

NEC

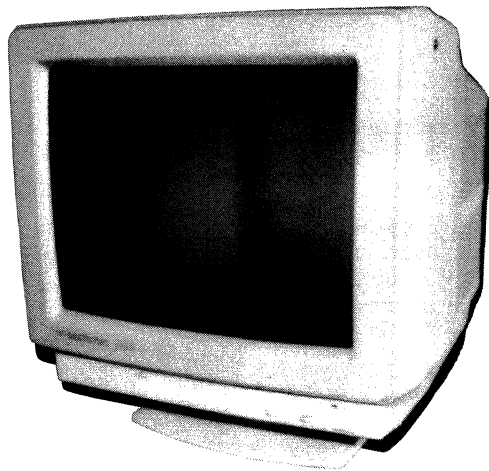
MODEL JC-1501VMA

COLOR MONITOR MULTISYNC *plus* SERVICE MANUAL

PARTS NO. 599910258



**Better Service
Better Reputation
Better Profit**



SPECIFICATIONS

A. Electrical Description

Picture Tube	14 Visual inches diagonal 90 degree deflection, 0.31 mm Trio dot pitch Dot type black matrix Non-long persistence phosphor, Dark bulb, Direct etch	Synchronization	Horizontal : 21.8KH to 45kHz (Automatically) Vertical : 56Hz to 80Hz (Automatically), Non-interlace
Input Signal	Video : TTL Level Positive : ANALOG 0.7 or 1.0Vp-p/75Ω Positive Sync. : Separate sync. TTL Level Horizontal sync. Positive/Negative Vertical sync. Positive/Negative : Composite sync. TTL Level Positive/Negative : Composite sync. on Green Video sync. 0.3Vp-p Negative (Video 0.7Vp-p Positive) or sync. 0.43Vp-p Negative (Video 1.0Vp-p Positive)	Resolution	Horizontal : 960 dots Vertical : 720 lines
Display Colors	TTL Input : 8/16/64 colors Analog Input : Unlimited colors	Video Band Width	55MHz on BNC, 30MHz on D-Sub
		Maximum Display Area	Horizontal : 260mm (Active display area is changed by signal timing) Vertical : 195mm
		Misconvergence	Less than 0.6mm
		Power Supply	AC 120V / 60Hz
		Power Consumption	120W
		Dimensions	360 (W) × 372 (H) × 410 (D) mm
		Weight	18 kg
		Environmental Consideration	Operating Temperature 0°C to +40°C Humidity 30% to 80% Storage Temperature -20°C to +60°C Humidity 10% to 90%

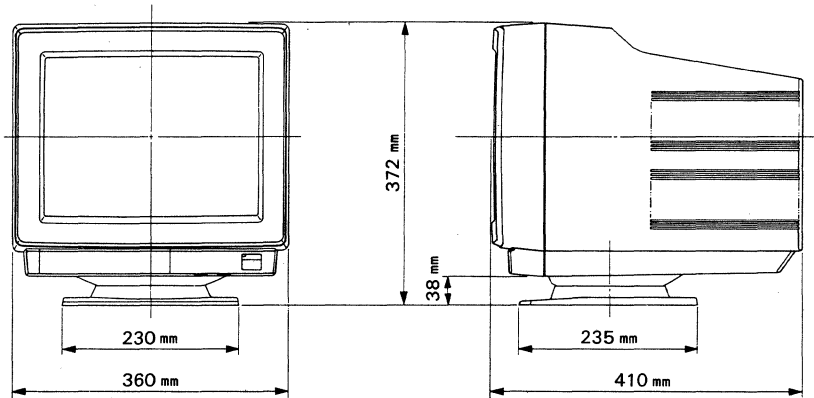
NOTE: The above specifications are subject to change without notice for further improvement.

NEC Corporation
TOKYO, JAPAN

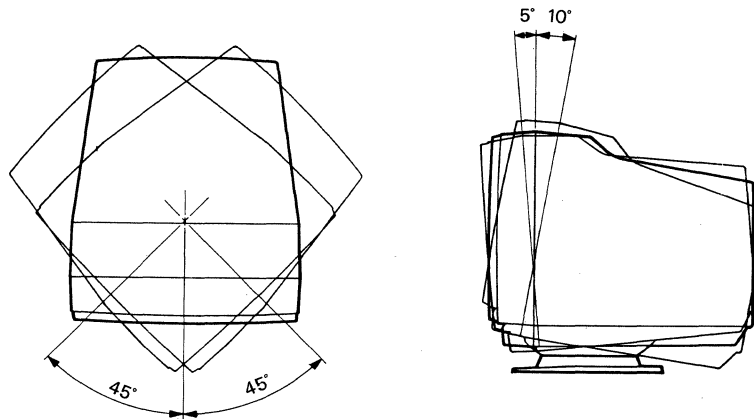
B. Mechanical Description (See below diagrams)

- | | |
|---------------|--|
| 1. Cabinet | Molded plastic cabinet with attachable tilt swivel base. |
| 2. Dimensions | 360(W) x 372(H) x 410(D) mm |
| 3. Weight | 18 kg |

Dimensions



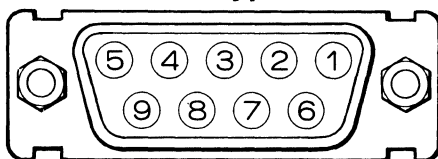
Tilt Swivel Range



- | | | | |
|-------------|-----------------------------|---|--|
| 4. Controls | BRIGHTNESS CONTROL | INPUT SWITCH | |
| | CONTRAST CONTROL | TEXT SWITCH | |
| | HORIZONTAL POSITION CONTROL | TEXT COLOR SWITCH | |
| | HORIZONTAL SIZE CONTROL | TTL/ANALOG SWITCH | |
| | VERTICAL POSITION CONTROL | BNC INPUT VOLTAGE SWITCH | |
| | VERTICAL SIZE CONTROL | COLOR SWITCH | |
| | POWER SWITCH | MANUAL SWITCH | |
| | 5. Input Signal Terminal: | 9 PIN D-SUB CONNECTOR (FEMALE) | |
| | | (SEE PAGE 2 FOR PIN ASSIGNMENTS) | |
| | | BNC CONNECTOR (FEMALE) | |
| | | (SEE PAGE 3 FOR CONNECTION ASSIGNMENTS) | |

PIN ASSIGNMENTS AND SIGNAL LEVELS

D-SUB Type 9-P

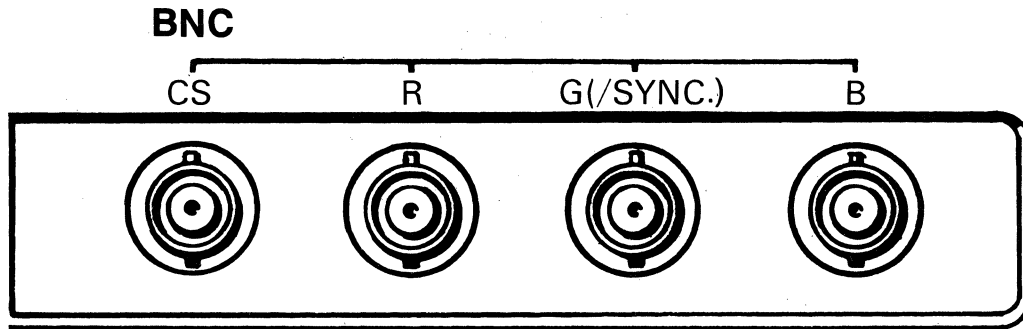


MANUAL SWITCH OFF

SIGNAL PIN No.	TTL		ANALOG	
	EGA COMPATIBLE		PGC COMPATIBLE	VGA/MCGA COMPATIBLE
	16 COLORS	64 COLORS		
1	GROUND	GROUND	●RED	●RED
2	GROUND	SECONDARY RED	●GREEN	●GREEN
3	RED	PRIMARY RED	●BLUE	●BLUE
4	GREEN	PRIMARY GREEN	COMPOSITE SYNC.	H. SYNC.
5	BLUE	PRIMARY BLUE	MODE CONTROL	V. SYNC.
6	INTENSITY	SECONDARY GREEN	RED GROUND	RED GROUND
7	NO-CONNECTION	SECONDARY BLUE	GREEN GROUND	GREEN GROUND
8	H. SYNC.	H. SYNC.	BLUE GROUND	BLUE GROUND
9	V. SYNC.	V. SYNC.	GROUND	GROUND

MANUAL SWITCH ON

SIGNAL PIN No.	TTL			ANALOG		
	8 COLORS	16 COLORS	64 COLORS	SEPARATE SYNC.	COMPOSITE SYNC.	SYNC. ON GREEN
1	GROUND			●RED		
2	—	—	SECONDARY RED	●GREEN		⊙H/V SYNC. ON GREEN
3	RED		PRIMARY RED	●BLUE		
4	GREEN		PRIMARY GREEN	H. SYNC.	H/V SYNC.	—
5	BLUE		PRIMARY BLUE	V. SYNC.	—	
6	—	INTENSITY	SECONDARY GREEN	GROUND		
7	—		SECONDARY BLUE			
8	H. SYNC.					
9	V. SYNC.					



CONNECTOR	SYNC. ON GREEN	COMPOSITE SYNC.
R	* RED	* RED
G	♠ H/V SYNC. ON GREEN	* GREEN
B	* BLUE	* BLUE
CS	—	H/V SYNC.

- “—” means GROUND or NON-CONNECTION
- “H” means HORIZONTAL
- “V” means VERTICAL
- “H/V” means COMPOSITE SYNC.

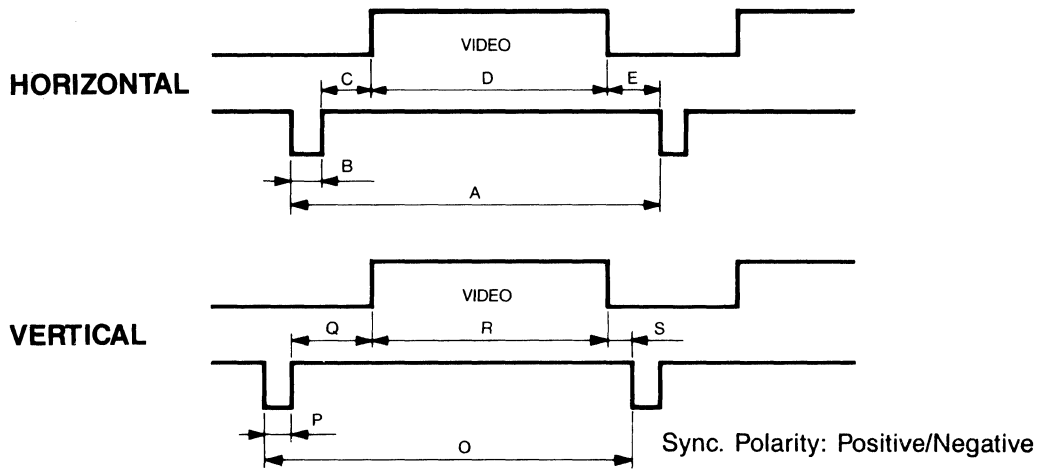
SIGNAL LEVEL

All signal levels, except for those listed below, are TTL.

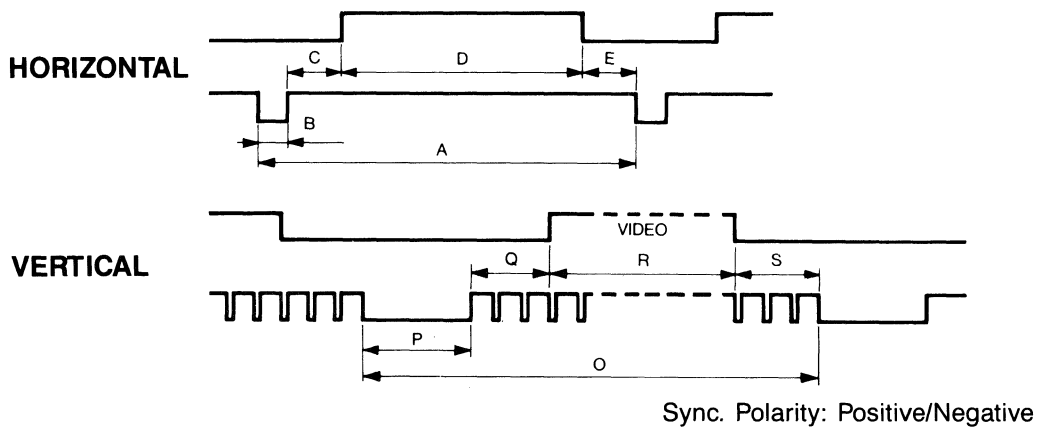
- “•” means 0.7Vp-p (VIDEO)
- “◎” means 0.7Vp-p (VIDEO), 0.3Vp-p (SYNC.)
- “*” means 0.7Vp-p or 1.0Vp-p (VIDEO)
- “♠” means 0.7Vp-p (VIDEO), 0.3Vp-p (SYNC.) or 1.0Vp-p (VIDEO), 0.43Vp-p (SYNC.)

TIMING CHARTS

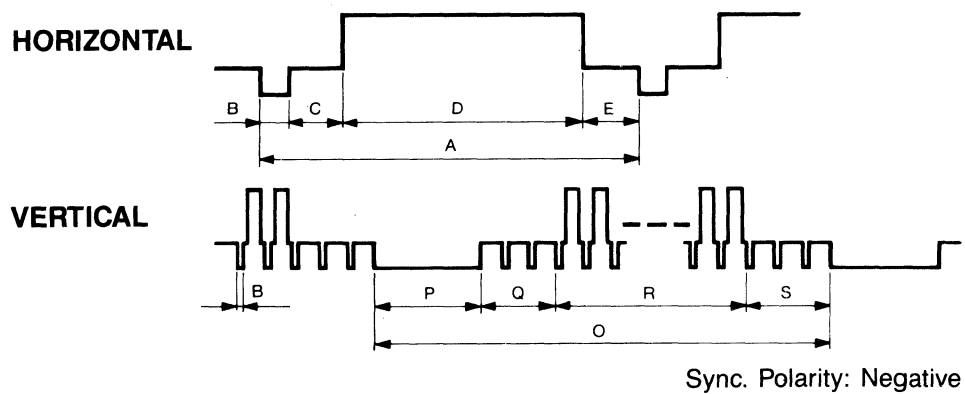
SEPARATE SYNC.



COMPOSITE SYNC.



COMPOSITE SYNC. & VIDEO (SYNC. ON GREEN)



PRESET TIMING

	EGA COMPATIBLE	VGA/MCGA COMPATIBLE			720 LINES
f_H	22 kHz	31.5 kHz			45 kHz
A μ s	45.5	31.77			22.287
B μ s	4.9	3.77			1.07
C μ s	1.6	1.89			3.2
D μ s	39	25.17			17.127
E μ s	0	0.94			0.89
f_v	60 Hz	70 Hz		60 Hz	60 Hz
O mS	16.68	14.27	14.27	16.68	16.85
P mS	0.6	0.064	0.064	0.064	0.089
Q mS	0.08	1.88	1.08	1.02	0.691
R mS	16	11.126	12.716	15.246	16.048
S mS	0	1.2	0.41	0.35	0.022
REMARKS	SEPARATE SYNC.	SEPARATE SYNC. H. SYNC. Positive V. SYNC. Negative	SEPARATE SYNC. H. SYNC. Negative V. SYNC. Positive	SEPARATE SYNC. H. SYNC. Negative V. SYNC. Negative	COMPOSITE SYNC. or COMPOSITE SYNC & VIDEO (Sync. on Green)

IBM PC, PC/XT, PC/AT, Personal System/2, MCGA, VGA, EGA and PGC are trademark of International Business Machines Corporation.

MultiSync is a registered trademark of NEC Home Electronics (U.S.A.) Inc.

GENERAL

MultiSync PLUS The Intelligent Monitor, from NEC, is a high resolution color monitor that automatically adjusts to graphics board scanning frequencies from 21.8 kHz to 45 kHz. MultiSync PLUS gives IBM PC, PC/XT, PC/AT, Personal System/2 and PC compatibles users crisp text and vivid color graphics displays when used with any of the IBM graphics adapters (the MCGA, VGA, EGA or PGC). MultiSync PLUS can also be used with other IBM compatible graphics adapters to provide IBM users with the widest range of color monitor compatibility and capability available in the market place.

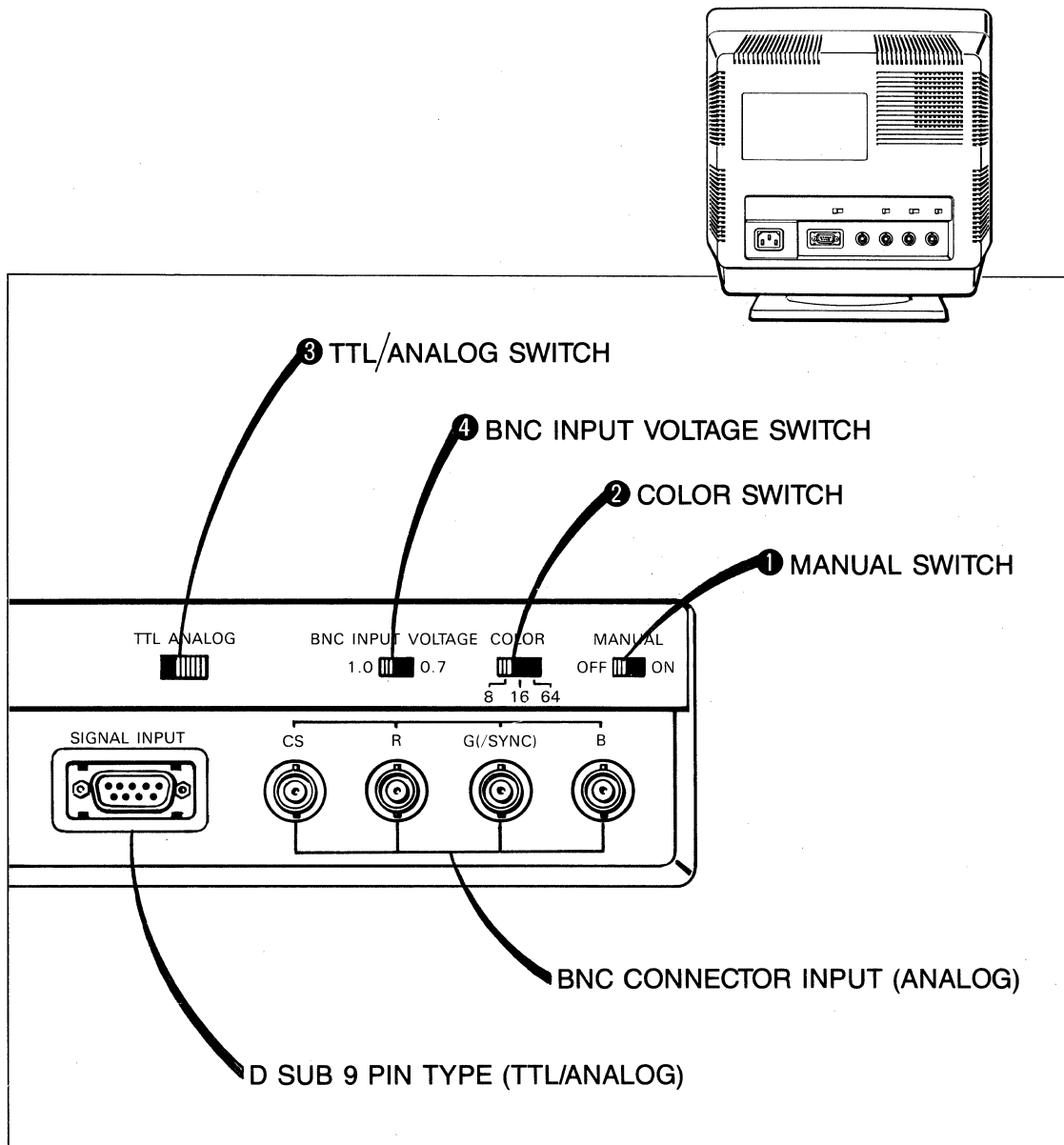
FEATURES

- MultiSync PLUS automatically scans all frequencies between 21.8kHz and 45kHz.
- MultiSync PLUS is compatible with the IBM PC, PC/XT, PC/AT and look-alikes.
- MultiSync PLUS is compatible with the IBM Professional Graphic Controller, the IBM Enhanced Graphics Adapter, the IBM Video Graphics Array, the IBM Multi Color Graphics Array and other IBM compatible graphics adapters.
- MultiSync PLUS's wide compatibility makes it possible to upgrade boards or software without purchasing a new monitor.
- MultiSync PLUS has a maximum horizontal resolution of 960 dots and a maximum vertical resolution of 720 lines for superior clarity of display.
- MultiSync PLUS offers both TTL and ANALOG signal inputs, and in the ANALOG mode can display an unlimited palette of colors depending on the graphics board and software being used.
- MultiSync PLUS features a TEXT SWITCH (TTL mode only) with a choice of three colors (green, amber and paper white) displaying word processing, spread sheets, databases or other software in crisp alphanumeric text on a dark-bulb black background.
- MultiSync PLUS has a 15 inch diagonal display and a large 14 inch viewing area.

ADJUSTING THE MULTISYNC PLUS CONTROLS

Before connecting the MultiSync PLUS with the IBM personal computers or compatibles and the IBM graphics adapters, take time to familiarize yourself with the switches and controls that give the MultiSync PLUS all its capabilities. Chapters 1 and 2 outline the control and switches of the MultiSync PLUS. Page 11 shows you how to connect the MultiSync PLUS with your IBM personal computer and graphics adapter.

1. ADJUSTING THE REAR CONTROLS



① MANUAL SWITCH

This switch selects either the IBM mode when OFF or the manual mode when ON. When this switch is OFF, MultiSync PLUS automatically works in the IBM mode and adjusts itself to the scanning frequency, resolution and color requirements of the IBM compatible graphics adapter being used.

When this switch is ON, the user must manually select the number of colors (8/16/64) needed by the graphics adapter being used with the COLOR SWITCH (see No. ② below). Refer to instructions accompanying the graphics adapter being used for information on how many colors the adapter can display.

② COLOR SWITCH

The three color configurations (8/16/64 colors) necessary when using non-IBM compatible graphics adapters can be set using the color switch as shown below. Refer to instructions accompanying the graphics adapter being used for information on how many colors the adapter can display.

COLOR MODE	COLOR SWITCH
8 colors	8
16 colors	16
64 colors	64

NOTE

This switch should be set correctly in relation to the input signal of the graphics adapter being used. Refer to instructions accompanying the graphics adapter for information on the input signal and refer to No. ③ below.

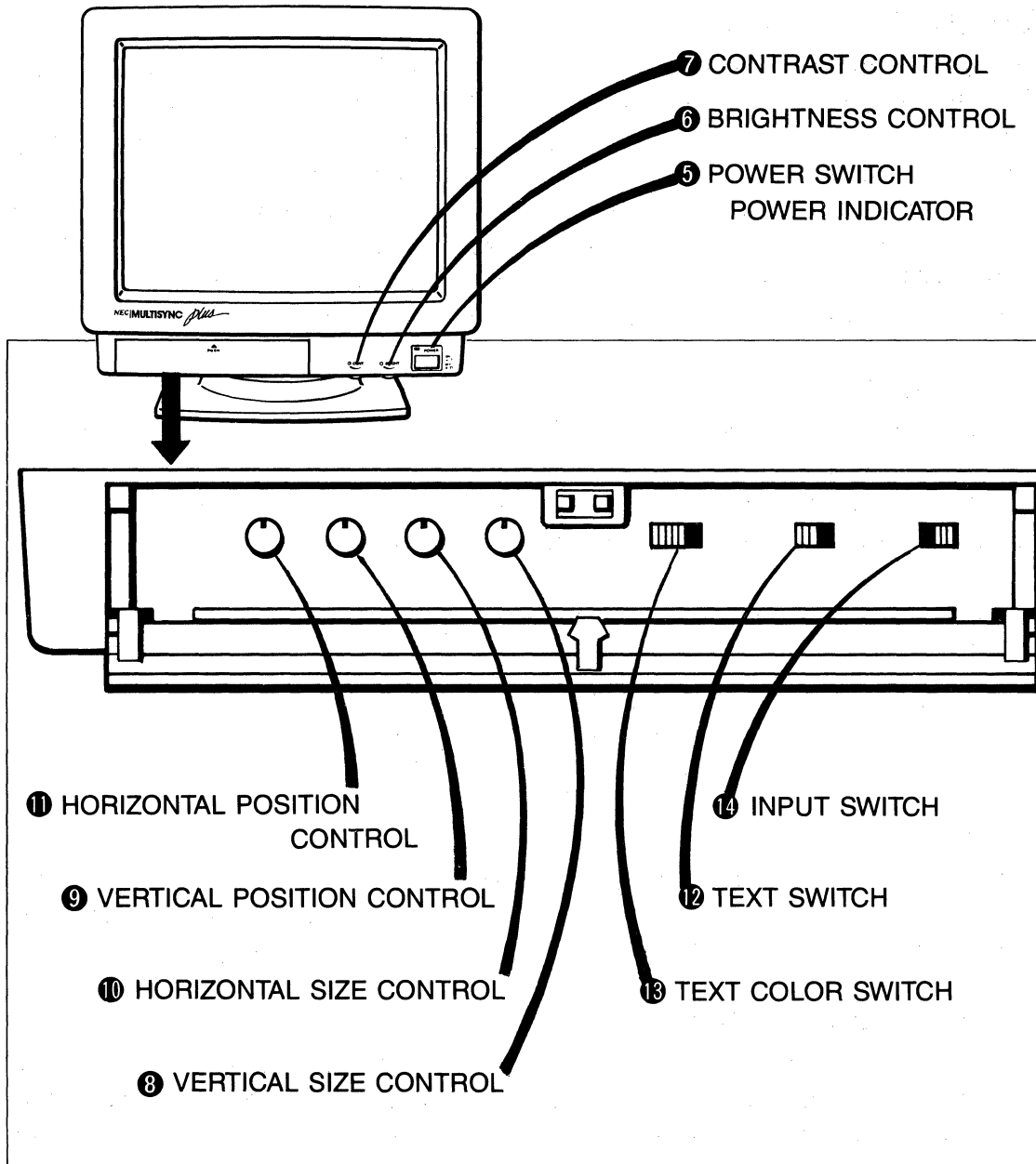
③ TTL/ANALOG SWITCH

Used to select an input video signal—either TTL or ANALOG—of the graphics adapter. It is important to determine whether the input signal of the graphics adapter being used is ANALOG or TTL prior to connecting the adapter with your the MultiSync PLUS. Refer to instructions accompanying the graphics adapter for information on the input signal.

④ BNC INPUT VOLTAGE SWITCH

Used to select an input video voltage—either 1.0Vp-p or 0.7Vp-p—of the graphics adapter. Refer to instructions accompanying the graphics adapter for information on the input video voltage.

2. ADJUSTING THE FRONT CONTROLS



5 POWER SWITCH

Used to turn power ON or OFF. When the power is ON the power indicator is lit.

6 BRIGHT CONTROL

Used to adjust the picture brightness of the screen.

7 CONTRAST CONTROL

Adjusts the display to the contrast preferred by the user.

8 V. SIZE CONTROL

Adjust this knob for the proper vertical size of the display. Turn the knob clockwise for a larger display; turn it counterclockwise for a smaller display.

9 V. POSITION CONTROL

Adjust this knob for the proper vertical position of the display. Turn the knob clockwise for a higher display position; turn it counterclockwise for a lower display position.

10 H. SIZE CONTROL

Adjust this knob for the proper horizontal size of the display.

11 H. POSITION CONTROL

Adjust this knob for the proper horizontal position of the display. Turn the knob clockwise to reposition display to the right; turn it counterclockwise to reposition to the left.

12 TEXT SWITCH

This switch controls the text mode of the MultiSync PLUS.

When it is ON, the text will appear in the color displayed by the TEXT COLOR SWITCH (See No. 13 below), regardless of the colors of the software program being used.

When it is OFF, the color of the software program being used will again be displayed.

NOTE

The text switch works only in the TTL mode.

13 TEXT COLOR SWITCH

Use this switch to select the text color—green, amber, or paperwhite—when the TEXT SWITCH is ON.

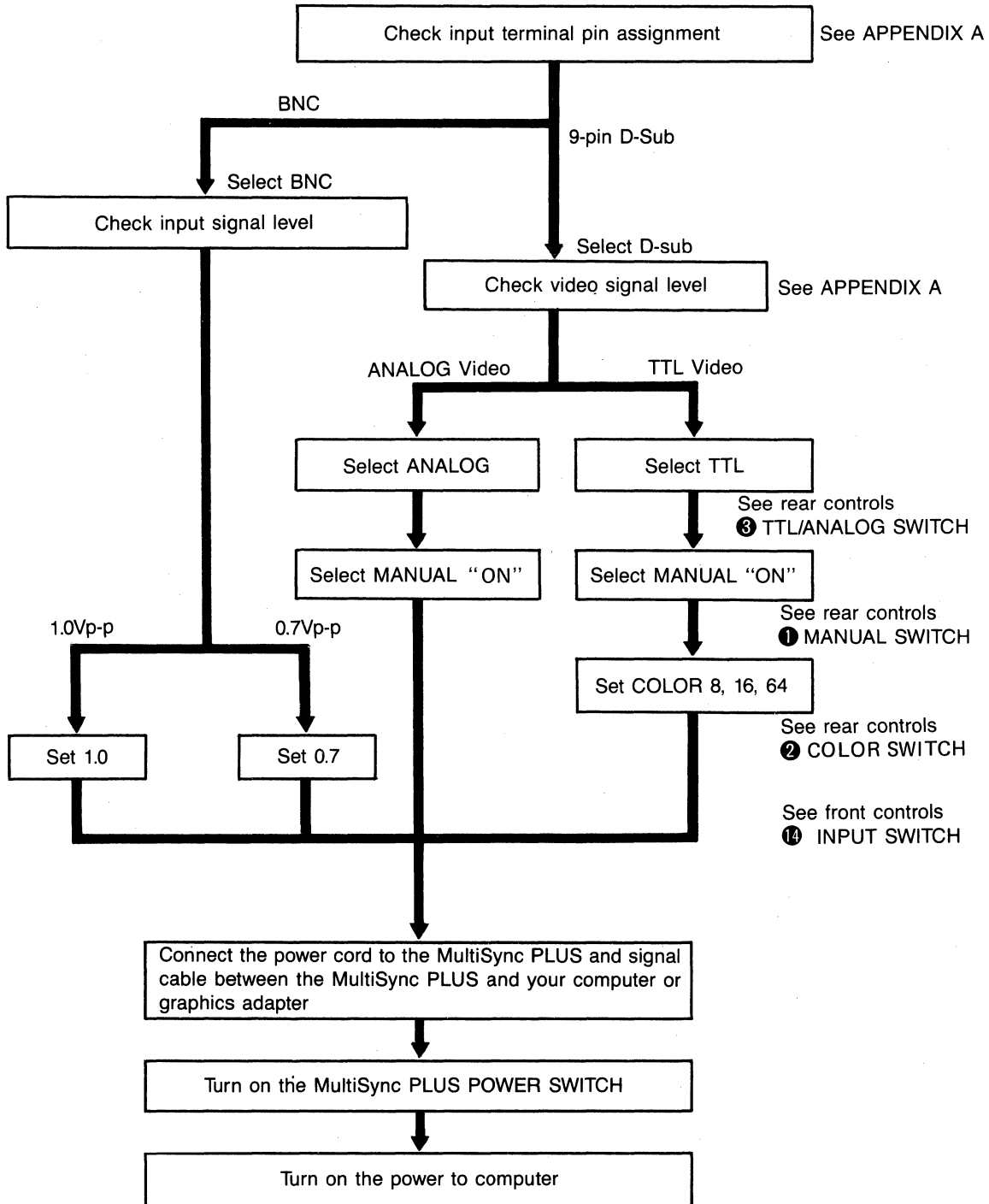
14 INPUT SWITCH

Use this switch to select input connector—either D-Sub or BNC.

CONNECTING THE MULTISYNC PLUS

1. WITH YOUR COMPUTER OR GRAPHICS ADAPTER

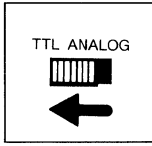



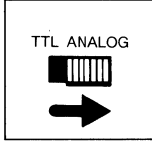



To connect the MultiSync PLUS with your computer or graphics adapter, refer to the diagram below.



2. WITH EGA, PGC OR COMPATIBLE ADAPTER

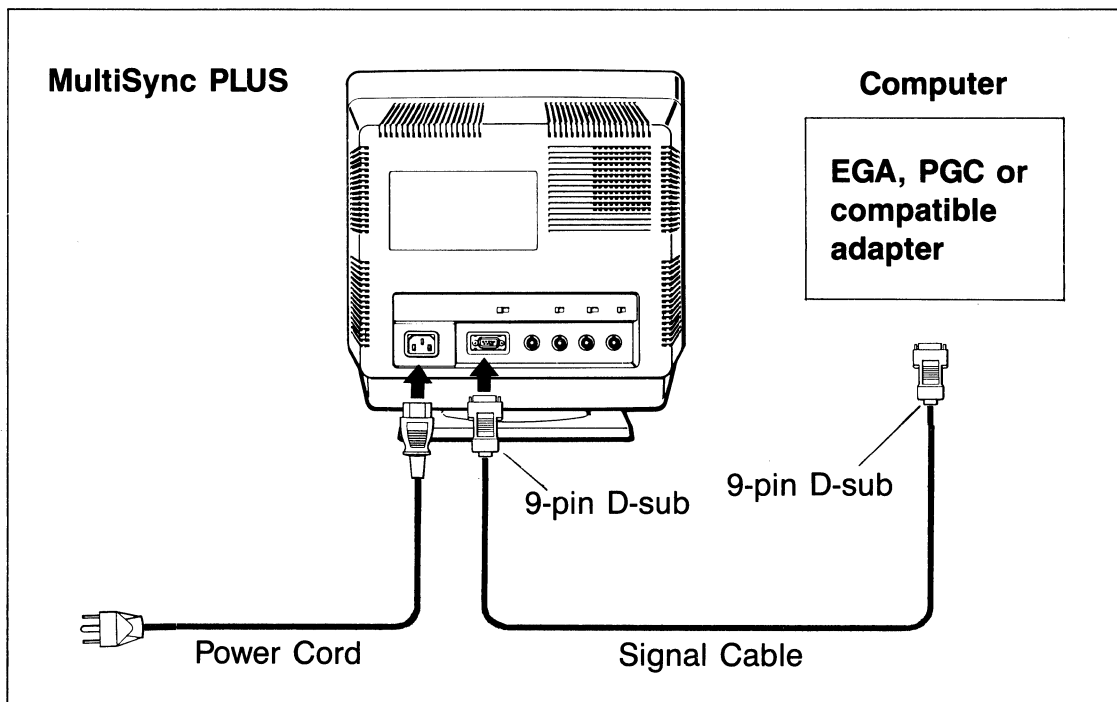
Using IBM PC, PC/XT, PC/AT or compatible computer equipped with the IBM Enhanced Graphics Adapter (EGA) or the IBM Professional Graphics Controller (PGC) or compatible adapter.

- 1** Make sure the power to the MultiSync PLUS and the computer is off.
- 2** Make sure the INPUT switch on the front of MultiSync PLUS is at "D-sub".
- 3** Make sure the TTL/ANALOG switch and the MANUAL switch on the rear are at appropriate position.

EGA or EGA compatible [TTL INPUT]		BNC INPUT VOLTAGE 1.0  0.7	COLOR 8 16 64 	MANUAL OFF  ON
PGC or PGC compatible [ANALOG INPUT]		BNC INPUT VOLTAGE 1.0  0.7	COLOR 8 16 64 	MANUAL OFF  ON

- 4** Connect the power cord and the signal cable to the MultiSync PLUS

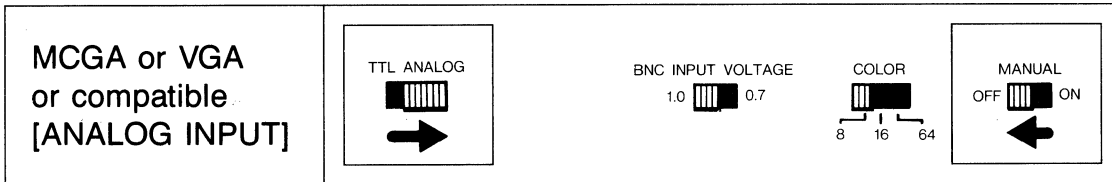
Use the signal cable with "9-pin D-sub to 9-pin D-sub".



3. WITH PERSONAL SYSTEM/2 OR COMPATIBLE SYSTEM

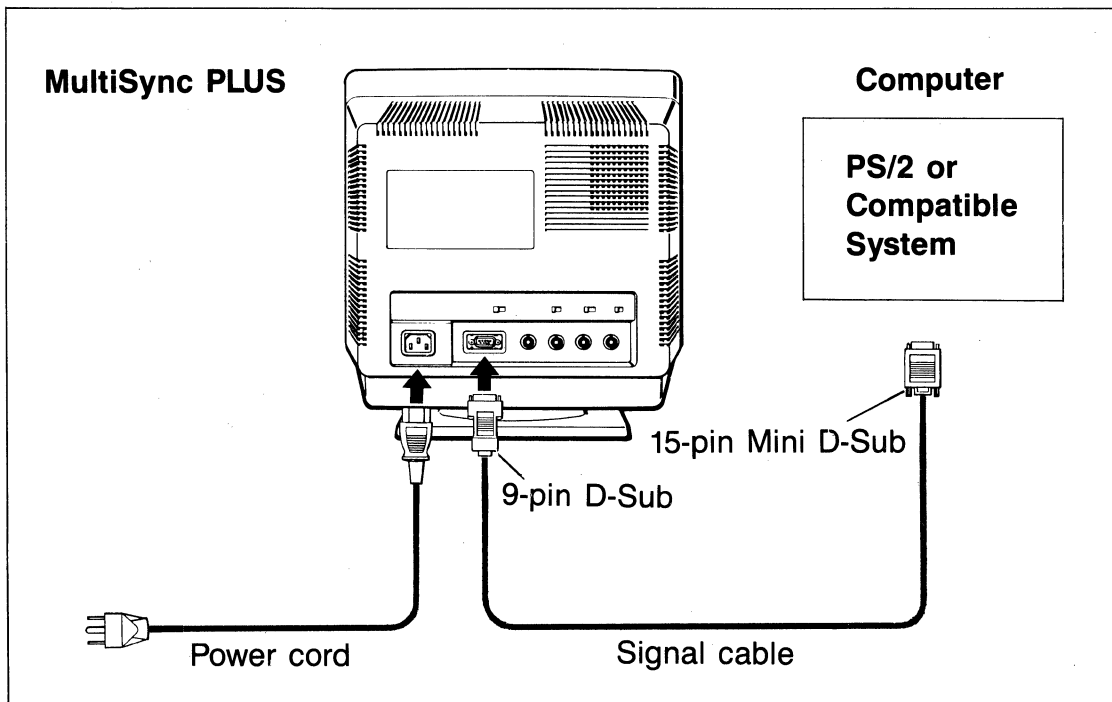
Using IBM Personal System/2 with Multi Color Graphics Array (MCGA) or Video Graphics Array (VGA) or compatible system.

- 1 Make sure the power to the MultiSync PLUS and the computer is off.
- 2 Make sure the INPUT switch on the front of the MultiSync PLUS is at "D-Sub".
- 3 Make sure the TTL/ANALOG switch and MANUAL switch on the rear are at appropriate position.



- 4 Connect the power cord and the signal cable to the MultiSync PLUS.

Use the SIGNAL CABLE with "9-pin D-sub to 15-pin Mini D-sub"

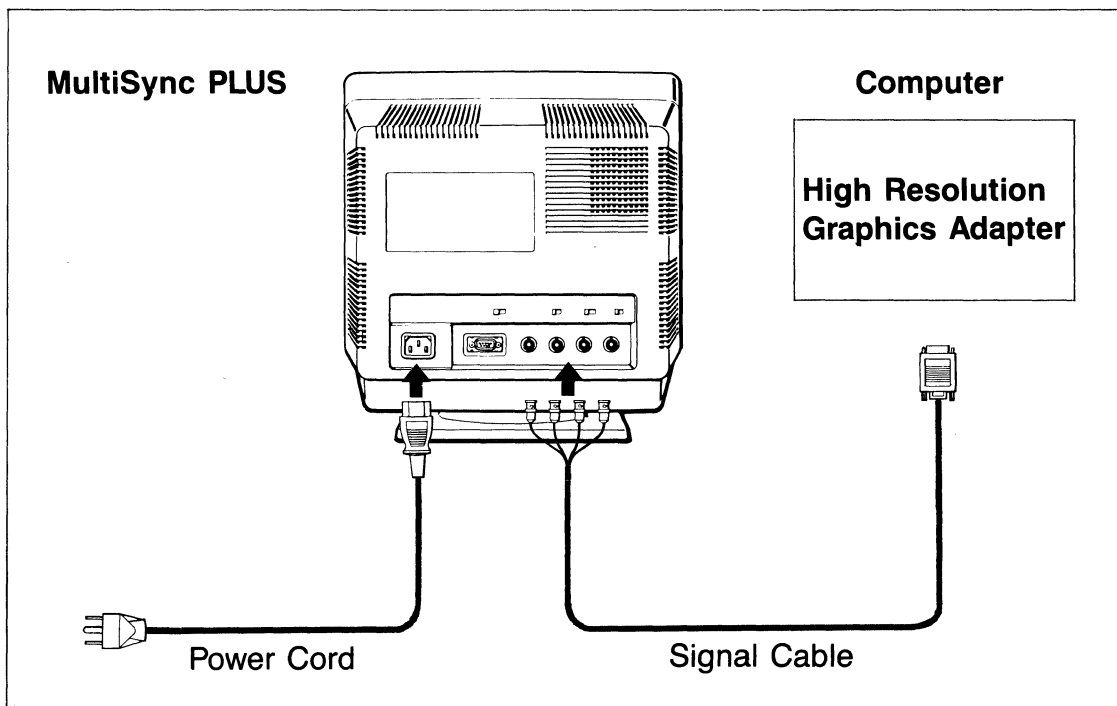


4. WITH A HIGH RESOLUTION GRAPHICS ADAPTER

Using a high resolution graphics adapter or a high resolution graphics system
(ex. 960 x 720 resolution)

- 1** Make sure the power to the MultiSync PLUS and the computer is off.
- 2** Make sure the INPUT switch on the front of the MultiSync PLUS is at "BNC".
- 3** Make sure the BNC INPUT VOLTAGE switch on the rear is at appropriate position for the maximum video output voltage from your adapter. (1.0:1V peak to peak, 0.7:0.7V peak to peak)
- 4** Connect the power cord and the signal cable to the MultiSync PLUS.

Use the optional signal cable or the signal cable supplied your adapter.



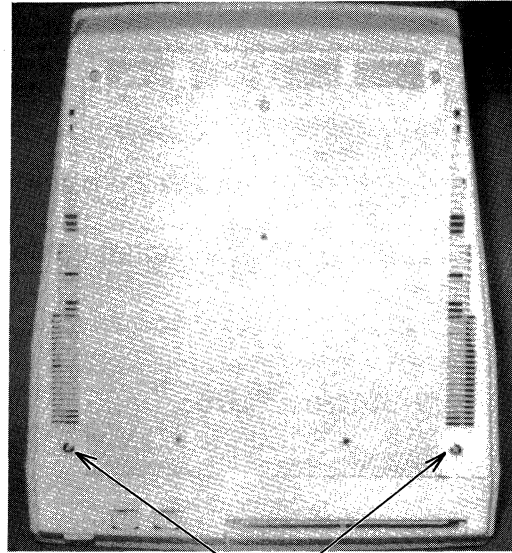
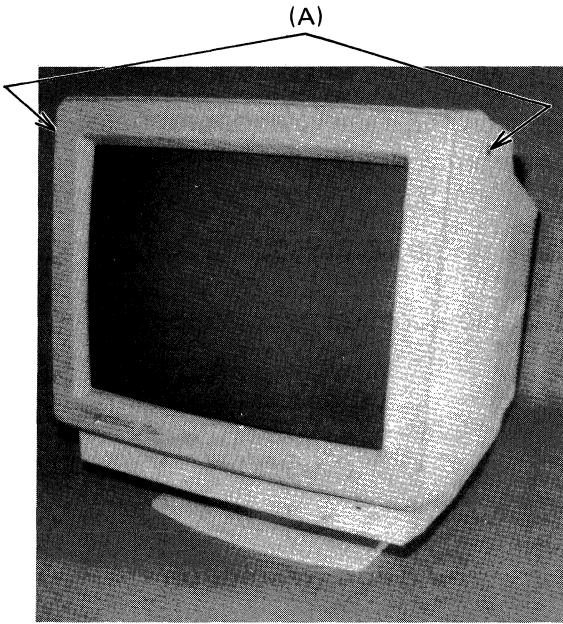
- 5** The red BNC cable should be connected to the BNC connector "R".
The green BNC cable should be connected to the BNC connector "G (/SYNC)".
The blue BNC cable should be connected to the BNC connector "B".
The black BNC cable should be connected to the BNC connector "CS".

For the optional signal cable, please contact your authorized NEC
Home Electronics dealer.

DISASSEMBLY

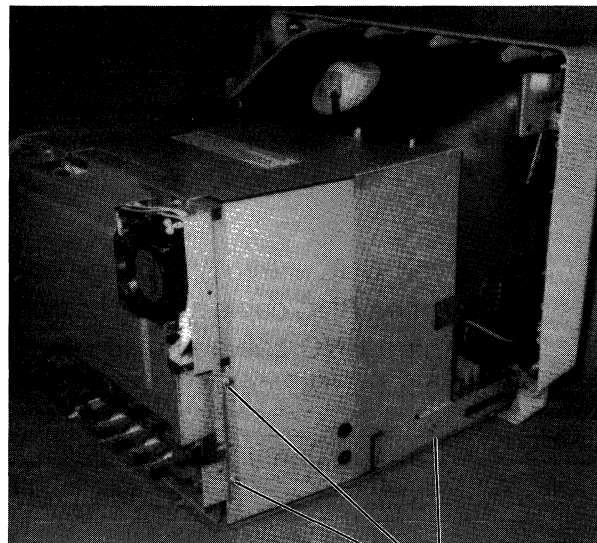
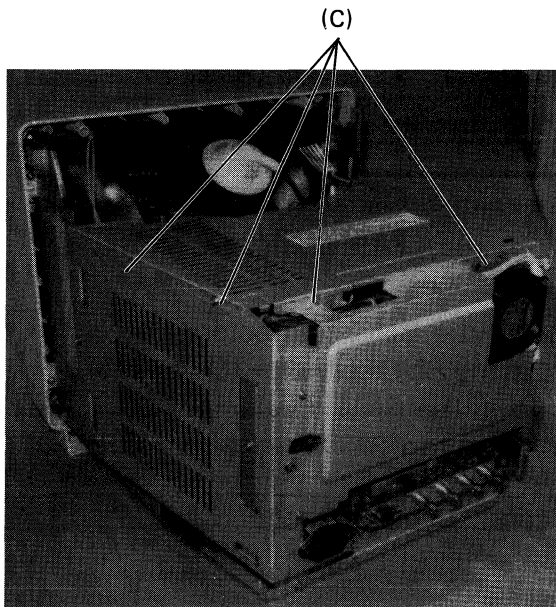
BACK COVER REMOVAL

Remove two back cover mounting screws (A) and (B) then take off back cover.



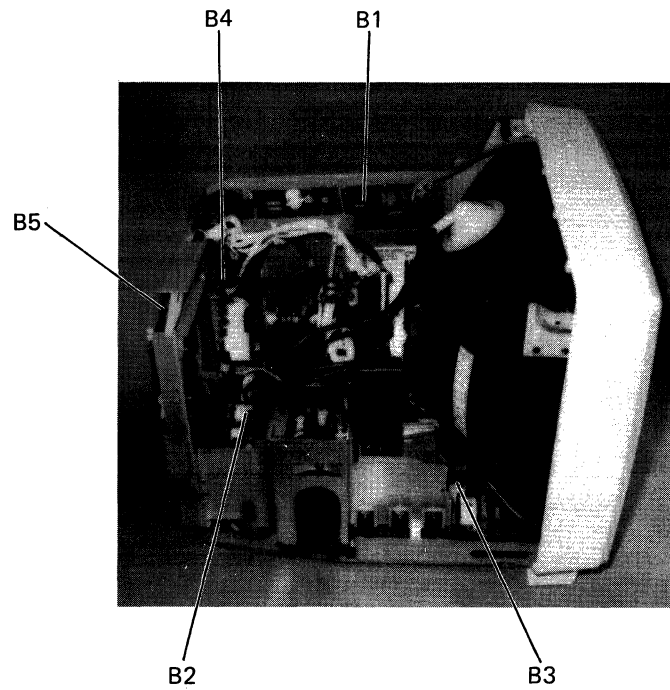
CASE SHIELDING (TOP) REMOVAL

Remove two case, shielding (TOP) mounting screws (C) and (D) then take off case shielding (TOP).



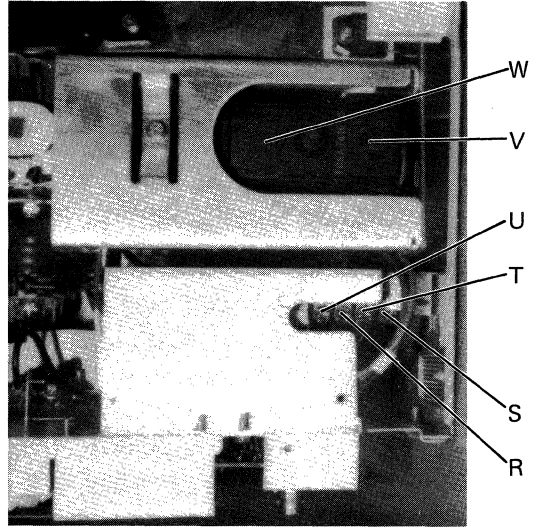
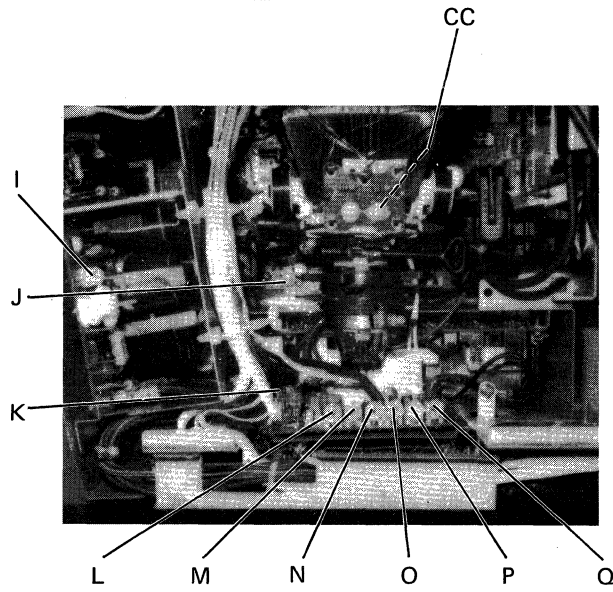
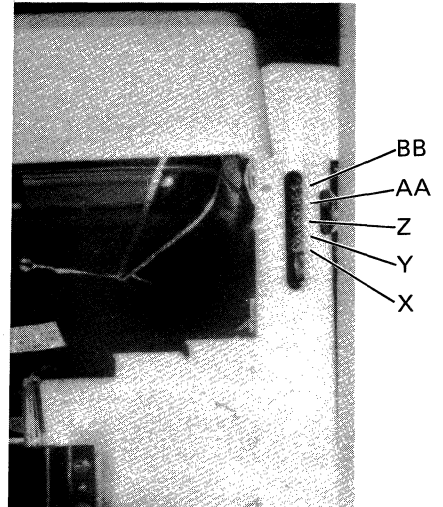
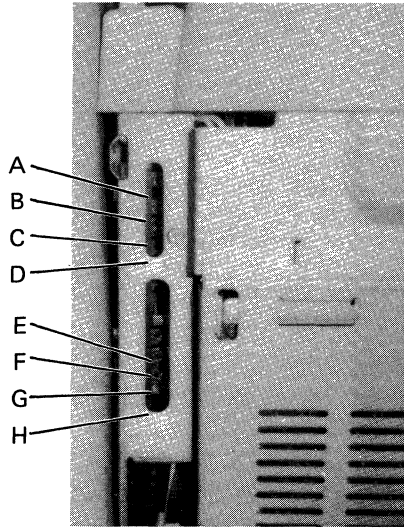
PART LOCATIONS

BOARD LAYOUT



BOARDS

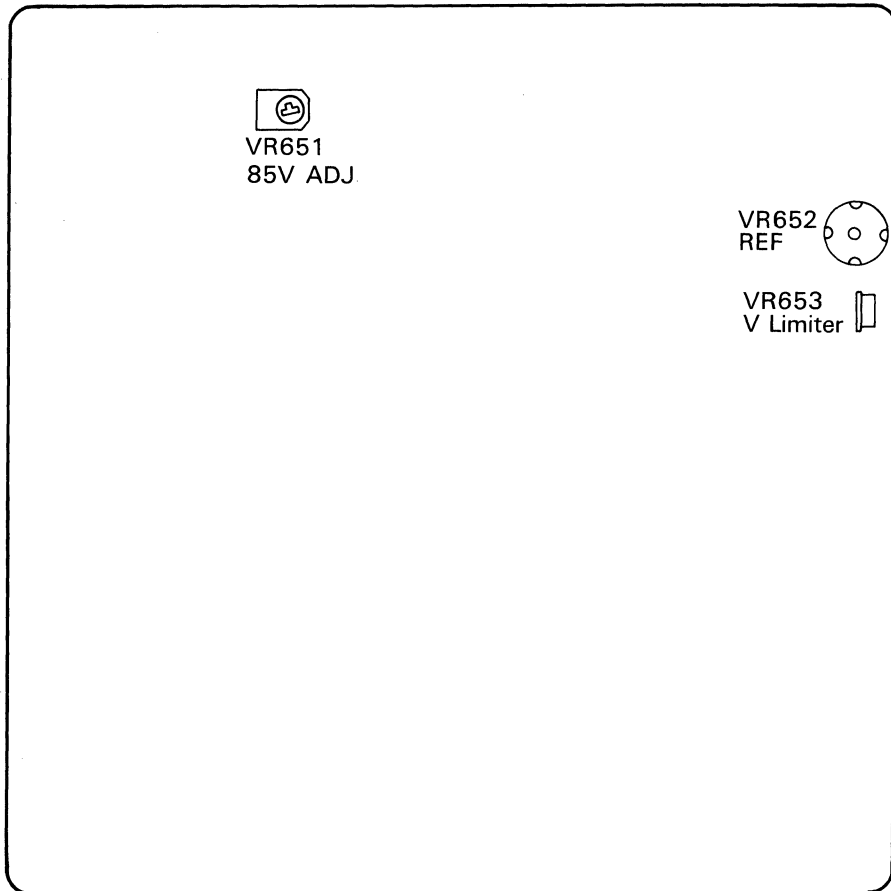
B1	SW. REG. PWB ASSY	PWE-168
B2	VIDEO PWB ASSY	PWE-179
B3	DEF PWB ASSY	PWE-173
B4	CRT PWB ASSY	PWE-177
B5	INTERFACE PWB ASSY	PWE-176



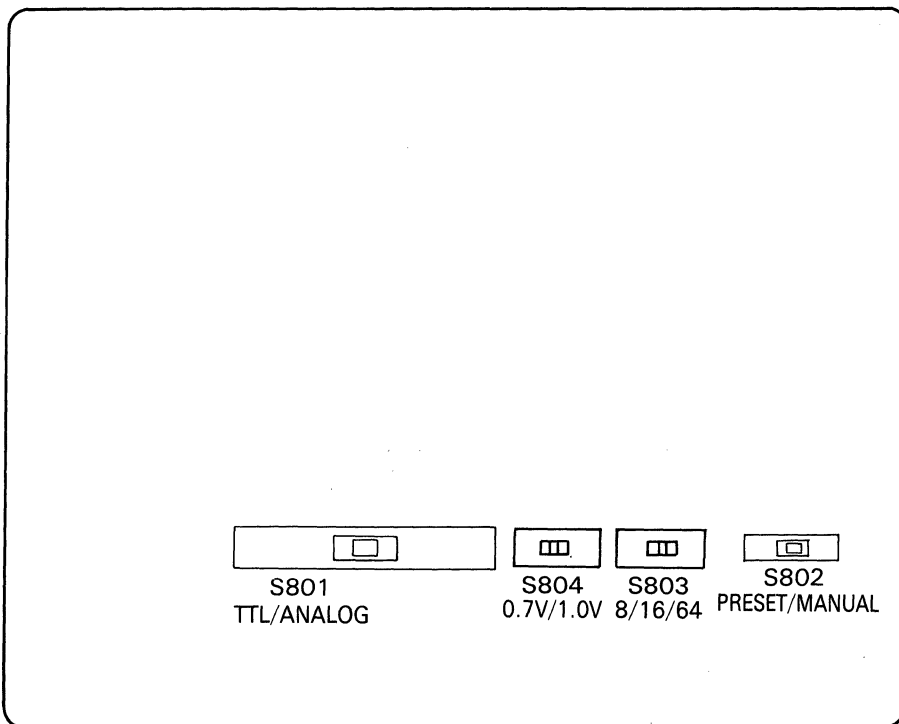
ADJUSTMENT CONTROLS

A	V. HOLD (VR401)	P	G. BIAS (VR902)
B	V. SUB HEIGHT (1) (VR440)	Q	B. BIAS (VR903)
C	V. SUB HEIGHT (2) (VR441)	R	G. GAIN (VR702)
D	V. SIZE LIMITER (VR443)	S	SUB. CONT (VR704)
E	SIDE-PIN (VR470)	T	B. GAIN (VR703)
F	V. BIAS (VR402)	U	R. GAIN (VR701)
G	V. LIN (S) (VR404)	V	SCREEN
H	V. LIN (C) (VR403)	W	FOCUS
I	CI VOLTAGE LIMITER (VR653)	X	SUB H. CENTER 2(27~35KHz)(VR504)
J	+6V ADJ (VR509)	Y	SUB H. CENTER 3(20~27KHz)(VR505)
K	SUB BIAS (VR907)	Z	SUB H. CENTER 1(42KHz~)(VR503)
L	R. SUB BRIGHT (VR904)	AA	H. HOLD 2 (27KHz) (VR502)
M	G. SUB BRIGHT (VR905)	BB	H. HOLD 1 (42KHz) (VR501)
N	B. SUB BRIGHT (VR906)	CC	H. SIZE CONTROL (VR510)
O	R. BIAS (VR901)		

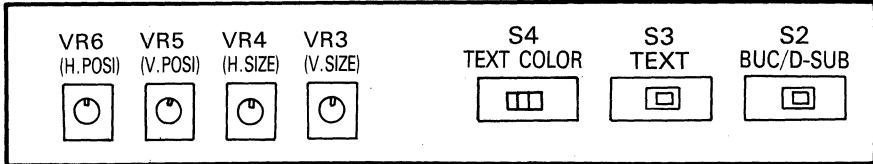
ADJUSTMENT CONTROLS LAYOUT



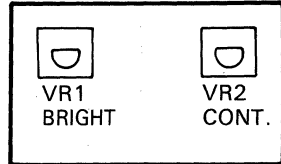
PWE-168 SW. REG PWB ASSY



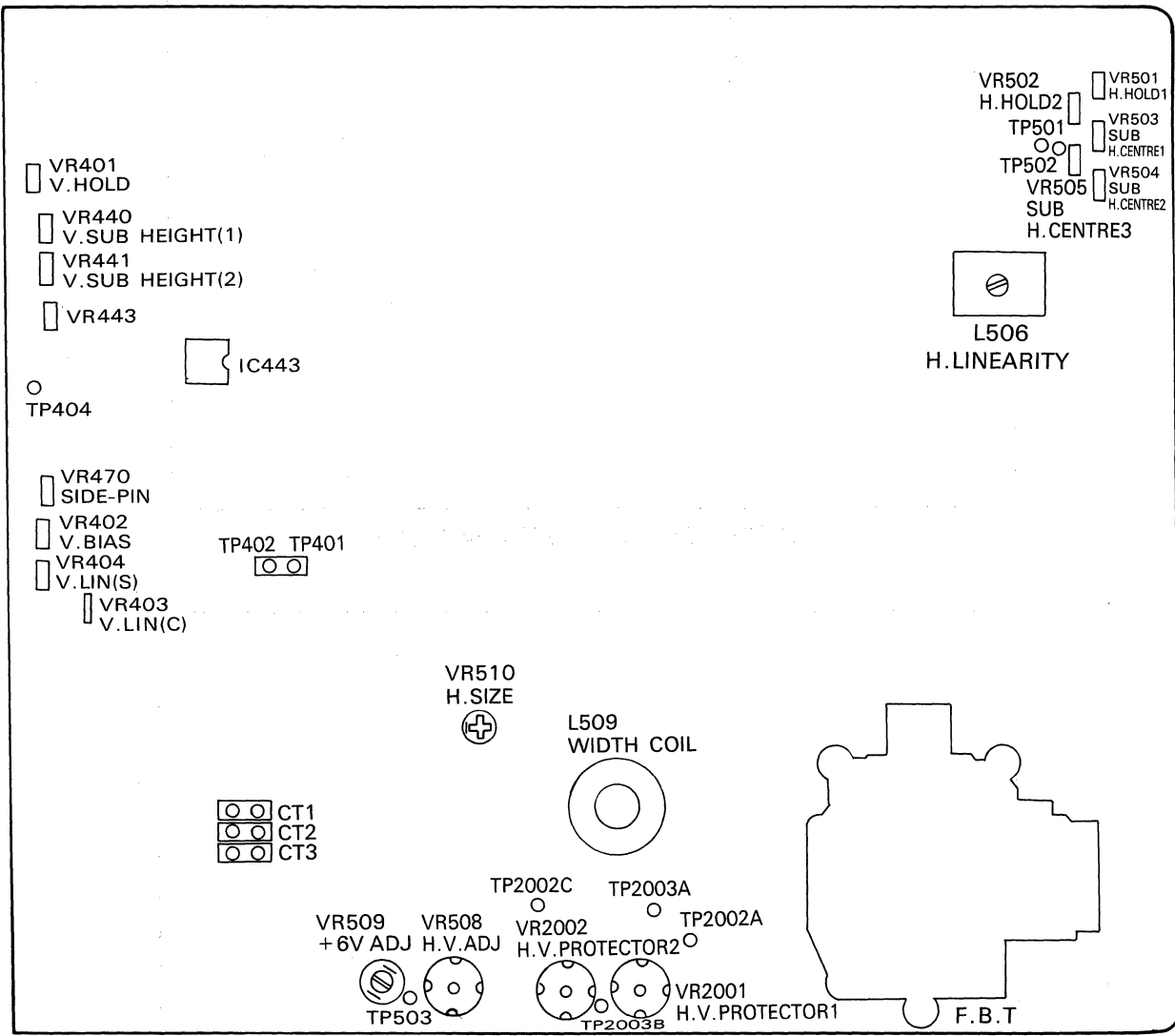
PWE-176 INTERFACE PWB ASSY



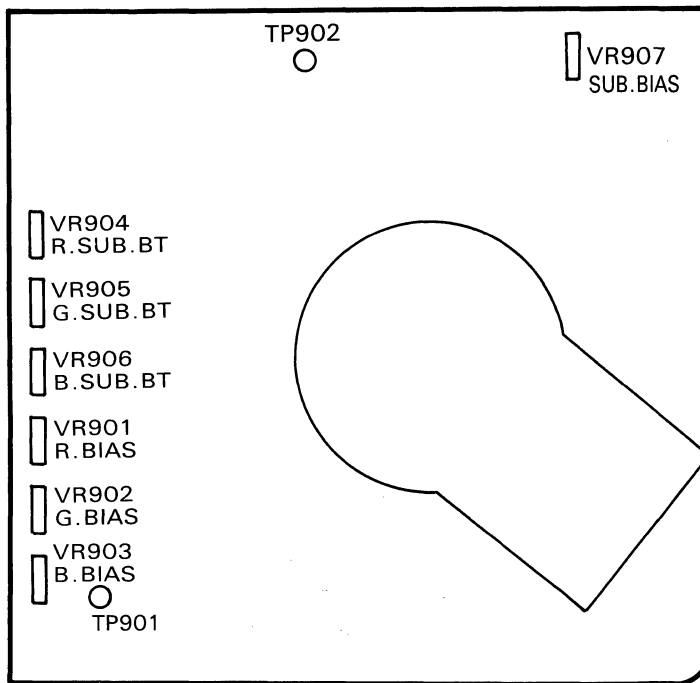
**PWE-173C
CONTROL PWB ASSY**



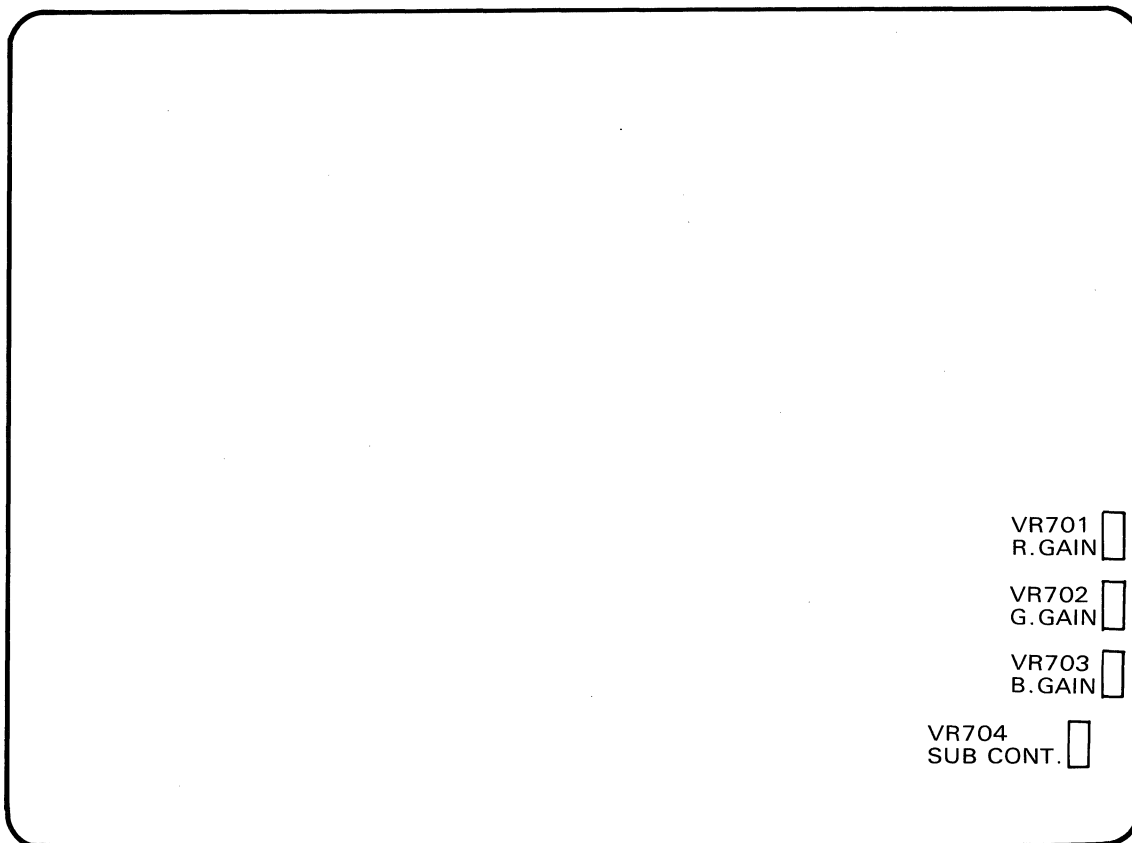
**PWE-173B
CONTROL PWB ASSY**



PWE-173A DEF PWB ASSY



**PWE-177A
CRT PWB ASSY**



PWE-179 VIDEO PWB ASSY

ALIGNMENT PROCEDURE

Adjustment conditions and Precautions

1. Power supply voltage: AC 120V, 60 Hz
2. Warm up time
The display must be on for at least 20 minutes before starting alignments.
This is especially critical in color temperature and white balance adjustments.
3. Signals
Video: Analog 0.7 Vp-p, 75Ω, positive
 analog sync. on green
 video: 0.7 Vp-p
 synchronizing: 0.3 Vp-p
Synchronizing: TTL level negative/positive
 separate/composite
Scanning Frequency: H 21.8 kHz ~ 45 kHz
 V 50 Hz ~ 80 Hz
Unless otherwise specified, adjust at signal (44.8 kHz).
Unless otherwise specified, input at D-sub 9 Pin.
Unless otherwise specified, adjust at separate sync.

1. SW. REG. UNIT

- 1-1. +B₁ (VR651) +85V LINE (K1 – Gnd Voltage)
Adjust VR651 to be 85 VDC
- 1-2. +B_H (VR652) High Voltage control
This control is permanently sealed at factory.
Do not attempt to readjust.
- 1-3. +B_{LIM} (VR653) V. limit (C1 – Gnd Voltage)
Remove C-connector.
Adjust VR653 to be 122 VDC.

Note: Do not operate the SW. Reg. unit itself without any load.

2. Main Adjustments

2-1) Settings of the Controls

VR2 Contrast: Max.

VR1 Brightness: Position where the back rasters are latent.

VR3 V. size: Center

VR4 H. size: Center

VR5 V. posi.: Center

VR6 H. posi.: Center

VR508 H.V. ADJ: Position where the high-voltage protector does not operate.

SW3 TEXT: OFF

SW2 BNC ↔ D-sub: D-sub

SW802 MANUAL: OFF

SW801 ANALOG/TTL: ANALOG

2-2) Adjustment of Raster Centering

Adjust the Screen VR and Brightness VR so that the back rasters are faintly illuminated, then connect the "CT" connector to the position that enables the back rasters to be centered on the CRT screen.

CT1: DOES not move the horizontal screen position.

CT2: Moves the horizontal screen position about 5mm.

CT3: Moves the horizontal screen position about 12mm.

* By changing the orientation in which the connector is inserted, the displacement direction of the screen can be changed from side to side.

2-3) Adjustment of Horizontal Oscillation, Horizontal Width, Horizontal Linearity, and Side Pincushion

(H. HOLD, H. WIDTH, H. LINEARITY, and SIDE PINCUSHION)

(1) H. HOLD

a) Create a short-circuit between TP501 and TP502.

b) During reception of Signal 2 (42 kHz), use H. HOLD 1 VR501 to adjust the image into a signal screen.

c) During reception of Signal 3 (27 kHz), use H. HOLD 2 VR502 to adjust the image into a single screen.

(2) H. WIDTH

Perform centering of H. SIZE (VR4), then use SUB H. SIZE (VR510) to adjust H. WIDTH to 260mm.

(3) H. LINEARITY (Signal 1 crosshatch pattern)

Visually check H. LINEARITY, then use L506 to adjust it if necessary. Avoid rotating L506 unless absolutely necessary.

(4) SIDE PINCUSHION

Use VR470 so that the optimum SIDE PINCUSHION is obtained. When SIDE PINCUSHION is set to its optimum value, the right and left edges of the screen each form a straight line. Because each of the four settings above will affect the other three settings, repeated confirmation is required.

(5) H. POSITION (Centering adjustment of rasters)

a) During input of Signal 1 (44.8 kHz), use SUB. H. CENTER 1 VR503 to adjust the screen to center.

b) During input of Signal 4 (31.5 kHz), use SUB. H. CENTER 2 VR504 to adjust the screen to center.

c) During input of Signal 5 (21.85 kHz), use SUB. H. CENTER 3 VR505 to adjust the screen to center.

During the signal input of steps a), b), and c) above, make sure that the screen is centered.

**2-4) Adjustment of Vertical Linearity, Vertical Height, and Vertical Bias:
(V. LINEARITY, V. SIZE, and V. BIAS)**

(1) V. LINEARITY

During reception of the crosshatch pattern of Signal 1 (44.8 kHz, 60 Hz), use VR404 (V. LIN (S)) fully to the right.

(A) Top/Bottom Adjustment

Adjust VR403 (V. LIN (C)) so that the top and bottom linearity is equal.

(B) Top/Center/Bottom Adjustment

a) If the center is elongated, rotate VR404 slightly to the left until the elongation is corrected (but do not rotate it fully to the point where top elongation occurs).

b) Adjust VR403 so that the top and bottom linearity is equal.

(C) Confirmation

a) Repeat steps a) and b) of (B) until the linearity is approximately 6%.

b) Receive Signal 7 (31.5 kHz, 70 Hz, 350 lines), and check that the linearity is within 8%.

(D) Compensation

If the linearity is not within 8%, receive Signal 1.

For top elongation: Rotate VR403 slightly to the right until top elongation is eliminated, then perform (B) and (C).

For bottom elongation: Rotate VR403 slightly to the left until top elongation is eliminated, then perform (B) and (C).

For center elongation: Rotate VR404 slightly to the left until center elongation is corrected, then perform b) and c) of (B).

(E) Confirmation

Based on the reception of Signals 1 and 7, check that the linearity is within 8%.

(2) V. SIZE

Set the MANUAL switch (SW802) to ON, and perform centering of VR3 (V. SIZE).

a) Receive Signal 1 (60 Hz), then use VR440 to adjust Signal 1 to 190mm.

b) Receive Signals 2, 4, and 9, then check that the back rasters are practically filling the screen.

c) Set the MANUAL switch to OFF.

Receive Signal 6 (60 Hz, 480 lines), then use VR441 to adjust Signal 6 to 175mm.

d) Receive Signal 4, and check that it is 161mm \pm 5mm.

Receive Signal 7, and check that it is 170mm \pm 5mm.

Receive Signal 8, and check that it is 180mm \pm 5mm.

* When receiving Signal 8, be sure to set V. MODE to LOW.

(3) V. BIAS

Receive Signal 1, then use VR402 (V. BIAS) to adjust Signal 1 to 13.5V \pm 0.2V.

The measurement point is the VDY 3 terminal of the deflection yoke (the terminal connected to the yellow lead wire of the deflection yoke).

Set V. POSITION (VR5) to the position where the screen is centered.

Set V. SIZE (VR3) to the center position.

2-5) Adjustment of Video Amplitude and White Balance

NOTE: Before performing this adjustment, make sure that the VIDEO signal is as follows:

VIDEO signal: Analog 0.7 Vp-p

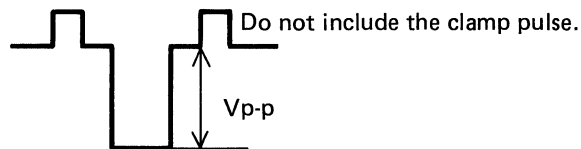
(1) Default Settings of the Adjustment VRs

VR701 ~ VR703	GAIN VR	Fully left
VR704	SUB CONT VR	Fully right
VR901 ~ VR903	BIAS VR	Fully left
VR904 ~ VR906	SUB BRIGHT VR	Fully right
VR907	SUB BIAS VR	Fully right
Screen VR		Fully left

(2) Video Contrast Adjustment

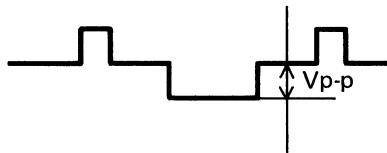
2-1) GAIN VR Adjustment: Signal 10 (All-white signal)

- Receive the window pattern of Signal 10. (A video range of $1/3 \sim 1/2$ H x $1/2$ V within the range where the ABL circuit is not applied despite maximum Contrast is desirable.)
- Rotate the Contrast VR fully to the right.
Rotate the Brightness VR fully to the left.
- Adjust VR701, VR702, and VR703 so that the R OUT, G OUT, and B OUT terminals on the VIDEO PWB are each set to 40 Vp-p. After adjustment, confirm the Vp-p value of each terminal and perform readjustment if necessary.



2-2) SUB CONT VR Adjustment

- Rotate the Contrast VR fully to the left.
Rotate the Brightness VR fully to the left.
- Adjust VR704 so that G OUT on the VIDEO PWB becomes 10 Vp-p. After adjustment, confirm that both R OUT and B OUT are within the range of $10 \text{ Vp-p} \pm 0.5 \text{ Vp-p}$.



If the R, B OUT is not within the limits mentioned above, adjust finely VR704 so the R, G, B OUT is within $10 \text{ Vp-p} \pm 0.5 \text{ Vp-p}$.

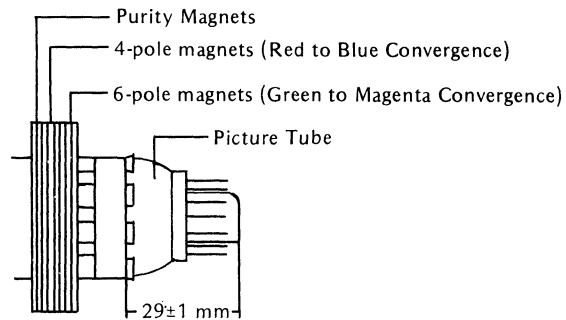
(3) Cutoff Adjustment (All-black signal)

Rotate the Contrast VR fully to the left.

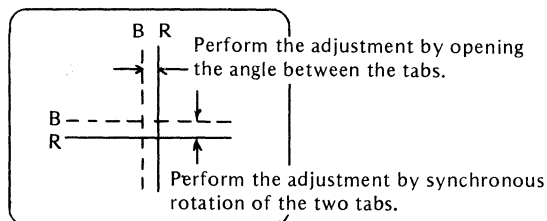
- Perform the two steps below in the (1) \rightarrow (2) sequence.
 - Create a short-circuit between TP901 and TP902.
 - Create a short-circuit between TP401 and TP402.
- Turn the Screen Control clockwise gradually and set to the position at which a single horizontal color appears faintly.
Use this color as the reference color for the cutoff adjustment.
- Turn the Bias Controls for a color other than the reference color clockwise until it is as bright as the reference color.

(7) Purity Adjustment

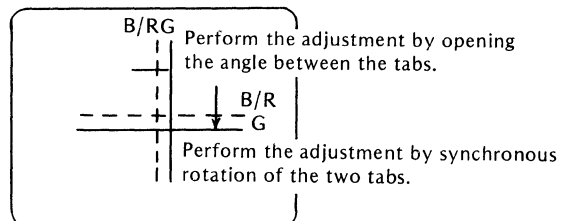
- 1) Be sure that the display is not being exposed to any external magnetic fields.
- 2) Ensure that the spacing between the Purity, Convergence Magnet, (PCM), assembly and the CRT stem is $29 \text{ mm} \pm 1 \text{ mm}$. (See below diagram)
- 3) Produce a complete, red pattern on the display. Adjust the Purity magnet rings on the PCM assembly to obtain a complete field of the color red. This is done by moving the two tabs in such a manner that they advance in an opposite direction but at the same time to obtain the same angle between the two tabs, which should be approximately 180° .
- 4) Check the complete blue and complete green patterns to observe their respective color purity. Make minor adjustments if needed.



Purity, Convergence Magnet Assembly (PCM)



Red to Blue Convergence
(Magenta)



Green to Magenta Convergence
(White)

(8) Convergence Adjustment

- 1) Produce a magenta crosshatch on the display.
- 2) Adjust the focus for the best overall focus on the display.
Also adjust the brightness to the desired condition.
- 3) Vertical red and blue lines are converged by varying the angle between the two tabs of the 4-pole magnets on the PCM assembly. (See above diagrams)
- 4) Horizontal red and blue lines are converged by varying the two tabs together, keeping the angle between them constant.
- 5) Produce a white crosshatch pattern on the display.
- 6) Vertical green and magenta lines are converged by varying the angle between the two tabs of the 6-pole magnets.
- 7) Horizontal green and magenta lines are converged by varying the two tabs together, keeping the angle between them constant.

TIMING OF REFERENCE SIGNALS

①	LVG-1600		④					⑤	DATA Signal 1 44.5 kHz						DATA Signal 2 42 kHz						
	②	③							3	9.	2	6	0	F	3	4.	4	4	0	F	
0	CLOCK	DOT CLOCK FREQUENCY	0					MHz	3	9.	2	6	0	F	3	4.	4	4	0	F	
1	H FREQ	HORIZONTAL FREQUENCY	1					KHz	4	4.	8	6	9	F	4	2.	0	0	0	F	
2	V FREQ	VERTICAL FREQUENCY	2					Hz	5	9.	3	5	0	F	8	0.	0	0	0	F	
3	CH	CHARACTOR CELL SIZE	3					DOT	/	/	H	7	V	9	/	/	H	0	V	9	
4	Nht	4	4					CHR	/	/	F	1	2	5	/	/	F		8	2	
5	Nht	5	5					CHR	/	/	F		9	6	/	/	F		6	4	
6	Nhsp	6	6					CHR	/	/	F	1	0	1	/	/	F		7	3	
7	Vpw-Hpw	7	7					V (LASTER) H (CHR)	/	/	V	4	H	6	/	/	V	2	H	3	
8	Nadj	8	8					H (LASTER)	/	/	/	/	0	0	/	/	/	/	0	3	
9	Nvt	9	9					LINE	/	/	F		8	4	/	/	F		5	8	
10	Nvd	10	10					LINE	/	/	F		8	0	/	/	F		5	5	
11	Nvsp	11	11					LINE	/	/	F		8	0	/	/	F		5	5	
12	Nvsadj	12	12					H (LASTER)	/	/	/	/	0	1	/	/	/	/	0	0	
13	INT	13	13						/	/	/	/	0	0	/	/	/	/	0	0	
14	OUT	14	0	Sync NEGA	Hsync	Sync OFF	TTL	RZ		F	0	1	0	1	1	F	0	1	1	1	1
			1	POS	H/Vsync	Sync ON	ANA	NRZ													

TIMING OF REFERENCE SIGNALS

①	LVG-1600		④					⑤	DATA						DATA					
	②	③							Signal 3			27 kHz			Signal 4			PS-II MODE 2		
0	CLOCK	DOT CLOCK FREQUENCY	0					MHz	2	2.	1	4	0	F	2	8.	6	1	0	F
1	H FREQ	HORIZONTAL FREQUENCY	1					KHz	2	7.	0	0	0	F	3	1.	4	7	4	F
2	V FREQ	VERTICAL FREQUENCY	2					Hz	7	5.	0	0	0	F	7	0.	0	9	5	F
3	CH	CHARACTOR CELL SIZE	3					DOT	/	/	H 1	0	V 0	9	/	/	H 0	9	V 1	0
4	Nht	4	4					CHR	/	/	F		8	2	/	/	F	1	0	1
5	Nht	5	5					CHR	/	/	F		6	4	/	/	F		8	0
6	Nhsp	6	6					CHR	/	/	F		6	7	/	/	F		8	3
7	Vpw-Hpw	7	7					V (LASTER) H (CHR)	/	/	V 0	5	H 1	1	/	/	V 0	2	H 1	2
8	Nadj	8	8					H (LASTER)	/	/	/	/	0	0	/	/	/	/	0	9
9	Nvt	9	9					LINE	/	/	F		4	0	/	/	F		4	4
10	Nvd	10	10					LINE	/	/	F		3	2	/	/	F		4	0
11	Nvsp	11	11					LINE	/	/	F		3	7			F		4	1
12	Nvsadj	12	12					H (LASTER)	/	/	/	/	0	8	/	/	/	/	0	3
13	INT	13	13						/	/	/	/	0	0	/	/	/	/	0	0
14	OUT	14	0	Sync NEGA	Hsync	Sync OFF	TTL	RZ												
			1	POS	H/Vsync	Sync ON	ANA	NRZ		F	0	1	1	1	1	F	1	0	0	1

TIMING OF REFERENCE SIGNALS

①	LVG-1600		④						⑤	DATA											
	②	③								Signal 5			EGA			Signal 6			PS-II MODE 17		
0	CLOCK	DOT CLOCK FREQUENCY	0						MHz	1	6.	3	7	0	F	2	5.	4	3	0	F
1	H FREQ	HORIZONTAL FREQUENCY	1						KHz	2	2.	0	0	3	F	3	1.	4	7	3	F
2	V FREQ	VERTICAL FREQUENCY	2						Hz	5	9.	9	5	3	F	5	9.	9	4	8	F
3	CH	CHARACTOR CELL SIZE	3						DOT	/	/	H 0	8	V 1	0	/	/	H 0	8	V 1	0
4	Nht	4	4						CHR	/	/	F	0	9	3	/	/	F	1	0	1
5	Nht	5	5						CHR	/	/	F	0	8	0	/	/	F		8	0
6	Nhsp	6	6						CHR	/	/	F	0	8	0	/	/	F		8	3
7	Vpw-Hpw	7	7						V (LASTER) H (CHR)	/	/	V 1	3	H 1	0	/	/	V 0	2	H 1	2
8	Nadj	8	8						H (LASTER)	/	/	/	/	0	6	/	/	/	/	0	5
9	Nvt	9	9						LINE	/	/	F	0	3	6	/	/	F		5	2
10	Nvd	10	10						LINE	/	/	F	0	3	5	/	/	F		4	8
11	Nvsp	11	11						LINE	/	/	F	0	3	5	/	/	F		4	9
12	Nvsadj	12	12						H (LASTER)	/	/	/	/	0	1	/	/	/	/	0	1
13	INT	13	13							/	/	/	/	0	0	/	/	/	/	0	0
14	OUT	14	0	Sync NEGA	Hsync	Sync OFF	TTL	RZ		F	1	0	0	0	1	F	1	0	0	1	0
			1	POS	H/Vsync	Sync ON	ANA	NRZ													

TIMING OF REFERENCE SIGNALS																					
①	LVG-1600		④					⑤	DATA						DATA						
	②	③							Signal 7	PS-II MODE 15			Signal 8	PGA 400							
0	CLOCK	DOT CLOCK FREQUENCY	0					MHz	2	5.	4	3	0	F	2	5.	1	1	0	F	
1	H FREQ	HORIZONTAL FREQUENCY	1					KHz	3	1.	4	7	3	F	3	0.	4	7	3	F	
2	V FREQ	VERTICAL FREQUENCY	2					Hz	7	0.	0	9	5	F	5	9.	9	8	7	F	
3	CH	CHARACTOR CELL SIZE	3					DOT	/	/	H 0	8	V 1	0	/	/	H 0	8	V 1	0	
4	Nht	4	4					CHR	/	/	F	1	0	1	/	/	F	1	0	3	
5	Nht	5	5					CHR	/	/	F		8	0	/	/	F	0	8	0	
6	Nhsp	6	6					CHR	/	/	F		8	3	/	/	F	0	8	0	
7	Vpw-Hpw	7	7					V (LASTER) H (CHR)	/	/	V 0	2	H 1	2	/	/	V 0	2	H 1	4	
8	Nadj	8	8					H (LASTER)	/	/	/	/	0	9	/	/	/	/	0	8	
9	Nvt	9	9					LINE	/	/	F		4	4	/	/	F	0	5	0	
10	Nvd	10	10					LINE	/	/	F		3	5	/	/	F	0	4	0	
11	Nvsp	11	11					LINE	/	/	F		4	3	/	/	F	0	4	4	
12	Nvsadj	12	12					H (LASTER)	/	/	/	/	0	1	/	/	/	/	0	1	
13	INT	13	13						/	/	/	/	0	0	/	/	/	/	0	0	
14	OUT	14	0	Sync NEGA	Hsync	Sync OFF	TTL	RZ		F	0	0	0	1	1	F	1	1	0	1	1
			1	POS	H/Vsync	Sync ON	ANA	NRZ													

TIMING OF REFERENCE SIGNALS																				
①	LVG-1600		④					⑤	DATA Signal 9 350 Lines 50 Hz						DATA Signal 10 44.8kHz WINDOW					
	②	③							2	5.	4	3	0	F	3	9.	2	6	0	F
0	CLOCK	DOT CLOCK FREQUENCY	0					MHz	2	5.	4	3	0	F	3	9.	2	6	0	F
1	H FREQ	HORIZONTAL FREQUENCY	1					KHz	3	1.	4	7	3	F	4	4.	8	6	9	F
2	V FREQ	VERTICAL FREQUENCY	2					Hz	5	0.	0	3	7	F	5	9.	3	5	0	F
3	CH	CHARACTOR CELL SIZE	3					DOT	/	/	H 0	8	V 1	0	/	/	H 0	7	V 0	9
4	Nht	4	4					CHR	/	/	F	1	0	1	/	/	F	1	2	5
5	Nht	5	5					CHR	/	/	F		8	0	/	/	F		3	2
6	Nhsp	6	6					CHR	/	/	F		8	3	/	/	F		6	9
7	Vpw-Hpw	7	7					V (LASTER) H (CHR)	/	/	V 0	2	H 1	2	/	/	V 0	4	H 0	6
8	Nadj	8	8					H (LASTER)	/	/	/	/	0	9	/	/	/	/	0	0
9	Nvt	9	9					LINE	/	/	F		6	2	/	/	F		8	4
10	Nvd	10	10					LINE	/	/	F		3	6	/	/	F		2	7
11	Nvsp	11	11					LINE	/	/	F		4	8	/	/	F		5	3
12	Nvsadj	12	12					H (LASTER)	/	/	/	/	0	3	/	/	/	/	0	4
13	INT	13	13						/	/	/	/	0	0	/	/	/	/	0	0
14	OUT	14	0	Sync NEGA	Hsync	Sync OFF	TTL	RZ	F	1	0	0	1	1	F	0	1	0	1	1
			1	POS	H/Vsync	Sync ON	ANA	NRZ												

TIMING OF REFERENCE SIGNALS																				
①	LVG-1600		④					⑤	DATA					DATA						
	②	③							Signal 11	PGA 480				Signal 12	60 Hz, 40 kHz					
0	CLOCK	DOT CLOCK FREQUENCY	0					MHz	2	5.	1	1	0	F	1	6.	3	7	0	F
1	H FREQ	HORIZONTAL FREQUENCY	1					KHz	3	0.	4	7	3	F	2	2.	0	0	3	F
2	V FREQ	VERTICAL FREQUENCY	2					Hz	5	9.	9	8	7	F	5	9.	9	5	3	F
3	CH	CHARACTOR CELL SIZE	3					DOT	/	/	H 0	8	V 1	0	/	/	H 0	8	V 1	0
4	Nht	4	4					CHR	/	/	F	1	0	3	/	/	F		9	3
5	Nht	5	5					CHR	/	/	F	0	8	0	/	/	F		8	0
6	Nhsp	6	6					CHR	/	/	F	0	8	0	/	/	F		8	0
7	Vpw-Hpw	7	7					V (LASTER) H (CHR)	/	/	V 0	2	H 1	4	/	/	V 1	1	H 1	0
8	Nadj	8	8					H (LASTER)	/	/	/	/	0	8	/	/	/	/	0	6
9	Nvt	9	9					LINE	/	/	F	0	5	0	/	/	F		3	6
10	Nvd	10	10					LINE	/	/	F	0	4	8	/	/	F		3	5
11	Nvsp	11	11					LINE	/	/	F	0	4	8	/	/	F		3	5
12	Nvsadj	12	12					H (LASTER)	/	/	/	/	0	1	/	/	/	/	0	3
13	INT	13	13						/	/	/	/	0	0	/	/	/	/	0	0
14	OUT	14	0	Sync NEGA	Hsync	Sync OFF	TTL	RZ	F	1	1	0	1	1	F	0	0	0,	1	0
			1	POS	H/Vsync	Sync ON	ANA	NRZ												

① Indication address

② Abbreviation

③ Description

④ Contents

⑤ Unit

Description of each address

add.	Description	Condition
0	Total dots	05.000 ~ 40.000 MHz, 5- or 6-digit
1	Horizontal Frequency	Reference data, 5-digit
2	Vertical Frequency	Reference data, 5-digit
3	Character cell SIZE	(H direction) x (V direction), 02 to 16 01 to 32 each 2-digit
4	Total number of characters, horizontal	255 characters or less, 3-digit
5	Number of indication characters, horizontal	N_{ht} or less, 3-digit
6	Horizontal synchronization position	N_{ht} or less, 3-digit
7	Vertical/horizontal pulse width	V: 1 to 16 H/H:1 to 15 chr.
8	Total raster adjustment	31 H or less
9	Total number of characters, vertical	127 rows or less, 3-digit
10	Number of indication characters, vertical	N_{vt} or less
11	Vertical synchronization position	N_{vt} or less
12	Vertical indication position correction	0 ~ 16 H (Synchronization position moves in the form of $N_{vsp} + N_{vsadj}$)
13	Interlace select	00: non-interlace 02: interlace + video 01: interlace
14	Output condition setting	

Likewise, when significant data is a single digit, do not forget to enter 0.

DATA FORMAT FOR USING Quantum 801C

TIMING PARAMETERS:

Real Time Parameters		Signal No.	Description
Dot Rate	MHz	1.	H: 44.85 kHz
Horizontal Rate	kHz	2.	H: 42.00 kHz
Vertical Rate	Hz	3.	H: 27.00 kHz
		4.	H: 31.47 kHz V: 70 Hz (400 Lines)
Non-Real Time Parameters		5.	H: 22.00 kHz
Horizontal	Vertical	6.	H: 31.47 kHz V: 60 Hz (480 Lines)
Dots/Character	Lines/Character	7.	H: 31.47 kHz V: 70 Hz (350 Lines)
Total Characters	Total Lines	8.	H: 30.48 kHz (400 Lines)
Displayed Characters	Displayed Rows Lines	9.	H: 31.47 kHz V: 50 Hz (350 Lines)
Drive Delay	Drive Delay (Rows)	10.	H: 44.85 kHz WINDOW PATTERN
Drive Width	Drive Width (Lines)		
	Step Width		

OPTION PARAMETERS

Signal Gating

Composit Sync.	OP 1.—0=off 1=on
Vertical Step	OP 2.—0=off 1=on
Horizontal Drive	OP 3.—0=off 1=on
Vertical Drive	OP 4.—0=off 1=on

Signal Polarity

Composite Sync.	OP 5.—0=non-inverted 1=inverted
Vertical Step	OP 6.—0=non-inverted 1=inverted
Horizontal Drive	OP 7.—0=non-inverted 1=inverted
Vertical Drive	OP 8.—0=non-inverted 1=inverted
Video	OP 13.—0=non-inverted/positive 1=inverted/positive 2=non-inverted/negative 3=inverted/negative

Interlace Mode

OP 9.—0=non-interlace 1=interlaced sync only 3=interlaced sync & video
--

Video Mode

OP 10.—0=monochrome 1=color

Duty Cycle

OP 11.—0=50% 1=100% (OP 12.0)
0 or 1=100% (OP 12.2)

Character Clocking Mode

OP 12.—0=single-phase
2=dual-phase

Horizontal Skew

OP 14.—skew right 0-3 dots 1=fast blink

Vertical Skew

OP 15.—skew down 0-9 lines 2=slow blink

Cursor

OP 16.—0:off 3=on continuous

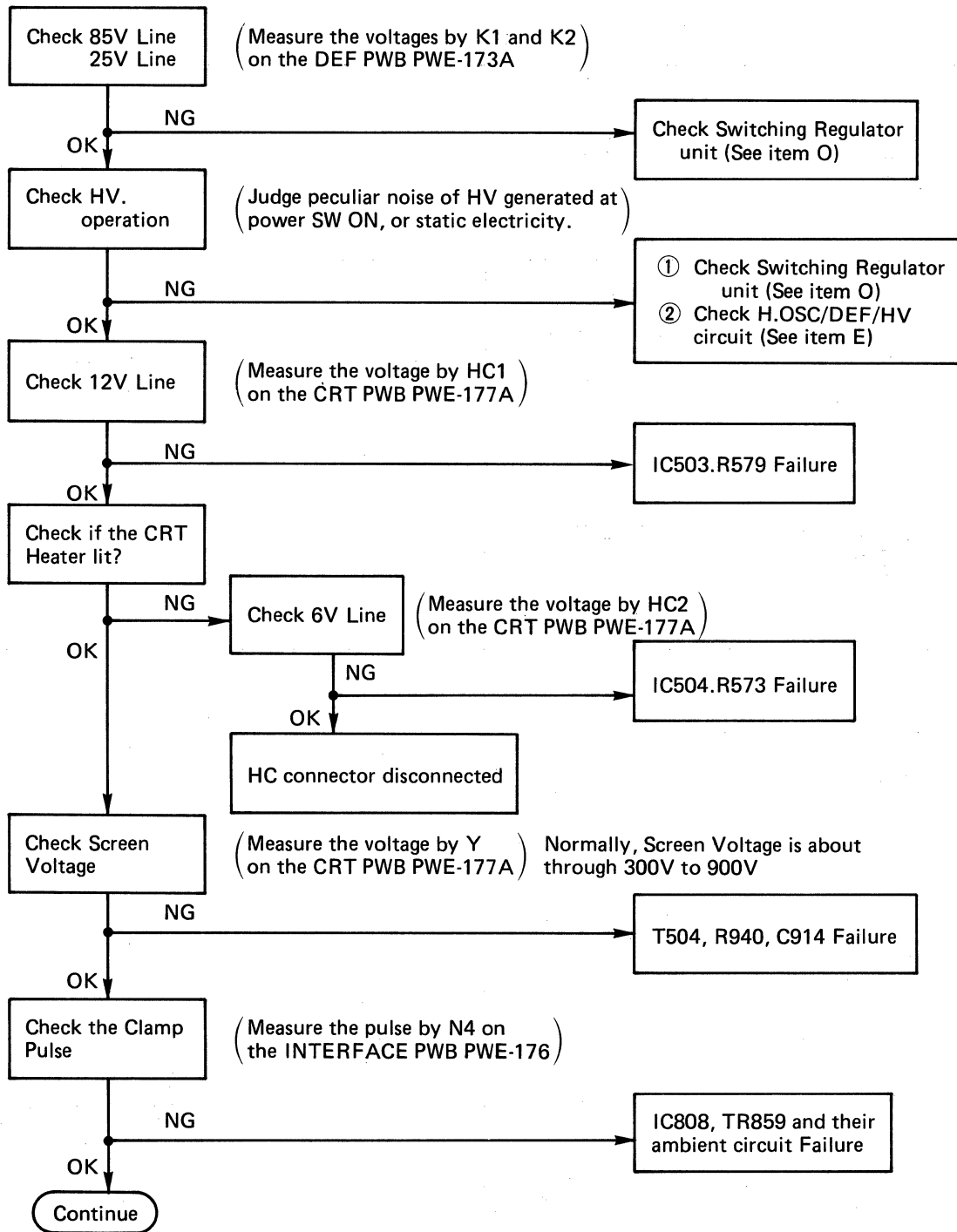
TEST SIGNALS FOR USING Quantum 801C

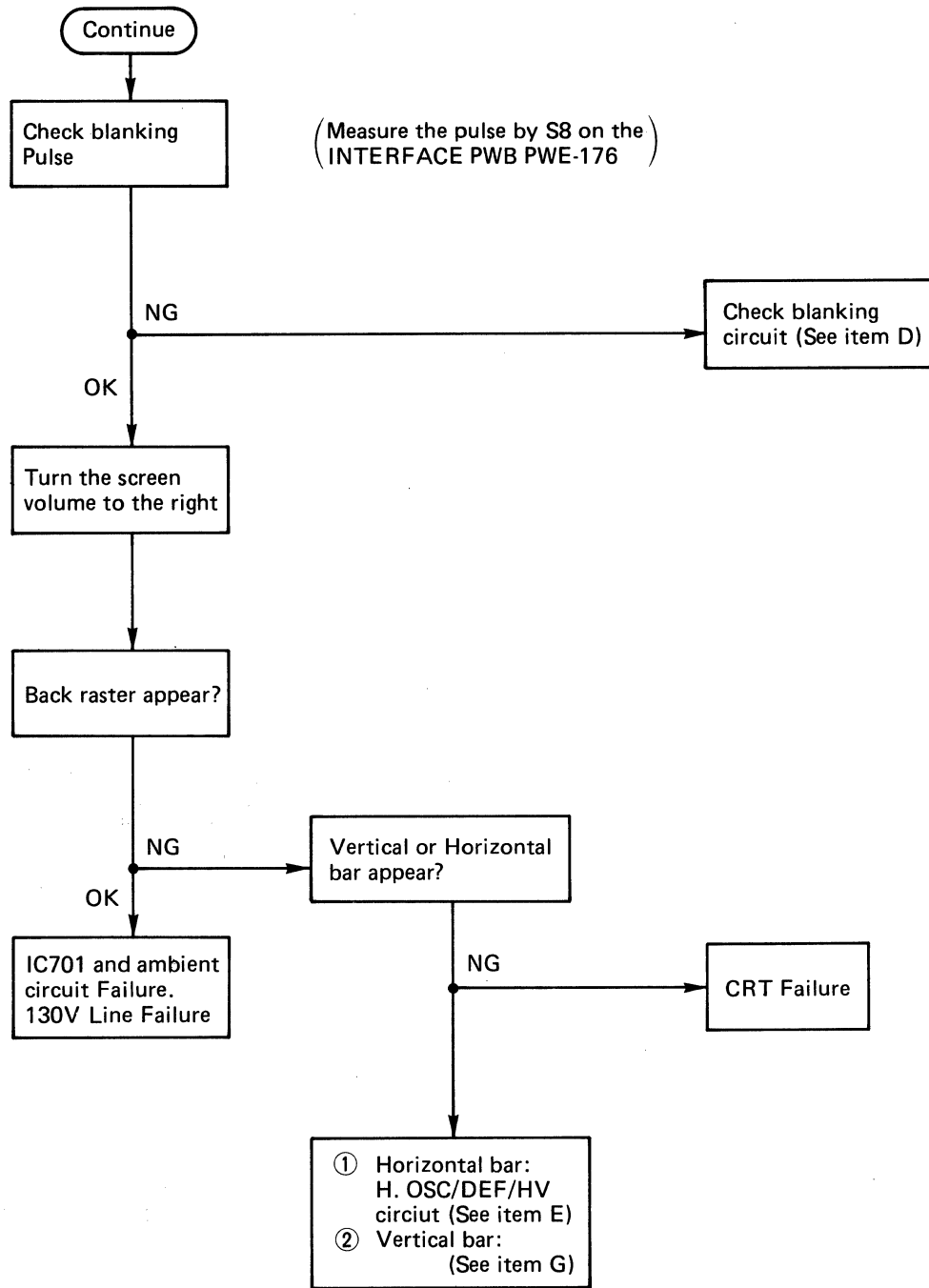
SIGNAL No.		1	2	3	4	5
Real Time Parameters						
Dot Rate (MHz)		31.216	29.400	22.136	25.432	16.368
Horizontal Rate (kHz)		44.851	42.000	26.995	31.475	22.000
Vertical Rate (Hz)		59.33	80.00	74.99	70.10	60.11
Non-Real Time Parameters						
H: Dots/Character		6	10	10	8	8
Total Characters		116	70	82	101	93
Displayed Characters		89	55	64	80	80
Drive Delay		94	62	67	83	80
Drive Width		5	3	11	12	10
V: Lines/Character		15	9	9	10	10
Total Lines		756	525	360	449	366
Displayed Rows		48	55	32	40	35
Drive Delay (Rows)		48	55	37	41	35
Drive Width (Lines)		4	2	8	2	13
Step Width		—	—	—	—	—
Signal Gating						
Composite Sync.	OP 1.-	1	1	1	1	1
Vertical Step	OP 2.-	0	0	0	0	0
Horizontal Drive	OP 3.-	1	1	1	1	1
Vertical Drive	OP 4.-	1	1	1	1	1
Signal Polarity						
Composite Sync.	OP 5.-	1	1	1	1	1
Vertical Step	OP 6.-	—	—	—	—	—
Horizontal Drive	OP 7.-	1	1	1	1	0
Vertical Drive	OP 8.-	1	1	1	0	1
Video	OP 13.-	0	0	0	0	0
Interlace Mode	OP 9.-	0	0	0	0	0
Video Mode	OP 10.-	1	1	1	1	1
Duty Cycle	OP 11.-	0	0	0	0	0
Character Clocking Mode	OP 12.-	0	0	0	0	0
Horizontal Skew	OP 14.-	—	—	—	—	—
Vertical Skew	OP 15.-	—	—	—	—	—
Cursor	OP 16.-	—	—	—	—	—

SIGNAL No.	6	7	8	9	10	10'
Real Time Parameters						
Dot Rate (MHz)	25.432	25.432	25.112	25.432	31.216	
Horizontal Rate (kHz)	31.475	31.475	30.475	31.475	44.851	
Vertical Rate (Hz)	59.95	70.10	59.99	50.04	59.33	
Non-Real Time Parameters						
H: Dots/Character	8	8	8	8	6	
Total Characters	101	101	103	101	116	
Displayed Characters	80	80	80	80	30	
Drive Delay	83	83	80	83	64	
Drive Width	12	12	14	12	5	
V: Lines/Character	10	10	10	10	9	
Total Lines	525	449	508	629	756	
Displayed Rows	48	35	40	36	27	
Drive Delay (Rows)	49	39	44	48	53	
Drive Width (Lines)	2	2	2	2	4	
Step Width	—	—	—	—	—	
Signal Gating						
Composite Sync. OP 1.-	1	1	1	1	1	
Vertical Step OP 2.-	0	0	0	0	0	
Horizontal Drive OP 3.-	1	1	1	1	1	
Vertical Drive OP 4.-	1	1	1	1	1	
Signal Polarity						
Composite Sync. OP 5.-	1	1	1	1	1	
Vertical Step OP 6.-	—	—	—	—	—	
Horizontal Drive OP 7.-	1	0	0	0	1	
Vertical Drive OP 8.-	1	1	0	1	1	
Video OP 13.-	0	0	0	0	0	
Interlace Mode OP 9.-	0	0	0	0	0	
Video Mode OP 10.-	1	1	1	1	1	
Duty Cycle OP 11.-	0	0	0	0	0	
Character Clocking Mode OP 12.-	0	0	0	0	0	
Horizontal Skew OP 14.-	—	—	—	—	—	
Vertical Skew OP 15.-	—	—	—	—	—	
Cursor OP 16.-	—	—	—	—	—	

TROUBLE SHOOTING

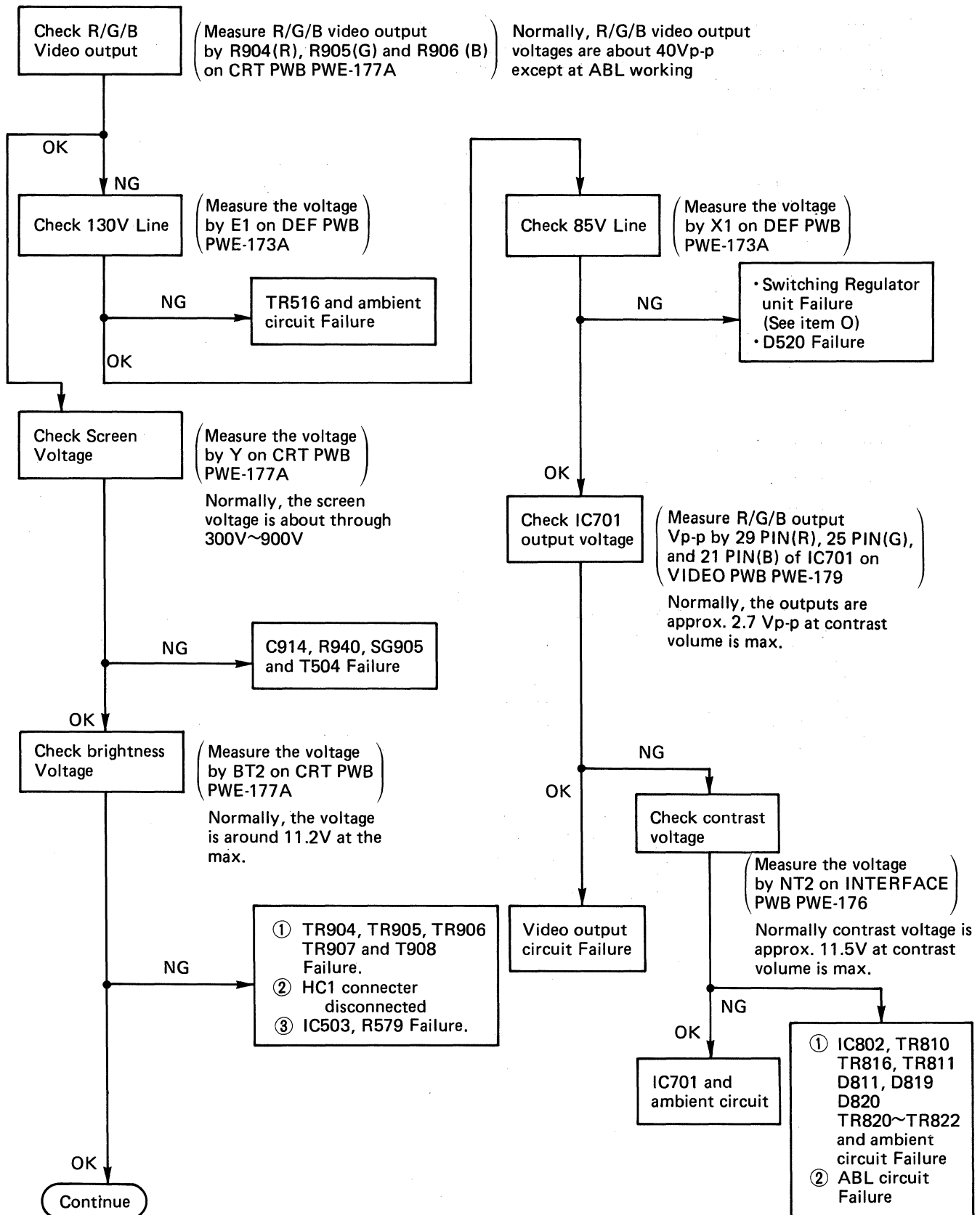
A. No Raster

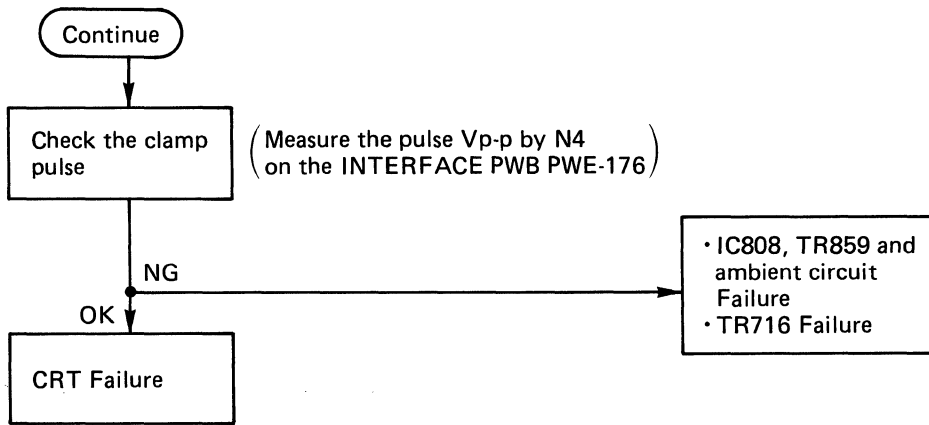




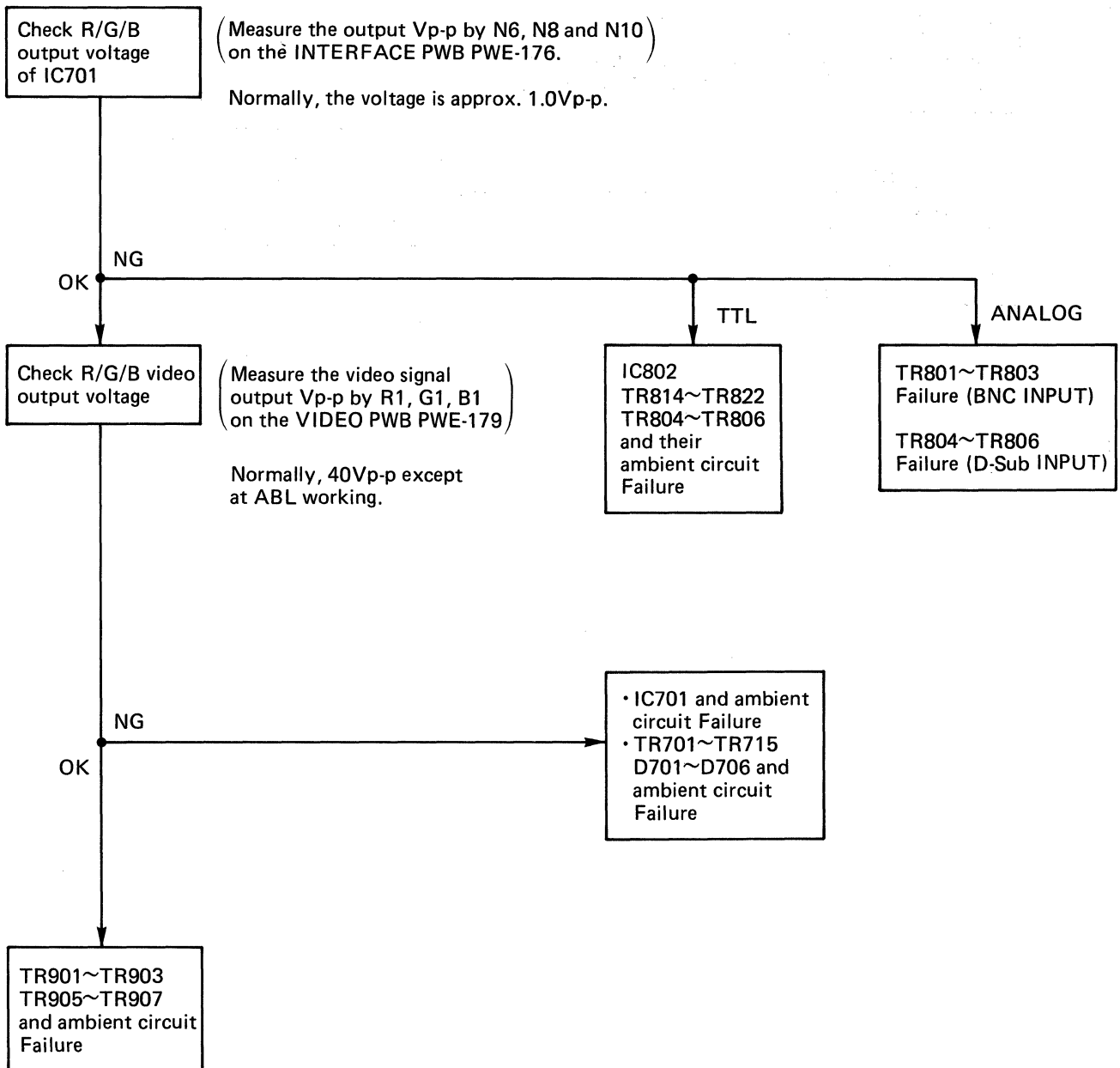
B. Abnormal Video on CRT Screen

Too dark or Too bright

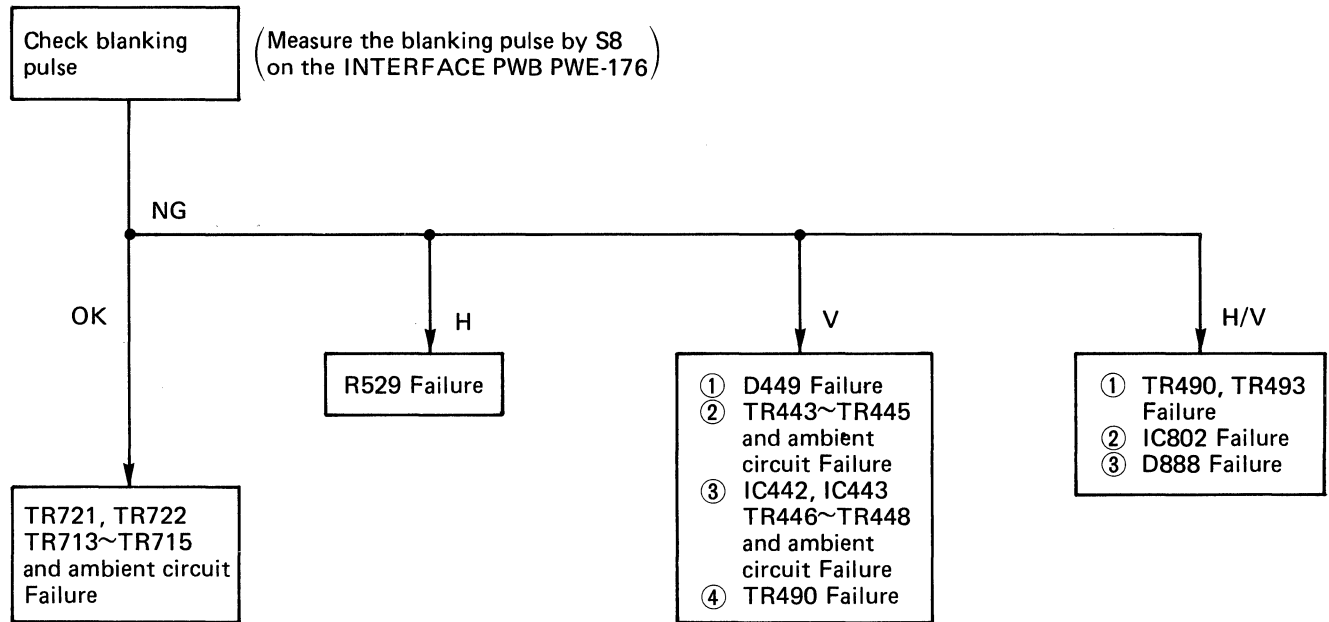




C. Abnormal White Balance

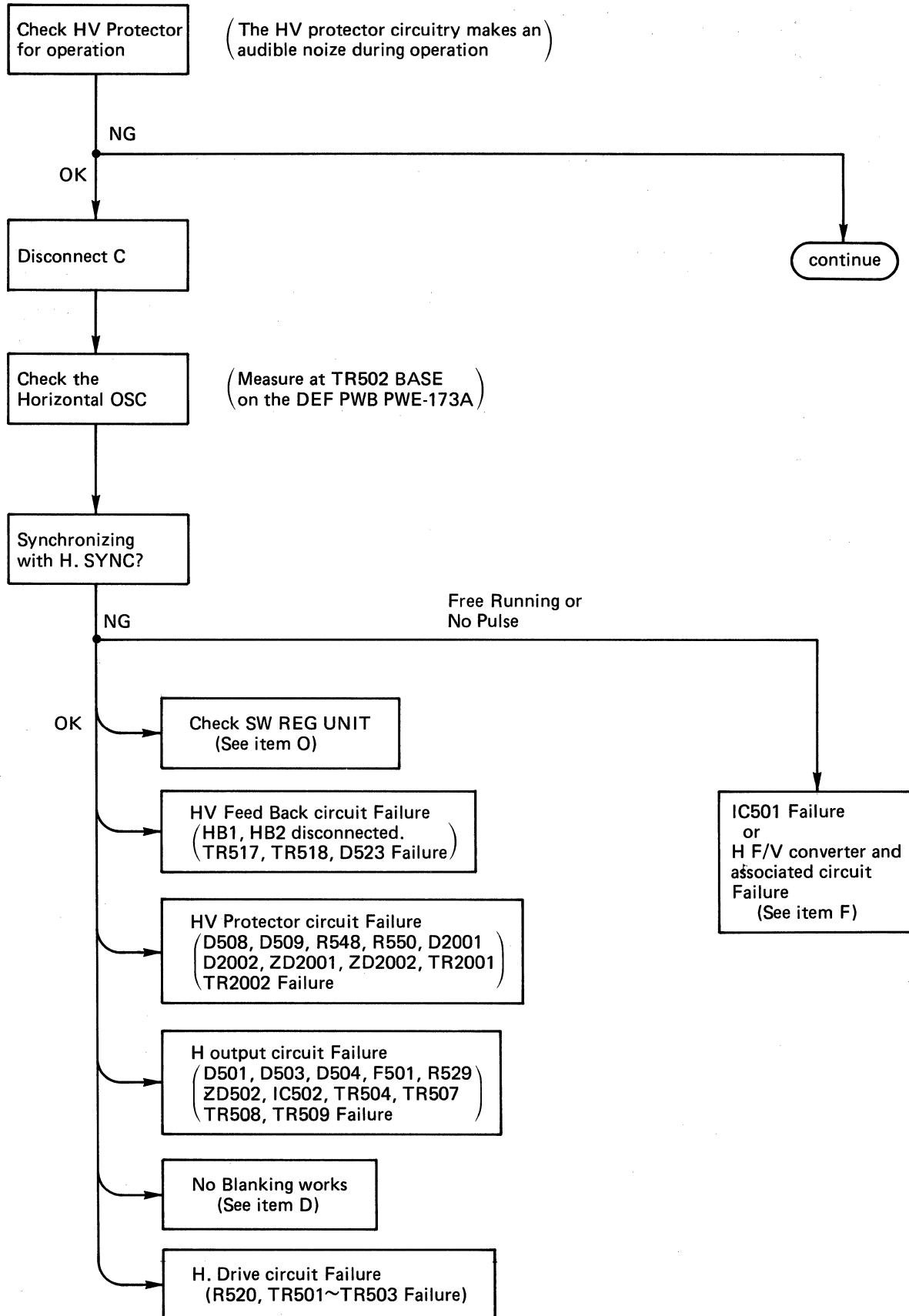


D. No Blanking works

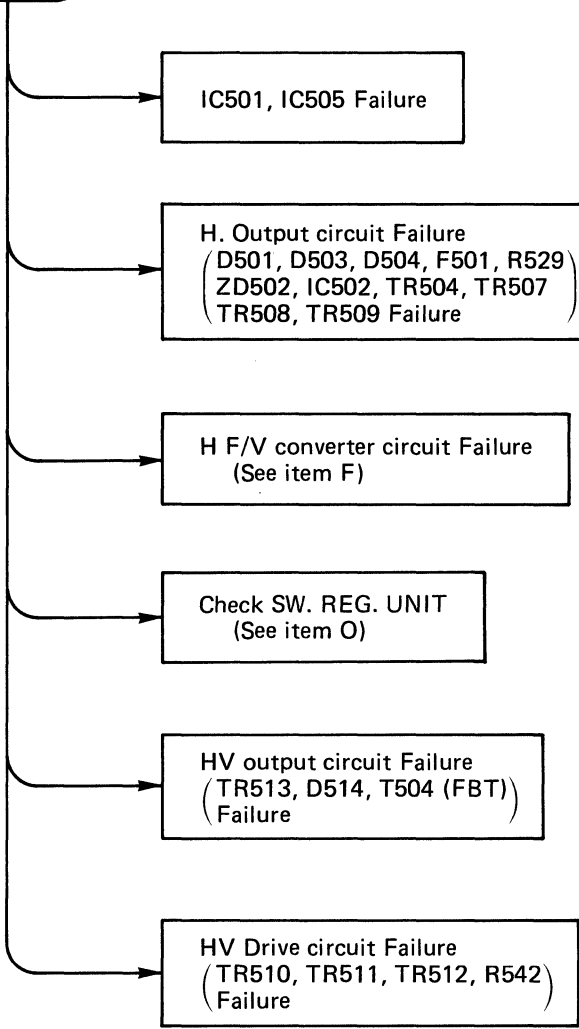


E. H.OSC/DEF/HV Circuit Fault

No Raster
Abnormal Picture Size
Abnormal Picture



Continue



IC501, IC505 Failure

H. Output circuit Failure
(D501, D503, D504, F501, R529)
(ZD502, IC502, TR504, TR507)
TR508, TR509 Failure

H F/V converter circuit Failure
(See item F)

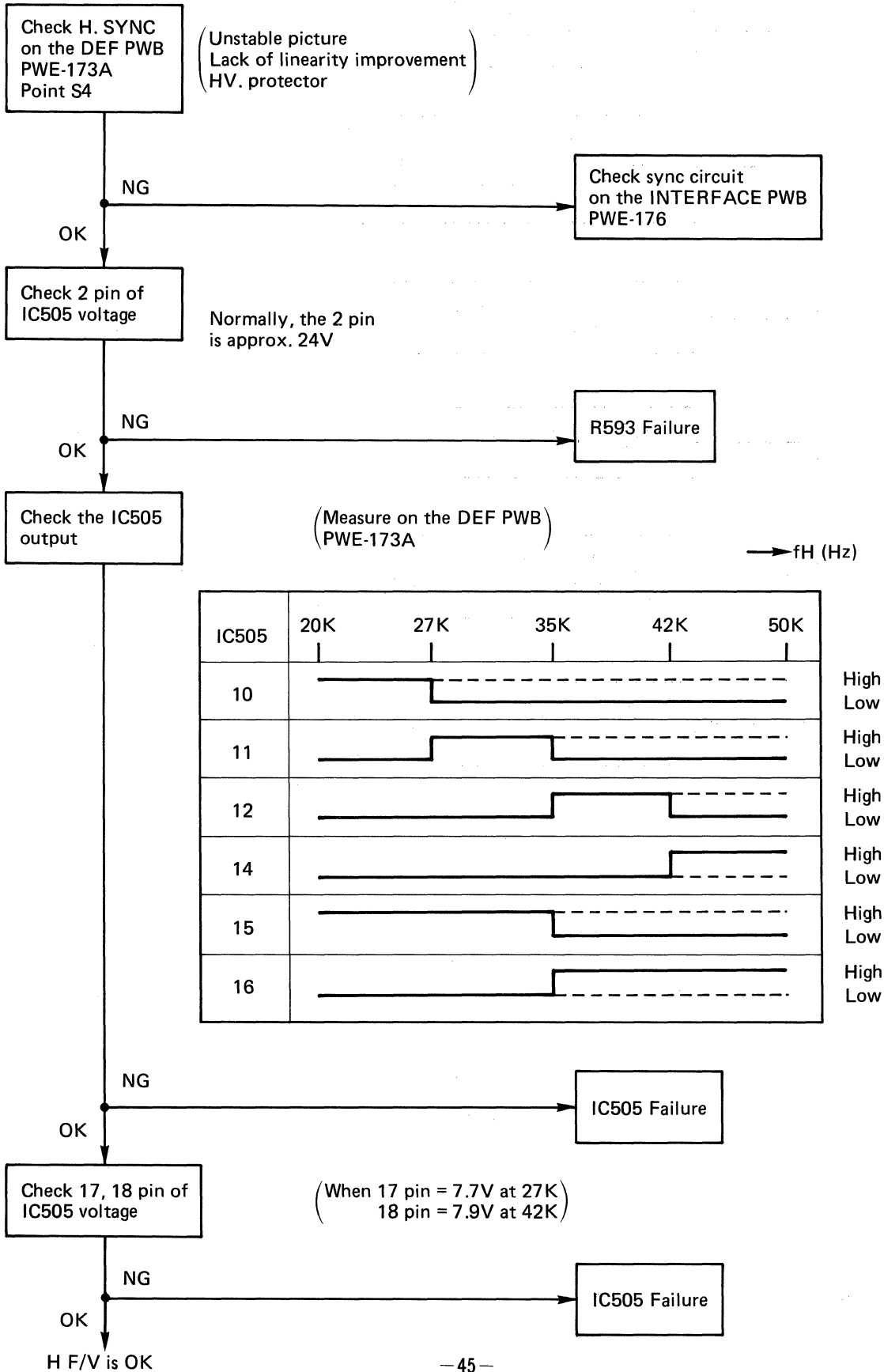
Check SW. REG. UNIT
(See item O)

HV output circuit Failure
(TR513, D514, T504 (FBT))
Failure

HV Drive circuit Failure
(TR510, TR511, TR512, R542)
Failure

F. H/V F-V converter and associated circuit

Ⓜ



①

Check V. sync
on the DEF PWB
PWE-173A
Point S3

(Unstable picture
Lack of linearity improvement
Lack of East-West pincushion
Abnormal V Size
No picture)

OK
NG

Check sync circuit
on the INTERFACE PWB
PWE-176

Check 2 pin of
IC401 voltage

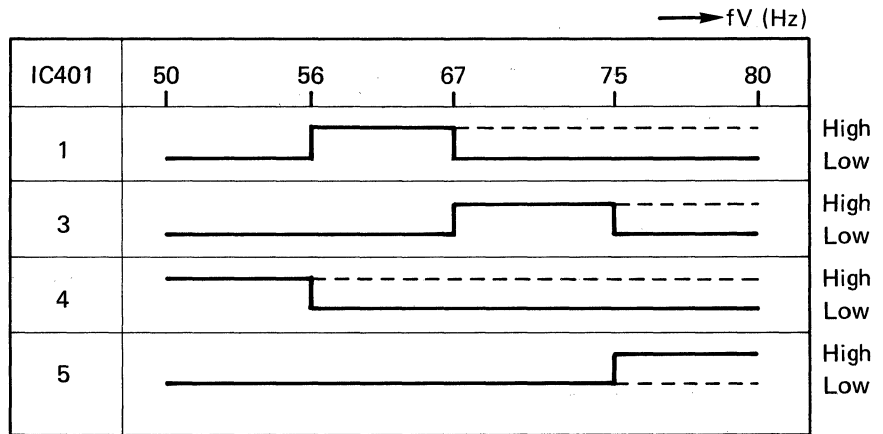
Normally, the 2 pin
is approx. 24V

OK
NG

R423 Failure

Check the
IC401 output

(Measure on the DEF PWB)
PWE-173A



OK
NG

IC401 Failure

Check 8 pin of
IC401

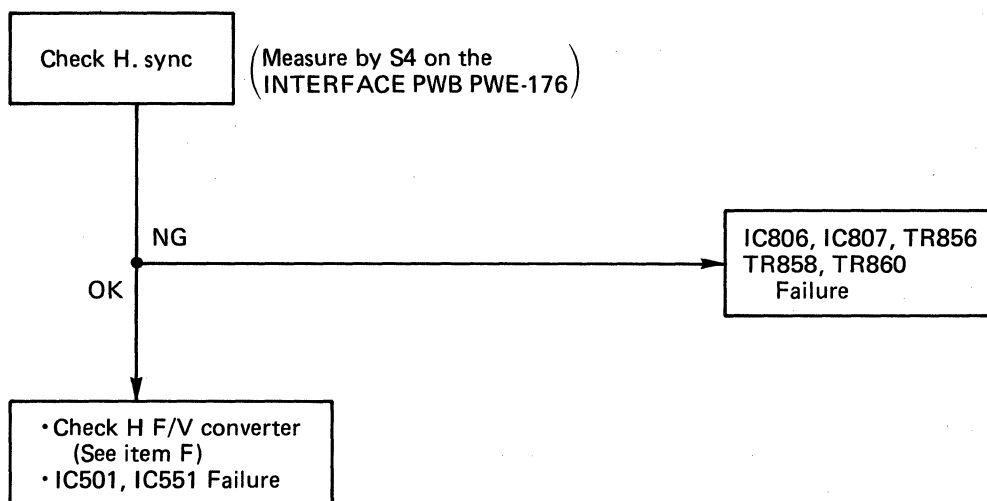
OK
NG

IC401 Failure

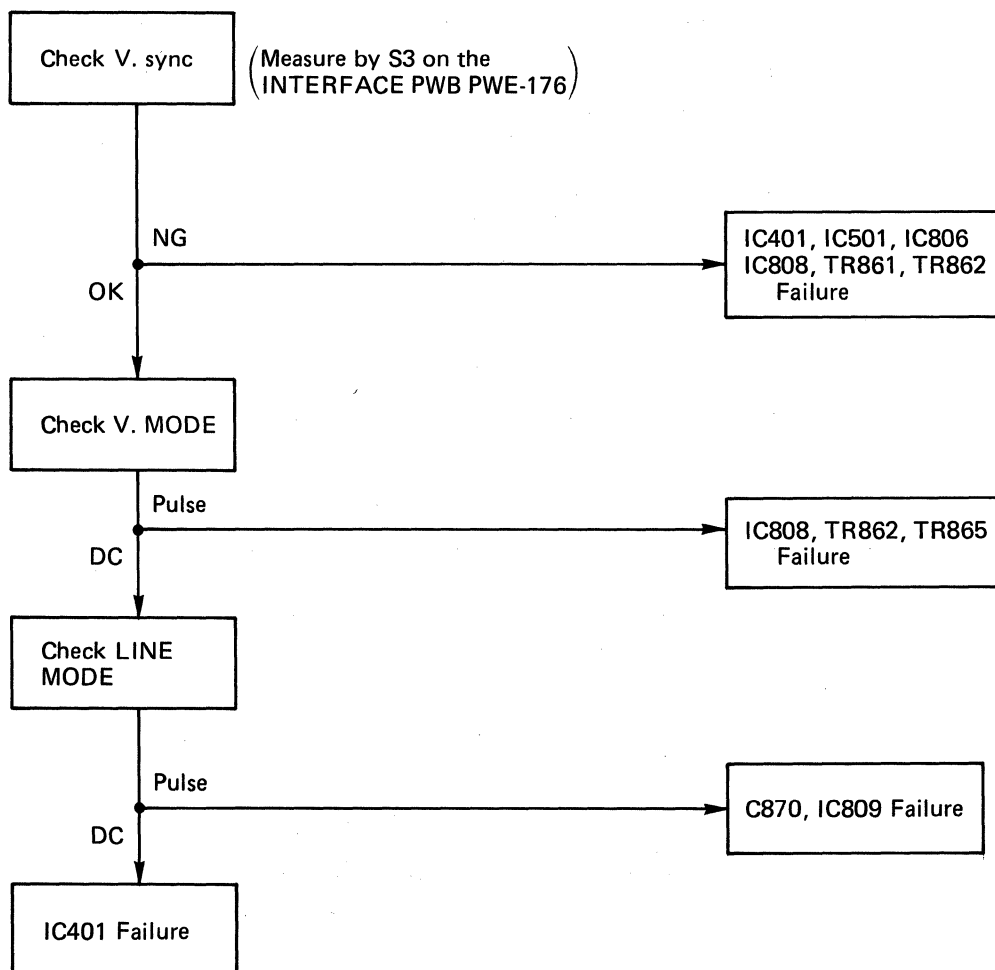
V F/V is OK

G. Unstable Picture

Horizontal

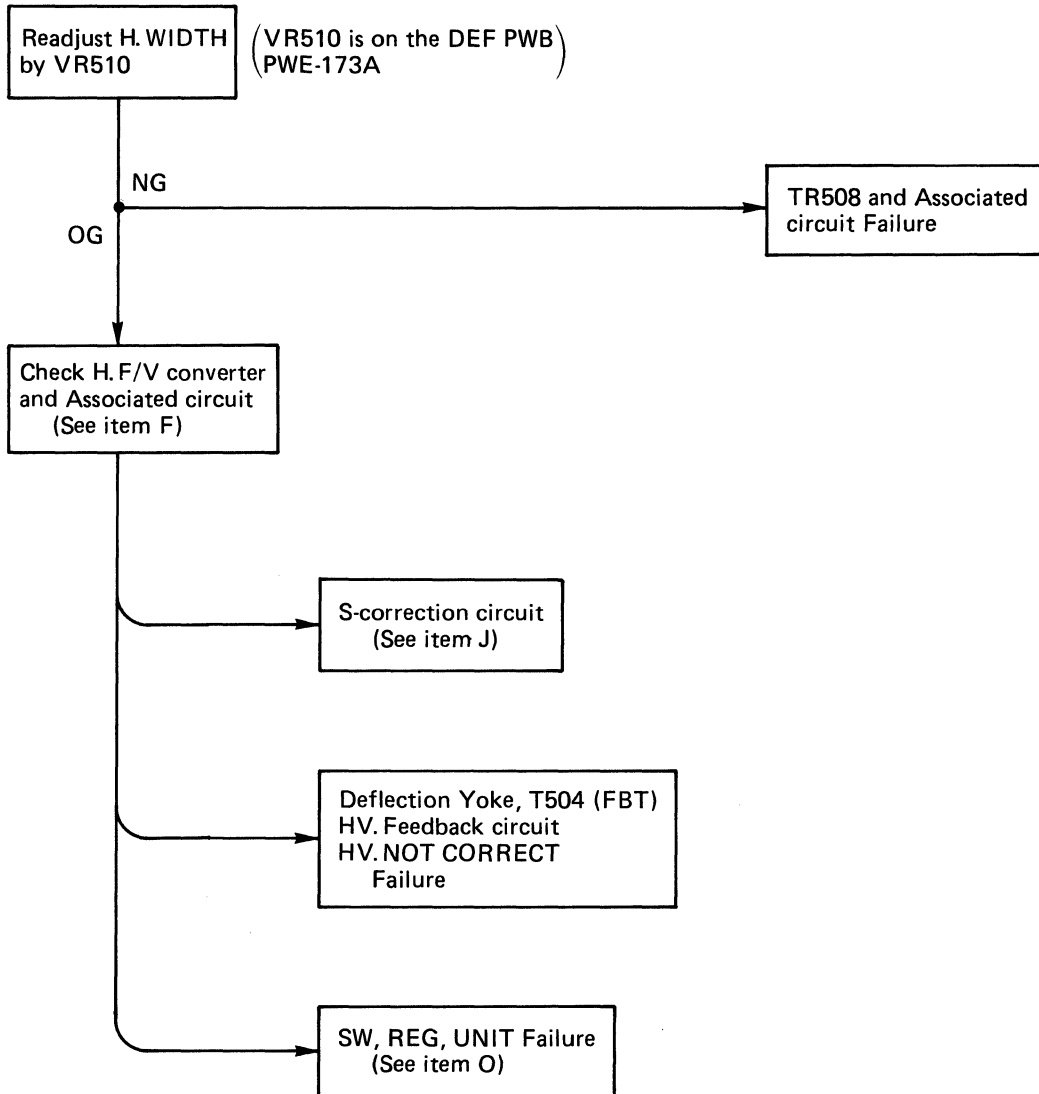


Vertical

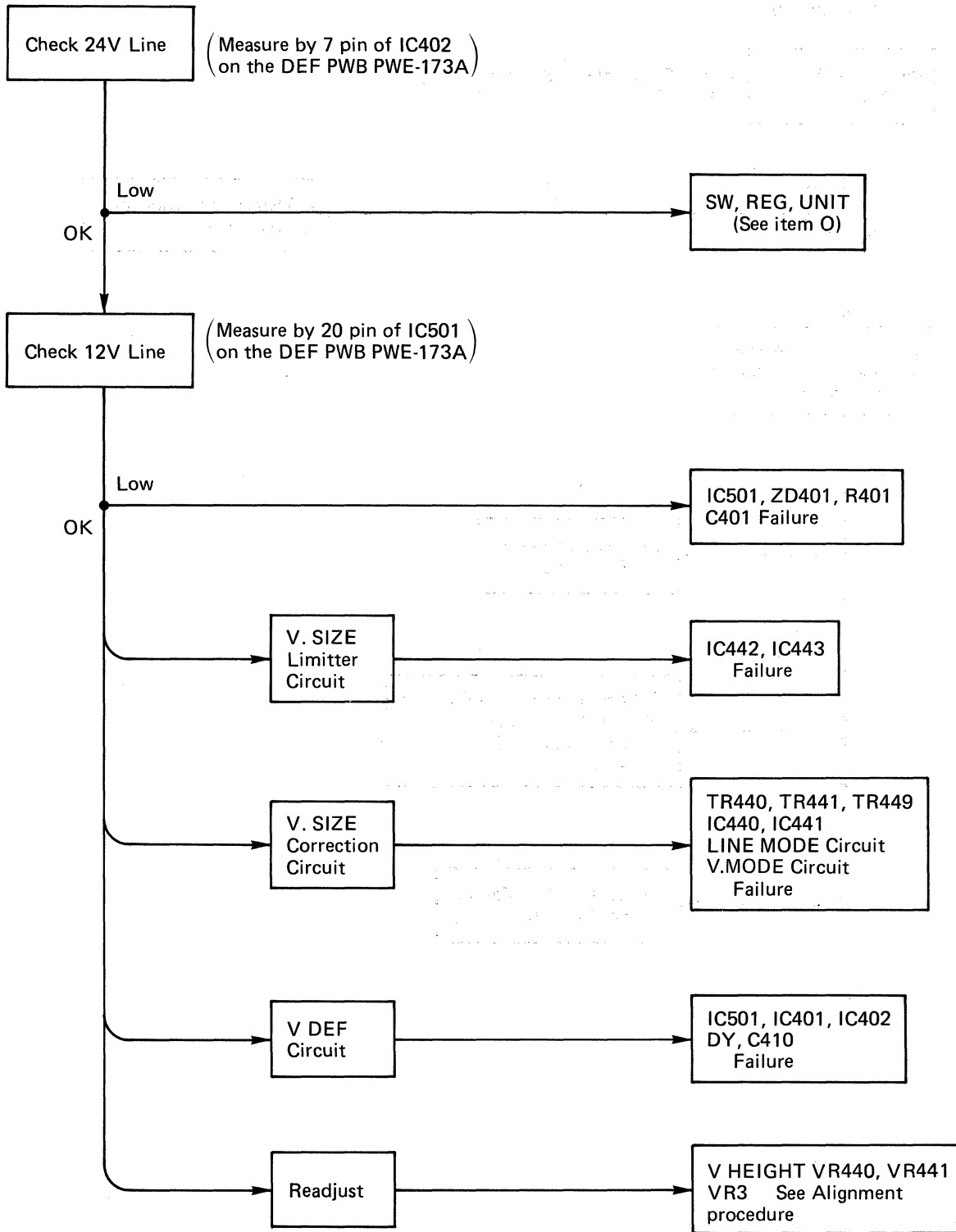


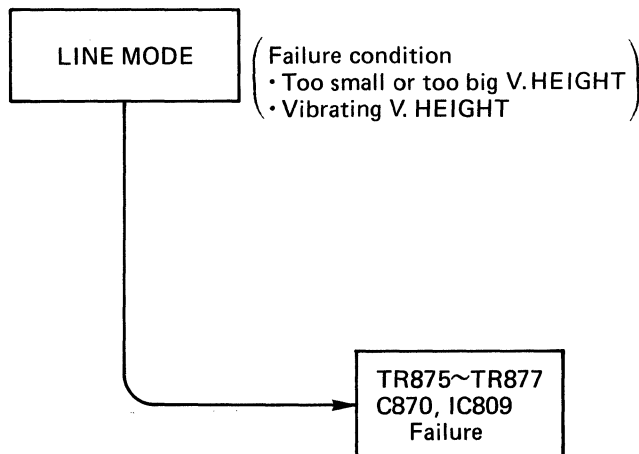
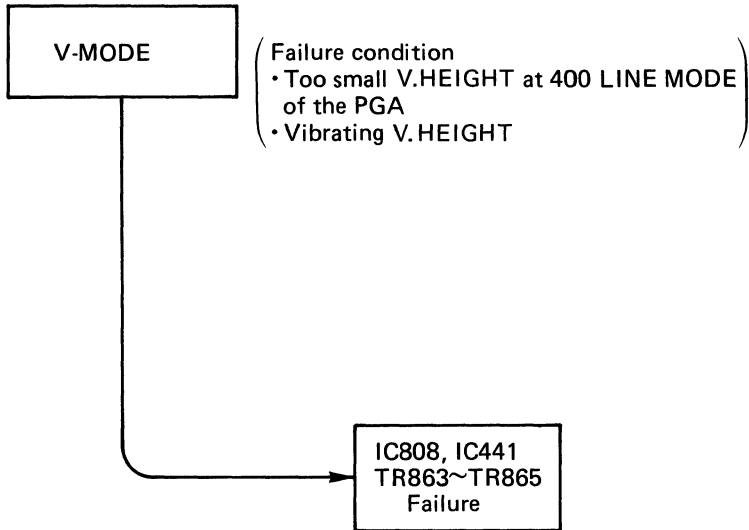
H. Abnormal Picture Size

1. Horizontal WIDTH



2. Vertical HEIGHT

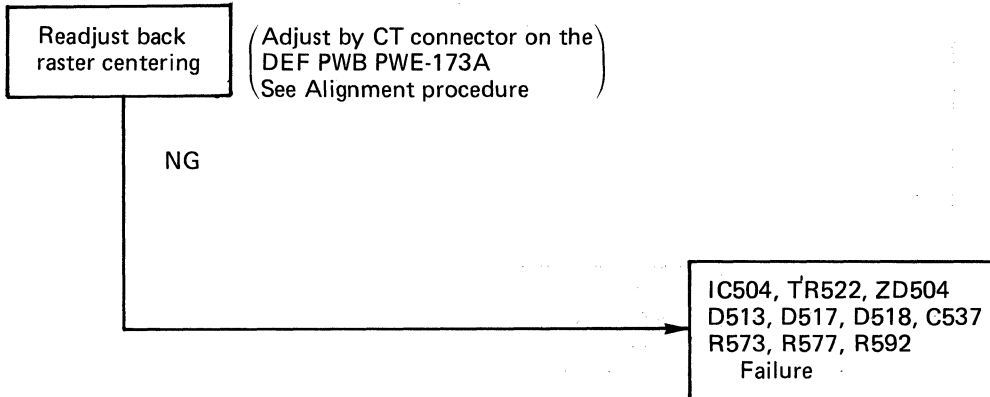




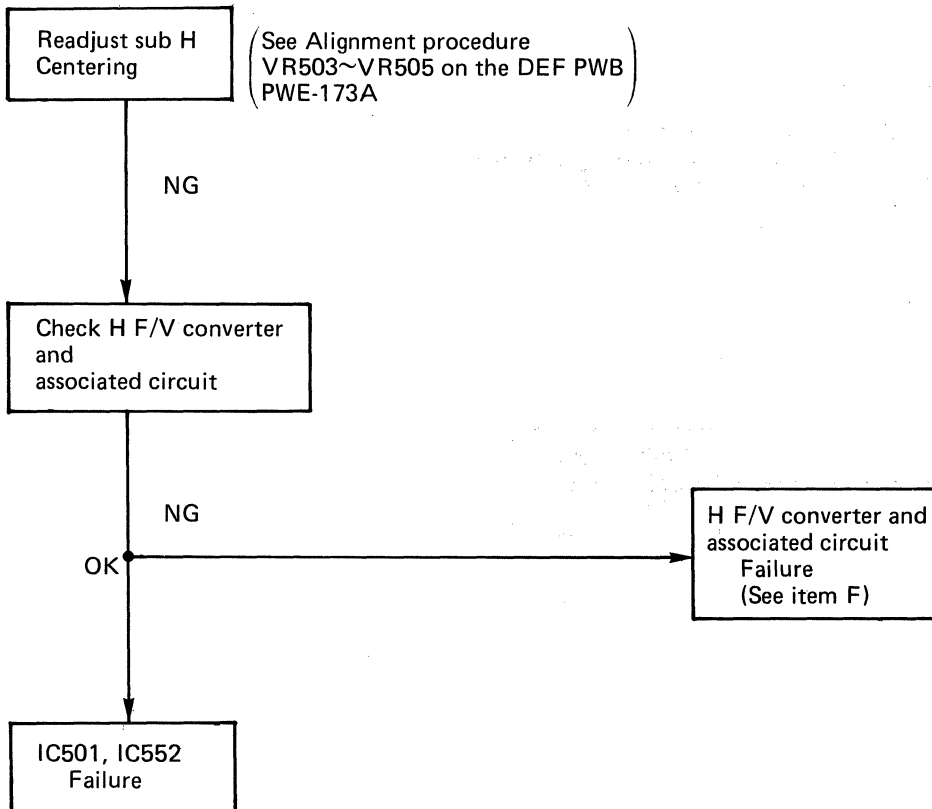
I. Centering

Horizontal

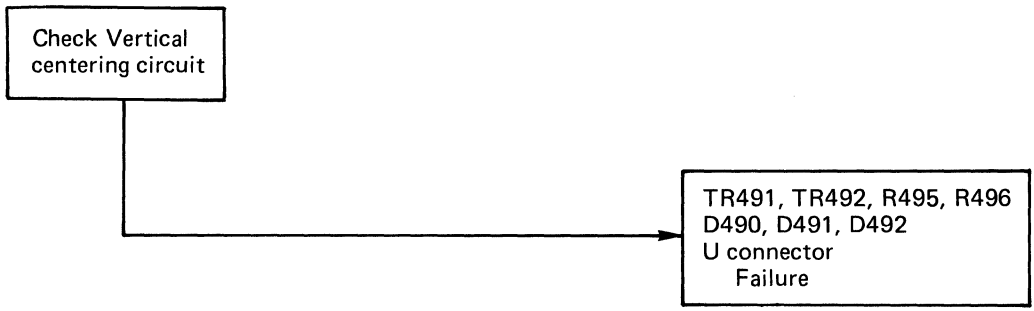
a) BACK RASTER CENTERING



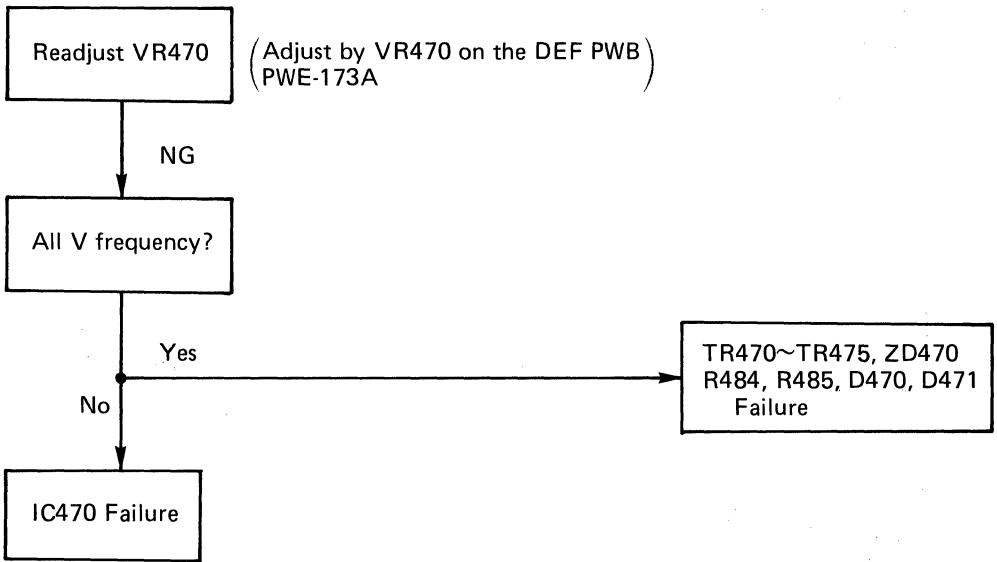
b) PICTURE CENTERING



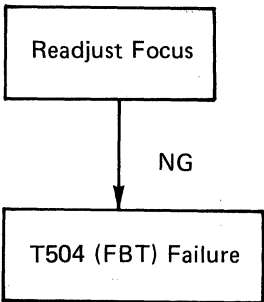
VERTICAL



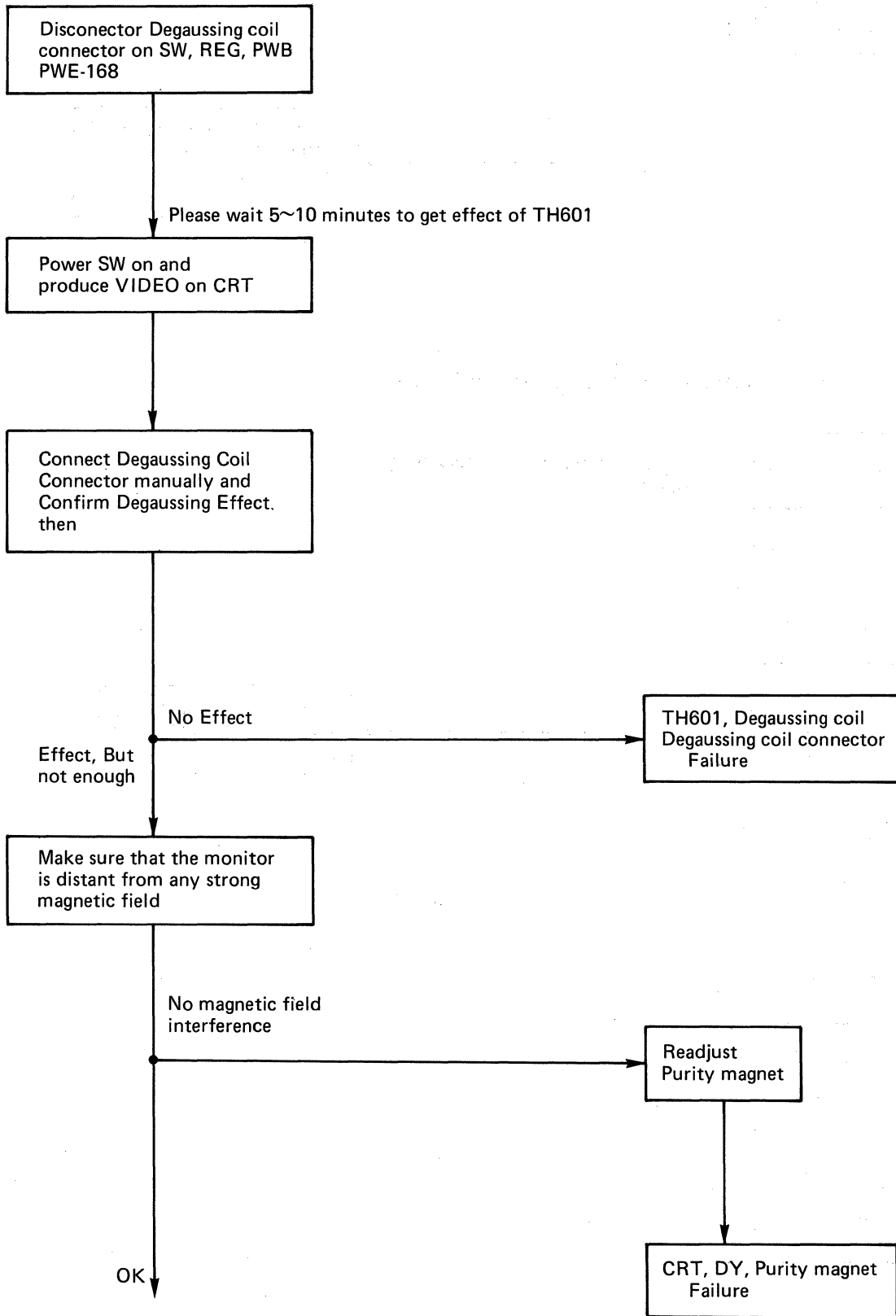
J. Side pincushion distortion correction Failure



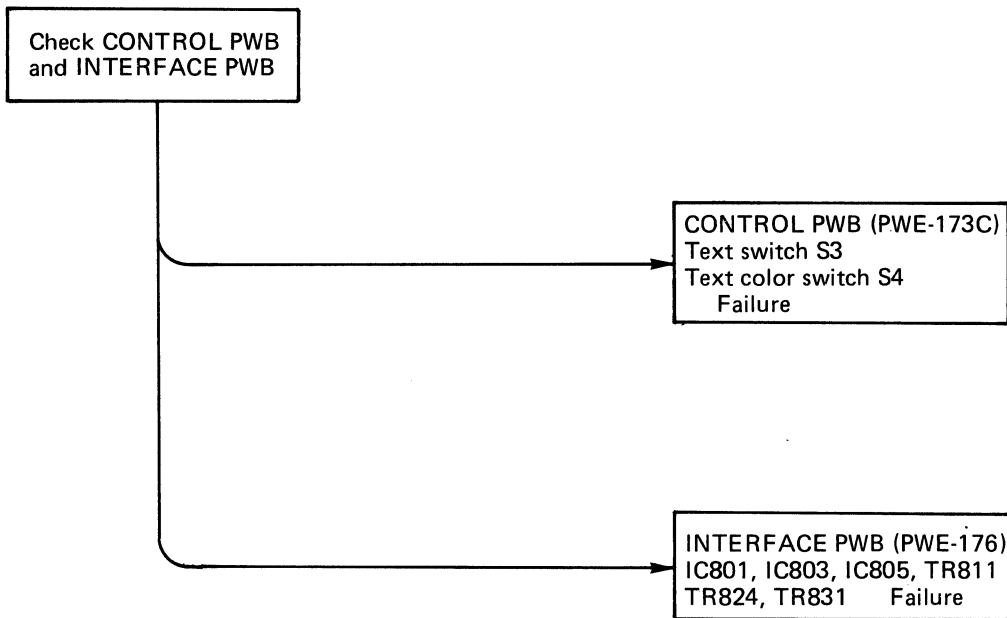
K. Poor focus



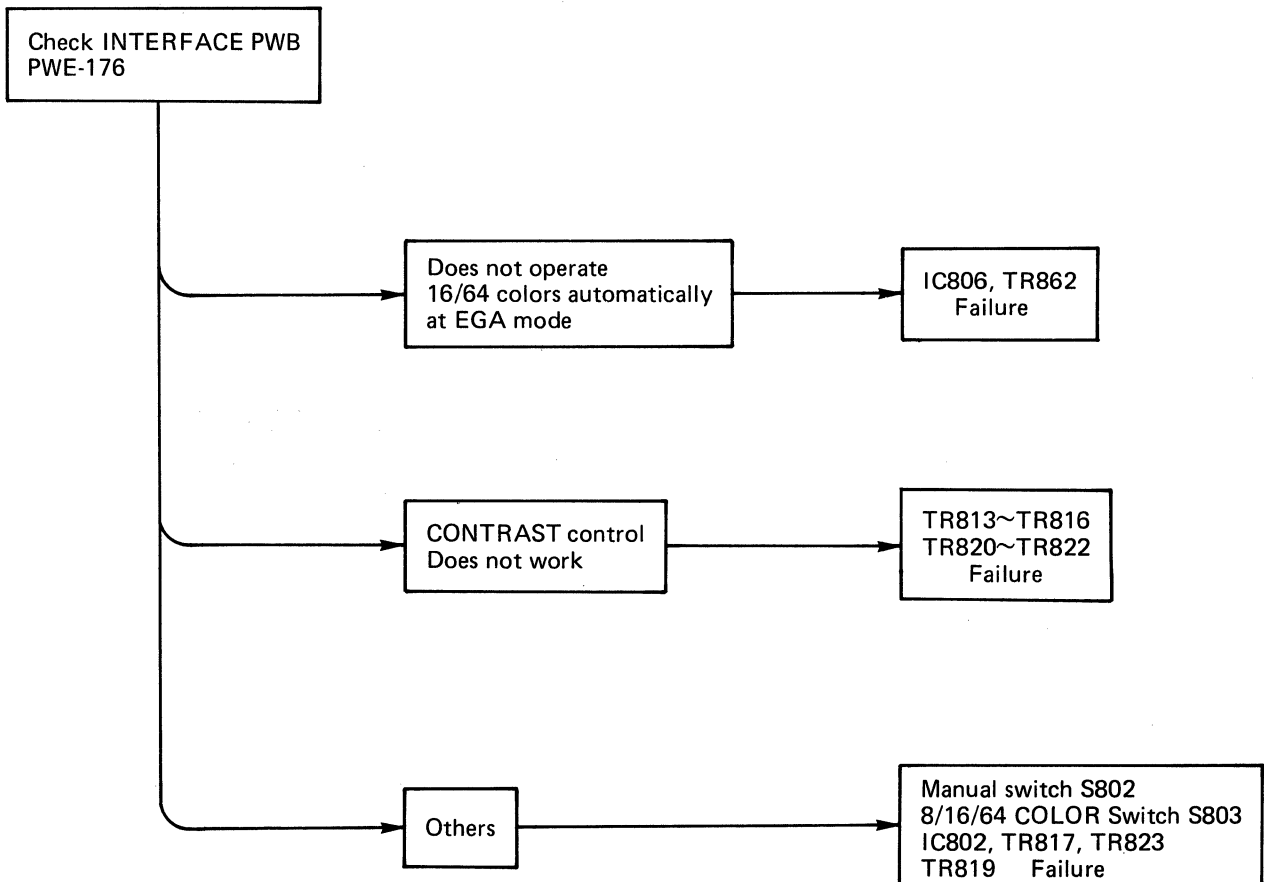
L. Impurity on CRT screen



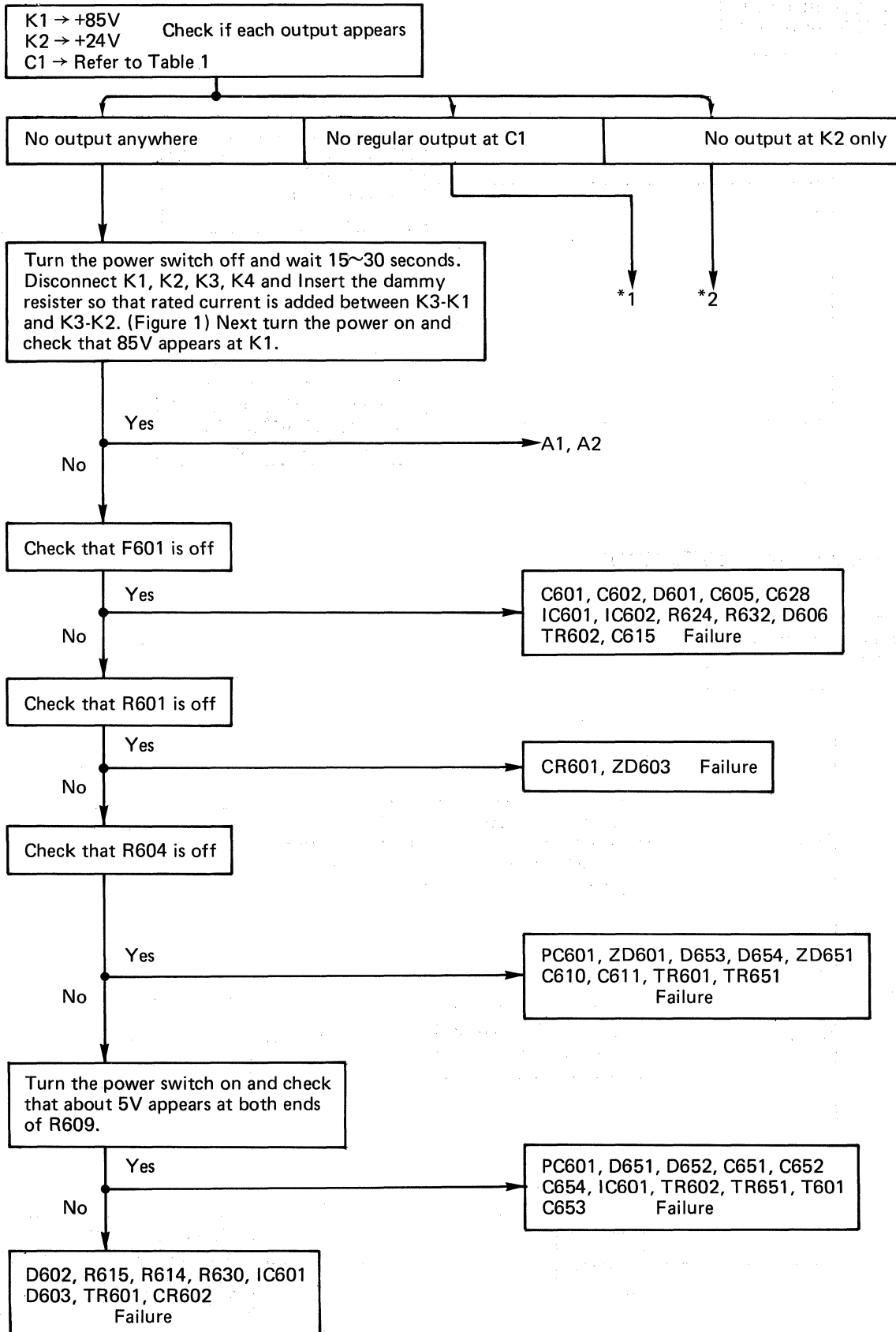
M. Abnormal Text mode operation

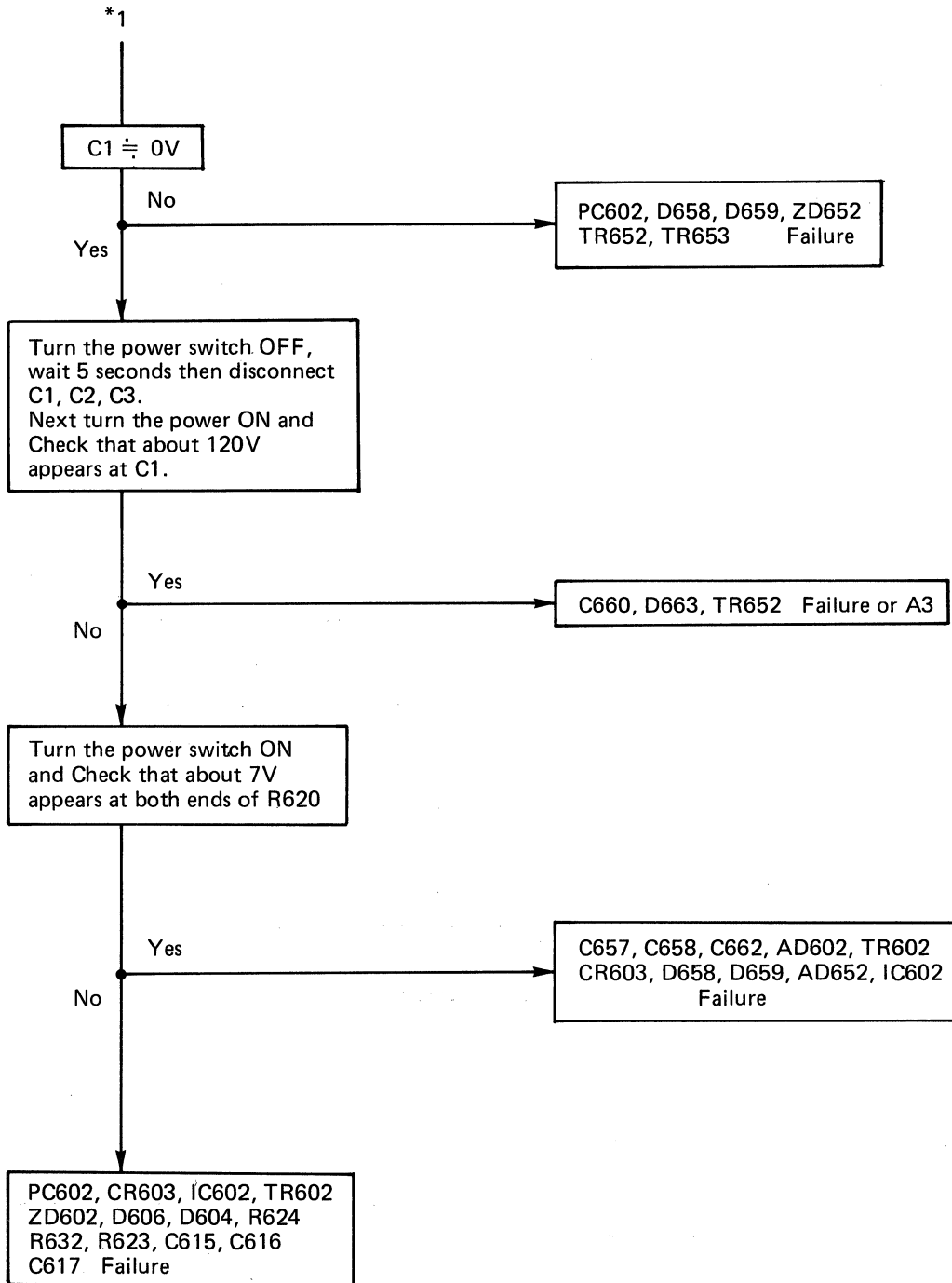


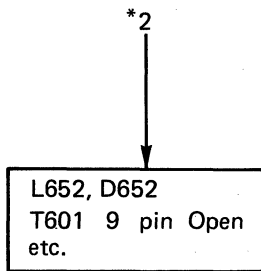
N. Abnormal Color at TTL MODE



O. Switching Regulator Unit







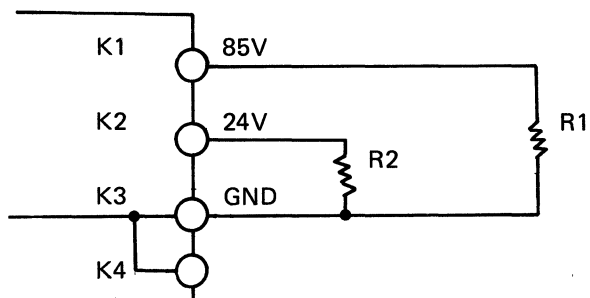
An Trouble excluding Switching Regulator (See next page)

Table 1. C1 output voltage

Horizontal Frequency [kHz]		C1 voltage [V]
22	EGA	50V ± 3V
31	VGA	70V ± 4V
45	GB-II	114V ± 5V

With no input signal, about 45V should appears at C1.

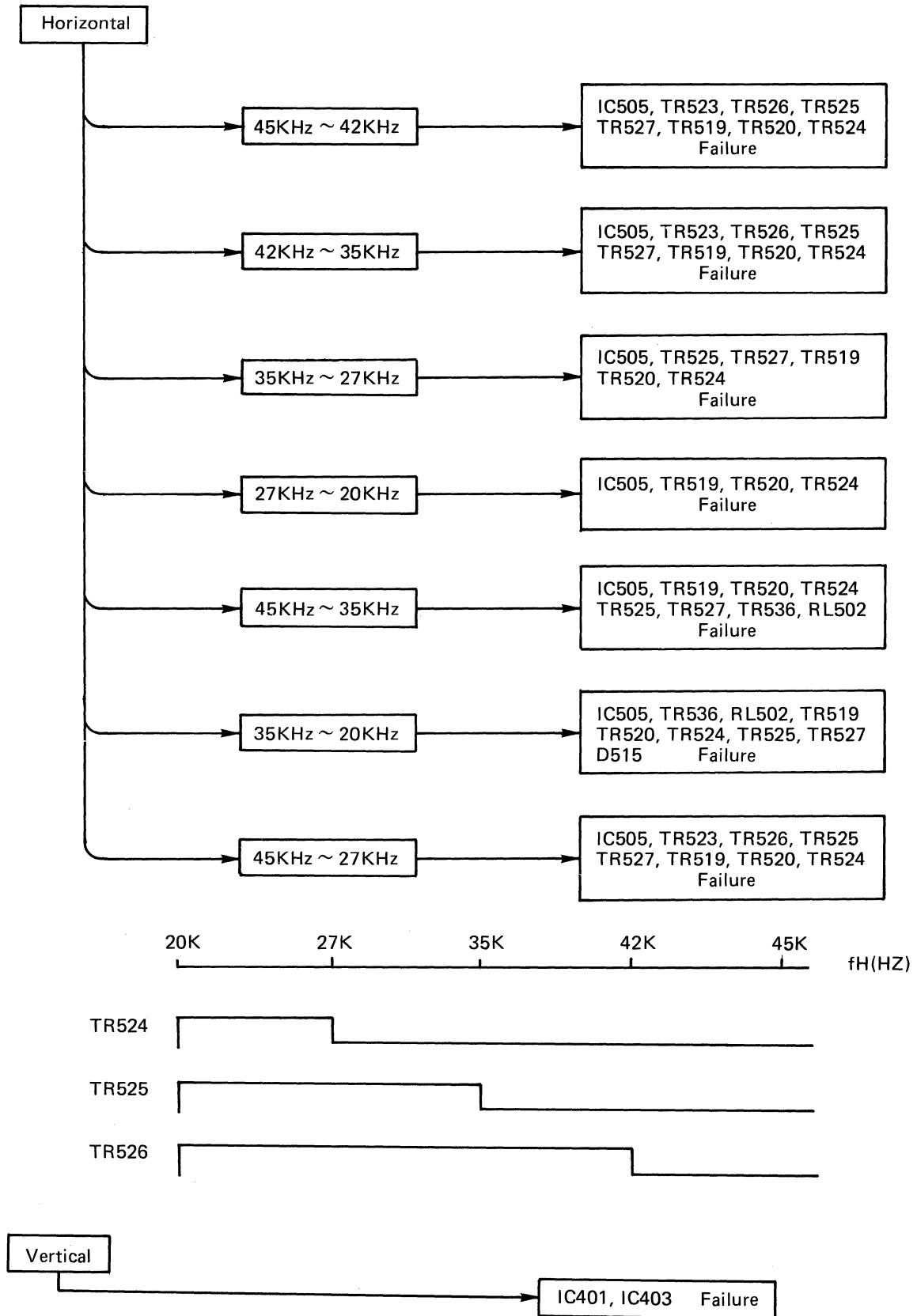
Fig. 1. Rated load current at K1 and K2 terminal



+85V	0.03A ~ 0.2A R1 (2.83kΩ~425Ω)
+24V	0.8A ~ 1.5A R2 (30Ω~16Ω)

Attention) Do not power on SW, REG, unit itself without the load at K1, K2, or it may misoperate protector.

P. H/V Linearity not improved



REPLACEMENT PARTS LIST

Note: The components identified by Δ make are critical for safety. Replace only with Parts Number Specified.

SYMBOL	PARTS NO	DESCRIPTION	QTY
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*** CRT & TUNER ***

Δ CRT	33015018	CRT M36JVL23XX(6408)	1
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*** ICS ***

IC8C9		37011054	IC UPC339C (COMP)	1
IC4C3	IC44C IC441	37051036	MOS UPD4066BC (ESD)	6
IC47C	IC551 IC552			
IC8C3		37051C81	IC SN74LS32N (OR)	1
IC801		37051096	IC SN74LS367AN (BUFF)	1
IC8C8		37051179	IC SN74LS123N (MONO MLT)	1
IC8C6		37052011	IC SN74LS136N (EX-OR)	1
IC804	IC805	37052179	IC SN74LSC7N	2
IC443	IC502	37056207	IC UPC358	2
IC5C4		37056219	IC STR2005	1
IC5C3		37056220	IC STR2012	1
IC8C2		37056233	IC PCD-Q16MI	1
Δ IC7C1		37056245	IC M51387P	1
Δ IC5C1		37056295	IC LA7851	1
Δ IC6C1 Δ IC602		37056352	IC STK7408HE	2
IC5C5		37056405	IC 56405	1
IC401		37056406	IC 56406	1
IC402		37056415	IC LA7835	1
IC442 IC807		37101127	IC UPC-393C	2

*** TRANSISTORS ***

Δ TR2C02 TR440 TR441	350D7217	TR,2SC945-T Q	51
TR442 TR444 TR445			
TR447 TR449 TR470			
TR471 TR473 TR474			
TR5C1 TR510 TR514			
TR515 TR519 TR523			
TR527 TR531 TR536			
TR718 TR720 TR721			
TR8C1 TR802 TR803			
TR8C4 TR805 TR806			
TR810 TR812 TR820			
TR821 TR822 TR824			
TR825 TR831 TR832			
TR851 TR852 TR856			
TR857 TR858 TR859			
TR862 TR87C TR871			

SYMBOL	PARTS NO	DESCRIPTION	QTY
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*** TRANSISTORS ***

TR872 TR904 TR9C8			
TR493 TR713 TR714	350H5017	TR,2SC3811-TA Q	12
TR715 TR716 TR814			
TR815 TR816 TR817			
TR818 TR819 TR860	350H5017	TR,2SC3811-TA Q	12
TR853	350H5018	TR,2SC3811-TA R	1
Δ TR2001 TR443 TR446	350K3517	TR 2SA733/2SA733A-T Q	14
TR448 TR472 TR490			
TR502 TR511 TR520			
TR717 TR719 TR722			
TR811 TR813			
TR492	350K4412	TR,2SA952 L	1
TR901 TR902 TR903	35005217	TR,2SA1C18 Q	3
TR71C TR711 TR712	35006804	TR,2SA1538-RA D	3
TR5C9	35025212	TR,2SB546/546A L	1
Δ TR601 Δ TR602	35047216	TR,2SC945 P	2
Δ TR651 Δ TR652 TR653	35053C11	TR,2SC1941 K	3
TR507 TR517 TR518	35053012	TR,2SC1941 L	3
TR491	35055312	TR 2SC2C01 L	1
TR508	35063412	TR,2SD401A L	1
TR475	35065416	TR,2SD882 P	1
TR522	35065417	TR,2SD882 Q	1
TR8C9	35065912	TR,2SD471 L	1
TR7C1 TR702 TR703	35083400	TR,2SC2408/2SC24C8A	3
TR9C5 TR906 TR9C7	35084417	TR,2SC1473 Q	3
Δ TR504	35084700	TR,2SC3688	1
TR7C4 TR705 TR706	35086004	TR,2SC3953-RA D	6
TR7C7 TR708 TR709			
Δ TR513	35087700	TR 2SC3685	1
TR823 TR854 TR874	351G0500	TR,AN1A4M-T	3
TR833 TR834 TR861	351G05C1	TR,AA1A4M-T	11
TR863 TR864 TR865			
TR866 TR875 TR877			
TR878 TR879			
TR8C8 TR876	351G0613	TR,DTC123YS-T	2
TR5C3 TR512 TR516	35121000	TR,2SK43C	3
Δ TR524 Δ TR525 Δ TR526	351218CC	TR,2SK754	3
Δ CR602 Δ CR603	35595C10	THYRISTOR 03P4M-L	2
Δ CR601	35595014	TRIAC AC10DGM	1

SYMBOL	PARTS NO	DESCRIPTION	QTY
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*** DIODES ***

△D603	△D6C6	D653	360K1009	DIODE,SI.1S2473	16
△D654	△D658	D659			
△D661	△D662	D663			
D701	D702	D703			
D704	D705	D706			
D707					
D440	D441	D442	360K1027	DIODE 1SS132	84
D443	D444	D445			
D446	D447	D448			
D449	D451	D470			
D471	D490	D491			
D492	D499A	D499B	360K1027	DIODE 1SS132	84
D499C	D499D	D499E			
D499F	D504	D506			
D515	D519	D520			
D521	D522	D801			
D802	D803	D804			
D805	D806	D807			
D808	D809	D810			
D811	D812	D813			
D814	D815	D816			
D817	D818	D819			
D820	D821	D822			
D823	D824	D825			
D826	D827	D828			
D829	D830	D831			
D832	D851	D852			
D853	D854	D855			
D856	D860	D861			
D871	D872	D873			
D874	D875	D876			
D880	D881	D882			
D883	D884	D885			
D886	D887	D889			
△D605	D901	D902	360K1032	DIODE 1SS82-TA	4
D903					
△ZD6C2			360K3098	DIODE RD12EB(3)-T4	1
△ZD653			360K3132	DIODE,ZENER RE3.0EB(2)-T4	1
△ZD2001	△ZD2002		360K3143	DIODE,RD8.2JSB(1)-T4	2
ZD47C	ZD601		360K3149	DIODE RD1CEB(2)-T4	2
△ZD651	△ZD652	ZD701	360K3151	DIODE RD6.8EB(2)-T4	3
ZD4C1			360K3160	DIODE RD8.2EB(2)-T4	1
ZD5C1			360K3161	DIODE RD12EB(2)-T4	1
△ZD6C3			360K3162	DIODE,RD2.7EB(1)-T4	1
ZD4C2			360K3188	DIODE RD3.9EB(2)-T4	1
ZD5C2			360K3403	DIODE RD5.1JSB(1)-T4	1
ZD851			360K3635	DIODE RD5.1ESB(2)-T4	1

SYMBOL	PARTS NO	DESCRIPTION	QTY
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*** DIODES ***

ZD5C4	360K3647	DIODE RD6.8ESB(2)-T4	1		
ZD8C3	360K3660	DIODE RD9.1ESB(3)-T4	1		
D888	36001027	DIODE 1SS132	1		
D401	D502	D503	361K7160	RECTIFIER,SI.TVR-06G G23	11
△D508	△D509	△D510			
D513	D516	D517			
D518	D523				
△D514			361K7259	CGJ-1	1
D5C5	D511	D512			
△D602	△D604		361K7505	RECTIFIER,SI.ERB44-G6V1	3
△D607			361C7174	RECTIFIER,SI. RU1P	2
△D657			36107303	DIODE EUC2	1
△D651			36107304	DIODE CTG-G3CR	1
			36107305	DIODE RU2B	1
△D501			36107515	RECTIFIER,SI. CTU-G3DR	1
△D652			36108072	D,NETWORK D5LCA20	1
△D601			36108090	DIODE D5SBA6G	1
D599			36801023	DIODE,LIGHT-E SEL1320G	1
△D2001	△D2002		38005011	VARIATER,VD1220	2
△TH6C1			38112026	THERMISTER,POSITIVE	1
△PC601	△PC602		38200214	PHOTO COUPLER	2

*** TRANSFORMERS ***

T503	45804002	TRANS,H.DRIVE	1
T501	45804004	TRANS	1
T505	46305101	TRANS,CONVERTER	1
△T601	46308103	TRANS,SWITCHING	1
△T602	46308104	TRANS,SWITCHING	1
△T504	47105635	FLY BACK TRANSFORMER	1
△T506	47502053	SIDE TRANS,PINCUSHION	1
△T502	47710003	TRANS,H.OUTPUT	1

*** VARIABLE RESISTORS ***

VR5			41011273	R,VARIABLE B20K-V(M)	1
VR3	VR4	VR6	41011275	R,VARIABLE B20K-V(M)	3
VR1	VR2		41023603	R,VARIABLE 10K 12W	2
VR5C9			41061511	R,VARIABLE B4.7K	1
VR7C4			41071160	R,VARIABLE B3.3K	1
VR440	VR441	VR443	41071161	R,VARIABLE B4.7K	7
VR501	VR701	VR702			
VR7C3					

SYMBOL	PARTS NO	DESCRIPTION	QTY
*** VARIABLE RESISTORS ***			
VR4C2	41071165	R,VARIABLE B22K	1
VR4C4 VR47C	41071167	R,VARIABLE B47K	2
VR4C1	41071169	R,VARIABLE B100K	1
VR5C3 VR504 VR5C5	41071171	R,VARIABLE B220K	3
VR5C2	41071173	R,VARIABLE B470K	1
VR4C3	41085C08	R,VARIABLE B5K	1
VR9C1 VR902 VR903	41085013	R,VARIABLE B100K	6
VR9C4 VR905 VR906			
VR907	41085C14	R,VARIABLE B200K	1
△VR651	41087C58	R,VARIABLE B5K	1
△VR652	41505005	R,VARIABLE B2K	1
△VR2C01 △VR2002	41505006	R,VARIABLE B3K	2
△VR653	41505007	R,VARIABLE B5K	1
△VR5C8	41505009	R,VARIABLE B20K	1
VR510	415052C8	R,VARIABLE B50K	1
*** RELAYS & SWITCHES ***			
SW4	65161021	SWITCH,SLIDE	1
△SW8C2 △SW804	65161022	SWITCH,SLIDE	2
△SW8C3	65161C23	SWITCH,SLIDE	1
△SW8C1	65161C24	SWITCH,SLIDE	1
△SW2 △SW3	65163002	SWITCH,SLIDE	2
SW1	65360006	SWITCH,PUSH BUTTON	1
RL501	65602551	RELAY	1
RL5C2	65660004	RELAY	1
*** COILS & FILTERS ***			
LC7C2	39099015	FILTER ZJSC-2R2-101	1
△L509	60908056	COIL	1
△L506	60918104	COIL,H.LIN	1
△L502	60919607	COIL	1
L511	60999C04	COIL,CHOKE	1
△L505	49801006	INDUCTOR,DUMMY(610UH)	1
L802	610E1714	COIL,FILTER 5.6UH	1
L801	610F6C14	COIL,FILTER 5.6UH	1
L501 L513	610F7C10	COIL,FILTER 2.7UH	2
L503	610F7C19	COIL,FILTER	1
L901 L9C2 L903	610F7504	COIL,FILTER PR68MAT(S)	3
L704 L705 L7C6	610F7505	COIL,FILTER P1RCMAT(S)	3
L701 L702 L7C3	610F7551	COIL,FILTER 0.82UH	3

SYMBOL	PARTS NO	DESCRIPTION	QTY
*** COILS & FILTERS ***			
L508	61022C81	COIL (SF471M1R0)	1
△L601	61062C43	LINE FILTER	1
	61062C57	LINE FILTER GL-2030F	1
L504 △L515 L7C8	61064C06	COIL,FILTER 50UH	3
△L651	61099C11	COIL,CHOKE 33UH	1
△L652 L653	61099C14	COIL 330K1.8	2
L507 L510 L512	61099C19	COIL,CHOKE	3
△L602	61099C27	FILTER CHOKE 101KR66	1
	61315103	COIL(60T)	1
L514	61605008	FERRITE BEADS 3.5*5*1.3	1
L904	61605C32	FERRITE BEADS	1
LC7C1	61606024	NOISE FILTER	1
LC7C5 LC706 LC7C7	61606027	NOISE FILTER 2A222M	3
LC7C3 LC704 LC9C1	61606028	NOISE FILTER 1H223X	5
LC9C2 LC903			
*** PWB ASSYS ***			
	84J99AC1	SW.REG.PWB ASSY	1
	84J99CC1	VIDEO PWB ASSY	1
	84J99D01	DEF PWB ASSY	1
	84J99J01	CRT PWB ASSY	1
	84J99K01	INTERFACE PWB ASSY	1
*** ELECTRICAL PARTS & MISCELLANFOUS PARTS ***			
HS4C2E	31700909	FAN (DC24V)	1
IC	31709202	SHEET,INSULATOR	1
	317092C3	INSULATOR (150*37,TR85)	1
	31709503	SHEET,INSULATOR	3
SG9C1 SG902 SG903	32990C47	ARRESTER	3
△F601	66653C17	FUSE 125V 4A-UC	1
△F501	66699011	FUSE SSFR-63CMA-F0C5	1
SG9C4 SG905	66706001	SPARK GAP 1.2KV	2
△	70032026	SG/CRT SOCKET	1
	70056355	D-SUE SOCKET 9P	1
IS8C2	70102147	IC SOCKET 24P	1
IS7C1	70102152	IC SOCKET 30P	1
	70810709	LINE CORD 3P,L=1.8	1

SYMBOL	PARTS NO	DESCRIPTION	QTY
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*** ELECTRICAL PARTS & MISCELLANEOUS PARTS ***

△FH6C1	71205037	HOLDER, FUSE	2
CN-CE CN-CT1 CN-CT2 CN-CT3	73721C03	CONNECTOR PIN 2P	4

*** APPEARANCE PARTS ***

	24514792	COIL SPRING	1
	25307251	CABINET, FRONT	1
	25307271	CABINET, BACK	1
	25402441	REVOLVING STAND T	1
	25405971	REVOLVING STAND (B) ASSY	1
	25407261	LID, CONTROL	1
	25515492	REAR PANEL	

*** KNOBS & PUSH BUTTONS ***

	25451871	PUSH BUTTON	1
	25451881	KNOB, CONTROL	2

*** PRINTED & PACKING MATERIALS ***

	24806961	BAG, POLYETHYLENE (270*370)	1
	24813191	BAG, POLYETHYLENE	1
	25812832	FILLER (L), CARTON	1
	25812842	FILLER (R), CARTON	1
	25812852	CARTON BOX	1
	25814151	FILLER T, CARTON	1
	78045671	SERVICE CONTRACT (1501VMA)	1
	78119472	INSTRUCTION BOOK	1
	25764502	NAME PLATE, INSTRUCTION	

*** RESISTORS ***

△R5B6	401C6641	R, CARBON 47H 5% 1/4W	1
R499E △R612 △R626	401C6657	R, CARBON 22CH 5% 1/4W	4
△R671 △R602 △R608 △R619 △R663	401C6673	R, CARBON 1.0K 5% 1/4W	4

SYMBOL	PARTS NO	DESCRIPTION	QTY
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*** RESISTORS ***

R609 R62C R658	401C6675	R, CARBON 1.2K 5% 1/4W	3
R495C R611 R627	401C6677	R, CARBON 1.5K 5% 1/4W	3
△R662	401C6679	R, CARBON 1.8K 5% 1/4W	1
△R666	401C6683	R, CARBON 2.7K 5% 1/4W	1
△R656 △R661	401C6685	R, CARBON 3.3K 5% 1/4W	2
△R633	401C6687	R, CARBON 3.9K 5% 1/4W	1
△R655	401C6691	R, CARBON 5.6K 5% 1/4W	1
△R636 △R664	401C6697	R, CARBON 10K 5% 1/4W	2
△R631 △R672	401C67C5	R, CARBON 22K 5% 1/4W	2
△R657	401C6723	R, CARBON 120K 5% 1/4W	1
R469J △R564	401C6757	R, CARBON 3.3M 5% 1/4W	2
△R568	401H5653	R, CARBON 150H 5% 1/2W	1
△R605	401H5721	R, CARBON 100K 5% 1/2W	1
△R618	401H5737	R, CARBON 470K 5% 1/2W	1
△R603	401H5739	R, CARBON 560K 5% 1/2W	1
R416 R419 R519	401K5675	R, CARBON 1.2K 5% 1/6W	9
R541 △R566 R741			
R742 R743 R903			
R477 R492 R540	401K5691	R, CARBON 5.6K 5% 1/6W	25
△R567 R591 R737			
R745 R810 R811			
R812 R813 R814			
R815 R835 R836			
R839 R840 R843			
R844 R871 R872			
R888 R893 R895			
R898			
△R20C2 R2004 R409	401K5697	R, CARBON 10K 5% 1/6W	28
R46C R463 R469D			
R47C R481 R5E5			
R532 R746 R8A4			
R8A5 R8A6 R8C1			
R8C2 R8C5 R8C6			
R8C4E R8C4G R8C4R			
R809E R8C9G R8C9R			
R852 R891 R892			
R919			
△R20C1 △R2C07 R42C	401K5699	R, CARBON 12K 5% 1/6W	10
R445 R5C1 R8C2			
R8C5 R870 R884			
R92C			
R4FE R453 R459	401K57C5	R, CARBON 22K 5% 1/6W	11
R475 R502 R504			
R531 △R563 R885			
R894 R941			

SYMBOL	PARTS NO	DESCRIPTION	QTY
*** RESISTORS ***			
R402 R418 Δ R5B9	401K5715	R,CARBON 56K 5% 1/6W	4
R851			
R405 R449 R450	401K5721	R,CARBON 100K 5% 1/6W	26
R451 R469E R469C			
R471 R5B2 Δ R521			
Δ R522 Δ R526 R530			
R536 R547 R554			
R589 R8A7 R8A9			
R8B1 R8E2 R8B3			
R8B4 R8B6 R8E7			
R8B9 R860			
Δ R2CC3 Δ R2C06	40107185	R,CARBON 3.3K 5% 1/6W	2
Δ R20C5	40107197	R,CARBON 10K 5% 1/6W	1
Δ R5FF	40175117	R,CARBON 4.7H 5% 1/4W	1
Δ R495	40175133	R,CARBON 22H 5% 1/4W	1
Δ R630 Δ R632	40175143	R,CARBON 56H 5% 1/4W	2
Δ R614	40175181	R,CARBON 2.2K 5% 1/4W	1
Δ R623	40175183	R,CARBON 2.7K 5% 1/4W	1
Δ R731 Δ R732 Δ R733	40177137	R,CARBON 33H 5% 1/4W	6
Δ R734 Δ R735 Δ R736			
Δ R579	40178117	R,CARBON 4.7H 5% 1/2W	1
Δ R546	40216026	R,WIRE 68H 5% 5W	1
Δ R601	402991C5	R,WIRE 6.8H 5% 5W	1
Δ R534	402991C8	R,WIRE 240H 5% 7W	1
R728 R729 R730	40318273	R,METAL 1.0K 5% 7W	3
Δ R573	40371115	R,METAL 3.9H 5% 1W	1
R545	40371119	R,METAL 5.6H 5% 1W	1
R5A3	40371125	R,METAL 10H 5% 1W	1
R5A2	40371133	R,METAL 22H 5% 1W	1
R484 R592	40371147	R,METAL 82H 5% 1W	2
R406	40371159	R,METAL 270H 5% 1W	1
R816	40371161	R,METAL 330H 5% 1W	1
R401	40371165	R,METAL 47CH 5% 1W	1
R407	403721C5	R,METAL 1.5H 5% 2W	1
R525	40372113	R,METAL 3.3H 5% 2W	1
Δ R667	40372137	R,METAL 33H 5% 2W	1
Δ R616	40372141	R,METAL 47H 5% 2W	1
Δ R607	40372147	R,METAL 82H 5% 2W	1
R581	40372151	R,METAL 120H 5% 2W	1
R496	40372157	R,METAL 220H 5% 2W	1
R423 R518	40372159	R,METAL 270H 5% 2W	2

SYMBOL	PARTS NO	DESCRIPTION	QTY
*** RESISTORS ***			
Δ R634	40372161	R,METAL 33CH 5% 2W	1
Δ R652	403722C3	R,METAL 18K 5% 2W	1
Δ R654	40372205	R,METAL 22K 5% 2W	1
Δ R665	40372209	R,METAL 33K 5% 2W	1
Δ R617 Δ R629	40372217	R,METAL 68K 5% 2W	2
Δ R613	40373131	R,METAL 18H 5% 3W	1
Δ R622	40373133	R,METAL 22H 5% 3W	1
Δ R625	40373149	R,METAL 100H 5% 3W	1
R485	40373157	R,METAL 220H 5% 3W	1
Δ R653	40373195	R,METAL 8.2K 5% 3W	1
Δ R66C	40373197	R,METAL 10K 5% 3W	1
Δ R659 Δ R670	403732C3	R,METAL 18K 5% 3W	2
Δ R615 Δ R624	40373337	R,METAL C.47H 5% 3W	2
Δ R604	40399031	R,METAL 2.2K 5% 2W	1
Δ R529 Δ R577	40405109	R,METAL 2.2H 5% 1/4W	2
Δ R527 Δ R548 Δ R549	40405117	R,METAL 4.7H 5% 1/4W	5
Δ R55C Δ R551			
Δ R52C Δ R542	40405137	R,METAL 33H 5% 1/4W	2
Δ R593	40801051	R,FUSE 1COH 5% 1/4W	1
*** CAPACITORS ***			
C9C9 C910 C911	420C9563	C,CERAMIC 500V 0.001UF	3
C52C	420C9565	C,CERAMIC 500V 1500PF	1
C906 C907 C908	420C9567	C,CERAMIC 500V 2200PF	4
C917			
C545 C546 C547	420G5C01	C,CERAMIC 50V 0.22UF	4
C563			
C721 C722 C723	4201J575	C,CERAMIC 500V 0.01UF	3
C914 C915	42019175	C,CERAMIC 2KV 0.01UF	2
Δ C565	4203J553	C,CERAMIC 500V 150PF	1
Δ C626	4203J554	C,CERAMIC 500V 180PF	1
Δ C528	4203J557	C,CERAMIC 500V 330PF	1
C513	4203J571	C,CERAMIC 500V 4700PF	1
Δ C603 Δ C604 Δ C606	42053C67	C,CERAMIC 400V 2200PF	3
C4FF	42099C69	C,CERAMIC 50V 0.01UF	1
Δ C663	42099C82	C,CERAMIC 2KV 1500PF	1
Δ C612 Δ C618 Δ C622	42099C85	C,CERAMIC 2KV 560PF	5
Δ C623 Δ C625			
C519 Δ C535 C727	421C0213	C,CERAMIC 50V 1000PF	5
C728 C729			

SYMBOL	PARTS NO	DESCRIPTION	QTY
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*** CAPACITORS ***

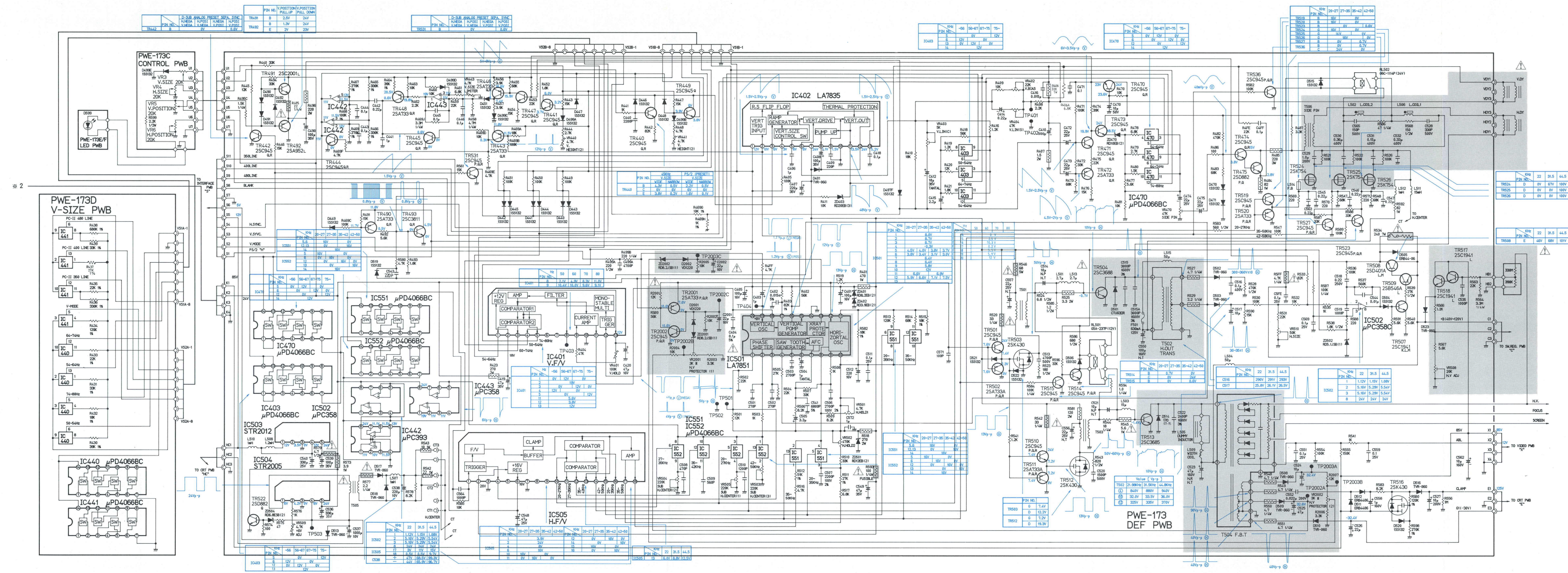
C440		421C0217	C.CERAMIC 50V 2200PF	1	
C499A		421C0221	C.CERAMIC 50V 4700PF	1	
C854		421C0225	C.CERAMIC 50V 0.01UF	1	
C571		421C07C1	C.CERAMIC 50V 100UF	1	
C544		421D52C1	C.CERAMIC 50V 0.01UF	1	
C443	C444	C471	421J9CC1	C.CERAMIC 50V 0.1UF	4
C912					
C543		423A1C33	C.CERAMIC 50V 33PF	1	
C501	C502	423A1C55	C.CERAMIC 50V 270PF	2	
C508		423A1101	C.CERAMIC 50V 470PF	1	
C858		423A2C27	C.CERAMIC 50V 18PF	1	
C718	C719	C72C	423A2C35	C.CERAMIC 50V 39PF	3
C891	C892	C893	423A2C41	C.CERAMIC 50V 68PF	3
C409		423A2104	C.CERAMIC 50V 220PF	1	
C509		423J8102	C.CERAMIC 50V 560PF	1	
C507		427A7C05	C.FILM 100V 0.0C22UF	1	
C506		427A7C06	C.FILM 100V 0.0C27UF	1	
C564		427F4CC1	C.FILM 50V 1000PF	1	
C510		427F4C02	C.FILM 50V 1200PF	1	
C503		427F4C06	C.FILM 50V 2700PF	1	
C402	C416	427F4C15	C.FILM 50V 0.015UF	2	
C404	C418	427F4C25	C.FILM 50V 0.1UF	2	
C862		427F4C51	C.FILM 50V 1000PF	1	
C859		427F4C54	C.FILM 50V 1800PF	1	
C860		427F4C55	C.FILM 50V 2200PF	1	
C905		427F4C75	C.FILM 50V 0.1UF	1	
△C552		42704567	C.FILM 200V 0.022UF	1	
C541		4276D011	C.FILM 50V 6800PF	1	
△C608	△C614	4276DC69	C.FILM 50V 0.033UF	2	
△C656		4276D073	C.FILM 50V 0.068UF	1	
△C607		4276DC75	C.FILM 50V 0.1UF	1	
△C659		42799C99	C.MYLAR 400V 0.033UF	1	
C445	C446	4282CC13	C.ELEC 50V 0.1UF	2	
C442		4282CC17	C.METAL FILM 50V 0.2U	1	
C406	C441	C572	4282CC25	C.METAL FILM 50V 1UF	3
△C601	△C6C2	△C627	42824325	C.FILM 250V 0.1UF	3
△C655		42839C21	C.METAL FILM 250V 0.068UF	1	
△C613	△C619	△C661	42839C22	C.METAL FILM 250V 0.1UF	4
△C666					
△C531		42839303	C.FILM 400V 0.15UF	1	
△C532		42839308	C.FILM 400V 0.33UF	1	

SYMBOL	PARTS NO	DESCRIPTION	QTY
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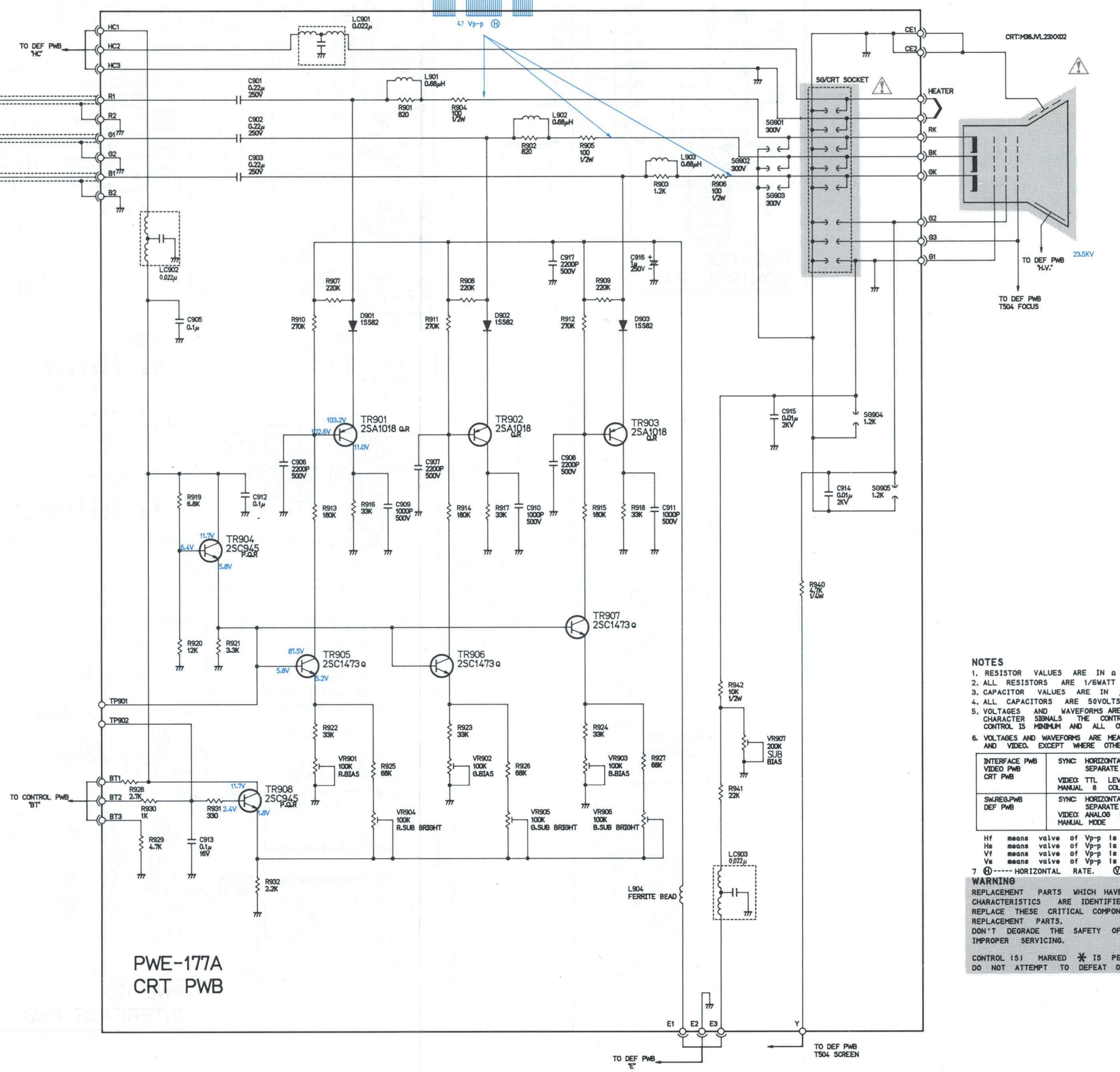
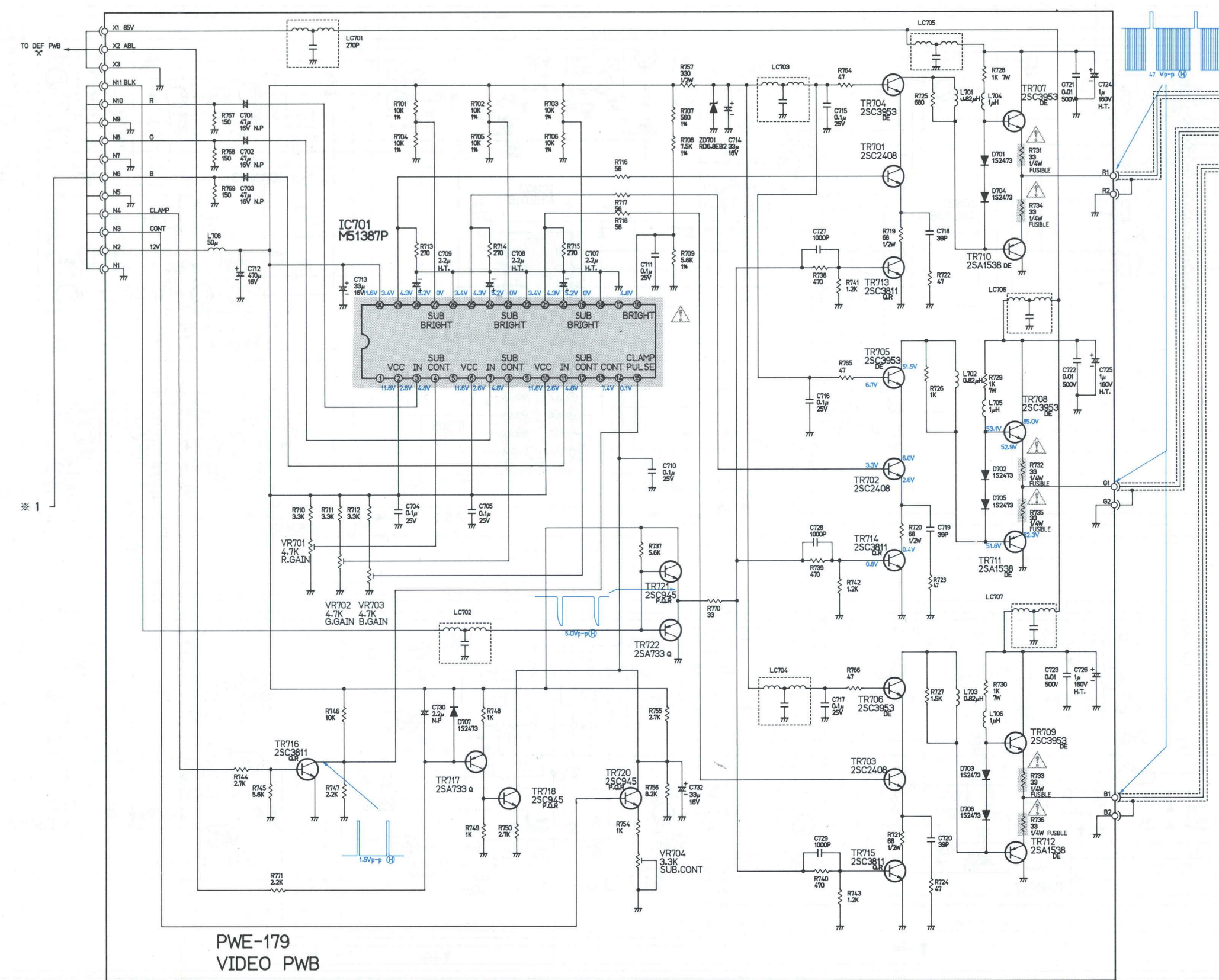
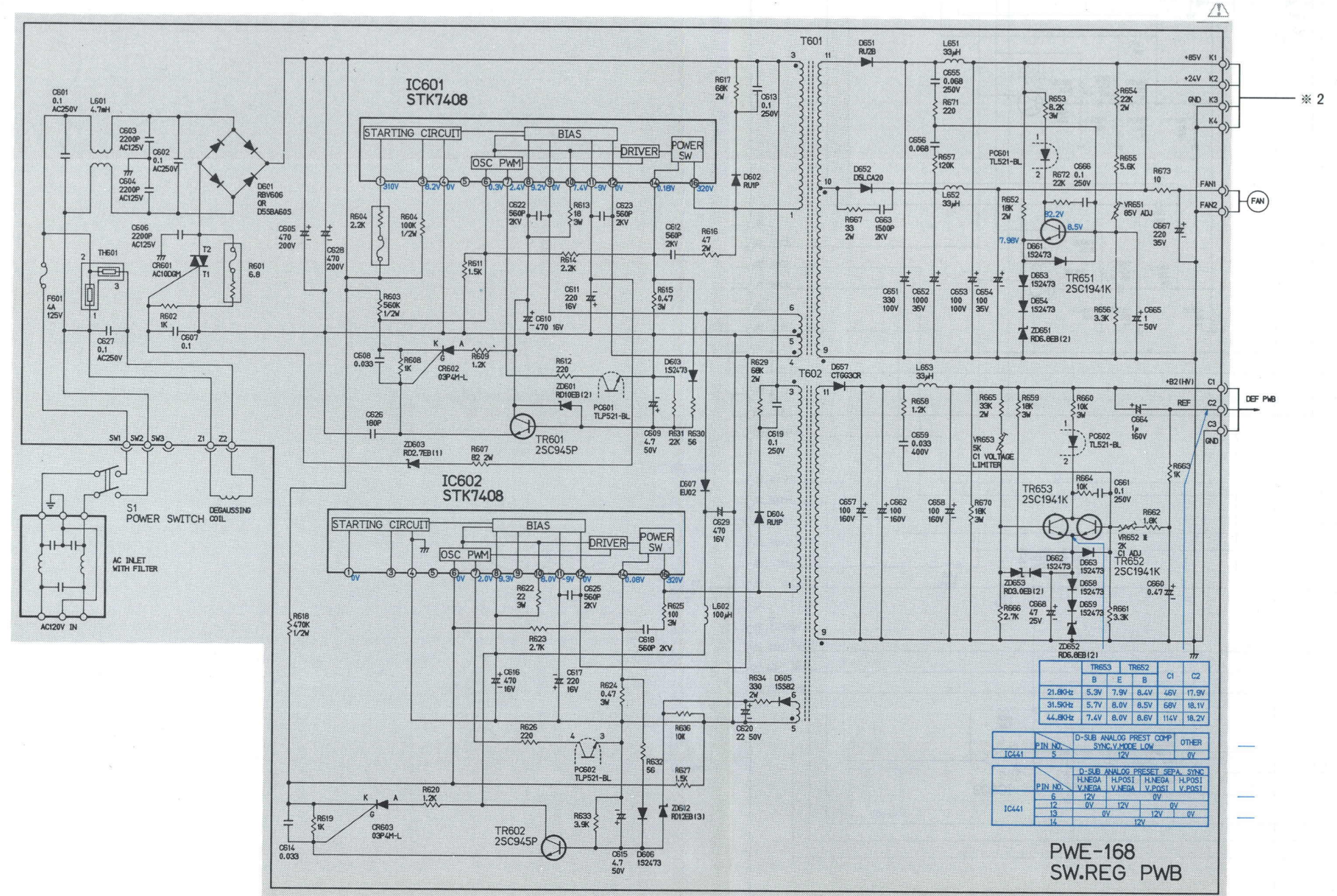
*** CAPACITORS ***

C901	C9C2	C903	42840C97	C.FILM 250V 0.22UF	3
C516			42840173	C.FILM 400V 0.1UF	1
△C515	△C515A		42842502	C.FILM 1600V 3000PF	2
△C522			42842503	C.FILM 1600V 2400PF	1
△C529			42843503	C.FILM 200V 1UF	1
C518			42899C10	C.METAL FILM 250V 0.22UF	1
△C530			42899C27	C.METAL FILM 400V 0.36UF	1
C4C3	C856		430A9061	C.ELEC 50V 1UF	2
C415	C857		430A9062	C.ELEC 50V 2.2UF	2
C5G5			430A9063	C.ELEC 50V 3.3UF	1
C47C	C870		430A9065	C.ELEC 50V 10UF	2
△C20C1			430B3047	C.ELEC 16V 22UF	1
C707	C7C8	C709	430B3103	C.ELEC 50V 2.2UF	3
△C524			430B3106	C.ELEC 50V 10UF	1
C525			430B3109	C.ELEC 50V 47UF	1
△C558	C724	C725	430B3182	C.ELEC 160V 1UF	4
C726					
△C20C2			430B6C26	C.ELEC 16V 22UF	1
C517			430B6C65	C.ELEC 50V 10UF	1
C525			430B6C68	C.ELEC 50V 47UF	1
C562			430K5120	C.ELEC 160V 10UF	1
C916			430K5126	C.ELEC 250V 1UF	1
C527			4300E135	C.ELEC 200V 10UF	1
C536			4301JC71	C.ELEC 50V 33UF	1
C410			43019C73	C.ELEC 50V 1000UF	1
△C660			4302C1C1	C.ELEC 50V 0.47UF	1
△C665			4302C1C2	C.ELEC 50V 1UF	1
△C526			4302C1C7	C.ELEC 50V 22UF	1
△C651			4302C172	C.ELEC 100V 330UF	1
△C664			4302C182	C.ELEC 160V 1UF	1
△C55C	△C657	△C658	4302C190	C.ELEC 160V 100UF	4
△C662					
△C611	△C617		4302E051	C.ELEC 16V 22UF	2
△C61C	△C616		4302E053	C.ELEC 50V 470UF	2
△C668			4302EC69	C.ELEC 25V 47UF	1
△C654			4302EC90	C.ELEC 35V 100UF	1
△C667			4302E091	C.ELEC 35V 220UF	1
△C609	△C615		4302E105	C.ELEC 50V 4.7UF	2

SYMBOL	PARTS NO	DESCRIPTION	QTY
*** CAPACITORS ***			
△C62C	4302E107	C,ELEC 50V 22UF	1
△C653	4302E170	C,ELEC 100V 100UF	1
△C629	4302J032	C,ELEC 16V 470UF	1
△C652	43023094	C,ELEC 35V 1000UF	1
△C523	43041001	C,ELEC 160V 47UF	1
△C605 △C628 C73C	43108311 433A3C56	C,ELEC 200V 470UF C,ELEC 50V 2.2UF	2 1



NEC JC-1501VMA SCHEMATIC DIAGRAM



NOTES

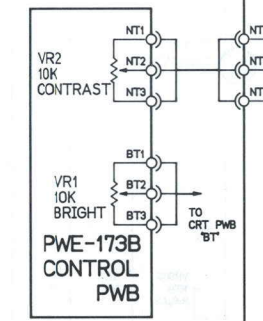
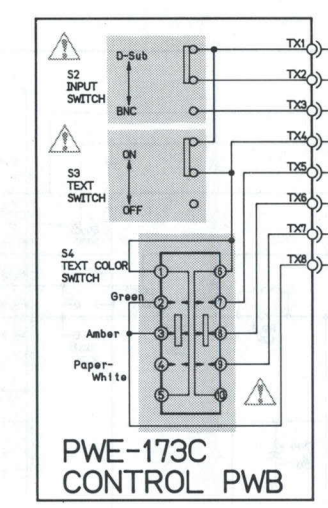
- RESISTOR VALUES ARE IN OHMS (K = 1,000; M = 1,000,000)
- ALL RESISTORS ARE 1/4WATT EXCEPT WHERE OTHERWISE INDICATED.
- CAPACITOR VALUES ARE IN μF UNLESS OTHERWISE INDICATED. P = PF
- ALL CAPACITORS ARE 50VOLTS EXCEPT WHERE OTHERWISE INDICATED.
- VOLTAGES AND WAVESHAPES ARE MEASURED UNDER THE INVERTED H CHARACTERISTICS. CONTRAST CONTROL IS MAXIMUM. THE BRIGHTNESS CONTROL IS MINIMUM AND ALL OTHER CONTROLS ARE NORMAL OPERATION.
- VOLTAGES AND WAVESHAPES ARE MEASURED UNDER THE FOLLOWING SYNC AND VIDEO EXCEPT WHERE OTHERWISE INDICATED.

INTERFACE PWB	VIDEO PWB	DEF PWB	TO DEF PWB	TO DEF PWB
TR901	TR902	TR903	TR904	TR905
TR906	TR907	TR908	TR909	TR910
TR911	TR912	TR913	TR914	TR915
TR916	TR917	TR918	TR919	TR920
TR921	TR922	TR923	TR924	TR925
TR926	TR927	TR928	TR929	TR930
TR931	TR932	TR933	TR934	TR935
TR936	TR937	TR938	TR939	TR940
TR941	TR942	TR943	TR944	TR945
TR946	TR947	TR948	TR949	TR950
TR951	TR952	TR953	TR954	TR955
TR956	TR957	TR958	TR959	TR960
TR961	TR962	TR963	TR964	TR965
TR966	TR967	TR968	TR969	TR970
TR971	TR972	TR973	TR974	TR975
TR976	TR977	TR978	TR979	TR980
TR981	TR982	TR983	TR984	TR985
TR986	TR987	TR988	TR989	TR990
TR991	TR992	TR993	TR994	TR995
TR996	TR997	TR998	TR999	TR1000

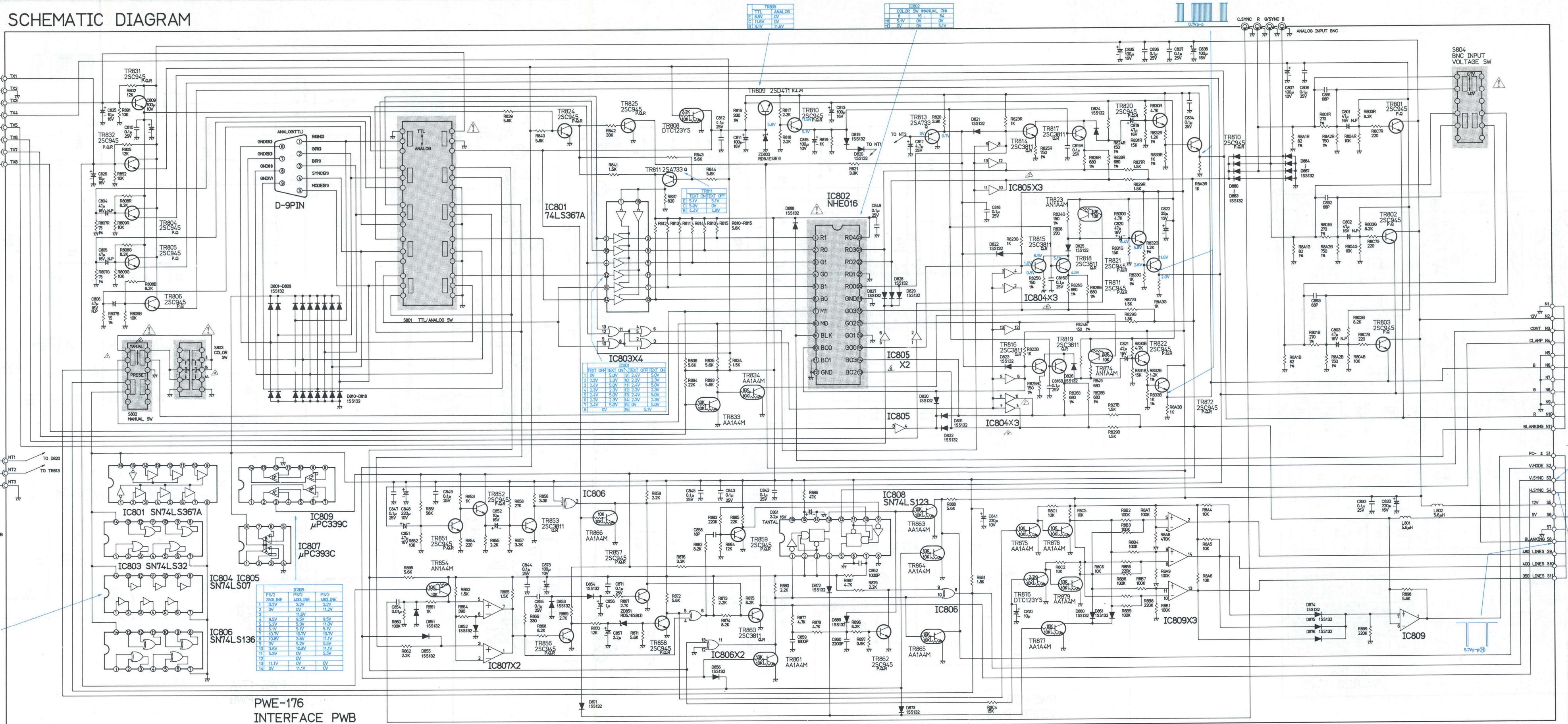
Hf means value of Vpp is varied with Horizontal Freq.
 Hv means value of Vpp is varied with Horizontal Size.
 Vv means value of Vpp is varied with Vertical Freq.
 Vs means value of Vpp is varied with Vertical Size.
 * --- HORIZONTAL RATE. @ --- VERTICAL RATE.

WARNING
 REPLACEMENT PARTS WHICH HAVE SPECIAL SAFETY CHARACTERISTICS ARE IDENTIFIED BY A SHADING ON THE SCHEMATICS. REPLACE THESE CRITICAL COMPONENTS WITH RECOMMENDED REPLACEMENT PARTS. DON'T DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.
 CONTROL IS1 MARKED IS1 IS PERMANENTLY FROZEN. DO NOT ATTEMPT TO DEFEAT OR IMPROPERLY REPLACE.

NEC JC-1501VMA SCHEMATIC DIAGRAM

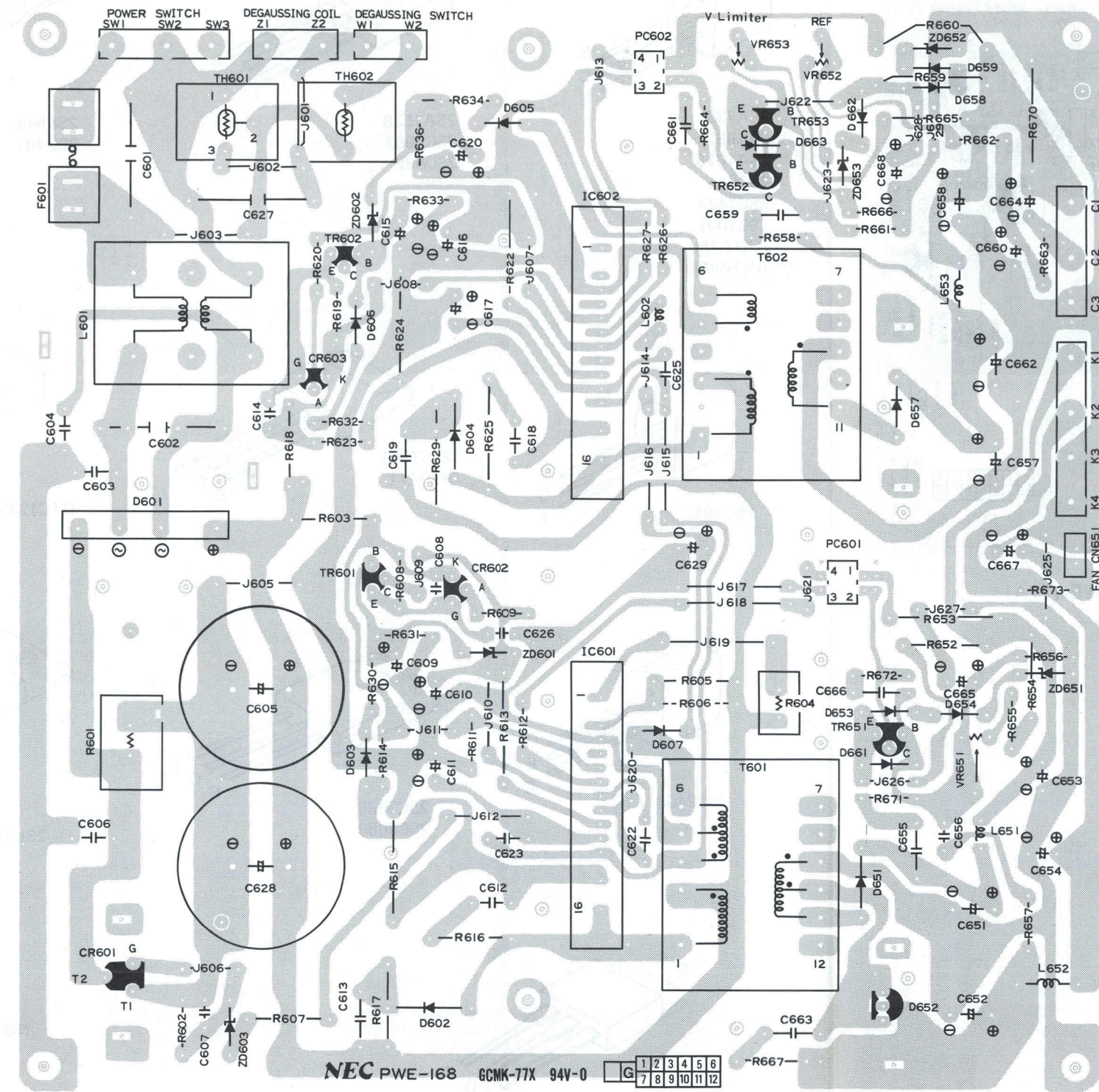


IC809	TEXT OFF	TEXT ON
1	4.5V	2.5V
2	2.5V	2.5V
3	4.5V	2.5V
4	2.5V	2.5V
5	4.5V	2.5V
6	4.5V	2.5V
7	0V	0V
8	4.5V	2.5V
9	4.5V	0V
10	2.5V	2.5V
11	2.5V	2.5V
12	2.5V	2.5V
13	2.5V	2.5V
14	5.0V	0V



IC809	PSU	IC809	PSU
1	4.5V	2.5V	4.5V
2	2.5V	2.5V	2.5V
3	4.5V	2.5V	2.5V
4	2.5V	2.5V	2.5V
5	4.5V	2.5V	2.5V
6	4.5V	2.5V	2.5V
7	0V	0V	0V
8	4.5V	2.5V	2.5V
9	4.5V	0V	0V
10	2.5V	2.5V	2.5V
11	2.5V	2.5V	2.5V
12	2.5V	2.5V	2.5V
13	2.5V	2.5V	2.5V
14	5.0V	0V	0V

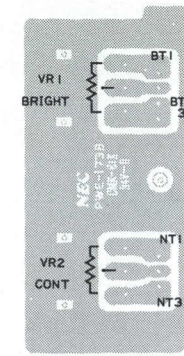
PRINTED WIRING BOARDS



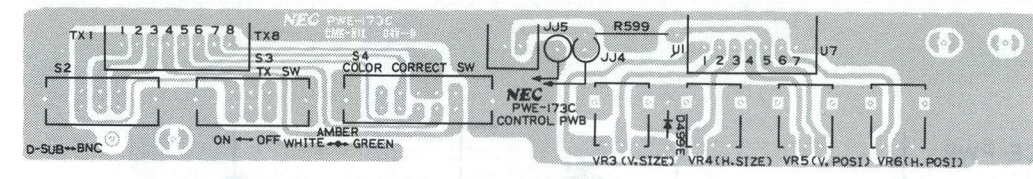
SW. REG PWB ASSY (PWE-168)
— Solder Side —



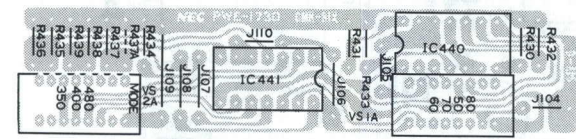
DEF PWB ASSY (PWB-173A)
— Solder Side —



CONTROL PWB ASSY (PWE-173B)
— Solder Side —



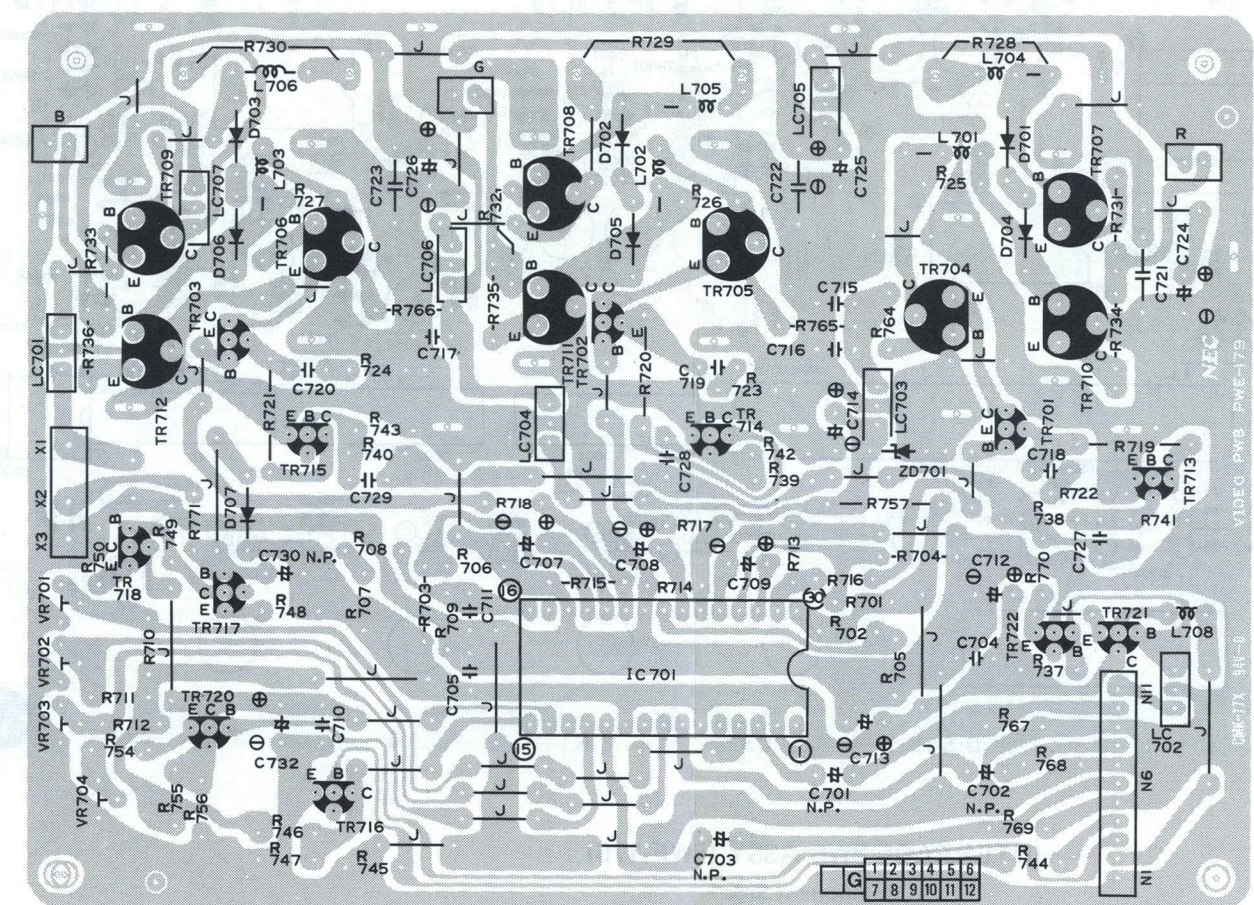
CONTROL PWB ASSY (PWE-173C)
— Solder Side —



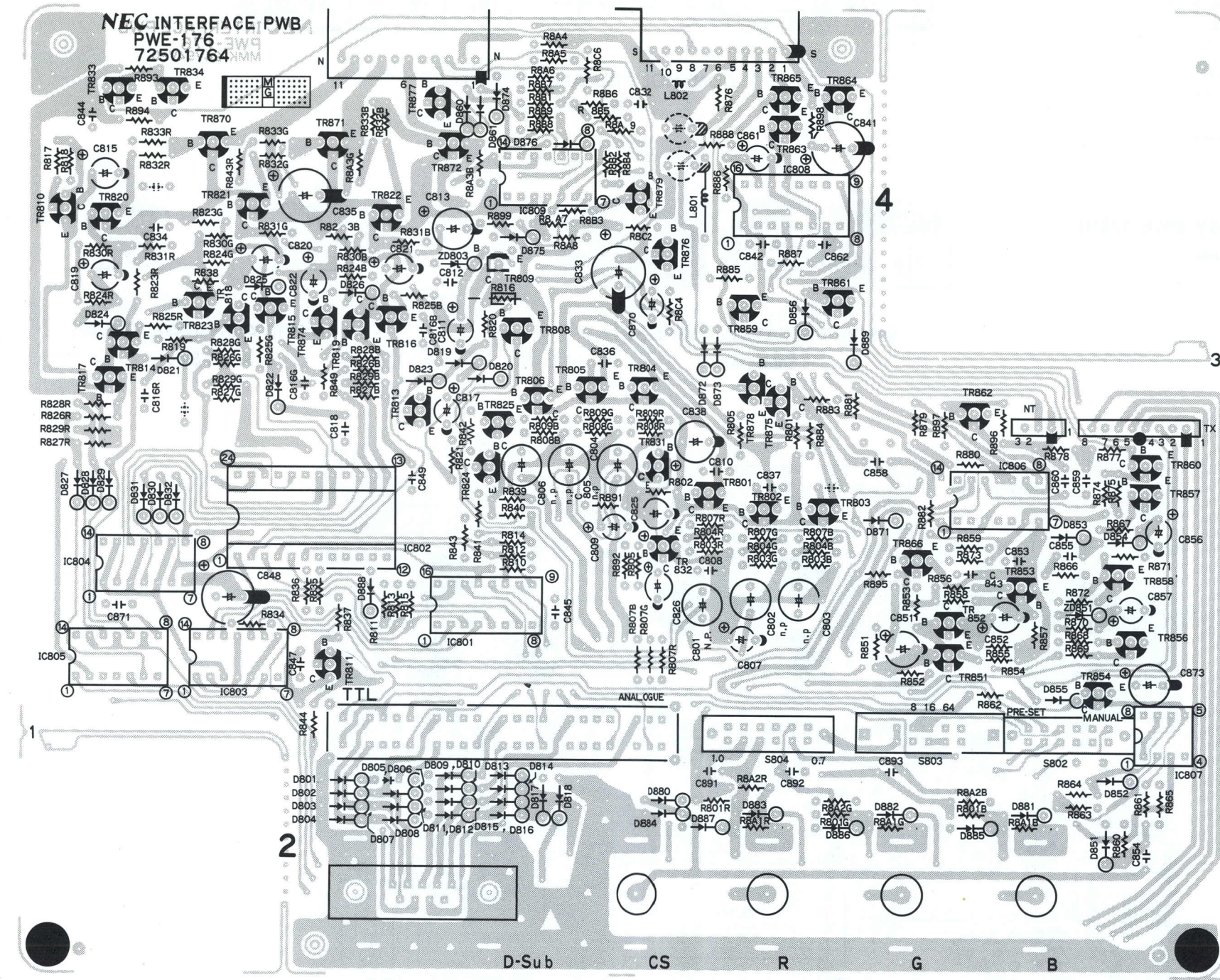
V-SIZE PWB ASSY (PWE-173D)
— Solder Side —



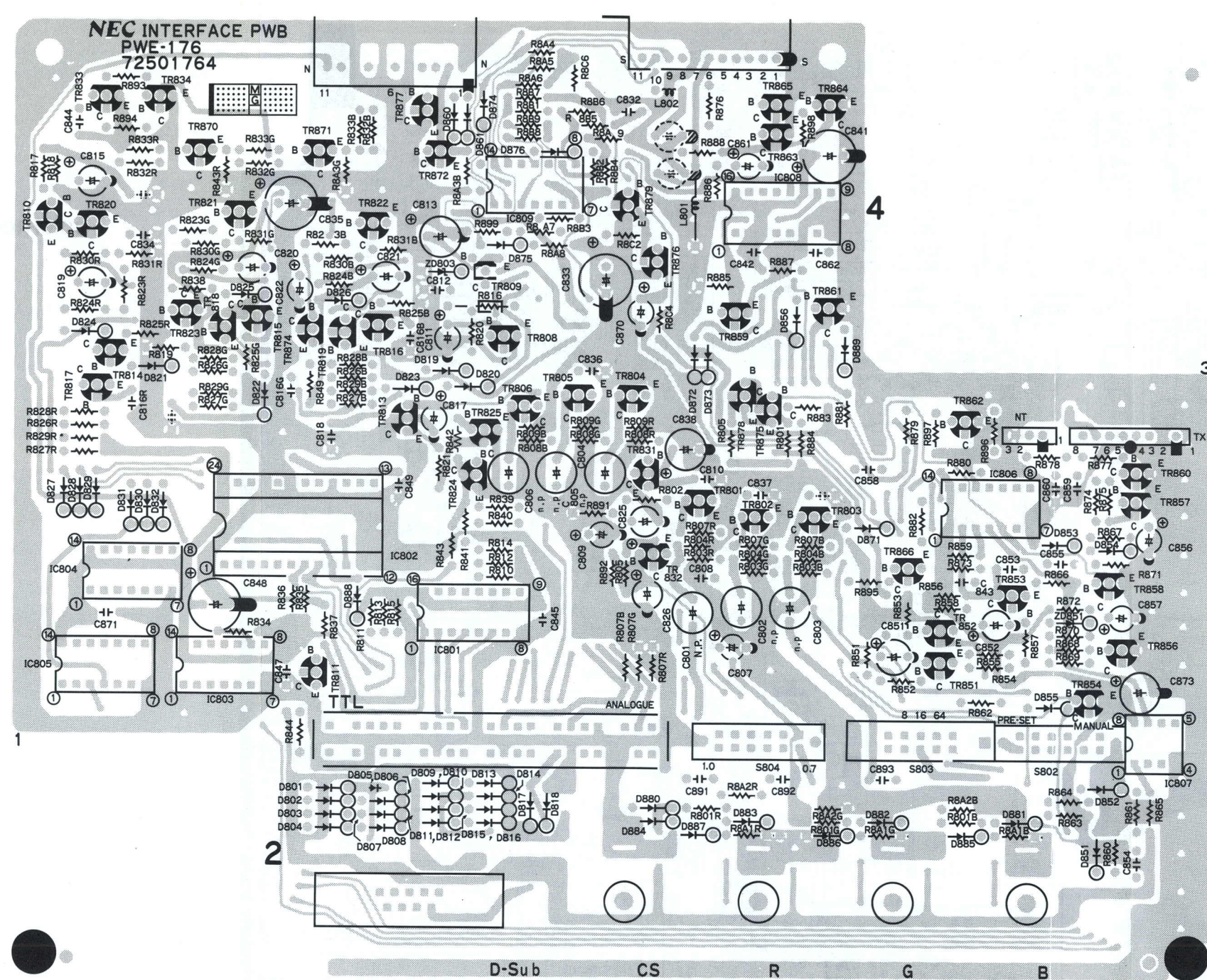
LED PWB ASSY (PWE-173E/F)
— Solder Side —



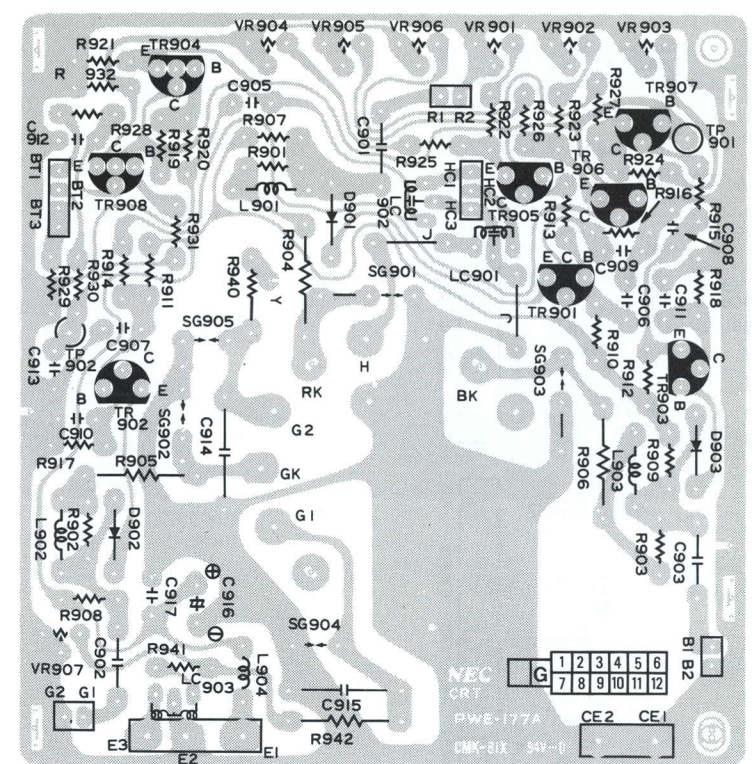
VIDEO PWB ASSY (PWE-179)
— Solder Side —



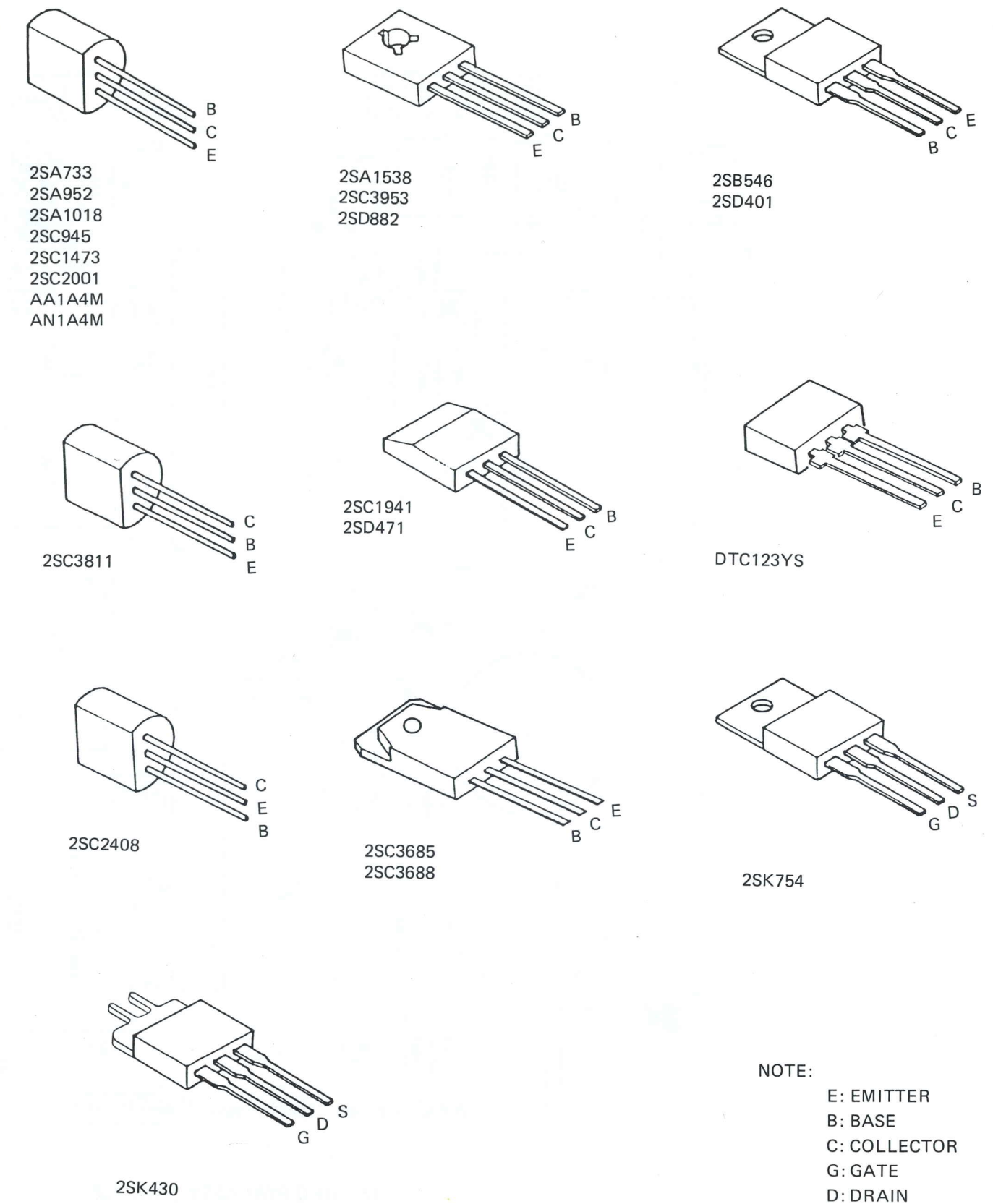
INTERFACE PWB ASSY (PWE-176)
- Component Side -



See-through view of reverse-side components



CRT PWB ASSY (PWE-177A)
- Solder Side -



NOTE:
E: EMITTER
B: BASE
C: COLLECTOR
G: GATE
D: DRAIN
S: SOURCE

