MITSUBISHI COLOR MONITOR

MODEL C-6919

SERVICE INFORMATION

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. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. 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.

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SECTION 1
SPECIFICATIONS

Mitsubishi Electric, MODEL C-6919 CRT DISPLAY MONITOR is a high resolution color display monitor for clear display of 4000 characters or less and for graphic symbols. This module is equipped with IN LINE GUNS/SHADOW MASK-CRT and PCBs with solid state active elements. MODEL C-6919 features stable convergence, easy maintenance and compact style. This standard model accepts R.G.B. composite video signal, composite sync and HD/VD signals. This model is supplied with a cabinet. This model complies with U.S. Department of Health, Education and Welfare X-Ray Safety Rules, applicable at time of manufacture.

1.1 FEATURES

EIA Standard Rack Mountable

Sliders can be attached to the both sides of the chassis for easy maintenance. JONATHAN 110QD-18-A2 sliders are applicable without any modification of the chassis.

Multi Frequency Use

These models accept the wide range of horizontal and vertical frequencies listed in this specification with easy re-adjustment.

Stable Convergence

Self convergence assemblies are mounted on the CRT. Complicated convergence procedures are not necessary, because electric convergence circuits are not used.

Dynamic Focusing

A dynamic focus circuit provides uniform focus over the entire screen.

High Reliability

Active and passive elements are all solid state parts except for the CRT. A spark killer circuit prevents damage that could be caused by sparking in the CRT.
All the PCBs are made of glass fibre-epoxy resin in order to improve the reliability.

High Stability

Video amplifiers with back porch clamping circuits provides stable white balance.
Raster width and height are independent of average picture level by virtue of HV regulation.
Automatic Brightness Limiter improves the life of CRT and protects HV circuits from overload.

Easy Maintenance

All the PCBs are easily replaced without tools.
Replacement and Check of a PCB can be done without dismounting from a rack.
A health check lamp indicates a fault of important circuits.

Various Applications

These models accept almost all power sources.
AC100/120, 220/240 Volt 50/60 Hz are tap selectable.
Loop-through connectors each for R.G.B., sync and HD/VD are provided for other monitors.

1.2 SPECIFICATION

1.2.1 AC Power Voltage : AC100∿120V or 220∿240V ±10%, Tap selectable

1.2.2 AC Power Frequency : 50 or 60 Hz

1.2.3 Power Consumption : Less than 200VA (130W)

1.2.4 Input Signal

a) Termination : 75 ohm or High Impedance are selected by termination switch.

b) Connectors : BNC connectors for all inputs.

c) R.G.B. Video : 0.5∿2.0 Vp-p, positive white.

d) Sync or HD : 1.0∿5.0 Vp-p, signal of negative going.

e) VD : 1.0∿5.0 Vp-p, signal of negative going.

Composite Sync shall be superimposed on the Green Video signal.
Separate Sync can be applied at the Sync Input for those cases where the Video signal is without Sync.

f) Loop through output

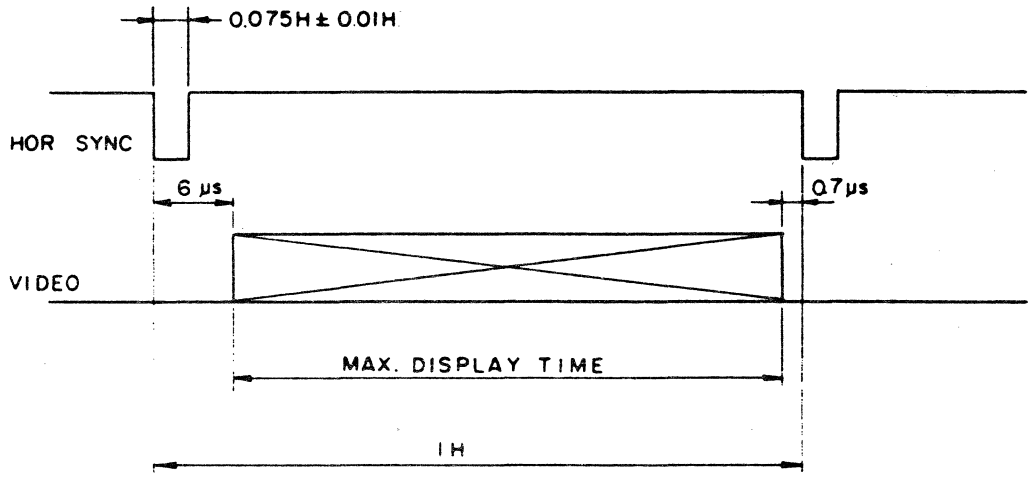
Loop through output connectors are provided for all inputs.

g) Timing requirements

Fig.1-1 Recommended Input Signal Timing Chart.

The composite sync signal conform generally with EIA-STD-RS170 and RS343.
Horizontal blanking time is less than 6 μs and Vertical blanking time is less than 700 μs.

HORIZONTAL TIMING



VERTICAL TIMING

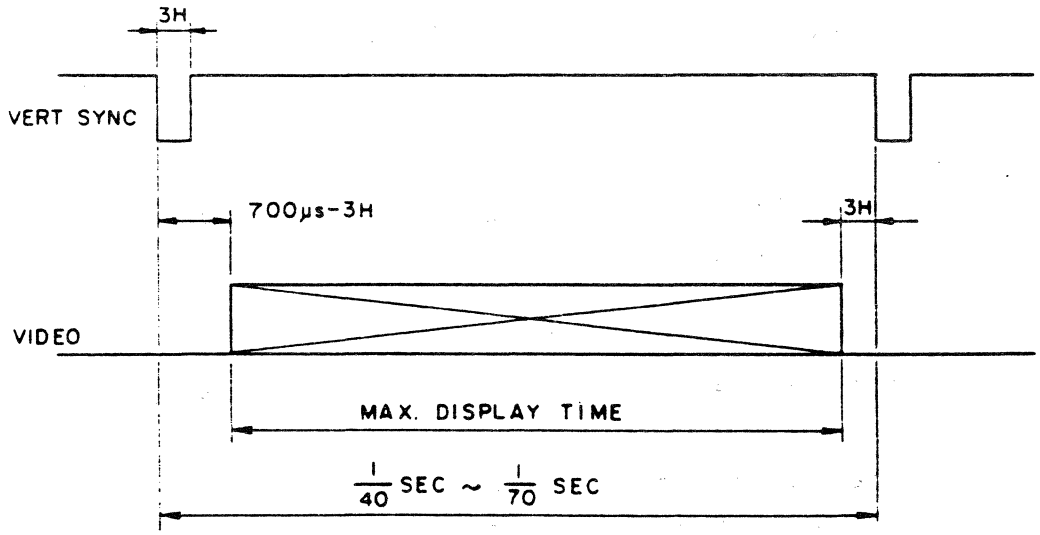


Fig. 1-1 TIMING CHART

1.2.5 Scanning Frequency

Scanning Frequencies shall be specified by users before order is placed.

Vertical frequency : 40-70 Hz

Horizontal frequency : 28 - 35 KHz

1.2.6 CRT

20"(19"V) Self-convergence type dot-phosphor shadow mask tube and in-line electron gun.

Phosphors are Red, Green and Blue for the standard model. A Red, Green and White phosphor combination is available to order.

In order to reduce FLICKER, Long Persistance phosphors are recommended.

1.2.7 Max. Effective Screen Size: 350(W) x 265(H) mm

Users are requested to advise timings and actual area of use. In order to avoid trouble caused by timing, the manufacturer needs the signal source made by the user.

1.2.8 3 : 4 or 1 : 1 aspect ratio can be selected by plug-in position of a connector.

1.2.9 Ambient Temperature

Ambient Temperature on operating shall be -5 ∿ +40°C for the model with cover and 0 ∿ +45°C without cover.

1.2.10 Warm-up Time

Warm-up time is 30 minutes max. At the end of the warm-up period, no adjustments or service is necessary to meet the specifications contained herein.

1.2.1 Package Environment

This equipment withstands room air temperature of -30°C to +60°C and 50 cm free drops encountered during transportation, handling and storage. This also withstands Relative Humidity of 0% to 90% without condensation.

1.2.12 Video Amplifier

The video amplifiers for these models are linear amplifiers which drive the cathode of the CRT.
Video signals shall be generally compatible with the timing requirements of EIA-STD-RS170 and RS343.
The peak-to-peak inputs signal amplitude will be between 0.5 volts and 2.0 volts.
The composite video signal shall be composed of approx. 70% video and approx. 30% sync amplitude.

a) Frequency Response : ±3 dB or less between 50 Hz to 40 MHz

b) Pulse Response : Rise and Fall times are shorter than 20 ns respectively

c) Differential Gain : Less than 5%

d) Black Level Stability

Pedestal clamp circuits are supplied.
Black level is maintained within 1% at any Average Picture Level of 10% to 90%.

1.2.13 Convergence

Less than 0.75 mm in a centrally located area bounded by a circle.
The diameter of this circle is equal to picture height.
Elsewhere the deviation is less tha 1.25 mm.

1.2.14 Raster Size Regulation

Raster Size change caused by change of CRT beam current 0 to 200μA is less than 2 mm.

1.2.15 Linearity and Geometry

Linearity measured and calculated by the following formula is less than 7%.

$$\text{Formula : } \frac{\text{MAX - MIN}}{\text{MEAN}} \times \frac{1}{2} \times 100 \ (\%)$$

Raster distortion is less than 2% of raster height.

1.2.16 Indentification and Marking

Marking and labels are as follows.

a) HEW labels on CRT and Chassis

b) High Voltage warning labels on the cover and chassis

c) Rating label

d) Serial Number labels on chassis and on the Package

1.2.17 Arrangement of controls

The following front panel controls are provided, which which are easily accessible to the operator:

1) BRIGHTNESS CONTROL

2) GAIN CONTROL

3) DEGAUSS SW

4) POWER SW

1.2.18 Configuration

1) Dimension

Refer to attached Drawings Fig.1-2.

2) Weight

40 kg with cover

1.2.19 Spare Parts

Fuses (5A, 2 pcs) and (2A, 2 pcs) are furnished in the package.

1.2.20 Documentation

The following documents are arranged and supplied to users:

1) Service manual containing circuit descriptions, operating procedures, maintenance instruction, parts list and schematic diagram.

2) Specification.

3) Drawings showing outline of equipment and details for installation.

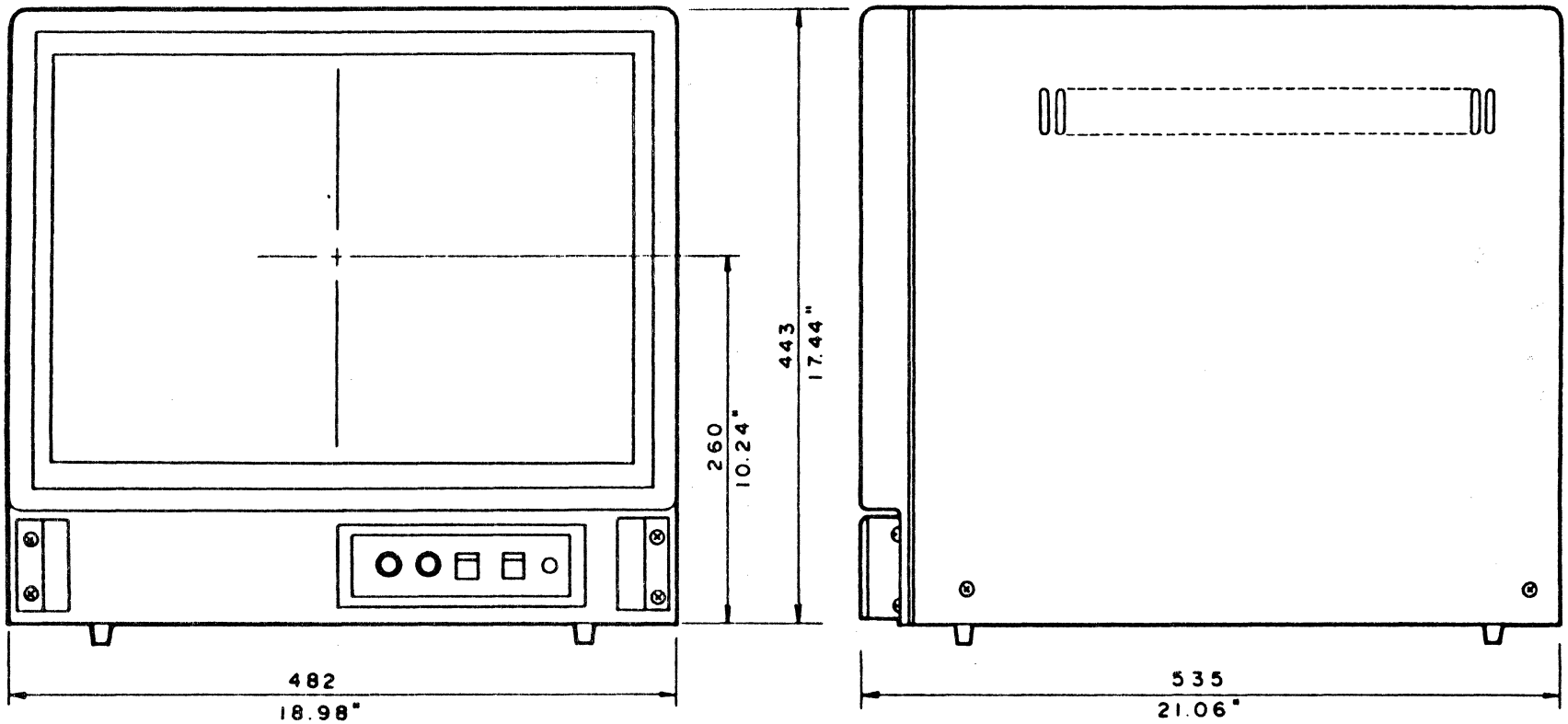


Fig. 1-2 Model C-6919
Color Monitor, Cabinet Configuration

SECTION 2
INSTALLATION

2.1 GENERAL

This section explains how to install the monitor and how to verify its basic operation. Like most commercial TV receivers, the monitor is thoroughly adjusted and checked out at the factory, but it may require certain minor adjustments to adapt it to a particular display generator or other controller and to compensate for minor adjustment disturbances caused during shipment. For convenient reference, complete adjustment procedures and other basic checks are consolidated in Section 3, but only selected, simple procedures should be necessary for initial installation.

2.2 UNPACKING

The monitor is normally packaged in a separate shipping container unless it is incorporated into a system by MITSUBISHI ELECTRIC CORPORATION. Carefully open the top of the container. Remove the inside packing material and lift out the monitor.

2.3 ASSEMBLY

The monitor is supplied completely assembled.

2.4 CAUTION BEFORE "POWER ON"

Please make sure that PCBs, wires, components and structures are in perfect mechanical order and not damaged during transportation.
Particular attention should be paid to the anode cap of the CRT.

2.5 VIDEO INPUTS

Connect red, green and blue video to the appropriate video input connectors located on the rear connector panel. The video cables should be constructed with 75Ω coaxial cable (type RG59/U, or equivalent) and terminated, at the monitor cable end, with standard BNC connector plugs.

The Model C-6919 Series (19-inch) monitor contains two connectors for each video input to provide for loop-through operation. In addition, the input impedance may be set to a high impedance or to 75Ω by means of input impedance selector switches, located on the PCB-VIDEO-SUB. If the monitor is used in a loop-through position, these switches should be set to the high impedance position. For single unit operation, or when the monitor is the last unit in a loop-through string, these switches should be set to the 75Ω position to terminate the video cable.

2.6 EXTERNAL SYNC INPUTS

When the monitor is driven by external sync signals, the Green Video signal will not require a sync "Component", because this monitor has an automatic sync mode select circuit.

1) Composite sync signals shall be connected to the SYNC/HD input terminal.

2) Horizontal sync and vertical sync signals shall be applied to SYNC/HD and VD terminals, respectively.

2.7 AC INPUT POWER

Before connecting the monitor to the power source, determine that the line voltage and frequency are proper (100 - 120V AC or 220 - 240V AC, 50/60 Hz).
Check the position of the input voltage plug (PG) on the PCB-POWER. Make certain that the plug (PG) is in the proper position for the input line voltage (100 - 120V AC or 220 - 240V AC, 50/60 Hz). Plug the ac line cord into the power receptacle on the rear panel.

2.8 DEGAUSSING AND BRIGHTNESS CONTROL

Turn on the "POWER SWITCH" and adjust the brightness control. The raster will then become visible in approximately 30 seconds. Push the degauss switch and a rainblow pattern will appear momentarily, then release the degauss switch.

SECTION 3
CIRCUIT DESCRIPTION

3.1 GENERAL DESCRIPTION

The model C-6919 Color Monitor is a 19V" high-resolution RGB Monitor. A simplified block diagram is shown in Fig. 5-1. The design relies on a superfine pitch shadow mask CRT to achieve a high-resolution color display. The number of apertures in the shadow mask is four times greater than domestic color-TV CRTs. Spacing between triads is approximately 0.31 mm. This superfine pitch shadow mask is complimented by a small aperture precision IN-LINE gun assembly providing small spot size.
This fine spacing enhances the display quality by minimizing display granularity. The supporting electronics, including the deflection amplifiers, video amplifiers, power supply regulation and noise rejection, dynamic focus circuit, have been optimized to complement the capability of the high-resolution shadow mask CRT.

The monitor is designed to accept video signals conforming to the EIA standard RS-170 and RS-343 format.
Provision is made to accept three separate video inputs; red, green and blue. Two BNC connectors are provided for each input to permit "loop through" operation.
Each video input has on associated switch which can select either high impedance, or 75 ohm termination. Video inputs are applied to three buffer amplifiers, located on the PCB-VIDEO-SUB. These buffer amplifiers drive three video amplifiers through Gain and Contrast controls.
The outputs of the video amplifiers drive their respective CRT cathodes. Each video amplifier contains a dc restorer circuit which is called a backporch clamp.
The dc level of each video amplifier output is clamped during the backporch interval.

The monitor is designed to accept composite sync signals on the green video input, or from the mixed sync input. This selection is made automatically by sync switch circuit. A sync separator circuit strips the sync information from the composite green video.
The separated composite sync is applied to the horizontal and vertical sync generators. The clamp pulse generator circuit extracts and forms a backporch pulse, which is provided to the video amplifiers for the dc restoration.

A negative horizontal and vertical sync signals from the PCB-VIDEO-SUB drive the horizontal sync regenerator and vertical oscillator.
The vertical oscillator generates the vertical sweep waveform.
Current feedback is provided to the vertical driver amplifier for operational stability and linearity correction. Vertical deflection current flows through the vertical yoke coil and feedback resistor (Rf).
A vertical sawtooth voltage which developed across the feedback resistor (Rf) is supplied to the vertical driver amplifier and T/B PCC (Top and Bottom Pincushion Correction) modulator. The modulated output signal is applied to the vertical driver amplifier.

Horizontal sync signal drives the horizontal sync regenerator. The regenerated horizontal sync signal is supplied the horizontal AFC phase detector which also receives a comparison voltage from the HOT (Horizontal Output Transformer). The output of the phase detector is proportional to the difference in phase between the two signals. The phase detector output is used to control the horizontal oscillator frequency resulting in horizontal phase-lock. The horizontal deflection output stage, located on the PCB-DEFL, drives the horizontal yoke.

The Side PCC amplifier produces a correction voltage which modulates the horizontal deflection yoke current for the correction of the pincushion distortion at both sides of the raster. The Side PCC modulates the horizontal deflection amplitude as a function of vertical deflection, and is obtained by applying a parabolic waveform, derived from vertical scan, to the horizontal deflection regulator. This is amplified by the horizontal deflection regulator and produces a parabolic modulation of the power supply voltage. This in effect makes the scanning lines near the center of the raster longer than lines near the top and bottom.

The high voltage winding of the flyback transformer drives a rectifier circuit to produce 25 KV DC CRT anode voltage (E.H.T.).
The high voltage is sampled and compared to a constant voltage, and the differential voltage drives the high voltage regulator transistor so that a normal high voltage condition is maintained. If high voltage become excessive, the SCR Switches in the HV Safety Circuits turn on and clamp the input pulse signal used for the high voltage drive circuit.
A health check circuit monitors the high voltage circuit and the horizontal deflection circuit.
The Health Check Indicator is illuminated during normal operation.

The brightness and blanking signal supplied to the CRT control grids is developed by mixing the brightness dc voltage from the brightness potentiometer with the outputs of the blanking circuits and the ABL (Automatic Beam Limiter) circuit. Blanking signal is derived by mixing and wave shaping vertical and horizontal deflection pulses. The brightness potentiometer is biased by a +100V and -86V dc regulator.

The ABL circuit monitors CRT beam current return.
If CRT beam current exceeds the set reference level, the brightness voltage is limited to control the beam current.

3.2 DETAILED DESCRIPTION

This section contains detailed description of circuit operation for the Model C-6919 series Color Display Monitor.
Schematic diagrams attached to this booklet are necessary to understand the following description.

3.3 PCB-VIDEO-SUB CIRCUIT

This PCB unit contains Video Preamplifier, Sync Separator and Sync Processor.

3.3.1 Video Preamplifier

This circuit board contains three video amplifiers, one for each primary color. These three amplifiers, for the red, green and blue CRT guns, are identical.
Since the three amplifiers are identical, the operation of one channel (GREEN) is described here.

The three video inputs are wired to BNC Connectors Located on the rear panel. One termination switch (S101) on the PCB-VIDEO-SUB circuit board provides all three inputs selection of 75 ohm or high-impedance termination.

GREEN Video signal enters the monitor at Connector S193 and is terminated by 75Ω resistor R101 through

Switch S101. Connector J194 allows for loop-through operation.

Input video signal is ac-coupled to the base of emitter-follower Q101 by capacitor C101. The output at the emitter of @101 drives the GREEN channel contrast control (VR101) on the PCB-VIDEO-SUB. The individual contrast controls allow matching the CRT color levels. Emitter-follower Q102 isolates the contrast control from the following cicuitry.

3.3.2 Sync Separator

The green video signal is provided by Q131, Q132, Q133 and Q134. D101 is a clamper diode for dc restoration. The composite video signal is clamped by D103, and applied to pin 9 (the non-inverting input) of operational amplifier IC101 through an emitter-follower Q136, IC101 pin 10 (the inverting input) is referenced to approx. +5.6V. Therefore only the sync tip would have an amplitude less than the reference (+5.6V) causing IC101 (pin 7) to switch to negative going output which is applied to sync switcher Q140 and sync mixer Q138, Q139.

When External Sync is applied, sync switcher Q140 automatically kills the output of sync separator IC101(7). For Internal Sync, Q140 is non-conducting, and the composite sync singal is applied to sync mixer, Q139. In external sync condition, composite sync signal is applied to SYNC/HD input terminal, J197, and sync signal is rectified by diodes, D107, D108. The rectified output voltage turn on the sync switcher, Q140, and composite sync signal from the sync separator is shunted to ground through resistor, R169.

3.3.3 Sync Processor

Monostable multivibrator, IC103B and NAND gate, IC104C forms a kind of differentiator to separate the horizontal sync.

NAND gate IC104D inverts the horizontal sync signal to supply positive sync to the differentiator formed by C169 and R185. Q141 is biased in the OFF state. Negative edges of the positive sync signal (which are the trailing edges of the horizontal sync pulses) drive Q141 to the ON state. The output across R186 is a positive pulse during the backporch interval. This pulse drives the backporch gate FETs, Q207, Q237 and Q267.

The vertical sync pulse is separated by monostable multivibrators, IC106A and IC106B.
Monostable multibibrator, IC103A generates the negative going vertical sync pulse.

External vertical sync (VD), if used, is converted to TTL level by IC101A and coupled through EXCLUSIVE-OR IC105D to monostable multivibrator IC103A.

This PCB unit contains video amplifier, backporch clamp circuit, ABL circuit and Blanking circuit.

3.4.1 Video-Driver Amplifier

R.G.B. video-driver amplifiers have quite same circuit and components. The Green video signal from the PCB-VIDEO-SUB enters emitter-follower at the base of Q201.

Emitter-folloer Q201 drives Balanced Modulator, IC201. IC201 controls Green video signal amplitude by a control voltage from Gain control, VR292 located on the front panel.

Output signal from IC201, pin #6 is supplied to the emitter-follower Q202. Transistors Q203 amplifies video signal approximately 20 dB.
Output signal from emitter-follower Q204 is applied to the backporch clamp circuit composed of Q205, Q206 and Q292.

A positive backporch pulse from the clamp pulse generator drives the gate of N-Channel FET, Q205. Normally Q205 is non-conducting. During the backporch time interval, Q205 is turned on by a positive pulse, and provides base bias to emitter-follower Q206 to maintain the backporch level at the constant dc level. Q292 supplies clamp level voltage and the voltage can be adjusted by VR291.

Cascade output amplifier formed by Q209 and Q210 is driven from the emitter-follower Q206.

Series and shunt peaking are provided by L201, L202 and damping resistor R2C2. The capacitor-resistor networks in the emitter of Q209 formed by R2C1, C220 and C221 provide high frequency peaking.
Emitter-follower composed of Q211 and Q212 drives the cathode of the CRT, and to neglect the stray capacitance between cathode and signal ground.

3.4.2 Blanking Circuit

The blanking circuit provides negative blanking pulses to the CRT control grids, during the vertical and horizontal retrace periods, to prevent the flyback retrace lines from appearing on the CRT. This blanking function is performed by transistors Q601 and Q602 located on the PCB-VIDEO. The base of pulse amplifier transistor Q601 is driven by both horizontal and vertical retrace pulses applied through pulse forming networks. A positive polarity vertical retrace pulse generated from vertical oscillator is coupled through capacitor C605 to D609. Diode D608 (through R603) clamps the pulse base line to the emitter potential of transistor Q601.
The positive vertical retrace pulses causes diode D607 to conduct. The stretched pulse is applied to zener diode D610 through R607.
When the positive pulse amplitude applied to diode D610 exceeds the zener potential, transistor Q601 is driven into conduction.

Horizontal retrace pulses from a horizontal output transformer winding are applied between diode D601 and the emitter of Q601.
The retrace pulses applied to diode D604 have a positive polarity.

Diode D604 conducts when the retrace pulse is absent and the applied potential swings negatively. Since the emitter of transistor Q601 is biased at -110V dc (supplied by the action of rectifier diode D601), resistors R604 and R605 provide a positive bias to the base of Q601 during horizontal retrace. This bias is limited by zener diode D606. When the retrace signal applied to diode D604 is negative, the base of Q601 is driven negative cutting off Q601. Diode D607 limits this negative potential at the base of Q601.

During horizontal or vertical retrace time, transistor Q601 is driven into conduction, generating negative blanking pulses at its collector. The output of Q601 is buffered by emitter-follower Q602, which drives the CRT control grids through capacitor C607. Diode D611 improves blanking pulse rise time at burn-on. When Q601 is turned-on at the beginning of a blanking pulse, its collector swings negative causing diode D611 to conduct, discharging capacitor C607 through the collector of Q601.

3.4.3 Automatic Beam Limiter

The Automatic Beam Limiter (ABL) circuit, located on the PCB-VIDEO, is implemented by transistors Q603, Q604 and Q605.
The ABL circuit functions to limit the CRT beam current to a level set by potentiometer VR601.

The high voltage rectifier current from horizontal flyback transformer T591 returns to ground through resistor R308 on the PCB-DEFL. Resistor, R308 is connected +18V dc regulator.
The dc voltage developed across resistor R308 is proportional to the CRT beam current. This positive dc voltage, developed across R308 is filtered by

capacitors C610 and R610 and applied to the base of transistor Q603. The differential amplifier, formed by transistors Q603 and Q604 compares the voltage across R308 with the reference level set by potentiometer VR601. If the voltage drop across R308, produced by the beam current, exceeds the level set at VR601, transistor Q603 conducts and turns on transistor Q605. The collector of transistor Q605 pulls the CRT grid voltage negative to limit the beam current.

3.5 PCB-DEFLECTION CIRCUIT

This PCB unit contains Vertical Deflection circuit, Horizontal Deflection circuit, High Voltage circuit, PCC circuit and High Voltage Protector circuit.

3.5.1 Vertical Deflection Circuit

The vertical deflection circuits consist of the IC503, (contains the vertical oscillator and vertical driver), vertical output stage and vertical centering circuit.

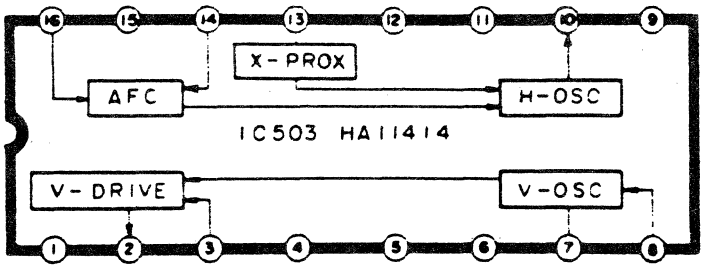


Fig. 3-1 Block Diagram of IC503

The vertical sync pulse is applied to pin #8 of IC503, and oscillator sawtooth wave generated in the IC503 is compared with the feed back deflection current wave developed across R408 and R409. Height control, VR402 adjusts the waveform of the feed back voltage.

The output voltage from IC503, pin #2 is applied to the base of driver Q401.

The vertical output amplifier Q404 and Q405 operates Class B push-pull. When scanning the upper half of the screen, deflection yoke current flows through +100V, Q404. When scanning the lower half of the screen, the yoke current reverses flow through Q405.

A sawtooth waveform developed across R408 and R409 drives the T/B Pincushion Correction Circuit.

Transistors Q402 and Q403 composed a complementary emitter-follower to supply slight dc current to the vertical deflection yoke to adjust centering the raster by Vert. Centering control, VR404.

3.5.2 Horizontal Deflection Circuit

The horizontal deflection circuits consist of the IC503, (Contains the horizontal oscillator and phase lock circuit), drive circuit and horizontal output circuit and horizontal centering circuit located on the PCB-DEFL.

The horizontal oscillator incorporates a phase lock circuit which locks the frequency and phase of the horizontal deflection current to the horizontal sync pulses stripped from the video input. The free-running oscillator frequency is primarily determined by capacitors C510, C538 and resistors R511, VR502. Horizontal Hold control VR502 adjusts the free-running frequency by varying the base bias voltage on pin number 12 of IC503.

The horizontal sync signal stripped from the green video signal is shaped by sync processor on the PCB-VIDEO-SUB and applied to the Horizontal Regenerator, IC501, pin number 13. Two gates of this IC501 are used as monostable multivibrator which equalizes horizontal sync pulse width.
The regenerated sync signal is applied to pin 16 of IC503 through sync amplifier, Q507.

The comparison voltage is applied to pin 14 of IC503. This comparison voltage is formed by integrator, R507 and C507 from the horizontal retrace pulse from the horizontal output transformer, T502.

Output pulse from IC503, Pin 10 is converted to saw-tooth wave signal in Miller Integrator Q501. Q501 turned on and off at the zero-cross level of the sawtooth waveform.

The square wave signal with duty cycle (1 : 1) is generated IC502 and this square wave is applied to Q502 through IC501, pin 4/5 and 6.

Transistor Q502 drives interstage transformer T501, which in turn couples the drive signal to the base of horizontal output transistor Q551. Capacitor C514 and resistor R522 provide wave-shaping.

Horizontal output transistor Q551 is driven into conduction for approximately 15 microseconds at the end of each horizontal sweep and turns off at the beginning of the retrace period.

Retrace time is determined by the resonant frequency of the parallel circuit formed by the inductance of the horizontal deflection yoke, the inductance of horizontal transformer T502, C519 and C521.

During retrace time, a half cycle of oscillation occurs at this resonant frequency with the collector of Q551 swinging positive. When the half cycle is complete, the collector of Q551 begins to swing negative, which causes damper diode D503 to conduct. When D503 conducts, the resonant frequency of the horizontal circuit is changed to produce the horizontal sweep (by the shorting of capacitor C519 and C521).
During sweep time, the resonant frequency is determined by the horizontal yoke inductance and capacitor C519 and C521.

Current from the yoke flows through diode D503 for approximately half of the horizontal sweep time. At that point the current reaches zero and reverses. The reversed yoke-current flows through Q551 (which is turned on during the last half of the sweep time) until the next retrace period. The horizontal yoke is returned to ground through linearity-correction inductor L501. Inductor L501 is magnetically biased and provides horizontal linearity correction.
Horizontal output transformer has tapped windings in order to accomodate increased flexibility in changing picture size from a 1 : 1 to a 4 : 3 aspect ratio.
A plug for this change has been provided on the PCB-DEF.

3.5.3 Pincushion Correction Circuits

Two Pincushion Correction Circuits (PCC) are contained on the PCB-DEF, a Side PCC, and a Top/Bottom PCC. The Side PCC modulates the raster width as a function of vertical deflection. The Top/Bottom PCC modulates the vertical deflection amplitude as a function of horizontal deflection.

The Side PCC is composed of operational amplifier IC702. IC702 amplifies the vertical parabolic wave derived

from the vertical deflection output stage through integrator formed by R720 and C717. The output voltage of IC702 is adjusted by the Side PCC potentiometer VR704. This output voltage produces the parabolic modulation of the horizontal power supply through C715. The Correction voltage modulates the horizontal yoke current to correct the Side pincushion distortion.

The Top/Bottom PCC is composed of the balanced modulater IC701. A horizontal parabolic voltage is applied to IC701 derived from C517 and C518 through C702 and C703. Vertical yoke current flows through the feedback resistors R408 and R409, and is applied to IC701. The modulated output signal is applied to the vertical drive stage of IC503, pin number 3 through the Top/Bottom PCC AMP potentiometer VR702. This correction voltage modulates the vertical yoke current to correct top and bottom pincushion distortion. Pincushion phase is adjusted by potentiometer VR703.

3.5.4 Horizontal Voltage Control Circuit

The horizontal voltage control circuit operates to keep the horizontal width constant for a line rate range of 28 KHz to 34 KHz line rate.

The control circuit is composed of the error amplifier Q503 and horizontal voltage regulator Q504 and Q552.

To detect output voltage the rectifier horizontal retrace pulse is utilized to keep constant width. The rectified voltage source is developed across capacitor C525. The error amplifier Q503 compares the attenuated rectified voltage source applied to base through VR505, with Zener voltage of D507. The amplified voltage difference developed across R531 drives the base of Q504 to maintain a regulated output voltage level. Potentiometer VR505 is used to provide horizontal width.

3.5.5 High Voltage Circuits

CRT anode voltage is produced by rectification of a horizontal retrace pulse obtained from the high voltage winding of high voltage transformer, T591(FBT).
High voltage remains independent of anode current in order to maintain stable high voltage performance.

The rectangular waveform voltage, produced by comparator IC502, is applied to the High Voltage driver Q301. Transistor Q301 drives interstage transformer T301, which then couples the drive signal to the base of High Voltage output transistor Q351.
The pulse at the collector of Q351 is stepped up by high voltage transformer, T591 and rectified by high voltage rectifiers located on T591.

The high voltage is then divided by resistors VR591 and R311, fed to the error amplifier Q303 through buffer amplifier Q302. The base voltage of Q303, which is proportional to the high voltage, is compared with Zener voltage of D303. This differential voltage is amplified before driving the High Voltage regulator Q304 and Q352.

If the differential amplifier does not maintain a normal high voltage condition, the differential voltage controls the emitter voltage of transistor Q352 through Darlington transistor Q304.

3.5.6 High Voltage Safety Circuits

High voltage safety circuits are located on the PCB-DEFL. (Refer to Fig.3-2)
If high voltage reaches to a certain designed level above 29 KV, protector circuits begins to operate and cuts off high voltage drive circuits.

The horizontal deflection circuit is separated from high voltage circuit which generates the anode voltage for the CRT.
The upper limits for the beam current and the high voltage are determined in Safety Circuit considering the X-RADIATION LIMIT CURVE of CRT.
The characteristics of the components employed to generate the high voltage have no effect on the upper limit.

Excessive high voltage is detected through the dividing resistors and is fed to Safety Circuit II.

Safety Circuits II operate based on the derived voltage generated from the resistor divider.
The voltage across the capacitor C323 which is proportional to the high voltage is fed to Safety Circuits II through R318 and VR302.

Safety Circuit II contains a comparator, IC302 which triggers silicon controlled rectifier (SCR), TH301 when the sample voltage fed to IC302 pin 2 exceeds the fixed voltage at pin 3 generated by R323 and R325. The voltage at pin 3 is normally greater than the potential at pin 2, therefore, the voltage at pin 2 will increase higher than voltage at pin 3 when the high voltage exceed limiting level 29 kV, and IC302 turns on to activate SCR, TH301. TH301 pulls down the potential of IC501, pin 1 and drive signal for high voltage circuit is interrupted completely.

While the Automatic Beam Limiter is designed to start its operation at approximately 0.5 mA, it is adjustable up to 0.7 mA by VR601. Safety Circuit I is designed to protect against beam limiter failure. Photo Coupler, PC507 is provided to detect excessive current flow into the high voltage transformer, T591. When the beam current increases, the voltage across R328 causes PC507 to conduct, and triggers SCR, TH301.

HV AND SAFETY CIRCUIT

****
*
* Safety Circuit is provided to prevent occasional
* increase of the high voltage that may cause radia-
* tion of harmful level. No modification shall be
* applied on the high voltage and safety circuit.
*
****

3.5.7 G_2 and Focus Voltage

Screen grid bias voltage and focus voltage are obtained from high voltage and formed by potentiometers VR591 and HV resistor.
The HV resistor and focus resistor combination is a potted assembly located on the deflection assembly.

3.5.8 Health Check Circuit

The health check circuit, located on the PCB-DEFL, functions to illuminate a Light Emitting Diode (LED), D991 when the CRT anode high voltage circuit and +100V power supply are operating properly.

The voltage generated across capacitor C306 is obtained from the rectified retrace pulse (D302) generated by high voltage transformer and is the voltage source for LED illumination.

Transistor Q305 is a voltage regulator which outputed +18V.

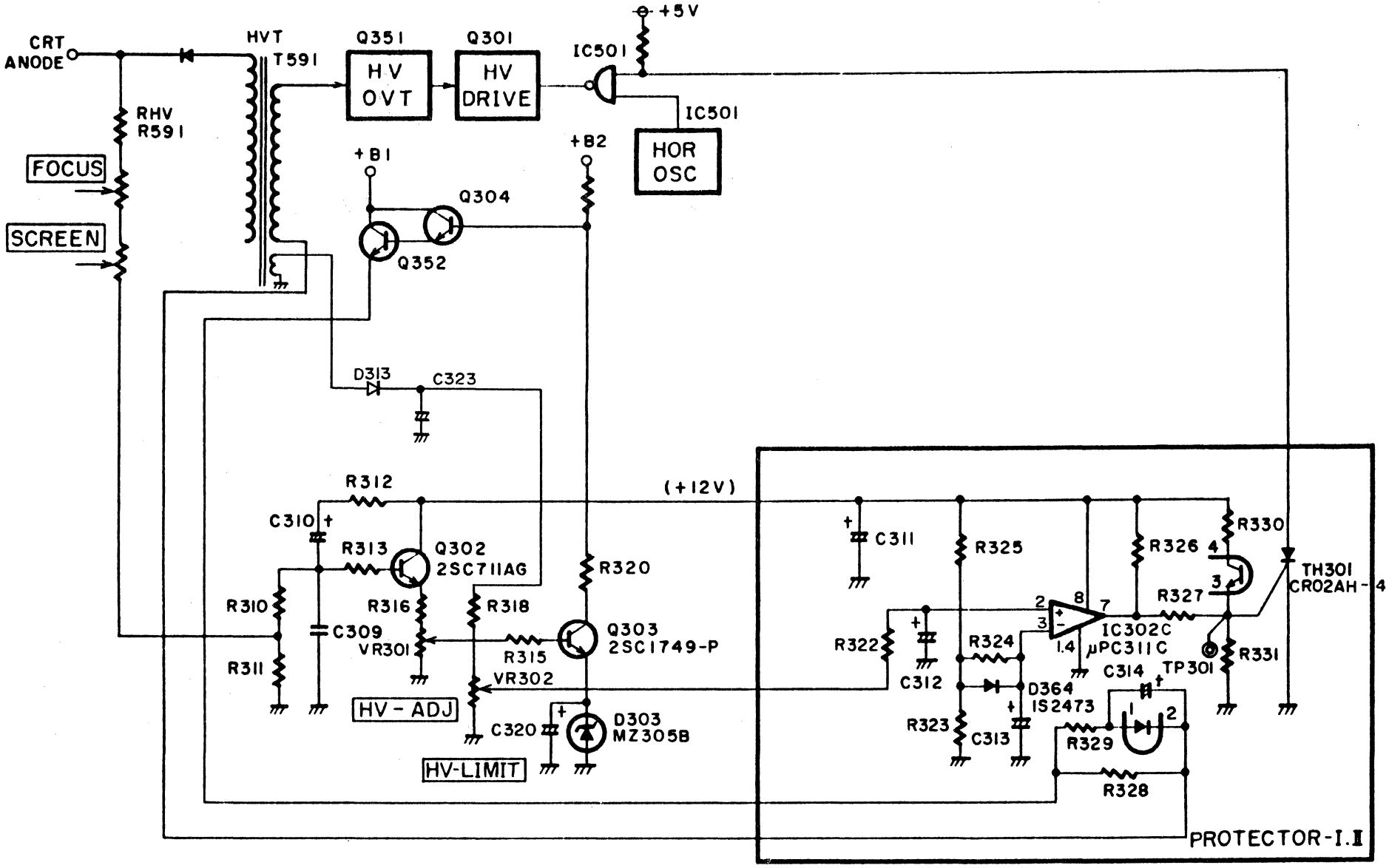


Fig.3-2 High Voltage Safety Circuits

3.6 PCB-POWER CIRCUIT

This power circuit is constructed as a Series-Regulator and outputed +100 V, +12 V and +6.3 V dc power source.

3.6.1 Positive 100 V dc Regulator

The input ac line voltage is applied to the primary windings of the power transformer, T991 through connectors PE, PF, power switch S991 and connectors PJ, PK, PL.

A Jumper plug, PJ must be placed in the appropriate position depending on the input ac line voltage.

The +100 V dc regulator is supplied with ac power from T991, is rectified by diode D901, filtered by C905, and applied to the collector of power output transistors, Q991 and Q992 which is connected in pararel.

The series regulator derives its name from the control element it uses. The output voltage is regulated by modulating a series element, usually a transistor, that acts as a variable resistor. Changes in input voltage result in a change in the equivalent resistance of the series element. The product of this resistance and the load current create a changing differential voltage that compensates for a changing input voltage.

The comparator transistor Q903 compares the attenuated regulator output voltage, applied to its base through VR901 to the reference zener voltage of the D905, and creating an error signal voltage. This error signal voltage is applied to the base of Q901, maintaining

the regulated output at +100 V dc.

Potentiometer VR901 adjust the regulated output voltage level.

The current limiter transistor Q902 provides short circuit protection by limiting the output current. Q902 is normally biased in the no conducting state by the resistors R904 and R906.

In case that the 100 Volt line is suddenly is short-circuited to ground, the voltage at the emitter of Q902 will drop, and Q902 will turn on. This causes Q901, Q991 and Q992 to turn off and latch in that condition. After removal of the short-circuit fault, operation can be restored by turning off the primary power to the monitor for a few seconds to allow the capacitors to discharge, and then restore power.

3.6.2 +12 Vdc Regulator

The +12 Vdc regulator is supplied with ac power from secondary of power transformer T991, is rectified by D902, filtered by C908 and applied to the IC901. IC901 is a 3-Terminal Regulator with the internal thermal overload protection and short-circuit current limiting.

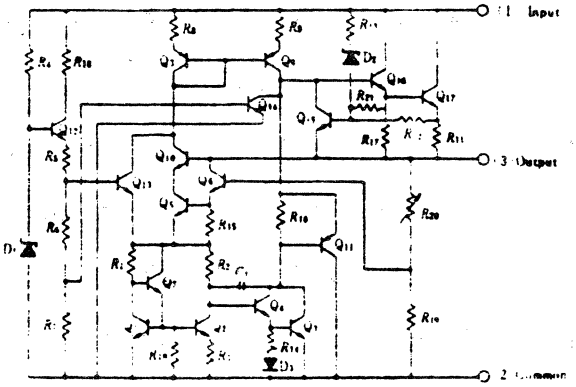


Fig.3-3 Schematic, HA17812P

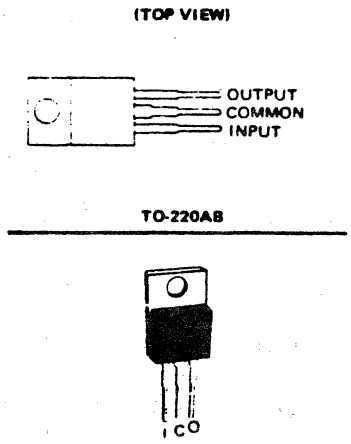


Fig. 3-4 Terminal Assignments HA17812P

3.6.3 +6.3 Vdc Regulator

The +6.3 Vdc is used by the CRT heater.
The +6.3 Vdc regulator is supplied with ac power from secondary of T991, is rectified by D903, filtered by C910 and applied to the collector of Q904.
Q904 serves as a series voltage regulator.

The base of Q904 is clamped at approximately 7 Vdc by D906 and R914.

Assume that the +6.3 Vdc; emitter of Q904 tries to go in the positive direction, decreases the conduction of Q904.

SECTION 4
MAINTENANCE

SAFETY PRECAUTIONS

(NOTICE) Observe all cautions and safety related notes located inside the monitor cabinet and on the monitor chassis.

WARNING

1. Operation of the monitor outside the cabinet or with the cover removed, involves a shock hazard from the monitor power supplies. Work on the monitor should not be attempted by anyone who is no throughly familiar with precautions necessary when working on high voltage equipment.

2. Do not install, remove or handle the picture tube in any manner unless shatter-proof goggles are worn. People not so equipped should be kept away while handling picture tube. Keep picture tube away from the body while handling.

X-RADIATION WARNING

The surface of picture tube may emit X-rays. Precaution during servicing, and if possible, shield service personnel with a lead metal apron.

To avoid possible exposure to X-Rays and electrical shock hazard, the high voltage compartment must be kept in place whenever the chassis is in operation. When replacing picture tube, use only designated replacement part since it is a critical component with regard to X-Rays hazard noted above.

PRODUCT SAFETY NOTICE

Many of the electrical and mechanical parts in the color display monitor have special safety related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc.

Replacement parts which have these special safety characteristics are identified in this service manual.

Electrical components having such features are identified by shading on the schematic diagram and the parts list of this service manual and by marking on the supplementary sheet for this chassis to be issued subsequently, therefore replacement of any safety parts should be identical invalue and characteristics.

ALIGNMENT PROCEDURE

Monitor alignment procedures contained in this section should be followed whenever a major component is replaced: such as a CRT, deflection yoke, or circuit board.
Some alignment may be periodically required to correct for component aging. Degaussing should be performed periodically whenever it is suspected that degaussing is required. These alignment procedures should be performed in the order given herein. Due to interaction, some portions of the alignment procedures may require repeating.

For quick reference, all maintenance adjustments are listed in Table 4-1, together with the location, circuit designator and related paragraph for each control. Figure 4-1 through 4-9 shows the location of all adjustments.

In the following alignment procedures it is assumed that proper line voltage and frequency are available. A video source with proper line rate is applied to the red, green, and blue inputs. The green video must contain composite sync or a proper signal supplied to the external sync input. After all inputs have been connected, the Horizontal Hold (VR502) and the Vertical Hold (VR401) must be adjusted for a stable picture. Approximately 30 minutes should be allowed for warm-up before proceeding.

Table 4-1 MAINTENANCE ADJUSTMENTS

FUNCTION	LOCATION	DESIGNATION	PARAGRAPH
Degauss	Front Panel	S992	4.2
Hor. Hold	PCB-DEFL	VR502	4.3
Vert. Hold	PCB-DEFL	VR401	4.3
100V DC	PCB-POWER	VR901	4.4
High Voltage	PCB-DEFL	VR301	4.5
HV Limit	PCB-DEFL	VR302	4.5
Hor. Width	PCB-DEFL	VR505	4.6
Height	PCB-DEFL	VR403	4.7
Vert. Linearity	PCB-DEFL	VR402	4.7
1:1 Aspect Ratio	PCB-DEFL	VR505	4.8
Top & Bottom PCC	PCB-DEFL		
a. Balance		a. VR701	4.9
b. Amp		b. VR702	4.9
c. Phase		c. VR703	4.9
Raster Position	PCB-DEFL		
a. Hor. Centering		a. VR503	4.10
b. Vert. Centering		b. VR404	
Video Phase	PCB-DEFL	VR501	4.11
Video Clamp Level	PCB-VIDEO	VR291	4.12.1

Table 4-1 MAINTENANCE ADJUSTMENTS

FUNCTION	LOCATION	DESIGNATION	PARAGRAPH
R Video Peaking	PCB-VIDEO	L201, L202	4.12.2
G Video Peaking	PCB-VIDEO	L231, L232	4.12.2
B Video Peaking	PCB-VIDEO	L261, L262	4.12.2
ABL	PCB-VIDEO	VR601	4.12.3
R Bias	PCB-VIDEO	VR201	4.12.4
G Bias	PCB-VIDEO	VR231	4.12.4
B Bias	PCB-VIDEO	VR261	4.12.4
G Contrast	PCB-VIDEO-SUB	VR101	4.13
B Contrast	PCB-VIDEO-SUB	VR111	4.13
R Contrast	PCB-VIDEO-SUB	VR121	4.13
Screen	PCB-CRT	VR371	4.14
Focus	Focus Block	VR591	4.14
Dynamic Focus	PCB-DEFL	VR504	4.14
Brightness	Front Panel	VR691	
Gain	Front Panel	VR292	

4.1 SETTING

a. Insert a connector (PG) on PCB-POWER to the AC power input voltage used. (100 - 120V AC or 220 - 240V AC)

b. Set a connector (FS) on PCB-DEFL to Horizontal Frequency used.

LOW	28 KHz - 31.5 KHz
HIGH	31.5 KHz - 35 KHz

4.2 DEGAUSSING

The display monitor should be degaussed before set-up and adjustment procedure are performed. The display monitor is equipped with a built-in picture tube degaussing coil.

To degauss the picture tube the degauss switch S992 on the front panel is depressed and held for approximately 5 seconds to ensure proper operation of the degauss circuit.

Other parts of the monitor may also require degaussing. This would be indicated by poor color purity or convergence which cannot be corrected by normal alignment. Degaussing of the monitor chassis is performed manually by using a commercial degaussing coil. The following procedure should be adhered to when using a degaussing coil:

a. With the coil switch in the OFF position and the degaussing coil 6 to 8 feet from, and perpendicular to the screen, turn the switch to the ON position.

b. Turn the coil parallel to the screen and, with a circular motion, slowly bring the coil to the monitor.

c. Continuing the circular motion, pass the coil over the front, top, and sides of the monitor for approximately two minutes.

d. Then, moving in a circular motion and with the coil perpendicular to the monitor, slowly back away 6 to 8 feet and turn the coil switch OFF.

NOTE: Degaussing Coil - G.C. Electronics, Catalog No. 9317.

4.3 HORIZONTAL AND VERTICAL HOLD CONTROLS

Ensure that video and sync signal are applied to the monitor. Set H. Hold (VR502) and V. Hold (VR401) on PCB-DEFL for stable picture.

4.4 DC SOURCE VOLTAGE ADJUSTMENT

a. After checking the AC input voltage is within 100 - 120V AC or 220 - 240V AC, apply the power input.

b. Turn the power switch (S991) on.

c. Connect the DC voltmeter to TP - +100V and TP-GND on PCB-POWER. Adjust VR901 on PCB-POWER at DC +100V.

4.5 HIGH VOLTAGE AND HV LIMITER ADJUSTMENT

a. Turn off a power switch (S991).

b. Connect a high voltage meter between the anode cap of the CRT and the chassis.

c. Set the High Voltage Control (VR301) on PCB-DEFL to the fully clockwise position.

d. Set the HV Limiter Control (VR302) on PCB-DEFL to the fully counterclockwise position.

e. Turn on a power switch (S991).

f. Turn the HV Limiter Control (VR302) gradually clockwise to operate the HV Protector circuit.

g. Turn off a power switch (S991).

h. Set the High Voltage Control (VR301) to the counterclockwise position.

i. Turn on a power switch (S991).

j. Turn High Voltage Control (VR301) gradually clockwise until a reading of 29KV ± 100V is achieved.

NOTICE

High Voltage Control (VR301) and HV Limiter Control (VR302) are critical components and never adjust or replace these components in the field servicing.

Replace whole PCB-DEFL ASSEMBLY to a new PCB-DEFL ASSEMBLY preadjusted and checked in the factory.

4.6 HORIZONTAL WIDTH ADJUSTMENT

a. Set a connector AS on PCB-DEFL to 3:4 aspect ratio position.

b. Adjust Hor. Width Control (VR505) for fully scanned horizontal raster width.

4.7 HEIGHT AND VERTICAL LINEARITY ADJUSTMENT

a. Select a cross-hatch test pattern.

b. Adjust BRIGHTNESS, GAIN and CONTRAST controls for suitable picture.

c. Adjust height control (VR403) on PCB-DEFL for fully scanned vertical size and linearity control (VR402) on PCB-DEFL for picture symmetry. Readjust the height, if required.

4.8 1:1 ASPECT RATIO ADJUSTMENT

a. Set Lead Connector as on PCB-DEFL to 1:1 aspect ratio position.

b. Adjust VR505 to suitable width.

4.9 TOP AND BOTTOM PCC ADJUSTMENT

a. Connect cross-hatch signal to a set.

b. On the PCB-DEFL, turn the T/B-PCC AMP Control (VR702) fully clockwise.

c. Adjust the T/B-PCC BALANCE Control (VR701) to equalize the curvature of the top and bottom raster edges.

d. Adjust T/B-PCC PHASE Control (VR703) to left and right symmetry of the top and bottom raster edges.

e. Adjust T/B-PCC AMP Control (VR702) for straightness of the raster top and bottom horizontal edges.

4.10 RASTER POSITION ADJUSTMENT

a. Adjust horizontal and vertical raster size.

b. Adjust Hor. Centering control (VR503) and Vert. Centering control (VR404) on PCB-DEFL to center raster on the screen.

4.11 VIDEO PHASE ADJUSTMENT

a. Connect a video signal.

b. Set the Hor. Hold control (VR502) to the center of its operating range.

c. Adjust Brightness, Gain and Contrast controls for a picture of suitable contrast so that both displayed video and raster are visible.

d. Adjust Hor. Phase (VR501) to center the picture on the raster.

4.12 PCB-VIDEO CIRCUIT ADJUSTMENT

4.12.1 Pedestal Level Adjustment

a. Apply composite video signal of 1Vp-p to the input terminal of the Green channel.

b. Set the R,G,B Contrast controls (VR101, VR111 and TR121) on PCB-VIDEO-SUB AND THE Gain control (VR291) at the center of rotation range.

c. Using a dc oscilloscope, adjust Clamp Level control (VR291) on PCB-VIDEO to obtain 100V ± 1V of the pedestal level at terminal 6 on the CRT socket.

4.12.2 Frequency Characteristics

a. Apply composite sweep signal of 1Vp-p to the input terminal of the RED and GREEN channels.

b. Adjust the Contrast control and the Gain control to obtain the output of 40Vp-p (at a frequency of less than 500KHz) at the RED output on PCB-VIDEO using an oscilloscope.

c. Connect a 10:1 probe of an oscilloscope through a coupling capacitor (1pF) to terminal 8 on PCB-CRT.

d. Adjust L201 and L202 in order that variations in the frequency range of 1 - 40 MHz to be ±3 dB.

e. Adjust the BLUE channel and GREEN channel in the same way.

GREEN-terminal 6-Coils L231, L232

BLUE-terminal 11-Coils L261, L262

4.12.3 Automatic Beam Limiter (ABL) Circuit

a. Apply composite video signal of 1Vp-p to the input terminal. Turn the Gain, Contrast and Brightness control fully clockwise.

b. Set the scale of the VTVM to measure 15V. Connect the probe of a VTVM (Vacuum Tube Voltage Meter) to Connector (MB) pin #1 on PCB-VIDEO.

c. ABL control (VR601) on PCB-VIDEO is factory sealed.

d. The voltage at Connector (MB) pin #1 should be 9V ± 0.5V on the VTVM.

4.12.4 Color Temperature

a. Turn the Gain control (VR292) and Brightness control (VR691) fully counterclockwise.

b. Adjust the Brightness control (VR691) to obtain a dim (just visible) raster.

c. Set the scale of the VTVM to measure 150V. Connect the probe of a VTVM to the collector of Q210, Q240 and Q270 on PCB-VIDEO. Set voltages to 130V by adjusting R,G,B-Bias controls (VR201, VR231 and VR261), respectively.
Observe the raster color to determine which CRT beams are not visible.
Adjust the R,B,G-Bias controls (VR201, VR231 and VR261) as required to equalize the three beam intensities resulting a white (color) raster of 9300 Kelvin.

4.13 VIDEO DRIVE ADJUSTMENT

a. Prior to Performing the video drive adjustment, the Color Temperature adjustments must be proper.

b. Set the Brightness control (VR691) to produce a blank (dark) screen.

c. Set the three Contrast controls (VR101, VR111 and VR121) on PCB-VIDEO-SUB to the center of their ranges.

d. Adjust the Gain control (VR292) on the front panel to obtain maximum useable highlight brightness.

e. Observe the highlight color and adjust the three Contrast controls (VR101, VR111 and VR121) to obtain white (color) highlights.

4.14 G2 AND FOCUS ADJUSTMENT

a. Turn the G2 control (VR371) on PCB-CRT fully counter clockwise and Brightness control on front panel fully clockwise.

b. Adjust G2 control to just produce a faint raster.

c. Adjust the Brightness and Gain controls for a normal display.

d. Adjust the Focus control (VR591) on the Focus Pack for best overall focus, observing both the center and corners of the screen.

e. Adjust Dynamic Focus control (VR504) on PCB-DEFL to obtain uniform focus.

f. Repeat step d and e if necessary.

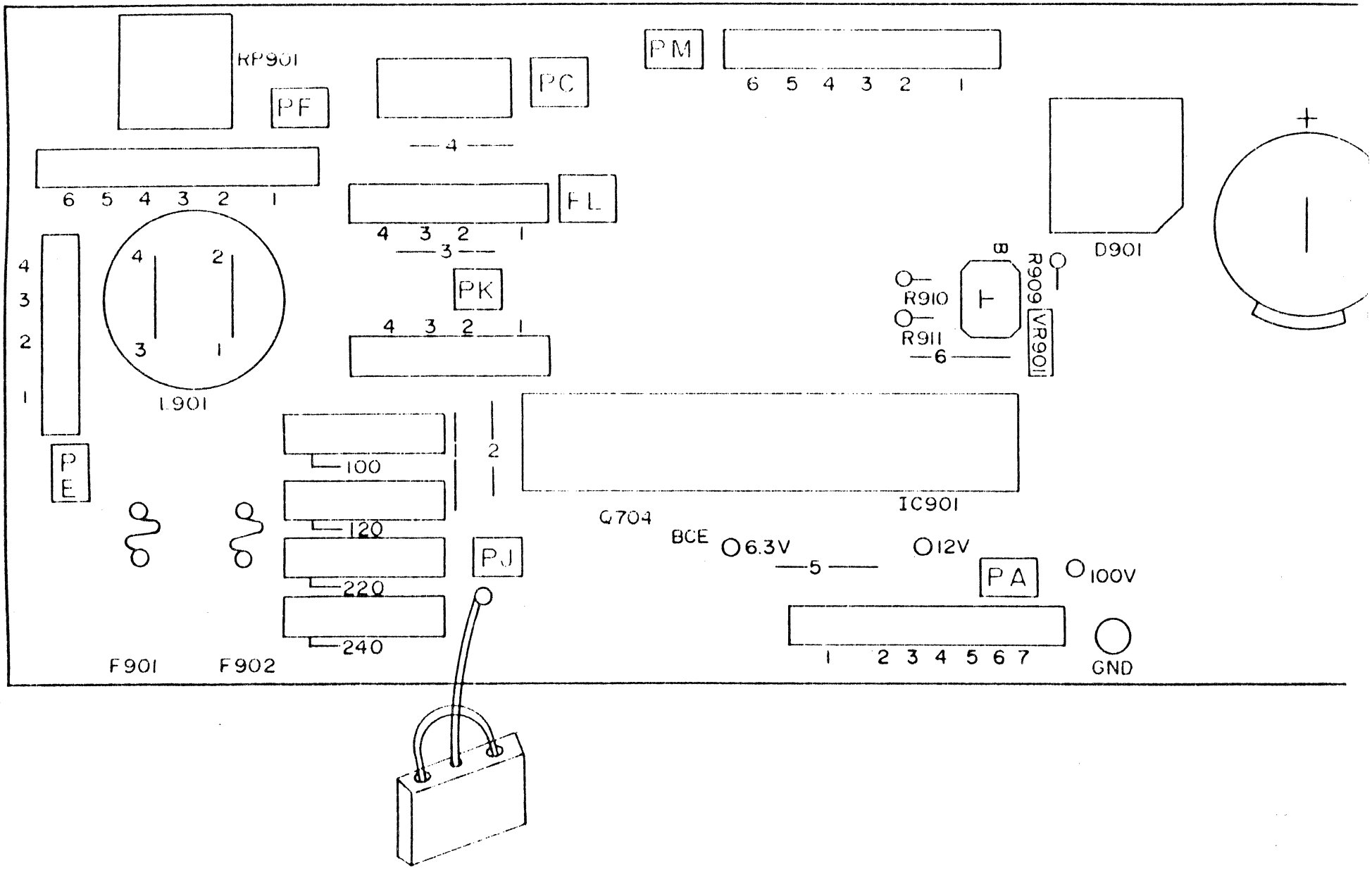


Fig. 4-1 PCB-POWER Location

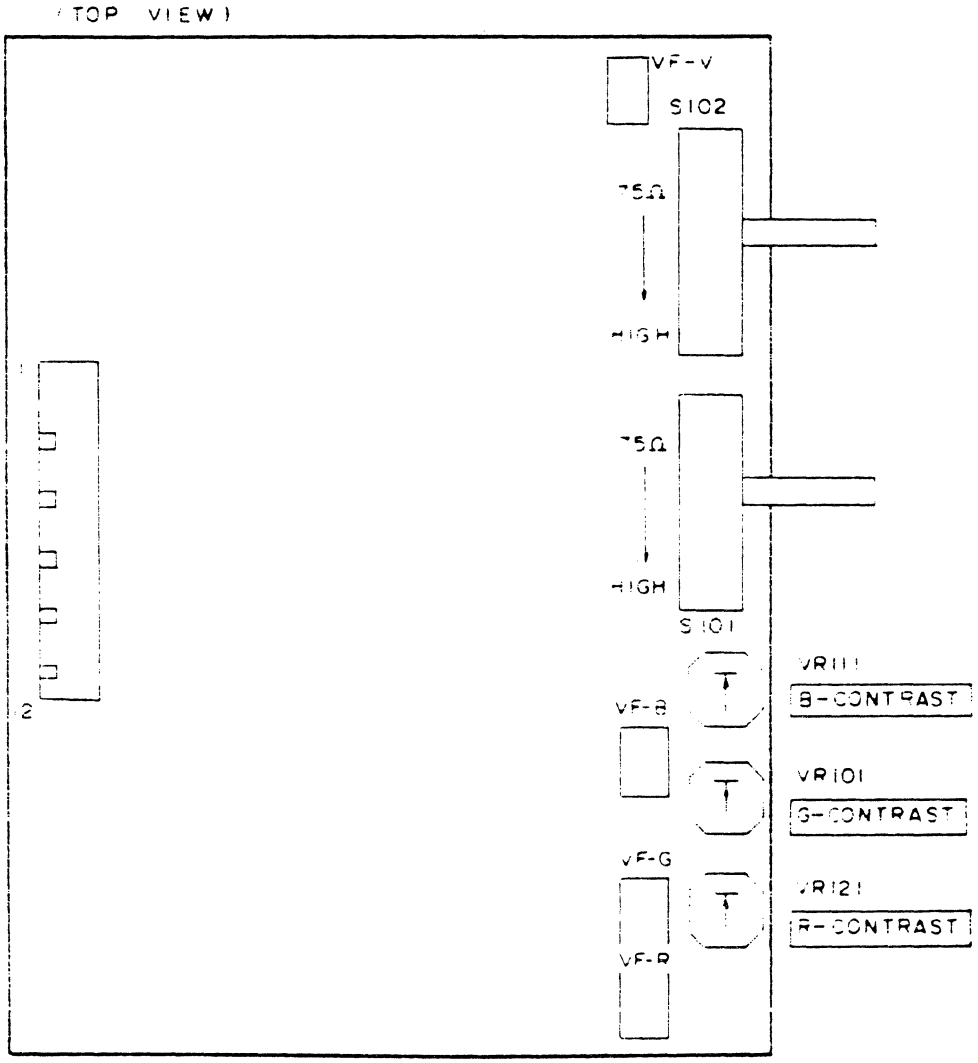


Fig. 4-2 PCB-VIDEO-SUB Location

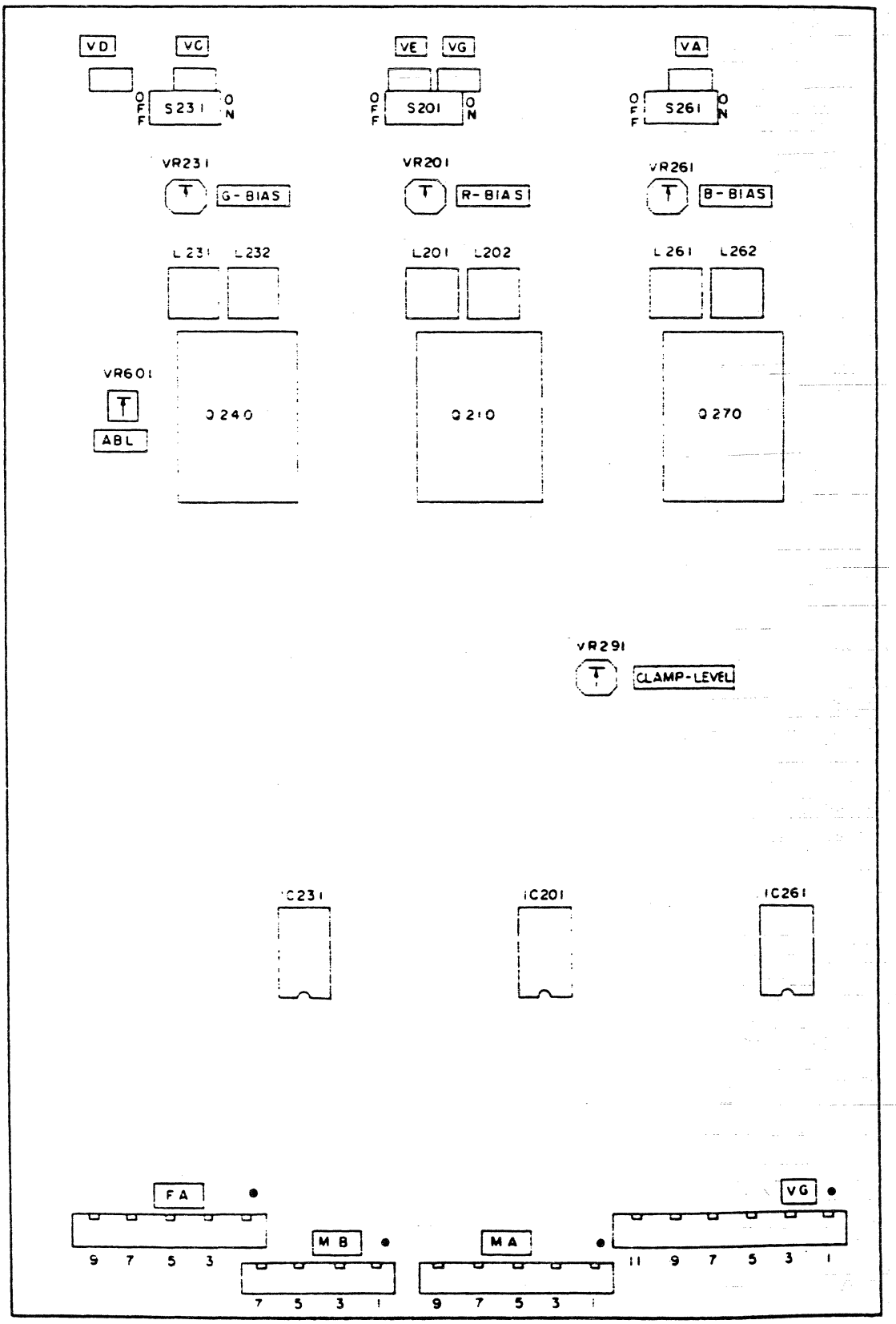


Fig. 4-3 PCB-VIDEO Location

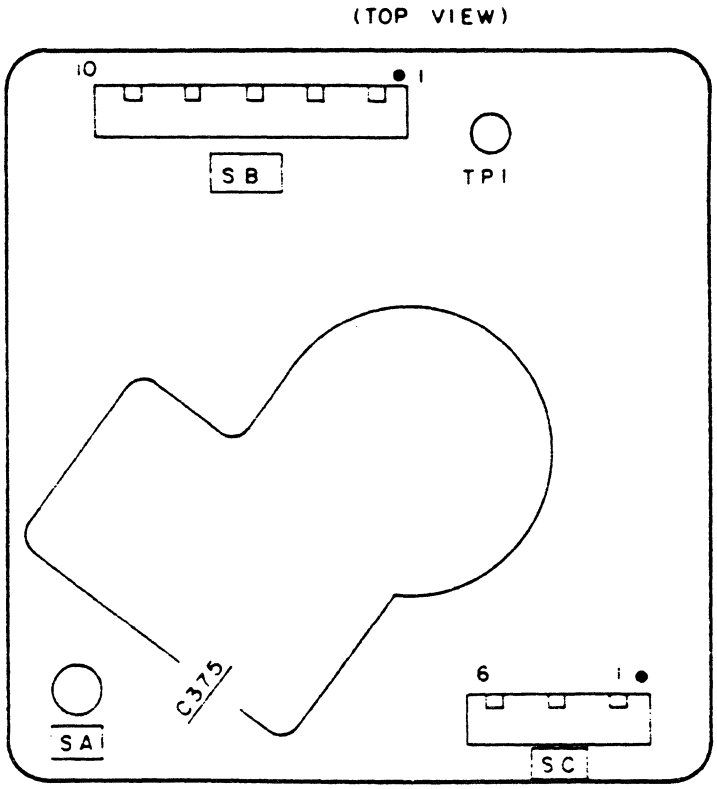


Fig. 4-4 PCB-CRT Location

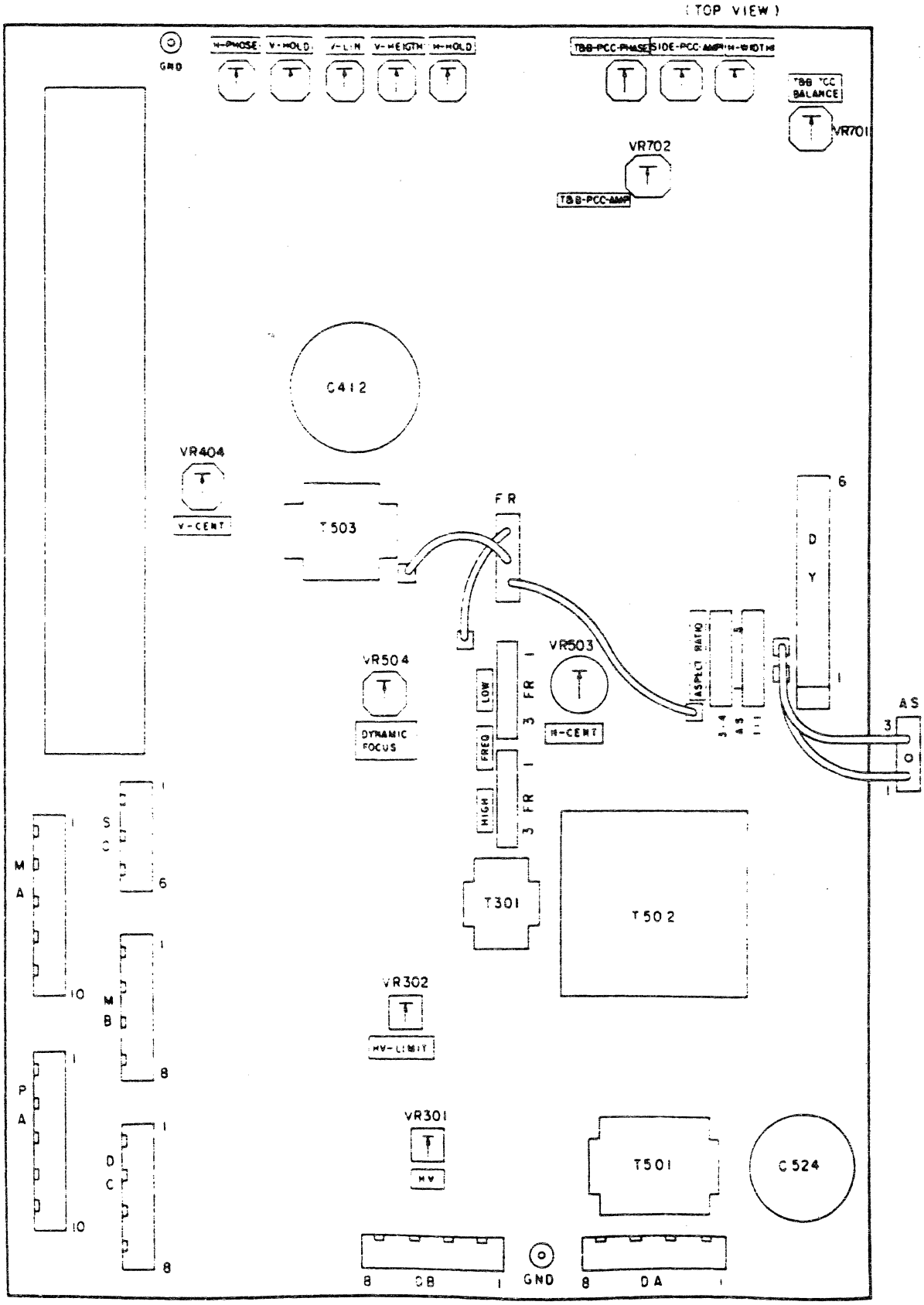


Fig. 4-5 PCB-DEFL Location

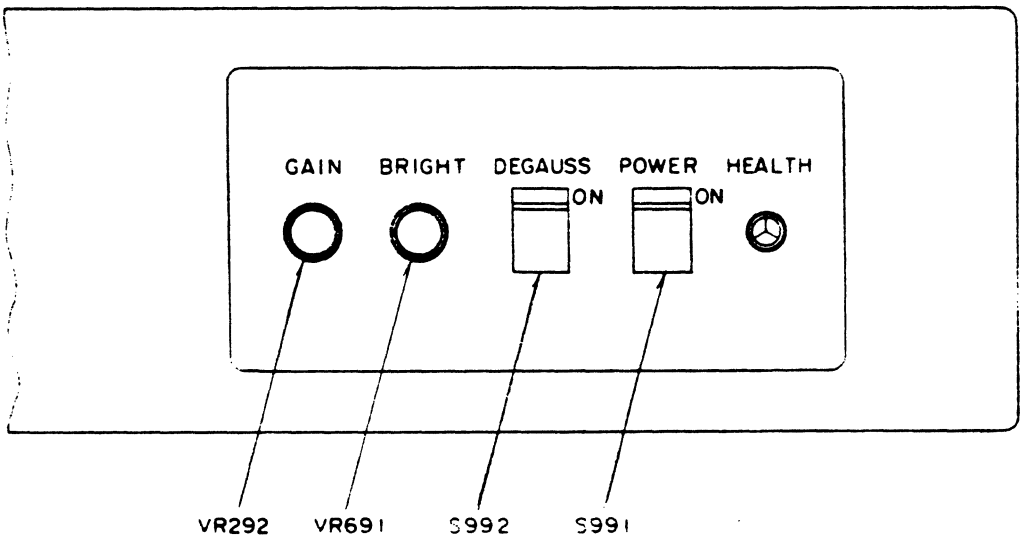


Fig. 4-6 Control on Front Panel

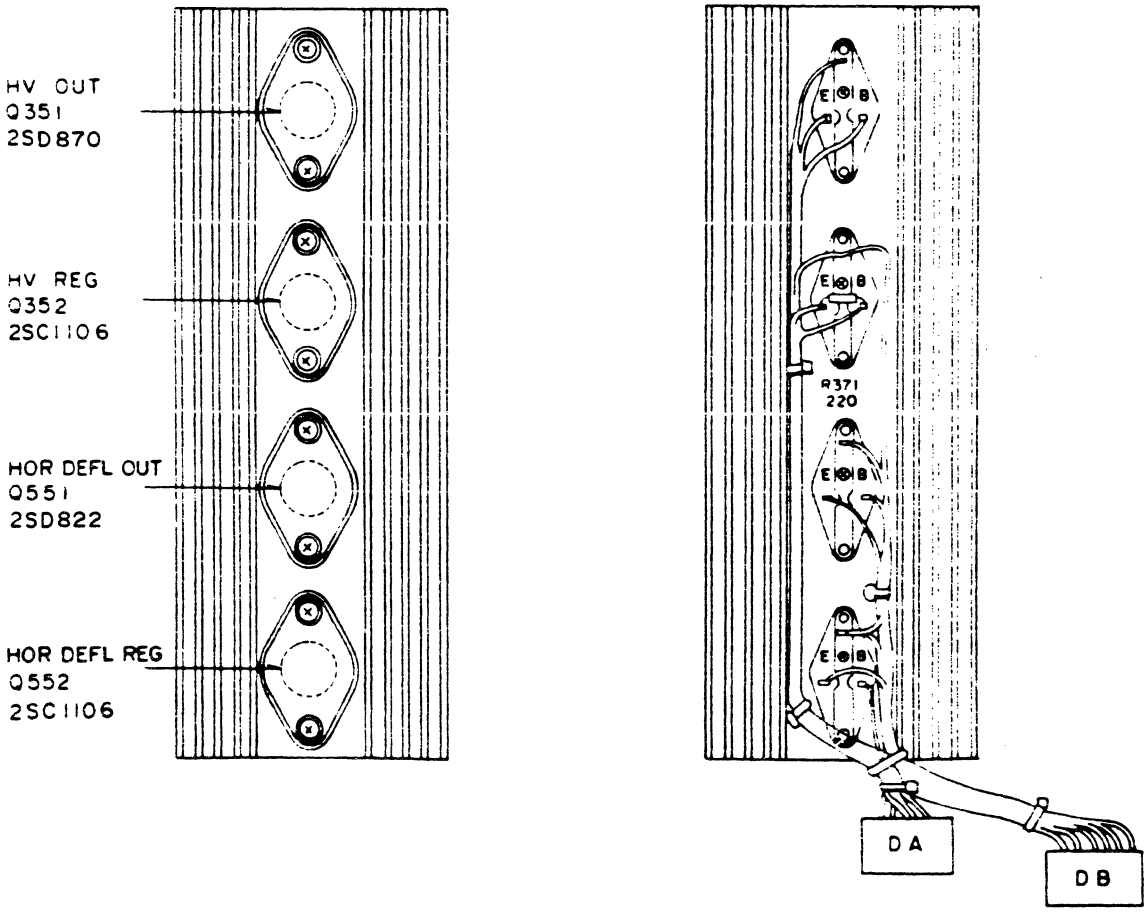
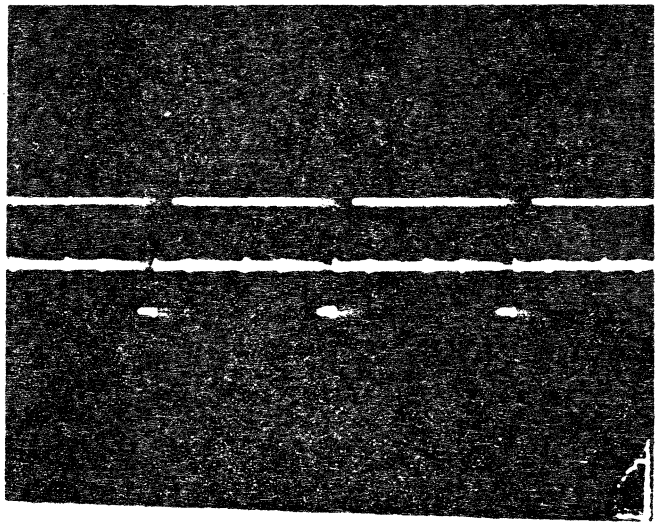
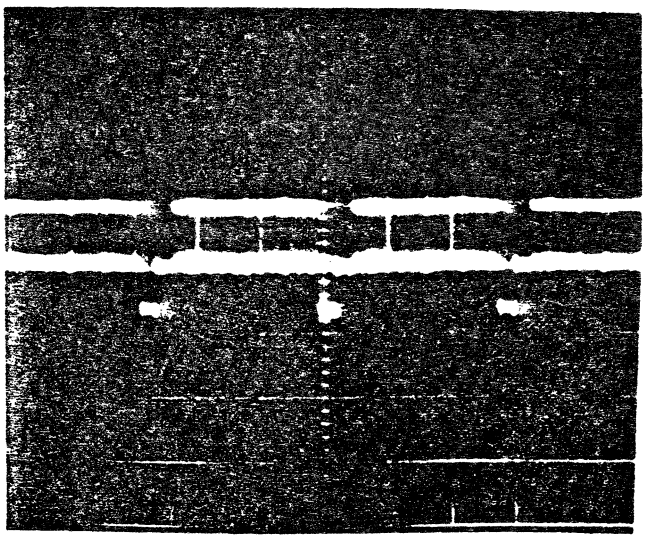


Fig. 4-7 Assey-DEFL-RADIATOR

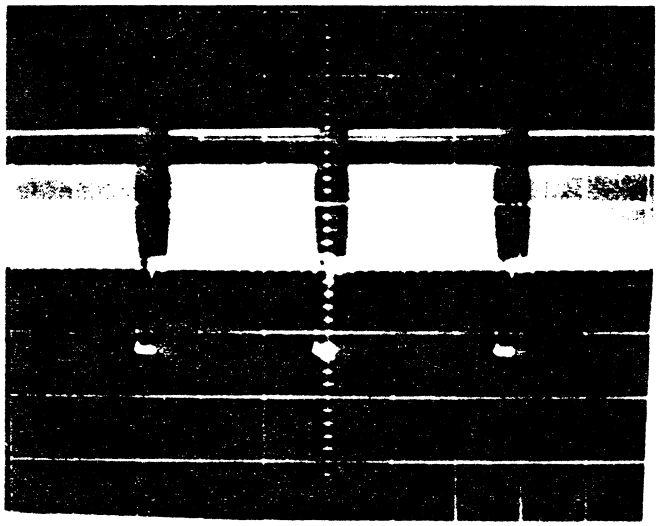
4.15 WAVEFORM DATA



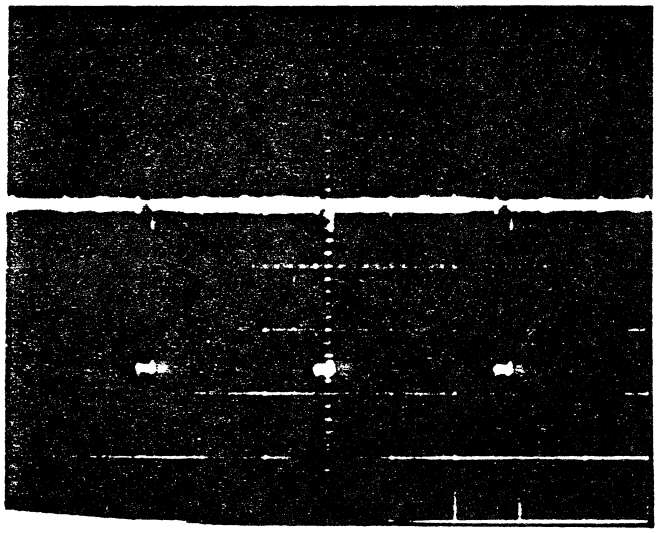
1) VIDEO INPUT, 0.5V, 20uS



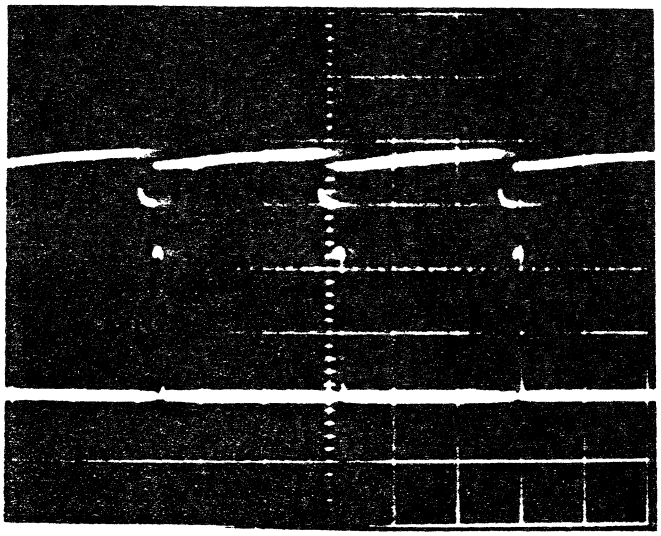
2) CONNECTOR VG, PIN 9, 0.5V, 20uS



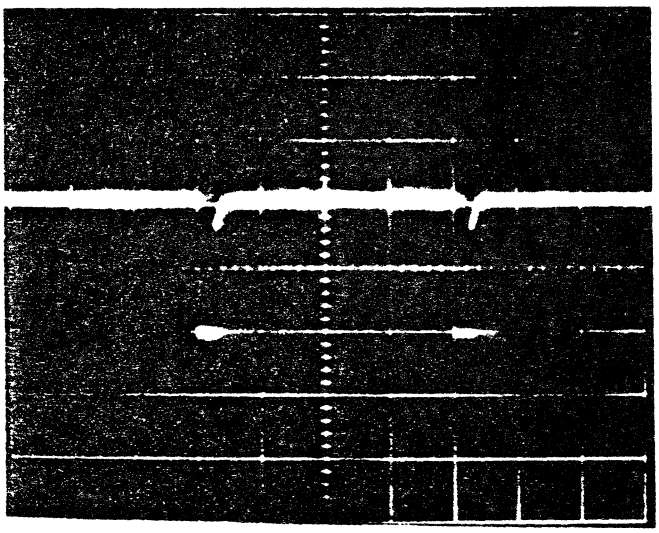
3) Q135 BASE, 2V, 20uS



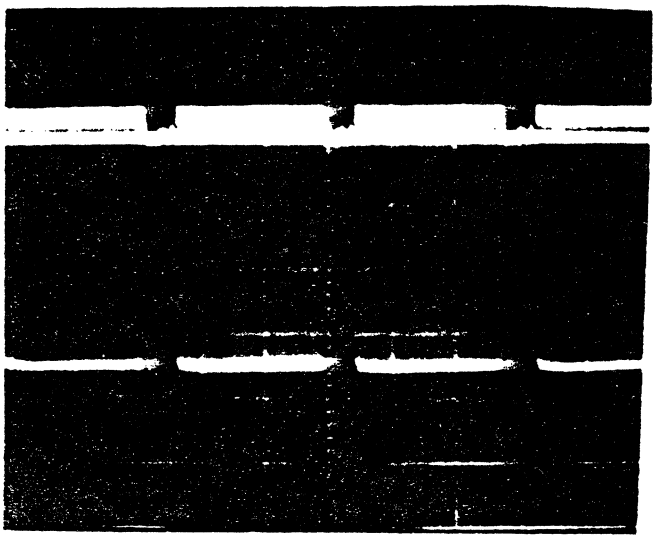
4) IC101, PIN 7, 0.5V, 20uS



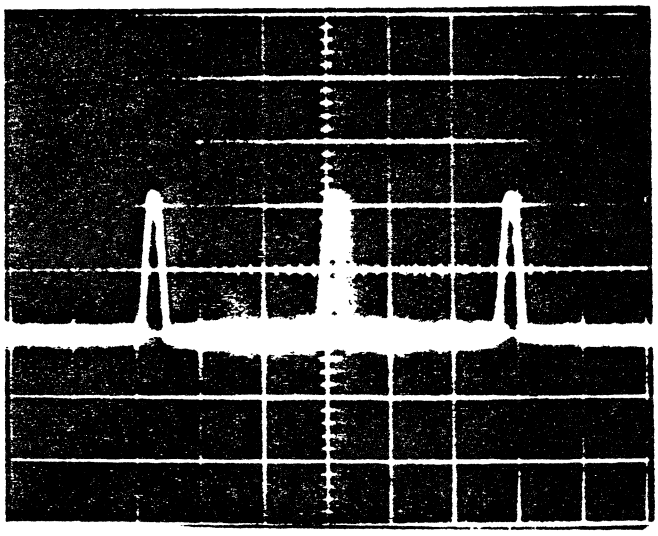
5) a. CONNECTOR VG, PIN 3 (HOR.SYNC) 5V, 20uS
   b. CONNECTOR VG, PIN 11, 5V, 20uS



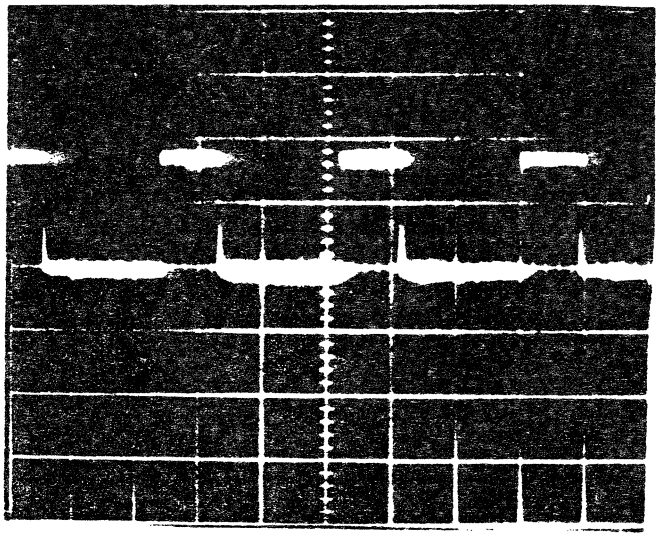
6) CONNECTOR VG, PIN 4 (VERT SYNC), 2V, 5mS



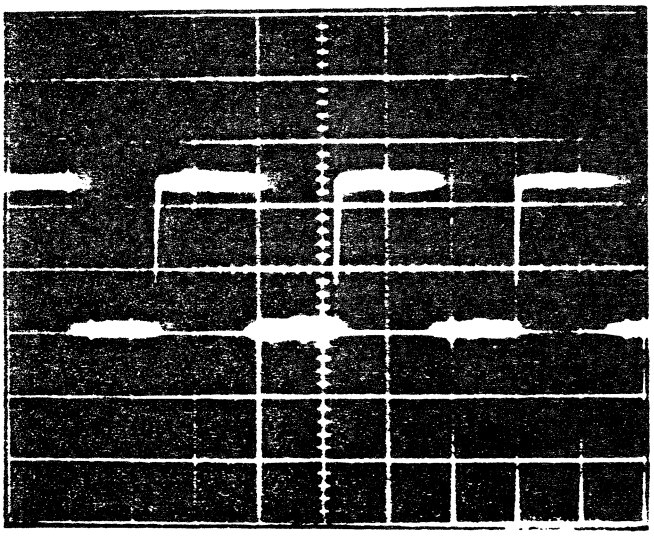
7) CONNECTOR VC (GREEN OUT), 10V, 20uS



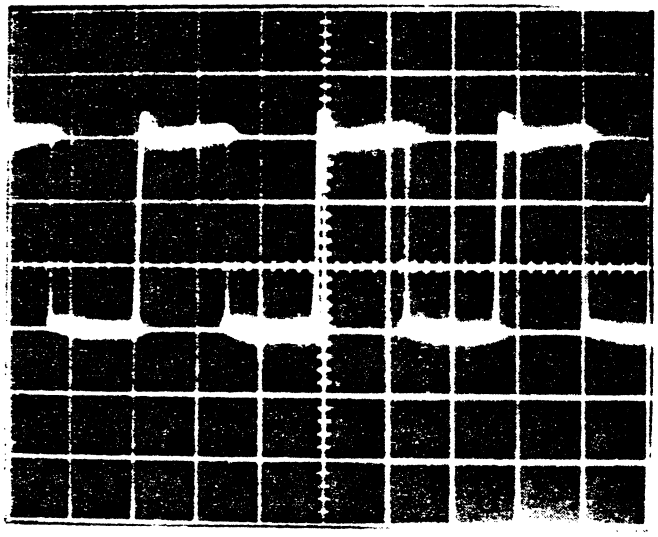
8) CONNECTOR MB, PIN 7 and PIN 3, 50V, 20uS



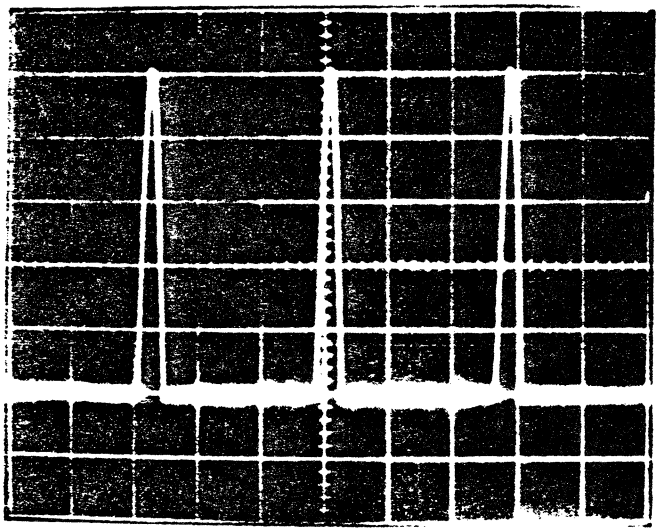
9) IC503, PIN 10, 2V, 20uS



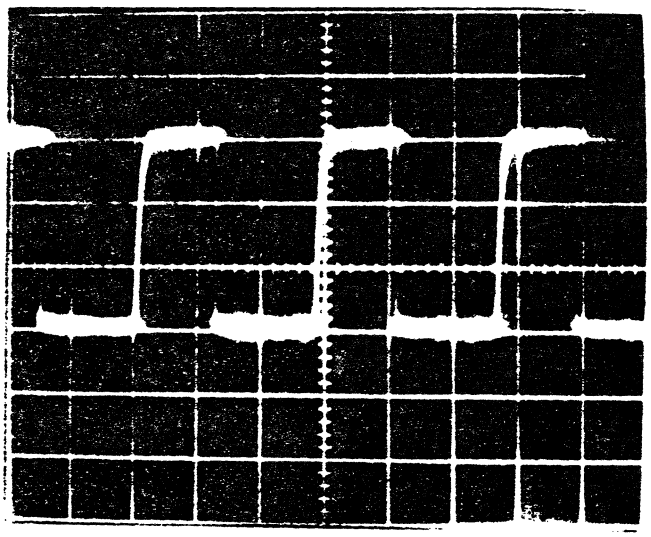
10) IC502, PIN 7, 2V, 20uS



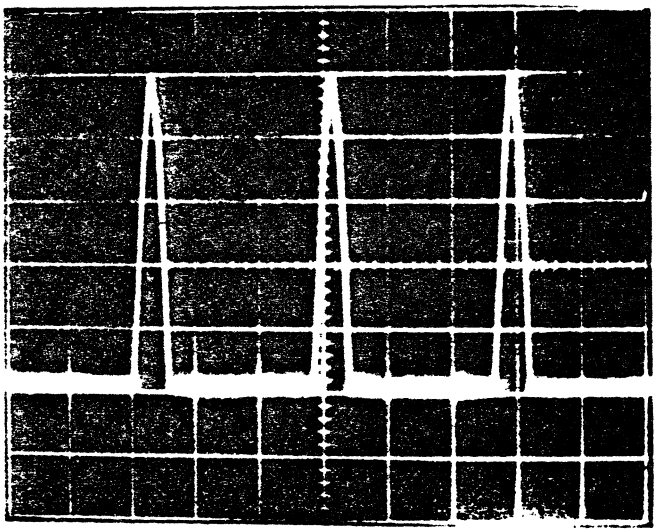
11) Q502 COLL, 50V, 20uS



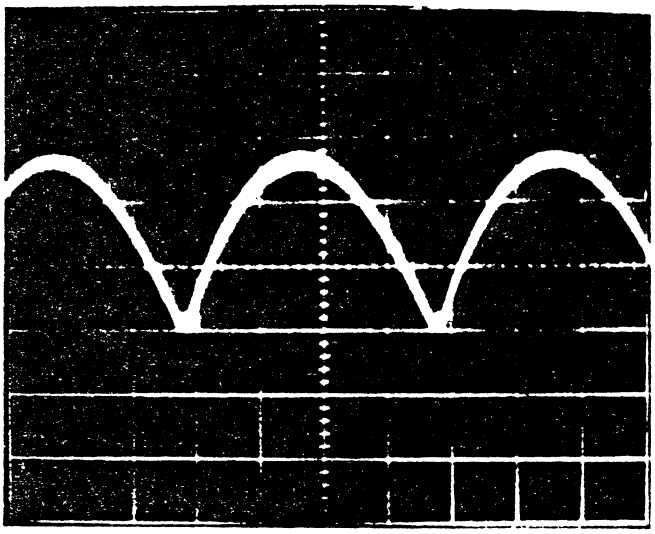
12) Q551 COLL, 770V_{p-p}, 20uS



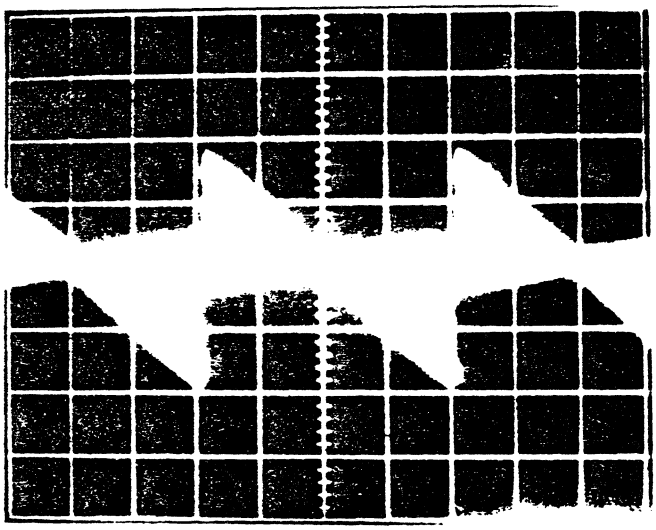
13) Q301 COLL, 50V, 20uS



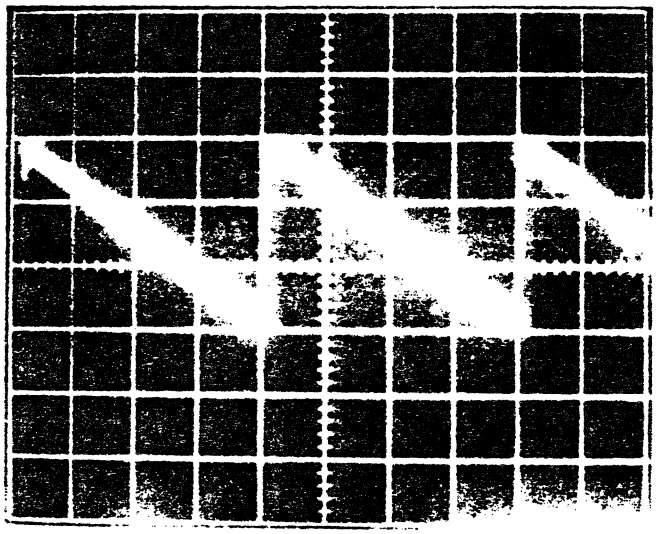
14) Q301 COLL, 660V_{p-p}, 20uS



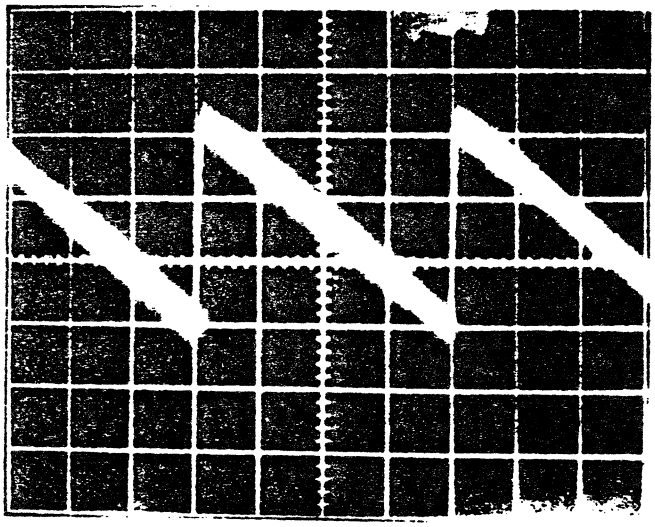
15) Q503 COLL, 1V, 5mS



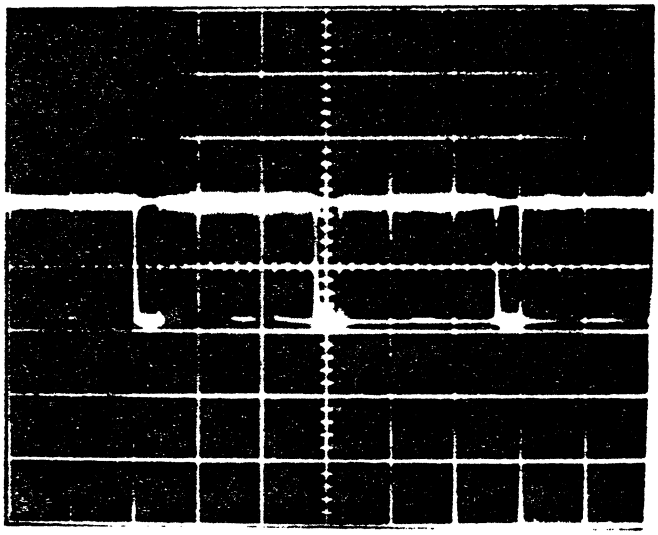
16) C707, 1V, 5mS



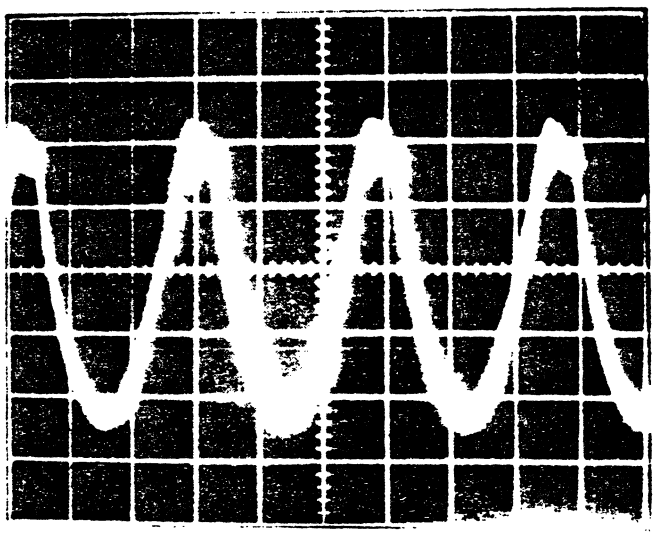
17) R908/R909, 2V, 5mS



18) IC503, PIN 3, 5V, 5mS



19) CONNECTOR VD, (BLK OUT), 50V, 20uS



20) CONNECTOR SC, PIN 3, 50V, 20uS

SECTION 5
SCHEMATIC DIAGRAMS

MODEL: C-6919 Series

The complete schematic diagram for the monitor is contained in four sections.

Fig.5-1 Block Diagram, Model C-6919
Fig.5-2 PCB-POWER Circuit
Fig.5-3 PCB-VIDEO-SUB Circuit
Fig.5-4 PCB-VIDEO Circuit
Fig.5-5 PCB-CRT Circuit
Fig.5-6 PCB-DEFL Circuit

NOTE 1:

1. The unit of resistance "ohm" entirely omitted.
   Accordingly, K=1000 ohms,
   M=1000K ohms
2. The wattage of resistor, not specifically designated, is 1/4 Watt.
3. Resistors, not specifically designated, are: Fixed carbon film resistor.
4. The marks of resistor are as follow:
   - S : Composition (Solid type) resistor
   - CE : Cemented resistor
   - MD : Metal oxide film resistor (type B)
   - W : Wire wound resistor
5. The tolerance of resistor value, not specifically designated, is ±5%, K = ±10%, M = ±20%
6. The unit of capacitance, not specifically designated,
   a) uF, for numbers less than 1
   b) pF, for numbers great than 1

7. Capacitors, not specifically designated are: ceramic Capacitors except electrolytic capacitors.

8. The marks of capacitors are as follow:

   (MF) : Polyester film capacitor

   (PC) : Paper capacitor (type C)

   (PP) : Polypropylene film capacitor

   (PL) : Plastic film capacitor

   (TAN) : Tantalum capacitor

    : Electrolytic capacitor

9. The PC work voltage of capacitor, not specifically designed is 50V.

10. The tolerance of capacitor value, not specifically designated,
    is: ±10% for polyester capacitor
        ±5% for ceramic capacitor
    and J=±5%, K=±10%, M=±20%, $P=\pm^{100}_{0}\%$
        C=±0.25pF, D=±0.5pF, F=±1pF, $Z=^{+80}_{-20}\%$

11. Specific Symbol

     Zener Diode,  SCR (Thyristor)

     Triac,  Air Gap

     Posistor

NOTE 2:

1. DC voltage were measured from points indicated to the circuit ground with a VTVM. Line voltage at 100V AC on signal applied.

2. This is a basic schematic diagram. Some sets may be subject to modification according to engineering improvement.

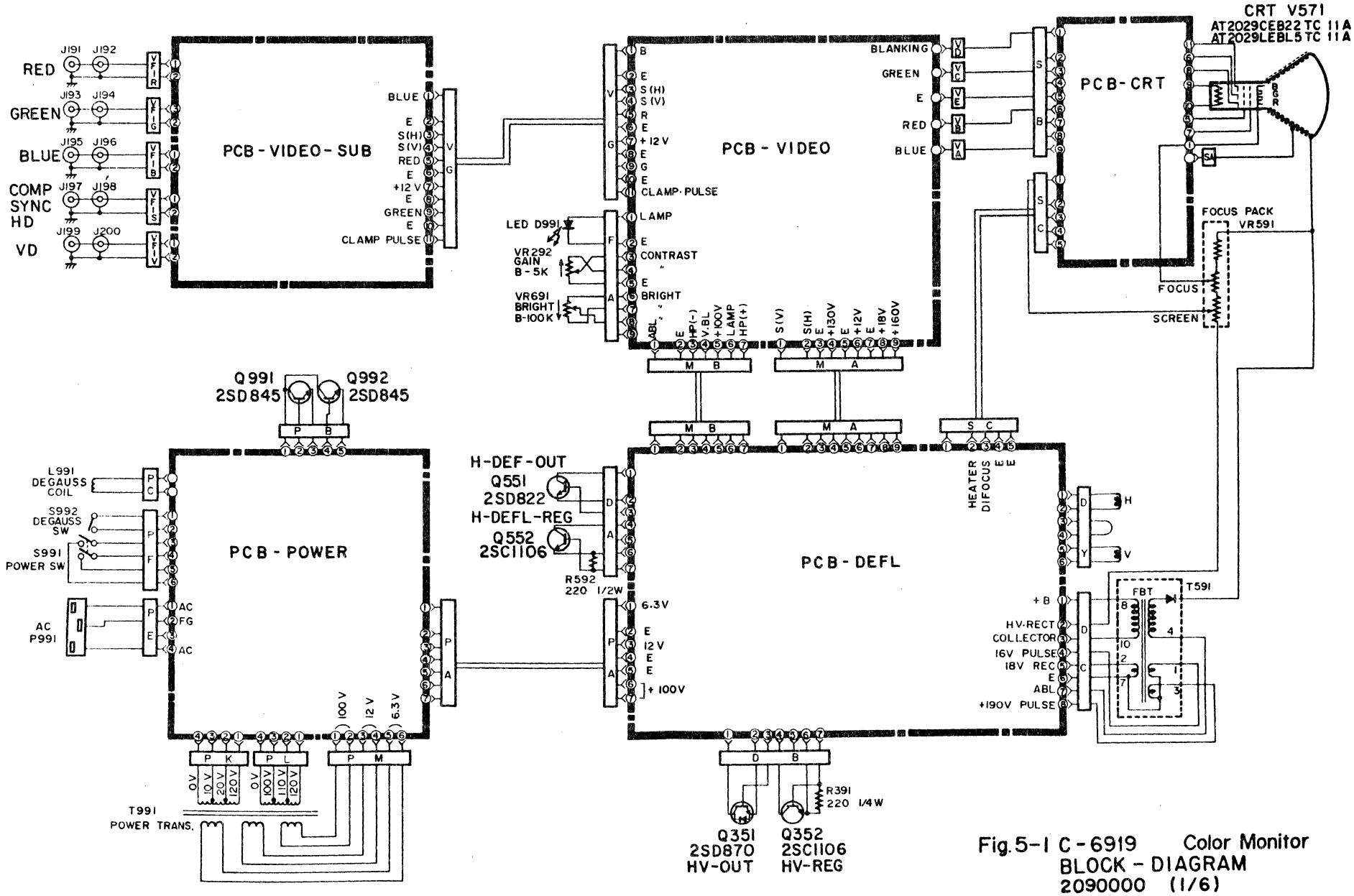


Fig.5-1 C-6919 Color Monitor
BLOCK-DIAGRAM
2090000 (1/6)

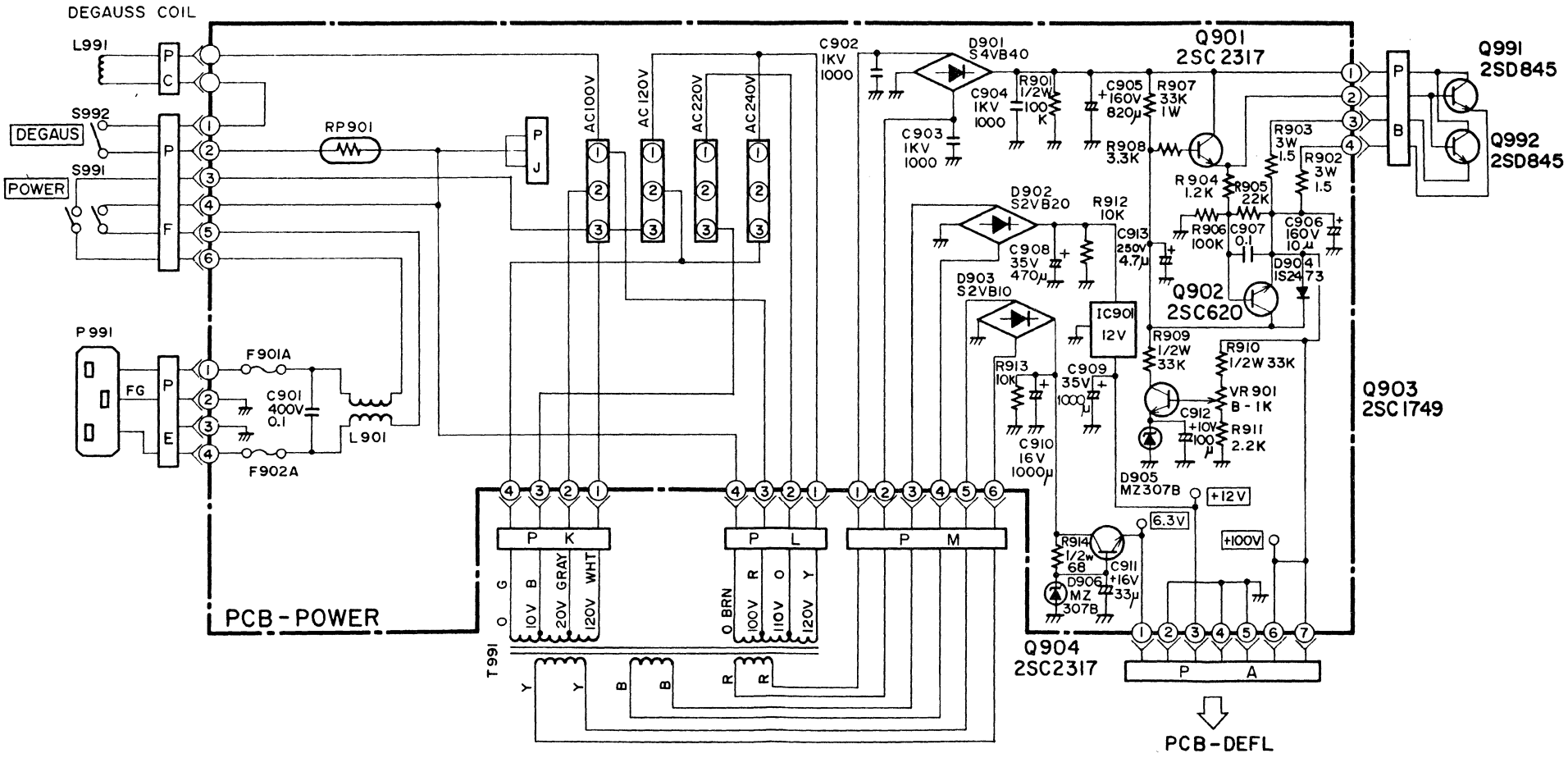


Fig. 5-2 C-6919 Color Monitor
PCB-POWER
2090000 (2/6)

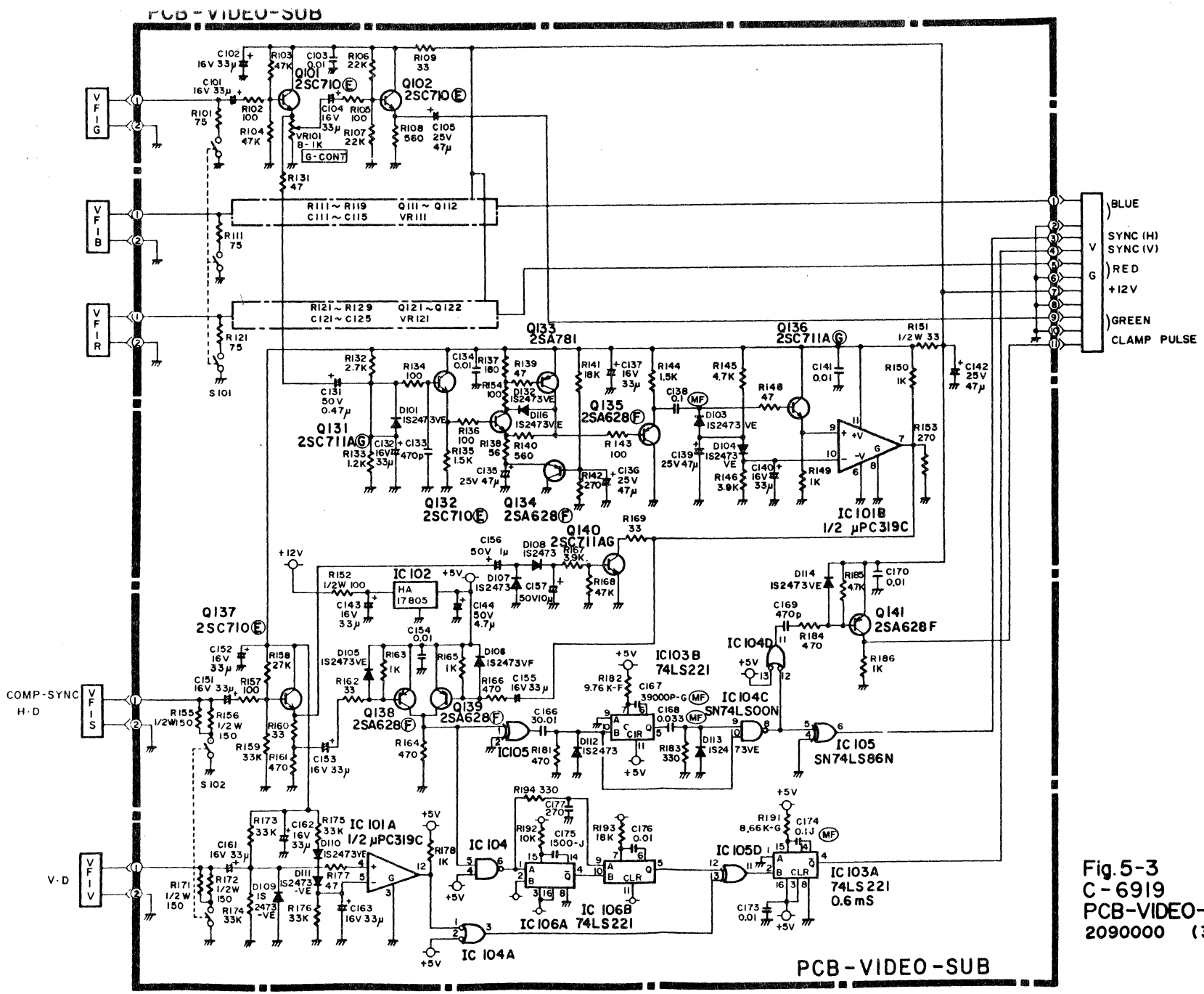


Fig. 5-3
C-6919 Color Monitor
PCB-VIDEO-SUB
2090000 (3/6)

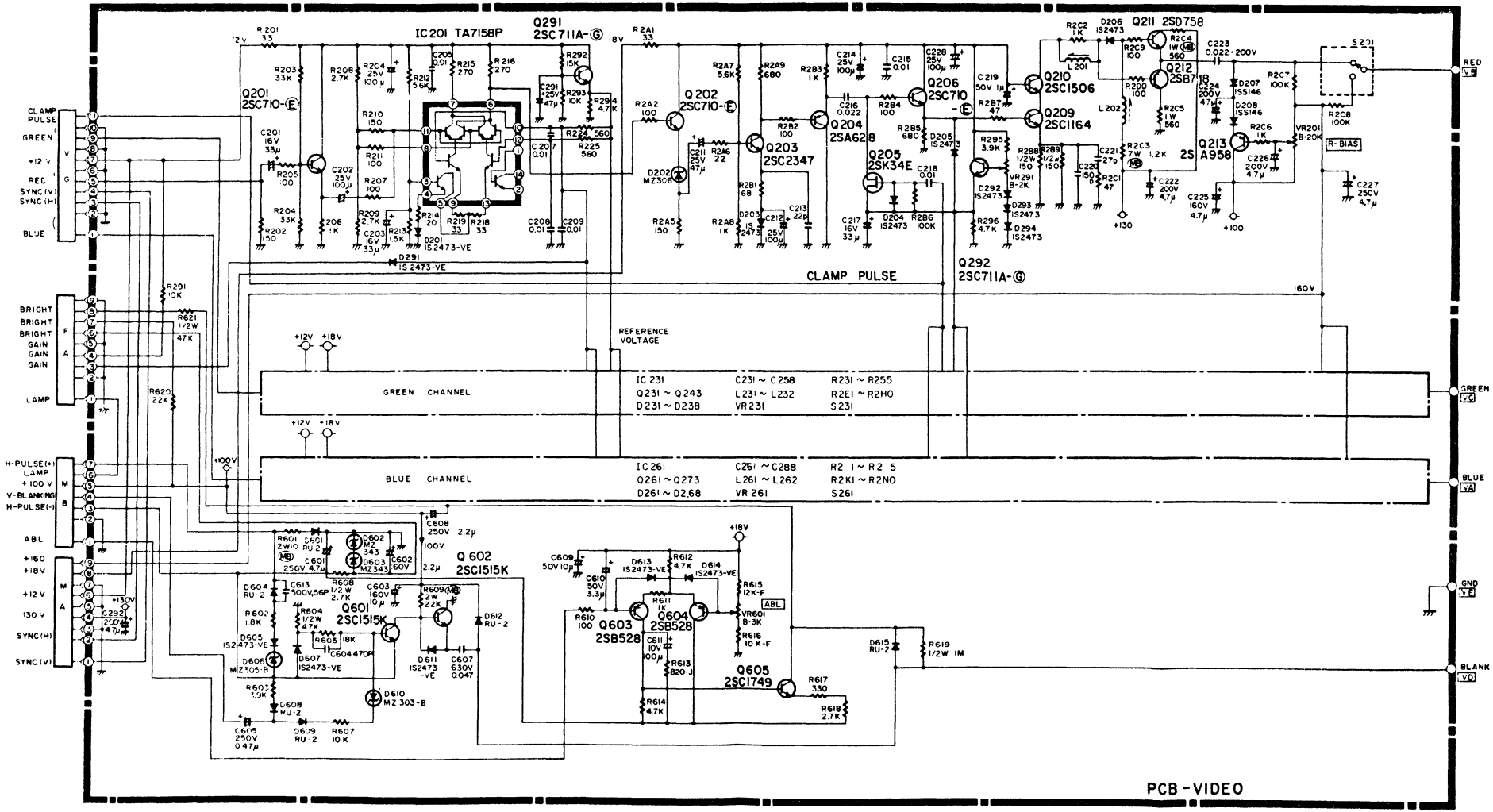


Fig.5-4 C-6919 Color Monitor
PCB-VIDEO
2090000 (4/6)

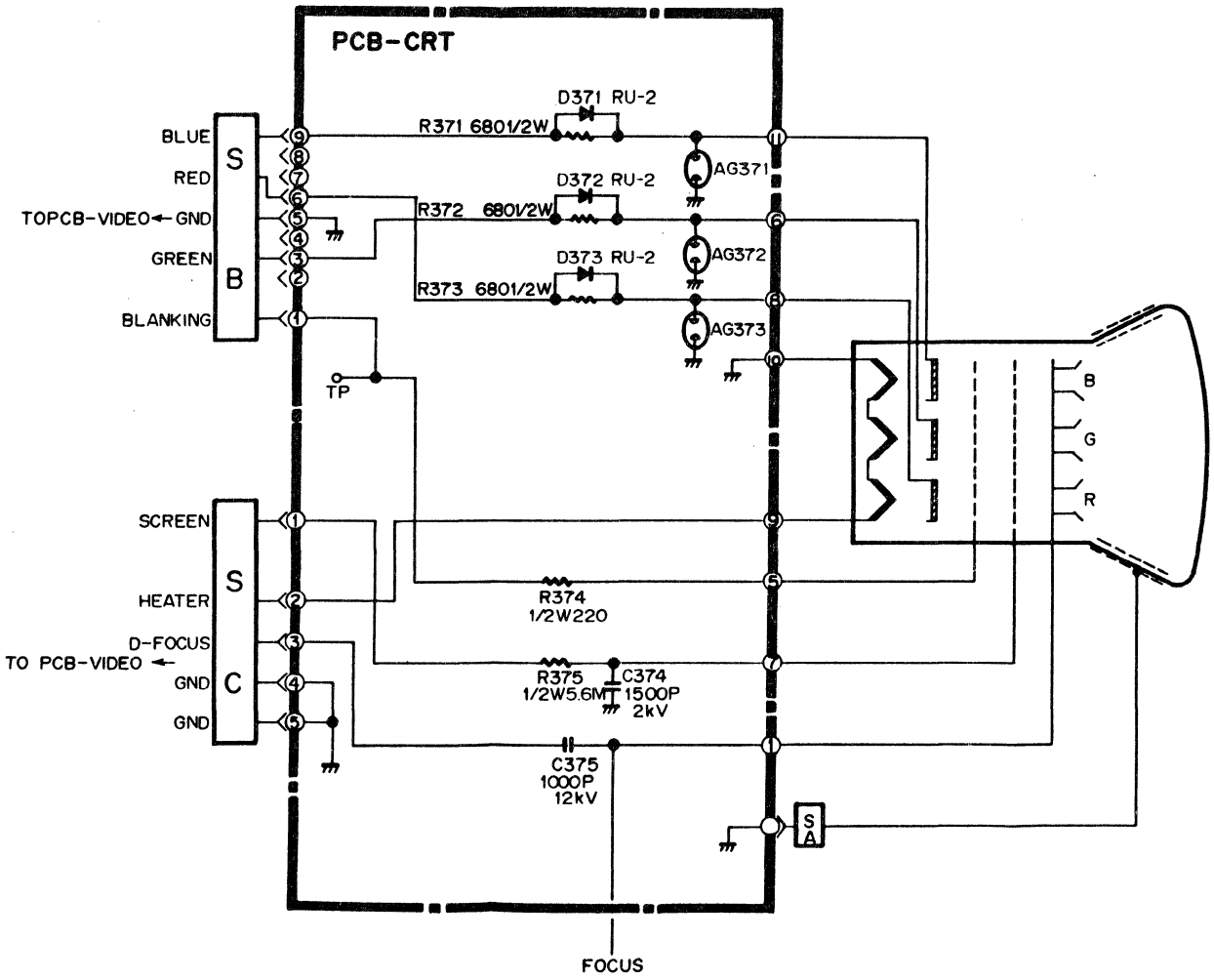


Fig. 5-5 C-6919 Color Monitor
PCB-CRT
2090000 (5/6)

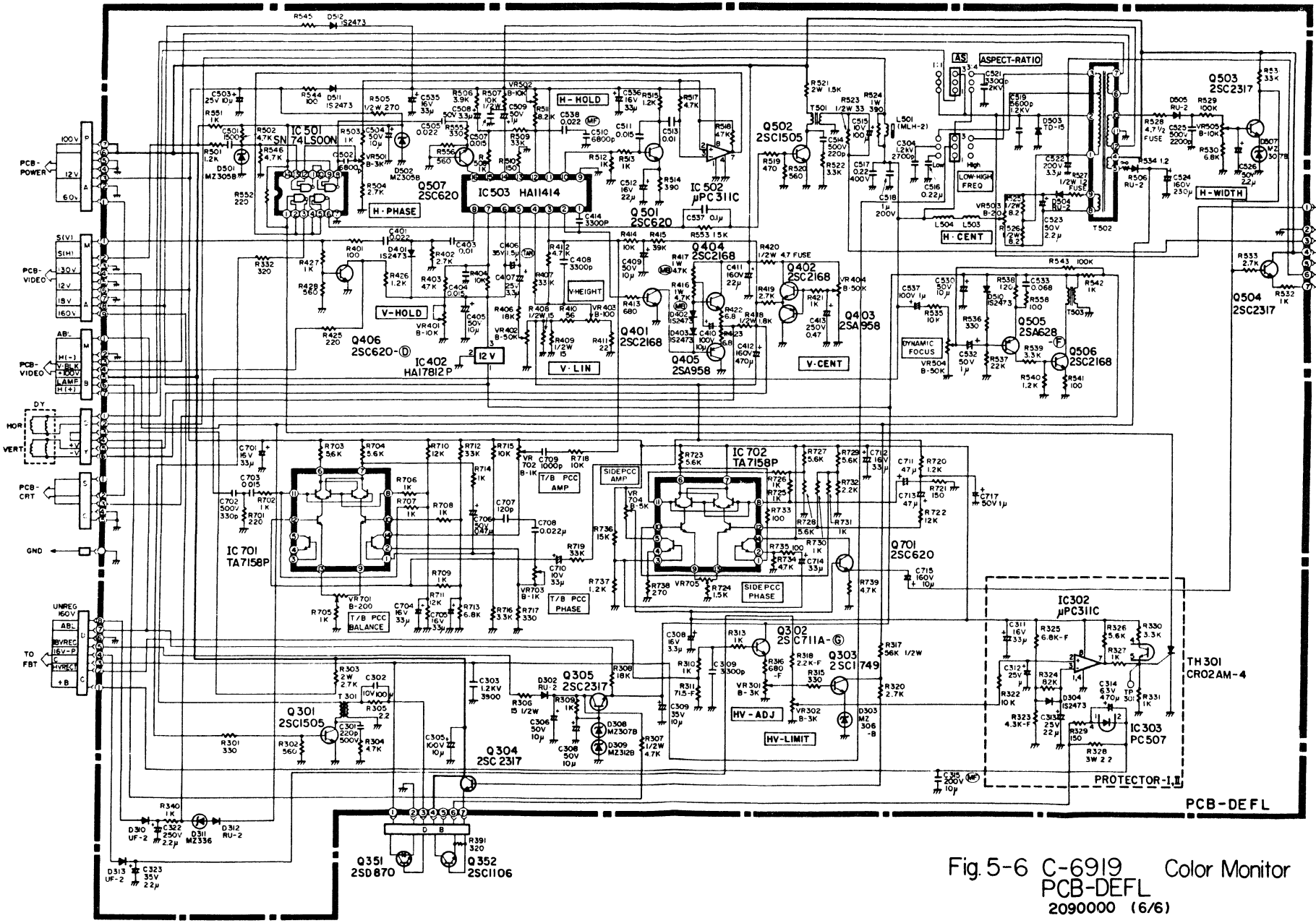


Fig. 5-6 C-6919 Color Monitor
PCB-DEFL
2090000 (6/6)

SECTION 6
PARTS LIST

MODEL: C-6919

The following table contains a list of replaceable sub-assemblies, and Chassis piece parts. In order to expedite delivery of replacement part orders.

Specify: 1. Model Number
2. Part Number and Description
3. Quantity

Unless full information is supplied, delay in execution of orders will result.

RESISTOR

MARK	TOLERANCE
J	±5%
K	±10%
M	±20%
F	±1%

CAPACITOR

MARK	TOLERANCE	MARK	TOLERANCE
J	±5%	Z	+80% -20%
K	±10%	C	±0.25pF
M	±20%	P	±0.5pF
P	+100% -0%	F	±1pF

R325 ; CRITICAL COMPORNENT

Table 6-1 PARTS LIST C-6919

SYMBOL NO.	PART NO.	DESCRIPTION	
	TRANSISTORS		
Q101	260P17107	TRANSISTOR	2SC710-E
Q102	"	"	"
Q111	"	"	"
Q112	"	"	"
Q121	"	"	"
Q122	"	"	"
Q131	260P17703	"	2SC711A-G
Q132	260P17107	"	2SC710-E
Q133	270P52401	"	2SA781-K
Q134	260P16504	"	2SA628-F
Q135	"	"	"
Q136	260P17703	"	2SC711A-G
Q137	260P17107	"	2SC710-E
Q138	260P16504	"	2SA628-F
Q139	"	"	2SA628-F
Q140	260P17703	"	2SC711A-G
Q141	260P16504	"	2SA628-F
Q201	260P17107	"	2SC710-E
Q202	"	"	"
Q203	270P52301	"	2SC2347
Q204	260P16504	"	2SA628-F
Q205	260P22006	FET	2SK34-E
Q206	260P17107	TRANSISTOR	2SC710-E
Q209	270P51701	TRANSISTOR	2SC1164
Q210	270P51407	"	2SC1506
Q211	270P51101	"	2SD758
Q212	270P51001	"	2SB718
Q213	270950801	"	2SA958

Table 6-1 PARTS LIST C-6919

SYMBOL NO.	PART NO.	DESCRIPTION	
	TRANSISTORS		
Q231	260P17107	TRANSISTOR	2SC710-E
Q232	"	"	"
Q233	270P52301	"	2SC2347
Q234	260P16504	"	2SA628-F
Q235	260P22006	FET	2SK34-E
Q236	260P17107	TRANSISTOR	2SC710-E
Q239	270P51701	TRANSISTOR	2SC1164
Q240	270P51407	"	2SC1506
Q241	270P51101	"	2SD758
Q242	270P51001	"	2SB718
Q243	270P50801	"	2SA958
Q261	260P17107	"	2SC710-E
Q262	"	"	"
Q263	270P52301	"	2SC2347
Q264	260P16504	"	2SA628-F
Q265	260P22006	FET	2SK34-E
Q266	260P17107	TRANSISTOR	2SC710-E
Q269	270P51701	TRANSISTOR	2SC1164
Q270	270P51407	"	2SC1506
Q271	270P51101	"	2SD758
Q272	270P51001	"	2SB718
Q273	270P50801	"	2SA958

SYMBOL NO.	PART NO.	DESCRIPTION	
	TRANSISTORS		
Q291	260P17703	TRANSISTOR	2SC711A-G
Q292	"	"	"
Q301	270P51406	"	2SC1505-L
Q302	260P17703	"	2SC711A-G
Q303	260P35203	"	2SC1749-D
Q304	270P51201	"	2SC2317
Q305	270P51201	"	2SC2317
Q351	270P52101	"	2SD870
Q352	260P21909	"	2SC1106
Q401	270P50701	"	2SC2168
Q402	"	"	2SC2168
Q403	270P50801	"	2SA958
Q404	270P50701	"	2SC2168
Q405	270P50801	"	2SA958
Q406	260P04003	"	2SC620-D
Q501	260P04003	"	2SC620-D
Q502	270P51406	"	2SC1505-L
Q503	270P51201	"	2SC2317
Q504	"	"	2SC2317
Q505	260P16504	"	2SA628-F
Q506	270P50701	"	2SC2168
Q507	260P04003	"	2SC620-D
Q551	270P52101	"	2SD822
Q552	260P21909	"	2SC1106
Q601	260P35301	"	2SC1515-K
Q602	"	"	"
Q603	260P15002	"	2SB528-C, D
Q604	"	"	"
Q605	260P35203	"	2SC1749-D
Q701	260P04003	"	2SC620-D
Q901	270P51201	TRANSISTOR	2SC2317

Table 6-1 PARTS LIST C-6919 (Cont)

SYMBOL NO.	PART NO.	DESCRIPTION	
	TRANSISTORS		
Q902	260P04003	TRANSISTOR	2SC620-D
Q903	260P35203	"	2SC1749-D
Q904	270P51201	"	2SC2317
Q991	270P52203	TRANSISTOR	2SD845
Q992	"	"	"

Table 6-1 PARTS LIST C-6919 (Cont)

SYMBOL NO.	PART NO.	DESCRIPTION	
	DIODES & OTHERS		
D101	274P50401	DIODE	1S2473-VE
D103	"	DIODE	1S2473-UE
D104	"	"	"
D105	"	"	"
D106	"	"	"
D107	"	"	"
D108	"	"	"
D109	"	"	"
D110	"	"	"
D111	"	"	"
D112	"	"	"
D113	"	"	"
D114	"	"	"
D116	274P50401	"	1S2473-VE
D201	"	"	"
D202	264P22004	"	MZ306B
D203	274P50401	"	1S2473-VE
D204	"	"	"
D205	"	"	"
D206	"	"	"
D207	274P51606	"	1SS146
D208	274P51606	"	"
D231	274P50401	"	1S2473-VE
D232	274P50401	"	MZ306B
D233	274P50401	"	1S2473-VE
D234	"	"	"
D235	"	"	"
D236	"	"	"
D237	274P51606	"	1SS146
D238	"	"	"

Table 6-1 PARTS LIST C-6919 (Cont)

SYMBOL NO.	PART NO.	DESCRIPTION	
	DIODE & OTHERS		
D261	274P50401	DIODE	1S2473-VE
D262	264P22004	"	MZ307B
D263	274P50401	"	1S2473-VE
D264	"	"	"
D265	"	"	"
D266	"	"	"
D267	274P51606	"	1SS146
D268	274P51606	"	"
D291	274P50401	DIODE	1S2473-VE
D292	"	"	"
D293	"	"	"
D294	"	"	"
D302	264P19601	"	RU-2
D303	264P19303	"	MZ305-B
D304	274P50401	"	1S2473-VE
D308	264P22001	"	MZ307-B
D309	264P19306	"	MZ312-B
D310	264P19601	"	RU-2
D311	264P22108	"	MZ336-B
D312	264P19601	"	RU-2
D313	"	"	"
D401	274P50401	"	1S2473-VE
D402	"	"	"
D403	"	"	"

Table 6-1 PARTS LIST C-6919 (Cont)

SYMBOL NO.	PART NO.	DESCRIPTION	
	DIODE & OTHERS		
D501	264P19303	DIODE	MZ305-B
D502	"	"	"
D503	264P06301	"	TD-15
D504	264P19601	"	RU-2
D505	"	"	"
D506	"	"	"
D507	264P22001	"	MZ307-B
D510	274P50401	"	1S2473-VE
D511	"	"	"
D512	"	"	"
D601	264P19601	"	RU-2
D602	274P50504	"	MZ343-B
D603	"	"	"
D604	264P19601	"	RU-2
D605	274P50401	"	1S2473-VE
D606	264P19303	"	MZ305-B
D607	274P50401	"	1S2473-VE
D608	264P19601	"	RU-2
D609	"	"	"
D610	264P19305	"	MZ303B
D611	274P50401	"	1S2473-VE
D612	264P19601	"	RU-2
D613	274P50401	"	1S2473-VE
D614	"	"	"
D615	264P19601	"	RU-2

Table 6-1 PARTS LIST C-6919 (Cont)

SYMBOL NO.	PART NO.	DESCRIPTION
DIODE & OTHERS		
D901	264P20006	" S4VB40
D902	264P20005	" S2VB20
D903	264P20004	" S2VB10
D904	274P50401	" 1S2473-VE
D905	264P22001	" MZ307-B
D906	"	" "

Table 6-1 PARTS LIST C-6919 (Cont)

SYMBOL NO.	PART NO.	DESCRIPTION	
	DIODE & OTHERS		
TH301	264P08203	THYRISTOR	CR02AM-4

Table 6-1 PARTS LIST C-6919 (Cont)

SYMBOL NO.	PART NO.	DESCRIPTION
	TRANSFORMERS	
T301	336P00504	Transformer-H-Drive
T501	336D00201	"
T502	409P50304	Transformer-H-OUT
T503	409P07301	Transformer-Focus
T591	334P51401	FBT
T991	355P51101	Transformer-Power

Table 6-1 PARTS LIST C-6919 (Cont)

SYMBOL NO.	PART NO.	DESCRIPTION
	COIL	
L201	349D06001	L-peak
L202	349D05801	"
L231	349D06001	"
L232	349D05801	"
L261	349D06001	"
L262	349D05801	"
L501	333P00201	L-LINEARITY
L503	409P00605	L-FILTER 4.7 mH
L504	"	" "
L901	351P00602	COIL-FILTER
L991	T409C043-1	COIL-DEGAUSSING 20"

Table 6-1 PARTS LIST C-6919 (Cont)

SYMBOL NO.	PART NO.	DESCRIPTION	
	CAPACITORS		
C303	189D07307	C-P-PP	1.2KV 3900 PF
C304	189D07305	C-P-PP	1.2KV 2700 PF
C315	189D05908	C-M-MF	200V 10μF
C412	185D04804	C-ELECTROLYTIC	160V 470μF
C516	189D50202	C-M-MF	400V 0.22μF
C517	"	"	"
C518	189D07202	"	200V 1 μF
C519	189D07309	C-P-PP	1.2KV 5600 PF
C521	189D07306	"	1.2KV 3300 PF
C522	189D05902	C-M-MF	200V 3.3μF
C901	189P06601	C-CERAMIC-AC	AC400V 0.1μF
C902	154P03202	C-CERAMIC	1KV 1000PF
C903	"	"	"
C904	"	"	"
C905	189D50302	C-ELECTROLYTIC	160V 820μF
C906	189D04106	"	160V 10μF

Table 6-1 PARTS LIST C-6919 (Cont)

SYMBOL NO.	PART NO.	DESCRIPTION
	RESISTORS	
R306	109P01305	R-FUSIBLE 1/2W 1.2
R308	103P30505	R-METAL 1/4W 18K-F
R311	103C10803	" 1/4W 71.5K-F
R316	103P30201	" 1/4W 680-F
R318	103P30303	" 1/4W 2.2K-F
R323	103P30400	" 1/4W 4.3K-F
R325	103P30405	" 1/4W 6.8K-F
R328	109D03801	R-WIRE 3W 2.2
R420	109P01307	R-FUSIBLE 1/2W 4.7
R527	109P01305	" 1/2W 1.2
R528	109P01307	" 1/2W 4.7
R534	109P01305	" 1/2W 1.2
R615	103P30501	R-METAL 1/4W 12K-F
R616	103P30409	" 1/4W 10K-F
R902	109D50602	R-CEMENT-WIRE 3W-1.5
R903	"	" "
R907	103D14403	R-METAL 1W-33K

Table 6-1 PARTS LIST C-6919 (Cont)

SYMBOL NO.	PART NO.	DESCRIPTION	
VARIABLE RESISTORS			
VR101	129D07305	Semifixed	1/2W B-1K
VR111	"	"	"
VR121	"	"	"
VR201	129D50301	"	0.3W B-20K
VR231	"	"	"
VR261	"	"	"
VR291	129D50206	"	0.3W B-2K
VR292	129C50503	"	1/4W B-5K
VR301	129C06009	"	1/4W B-3K
VR302	"	"	"
VR401	129D07309	"	1/2W B-10K
VR402	129D05907	"	1/2W B-50K
VR403	129D07301	"	1/2W B-100
VR404	129C05008	"	1/2W B-50K
VR501	129D07307	"	1/2W B-3K
VR502	129C04106	"	3/4W B-10K
VR503	129C50401	"	3/4W B-20
VR504	129C05008	"	1/2W B-50K
VR505	129D07308	"	1/2W B-5K
VR601	129C06009	Semifixed	1/4W B-3K
VR691	129C50504	"	1/4W B-100K
VR701	129C05002	"	1/2W B-200
VR702	129C05003	"	1/2W B-1K
VR703	129D07305	"	1/2W B-1K
VR704	129D07308	"	1/2W B-5K
VR901	129D50205	"	0.3W B-1K

Table 6-1 PARTS LIST C-6919 (Cont)

SYMBOL NO.	PART NO.	DESCRIPTION
	MISCELLANEOUS	
S101	439D50401	Slide Switch
S102	"	"
S201	439C50101	"
S231	"	"
S261	"	"
S991	439C50901	ROCKER Switch (Power)
S992	439C50902	" (Degauss)
F901	283D02006	FUSE 5A
F902	"	" "
RP901	265P04702	Posistor
AG371	224D01901	AIR-GAP
AG372	"	"
AG373	"	"
	449C03101	SOCKET-CRT
	241C22301	PCB-CRT
	241B24001	PCB-POWER
	241B23901	PCB-VIDEO
	241A09601	PCB-DEFL
	241C24001	PCB-VIDEO-SUB

Table 6-1 PARTS LIST C-6919 (Cont)

SYMBOL NO.	PART NO.	DESCRIPTION
	MISCELLANEOUS	
	T927B39002	ASSY-PCB-CRT
	T927B44001	ASSY-PCB-POWER
	T927B39103	ASSY-PCB-VIDEO
	T927B39203	ASSY-PCB-DEFL
	T927C31103	ASSY-PCB-VIDEO-SUB
	242D12501	AC-POWER-code
	452D04901	PLUG-AC
	730A50401	FRONT-PANEL
	740A51001	CABINET
	771D03901	PAD

Table 6-1 PARTS LIST C-6919 (Cont)

SYMBOL NO.	PART NO.	DESCRIPTION
	TUBE	
V571	254P46801	Picture Tube AT2029LEB22-TC11A
	254P46901	" AT2029LEBL5-TC11A
	ICs	
IC101	266P74602	IC μPC319C
IC102	277P51902	IC HA17805P
IC103	272P22101	IC SN74LS22IN
IC104	266P84001	IC SN74LS00N
IC105	266P47801	IC SN74LS86N
IC106	272P22101	IC SN74LS22IN
IC201	266P74801	IC TA7158P
IC231	"	IC TA7158P
IC261	"	IC TA7158P
IC302	266P72602	IC μPC311C
IC303	268P01001	IC PC-507
IC402	277P51901	IC HA17812P
IC501	266P84001	IC SN74LS00N
IC502	266P72602	IC μPC311C
IC503	266P50101	IC HA11414
IC701	266P74801	IC TA7158P
IC702	266P74801	IC TA7158P
IC901	277P51901	IC HA17812P