Honeywell

Process Management
Systems Division

MODEL AVMD COLOR CRT
Hardware Maintenance Manual

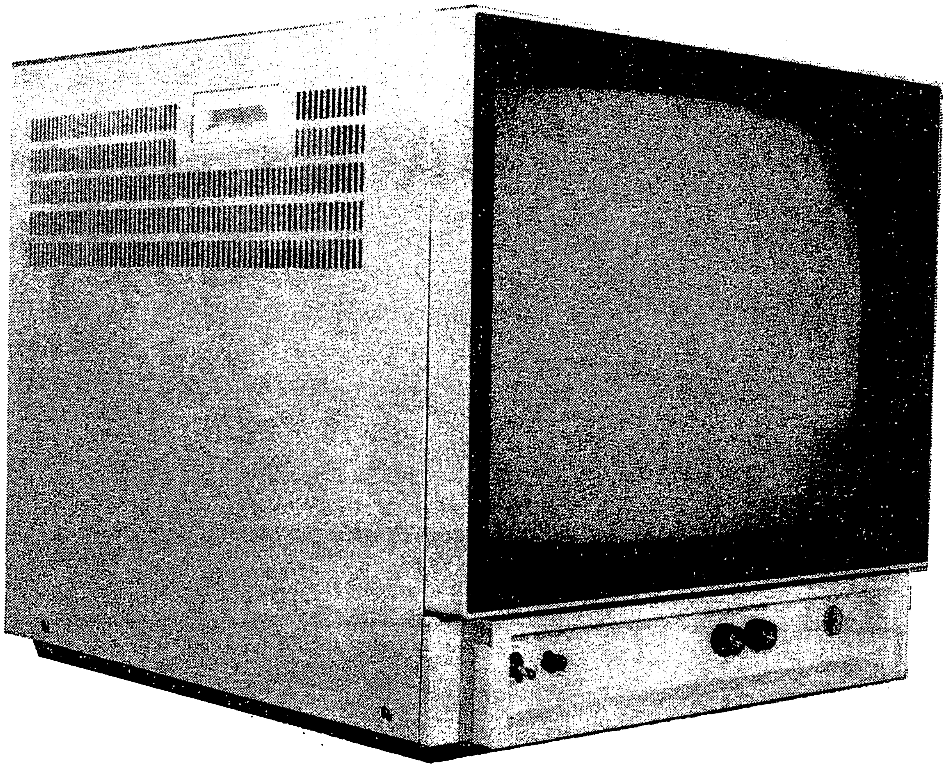
PE-13-200
3/83

MODEL AVMD COLOR CRT HARDWARE MAINTENANCE MANUAL

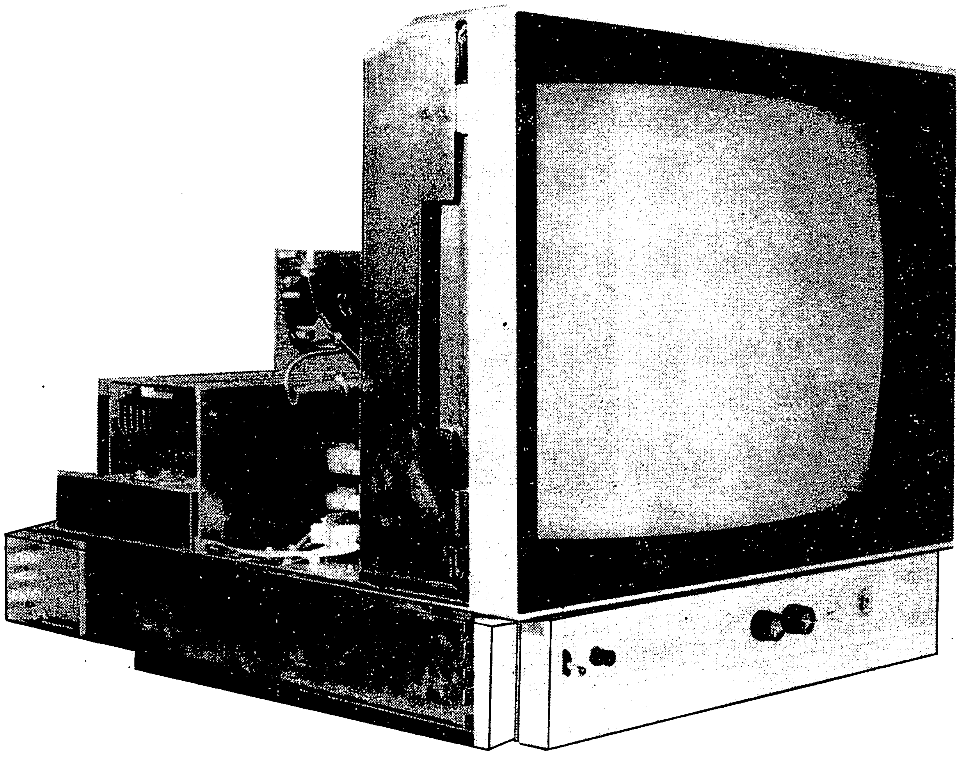
The following notice is provided in accordance with the United States Federal Communications Commissions (FCC) regulations.

WARNING

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. As temporarily permitted by regulation, it has not been tested for compliance with limits for Class A computing devices persuant to Subpart J of Part 15 of FCC Rules, which are designed to proivde reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.



Model AVMD12 Color CRT (table mount)



Model AVMD11 Color CRT (console mount or rackmount)

It is recommended that maintenance, operation and design personnel read the following chapters:

Maintenance : Chapters 1 through 6
Operation : Chapters 1 through 4
Design : Chapters 1 and 2

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APPENDICES:

1. INTRODUCTION

1.1 TECHNICAL FEATURES

The AVMD11/12 color monitor is designed to be an economical, high-performance RGB color monitor with in-line gun and provides the following features:

a. Self Convergence Adjustment
Self convergence in-line gun eliminates troublesome adjustments.

b. High Resolution
Clear and sharp pictures obtained from 0.012" (0.3mm) dot pitch and wide video bandwidth of 21 MHz.

c. High Reliability
Single PC board assures high reliability and easy maintenance.

d. Wide Range Adaptability
Wide range of sweep frequency (15—18KHz) and input voltages (100, 120, 200, 220, 240 VAC) adjustable without soldering iron provide the easy adjustment of the monitor.

e. Stable Picture
Low power consumption in-line gun and high voltage stability provide the stable picture and long life operation.

1.2 TECHNICAL SPECIFICATIONS

1.2.1 Visual Perfomance

a. CPT:
In-line gun trio dot type

Type	HM-2719
Size	19"
dot pitch	0.012" (0.31mm)

b. Resolution:
960 pixels: holizontal
720 pixels: vertical

c. Linearity:
No point on raster deviates from its proper position by more than 2% of raster hight.

d. Convergence:
Does not deviate more than 0.028" (0.7mm) from picture height in a centrally located area bounded by a circle whose diameter is equal to the picture height. Elsewheve, the deviation does not exceed 0.047 (1.2mm).

e. Raster size regulation:
Less than 1% change 0% to 100% APL (Average picture Level) at peak 10fL (Long persistence phosphar), 15 fL (Normal phosphar) luminance.

f. Black level stability:
DC restorer maintains black level shift to within less than 1% of peak luminance from 10% to 90% APL.

1.2.2 Electrical Specifications

a. Input signals:
Video Composite: 1Vp-p nominal (0.35V to 2.5V), Sync (composite on green input) negative polarity.
Non-composite: 0.7Vp-p nominal (0.25V to 1.8V) black negative
Ext. Sync 4Vp-p nominal (1.0V to 5.0V) Sync negative.
Impedance Switch selectable to either 75 ohms or higher impedance.

b. Impedance (optional):
Switch selectable to either 75 ohms or higher impedance.

c. Circuit performance:
Scanning frequency:
Frequency range:
Vertical 50 - 60Hz
Horizontal 15 - 18KHz
Standard Scanning frequency for 625 lines:
Vertical 50Hz ± 0.5Hz
Horizontal 15625Hz ± 300Hz
Standard scanning frequency for 525 lines:
Vertical 60Hz ± 0.5Hz
Horizontal 15750Hz ± 300Hz
Retrace time:
Vertical 1000 μsec. Max.
Horizontal 8.5μ sec. Max.
Video aplifier bandwidth:
Flat within 3dB 50Hz to 21MHz at nominal input.
Fast pulse response:
Rise time: Typical. 20n sec. from 10% to 90%.
Fall time: Typical. 20n sec. from 10% to 90%.
Low voltage regulation:
Less than 1% change for variations from nominal line voltage of ± 10%.
High voltage regulation:
Less than 2% change over 0% to 100% APL at 10fL (Long persistence phospher), 15fL (Normal phospher) peak luminance.

1.2.3 Controls and Connectors

a. Front panel:
Contrast knob adjustment
Brightness knob adjustment
Power ON/OFF toggle switch
Degauss push button switch

b. Drawer:
Height potentiometer
Width potentiometer
Vertical hold potentiometer
Horizontal hold potentiometer
Red background potentiometer
Green background potentiometer
Blue background potentiometer

c. Rear panel:

Channel A: BNC connectors with loopthrough

Ext. Sync: BNC connectors with loopthrough

Impedance Select: toggle switch
Sync Select: toggle switch (standard)

Fuse
AC power socket

1.2.4 Installation

a. Power requirements:
150W
100V/120V ± 10% or 200V/240 ± 10% or 220V ± 10% 50/60Hz ± 3Hz.

b. Power connector
AC power socket #17252.

c. Signal connectors:
AMP connector (standard)
Cup No. 1-480694-0
Plug No. 1-480691-0
BNC connectors (optional)

d. X-ray radiation:
.5mR/hour
(THE UNIT COMPLIES WITH U.S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE, X-RAY RADIATION SAFETY RULES, 21CFR, SUBCHAPTER.)

e. Heat dissipation:
395 BTU/hour nominal

f. Dimensions and weight:

		19 inch
Cabinet	width	20.0" (481mm)
	hight	19.8" (444mm)
	depth	21.5" (537mm)
	weight	101 lbs. (46kg)
Rack-mount	width	19.3" (481mm)
	hight	18.3" (444mm)
	depth	21.7" (544mm)
	weight	77 lbs. (35kg)

g. Mechanical configuration:
Rackmount type without slides (standard)
Rackmount type with slides (optional)
Cabinet type (optional)

1.2.5 Environmental Conditions

a. Ambient temperature:
0 – 50°C with case cover (operating)
0 – 50°C without case cover (operating)

b. Humidity:
5–95% RH, no condensation

c. Vibration:
1.0G 15–120Hz (operation)

d. Shock:
10G ; unprotect 3G

e. Altitude:
10,000ft.

1.2.7 Signal Waveform

CONFORM TO THE EIA RS-170 STANDARD WAVEFORM.

1.3 PHYSICAL DESCRIPTIONS

External dimentions of both rackmount type and cabinet type are illustrated in Figure 1-1, 1-2.

Figure 1-3 shows the relative measurements of slides equipped on the rackmount type chassis.

1.4 TEST EQUIPMENT AND SPECIAL TOOLS

The following test equipment and special tools, or equivalent substitutions are recommended to maintain the monitor:

a. Volt-ohm-Ammeter:
Simpson Model 260

b. High Voltage Probe 30kV:
Simpson catalog No. 00509

c. Oscilloscope:
Hewlett Packard Type 184A with two channel 50MHz amplifier Type 1801-A, Time base and delay generator Type 1821A, two 10-1 probes Type 10004D and a 50-to-1 probe Type 10002A.

d. Degaussing Coil:
G. C. Electronics catalog No. 9317

e. Hex Tuning Tool:
G. C. Electronics catalog No. 8284

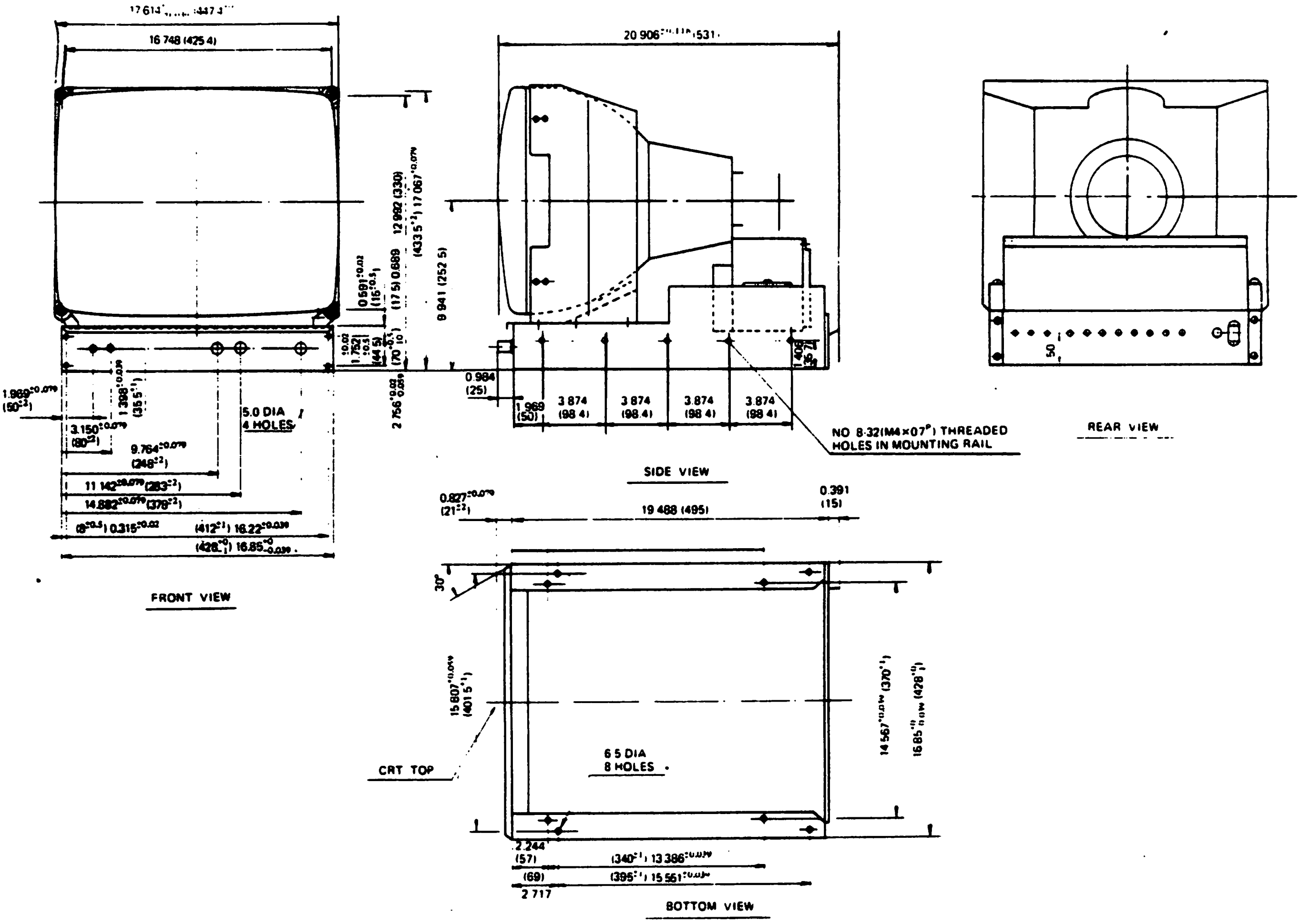
f. Alignment Screwdriver:
G. C. Electronics catalog No. 5009

g. Duplex Steel Blade Aligner:
G. C. Electronics catalog No. 8277

h. White balance adjuster
Shibasoku 898B

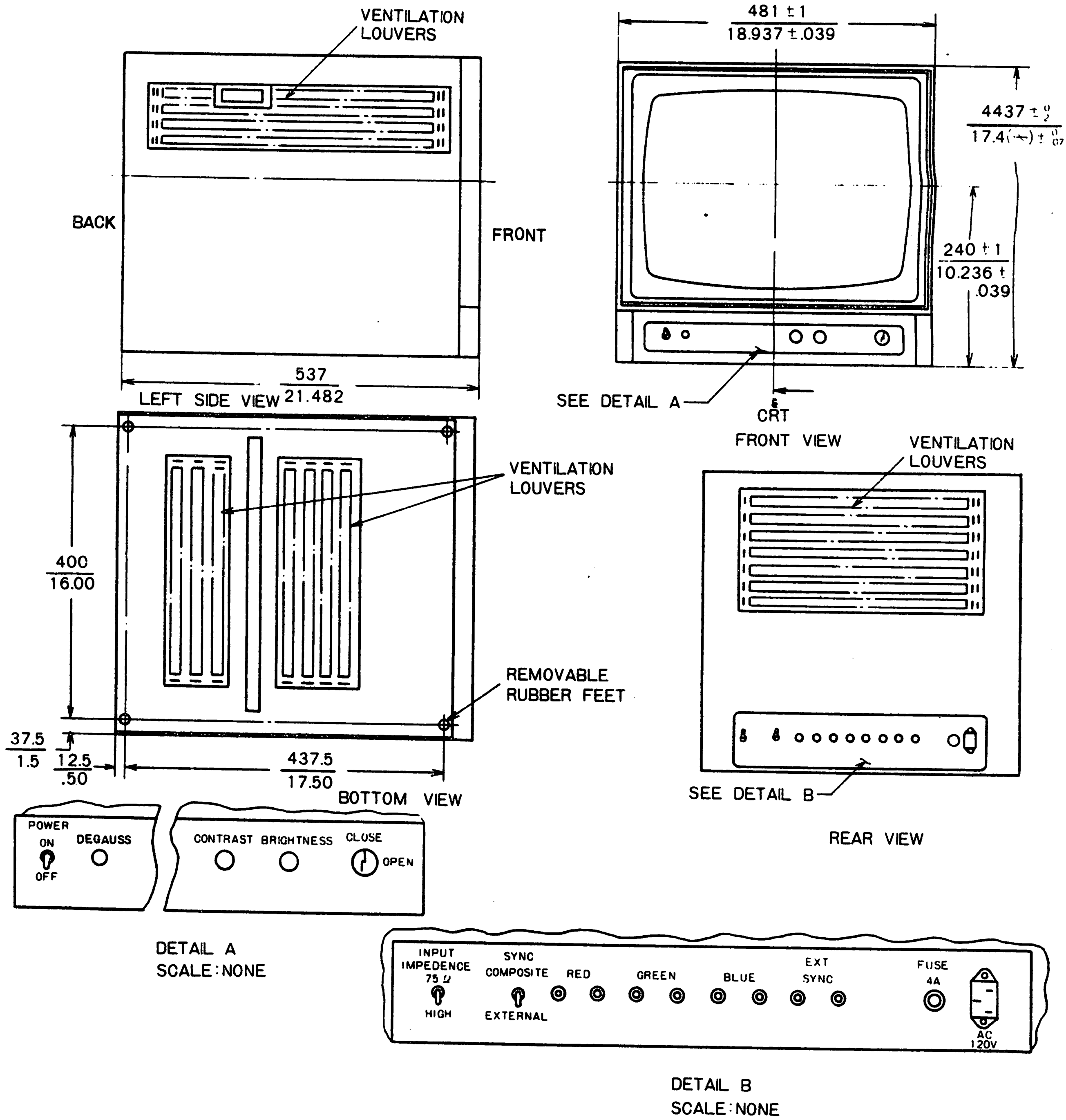
i. TV signal generator
Shibasoku { TG-7 (standard)
U703 (closs-hach Unite)

j. Magnifier



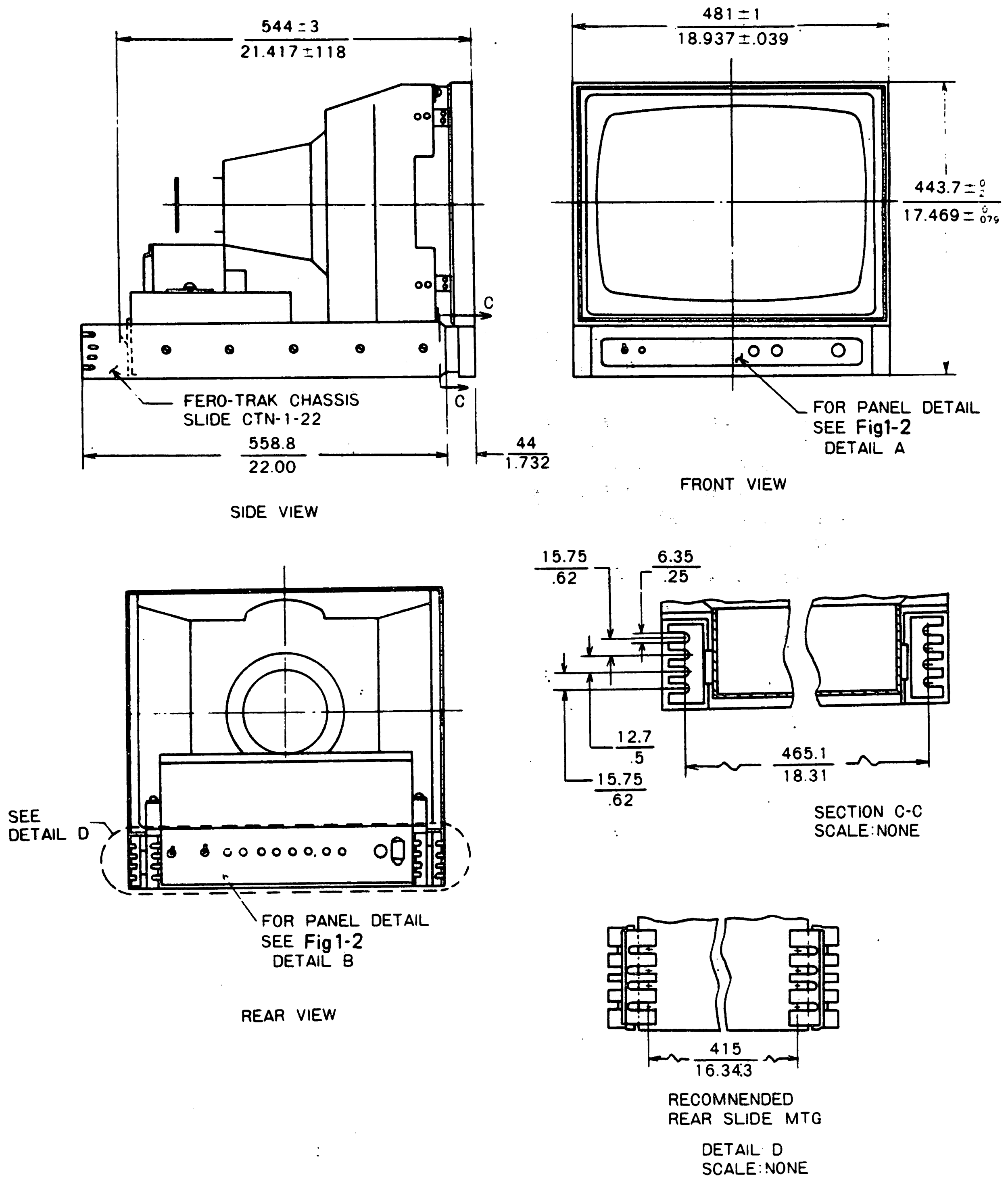
(b) 19" Rackmount Type

Figure 1-1 External Dimentions



Tablemount Type

Figure 1-2 External Dimentions



(b) 19″Consolemount Type with Slides
(Rackmount)
Figure 1-3 Relative Measurements of Slibes

2. INSTALLATION

2.1 UNPACKING

2.1.1 Package

The monitor is normally packaged in a carton box and its dimensions and weight are as follows:
Dimensions:

	19" Cabinet, Rackmount
Wide	28.0" (710mm)
High	27.6" (700mm)
Deep	25.6" (650mm)

Weight :
19" cabinet 125 lbs. (57kg)
19" Rackmount 102 lbs. (47kg) with out slide
Standard accessories of 2 keys, 1 fuse and 1 manual are also packed in a carton box.

2.1.2 Unpacking

a. Package weight of the carton box is more than 44 lbs. (20kg.) So, it is desirable to handle it by two men.

b. The monitor is normally packaged in a carton. Unpack the monitor carefully, make sure not to scratch or strike the picture tube face. The rack-mount types require additional attention because the neck of the color picture tube is exposed.
Packings are illustrated in Figure 2-1.

c. Please read the following section before connecting the color monitor to any AC power supply.

19' Rackmount Type

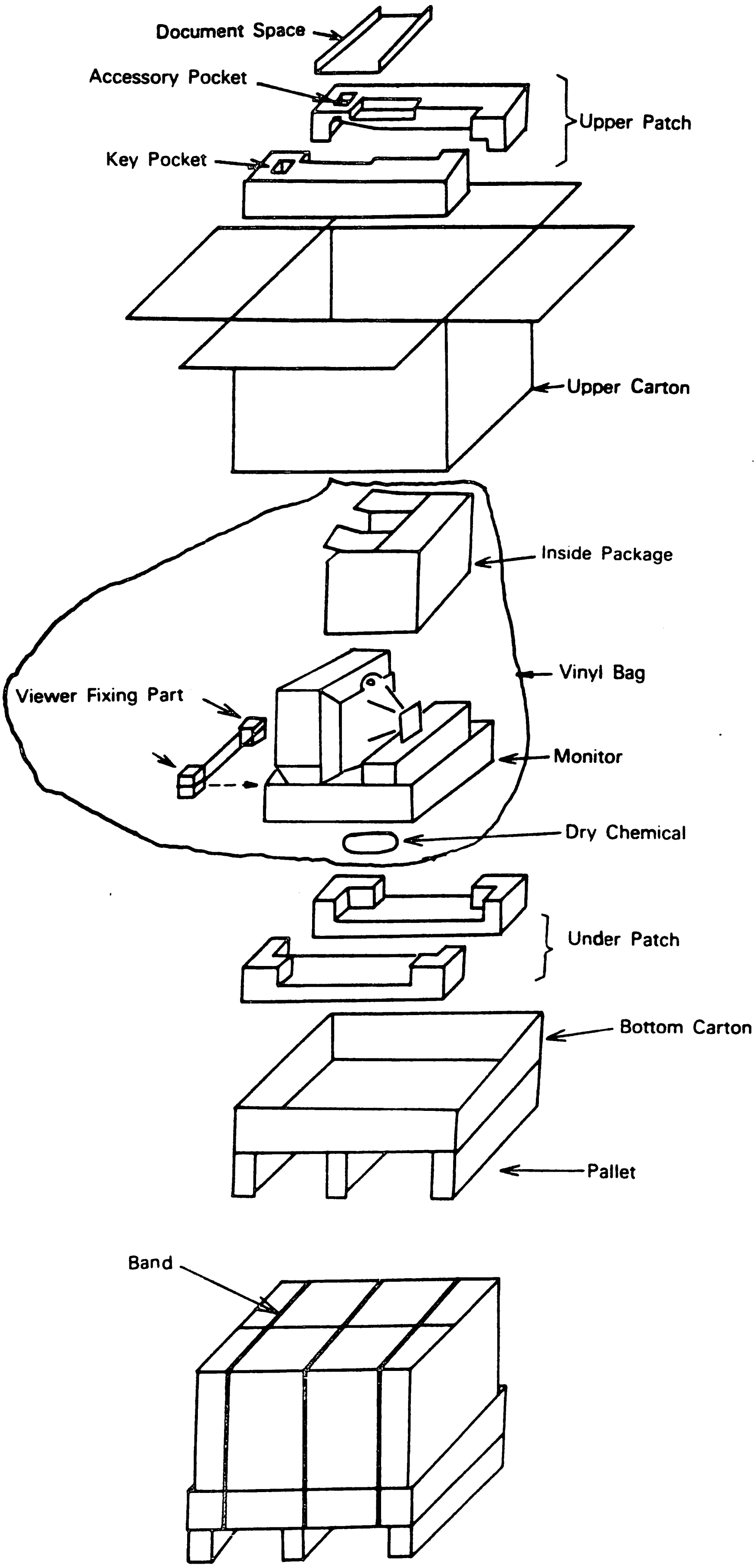


Figure 2-1a Packing Procedure

2.2 PRECAUTION

2.2.1 Installation Precaution

The convergence of color monitor is subject to the influence of external magnetic fields. Avoid installing the unit in areas where magnetic fields are present. The following additional items will ensure proper monitor operation:

a. Ventillation:

For long time stable operation, the temperature inside the case must be kept below 60°C.
Allow sufficient spacing between the monitor and its surroundings as illustrated in Figure 2-2.

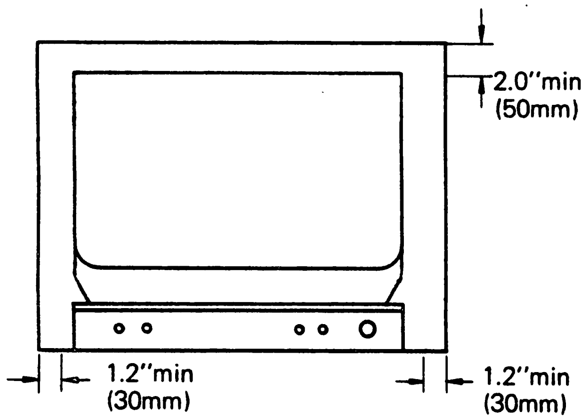


Figure 2-2 Installation Area

Specifically, when this monitor is mounted in a cabinet, it must have vertical ventilation, both above and below.
If there is insufficient space between the monitor and its surroundings, a cooling fan is recommended.

b. Leakage flux:

Do not install the monitor in areas where a transformer, fan or other leakage flux source will be nearby.
Because AC leakage flux causes oscillation of the picture, and DC flux (magnet or the like) causes raster distortion and makes the purity of the picture worse.
If it is necessary to mount such a device in the vicinity, the following minimum requirements must be met. For a transformer, attach to it a shield ring and shorting ring, and design its windings in a balanced type to minimize leakage flux. For devices other than transformers, minumize leakage flux by means of a magnetic shield or non-inductive windings.
The color monitor is susceptible to the influence of external magnetic fields.
To eliminate misconvergence avoid an inductive magnetic field as far as possible when installing the unit.
A magnetic field of more than 0.01 Oe will cause noticeable distortion.

c. High vibration:

Although this monitor is designed to withstand vibration, it is still advisable to mount it on a vibration preventive base for long-time stable operation especially when it is installed on a vehicle or the like.
The same caution should be exercised when there is a source of vibration in the vicinity.

d. Humidity:

This monitor can be operated within a relative humidity range of between 5 and 95%.
If it is operated in a humid environment for a long time, however, its life time may be shortened by deterioration of connector contacts or rheostats.
It is, therefore, advisable to operate the unit in a humidity range of between 30 and 70%.

e. Ambient illumination:

This monitor employs a black matrix color picture tube which provides excellent resistance to glare or reflection in high ambient light.
It is, however, still advisable to avoid direct light sources shining onto the CPT screen in order to prevent eye fatigue.
In direct sunlight or high ambient lighting, use of a visor is recommended. (Figure 2-3)

f. Dust:

This monitor is designed to minimize dust collection. However, because of the high static electric fields, dust will be attracted through the cabinet ventilation holes. Therefore, precaution should be taken to minimize dust in the vicinity.
It is advisable to periodically clean the anode cap of the CPT which tends to collect dust electrostatically.

g. Power voltage:

On this monitor which incorporates a voltage regulator circuit, the picture is not influenced by a voltage fluctuation within ± 10% of the rated value.
Operation over +10% should be avoided, however, because of excessive heating in the interior and incidental detriment to the life time of the unit.
Either 50Hz or 60Hz can be used without any modification of the unit.

h. CPT screen dirt

The explosion-proof CPT used in this unit has no front protective glass.
Therefore, dirt on the CPT screen can easily be wiped off.
As hypertension is applied, the CPT screen tends to collect dirt, which degrades brightness and focus.
Use of soft cloth dampened with a silicone type glass cleaner is recommended for periodic removal of this dirt.
Do not use a thinner or the like instead of a cleaner.
(The escutcheon may be stained.)
The static change on the CPT screen may result in a shock if the screen is touched in a low-humidity environment. To avoid this, prepare a wet towel (wrung tightly), touch one end of it to the case and the other end to the CPT screen, and press lightly to cause discharge.

i. Installing a visor

1. Place the CPT with its front up and remove four rubber legs as shown in (a) below.
2. Install a visor support plate at the front end and spacers on the underside, as shown in (b).
3. Set the CPT up, install the visor over the top, and fasten it with four bolts, as shown in (c).

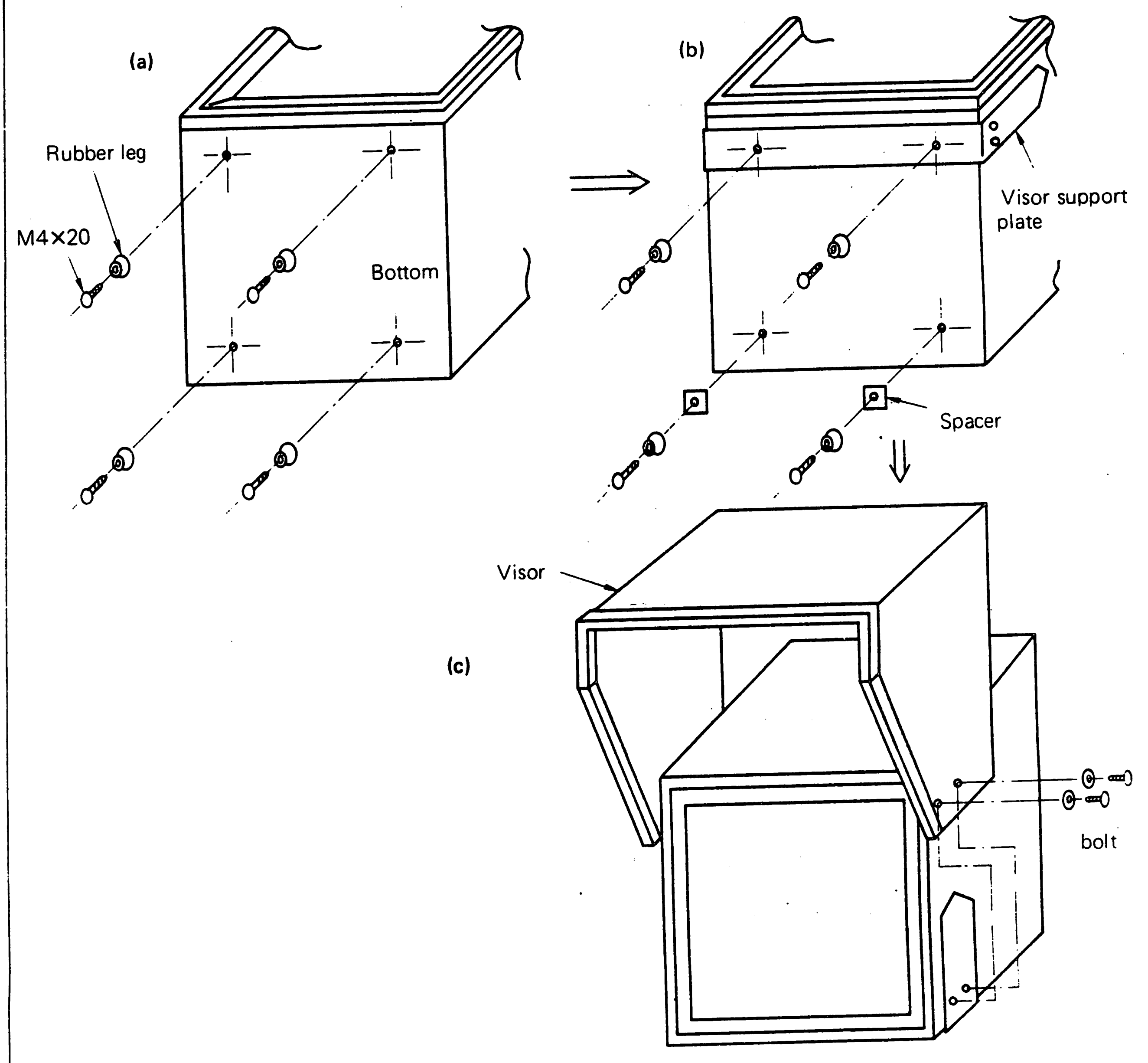


Figure 2-3 Installing a Visor

2.2.2 Safety Precaution

a. Dangerous voltage exists within the display unit and the pedestal.
Normal electrical precaution should be observed whenever working within those units while the covers are removed.

b. Disconnect the monitor from the power source, before removing or replacing circuit cards and components.

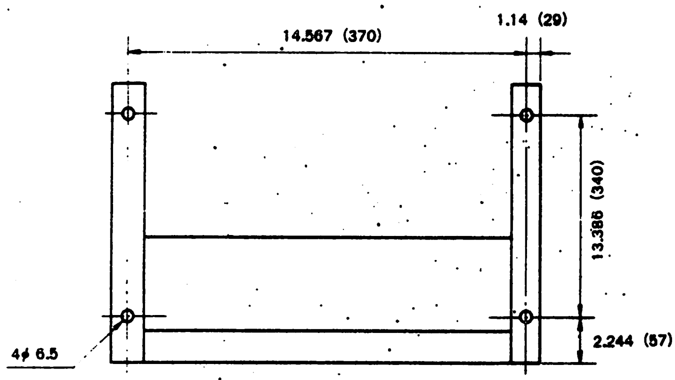
c. Caution must be exercised during the replacement or servicing of the CPT since a residual electrical charge may be contained on the anode button.
Be sure to ground the soldering iron and measuring instruments.

2.3 MOUNTING INSTRUCTIONS

2.3.1 Rackmount Type

a. Rackmount type without slides

The rackmount type monitor without slides is standard.
The monitor can be fixed with four screws on the flat pedestal.
Measurement of the base view is shown below.
If the use of slides is desired, user may prepare the slides.



(base View)

b. Rackmount type with slides

Zero-Trak chassis slides, model CTN-1-22, are used and relative measurements are shown in Fig1-3.

2.3.2 Cabinet type

The cabinet type monitor is placed on a stable supporting surface within the user's system configuration.
To remove the cabinet, remove four screws of the cabinet and pull up the chassis (Figure 2-4)

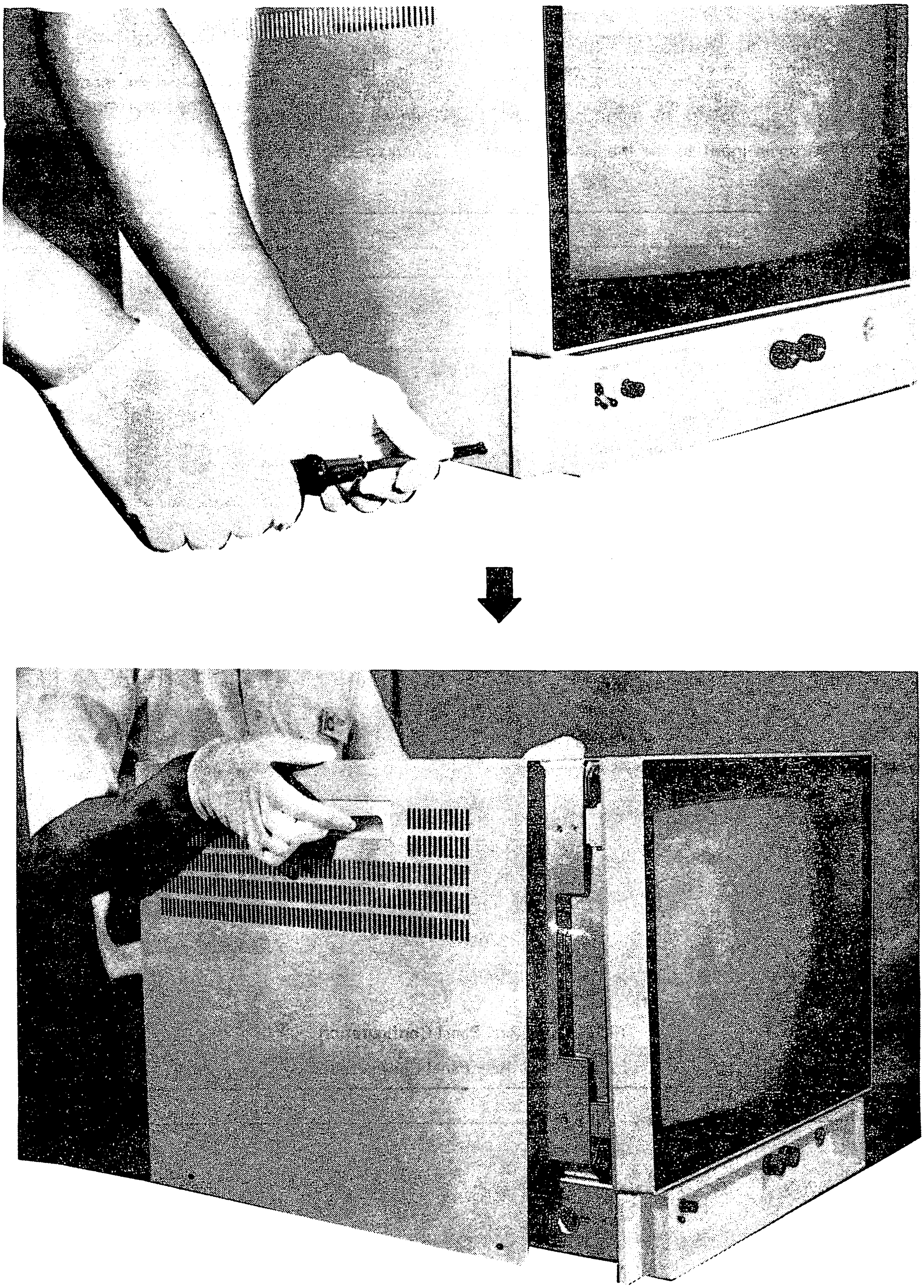


Figure 2-4 Removement of cabinet

2.4 VIDEO INPUT

2.4.1 BNC Type Connectors

Connected red, green and blue video to the appropriate video input connecters on the rear connector panel as shown on Figure 2-6.

The video cables must be constructed with 75-ohm coaxial cable, and terminated at the monitor cable end with standard BNC connector plugs.

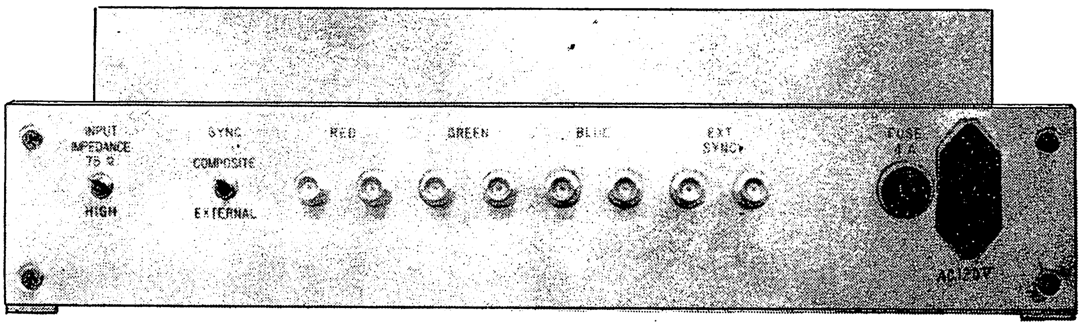
If the green video signal input to the monitor contains composite sync, no external sync input is required.

When using external sync, the sync selector switch must be set to "EXTERNAL". Otherwise, it must be set to "COMPOSITE".

If the monitor is used in a loopthrough position, the input impedance selector switch must be set to "HIGH".

For single unit operation, or when the monitor is the last unit in a loopthrough series, the input impedance selector switch must be set to "75 Ω ".

When we ship monitors, we set "75Ω".



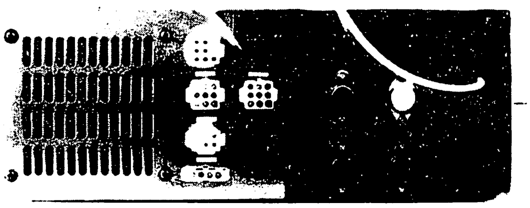
(a) BNC Connectors with Loopthrough

Figure 2-6 Rear Panel Configuration

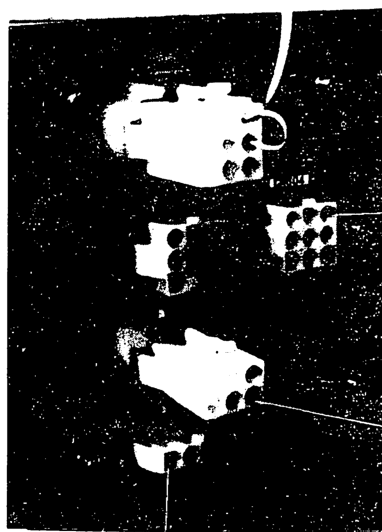
2.5 AC POWER SOURCE

The monitor can use power line frequencies from 50 to 60Hz without modification and can be connected to supply voltages from 100V to 240V by selecting the correct transformer and corresponding connections.
Unless special arrangements have been made, the monitor set for 120V.
Figure 2-7 shows the transformer connections and switches necessary to accommodate different AC voltages, 100V, 120V, 200V, 220V and 240V by means of connector CN 802, CN 805.
For proper protection, be sure that the fuse is the correct type and rating for the line voltage used.
The ratings of the fuses are 240V4A

After making the necessary transformer switch selections, plug the AC line cord into the power socket on the rear panel and connect the cord to the AC power source.



CONNECTOR (CN802, CN805)



CONNECTIONS

NOMINAL	RANGE	CN802 JMP – 1	CN802 JMP – 2
100Vac	90 – 110V	1 – 5	2 – 6
120Vac	108 – 132V	1 – 4	3 – 6
200Vac	180 – 220V	2 – 5	
240Vac	216 – 264V	3 – 4	

(CN805 is not connected)

NOMINAL	RANGE	CN805 JMP – 1	——
220Vac	198 – 242V	1 – 4	——

(CN802 is not connected)

Figure 2-7 Transformer Connections

2.6 INSTALLATION CHECKOUT

Apply a test pattern or some other suitable video to the video inputs.

Connect the monitor to an AC power source and turn the POWER switch on the front panel to the ON position.

There is normally a thirty (30) Second delay from the application of power to the appearance of an image.

Adjust the front panel controls (brightness and contrast) for the desired viewing level.

Turn BRIGHTNESS control Rnob until raster just disappear.

If the color purity or the convergence appear to be slightly out of adjustment, depress the DEGAUSS switch, hold it for 10 seconds and then release it. The image should improve noticeably.

If the monitor does not display an image, or if the displayed image is distorted and cannot be corrected, refer to the maintenance procedures given in Section 6.

3. OPERATION

3.1 CONTROLS AND CONNECTORS

This section describes controls and connectors on the front and rear panels.

3.1.1 Front Panel (Figure 3-1)

a. POWER switch

This switch is a toggle switch which applies operating power to the electronic circuits.

b. DEGAUSS switch

Pushing this switch for more than 10 seconds operates the internal degaussing system.

c. CONTRAST Knob

Adjust the luminance level.

d. BRIGHTNESS Knob

Adjust the black level of the screen.

3.1.2 Rear Panel (Figure 3-2)

a. SYNC switch

Composite sync or external sync selector switch. When using the composite sync (on green video signal), the switch must be set to the composite position.

b. INPUT IMPEDANCE switch

75ohm termination or loopthrough selector switch.
If only one monitor is connected to the display generator, set this switch to the 75Ω:
On the other hand, when connecting a next-stage monitor, turn the switch to HIGH.

c. RED, GREEN, BLUE connectors

This connector is connected to the display generator.
BNC connectors with loopthrough function is standard.
These terminals are connected to the display generator or a next stage monitor.
(connect R, G and B to their respective positions)

d. AC power cord socket

Two-prong socket is equipped on the rear panel.

e. FUSE

240V 4A fuse will be mounted on the fuse holder, corresponding to the AC power voltage.

f. EXT SYNC connectors

Connectors for external sync signal input or loopthrough.

3.2 OPERATING INSTRUCTION

3.2.1 Initial Operation

The following equipment is commonly used in the industry to conduct these test: Degaussing Coil, hand held if necessary, and Crosshatch Generator.

Procedures before adjustment are:

a. Connect the AC line cord to the AC INPUT on the rear panel of the monitor.

b. Connect the R.G.B singnal output cord of the crosshatch generator to the R.G.B signal input connectors.
When using external sync, connect the external sync line cord to the EXT. SYNC INPUT of the monitor.

c. Set the rear panel sync switch to the respective position.
SYNC SWITCH

Composite video signal	COMPOSITE
External sync signal	EXTERNAL

d. Turn the INPUT IMPEDANCE switch to 75Ω, when connecting only one monitor to the crosshatch generator, and when connecting several monitors, turn the switch to HIGH and the last monitor switch to 75Ω.

e. Turn on and operate the monitor for a half hour. During this time, degauss the monitor.

- Push the DEGAUSS switch on the front panel for more than 10 seconds.
  ·Repeat every two minuts, if necessary.
- Turn on the hand-held degaussing coil at a distance of 1 meter from the monitor. Move it to within about 10cm of the top and side of the monitor. Make a slow circular movement a few times.
  Then move the coil gradually away from the monitor and turn off the coil.

f. Apply a crosshatch signal.

3.2.2 Preliminary Adjustment (Figure 3-3)

a. Sync adjustment

If horizontal synchronism is lost, adjust H-Hold on the control drawer. And if vertical synchronism is lost, adjust V-Hold on the control drawer.

- Display a kind of picture.
- Adjust H. Hold potentiometer to get horizontal synchronism.
- Adjust V. Hold potentiometer to get vertical synchonism.
- Adjust brightness control knob until raster appears.
- Adjust contrast control knob until video appears. At this time both raster and video should be seen on screen.
- Adjust H. Blanking complete clockwise.
- Adjust H. Phase until video gets centered on raster.

Refer to Section 5.2.1 "Horizontal Hold" and "Vertical Hold".

b. Size adjustment

Vertical and horizontal amplitudes are adjusted by "Height" and "Width" potentiometers on the control drawer, refer to Section 5.2.1 "Hight" and "Width".

c. Purity check

Turn on only the RED BEAM switch and turn BRIGHTNESS on front panel to produce red raster of the appropriate brightness. If the red raster is not uniform over all the picture, refer to Section 5.4 PURITY ADJUSTMENT.

d. Convergence check

Turn on the other BEAM switches to generate a white crosshatch pattern. If there is any convergence error, refer to Section 5.4 CONVERGENCE ADJUSTMENT.

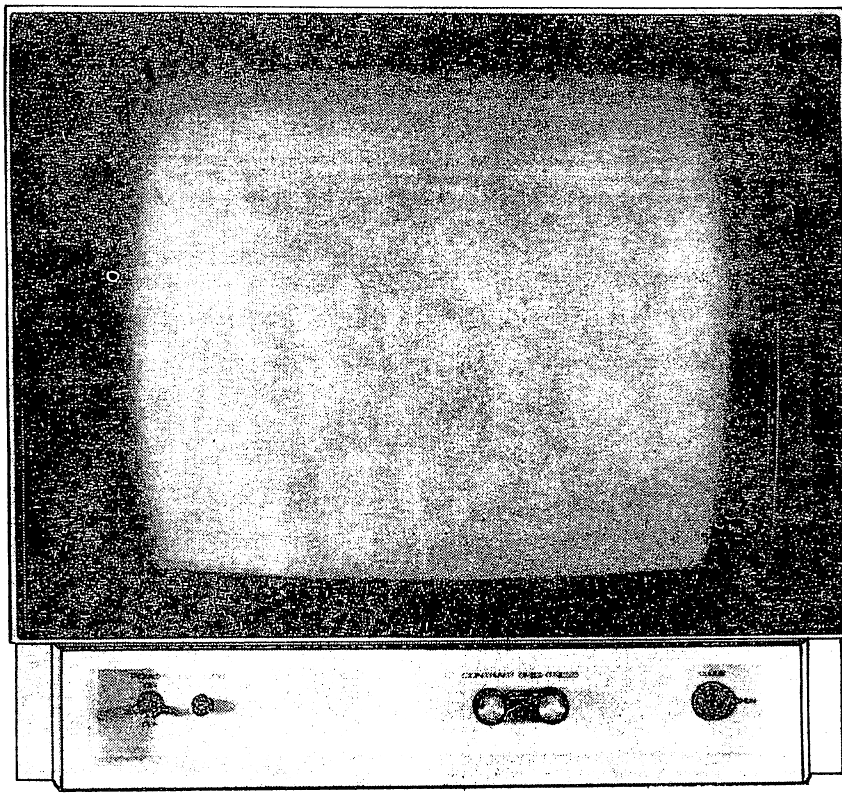


Figure 3-1 Front Panel

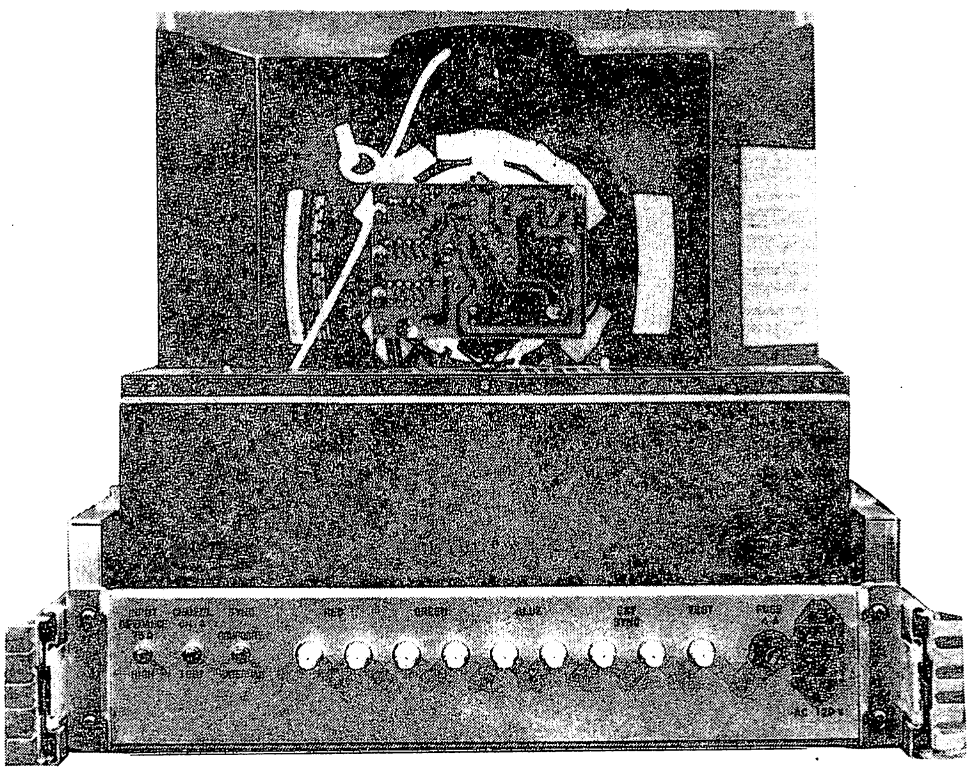


Figure 3-2 Rear Panel

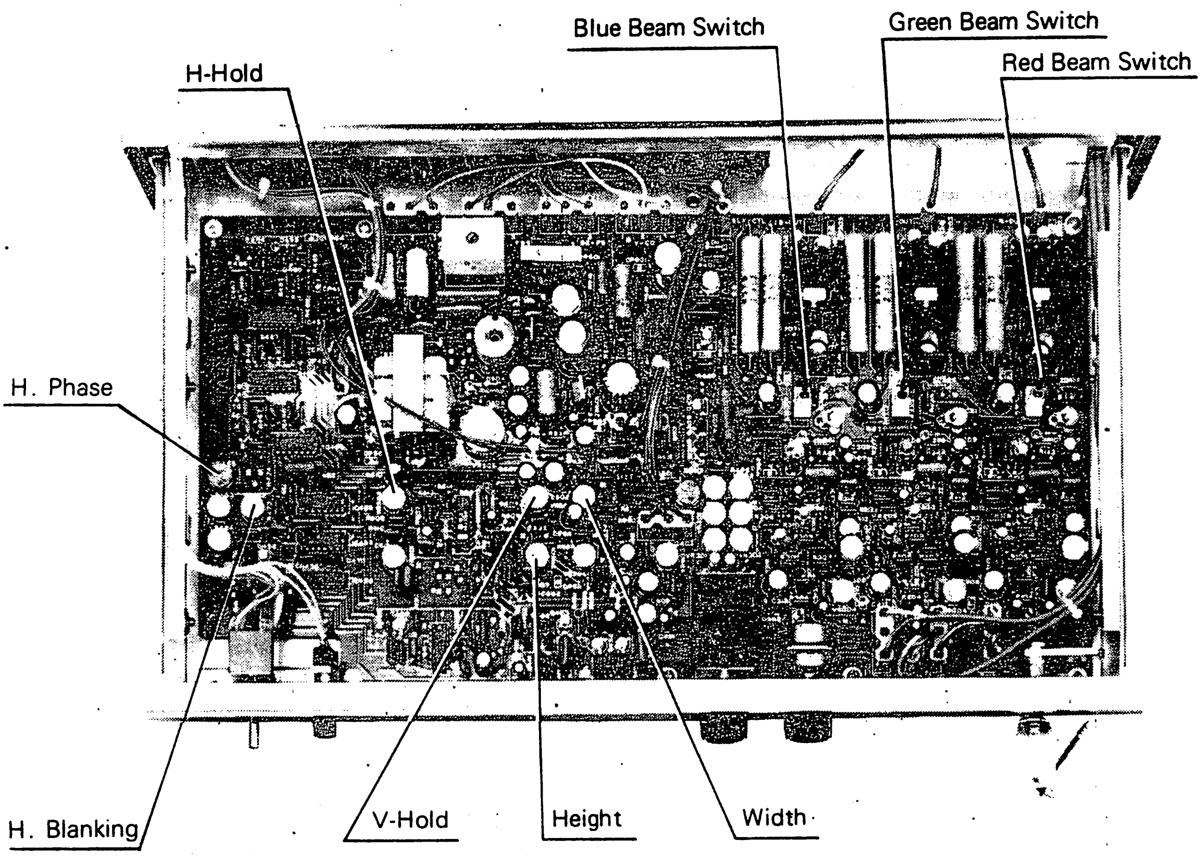


Figure 3-3 Control Drawer

4. THEORY OF OPERATION

4.1 GENERAL DESCRIPTION

4.1.1 Input Signals

Input signals include video signals, vertical shynchronizing signals, vertical blanking signals, horizontal synchronizing signals and horizontal blanking signals applied sequentially.

The horizontal synchronizing signals and the vertical synchronizing signals are input during their respective blanking interval. Figure 4-1 shows the horizontal blanking interval.

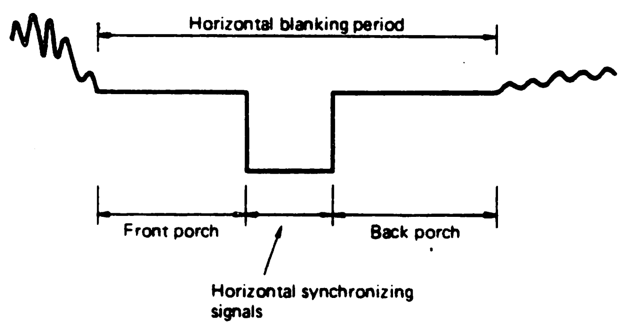


Figure 4-1 Horizontal blanking period

The vertical blanking interval includes the equalizing pulse, the vertical synchronizing pulse and the horizontal synchronizing pulse as specified in EIA Standards.

Figure 4-2 shows an expanded view of the vertical blanking interval.

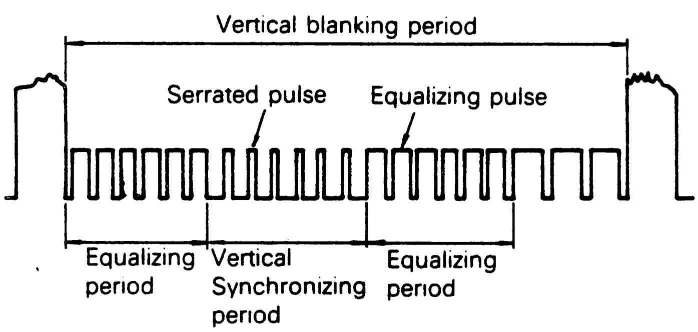


Figure 4-2 Vertical blanking period

Figure 4-3 and Figure 4-4 show the waveforms of EIA Standards.

Equalizing pulses stabilize the horizontal synchronization of the monitor during the horizontal blanking interval.

These pulse frequencies are double the horizontal synchronizing frequency to provide perfect interlaced scanning.

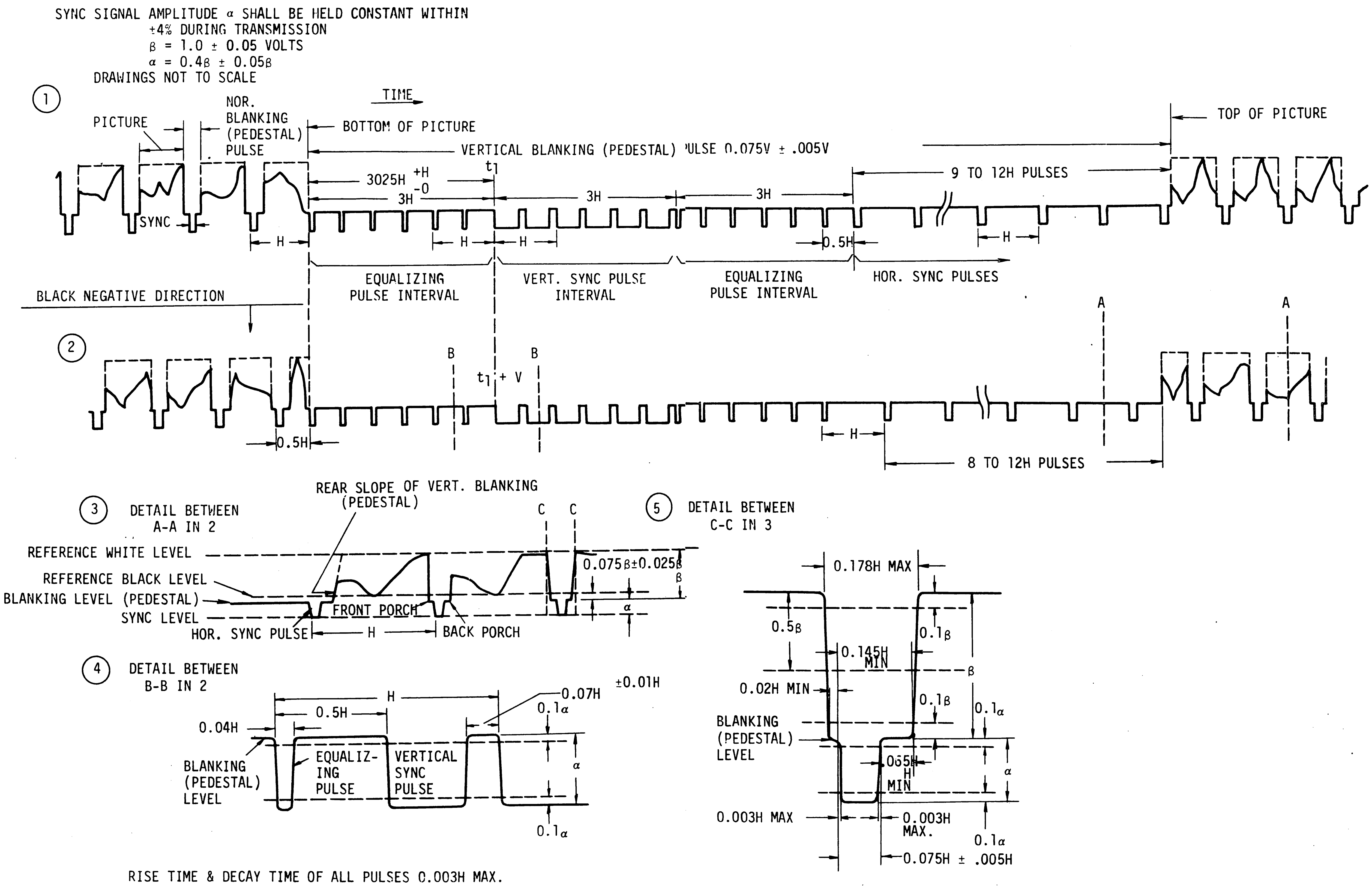


Figure 4-3 INPUT SIGNAL WAVEFORMS

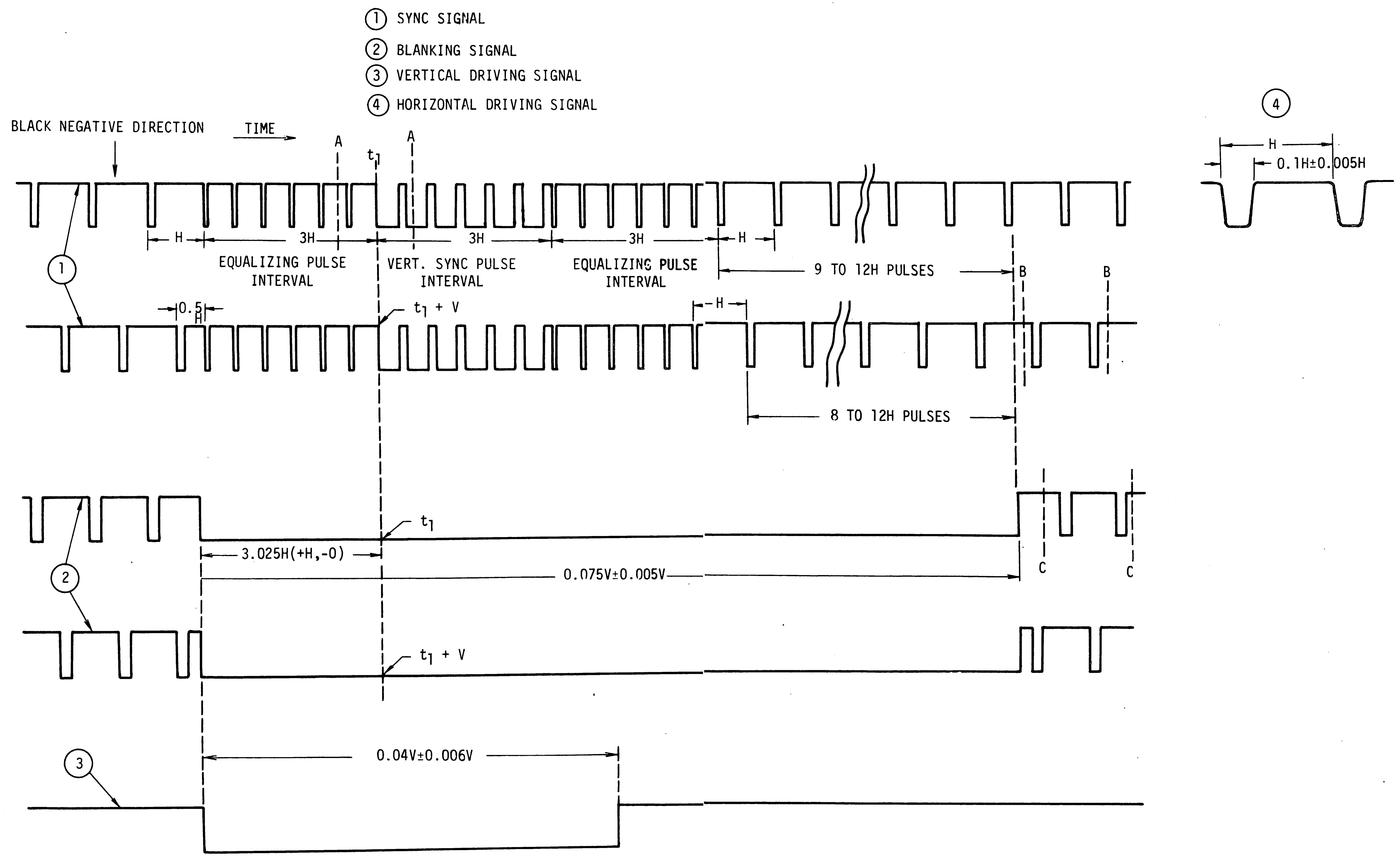


Figure 4-4 STANDARD SYNC WAVEFORMS

4.1.2 Construction

a. Power supply unit

The power supply unit of this monitor is a circuit that supplies the appropriate voltages required by picture tube, video amplifier, deflection circuit, synchronizing circuit, etc.

b. Scanning section

Scanning is performed by shooting a beam of electrons to the fluorescent surface of the CPT and deflecting the electrons by changing the current applied to the deflection yoke.

Present TV sets generally scan by deflecting the beam of electrons diagonally accross the surface with saw-tooth wave current and by adjusting the beam on the surface, i.e. the scanning spot to control the focus.

Pictures are composed of lines of scanning spots. The number of lines is refered to as the number of scanning lines.

There are two types of scanning methods, one method scans sequentially and the other employs an interlaced scanning pattern to cover the entire picture.

In interlaced scanning, one vertical scanning is called field scanning and complete scanning by two field scanning is called frame scanning. Flickering on the screen can be reduced by shortening the scanning time for one field, thus this reduction can be achieved with interlaced scanning rather than sequential scanning when the scanning time for one frame is equal.

c. Video amplifier section

This circuit serves to amplify video signals to the input required by the picture tube.

It also has functions to distribute signals to the synchronizing circuit, DC restore circuit and high-pass characteristics compensation circuit and to adjust brightness.

d. Picture tube

This electron tube is designed to make light spots by applying electron rays from the electron gun to the fluorescent screen and to produce pictures by tracing the movement of these light spots as the electron rays are deflected by the deflection coil.

The fundamental construction of the picture tube is the electron gun and the fluorescent screen sealed in filter-shaped glass tube.

A typical electron gun is composed of a metal coil heater, a cathode, and five grids all mounted in line on the same shaft.

At present most widely used color picture tube is the shadow mask type. This type of picture tube is composed of a fluorescent screen painted in three colors, a shadow mask, and an electron gun that emits three electron beams.

A three-beam electron gun can have two types of beam arrangement: a delta arrangement and an in-line arrangement.

The delta arrangement refers to an arrangement where the sections of three electron beams form an equilateral triangle, while the in-line arrangement refers to an arrangement where they are arranged on one straight line horizontally.

The three electron beams emited from the electron gun are deflected and scan the entire fluorescent screen.

The electron beams must first pass through holes in the shadow mask which ensure the beams will strike only their corresponding phosphor colors on the screen.

One set of red, green and blue dots can reproduce any color depending on the strength of the signal received.

4.2 CIRCUIT DESCRIPTION

4.2.1 Video Amplifier (Figure 4-5)

Vedeo amplifiers consist of three amplifiers, one each for the red channel, green channel and blue channel. Those amplifiers have same functions. So, the following describes the operation of red channel amplifier.

Each amplifier performs these functions; Buffer Amplifier, Gain and Contrast Control, Pre-amplifier, DC Restoration, Background and Brightness Control, Blanking and Beam Control, Frequency Compensation and Video Driver.

a. Buffer amplifier

Video input signals are sent to Transistor Q101 through the AC Coupling with Capacitor C101.

These signals are kept at high impedance for loop-through function. The Emitter Follower of Transistor Q101 forms the connection with next Gain and Contrast Control circuit.

b. Gain and contrast control

Emitter of Q101 is connected to Gain Control Potentiometer VR104, Contrast potentiometer and Transistor Q102 in series.

Gain Control potentiometer VR104 is used for adjusting the different red, green and blue gains of the CPT cathode.

Turning the CONTRAST knob on the front panel changes the base voltage of Transistor Q102 to control the contrast of the picture.

c. Pre-amplifier

Transistors Q102 and Q103 increase the input video signals to make them strong enough to drive Video Amplifier Transistors Q107 and Q108. The collector of Transistor Q103 is connected to Transistor Q104, which converts the impedance from heigh level to low level for the next AC coupling.

d. DC restoration

By suppling the DC restoration timing signals from the SYNC circuit to the base of Transistor Q105, output signals from AC coupling capacitor C105 are kept constant thus maintaining the consistency of the black level of the screen. Collector output of Q105 is sent to the base of Transistor Q106, which converts the impedance from high to low for driving Video Amplifier Transistor Q108.

e. Background and brightness control

Brightness control voltage, which controls the black level of the screen, is supplyed to the emitter of

Transistor Q105, and adjusted by Background potentiometer VR102 and the BRIGHTNESS knob on the front panel.
VR101 makes fine adjustment in the brightness of the background and the Zener Diode on the CPT socket board makes rough adjustment. VR102 adjusts the different brightness gains (Red, Green and Blue) of the in-line jun type of CPT.

f. Blanking and beam control

HV BLANKING signals from the SYNC circuit makes Transistor Q402 cut off and erase the raster during retrace periods by making video amplifier transistors Q107 and Q108 cut off.
BEAM ON/OFF switches makes the red, green and blue beams cut off individually.

g. Frequency compensation and Video driver

Transistors Q107 and Q108 are used for the video amplifier to drive the CPT cathode. Base input of transistor Q107 is converted to a high voltage for driving the CPT cathode directly.
High voltage signals, whose frequency characteristics deteriorate, are compensated by Coils L101 and L102, Registers R127 and R128, and Capacitors C111 and C118.

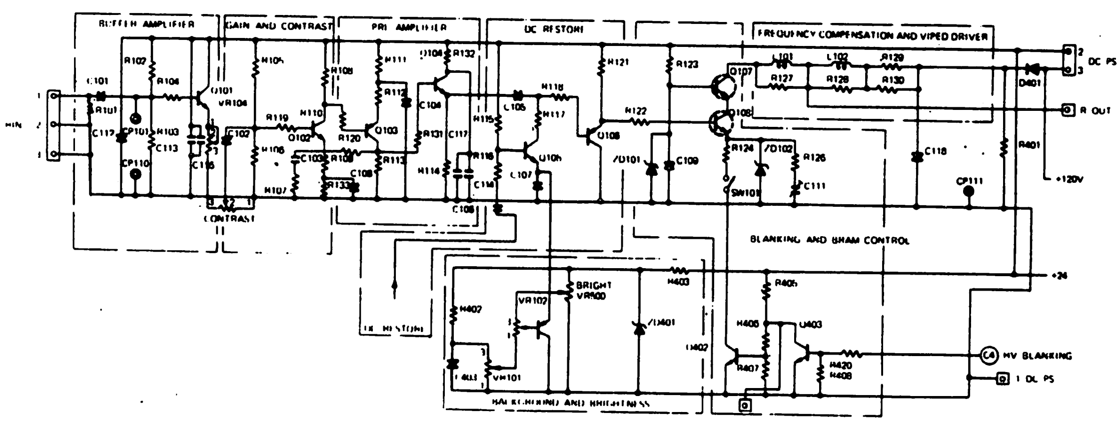


Figure 4-5 Video Amplifiers

4.2.2 Synchronizing Circuit (Figure 4-6)

The synchronizing circuit is composed of a synchronizing separator and a synchronizing processor.

a. Synchronizing separator

The synchronizing separator is composed of an input amplitier (Q451, Q452, Q453), a signal detector (Q454, Q455) and an output amplifier (Q456).

The composite video signal (SYNC IN) is amplified by the input amplifier.

The synchronizing signal (H.V. SYNC) is separated from the composite video signal by means of the signal detector, and the amplified signal is supplied to the synchronizing processor.

b. Synchronizing processor

The synchronizing processor is composed of a vertical synchronizing control circuit, a blanking signal generation circuit, a DC restoration circuit and a horizontal delay control circuit.

The vertical synchronizing control circuit separates the vertical synchronizing signal (V. SYNC) from the synchronizing signal (H.V. SYNC) by means of a monostable multivibrator (IC451) and NAND gate (IC452).

The output of the NAND gate generates the V. SYNC by means of a monostable multivibrator (IC451) and an output buffer (Q457).

The blanking signal generation circuit generates a blanking signal (H.V. BLANKING) by means of a monostable multivibrator (IC453) for horizontal blanking, two monostable multivibrators (IC451, IC453) for vertical blanking, a NOR gate (IC 452) and an output buffer (Q458).

The blanking period is adjusted by turning the VR 452 for the horizontal period and the VR453 for the vertical period.

The DC restoration circuit generates a D.C restoration signals (DC RESTORE) by two NOR gates (IC456), a NOR gate (IC456) and an output buffer (Q459) for normal operation when the H.V SYNC is not supplied, its absense is detected by the monostable multivibrator which forms one half of IC455, a NOR gate (IC456) is then activated, and passes an (X) signal that is fed from the horizontal positioning control circuit.

The horizontal delay control circuit generates the proper delayed signals upon receiving a horizontal trigger signal by means of a rectifier and a level changing circuit (D455, Q460), and two monostable multivibrator (IC457).

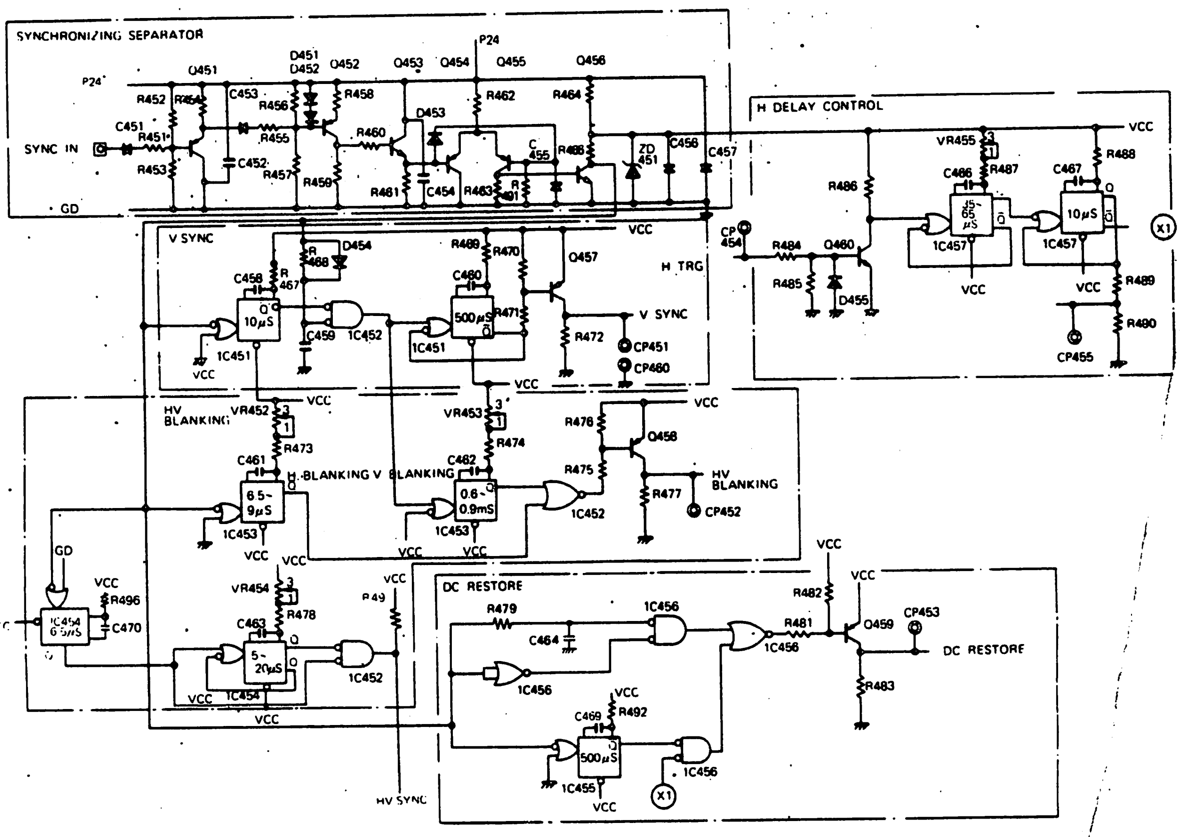


Figure 4-6 Synchronizing Circuit

4.2.3 Deflection Circuit (Figure 4-7)

The deflection circuit consists of IC501 (which contains a horizontal AFC circuit, a horizontal oscillator, a vertical oscillator and a vertical driving circuit.), a horizontal power supply adjusting circuit, a side pincushion circuit, a horizontal and vertical output circuits, and a horizontal and vertical position adjusting circuits.

a. Horizontal scanning

IC501 generates a synchronizing horizontal pulse when it is supplied with the synchronizing signal (H.V. SYNC) and the delayed signal of the horizontal output pulse (H. PHASE).
IC501 compares the H.V. SYNC and the H. PHASE, and generates the phase detecting output current according to the difference. This current is supplied to the horizontal oscillator in IC501 through the low pass filter circuit which consists of C507, C508, R507, R508 and VR501.
VR501 is used to adjust AC loop gain. The horizontal oscillator operates as a VCO (Voltage Controlled Oscillator), and it is composed of C512, R509, R510 and VR502.
The output of the horizontal osillator is supplied to the horizontal output circuit and the high voltage circuit as a triggering signal.
The horizontal oscillating pulse is amplified by transistor Q501 and the driving transformer TR501 to drive a horizontal output transistor Q504.
A horizontal deflection current flows through the damper diode, the horizontal deflection coil, L501, C519 and C520 in the first half of the scanning period and in the second half it flows through the transistor, the deflection coil, L501, C519 and C520.
Part of the current from the horizontal coil flows through the horizontal output transformer TR502.

b. Horizontal centering control

The horizontal position adjuster rectifies voltage across the secondary side winding of the horizontal output transformer TR502 by means of D504 and D505, and there by direct current is passed to the horizontal deflection coil. The position of the electron beam is adjusted by VR505 which regulates the polarity and level of the input signal.

c. Pincushion compensation and horizontal amplitude adjustment

Power source voltage applied to the horizontal deflection coil is adjusted by transistor Q505 to provide pincushion compensation and horizontal amplitude adjustment.
Vertical deflection coil current is supplied to Q502, which changes current to parabolic voltage, and also provides compensation for the voltage drop of the Q505. The current change and the amount of compensation are adjusted by VR504.
Horizontal amplitude is varied by increasing or decreasing the base voltage of Q503 by means of VR503 to control the voltage drop of Q503.

d. Vertical deflection

IC501 supplies the synchronizing vertical pulse by supplying only a vertical synchronizing signal.
The vertical oscillator determines the frequency by comparing the voltage of C604, which discharges constant current through the 4th pin, with the divided voltage of R605, R608, R609 and VR602.
Vertical linearity is improved by adding vertical deflection current to the saw-tooth wave current generated by C604. The amplified vertical pulse is generated at the 2nd pin, and is supplied to the base of vertical output transistor Q602, Vertical deflection current flows through Q601 in the first half of the scanning period, and through Q602 in the second half.
The output voltage is controlled by the negative feedback to the 3rd pin.
Vertical amplitude is adjusted by varying the feedback level by means of VR601.

e. Vertical centering control

Vertical centering is controlled by passing current to the vertical deflection coil. This current is controlled by VR604.

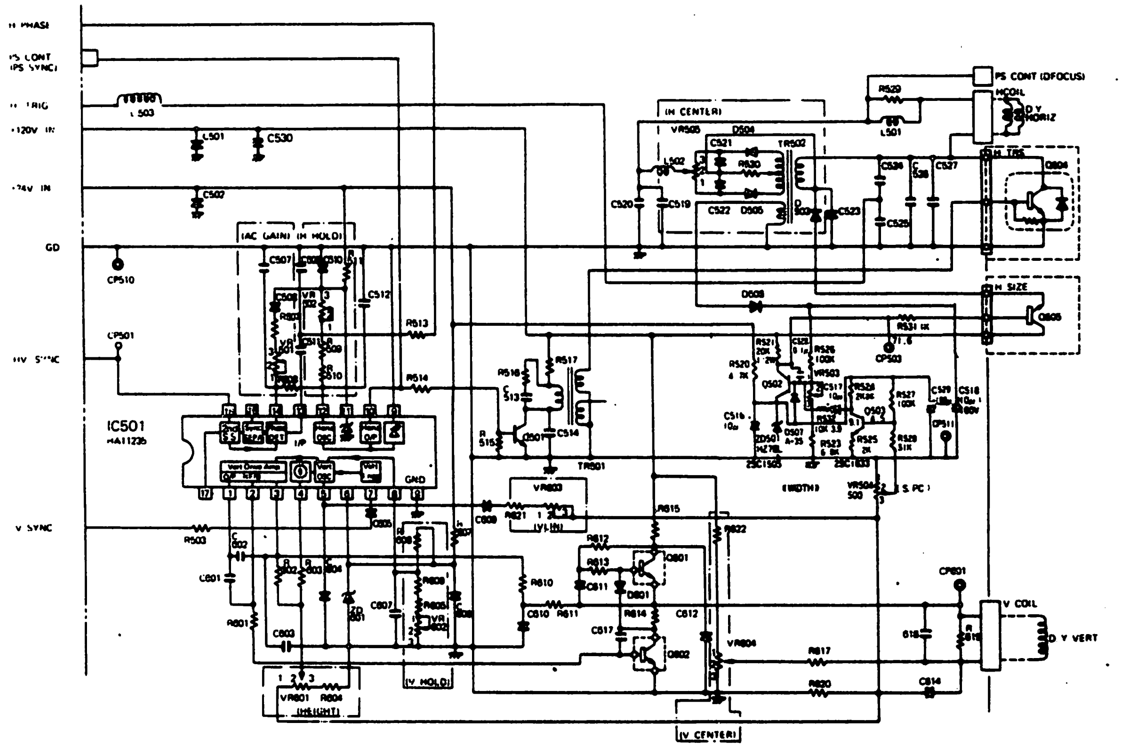


Figure 4-7 Deflection Circuit

4.2.4 High Voltage Power Supplies (Figure 4-8)

a. CPT anode voltage (+27.5kV power source)

The +27.5kV power source is composed of the switching transistor Q804, fly back transformer TR801 and the high voltage stabilizing circuit. The high voltage stabilizing circuit is located on the PC board (FPS101) and everything else is located on the power supply unit.

The switching transistor Q804 is driven in synchronization with the horizontal deflection current and Q804 stays ON during the horizontal scanning period. The energy stored on the primary side of TR801 during this period is released as high voltage to the secondary side of TR801 while Q804 is OFF (horizontal blanking period).

This high voltage is then rectified to 27.5kV and the voltage is supplied to the anode of the CPT.

The feadback signal from TR801 is supplied to the high voltage stabilizing circuit.

b. CPT screen grid voltage (+ 680V power source)

The constant + 680V power source is obtained through varistor RZ801 by rectifying the high voltage pulse of approximately 1000V which occurs across the collector of the transistor Q804 (on the power source unit) by means of D803 on the PC Board (FPS101) and leveling it with C808.

This voltage is divided by variable registor VR901 on the PC board (FCS100) and supplied to the CPT screen grid.

c. Focus voltage (+ 8,000V power source)

Like the + 27.5kV power source, the +8,000V power source is obtained by rectifying the high voltage which occurs on the secondary side of the fly back transformer TR801. This voltage is divided by the variable registor VR810 for focus setting and supplied to pin 1 of the CPT socket.

d. High voltage detection circuit

The high voltage detection circuit detects any abnormal increase in the anode voltage of the CPT and is set to operate between 29 and 30kV. When the anode voltage increases abnormally, the voltage across the capacitor C833, normally −200V, rises proportionally and this turns off Q833.

Both Q834 and Q835 are turned ON by the OFF state of Q833 and are followed by the ON state of Q722 which turns on Q723 to suppress the output of the +120V power source. (reference to Page 86)

This condition is maintained in the same way as for the over current detection of the +120V power source until the operator turns off the main power source.

e. Over current limiter **(reference to Page 85)**

The over current limiter converts the load current of the +120V power source into the voltage by means of registor R708 and supplies it to the base and the emitter of the transistor Q723, which is turned ON by this voltage when the load current is more than 1.1 to 1.3 amperes.

When Q723 is turned ON, the control circuit of the +120V power source is locked and its output is cut off.

Simultaneously Q722 is turned ON and this condition is maintained until the main power source is turned off.

Then if the over current detection circuit has been operated, AC power source must be turned ON after the causes of over current are rejected.

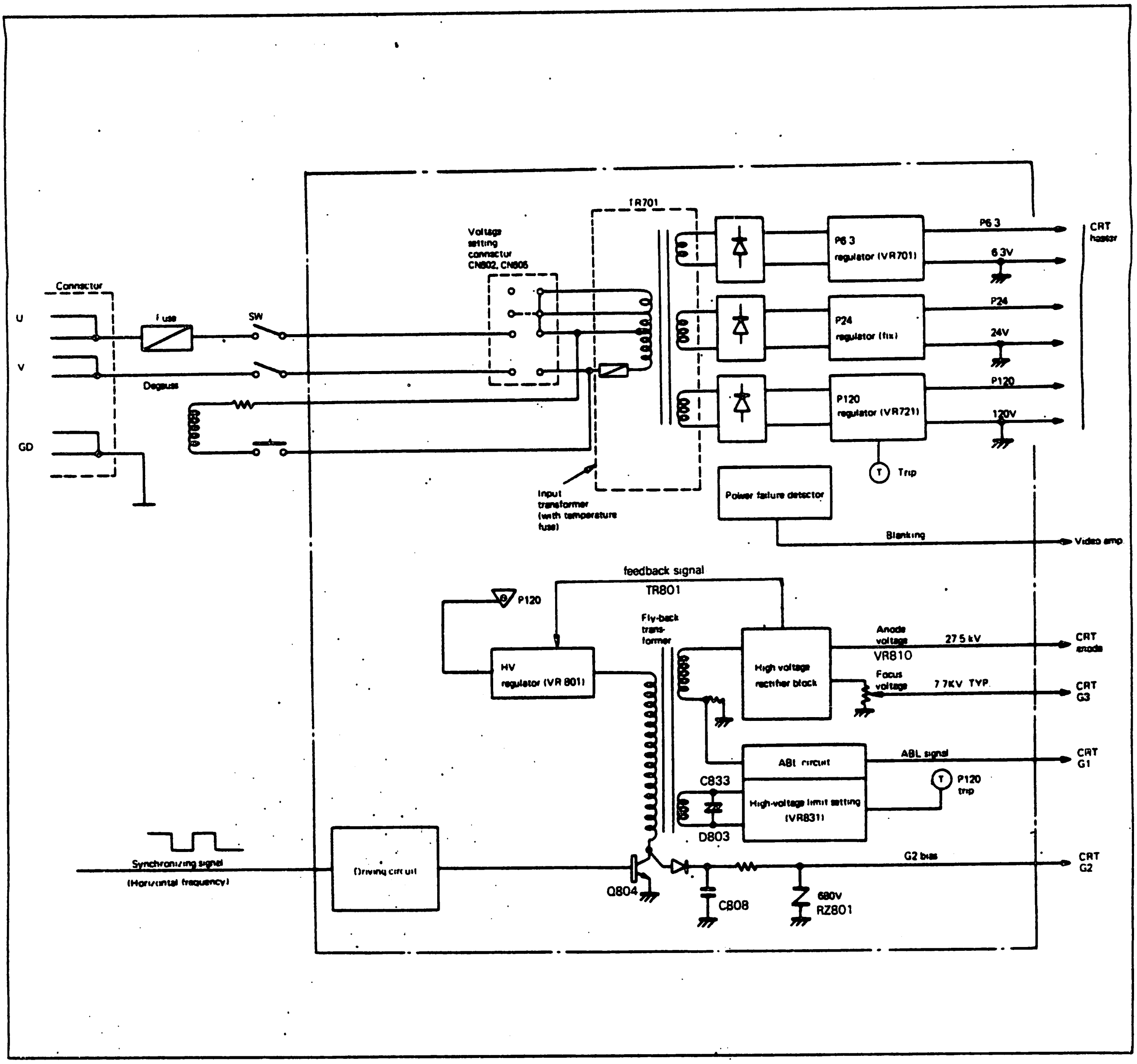


Figure 4-8 Power Supplies

4.2.5 Low Voltage Power Supplies

a. Voltage regulator P6.3 (Figure 4-9)

IC701 is a 5-volt fixed voltage IC regulator to which 1.3V voltage is added by R709, R710, and VR701 to obtain stablilized output voltage 6.3V. An overcurrent protector circuit is incorporated in IC 701, thereby voltage is limited to approximately 1A.

b. Voltage regulator P24 (Figure 4-10)

IC702 is a 24-volt fixed voltage (24V) IC regulator, to which TRS Q702 is added to obtain stabilized output voltage 24V.

The sum of voltage I_0R_{701} and Q702 B-E forward voltage ($=V_{be}$) produced in R701 is limited to within forward voltage drop ($=2V_{df}$) of D706 and D707.

$$V_{be} = V_{df},\ I_0R_{701} \leqq V_{df} \quad \text{Therefore,}$$

$$I_0 \leqq \frac{V_{df}}{R_{701}} \leqq \frac{0.8V}{0.5\Omega} = 1.6A \quad \text{That is,}$$

overcurrent is limited at 1.6A max. to protect parts and wirings from load short-circuit (short time).

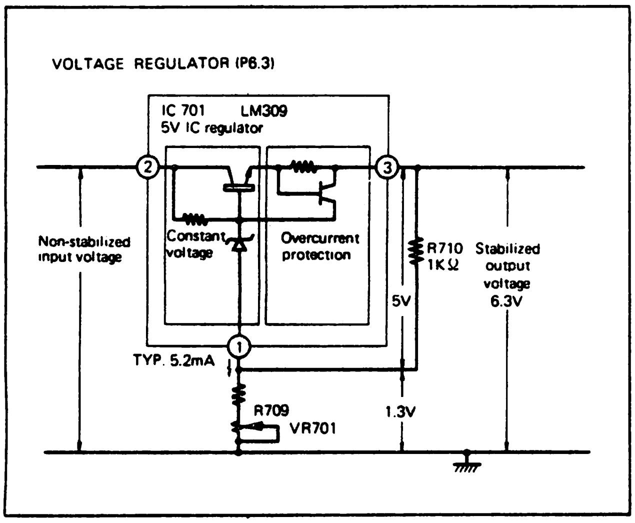


Figure 4-9 Voltage Regulator P6.3

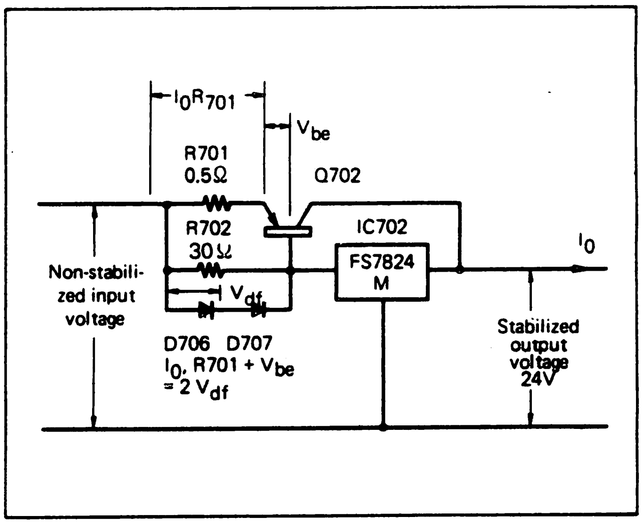


Figure 4-10 Voltage Regulator P24

c. Voltage regulator P120 (Figure 4-11)

The control circuit synchronizes voltage to synchronizing signal of the horizontal period of CPT to produce driving signal. It is amplified by Q704 to drive main TRS Q703. Output of Q703 (emitter of Q703) becomes high switching wave ($=V_i$) during the Ton period and low one (OV) during the Toff period as shown above. The switching wave forms are smoothed by L701 and C706 to obtain Stabilized output voltage V_0. Q705 serves to reduce storage time when shifting Q703 from ON to OFF. Load current is converted to voltage by R708 to be detected and limited to 1 A. Limit current is set by VR722. Latch circuit in the control circuit operates when overcurrent is detected, trips switching, and nullifies output voltage. When overvoltage detector receives the signal from anode voltage, switching is tripped to nullify output voltage. To release tripping, once turn off the power source switch (approx. 10 sec.). When tripping is resumed, the power source unit must be replaced.

power source unit must be replaced.

Input voltage V_i

Output voltage V_0, Toff are controlled to establish the following relation:

$$V_0 = \frac{Ton}{Ton + Toff} Vi \quad \text{........ (1)}$$

$$Ton + Toff = T_H \text{ horizontal period constant}$$

That is, ratio of Ton is regulated according to input voltage V_i so that output voltage V_0 may be constant.

Voltage is set by VR721. Actual typical values are:

V_i = 150V

V_0 = 120V. and

T_H = 50 μs (at F_H = 20kHz). From equation (1)

Ton ratio then (= Ton/T_H) is

$$Ton/T_H = \frac{V_0}{V_i} = \frac{120V}{150V} = \frac{40\mu s}{50\mu s} = 0.8$$

FH	TH
15KHz	66.7μs
18KHz	55.6μs

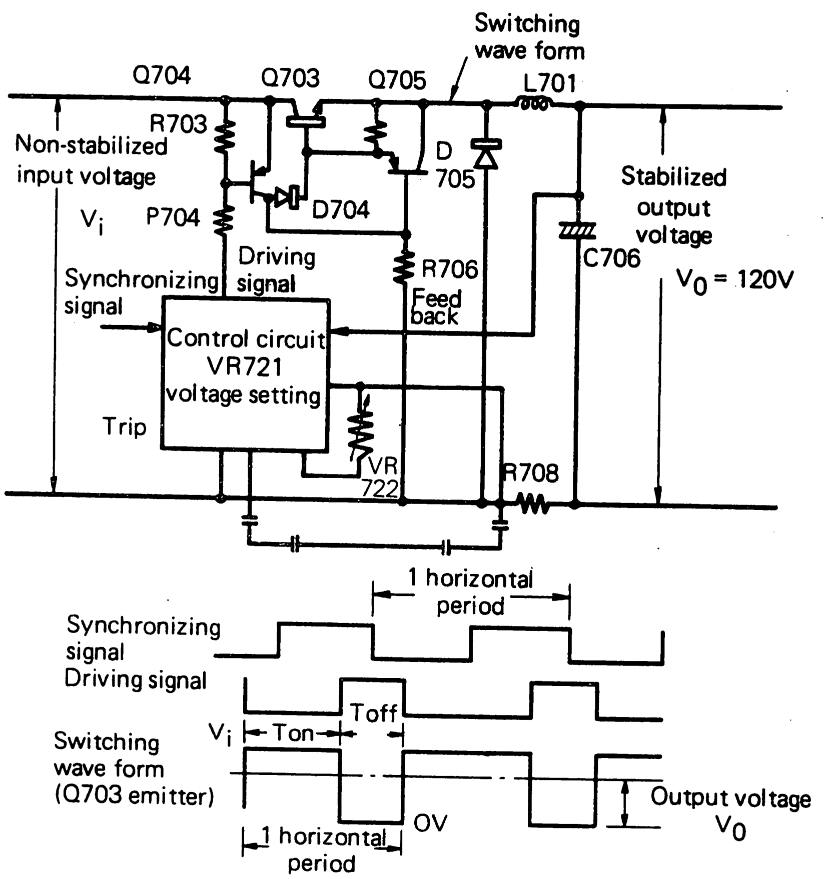


Figure 4-11 Voltage regulator P120

4.2.6 Differential Amplifier (optional, ref. 331Dx 07899)

Differential amplifier consist of three video amplifier, external synchronizing amplifier and composite synchronizing amplifier. And, Video amplifier is composed of the input buffer amplifier, differential amplifier, constant current circuit and output buffer amplifier.

a. Input buffer amplifier.

Video input signals are sent to Transistor Q151 through the AC coupling with Capacitor C151, C152 and Transistor Q154 through the AC coupling with capacitor C153, C154. These signals are kept at high impedance and the Emitter Follower of Transistor Q151, Q154 form the connection with next differential amplifiers.

b. Differential amplifier.

This circuit consist of Transistor Q152 and Q153, reduce common mode noise by differential operation and generate single-end signal. The gain of differential amplifier is shown following

Diffential Amplifier Gain (Gv)

$$Gv = \frac{R165}{R159+R161} \times \frac{R101}{R166+R101}$$

$$\fallingdotseq 1$$

c. Constant current circuit.

Constant current circuit is composed of Transistor Q155 and Register R164. This circuit supply a constant current to differential amplifier.

d. External synchronizing amplifier.

External Sync. signal are sent to Transistor Q421 through the AC coupling with Capacitor C421, C422 and Transistor Q422 through the AC coupling with Capacitor C423, C424. This circuit reduce common mode noise and generate single-end signal. The gain (GET) of this circuit is shown following.

$$G_{ET} = \frac{R425}{R426}$$

$$\fallingdotseq 0.5$$

e. Composite synchronizing amplifier.

Composite synchronizing signal was generated by the green video amplifier and is sent to Transistor Q423, Q424 through the AC coupling with Capacitor C426. The gain (Gcp) of this circuit is shown following

$$Gcp = \frac{R430}{R431}$$

$$\fallingdotseq 1.5$$

5. ADJUSTMENT AND TEST

5.1 FRONT PANEL

5.1.1 Degaussing

Degaussing will be required when misconvergence or poor color purity appear on the screen. This monitor is equipped with a built-in degaussing coil and an internal shield, however, use of external hand-held degaussing coil may be necessary for other parts like cabinet, which may have been magnetized during handling and transportation.

a. Built-in degaussing

By depressing the DEGAUSS switch, located second from the left on the front panel of the unit, CPT and its internal shield will be degaussed. Keep the switch depressed until the color distortion disappears, which is highly recommended at the time of installation.

b. External degaussing

Turn on the hand-held degaussing coil at a distance of 3 feet (1m) from the screen. Move it to within about 4 inches (10cm) of the top and side of the screen. Make a slow circular movement a few times. Then move the coil gradually away from the screen and turn off the coil.

5.1.2 Contrast

CONTRAST control on the front panel increases or decreases the AC gains of red, green and blue signals. By turning clockwise, AC gain (contrast) of three colors is increased.

5.1.3 Brightness

BRIGHTNESS control increases or decreases the DC level of red, green and blue signals (brightness of raster of red, green and blue). By turning clockwise, DC level of three colors is increased.

5.2 DRAWER UNIT (PC BOARD) (Figure 5-1)

5.2.1 Deflection Circuit

a. Horizontal hold (VR502)

Horizontal hold potentiometer H. HOLD (VR502) adjusts the horizontal deflection frequency. When picture is unstable and moves to the left, turn H. HOLD counterclockwise. While picture moves to right, turn H. HOLD clockwise. Still, picture remains unstable after above adjustment, turn AC GAIN potentiometer VR501 counterclockwise.
If AC GAIN adjustment does not work well, turn AC GAIN clockwise and repeat the above adjustment.

b. Vertical hold (VR602)

Vertical hold potentiometer V. HOLD (VR602) adjusts the vertical deflection frequency. When picture is not stable and moves downwards, turn V. HOLD clockwise. While picture moves upwards, turn V. HOLD counterclockwise.

c. Horizontal centering (VR505)

Horizontal centering potentiometer H. CENTER (VR505) adjusts the horizontal center of picture.
When picture is displayed to the right of the center, turn H. CENTER counterclockwise by moving picture to the left. Turning H. CENTER clockwise moves picture to right.

d. Vertical centering (VR604)

Adjust the horizontal center of picture.
Rotate the V. CENTER potentiometer (VR604) counterclockwise when the picture is displayed above the center. Rotate the potentiometer clockwise when picture is displayed below the center.

e. Horizontal sync separate (VR454)

Adjust the potentiometer to get stable horizontal sync from composite sync signal (H and V).

f. Horizontal blanking (VR452)

Adjust the potentiometer to erase horizontal retrace line, if necessary. By turning counterclockwise, the raster of left side is disappeared gradually.

g. Vertical blanking (VR453)

Adjust the potentiometer to erase vertical retrace line, if necessary. By turning counterclockwise, the raster of upper side is disappeared gradually.

h. Height (VR601)

Height control potentiometer Height (VR601) adjusts the vertical size of picture.
Turn Height clockwise to make picture height increase.

i. Width (VR503)

Width control potentiometer Width (VR503) adjusts the horizontal size of picture.
Turn Width clockwise to make picture width increase.

j. Side pincushion (VR504)

Side pincushion control potentiometer VR 504 adjusts the vertical lines to be straight and unbowed. By turning Side pincushion potentiometer clockwise counterclockwise, the side distortion of the picture is corrected.

k. Horizontal linearity (L602)

Horizontal linearity inductor L602 adjusts the horizontal linearity of the picture. By turning the inductor clockwise or counterclockwise, the interval of horizontal dots is adjusted to make the horizontal lines straight.

l. Vertical linearity (VR603)

Vertical linearity potentiometer VR 603 adjusts the vertical linearity of the picture. By turning the potentiometer clockwise or counterclockwise, the interval of rasters is adjusted to make the vertical lines straight.

m. Horizontal phase (VR455)

Adjust the potentiometer to make picture to be centered within raster. By rotating the potentiometer clockwise, the picture is displayed to left of the center.

5.2.2 Video Circuit

a. Background brightness control

Background brightness control potentiometers VR101, VR201 and VR301 (for RED, GREEN and BLUE, respectively) make fine adjustments in the brightness of the background.
By turning the potentiometer clockwise, the back-

ground becomes to be more bright.

b. Brightness gain control

Brightness gain control potentiometers VR102, VR202 and VR302 (for RED, GREEN and BLUE, respectively) are used for adjusting the different brightness gains in red, green and blue signals.

c. Contrast control

Contrast control potentiometers VR104, VR204 and VR304 (for RED, GREEN and BLUE, respectively) adjust the input signal gains different in red, green and blue signals.

d. Beam switch

Beam on/off switches SW101, SW201 and SW301 (for RED, GREEN and BLUE, respectively) are used for turning the beams of red, green or blue on and off.

e. White balance adjustment

Unit delivered from factory, does not require white balance adjustment when input video is nominal voltage.

When input video deviates from nominal voltage, readjustment of white balance may be required.

Proceduce

- Display solid white video pattern.
- Turn CONTRAST control knob on front panel counter-clockwise to minimum.
- Turn BRIGHTNESS control knob on front panel clockwise to maximum.
- Adjust RBG brightness gain pots VR102, 202, 302 to get white.
- Turn BRIGHTNESS control knob on front panel counter-clockwise until raster can be slightly seen.
- Adjust RGB background pots VR101, 201, 301 to get Grey.
- Turn BRIGHTNESS control knob on front panel counter-clockwise until raster disappear.
  STOP turning BRIGHTNESS control know just after raster disappears.
- Display any alphanumeric. (Color shall be white)
- Turn CONTRAST control knob on front panel clockwise until just before picture becomes blurred.
- Adjust RGB gain pots VR104, 204 and 304 to get white.

Confirm that picture remains white regardless of range of CONTRAST control knob.

WHITENESS BALANCE ADJUSTMENT

1. Pull the drawer out to expose the adjustment potentiometer on the PWA.
2. Refer to the attached PWA diagram for pot location and names.
3. Use the keyboard to display a solid white raster by using RGB Background.
4. Use a non-metalic adjuster on all of the following pot adjustments.
5. Display a solid white raster pattern.
6. Turn the CONTRAST control knob on the front panel fully counter-clockwise.
7. Turn BRIGHTNESS control knob on the front panel clockwise just below the level where the raster begins to bloom.
8. Turn the RGB Background (3 pots), Brightness (3 pots), and Gain pots (3 pots) to their approximate mechanical center.
9. Adjust the RGB brightness gain pots VR102, 202, 302 to obtain a pure white level.
10. Turn the BRIGHTNESS control knob on the front panel counter-clockwise until the roster can be slightly seen.
11. Raise the level of the brightness as needed to maintain the same level of intensity during the adjustments. Adjust RGB background pots VR101, 201, 301 to obtain a grey raster level.
12. Turn BRIGHTNESS control knob on the front panel counter-clockwise until the raster disappears. Stop turning BRIGHTNESS knob just after the raster disappears.
13. Display any alphanumeric white video pattern. Increase contrast as necessary.
14. Turn contrast control knob on the front panel clockwise until just before the displayed video becomes blurred (saturated).
15. Adjust the RGB gain pot VR104, 204, 304 to obtain a pure white video level.
16. Confirm that the video remains white in the range of the CONTRAST knob. The high end of the CONTRAST range to be considered here shall be just before any blurring (saturation) occurs. If required, repeat Step 15, except at lower contrast levels as required using the front panel knob to adjust the contrast.

After the unit is installed and power is applied and a video image is input, the unit should display a stable image if the frequency is adjusted properly. If not, the unit will display an unstable image and the following adjustments should be made to stabilize the picture: (Use a non-metalic adjuster to make all adjustments.)

1) Pull the drawer out to expose the adjustment potentiometers on the PWA.
2) Refer to the potentiometer diagram in the left, front side of the drawer.
3) Turn the brightness level up until the raster is visible.
4) Turn the contrast level up until the video appears superimposed on the white raster.
5) Adjust the V-HOLD potentiometer until the vertical portion of the image stabilizes (syncs in).
6) Adjust the H-HOLD potentiometer until the horizontal portion of the image stabilizes (syncs in).
7) Adjust the H-PHASE potentiometer until the video is stable and centered on the raster. Note a very light line appears and disappears on the right side of the raster perimeter as the potentiometer

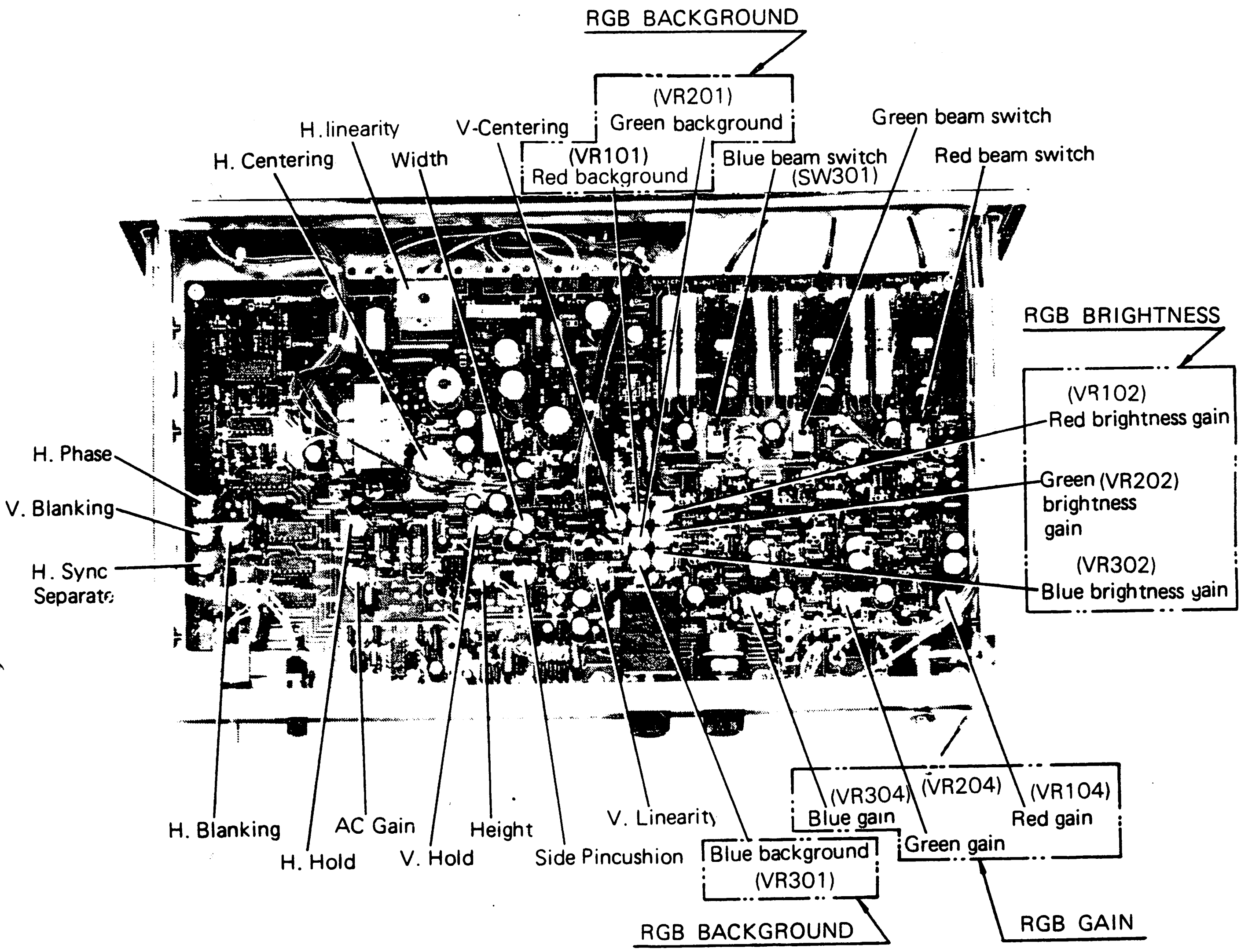


Figure 5-1 Control Drawer

5.3 POWER UNIT (Figure 5-2)

5.3.1 Low Voltage (P120, P6.3)

The variable resistors ② and ④ adjust the +120V and +6.3V power supplies, respectively. By turning clockwise, the power supplies are raised.

5.3.2 High voltage (P680)

The variable resistor VG2 ⑥ adjusts the screen grid voltage. This voltage should be adjusted be-
This voltage should be adjusted between 670V and 690V for 19" CPT
checking with check point ⑤.

5.3.3 Over current detection

The variable resistor OC ③ adjusts the set value which detects over current.
At the normal use, this resistor should be set at the most clockwise position.

5.3.4 Focusing

The variable resistor FOCUS VR ① adjusts the focus of CPT.
Set the best focus position.

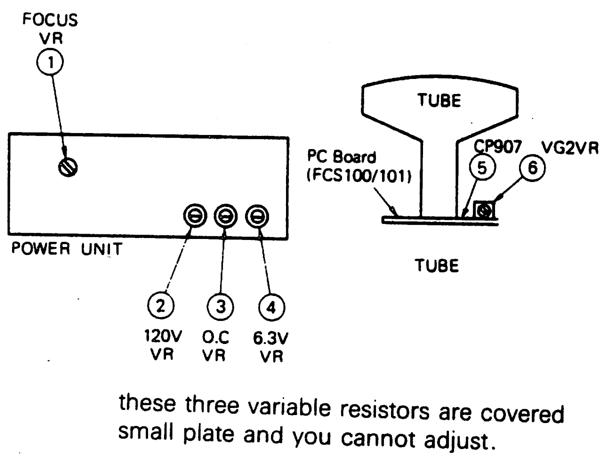


Figure 5-2 Arrangement for Controls and Check Pins

5.4 TUBE

This tube is of an in-line gun type, and normally needs no adjustment (of purity, convergence, for example) by the user. If any adjustment is required of this tube, it is requested to return it to the factory without trying to adjust it by yourself.
Top views of the monitor and magnetic ring alignment are shown in Figures 5-3 and 5-4.

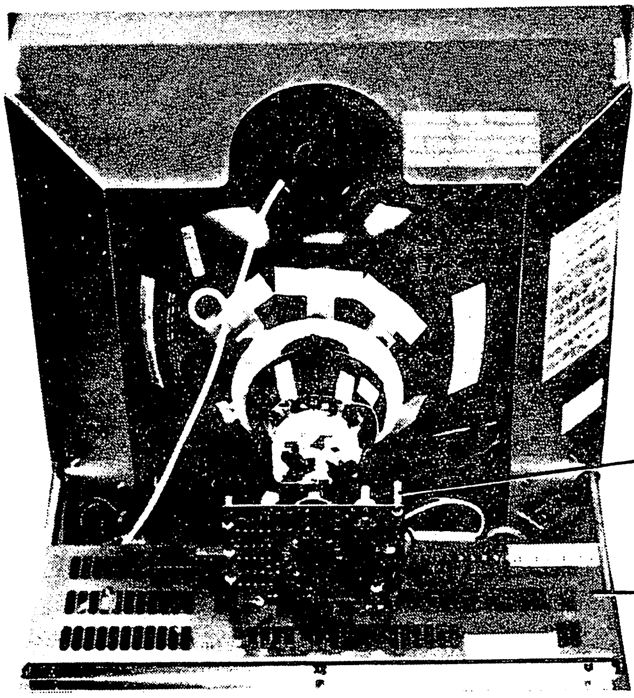


Figure 5-3 Top view of Monitor

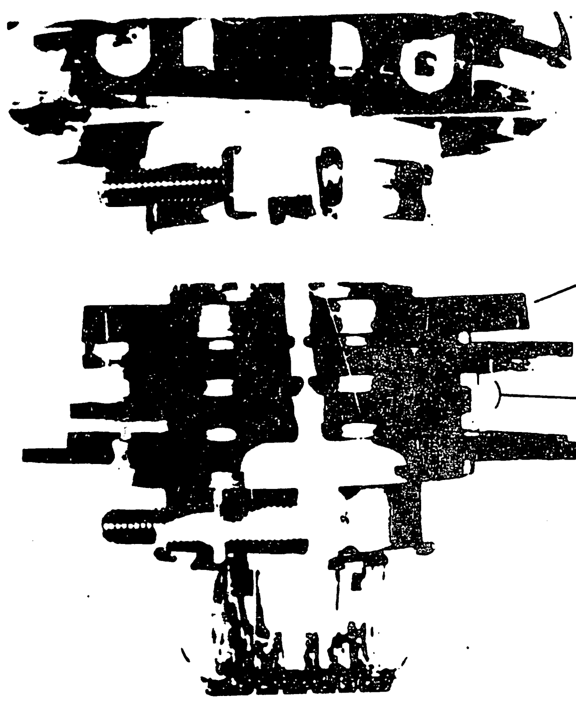


Figure 5-4 Magnetic Rings

5.4.1 Purity

a. Purity adjustment for vertical center

Adjust the HEIGHT control to get the minimum height of the picture which will form a narrow horizontal band in the center of the screen.

1) Do not turn the purity magnet if the horizontal band coincides with the horizontal line in the center of the screen as shown in Figure 5-5. In this

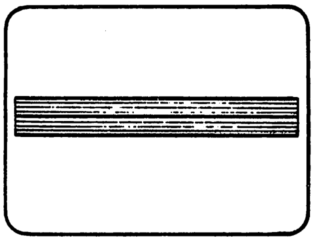


Figure 5-5

case, the purity magnet knobs should be set at 3 o'clock and 9o'clock, respectively, as shown in Figure 5-6.

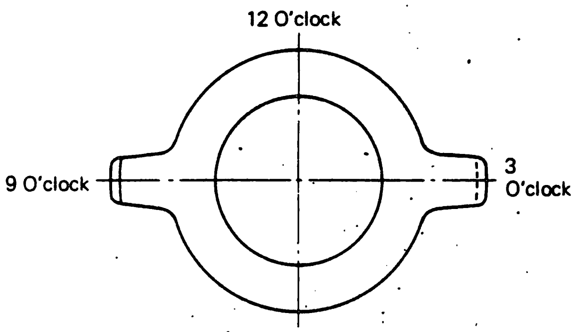


Figure 5-6

2) If the horizontal band does not coincide with the horizontal line in the center of the screen, move each set of purity magnet knobs so that one set points to 12 o'clock and the other to 6 o'clock as shown in Figure 5-7.

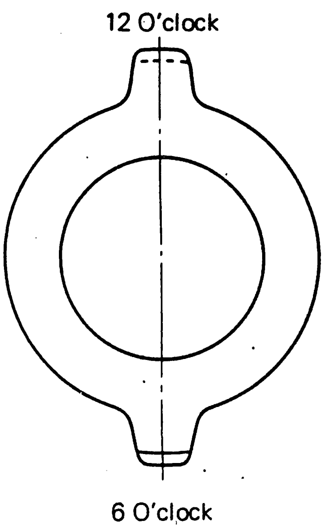


Figure 5-7

Then, gradually adjust them, making sure that the angles remain equal, until the horizontal band coincides with the horizontal center line as shown in Figure 5-8.

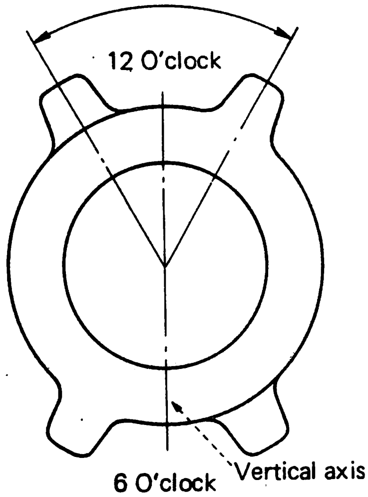


Figure 5-8

b. Purity adjustment at the screen center

1) Put a monoscope pattern or blanking raster on the screen with a single beam from the green electron gun.
2) Move the deflection yoke backward or forward along the tube axis, until a green ball appears on the screen.
3) If the horizontal band coincides with the horizontal line in the center of the screen as shown in Figure 5-5, move the purity magnet knobs so that one set points to 3 o'clock and the other to 9 o'clock, keeping the angles equal (Figure 5-9),

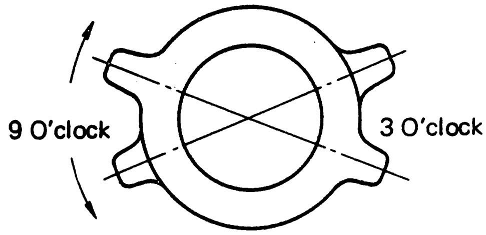


Figure 5-9

until the green ball should be in the center of the screen as shown in Figure 5-10.

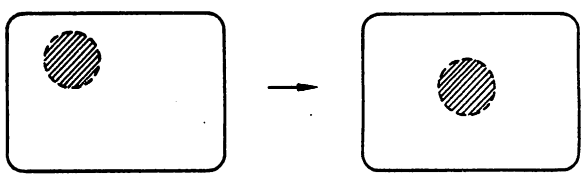


Figure 5-10

4) If the horizontal band does not coincide with the horizontal line in the center of the screen, perform the adjustment in a. 2). Then, move both sets of knobs simultaneously, keeping the angle equal,

until the green ball is in the center of the screen as shown in Figure 5-10.

5) Use a magnifier to make sure that the electron beam is striking the exact center of the screen.

c. Purity adjustment for the entire screen

1) Loosen the screw of the deflection yoke and gradually move it backward along the tube axis until the entire screen becomes green. If the deflection yoke is closely posistioned to the neck, move it forward as close as posible to the funnel. Then, using a magnifier, check to make sure that the electron beam is squarely striking the phosphor dots on all sides of the screen.

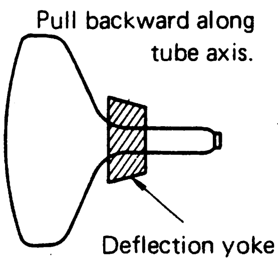


Figure 5-11

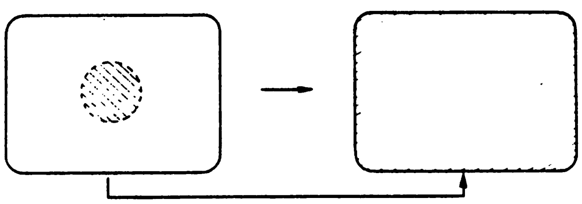


Figure 5-12

2) Adjust the purity of the other two colors (Red and Blue), in the same way.
3) Recheck and readjust the vertical center of the horizontal band and repeat the same operation according to the same steps mentioned in c. 1) and c. 2).
4) Tighten the screw of the deflection yoke with a torque screwdriver set at a torque of 14kg·cm.

5.4.2 Static Convergence

a. Adjust the cathode current so that the width of the crosshatch lines (Red, Green and Blue) is from 6 to 8 phosphor dots.

b. Adjust focus voltage for the best focus.

c. Switch the green signal to the red and blue patterns, and repeat the same operations.

d. Carefully watch the intersection of cross-hatch pattern at the center of the screen and gradually move the knobs of two 4-pole magnets until there is no misconvergence between red and blue vertical lines as shown in Figure 5-13.

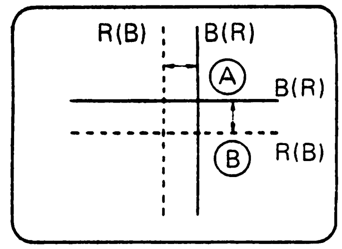


Figure 5-13

e. Keep the angles of two 4-pole magnets constant and gradually move the knobs simultaneously until there is no misconvergence between red and blue horizontal lines as shown in figure 5-13.

f. Put the R, G and B cross-hatch pattern on the screen again.

g. Gradually move the kobs of two 6-pole magnets until there is no misconvergence among the red, green and blue vertical lines at the center of the screen as shown in Figure 5-14.

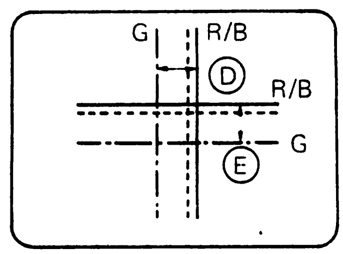


Figure 5-14

h. Then, keeping the angle of two 6-pole magnets constant, gradually move them at the same time until there is no misconvergance among the red, green and blue horizontal lines at the center of the screen as shown in Figure 5-14.

i. Repeat the above steps (d. through h.) to adjust the convergence at the center of the screen.

Reference: Changes in Beam Direction by Purity Magnet

This section describes the changes in beam direction caused by moving the purity magnet, 4-pole magnets and 6-pole magnets.

The correction for static convergance and color purity required in this tube can be realized by permanent magnets. The purity magnets consist of magnetized metal rings.

Two types of magnets are recommended for static convergence, one is a 4-pole magnet which moves the outside beams equally in opposite directions and the other is a 6-pole magnet which moves the outside beams equally in the same direction, as shown in Figure 5-15 and Figure 5-16, respectively.

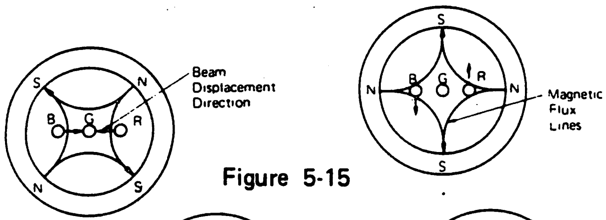


Figure 5-15

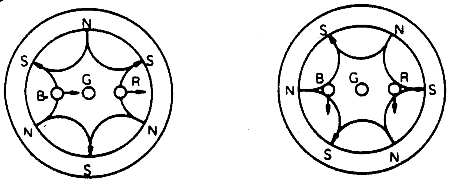


Figure 5-16

Barium ferrite magnets with a permeability close to 1.0 are recommended to avoid interference between the magnets and the deflection yoke.
Both the 4-pole and 6-pole magnets have no magnetic field at their center so the center electron beam is unaffected. These magnet can be used to converge the outside beams to the center beam without substantially moving the center beam, and thus no magnets are required in the electron gun itself. Consequently, the beams can be converged with practically no interference and a minimum amount of bending of the beams. Therefore, there is very little distortion in the shape of the individual beams.

5.4.3 Dynamic Convergence

a. Tilt the deflection yoke upward or downward by turning the adjustment handle of the deflection yoke so that the misconvergence between the red and blue vertical cross-hatch lines at 1 and 1', and that between the red and blue horizontal cross-hatch lines at 2 and 2', are minimize as shown in Figure 5-17.

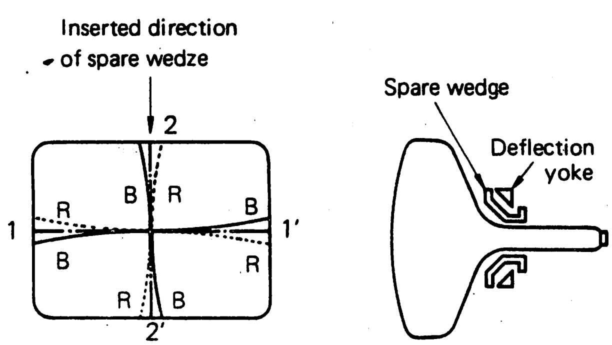
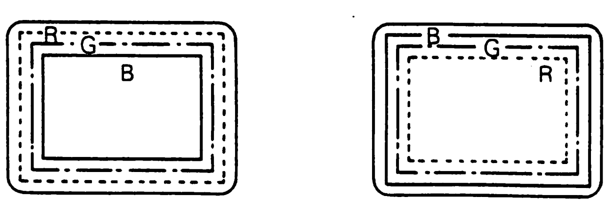


Figure 5-17

b. After making the adjustment in step a., residual mis convergence pattern will be either (a) or (b) as shown in Figure 5-18.



(a) (b)

Figure 5-18

If the red cross-hatch line deviates outside the blue cross-hatch line in the peripheral area as shown in Figure 5-18 (a), move the deflection yoke counterclockwise (as viewed from the top of the tube) by rotating the adjustment handle of the deflection yoke, in order to minimize the misconvergence between the red and blue horizontal lines at the top and the bottom of the screen as well as the misconvergence between the red and blue vertical lines at the left and right of the screen.
If the blue line deviates outside the red line as shown in Figure 5-18 (b), move the deflection yoke clockwise (as viewed from the top of the tube).

c. Repeat steps a. and b. above to adjust the convergence.

d. After convergence is adjusted, put the blanking signal for making the white raster on the screen. Then, check the purity and vertical centering position*1 with the tube placed in a north-south direction. (change the tube direction to an east-west direction*2, and perform degaussing respectively).
*1: The equivalent magnetic field can be used. In this case, check the purity without changing the tube direction.
*2: When the equivalent magnetic field is applied, degaussing is necessary.

5.4.4 Fixing the Magnets

a. Be careful not to move the 4-pole, 6-pole and purity magnets, and fix the magnet assemblies with respective locking ring.

b. Apply white paint on the magnet assemblies in order to prevent them from moving.

5.4.5 Final Fixing

a. A silicone adhesive sealer should be put on the wedge before it is inserted as shown in Figure 5-19.

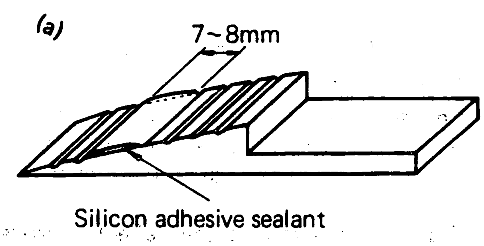


Figure 5-19

b. Taking care not to move the deflection yoke, insert three wedges at an angle of approximately 120° at a strength of 6 to 8 kg·cm as shown in Figure 5-20.

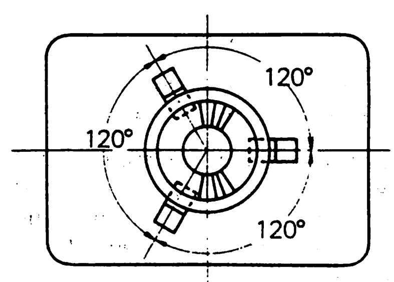


Figure 5-20

c. After inserting the wedge, raise the end of each wedge and drip the silicone adhesive sealer between the wedge and the funnel as shown in Figure 5-21.

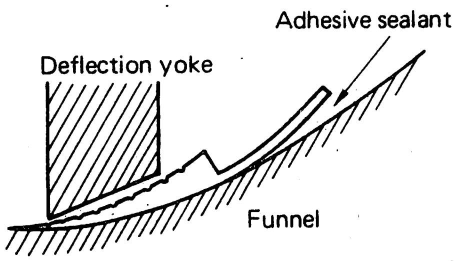


Figure 5-21

d. Apply a piece of glass fiber tape to each wedge as shown in Figure 5-22.

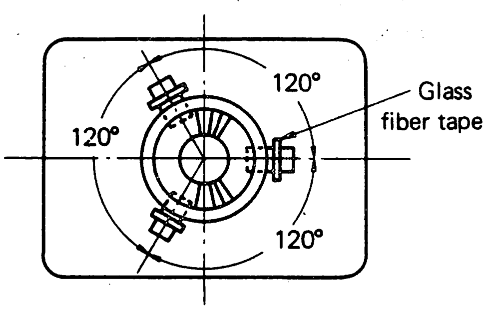


Figure 5-22

5.5 REPLACEMENT AND ASSEMBLY

5.5.1 PC Board Unit

The following procedure describes the removal of the PC Board Unit.

1) Remove the AC power connector CN002 and the signal connector CN003 at the back of the monitor. (Page 41 Figure 5-3)
2) Insert the key into the key hole on the front panel of the monitor, turn the key to the "OPEN" position and pull out the drawer.
3) Remove the eight connectors, H-COIL, PS-CONT, DC-PS, V-COIL, BLK-CTL, B-OUT, G-OUT and R-out, inside the drawer.
4) Remove the drawer by pulling it forward.

To install the drawer, reverse the previous procedure from 1) to 4).

5.5.2 Power unit

The following procedure describes the removal of the power unit.

1) Remove the anode cap from the tube by pulling up its vinyl cover and twisting it to the right.
2) Remove the three connectors, CN801, CN803, CN804, at the back of the power unit. (Page 20 Figure 2-7)
3) Remeve the screw which fixed the Silicone tube and slide the Silicone tube to upper side of focus lead and then disconnect focus connector.
4) Remove the two screws at both side of the unit which fasten the unit of the base.
5) Remove the power unit by pulling it up.

To install the unit, reverse the previous procedure from 1) to 5).

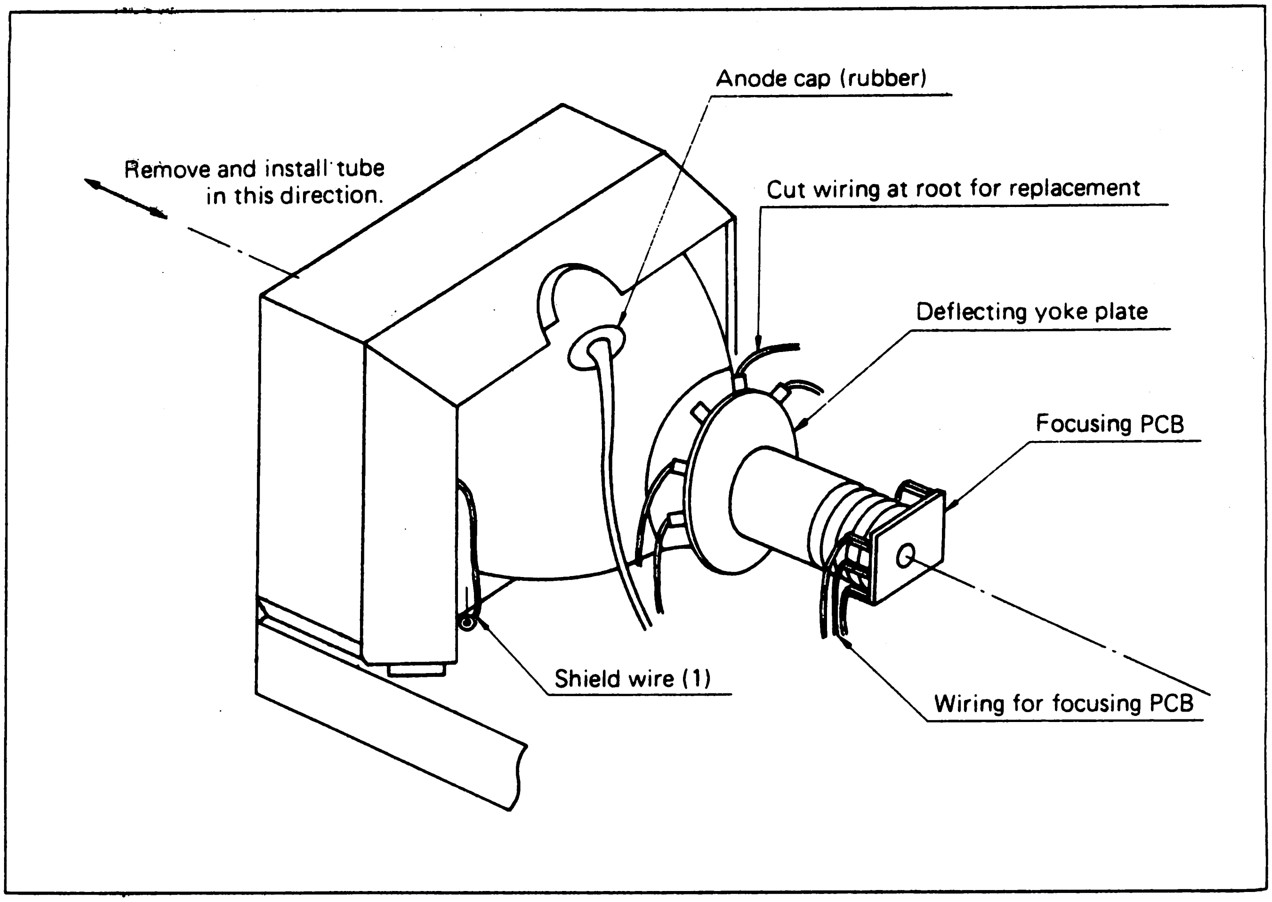
5.5.3 Tube

a. Precaution

1) The tube is made of glass, and therefore proper care should be taken when removing, installing and carrying it.
2) Avoid touching a focusknob on the power supply unit when removing and reinstating the tube.
3) Be sure to remove the wiring and anode cap at the rear of the tube before removing the tube.
4) Avoid contact with the anode cap because of high voltage involved.
5) Care should be taken not to damage the tube face.

b. Procedure

1) Select a new tube and focusing PCB (FCS100) as designated in the specifications. (When laying the tube down, be sure to place it on a special support.)
2) Remove the focusing PCB from the rear of the tube. Slide the Silicon tube to upper side of focus lead and then disconnect focus connector. (Page 45 figure 5-23)
3) Cut the wiring of the deflecting yoke plate (located at the rear of the tube) at its root.
4) Remove the anode cap on the back of the tube. (Note: proper care should be taken since a high voltage can remain after the power has been turned off.)
5) Disconnect the shield wire from the back of the tube.
6) Turn out four tube holding screws on the front and pull the tube forward.
7) Remove the shield wire from the tube and install it on the new tube.
   Note, however, that if tube sizes differ, then an appropriate shield wire must be selected.
8) Install the new tube in place and fasten the shield earth wire.
9) Replace the focusing PCB removed in step 2) with a new one. (Note that at this time, the wiring should be in original position.)
10) Install the focusing PCB on the tube.
11) Connect the wiring which was cut in step 3) to the newly installed tube.
12) Attach the anode cap.
13) Position the tube accurately using a special tool.



5.6 OPTIONS

5.6.1 Mechanical Options

Cabinet type —— A rack-mount type monitor installed in a cabinet, permitting the main body to be places on a desk.

Rack-mount type with slide —— A rack-mount type monitor fitted with a slide.

5.6.2 Tube Options

Long-persistence phosphor tube —— A Tube coated with a type of phosphor that gives longer persistence than normal type. The table below shows the comparison between them:

	Normal type (Approx.)	Long-persistence type (Approx.)
Red	0.2mS	50mS
Green	0.2mS	150mS
Blue	0.5mS	0.5mS

6. MAINTENANCE

This chapter describes both preventive and corrective maintenance. Preventive maintenance is mainly concerned with monitor cleaning.
Corrective maintenance deals with fault isolation in reference to the waveforms.
Before beginning maintenance work, always make sure that AC power is turned off.
Maintenance personnel should refer to this chapter when carrying out maintenance procedure.

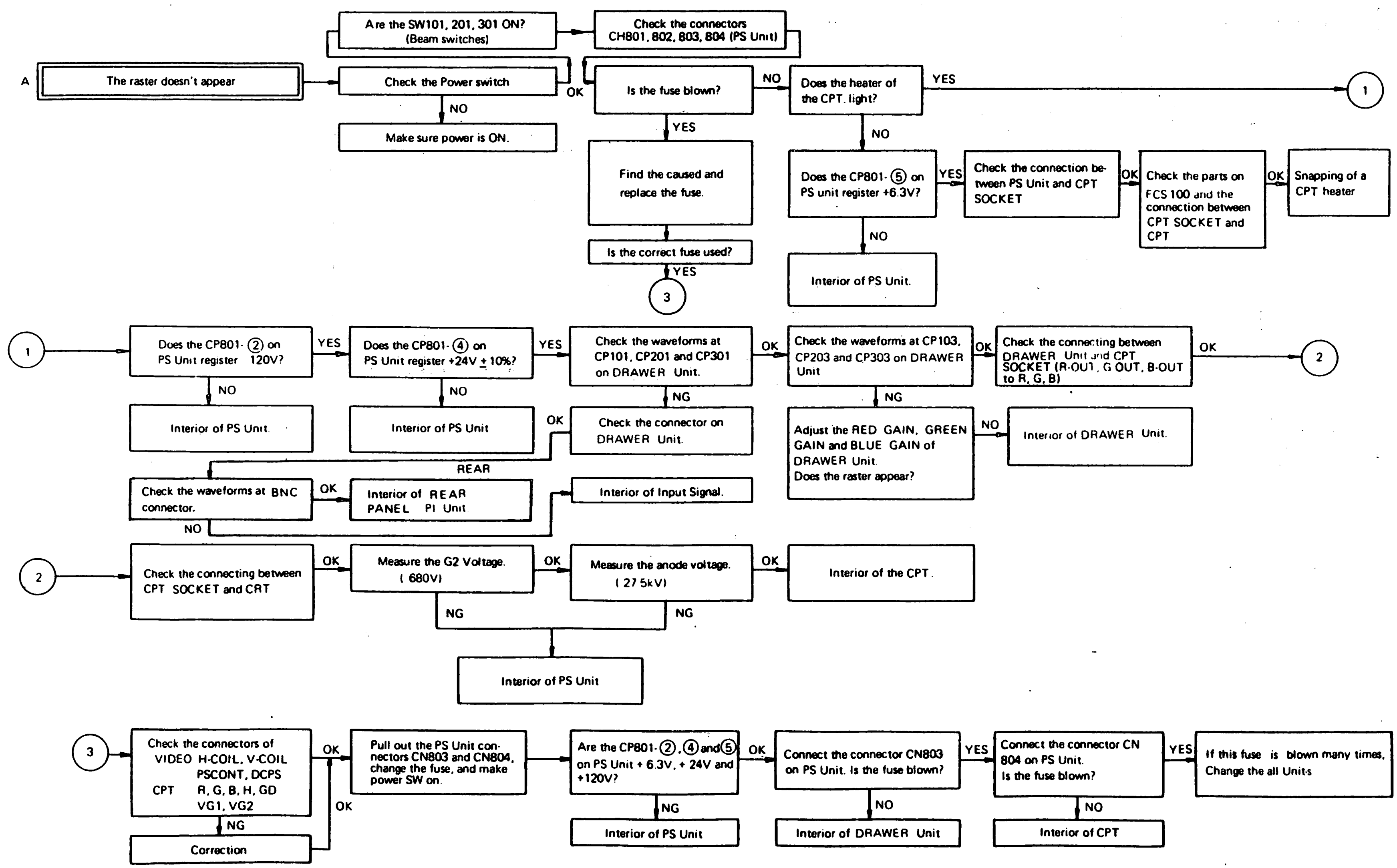
6.1 PREVENTIVE MAINTENANCE

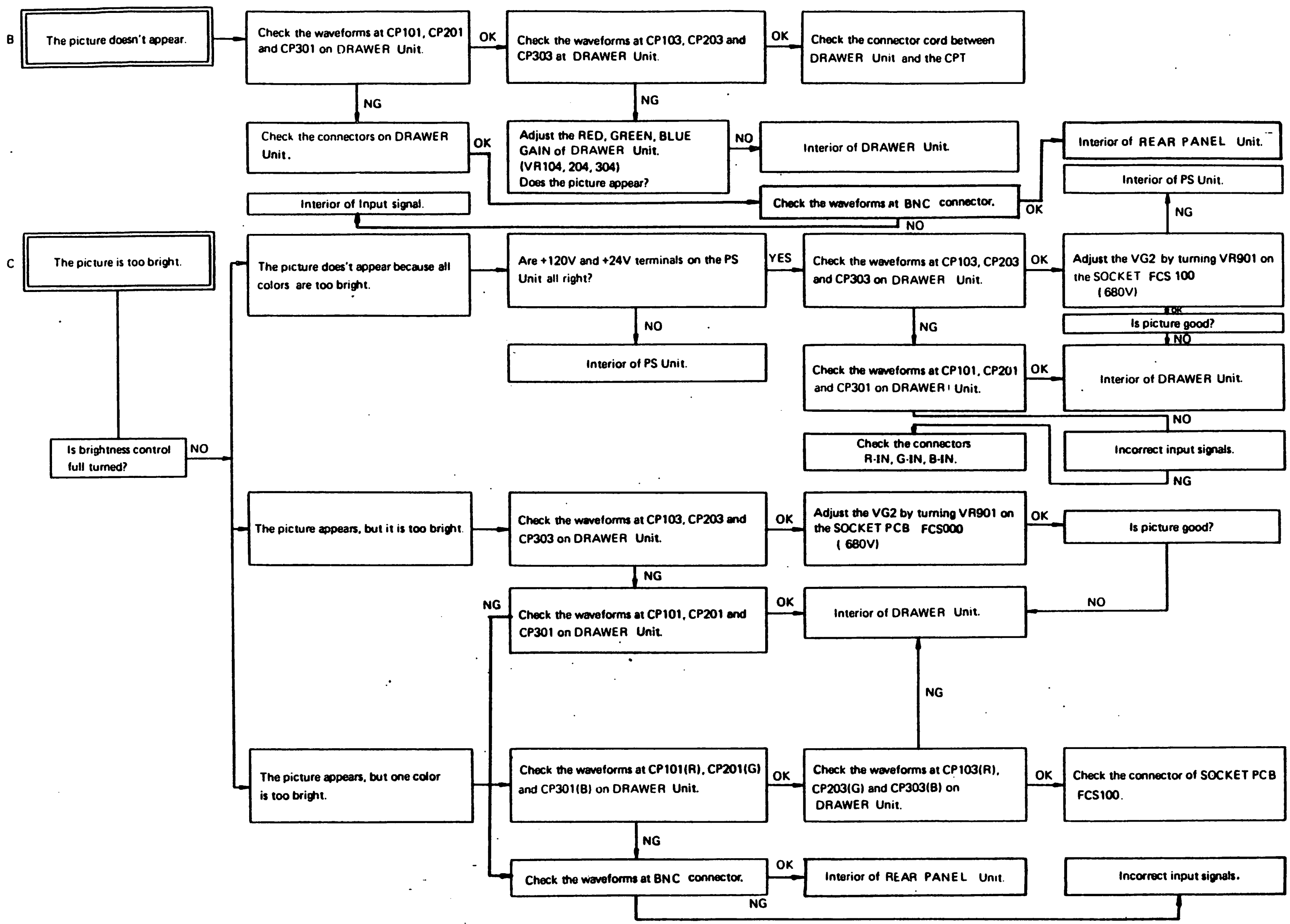
Preventive maintenance consists of cleaning the inside of the chassis, cleaning the screen face and checking the cable connections.
Environmental conditions will determine how often cleaning has to be done.
Maintenance personnel are urged to refer to Section 2.1 "Installation Precautions".

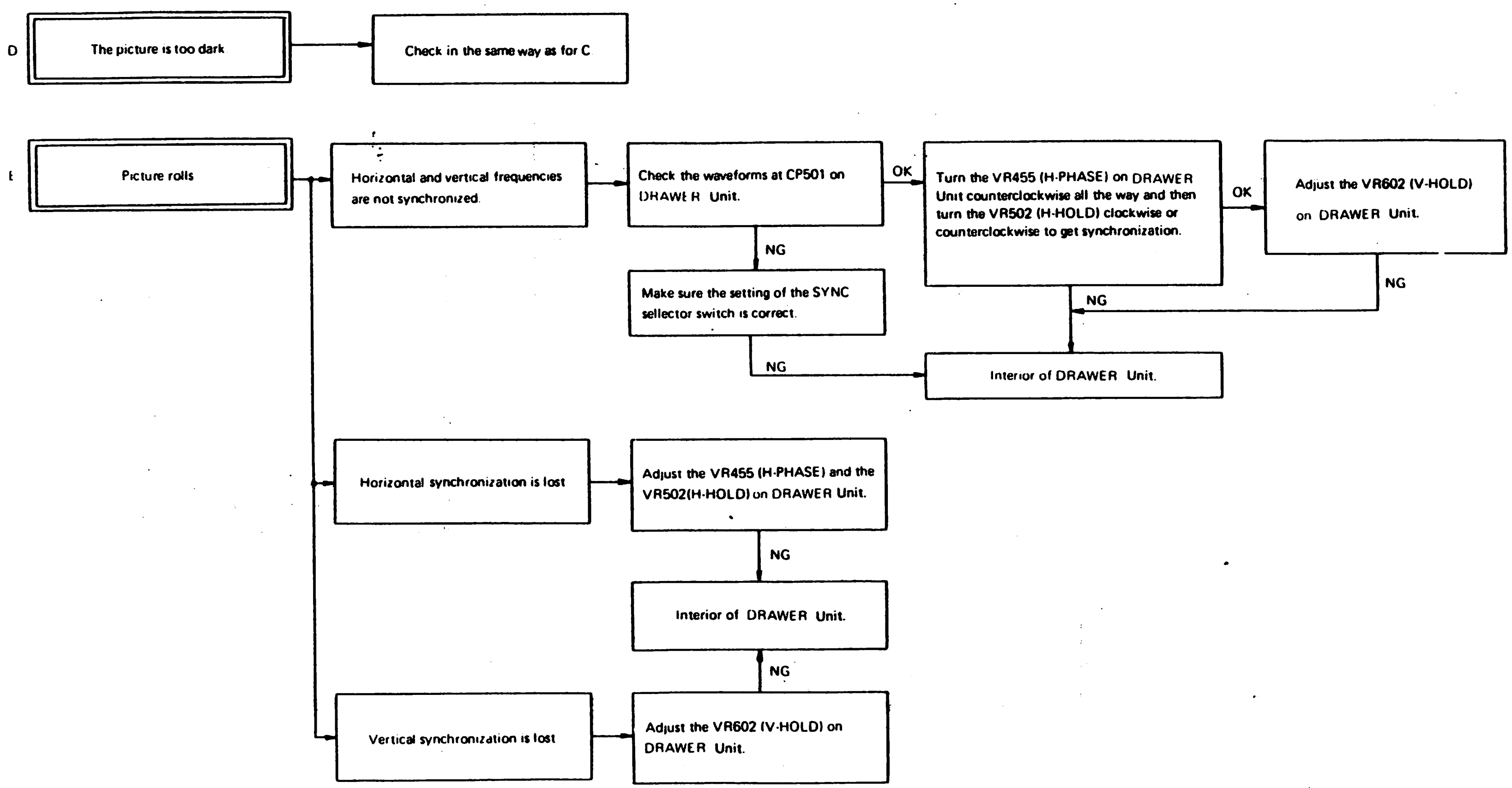
6.2 CORRECTIVE MAINTENANCE

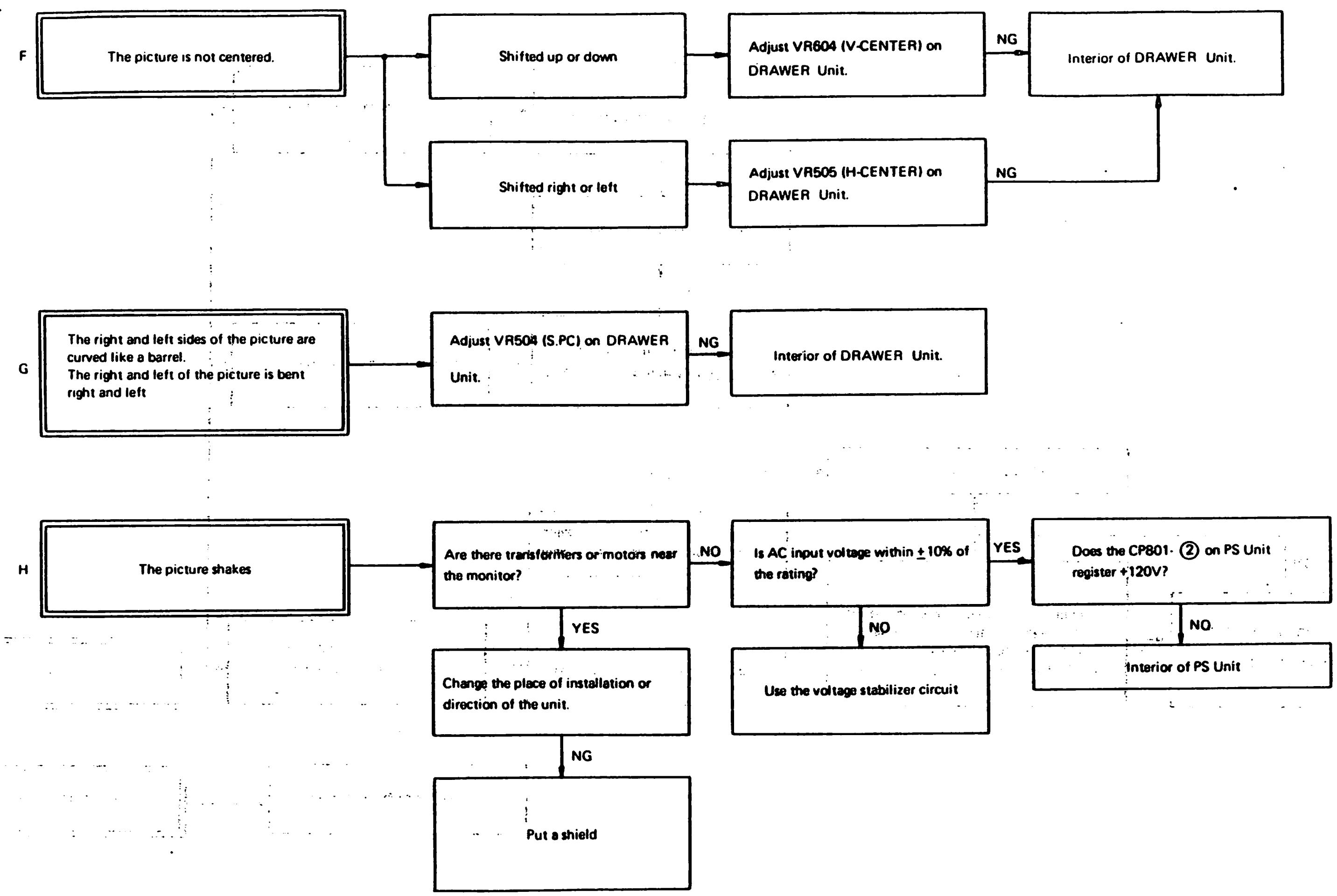
Corrective maintenance consists of the fault isolation as described in the following flow charts and Section 5 "ADJUSTMENT AND TEST".
When replacing the power supply unit, the printed circuit board and the component parts, it may be necessarry to refer to Section 5 "ADJUSTMENT AND TEST".
The fault isolation includes:

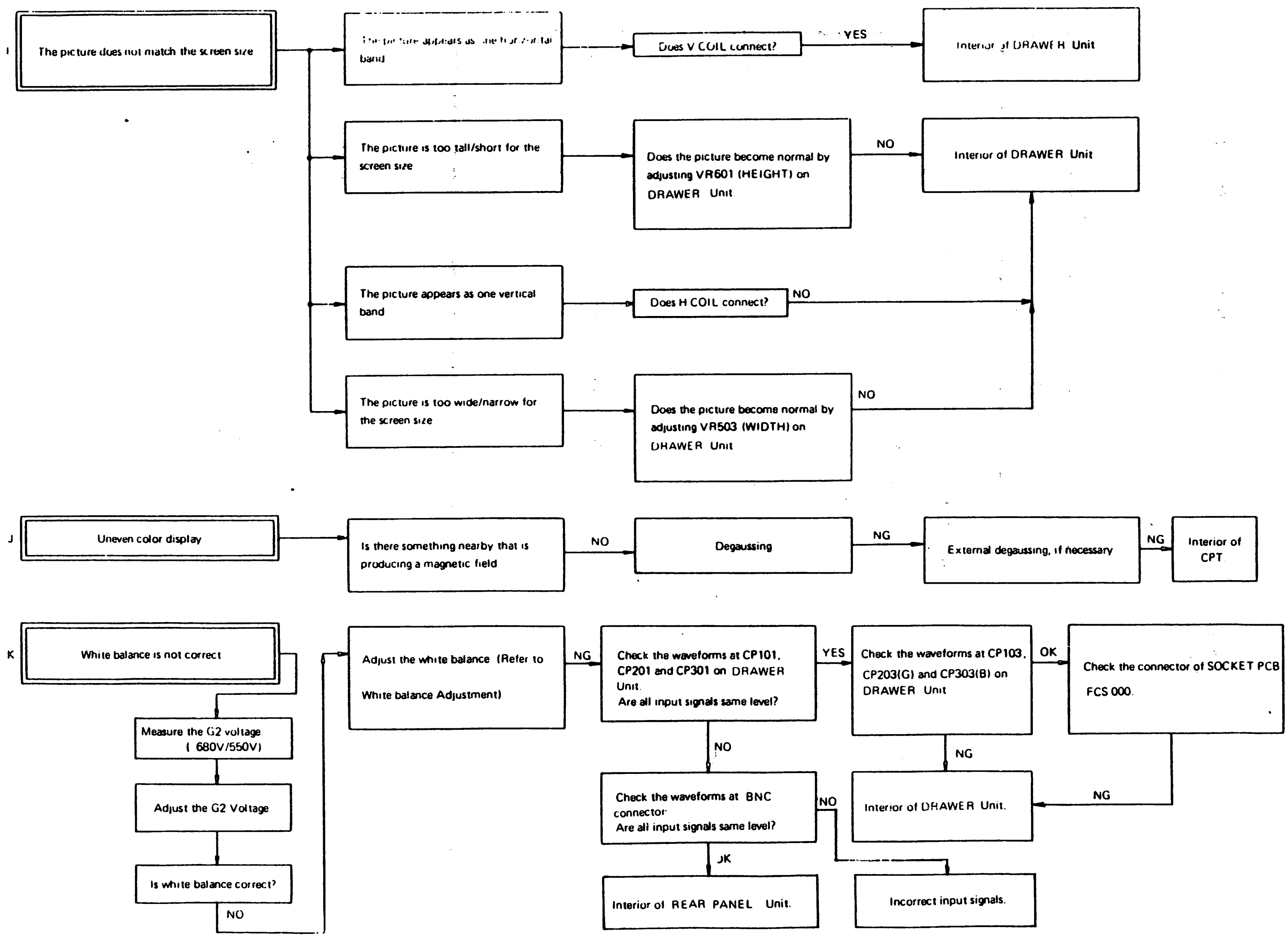
A. Raster doesn't appear.
B. Picture doesn't appear.
C. Picture is too bright.
D. Picture is too dark.
E. Picture rolls.
F. Picture is not centered.
G. Left and right sides of the picture are curved.
H. Picture shakes.
I. Picture does not match the screen size.
J. Picture color is uneven.
K. White balance is incorrect.


A
The raster doesn't appear
Check the Power switch
NO
Make sure power is ON.
OK
Are the SW101, 201, 301 ON? (Beam switches)
Check the connectors CH801, 802, 803, 804 (PS Unit)
Is the fuse blown?
YES
Find the caused and replace the fuse.
Is the correct fuse used?
YES
3
NO
Does the heater of the CPT. light?
YES
1
NO
Does the CP801-⑤ on PS unit register +6.3V?
NO
Interior of PS Unit.
YES
Check the connection between PS Unit and CPT SOCKET
OK
Check the parts on FCS 100 and the connection between CPT SOCKET and CPT
OK
Snapping of a CPT heater
1
Does the CP801-② on PS Unit register 120V?
NO
Interior of PS Unit.
YES
Does the CP801-④ on PS Unit register +24V ± 10%?
NO
Interior of PS Unit
YES
Check the waveforms at CP101, CP201 and CP301 on DRAWER Unit.
NG
Check the connector on DRAWER Unit.
OK
REAR
Check the waveforms at BNC connector.
OK
Interior of REAR PANEL PI Unit
NO
Interior of Input Signal.
OK
Check the waveforms at CP103, CP203 and CP303 on DRAWER Unit
NG
Adjust the RED GAIN, GREEN GAIN and BLUE GAIN of DRAWER Unit. Does the raster appear?
NO
Interior of DRAWER Unit.
OK
Check the connecting between DRAWER Unit and CPT SOCKET (R-OUT, G OUT, B-OUT to R, G, B)
OK
2
2
Check the connecting between CPT SOCKET and CRT
OK
Measure the G2 Voltage. (680V)
OK
Measure the anode voltage. (27.5kV)
OK
Interior of the CPT.
NG
NG
Interior of PS Unit
3
Check the connectors of VIDEO H-COIL, V-COIL PSCONT, DCPS CPT R, G, B, H, GD VG1, VG2
NG
Correction
OK
OK
Pull out the PS Unit connectors CN803 and CN804, change the fuse, and make power SW on.
Are the CP801-②, ④ and ⑤ on PS Unit + 6.3V, + 24V and +120V?
NG
Interior of PS Unit
OK
Connect the connector CN803 on PS Unit. Is the fuse blown?
NO
Interior of DRAWER Unit
YES
Connect the connector CN 804 on PS Unit. Is the fuse blown?
NO
Interior of CPT
YES
If this fuse is blown many times, Change the all Units


B
The picture doesn't appear.
Check the waveforms at CP101, CP201 and CP301 on DRAWER Unit.
OK
Check the waveforms at CP103, CP203 and CP303 at DRAWER Unit.
OK
Check the connector cord between DRAWER Unit and the CPT
NG
Check the connectors on DRAWER Unit.
OK
NG
Adjust the RED, GREEN, BLUE GAIN of DRAWER Unit. (VR104, 204, 304) Does the picture appear?
NO
Interior of DRAWER Unit.
Interior of REAR PANEL Unit.
Interior of PS Unit.
Interior of Input signal.
Check the waveforms at BNC connector.
OK
NO
NG
C
The picture is too bright.
The picture does't appear because all colors are too bright.
Are +120V and +24V terminals on the PS Unit all right?
YES
Check the waveforms at CP103, CP203 and CP303 on DRAWER Unit.
OK
Adjust the VG2 by turning VR901 on the SOCKET FCS 100 (680V)
OK
Is picture good?
NO
NO
Interior of PS Unit.
NG
Check the waveforms at CP101, CP201 and CP301 on DRAWER Unit.
OK
Interior of DRAWER Unit.
NO
Check the connectors R-IN, G-IN, B-IN.
Incorrect input signals.
NG
Is brightness control full turned?
NO
The picture appears, but it is too bright.
Check the waveforms at CP103, CP203 and CP303 on DRAWER Unit.
OK
Adjust the VG2 by turning VR901 on the SOCKET PCB FCS000 (680V)
OK
Is picture good?
NG
NG
Check the waveforms at CP101, CP201 and CP301 on DRAWER Unit.
OK
Interior of DRAWER Unit.
NO
NG
The picture appears, but one color is too bright.
Check the waveforms at CP101(R), CP201(G) and CP301(B) on DRAWER Unit.
OK
Check the waveforms at CP103(R), CP203(G) and CP303(B) on DRAWER Unit.
OK
Check the connector of SOCKET PCB FCS100.
NG
Check the waveforms at BNC connector.
OK
Interior of REAR PANEL Unit.
Incorrect input signals.
NG


D
The picture is too dark
Check in the same way as for C
E
Picture rolls
Horizontal and vertical frequencies are not synchronized.
Check the waveforms at CP501 on DRAWER Unit.
OK
Turn the VR455 (H-PHASE) on DRAWER Unit counterclockwise all the way and then turn the VR502 (H-HOLD) clockwise or counterclockwise to get synchronization.
OK
Adjust the VR602 (V-HOLD) on DRAWER Unit.
NG
NG
NG
Make sure the setting of the SYNC sellector switch is correct.
NG
Interior of DRAWER Unit.
Horizontal synchronization is lost
Adjust the VR455 (H-PHASE) and the VR502(H-HOLD) on DRAWER Unit.
NG
Interior of DRAWER Unit.
NG
Vertical synchronization is lost
Adjust the VR602 (V-HOLD) on DRAWER Unit.


F
The picture is not centered.
Shifted up or down
Adjust VR604 (V-CENTER) on DRAWER Unit.
NG
Interior of DRAWER Unit.
Shifted right or left
Adjust VR505 (H-CENTER) on DRAWER Unit.
NG
G
The right and left sides of the picture are curved like a barrel.
The right and left of the picture is bent right and left
Adjust VR504 (S.PC) on DRAWER Unit.
NG
Interior of DRAWER Unit.
H
The picture shakes
Are there transformers or motors near the monitor?
NO
Is AC input voltage within ±10% of the rating?
YES
Does the CP801- ② on PS Unit register +120V?
NO
Interior of PS Unit
NO
Use the voltage stabilizer circuit
YES
Change the place of installation or direction of the unit.
NG
Put a shield


I
The picture does not match the screen size
The picture appears as one horizontal band
Does V COIL connect?
YES
Interior of DRAWER Unit
The picture is too tall/short for the screen size
Does the picture become normal by adjusting VR601 (HEIGHT) on DRAWER Unit
NO
Interior of DRAWER Unit
The picture appears as one vertical band
Does H COIL connect?
NO
The picture is too wide/narrow for the screen size
Does the picture become normal by adjusting VR503 (WIDTH) on DRAWER Unit
NO
J
Uneven color display
Is there something nearby that is producing a magnetic field
NO
Degaussing
NG
External degaussing, if necessary
NG
Interior of CPT
K
White balance is not correct
Measure the G2 voltage (680V/550V)
Adjust the G2 Voltage
Is white balance correct?
NO
Adjust the white balance (Refer to White balance Adjustment)
NG
Check the waveforms at CP101, CP201 and CP301 on DRAWER Unit. Are all input signals same level?
YES
Check the waveforms at CP103, CP203(G) and CP303(B) on DRAWER Unit
OK
Check the connector of SOCKET PCB FCS 000.
NG
NG
Interior of DRAWER Unit.
NO
Check the waveforms at BNC connector Are all input signals same level?
NO
JK
Interior of REAR PANEL Unit.
Incorrect input signals.

APPENDIX I

RECOMMENDED SPARE PARTS

The following table contains all service parts available from Honeywell PMSD for the AVMD11/12 Video Monitor, Honeywell Part Number 51107325.

PMSD PART NO.	DESCRIPTION
51107758-001	Video and deflection amplifier printed circuit board.
51107758-002	Differential amplifier module.
51107758-003	Power supply module.
51107758-004	Fuse, 4A, 250 volts, AGS fast blow.
51107758-005	Slides, Zero slides CTN-1-22
51107758-006	Anti-glare filters Sunflex T109SF90-X with cleaning cloth.
51107758-007	Cleaning cloth.
51107758-008	PWR. Cord, Keys, Cleaning cloth and manual.

APPENDIX II

RECOMMENDED CABLING

Good cabling practice is essential for displaying good pictures. Crosstalk and line reflections in the cable are easily handled if the high frequency characteristics and low impedance video signal generators are considered.

For each interface signal twisted pair or coaxial cable with characteristic impedance of close to 75 ohms should be used. (Higher impedances increase crosstalk while lower impedances are difficult to drive.)

The importance of good cabling design is clearly seen from considering the following table of cable type versus distance. (These figures must be considered only approximate. For example, if high electrical noise levels are encountered coaxial cable could be mandatory at any distance.).

Connectors	Cable Type	Cabling Distance (Approximately)
BNC connector	Coaxial cable with 75 ohms characteristic impedance	50 – 1,000 feet (15 – 300m)

APPENDIX III

PARTS LIST

This section (pages 57—67-1) has been deleted. Please refer to Appendix I for Service Parts information.

APPENDIX IV

EXPLODED VIEWS OF MECHANICAL PARTS

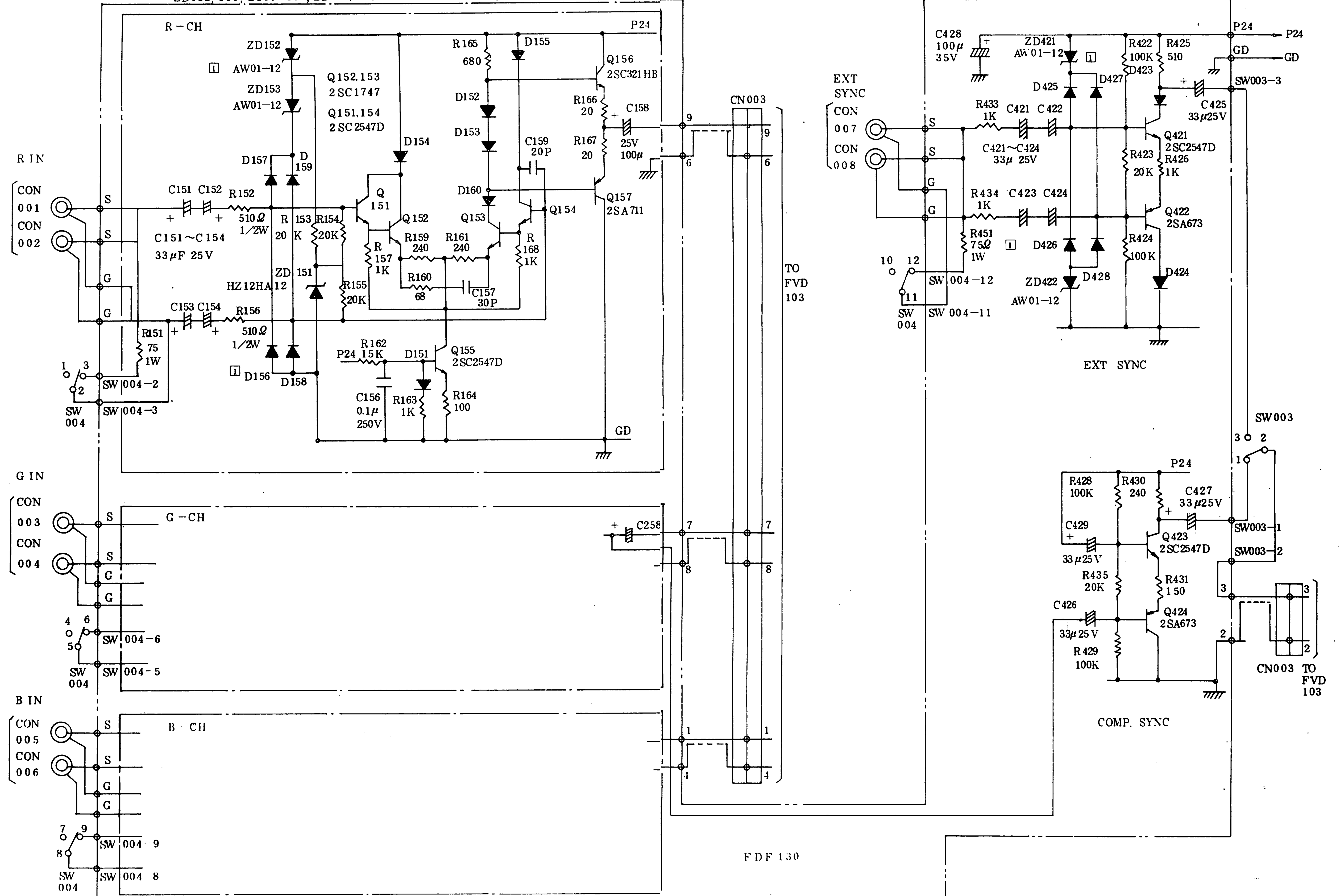
1. MECHANICAL PARTS LIST

ITEM NO.	REF. DESIGNATION	DESCRIPTION	
1	1	COLOR PICTURE TUBE	
2	2	FRAME	
3	3	BASE	
4	4	PANEL	
5			
6			
7			
8			
9			
10			
11	11	CHASSIS	
12			
13	13	PRINTED CIRCUIT BOARD (FPS 101)	
14	14	BARRIER	
15	15	FIN	
16	16	SHEET	
17			
18			
19			
20	20	SLIDE (ACCURIDE MODEL-203-12")	
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			

331DX11000

CHANGE NOTE
B Prior to Sep. 1982,
ZD152, 153, D156–160, ZD421, 422, D425–428 weve not present

REV.	DESCRIPTION	DWN.	APPD.	DATE
B	REVISED	K.SHIRAISHI	Y. KAMATA	6.10. OCT



NOTES. UNLESS OTHERWISE SPECFIED (1) REGISTOR VALUES ARE IN OHM 1/4W.
(2) CAPACITOR VALUES ARE IN FARADS.
(3) DIODE ARE A-35.

DWN.	K.SHIRAISHI	5.10. 82
APPD.	Y. KAMATA	5.10. 82

SCHEMATIC

REV'D

331DX11000

ITEM NO.	REF. DESIGNATION	DESCRIPTION		
31				
32	32	COVER		
33	33	DRAWER		
34	34	FIN		
35	35	KNOB		
36	36	KNOB		
37	37	LOCK		
38				
39	39	PRINTED CIRCUIT BOARD (FVD103)		
40				
41	41	PAN SCREW	(M4×10)	
42	42	SPRING WASHER	(M4)	
43	43	PLAIN WASHER	(M4)	
44	44	PAN SCREW	(M5×16)	
45	45	SPRING WASHER	(M5)	
46				
47				
48	48	PAN SCREW	(M4×8)	
49	49	FINISHED NUT	(M4)	
50				
51				
52	52	PAN SCREW	(M4×12)	
53	53	FINISHED NUT	(M3)	
54				
55				
56	56	PAN SCREW	(M4×12)	
57	57	PAN SCREW	(M3×10)	
58	58	BOLT	(M6×16)	
59	59	PLAIN WASHER	(M6)	
60	60	SPRING WASHER	(M6)	
61				

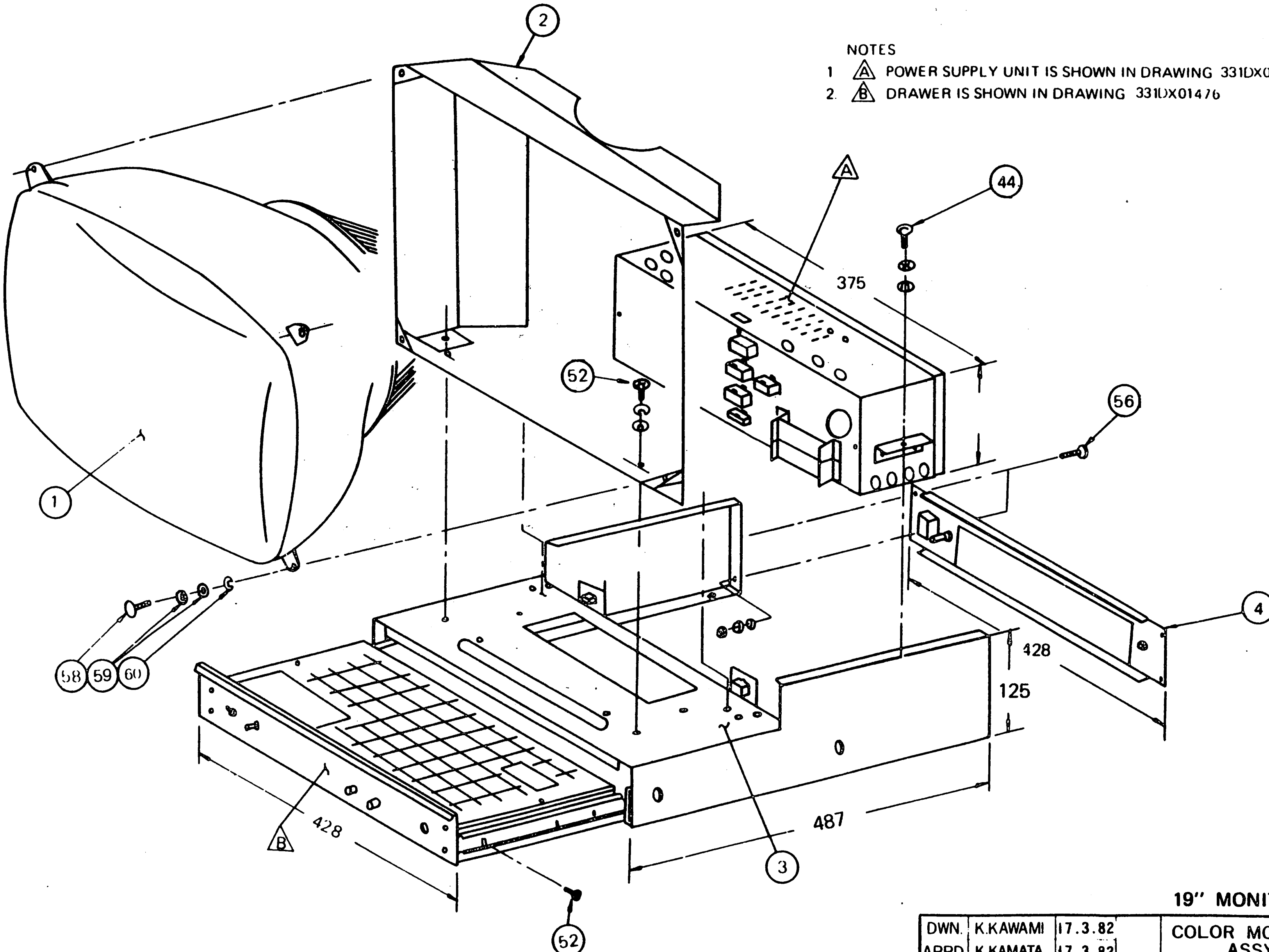
2. EXPLODED VIEWS OF MECHANICAL PARTS

19" COLOR MONITOR ASSY	331DX01475
DRAWER ASSY	331DX01476
POWER SUPPLY ASSY	331DX01477
SLIDES ASSY	331DX01478

NOTES

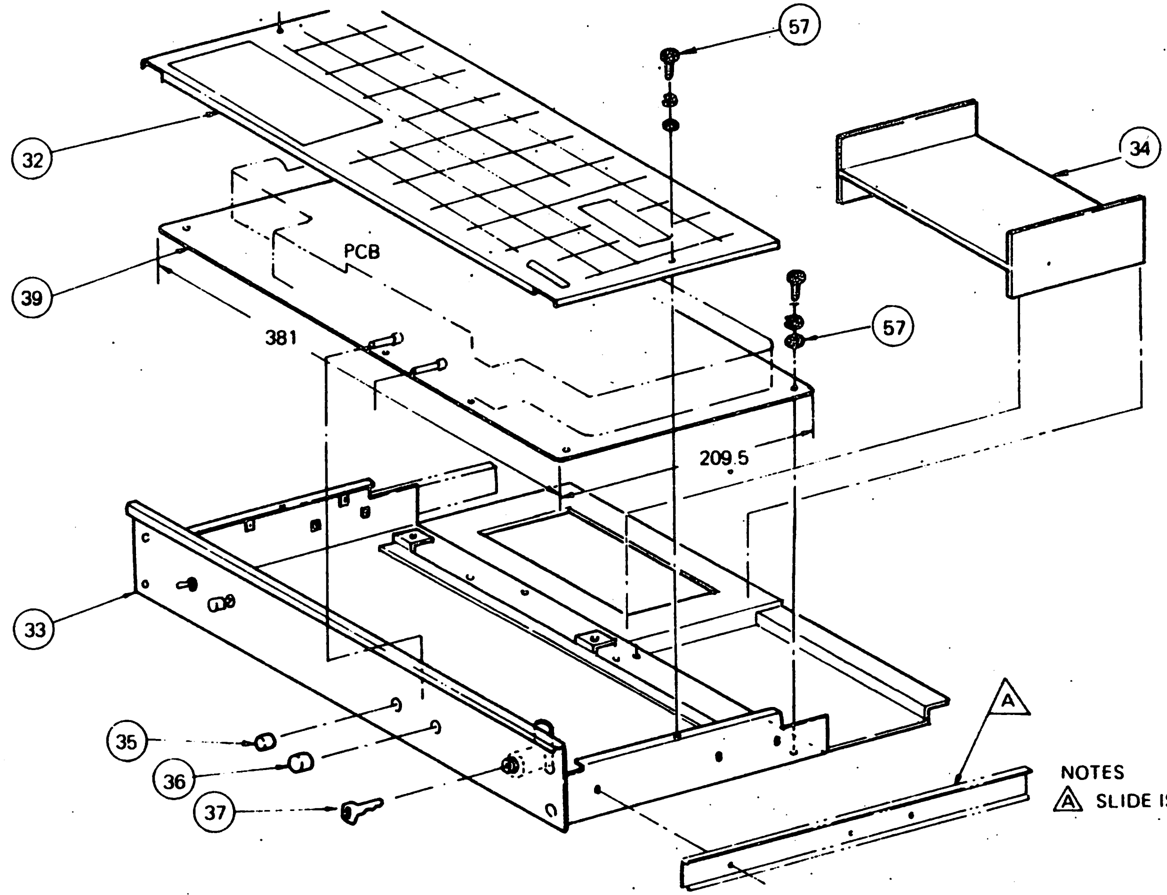
1 △A POWER SUPPLY UNIT IS SHOWN IN DRAWING 331DX01477

2. △B DRAWER IS SHOWN IN DRAWING 331DX01476



19" MONITOR

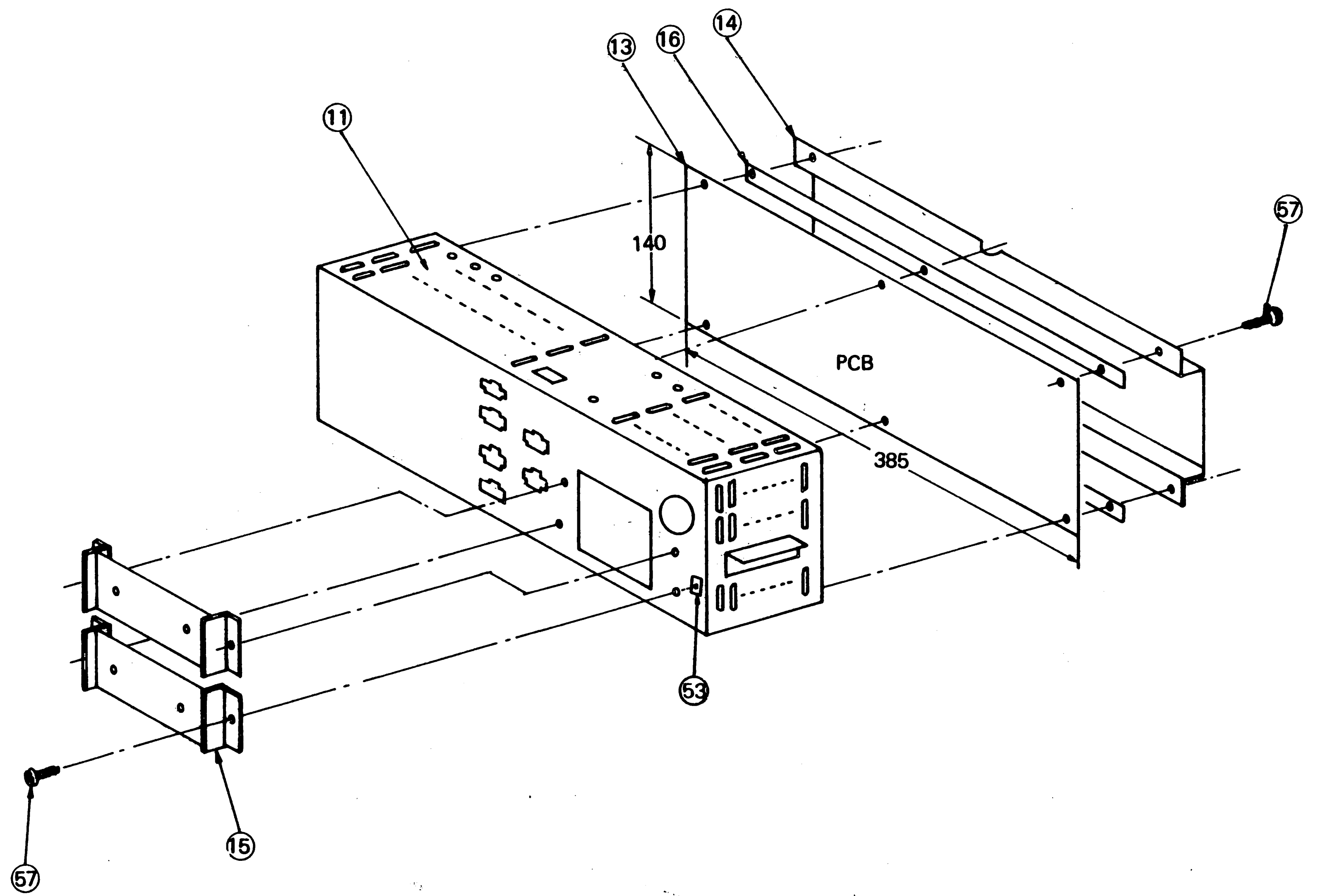
DWN.	K.KAWAMI	17.3.82	COLOR MONITOR ASSY	REV'D
APPD.	K.KAMATA	17.3.82	331DX01475	



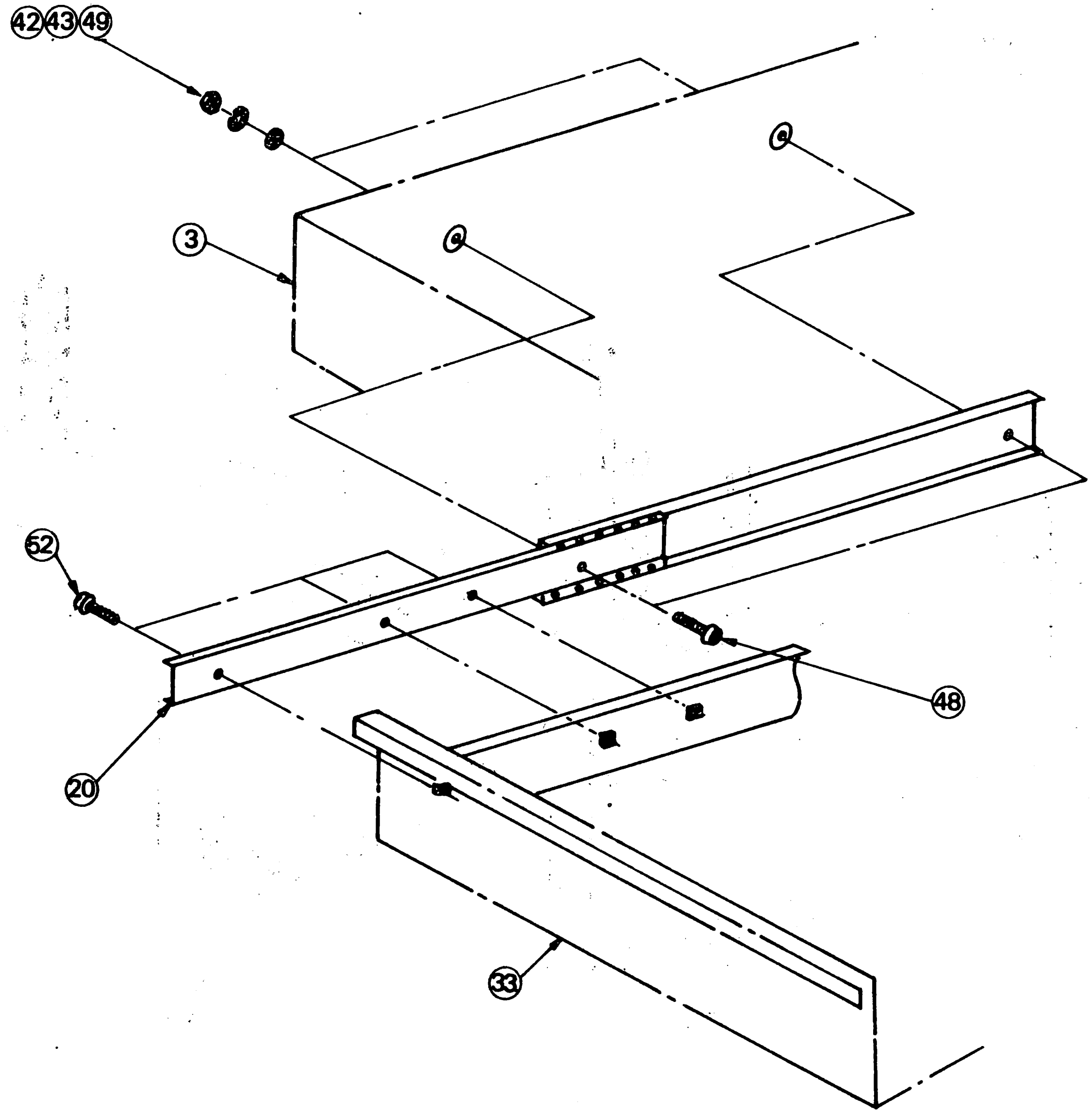
NOTES

A SLIDE IS SHOWN IN DRAWING 331DX01478

DWN.	K.KAWAMI	17.3.82	DRAWER ASSY	REV'D
APPD.	K.KAMATA	17.3.82	331DX01476	



DWN.	K.KAWAMI	17.3.82	POWER SUPPLY ASSY	REV'D
APPD.	Y.KAMATA	17.3.82	331DX01477	

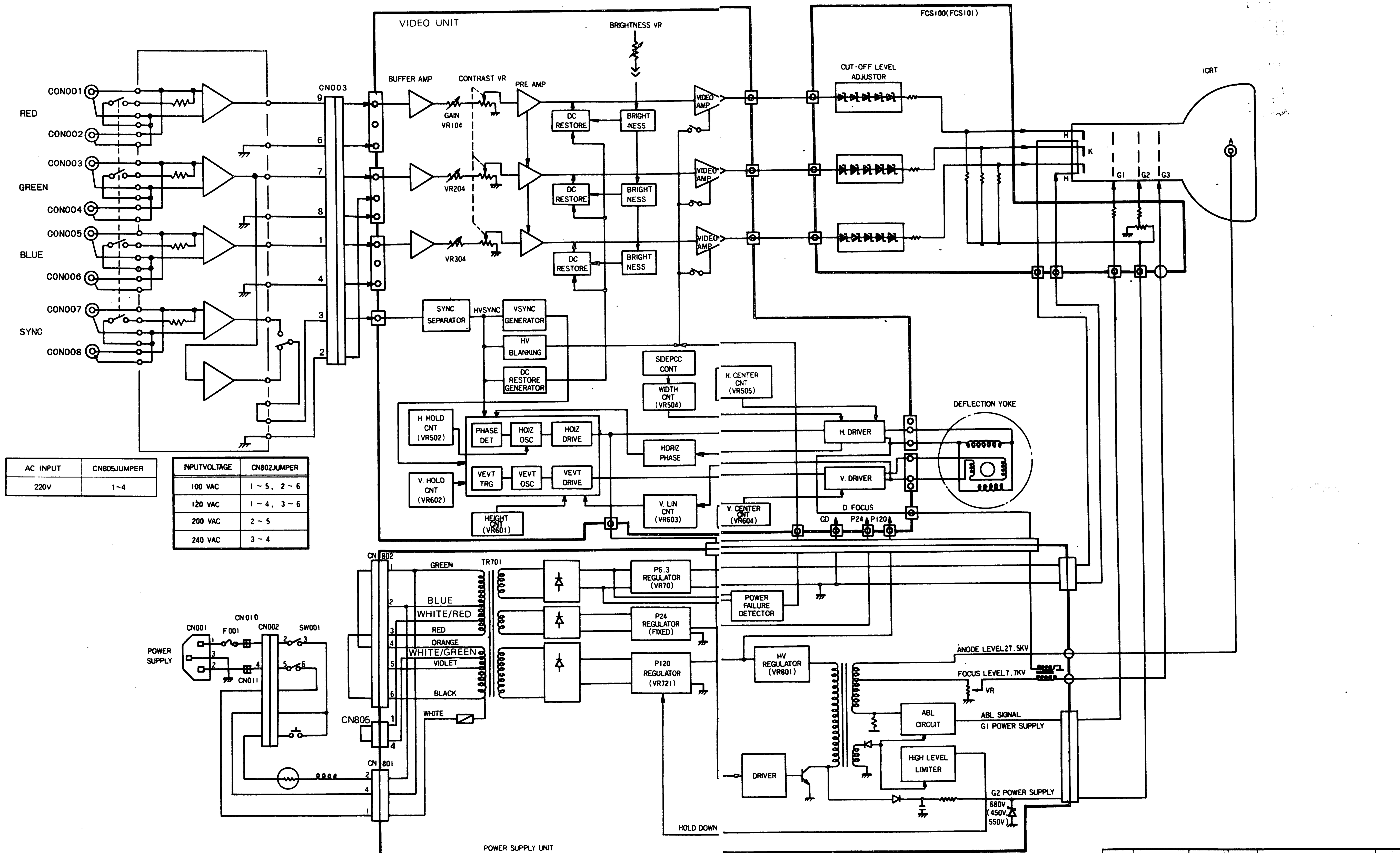


DWN.	K.KAWAMI	17.3.82	SLIDE ASSY	REV'D
APPD.	Y.KAMATA	17.3.82		
			331DX01478	

APPENDIX V

SCHEMATICS AND FUNCTIONAL DIAGRAMS

BLOCK DIAGRAM (With Dif Amp)	331D×07896
WIRING DIAGRAM (With Dif Amp)	331D×07898
LOGIC DIAGRAMS	
FVD 103 (A/3)	331D×07900
FVD 103 (B/3)	331D×07901
FVD 103 (C/3)	331D×07902
FPS 101 (A/3)	331D×01502
FPS 101 (B/3)	331S×69241
FPS 101 (C/3)	331S×69242
FCS 100	331D×07903
FDF 130	331D×07899

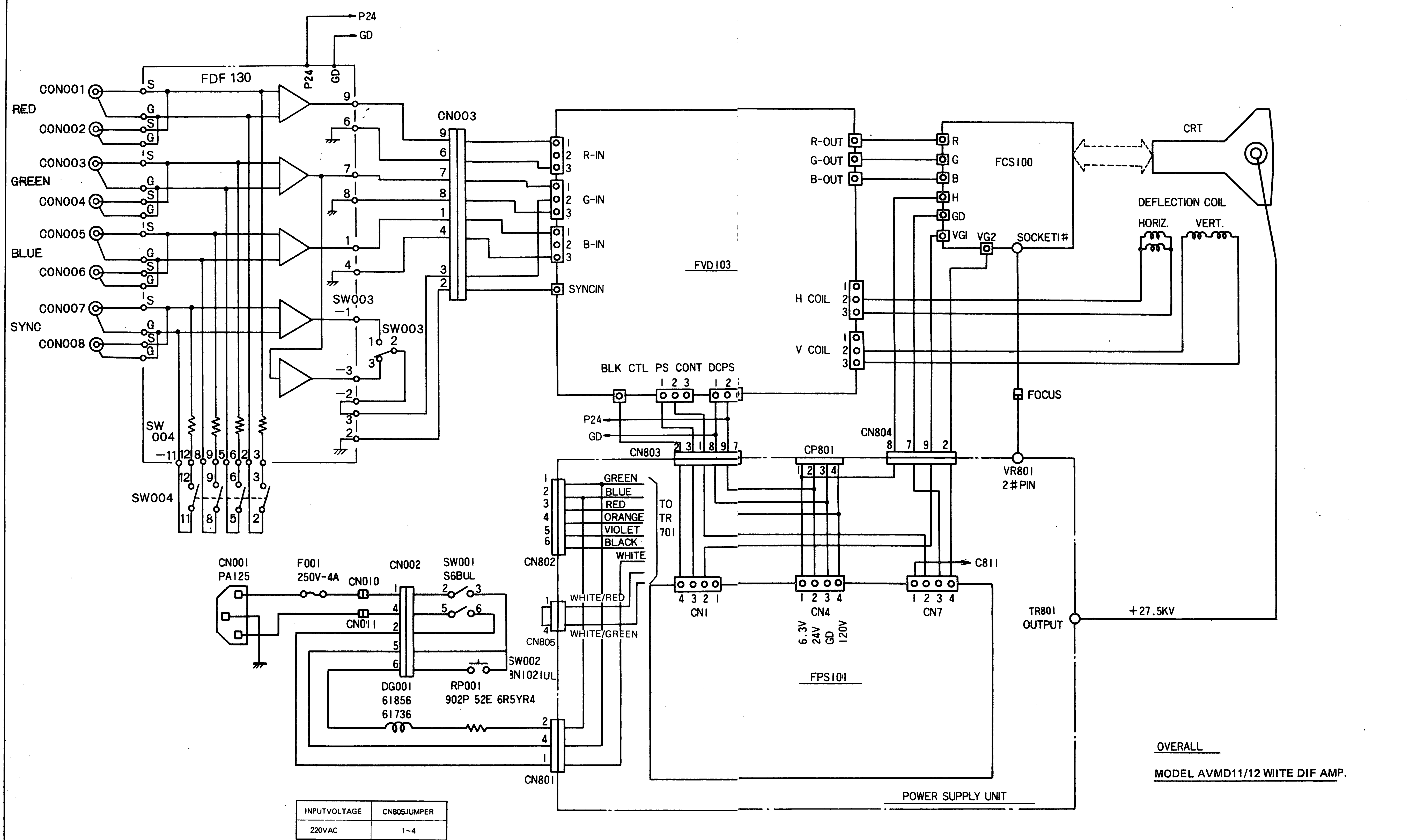


AC INPUT	CN805JUMPER
220V	1~4

INPUTVOLTAGE	CN802JUMPER
100 VAC	1~5, 2~6
120 VAC	1~4, 3~6
200 VAC	2~5
240 VAC	3~4

NOTE) Connector, CN805 is only used in case of 220 VAC input voltage.

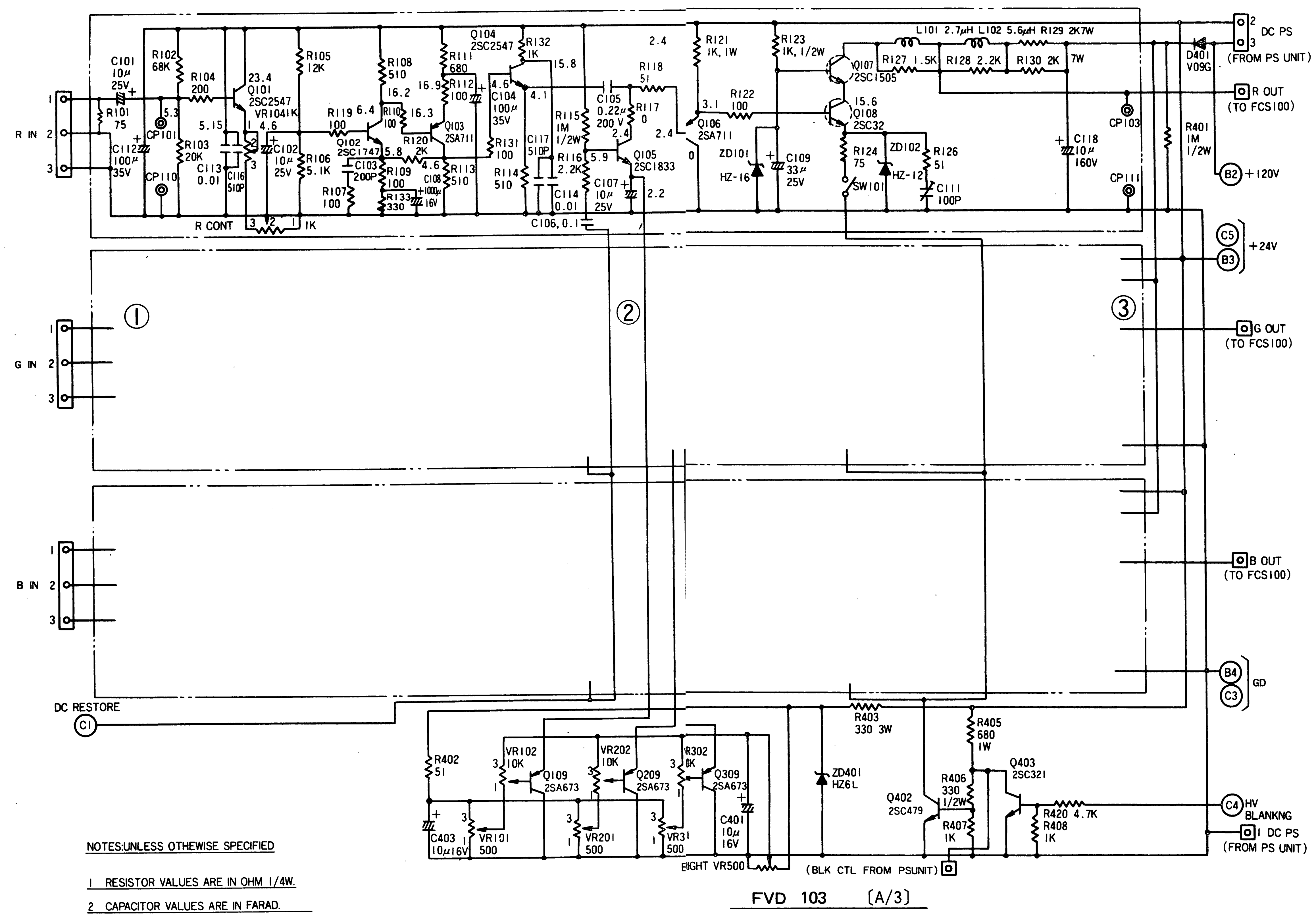
DWN.	K.SHIRAISHI	18.3.82	BLOCK DIAGRAM	REV'D
APPD.	Y.KAMATA	18.3.82	331DX07896	



INPUTVOLTAGE	CN805JUMPER
220VAC	1~4

NOTE) Connector, CN805 is only used in case of 220 VAC input voltage.

DWN.	K.SHIRAISHI	18.3.82	SCHEMATIC	REV'D
APPD.	Y.KAMATA	18.3.82	331DX07898	



NOTES:UNLESS OTHEWISE SPECIFIED

1 RESISTOR VALUES ARE IN OHM 1/4W.

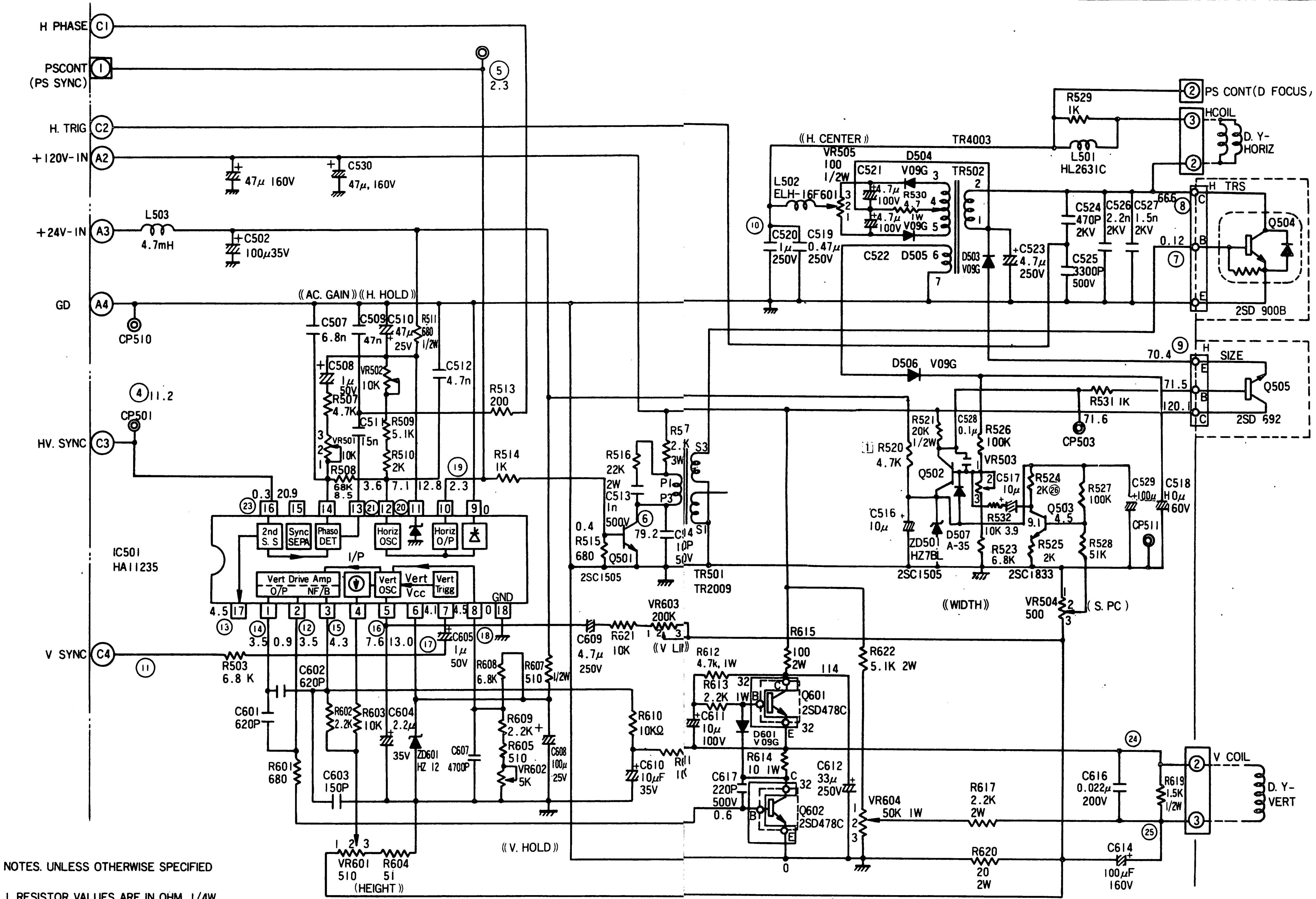
2 CAPACITOR VALUES ARE IN FARAD.

DWN.	K.SHIRAISHI	20.7.82	SCHEMATIC	REV'D
APPD.	Y.KAMATA	20.7.82	331DX07900	

REV.	DESCRIPTION	DWN.	APPD	DATE
	REVISED	K.YAWASHITA	Y.KAMATA	18. 9. 82

CHANGE NOTE

1) REVISED



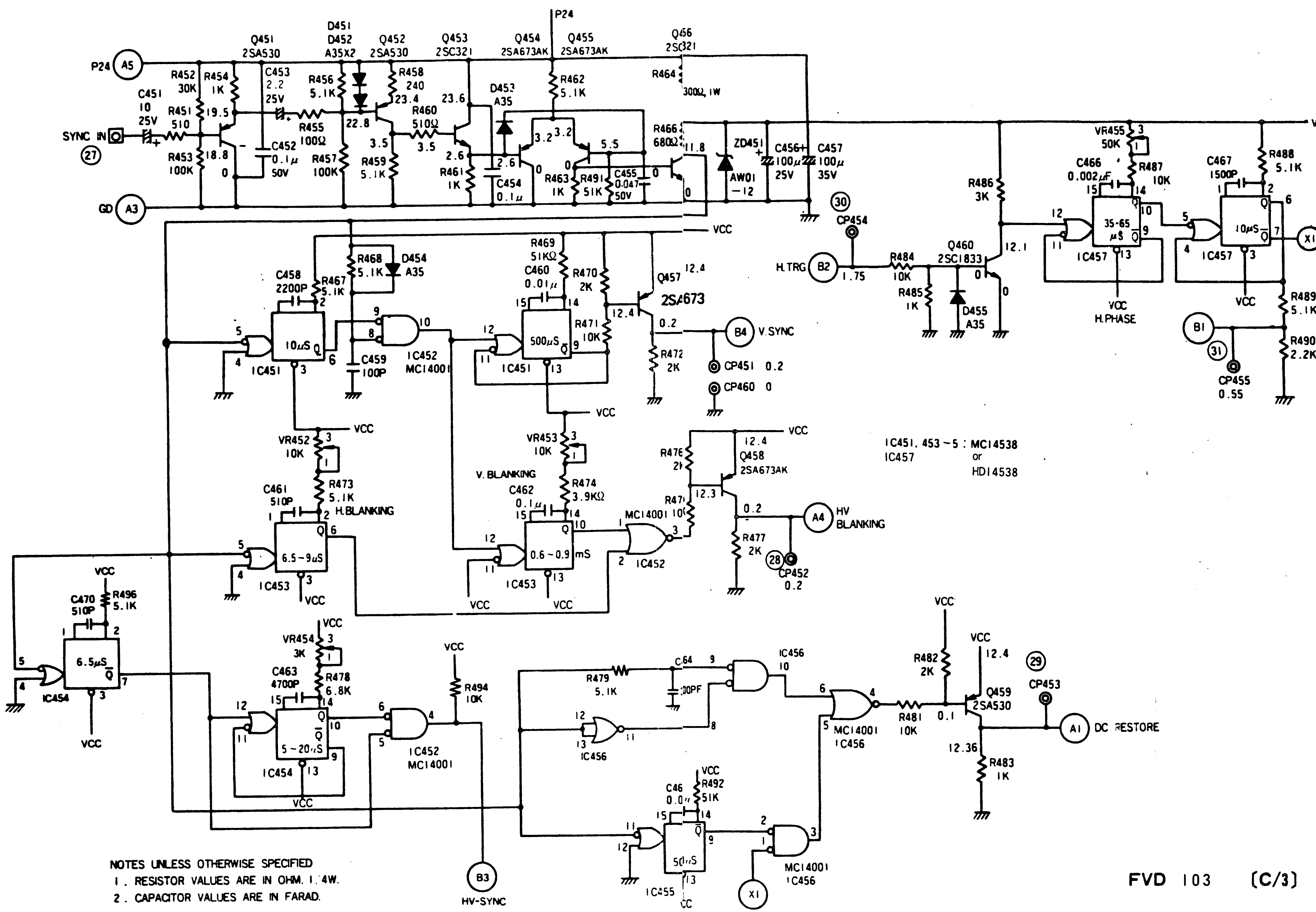
NOTES. UNLESS OTHERWISE SPECIFIED

1. RESISTOR VALUES ARE IN OHM, 1/4W.

2. CAPACITOR VALUES ARE IN FARADS, 25V.

FVD 103 (B/3)

DWN.	K.SHIRAISHI	20.7.82	SCHEMATIC	REV'D
APPD.	Y.KAMATA	20.7.82	331DX07901	



NOTES UNLESS OTHERWISE SPECIFIED

1. RESISTOR VALUES ARE IN OHM. 1/4W.
2. CAPACITOR VALUES ARE IN FARAD.

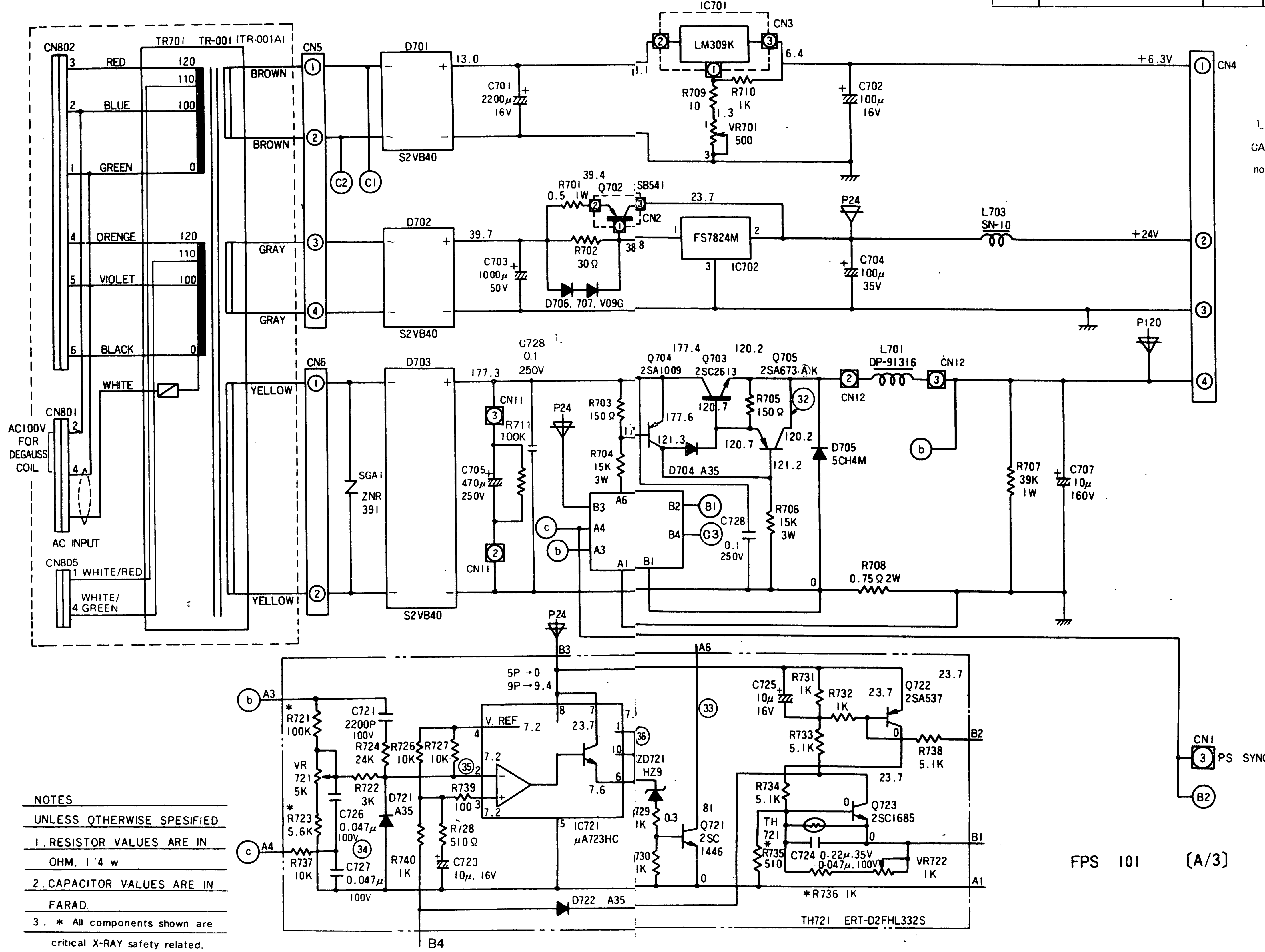
FVD 103 (C/3)

DWN.	K.SHIRAISHI	20.7.82	SCHEMATIC
APPD.	Y.KAMATA	20.7.82	331DX07902

REV.	DESCRIPTION	DWN	APPD	DATE
K	ADDED CAPACITOR C728	K. TOMITA	Y.KAMATA	31. 8. 82

CHANGE NOTE

1. Prior to Aug. 1982, CAPACITOR C728 was not present.



FPS 101 (A/3)

NOTES

UNLESS OTHERWISE SPESIFIED

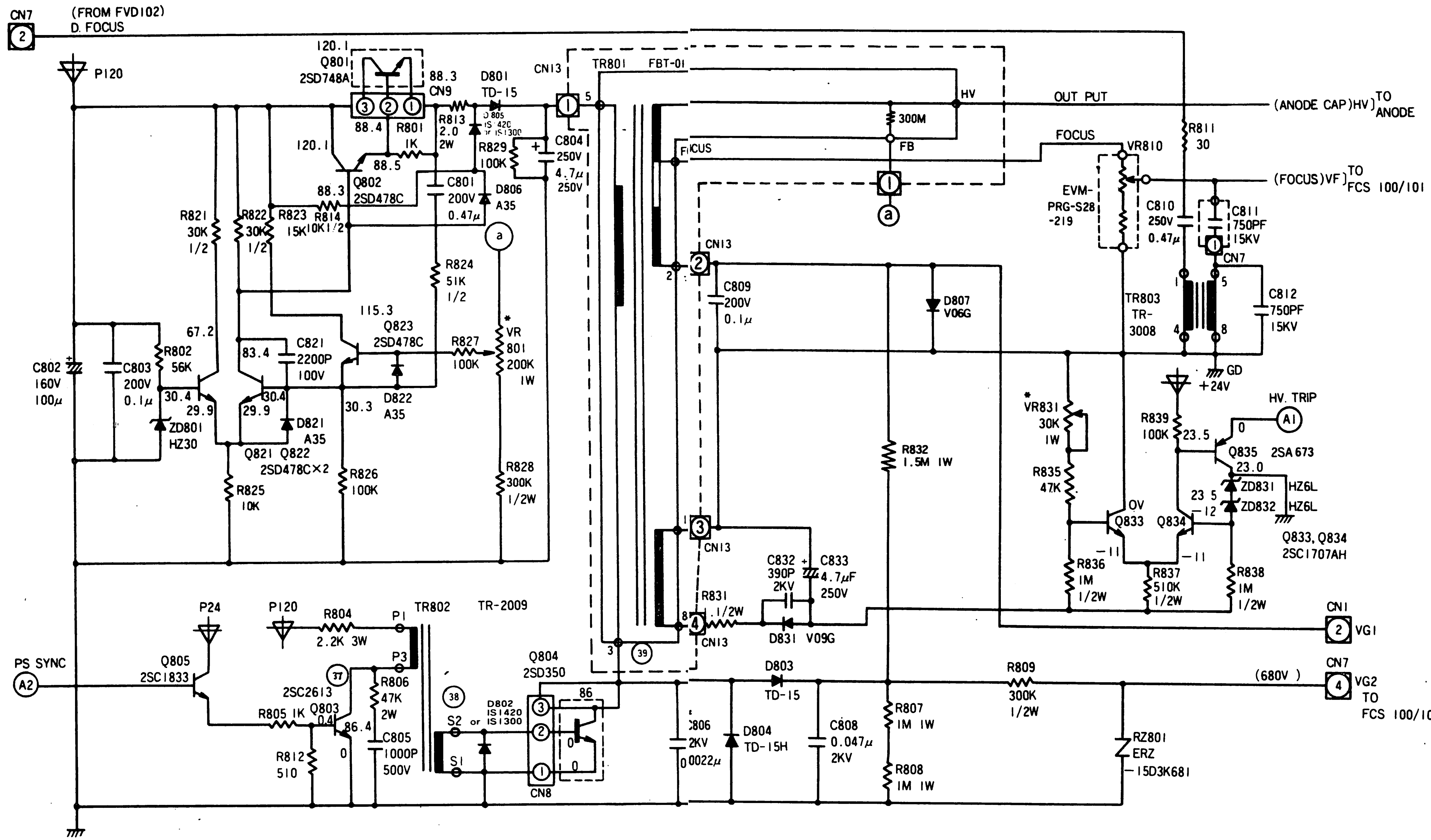
1. RESISTOR VALUES ARE IN OHM. 1/4 w

2. CAPACITOR VALUES ARE IN FARAD.

3. * All components shown are critical X-RAY safety related, replaces with exact part.

4. Connector, CN805 is only used in case of 220 VAC input voltage

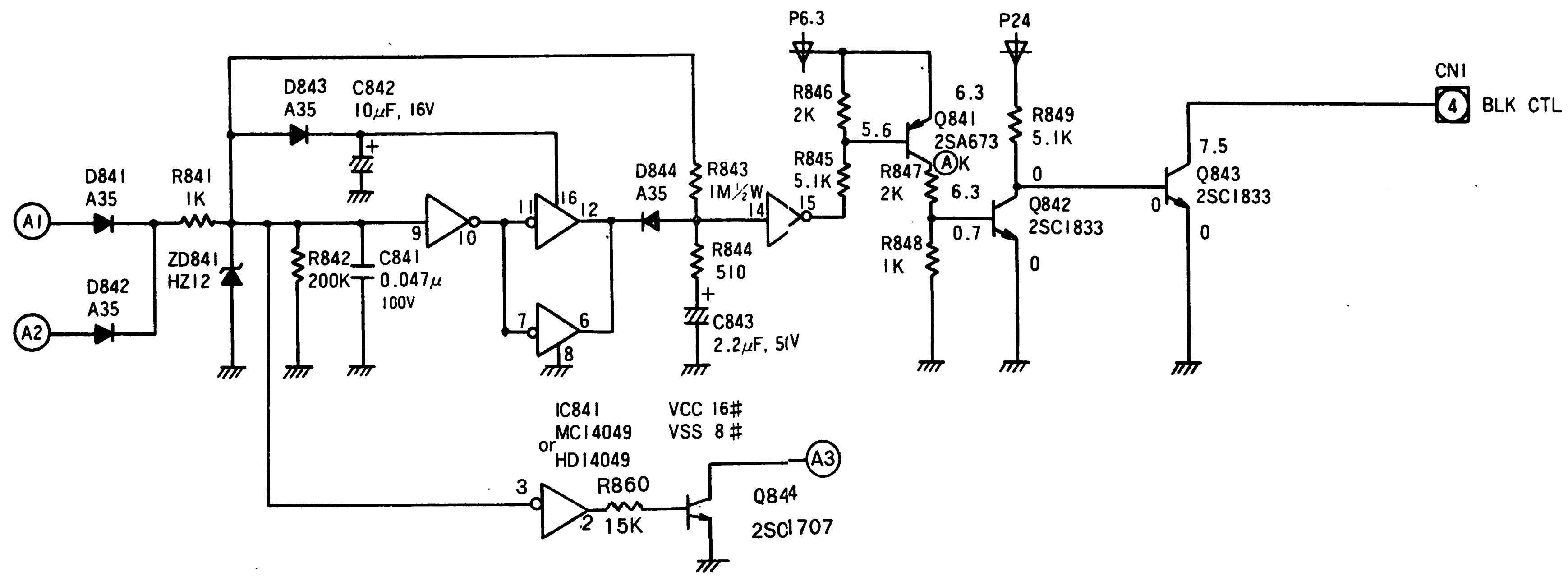
DWN. K.SHIRAISHI 18.3.82	SCHEMATIC	REV.D
APPD. Y.KAMATA 18.3.82	331DX01502	



NOTES:UNLESS OTHERWISE SPECIFIED
1. RESISTOR VALUES ARE IN OHM. 1/4W.
2. CAPACITOR VALUES ARE IN FARADS.
3. * All components shown are critical X-RAY safety related, replaces with exact part.

FPS 101 (B/3)

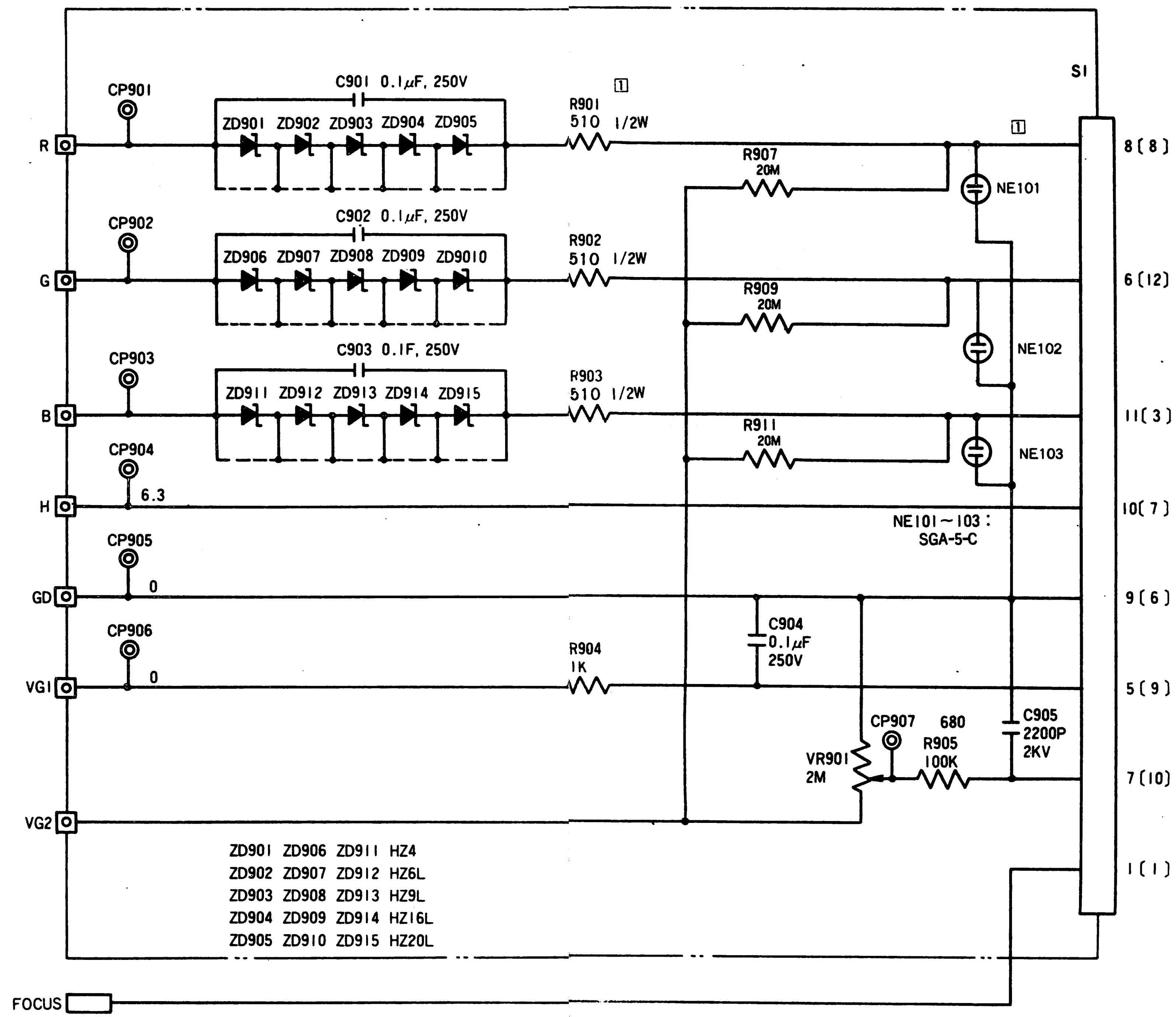
DWN.	K.SHIRAISHI	14.3.80	SCHEMATIC	REV'D
APPD.	K.KONAKA	14.3.80	331SX69241	



FPS 101 〔C/3〕

DWN.	K.SHIRAISHI	14.3.80	SCHEMATIC	REV'D
APPD.	K.KONAKA	14.3.80	331SX69242	

REV.	DESCRIPTION	DWN.	APPD	DATE
A	ADDED GAPS NE101,102,103 R901, 902, 903 WERE 100Ω	T.DOMOTO	Y.KAMATA	31. 8. 82



CHANGE NOTE

1 Prior to Aug. 1982:

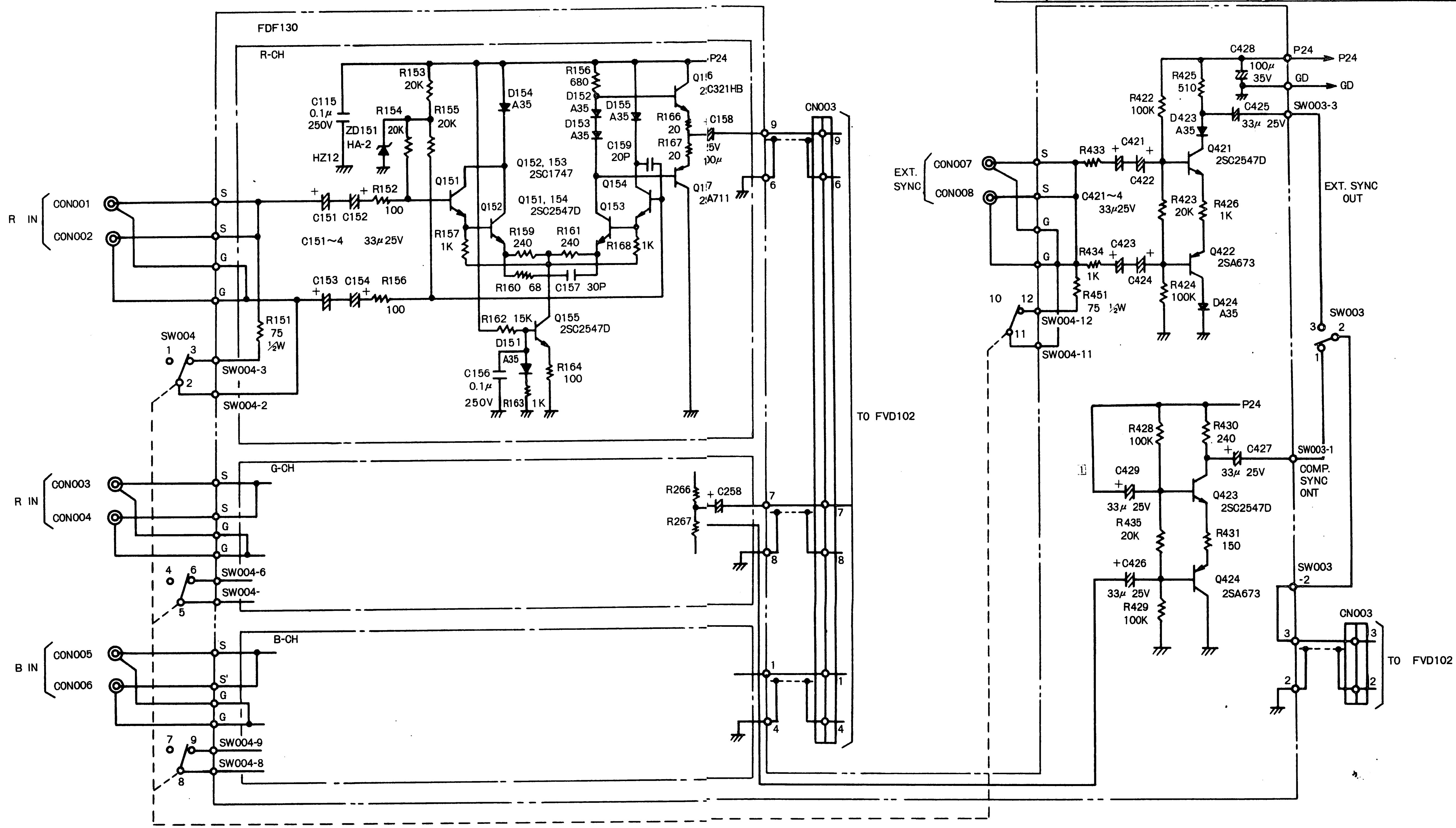
(a) Resistor R901, 902, 903 were 100Ω

(b) GAP NE101, 102, 103 were not present.

FCS 100 (1/1)

DWN.	K.SHIRAISHI	14.3.80	SCHEMATIC	REV'D
APPD.	K.KONAKA	14.3.80	331DX07903	

REV.	DESCRIPTION	DWN.	APPD.	DATE
A	REVISED	K.YAWASHITA	Y.KAMATA	31. 8. 82



FDF130

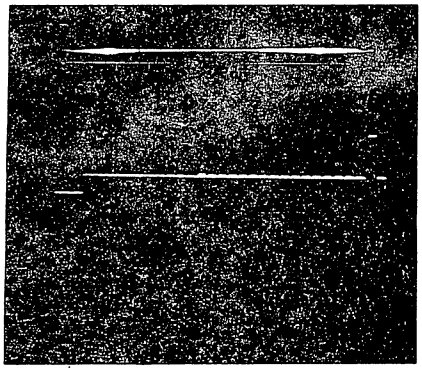
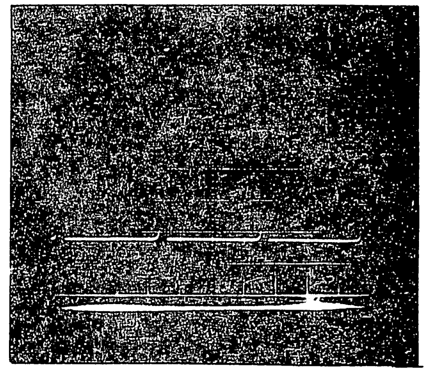
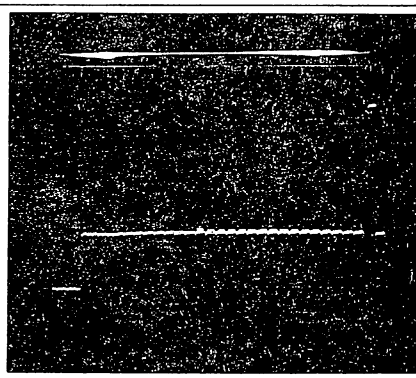
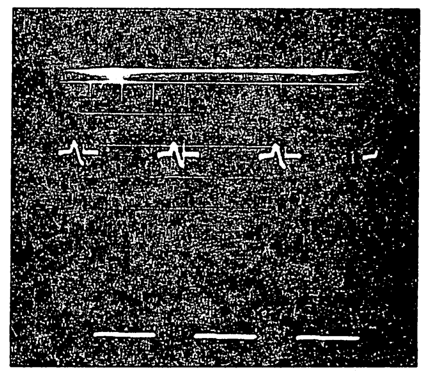
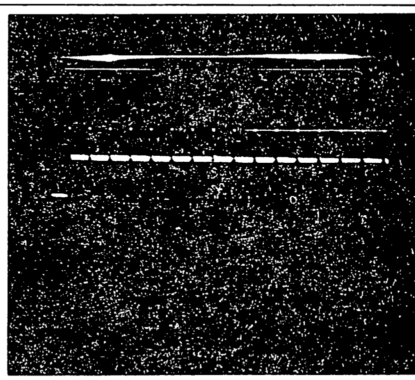
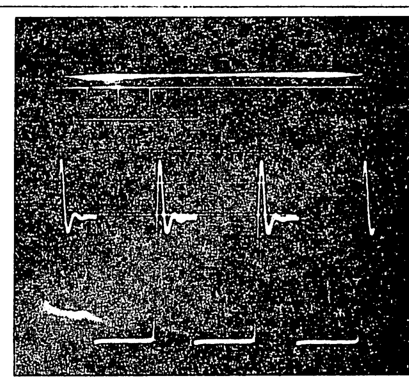
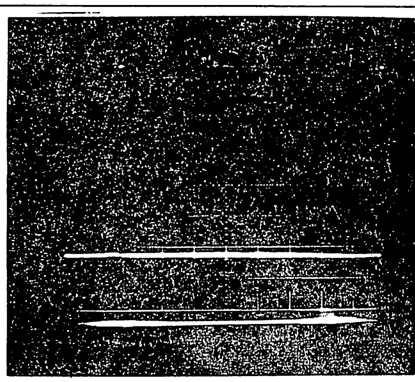
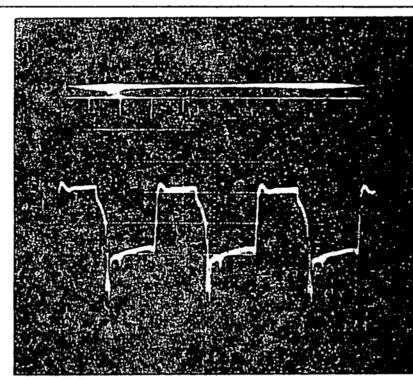
NOTES UNLESS OTHERWISE SPECIFED
1. RESISTOR VALUES ARE IN OHM, ¼W
2. CAPACITOR VALUES ARE IN FARAD

CHANGE NOTE
1) Prior to Aug. 1982.
Capacitor C429 was grounded.

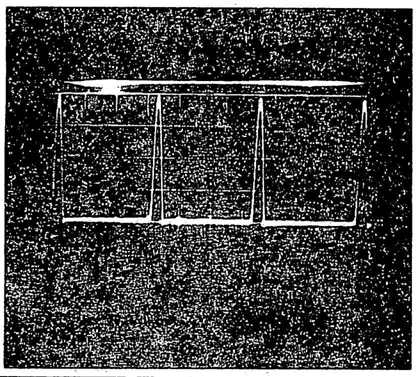
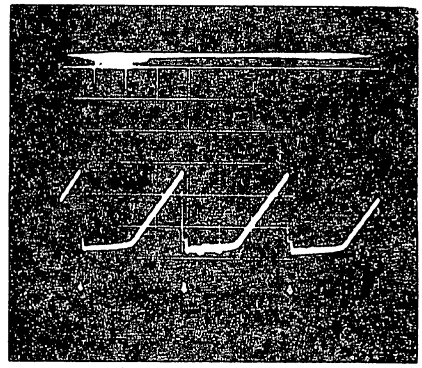
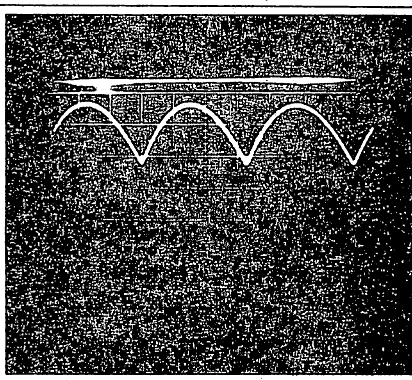
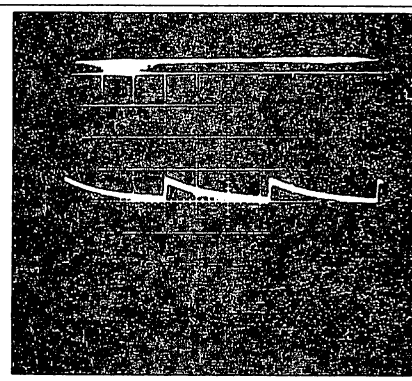
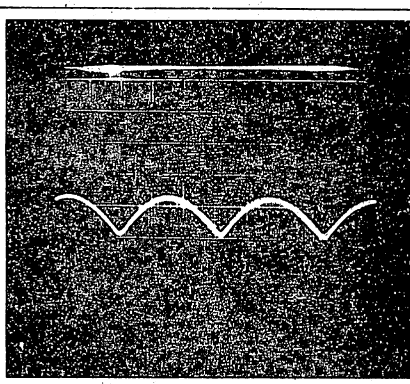
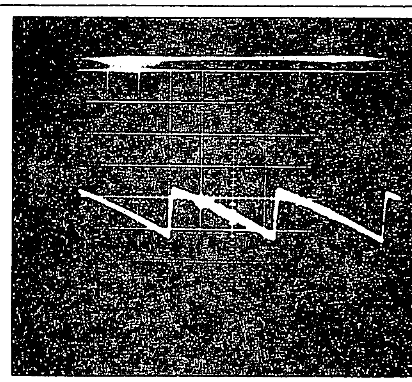
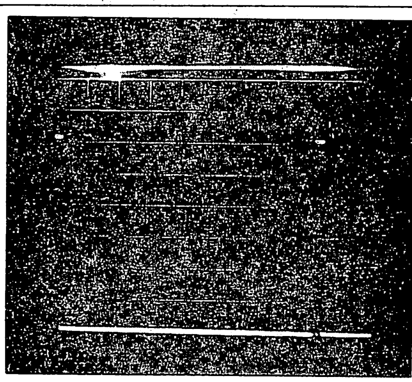
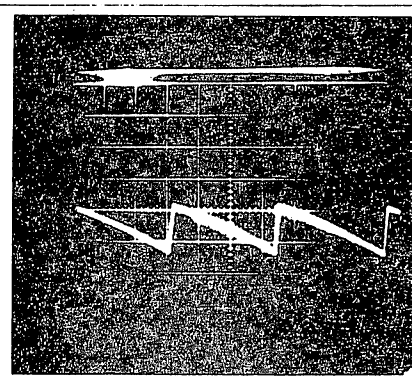
DWN.	K.SHIRAISHI	9. 8. 82	SCHEMATIC	REV'D
APPD.	Y. KAMATA	9. 8. 82	331DX07899	

WAVE'FORMS

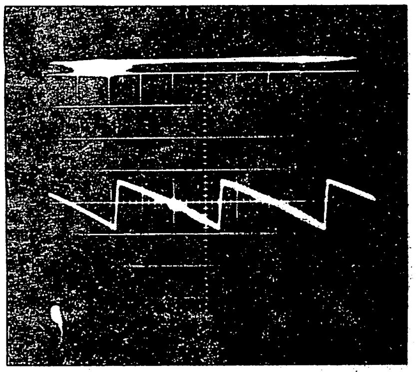
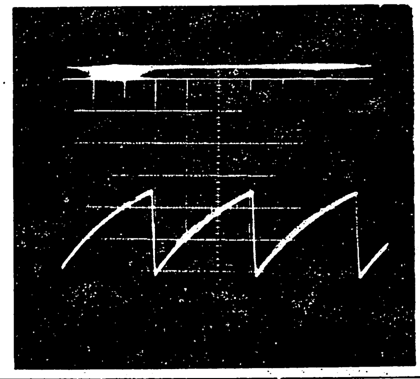
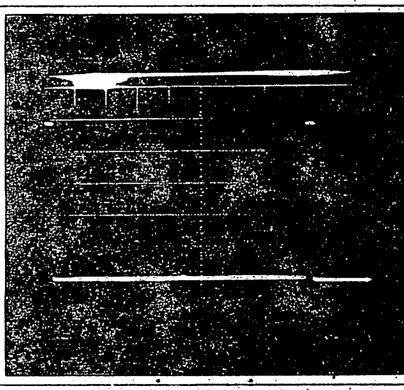
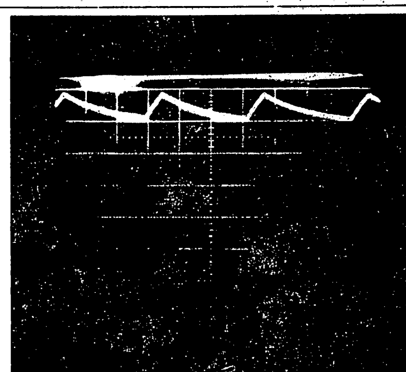
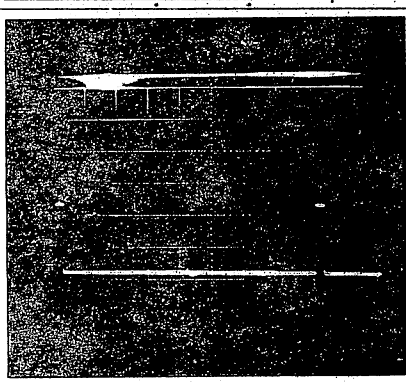
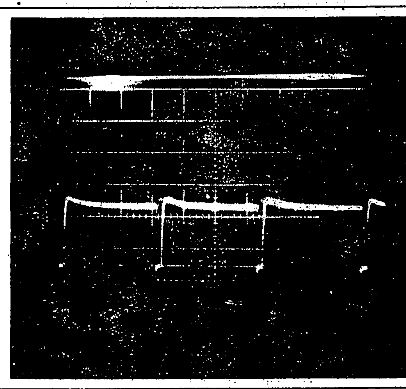
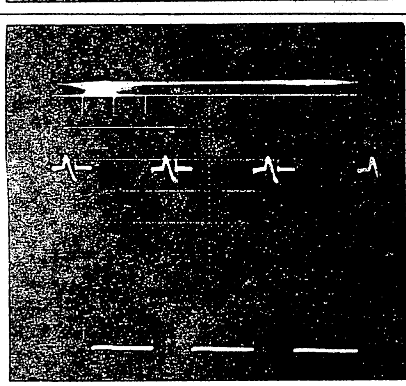
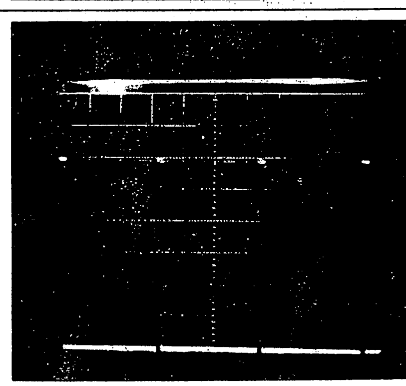
TYPE FVD103 (CONTROL DRAWER)
INPUT SIGNAL 1Vp-p composite H. . .15.75KHz V. . .60Hz
SCOPE INPUT 10Megohm shunted by 10pF

WAVEFORMS	comment	WAVEFORMS	comment
	① CP201 VIDEO INPUT ←0V AC 0.5V, 0.2msec		④′ CP501 HV SYNC (H-SIGNAL) ←0V DC 2V, 20μsec.
	② CP202 VIDEO INPUT + BRIGHT DC 0.5V, 0.2msec. ←0V		⑤ CP502 H. SIGNAL DC 1V, 20μsec. ←0V
	③ CP203 G-OUT DC 20V, 0.2mμsec. ←0V		⑥ Q501-C H. SINGAL DC 50V, 20μsec. ←0V
	④ CP501 HV SYNC (V-SIGNAL) DC 2V, 2msec. ←0V		⑦ H TRS-B ←0V DC 1V, 20μsec.

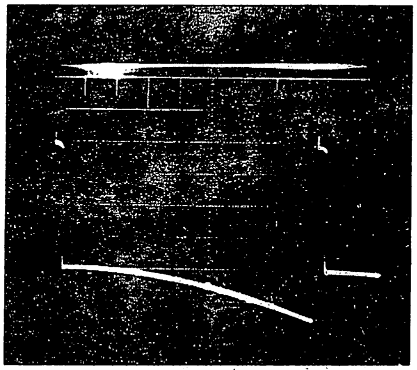
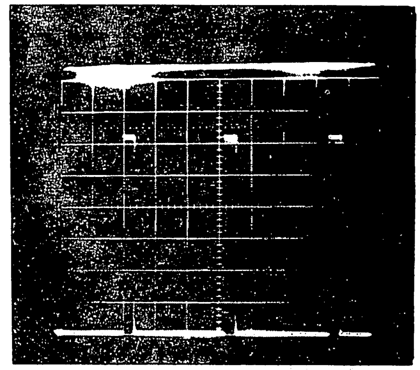
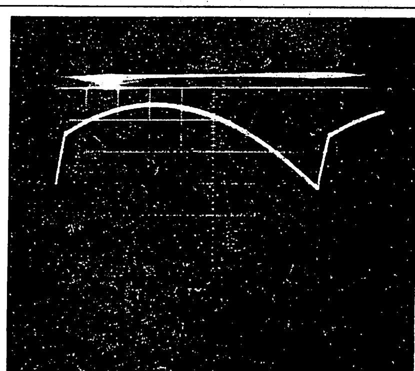
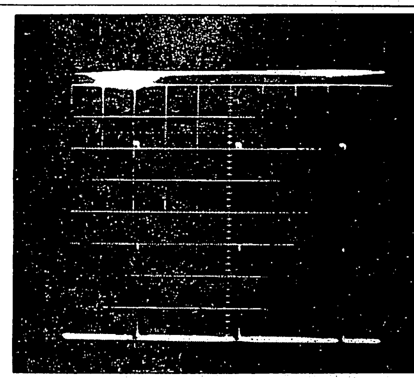
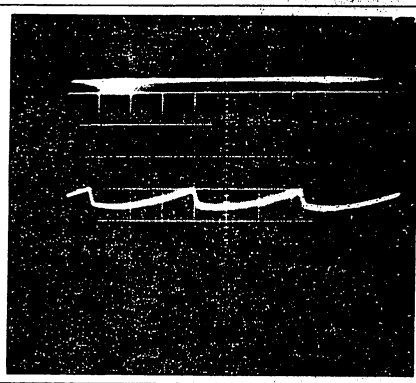
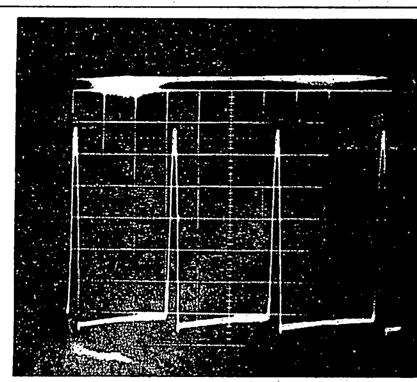
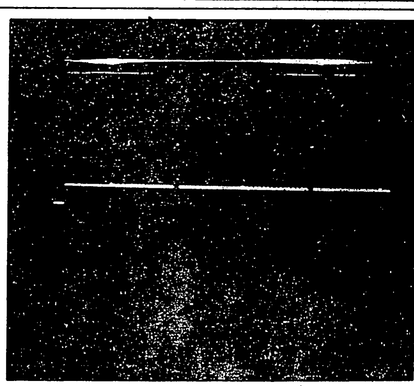
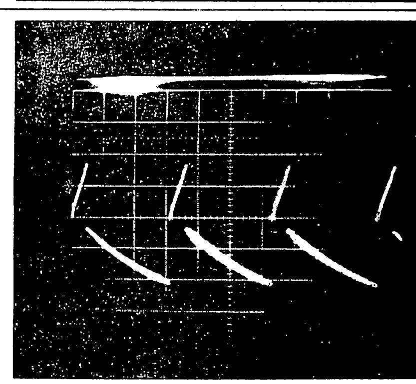
TYPE FVD102 (CONTROL DRAWER)
INPUT SIGNAL 1Vp-p composite H. . .15.75KHz V. . .60Hz
SCOPE INPUT 10Megohm shunted by 10pF

WAVEFORMS	comment	WAVEFORMS	comment
	(8) H TRS-C ←0V DC 250V, 20μsec.		(12) IC501 −2PIN V. SIGNAL DC 0.5V, 5msec. ←0V
	(9) H SIZE-E (S-PC MAX) DC 10V, 5msec. ←0V		(13) IC501 −17PIN H. SIGNAL DC 1V, 5msec. ←0V
	(10) C520 H. SIGNAL DC 20V, 20μsec. ←0V		(14) IC501 −1PIN V. SIGNAL DC 1V, 5msec. ←0V
	(11) CP451 V. SYNC DC 2V, 2msec. ←0V		(15) IC501 −3PIN V. SIGNAL DC 1V, 5msec. ←0V

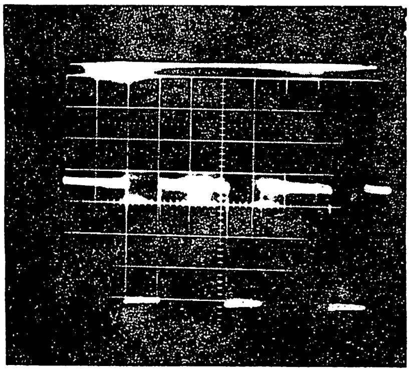
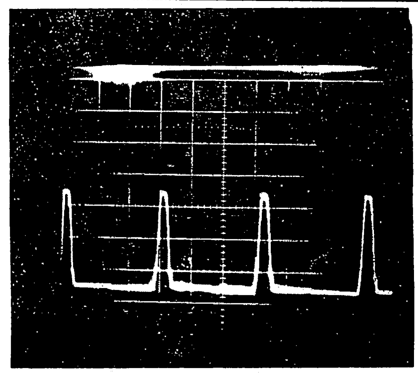
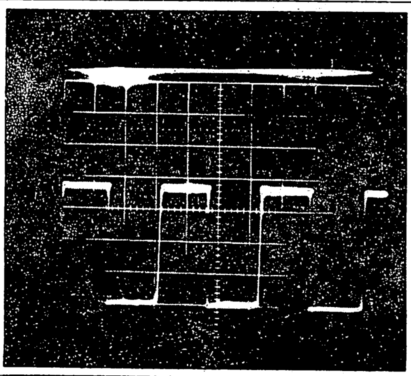
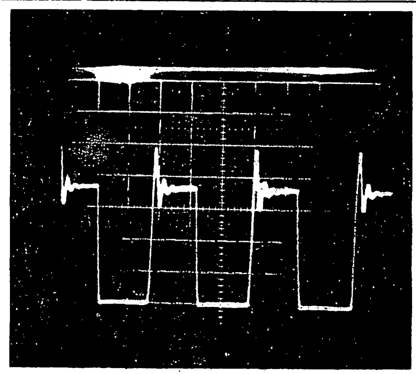
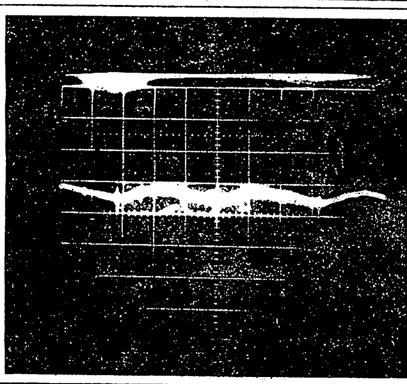
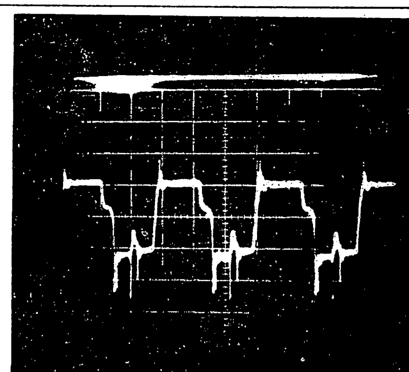
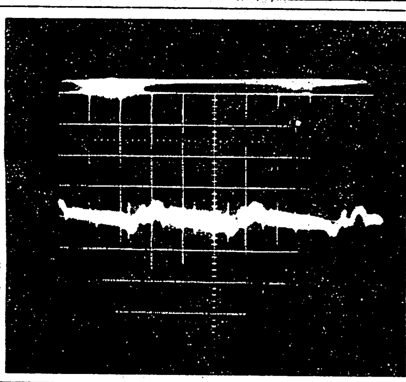
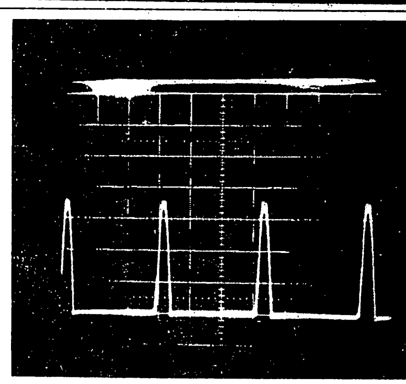
TYPE FVD103 (CONTROL DRAWER)
INPUT SIGNAL 1Vp-p composite H. . .15.75KHz V. . .60Hz
SCOPE INPUT 10Megohm shunted by 10pF

	comment	WAVEFORMS	comment
	(16) IC501 –5PIN V. SIGNAL DC 2V, 5msec. ←0V		(20) IC501 –12PIN H. SIGNAL DC 2V, 20μsec. ←0V
	(17) IC501 –7PIN V. SIGNAL DC 2V, 2msec. ←0V		(21) IC501 –13PIN H. SIGNAL DC 0.5V, 20μsec. ←0V
	(18) IC501 –8PIN V. SIGNAL DC 2V, 2msec. ←0V		(22) IC501 –15PIN H. SIGNAL DC 5V, 20μsec ←0V
	(19) IC501 –10PIN H. SIGNAL DC 1V, 20μsec. ←0V		(23) IC501 –16PIN H. SIGNAL DC 2V, 20μsec. ←0V

TYPE FVD103 (CONTROL DRAWER)
INPUT SIGNAL 1Vp-p composite H. . .15.75KHz V. . .60Hz
SCOPE INPUT 10Megohm shunted by 10pF

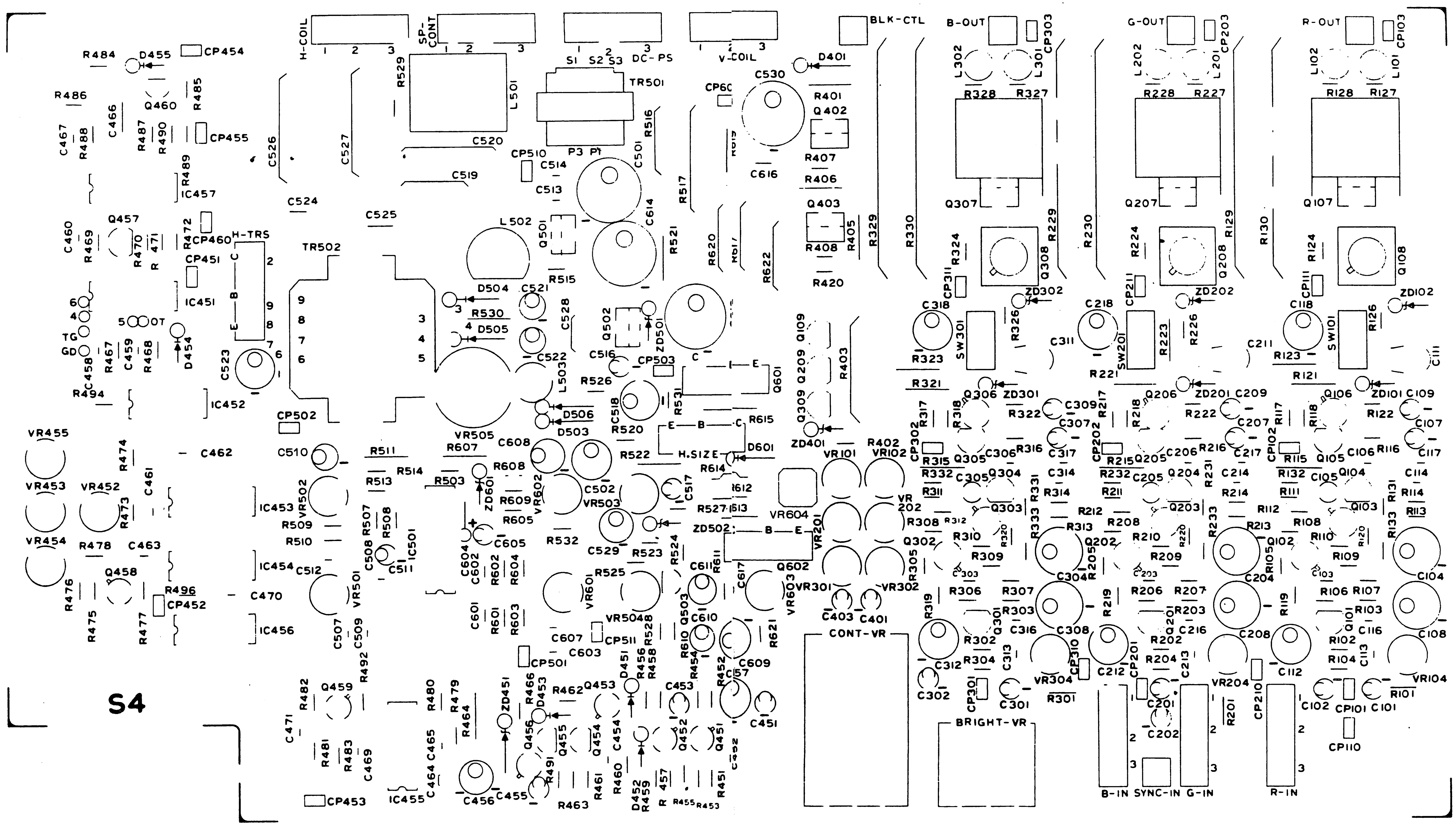
WAVEFORMS	comment	WAVEFORMS	comment
	㉔ CP601 V-COIL– 2 PIN DC 200V, 2msec. ←0V		㉘ CP452 HV BLANKING DC 2V, 20μsec. ←0V
	㉕ V-COIL- 3 PIN DC 5V, 2msec. ←0V		㉙ CP453 DC RESTORE DC 2V, 20μsec. ←0V
	㉖ Q503-C S-PC DC 2V, 5msec. ←0V		㉚ CP454 H. TRG DC 10V, 20μsec. ←0V
	㉗ SYNC-IN ←0V DC 0.5V, 0.5msec.		㉛ CP455 H. PHASE DC 0.2V, 20μsec. ←0V

TYPE FPS101 (POWER SUPPLU)
INPUT SIGNAL 1Vp-p composite H. . .15.75KHz V. . .60Hz
SCOPE INPUT 10Megohm shunted by 10pF

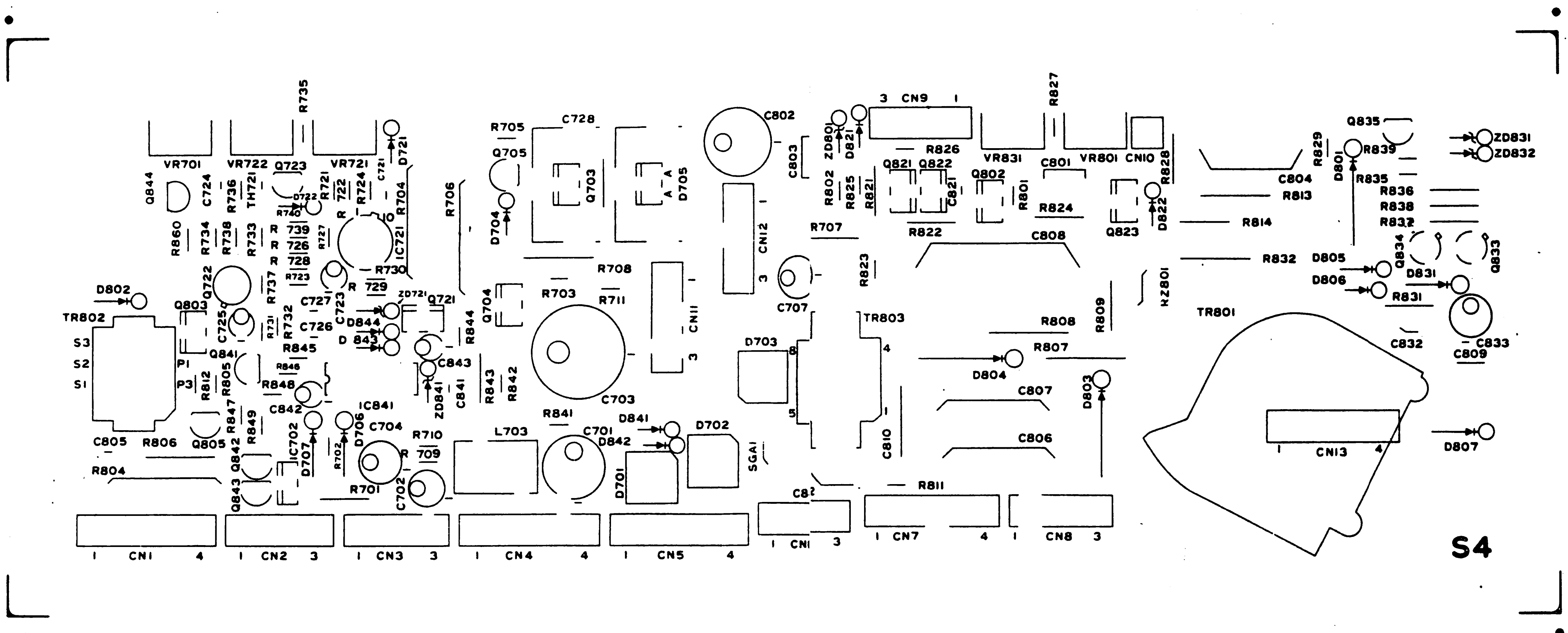
WAVEFORMS	comment	WAVEFORMS	comment
	㉜ Q705-C P120 DC 50V, 20μsec. ←0V		㊱ IC721 –6PIN DC 5V, 20μsec. ←0V
	㉝ Q721-C P120 DC 50V, 20μsec. ←0V		㊲ Q803-C HIGH VOLTAGE DC 50V, 20μsec. ←0V
	㉞ R737 P120 SWITCHING SIGNAL DC 0.5V, 20μsec. ←0V		㊳ Q804-B ←0V DC 1V, 20μsec.
	㉟ IC721 –2PIN ←0V AC 0.05V, 20μsec.		㊴ Q804-C (TR801-7) HIGH VOLTAGE DC 250V, 20μsec. ←0V

PARTS ARRANGEMENT

FVD 103	331DX08632
FPS 101	331DX08633
FCS 100	331DX08634
FDF 130	331DX08628



DWN.	K.SHIRAISHI	14.3.80	PARTS LAYOUT
APPD.	K.KONAKA	14.3.80	REV'D
			331DX08632



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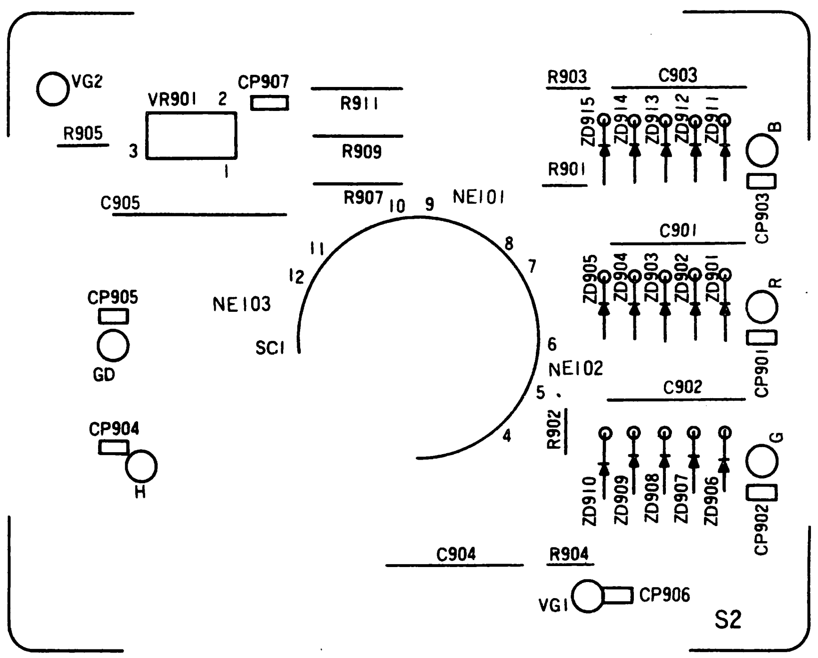
APPD.	K.KONAKA	14.3.80	331DX08633	



FCS 100

DWN.	K.SHIRAISHI	14.3.80		PARTS LAYOUT	REV'D
APPD.	K.KONAKA	14.3.80			
				331DX08634	

REV.	DESCRIPTION	DWN.	APPD.	DATE
	ADDED NEW PRINTED BOARD	H. ANTOKU	Y. KAMATA	29. 9. 82

CHANGE NOTE

1

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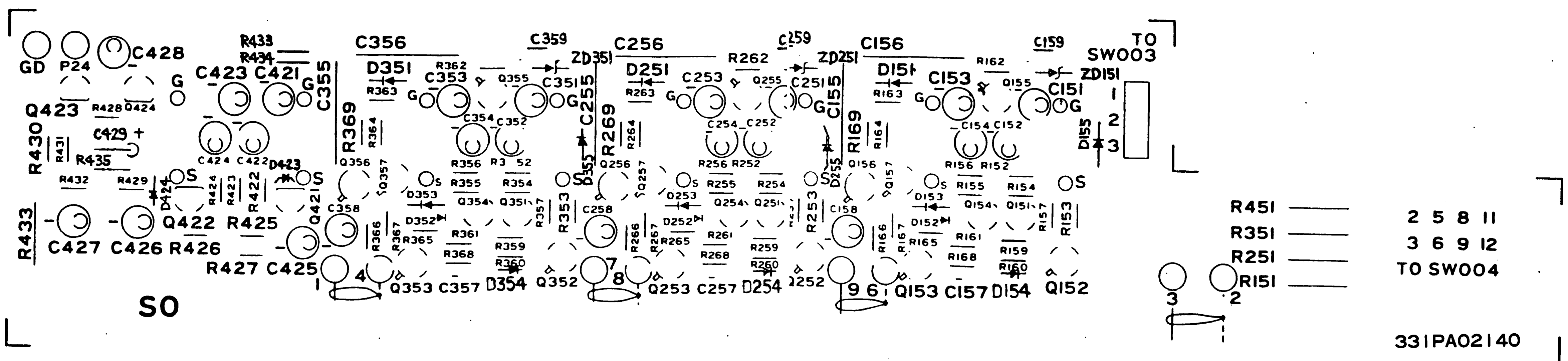
331PA02140 only.



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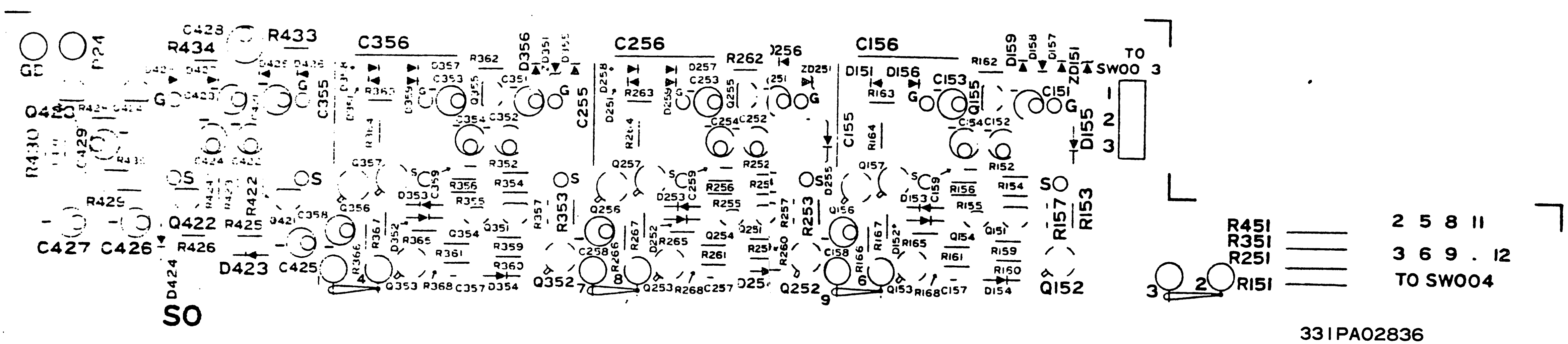


FDF 130

DWN.: K.SHIRAISHI	18.3.82	BLOCK DIAGRAM	REV'D
APPD.: Y.KAMATA	18.3.82	331DX08628	

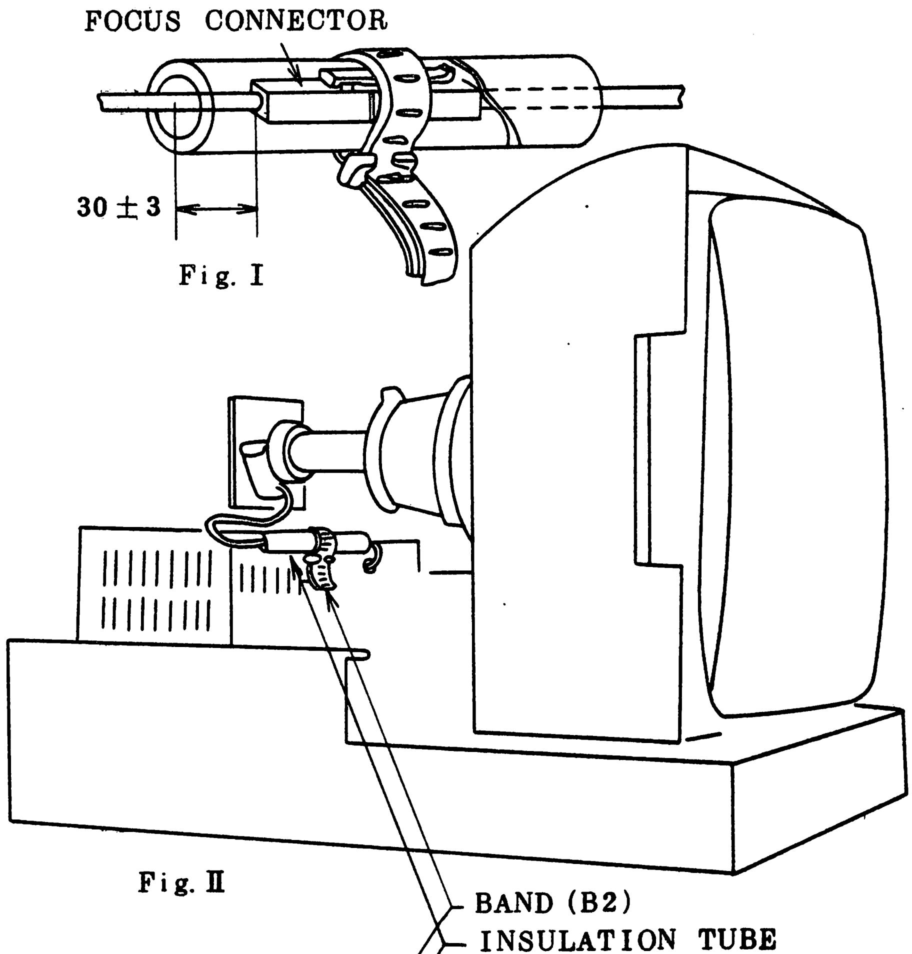
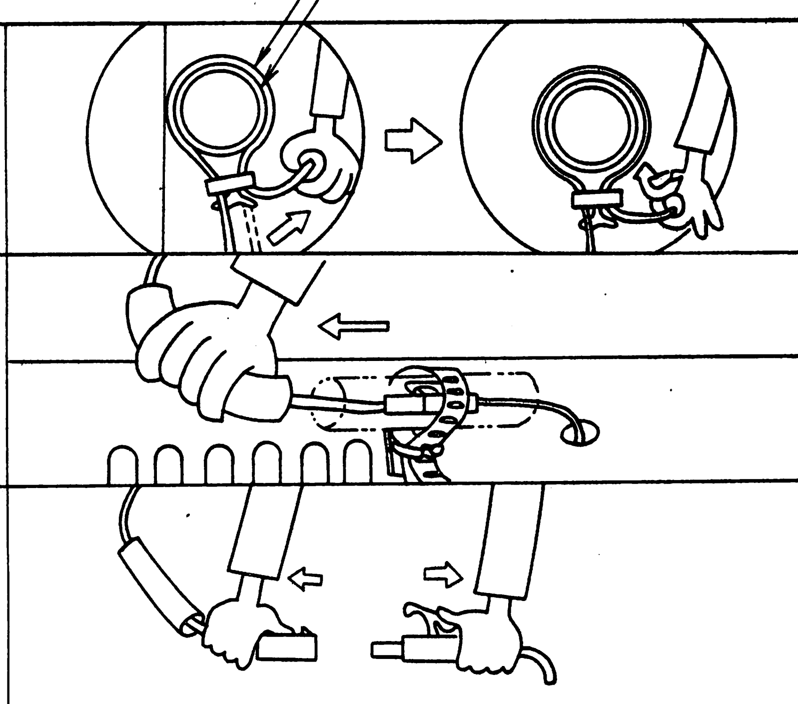


Fig. I

Fig. Ⅱ

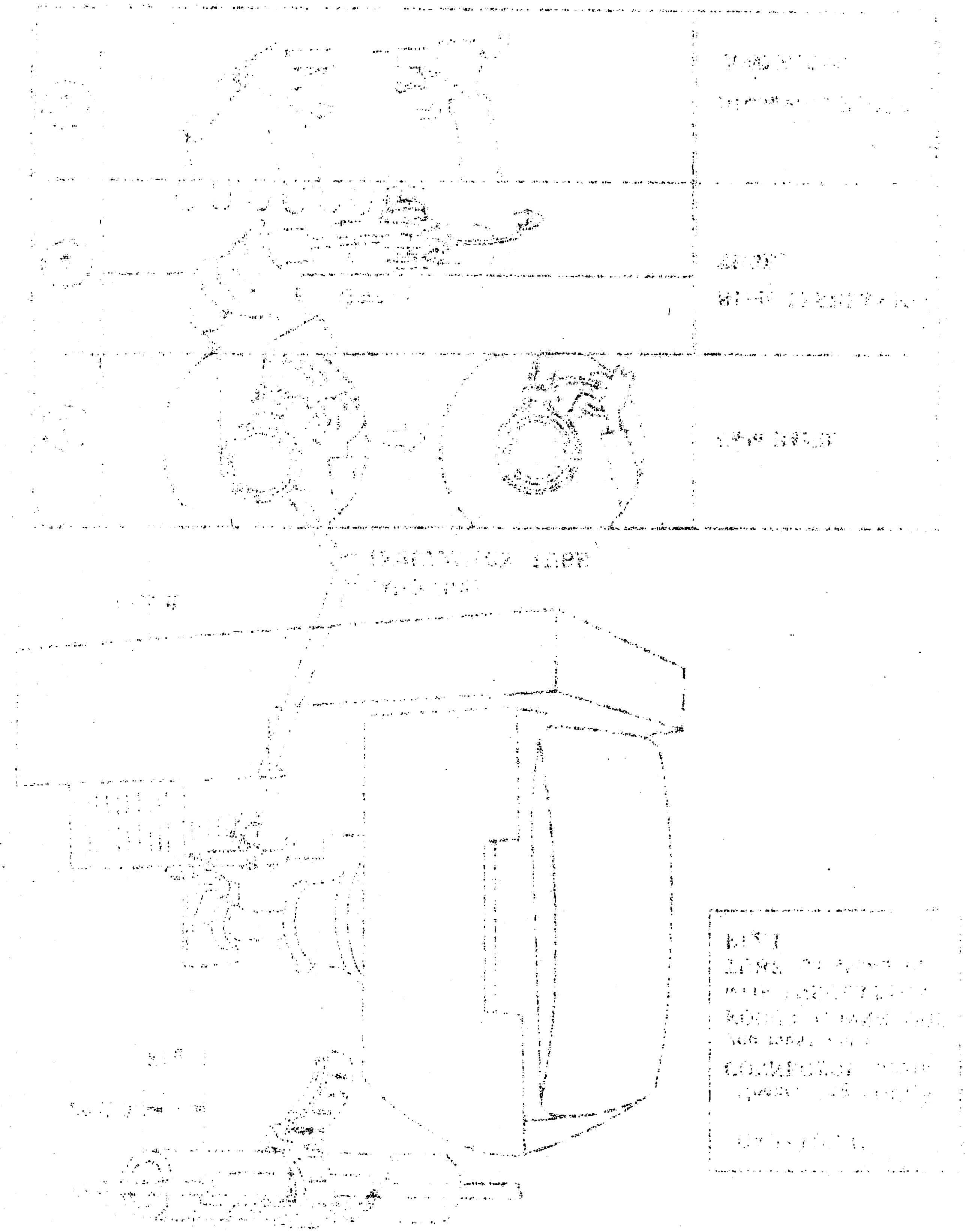
CAUTION !!

Connecting FOCUS CONNECTOR again, you must cover FOCUS CONNECTOR with INSULATION TUBE as shown in Fig. I.



①	Undo BAND.
②	Slide INSULATION TUBE.
③	Disconnect FOCUS CONNECTOR.

Fig. Ⅲ



The following are Revised Pages for the Manual

REVISION No.	PAGE	CONTENTS	DATE
A	P7, 58, 62, 63, 66, 69, 75, 77, 78, 79, 80 81, 84, 86, 87, 88, 89.	Revised VIDEO P.C. Board	Sep. 18. '82

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