

PRELIMINARY SETTING FOR SERVICE

1. STANDARD ADJUSTMENT CONDITION

The projector should be in the following condition for all adjustments.

- (1) Power supply: AC 120V, 60Hz
- (2) Warmed up for 20 minutes.
- (3) INPUT SIGNALS:
 - (I) VIDEO INPUT
 1. NTSC video signal, 1.0Vp-p, 75Ω positive polarity.
 2. S-VIDEO signal
Y: 1.0Vp-p, 75Ω, positive polarity
C: 0.28Vp-p, 75Ω, burst level
 - (II) RGB INPUT
 1. Video signal, 0.7Vp-p, 75Ω, positive polarity
 2. SYNC signal, 1.0Vp-p, 75Ω, negative/positive polarity
 3. Deflection frequency
H: 15kHz-55kHz
V: 38Hz-100Hz
- (4) Unless otherwise specified, use 100" flat screen.
- (5) Unless otherwise specified, all adjustments should be performed with the projector only.
- (6) The system interface, SI-5320, to be used in adjustments should be preadjusted and operating normally.

2. SETTING OF HIGH VOLTAGE PWB

Set the VRs to the positions as follows;

- | | | |
|----------------|----------|--------------------------|
| HV ADJ | (VR5501) | } Fully counterclockwise |
| HV PROTECT (1) | (VR5502) | |
| HV PROTECT (2) | (VR5503) | |
| FREQ ADJ | (VR5504) | Fully clockwise |

3. GAIN CONTROL PWB SETTING

Set the VRs to the positions as follows;

- | | | |
|----------------|----------|---------------------|
| SUB CONTRAST | (VR7108) | } Mechanical Center |
| SUB BRIGHTNESS | (VR7109) | |
| R. BLANKING | (VR7103) | |
| G. BLANKING | (VR7102) | |
| B. BLANKING | (VR7101) | |
| R. GAIN | (VR7110) | |
| G. GAIN | (VR7112) | |
| B. GAIN | (VR7114) | |
| R. BIAS | (VR7111) | |
| G. BIAS | (VR7113) | |
| B. BIAS | (VR7115) | |

- | | | |
|-----------|----------|--------------------------|
| R. DRIVE | (VR7107) | } Fully counterclockwise |
| G. DRIVE | (VR7106) | |
| B. DRIVE | (VR7105) | |
| PEAK CLIP | (VR7104) | Fully clockwise |

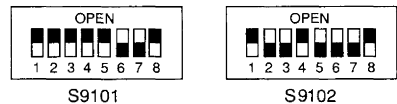
4. SETTING OF SCREEN UNIT VRs

Set the VRs on the SCREEN UNIT as follows;

- | | |
|--------------|--------------------------|
| R. SCREEN VR | } Fully counterclockwise |
| G. SCREEN VR | |
| B. SCREEN VR | |

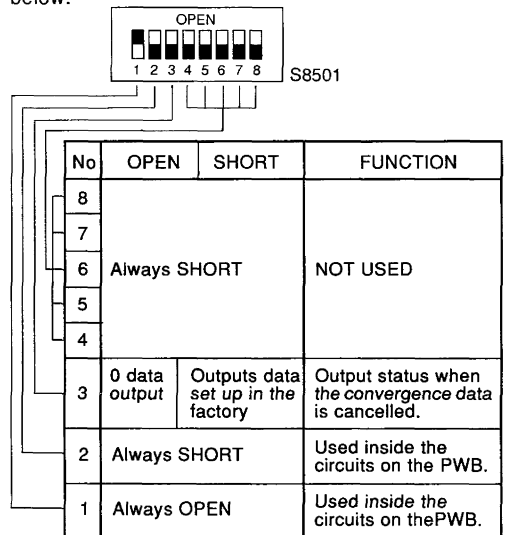
5. SETTING OF DIP SWITCH PWB

Set the dip switches to the positions as illustrated below.



6. DIP SWITCH SETTING OF D-CONV PWB

Set the dip switches to the positions as illustrated below.



7. HIGH VOLTAGE & HIGH VOLTAGE PROTECTOR ADJUSTMENT (HV PWB)

Note: The digital voltmeter to be used in this adjustment section should have the accuracy of $\pm 0.01V$.

- (A) High Voltage Adjustment
 - (1) Connect a high voltage voltmeter to the HV CR unit.
 - (2) Adjust VR5501 (HV ADJ) to obtain $34.0 \pm 0.1kV$.
- (B) Frequency Adjustment
 - (1) Connect a digital voltmeter to the TPs as follows;
 - Positive polarity :TP5502 (CTL)
 - Negative polarity :TP5501 (GND)
 - (2) Adjust VR5504 (FREQ ADJ) so the voltmeter reads $11.0 \pm 0.1V$.
- (C) High Voltage Protector 2 Adjustment
 - (1) Connect a digital voltmeter to the limiter current check terminal (HV CURR).
 - (2) Adjust VR7108 (CONTRAST) on the GAIN CTL PWB and the VRs of the screen unit alternately to obtain the value of $1.2 \pm 0.1V$.
 - (3) Connect the digital voltmeter to the TPs as follows;
 - Positive polarity :TP5503 (REF)
 - Negative polarity :TP5504 (HV-PROTECTOR 2)
 - (4) Adjust VR5503 (HV PROTECTOR 2) so the voltmeter reads $0.15 \pm 0.01V$.
 - (5) Seal the VR5503 with silicone rubber.
 - (6) Measure and reconfirm the voltage obtained in item (4) is still $0.15 \pm 0.01V$.
- (D) High Voltage Protector 1 Adjustment
 - (1) Connect a digital voltmeter to the TPs as follows;
 - Positive polarity :TP5503 (REF)
 - Negative polarity :TP5505 (HV PROTECTOR 1)
 - (2) Adjust VR5502 (HV PROTECTOR 1) so the voltmeter reads $0.15 \pm 0.01V$.
 - (3) Seal the VR5502 with silicone rubber.
 - (4) Measure and reconfirm the voltage obtained in item (2) is still $0.15 \pm 0.01V$.

8. SIGNAL LEVEL ADJUSTMENT (GAIN CTL PWB)

- (A) Setting of Blanking Margin
 - (1) Feed in cross signal.
 - (2) Connect an oscilloscope to the cathode of each R, G and B CRT PWB.
 - (3) Adjust VR7101 (B. BLANKING), VR7102 (G. BLANKING) and VR7103 (R. BLANKING) respectively to obtain a 20V blanking level for each CRT as illustrated below.

- (4) Adjust VR7110 (R. GAIN), VR7112 (G. GAIN), and VR7114 (B. GAIN) respectively to obtain the pedestal level of 140V for each CRT.

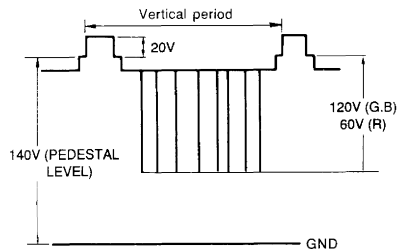


FIG. 1 PEDESTAL AND WHITE PEAK ADJUSTMENT

- (B) Peak Clip Adjustment
 - (1) Connect the oscilloscope to the cathode of G CRT PWB.
 - (2) Feed in cross signal.
 - (3) Adjust VR7106 (G. DRIVE) so the vertical height of horizontal line becomes 130V on the oscilloscope.
 - (4) Adjust VR7104 (PEAK CLIP) to reduce to 125V.
- (C) Drive Adjustment
 - (1) Connect an oscilloscope to the cathode of B CRT PWB and G CRT PWB respectively.
 - (2) Adjust VR7105 (B.DRIVE) and VR7106 (G.DRIVE) so the vertical height of horizontal line becomes 120V on B CRT PWB and G CRT PWB respectively.
 - (3) In the same manner, adjust VR7107 (R. DRIVE) so the vertical height of horizontal line becomes 60V at the cathode of R CRT PWB.

9. VIDEO BLANKING ADJUSTMENT (VIDEO PWB)

Note: Adjustment of this section is to be performed with the projector only.

- (1) Feed in color bar signal.
- (2) Adjust VR7407 to align the scale of 97.5% on the pattern to the right border of the screen.
- (3) Adjust VR7405 to align the scale of 97.5% on the pattern to the left border of the screen.
- (4) Adjust VR7406 to align the scale of 97.5% on the pattern to top border of the screen.

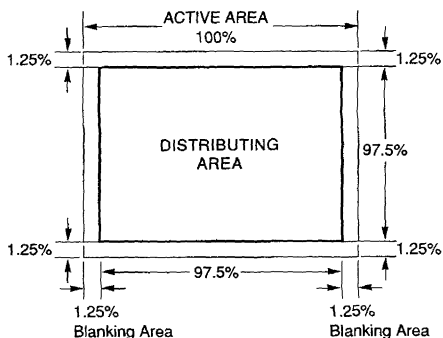


FIG. 2 BLANKING ADJUSTMENT

10. HORIZONTAL OSCILLATION FREQUENCY ADJUSTMENT

- (1) Set S5001 to the ADJ position.
- (2) Switch to the VIDEO mode.
Adjust the VR5006 (VIDEO. H. OSC) to obtain the synchronized picture.
- (3) Switch to the RGB mode.
Feed in a signal 7, adjust the VR5002 (H. OSC (1)) to obtain the synchronized picture.
- (4) Feed in a signal 11, adjust the VR5003 (H. OSC (2)) to obtain the synchronized picture.
- (5) Repeat the item 3) and 4) to obtain the synchronized picture both with a signal 7 and a signal 11.
- (6) Set S5001 to the NORM position.

11. VERTICAL BLANKING PULSE WIDTH (DEF PWB)

- (1) Connect an oscilloscope to TP4003.
- (2) Adjust VR4001 (V. BLK) so the blanking pulse width becomes 0.45 ± 0.1 ms on the oscilloscope.

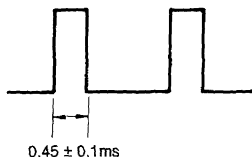
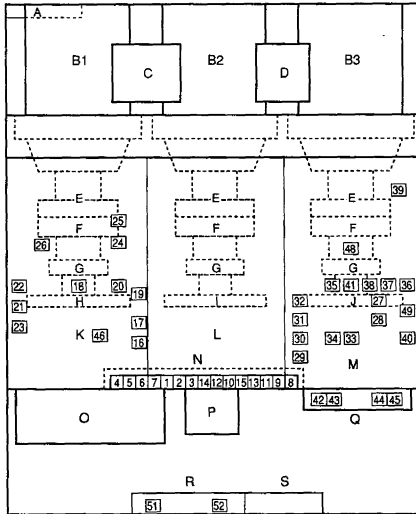


FIG. 3 V. BLANKING PULSE WIDTH

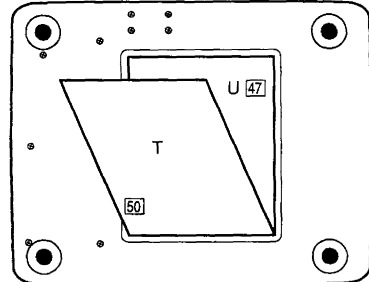
ADJUSTMENT PROCEDURE

CONTROL LOCATIONS

TOP VIEW



BOTTOM VIEW



A	INPUT PWB	1	VR7101	B. BLANKING	27	VR4001	V. BLANKING	
B ₁	BLUE CRT	2	VR7102	G. BLANKING	28	VR4002	V. LIN	
B ₂	GREEN CRT	3	VR7103	R. BLANKING	29	VR4003	V. OSC1 100Hz	
B ₃	RED CRT	4	VR7104	PEAK CLIP	30	VR4004	V. OSC2 38Hz	
C	PS DIV PWB	5	VR7105	B. DRIVE	31	VR4005	V. HEIGHT1 100Hz	
D	LINEAR COIL PWB	6	VR7106	G. DRIVE	32	VR4006	V. HEIGHT2 38Hz	
E	DEFLECTION YOKES CENTERING MAGNETS	7	VR7107	R. DRIVE	33	VR4007	V. OSC3 60Hz	
F	FOCUS MAGNETS	8	VR7108	SUB CONTRAST	34	VR4008	V. HEIGHT3 60Hz	
G	C. P. C MAGNETS	9	VR7109	BRIGHTNESS	35	VR4009	V. HEIGHT 60Hz	M
H	B CRT PWB	10	VR7110	R. GAIN	36	VR5001	F/V	
I	G CRT PWB	11	VR7111	R. BIAS	37	VR5002	H. OSC1 15kHz	
J	R CRT PWB	12	VR7112	G. GAIN	38	VR5003	H. OSC2 55kHz	
K	VIDEO PWB	13	VR7113	G. BIAS	39	VR5004	H. OUT PROTECTOR	
L	CF DRIVE PWB	14	VR7114	B. GAIN	40	VR5005	H. WIDTH	
M	DEF PWB	15	VR7115	B. BIAS	41	VR5006	VIDEO H. OSC	
N	GAIN CTL PWB	16	T 7401	COMB FILTER	42	VR5501	HV ADJ	
O	F. B. T PWBs	17	VR7401	COMB FILTER	43	VR5502	HV PROTECT (1)	
P	SCREEN CONTROL UNIT	18	VR7402	SUB BRIGHTNESS	44	VR5503	HV PROTECT (2)	Q
Q	HV PWB	19	VR7403	SUB PICTURE	45	VR5504	FREQ ADJ	
R	DIP SW PWB	20	VR7404	WHITE PEAK	46	VR801	VIDEO AFC	K
S	LED PWB	21	VR7405	H. BLANKING 1	47	VR8301	REFERENCE VOLTAGE	U
T	D-CONV PWB	22	VR7406	V. BLANKING	48	S 4001	V. SYNC ADJUST	M
U	SYSTEM PWB	23	VR7407	H. BLANKING 2	49	S 5001	H. OSC ADJUST	
		24	VR7408	SUB COLOR	50	S 8501	DIP SWITCH	T
		25	VR7409	SUB TINT	51	S 9101	DIP SWITCH	
		26	VR7410	SUB SHARPNESS	52	S 9102	DIP SWITCH	R

1. HORIZONTAL POSITION ADJUSTMENT

- (1) Feed in video NTSC color bar signal.
- (2) Set VR7108 (CONTRAST) control to minimum.
- (3) Rotate G. SCREEN VR clockwise to display the back raster faintly.
- (4) Rotate the VR7108 (CONTRAST) to display the color bar signal.
- (5) Adjust the H. POSITION control on the remote control unit to position the pattern center with the center of raster.
- (6) Press STORE key twice.
- (7) Switch to the RGB mode, and apply the character signal which consists of 2000 "H" characters (Henceforth referred as H-character signal) with 31.5kHz H. sync frequency.
- (8) Adjust the H. POSITION control so the H-character pattern is properly located in the raster.

2. C. P. C (Convergence and Purity Control) MAGNET ADJUSTMENT

- (1) Check that the deflection yoke, focus magnet, and C. P. C magnet of G CRT are precisely mounted on their assigned positions.
- (2) Set the CENTERING and C. P. C magnets to zero magnetic field as shown below.

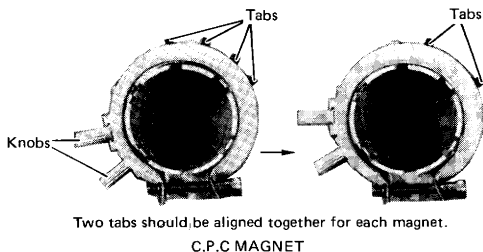
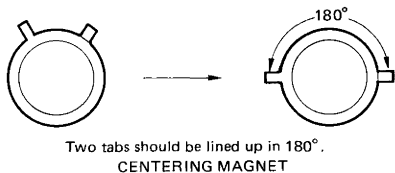


FIG.4 ZERO MAGNETIC FIELD

- (3) Select built-in dot pattern test signal.
- (4) Cover R and B CRTs to display only G CRT.
- (5) Adjust the G. SCREEN VR to darken the back raster.
- (6) Adjust the G. FOCUS control on the remote control unit so the flare appears around the spot as illustrated below;

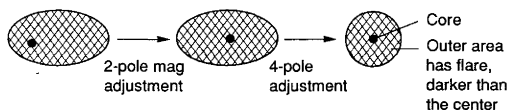


FIG. 5 C. P. C MAGNET ADJUSTMENT

- (7) Adjust the 2-pole magnet to produce a core at the center of the flare.
Rotating the knob changes the angle between tabs. Sliding the knob moves tabs together.

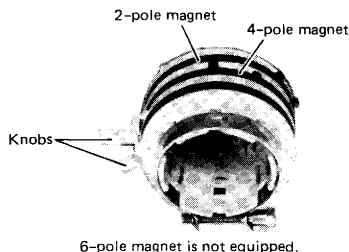


FIG. 6 C. P. C MAGNET

- (8) Adjust the 4-pole magnet so the flare forms a circular shape.
- (9) Adjust the G. FOCUS control on the remote control unit to make the flare disappear from the spot.
- (10) In the same manner, adjust the R and B CRTs.

3. CENTERING MAGNET ADJUSTMENT

- (1) Press CANCEL key twice to cancel RGB static convergence.
- (2) Adjust the focus wing nut on each CRT to obtain the optimum focus on the screen. (LENS FOCUS)
- (3) Apply H-character signal, and change to the RGB mode.
- (4) Cover R and B CRTs to display only G CRT.
- (5) Adjust the centering magnet (on page 36) to position the pattern center with the screen center.
- (6) If the pattern tilts horizontally or vertically, adjust the deflection yoke.
- (7) Adjust the R and B CRTs in the same manner.

4. H. WIDTH, V. HEIGHT, and V. HOLD ADJUSTMENTS

- (1) Feed in NTSC video color bar signal.
- (2) Set H. WIDTH control to maximum with the remote controller and adjust VR5005 (H. WIDTH) to obtain 15% overscanning.
- (3) Adjust H. WIDTH control to align the scale of 90% on the pattern to the screen borders of both sides.
- (4) Adjust V. HEIGHT control to obtain a pattern balanced with its within horizontal width.
- (5) If a vertical rolling or pairing occurs, adjust V. HOLD control.
- (6) Change to the RGB mode, and apply H-character signal.
- (7) Adjust the H. WIDTH control again to obtain 10% ratio of blanking area at both sides as in item (3).
- (8) If a vertical rolling or pairing occurs, adjust the V. HOLD control again.

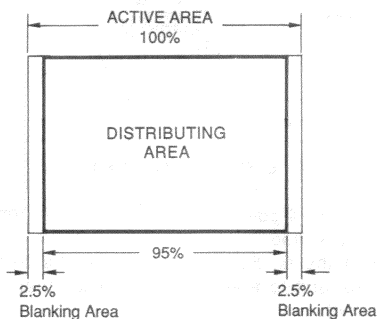


FIG. 7 OVERSCAN ADJUSTMENT

5. VERTICAL LINEARITY ADJUSTMENT

- (1) Feed in NTSC video crosshatch pattern signal.
- (2) Adjust VR4002 (V. LIN) on DEF PWB to balance the pattern in its vertical and horizontal axes.

6. OPTICAL FOCUS (LENS) ADJUSTMENT

- (1) Change to the RGB mode.
- (2) Feed in H-character signal.
- (3) Cover R and B CRTs to display only G CRT.

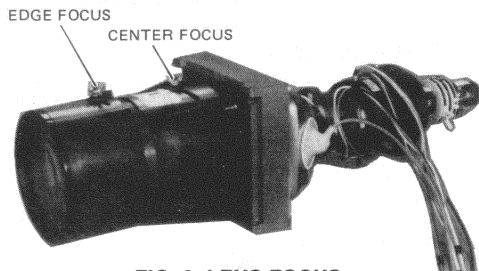


FIG. 8 LENS FOCUS

- (4) Concentrate on the center of the pattern, and adjust the CENTER focus knob of the G CRT lens to obtain the best focus.
- (5) Next, adjust the EDGE focus knob of the G CRT to obtain the best focus observing the ambient area of the pattern.
- (6) If the center focus deteriorates, repeat item (4).
- (7) In the same manner, perform both CENTER and EDGE focus adjustments on the R and B CRTs.

7. ELECTRIC FOCUS ADJUSTMENT

- (1) Set No. 5 of S9101 on DIP SW PWB to SHORT side. Push RESET button to enter the common control mode.
- (2) Feed in NTSC video crosshatch pattern signal.
- (3) Cover R and B CRTs to display only G CRT.
- (4) Concentrate on the center of the pattern by pressing the focus key in combination with the STATIC key, and adjust G. CENTER FOCUS control to obtain the best focus.
- (5) Adjust G-DYNAMIC Focus referring to A section in the figure below.
- (6) Adjust H/V BALANCE referring to B section. It is enough only to adjust G. CRT for H/V BALANCE adjustment.
- (7) In case the center focus deteriorates, repeat item (3).
- (8) In the same manner, perform the CENTER and EDGE FOCUS adjustment on the R and B CRTs.
- (9) Set No. 5 of S9101 on DIP SW PWB to OPEN side. Push RESET button to enter the normal control mode.
- (10) Change to the RGB mode, and apply H-character signal.
- (11) Perform the CENTER and EDGE FOCUS adjustments for each R, G and B CRT as outlined in steps (2) to (8).

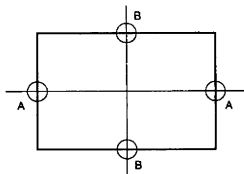


FIG. 9 H/V BALANCE

8. TILT PHASE ADJUSTMENT

- (1) Confirm that DIP SW S9102 No. 2 is set to the SHORT side.
- (2) Press TEST to display TEST screen.
- (3) Press CTL and CONV to display MENU screen as following.

*** MENU ***

⇒ 1. TILT PHASE

2. CURSOR PHASE

- (4) Position the cursor to 1. TILT PHASE by pressing Δ or ∇ and press ENTER to display the picture including TILT component on G-CRT alone.

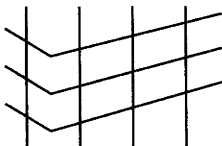


FIG. 10 TILT PHASE

- (5) Adjust \leftarrow or \rightarrow to equalize the distortion on both sides of the screen.
- (6) Press STORE twice to store the status after the adjustment.
- (7) Press END to return to MENU screen.
- (8) Press END once again to return to the normal mode.
- (9) After this procedure perform the normal convergence adjustment.

9. CURSOR PHASE ADJUSTMENT

- (1) Confirm that DIP SW S9102 No. 2 is set to the SHORT side.
- (2) Press TEST to display TEST screen.
- (3) Press CTL and CONV to display MENU screen as following.

*** MENU ***

1. TILT PHASE

⇒ 2. CURSOR PHASE

- (4) Position the cursor to 2. CURSOR PHASE by pressing Δ or ∇ and press ENTER to display the picture including POINT component on G-CRT alone.

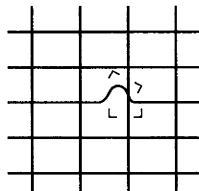


FIG. 11 CURSOR PHASE

- (5) Adjust \rightarrow or \leftarrow to locate the vertical line of the center of the cursor with the peak of POINT component as indicated in the figure.
- (6) Press STORE twice to store the status after the adjustment.
- (7) Press END to return to MENU screen.
- (8) Press END once again to return to the normal mode.
- (9) After this procedure perform the normal convergence adjustment.

10. CONVERGENCE ADJUSTMENT

Note: 1. H. WIDTH, H. POSITION, CENTERING MAGNET FOR V. HEIGHT adjustments should be completed before proceeding to the convergence adjustments.

2. Improper adjustment of these will cause the excessive correction by the convergence adjustment, and the proper adjustment is hard to be obtained.

- (1) Set No. 5 of S9101 on DIP SW PWB to SHORT side. Push RESET button to enter the common control mode.
- (2) Feed in video NTSC signal.
- (3) Perform TILT PHASE and CURSOR PHASE adjustments, and store the each adjustment data.
- (4) Cover R and B CRTs to display only G CRT, and then carry out GEOMETRICAL DISTORTION CORRECTION adjustment.
- (5) Adjust STATIC CONVERGENCE of R and B CRTs respectively, and then store each data.
- (6) Adjust DYNAMIC CONVERGENCE of R and B CRT respectively, and then store each data.
- (7) If the distortions still exist, perform the POINT CONVERGENCE adjustment.

Note: 1. As the POINT CONVERGENCE adjustment increases it becomes hard to maintain the proper pattern. Therefore the POINT CONVERGENCE adjustment should be kept to a minimum.

- (8) Store the POINT CONVERGENCE data.
- (9) Set No. 5 of S9101 on DIP SW PWB to OPEN side. Push RESET button to enter the normal mode.
- (10) Switch to the RGB mode, and apply H-character signal.
- (11) Perform steps (2) to (7).

Note: 2. As to the adjustments of TILT, CURSOR, PHASE, DISTORTION, STATIC CONVERGENCE, DYNAMIC CONVERGENCE, and POINT CONVERGENCE, refer to the CONVERGENCE ADJUSTMENT on page 15.

STATIC and DYNAMIC CONVERGENCE must be performed for all input.

11. WHITE BALANCE ADJUSTMENT (GAIN CTL PWB)

1. Cut-off and Drive Adjustment

- (1) Feed in color bar signal.
- (2) Cover R and B CRTs to display only G CRT.
- (3) Adjust the G SCREEN VR to darken the three areas of APL (Average Picture Level)

chart on the pattern evenly. (5% and 10% areas should be distinguished from each other.)

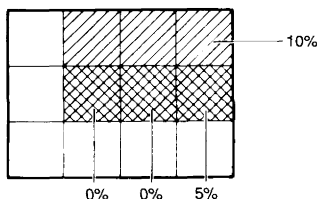


FIG. 12 APL ADJUSTMENT

- (4) Remove the covers from R and B CRTs'.
 - (5) Set CONTRAST to minimum with the remote controller.
 - (6) Observe the gray scale which is located at the center of the color bar, and adjust R and B SCREEN VRs alternately to obtain the optimum white balance. (Do not rotate the G SCREEN VR as it is the reference.)
 - (7) Set CONTRAST to maximum with the remote controller.
 - (8) Confirm the white balance is optimum. If not, adjust it with VR7107 (R. DRIVE) and VR7105 (B. DRIVE). (Do not rotate VR7106 (G. DRIVE) as it is the reference.)
 - (9) Repeat items from (6) to (8) until the best white balance is obtained.
2. Brightness Tracking Adjustment
- (1) Set BRIGHTNESS and CONTRAST to maximum with the remote controller.
 - (2) Check if the white balance is optimum. If not, adjust it with VR7110 (R. GAIN) or VR7114 (B. GAIN). Do not rotate VR7112 (G. GAIN) as it is reference.
 - (3) Set BRIGHTNESS to minimum with the remote controller.
 - (4) Check the white balance, and if it is out, adjust it with VR7111 (R. BIAS) or VR7115 (B. BIAS). (Do not rotate VR7113 (G. BIAS) as it is reference.)
 - (5) Set BRIGHTNESS to maximum with the remote controller, and repeat the items from (2) to (4) until the best white balance is obtained.

3. White Balance Confirmation

- (1) Set BRIGHTNESS to center, and CONTRAST to maximum with the remote controller.
- (2) Check the white balance by varying CONTRAST and BRIGHTNESS alternately. If the white balance is off, perform the following procedures.
 - [1] If the white balance is not obtained when varying CONTRAST, repeat the cut-off and drive adjustment.
 - [2] If the white balance is not obtained when varying BRIGHTNESS, repeat the brightness tracking adjustment.
- (3) To increase or decrease the black level, perform fine adjustment by VR7402 (SUB BRIGHTNESS) on the VIDEO PWB.
- (4) To increase or decrease the brightness level, perform fine adjustment by VR7108 (CONTRAST) on the GAIN CTL PWB.

Note: The items (3) and (4) are not necessary in the ordinary adjustment.

12. CONFIRMATION OF COLOR, TINT, and SHARPNESS

- (1) Feed in video color bar signal.
- (2) If any abnormalities are found in color, tint, or sharpness, adjust it by VR7408 (SUB COLOR), VR7409 (SUB TINT), or VR7410 (SUB SHARPNESS) with eye confirmation.

13. SYSTEM INTERFACE

1. Connection

- (1) Turn the power off.
- (2) Connect the system interface, SI-5320 to the projector.
- (3) Feed the following signals into the system interface.

INPUT TERMINAL	INPUT SIGNALS
VIDEO 1	NTSC
VIDEO 2	PAL
RGB 1	SIGNAL 1 (CGA) SIGNAL 2 (EGA) SIGNAL 3 (PGA 400) SIGNAL 4 (PGA 480)
RGB 2	SIGNAL 5 (IDC-1000)
RGB 3	SIGNAL 6 (MAC-II)

* For further explanation of signal compositions refer to the SIGNAL TABLE and TIMING CHART on page 59.

14. ELECTRIC FOCUS ADJUSTMENT (2)

- (1) Apply one of the signals listed on the connection section to the system interface.
- (2) Adjust the G. CENTER FOCUS by pressing the focus key in combination with the STATIC key on the remote controller to obtain best focus on the screen concentrating on the center area.
- (3) Adjust H/V BALANCE referring to B section. It is enough only to adjust G. CRT for H/V BALANCE adjustment.

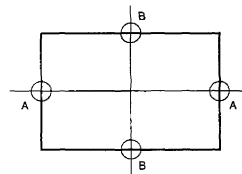


FIG. 13 H/V BALANCE

- (4) Adjust the G. EDGE FOCUS by pressing the focus key in combination with the DYNAMIC key on the remote controller concentrating on the peripheral area.

15. HORIZONTAL POSITION, HORIZONTAL WIDTH, VERTICAL HEIGHT, and VERTICAL HOLD ADJUSTMENT (2) (REMOTE CONTROL UNIT)

1. Horizontal Position

Center the pattern within the screen using the H. POSITION control on the remote controller.

2. Horizontal Width and Vertical Height

- (1) Select the VIDEO 1 mode and apply NTSC color bar signal.
- (2) Check that the 10% blanking of the horizontal width are obtained, and the vertical height is balanced with its horizontal width. (Refer to Fig. 14)
- (3) Switch to the VIDEO 2 mode, and then apply PAL color bar signal.
- (4) Adjust the H. WIDTH control on the remote controller to obtain 10% blanking on the horizontal width, and adjust V. HEIGHT button to obtain the vertical height which is in proportion as its horizontal width. (Refer to Fig. 14)
- (5) When in RGB 2 mode, apply H-character signal.
- (6) Confirm the 10% blanking is obtained on both sides of the screen, and the vertical height is in proportion to its H. WIDTH. (Refer to Fig. 14)

- (7) When in RGB 1 and 3, apply H-character signal.
- (8) Adjust the H. WIDTH and V. HEIGHT controls so the both horizontal width and vertical height of the pattern become 5% underscan as illustrated below.

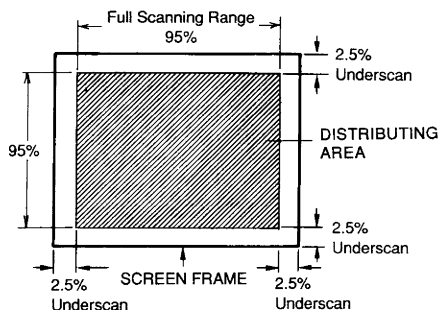


FIG. 14 UNDERSCAN ADJUSTMENT

3. Vertical Hold

If vertical rolling or pairing occurs, adjust V. HOLD control.

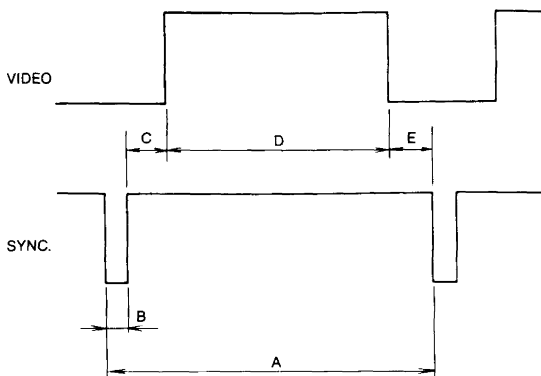
16. CONVERGENCE ADJUSTMENT (2)

The readjustment of the CONVERGENCE ADJUSTMENT (8-1~8-6) is required for every assigned signals in item 11.

- (1) Set in VIDEO 1 mode and feed in NTSC signal.
- (2) Set in VIDEO 2 mode and feed in PAL or SECAM signal and carry out the convergence adjustment 8.
- (3) Set in RGB 1 mode and feed in a CGA signal (Signal 1). Carry out the "8. CONVERGENCE ADJUSTMENT".
- (4) Set in RGB 1 mode and feed in an EGA signal (Signal 2). Carry out the "8. CONVERGENCE ADJUSTMENT".
- (5) Set in RGB 1 mode and feed in a PGA (400 line) signal (Signal 3). Carry out the "8. CONVERGENCE ADJUSTMENT".
- (6) Set in the RGB 1 mode and feed in a PGA (480 line) signal (Signal 4). Carry out the "8. CONVERGENCE ADJUSTMENT".
- (7) Set in RGB 2 mode and feed in Signal 5.
- (8) Set in the RGB 3 mode and feed in a Signal 6. Carry out the "8. CONVERGENCE ADJUSTMENT".

Note: The convergence data store must be carried out for each mode adjustment, not for each input.

TIMING CHART



ADJUSTMENT SIGNALS

Signal 1	RGB 1	IBM CGA IBM EGA IBM PGA 400 line mode IBM PGA 480 line mode
Signal 2		
Signal 3		
Signal 4	RGB 2 RGB 3 15kHz 25kHz 35kHz 45kHz 55kHz 15kHz 15kHz 15kHz	IDC-1000 MAC II 60Hz 60Hz 60Hz 60Hz 60Hz 38Hz 70Hz 100Hz
Signal 5		
Signal 6		
Signal 7		
Signal 8		
Signal 9		
Signal 10		
Signal 11		
Signal 12		
Signal 13		
Signal 14		

SIGNAL TABLE

		A	B	C	D	E
Signal 1	H μ s	63	4.2	7.2	45	6.6
	Vms	16.4	0.075	1.525	12.6	2.2
Signal 2	H μ s	45.5	4.9	1.6	39	0
	Vms	16.68	0.6	0.08	16	0
Signal 3	H μ s	33	4.5	2.8	25.6	0.1
	Vms	16.6	0.07	2.12	13.05	1.36
Signal 4	H μ s	33	4.5	2.8	25.6	0.1
	Vms	16.6	0.07	0.83	15.67	0.03
Signal 5	H μ s	31.78	2.76	1.60	26.29	1.13
	Vms	16.67	0.64	0.77	15.14	0.12
Signal 6	H μ s	28.57	2.12	3.17	21.16	2.12
	Vms	15.00	0.09	1.11	13.71	0.09
Signal 7	H μ s	66.7	9.1	5.7	51.7	0.2
	Vms	16.7	0.07	3.33	10.95	2.35
Signal 8	H μ s	40.0	5.5	3.4	31.0	0.1
	Vms	16.7	0.07	3.33	10.95	2.35
Signal 9	H μ s	28.6	3.9	2.4	22.2	0.1
	Vms	16.7	0.07	3.33	10.95	2.35
Signal 10	H μ s	22.2	3.0	1.9	17.2	0.1
	Vms	16.7	0.07	3.33	10.95	2.35
Signal 11	H μ s	18.2	2.5	1.6	14.1	0
	Vms	16.7	0.07	3.33	10.95	2.35
Signal 12	H μ s	66.7	9.1	5.7	51.7	0.2
	Vms	26.3	0.11	5.2	17.2	3.8
Signal 13	H μ s	66.7	9.1	5.7	51.7	0.2
	Vms	14.3	0.06	2.9	9.4	1.9
Signal 14	H μ s	66.7	9.1	5.7	51.7	0.2
	Vms	10.0	0.05	2.0	6.6	1.3

SUPPLEMENTARY ADJUSTMENT

Note: All the adjustments of this section are already completed at the factory. It is necessary to perform the adjustment only when replacing the entire circuit board assembly.

1. DEF PWB

(A) Setting of VRs and Switches

- (1) Rotate VR5004 fully counterclockwise. Place the other controls in their mechanical center positions.
- (2) Set S4001 and S5001 to the ADJ position.

(B) Vertical Oscillation Frequency and Amplitude Adjustment

- (1) Disconnect the HV connector.
- (2) Connect VR, VG, and VB connectors to each CRT.
- (3) Unplug the connector DC.
- (4) Apply the power supplies to PD connector as shown below.
 PD 1 : $110.0 \pm 1.0V$
 PD 2 : $15.0 \pm 0.1V$
 PD 3 : $-15.0 \pm 0.1V$
 PD 4 : GND
- (5) Connect a frequency counter or an oscilloscope to TP4006.
- (6) Adjust VR4007 (V. OSC 3) to obtain a vertical oscillation frequency of 60.0 ± 0.1 Hz.
- (7) Connect the oscilloscope to TP4004, and adjust VR4008 (V. HEIGHT 3) to obtain a vertical sawtooth waveform less than 10mVp-p.

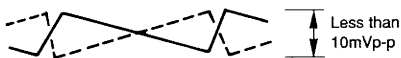


FIG. 15 WAVEFORM AT TP4004

- (8) Connect the oscilloscope to TP4006, and adjust VR4009 (V. HEIGHT) so the sawtooth waveform becomes 6.5 ± 0.1 Vp-p on the oscilloscope.



FIG. 16 WAVEFORM AT TP4006

- (9) Adjust VR4002 (V. LIN) to make the sawtooth waveform linear slope.
- (10) Connect a signal generator to feed V. SYNC signal in HV connector as below.
 HV 3 : Vertical sync signal
 HV 4 : GND

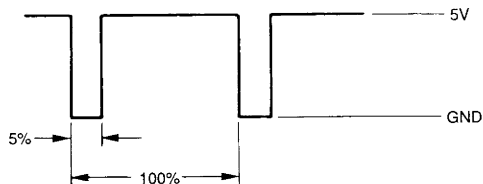


FIG. 17 V. SYNC SIGNAL

- (11) Connect an oscilloscope to TP4001 and TP4006 respectively.
- (12) Check that the following patterns are obtained on the oscilloscope.
- (13) Feed in a 38 Hz V. SYNC signal, and adjust VR4004 (V. OSC 2) to set the pattern within the synchronized drawing range.
- (14) Feed in a 100 Hz V. SYNC signal, and adjust VR4003 (V. OSC 1) to set the pattern within the synchronized drawing range.

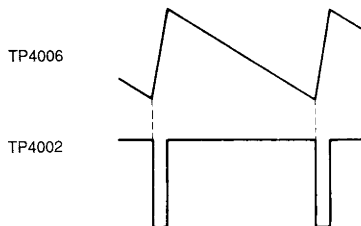


FIG. 18 V. SYNC SIGNAL

- (15) Repeat the above steps (10) to (14) to make the pattern within the synchronized drawing range with both 38 Hz and 100 Hz frequencies.
- (16) Set S4001 to the "NORM" side.
- (17) Connect the oscilloscope to TP4006.
- (18) Adjust the VRs below to obtain $6.5 \pm 0.1Vp-p$ sawtooth waveform on the oscilloscope while feeding their corresponding input signals.

VR4006 (V. HEIGHT 2) : 38 Hz signal
 VR4005 (V. HEIGHT 1) : 100 Hz signal

- (19) If the value of $6.5 \pm 0.1 \text{Vp-p}$ can not be obtained, repeat item (18).

(C) Horizontal Oscillation Frequency

- (1) Feed an H. sync signal into HV connector as follows:

HV 1 : Horizontal sync signal

HV 2 : GND

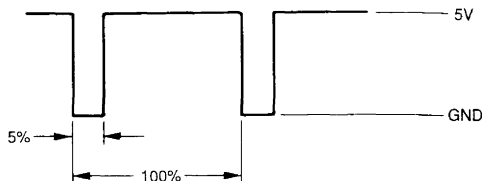


FIG. 19 H. SYNC SIGNAL

- (2) Connect a voltmeter to TP5003.
- (3) Adjust VR5001 (F/V) to obtain $2.1 \pm 0.01 \text{V}$ on the voltmeter with the H. sync signal of 15.75kHz.
- (4) Connect a frequency counter to TP5004, and adjust VR5002 (H. OSC 1) with 15.75kHz H. sync signal input to obtain $15.75 \pm 0.2 \text{kHz}$.
- (5) Connecting the frequency counter as it is, adjust VR5003 (H. OSC 2) to obtain $55.0 \pm 0.2 \text{kHz}$ with 55kHz H. sync signal input.
- (6) Repeat item (4), (5) to obtain $55.0 \pm 0.2 \text{kHz}$.
- (7) Adjust VR5006 (VIDEO H. OSC) so a $15.75 \pm 0.2 \text{kHz}$ reading is obtained at TP5004 when removing the H. SYNC signal from HV connector.
- (8) Set the S5001 to the "NORM" side.

(E) Horizontal Width Adjustment

- (1) Connect the horizontal deflection yoke to the HR, HG, and HB connectors, and the LINEAR COIL PWB to the LC connector.
- (2) Connect the following power supply to the PA connector as follows;
 PA 1 : $33.0 \pm 0.1 \text{V}$
 PA 3 : GND
- (3) Connect a voltmeter to TP5008, and adjust VR5005 (H. WIDTH) to obtain $1.8 \pm 0.1 \text{V}$.
- (4) Connect a digital voltmeter to the TPs as follows;

Positive polarity : TP5007

Negative polarity : TP5006

- (5) Adjust VR5004 (H. OUT PROTECTOR) to obtain $1.0 \pm 0.1 \text{V}$.

2. VIDEO PWB

(A) Initial setting of VRs

Set the VRs as described below.

VR7407 (H. BLK 1) : } Mechanical center

VR7405 (H. BLK 2) : }

VR7404 (W. PEAK) : Fully counterclockwise

Disconnect the connector VC or normalize the picture with the remote controller.

(B) VIDEO AFC

- (1) Connect a frequency counter to TP7407.
- (2) Adjust VR801 to obtain $15.7 \pm 0.1 \text{kHz}$.

(C) Sub Brightness and Sub Picture Adjustment

- (1) Feed in color bar signal with the signal input level of 1.0Vp-p and cut-off the chroma component.
- (2) Connect an oscilloscope to TP7404.
- (3) Adjust VR7402 (SUB BRIGHTNESS) so the set-up level is 0.05V as below.
- (4) Adjust VR7403 (SUB PICTURE) so the amplitude is $0.7 \pm 0.05 \text{Vp-p}$.

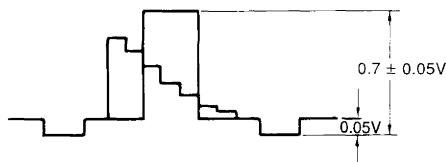


FIG. 20 SUB-BRIGHTNESS and SUB-PICTURE ADJUSTMENT

(D) Comb Filter Adjustment

- (1) Feed in color bar signal.
- (2) Connect the oscilloscope to TP7402 (Y).
- (3) Adjust VR7401 and T7401 alternately so that the amplitude of the chroma element on the color bar signal becomes minimum.

- (3) Adjust VR7401 and T7401 alternately so that the amplitude of the chroma element on the color bar signal becomes minimum.

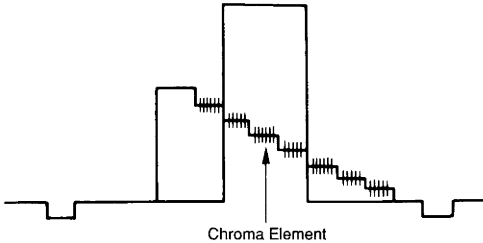


FIG. 21 WAVEFORM AT TP7402

(E) Color, Tint, and Sharpness Adjustment

- (1) Feed in color bar signal.
- (2) Connect the oscilloscope to TP7404 (G).
- (3) Adjust VR7408 (SUB COLOR) and VR7409 (SUB TINT) alternately to align the level of each column on the waveform as illustrated below.

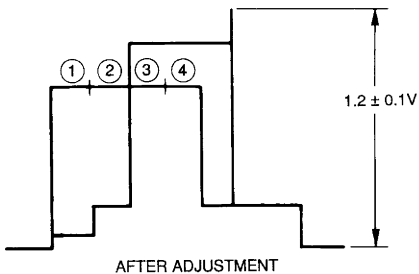
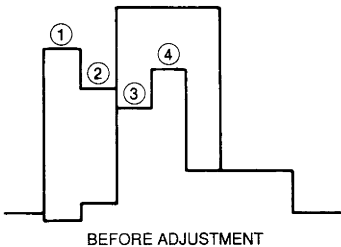


FIG. 22 WAVEFORM AT TP7404 (G)

3. SYSTEM PWB

Setting of Reference Voltage

- (1) Setting of Jumper Lead
Connect pins 3 and 6 of J8201.
- (2) Connect a voltmeter to pin 1 of BC connector.
- (3) Adjust VR8301 to obtain a measurement of $0.0 \pm 0.1 V$ on the voltmeter.
- (4) Remove the jumper.