture together.

It is easiest to do this in one direction at a time, first horizontally and then vertically. A crosshatch pattern is used for the dynamic convergence procedure. This provides a geometric matrix of lines in both the horizontal and vertical direction that should all be perpendicular, straight and completely white when the convergence procedure is done. NOTE: The vertical lines on the cross hatch matrix are actually controlled by horizontal adjustments on the convergence board, and vice versa.

Begin by darkening the room and uncovering only the green lens. Project a cross-hatch pattern onto the screen. Reduce the "Contrast" and "Brightness" controls on the customer video menu to approximately 1/3 value. The convergence procedure is now followed step by step. Refer to the accompanying diagram for each step in the process.

I. GREEN INITIALIZATION
   A. HORIZONTAL - Use the row of pots marked GH
      1. CENTER
         a. SKEW - Adjust the "Skew" pot until the center vertical line is plumb

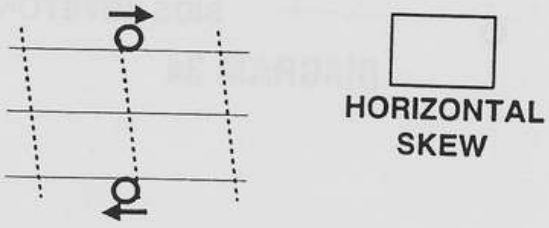


DIAGRAM 31

b. BOW- Adjust the "Bow" pot until the center vertical line is straight.

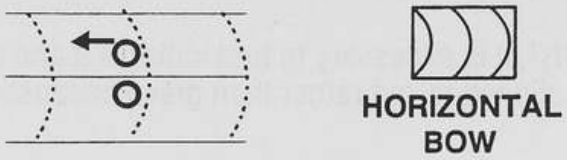


DIAGRAM 32

c. Repeat steps 1a. and 1b. if necessary.

2. EDGE

a. KEYSTONE - adjust the "Key" pot until the right vertical line is no longer tilted and is parallel to the center vertical line.

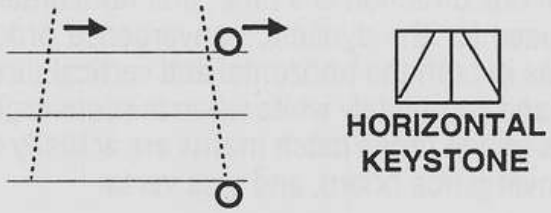


DIAGRAM 33

b. SIDE KEYSTONE - adjust the "S Key" pot until the leftmost vertical line is parallel to both the center and rightmost vertical line.

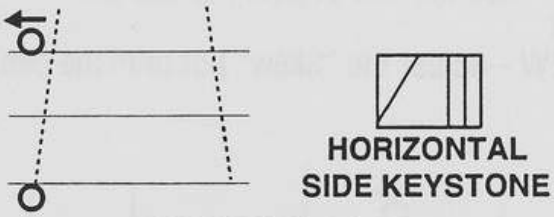


DIAGRAM 34

c. PINCUSHION - Adjust the "Pin" pot until the rightmost vertical line is straight.

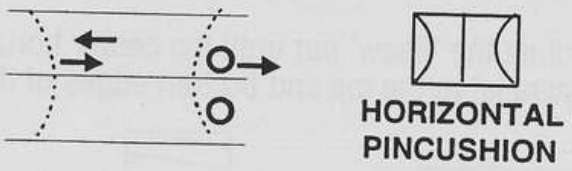


DIAGRAM 35

d. SIDE PINCUSHION - Adjust the "S Pin" pot until the leftmost vertical line is straight.

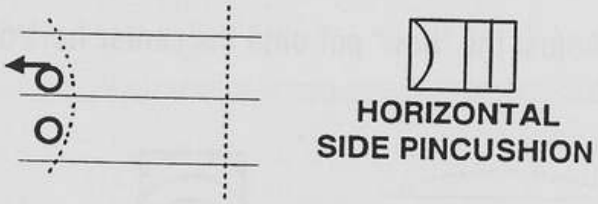


DIAGRAM 36

e. Repeat steps 2a. through 2d. if neccessary until the outside vertical lines are both straight and parallel to each other and the center line.

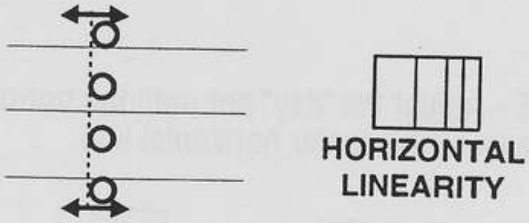


DIAGRAM 37

B. VERTICAL - Use the row of green marked "GV"

1. CENTER

a. SKEW - Adjust the "Skew" pot until the center horizontal line is level and parallel to the top and bottom edges of the screen.

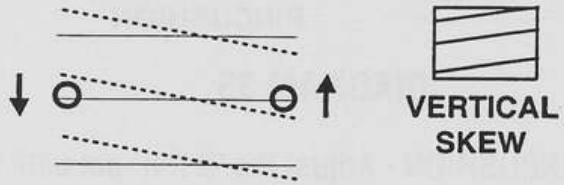


DIAGRAM 38

b. BOW - Adjust the "Bow" pot until the center horizontal line is straight.

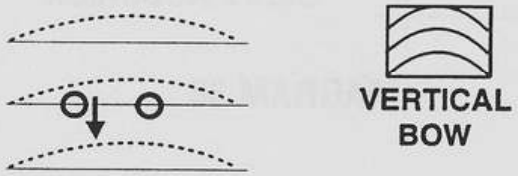


DIAGRAM 39

c. Repeat steps 1a. and 1b. if necessary.

2. EDGES

a. KEYSTONE - Adjust the "Key" pot until the bottommost horizontal line is parallel to the center horizontal line.

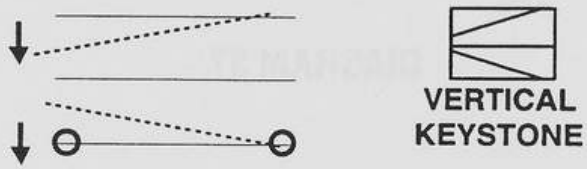


DIAGRAM 40

b. SIDE KEYSTONE - Adjust the "S Key" pot until the topmost horizontal line is parallel to the center and bottommost horizontal lines.

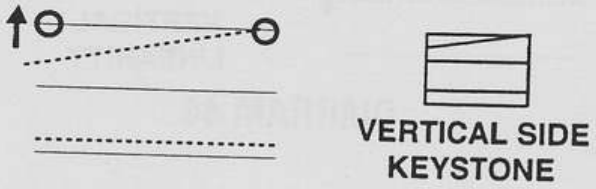


DIAGRAM 41

c. PINCUSHION - Adjust the "Pin" pot until the bottommost horizontal line is straight.

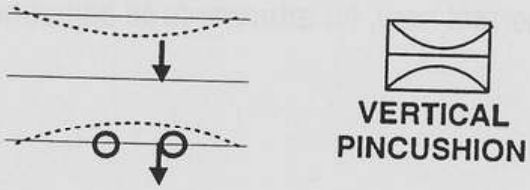


DIAGRAM 42

d. SIDE PINCUSHION - Adjust the "S Pin" pot until the topmost horizontal line is straight.

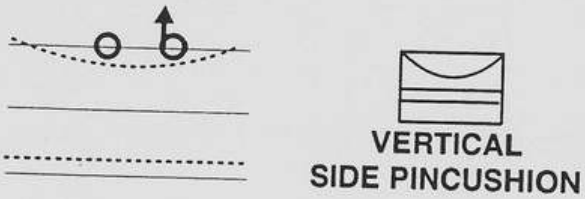


DIAGRAM 43

e. Repeat steps 2a. through 2d. if necessary until the outside horizontal lines are both straight and parallel to each other and the center horizontal line.

3. LINEARITY - Adjust the "Lin" pot until the horizontal lines are evenly spaced.

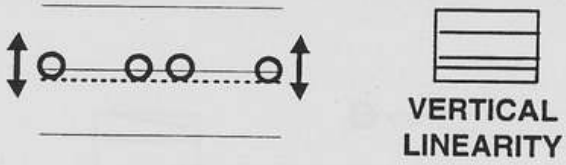


DIAGRAM 44

C. TOUCHUP

At this point, step back and observe the entire green matrix. It should consist of evenly spaced perpendicular and parallel straight lines. If neccessary, go back to the appropriate step to further refine any section of the matrix. It is important that the green matrix be geometrically correct now, for afterwards all adjustments will be made with red and blue pots only.

II. RED TO GREEN

Uncover the red lens. Using the red pot, marked "RH" and "RV" on the convergence module, repeat the dynamic convergence procedure in both horizontal and vertical directions to obtain an exact overlay of all red and green lines on the screen. NOTE that the convergence process for adjusting red to green will completely differ, however, for step 3, linearity, in both directions. While there are no horizontal width or vertical height controls for green on the 9-850 convergence module, these are present for both red and blue and are to be used with both the linearity pots, and the customer centering controls on the outside of the unit, in an interactive process as follows:

A. HORIZONTAL

3. LINEARITY - SIZE - CENTERING

a. Cover the green lens and observing the red matrix only, adjust the RH "Lin" pot until the red vertical lines are evenly spaced.

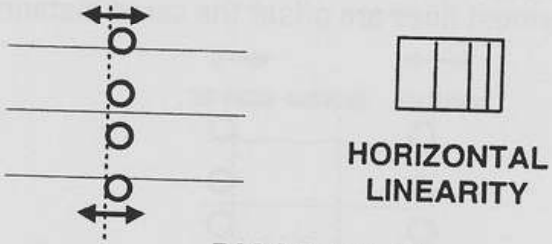


DIAGRAM 45

b. Uncover the green lens and adjust the red left-right centering pot on the customer control panel until the red vertical center line exactly overlaps the green verical center line.

c. Adjust the Red RH "Width" pot until both outermost vertical lines overlap the green outermost vertical lines.

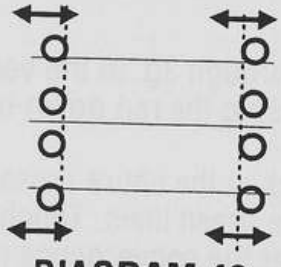


DIAGRAM 46

d. If necessary, to further refine the alignment of the red and green vertical lines at this point, slightly offset the red center vertical line using the red left-right centering pot and follow steps e. through g.

e. Re-adjust the RH "Lin" pot until all red vertical lines are offset from green in the same direction as the red center vertical line.

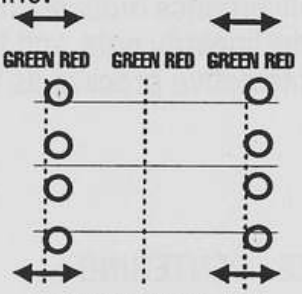


DIAGRAM 47

f. Re-adjust the RH "Width" pot until the red left and right outermost lines are offset the same distance from green.

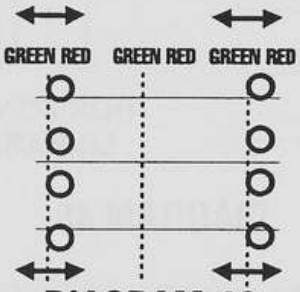


DIAGRAM 48

g. Re-adjust the red left-right centering control until the red and green vertical center lines overlap completely. All red vertical lines should be aligned to green at this point. If not, repeat the necessary step.

B. VERTICAL- Repeat steps 3a. through 3g. in the vertical direction, substituting the RV pots for the RH pots and using the red down-up centering control.

C. TOUCHUP - Step back and look at the entire cross-hatch matrix. Look for any red shadows which may fall off the green lines. Touch up the appropriate controls, if necessary, bearing in mind that the convergence procedure is hierarchical by step and that subsequent controls may need adjustment afterwards.

III. BLUE TO RED

Uncover the blue and red lenses and cover the green lens. Repeat the entire dynamic convergence procedure using the blue pots BH and BV and blue customer centering controls to completely align blue to red. The linearity-size-centering procedure is the same as for aligning red to green.

IV. OVERVIEW

Uncover all three lenses and closely observe the cross-hatch matrix Look for any line which is not completely white. If necessary, cover the appropriate lens and adjust the control necessary to fully align the appropriate section of the matrix, again bearing in mind that the dynamic convergence procedure is hierarchical and any subsequent adjustments will need to be made.

COLOR / G2 BALANCING

To establish the proper color balance on the Runco video projector, it is necessary to individually rotate the G2 pots on the A-15860 G2/focus module while the projector is in the setup mode. This procedure is done initially for the set at the factory and should need to be redone only if the G2 pots are accidentally misadjusted or after replacement of a major component in the set. To check the color balance, supply the projector with a SMPTE color bar test pattern. Ensure that the tint and color level values on the customer video menu are in the preset positions by activating the preset mode on the video sentry function of the customer video menu. You should see true color for each of the colors on the test pattern and the white portion should be pure white, while the black portion should be as black as the ambient light in the room will allow. Bear in mind that ambient light conditions may also slightly affect color saturation on the screen, so it is best to darken the room.

You may also want to supply the projector with a familiar video scene which has good color values and look for correct flesh tone, blue sky, etc. A grey scale test pattern may also be used to check proper color balance. It should show a darkening series of grey bars, from pure white on the left to pure black on the right with no prominence of either red, blue or green tint in the greys. If it is necessary to balance the color of the projector, begin by displaying a white raster on the screen. Locate the 9-678 video interface board inside the unit. It is placed directly behind the red CRT assembly facing the front of the set. On the 9-678 board, find the 5L jumper. It is on the far side of the board, beside three sets of pins marked 5R, 5G, and 5B . To put the projector in setup mode, remove the 5L jumper, remembering the direction in which it was on the board for replacement later. Uncover the red lens only. Using a mirror so that you can see into the red CRT directly while you are standing behind the set, slowly rotate the G2 pot for red on the A-15860 focus/G2 module counterclockwise until there is no light coming out of the red CRT. Then very slowly rotate the pot clockwise until you can first see light from the CRT. Repeat this procedure for the green and blue CRTs using the appropriate pot on the G2/focus module for each color.

Place the 5L jumper back in its original position on the 9-678 board. Now the projector will begin adjusting the automatic black level. While it does this you will see the projector actually adjust its contrast level on the screen. This process could take up to 30 seconds. When it has finished replace the white raster with a cross-hatch test pattern. With the room darkened as much as possible, uncover the red lens only and very slowly rotate the G2 pot for red on the focus/G2 module until the black area in the cross hatch matrix is completely black, with no red tint. It is important that this pot be rotated slightly and slowly, so as not to activate the automatic black level adjustment. If the automatic black level activates, repeat the G2/color balancing procedure again from the beginning.

Uncover the green lens only and repeat this final G2 adjustment for green. Do the same for blue. The G2/color balancing process is now complete. Check the results by resupplying the projector with a video source or SMPTE color bar test pattern.

CUSTOMER VIDEO MENU TOUCHUP

The last stage of setup on the projector is to adjust the customer video menu for the best possible picture. Refer to the operators manual for detailed instructions about the video menu. Note the separate functions and their values on the video menu in diagram 40.

DIAGRAM 49

Here are a few suggestions as to how to achieve the best possible picture by adjusting the video menu. As always, the less ambient light that is on the screen itself, the better the picture will look. A video projector cannot throw black onto a screen, so the contrast of the image will always be greatly determined by the ambient light on the screen. The Runco projector, however, is bright enough to maintain good color saturation and brightness, even in high ambient light situations. Consequently, the first function, contrast, should rarely need to be set above 2/3 to 3/4 of full value The brightness, in general should be kept to a 1/2 value or below to ensure the best contrast on the screen. The color level function allows for compensation for a wide range of chroma levels on the source to the projector, by moving the value from extreme left to the far right of its range, but in general, should be kept near 1/2 of full value. The tint function may be used to fine tune the tint of the picture, again to compensate for chroma variations on the source, but should normally remain near the middle of its range.

The sharpness function increments the apparent detail of the picture from a filmlike softness at the far left to a harder, metallic or grainy look at the right. This is largely a subjective function and up to the viewer's discretion. The projector, however, seems to have better resolution near the left end of the sharpness range and it is suggested that it be set there.

The video sentry function stores a factory preset value for all of the above functions. This is useful as a reference point when adjusting the video menu. If AC power is disconnected from the projector for more than 5 minutes, the set automatically reverts to the preset values on the customer video menu, and it is necessary to reset the custom values. To store your custom values in memory as the preset values, in the event that this may happen, enter the factory/service menu as described previously, and go to function "Store Custom Control." Press enter. The values currently in the customer video menu are now stored as the new preset values.