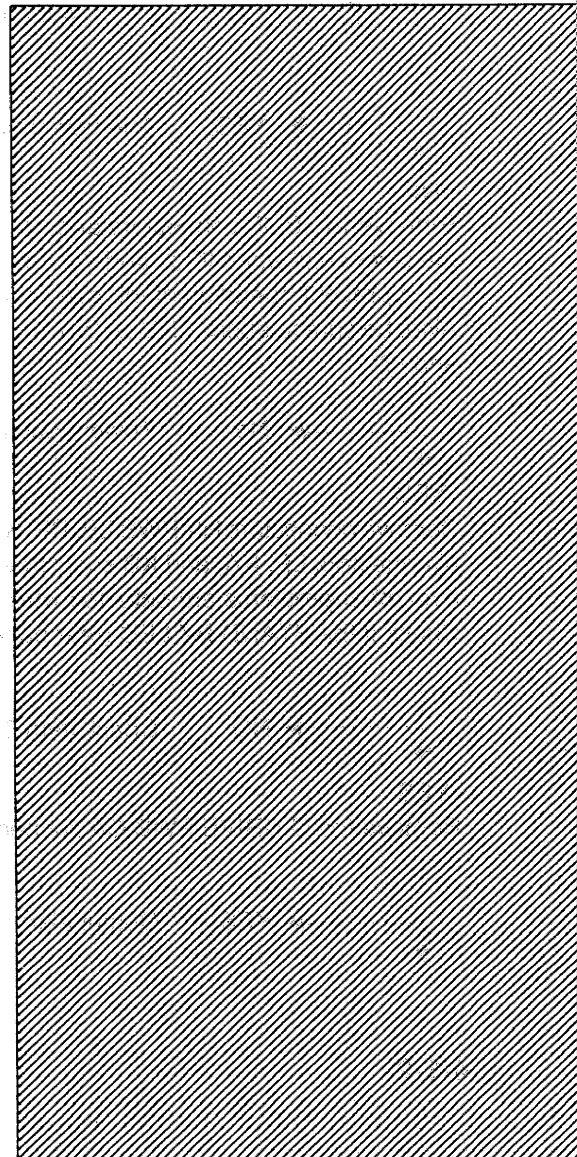


Trouble Diagnosis



TROUBLESHOOTING CHART

1. No Power /Power Supply Problems

When a projector does not function properly it is one of two failures: Power supply or some other component failure. The following flow chart will help you to determine which component (sub assembly) has failed. This chart lists Test points and Reference Voltages to assist you in your troubleshooting efforts.

IA ①	About 35 V	(H DEF)	When a video signal is supplied.
IA ②	About 7 V	(FOCUS)	
IA ③	About -7 V	(FOCUS)	
IA ④	About 1.5V	(H DEF CTL)	
IA ⑥	About -75V	(VIDEO OUT)	
IB ①	About 110 V	(VIDEO OUT)	
IB ③	About 150 V	(HV)	
IB ④	About 60 V	(V DEF)	
IB ⑤	About 35 V	(CONV. etc)	
IB ⑥	About 15 V		
IB ⑦	About -15 V		
IB ⑧	About -35 V	(CONV. etc)	
IB ⑪	About 6.3 V	(CRT HEATER)	
IB ⑬	About 5 V	(DIGITAL)	
IB ⑭	About 5 V	(STAND BY)	

Attached Sheet 1. Connector Pin Configuration

YES The power supply unit is functioning normally.

No.

Remove IA, IB, IF connectors and check to be sure that the specified voltage is output to IA and IB connectors of the power unit when IF ② and ③ are shorted. (But be sure to connect a 3.6Kohm/10W resistor between IB ① and ② to prevent operation of the overvoltage protector.

Also, be sure to apply 1.5 V DC voltage between IA ④ (+) and IA ⑤ (GND) when checking the voltage of IA ①, ②, and ③.

No Power supply unit failure.

YES

Remove connectors HV PWB LP, DF, KA, and KB for CRT protection and properly connect IA, IB, and IF connectors. (Connectors LP, KA, and KB should be checked while they are removed. All other connectors should be attached if no other problems are detected while taking these measurements.)

Check if the STAND BY LED (rear panel) lights when the main power is switched ON.

NO Check item 2. (Page 4-1-5 (2. Projector Does Not Power Up))

YES

Remove the C DRIVE PWB CA connector and check if the specified voltage is output to IA and IB connectors.

YES Output alarm from the WAVE PWB.

TROUBLESHOOTING CHART

NO

Remove the C DRIVE PWB CP connector and check if the the specified voltage is output to the IA and IB connectors when the power is turned ON.



YES C Drive PWB failure.

NO

Remove the F DRIVE PWB FA connector and check if the specified voltage is output to the IA and IB connectors when the power is turned ON.



YES Output alarm from the Wave PWB.

NO

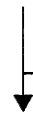
Remove the F DRIVE PWB FP connector and check if the specified voltage is output to the IA and IB connectors when the power is turned ON.



YES F DRIVE PWB failure.

NO

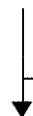
Remove the HV PWB PK connector and check if the specified voltage is output to IA and IB connector when the power is turned ON.



YES HV PWB failure.

NO

Remove the DEF PWB PA connector and check if the specified voltage is output to the IA and IB connectors when the power is turned ON.



YES DEF PWB horizontal deflection system failure.

NO

Remove the DEF PWB PD connector and check if the specified voltage is output to the IB connector when the power is turned ON.



YES DEF PWB vertical deflection system or control system failure.

NO

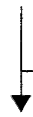
Remove the GAIN CTL PWB and check if the specified voltage is output to the IA and IB connectors when the power is turned ON.



YES GAIN CTL PWB failure.

NO

Remove the VIDEO OUT PWB and check if the specified voltage is output to the IA and IB connectors when the power is turned ON.

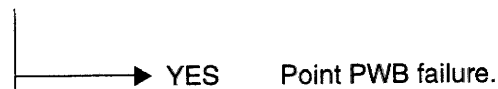


YES VIDEO OUT PWB failure.

TROUBLESHOOTING CHART

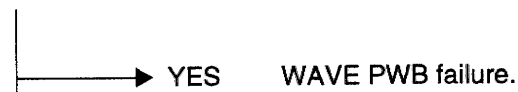
NO

Remove the POINT PWB and check if the specified voltage is output to the IA and IB connectors when the power is turned ON.



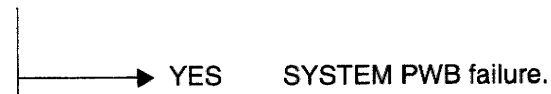
NO

Remove the WAVE PWB and check if the specified voltage is output to the IA and IB connectors.



NO

Remove the SYSTEM PWB and check if the specified voltage is output to the IA and IB connectors when the output connectors IF (2) and (3) of the power supply unit are shorted.

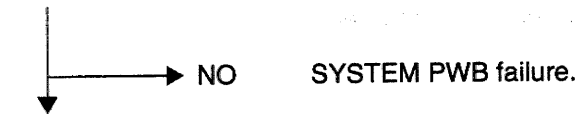


NO

Check to be sure that the power line is not shorted by the connection cable, or by the MOTHER PWB.

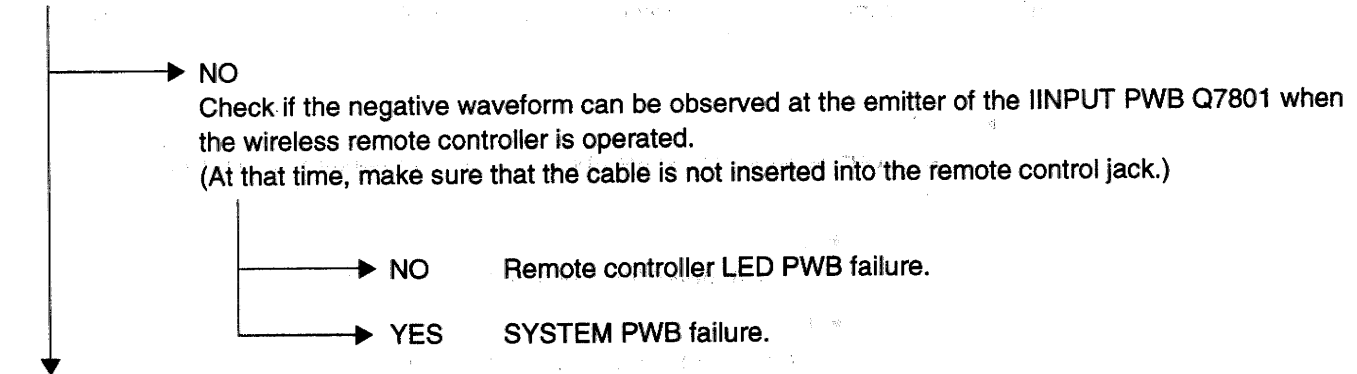
2. Projector Does Not Power UP

Check to see if the STAND BY LED is lit in the STAND BY mode.



YES

Check to see whether or not the POWER LED lights when the power is turned ON.



YES

The power is switched ON. Check other part of the set.

3. Projector Stays Locked in STAND BY mode

Care should be taken as PJ is put in the STAND BY state after turning the power ON for circuit protection.

- 1) When the Fan is Stopped (When any one of the four fans is stopped).

NOTE: Either is only used when offering two options.

There is a thirty second reset cycle time between the STAND BY and POWER ON MODES when rear control panel LEDs display EO. Therefore, replace the defective fan.

- 2) C DRIVE PWB, F-DRIVE PWB or DCPD-DRIVE PWB failure places the projector into the STAND BY mode with the rear control panel LEDs displaying F8, F9, FA.

The set is placed in the STAND BY state with these displayed on the 7-segment LED at the rear panel.

(See ERROR MESSAGE FUNCTION)

TROUBLESHOOTING CHART

4. No High Voltage

This projector was designed with several CRT protect circuits. Therefore, use caution when testing these protect circuits for failures that the HV PWB High Voltage Over Voltage circuit is not activated.

Is HV PWB LP (1) GND Level?

YES (Deflection stop signal)

Which LED is lit, the vertical deflection detection LED (D4010) or horizontal deflection detection LED (D5023)?

YES D4010 lit

Can a vertical sawtooth wave above 1 Vp-p be measured at TP4003?

YES

Vertical deflection detection circuit is failure.

NO

Vertical deflection output circuit failure.

YES D5023 lit

Can the horizontal what is the voltage peak to peak value at these points?

YES

Horizontal deflection detection circuit failure.

NO

Horizontal deflection output circuit failure.

NO

DEF PWB high-tension stop circuit (Q5012, Q5013) in trouble.

NO

Is HV PWB IF (4) is GND level?

YES

Is 110V line dropped?

YES

Refer to item 1 "Power and Associated Equipment failure".

NO

Power unit 110V drop detector circuit failure.

YES

Is the high voltage drive pulse of about 6 Vp-p output at the HV PWB IC5501 (8) and (11)?

YES

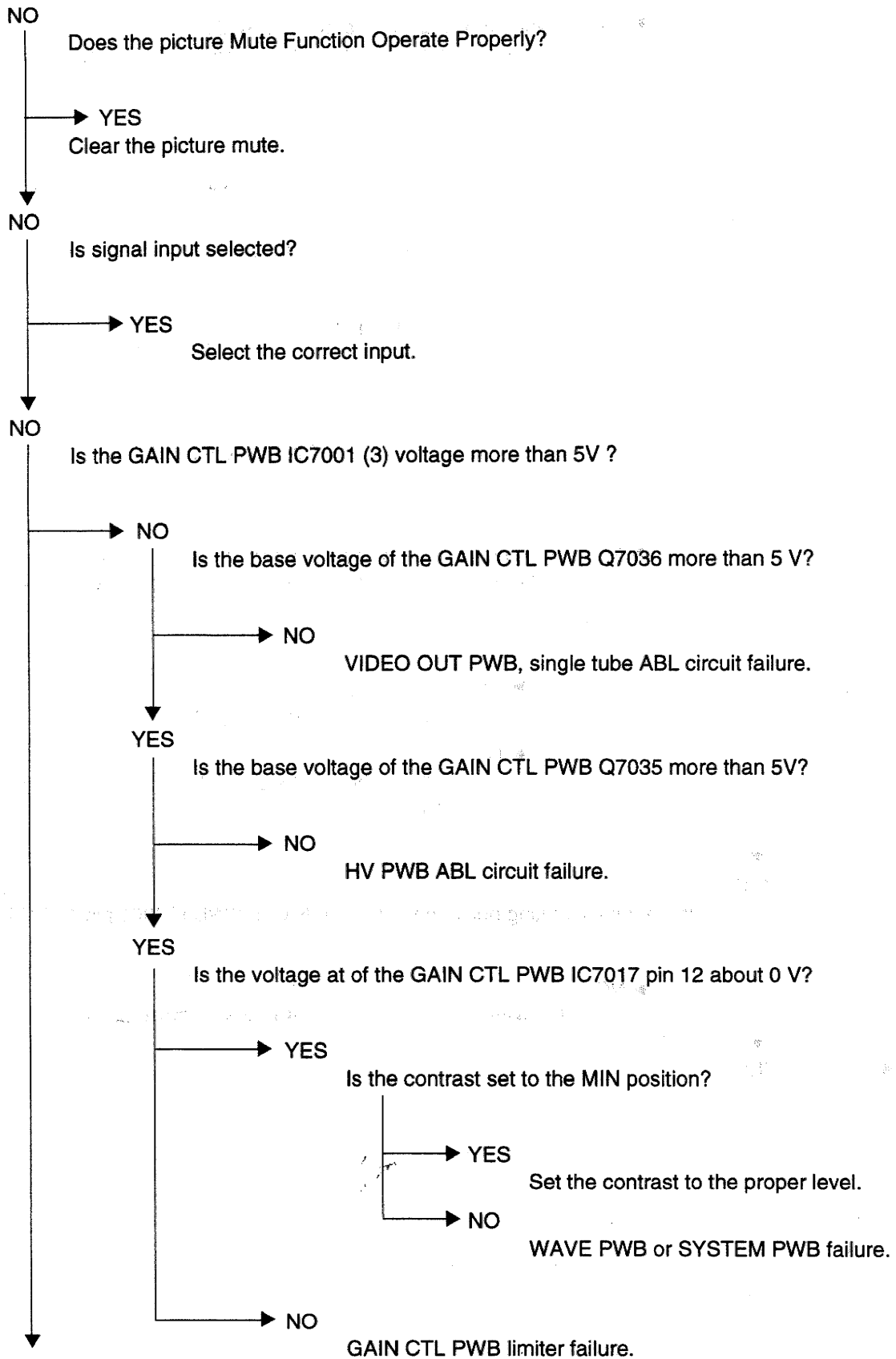
High-tension voltage circuits (Q5515 ~ 18), FBT failure.

NO

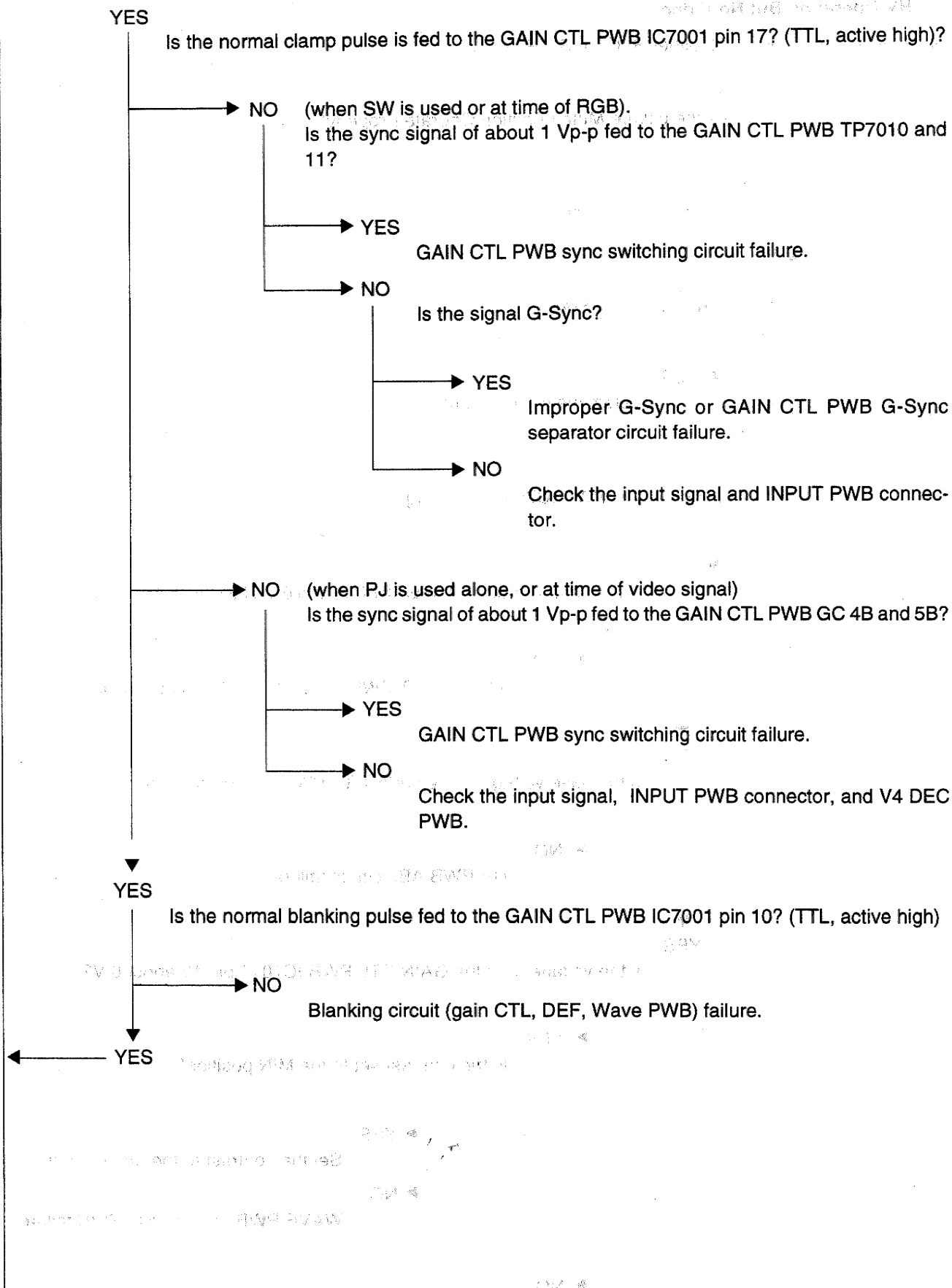
HV PWB high voltage control circuit failure. (IC5501, HV protector, etc.)

5. HV Operation But No Video

Is the video image output to either R, G, or B CRT?



TROUBLESHOOTING CHART



TROUBLESHOOTING CHART

YES

Is the video signal of about 0.4Vp-p fed to pins 4, 6, and 8 of the GAIN CTL PWB IC7001?

NO

(At time of SW use or at time of RGB)

Is the video signal of about 0.7Vp-p fed to the GAIN CTL PWB TP7001, TP7002, and TP7003?

YES

GAIN CTL PWB video switching circuit failure.

NO

Check the input and INPUT PWB connector.

NO

(At time of PJ use alone, and at time of video)

Is the video signal of about 0.7Vp-p fed to the GAIN CTL PWB GC 1B, 2B, and 3B?

YES

GAIN CTL PWB video switching circuit failure.

NO

Check the input signal, INPUT PWB connector, and V4 DEC PWB.

YES

Is the video signal of about 1Vp-p output to the GAIN CTL PWB TP7005, TP7006, and TP7007?

NO

GAIN CTL PWB pre-drive circuit failure.

YES

Are the video signal of about 3.8Vp-p, about 4.0Vp-p, and about 3.2Vp-p output to the VIDEO OUT PWB TP3007, TP3207 and TP3407?

NO

CRTOUT PWB failure or VIDEO OUT PWB failure.

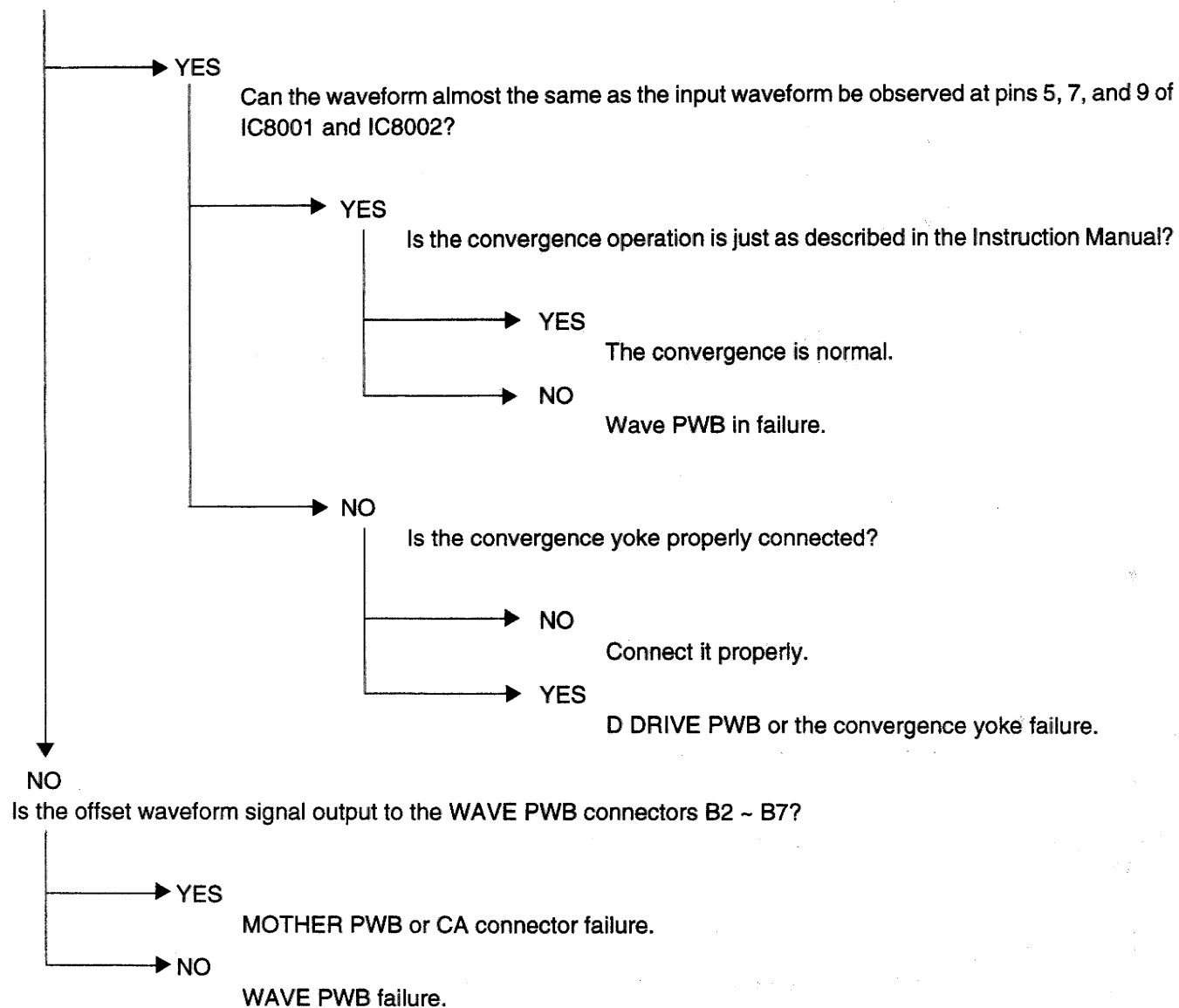
YES

The CRT not output a signal, or G2 connector failure.

TROUBLESHOOTING CHART

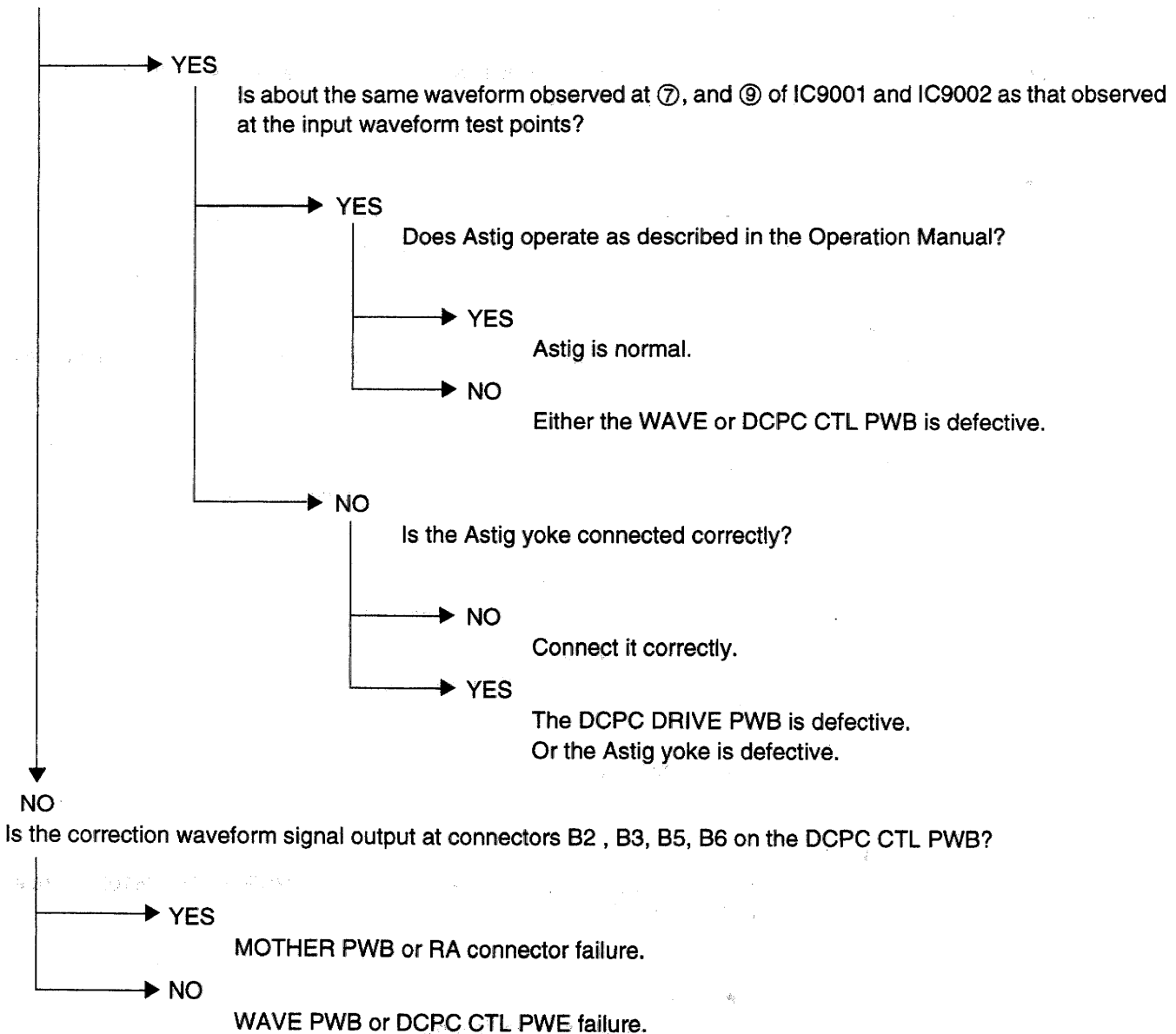
6. Convergence Failure

Is the offset wave signal of about 1 to 5Vp-p is fed to input waveform test points TP8001~ TP8006 of the C DRIVE PWB.



7. Astig Drive

Check pins 1, 2 at input waveform test point TP9001 on the DCPC DRIVE PWB and pins 3 and 4 at test point TP9002 on the same PWB that the normal correction waveform signal is applied to them?



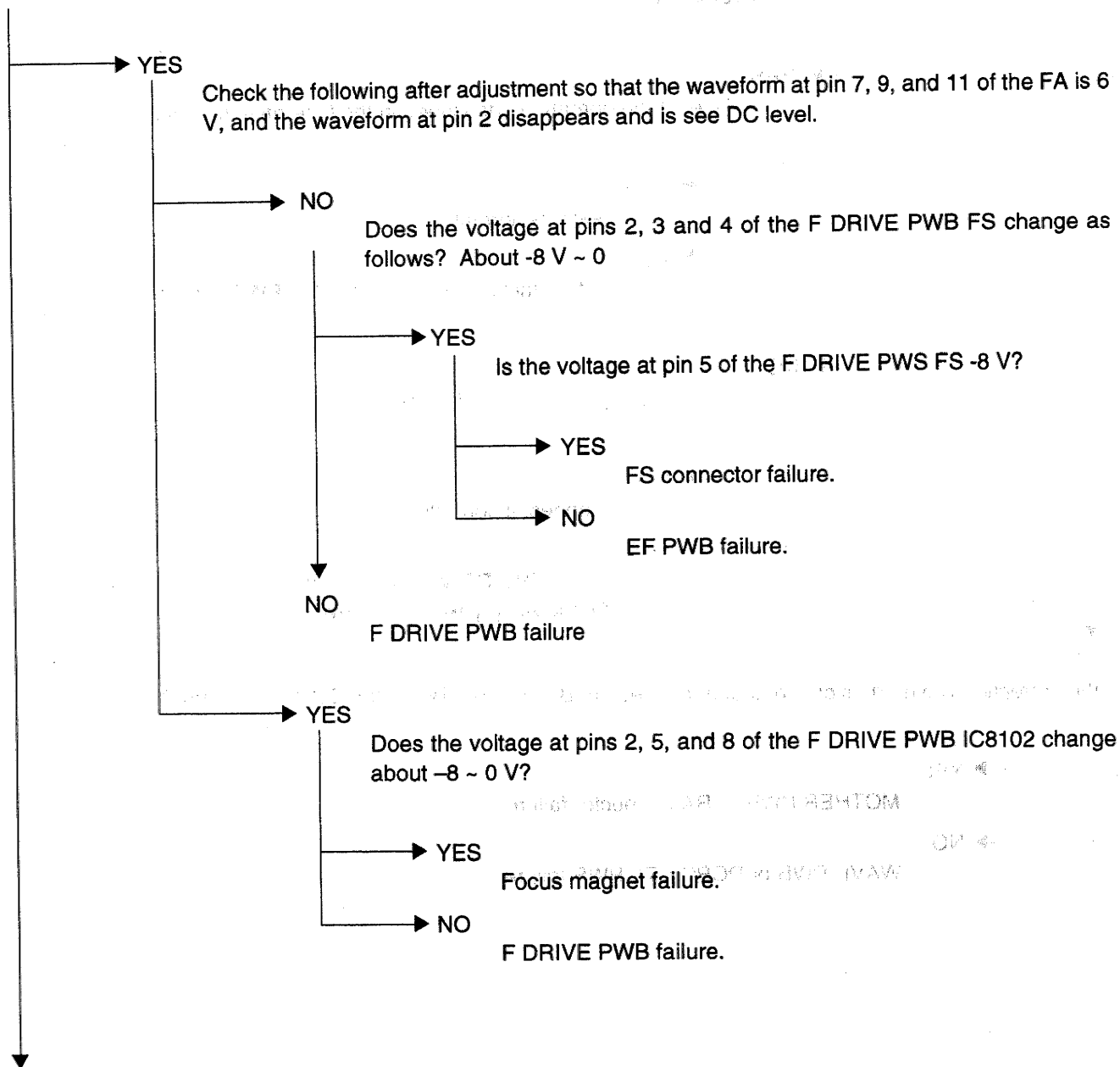
TROUBLESHOOTING CHART

8. Electric Focus Failure

Is the static focus not proper? Or, the vertical dynamic focus improper?
Or else, the horizontal dynamic focus improper? ---- can be localized.

8-1. Static Focus Failure

Does the voltage at pins 7, 9 and 11 of the DRIVE PWB FA change to about 0 ~ 2 V when adjusting the static focus from the minimum to the maximum, from the remote controller?



TROUBLESHOOTING CHART

NO

Do change the voltage at connector B26, 27, or 29 of the Wave PWB change to about 0 ~ 12 V when adjusting the static focus from the minimum to the maximum?

YES

MOTHER PWB and FA connector failure.

NO

WAVE PWB failure.

8-2. Vertical Dynamic Focus Failure

When the vertical edge focus is set to the maximum. Is the voltage at pin 7, 9, 11 of the F DRIVE PWB FA is about 2 Vp-p (V-paravola wave form)?

NO

Is the voltage at the connector B26, 27, 29 of the WAVE PWB about 2 Vp-p?

YES

MOTHER PWB and FA connector failure.

NO

WAVE PWB failure.

YES

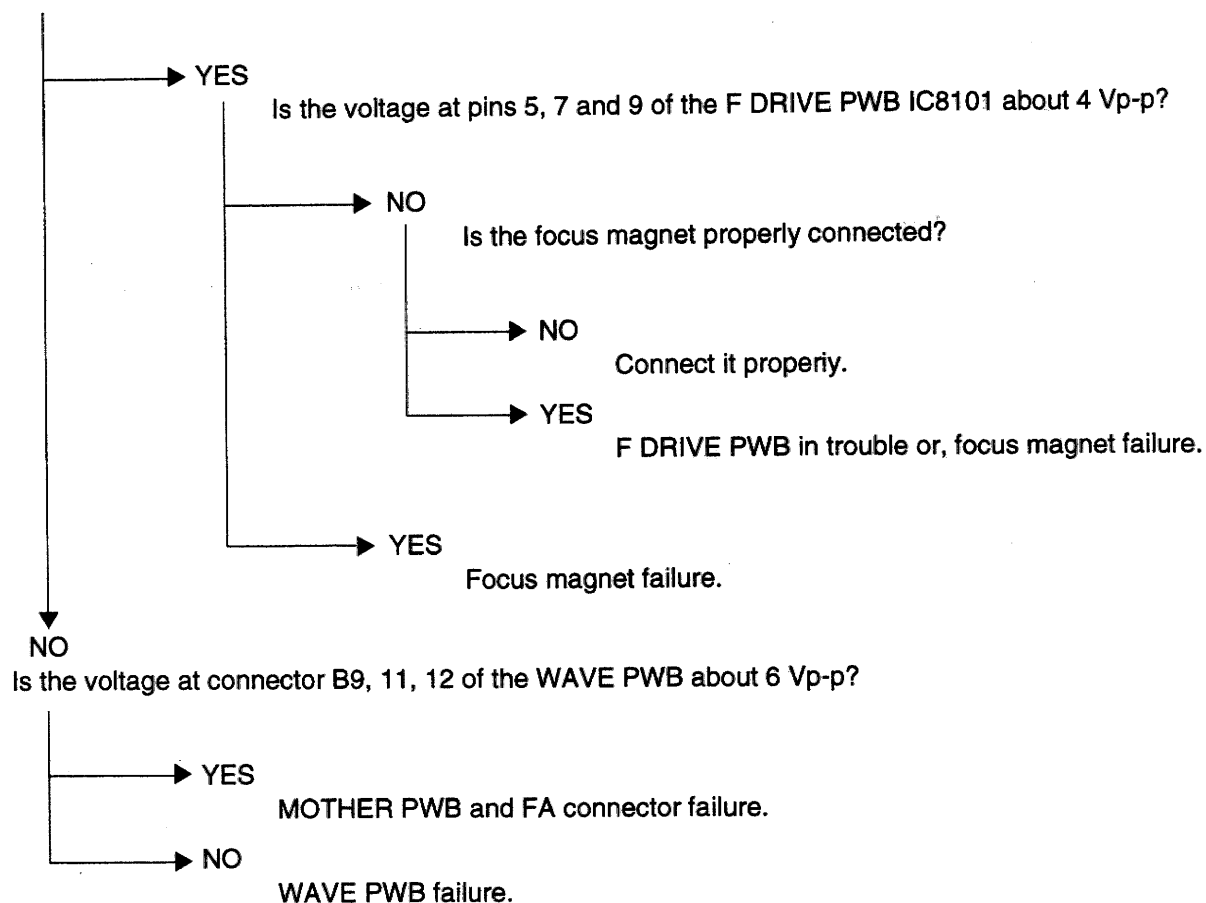
8-1 Verify proper Static Focus Operation.

TROUBLESHOOTING CHART

8-3. Horizontal Dynamic Focus Failure

When the balance between the left and the right is poor, adjust the tilt phase.

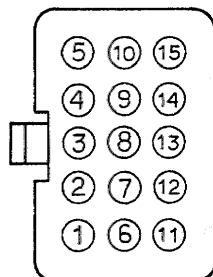
Is the voltage at pin 1, 3, 5 of the F DRIVE PWB FA about 6 Vp-p when both L and R the horizontal edge focus is maximum?



[Attached Sheet 1]

PS Unit
Specifications of Connector Pin

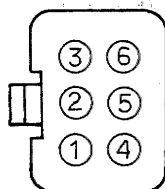
(1) "IB"



Connector Pin Specifications

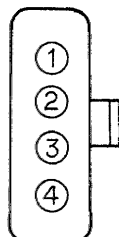
⑤ 35V	⑩ GND	⑮ GND
④ 60V	⑨ GND	⑭ 5.0V (STAND-BY)
③ 150V	⑧ -35V	⑬ 5.0V
② GND	⑦ -15V	⑫ GND
① 110V	⑥ 15V	⑪ 6.3V

(2) "IA"



③ -F/V	⑥ -75V
② F/V	⑤ GND
① +B. H. DEF	④ +B. CTL

(3) "IF"



① MUTE
② POWER
③ FAN STOP
④ GND

ERROR MESSAGE FUNCTION

ERROR CODE EXPLANATION

This projection systems have the capability of displaying an error message when either of the following occur:
projector operation failure or improper connection.

Code messages are displayed on the 2 seven segment displays located on the rear control panel.

Code list and explanations can be found on the attached sheets.

1. 7-Segment Display Error Code List

1. Communication Errors

- | | |
|---|---|
| (1) "F3"
Point PWB communications error. | (9) "F9"
Focus has stopped. |
| (2) "F7"
Point PWB does not respond. | (10) "FA"
DCPC (ASTIG) has stopped. |
| (3) "F1"
Switcher communications error. | (11) "FB"
Fail to count the Vertical Lines. |
| (5) "F5"
Switcher does not respond. | (12) "FC"
VCC+15V down. |
| (6) "F4"
System program has crashed. | (13) "FD"
HV down. |
| (7) "F8"
Convergence, has stopped. →
• Is the PP pulse normal.
• CF drive overvoltage. | (14) "FE"
VIDEO DEC PWB does not be installed. |
| (8) "E0"
Fan stoppage. | |

2. DEF PWB Failure

- (1) "B1" ~ "BF"
Refer to "3. DEF PWB Failure Diagnosis" for further details.

3. Gain CTL/Video OUT PWB Failure

- (1) "41" ~ "7F"
Refer to "5. Gain CTL/Video OUT PWB Failure Diagnosis" for further details.

4. HV PWB Failure

- (1) "D0"
HV OFF with the protector operated. →
• The PS unit 110 V dropped.
• DEF deflection stopped.
• Video OUT output abnormal.
• HV overcurrent.
• HV overvoltage.
- (2) "D1"
HV OFF without the protector operated. → • Cause: HV PWB in trouble.

2. DEF PWB Failure Diagnosis

Display	DEF	Symptom	Next Step
B1	OK	H sync input alarm	TO STEP 01
B2	OK	V sync input alarm	TO STEP 01
B3	OK	HV sync alarm	TO STEP 01
B4	NG	H deflection stopped	TO STEP 02
B5	NG	H deflection stopped and H sync input alarm	TO STEP 02
B6	NG	H deflection stopped and V sync input alarm	TO STEP 02
B7	NG	H deflection stopped and HV sync input alarm	TO STEP 02
B8	NG	V deflection stopped	TO STEP 03
B9	NG	V deflection stopped and H sync input alarm	TO STEP 03
BA	NG	V deflection stopped and V sync input alarm	TO STEP 03
BB	NG	V deflection stopped and HV sync input alarm	TO STEP 03
BC	NG	HV deflection stopped	TO STEP 01, 02, 03
BD	NG	HV deflection stopped and H sync alarm	TO STEP 01, 02, 03
BE	NG	HV deflection stopped and V sync alarm	TO STEP 01, 02, 03
BF	NG	HV deflection stopped and HV sync alarm	TO STEP 01, 02, 03

- * Step 01 : Check GAIN CTL PWB for valid input signal.
- * Step 02 : H deflection yoke connector check and F/V power check.
- * Step 03 : Deflection yoke connector check and DEF output check.

ERROR MESSAGE FUNCTION

3. GAIN CTL/VIDEO PWB Failure Diagnosis

NOTE: This listing containing variations of the following explanation which is confusing. For example OUT (B) Not output is easier to understand when written: No (B) OUTPUT'. Therefore the following corrections should be made for this page and the next:

Current listing	Correction
OUT (B) Not output	No (B) Video Output
OUT (G) Not output	No (G) Video Output
OUT (R) Not output	No (R) Video Output
OUT (R, G, B) Not output	No (R, G, B) Video Output
GAIN (R, G, B) Not output	No (R, G, B) Video Gain Output

Display	Gain/OUT	Symptom	Next Step
41	NG	OUT (B) Not output.	TO STEP 01
42	NG	OUT (G) Not output.	TO STEP 01
43	NG	OUT (G, B) Not output	TO STEP 01
44	NG	OUT (R) Not output	TO STEP 01
45	NG	OUT (R, B) Not output	TO STEP 01
46	NG	OUT (R, G) Not output	TO STEP 01
47	NG	OUT (R, G, B) Not output	TO STEP 01
48	***	***	
49	NG	GAIN (B) Not output	TO STEP 02
4A	***	***	
4B	NG	GAIN (B), OUT (G) Not output	TO STEP 03
4C	***	***	
4D	NG	GAIN (B), OUT (R) Not output	TO STEP 03
4E	***	***	
4F	NG	GAIN (B), OUT (R, G) Not output	TO STEP 03
50	***	***	
51	***	***	
52	NG	GAIN (G) Not output	TO STEP 02
53	NG	GAIN (G), OUT (B) Not output	TO STEP 03
54	***	***	
55	***	***	
56	NG	GAIN (G), OUT (R) Not output	TO STEP 03
57	NG	GAIN (G), OUT (R, B) Not output	TO STEP 03
58	***	***	
59	***	***	
5A	***	***	
5B	NG	GAIN (G, B) Not output	TO STEP 02
5C	***	***	
5D	***	***	
5E	***	***	
5F	NG	GAIN (G, B), OUT (R) Not output	TO STEP 03

ERROR MESSAGE FUNCTION

Display	Gain/OUT	Symptom	Next Step
60	***	***	
61	***	***	
62	***	***	
63	***	***	
64	NG	GAIN (R) No output	STEP 02
65	NG	GAIN (R), OUT (B) No output	STEP 03
66	NG	GAIN (R), OUT (G) No output	STEP 03
67	NG	GAIN (R), OUT (G, B) Output	STEP 03
68	***	***	
69	***	***	
6A	***	***	
6B	***	***	
6C	***	***	
6D	NG	GAIN (R, B) No output	STEP 02
6E	***	***	
6F	NG	GAIN (R, B), OUT (G) No output	STEP 03
71	***	***	
72	***	***	
73	***	***	
74	***	***	
75	***	***	
76	NG	GAIN (R, G) No output	STEP 02
77	NG	GAIN (R, G), OUT (B) No output	STEP 03
78	***	***	
79	***	***	
7A	***	***	
7B	***	***	
7C	***	***	
7D	***	***	
7E	***	***	
7F	NG	GAIN (R, G, B) No output	STEP 04

Note: *** Unused mode. Possible detection section failure.

* Step 01: Check if the CRT is cut off.

If it is replace the CRT PWB.

* Step 02: 1) Verify valid input signal.

(If this problem occurs in video but not RGB mode, then the V4-DEC PWB is faulty.)

Note: An all white raster must be input to run this check.

2) If nothing unusual is found, replace the GAIN CTL PWB Check performance one more time.

* Step 03: If error persists after performing step 02; Go back to step 01.

* Step 04: 1) First, check the power supply unit. (180 V, 15 V)

2) When the power supply unit is normal, perform Step 02.

1. The first part of the message is a header containing the following information:

TO: [illegible]
FROM: [illegible]
SUBJECT: [illegible]

2. The second part of the message is the body, which contains the following information:

[illegible text]

3. The third part of the message is the footer, which contains the following information:

[illegible text]

Trouble Repair

SERVICE (FIELD TECHNICIAN) ADJUSTMENTS

I. SCOPE

The Adjustment Procedures outlined on the following pages covers both the PG-6100/6100G/9100/9100G projectors.

Standard Adjustment Conditions

1. Supply Voltage : AC 120V, 60Hz (PG-6200/9200)
2. Burn In. AC220~240V, 50Hz (PG6200G/9200G)
Allow the projector to warm up for a minimum of 20 minutes before performing any adjustment procedures.
3. Input Signals
 - (1) Video Inputs
Video signal : 1.0 Vp-p, 75Ω, positive
S-video signal : Y: 1.0 Vp-p, 75Ω, positive
C: 0.28 Vp-p, 75Ω burst level
 - (2) RGB Input
Video signal : 0.7 Vp-p, 75Ω, positive
Sync signal : 1.0 Vp-p, 75Ω, positive/negative
Sync On Green video signal : 0.7 Vp-p, 75Ω positive
Sync On Green sync signal : 0.3 Vp-p, 75Ω
Deflection frequency : H: 15-69kHz PG-6200/6200G
: H: 15-100kHz PG-9200/9200G
: V: 38-150Hz PG-6200/6200G/9200/9200G
4. Screen
Be sure to use a 100" flat screen.
5. The projector is adjusted in Stand Alone configuration.
6. The Intelligent Switcher System ISS-6010/6010G should be properly adjusted in advance.
7. For detailed information about the operating method and installation location of the control section and remote control, refer to the relevant Instruction Manual.
8. Unless otherwise specified, the digital control picture shall be adjusted in a normalized state (color, and sharpness shall be 50%, the brightness shall be 60% and the tint shall be 0%, and the contrast shall be 75%).
9. With regard to the adjustment of the video signal input, the video mode shall be in the fixed MANUAL mode when using signals without the burst signal, namely, cross signal, crosshatch signal, dot signal, etc.

II. SERVICE (FIELD TECHNICIAN) ADJUSTMENTS

1. High-Voltage Adjustment

NOTE: Performed only when High voltage unit replaced.

High-Voltage Adjustment

① HV ADJ

- (1) Connect a high voltmeter to the HV CR block. Switch power on and input an all-white NTSC signal input.
- (2) Adjust the high voltage to 32.0 ± 0.1 kV using VR5501 HV ADJ.
- (3) Inject silicon rubber into VR5501 to seal it. Measure the voltage mentioned in step (2) above, and check that it is 32.0 ± 0.1 kV.

High-Voltage Protect Adjustment

① HV Protect (2)

- (1) Connect a digital voltmeter to the following:
 - + end: TP5501 REF terminal
 - end: TP5503 HV protector (2) terminal
- (2) Input an NTSC all white signal and set the brightness and contrast of remote control to the MAX position. Set S5502 to ON Position.
- (3) Adjust VR5503 HV PROTECT (2) to 0.15 ± 0.01 V.
- (4) Inject silicon rubber into VR5503 to seal it. Measure the voltage at HV PROTECT (2) above, and make sure that it is 0.15 ± 0.01 V.

② HV Protect (1)

- (1) Connect a digital voltmeter to the following:
 - + end: TP5501 REF terminal
 - end: TP5502 HV protect (1) terminal
- (2) Adjust VR5502 HV PROTECT (1) to 0.15 ± 0.01 V.
- (3) Inject silicon rubber into VR5502 to seal it. Measure the voltage at HV PROTECT (1) above, and make sure that it is 0.15 ± 0.01 V. Set S5502 to OFF Position.

SERVICE (FIELD TECHNICIAN) ADJUSTMENTS

2. DEF PWB

DEF PWB

NOTE: Performed when DEF PWB is replaced.

1) Control VRs and Switch Settings

1)-1 Turn VR5004 fully counterclockwise, and set all other control VRs to mechanical center.

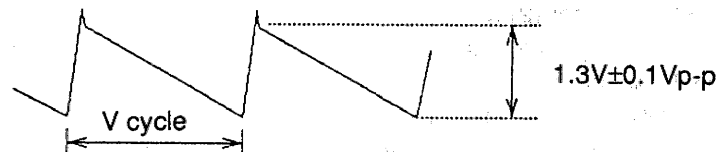
1)-2 Set S5002 to the ADJ position.

Also set S4201 to OFF position.

2) Vertical Height and Vertical Hold Adjustments

2)-1 Connect the vertical deflection yoke to connectors VR, VG and VB.

2)-2 Connect an oscilloscope to TP4003 and make adjustment so that the vertical sawtooth wave at VR4002 V-HEIGHT equals 1.3 ± 0.1 Vp-p (The peak edge should be ignored in this case).



2)-3 The vertical sync is supplied from the HV connector.

HV PIN ③ : Vertical sync signal (See the figure shown below.)

HV PIN ⑨ : GND

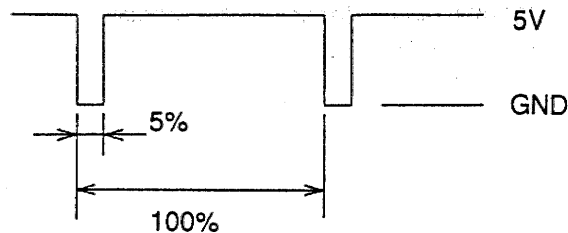


Fig. 2)-4

SERVICE (FIELD TECHNICIAN) ADJUSTMENTS

- 2)-4 Check to be sure that the sawtooth wave of TP4003 locks to the vertical sync signal when the 38 Hz or 150 Hz vertical sync signal is supplied.
- 2)-5 Pull the VG connector out and check to be sure that D4010 lights and that LP pin ① voltage is greater than 10Vdc.
- 2)-6 Make sure that the waveform of HV pin ② and that of DP pin ③ appear as shown in Fig. 2)-7.
- 2)-7 The waveform shown in Fig. 2)-7 moves back and forth with respect to the vertical sync signal when the voltage at DP pin ① changes from 0-12V. (The trigger is vertical sync signal.)

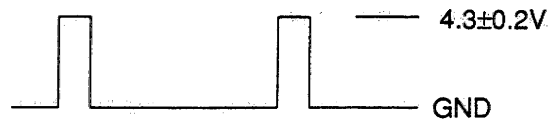


Fig. 2)-6

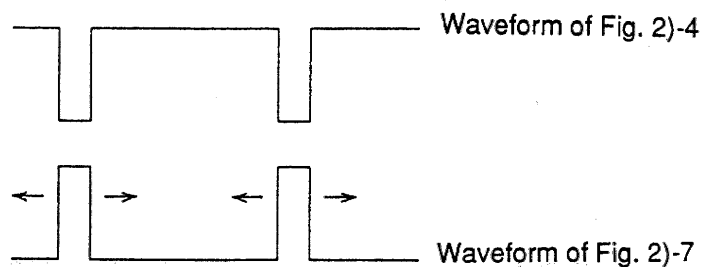


Fig. 2)-7

SERVICE (FIELD TECHNICIAN) ADJUSTMENTS

3) Horizontal Oscillation Adjustment

- 3)-1 The HV connector supplies the Horizontal sync signal.

HV pin ① Horizontal sync signal

HV pin ⑨ GND

Waveform is the same Fig. 2)-4

- 3)-2 Adjust VR5001 F/V CTL1 to 3.00 ± 0.02 V at TP5003 when the horizontal sync signal frequency is 30 kHz.

- 3)-3 Connect a frequency counter or oscilloscope to TP5005, and adjust VR5006 H.OSC(1) to 15.0 ± 0.2 kHz when the horizontal sync signal frequency is 15 kHz; VR5003 FV CTL(2) to 25.0 ± 0.2 kHz when the horizontal sync signal frequency is 25 kHz; VR5007 H.OSC(2) to 55.1 ± 0.2 kHz when the horizontal sync signal frequency is 55 kHz.

- 3)-4 Apply horizontal frequency signals of 15 kHz, 25 kHz, 55kHz, 61kHz and 90kHz and check to be sure that free run is within ± 200 Hz at the frequency below the frequency of 30kHz and within ± 300 Hz at the frequency below 30kHz.

- 3)-5 Set S5002 to the NORM position.

4) Horizontal Amplitude Adjustment

- 4)-1 Connect a horizontal deflection yoke to the HR, HG, and HB connectors.

- 4)-2 Adjust VR5005 H-WIDTH to 1.8 ± 0.1 V at voltage of PA pin ②.

- 4)-3 Adjust VR5301 F/V so that the voltage becomes 3.00 ± 0.02 V at TP5303 when the horizontal sync signal frequency is 30kHz.

Note: Be sure to make adjustment after checking to be sure that the horizontal sync frequency at TP5305 is 30.00 ± 0.01 kHz.

- 4)-4 Check to be sure that when the power at pin ① of PA is removed, D5023 lights and that pin ① of LP becomes in excess of 10V.

- 4)-5 When the HG connector is removed and the power of 4)-2 is connected to pin ① of PA, check to make sure that D5023 remains lit.

- 4)-6 Remove the power at pin ① of PA once again and connect the HG connector for connection off and that pin ① of LP drops below 1V.

5) VR5002 H-POSITION Adjustment

- 5)-1 Make sure that pin ② of HV and pin ① of DP show the waveform of Fig. 2)-7.

- 5)-2 Check to be sure that VR5002 is set in the mechanical center.

- 5)-3 Make sure that the waveform of Fig. 2)-7 moves back and forth with respect to the horizontal sync signal when the voltage at pin ③ of DP is changed from 0 to 12V.

6) Horizontal Deflection Output Transistor Protective Circuit Adjustment

Connect a digital voltmeter to TP5007 (+ terminal) and TP5006 (– terminal), apply a 15-kHz signal input, and adjust VR5004 H-OUT PROTECTOR to 2.0 ± 0.1 V.

SERVICE (FIELD TECHNICIAN) ADJUSTMENTS

H. OSC FREQ CHECK (Fine Adjustment)

- 1) Horizontal Oscillation Frequency Check (Fine adjustment)
 - 1)-1 Set S5002 to the ADJ position.
 - 1)-2 Connect a frequency counter or scope to TP5005.
 - 1)-3 Input signal 7 in RGB mode, and check with VR5006 H. OSC (1) that it is 15.0 ± 0.2 kHz.
 - 1)-4 Input signal 8, and check with VR5003 F/V CTL (2) that it is 25.0 ± 0.2 kHz.
 - 1)-5 Input signal 11, and check with VR5007 H. OSC (2) that it is 55.1 ± 0.2 kHz.
 - 1)-6 Disconnect the frequency counter, and set S5002 back to the NORM position.

H. Phase (1)

- 1) Horizontal Phase Adjustment 1
 - 1)-1 Input NTSC split screen pattern in video mode. Display and use the projector generated coarse cross hatch pattern to make these adjustments.
 - 1)-2 Set CONTRAST to the MIN position.
 - 1)-3 Turn the G screen VR clockwise until the back raster appears.
 - 1)-4 Increase CONTRAST to output the split screen pattern.
 - 1)-5 Adjust G-FOCUS of VR4202 on the DEF PWB.
 - 1)-6 Adjust VR5002 on the DEF PWB until the cross hatch pattern is centered within the raster. (Make sure that the H-Position of remote controll is normalized.)
 - 1)-7 Adjust G-centering MAGNET to magnet the screen center.
(Coarse adjustment)
Carefully note the horizontal line of crosshatch, etc. (in tilt direction) and turn the deflection yoke when any tilt is found.)
 - 1)-8 Switch to RGB and receive signal 15 VGA480 crosshatch and adjust H-LINEAR and V-LINEAR.
 - 1)-9 Adjust H-POSITION and V-POSITION so that the cross hatch comes to the center of the raster.

H. WID, V HGT, H&V LIN

- 1) Horizontal width, Vertical Height, Horizontal and Vertical Linearity Adjustments
 - 1)-1 Input NTSC split screen pattern in video mode. Display and use the projector generated coarse cross hatch pattern to make these adjustments.
 - 1)-2 Adjust H-LINEAR and V-LINEAR, V-LINEAR-VALANCE to make the horizontal and vertical linearities uniform.
 - 1)-3 With H-AMPLITUDE set to the MAX position, adjust VR5005 H-WIDTH on the DEF PWB to 10% overscan.
 - 1)-4 When set V-AMPLITUDE to the Max position, adjust VR4002 V-Height on the DEF PWB so that maintain balance of H-AMPLITUDE.
 - 1)-5 Switch to RGB and receive signal 15 VGA480 character H.
 - 1)-6 Adjust H-Amplitude and V-Amplitude so that 5% underscan is observed on the screen.
After that, check to be sure that Linear, Position (both H and V) with respect to the reater and make necessary fine adjustment, when and if necessary.
Note: Adjustment of amplitude, phase, and linearity should be done by G signal tube.

H. Phase (2)

- 1) Adjustment of Amplitude, Phase, and Electrical Focus (VIDEO)
 - 1)-1 Receive a 525 cross hatch signal with the VIDEO.
 - 1)-2 Adjust H- Position and V-Position so that the cross hatch pattern is centered within the raster.
 - 1)-3 Adjust H-Amplitude so that 5% overscan is observed on the screen. Also adjust V-Amplitude in such a way that V-Amplitude is balanced.
 - 1)-4 Check the H-Linearity and V-Linearity and make fine adjustment.
 - 1)-5 Adjust the center focus and the edge focus.
 - 1)-6 Receive the 625 cross hatch pattern and similar make adjustment.
 - 1)-7 After adjustment, turn S4201 on.
(To obtain satisfactory white uniformity, When adjusting the B-Center Focus from the remote controller, be sure to turn S4201 off in advance.)

SERVICE (FIELD TECHNICIAN) ADJUSTMENTS

H. Phase, V POS, H WID, V HGT Check

Checking Horizontal Phase, Vertical Position, Horizontal Amplitude, and Vertical Amplitude

1) Horizontal Phase, Vertical Position

Check that the center of each signal meets the center of the screen.

2) Horizontal Amplitude, Vertical Amplitude

2)-1 Receive the 525 cross hatch pattern and check to be sure that the horizontal amplitude is 5% overscanned and that the vertical amplitude is balanced.

2)-2 Receive the 625 cross hatch pattern and check to be sure that the horizontal amplitude is 5% overscanned and that the vertical amplitude is balanced.

2)-3 Receive signal 15 VGA480 H character, and check that horizontal and vertical amplitude show 5% underscan.

3. White Balance Procedure

Perform when V-DEC PWB, Video Out PWB, SCREEN PWB, GAIN CTL PWB or CRT is replaced.

Adjustment VRs Initial Settings

- GAIN CTL PWB

WHT P. LEVEL (VR7001)

BKG LEVEL (VR7005)

SUB CONT (VR7009)

Mechanical center

- VIDEO OUT PWB

R BLK REF (VR3002)

R SUB BRT (VR3003)

R DRV RET (VR3005)

R WHT 2 (VR3007)

R OS (VR3010)

MIN (fully counterclockwise)

Mechanical center

G BLK REF (VR3202)

G SUB BRT (VR3203)

G DRV RET (VR3205)

G WHT 2 (VR3207)

B BLK REF (VR3402)

B SUB BRT (VR3403)

B DRV RET (VR3405)

B WHT 2 (VR3407)

B OS (VR3410)

MIN (fully counterclockwise)

Mechanical center

MIN (fully counterclockwise)

Mechanical center

- SCREEN PWB

R G2 (VR7901)

G G2 (VR7902)

B G2 (VR7903)

MIN (fully counter clockwise)

S3601 (AKB TEST/NORM) TEST position

Remote Control

Unless otherwise specified, set the COLOR, and SHARPNESS controls to the center (50%) position, the BRIGHT control to the 60% position, the TINT control to the 0% position, and the CONTRAST control to the 100% position in pre-adjustments, and store these settings in the memory.

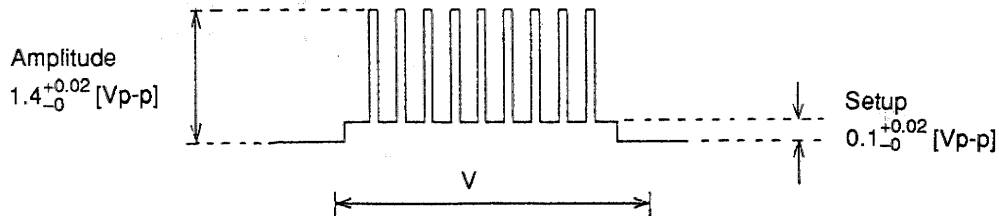
After the pre-adjustments, set CONTRAST to 75% and store this setting in the memory.

SERVICE (FIELD TECHNICIAN) ADJUSTMENTS

White Balance Preadjustment

* The trigger of oscilloscope can be made easier to see by bringing an other probe into contact with DEF PWB TP4001(VD).

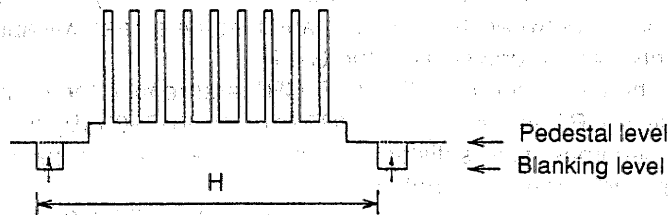
- ① Apply an VIDEO cross hatch signal input. Set CONTRAST to MAX on the remote controller, and store it in the memory.
- ② Check the emitter of Q715 on the V4-DEC PWB that the waveform is as shown in the figure below. (Use an extension PWB for the V4 DEC PWB.)



If any deviation is found, adjust VR702 for amplitude and VR812 for setup on the V4-DEC PWB.

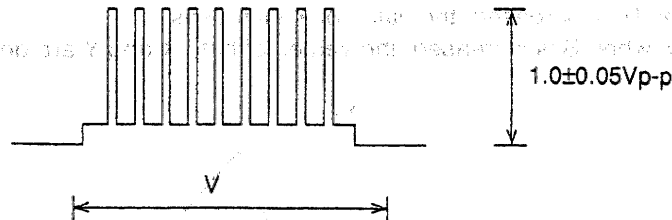
- ③ Check TP7006 (G-channel OUT) on the GAIN CTL PWB, and adjust as follows:
 - (1) Adjust VR7001 (BKG LEVEL) until the blanking level is the same as the pedestal level (± 0.05 V).

(Trigger: H period)



- (2) Adjust VR7009 (SUB CONT) until the cross hatch signal is 1.0 ± 0.05 Vp-p.

(Trigger: V period)



- ④ Check TP3008 (G: TP3208, B: TP3408) on the VIDEO OUT PWB, and adjust VR3002 to 5 ± 0.5 [V] at voltage of test point.

(G: VR3202, B: VR3402)

Similarly adjust the G and B channels.

SERVICE (FIELD TECHNICIAN) ADJUSTMENTS

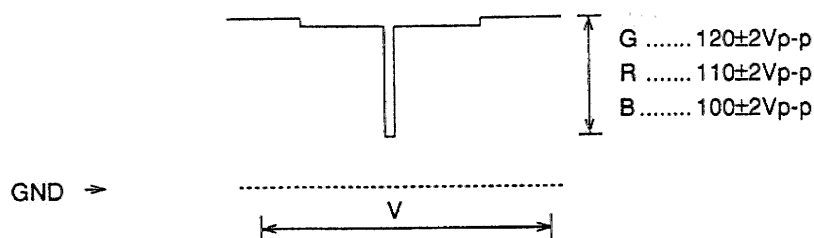
- ④ Check TPTP3207 (R: TP3007, B: TP3407) on the VIDEO OUT PWB and adjust as follows:
 (1) Adjust the cross hatch signal amplitude to 4.0 ± 0.1 Vp-p using VR3207 (R: VR3007, B: VR3407).

Similarly adjust the K and B channels.

Adjust the cross hatch signal amplitude for the R and B channels as follows:

R channel 3.8 ± 0.1 Vp-p (VR3007 (R WHT 2))

B channel 3.2 ± 0.1 Vp-p (VR3407)

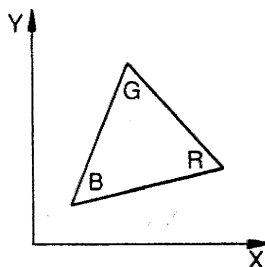


White Balance Adjustment

- 1) Setting
 - ① Supply a VIDEO split field gray scale pattern.
 - ② Set the VIDEO OUT PWB S3601 to the TEST position.
 - ③ Set the CONTRAST to the MAX position and store the new setting.
 - ④ Turn AKB ON on the Source Information screen.
 - ⑤ Check to be sure that color temperature is 6500 k (initial value) on the Source Information screen.
- 2) Put the cap on R-CRT and B-CRT and adjust the G-CRT by VR7902 on the SCREEN PWB so that there is clear distinction between 10% and 5% and that the screen will appear similarly dark at 5% and 0% with special attention to the grayscale in the G-CRT.
- 3) ① Remove the cap of the R-CRT and B-CRT and reduce the contrast using the remote controller then adjust the R-CRT and B-CRT by VR7901 (R), VR7903 (B) on the SCREEN PWB so that the white balance becomes quite satisfactory with special attention paid to the grayscale in the center of the NTSC split field gray scale pattern.
 (Because the G-CRT is standard, do not move the VR7902 (G).)
 ② Set the contrast to the MAX position, measure the color temperature, and adjust the R WHT 2 (VR3007) and B WHT 2 (VR3407) as follows until the following values are obtained.
 $X = 0.335 \pm 0.01$
 $Y = 0.325 \pm 0.01$

Note: When R is increased, the value of X increases.

Also, when B is increased, the values of both X and Y are decreased.



- ③ Repeat steps ① and ② and take the contrast tracking.

After that, supply a crosshatch signal at the maximum contrast. Check to be sure that each cathode amplitude value (TP3007, TP3207, TP3407 on the VIDEOOUT PWB) does not exceed cathode 4.2Vp-p. If the amplitude exceeded the said value, reduce the cathode amplitude of the G-CRT slightly using VR3207 and take step 3). (Refer to 10).)

SERVICE (FIELD TECHNICIAN) ADJUSTMENTS

- 4) Check the onscreen white balance on the Source Information screen, etc. If the white balance does not track properly, adjust the following.

R OS (VR3010)

B OS (VR3410)

on the VIDEO OUT PWB.

(Do not readjust these controls once they have been set.)

- 5) Adjustment of the G-CRT brightness tracking

① Put the cap on the R-CRT and B-CRT.

② Watch

G: TP3208

on the VIDEO OUT PWB by means of a digital voltmeter, switch S3601 to TEST/NORM with 60% brightness, and adjust

G SUB BRT (VR3203)

so as to obtain the same voltage ($\pm 0.1[V]$).

③ Switch S3601 to the NORM side.

④ Adjust the brightness at 0%, pay attention to the G-CRT gray scale, and adjust

G DRV RET (VR3205)

on VIDEO OUT PWB in such a way to obtain the same black for both 30% and 0%.

⑤ Carry out brightness tracking by repeating the steps ② to ④ above.

- 6) Adjustment of the brightness tracking of the R-CRT and B-CRT.

① Take off the caps of R-CRT and B-CRT.

② Watch

R: TP3008

B: TP3408

on the VIDEO OUT PWB with a digital voltmeter, and adjust

R SUB BRT (VR3003)

B SUB BRT (VR3403)

so as to obtain the same voltage ($\pm 0.1[V]$) when the brightness is set to 60% and S3601 is switched by means of TEST/NORM.

③ Turn S3601 to the NORM side.

④ Set the brightness to 0% and adjust

R DRV RET (VR3005)

B DRV RET (VR3405)

on the VIDEO OUT PWB by watching the gray scale of G-CRT so as to obtain a good white balance.

(Refrain from touching VR3203 and VR3205 because G-CRT is used as a reference.)

⑤ Measure the color temperature, and make sure that it is within the standard values.

⑥ Carry out the brightness tracking by repeating the steps ② to ⑤ above.

- 7) Measure the color temperature when the brightness is 0% and 100%, and make sure that they are

$X=0.335\pm 0.01$

$Y=0.325\pm 0.01$

Moreover, make sure that it changes satisfactorily from brightness 0% to brightness 100%.

* If there is some deviation from the standard values, a fine adjustment by means of

R SUB BRT (VR3003)

B SUB BRT (VR3403)

R DRV RET (VR3005)

B DRV RET (VR3405)

is OK.

SERVICE (FIELD TECHNICIAN) ADJUSTMENTS

SUB BRT VR: When the color temperature deviation is in the same direction for BRIGHT 0% and for BRIGHT 100%.

DRV RET VR: When the color temperature deviation is in opposite directions for BRIGHT 0% and for BRIGHT 100%.

The deviations are in the "same direction" when the R color is stronger when BRIGHT is 0%, and the R color is stronger also when BRIGHT is 100%.

On the other hand, the deviations are in "opposite directions" when the R color gets stronger when BRIGHT is 0% but the same R color gets weaker when BRIGHT is 100%.

It must be remembered, however, that the white balance of the cut-off is lost when the extent of the adjustment made on that occasion is too large.

When the voltage waveforms of

TP3008

TP3208

TP3408

that occur when S3601 is set to the NORM side with BRIGHT set to 0% are made exactly the same as those ones that occur when S3601 is set to the TEST side, and the adjustments are made after that, the color temperature is presumed to get adjusted within the standard values. Thus, prior to making any adjustments in the VR mentioned above, make sure that the voltage waveforms corresponding to S3601 set to the TEST/NORM positions with BRIGHT set to 60% are exactly the same, and make the fine adjustments that are required on that occasion, if any.

8) Enter the cross hatch signal, watch

G: TP3207

R: TP3007

B: TP3407

on the VIDEO OUT PWB, and make sure that the amplitude does not surpass 4.2 [Vp-p].

If the voltage amplitude surpasses 4.2 [Vp-p], carry out the required adjustment by means of the variable resistors

G: VR3207

R: VR3007

B: VR3407

located on the VIDEO OUT PWB so as to obtain 4.2 [Vp-p].

After that, measure the color temperature, and if it surpasses the standard values reduce slightly the cathode amplitude of G-CRT so as to meet the value of Y, and after that make the necessary readjustments.

NOTE: Since the cathode amplitude of G-CRT exerts conspicuous influence on the peak brightness, it is recommended to keep the amplitude reduction extent as small as possible.

9) Turn the ABK "OFF", and store it.

4. Centering Magnets Adjustments

Refer to Setup Guide Section Centering Magnet Adjustment (Service manual PG-6000/6000G/9000/9000G Pages 3-23.)

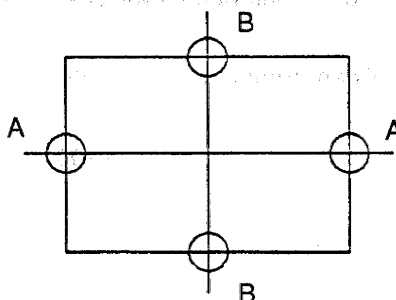
5. Focus Adjustment

Lens (Optical)

- (1) Receive signal 15 VGA480 H character in RGB mode.
- (2) Display only the G-CRT.
- (3) Watch the center part, and adjust the G-CRT lens focus knob.
- (4) Watch the peripheral part, and adjust the G-CRT lens peripheral focus knob.
- (5) After that, turn the center focus knob once again and make readjustment so that the balance between the center focus and the peripheral focus becomes the best.
- (6) Make a similar adjustment for the R and B CRTs.

Electric (CRT)

- (1) Receive NTSC split screen pattern in video mode.
- (2) Check that G-CENTER FOCUS on the remote control is at 50%, and adjust VR4202 on the DEF PWB, watching the center.
- (3) Watch part selected, and adjust G-EDGE FOCUS.
- (4) Adjust the item (3) point A, B and store the setting.



- (5) If the center focus is adversely affected, repeat steps (3) to (5).
- (6) Repeat steps 2) through 5) if necessary and adjust the focus to the optimum state.
- (7) Just as in the case of step 2) for R and B, adjust VR4201 and VR4203.
- (8) Adjust as in the case of stop (3), (4) for R and B.

Note: At the time of B adjustment, make sure that the DEF PWB FOCUS SW S4201 is placed in the OFF state.

C.P.C Magnets

Refer to Setup Guide Section C.P.C Magnet Adjustment (Service Manual PG-6000/6000G/9000/9000G Pages 3-24).

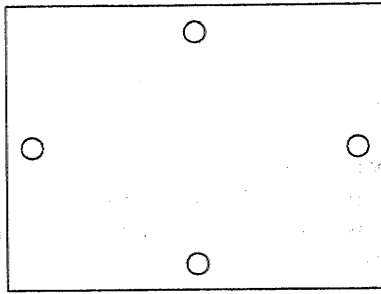
6. ASTIG Adjustment

1. Receive signal 15 VGA480 H character in RGB mode.
2. Check that the beam in the screen center is circular.
3. Adjust the ASTIG CROSS of the remote control so that the beam is circular at the selected points on the screen (top, bottom, left, right)
4. Adjust the ASTIG CORNER of the remote control so that the beam is circular at the selected points on the screen (upper left corner, upper right corner, lower left corner, lower right corner).
5. Check the beam shape in the screen center. If it is not circular, repeat the CPC MAGNET adjustment described in Section 4, then Steps 3 and 4 above.

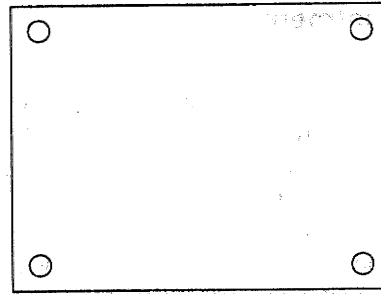
NOTE: When ASTIG is selected, the center focus is automatically defocused and the beam grows in size.

NOTE: When the ASTIG CROSS is adjusted, the ASTIG CORNER will change. Be sure to adjust the ASTIG cross first.

SERVICE (FIELD TECHNICIAN) ADJUSTMENTS



ASTIG CROSS Adjustment Points









ASTIG CORNER Adjustment Point

(for reference) ASTIG Operation

When ASTIG is selected, test pattern dots are automatically displayed, followed by state of defocus and a large beam.

ASTIG has two directions of operation, which are displayed as HV and SK on the screen.

When HV and SK are changed, their beams will change as shown below.

HV	Beam Shape	SK	Beam Shape
+100%		+100%	
0%		0%	
-100%		-100%	

(The above shapes of HV and SK apply in cases where the beam is circular at 0%)

7. Convergence Adjustment

Refer to Setup Guide Section Convergence Adjustment (Service Manual PG-6000/6000G/9000/9000G Pages 3-29).

8. ISS Switcher Connection

Signal Entry

Refer to Setup Guide Section Signal Entry (Service Manual PG-6000/6000G/9000/9000G Pages 3-6).

Size and Centering

Refer to Setup Guide Section Centering Magnet Adjustment (Service Manual PG-6000/6000G/9000/9000G Pages 3-23).

Convergence Check

Refer to Setup Guide Section Setting for Using Point Convergence (Service Manual PG-6000/6000G/9000/9000G Pages 3-58).

Focus Check

Refer to Setup Guide Section Focus Adjustment (Service Manual PG-6000/6000G/9000/9000G Pages 3-20).

III. SERVICE (BENCH) ADJUSTMENTS

1. V4-DEC PWB (PWC-3683)

Items

- ① Preparations
- ② Blanking Position Adjustment (VR705)
- ③ Contrast Level Adjustment (VR702, VR703)
- ④ PAL Comb Filter Adjustment (VR701, T701)
- ⑤ PAL Chroma Adjustment (T752, VR811) (1H DLY Adjustment)
- ⑥ SECAM Chroma Adjustment (T801, T802, T803, T804, VR813)
 - (1) Bell filter adjustment (T801)
 - (2) SECAM ID adjustment (T802)
 - (3) R-Y, B-Y demodulation adjustment (T803, T804, VR813)
- ⑦ Tint Adjustment (VR814)

① Preparations

- Input signals

- (1) Video signal:

NTSC 3.58	color bars
NTSC 4.43	color bars
PAL	color bars
SECAM	color bars

Note: Unless otherwise specified, NTSC 3.58 color bars will be used as video signal.

- (2) S-video signal: NTSC 3.58 color bars

- Preparations

- (1) Terminate the quad decoder output at 75 ohms. (Connect it to a monitor.)
- (2) Turn all the variable resistors (VRs) to the mechanical center position.

SERVICE (BENCH) ADJUSTMENTS

Table 3-1-1

MODE	07A	07B	06A
PAL	LOW	H1	HI
NTSC 4.43	LOW	LOW	HI
NTSC 3.58	LOW	LOW	LOW
SECAM	LOW	HI	LOW
AUTO	HI	LOW	LOW

Note: HI means +5 V and low 0 V.

② Blanking Position Adjustment (VR705)*

Setup level adjustment (VR812)

- (1) Disconnect external signals.
- (2) Connect a probe to the emitter of Q715.
- (3) Turn VR812 fully counterclockwise to increase the brightness all the way.
- (4) Adjust VR705 until the green waveform is 8 ± 0.1 [usec] as shown in Figure 3-2-1.
- (5) Also adjust VR812 until the setup level is 0.1 ± 0.02 [-0] [Vp-p] as shown in Figure 3-2-1.

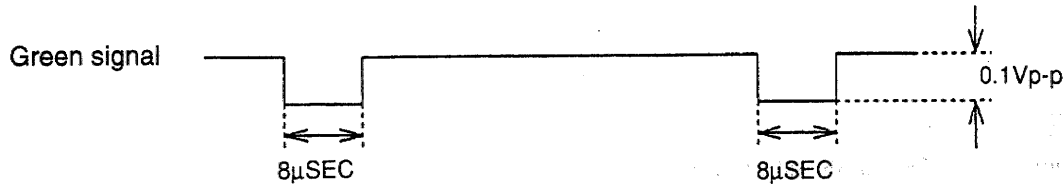


Figure 3-2-1 Green Signal Blanking Waveform

③ Contrast Level Adjustment (VR702, VR703)

- (1) Input an NTSC color bars signal.
- (2) Turn VR703 fully counterclockwise.
- (3) Adjust VR702 until the emitter output of Q715 is $1.4 \pm 0.1/0$ [Vp-p] as shown in Figure 3-1-1.

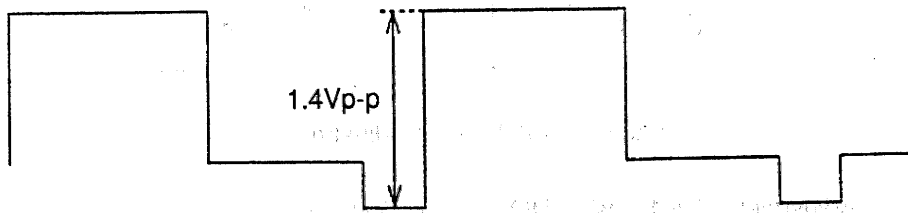


Figure 3-1-1 Green Signal Level

④ PAL Comb Filter Adjustment (VR701, T701)

- (1) Set the quad decoder to manual PAL mode, and input a PAL color bar signal.
- (2) Connect an oscilloscope to pin 7 of IC709, and adjust T701 and VR701 until the color signal component (4.43 MHz) is minimum while watching the waveform.

⑤ PAL Chroma Adjustment (T752, VR811) (1H DLY adjustment)

- (1) Turn the color VR to the maximum position, and receive the DEM signal.
- (2) Connect an oscilloscope to TP803 via the pad shown in Figure 3-5-1.
- (3) Turn T752 to adjust the first wave of each line to the same height. (Figure 3-5-2 (a))
- (4) Turn VR811 to adjust the third wave of each line to the same height. (DELAY) (Figure 3-5-2 (b))
- (5) Lower the brightness of the monitor connected, and check that there is no blind. If there is, repeat the adjustment steps of (2) to (4).

Note: If the adjustment has been properly made, the lower four windows of the test signals will be grey and the upper four windows color when the DEM signal is received from the PM5519.

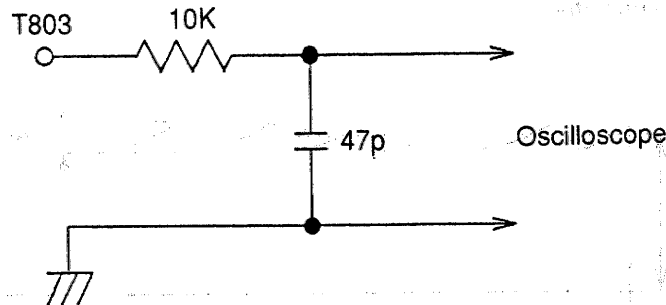


Figure 3-5-1 Pad

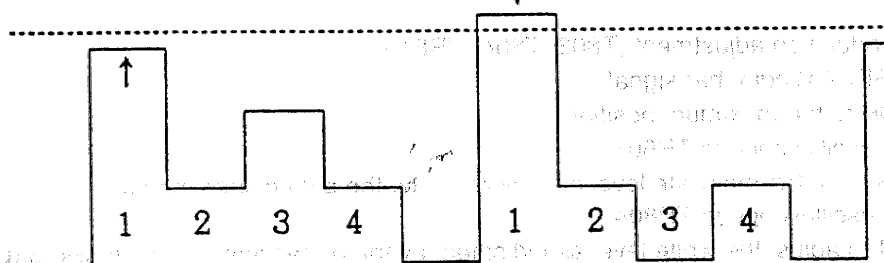


Figure 3-5-2 (a) Before Adjustment

SERVICE (BENCH) ADJUSTMENTS

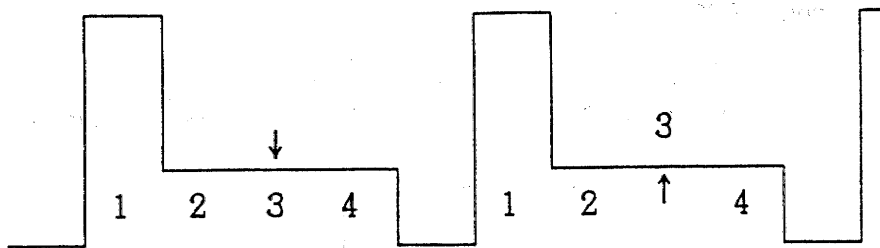


Figure 3-5-2 (b) After Adjustment

⑥ SECAM Chroma Adjustment (T801, T802, T803, T804, VR813)

(1) Bell filter adjustment (T801)

- 1)-1 Set the quad decoder system to the manual SECAM mode.
- 1)-2 Input a SECAM test signal (color bars).
- 1)-3 Connect an oscilloscope to TP801 (pin 18 of IC701), and adjust T801 until the levels are the same every 1H.

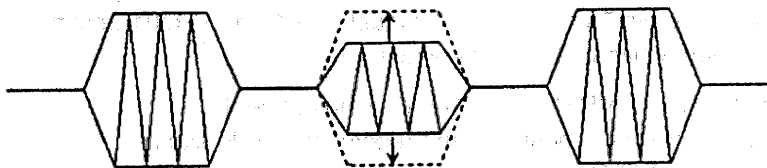


Figure 3-6-1 SECAM Chroma Signal

(2) SECAM ID adjustment (T802)

- 2)-1 Connect a "DMM" and an oscilloscope to the SECAM IDENT output terminal (T802).
- 2)-2 Adjust T802 until the DC+AC components of the wave form reach the maximum (about 8.5 [V_{DC}]).
The test screen appears tinted.

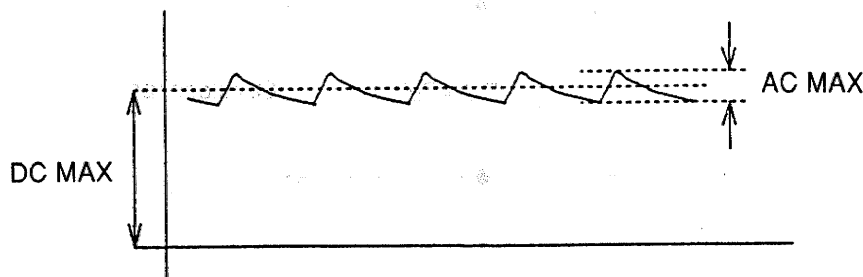


Figure 3-6-2 SECAM IDENT Waveform

(3) R-Y, B-Y demodulation adjustment (T803, T804, VR813)

- 3)-1 Receive a SECAM color bar signal.
- 3)-2 Turn COLOR to the maximum position.
- 3)-3 Connect an oscilloscope to TP803.
- 3)-4 Adjust T803 to adjust the white level as indicated by the dotted lines in Figure 3-6-3 (a).
- 3)-5 Connect an oscilloscope to TP804.
- 3)-6 Adjust T804 to adjust the white level as indicated by the dotted lines in Figure 3-6-3 (b).
- 3)-7 Receive a SECAM slide signal, and adjust VR813 so that the background color will be the same as the color of the PAL slide signal. If necessary, adjust T803 and T804.

Note: Steps 3)-1 to 3)-6 constitute the primary adjustment, and step 3)-7 is the final adjustment.

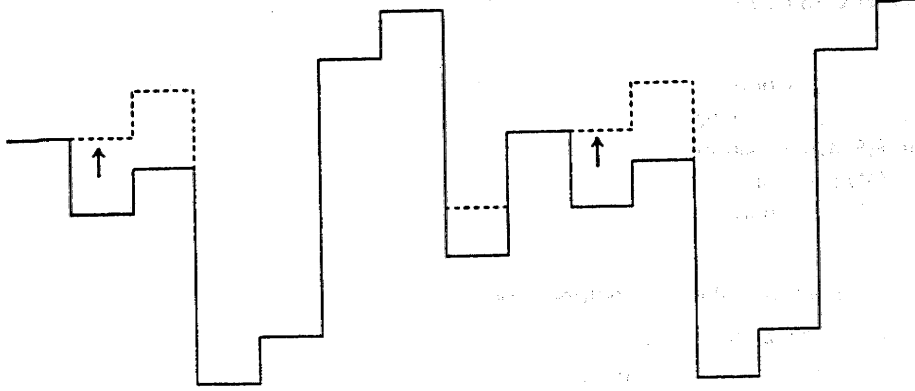


Figure 3-6-3 (a) R-Y Signal

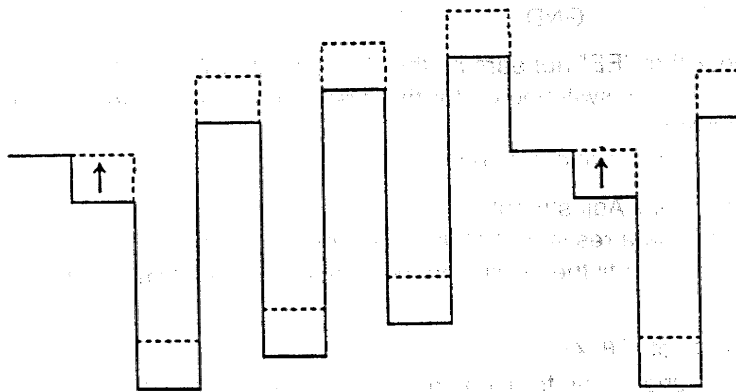


Figure 3-6-3 (b) B-Y Signal

⑦ Tint Adjustment (VR814)

- (1) Select the Video Input PWB (SW-SI) to the manual NTSC mode.
 - (2) Input the NTSC 3.58 color bar signal.
 - (3) Adjust VR814 to $6.0 \pm 0.1 V_{DC}$ at test point.
- Connector EH pin 5 set your scope probe to X1 (75 Ω) to perform this adjustment.

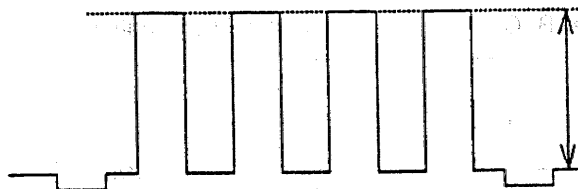


Figure 3-7-1 B Signal

SERVICE (BENCH) ADJUSTMENTS

2. SYSTEM PWB (PWC-3717)

① Switch Settings

- (1) Set S8212 to the OFF position.
- (2) Set S8221 to the RS-232C position.
- (3) Set S8222 to the RS-422 position.
- (4) Set S8231 to the ON position.
- (5) Set S8232 to the OFF position.

② Initializing EROM

- (1) Apply the following voltages to the connectors specified.

Connector SV-30, 31-A, B, C	+5±0.2 V
Connector SV-29-B, C	+5±0.2 V
Connector SV-32-A, B, C	GND
Connector SV-25-B, C	+15±0.2 V
Connector SV-27-B, C	-15±0.2 V
Connector SV-26-B, C	GND

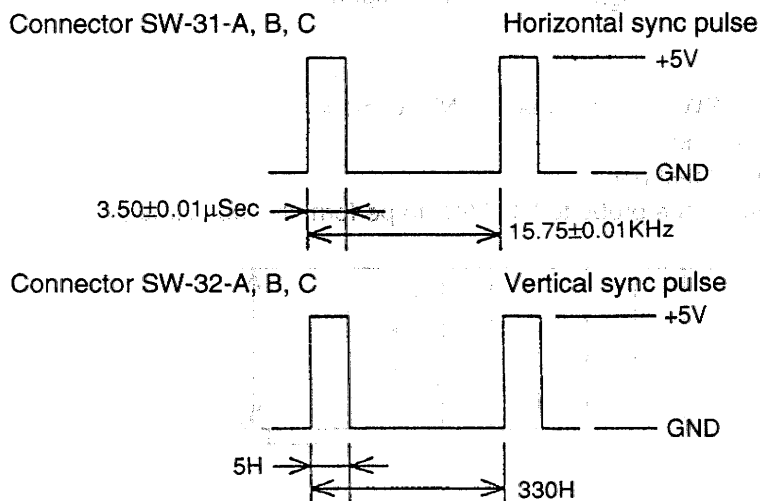
- (2) Switch power on, and check that "EE" appears on the 7-segment LED.
("EE" appears only when power is switched on for the first time, not in subsequent switching operations. Thus, this step may be omitted.)
- (3) Check that the LED displays "00" in about 7 seconds.

③ Calendar/Timer Oscillation Frequency Adjustment

- (1) Connect a frequency counter via a resistor of 10 k Ω in series to the X8211 terminal (IC8222 pin ⑩).
- (2) Adjust trimmer capacitor C8212 until the oscillation frequency is 32.768 kHz±1.0 Hz.

④ PLL Adjustment

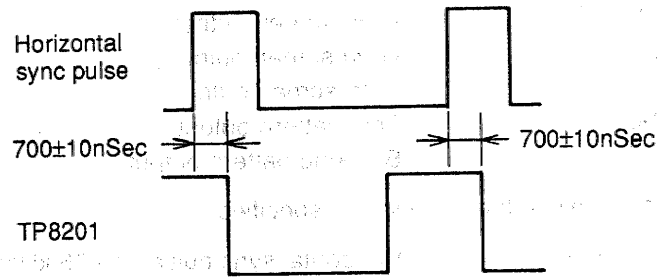
- (1) Connect a voltmeter to pin ② of IC8245.
- (2) Input the special 15.75kHz signal to the front control panel's RGB connectors.



- (3) Connect an oscilloscope to TP8201, and adjust L8201 to lock TP8201's waveform to the horizontal input sync pulse. If unadjust L8201 to lock TP8201's waveform, turn the VR8201 to clockwise till lock it.
- (4) Adjust L8201 so that the display of the 7-segment LED becomes 80.

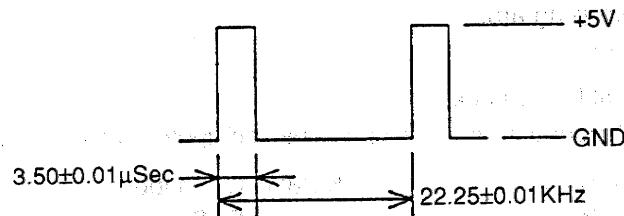
SERVICE (BENCH) ADJUSTMENTS

- (5) Adjust VR8201 in such a way that the phase of the waveform of TP8201 is delayed to the extent of 400 ± 10 nsec. with respect to the input horizontal sync pulse.

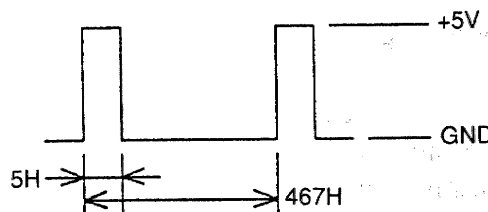


- (6) Adjust L8201 finely so that the display of the 7-segment LED becomes 80.
 (7) Check to be sure that the voltage at pin ② of IC8245 is 2.5 ± 0.2 V.
 (8) Change the input signal to the following signal and it to each section:

Connector SW-31-A. B. C Horizontal sync pulse (22.25kHz)



Connector SW-32-A. B. C Vertical sync pulse (60Hz)



- (9) Just as in the case of step 4), make coarse adjustment of L8202 so that the horizontal sync pulse fed can be synchronized with the waveform of TP8201.
 (10) Adjust L8202 finely so that the display of the 7-segment LED becomes 80.
 (11) Check to be sure that the voltage at pin ② of IC8245 is 2.5 ± 0.2 V.

SERVICE (BENCH) ADJUSTMENTS

⑤ On-screen Output Check

(1) Connect the following output signals to the jig display.

Connector SV-9-C	R on-screen output
Connector SV-10-C	G on-screen output
Connector SV-11-C	B on-screen output
Connector SV-12-C	Test pattern output
Connector SV-13-C	Blanking pattern output

(2) Input the following sync signals to the connectors specified.

Connector SW-31-A, B, C	Horizontal sync pulse (15.75 kHz)
Connector SW-32-A, B, C	Vertical sync pulse (60 Hz)

(3) Check the characters and test pattern shown on the display are normal.

(4) Set S8231 to OFF position. IF Check the character to disappear, set S8231 to ON position.

(5) Set S8232 to ON position. IF Check the character to disappear, set S8232 to OFF position.

⑥ Memory Check

(1) Start the memory check program.

(2) Verify error free operation.

⑦ RS-232C Input/Output Serial Port Check

(1) Connect the RS-232C input/output of a jig personal computer to the following connectors.

Connector SW-14-B	RS-232C CTS input
Connector SW-15-B	RS-232C RXD input
Connector SW-16-B	RS-232C RTS output
Connector SW-17-B	RS-232C TXD output

(2) Start the serial port check program.

(3) Verify error free operation.

⑧ RS-422 Input/Output Serial Port Check (1)

(1) Set S8221 to the RS-422/485 position.

(2) Set S8222 to the RS-422 position.

(3) Connect the RS-422 input/output of a jig personal computer to the following connectors.

Connector SW-15-B	RS-422 RXD (negative) input
Connector SW-15-C	RS-422 RXD (positive) input
Connector SW-17-B	RS-422 TXD (negative) output
Connector SW-17-C	RS-422 TXD (positive) output

(4) Start the serial port check program.

(5) Verify error operation.

⑨ RS-422 Input/Output Serial Port Check (2)

- (1) Connect the RS-422 input/output of a jig personal computer to the following connectors.

Connector SW-10-B	RS-422 RXD (negative) input
Connector SW-10-C	RS-422 RXD (positive) input
Connector SW-8-B	RS-422 TXD (negative) output
Connector SW-8-C	RS-422 TXD (positive) output

- (2) Start the serial port check program.
(3) Verify proper operation.

⑩ TTL Level Input/Output Serial Port Check

- (1) Connect the TTL serial port input/output of a jig personal computer to the following connectors.

Connector SW-28-A	TTL RXD input
Connector SW-28-B	TTL TXD output

- (2) Start the serial port check program.
(3) Verify proper operation.

⑪ Parallel port Input/Output Check

- (1) Connect the parallel port and output of the personal computer for jigs to each connector.
(2) Start the parallel port check program.
(3) Check that the parallel port check results shown on the jig display screen are free of errors.

⑫ Remote Controller Input Check

- (1) Input remote controller signals to the following connectors.
Connector SW-2-B
Connector SW-2-C
(2) Start the remote controller check program.
(3) Check that the remote controller reception check results shown on the display are free of errors.

SERVICE (BENCH) ADJUSTMENTS

3. WAVE PWB

- 1) Connect the power supply voltages and signals shown in the followings with the various terminals of the connector "WA".

42A, 42B: $+15 \pm 0.5$ V

44A, 44B: -15 ± 0.5 V

45A, 45B: $+5 \pm 0.2$ V

15A, 15B: Horizontal frequency 15.75 kHz

16A, 16B: Vertical frequency 60 Hz

- 2) Connect the DC voltages shown in the followings with the various terminals of the connector "WA".

14B: 2.5 ± 0.2 V

25B: 5.0 ± 0.2 V

- 3) Assume that the correction value of the ALIGNMENT V-PINCUSHION is +100% (DATA=FF), and assume that the correction values of all adjustment items of ALIGNMENT and CONVERGENCE is CANCEL (DATA=7F).

- 4) Adjustment of the horizontal tertiary waveform

- ① Observe the terminal 7B of the connector "WA" with an oscilloscope, and make sure that the output waveform is 0 ± 0.5 V. (DC range)
- ② Set the correction value of L of R-LINEAR BALANCE to -100% (DATA=00), and set the correction value of R to -100% (DATA=FF).
- ③ Adjust VR8401 for the two peaks to acquire shapes that are symmetric at the right- and left-hand sides (the part of the waveform of Figure 3-4-1 bearing the mark ☆ shall be horizontal with regard to the abscissa). (At that time the waveform acquires the shape shown in Figure 3-4-2(a).)

- 5) Adjustment of the vertical tertiary waveform

- ① Observe the terminal 4B of the connector "WA" with an oscilloscope, and make sure that the output waveform is 0 ± 0.5 V. (DC range)
- ② Set the correction value of U of the R-LINEAR BALANCE to +100% (DATA=00), and set the correction value of D to +100% (DATA=FF).
- ③ Adjust VR8402 for the two peaks to acquire shapes that are symmetric at the right- and left-hand sides (the part of the waveform of Figure 3-4-1 bearing the mark ☆ shall be horizontal with regard to the abscissa). (At that time the waveform acquires the shape shown in Figure 3-4-2(b).)

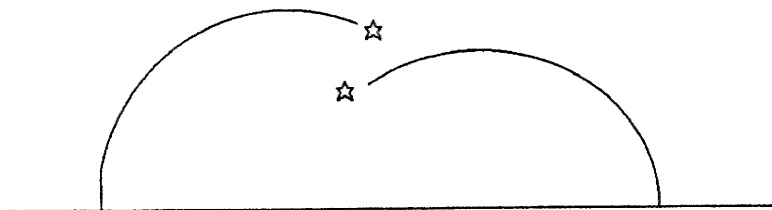


Figure 3-4-1

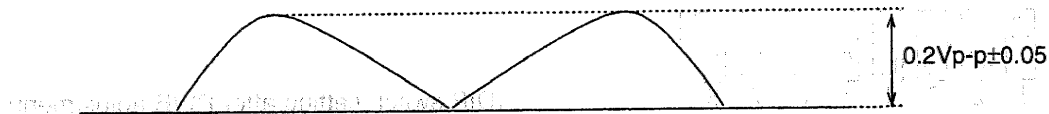


Figure 3-4-2(a)

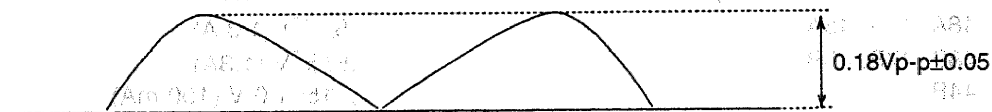


Figure 3-4-2(b)

6) Adjustment of VR8403

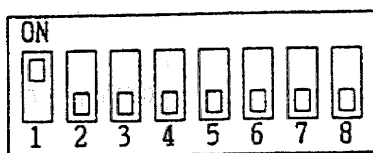
- ① Cancel the correction values of U and D of the R-LINEAR BALANCE. (DATA=7F)
- ② Set the correction value of U of the R-PINCUSHION to -100% (DATA=FF) and the correction value of D of R-PINCUSHION to -100% (DATA=00).
- ③ Adjust VR8403 in such a way that the place where the waveforms of the right- and left-hand sides of the vicinity of the center of the vertical synchronism match each other at the terminal 4B of the connector "WA".

SERVICE (BENCH) ADJUSTMENTS

4. POINT PWB (PWC-3718)

① DIP Switch Setting

Set the DIP switch S8701 as shown in the figure below (after adjusting the PWB).



(DIP switch setting after PWB adjustment)

② Connections

Apply source voltages and signals and connect devices to the terminals of connector PO as specified below.

49A, 48A, 47A, 45A	: $5\pm 0.5V$ (1.3 A)
49B, 48B, 47B, 45B	: $5\pm 0.5V$ (1.3A)
44A, 44B	: $-15\pm 1.0 V$ (100 mA)
42A, 42B	: $+15\pm 1.0V$ (100mA)
46A, 46B, 50A, 50B	:Digital GND
43A, 43B	:Analog GND
14A	:Horizontal sync signal input, TTL level, positive (15 kHz/90 kHz)
16A, 16B	:Vertical sync signal input, TTL level, positive (150 Hz/38 Hz)
13A	:Clock input of 128 times locked to horizontal sync signal, TTL level
17A	:Serial communication data input, TTL level Connect after level conversion to personal computer 232C port transmission terminal
18A	:Serial communication data output, TTL level Connect after level conversion to personal computer 232C port receiving terminal
21A	:R-H point converter waveform output. Connect oscilloscope.
22A	:R-V point converter waveform output. Connect oscilloscope.
23A	:G-H point converter waveform output. Connect oscilloscope.
24A	:G-V point converter waveform output. Connect oscilloscope.
25A	:B-H point converter waveform output. Connect oscilloscope.
26A	:B-V point converter waveform output. Connect oscilloscope.

③ Adjustment

(1) VR8761 adjustment

While watching 23A (G-H point converter output) at the connector "PO" with an oscilloscope (0.1 V/div), adjust VR8761 until the voltage on it is $4.0\pm 0.1 V$.

(2) VR8762 adjustment

While watching 21A (R-H point converter output) at the connector "PO" with an oscilloscope (0.1 V/div), adjust VR8762 until the voltage on it is $0\pm 0.01 V$.

④ Continuity

Set the personal computer to terminal mode, and check the following.

(1) Serial communication port check

Supply a check command of the check program existing in the PWB and make a serial port check. As the results are shown on the display of the personal computer, check to be sure that nothing is in trouble.

(2) Memory check

Check each of the following memories for write/read using the check program provided inside the PWB, and display the check results on the display screen of the personal computer via the serial communication port. Make sure that all the memories are free of errors.

- SRAM 32K bytes (IC8705)
- EEPROM 32K/128K bytes (IC8706)
- OUTRAM 128K bytes x 3 (R, G, B) (IC8780, 8783, 8786)

(3) Output check

(a) 93 kHz - 38 Hz

Apply the following signals to 14A, 16A, and 13A of the connector PO.

14A: Horizontal sync signal, 93 kHz, TTL level, positive

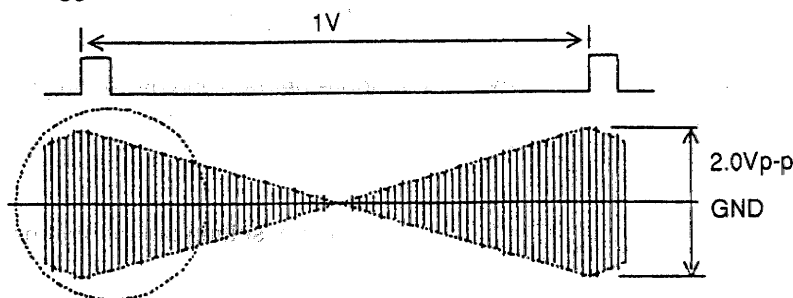
16A: Vertical sync signal, 38 Hz, TTL level, positive

13A: Clock of 128 times locked to horizontal sync signal, TTL level

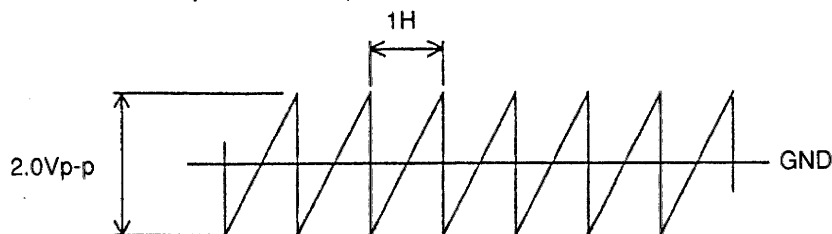
SERVICE (BENCH) ADJUSTMENTS

Check that the waveform is as shown in the figure below at each horizontal output terminal, using an oscilloscope. At this time, trigger the oscilloscope with a vertical sync signal.

- PO-21A (R-H)
- PO-23A (G-H)
- PO-25A (B-H)

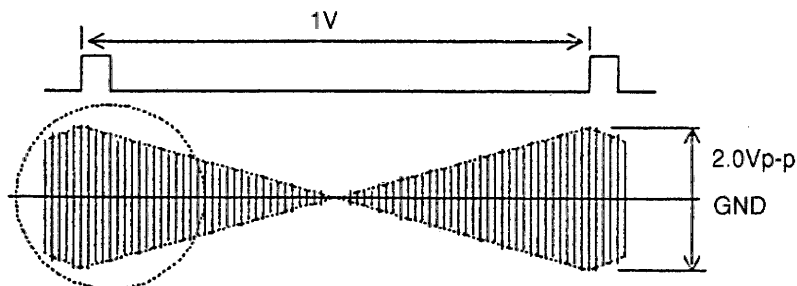


Extend the time base of the oscilloscope and observe the part shown cycled in the figure below, and check that a sawtooth wave of horizontal period is output as shown in the figure.

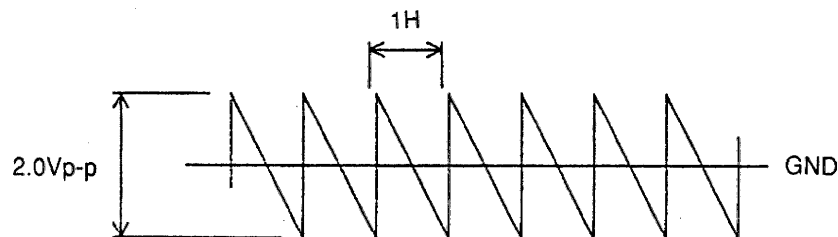


Similarly, check with the oscilloscope the waveform each vertical output terminal that it is as shown in the figure.

- PO-22A (R-V)
- PO-24A (G-V)
- PO-26A (B-V)



Extend the time base of the oscilloscope and observe the part shown cycled in the figure below, and check that a sawtooth wave of horizontal period is output as shown in the figure. Also check the phase of the sawtooth wave that it is inverted from that of the horizontal output terminal.



(b) 15 kHz - 150 Hz

Apply the following signals to 14A, 16A, and 13A of the connector PO.

14A: Horizontal sync signal, 15 kHz, TTL level, positive

16A: Vertical sync signal, 150 Hz, TTL level, positive

13A: Clock of 128 times locked to horizontal sync signal, TTL level

Check each of the horizontal and vertical output waveforms similar to (a) above.

But check to be sure that the phase of horizontal sync sawtooth wave between the horizontal output and the vertical output is inverted with each other.

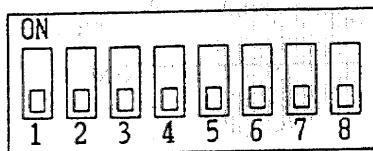
SERVICE (BENCH) ADJUSTMENTS

(4) Reset terminal check

Set IIA of the connector PO to "L" level (connecting it to GND), and check that the output waveforms specified in ④-(3) disappear (the output falls to 0 V).

(5) DIP Switch Setting

Set the DIP switch S8701 as shown in the figure below (original setting before shipment).



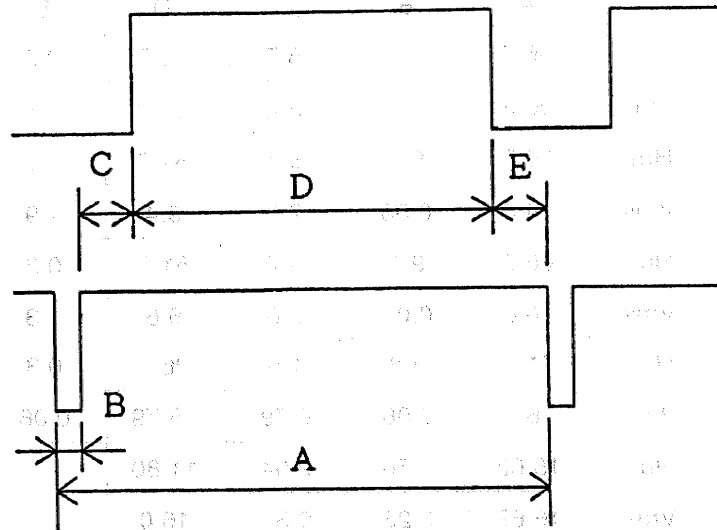
(Original setting before shipment)

(6) The setting should be made to the state shown in step 5) when assembling the set of DIP switch S8701.

TIMING DIAGRAMS

VIDEO

SYNC



		A	B	C	D	E	
Signal 1	Hus	63.0	4.2	7.2	45.0	6.6	(CGA)
	Vms	16.4	0.075	1.525	12.6	2.2	
Signal 2	Hus	45.5	4.9	1.6	39.0	0	(EGA)
	Vms	16.68	0.6	0.08	16.0	0	
Signal 3	Hus	31.8	3.8	1.6	26.1	0.3	(VGA350)
	Vms	14.3	0.06	1.72	11.53	0.99	
Signal 4	Hus	31.8	3.8	1.6	26.1	0.3	(VGA400)
	Vms	14.3	0.06	0.89	13.19	0.16	
Signal 5	Hus	31.78	2.76	1.6	26.29	1.13	(IDTV)
	Vms	16.67	0.64	0.77	15.14	0.12	
Signal 6	Hus	28.57	2.12	3.17	21.16	2.12	(MAC2)
	Vms	15.00	0.09	1.11	13.71	0.09	
Signal 7	Hus	66.7	9.1	5.7	51.7	0.2	15K/60Hz
	Vms	16.7	0.07	3.33	10.95	2.35	
Signal 8	Hus	40.0	5.5	3.4	31.0	0.1	25K/60Hz
	Vms	16.7	0.07	3.33	10.95	2.35	
Signal 9	Hus	28.6	3.9	2.4	22.2	0.1	35K/60Hz
	Vms	16.7	0.07	3.33	10.95	2.35	
Signal 10	Hus	22.2	3.0	1.9	17.2	0.1	45K/60Hz
	Vms	16.7	0.07	3.33	10.95	2.35	
Signal 11	Hus	18.2	2.5	1.6	14.1	0	55K/60Hz
	Vms	16.7	0.07	3.33	10.95	2.35	

TIMING DIAGRAMS

		A	B	C	D	E	
Signal 12	Hus	66.7	9.1	5.7	51.7	0.2	15K/38Hz
	Vms	26.3	0.11	5.2	17.2	3.8	
Signal 13	Hus	66.7	9.1	5.7	51.7	0.2	15K/70Hz
	Vms	14.3	0.06	2.9	9.4	1.9	
Signal 14	Hus	66.7	9.1	5.7	51.7	0.2	35K/60Hz
	Vms	10.0	0.05	2.0	6.6	1.3	
Signal 15	Hus	31.8	3.8	1.6	26.1	0.3	15K/100Hz
	Vms	16.7	0.06	0.79	15.79	0.06	
Signal 16	Hus	15.62	1.76	2.04	11.80		64K/60Hz
	Vms	16.67	0.23	0.34	16.0		
Signal 17	Hus	13.34	0.83	1.93	10.25	0.33	75K/60Hz
	Vms	16.57	0.05	0.5	15.93	0.09	
Signal 18	Hus	11.11	1.0	1.4	8.31	0.4	90K/Hz
	Vms	16.57	0.05	0.5	15.93	0.09	
Signal 19	Hus	16.18	1.38	2.10	12.39	0.31	CAD CAM (SUN-WS)
	Vms	15.16	0.06	0.50	14.57	0.03	
Signal 20	Hus	12.799	1.422	1.422	9.481	0.474	HP-WS
	Vms	13.887	0.038	0.704	13.107	0.038	
Signal 21	Hus	12.771	1.067	1.896	9.481	0.327	SPEA1280
	Vms	13.519	0.038	0.496	12.985	0	
Signal 22	Hus	14.64	1.30	1.32	11.56	0.46	QUADRA
	Vms	13.342	0.044	0.574	12.68	0.044	
Signal 23	Hus	66.7	9.1	5.7	51.7	0.2	15K/150Hz
	Vms	6.67	9.94	9.4	6.18	0.05	
Signal 24	Hus	11.11	1.0	1.4	8.31	0.4	90K/150Hz
	Vms	6.67	0.04	0.4	6.18	0.05	
Signal 25	Hus	20.880	2.400	1.280	16.000	1.120	VESA800
	Vms	13.887	0.124	0.479	12.510	0.722	
Signal 26	Hus	20.677	2.092	2.462	15.754	0.369	VESA1024
	Vms	16.667	0.124	0.600	15.880	0.062	
Signal 27	Hus	40.28	3.04	3.80	30.4	3.04	PC-9801
	Vms	17.72	0.32	1.01	16.11	0.28	

TIMING DIAGRAMS

		A	B	C	D	E	
Signal 28	Hus	30.45	1.46	2.92	24.29	1.78	N5200/07
	Vms	12.50	0.15	0.43	11.88	0.046	
Signal 29	Hus	19.99	1.43	2.14	14.28	2.14	PC-H98
	Vms	16.65	0.20	0.56	15.59	0.30	
Signal 30	Hus	15.49	1.79	1.49	11.91	0.3	EWS4800
	Vms	16.69	0.06	0.67	15.85	0.11	

NOTE: When signals 3, 4 and 15 are input to the ISS-6010/6010G switcher, their sync polarity changes are listed in the Table below.

	Sync Polarity	
	H	V
VGA 350	P	N
VGA 400	N	P
VGA480	N	N

TTL Level

P: Positive
N: Negative

ADVANCED DESIGN

1525