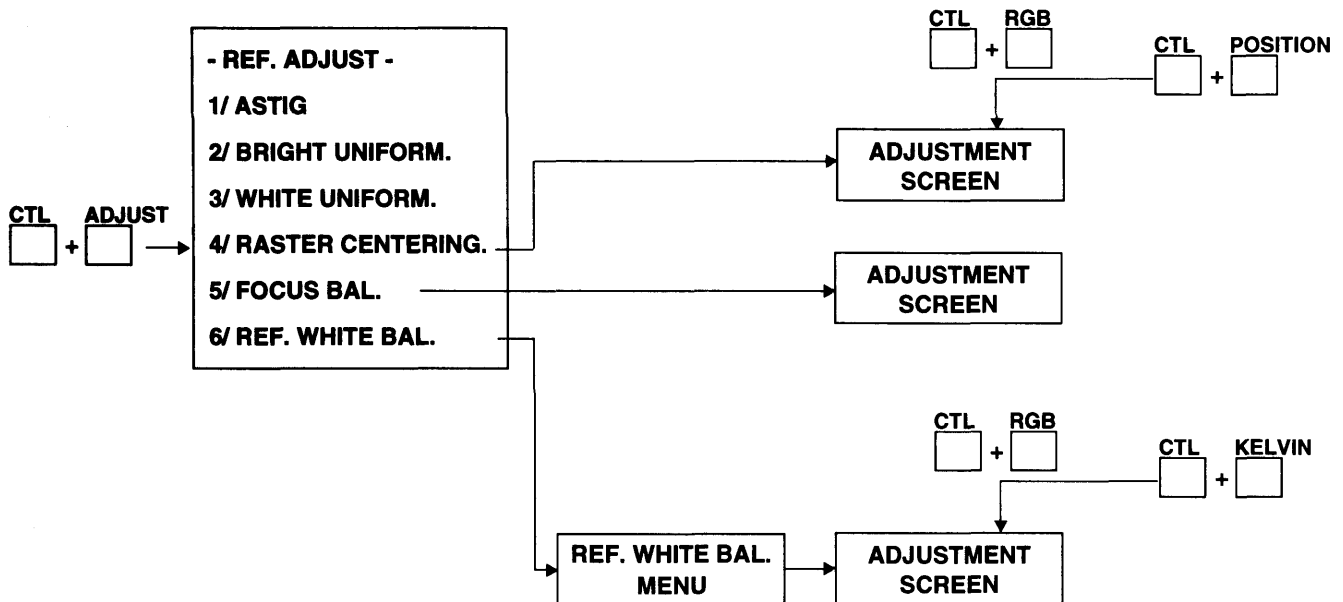


METHOD OF ADJUSTMENTS

List of Reference Adjustment Menus

This section provides a description about the method of operation for the various adjusting functions that call for a service passcode (3151). A required screen can be chosen by button operation according to the display shown below.



Adjusting data for function in the REF. ADJUST menu are dealt with by a single memory. This must be carefully borne in mind regarding data storage.

When returning the memory data to the factory-arranged values, data normalization should be carried out for each item. Data can be stored after normalization.

Adjustment of Raster Centering

Horizontal and vertical positions of raster are corrected.

Prior to adjustment:

- The adjusting value is arranged for 1-memory mode.

Adjustment can be performed in the following procedures:

- ① Press ADJUST button, with CTL button kept pressed. Then a display of "REF.,ADJUST" menu is presented.
Otherwise, it is also possible to directly enter the adjusting mode, by pressing POSITION button while CTL button is kept pressed.
 - When a passcode input screen is displayed, enter the service passcode "3151."
- ② Using CURSOR ☐ or ☐ button, select "4/RASTER CENTERING" and press ENTER button or "4" of INPUT button.
 - The ADJUST screen of RASTER CENTERING is displayed.
- ③ Press R,G,B button, with CTL button kept pressed. Then select the CRT being adjusted.
- ④ Move the raster position with CURSOR button.
 - When CURSOR ☐ or ☐ button is pressed, the video screen moves to the right or left.
 - When CURSOR ☐ or ☐ button is pressed, the video screen moves upwards or downwards.
- ⑤ To finish the adjusting mode, press END button.
 - Each time END button is pressed, the screen changes as follows:
"REF.ADJUST" menu -> "RETURN TO USER MODE?" menu -> "STORE?" menu -> SOURCE screen.
 - In the "RETURN TO USER MODE?" menu, select a required item with CURSOR ☐ or ☐ button, and press ENTER button.

- REF. ADJUST -
1/ ASTIG
2/ BRIGHT UNIFORM.
3/ WHITE UNIFORM.
4/ RASTER CENTERING.
5/ FOCUS BAL.
6/ REF. WHITE BAL.

RASER
CENTERING
CRT - G -

H |-----| 0%
V |-----| 0%

RETURN TO USER MODE?
YES NO

Contents of Items:

- YESA service passcode input is required when entering the ADJUST mode of RASTER CENTERING next time.
- NO No service passcode input is required when entering the ADJUST mode of RASTER CENTERING next time.

METHOD OF ADJUSTMENTS

Adjustment of FOCUS BALANCE

Horizontal phases are adjusted against horizontal deflection, for the respective adjusting waveforms of dynamic focus.

Prior to adjustment:

- The FOCUS BALANCE adjusting value for dynamic focus is arranged for 1-memory mode.

Adjustment can be performed in the following procedures:

- ① Press ADJUST button, with CTL button kept pressed. Then a display of "REF.,ADJUST" menu is presented.
 - When a passcode input screen is displayed, enter the service passcode "3151."
- ② Using CURSOR ☐ or ☐ button, select "5/FOCUS BAL" and press ENTER button or "5" of INPUT button.
 - The FOCUS BALANCE adjustment screen is displayed.
- ③ Move PHASE with CURSOR button.
 - When CURSOR ☐ or ☐ button is pressed, PHASE of DYNAMIC FOCUS moves to the right or left.

- REF. ADJUST -

1/ ASTIG

2/ BRIGHT UNIFORM.

3/ WHITE UNIFORM.

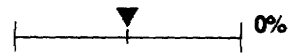
4/ RASTER CENTERING.

5/ FOCUS BAL.

6/ REF. WHITE BAL.

PHSE

- FOCUS BALANCE -



- ④ To finish the adjusting mode, press END button.
 - Each time END button is pressed, the screen changes as follows:
"REF.ADJUST" menu → "RETURN TO USER MODE?" menu → "STORE?" menu → SOURCE screen.
 - In the "RETURN TO USER MODE?" menu, select a required item with CURSOR ☐ or ☐ button, and press ENTER button.

RETURN TO USER MODE?

YES

NO

Contents of Items:

- YES ...A service passcode input is required when entering the ADJUST mode of PHASE next time.
- NONo service passcode input is required when entering the ADJUST mode of PHASE next time.





Adjustment of REF. WHITE BAL.

Various adjustments are performed for the amplitude of video signal, that of AKB reference signal, and bias of G2 control voltage.

Prior to adjustment:

- Each adjusting value for REF. WHITE BALANCE is arranged for 1-memory mode.

Adjustment can be performed in the following procedures:

- ① Press ADJUST button, with CTL button kept pressed. Then a display of "REF.,ADJUST" menu is presented.
 - When a passcode input screen is displayed, enter the service passcode "3151."
- ② Using CURSOR  or  button, select "6/REF.WITE" and press ENTER button or "6" of INPUT button.
 - The REF. WHITE BAL menu is displayed.
- ③ Press CURSOR  or  button to select a required adjusting item. Then press ENTER button or INPUT button to choose a numeral in the adjusting item.
 - INPUT button "1" is used to display an ADJUST screen of DRIVE CONTROL.
 - INPUT button "2" is used to display an ADJUST screen of BRIGHT BIAS.
 - INPUT button "3" is used to display an ADJUST screen of BRIGHT GAIN.
 - INPUT button "4" is used to display an ADJUST screen of BLACK BIAS.

- REF. ADJUST -
 1/ ASTIG
 2/ BRIGHT UNIFORM.
 3/ WHITE UNIFORM.
 4/ RASTER CENTERING.
 5/ FOCUS BAL.
 6/ REF. WHITE BAL.

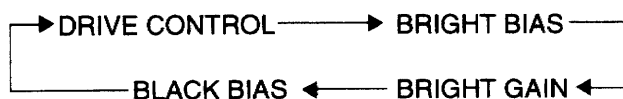
- REF. W/BAL -
 1/ DRIVE CONTROL
 2/ BRIGHT BIAS
 3/ BRIGHT GAIN
 4/ BLACK BIAS

Contents of Items:

DRIVE CONTROL Amplitude adjustment for video signal.
 BRIGHT BIAS Amplitude adjustment for AKB reference signal. BIAS adjustment for BRIGHT.
 BRIGHT GAIN Amplitude adjustment for AKB reference signal. GAIN adjustment for BRIGHT.
 BLACK BIAS BIAS adjustment for G2 control voltage.



Otherwise, press KELVIN button, with CTL button kept pressed.

- Each time KELVIN button is pressed while CTL button is kept pressed, the adjusting mode is changed over as shown below.



METHOD OF ADJUSTMENTS



■ When "DRIVE CONTROL" is selected:

- 1) Select an adjusting CRT by pressing R or B button, while CTL button is kept pressed.
 - No adjustment is available for the green CRT.
- 2) Adjustment can be effected with CURSOR  or  button.

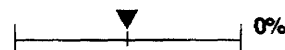
REF. W/BALANCE
- DRIVE CONTROL -
CRT - R -





■ When "BRIGHT BIAS" is selected:

- 1) Select an adjusting CRT by pressing R or B button, while CTL button is kept pressed.
- 2) Adjustment can be effected with CURSOR  or  button.

REF. W/BALANCE
- BRIGHT BIAS -
CRT - G -





■ When "BRIGHT GAIN" is selected:

- 1) Select an adjusting CRT by pressing R or B button, while CTL button is kept pressed.
- 2) Adjustment can be effected with CURSOR  or  button.

REF. W/BALANCE
- BRIGHT GAIN -
CRT - R -



■ When "BLACK BIAS" is selected:

- 1) Select an adjusting CRT by pressing R or B button, while CTL button is kept pressed.
- 2) Adjustment can be effected with CURSOR  or  button.

REF. W/BALANCE
- BLACK BIAS -
CRT - G -



- ④ To finish the adjusting mode, press END button.
- Each time END button is pressed, the screen changes as follows:
"REF.ADJUST" menu → "REF.W/BAL" menu →
"RETURN TO USER MODE?" menu → "STORE?" menu
→ SOURCE screen.
 - In the "RETURN TO USER MODE?" menu, select a required item with CURSOR ☐ or ☐ button, and press ENTER button.

RETURN TO USER MODE?

YES

NO

Contents of Items:

- YES ...A service passcode input is required when entering the ADJUST mode of REF.W/BAL next time.
- NONo service passcode input is required when entering the ADJUST mode of REF.W/BAL next time.

Adjustment Notes for Set Repair Services

1. H-DEF Board

When this board is repaired or replaced, the repair set requires the following adjustments:

1-1) Adjusting VR

VR5301 : (H-Amp adjusting VR)

VR5302 : (H adjusting VR)

1-2) Method of adjustment

-VR5301-

Case 1 : With video color bar adjusting signal

<For PAL color bar signal>

Adjust H-DEF PWB VR5301 for H-width, so that there can be 10% over-scan when a PAL color bar adjusting signal input is applied to the set to obtain a maximum H-amplitude.

<For NTSC color bar signal>

Adjust H-DEF PWB VR5301 for H-width, so that there can be 13% over-scan when a NTSC color bar adjusting signal input is applied to the set to obtain a maximum H-amplitude.

Case 2 : Without video color bar adjusting signal

Apply a video signal input to the set and adjust VR5301 so that voltage at Pin #1 of IC5306 on the H-DEF board, measured with a voltage tester, attains $4.5 \pm 0.05V$ when H-amplitude is maximum.

-VR5302-

Apply a video signal input and obtain a maximum H-amplitude in the same manner as above. Connect a digital voltmeter to TPGND (- side) and TP5302 (+ side), and adjust H-DEF PWB VR5302 until the voltage attains $7.5 \pm 0.1V$.

2. Adjustments for HV PWB Replacement

1) VRs required for arrangement and adjustment

HV ADJ	(VR5501)	} MIN (counterclockwise)
HV PROTECTOR (1)	(VR5502)	
HV PROTECTOR (2)	(VR5503)	
S5001 (ABL SW)	Setting conditions of the set are checked.	Shipping conditions (protruded)
S5002 (ABL SW)		Shipping conditions (protruded)

2) High-voltage adjustments

- ① Disconnect a any anode cable of CRT from the HV CR block and connect a high-voltage meter. Turn on the set and input an NTSC all-white signal.
- ② Using VR5501 HV ADJ, adjust high voltage to $32.0 \pm 0.1kV$.
- ③ Feed silicone rubber to VR5501 for sealing.
Measure the voltage described in 1) - ②, and confirm that it is really $32.0 \pm 0.1kV$.

3) High-voltage protector adjustments

3-1) HV protector (2)

- ① Connect a digital voltmeter to the terminals below:
 - + side: #1 Reference terminal of TP5501
 - side: #3 PROTECT (2) terminal of TP5501

- ② Apply an NTSC all-white signal input, and move Brightness and Contrast of remote control to MAX positions.
- ③ Press ABL SW S5502 to assume a HIGH BEAM mode.
- ④ Adjust VR5503 PROTECT (2) to attain $0.15 \pm 0.01V$.

3-2) HV protector (1)

- ① Connect a digital voltmeter to the terminals below:
 - + side: #1 Reference terminal of TP5501
 - side: #2 PROTECT (1) terminal of TP5501
- ② Adjust VR5502 PROTECT (1) to attain $0.15 \pm 0.01V$.
- ③ Assume initial conditions for both ABL SW S5501 and S5502.

3. Adjustments for DAUGHTER PWB Replacement

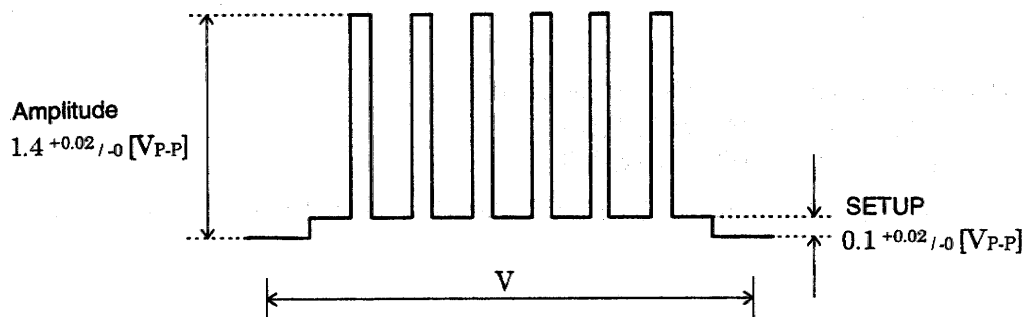
3-1. VRs required for adjustments

VR703 : (LEVEL adjustment)

VR812 : (SETUP adjustment)

3-2. Method of adjustment

- 1) Apply an NTSC or PAL cross-hatch signal input. Move CONTRAST to the MAX position with a remote control and store it. Set the video mode at NTSC3.58 or the fixed mode of PAL.
- 2) Check TP701 of DAUGHTER PWB and confirm that the waveform shown below is obtained.



(Fig. 1)

If any displacement is discovered, adjust the following VRs on the DAUGHTER PWB, in the order shown below.

① VR812 (SETUP) SETUP

The setup level shall be adjusted so that the waveform at TP701 appears as shown below, when the signal is removed under the video display condition.



② VR703 (LEVEL) Amplitude

After completing adjustment of ①, enter thr signal again and secure the TP701 waveform as shown in Fig. 1.

METHOD OF ADJUSTMENTS

4. Adjustments for GAIN CTL PWB Replacement

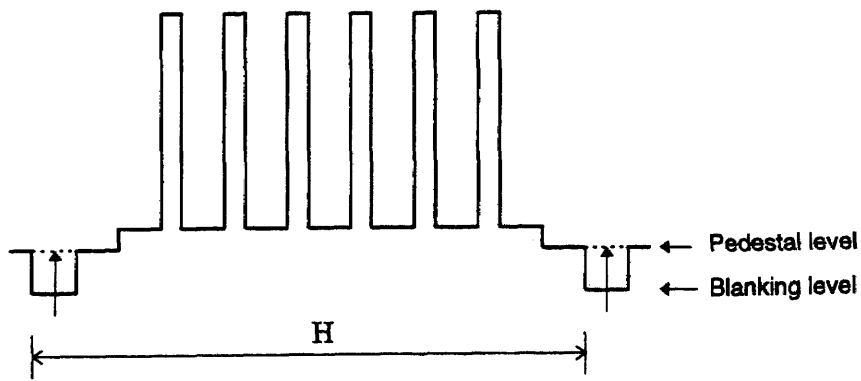
4-1. VRs required for adjustments

VR7002 (R) : (R-BIAS blanking adjusting VR) /TP7013 (R)
VR7008 (G) : (G-BIAS blanking adjusting VR) /TP7012 (G)
VR7004 (B) : (B-BIAS blanking adjusting VR) /TP7011 (B)
VR7008 : (SUB CONTRAST adjusting VR)

4-2. Method of adjustment

After adjustment and confirmation of voltage waveform at TP701 of the DAUGHTER board as described in 3-2, make the same adjustments under the same conditions (in the state of cross-hatch signal input and 100% contrast).

- ① Checking TP7013(R), adjust VR7002(R BIAS) so that the blanking level is fixed at $(\pm 0.02V)$ that is the same as the pedestal level.

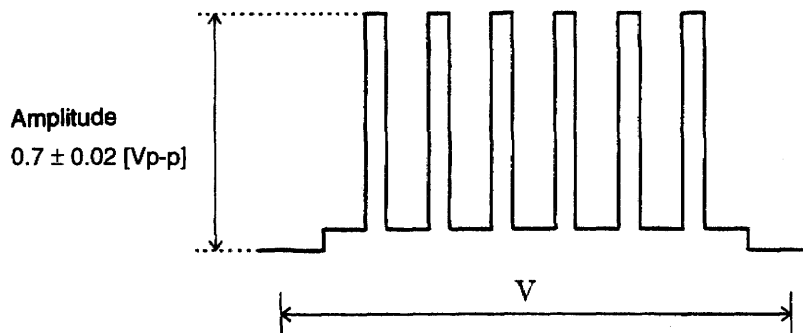


Make the same adjustments also for G-ch and B-ch.

TP7012 (G) — VR7003 (G BIAS)

TP7001 (B) — VR7004 (B BIAS)

- ② Checking TP7012(G), adjust VR7008 (SUB CONT) so that $0.7 \pm 0.02V_{p-p}$ is obtained.



5. Adjustments for VIDEO OUT PWB Replacement

5-1. VRs and remote control required for adjustments

VR7401 : (R: ON-screen color adjusting VR)
 VR7505 : (G: Cathode amplitude adjusting VR) /TP7501
 VR7601 : (B: ON-screen color adjusting VR)
 BLACK BIAS

5-2. Preparation for adjustments

Adjust and check voltage waveforms at TP7011, TP7012, and TP7013 of GAIN CTL PWB described in 4-2. Then adjust VIDEO OUT.

Input signal NTSC3.58 all-white, gray scale, cross-hatch
 or PAL all-white, gray scale, cross-hatch

Setting for various VRs and SWs

VIDEO OUUT PWB

S7701 : NORM

HV PWB

S5001 : OFF (PROTRUDED)

S5002 : OFF (PROTRUDED)

Setting for the set

VIDEO MODE : MANUAL NTSC 3.58 or MANUAL PAL

B-FOCUS TRACKING : ON

AKB : ON

COLOR TEMP : CENTER (6500K)

BRIGHT : 60%

CONTRAST : 100%

COLOR : 60%

SHARPNESS : 50%

TINT : 0%

Note: The set shall be adjusted after more than 20 minutes of aging.

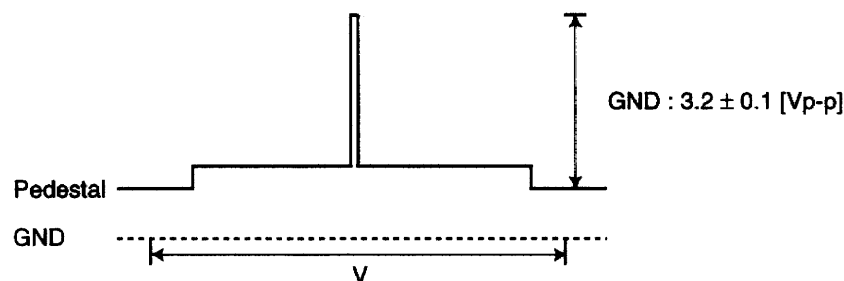
5-3. Method of adjustment

Adjust and check voltage waveforms at TP7011, TP7012, and TP7013 of GAIN CTL PWB described in 4-2. Then adjust VIDEO OUT.

1) Adjustment of cathode amplitude

Adjust the amplitude of cross-hatch signal until it is maintained at the voltage specified below.

TP7921 3.2 ± 0.1 [Vp-p] VR7505
 (CRT OUT PWB) (VIDEO OUT PWB)



METHOD OF ADJUSTMENTS

2) Adjustment of reference voltage

Adjust BLACK BIAS at the following TPs until voltages specified below are attained.

TP7404	$2.5 \pm 0.1[V]$	BLACK BIAS-R
TP7504	$2.5 \pm 0.1[V]$	BLACK BIAS-G
TP7604	$2.5 \pm 0.1[V]$	BLACK BIAS-B

3) ON-screen white adjustment

Check ON-screen white balance on the INFO screen. If any imbalance is discovered, adjust R-CRT: VR7401 and B-CRT: VR7601.

4) Turn off AKB on the all-white screen and store it.

5) Measure color temperature at 60% BRIGHT and confirm that the conditions are the same as those in the state of AKB ON.

6) Make setting of 60% BRIGHT and 75% CONTRAST, and store it.

7) Set the VIDEO mode at auto, and store it.

8) Apply other adjusting signal inputs, and turn on AKB on the INFO screen. Then turn off AKB, and store the resultant condition.

6. Adjustments after CRT OUT PWB unit

6-1. VRs needed for adjustments

VR7901 : (R pedestal level)

VR7921 : (G pedestal level)

VR7941 : (B pedestal level)

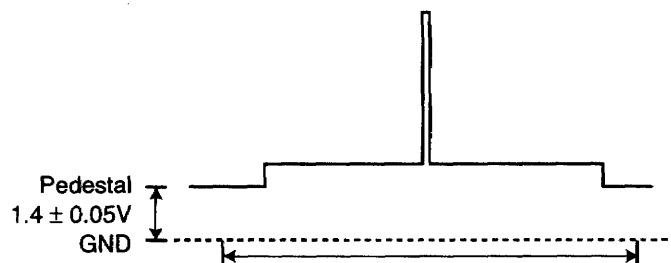
6-2. Adjusting method

The input signals shall be as follows:

NTSC 3.58 All white, gray scale, cross hatch or

PAL All white, gray scale, cross hatch

- 1) Watching at the signal at TP7901 on R CRT OUT PWB, adjust VR7901 until the pedestal level attains $1.4 \pm 0.05 [V]$.
- 2) Watching at the signal at TP7921 on G CRT OUT PWB, adjust VR7921 until the pedestal level attains $1.4 \pm 0.05 [V]$.
- 3) Watching at the signal at TP7941 on R CRT OUT PWB, adjust VR7941 until the pedestal level attains $1.4 \pm 0.05 [V]$.



Note : The set should be adjusted after more than 20 minutes of aging.

7. Adjustments for WAVE PWB Replacement

7-1. VRs required for adjustments

VR9001 : RED static focus VR
VR9002 : GREEN static focus VR
VR9003 : BLUE static focus VR

7-2. Method of adjustment

- 1) Enter the signal input that has already been registered in the set.
- 2) Adjust the respective focus VRs of R, G, and B, so that a focus can be secured in the center without operating the remote control.

7-3. Other adjustments

Generally speaking, there can be subtle setting displacement in convergence, focus, and astigmatism already adjusted before repair services, when this WAVE PWB is replaced. Therefore, after modification replacement of the board, adjustments may be necessary.

<Major adjustment items>

- 1) Centering adjustment
When all signals of customers' use are input in the set, and if there is displacement of static convergence, make centering adjustment to eliminate this displacement of static convergence. During adjustment of centering, assume the state of defocus with a remote control, and confirm that both 4-pole and 6-pole are free from displacement. Readjust the CPC if any displacement is discovered.
- 2) Convergence adjustment
Correct subtle displacement of convergence, using the remote control.
(Refer to the instruction manual for the set.)

8. Adjustments for D-CONV PWB Replacement

8-1. VRs required for adjustments

VR8301 : DC offset adjustment for horizontal compensation waveform
VR8302 : DC offset adjustment for vertical compensation waveform

8-2. Method of adjustment

- 1) Cancel ALIGNMENT data.
 - ① Using a remote control, press the ADJUST key and move a cursor to 3/ALIGNMENT.
 - ② Press the CTL and NORMAL keys at the same time, and select "CANCEL."
- 2) Cancel CONVERGENCE data.
 - ① Using a remote control, press the ADJUST key in the same manner as for 1) above and move the cursor to 4/CONVERGENCE.
 - ② Press the CTL and NORMAL keys at the same time, and select "CANCEL."
- 3) Observe an waveform with an oscilloscope at the 1B terminal of Connector "P0DA" on the D-CONV Board. Adjust VR8301 so that the output waveform is maintained at $0 \pm 0.5V$ in DC range.
- 4) Under the above-mentioned conditions, set the compensation value of the ALIGNMENT V-PINCUSHION at +100%.
- 5) Observe waveform with an oscilloscope at the 3A terminal of Connector "P0DA" and adjust VR8302 so that the output waveform is maintained at $0 \pm 0.5V$ in DC range.

9. Adjustments for SYSTEM PWB Replacement

9-1. VRs required to be adjusted

Basically, this PWB shall employ the parts that have already been adjusted at the factory. Therefore, the adjusted VRs must not be moved.

METHOD OF ADJUSTMENTS

9-2. Method of replacement

- 1) Backup the data adjusted in the set.
 - ① Connect a PC to the set, in which PC control software is loaded.
(For the PC control software, 9PG XTRA is available so long as commands of backup data load.)
 - ② Load the system before replacement on the set again, and make the set assume the standby condition.
Use a PC control and back up the data before replacement. (Regarding the method of backup, refer to the manual for PC control.)
- 2) Load the backup data on the replaced board.
 - ① Load the replacing SYSTEM in the set.
 - ② Assume the standby state for the set.
 - ③ Connect the PC and load the backup data from the system board before replacement into the PC.
 - ④ Turn on the power circuit and confirm that all data of convergence, etc., are normally adjusted.
 - ⑤ Display signals and make readjustments with the remote control if there is problem in data, such as convergence, etc.

Data backup is impossible if there is interference by backup functions. In such a case, all PJ adjustments (those made by the remote control) must be those made at the factory.
(Base data by factory adjustments are available, but everything must be readjusted, in principle.)

*: Recommendation

SYSTEM's data backup may be impossible if the SYSTEM board is out of order. In such a case, all PJ adjustments must be performed, and this results in excessive repair time and loss of reliability.

For the above reason, it is recommended to back up data at the time of delivery and installation adjustments, in order to facilitate final repair services upon completion of adjustments. (This fact should be explained to general dealers.)

10. Adjustments for OSC PWB Replacement

10-1. VRs required for adjustments

This replacement board are shipped after detailed adjustments at the factory. Therefore, they need not be readjusted at the time of replacement. In some cases, however, there can be deviation of setting in adjusting VRs during transportation. Assuming such a case, the method of VR adjustments is described below.

VR5711 : Free-run adjusting VR

10-2. Required adjustments

- 1) VR5711 : Free-run adjusting VR
- 2) Readjustment of FOCUS PHASE
- 3) Readjustment of H-POSI
- 4) Readjustment of H-WIDTH

10-3. Method of VR5711 adjustment

- 1) Signal input

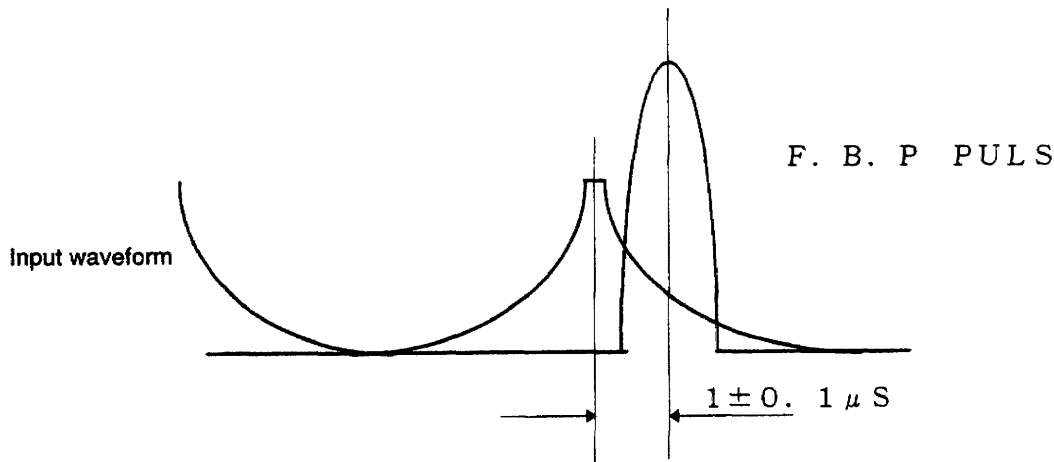
For XG1350/XG-1100 : Apply 110kHz signal input from SG.
For XG750 : Apply 75kHz signal input from SG.
- 2) Method of adjustment
 - ① Apply the above-mentioned signal input to the set and turn on the power circuit. Press S5703 once on the replaced OSC board to let the set stay in the free-run state.
 - ② Connect the frequency counter to the red wire of DY for the blue CRT, and adjust frequency to a level about 1% higher than the input frequency. (Example : Adjusted to 111kHz when input frequency is 110kHz.)
 - ③ Press S5703 once more to cancel the free-run state.

10-4. FOCUS PHASE adjustment

When the OSC board is replaced, adjustment and checking may be required for FOCUS PHASE. Checking can be effected in the procedures described below. As required, adjustments should be also carried out as described below.

<Adjusting procedures>

- 1) Assume a serviceman mode, using password "3151."
- 2) For a 135kHz set, apply a signal input at a maximum frequency of 135kHz.
- 3) Connect Probe 1 of the oscilloscope to the red wire of horizontal DY for BLUE CRT.
- 4) Connect Probe 2 of the oscilloscope to Pin #2 (G.D) of TP4801 on FOCUS PWB.
- 5) Adjust FOCUS PHASE until each waveform appears as shown below, and store it.



—When FOCUS PHASE is above value at the time of checking, adjustment is needed. —

Note) No adjustments shall be made at any frequency other than the above.

10-5. Reconfirmation and Readjustment of H-POSI and H-WIDTH

When the OSC board is replaced, there may arise some deviation in H-POSI and H-WIDTH. In such a case, the client control signals already registered should be displayed again, so that adjustments can be made with a remote control as required.

11. Replacement of PWBs other than the above

* : Basically, PWBs other than the above need not be readjusted after repair and/or replacement services.

When such a PWB is repaired, however, use customers signals and confirm that all projections are normal.

In particular, the CRT-OUT and A, C, F, V, DRIVE boards are mounted on neck parts or very close to the CRT ASSY block. Therefore, these boards must be carefully replaced without permitting them to touch CPC and the like.

In case of moving these parts during replacement, it is recommended to carry out readjustment of CRT (CPC, DY tilt etc.).

METHOD OF ADJUSTMENTS

12. CRT Replacement

For CRT replacement, the following adjustments are required.
Such adjustments should follow the described steps.

12-1. Preliminary arrangements

When replacing the whole CRT for maintenance, the following preparation should be carried out prior to replacement of the CRT. (This preparation makes successive adjustments easier.)

1-1. RASTER POSITION marking

- ① A video image is displayed, using client signals, etc.
- ② Confirm on the screen that convergence is well adjusted.
- ③ If no adjustment has been made, make simplified adjustment so that convergence can be secured only in the center.
- ④ Display a cross signal, chosen from the built-in test signals, and mark the present cross signal position in the screen center or at the edge of the screen. (If possible, mark the position with four points at the edge of the screen.)

Note) After completion of CRT replacement, these marking are used thereafter. These marking must be correctly arranged.

12-2. Adjustments after replacement

After CRT replacement, the step-by-step adjustments specified below must be carried out in the following procedures:

- 1) Adjustment of RASTER POSITION (centering)
- 2) Adjustment of DY tilt
- 3) Adjustment of F-MG tilt
- 4) Adjustment of CPC
- 5) Readjustment of ASTIG
- 6) Readjustment of FOCUS
- 7) Readjustment of WHITE BALANCE

12-3. Basic Adjustment Required for CRT Replacement (Regular Adjustment)

In this section, the method of basic adjustment to be done at the factory is described. It is always necessary to remember the method of this basic adjustment. In the field, "simplified adjustment" as described in Item 4 may be carried out. As required, steps of "regular adjustment" should be followed.

3-1. Basic adjustment of RASTER POSITION

(Note: This adjustment is impossible for each registered signal. If adjustment is attempted with one signal, all registered signals are modified.)

- ① For the RGB signal, apply VESA1024 of factory-adjusted signal input from an SG. Using a PJ-incorporated test pattern, display the cross-hatch signal.
- ② Confirm that STATIC CONV is at 0%, and then adjust RASTER POSITION so that raster is uniformly distributed to the right, left, up, and down in the CRT. Observe the side lines of cross-hatch against the screen (direction of TILT) and turn the deflection yoke if any gradient is perceived.
- ③ For R-CRT and B-CRT, make adjustments so that they converge at in the center of G on the screen.
- ④ Adjustments should take into account a change in centering due to open-close motion of H-DEF mounting metal fitting.
- ⑤ Mark the cross-hatch center on the screen.

* In successive adjustments, this point should be placed in the center of screen.

3-2. Basic adjustment of DY tilting angle

- ① Set compensation of TILT at "0" for alignment and convergence.
- ② Tilt the DY until the horizontal direction (direction of TILT) becomes level.
- ③ Secure the DY.

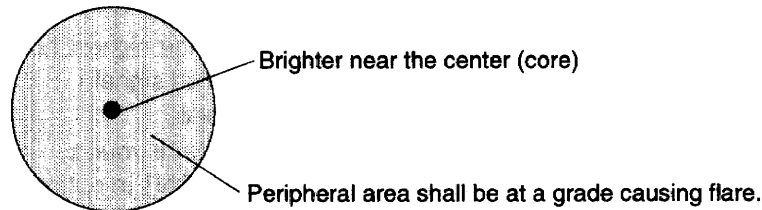
3-3. Basic adjustment of F-MG tilt

- ① Receive VESA1024 in RGB mode.
- ② Select ASTIG CROSS SCREEN-U- with a remote control. In this case, this screen assumes TEST PATTERN DOTS FINE and the flare shape is enlarged.
- ③ Adjust the 4-pole CPC Mg so that the flare shape becomes circular at the top of the screen.
(Coarse)
(In this case, both ASTIG CROSS SCREEN -U- HV and SK shall be 0%.)
- ④ Set ASTIG CROSS SCREEN -U- HV at +100%.
- ⑤ At that time, turn and then fix the FM when the flare shape is vertically oblong at the top of the screen.
- ⑥ Set ASTIG CROSS SCREEN -U- HV at 0%.

3-4. Basic adjustment of CPC Mg

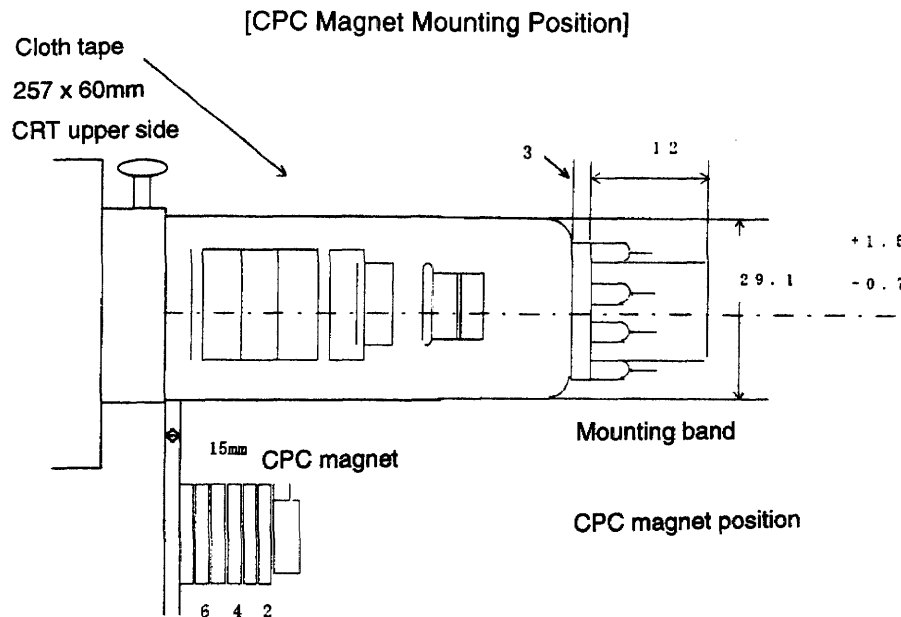
- ① The deflection yoke, focus Mg, and CPC Mg shall be mounted in normal positions.
- ② The CPC Mg shall be in zero magnetic field.
- ③ VESA1024 dot signals shall be received in RGB mode.
- ④ Adjust back raster until it becomes black, with contrast at set maximum and each color at bright bias.
(In monoscope mode, distinction shall be possible for 5% to 10% of the upper gray scale chart.)
At that time, coarse adjustment shall be made with WAVE PWB VR9001, 9002, 9003, and FOCUS VR.

[Over-focus]



[CPU Magnet Mounting Position]

METHOD OF ADJUSTMENTS



- ⑤ Adjust the 2-pole Mg so that the core is positioned in the center of flare.
- ⑥ Assume an under-focus state with VR9002, and set CONTRAST at 75%.
- ⑦ If there is imbalance in the right and left flare shapes (size), perform right-left adjustment of FOCUS SEPARATE. (G-adjustment only)
- ⑧ Obtain a round flare in the center of screen, using 4-pole/6-pole Mgs. (4-pole Mg: Used for vertical and horizontal amendment. 6-pole Mg: Used for triangular amendment.)
- ⑨ Make the same adjustments for 4) and thereafter, even for R-CRT and B-CRT.
- ⑩ In case of displacement of centering as a result of this adjustment, repeat the procedures of 1. RASTER POSITION adjustment.

3-5. Basic adjustment of ASTIG (To be carried out with the highest horizontal frequency registered) (This adjustment cannot be made for each registered signal.)

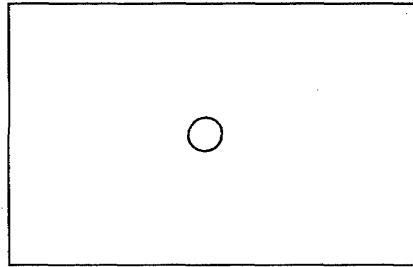
- ① Receive Character H of VESA1024 in RGB mode.
- ② Confirm that the beam shape in the screen center is round.
- ③ Set the projection ASTIG output at CEILING/FRONT in optional setting mode.
- ④ At each part (U, D, L, R) of the selected screen, adjust ASTIG CROSS of remote control so that the beam shape becomes round.
- ⑤ At each part (UL, UR, DL, DR) of the selected screen, adjust ASTIG CORNER of remote control so that the beam shape becomes round.
- ⑥ Check the beam shape in the screen center, and adjust the ASTIG center again if the beam shape is not round. Repeat the procedures of 4) and 5) above.
- ⑦ Store the setting.

Note) When ASTIG is selected, a test pattern dot-fine screen automatically appears and the center focus is defocused to enlarge the beam shape.

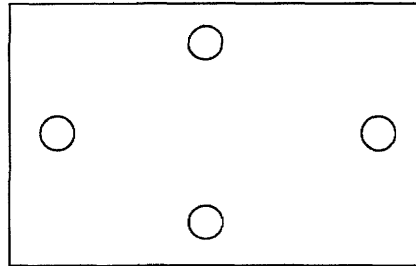
Note) When the SOURCE screen is selected at the test end, a JUST FOCUS state is assumed.

Note) Adjust ASTG center, and then ASTIG cross. Since then, adjust ASTIG corner, by reason of when ASTIG center is adjusted, ASTIG cross and ASTIG corner are also changed, and when ASTIG cross is adjusted, ASTIG corner is also changed.

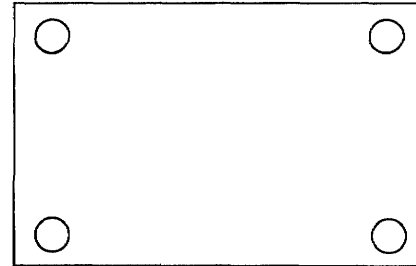
Note) When adjusting signal CRT at a time, cover the other two with lens caps.



ASTIG CENTER adjusting position



ASTIGCROSS adjusting position



ASTIG CORNER adjusting position

For reference: ASTIG performance

When ASTIG is selected, test pattern dot-line is automatically displayed and the DEFOCUS state is further intensified to enlarge the beam shape.

ASTIG has two operating directions, displayed as "HV" and "SK" on screen. (Bottom left on screen)

When HV or SK is changed, the beam shape is also changed as shown below.

HV Beam shape prolonged vertically or horizontally.

SK Beam shape prolonged slantwise.

3-6. Basic adjustment of FOCUS (Adjustment required for each signal)

- ① Receive Character H of VESA1024 in RGB mode.
- ② Using the remote control, select SEPARATE in the FOCUS EDGE mode, which is an optional setting mode.
- ③ Confirm that G-CENTER FOCUS of the remote control is set at 0%. Then, paying attention to the center part, adjust WAVE PWB VR9002.
- ④ Seeing a picture in the vicinity of the screen, make fine adjustment of CENTER FOCUS for the G control, using the remote control.

Note) "The vicinity of the screen" means that distance is within 2m from the screen.

Note) Fine adjustment of the remote control shall be within $\pm 20\%$.

If $\pm 20\%$ is exceeded, adjustments shall be repeated from 3) again.

- ⑤ Paying attention to the selected area, adjust G-EDGE FOCUS.
- ⑥ Make adjustment of (5) for the right, left, up, and down, and store it.
- ⑦ Paying attention to the selected area, adjust G-CORNER FOCUS.
- ⑧ Make adjustments of 6) for 4 corners and store the result.
- ⑨ When FOCUS in the center gets worse, repeat the procedures of 3) to 9) again.
- ⑩ In the same manner as for 3), adjust VR9001 and VR9003 also for R and B, respectively.
- ⑪ Make the same adjustments as for 5) and 6) also for R and B.
- ⑫ Make the same adjustments as for 7) and 8) also for R and B.
- ⑬ Focus adjustment is required for all signals registered. Focus adjustment should be carried out also for other signals.

METHOD OF ADJUSTMENTS

3-7. WHITE BALANCE adjustment

- 7-1. VRs required for adjustments, and remote control
- | | |
|--|------------------|
| VR7401 : (R: ON-screen color adjusting VR) | } VIDEO OUT PWB |
| VR7505 : (G: Cathode amplitude adjusting VR) | |
| VR7601 : (B: ON-screen color adjusting VR) | |
| DRIVE CONTROL | } REMOTE CONTROL |
| BRIGHT BIAS | |
| BRIGHT GAIN | |
| BLACK BIAS | |

7-2. Method of adjustment

Make VIDEO OUT adjustments, after adjustment and checking of voltage waveforms at TP7011, TP7012, and TP7013 of 4-2 GAIN CTL PWB.

Preliminary arrangement

Input signals: NTSC3.58 all-white gray-scale, cross-hatch
or PAL all-white gray-scale, cross-hatch

Setting of each VR, SW

VIDEO OUT PWB

S7701 : TEST

HV PWB

S5001 : OFF (PROTRUDED)

S5002 : OFF (PROTRUDED)

Setting of the set

VIDEO MODE : MANUAL NTSC3.58 or MANUAL PAL

B-FOCUS TRACKING: ON

AKB : ON

COLOR TEMP : CENTER (6500K)

WHITE BLANCE : W 50%, B 50% (R, G, B)

BRIGHT : 60%

CONTRAST : 100%

COLOR : 60%

SHARPNESS : 50%

TINT : 0%

Note: Prior to adjustment, the set requires more than 20 minutes of aging.

For reference: If the adjusting signal is different from the above setting, data of an existing signal should be copied in the empty input list, and the above-mentioned setting is made according to the copied list. This arrangement is convenient for adjustments.

At that time, however, it is necessary to confirm that CONVERGENCE and FOCUS have been adjusted. After completion of adjustment, the copied list shall be deleted.

- (1) Test the S7701 and check voltages below.

TP7404 2.5 ± 0.1 [V]

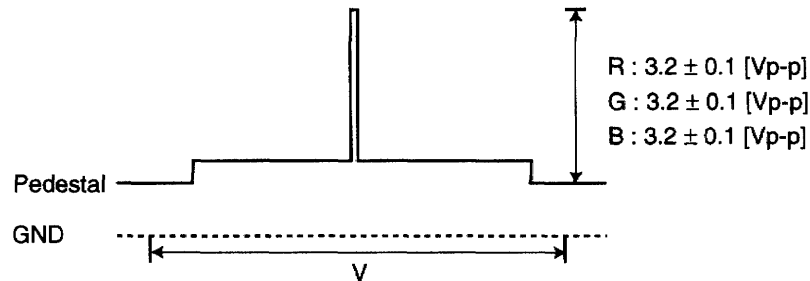
TP7504 2.5 ± 0.1 [V]

TP7604 2.5 ± 0.1 [V]

(2) Coarse adjustment of cathode amplitude

Make adjustments until the amplitude of cross-hatch signal is below the following voltages:

CRT OUT PWB	TP7901	3.2 ± 0.1 [Vp-p]	DRIVE CONTROL-R
	TP7921	3.2 ± 0.1 [Vp-p]	VR7505 (VIDEO OUT PWB)
	TP7941	3.2 ± 0.1 [Vp-p]	DRIVE CONTROL-B



(3) Coarse adjustment of cutoff voltage

Under the conditions with low contrast and some brightness, look into the CRT and adjust BLACK BIAS-R/G/B to a voltage, so that back raster begins brighter than black.

(4) Switch S7701 to NORM.

(5) G-control adjustment

① Put caps on R-CRT and B-CRT.

② Enter gray-scale signal and pay attention to G-CRT. Adjust BRIGHT BIAS-G until there can be distinction between 10% and 5%, and similar black can be obtained at 5% and 0%.

Note) This confirmation should be made as closer to the screen center as possible.

③ Adjust BLACK BIAS-G at TP7504, to secure the voltage below.

TP7504 2.5 ± 0.1 [V]

④ Set BRIGHT at 0%.

⑤ Adjust BRIGHT GAIN-G to a point, where 30% and 0% of gray scale begin to obtain similar black.

⑥ Set BRIGHT at 60%.

⑦ When there is deviation from the voltage of 3) at TP7504, adjust the voltage to that of 3) with BRIGHT BIAS-G. Re-adjust from 4).

⑧ The G control is used as a standard hereafter. Do not change settings.

(6) Contrast and tracking

① Remove caps from R-CRT and B-CRT.

② Display cross-hatch pattern.

③ In STATIC mode, shift R and B upwards and downwards, respectively.

Note) Data should not be stored under the condition with STATIC shifted.

④ Set the contrast at 0% and reduce the amplitude of input signal. Make the cross hatch slightly bright.

⑤ Adjust BRIGHT BIAS-R/B, so that R, G, B of horizontal lines begin to light similarly and vertical lines are white.

⑥ Adjust the contrast to 100%, input amplitude to normal, and the signal to all white.

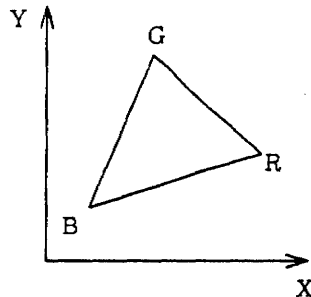
METHOD OF ADJUSTMENTS

- ⑦ Measure color temperature in the vicinity of screen center, and adjust DRIVE CONTROL-R/B to secure the following values:

$$X=0.317 \pm 0.01$$

$$Y=0.345 \pm 0.01$$

(For reference)



When R is increased, X increases.

When B is increased, both X and Y decrease.

- ⑧ Repeat the procedures of ② to ⑦ and secure contrast and tracking.
(For reference)

If cathode amplitude is increased by the use of DRIVE CONTROL when securing contrast and tracking, cut-off voltage is lowered because of characteristics of the AKB circuit. Therefore, it is necessary to raise the cut-off voltage with BRIGHT BIAS. For this reason, when adjusting cathode amplitude with DRIVE CONTROL, it should be set at a level somewhat lower than the cathode amplitude at which specified color temperature is to be assured. This treatment will result in obtaining the specified color temperature at the said BRIGHT BIAS.

- ⑨ Secure a signal in cross-hatch mode, and confirm that the cathode amplitude is 3.35 [Vp-p] or below at TP7901, TP7921, and TP7941 on CRT OUT PWB when the contrast is 100%.
If 3.35[Vp-p] is exceeded, the cathode amplitude should be adjusted to 3.35[Vp-p] by the use of DRIVE CONTROL. Adjustments can be started again from 2) with VR7505, after the Y value (color temperature) of G-cathode amplitude is met.

Note) The G-cathode amplitude can greatly affect the peak brightness. Therefore, the least modification should be attempted for the amplitude.

(7) Brightness and tracking

- ① Adjust BLACK BIAS-R/B until the following voltages are attained at TP7404 and TP7604:

$$\text{TP7404: } 2.5 \pm 0.05 \text{ [V]}$$

$$\text{TP7604: } 2.5 \pm 0.05 \text{ [V]}$$

- ② Set BRIGHT at 0%.
③ Let signals stay in the cross-hatch mode.
④ In STATIC mode, shift R and B upwards and downwards, respectively.

Note) Data should not be stored under the condition that STATIC is shifted.

- ⑤ Lower the contrast and make the cross hatch slightly bright.
⑥ Adjust BRIGHT GAIN-R/B, so that R, G, B of horizontal lines begin to light similarly and vertical lines are white.
⑦ Select NORMAL for input amplitude and set the signal in momoscope mode.
⑧ Set BRIGHT at 60%.
⑨ When there is deviation from the voltage of 1) at TP7504 and TP7604, adjust the voltages to the above values with BRIGHT BIAS-R/B. Restart adjustments from 2).

- ⑩ Measure the color temperature and confirm that it is maintained within the standard range. Check the monoscope fray scale and confirm that white balance is favorably maintained. If some deviation is found, make slight adjustments as shown below.

BRIGHT BIAS-R/B

(At 0% and 100% of BRIGHT, color temperature is shifted in the same direction.)

BRIGHT GAIN-R/B

(At 0% and 100% of BRIGHT, color temperature is shifted in the reverse direction.)

(For reference)

The same direction shall mean, for example, that R is dominant at 0% BRIGHT, and also at 100% BRIGHT.

The reverse direction shall mean, for example, that R is dominant at 0% BRIGHT, but it is less at 100% BRIGHT.

If color temperature is widely changed, cutoff white balance may be lost. In such a case, white balance should be checked again.

If deviation is discovered, restart adjustments from 6) above.

- (8) Cathode amplitude check
Secure a signal in cross-hatch mode, and confirm that the cathode amplitude is 3.35 [Vp-p] or below at TP7901, TP7921, and TP7941 on CRT OUT PWB when the contrast is 100%.
If 3.35[Vp-p] is exceeded, the cathode amplitude should be adjusted to 4.2[Vp-p] by the use of DRIVE CONTROL. Adjustments can be started again from 6) with VR7505, after the Y value (color temperature) of G-cathode amplitude is met.
Note) The G-cathode amplitude can greatly affect the peak brightness. Therefore, the least modification should be attempted for the amplitude.
- (9) ON-screen white-balance adjustment
Check ON-screen white-balance at the INFO screen, etc., and adjust R-CRT: VR7401 and B-CRT: VR7601 if any deviation is found.
- (10) Turn off AKB on all-white screen, and store it.
- (11) Measure the color temperature at 60% BRIGHT and confirm that it is kept the same as when AKB is turned on.
- (12) White uniformity adjustment
① Receive an all-white signal and set CONTRAST at MIN.
② Check both right and left ends of the screen and adjust WHITE UNIFORM so that the white uniformity becomes favorable.
(ADJUST - 9/REF ADJUST - 1/WHITE UNIFORM)
- (13) Set BRIGHT at 60% and CONTRAST at 75%, and store the result.
- (14) Set VIDEO MODE at AUTO, and store it.
- (15) Apply other adjusting signal inputs, and turn on AKB on the INFO screen. Then turn off AKB, and store the resultant condition.

METHOD OF ADJUSTMENTS

12-4. Simplified adjustments

4-1. Method of adjustments for replacement of periodic maintenance, together with CRT (R, G, B)

Make adjustments by the method and procedures shown below.

1) Adjustment of raster position (centering) and DY tilt

- ① After replacement of CRT, turn on the power circuit.
- ② Enter the marking signal input, which has been prepared during CRT replacement.
- ③ Display the testing cross (+) signal and adjust the raster position with a remote control so that the signal coincides with the marking on the screen. (Enter the code input of serviceman mode.)
- ④ If the tilt is found inadequate, adjust the DY tilt to the correct position.

2) F-MG tilt adjustment

Adjust the F-MG tilt, according to the method of F-MG tilt adjustment described in 3-3 for regular adjustments.

3) CPC adjustment

- ① Select DYNAMIC ASTIG with the remote control and defocus the beam. Adjust Pole 2, Pole 4, and Pole 6 so that the beam shape in the center can be normal.
As required, shift the center focus and adjust the CPC.
(Regarding the beam shape, refer to adjustment of CPC in 3-4 for regular adjustments.)
- ② After CPC adjustment of beam shape in the center, readjust the raster position with the remote control for the amount of shift caused by pole-2 adjustment.
- ③ When the raster position is readjusted, readjust Pole 6, as required.
- ④ Upon completion of adjustment in the screen center, check the focus around the screen to see whether it needs readjustment. If required, adjust the ASTIG and FOCUS.

4) ASTIG readjustment

- ① When the CPC center is adjusted, no other adjustments are needed if there is no problem in the peripheral focus.
- ② When adjustments are found to be necessary, make readjustments according to 3-5 for regular adjustment of ASTIG.

5) Focus readjustment

- ① Adjust the center focus with a VR on the WAVE board.
(If the center focus is adjusted at WAVE PWB without changing focus data of the remote control, readjustments become unnecessary for all signals.)
- ② Check peripheral focus, and finish adjustments if no other problem has been found.
- ③ If there is problem in peripheral focus, make adjustments according to 3-6 for the basic adjustment of focus.

6) White balance readjustment

Only in the case of CRT replacement, white balance can be readjusted in the following simplified procedures:

① Preliminary arrangement

Input signals : NTSC3.58 all-white gray-scale, cross-hatch
or PAL all-white gray-scale, cross-hatch

Setting of each VR, SW

S7701 : NORM

HV PWB

S5001 : OFF

S5002 : OFF

Setting of the set

VIDEO MODE	: MANUAL NTSC3.58 or MANUAL PAL
B-FOCUS TRACKING	: ON
AKB	: ON
COLOR TEMP	: CENTER (6500K)
WHITE BALANCE	: W 50%, B 50% (R, G, B)
BRIGHT	: 60%
CONTRAST	: 100%
COLOR	: 60%
SHARPNESS	: 50%
TINT	: 0%

Note: Prior to adjustment, the set requires more than 20 minutes of aging.

For reference: If the adjusting signal is different from the above setting, data of an existing signal should be copied in the empty input list, and the above-mentioned setting is made according to the copied list. This arrangement is convenient for adjustments.

At that time, however, it is necessary to confirm that CONVERGENCE and FOCUS have been adjusted. After completion of adjustment, the copied list shall be deleted.

② Reference voltage setting

Adjust BLACK BIAS to obtain the voltages specified below at the following TPs:

TP7404	2.5 ± 0.1 [V]	BLACK BIAS-R
TP7504	2.5 ± 0.1 [V]	BLACK BIAS-G
TP7604	2.5 ± 0.1 [V]	BLACK BIAS-B

- ③ Turn off AKB on the all-white screen, and store it.
- ④ Measure the color temperature at 60% BRIGHT and confirm that it is kept the same as when AKB is turned on.
- ⑤ Set BRIGHT at 60% and CONTRAST at 75%, and store the result.
- ⑥ Set VIDEO MODE at AUTO, and store it.
- ⑦ Apply other adjusting signal inputs, and turn on AKB on the INFO screen. Then turn off AKB, and store the resultant condition.

4-2. Adjustments for CRT replacement only, resulting from a fault

Adjust the CRT only, replaced by the method and procedures below.

1) Adjustment of raster position (centering) and DY tilt

- ① After replacement of CRT, turn on the power circuit.
- ② Display the testing cross (+) signal and adjust the raster position so that it coincides with the display position of the cross signal for the color at the CRT not replaced yet. (Enter the code input of serviceman mode.)
- ③ If the tilt is found inadequate, adjust the DY tilt to the correct position.

2) F-MG tilt adjustment

Adjust the F-MG tilt, according to the method of F-MG tilt adjustment described in 3-3 for regular adjustments.

METHOD OF ADJUSTMENTS

3) CPC adjustment

- ① Select DYNAMIC ASTIG with the remote control and defocus the beam. Adjust Pole 2, Pole 4, and Pole 6 so that the beam shape in the center can be normal.
As required, shift the center focus and adjust the CPC.
(Regarding the beam shape, refer to adjustment of CPC in 3-4 for regular adjustments.)
- ② After CPC adjustment of beam shape in the center, readjust the raster position with the remote control for the amount of shift caused by pole-2 adjustment.
- ③ When the raster position is readjusted, readjust Pole 6, as required.
- ④ Upon completion of adjustment in the screen center, check the focus around the screen to see whether it is free from problem. If there is any problem, adjust the next ASTIG and FOCUS.

4) ASTIG readjustment

- ① When the CPC center is adjusted, no other adjustments are needed if there is no problem in the peripheral focus.
- ② When adjustments are found to be necessary, make readjustments according to 3-5 for regular adjustment of ASTIG.

5) Focus readjustment

- ① Adjust the center focus with a VR on the WAVE board.
(If the center focus is adjusted at WAVE PWB without changing focus data of the remote control, readjustments become unnecessary for all signals.)
- ② Check peripheral focus, and finish adjustments if no other problem has been found.
- ③ If there is problem in peripheral focus, make adjustments according to 3-6 for the basic adjustment of focus.

6) White balance readjustment

Simplified adjustments described in 4-1-6) shall be carried out only for the replaced CRT.