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 5.

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 power 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 1, 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 5 milliampere for USA, but in Europe, the current is limited less than 7.5 milliampere.

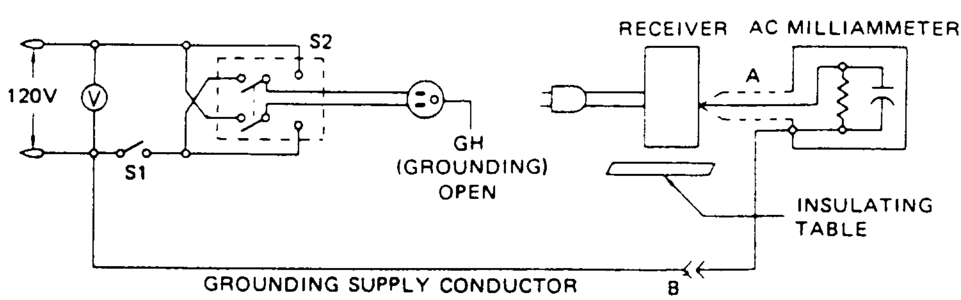


Figure 1

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in a 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.

SPECIFICATIONS

Description		Nominal	Limit
1	Power input	AC 100V ~240V–50/60Hz (AT-1332A–AC120V, 60Hz)	
2	Power consumption		70W Max.
3	Input signal		
	a) R.G.B. Video	R.G.B. Separate T.T.L. Level, Positive	
	b) Synchronous	T.T.L. Level Positive	
	c) Intensity	T.T.L. Level, Positive	
4	Resolution		
	a) Horizontal	640 dots	
	b) Vertical	200 lines	
5	Display size	256(W) x 178(H) mm	
6	Retrace time		
	a) Horizontal		12.0μs Max.
	b) Vertical		1.0 ms Max.
7	Display color	16 colors	
8	High voltage	22.5 kV/0.5mA	22.5 ± 1 kV/0.5mA
9	Picture linearity		
	a) Horizontal		10% Max.
	b) Vertical		10% Max.
10	Synchronous (Pull in range)		
	a) Horizontal		15.70 ± 0.2 kHz
	b) Vertical		59.81 ± 3 Hz

THEORY OF OPERATION

1. RGB Drive Circuit

The RGB input signal with positive polarity is applied to the inverter IC201 and output by IC201 in the negative polarity. The signal is inverted to the positive polarity. by IC202 and applied to the base of RGB-Drive transistors Q6R1, Q6G1 and Q6B1.
The bias of RGB-Amp transistors are adjustable by BRIGHTNESS control (VR-291) and SUB-BRIGHT volume (VR201) connected to the base of BRIGHT control transistor Q203.
When the intensity signal is of negative polarity, the transistor Q201 is turned to OFF and the contrast can be adjusted by the CONTRAST control (VR-292).

2. RGB Beam Current Limiting Circuit

If the beam current increases, the cathode side of D505 will drop. So the base bias of Q204 will drop and the collector current will increase. As the result, the base voltages of Q203 decrease to limit the increase of the CRT current.
If the beam current reduces, the base voltage of Q203 increases to limit the reduction of beam currrent. In other words, the brightness of picture is maintained at a constant level.

3. RGB Output Circuit

The RGB signal is applied to the base of the RGB Output transistors Q6R2, Q6G2 and Q6B2 through the RGB Drive transistors Q6R1, Q6G1 and Q6B1. Since the circuit is connected to the CRT, the structure is so designed to accept adjustment of RGB-Cutoff volume VR6R2, VR6G2 and VR6B2.
Correct white balance is obtained by adjusting RB-Drive volume VR6R1 and VR6B1. Blanking pulse is applied to the emitter of Q6R2, Q6G2 and Q6B2 through Blanking-1, -2 and -3 transistors Q403, Q601 and Q602.

4. Vertical Deflection Circuit

The vertical sync. signal with positive polarity is applied to pin ⑪ of the vertical and horizontal IC (IC401).
Pin ⑩ of IC401 is connected to the vertical oscillator circuit and the frequency of the oscillator can be controlled by the voltage of pin ⑩ which can be varied by V.HOLD Volume (VR404).
The oscillator output is fed to the vertical drive circuit and its output derived from pin ⑦ 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 ⑧ 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 ⑭ of IC401 through IC202.
The saw-tooth wave of horizontal frequency is produced by integrating the horizontal pulse from FBT (T503), and is fed to pin ① of IC401 for AFC. The phase of horizontal saw-tooth wave is compared with that of horizontal sync. signal from pin ⑭ at AFC circuit inside the IC401.
H. PHASE control (VR501) determines the relative position of raster and picture.
The horizontal oscillation frequency can be controlled by H. HOLD Volume VR502 connected to pin ③.
The horizontal frequency oscillated is obtained from pin ④ 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 deflection coil and, at the same time, pulses for blanking, for CRT heater voltage and for D.C. voltages, are generated in the flyback transformer (T503).

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;

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

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.

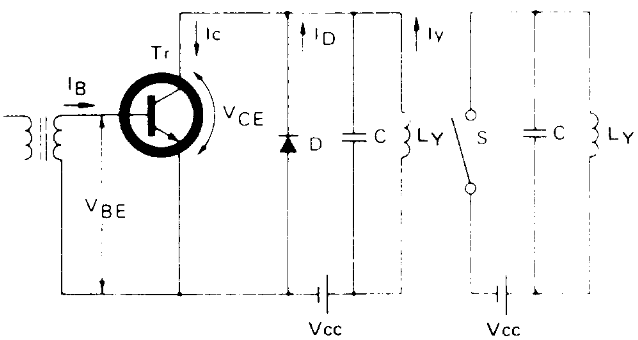


Figure A Figure B

Horizontal Output Circuit

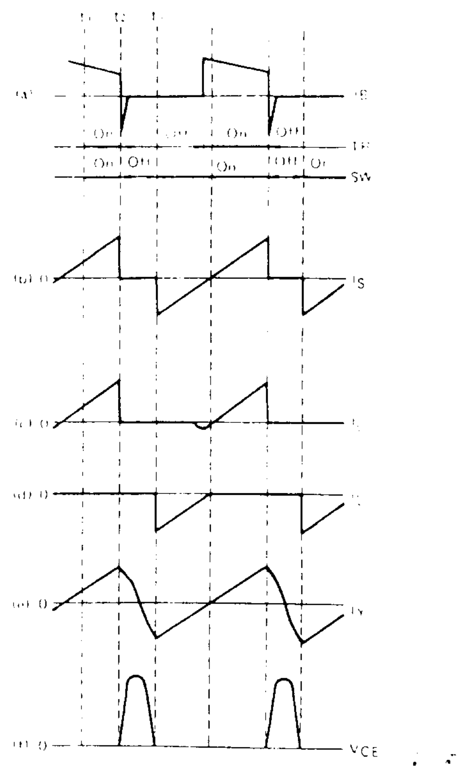


Figure C

Waveform in Horizontal Output Circuit

7. **High Voltage Hold-Down Circuit**

If a failure occurs which causes an increase in high voltage (such as an opened sweep capacitor or failed power regulator), then the pin ⑤ voltage of IC401 will increase through FBT (T503).
When this happens, the oscillator signal coming from IC401 through R508 can no longer drive Q501, turning off the high voltage. Therefore, to restart the oscillator and the high voltage, the television set must be turned off and then turned on again.

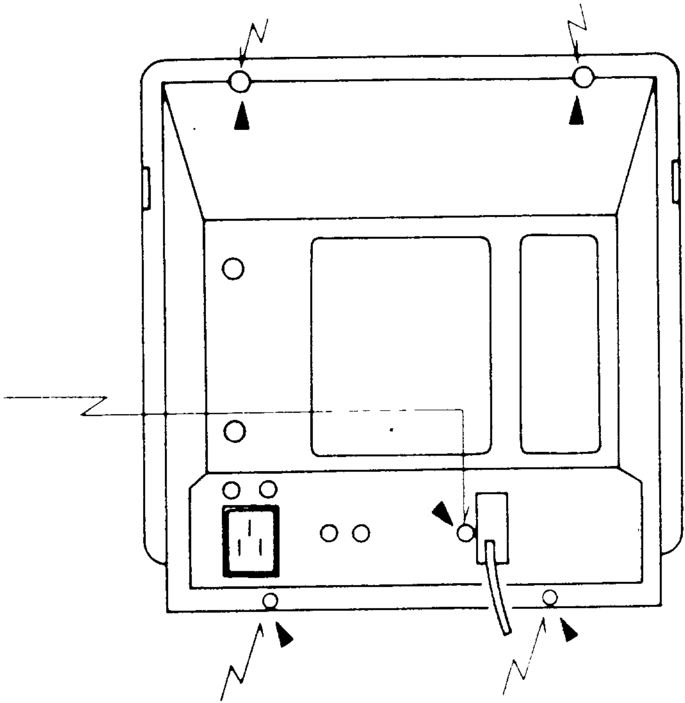
8. **Power Source Circuit**

The chassis (secondary side) is insulated from the power source (primary side) by the 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 IC (IC991) is submitted to positive feed back and operates as a blocking oscillator.
The operating freqeuncy is determined in around 16 to 20 KHz by the primary winding of T931. Changes in the power source voltage and in the load current are detected by the winding and the voltage is applied to pin ④ of IC991.
When the voltage applied to pin ④ 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**

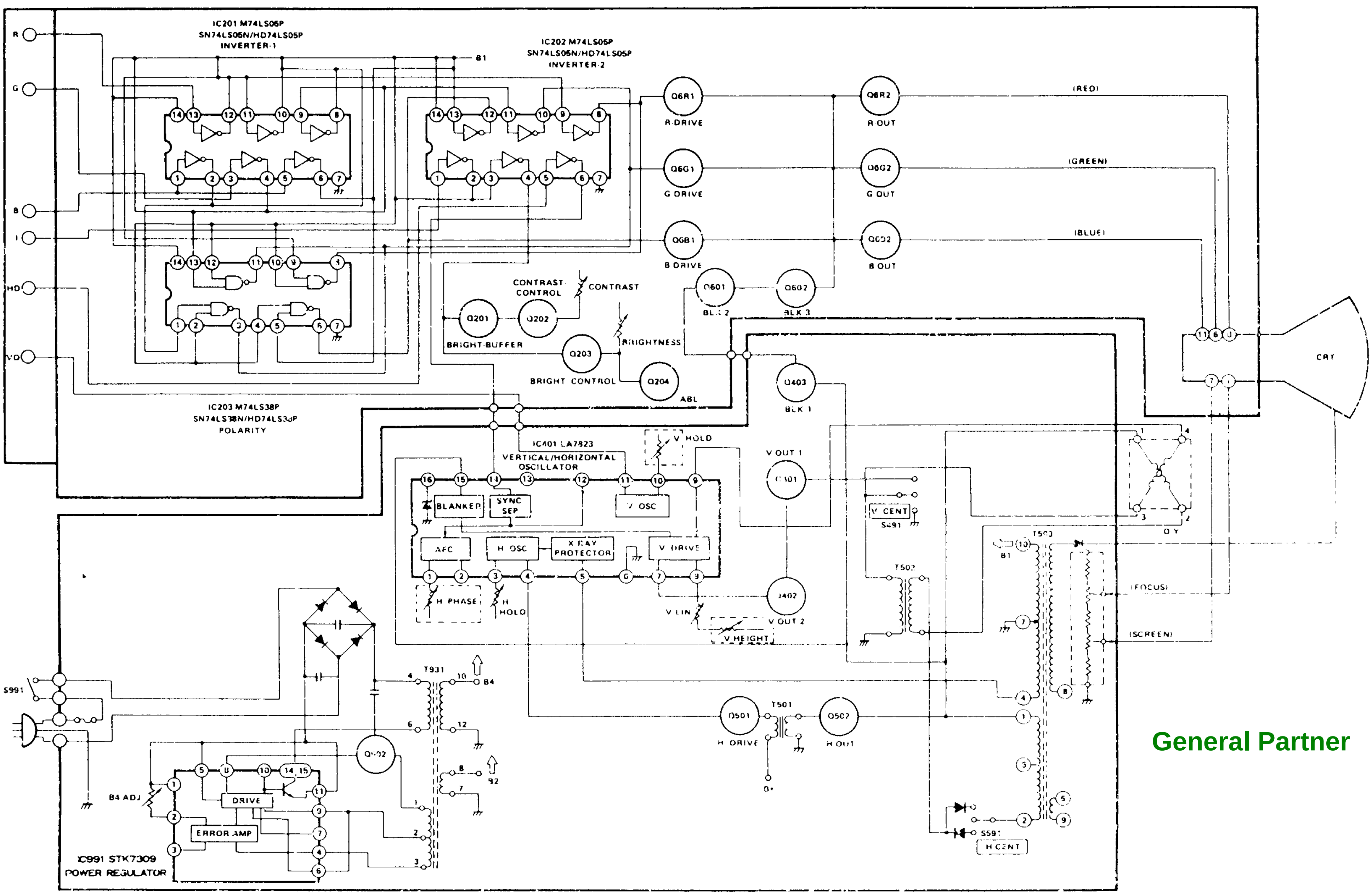
I	R	G	B	COLOR
0	0	0	0	BLACK
0	0	0	1	BLUE
0	0	1	0	GREEN
0	0	1	1	CYAN
0	1	0	0	RED
0	1	0	1	MAGENTA
0	1	1	0	BROWN
0	1	1	1	GRAY 1 (BRIGHT)
1	0	0	0	GRAY 2
1	0	0	1	LIGHT BLUE
1	0	1	0	LIGHT GREEN
1	0	1	1	LIGHT CYAN
1	1	0	0	LIGHT RED (PINK)
1	1	0	1	LIGHT MAGENTA
1	1	1	0	YELLOW
1	1	1	1	WHITE

DISASSEMBLY INSTRUCTIONS

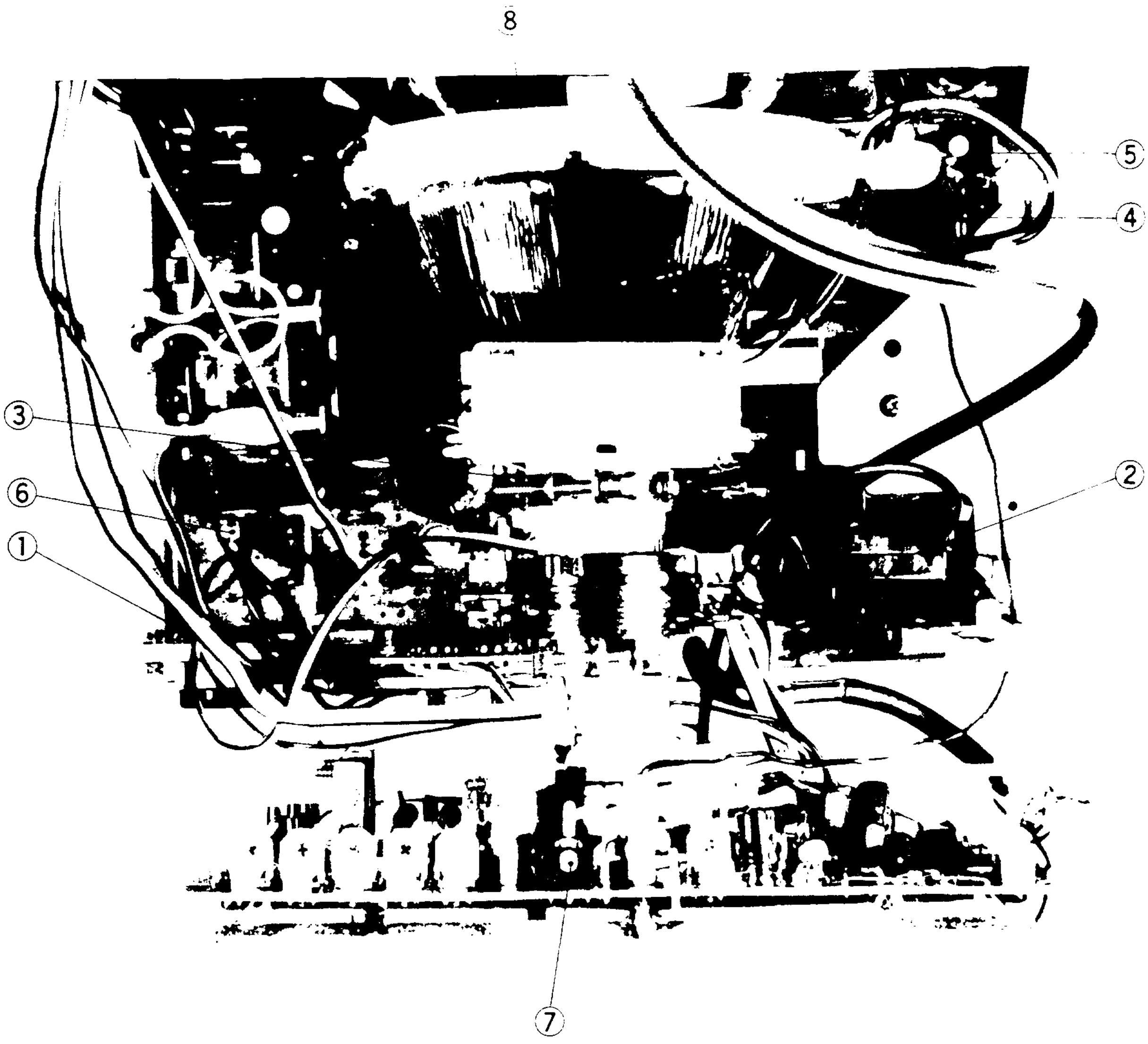


NOTE: Remove only the screws marked with an arrow.

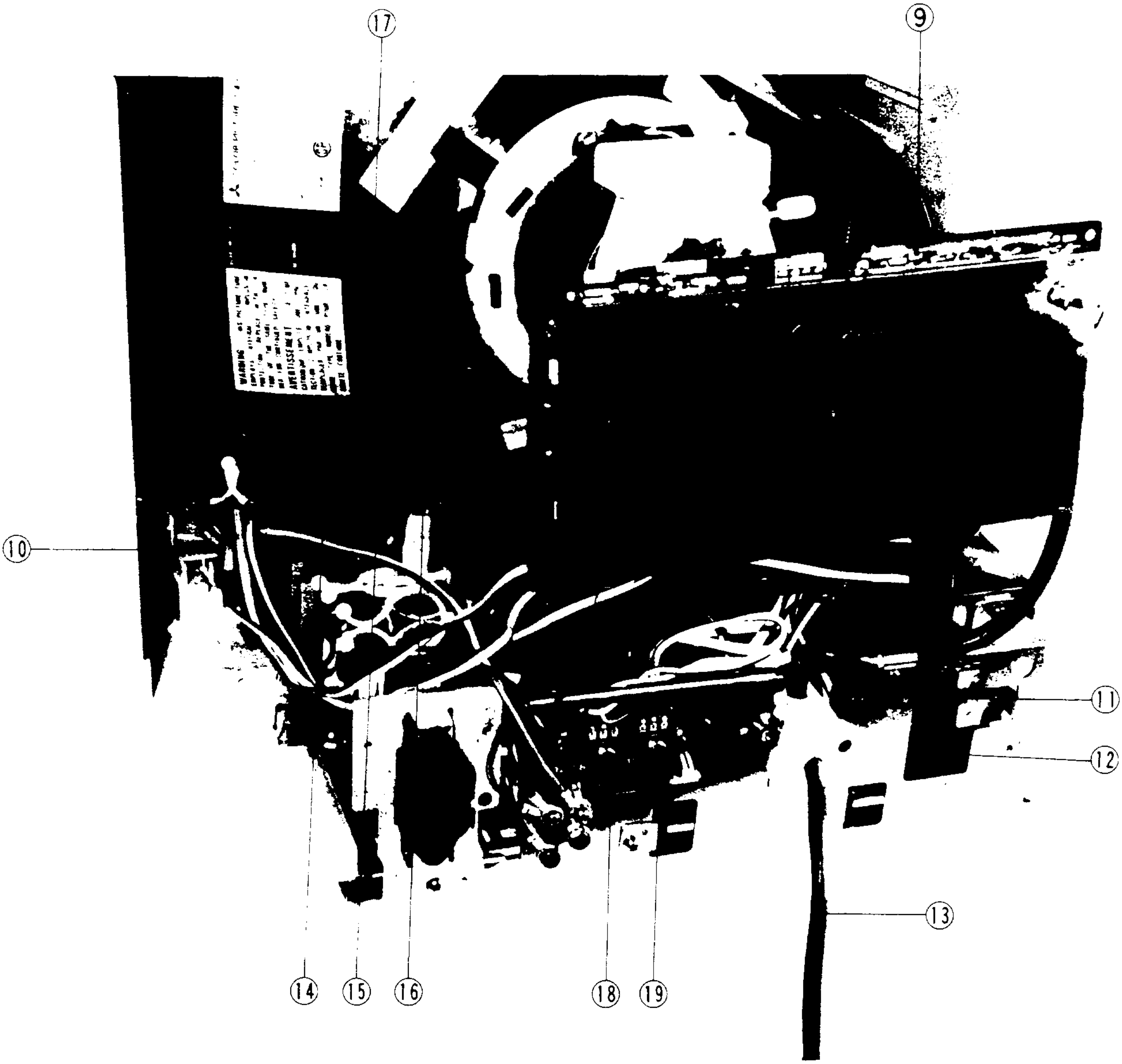
BLOCK DIAGRAM



PARTS LOCATION



①	DISPLAY P.C. BOARD	⑤	H. CENTER SWITCH
②	FLYBACK TRANSFORMER	⑥	FUSE, 3.15A
③	POWER TRANSFORMER	⑦	SERVICE SWITCH
④	V.CENTER SWITCH	⑧	DEFLECTION YOKE



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. PHASE CONTROL
17 CRT
18 V. HEIGHT
19 V. HOLD

ALIGNMENT INSTRUCTIONS

1. General

(1) Supply Voltage: Nominal voltage

(2) Signal: R.G.B. (Positive, Default), HD, VD (Positive, Default), Intensity (Positive, Default)
fH = 15.70 KHz, fV = 59.81 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 (VR292, VR241) 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 points TP-9Z (+) on the DISPLAY PCE chassis ground (−).

(5) Adjust B4-ADJ volume (VR901) on the DISPLAY PCB for a 115 ± 1V reading on the meter.

3. Horizontal Deflection Circuit Adjustment

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 si until the picture almost becomes still (synchronized).

(4) Release short circuit (2) above.

3.2 Horizontal Position Adjustment

(1) Receive a border pattern signal.

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

Notes: 1. This adjustment should be done after ITC adjustment.
2. During this adjustment, H. PHASE control (VR591) should be at the mid-position.

3.3 Horizontal Width Adjustment

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

(2) Set CONTRAST and BRIGHTNESS controls (VR292, VR291) at their maximum positions.

(3) Adjust H.WIDTH control (L552) so that a white pattern width becomes 256 ± 8 mm.

4. Vertical Deflection Circuit Alignment

4.1 Vertical Oscillation Circuit Adjustment

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

(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 bec (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 gray-1 pattern signal.

(2) Adjust HEIGHT volume (VR403) so that the height of the pattern becomes 178 ± 5 mm.

4.4 Vertical Position Adjustment

(1) Receive a border pattern signal.

(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 (VR6R2, VR6G2, VR6B2) and SCREEN control counterclockwise as far as they will go.

(3) Set DRIVE volume (VR6R1, VR6B1) at the mechanical center.

(4) Set CONTRAST AND BRIGHTNESS controls (VR292, VR291) at their maximum positions.

(5) Set the SERVICE switch (S691) to the service position.

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

(7) Adjust CUTOFF volume (VR6R2, VR6G2, VR6B2) of not appearing R,G or B so that a white horizontal line shines slightly.

(8) Set the SERVICE switch (S691) back to its normal position.

(9) Adjust DRIVE volume (VR6R1, VR6B1) for standard white. If necessary, a color analyzer may be used.

(10) Turn the CONTRAST and BRIGHTNESS controls (VR292, VR291) to its maximum position.

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

(12) Adjust SUB-BRIGHT volume (VR201) so that the ammeter reads 550 ± 20uA.

6. Focus Adjustment

(1) Receive a characters pattern signal.

(2) Set CONTRAST and BRIGHTNESS controls (VR292, VR291) 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 (VR201) 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

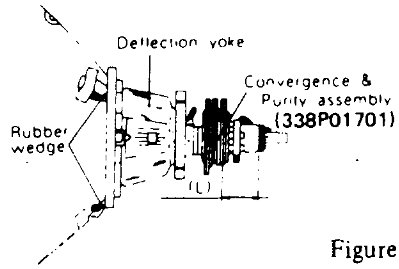
(1) Remove the deflection yoke and the rubber wedges from the picture tube cone, taking care not to strike or scratch the cone surface.

(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 36 mm (1-7/16 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.



	(L)
370MLB22E 370MLB22-DE	36mm(1-7/16inches)

Figure 1

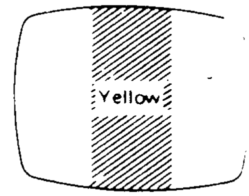


Figure 2

B) Preliminary Adjustment

1. Purity

(1) Produce a yellow raster by short-circuiting the base and emitter of Q6B2 (B-OUT) with a sho lead. (Another method; Primary color pattern signal can be generated by compatible computer

(2) With the deflection yoke positioned fully forward, adjust the purity magnet so that the yellow b: 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 ol served for each color.
To produce a red raster, short-circuit the base and emitter Q6G2 (G-OUT) and Q6B2 (B-OUT with two short leads. To produce green and blue primary colors, short-circuit the base and emitt of Q6R2 (R-OUT) and Q6B2 , or Q6R2 and Q6G2, with two short leads.
Temporarily fasten the deflection yoke.

2. Static Convergence

(1) Set the CONTRAST control (VR292) to its minimum position (fully counterclockwise). If nece sary, adjust the BRIGHTNESS control (VR291).

(2) Adjust the two 4-pole magnets to converge red and blue vertical and horizontal lines at the center c 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 Q6B2 (B-OUT) with a sho lead.

(2) Loosen the deflection yoke screw and move it forward. Make certain that the yellow bar is at th 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 primar 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 (VR292) to minimum. If necessary, adjust the BRIGHTNESS contrc (VR291).

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

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.

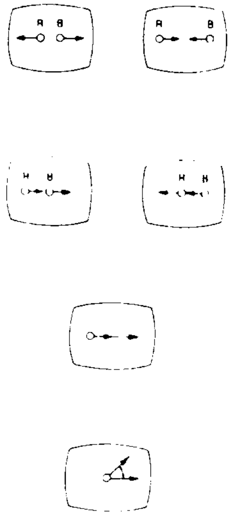


Figure 3

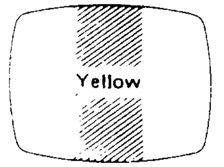


Figure 4

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 Q6R2, Q6G2 and Q6B2. 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.

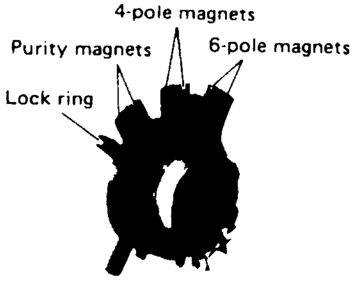


Figure 5

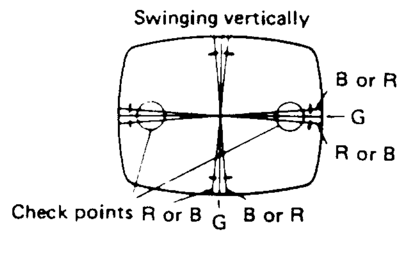


Figure 6

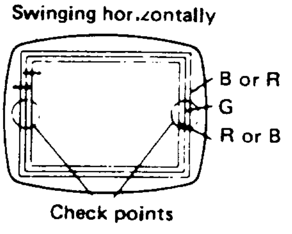


Figure 7

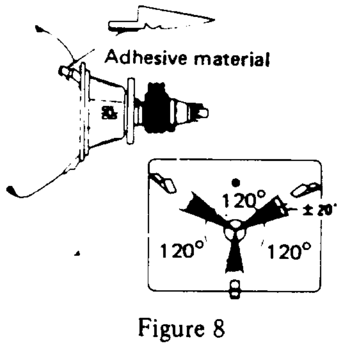
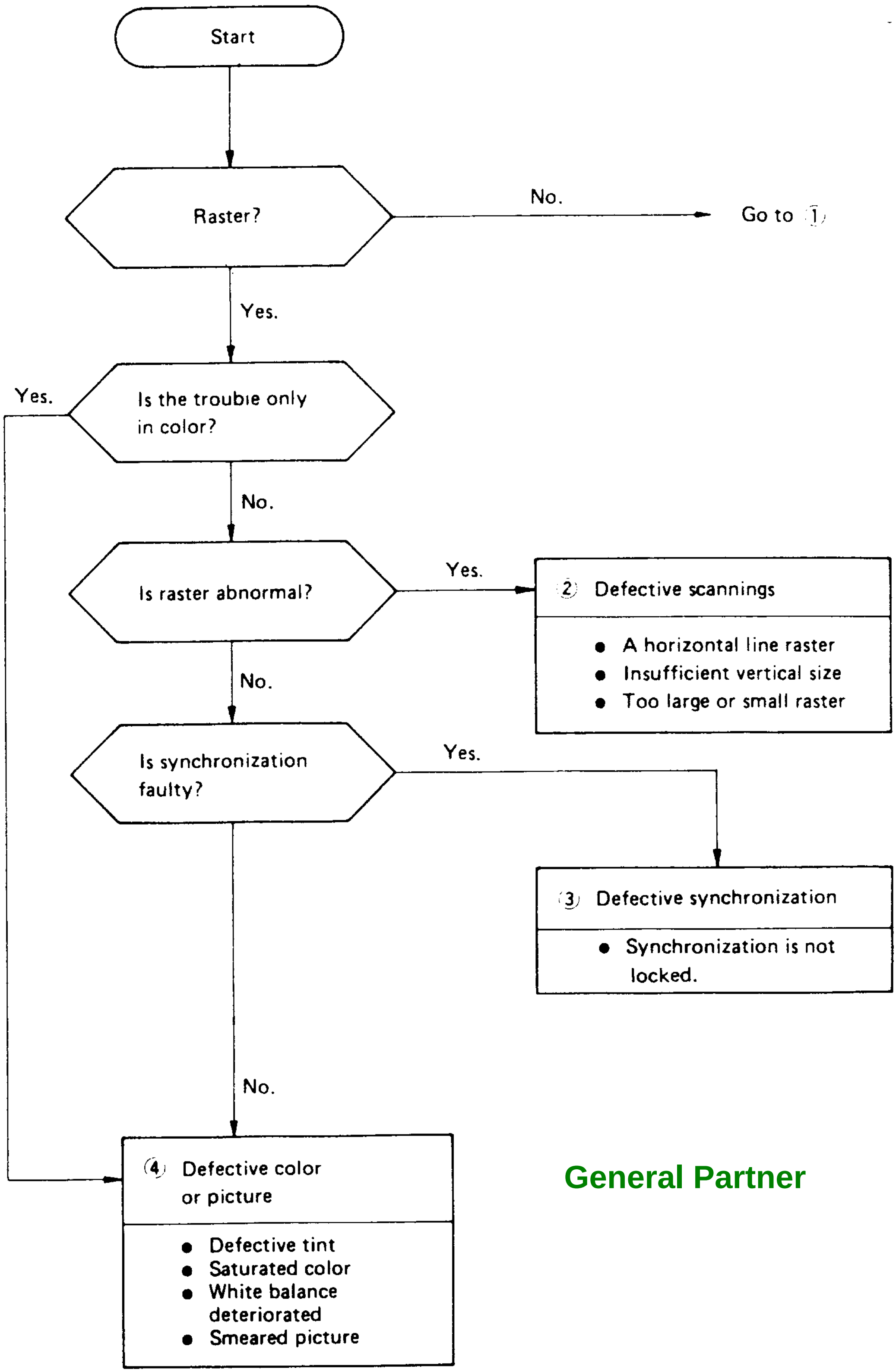
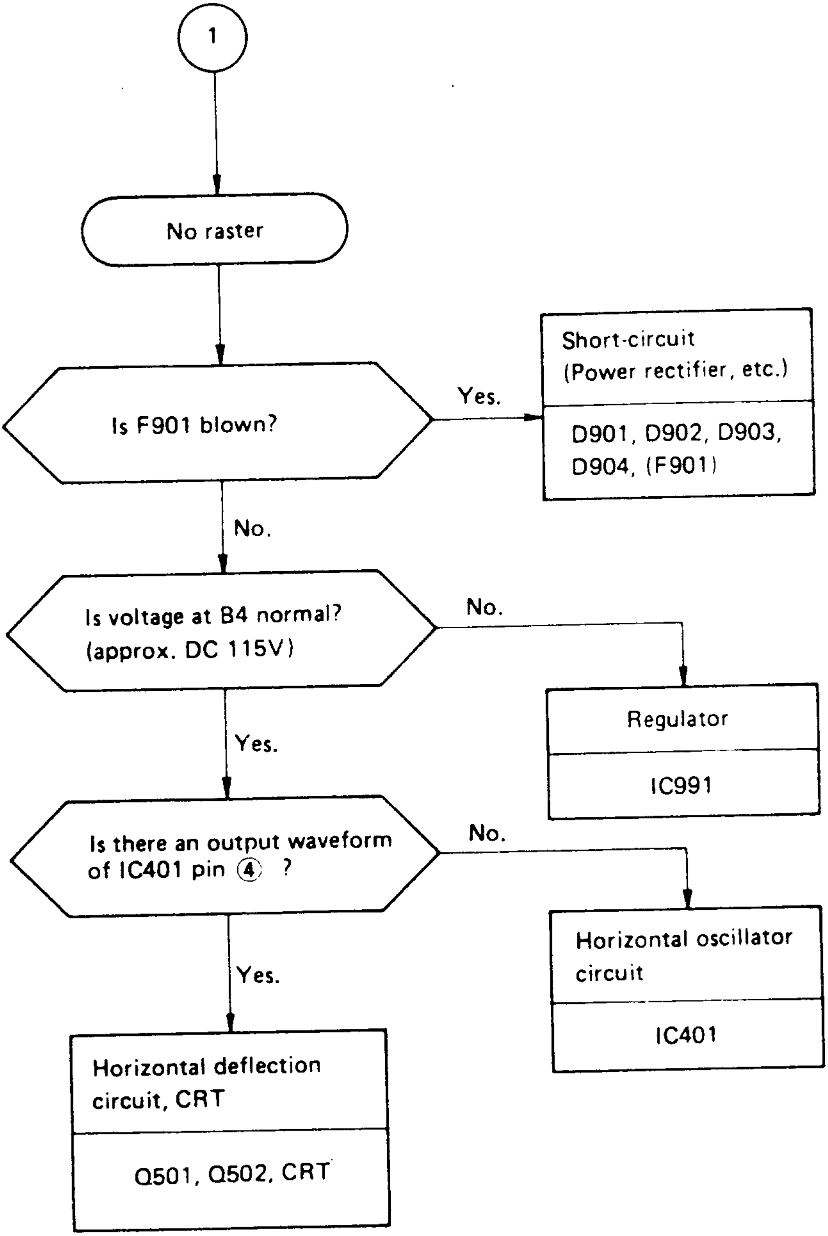
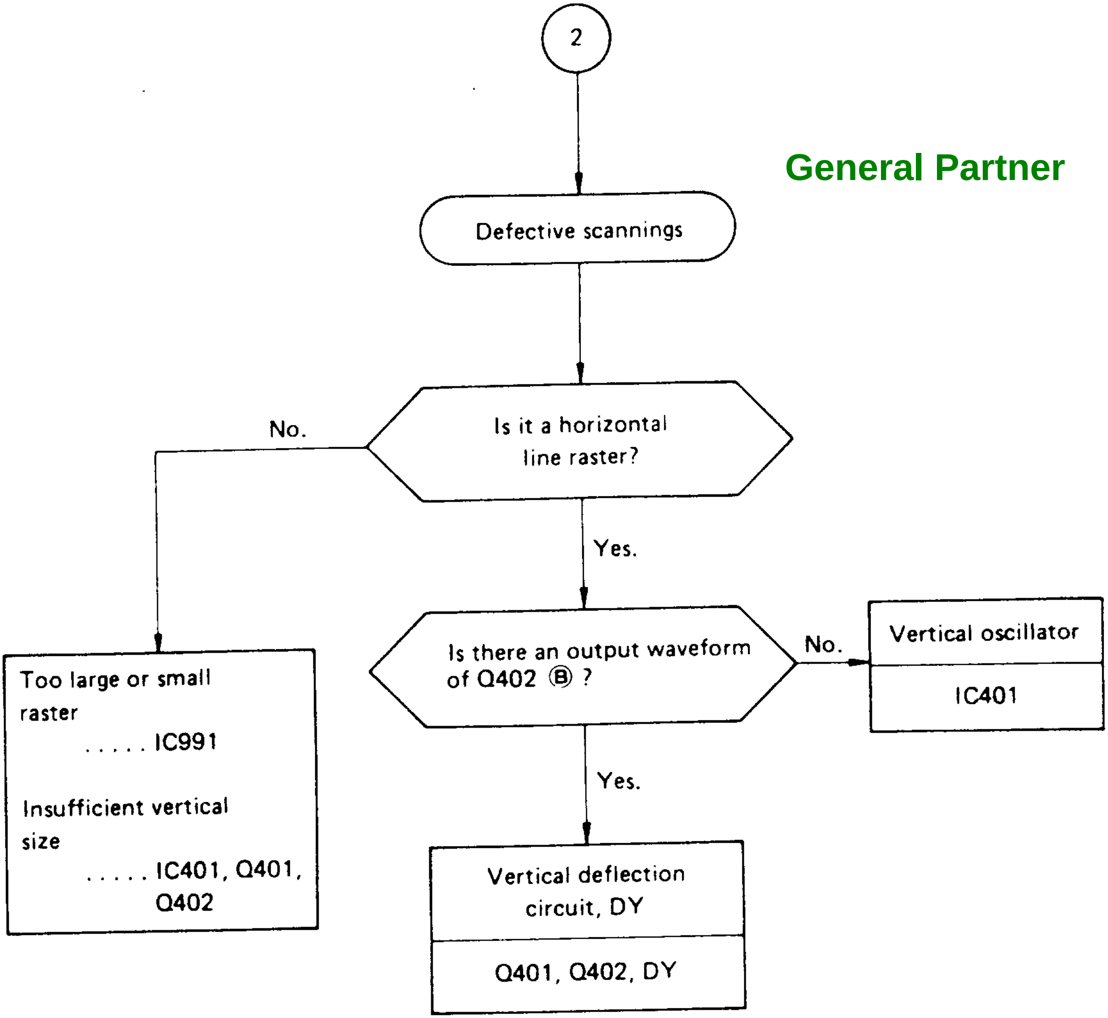
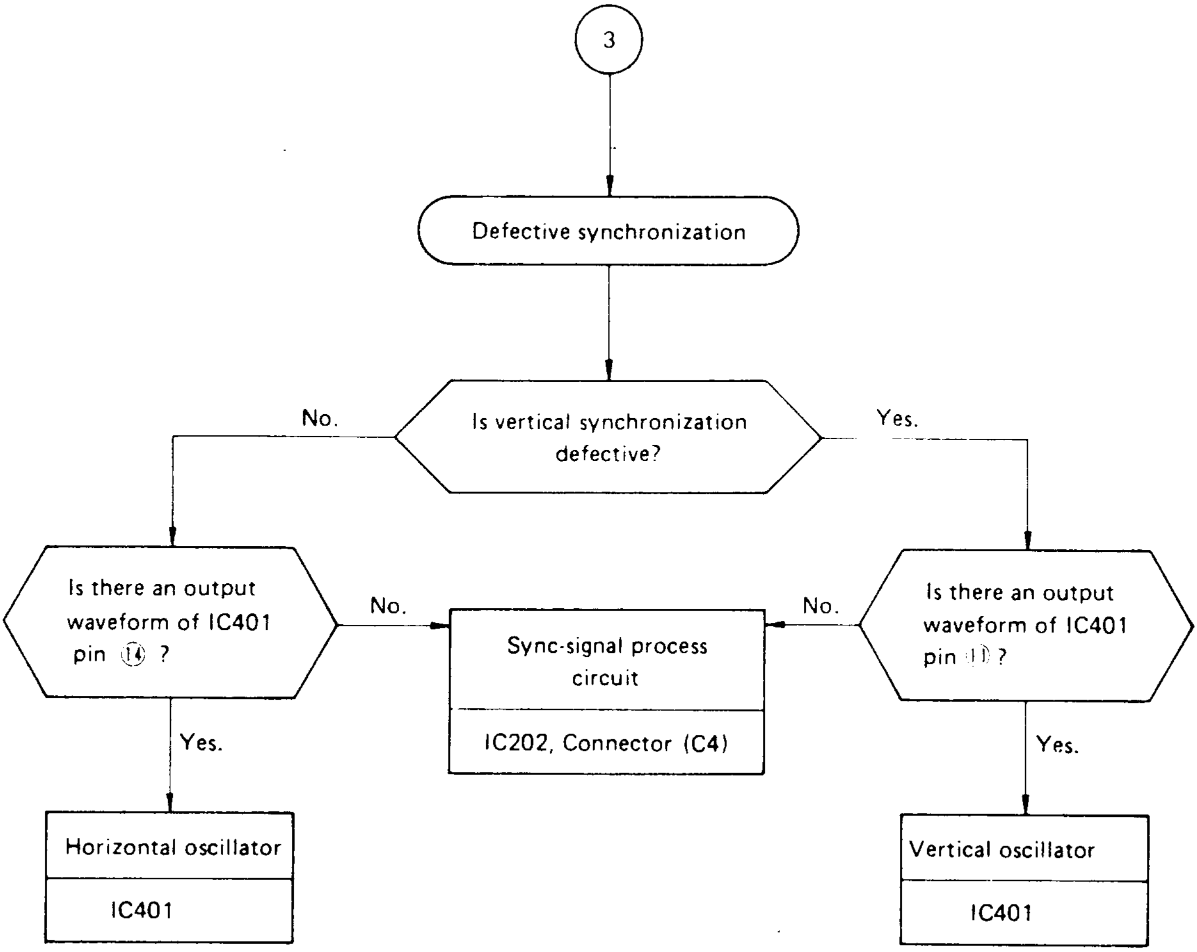


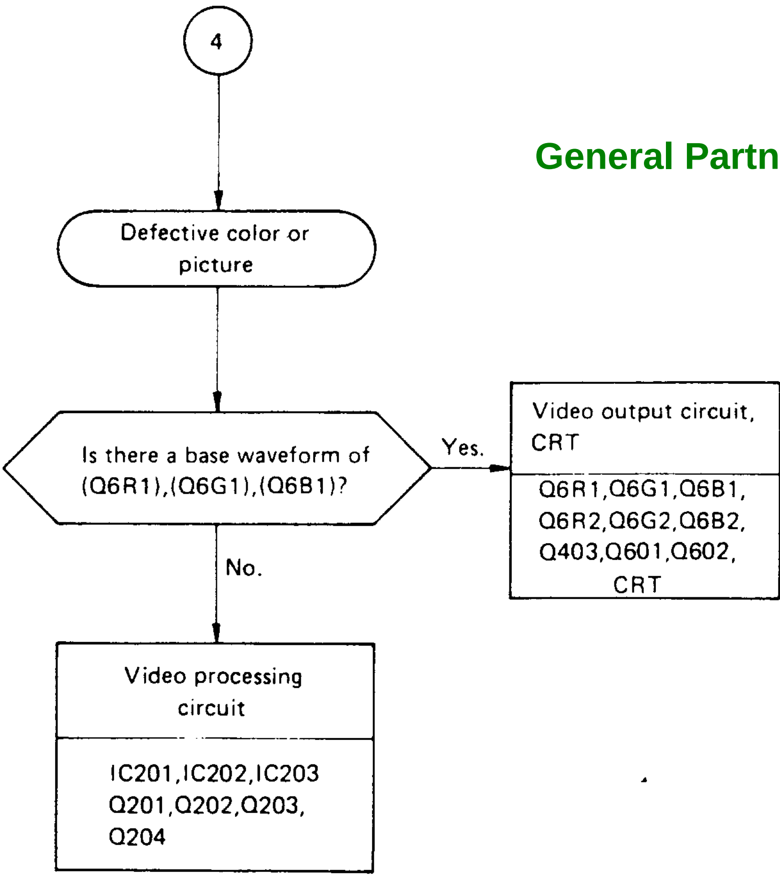
Figure 8


Start
Raster?
No.
Go to ①
Yes.
Is the trouble only in color?
Yes.
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

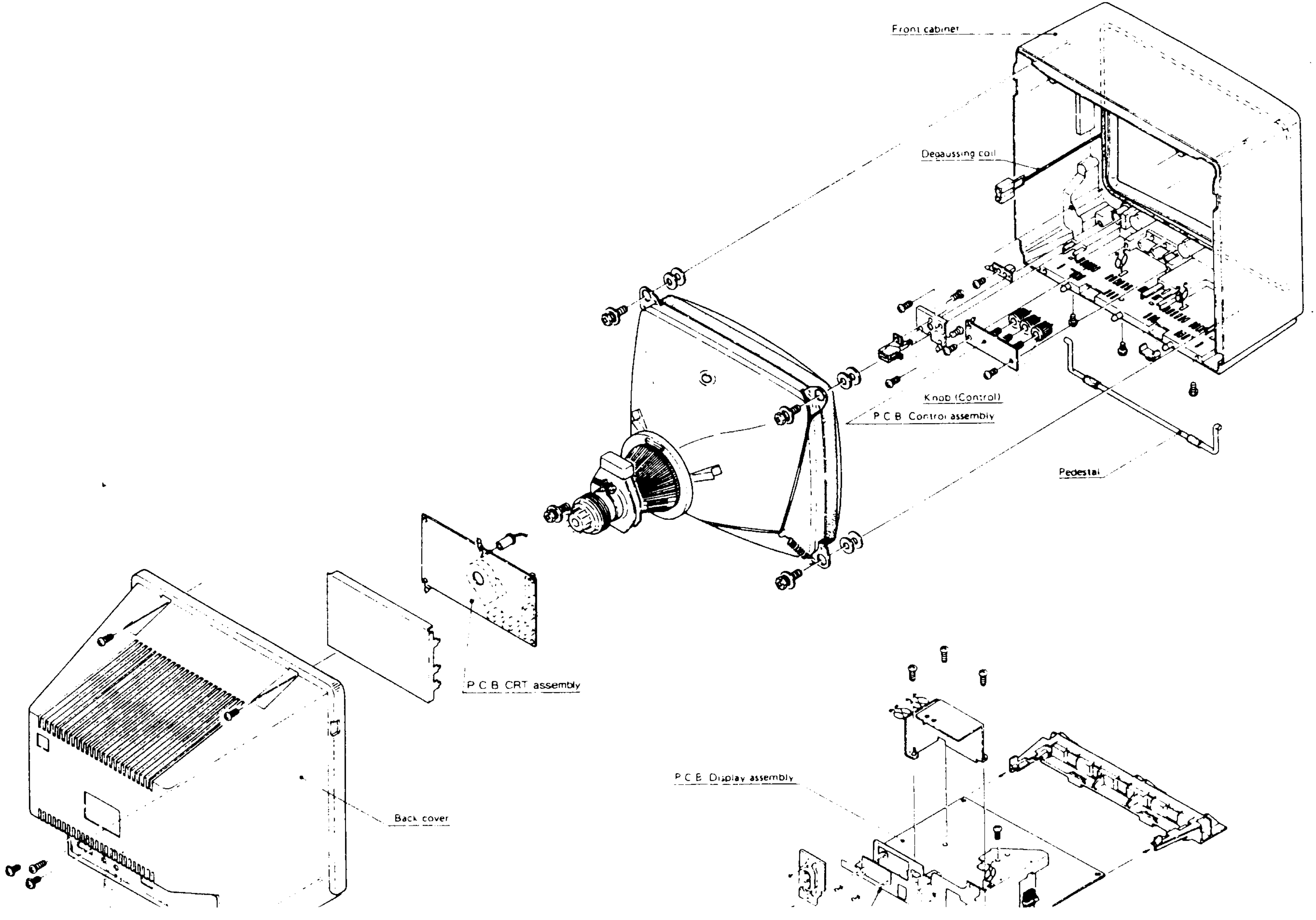

1
No raster
Is F901 blown?
Yes.
Short-circuit
(Power rectifier, etc.)
D901, D902, D903,
D904, (F901)
No.
Is voltage at B4 normal?
(approx. DC 115V)
No.
Regulator
IC991
Yes.
Is there an output waveform
of IC401 pin ④ ?
No.
Horizontal oscillator
circuit
IC401
Yes.
Horizontal deflection
circuit, CRT
Q501, Q502, 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

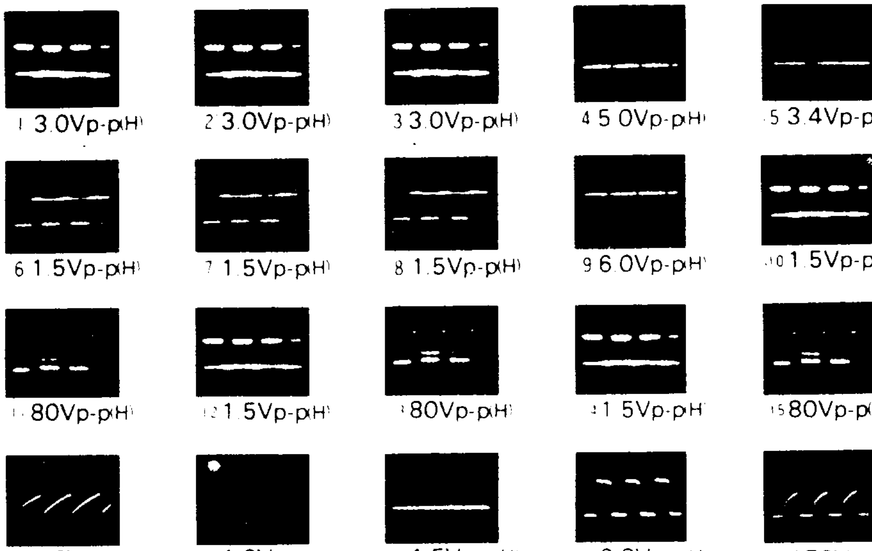

3
Defective synchronization
Is vertical synchronization defective?
No.
Yes.
Is there an output waveform of IC401 pin ⑭ ?
No.
Sync-signal process circuit
IC202, Connector (C4)
No.
Is there an output waveform of IC401 pin ⑪ ?
Yes.
Horizontal oscillator
IC401
Yes.
Vertical oscillator
IC401


4
Defective color or picture
Is there a base waveform of (Q6R1),(Q6G1),(Q6B1)?
Yes.
Video output circuit, CRT
Q6R1,Q6G1,Q6B1, Q6R2,Q6G2,Q6B2, Q403,Q601,Q602, CRT
No.
Video processing circuit
IC201,IC202,IC203 Q201,Q202,Q203, Q204

CABINET EXPLODED VIEW



CHASSIS WAVEFORMS

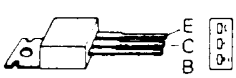
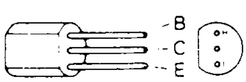
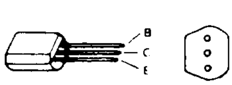


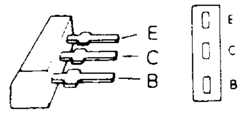
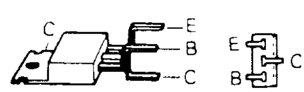
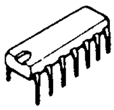
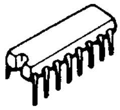
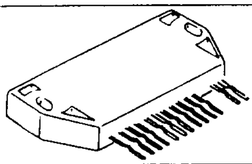
1 3.0Vp-p(H)	2 3.0Vp-p(H)	3 3.0Vp-p(H)	4 5.0Vp-p(H)	5 3.4Vp-p(V)
6 1.5Vp-p(H)	7 1.5Vp-p(H)	8 1.5Vp-p(H)	9 6.0Vp-p(H)	10 1.5Vp-p(H)
11 80Vp-p(H)	12 1.5Vp-p(H)	13 80Vp-p(H)	14 1.5Vp-p(H)	15 80Vp-p(H)
16 4.6Vp-p(H)	17 1.0Vp-p(V)	18 1.5Vp-p(V)	19 0.8Vp-p(H)	20 170Vp-p(H)

Note:
Waveforms were taken with character signal

SEMICONDUCTOR LEAD IDENTIFICATION

Shape of Transistors

Q502		2SD1426
Q401 Q402		2SC2073 2SD1459 2SD401
Q201 Q202 Q203 Q204 Q501 Q601 Q602 Q6B1 Q6G1 Q6R1 Q901		2SC2230 2SC2274 2SC2482 2SA564 2SA673 2SC2236 2SC1213
Q204 Q403 Q601		2SC2603 2SC1685 2SA1115
Q401 Q403		2SC2168 2SD386

Q204 Q403 Q601		2SC2021 2SA937
Q6R2 Q6G2 Q6B2		2SC1507
IC201 IC202 IC203		M74LS05P M74LS38P
IC401		LA7823
IC991		STK7308 STK7309

SERVICE PARTS LIST RM 14Ø4

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	TOLERACE
J	± 5%
K	± 10%
M	± 20%

CAPACITOR

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

SYMBOL NO.	PARTS NO.	DESCRIPTION
	PICTURE TUBE	
	QX251P20701	Picture tube 370MLB22E (AT-1332A)
	〃	〃 〃 (XC-1404C)
	〃	〃 〃 (XC-1404CA)
	QX251P20704	〃 370MLB22-DE (XC-1404CB)
	〃	〃 (XC-1404CC)
	〃	〃 (XC-1404CD)
	TRANSISTORS	
Q201	QX260P41603	2SC2274-F
Q202	〃	〃
Q203	QX260P38701	2SC2236-O.Y
Q204	QX260P25601	2SA1115-E.F
Q401	QX260P42002	2SC2073-B.C
Q402	〃	〃
Q403	QX260P33804	2SC2603-E.F
Q501	QX260P42201	2SC2482
Q502	QX260P44701	2SD1426
Q6B1	QX260P16607	2SA673-C/D
Q6B2	QX260P35401	2SC1507-(1)
Q6G1	QX260P16607	2SA673-C/D
Q6G2	QX260P35401	2SC1507-(1)
Q6R1	QX260P16607	2SA673-C/D
Q6R2	QX260P35401	2SC1507-(1)
Q601	QX260P25601	2SA1115-E.F
Q602	QX260P41603	2SC2274-F
Q901	QX260P38603	2SC2230-Y.GR
	INTEGRATED CIRCUITS	
IC201	QX266P45208	M74LS05P/SN74LS05N/HD74LS05P /MB74LS05M/DN74LS05
IC202	〃	〃
IC203	QX266P45708	M74LS38P/SN74LS38N/HD74LS38P /MB74LS38M/DN74LS38
IC401	QX266P50701	LA7823
IC991	QX267P90701	STK7308 (AT-1332A)
	QX267P90702	STK7309 (XC-1404C)
	〃	〃 (XC-1404CA)
	〃	〃 (XC-1404CB)
	〃	〃 (XC-1404CC)
	〃	〃 (XC-1404CD)
	DIODES AND OTHERS	
D2B1	QX264P22001	MZ307B or EQA02-07CDA
D2G1	〃	〃
D2H I	〃	〃
D2R1	〃	〃

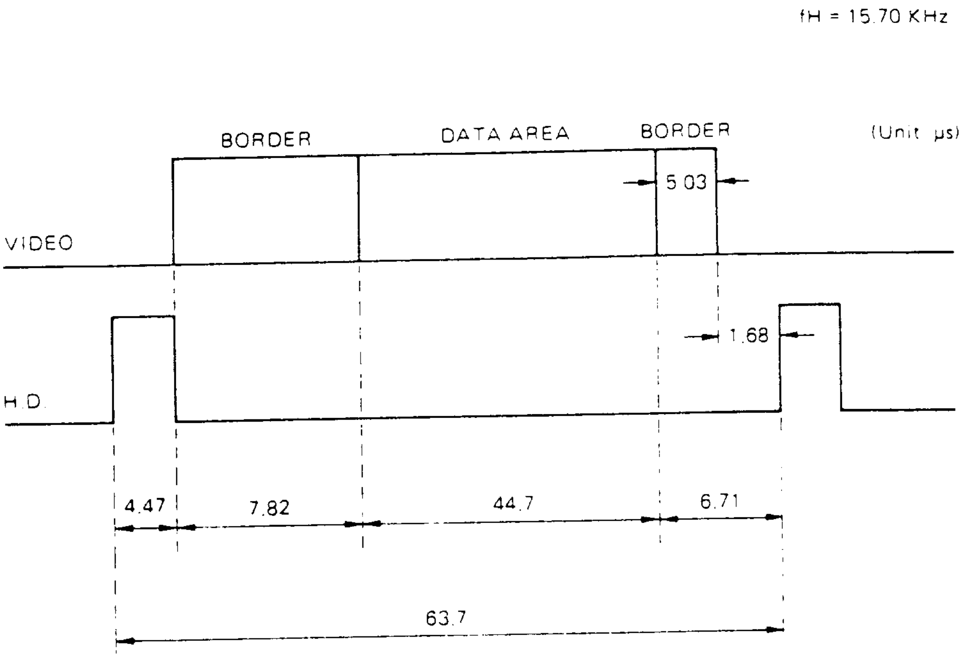
SYMBOL NO.	PARTS NO.	DESCRIPTION
D201	QX264P19303	MZ305B or EQA02-05CDB
D202	QX264P22001	MZ307B or EQA02-07CDA
D401	QX264P04508	1S2076A
D402	〃	〃
D403	〃	〃
D404	QX264P28501	S5500-D
D501	QX264P04508	1S2471
D502	QX264P23101	TVRIG
D503	〃	〃
D504	QX264P04504	1S2471
D505	QX264P28501	S5500-D
D506	QX264P23101	TVRIG
D507	QX264P28501	S5500-D
D508	QX264P23101	TVRIG
D510	QX264P04508	1S2076A/1S2471
D511	QX264P24401	HZT33-01
D6B1	QX264P22203	MZ306-B2/HZ6C21
D6G1	〃	〃
D6R1	〃	〃
D601	QX264P04508	1S2471
D602	〃	〃
D901	QX264P10106	RM-1C
D902	〃	〃
D903	〃	〃
D904	〃	〃
D905	QX264P35101	HZ3.6BP
D906	QX264P23101	TVRIG
D907	QX264P35101	HZ3.6BP
D912	QX264P23101	TVRIG
D951	QX264P10202	RU-3B
D952	QX264P30601	R2KY
D953	QX264P23101	TVRIG
D991	QX264P20101	GL-9PR2
	TRANSFORMERS	
T501	QX336D00301	Horizontal drive
T502	QX349P14201	Side-PCC
T503	QX334P12101	Flyback (AT-1332A)
〃	QX334P12102	〃 (XC-1404C)
〃	〃	〃 (XC-1404CA)
〃	〃	〃 (XC-1404CB)
〃	〃	〃 (XC-1404CC)
〃	〃	〃 (XC-1404CD)
T931	QX350P24702	Power

SYMBOL NO.	PARTS NO.	DESCRIPTION		
COILS				
L201	QX411D00901	Core-ferrite		
L204	〃	〃		
L205	〃	〃		
L208	QX351P02201	Line-filter		
L209	〃	〃		
L210	QX411D00901	Core-ferrite		
L401	QX321C03109	RF	33μH-K	
L491	QX330P08506	Deflection Yoke		
L501	QX321C01105	RF	8200μH-J	
L502	QX321C03109	〃	33μH-K	
L551	QX333D00801	Horizontal linearity		
L552	QX335P00401	Horizontal width		(AT-1332A)
	QX335P00601	〃		(XC-1404C)
	〃	〃		(XC-1404CA)
	〃	〃		(XC-1404CB)
	〃	〃		(XC-1404CC)
	〃	〃		(XC-1404CD)
L601	QX411P00104	Lead-ferrite		
L603	QX321C03009	RF	4.7μH-K	
L901	QX351P01701	Line-filter		
L902	QX351D02501	〃		
L904	QX411P00101	Lead-ferrite		
L905	QX409P23201	COil	6μH	
L951	QX409P06501	Filter		
	QX409B02007	Degaussing		(AT-1332A)
	QX409B04301	〃		(XC-1404C)
	〃	〃		(XC-1404CA)
	〃	〃		(XC-1404CB)
	〃	〃		(XC-1404CC)
	〃	〃		(XC-1404CD)
CAPACITORS AND RESISTORS				
C906	QX185D05409	H250V 150M-M		(AT-1332A)
	QX185D05408	H450V 150M-M		(XC-1404C~ XC-1404CD)
C953	QX185D05404	H180V 330M-M		
R413	QX109D05105	R-Cement wire	10W 390Ω-K	
R520	QX103P37804	R-Fuse	1/4W 2.2Ω-J	
R521	QX109P05204	〃	1/4W 1.2Ω-J	
R524	QX109D06701	R-Cement wire	10W 10Ω-K	
R901	QX102P08704	〃	10W 4.7Ω-K	
R952	QX103P37707	R-Fuse	1/4W 0.56Ω-K	
VARIABLE RESISTORS				
VR201	QX127C03100	Semifixed	1/5W B30KΩ±25%	
VR291	QX129D09801	PCB	0.15W B5KΩ-25S	
VR292	QX129D10503	PCB	0.15W B200Ω-25S	
VR402	QX127C02008	Semifixed	1/5W B10KΩ±25%	
VR403	QX129D09209	PCB	0.15W B500Ω-15S	
VR404	QX129D09205	〃	0.15W B200KΩ-15S	
VR502	QX127C02007	Semifixed	1/5W B5KΩ±25%	
VR591	QX129D09801	PCB	0.15W B5KΩ-25S	
VR6B1	QX127C03002	Semifixed	1/5W B300Ω±25%	
VR6B2	QX127C03006	〃	1/5W B3KΩ±25%	
VR6G2	〃	〃	〃	
VR6R1	QX127C03002	〃	1/5W B300Ω±25%	
VR6R2	QX127C03006	〃	1/5W B3KΩ±25%	

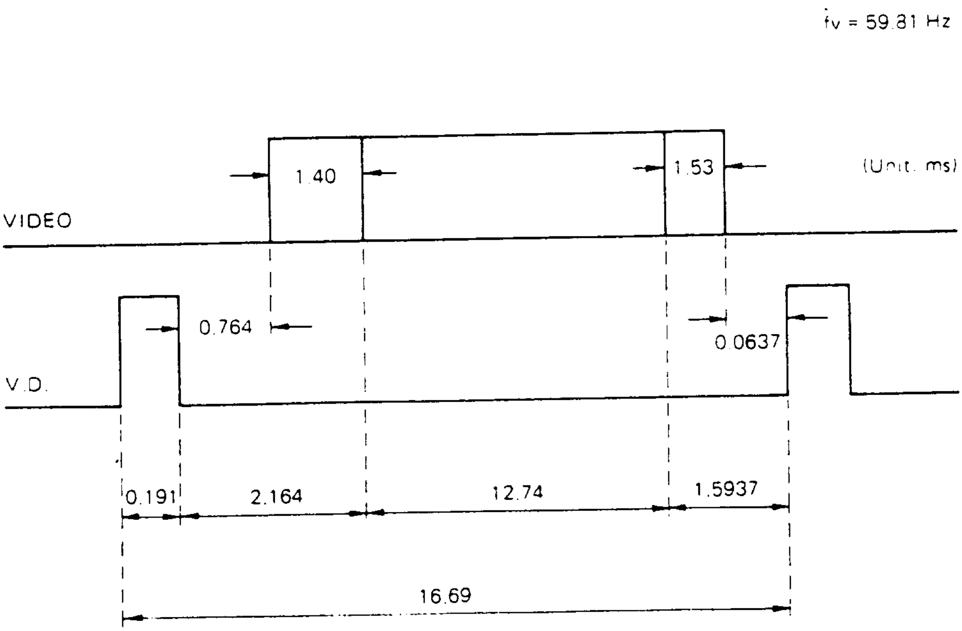
SYMBOL NO.	PARTS NO.	DESCRIPTION		
VR901	QX127C02101	〃	1/5W B50KΩ±25%	
PRINTED CIRCUITS BOARD				
	QT920A20701	PCB-DISPLAY		(AT-1332A)
	QT920A20704	PCB-DISPLAY		(XC-1404C~CD)
	QT920C89901	PCB-CONTROL-2		
	QT920C90001	PCB-CONTROL		
	QT920D06605	PCB-CRT		(AT-1332A)
	CT920D90101	〃		(XC-1404C)
	〃	〃		(XC-1404CA)
	〃	〃		(XC-1404CD)
	〃	〃		(XC-1404CC)
				(XC-1404CD)
MISCELLANEOUS				
F901	QX283D03805	Fuse	3.15A	(AT-1332A)
	QX283D02406	Fuse	3.15A	(XC-1404~ XC-1404CD)
S491	QX129P00709	Band SW (V-CENT)		
S591	〃	〃 (H-CENT)		
S691	〃	〃 (SERVICE)		
S991	QX432P05301	SW-Push (Power on/Off)		
	QX242C79304	AC-Power cond		(AT-1332A) (XC-1404CD)
	QX242C84902	Cable		
	QX338P01701	Convergence purity ring assembly		
	QX449C03102	Socket-CRT		
	QX641D36501	Wedge		(AT-1332A)
	QX641D75801	Wedge		(XC-1404C~ XC-1404CD)
	QX669D22106	Screw-TB		
	QX871C18101	IB-Display		(AT-1332A)
	QX871C18201	IB-Display		(XC-1404C~ XC-1404CD)
RP901	QX260P07101	Posistor		(AT-1332A)
	QX265P04703	Posistor		(XC-1404C~ XC-1404CD)
RT201	QX265P07201	Thermistor		
CABINET PARTS				
	QX700A14107	Back cover		(AT-1332A)
	QX700B09603	〃		(XC-1404C)
	〃	〃		(XC-1404CA)
	〃	〃		(XC-1404CB)
	〃	〃		(XC-1404CC)
	〃	〃		(XC-1404CD)
	QX700B08805	Front cabinet		
	QX702C47100	Door		
	QX734D01001	Knob-VR		
	QX802C53501	Packing case		(AT-1332A)
	QX802C61101	〃		(XC-1404C)
	QX802C61102	〃		(XC-1404CA)
	QX802C61103	〃		(XC-1404CB)
	QX802C61104	〃		(XC-1404CC)
	QX802C61105	〃		(XC-1404CD)
	QX803B35502	Cushion		
	QX803D14503	〃		
	QX829C04401	Packing sheet		
	QX829D11501	〃		
	QX831B02103	Packing bag		

TIMING CHART

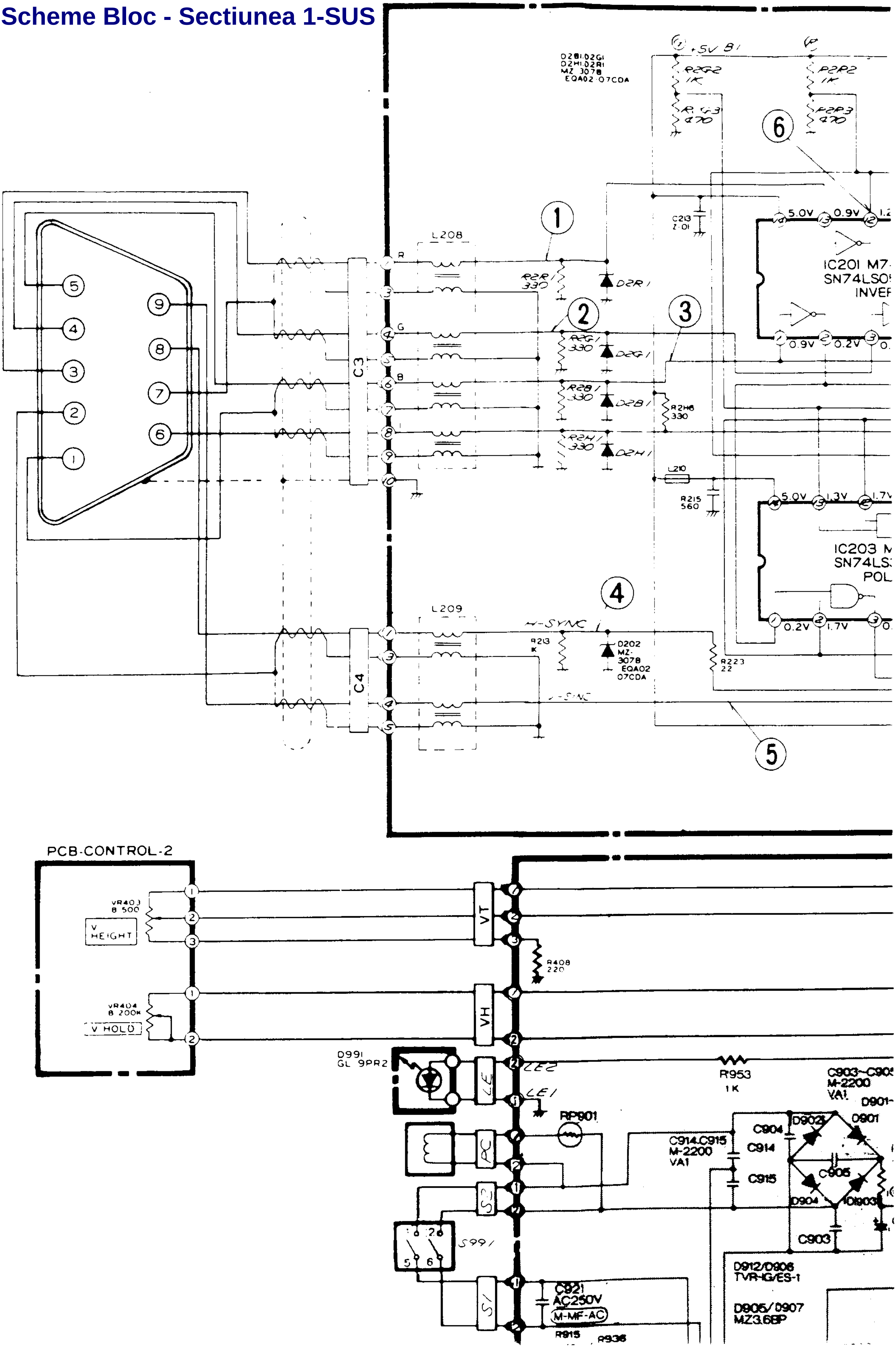
1) HORIZONTAL



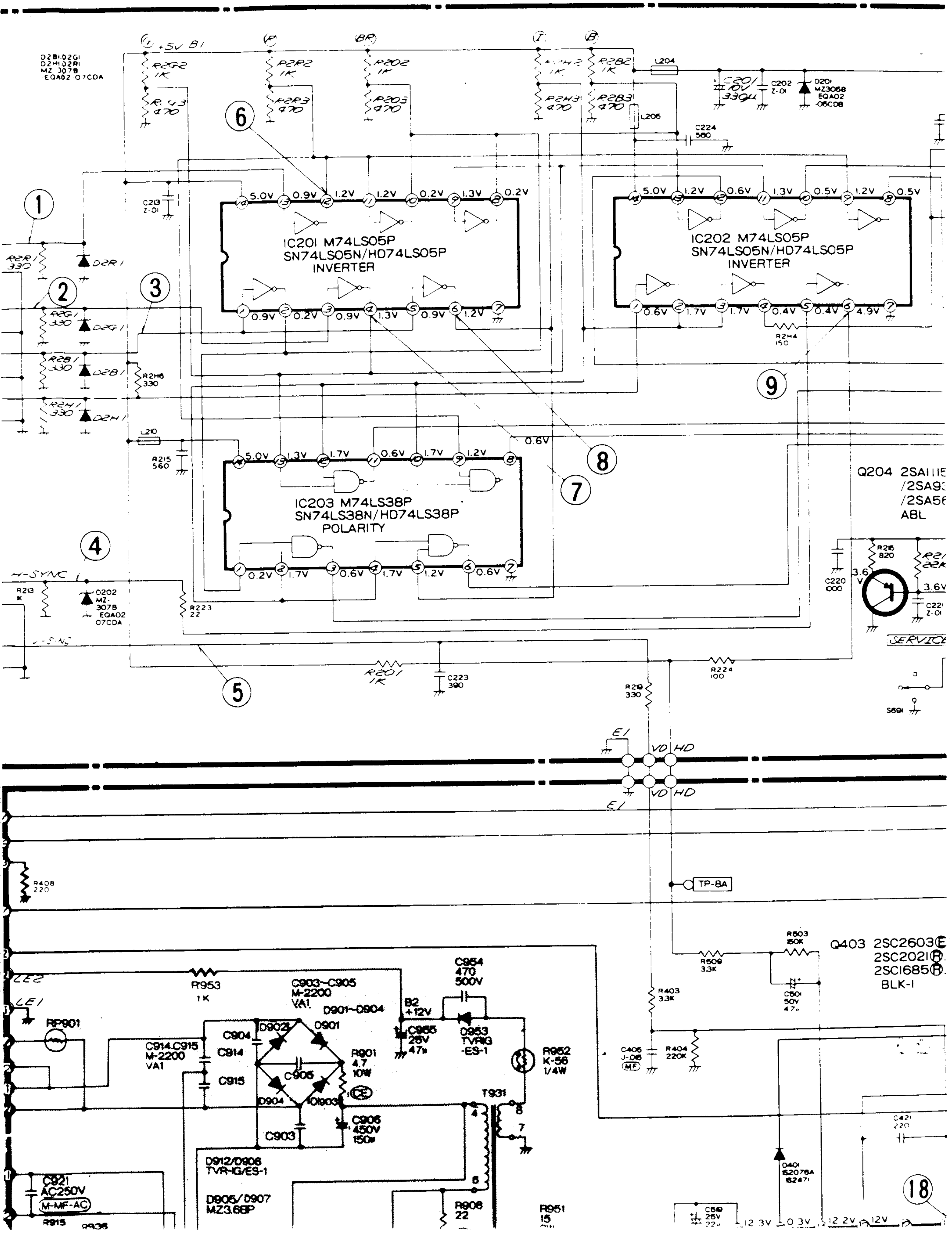
2) VERTICAL



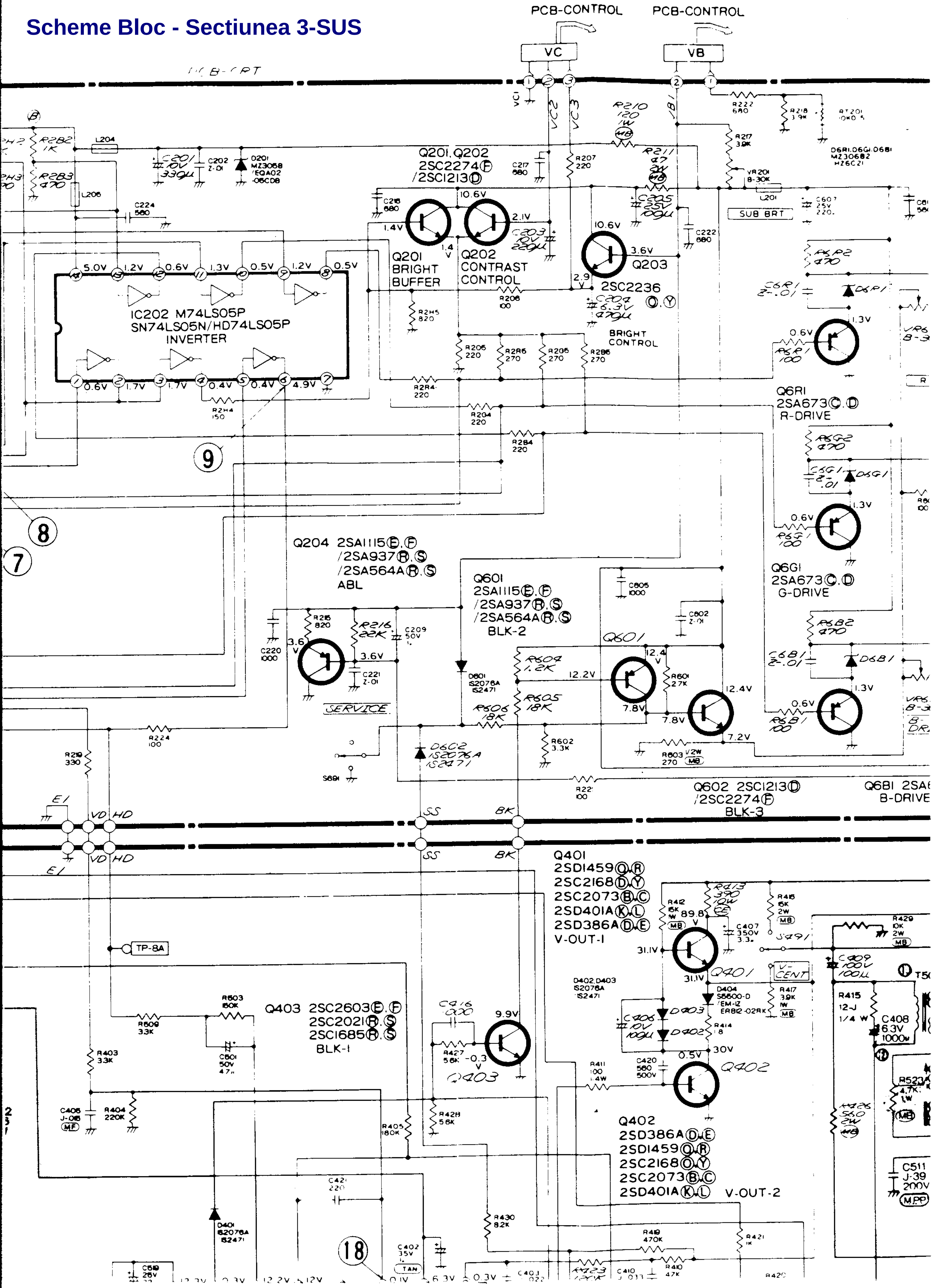
Scheme Bloc - Sectiunea 1-SUS



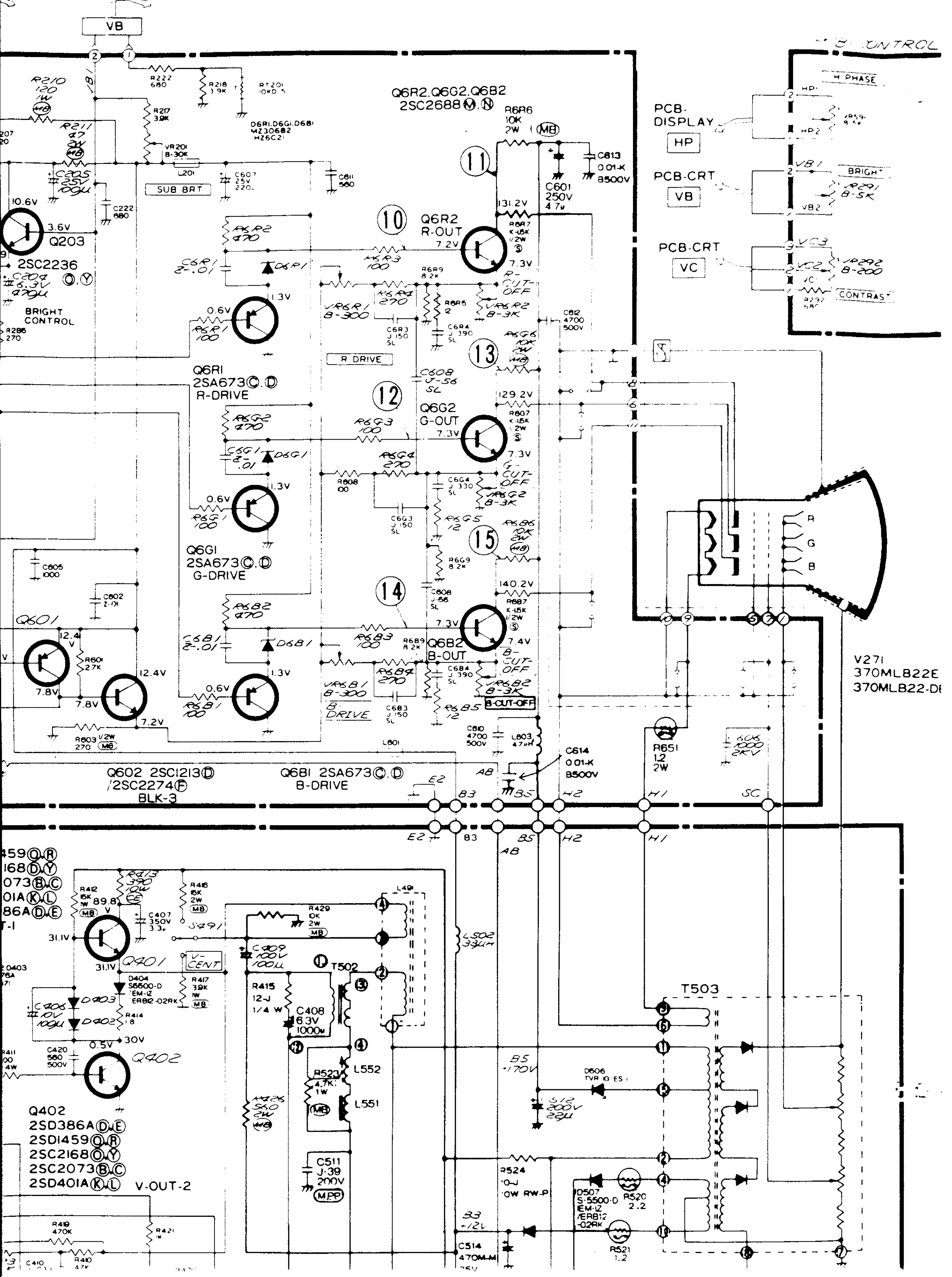
Scheme Bloc - Sectiunea 2-SUS



Scheme Bloc - Sectiunea 3-SUS

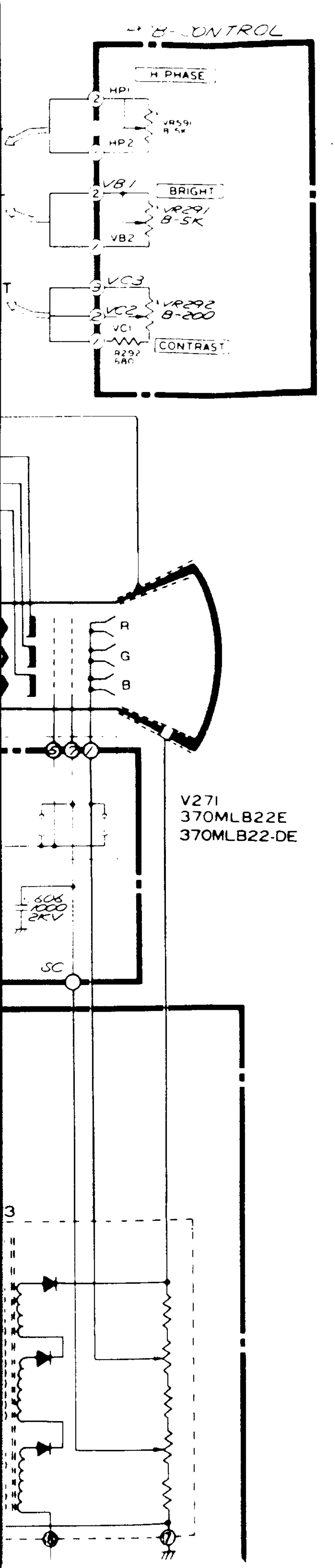


Scheme Bloc - Sectiunea 4-SUS



SCHEMATIC DIAGRAM

MODEL : RM 14Ø4



Scheme Bloc - Sectiunea 5-SUS

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
Ⓢ	:	Fixed composition resistor
Ⓦ	:	Wire wound resistor
Ⓜ	:	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

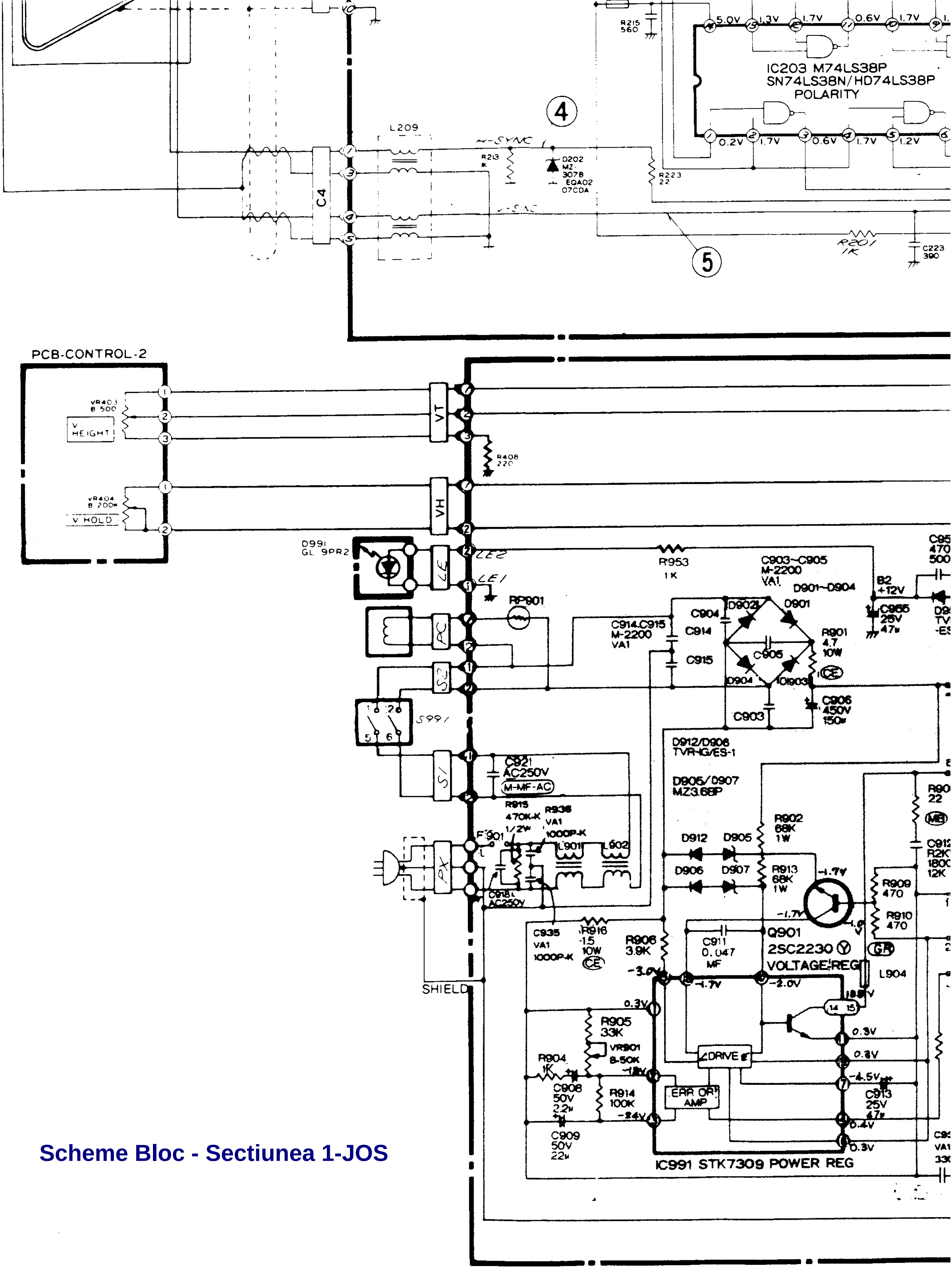
ALM	:	Aluminus electrolytic capacitor
MF	:	Polyester capacitor
PP	:	Polypropylene film capacitor
TAN	:	Tantalum capacitor
TF	:	Twin film capacitor
MF.PP	:	Polyester polypropylene film capacitor.
MPP	:	Metallize plastic film capacitor.
NP	:	Non polarized electrolytic capacitor.
⏊	:	Electrolytic capacitor

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

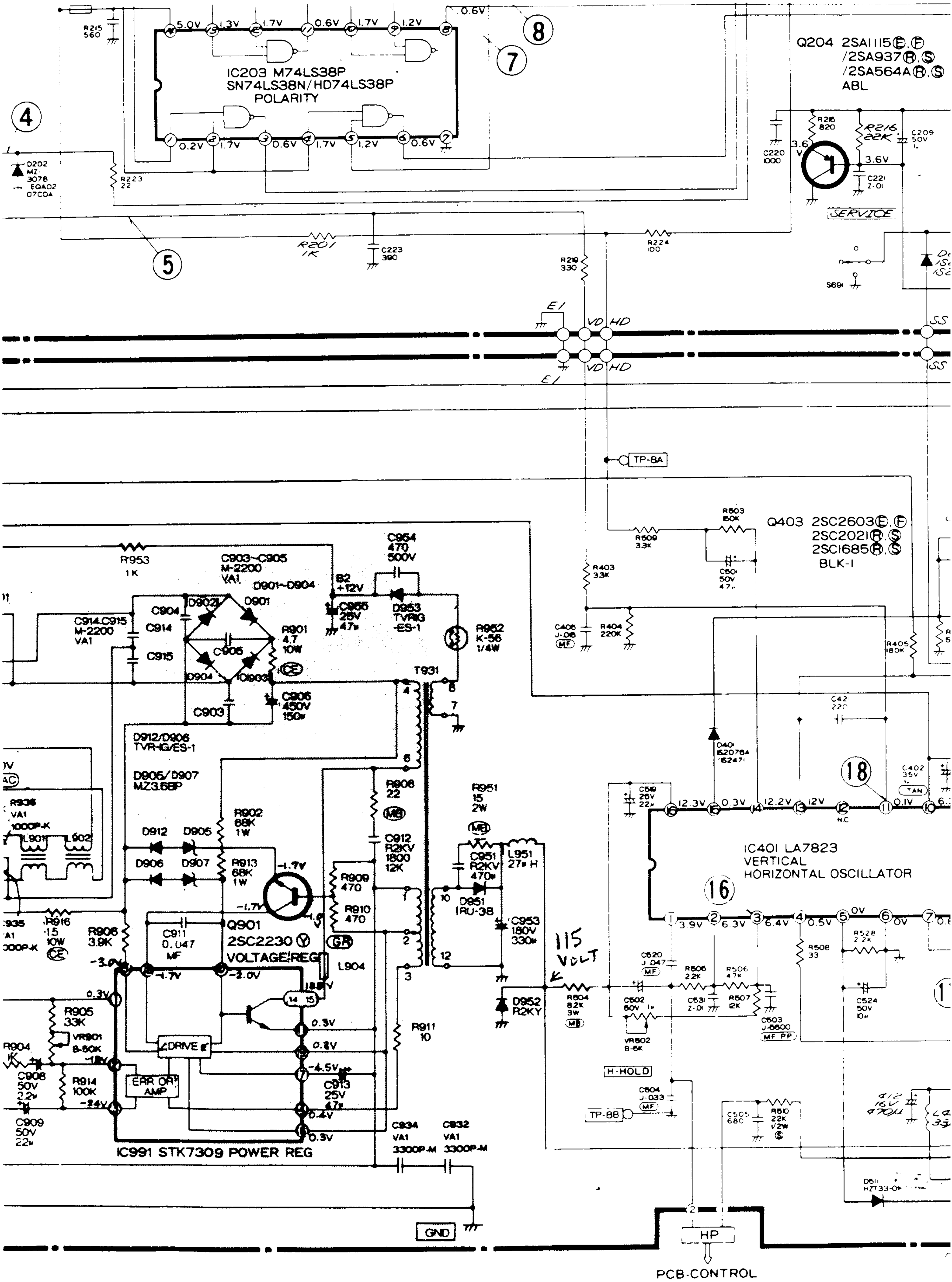
    and J = ±5% K = ±10% M = ±20% P = $^{+100\%}_{-\ 0\%}$

    C = ±0.25PF D = ±0.5PF F = ±1PF Z = $^{+80\%}_{-20\%}$

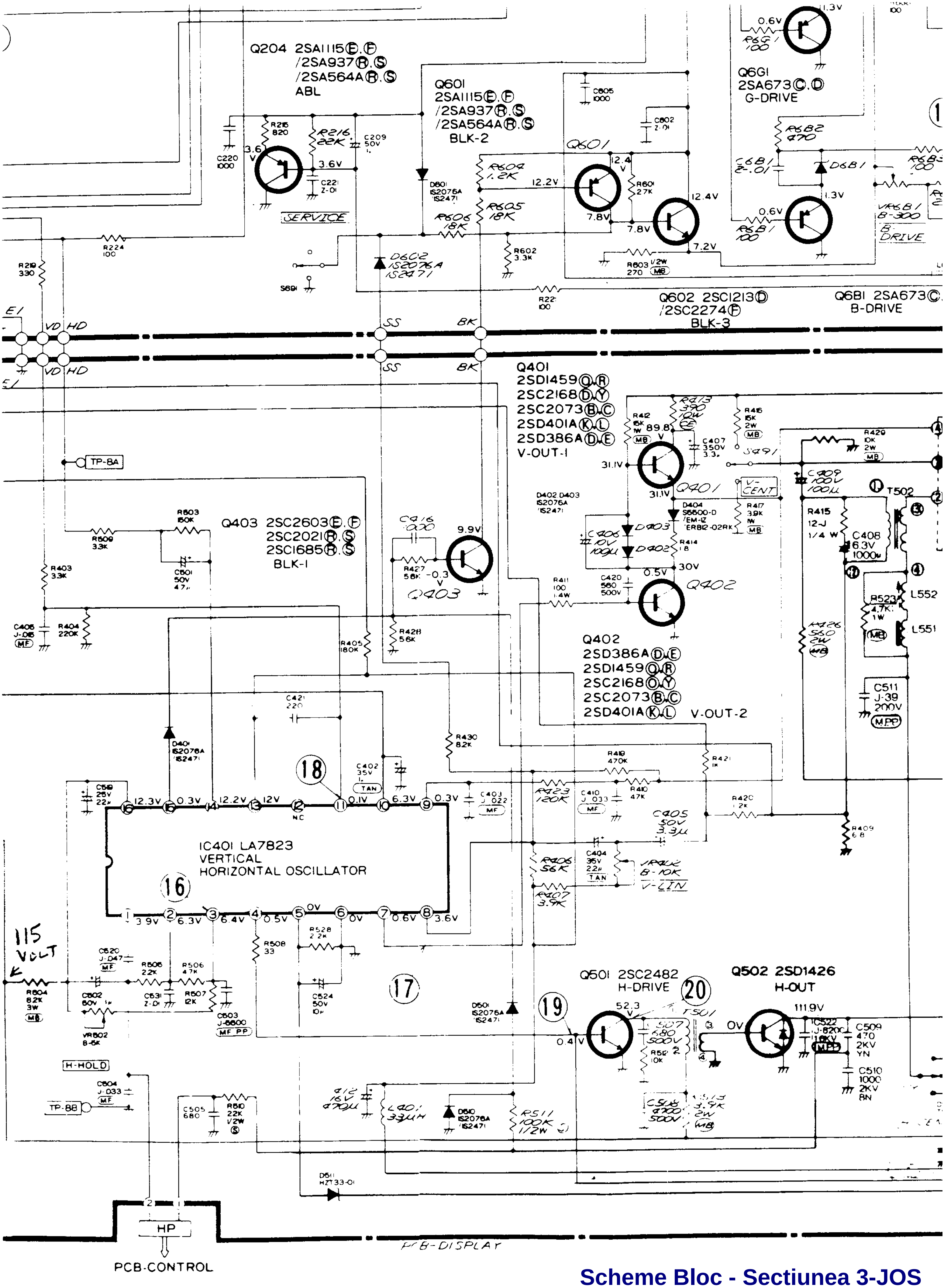
SPECIFIC SYMBOL



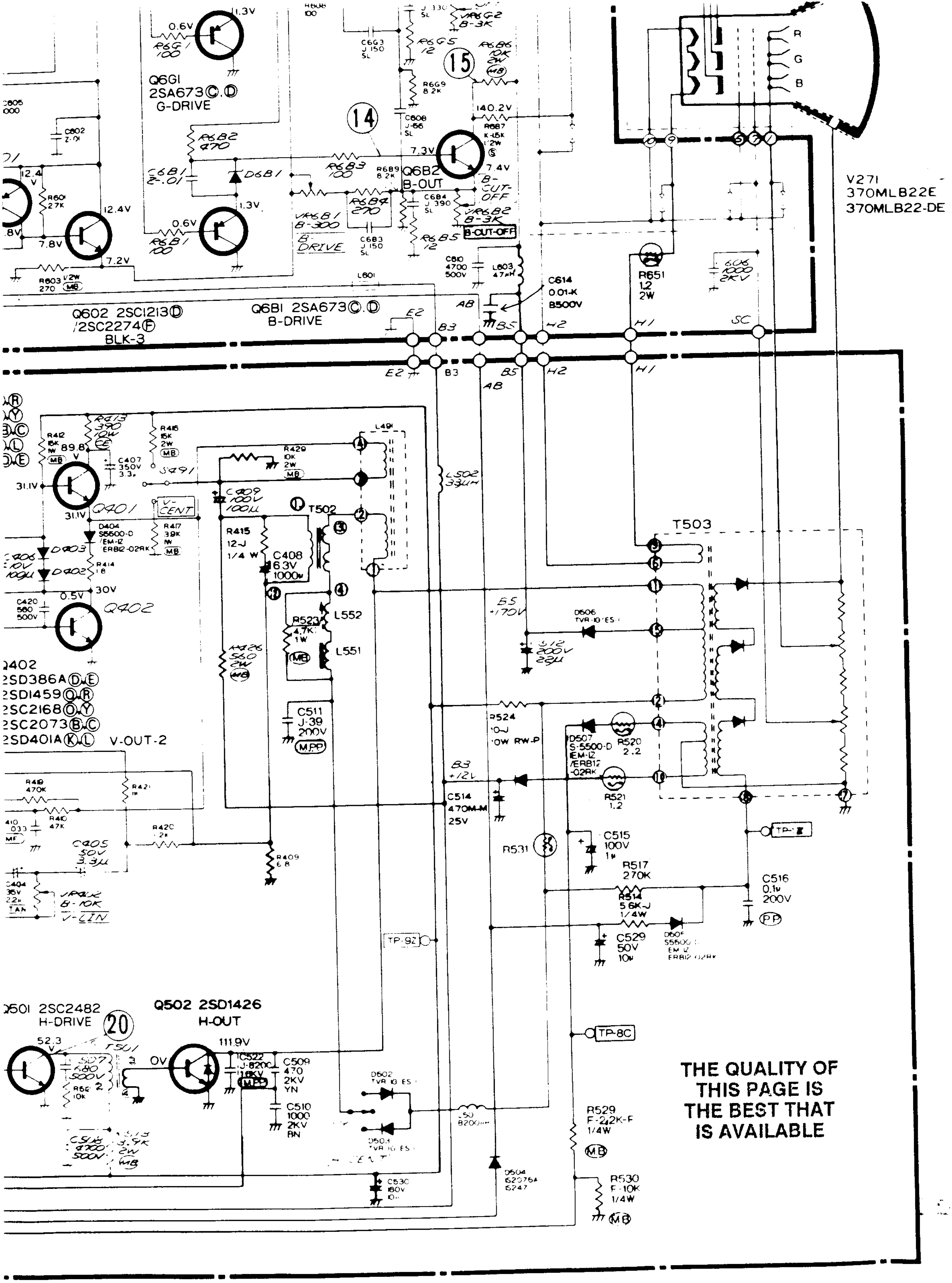
Scheme Bloc - Sectiunea 1-JOS



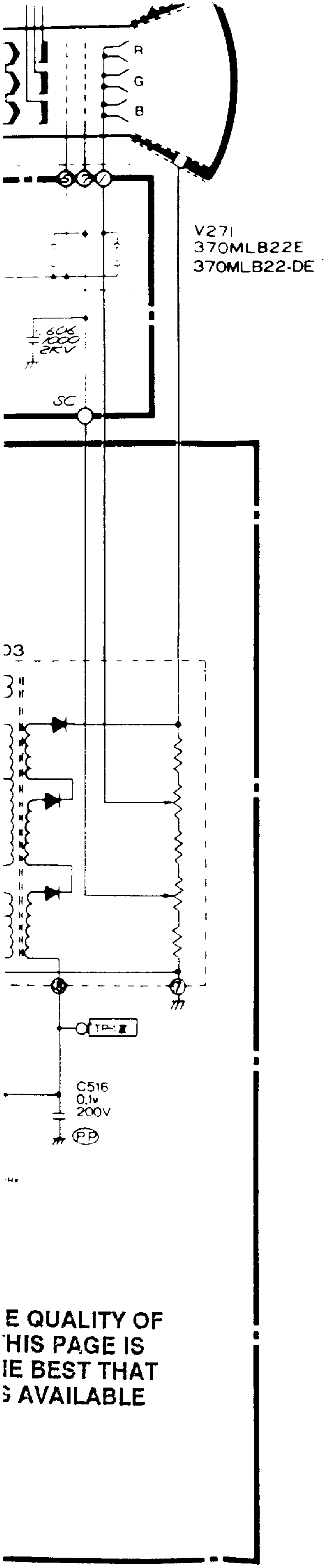
Scheme Bloc - Sectiunea 2-JOS



Scheme Bloc - Sectiunea 3-JOS



Q6G1
2SA673©.Ⓓ
G-DRIVE
Q6B2
B-OUT
B-CUT-OFF
Q602 2SC1213Ⓓ
/2SC2274Ⓕ
BLK-3
Q6B1 2SA673©.Ⓓ
B-DRIVE
V271
370MLB22E
370MLB22-DE
R651
1.2
2W
C614
0.01-K
B500V
T502
T503
L552
L551
C408
63V
1000
R415
Q401
Q402
2SD386AⒹⒺ
2SD1459ⓆⓇ
2SC2168ⓄⓎ
2SC2073ⒷⒸ
2SD401AⓀⓁ
V-OUT-2
C514
470M-M
25V
R531
C515
100V
R517
270K
C516
0.1
200V
R514
5.6K-J
1/4W
C529
50V
TP-9Z
TP-8C
Q501 2SC2482
H-DRIVE
Q502 2SD1426
H-OUT
C509
470
2KV
YN
C510
1000
2KV
BN
R529
F-2.2K-F
1/4W
R530
F-10K
1/4W
THE QUALITY OF
THIS PAGE IS
THE BEST THAT
IS AVAILABLE



(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.
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.

Scheme Bloc - Sectiunea 5-JOS