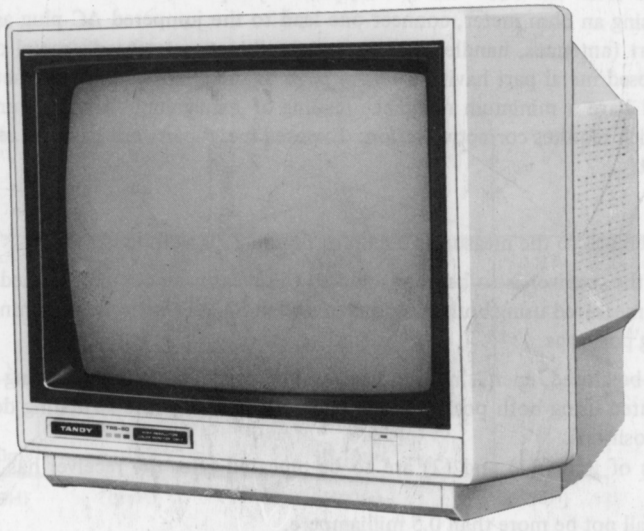
REALISTIC®

Service Manual

26-5112

COLOR MONITOR

Catalog Number: 26-5112



CUSTOM MANUFACTURED FOR RADIO SHACK, A DIVISION OF TANDY CORPORATION

SAFETY PRECAUTIONS

NOTICE: Observe all cautions and safety related notes located inside the receiver cabinet and on the receiver chassis.

WARNING

1. Operation of the receiver, outside the cabinet or with the cover removed, involves a shock hazard from the receiver power supplies. Work on the receiver should not be attempted by anyone who is not thoroughly 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 the picture tube is being handled. Keep the picture tube away from the body while handling.

X-RADIATION WARNING

The surface of the picture tube may generate X-Radiation. Caution during service and, if possible, the use of a lead apron is recommended for shielding.

When replacing the picture tube, use only a designated replacement part since it is a critical component with regard to X-Radiation as noted above. (No high-voltage adjustments are provided.) The high-voltage specification is described on page 3.

LEAKAGE CURRENT CHECK

Before returning the receiver to the customer, it is recommended that the leakage current be measured according to the following methods.

1. Cold Check

   With the AC plug removed from the 120V AC source, place a jumper across the two AC plug prongs. Turn the receiver AC switch on. Using an ohm meter, connect one lead to the jumpered AC plug and touch the other lead to each exposed metal part (antennas, handle bracket, metal cabinet, screwheads, metal overlays, control shafts, etc.), particularly any exposed metal part having a return path to the chassis. Exposed metal parts having a return path to the chassis should have a minimum resistance reading of 1 megohm. Any resistance below this value indicates an abnormality which requires corrective action. Exposed metal parts not having a return path to the chassis will indicate an open circuit.

2. Hot Check

   The test sequence, with reference to the measuring circuit in Figure I, is as follows:

   (1) With switch S1 open, the receiver is to be connected to the measuring circuit. Immediately after connection, the leakage current is measured using both positions of switch S2, and with the switching devices in the receiver in all of their operating positions.

   (2) Switch S1 is then to be closed, energizing the receiver, and immediately after closing the switch, the leakage current is to be measured using both positions of switch S2, and with the switching devices in the receiver in all of their operating positions.

   Current measurements of items (1) and (2) are to be repeated after the receiver has reached thermal stabilization.

   The leakage current shall not be more than 0.5 milliampere.

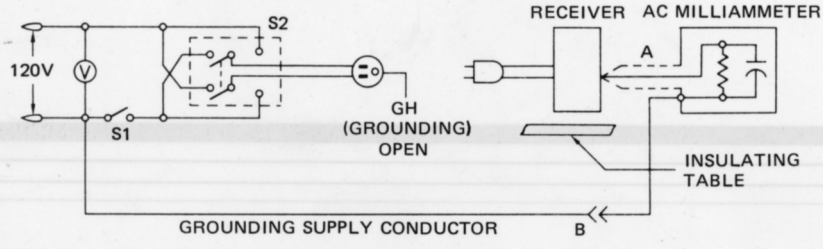


Figure I

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in a television receiver (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 replacements for any safety parts should be identical in value and characteristics.

WARNING

Cut silicone seal between black socket guide and white socket prior to removing CRT socket PCB assembly.

CONTENTS

SPECIFICATIONS

	Description	Nominal	Limit
1	Power input	AC 120V 60 Hz	
2	Power consumption		78W Max.
3	Input signal		
	a) R.G.B. Video	R.G.B. Separate T.T.L. Level, Positive white (Default)	
	b) Synchronous	T.T.L. Level, Negative going (Default)	
	c) Intensity	T.T.L. Level, Positive going (Default)	
4	Resolution		
	a) Horizontal	640 dot	
	b) Vertical	400 line	
5	Contrast control range (Cathode drive voltage)		more than 75% Full BRT
6	Brightness		30 fl. Min.
7	Video amplifier (Pulse response)		
	a) Rise time		30 nS Max.
	b) Fall time		30 nS Max.
8	Display color	15 colors	
9	High voltage	22.5 kV/0.5mA	22.5 ±1 kV/0.5mA
10	Picture linearity		
	a) Horizontal		10% Max.
	b) Vertical		10% Max.
11	Synchronous (Pull in range)		
	a) Horizontal		26.4 ±0.8 kHz
	b) Vertical		60 $^{+5}_{-3}$ Hz

THEORY OF OPERATION

1. RGB Drive Circuit

The RGB input signal with positive polarity is applied to the exclusive OR gate IC601 and output by IC601 in the negative polarity. The signal is inverted to the positive polarity and applied to the base of RGB-Amp transistors Q616, Q617 and Q618.
The bias of RGB-Amp transistors are adjustable by BRIGHTNESS control (VR681) and SUB-BRIGHT volume (VR694) connected to the base of Q611 and Q602.
When the intensity signal is of negative polarity, the transistor Q601 is turned to ON and the contrast can be adjusted by the CONTRAST control (VR682).

2. RGB Beam Current Limiting Circuit

If the beam current increases, the cathode side of D552 will drop. So the base bias of Q612 will drop and the collector current will increase. As the result, the base voltages of Q611, Q602 decrease to limit the increase of the CRT current.
If the beam current reduces, the base voltage of Q611 increases to limit the reduction of beam current. In other words, the brightness of picture is maintained at a constant level.

3. RGB Output Circuit

For the RGB output, SEPP (Single Ended Push-Pull) circuit is employed to reduce output impedance and to improve frequency characteristics.
Since the circuit is connected to the CRT with a coupling capacitor, the structure is so designed to accept adjustment of RGB-Cutoff Volume VR654, VR655, and VR656 D.C. clamp circuits respectively.
The RGB drive circuit also operates in such a manner that the charging time constant is made smaller for shorter fall time when the transistor is turned to ON during the fall-time by the RGB Drive-2.
Correct white balance is obtained by adjusting RGB-Drive Volume VR651 and VR653. Blanking pulse is applied to the emitter of RGB Drive-1 transistors Q651, Q652 and Q653 through blanking-1 and -3 transistors Q610 and Q660.

4. Vertical Deflection Circuit

The vertical sync. signal with negative polarity is applied to pin ⑧ of the vertical and horizontal IC (IC401) through IC602.
Pin ⑦ of IC401 is connected to the vertical oscillator circuit and the frequency of the oscillator can be controlled by the voltage of pin ⑦ which can be varied by V. HOLD Volume (VR401).
The saw-tooth signal is obtained by the integrating circuit which is connected between pin ⑤ and pin ⑦.
The oscillator output is fed to the vertical drive circuit through a buffer circuit and its output derived from pin ② is applied to the vertical output.
The vertical output employs a SRPP (Shunt Regulated Push-Pull) circuit consisting of two transistors Q401 and Q402.
The saw-tooth wave is applied to pin ④ of IC401 as an A.C. feed-back.
The emitter circuit of Q401 is controlled by HEIGHT Volume (VR403) to vary the vertical size of the raster.
Linearity adjustment is done by integrating the saw-tooth voltage.
V. LIN Volume (VR402) is a variable resistor for vertical linearity adjustment.
Vertical position is determined by the amount of D.C. component flowing through the vertical deflection coil. The amount can be varied by changing the position of V-CENT (S491).

5. Horizontal Oscillator, AFC and Drive Circuit

The horizontal sync. signal with negative polarity is applied to pin ⑯ of IC401 through IC602.
The saw-tooth wave of horizontal frequency is produced by integrating the horizontal pulse from FBT (T552), and is fed to pin ⑭ of IC401 for AFC. The phase of horizontal saw-tooth wave is compared with that of horizontal sync. signal from pin ⑯ at AFC circuit inside the IC401.
H. CENT control (VR551) determines the relative position of raster and picture.
The horizontal oscillation frequency can be controlled by H. HOLD Volume VR502 connected to pin ⑫.
The horizontal frequency oscillated is obtained from pin ⑩ of IC401, and is fed to the next horizontal drive circuit. The pulse switching mode of the driver and output stage is of reverse polarity type; that is, when the driver transistor is ON, the output transistor is OFF.

6. Horizontal Output Circuit

In the horizontal output circuit, deflection current is supplied to the horizontal defection coil and, at the same time, pulses for blanking, for CRT heater voltage and for D.C. voltages, are generated in the flyback transformer (T552).

The Figure A below shows the basic circuit of a horizontal output circuit. In this circuit, the transistor goes on and off according to the base current and it functions as one switch together with the damper diode connected parallel to it. Thus, the equivalent circuit becomes like the one shown in Figure B. In the actual circuit, the damper diode D is not provided. The base-collector junction of H.OUT transistor plays the role of the damper diode.

The performance is explained hereafter with reference to Figure B and the waveforms at various parts of the circuit shown in Figure C. When switch S is closed at t_1, the current I_Y which flows through the deflection yoke L_Y increases linealy with time. When I_Y reaches a certain value, switch S is opened at $t=t_2$, and switch current I_S becomes zero at once, but I_Y does not become zero instantly and flows into capacitor C, resulting in a ring. After a half cycle of ringing, yoke current I_Y reaches the negative maximum level at t_3 time. If at this time, the switch S is closed again, ringing stops and the current flowing through the deflection yoke decreases linearly to zero. Thus one cycle is completed. During $t_1 \sim t_2$, energy flows out of the power source but, at t_3, energy returns to the power source. Thus the power loss in the circuit is extremely small. The time from $t_2 \sim t_3$ is the retrace period, which is determined by the resonant frequency of L_Y and C.

During the period of $t_2 \sim t_3$, the deflection yoke current I_Y changes from the positive peak to the negative peak and, during this period, the voltage of C becomes maximum as shown in figure C(f). When the retrace period is set at about 1/5 the horizontal scanning period, the amplitude of this pulse voltage will become 7 to 8 times that of the power supply voltage. The said peak level of pulse voltage is expressed by the following formula;

$$V_{cp} \propto \frac{Vcc}{\sqrt{L_Y C}}$$

The output transistor used for switching should be able to withstand this pulse voltage.

H. WIDTH control (L552) is variable inductance which enables adjustment of raster horizontal size.

Horizontal position of the raster can be adjusted by changing the position of H. CENT (S591) which can switch the direction of D.C. current flow in the defleciton yoke.

Focus and Screen voltage for the CRT is produced by dividing the anode voltage.

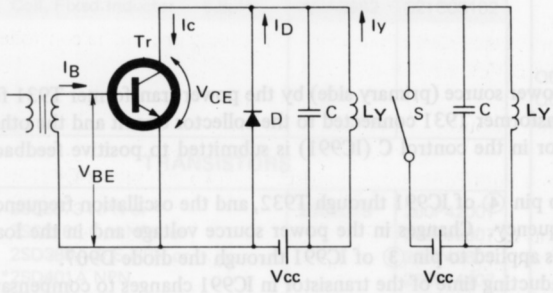


Figure A Figure B

Horizontal Output Circuit

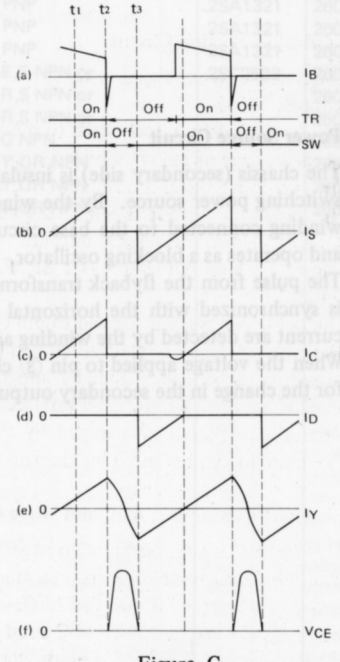


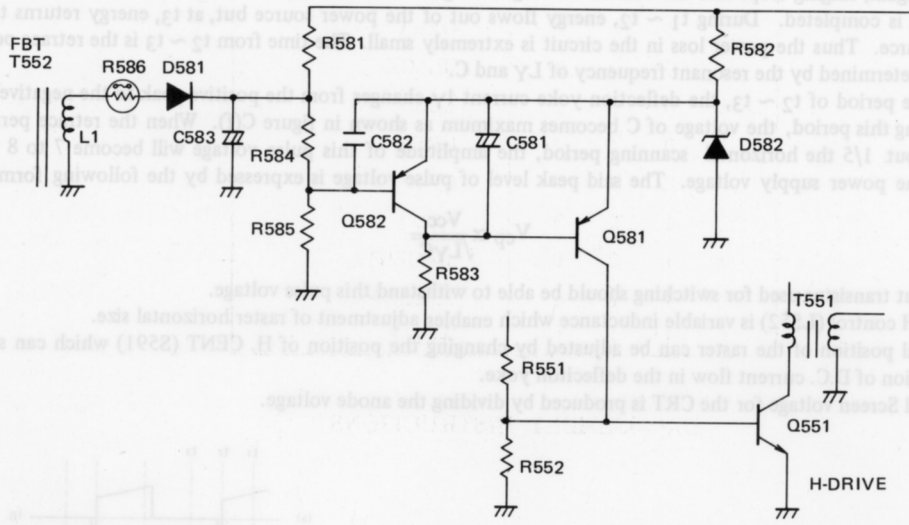
Figure C

Waveform in Horizontal Output Circuit

7. High Voltage Hold-Down Circuit

The winding L1 wound on FBT (T552) generates a voltage which is proportional to the high voltage going to the CRT. If a failure occurs which causes an increase in high voltage (such as an opened sweep capacitor or failed power regulator), then the voltage on winding L1 will increase until the base voltage of transistor (Q582) is higher than one VBE below the zener voltage (produced by D582). (VBE is approximately 0.6 volts.) When this happens, transistor (Q582) is turned off and transistor (Q581) is turned on. This saturates transistor (Q551). The oscillator signal coming from IC401 through R551 can no longer drive Q551, turning off the high voltage. The voltage at D582 will then be VCE (sat) of Q581 plus VBE of Q551 (approximately 0.6 to 0.8 volts). The residual voltage at resistor (R581) will always be high enough to reverse bias the base emitter junction of transistor (Q582) when this occurs. Therefore, to restart the oscillator and the high voltage, the television set must be turned off and then turned on again.

HOLD-DOWN CIRCUIT



8. Power Source Circuit

The chassis (secondary side) is insulated from the power source (primary side) by the power transformer T931 for switching power source. By the winding of the transformer T931 connected to the collector circuit and the other winding connected to the base circuit, the transistor in the control C (IC991) is submitted to positive feedback and operates as a blocking oscillator.

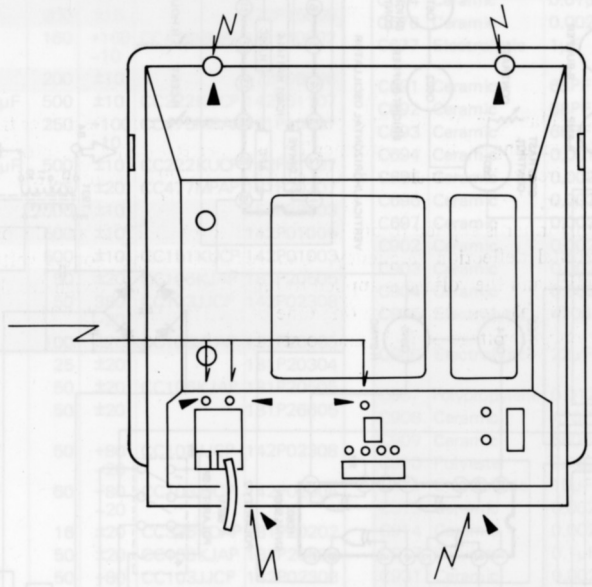
The pulse from the flyback transformer is applied to pin ④ of IC991 through T932, and the oscillation frequency is synchronized with the horizontal deflection frequency. Changes in the power source voltage and in the load current are detected by the winding and the voltage is applied to pin ③ of IC991 through the diode D907.

When the voltage applied to pin ③ changes, the conducting time of the transistor in IC991 changes to compensate for the change in the secondary output voltage of T931 and to stabilize the output voltage.

9. DISPLAY COLOR

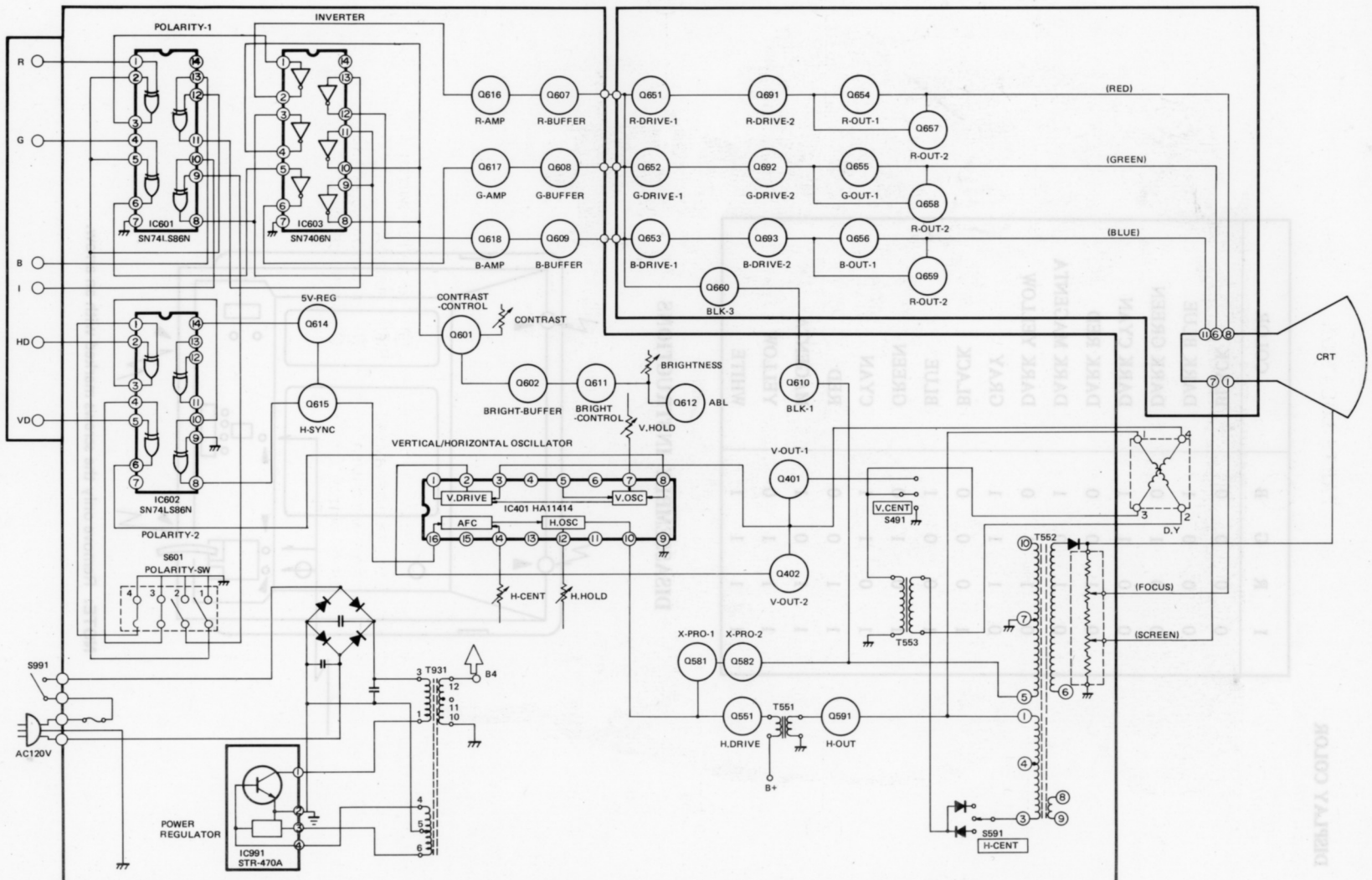
I	R	G	B	COLOR
0	0	0	0	BLACK
0	0	0	1	DARK BLUE
0	0	1	0	DARK GREEN
0	0	1	1	DARK CYAN
0	1	0	0	DARK RED
0	1	0	1	DARK MAGENTA
0	1	1	0	DARK YELLOW
0	1	1	1	GRAY
1	0	0	0	BLACK
1	0	0	1	BLUE
1	0	1	0	GREEN
1	0	1	1	CYAN
1	1	0	0	RED
1	1	0	1	MAGENTA
1	1	1	0	YELLOW
1	1	1	1	WHITE

DISASSEMBLY INSTRUCTIONS

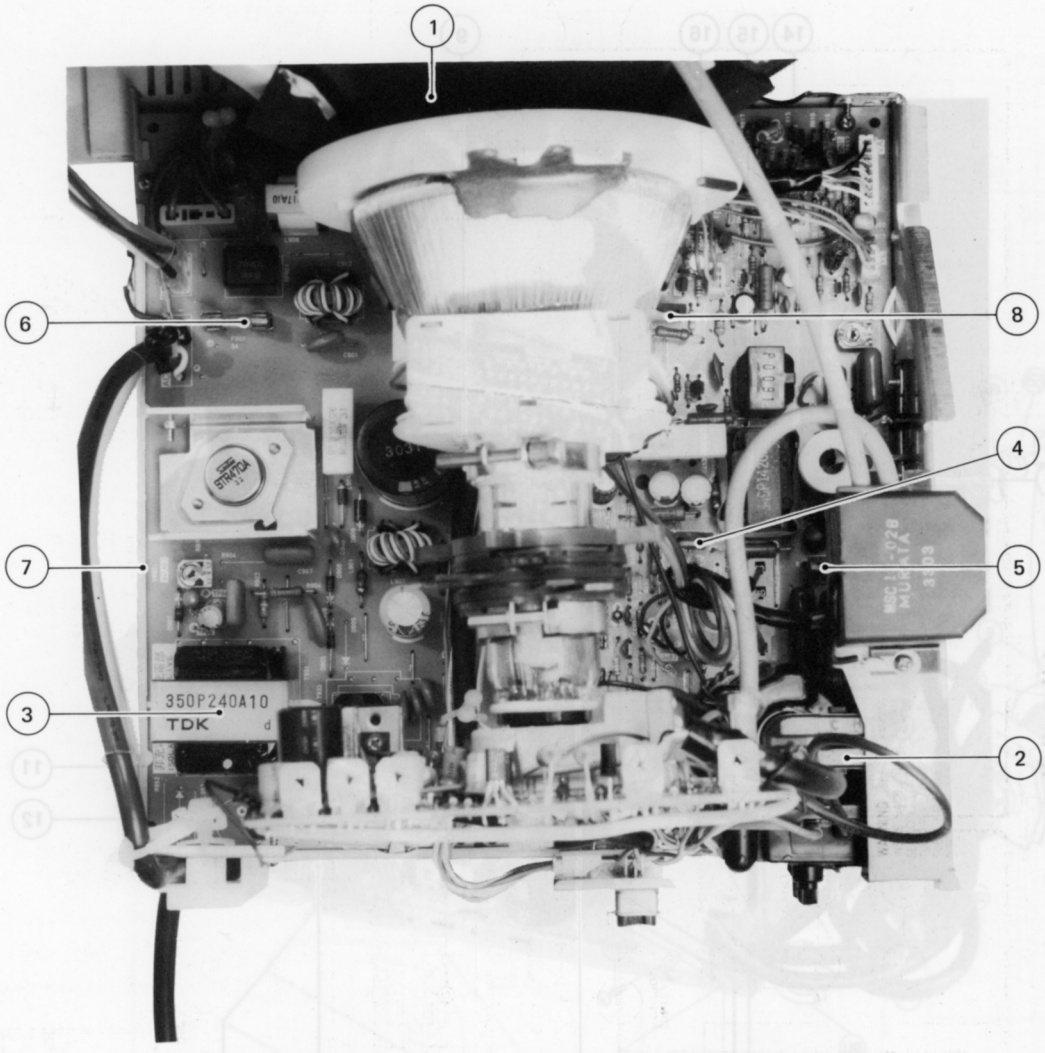


NOTE: Remove only the screws marked with an arrow.

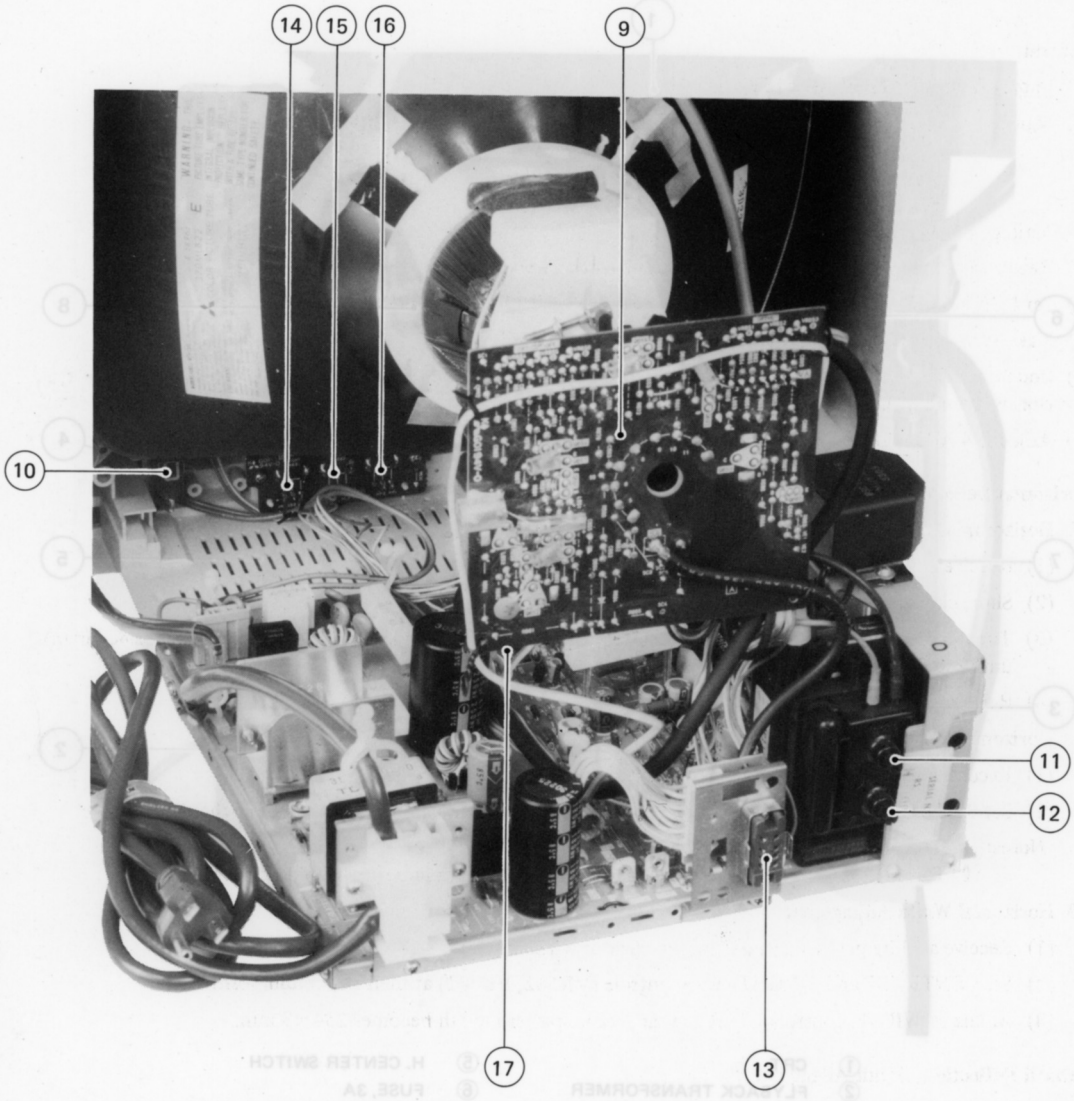
BLOCK DIAGRAM



PARTS LOCATION



①	CRT	⑤	H. CENTER SWITCH
②	FLYBACK TRANSFORMER	⑥	FUSE, 3A
③	POWER TRANSFORMER	⑦	MONITOR P.C. BOARD
④	V. CENTER SWITCH	⑧	SERVICE SWITCH



⑨ CRT P.C. BOARD
⑩ POWER SWITCH
⑪ FOCUS CONTROL
⑫ SCREEN CONTROL
⑬ INPUT TERMINAL
⑭ BRIGHTNESS CONTROL
⑮ CONTRAST CONTROL
⑯ H. CENTER CONTROL
⑰ POLARITY SWITCH

ALIGNMENT INSTRUCTIONS

1. General

(1) Supply Voltage: 120V AC ±15V

(2) Signal: R.G.B. (Positive, Default), HD, VD (Negative, Default), Intensity (Positive, Default)
fH = 26.4 kHz, fV = 60 Hz
Should comply with compatible computer.

2. +B4 Voltage Adjustment

(1) Receive a white pattern signal (Chroma-clear or white raster).

(2) Set CONTRAST and BRIGHTNESS controls (VR682, VR681) at maximum position.

(3) Make sure the AC power supply voltage is at the specified value.

(4) Connect a DC voltmeter of 150V full scale between the test point B4 (+) on the MONITOR PCB and the chassis ground (–).

(5) Adjust B4-ADJ volume (VR901) on the MONITOR PCB for a 112 ±1V reading on the meter.

3. Horizontal Deflection Circuit Alignment

3.1 Horizontal Oscillation Circuit Adjustment

(1) Receive a white pattern signal (Chroma-clear or white raster).

(2) Short circuit TP-8A and TP-8B.

(3) Turn the H. HOLD volume (VR502) slowly, starting from higher horizontal frequency (right side down) until the picture almost becomes still (synchronized).

(4) Release short circuit (2) above.

3.2 Horizontal Position Adjustment

(1) Receive a white pattern signal (Chroma-clear or white raster).

(2) Set the H. CENT switch (S591) so that the raster is positioned at almost the center of the CRT screen.

Notes: 1. This adjustment should be done after ITC adjustment.
2. During this adjustment, H. CENT control (VR551) should be at the mid-position.

3.3 Horizontal Width Adjustment

(1) Receive a white pattern signal (Chroma-clear or white raster).

(2) Set CONTRAST and BRIGHTNESS controls (VR682, VR681) at their maximum positions.

(3) Adjust H. WIDTH control (L552) so that a white pattern width becomes 254 ±3 mm.

4. Vertical Deflection Circuit Alignment

4.1 Vertical Oscillation Circuit Adjustment

(1) Receive a cross-hatch pattern signal.

(2) Turn V. HOLD volume (VR401) clockwise as far as it will go.

(3) Then turn the V. HOLD volume(VR401)slowly counterclockwise so that the pattern becomes still (synchronized) and continue to turn by 30 degrees at a time.

4.2 Vertical Linearity Adjustment

(1) Receive a cross-hatch pattern signal.

(2) Adjust HEIGHT volume (VR403) so that the height becomes 80% of the display area of the CRT.

(3) Adjust V. LIN volume (VR402) to get optimum linearity.

4.3 Height Adjustment

(1) Receive a white pattern signal (Chroma-clear or white raster).

(2) Adjust HEIGHT volume (VR403) so that the height of the pattern becomes 178 mm ±3 mm.

4.4 Vertical Position Adjustment

(1) Receive a white pattern signal (Chroma-clear or white raster).

(2) Set the V. CENT switch (S491) at the appropriate position so that the raster is positioned at almost the center of the CRT screen.

5. CRT Circuit Alignment

(1) Receive a white pattern signal (Chroma-clear or white raster).

(2) Turn CUTOFF volume (VR654, VR655, VR656) and SCREEN control counterclockwise as fas as they will go.

(3) Set DRIVE volume (VR651, VR653) so that it is turned 30 degrees clockwise from the mechanical center.

(4) Set CONTRAST AND BRIGHTNESS controls (VR682, VR681) at their maximum positions.

(5) Set the SERVICE switch (S602) to the service position and short-circuit resistor R696.

(6) Adjust the SCREEN control slowly so that either a red, green or blue horizontal line begins to shine.

(7) Adjust CUTOFF volume (VR654, VR655, VR656) of not appearing R, G or B so that a white horizontal line shines slightly.

(8) Set the SERVICE switch (S602) back to its normal position and release short-circuit (5) above.

(9) Adjust DRIVE volume (VR651, VR653) for standard white. If necessary, a color analyzer may be used.

(10) Turn CONTRAST and BRIGHTNESS controls (VR682, VR681) to their minimum positions and check if other components than the white signal (background) is bright. If yes, gradually turn SCREEN control counterclockwise to a point where the background fades out.

(11) Turn the CONTRAST and BRIGHTNESS controls (VR682, VR681) to its maximum position.

(12) Connect (+) terminal of 1 mA DC ammeter to the TP-9Z and (–) terminal to the TP-1Z.

(13) Adjust SUB-BRIGHT volume (VR694) so that the ammeter reads 550 ± 20μA.

6. Focus Adjustment

(1) Receive a characters pattern signal.

(2) Set CONTRAST and BRIGHTNESS controls (VR682, VR681) at their maximum positions.

(3) Adjust the FOCUS control on the FBT BLOCK to get optimum focus.

Note: This adjustment should be done after the completion of SUB-BRIGHT volume (VR694) adjustment.

7. ITC Alignment

Receive a white pattern signal (Chroma-clear or white raster) and allow the regular beam current to flow through it for at least 30 minutes. Place the unit so that it faces east or west and degauss thoroughly the CRT face, chassis, etc. with a degaussing coil.

7.1 Purity and Convergence Adjustment

A) Procedure

(1) Remove the deflection yoke and the rubber wedges from the picture tube cone, taking care not to strike or scratch the cone surface.

(2) Clean the remaining cement off the deflection yoke and the surface of the picture tube cone.

(3) Put the deflection yoke on the neck of the picture tube, fully forward against the cone of the CRT.

(4) Put the Convergence-Purity Assembly on the neck of the picture tube so that the distance between the 6-pole magnet and the base of the tube is 32 mm (1¼ inches), as shown in Figure 1, and hand-tighten the screw.

(5) Demagnetize the front and sides of the picture tube with a degaussing coil.

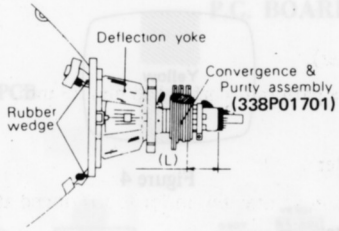


Figure 1

	(L)
370MLB22E	32mm (1¼inches)

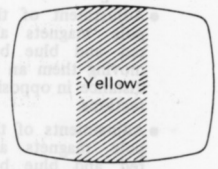


Figure 2

B) Preliminary Adjustment

1. Purity

   (1) Produce a yellow raster by short-circuiting the base and emitter of Q653 (B-DRIVE-1) with a short lead.

   (2) With the deflection yoke positioned fully forward, adjust the purity magnet so that the yellow bar is at the center of the screen with normal vertical centering.

   (3) Slide the deflection yoke slowly backwards to produce a uniform yellow raster (Figure 2).

   (4) Produce the primary color rasters – red, green and blue – and make sure no contamination is observed for each color.

   To produce a read raster, short-circuit the base and emitter Q652 (G-DRIVE-1) and Q653 (B-DRIVE-1) with two short leads. To produce green and blue primary colors, short-circuit the base and emitter of Q651 (R-DRIVE-1) and Q653, or Q651 and Q652, with two short leads.
   Temporarily fasten the deflection yoke.

2. Static Convergence

   (1) Set the CONTRAST control (VR682) to its minimum position (fully counterclockwise). If necessary, adjust the BRIGHTNESS control (VR681).

   (2) Adjust the two 4-pole magnets to converge red and blue vertical and horizontal lines at the center of the screen.

   (3) Adjust the two 6-pole magnets to converge the red and blue lines on green (Figure 3).

3. Focus

   If necessary, adjust focus. Be certain focus is optimum throughout the entire screen.

C) Regular Adjustment

1. Purity

   (1) Produce a yellow raster by short-circuiting the base and the emitter of Q653 (B-DRIVE-1) with a short lead.

   (2) Loosen the deflection yoke screw and move it forward. Make certain that the yellow bar is at the horizontal center. If necessary, adjust purity magnets to center it.

   (3) Slide the yoke backwards to produce a uniform yellow raster (Figure 4).

   (4) Using the same procedure as for Preliminary Adjustment, produce a red, blue, and green primary color raster and make sure no contamination is observed for each color.

   (5) If necessary, repeat the above steps.

   (6) Tighten the yoke in position.

2. Static Convergence

   (1) Tune receiver to a cross-hatch signal.

   (2) Set the CONTRAST control (VR682) to minimum. If necessary, adjust the BRIGHTNESS control (VR681).

   (3) Adjust the 4-pole magnets to converge red and blue vertical and horizontal lines at the center of the screen (Figure 5).

   (4) Adjust the 6-pole magnets to place the red and blue converged lines on the green line.

   (5) If necessary, repeat steps (3) and (4) above.

   (6) Fasten lock-ring tightly.

Note:

- Adjustment of the 4-pole magnets affects red and blue beams, moving them an equal distance in opposite directions.
- Adjustments of the 6-pole magnets affects red and blue beams, moving them an equal distance in the same direction.
- The degree of the angle between the tab on the 4-pole magnet and that on the 6-pole magnet controls the amount of beam movement.
- Rotation of the 4 and 6-pole magnets together controls the direction of beam movement.

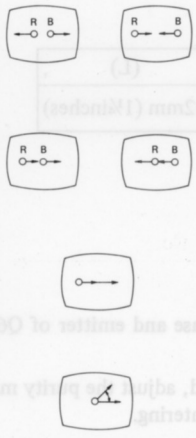


Figure 3

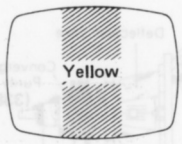


Figure 4

Note:

When adjusting the deflection yoke position, never touch any portion of the yoke other than the screw. Do not touch the purity ring magnets unless absolutely necessary, in which case carry out preliminary purity adjustment procedures again. Then remove the shorting lead across the base and emitter of Q651, Q652 and Q653. Otherwise, abnormal tint will occur on color programs.

3. Periphery of Convergence

(1) Observe the horizontal lines at the center of the screen. If the red and blue horizontal lines have shifted when crossing the green horizontal lines, as shown in Figure 6, converge by vertically swinging the yoke. Then confirm that the vertical lines at the center of the screen are also converged.

(2) Observe the vertical lines at the left and right center of the screen, as shown in Figure 7. If red or blue has shifted against green, converge it by swinging the yoke horizontally. Then confirm that the horizontal lines both at the top and bottom centers of the screen are also converged.

(3) Insert three rubber wedges between the picture tube cone surface and the deflection yoke, as indicated in Figure 8, so that no space remains.

(4) Observe the entire screen and make sure convergence adjustment is completed. If necessary, change the positions of the wedges and repeat steps (1) and (2) above.

(5) After positioning the wedges, gently turn each wedge over and strip the tape from the rear to expose the adhesive material, then replace each wedge so that they adhere to the picture tube cone.

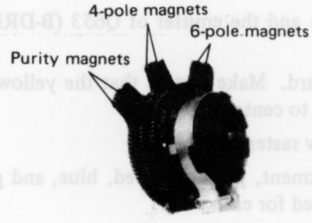


Figure 5

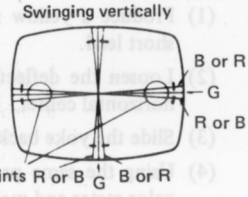


Figure 6

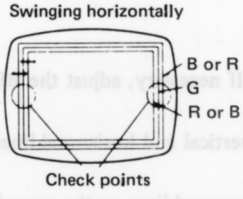


Figure 7

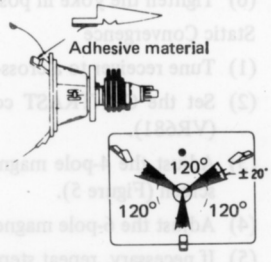
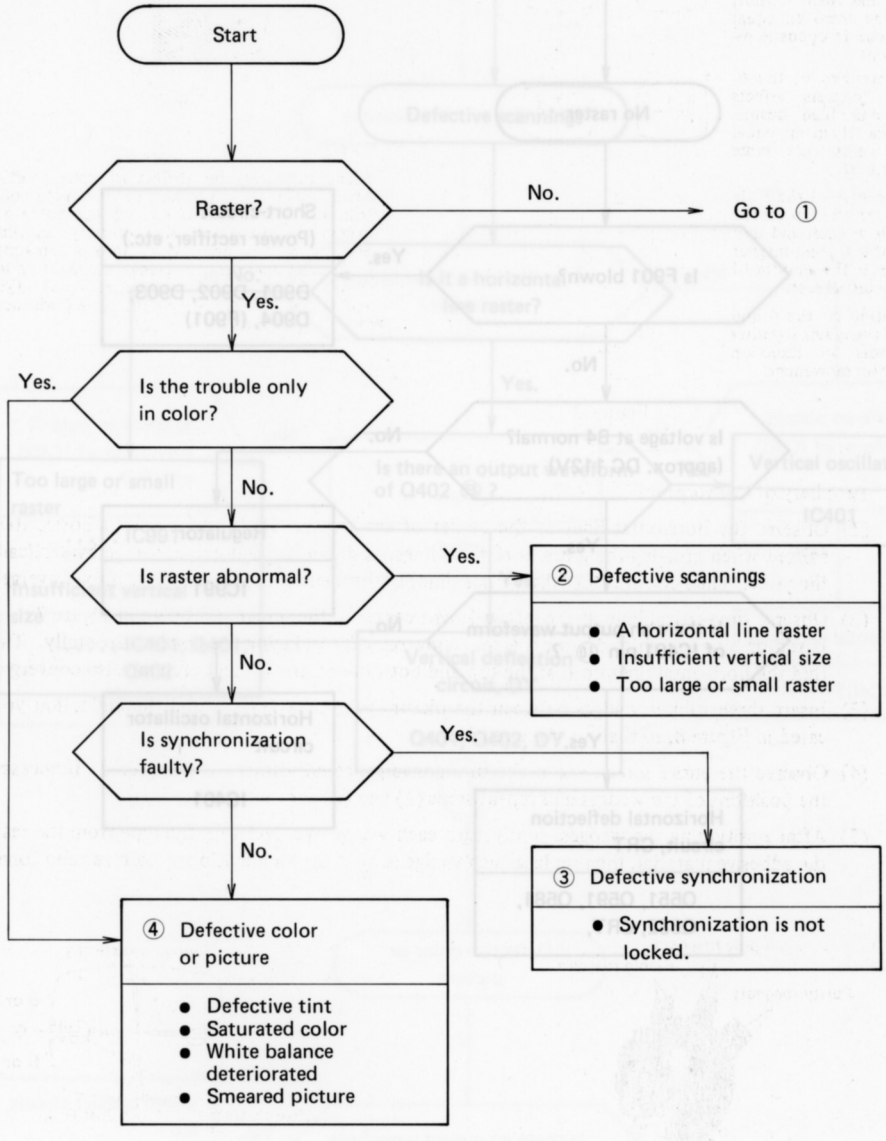
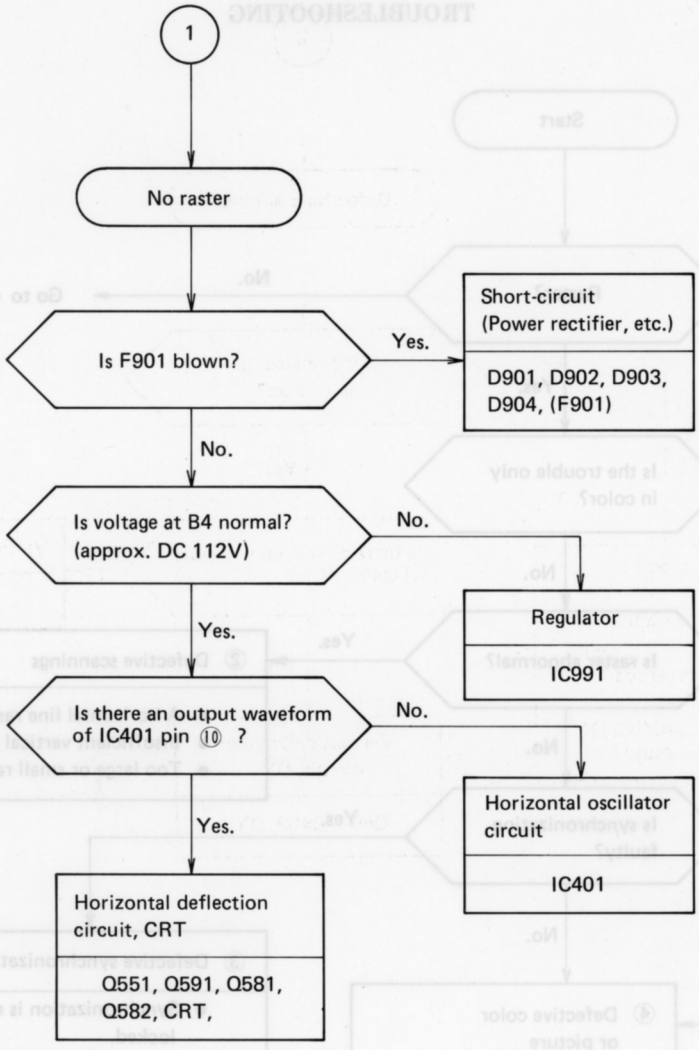
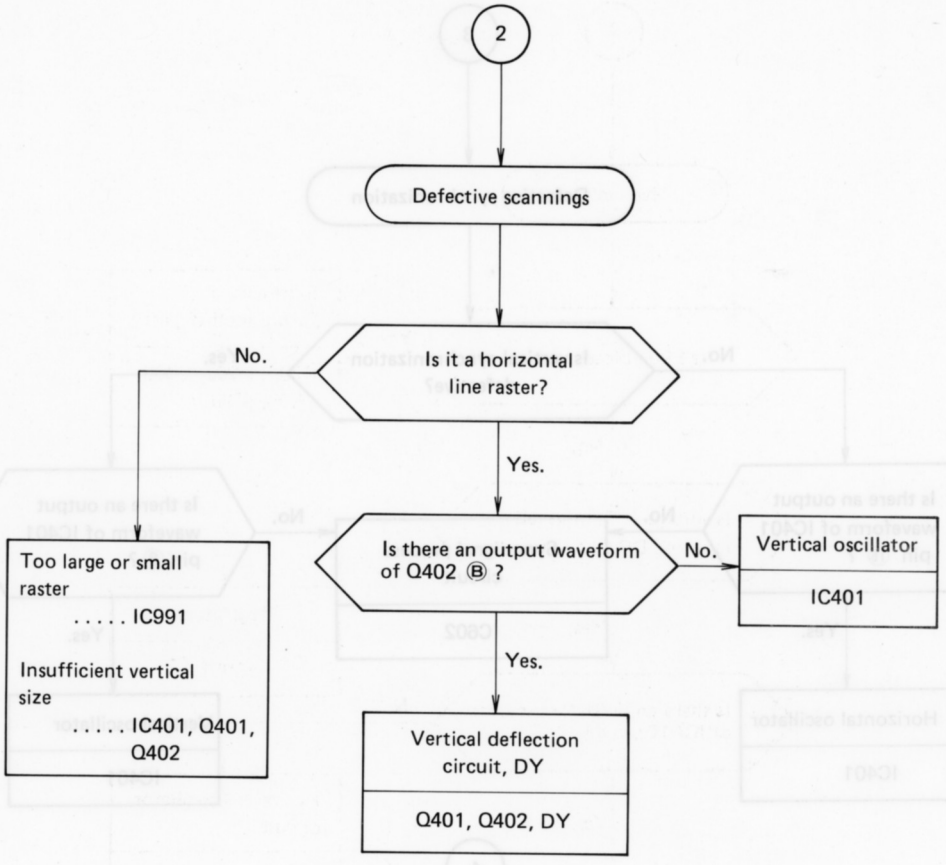
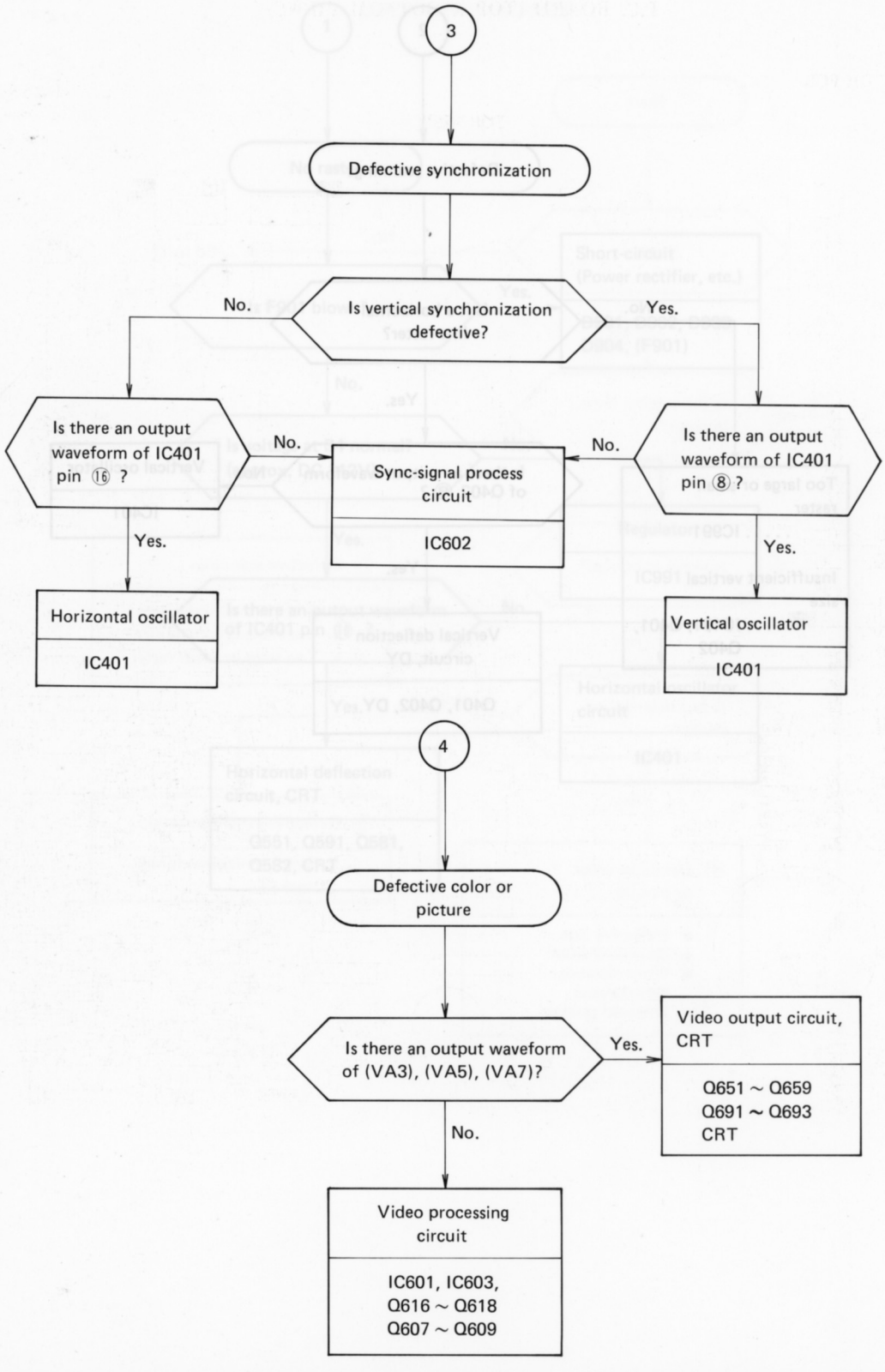


Figure 8


Start
Raster?
No.
Go to ①
Yes.
Yes.
Is the trouble only in color?
No.
Is raster abnormal?
Yes.
② Defective scannings
• A horizontal line raster
• Insufficient vertical size
• Too large or small raster
No.
Is synchronization faulty?
Yes.
③ Defective synchronization
• Synchronization is not locked.
No.
④ Defective color or picture
• Defective tint
• Saturated color
• White balance deteriorated
• Smeared picture


1
No raster
Is F901 blown?
Yes.
Short-circuit
(Power rectifier, etc.)
D901, D902, D903,
D904, (F901)
No.
Is voltage at B4 normal?
(approx. DC 112V)
No.
Regulator
IC991
Yes.
Is there an output waveform
of IC401 pin ⑩ ?
No.
Horizontal oscillator
circuit
IC401
Yes.
Horizontal deflection
circuit, CRT
Q551, Q591, Q581,
Q582, CRT,

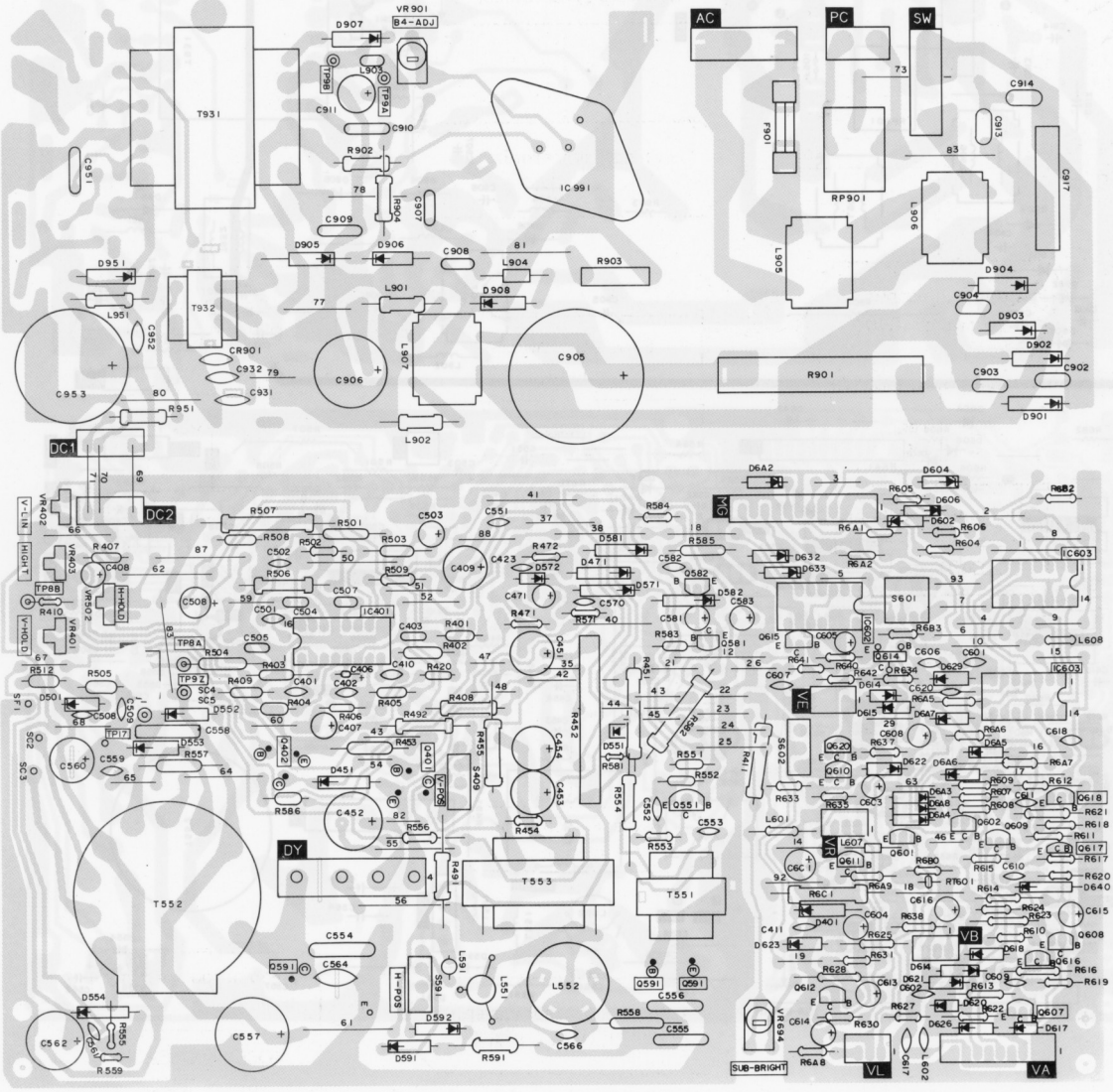

2
Defective scannings
Is it a horizontal line raster?
No.
Yes.
Too large or small raster
..... IC991
Insufficient vertical size
..... IC401, Q401, Q402
Is there an output waveform of Q402 Ⓑ ?
No.
Vertical oscillator
IC401
Yes.
Vertical deflection circuit, DY
Q401, Q402, DY


3
Defective synchronization
Is vertical synchronization defective?
No.
Yes.
Is there an output waveform of IC401 pin ⑯ ?
No.
Sync-signal process circuit
IC602
No.
Is there an output waveform of IC401 pin ⑧ ?
Yes.
Horizontal oscillator
IC401
Yes.
Vertical oscillator
IC401
4
Defective color or picture
Is there an output waveform of (VA3), (VA5), (VA7)?
Yes.
Video output circuit, CRT
Q651 ~ Q659
Q691 ~ Q693
CRT
No.
Video processing circuit
IC601, IC603,
Q616 ~ Q618
Q607 ~ Q609

P.C. BOARD (TOP & BOTTOM VIEWS)

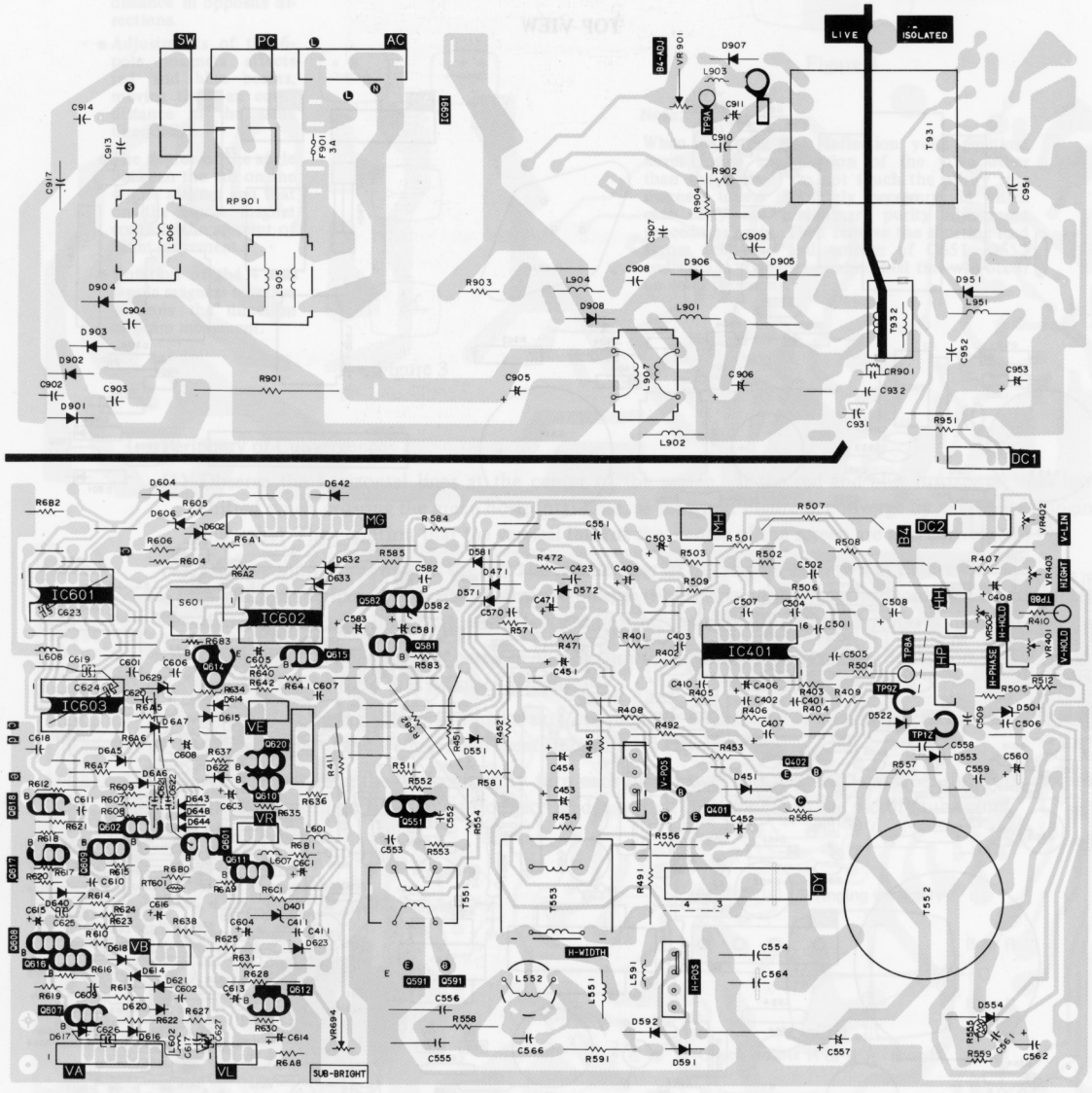
MONITOR PCB

TOP VIEW



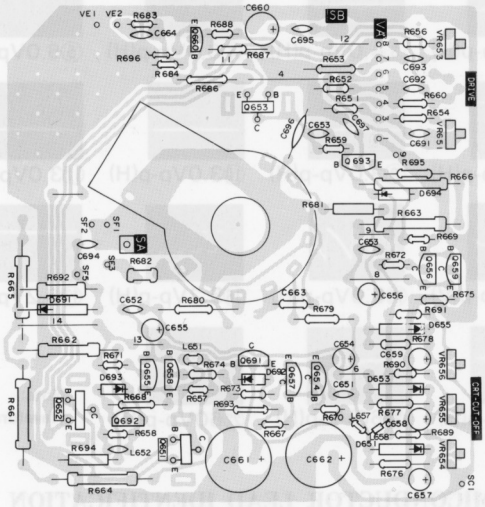
MONITOR PCB

BOTTOM VIEW

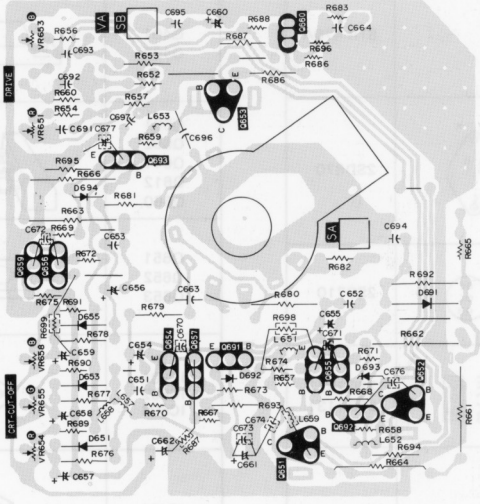


CRT PCB

TOP VIEW

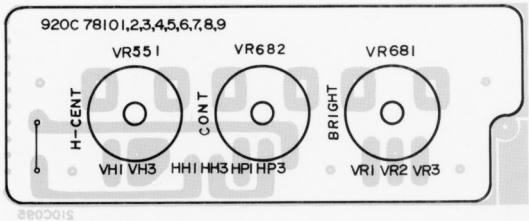


BOTTOM VIEW

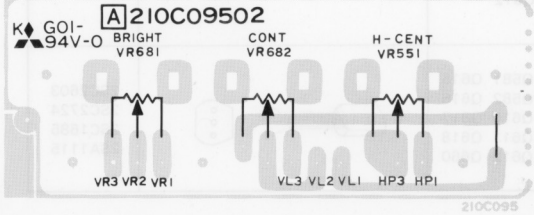


CONTROL PCB

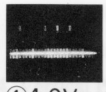
TOP VIEW

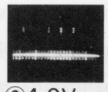


BOTTOM VIEW

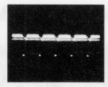


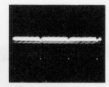
CHASSIS WAVEFORMS

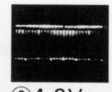

①4.0Vp-p(H)


②4.0Vp-p(H)

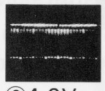

③4.0Vp-p(H)


④6.0Vp-p(H)

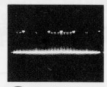

⑤6.0Vp-p(V)

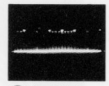

⑥4.2Vp-p(H)

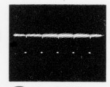

⑦4.2Vp-p(H)


⑧4.2Vp-p(H)

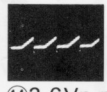

⑨3.0Vp-p(H)

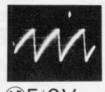

⑩3.0Vp-p(H)

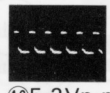

⑪3.0Vp-p(H)


⑫4.0Vp-p(H)


⑬3.5Vp-p(V)


⑭2.6Vp-p(V)


⑮5.0Vp-p(H)


⑯5.2Vp-p(H)

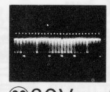

⑰3.2Vp-p(H)


⑱3.8Vp-p(H)


⑲3.2Vp-p(H)


⑳80Vp-p(H)

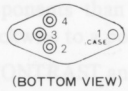
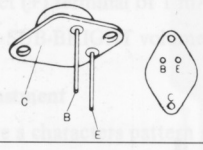
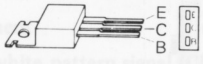
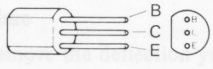
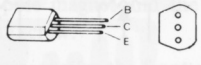

㉑60Vp-p(H)

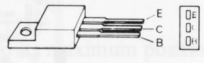
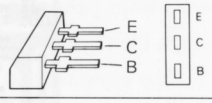
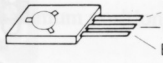
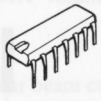
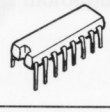

㉒60Vp-p(H)

Note:
Waveforms were taken with character signal.

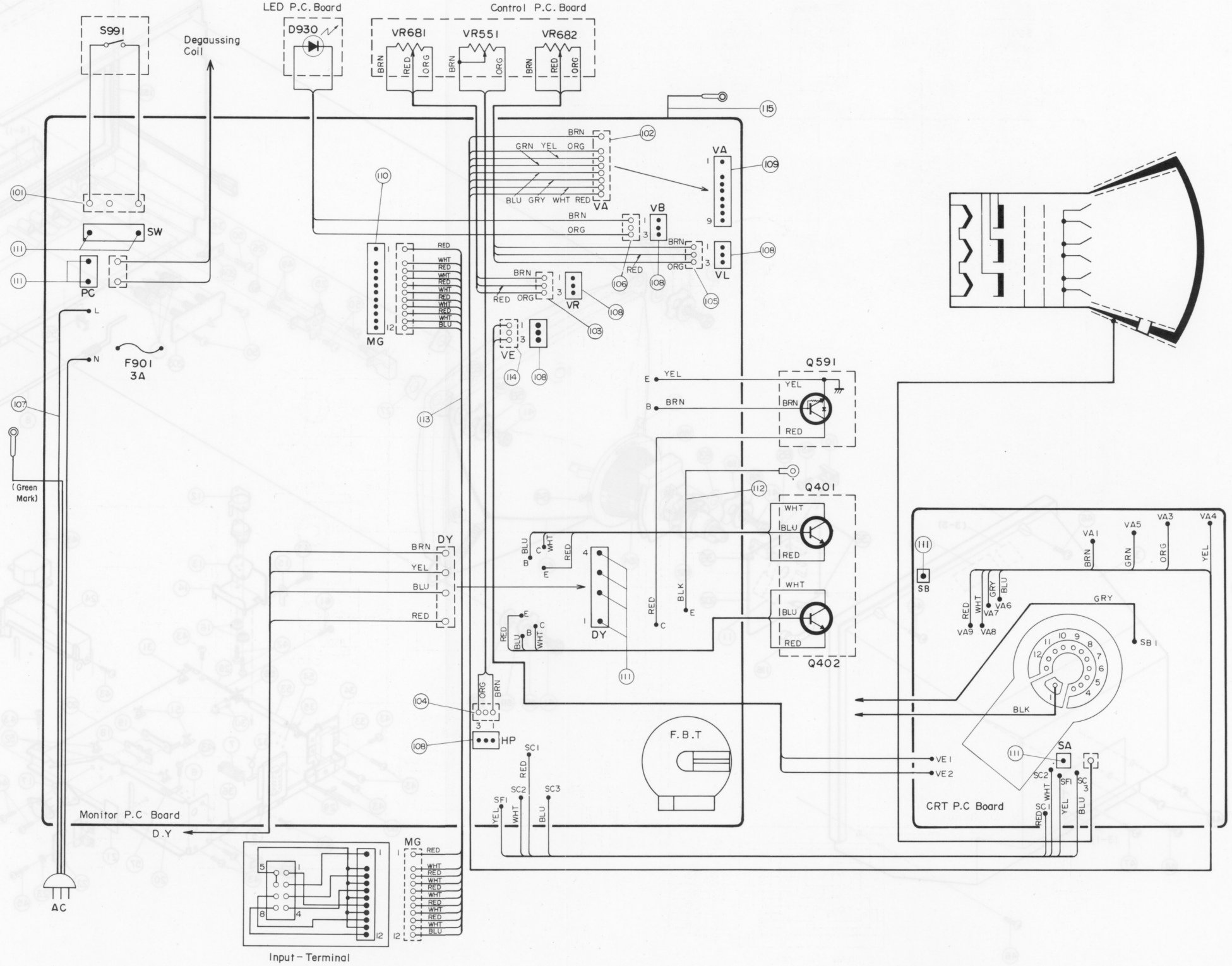
SEMICONDUCTOR LEAD IDENTIFICATION

Shape of Transistors

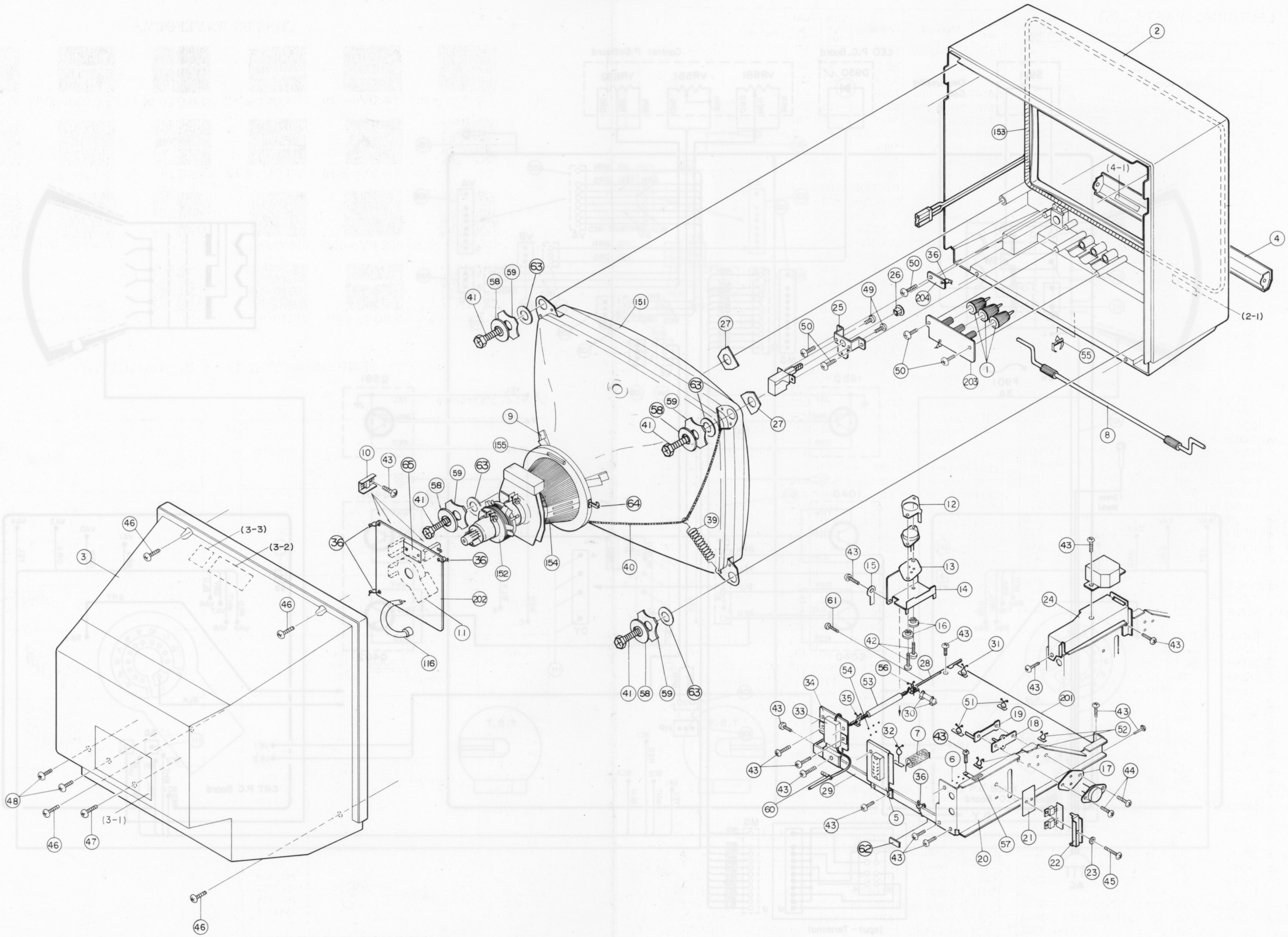
IC991	 (BOTTOM VIEW)	STR-470A
Q591		2SD870
Q615		2SC710
Q401 Q402 Q614		2SC2073 2SD1131
Q551 Q654 Q581 Q655 Q582 Q656 Q601 Q657 Q602 Q658 Q607 Q659 Q608 Q691 Q609 Q692 Q611 Q693 Q612		2SC2230 2SC3334 2SC2482 2SA564 2SA1321 2SC2236
Q581 Q615 Q582 Q616 Q610 Q617 Q611 Q618 Q612 Q660		2SC2603 2SC2724 2SC1685 2SA1115

Q401 Q402		2SC2168 2SD386
Q581 Q582 Q611 Q612 Q660		2SC2021 2SA937
Q651 Q652 Q653		2SC2688
IC601 IC602 IC603		SN74LS86N SN7406N M53206P
IC401		HA11414

WIRING DIAGRAM



CABINET EXPLODED VIEW



ELECTRICAL PARTS LIST

(* means spare parts only.)

CAPACITORS

Ref. No.	Material	Value	Voltage (V)	Tolerance (%)	R/S Part No.	Mfr's Part No.
C401	Ceramic	220PF	50	±10	CC221JJCP	142P02001
C402	Ceramic	560PF	50	±10	CC561CJCP	142P02006
C403	Polyester	0.001μF	50	±5	CC102JJGP	172P14001
C406	Tantalum	1μF	35	±10	CC105KGTP	189D05806
C407	Electrolytic	2.2μF	50	±20	CC225KJAP	181P20502
C408	Electrolytic	10μF	50	±20	CC106KJAP	181P20505
C409	Electrolytic	330μF	16	±20	CC337KDAP	181P20206
C410	Ceramic	0.0047μF	50	±10	CC472KJCP	142P02107
C411	Ceramic	0.01μF	50	+80 −20	CC103JJCP	142P02308
C423	Ceramic	0.0033μF	500	±10	CC332KJCP	142P01109
C451	Electrolytic	4.7μF	200	±20	CC475KPAP	181P18904
C452	Electrolytic	100μF	100	±20	CC107KLAP	181P20703
C453	Electrolyitc	470μF	6.3	±20		181P18001
C454	Electrolytic	470μF	6.3	±20		181P18001
C455	Ceramic	100PF	500	±10		142P01001
C471	Electrolytic	0.47μF	100	±20	CC474KLAP	181P20604
C501	Ceramic	390PF	50	±10	CC391JJCP	142P02004
C502	Ceramic	0.01μF	50	+80 −20	CC103JJCP	142P02308
C503	Electrolytic	1μF	50	±20	CC105JJAP	181P20501
C504	Polyester	0.047μF	50	±5	CC473JJGP	172P14201
C505	Polyester	0.015μF	50	±5	CC153JJGP	172P14105
C506	Ceramic	0.0012μF	500	±10		142P01104
C507	Polypropylene	0.0033μF	100	±5	CC332JLHP	189P06403
C508	Electrolytic	47μF	25	±20	CC476KFAP	181P20303
C509	Ceramic	120PF	500	±10		142P01002
C551	Ceramic	0.0022μF	50	±10	CC222KJCP	142P02103
C552	Ceramic	680PF	500	±10	CC681KUCP	142P01101
C553	Ceramic	0.0047μF	500	±10	CC472KUCP	142P01201
C554	Polypropylene	0.0056μF	1600	±5	CC562JYHP	172P17100
C555	Polypropylene	0.33μF	200	±5	CC334JPHP	189P07105
C556	Polypropylene	0.12μF	200	±10		172P15005
C557	Electrolytic	47μF	160	+100 −10	CC476MNAP	181P10802
C558	Polypropylene	0.1μF	200	±10		172P08006
C559	Ceramic	0.0022μF	500	±10	CC222KUCP	142P01107
C560	Electrolytic	4.7μF	250	+100 −10	CC475MRAP	181P10807
C561	Ceramic	0.0022μF	500	±10	CC222KUCP	142P01107
C562	Electrolytic	470μF	25	±20	CC477MPAP	181P20307
C564	Ceramic	680PF	2000	±10		154P23603
C566	Ceramic	220PF	500	±10		142P01005
C570	Ceramic	150PF	500	±10	CC151KUCP	142P01003
C581	Electrolytic	10μF	50	±20	CC106KJAP	181P20505
C582	Ceramic	0.01μF	50	380 −20	CC103JJCP	142P02308
C583	Electrolytic	1μF	100	±20	CC105JLAP	181P20605
C6C1	Electrolytic	100μF	25	±20		181P20304
C6C2	Electrolytic	10μF	50	±20	CC106KJAP	181P20505
C6C3	Electrolytic (Long leads)	10μF	50	±20		181P26605
C601	Ceramic	0.01μF	50	+80 −20	CC103JJCP	142P02308
C602	Ceramic	0.01μF	50	+80 −20	CC103JJCP	142P02308
C604	Electrolytic	33μF	16	±20	CC336KDAP	181P20202
C605	Electrolytic	10μF	50	±20	CC106KJAP	181P20505
C606	Ceramic	0.01μF	50	+80 −20	CC103JJCP	142P02308
C607	Ceramic	0.0022μF	50	±10	CC222KJCP	142P02103
C608	Electrolytic	10μF	50	±20	CC106KJAP	181P20505
C609	Ceramic	56PF	50	±5		155P31300
C610	Ceramic	56PF	50	±5		155P31300
C611	Ceramic	56PF	50	±5		155P31300
C613	Electrolytic	0.1μF	50	±20		181P20906
C614	Electrolytic	10μF	50	±20	CC106KJAP	181P20505
C615	Electrolytic	33μF	16	±20	CC336KDAP	181P20202
C616	Electrolyitc	10μF	50	±20	CC106KJAP	181P20505
C617	Ceramic	0.0022μF	500	±10	CC222KUCP	142P01107
C618	Ceramic	18PF	50	±5		155P31108
C619	Ceramic	18PF	50	±5		155P31108
C620	Ceramic	18PF	50	±5		155P31108
C621	Ceramic	0.0022μF	50	±30		141P09103
C622	Ceramic	0.0022μF	50	±30		141P09103
C623	Ceramic	0.0022μF	50	±30		141P09103
C624	Ceramic	0.0022μF	50	±30		141P09103
C625	Ceramic	0.0022μF	50	±30		141P09103
C626	Ceramic	0.0022μF	50	±30		141P09103
C627	Electrolytic	4.7μF	50	±20		181P20504
C651	Ceramic	0.0047μF	500	±10	CC472KUCP	142P01201
C652	Ceramic	0.0047μF	500	±10	CC472KUCP	142P01201
C653	Ceramic	0.0047μF	500	±10	CC472KUCP	142P01201
C654	Electrolytic	0.47μF	200	±20	CC474MNAP	181P19200
C655	Electrolytic	0.47μF	200	±20	CC474MNAP	181P19200
C656	Electrolytic	0.47μF	200	±20	CC474MNAP	181P19200
C657	Electrolytic	1μF	250	±20		181P19306
C658	Electrolytic	1μF	250	±20		181P19306
C659	Electrolytic	1μF	250	±20		181P19306
C660	Electrolytic	47μF	25	±20	CC476KFAP	181P20303
C661	Electrolytic	47μF	200	±20		181P18908
C662	Electrolytic (105°C)	47μF	200	±20	CC475MRCP	181P19208
C663	Ceramic	0.001μF	2000	±10	CC102KZCP	154P23102
C664	Ceramic	47PF	50	±5		155P31208
C670	Ceramic	0.001μF	500	±10		142P01103
C671	Ceramic	0.001μF	500	±10		142P01103
C672	Ceramic	0.001μF	500	±10		142P01103
C673	Ceramic	0.0022μF	500	±10		141P04006
C674	Ceramic	0.01μF	25	±30		141P09303
C676	Ceramic	0.0022μF	500	±10	CC222KUCP	142P01107
C677	Electrolytic	1μF	160	+100 −10		181P10705
C691	Ceramic	68PF	50	±5		155P31302
C692	Ceramic	68PF	50	±5		155P31302
C693	Ceramic	68PF	50	±5		155P31302
C694	Ceramic	0.001μF	500	±10		142P01103
C695	Ceramic	0.0022μF	50	±10	CC222KJCP	142P02103
C696	Ceramic	0.0022μF	50	±30		141P09103
C697	Ceramic	0.0022μF	500	±10	CC222KUCP	142P01107
C902	Ceramic	0.0022μF	125	±20	CC222MMCP	189P02705
C903	Ceramic	0.0022μF	125	±20	CC222MMCP	189P02705
C904	Ceramic	0.0022μF	125	±20	CC222MMCP	189P02705
C905	Electrolytic	470μF	250	+30 −10	CC477RRAP	185D05205
C906	Electrolyitc	22μF	250	+100 −10	CC226MRAP	181P10809
C907	Polypropylene	0.012μF	630	±5	CC123JVHP	172P08800
C908	Ceramic	470PF	2000	±10	CC471KZCP	154P23101
C909	Ceramic	680PF	2000	±10		154P23603
C910	Polyester	0.18μF	50	±10		172P13604
C911	Electrolytic	10μF	100	±20	CC106MLAP	181P20609
C913	Ceramic	0.0022μF	125	±20	CC222MMCP	189P02705
C914	Ceramic	0.0022μF	125	±20	CC222MMCP	189P02705
C917	Polyester	0.1μF	125	±20	CC104MMGP	189P03305
C931	Ceramic	0.0022μF	125	±20	CC222MMCP	189P02705
C932	Ceramic	0.0047μF	125	±20		189P02707
C951	Polypropylene	0.0033μF	630	±10		172P08604
C952	Ceramic	470PF	2000	±10	CC471KZCP	154P23101
C953	Electrolytic	330μF	180	+30 −10	CC337MNAP	185D05203

DIODES

Ref. No.	Description		R/S Part No.	Mfr's Part No.
D401	MZ310-C1	Zener or	DX2076	264D05104
	MZ11B24	Zener		264D05105
D451	S5500-D	Silicon or	DX2079	264P28501
	EM-1Z	Silicon or		264P29401
	ERB12-02RK	Silicon		264P29301
D471	1S2471	Silicon		264P04504
D501	MZ-324A	Zener	DX2078	264P29101
D551	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D552	S5500-D	Silicon or	DX2079	264P28501
	EM-1Z	Silicon or		264P29401
	ERB12-02RK	Silicon		264P29301
D553	TVRIG	Silicon or	DX2072	264P23101
	ES-1	Silicon or		264P29501
	*RU-3B	Silicon		264P10202
D554	TVRIG	Silicon or	DX2072	264P23101
	ES-1	Silicon or		264P29501
	*RU-3B	Silicon		264P10202
D571	1S2471	Silicon		264P04504
D572	1S2471	Silicon		264P04504
D581	S5500-D	Silicon or	DX2079	264P28501
	EM-1Z	Silicon or		264P29401
	ERB12-02RK	Silicon		264P29301
D582	HZT33-01	Zener	DX2077	264P24401
D591	TVRIG	Silicon or	DX2072	264P23101
	ES-1	Silicon		264P29501
	*RU-3B	Silicon		264P10202
D592	TVRIG	Silicon or	DX2072	264P23101
	ES-1	Silicon or		264P29501
	*RU-3B	Silicon		264P10202
D6A2	MZ307B	Zener or	DX2179	264D05106
	EQA02-07CDA	Zener		264D05107
D6A3	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D6A4	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D6A5	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D6A6	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D6A7	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D6A8	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D602	MZ307B	Zener or	DX2179	264D05106
	EQA02-07CDA	Zener		264D05107
D604	MZ307B	Zener or	DX2179	264D05106
	EQA02-07CDA	Zener		264D05107
D606	MZ307B	Zener or	DX2179	264D05106
	EQA02-07CDA	Zener		264D05107
D614	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D615	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D616	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D617	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D618	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D619	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D620	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D621	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D622	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D623	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D629	MZ306-A1	Zener or	DX2075	264D05102
	HZ6A19	Zener		264D05103
D632	MZ307B	Zener or	DX2179	264D05106
	EQA02-07CDA	Zener		264D05107
D633	MZ307B	Zener or	DX2179	264D05106
	EQA02-07CDA	Zener		264D05107
D640	MZ406	Zener		264P33005
D651	TVRIG	Silicon or	DX2072	264P23101
	ES-1	Silicon or		264P29501
	*RU-3B	Silicon		264P10202
D653	TVRIG	Silicon or	DX2072	264P23101
	ES-1	Silicon or		264P29501
	*RU-3B	Silicon		264P10202
D655	TVRIG	Silicon or	DX2072	264P23101
	ES-1	Silicon or		264P29501
	*RU-3B	Silicon		264P10202
D691	S5500-D	Silicon or	DX2079	264P28501
	EM-1Z	Silicon or		264P29401
	ERB12-02RK	Silicon		264P29301
D692	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D693	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D694	1S2076A	Silicon or	DX2162	264P04502
	1S2471	Silicon		264P04504
D901	RM-1B	Silicon or	DX2073	264P10105
	*RM-1C	Silicon		264P23406
D902	RM-1B	Silicon or	DX2073	264P10105
	*RM-1C	Silicon		264P23406
D903	RM-1B	Silicon or	DX2073	264P10105
	*RM-1C	Silicon		264P23406
D904	RM-1B	Silicon or	DX2073	264P10105
	*RM-1C	Silicon		264P23406
D905	TVRIG	Silicon or	DX2072	264P23101
	ES-1	Silicon or		264P29501
	*RU-3B	Silicon		264P10202
D906	TVRIG	Silicon or	DX2072	264P23101
	ES-1	Silicon or		264P29501
	*RU-3B	Silicon		264P10202
D907	TVRIG	Silicon	DX2072	264P23101
	ES-1	Silicon or		264P29501
	*RU-3B	Silicon		264P10202
D908	RU-3A	Silicon or	DX2074	264P10201
	*RU-3B	Silicon		264P10202
D951	RU-3A	Silicon or	DX2074	264P10201
	*RU-3B	Silicon		264P10202
D930	LED GL-9PR2		AL1472	264P20101

IC

Ref. No.	Description	R/S Part No.	Mfr's Part No.
IC401	HA11414	MX5754	266P50101
IC601	SN74LS86N TTL	AMX3701	266P47801
IC602	SN74LS86N TTL	AMX3701	266P47801
IC603	SN7406N or TTL	AMX3675	266P80602
	M53206P TTL		266P80603
IC991	STR-470A HYBRID	MX5753	267P90502

COILS

L401	Coil, Fixed Inductor 33μH		321C03109
L551	Coil, Linearity	ACA3980	333P01205
L552	Coil, Width control	ACA3979	335P00402
L591	Coil, Fixed Inductor 3300μH	ACA3981	321C01100
L601	Coil, Fixed Inductor 33μH		321C03109
L602	Coil, Fixed Inductor 4.7μH (Vertical type)		325C10009
L607	Coil, Lead-Ferrite	ACA8317	411P00104
L608	Coil, Fixed Inductor 4.7μH	ACA8318	325C11009
L651	Coil, Fixed Inductor 3.9μH	ACA8306	325C10008
L652	Coil, Fixed Inductor 3.9μH	ACA8306	325C10008
L653	Coil, Fixed Inductor 3.9μH	ACA8306	325C10008
L657	Coil, Fixed Inductor 4.7μH	ACA8318	325C11009
L658	Coil, Lead-Ferrite	ACA8303	411P00101
L659	Coil, Lead-Ferrite	ACA8303	411P00101
L901	Coil, Fixed Inductor 6.8μH	ACA3982	321C03102
L902	Coil, Fixed Inductor 6.8μH	ACA3982	321C03102
L903	Coil, Fixed Inductor 390μH	ACA8308	325C10302
L904	Coil, Lead-Ferrite	ACA8303	411P00101
L905	Coil, Line-Filter (Ring Type)	ACA8304	351P01102
L906	Coil, Line-Filter (Square Type)	ACA8305	351P01701
L907	Coil, Line-Filter (Ring Type)	ACA8304	351P01102
L951	Coil, Fixed Inductor 6.8μH	ACA3982	321C03102

TRANSISTORS

Q401	2SC2073 NPN or	2SC2073	260P42001
	2SC2168-O,Y NPN or		260P42807
	2SD386A-D,E NPN or		260P43607
	*2SD401A NPN		260P14407
Q402	2SC2073 NPN or	2SC2073	260P42001
	2SC2168-O,Y NPN or		260P42807
	2SD386A-D,E NPN or		260P43607
	*2SD401A NPN		260P14407
Q551	2SC2482 NPN or	2SC2482	260P42201
	*2SC2688-K,L		260P42502
Q581	2SA1115-E,F PNP or	2SA1115	260P25601
	2SA937-R,S PNP or	2SA937	260P40801
	2SA564A-R,S PNP or	2SA564	260P40701
	*2SA1115-F PNP		260P25604
Q582	2SA1115-E,F PNP or	2SA1115	260P25601
	2SA937-R,S PNP or	2SA937	260P40801
	2SA564A-R,S PNP or	2SA564	260P40701
	*2SA1115-F PNP		260P25604
Q591	2SD870 NPN	2SD870	260P43501
Q601	2SC2236-O,Y NPN or	2SC2236	260P38701
	*2SD669-C NPN		260P27601
Q602	2SC2236-O,Y NPN or	2SC2236	260P38701
	*2SD669-C NPN		260P27601
Q607	2SA564A-R,S PNP	2SA564	260P40701
Q608	2SA564A-R,S PNP	2SA564	260P40701
Q609	2SA564A-R,S PNP	2SA564	260P40701
Q610	2SC1685-Q,R NPN	2SC1685	260P32202
Q611	2SA1115-E,F PNP or	2SA1115	260P25601
	2SA937-R,S PNP or	2SA937	260P40801
	2SA564A-R,S PNP or	2SA564	260P40701
	*2SA1115-F PNP		260P25604
Q612	2SA1115-E,F PNP or	2SA1115	260P25601
	2SA937-R,S PNP or	2SA937	260P40801
	2SA564A-R,S PNP or	2SA564	260P40701
	*2SA1115-F PNP		260P25604
Q614	2SD1131-B,C NPN or	2SD1131	260P29003
	*2SC1826-O,Y NPN		260P42701
Q615	2SC710-D,E NPN or		260P17105
	2SC2724-D,E NPN or	2SC2724	260P41903
	*2SC2724-C,D NPN		260P41904
Q616	2SC1685-Q,R NPN	2SC1685	260P32202
Q617	2SC1685-Q,R NPN	2SC1685	260P32202
Q618	2SC1685-Q,R NPN	2SC1685	260P32202
Q651	2SC2688-M,N NPN or	2SC2688	260P42504
	*2SC2688-K,L NPN		260P42502
Q652	2SC2688-M,N NPN	2SC2688	260P42504
	*2SC2688-K,L NPN		260P42502
Q653	2SC2688-M,N NPN or	2SC2688	260P42504
	*2SC2688-K,L NPN		260P42502
Q654	2SC3334 NPN	2SC3334	260P30701
Q655	2SC3334 NPN	2SC3334	260P30701
Q656	2SC3334 NPN	2SC3334	260P30701
Q657	2SA1321 PNP	2SA1321	260P46901
Q658	2SA1321 PNP	2SA1321	260P46901
Q659	2SA1321 PNP	2SA1321	260P46901
Q660	2SC2603-E,F NPN or	2SC2603	260P33804
	2SC2021-R,S NPN or		260P33904
	2SC1685-R,S NPN or		260P32204
	*2SC2603-G NPN		260P33805
Q691	2SC2230-Y,GR NPN		260P38603
Q692	2SC2230-Y,GR NPN		260P38603
Q693	2SC2230-Y,GR NPN		260P38603

RESISTORS

Ref. No.	Material	Value (Ω)	Wattage (W)	Tolerance (%)	R/S Part No.	Mfr's Part No.
R401	Carbon	5.6K	1/4	±5	N0257EEC	103P31304
R402	Carbon	5.6K	1/4	±5	N0257EEC	103P31304
R403	Carbon	560	1/4	±5	N0176EEC	103P31202
R404	Carbon	22K	1/4	±5	N0311EEC	103P31401
R405	Carbon	56K	1/4	±5	N0345EEC	103P31406
R406	Carbon	22K	1/4	±5	N0311EEC	103P31401
R407	Carbon	3.3K	1/4	±5	N0230EEC	103P31301
R408	Metal	22K	1/2	±5	N0311EFD	103P34401
R409	Carbon	560	1/4	±5	N0176EEC	103P31202
R410	Carbon	180	1/4	±5	N0144EEC	103P31106
R411	Metal	220	1	±5	N0149EGD	103C14107
R420	Carbon	4.7K	1/6	±5	N0247ECC	103P41303
R451	Metal	6.8K	2	±5	N0262EHD	103C07305
R452	Cement-wire	390	10	±10	N0162FMF	109D05105
R453	Metal	8.2	1/2	±5		103P34901
R454	Metal	11	1/4	±1		103C12005
R455	Metal	470	2	±5	N0187EHD	103C07201
R456	Carbon	27K	1/6	±5		103P41402
R471	Carbon	3.9K	1/4	±5	N0237EEC	103P31302
R472	Carbon	1.5K	1/4	±5	N0206EEC	103P31207
R491	Metal	12K	2	±5	N0288EHD	103C07308
R492	Metal	3.3K	1	±5	N0237EGD	103C14301
R501	Carbon	1K	1/4	±5	N0196EEC	103P31205
R502	Carbon	39K	1/4	±5	N0330EEC	103P31404
R503	Carbon	12K	1/4	±5	N0288EEC	103P31308
R504	Carbon	560	1/4	±5	N0176EEC	103P31202
R505	Carbon	1.2K	1/4	±5	N0199EEC	103P31206
R506	Metal	12K	1/2	±5	N0285BED	109D02705
R507	Metal	6.8K	3	±5	N0262EJD	103C05301
R508	Carbon	22	1/4	±5	N0078EEC	103P31005
R509	Carbon	560	1/4	±5	N0176EEC	103P31202
R512	Carbon	2.7K	1/4	±5	N0224EEC	103P31300
R551	Carbon	100	1/4	±5	N0132EEC	103P31103
R552	Carbon	470	1/4	±5		103P31201
R553	Carbon	10K	1/4	±5	N0281EEC	103P31307
R554	Metal	2.7K	2	±5	N0224EHD	103C07300
R555	Carbon	1.2	1/4	±5	N0024EEC	103P33801
R556	Carbon	5.6K	1/4	±5	N0257EEC	103P31304
R557	Carbon	270K	1/4	±5		103P31504
R558	Metal	4.7K	1/2	±5	N0247BFE	103P34303
R559	Carbon	560	1/6	±5	N0176ECC	103P41202
R571	Carbon	6.8K	1/4	±5	N0262EEC	103P31305
R581	Carbon	1.2M	1/4	±5	N0447EEC	103P31602
R582	Metal	22K	2	±5	N0311EHD	103C07401
R583	Carbon	27K	1/4	±5	N0316EEC	103P31402
R584	Metal	2.7K	1/4	±1	N0257BED	103P30305
R585	Metal	27K	1/4	±1	N0316BED	103P30509
R586	Carbon	2.2	1/4	±5	N0032EEC	103P33804
R591	Metal	180	1	±5	N0144EGD	103C14106
R6A1	Carbon	680	1/4	±5	N0183EEC	103P31203
R6A2	Carbon	680	1/4	±5	N0183EEC	103P31203
R6A5	Carbon	47	1/4	±5	N0099EEC	103P31009
R6A6	Carbon	47	1/4	±5	N0099EEC	103P31009
R6A7	Carbon	47	1/4	±5	N0099EEC	103P31009
R6A8	Carbon	4.7K	1/4	±5		103P31303
R6A9	Carbon	220	1/4	±5	N0149EEC	103P31107
R6B0	Carbon	330	1/4	±5	N0159EEC	103P31109
R6B2	Carbon	2.2K	1/4	±5	N0311EEC	103P31209
R6B3	Carbon	2.2K	1/4	±5	N0311EEC	103P31209
R6C1	Metal	68	2	±5		103C07101
R604	Carbon	330	1/4	±5	N0159EEC	103P31109
R605	Carbon	330	1/4	±5	N0159EEC	103P31109
R606	Carbon	330	1/4	±5	N0159EEC	103P31109
R607	Carbon	150	1/4	±5	N0142EEC	103P31105
R608	Carbon	150	1/4	±5	N0142EEC	103P31105
R609	Carbon	150	1/4	±5	N0142EEC	103P31105
R610	Carbon	100	1/4	±5	N0132EEC	103P31103
R611	Carbon	100	1/4	±5	N0132EEC	103P31103
R612	Carbon	100	1/4	±5	N0132EEC	103P31103
R613	Carbon	470	1/4	±5		103P31201
R614	Carbon	470	1/4	±5		103P31201
R615	Carbon	470	1/4	±5		103P31201
R616	Carbon	220	1/4	±5	N0149EEC	103P31107
R617	Carbon	220	1/4	±5	N0149EEC	103P31107
R618	Carbon	220	1/4	±5	N0149EEC	103P31107
R619	Carbon	100	1/4	±5	N0132EEC	103P31103
R620	Carbon	100	1/4	±5	N0132EEC	103P31103
R621	Carbon	100	1/4	±5	N0132EEC	103P31103
R622	Carbon	3.3K	1/4	±5	N0230EEC	103P31301
R623	Carbon	3.3K	1/4	±5	N0230EEC	103P31301
R624	Carbon	3.3K	1/4	±5	N0230EEC	103P31301
R625	Carbon	220	1/4	±5	N0149EEC	103P31107
R627	Carbon	3.3K	1/4	±5	N0230EEC	103P31301
R628	Carbon	18K	1/4	±5		103P31400
R630	Carbon	820	1/4	±5	N0187EEC	103P31204
R631	Carbon	22K	1/4	±5	N0311EEC	103P31401
R634	Carobn	1.8K	1/4	±5	N0029EEC	103P31208
R635	Carbon	1K	1/4	±5	N0196EEC	103P31205
R636	Carbon	470	1/4	±5		103P31201
R637	Carbon	1K	1/4	±5	N0196EEC	103P31205
R638	Carbon	1.5K	1/4	±5	N0206EEC	103P31207
R640	Carbon	10K	1/4	±5	N0281EEC	103P31307
R641	Carbon	8.2K	1/4	±5	N0271EEC	103P31306
R642	Carbon	1.5K	1/4	±5	N0206EEC	103P31207
R651	Carbon	330	1/6	±5	N0159ECC	103P41109
R652	Carbon	330	1/6	±5	N0159ECC	103P41109
R653	Carbon	330	1/6	±5	N0159ECC	103P41109
R654	Carbon	82	1/6	±5	N0122ECC	103P41102
R656	Carbon	82	1/6	±5	N0122ECC	103P41102
R657	Carbon	1K	1/6	±5		103P41205
R658	Carbon	1K	1/6	±5		103P41205
R659	Carbon	1K	1/6	±5		103P41205
R660	Carbon	120	1/6	±5	N0136ECC	103P41104
R661	Metal	820	2	±5	N0187EHD	103C07204
R662	Metal	820	2	±5	N0187EHD	103C07204
R663	Metal	820	2	±5	N0187EHD	103C07204
R664	Metal	820	2	±5	N0187EHD	103P07204
R665	Metal	820	2	±5	N0187EHD	103C07204
R666	Metal	820	2	±5	N0187EHD	103C07204
R667	Carbon	100	1/6	±5	N0132ECC	103P41103
R668	Carbon	100	1/6	±5	N0132ECC	103P41103
R669	Carbon	100	1/6	±5	N0132ECC	103P41103
R670	Carbon	100	1/6	±5	N0132ECC	103P41103
R671	Carbon	100	1/6	±5	N0132ECC	103P41103
R672	Carbon	100	1/6	±5	N0132ECC	103P41103
R673	Carbon	100	1/6	±5	N0132ECC	103P41103
R674	Carbon	100	1/6	±5	N0132ECC	103P41103
R675	Carbon	100	1/6	±5	N0132ECC	103P41103
R676	Carbon	560K	1/6	±5	N0429ECC	103P41508
R677	Carbon	560K	1/6	±5	N0429ECC	103P41508
R678	Carbon	560K	1/6	±5	N0429ECC	103P41508
R679	Composition	330	1/2	±5	N0159ECC	101P33103
R680	Composition	330	1/2	±5	N0159ECC	101P33103
R681	Composition	330	1/2	±5	N0159ECC	101P33103
R682	Wire-P	2.2	2	±10		109D05804
R683	Carbon	10K	1/6	±5	N0281ECC	103P41307
R684	Carbon	6.8K	1/6	±5	N0262ECC	103P41305
R686	Carbon	1.2K	1/4	±5	N0199EEC	103P31206

Ref. No.	Material	Value Ω	Wattage (W)	Tolerance (%)	R/S Part No.	Mfr's Part No.
R687	Carbon	1.2K	1/4	±5	N0199EEC	103P31206
R688	Carbon (Vertical type)	1.2K	1/4	±5		103P32206
R689	Carbon	10K	1/6	±5	N0281ECC	103P41307
R690	Carbon	10K	1/6	±5	N0281ECC	103P41307
R691	Carbon	10K	1/6	±5	N0281ECC	103P41307
R692	Composition	56K	1/2	±10		101P56303
R693	Composition	39K	1/2	±5	N0330EFC	101P39303
R694	Composition	39K	1/2	±5	N0330EFC	101P39303
R695	Composition	39K	1/2	±5	N0330EFC	101P39303
R696	Carbon	150	1/6	±5		103P41105
R697	Carbon	220K	1/4	±5		103P31503
R698	Carbon	220K	1/4	±5		103P31503
R699	Carbon	220K	1/4	±5		103P31503
R901	Cement wire	2.7	10	±10	N0034FMF	102P08208
R902	Carbon	150K	1/2	±5	N0384EFC	103P14501
R903	Cement-Metal	10K	5	±10	N0281FKF	102P17307
R904	Metal	100	1	±5	N0132EGD	103C14103
R951	Metal	2.7K	1/2	±5	N0224EFD	103P34300

SWITCHES

Ref. No.	Description	R/S Part No.	Mfr's Part No.
S491	Band Switch, Lever Slide	AS2868	129P00709
S591	Band Switch, Lever Slide	AS2868	129P00709
S601	Switch, Slide (Polarity)	AS2867	431C04801
S602	Band Switch, Lever Slide	AS2868	129P00709
S991	Switch, Power, Push (AC125V 3A, TV-3)	AS2869	432C03202

TRANSFORMERS

T551	Transformer, Horizontal Drive	ATB0476	336P00901 or 336P00504
T552	Transformer, Flyback	ATB0475	334P11101
T553	Transformer, Side-Pcc	ATB0478	349P14202
T931	Transformer, Power	ATA1034	350P24001
T932	Transformer, Output	ATB0477	352P02702

VARIABLE RESISTORS

VR401	Resistor, Variable Semifixed 1/5W B-30K	AP7357	127C03100
VR402	Resistor, Variable Semifixed 1/5W B-10K	AP7356	127C03008
VR403	Resistor, Variable Semifixed 1/5W B-500	AP7354	127C03003
VR502	Resistor, Variable Semifixed 1/4W B-3K	AP7355	129D13001
VR551	Resistor, Variable 0.15W B-5K	AP7361	129D09801
VR651	Resistor, Variable Semifixed 1/5W B-200	AP7359	127C03001
VR653	Resistor, Variable Semifixed 1/5W B-200	AP7359	127C03001
VR654	Resistor, Variable Semifixed 1/5W B-20K	AP7360	127C03009
VR655	Resistor, Variable Semifixed 1/5W B-20K	AP7360	127C03009
VR656	Resistor, Variable Semifixed 1/5W B-20K	AP7360	127C03009
VR681	Resistor, Variable 0.15W B-5K	AP7361	129D09801
VR682	Resistor, Variable 0.15W B-5K	AP7361	129D09801
VR694	Resistor, Variable Semifixed 1/5W B-30K		127C02100
VR901	Resistor, Variable Semifixed 1/5W B-300	AP7353	127C02002

MISCELLANEOUS

RP901	Posistor	ARX0367	265P07101
F901	Fuse 125V S3A	AHF1279	283D03803
CR901	CR Multiple 130PF 2MΩ-4MΩ	MX5752	149P00802
RT601	Thermistor, 23D26		265P03001

MECHANICAL PARTS LIST

(* means spare parts only.)

COSMETIC PARTS

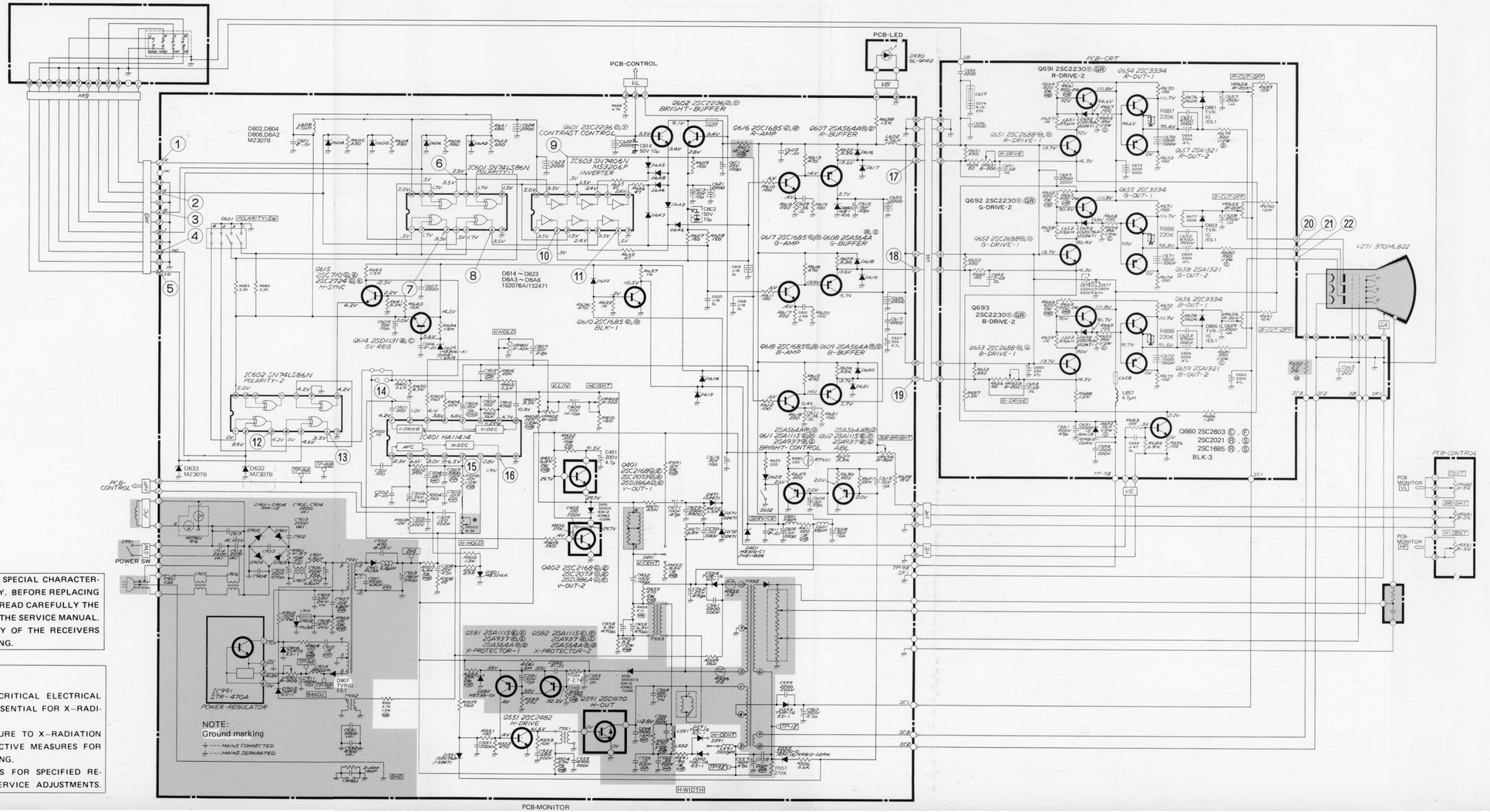
Ref. No.	Description	R/S Part No.	Mfr's Part No.
1	Knob, Control	AK5454	734D01001
2	Cabinet, Front	AZ7025	700A14003
2-1	Badge	AHC3007	716D17301
3	Cabinet, Back	AZ7024	700A14102
3-1	Name Plate	AHC3006	775C14701
3-2	Label, Serviceman Warning		851D83401
3-3	Label, Fuse Replacement		853D71901
4	Door Ass'y, Control	ADB0456	702C40500
4-1	Label, Door	AHC3009	712D62002
5	Terminal Board		440C09501
6	Eyelet, Flyback Trans		679D02201
7	Sleeve Glass (Heat Insulation)		640H30909
8	Pedestal, Steel		770C03201
9	Wedge, Picture Tube	AHC3008	641D36501 or *641D33809
10	Heat Sink, Video Transistor		594D69501
11	Socket, CRT	AJ7448	449C03102
12	Plate, Power Transistor		592D83001
13	Insulator, Power IC		221D00901
14	Heat Sink, Power Transistor		593D72601
15	Lug, Terminal		443D00403
16	Bush, Power Transistor		224D19701
17	Insulator, Horizontal Transistor		221D01301
18	Bush, Horizontal Transistor		224D19201
19	Plate, Horizontal Transistor		593D23201
20	Heat Sink, Deflection Transistor		590B86101
21	Spacer (36x20x0.3t)	AHC3005	221D00801
22	Holder, Vertical Transistor		592D19001
23	Washer, Spring (3ø)	AHD8803	680P23001
24	Holder, Capacitor		592C02202
25	Holder, Power Switch		594D81101
26	Button, Power Switch	AK5453	641D75101
27	Washer, Picture Tube 20mm (DIA) x 1t	AHD8804	550D07905
28	Frame, Right of PCB Monitor		591C47901
29	Frame, Rear of PCB Monitor		591C93001
30	Holder, Fuse	AF1235	442D08601
31	Clamper, Lead (on PCB Monitor) Size: 35mm		540D12401
32	Clamper, Lead (on PCB Monitor) Size: 56mm		540D03601
33	Clamper, AC Cord		641C39201
34	Holdr, Power Cord Clamper		594D88801
35	Clamper, Lead (on PCB Monitor) Size: 84mm		540D12101
36	Clamper, Lead Fastener Type		641D45201
39	Spring, Coil, Extension Ground		570D00401
40	Wire Ground		920C80203
41	Screw 5 x 32, Tap, Pan	AHD2672	657P50302
42	Screw 3 x 0.5 – 12, Machine, Pan	HD2063	650P30102
43	Screw 3 x 8, Taptight, Brazier	AHD2669	669D22002
44	Screw 3 x 0.5 – 12, Sems, Pan	AHD2668	669D12901
45	Screw 3 x 1.6, Taptight, Brazier	AHD2670	669D22006
46	Screw 4 x 16, Taptight, Brazier		669D22106
47	Screw 3 x 0.5 – 6, Sems, Pan		669D10409
48	Screw 3 x 0.5 – 20, Sems, Pan		669D10406
49	Screw 3 x 0.5 – 5, Machine, Pan	AHD2673	650P30005
50	Screw 3 x 10, Tapptight, Brazier	AHD2674	669D22003
51	Clamper, Lead (on PCB Monitor) Size: 38mm		540D08501
52	Clamper, Lead Size: 31mm		540D11101
53	Sleeve, PVC (AC Cord Insulation)		501H159Z9
54	Eyelet, Power Trans		679D02202
55	Clamper, pedestal Size: 8mm		540D13601
56	Clamper, lead (on PCB Monitor) Size: 33mm		540D08401
57	Label, Warning		853D43401
58	Washer, Ring, Picture Tube	AHD8815	683D01203
59	Washer, Steel, Picture Tube	AHD8816	683D02202
60	Band, AC Cord		641D12901
61	Screw, Tap, Hexagonal	AHD2719	669D24402
62	Spacer, Industrial Laminate 6.2 x 40 x 2t		640D49101
63	Washer, Gum, Picture tube	AHD8818	550D07903
64	Hook, Anode Lead	AHC3034	540D08201
65	Label, Serviceman Warning (On PCB CRT)		853D76701
151	Tube Picture 370MLB22E	AXX8394	251P20701
152	Magnet, Purity & Convergence	ART5110	338P01701
153	Coil Degaussing	ACA8307	409B02007
154	Deflection Yoke	ATA1035	330P08504
155	Magnet, Convergence Correction	ART5111	461D01701
–	Hardware kit	AHW2605112	669D24301

CONNECTORS

101	Connector, Lead, Power Switch	AJ7452	242B87907
102	Connector, Lead, Female 8Pin	AJ7447	242C82201
103	Connector, Lead, Female 3Pin	AJ7451	242B95203
104	Connector, Lead, Female 3Pin	AJ7450	242B95204
105	Connector, Lead, Female 3Pin		246B01003
106	Connector, Lead, Female 3Pin	AJ7449	242B95202
107	AC Cord	AW3124	242C79302
108	Connector, Male-3Pin	AJ7444	452D10903
109	Connector, Male-8Pin	AJ7445	452D10909
110	Connector, Male-11Pin	AJ7446	452D11002
111	Pin-GT	AHC3004	452D03101
112	Terminal Lead, Ground (90mm)		242C91907
113	Connector, Lead, Female 11Pin		246B01004
114	Connector, Lead, Female 3Pin	AJ7492	246B01002
115	Terminal Lead, Ground (60mm)	AHC3026	242C92108
116	Cable, Ground	AW3139	242C92303
–	Cable, Extension to computer		242C81401

P.C. BOARD ASS'Y

201	P.C. Board Ass'y, Monitor	AX9389	920A17301
202	P.C. Board Ass'y, CRT	AX9390	920B78701
203	P.C. Board Ass'y, Control	AX9392	920C81101
(204)	P.C. Board Ass'y, LED (Separated from P.C.B. Ass'y Control)	AX9391	920D06102



SCHEMATIC DIAGRAM

MODEL : CM-1

NOTE 1:

1. The unit of resistance "ohm" no symbol.
   Accordingly, K = 1000 ohms
   M = 1000K ohms.
2. The wattage of resistor, if not specifically designated, is less than 1/4 watt.
3. Resistors, if not specifically designated, are carbon resistors.
4. The marks of resistors are as follows:
   - (CE) : Cemented resistor
   - (MB) : Metal oxide film resistor (type B)
   - (MPC) : Metal plate cement resistor.
   - (S) : Fixed composition resistor
   - (W) : Wire wound resistor
   - (M) : Metal film resistor
5. The tolerance of resistor value, if not specifically designated, is: J =±5%, K = ±10% m = ±20%
6. The unit of capacitance, if not specifically designated, is:
   a) μF, for numbers less than 1
   b) PF, for numbers more than 1
7. Capacitors, if not specifically designated are Ceramic capacitors except electrolytic capacitors.
8. The marks of capacitors are as follows:
   - (ALM) : Aluminus electrolytic capacitor
   - (MF) : Polyester capacitor
   - (PP) : Polypropylene film capacitor
   - (TAN) : Tantalum capacitor
   - (TF) : Twin film capacitor.
   - (MF.PP) : Polyester polypropylene film capacitor.
   - (MPP) : Metallize plastic film capacitor.
   - (NP) : Non polarized electrolytic capacitor.
   - : Electrolytic capacitor
9. The DC working voltage of capacitor, if not specifically designated is: 50V
10. The tolerance of capacitor value, if not specifically designated is: ±10% for polyester capacitor
    ±5% for ceramic capacitor
    and J =±5% K =±10% M =±20% P = +100% −0%
    C =±0.25PF D = ±0.5PF F =±1PF Z = +80% −20%

SPECIFIC SYMBOL

Zener Diode	Varistor
Varicap	Crystal unit
Posistor	Air Gap
Thermistor	Part (resistor) attached on the copper-foil side of PCB
Fusible Resistor	Ceramic filter

NOTE 2:

1. **DC voltages were measured from points indicated to the circuit ground with a VTVM.**
   Line voltage at 120V AC on signal applied.
2. **Number in circle indicates waveform number.**
3. **This is a basic schematic diagram. Some sets may be subject to modification according to engineering improvement.**

* On completion of adjustment, mash the screw driver slot by the hot melting.

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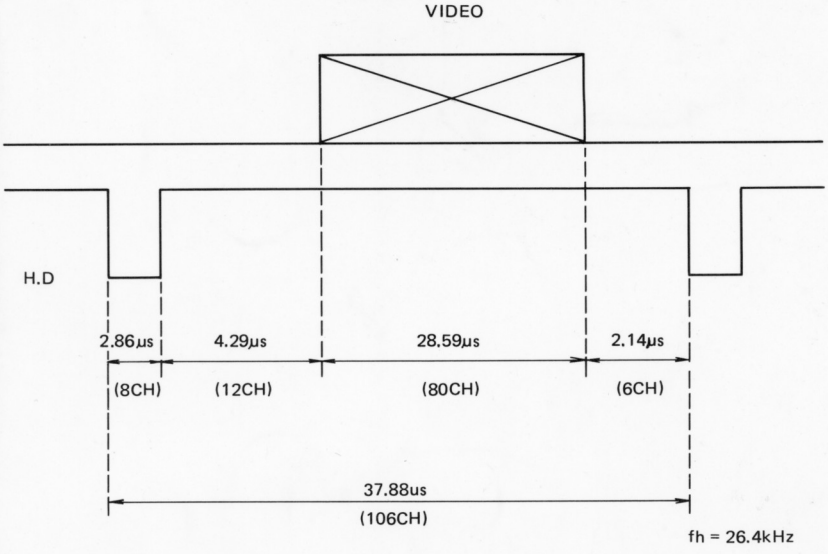
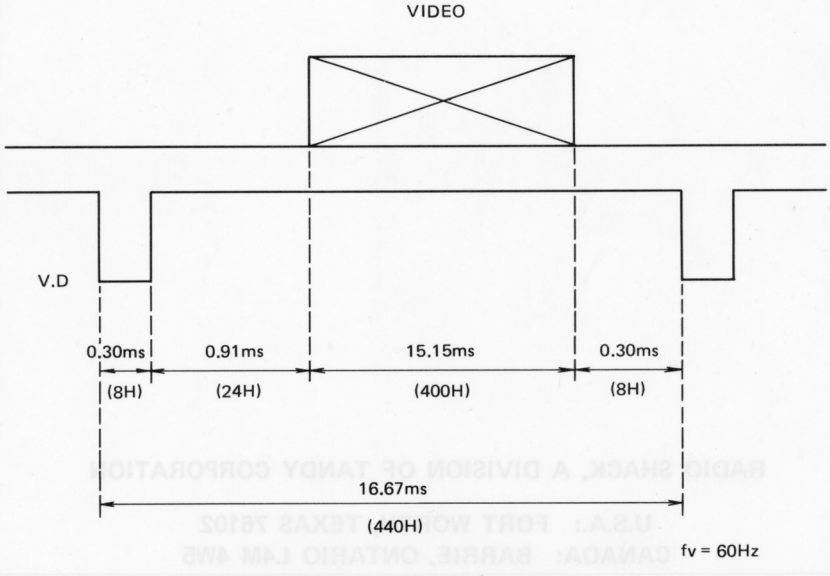
TIMING CHART

1) HORIZONTAL



2) VERTICAL



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