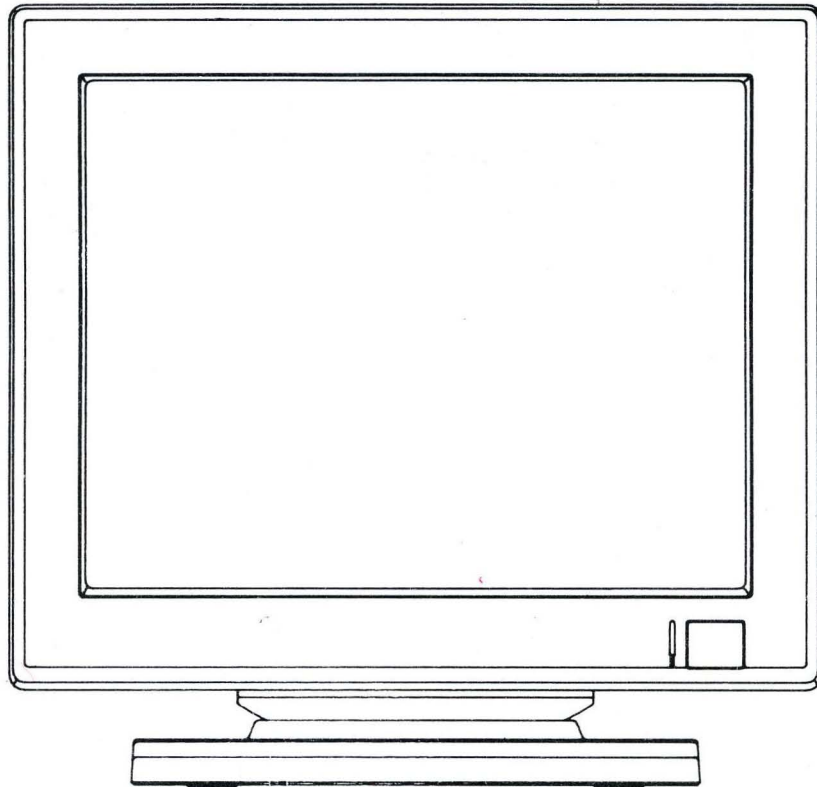




# SERVICE MANUAL

## MDA MONO MONITOR CGA

**MZ467\***



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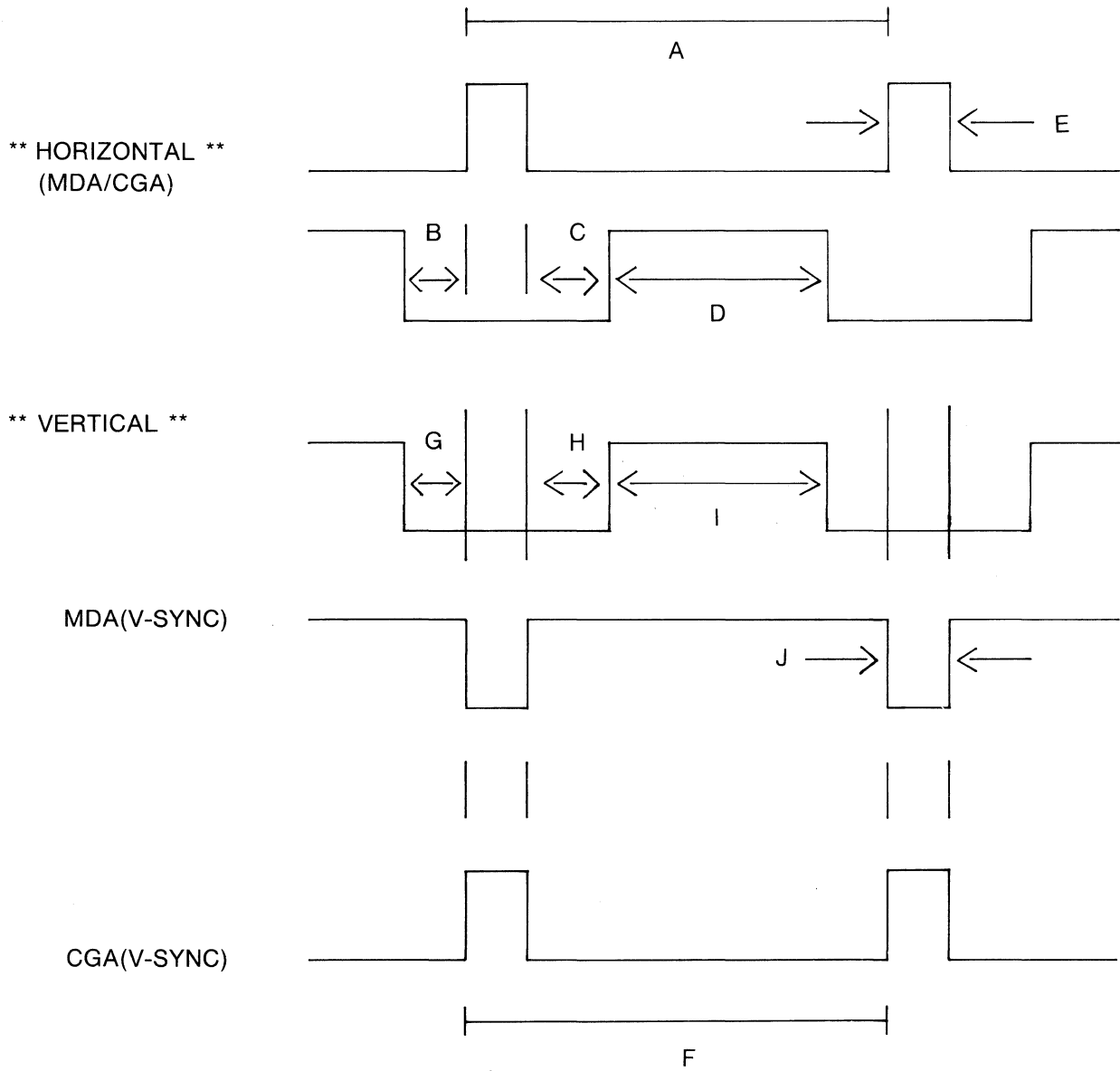
## SPECIFICATIONS

DESCRIPTION	NOMINAL	LIMIT
1. Power input	AC108-132V, 60Hz AC220V 50Hz, AC240V 50Hz	OPTION
2. Power consumption	40 Watts	Max 50 Watts
Video input signal	Separate TTL signal 3.5Vp-p	±1.0V
Video bandwidth	25MHz at-3db	
Video display size	230mm x 170mm	±3mm
3. Number of characters	2000 characters	80 Columns x 25 Rows
4. Resolution	720 dots 350 line (MDA) 640 dots 200 line (CGA)	
5. CRT	14" 90 Degree deflection WHITE, GREEN, AMBER, PHOSPHOR/NON-GRARE	
6. Synchronous		
a) Horizontal	18.432KHz/15.75KHz	
b) Vertical	50Hz/60Hz	
7. Dimensions	(W)12.4"(320 mm) (D)12.8"(326 mm) (H)12.1"(308.5 mm)	
8. Weight	13lbs (8.3Kg)	
9. Length of signal cable	5ft (1500 mm)	
10.Length of power cord	7.5ft (2300 mm)	

**Note :** Nominal specs represent the design specs; all units should be able to approximate these - some will exceed and some may drop slightly below these specs.

Limit specs represent the absolute worst condition which still might be considered acceptable; in no case should a units perform to less than within any limit specs.

## SIGNAL TIMING CHART



	A (uS)	B (uS)	C (uS)	D (uS)	E (uS)
M D A	54.3	0.6	1.1	44.3	8.3
C G A	63.5	6.6	7.2	45.2	4.5
	F (mS)	G (mS)	H (mS)	I (mS)	J (mS)
M D A	20.07	0.0	0.217	18.985	0.868
C G A	16.67	1.58	2.15	12.75	0.19

## IMPORTANT SERVICE SAFETY PRECAUTIONS

Service work should be performed only by qualified service technicians who are thoroughly familiar with all of the following safety checks and servicing guidelines:

### WARNING

1. For continued safety, do not attempt to modify the circuit.
2. Disconnect the AC power before servicing.
3. Semiconductor heat sinks are potential shock hazards when the chassis is operating.

### SERVICING THE HIGH VOLTAGE SYSTEM AND PICTURE TUBE

When servicing the high voltage system, remove the static charge by connecting a 10kohm resistor in series with an insulated wire (such as a test probe) between the chassis and the anode lead. (The AC line cord should be disconnected from the AC outlet.)

1. The picture tube in this display monitor employs integral implosion protection.
2. Replace with a tube of the same type and number for continued safety.
3. Do not lift the picture tube by the neck.
4. Handle the picture tube only when wearing shatter proof goggles and after discharging the high voltage anode completely.

### X-RADIATION AND HIGH VOLTAGE LIMITS

1. Be sure all service personnel are aware of the procedures and instructions covering X-radiation. The only potential source of X-ray in a current solidstate display monitor is the tube. However, the picture tube does not emit measurable X-ray radiation if the high voltage is as specified in the "high voltage check" instruction.

It is only when high voltage is excessive that X-radiation is capable of penetrating the shell of

the picture tube, including the lead in glass material. The important precaution is to keep the high voltage below the maximum level specified.

2. It is essential that servicemen have available at all times an accurate high voltage meter. The calibration of this meter should be checked periodically.
3. High voltage should always be kept at the rated value-no higher. Operation at high voltages may cause a failure of the picture tube or high voltage circuitry and, also under certain conditions, may produce radiation in excess of desirable levels.
4. When the high voltage regulator is operating properly there is no possibility of an X-radiation problem.  
Everytime a color chassis is serviced, the brightness should be tested while monitoring the high voltage with a meter to be certain that the high voltage does not exceed the specified value and that it is regulating correctly.
5. Do not use a picture tube other than that specified or make unrecommended circuit modifications to the high voltage circuitry.
6. When troubleshooting or taking test measurements on a display monitor with excessively high voltage, avoid being unnecessarily close to the display monitor. Do not operate the display monitor longer than is necessary to locate the cause of excessive voltage.

### BEFORE RETURNING THE DISPLAY MONITOR

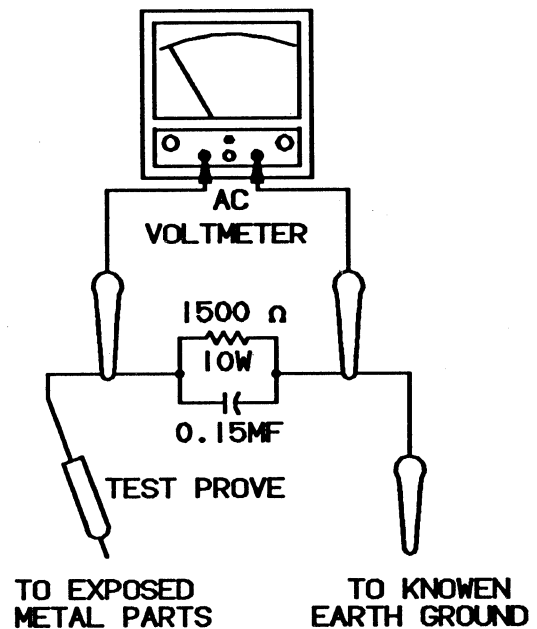
#### Fire and Shock Hazard

Before returning the display monitor to the user, perform the following safety checks:

1. Inspect all lead dress to make certain that the leads are not pinched or that the leads are not

lodged between the chassis and other metal parts in the display monitor.

2. Inspect all protective devices such as non-metallic control knobs, insulating materials, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacitor networks, mechanical insulators, etc.
3. To be sure that no shock hazard exists, check for leakage current in the following manner:
  - Plug the AC line cord directly into a 120volt AC outlet. (Do not use an isolation transformer for this test)
  - Using two clips leads, connect 1.5 kohm, 10 watt resistor paralleled by a 1.5uF capacitor in series with all exposed metal cabinet parts and a known earth ground such as electrical conduit or electrical ground connected to earth ground.
  - Use a SSVM or VOM with 1000 ohms per-volt or higher sensitivity to measure the AC voltage drop across the resistor. (See Figure 1.)
  - Connect the resistor to all exposed metal parts having a return path to the chassis (metal cabinet, screw heads, knobs and shafts, escutcheon, etc.) and measure the AC voltage drop across the resistor.
  - Any reading of 0.3volt RMS (this corresponds to 0.5milliamp.AC) or more is excessive and indicates a potential shock hazard which must be corrected before returning the display monitor to the user.



### SAFETY NOTICE

Many electrical and mechanical parts which have special characteristics in this chassis often pass unnoticed and the protection afforded by them can not necessarily be obtained by using replacement components rated for higher voltage, wattage, etc.

Replacement parts that have these special safety characteristics are identified in this manual, and its supplement; electrical components having such features are identified by a ! in the Parts List and Schematic Diagrams.

Before replacing any of these components, read the Parts List in this manual carefully. The use of substitute replacement parts that do not have the same safety characteristics as specified in the Parts List may create shock, fire, or other hazards.

# THEORY OF OPERATION

## GENERAL

This monitor is a high resolution monochrome monitor using a AMBER, GREEN, WHITE phosphored CRT with etched faceplate.

It receives one VIDEO signal and INTENSITY signal, separated sync signals by TTL level.

In case of CGA MODE, It receives R,G,B, INTENSITY and separated sync signals by TTL level.

It can operate in all of the MDA and CGA mode.

## DESCRIPTION

### 1. Main board

#### 1-1) Power supply

This is a linear power supply using power trans (T701) and a monolithic intergrated circuit voltage regulation (IC701: L123CB or LM723).

The output voltage regulation is achieved by means of the error amplifier contained in IC701.

The output voltage of this power supply is fed back into the pin4 of IC701.

This voltage is compared to the reference voltage internally.

The deference of this voltage control the output current of error amplifier.

D701 to D704 and C704 from DC supplier circuit. Q701 is current amplifier. R701 is shunt resistor. Q701 and R701 transfer current from DC circuit to road. R703 is for minimum temparature drift. C705 and C706 is noise filter condenser.

Output voltage is fixed by adjusting VR706 variable resistor.

#### 1-2) Horizontal and Vertical processor IC202

##### 1-2-1 Horizontal processor

IC202 perform following functions.

- Horizontal oscillator
- Sync separator
- Horizontal predriver

- Horizontal AFC

- Shunt regulator

The sync signal is inverted by inverting transistor Q301 and is fed back into pin15 of IC202 and flyback pulse into pin14 of IC202.

This two signal are compared and the circuit is locked to a correct frequency and phase.

##### 1-2-2 Vertical processor

IC202 performs following functions

- Vertical oscillator
- Vertical predriver
- Vertical output
- Flyback generator

There are two Vertical control functions. One is V-SIZE control, the other is V-LINEARITY control.

To control V-SIZE, turn the VR219(MDA MODE), VR220(CGA MODE).

To control V-LINEARITY, turn the VR221.

#### 1-3) Horizontal output stage Q303

Q303 is horizontal output switching transistor which closed during the scan period and open during the flyback. It receives drive signal from IC202 through transistor Q302 and horizontal drive trans T301.

The flyback period is determined by resonance of C409 deflection yoke. C409 makes the necessary S-correction.

Because of the losses in the deflection yoke, a linearity correction is required.

This is achieved by L402. The horizontal screen can be varied by adjusting L401.

The high voltage of 13Kv for CRT anode is also generated in flyback transformer by using flyback pulse.

#### 1-4) Dynamic focus

Q401 (BUV46 or KSC 5021) is used to provide dynamic focus voltage which is added to G4 voltage of the CRT.

This voltage is needed to change G4 voltage according to the angle of the beam.

1-5) Video circuit

This circuit performs following functions.

- Video input buffer (IC501:74LS07)
- Cascade amplifier (Q503, Q801)
- Contrast control circuit (Q501, VR511, D509)

If only video signal input into the IC501, IC501 delivered to cascade amplifier(Q503,Q801)

If only intensity signal input into the IC502, IC502 delivered to cascade amplifier (Q503, Q801). CONTRAST CONTROL is operated by Q501,D509, VR511 from a cascade video amplifier which circuit output is applied to cathode pin of the CRT.

1-6) CRT board

it contains video amplifier transistor Q801 and CRT socket.

1-7) Power board

This board contain fuse.

**IMPORTANT:** When replacing the power supply, make sure that the green ground wire is properly attached to the make sure that the fuse is of the same type and rating as original.



# ALIGNMENT INSTRUCTIONS

## PLEASE READ BEFORE ATTEMPTING SERVICE

1. Line voltage must be kept within 10% of the rated voltage.
2. When operating at AC voltage, you must adjust DC B+ voltage. To get correct B+, mode is to be MDA. and then check B+ which is 12v  $\pm$ 0.1v, if not, adjust VR706.
3. Do not discharge, ARC, or measure high voltage when high voltage lead is connected to CRT. Discharge 2nd anode of CRT only after high voltage lead has been disconnected. Do not discharge high voltage lead at any time. This may result in damage to transistor.
4. While the monitor is in operation, do not attempt to connect or disconnect any wires.
5. Disconnect all power before attempting any repair.
6. When the power is on, do not attempt to short any portion of the circuit. This shorting may cause damage to the transistors in the receiver.

## ADJUSTMENT

Apply power and video signal(alpha-numeric information) to the data display.

## CENTERING

1. Loosen the deflection yoke clamp and carefully move the yoke on the neck of the CRT as far forward as possible. Rotate the yoke until the top and bottom edges of the raster are straight. Tighten the clamp.
2. Center the raster by rotating the centering rings.

## B<sup>+</sup> ADJUSTMENT

1. Operate the monitor in MDA MODE.
2. Connect the plus pole of DVM (Digital multi meter) to yellow wire which is attached to resistor and connect the other pole (GND) to chassis frame.
3. Rotate the B<sup>+</sup> voltage adjusting control (VR706) to provide DC 12V. (Tolerance is  $\pm$ 0.1v)

## SUB-BRIGHTNESS

1. Set contrast(VR511) control to maximum and brightness(VR415) control about 90 degrees counterclockwise from fully clockwise position.
2. Adjust sub-brightness control(VR411) at visual cut off of the raster.
3. You could change the brightness by another method in only MDA. To see more or less brightness, you turn VR416.

## HORIZONTAL FREQUENCY ADJUSTMENT

( Instrument in use : frequency counter and scope probe )

1. Connect the PLUS pole of the scope probe to brown wire of DY and GND pole to chassis frame.
2. Without input signal, adjust the horizontal frequency control(VR315) so that the horizontal frequency is 18.00KHZ. (Tolerance is  $\pm$ 100 Hz)

## VERTICAL FREQUENCY ADJUSTMENT

( Instrument in use : frequency counter, scope probe )

1. Connect the GND pole of the scope probe to chassis frame and the scope probe to DY pin connected to yellow wire.
2. Without input signal, adjust the vertical frequency control (VR223) so that the vertical frequency is 41HZ. (Tolerance is  $\pm$ 1 Hz)

## HORIZONTAL WIDTH ADJUSTMENT

Adjust the horizontal width control(L401) so that the horizontal width of displayed pattern is 230mm. (Tolerance is  $\pm$ 3 mm)

## VERTICAL SIZE ADJUSTMENT

Adjust the vertical size control(VR219,VR220) so that the vertical of displayed pattern is 170mm. (Tolerance is  $\pm$ 3 mm)

- Height control VR219 (IN MDA MODE)
- Height control VR220 (IN CGA MODE)

### VERTICAL LINEARITY ADJUSTMENT

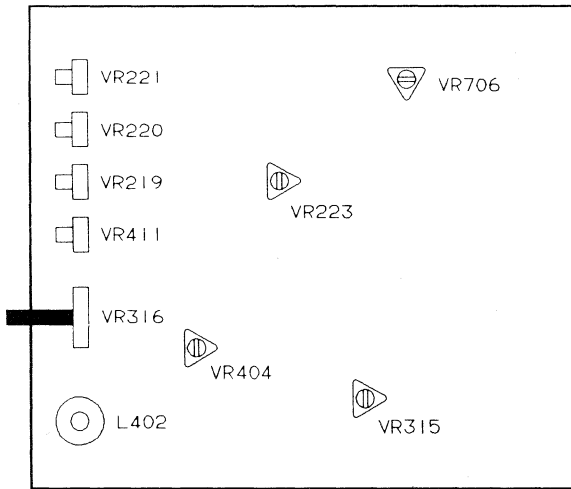
Adjust the vertical linearity control(VR221) for the best linearity.

### HORIZONTAL POSITION ADJUSTMENT

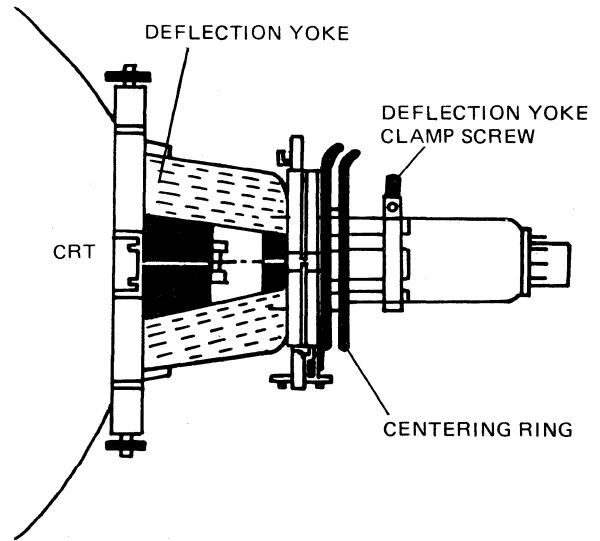
Adjust horizontal position control(VR316) so that the image(or test pattern) is placed on the center of the screen.

### FOCUS ADJUSTMENT

Adjust focus control(VR404) for providing the best focus.



ALIGNMENT PARTS LOCATION



CRT NECK COMPONENTS LOCATION

# DISASSEMBLY INSTRUCTIONS

## REAR COVER REMOVAL

1. Place the monitor upside down.
2. Remove 2 screw A.(fig1)
3. Pull the REAR COVER backward as pushing the 2 points B in the direction of the arrows to separate from the FRONT COVER.

## CRT ASSY/CHASSIS FRAME ASSY REMOVAL

1. Remove the CRT'S anode cap 1 from the CRT.
2. Remove the CHASSIS-FRAME from the FRONT CABINET.

**NOTE :** CRT must be discharged according to the CRT discharge procedure in the important safety precaution.

FIGURE A,CABINET

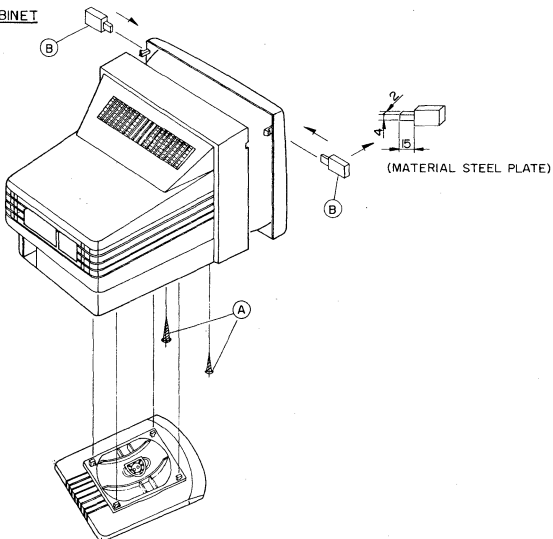


FIG 1

FIGURE B,PCBS

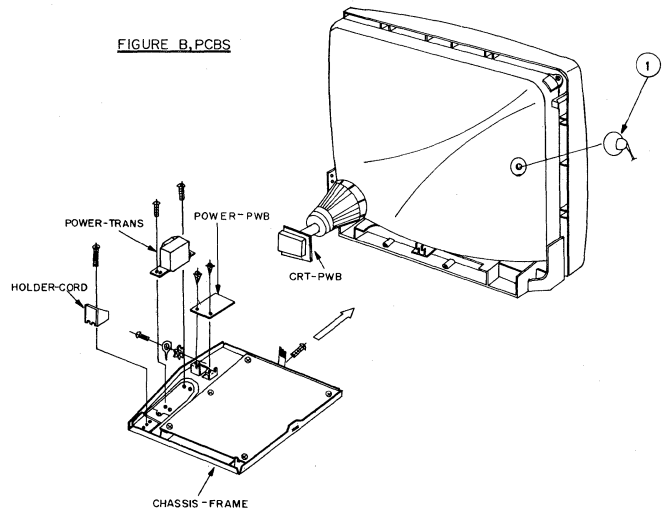
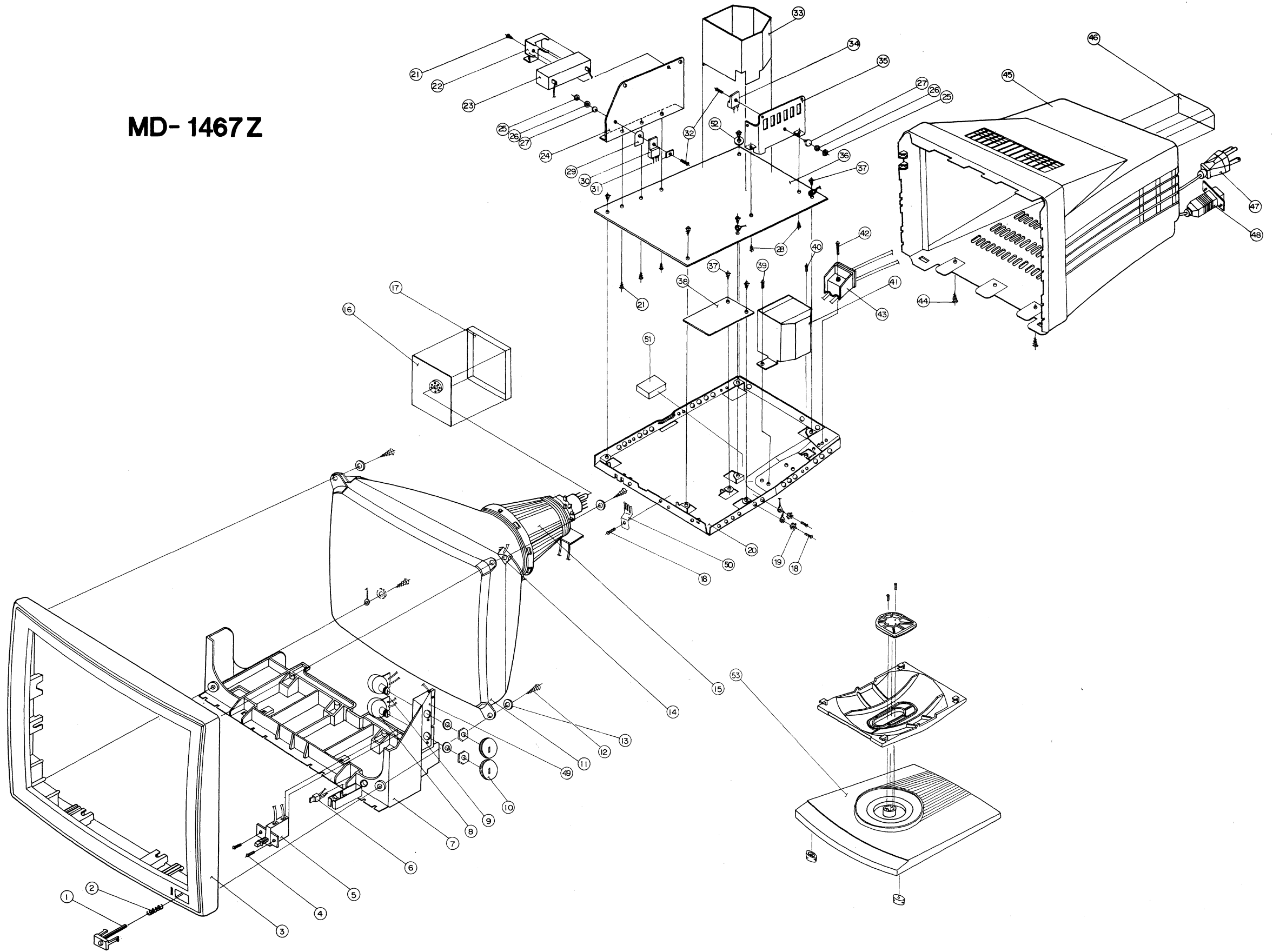


FIG 2

EXPLODED VIEW

MD-1467Z

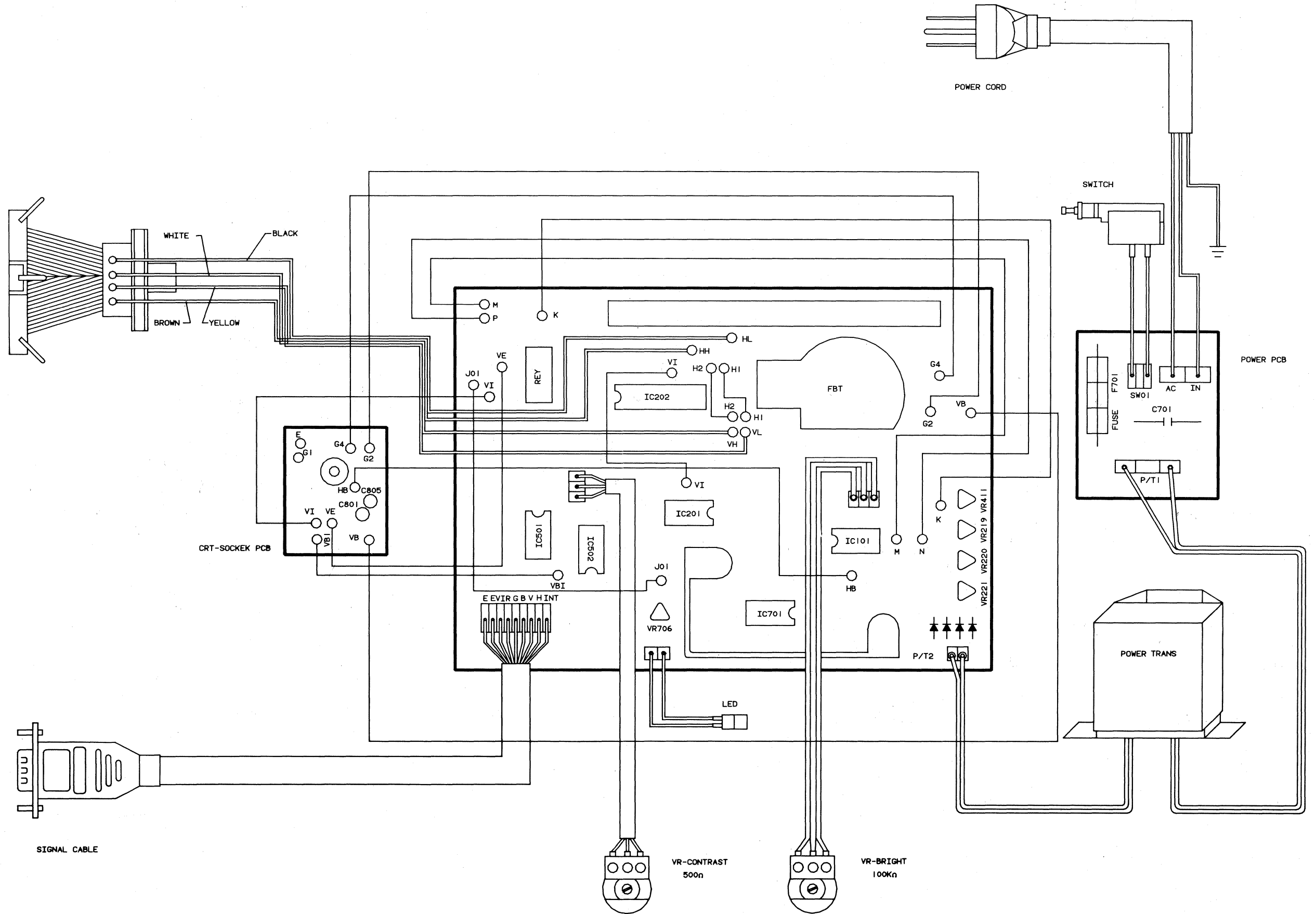


### EXPLODED VIEW PART LIST

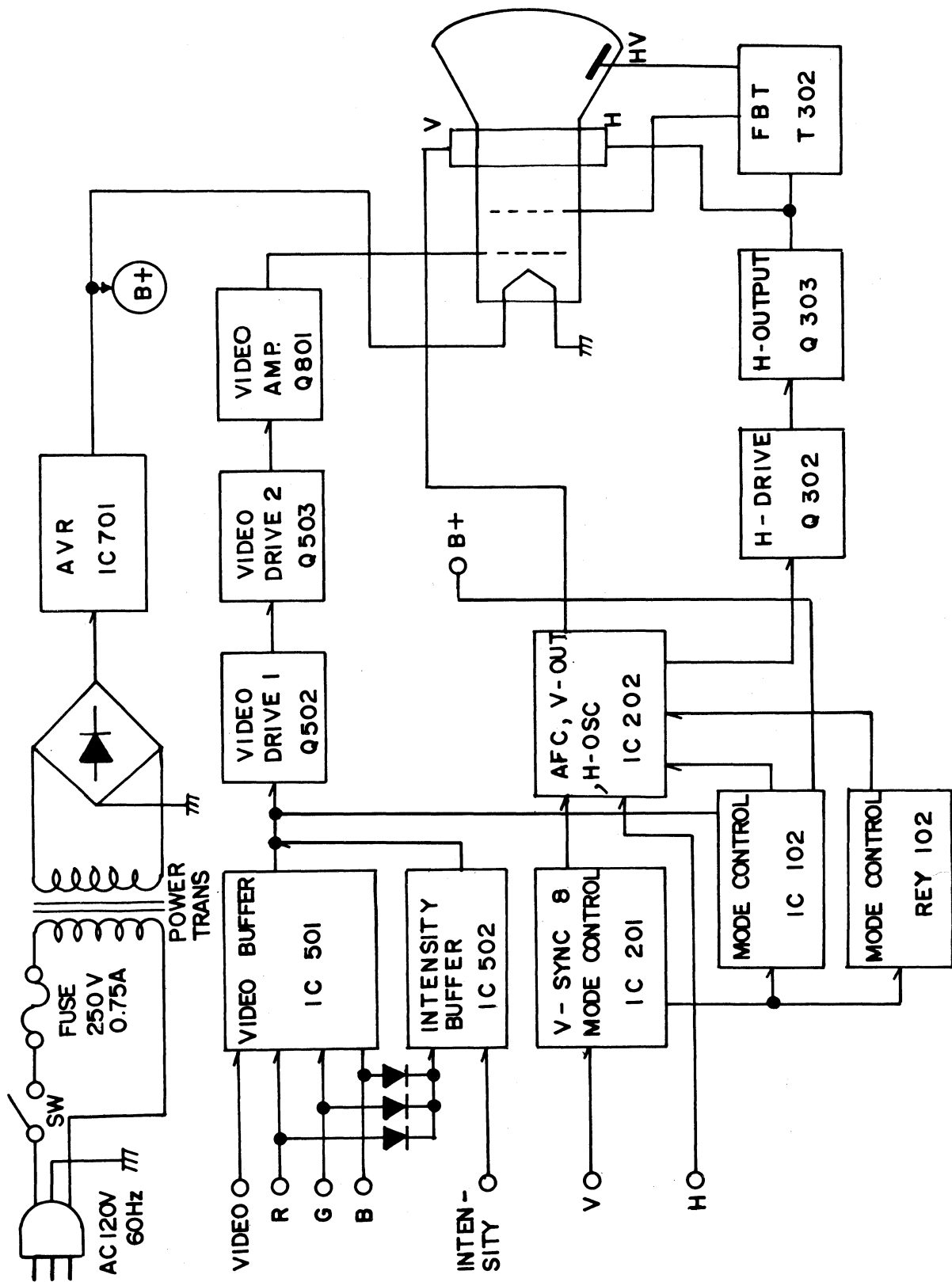
REF NO	DESCRIPTION	PART NO	Q'TY	REMARKS
1	KNOB-POWER;PPO VO BGE MD-1467	7622-701-610	1	
2	SPRING-COIL;SUS-302 WPA PI0.5	6674-713-710	1	
3	COVER FRONT;PPO VO BGE 000ZZZBC	6000-706-010	1	#50924
4	SCREW-RH;M3X8 FE FZY	7048-130-081	2	
5	SWITCH-PUSH;ESB 8213V	3529-702-210	1	
6	ASSY-LED	0M905-000-2750	1	
7	SUPPORT-CHASSIS;NOYRL PX-1005 PPO VO BGE	6460-700-110	1	#50924
8	ASSY-CONTRAST, VR;MZ467*	0M905-000-2880	1	
9	ASSY-BRIGHT, VR;MZ467*	0M905-000-2870	1	
10	KNOW-VR;PPO VO BGE	7622-701-510	2	#50924
11	CRT-MONOCHROME;M32ECB2LA	2019-133-910	1	
12	SCREW-TAP,TH;2S-4X20 FE FZY	7128-540-201	4	
13	WASHER-PLAIN;165216 FE FZY	7304-101-190	4	
14	EARTH-PLATE;PBS3 SP-H TO.3	4554-701-010	1	
15	DY;DMK-1493AL	2439-056-710	1	
16	CRT PWB, ASSY;	0M904-000-2540	1	
17	SHIELD-CASE;SPTTE TO.306	4543-703-110	1	
18	SCREW-RH;M4X8 FE FZY	7048-140-081	3	
19	WASHER-TOOTHED;B PI6XPI4	7328-204-001	2	
20	CHASSIS-FRAME;SECC TO.8	6021-702-510	1	
21	SCREW-TAP, RH;2S-3X8 FE FZY	7148-530-081	4	
22	HOLDER-CEMENT,R ,SHBG-1/SECC-1 TO.8	6604-117-432	1	
23	R-CEMENT	1039-927-100	1	
24	HEATSINK-TR,HORIZ;AL 050P T1.8	5682-705-710	1	
25	NUT-HEX;1-M3 FE FZY	7028-113-001	2	
26	WASHER-SPRING;PI3.0 FE FZY	7318-103-001	2	
27	INSULATOR-TR;4.5-8D 2-3H N66 V-O	3934-103-110	2	
28	SCREW-TAP,RH;2S-3X8 FE FZY	7148-530-081	2	
29	PLATE-MICA;5-13X9 TO.09 RECT	3914-100-340	1	
30	TRANSISTOR;BU406	2159-301-410	1	
31	WASHER-REC;SBC-1 TI.5 NI	7304-701-110	1	
32	SCREW-RH; + M3X10 FE FZY	7048-130-010	2	
33	SHIELD-FBT;SPTTE TO.306	4542-701-114	1	

REF NO	DESCRIPTION	PART NO	Q'TY	REMARKS
34	TRANSISTOR;KSA1010	2149-102-240	1	
35	HEATSINK-TR,POWER;AL050S-H14 T1.8	5682-705-910	1	
36	ASSY-MAIN, PWB	0M904-000-2530	1	
37	SCREW-TAP,PH;2S-3X8 FE FZY W/WASHER	7154-230-081	7	
38	ASSY-POWER,PCB	0M905-000-1760	1	
39	SCREW-TH; + M4X8 FE FZY	7028-140-081	1	
40	SCREW-TH; + M4X8 FE FZY	7028-140-081	1	
41	TRANS-POWER;P:120V S:16.2V LOAD:1.5A	2869-301-910	1	
42	SCREW-PH;M4X25 FE FZB	7008-140-253	1	
43	HOLDER-CORD;NOLYL PX-1005 VO BGE 00	6601-703-020	1	#50924
44	SCREW-TAP,FH;2S-4X15 FE FZW	7118-540-152	2	
45	COVER-BACK;PPO VO BGE	6000-709-010	1	#50924
46	LABEL-LATING;POLYESTER TO.166	8033-726-130	1	
47	POWER-CORD,AC ASSY	3053-815-030	1	
48	CABLE-SIGNAL;ASSY	3052-400-720	1	
49	SHILD-VR;SPTTE TO.25	4543-705-210	1	
50	EARTH-PLATE;PBSP TO.3	4553-700-410	1	
51	RUBBER-SUPPORT;NEPRENE RUBBER	8464-703-210	1	
52	WASHER-PLAIN;104512 SPC-1 FZY	7304-101-040	1	
53	STAND-ASSY;MD-1467	8302-700-910	1	

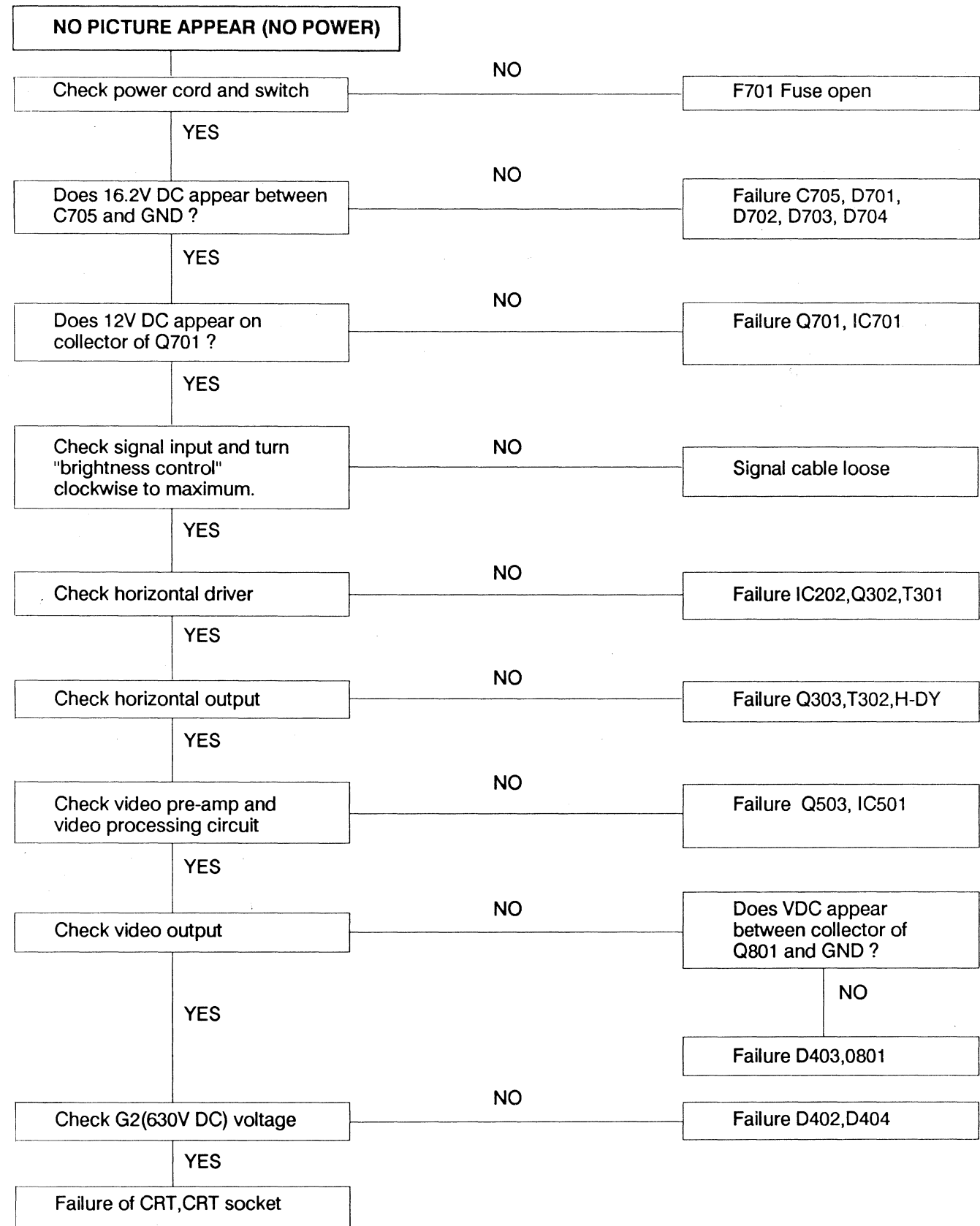
# WIRING DIAGRAM AND PARTS LOCATION

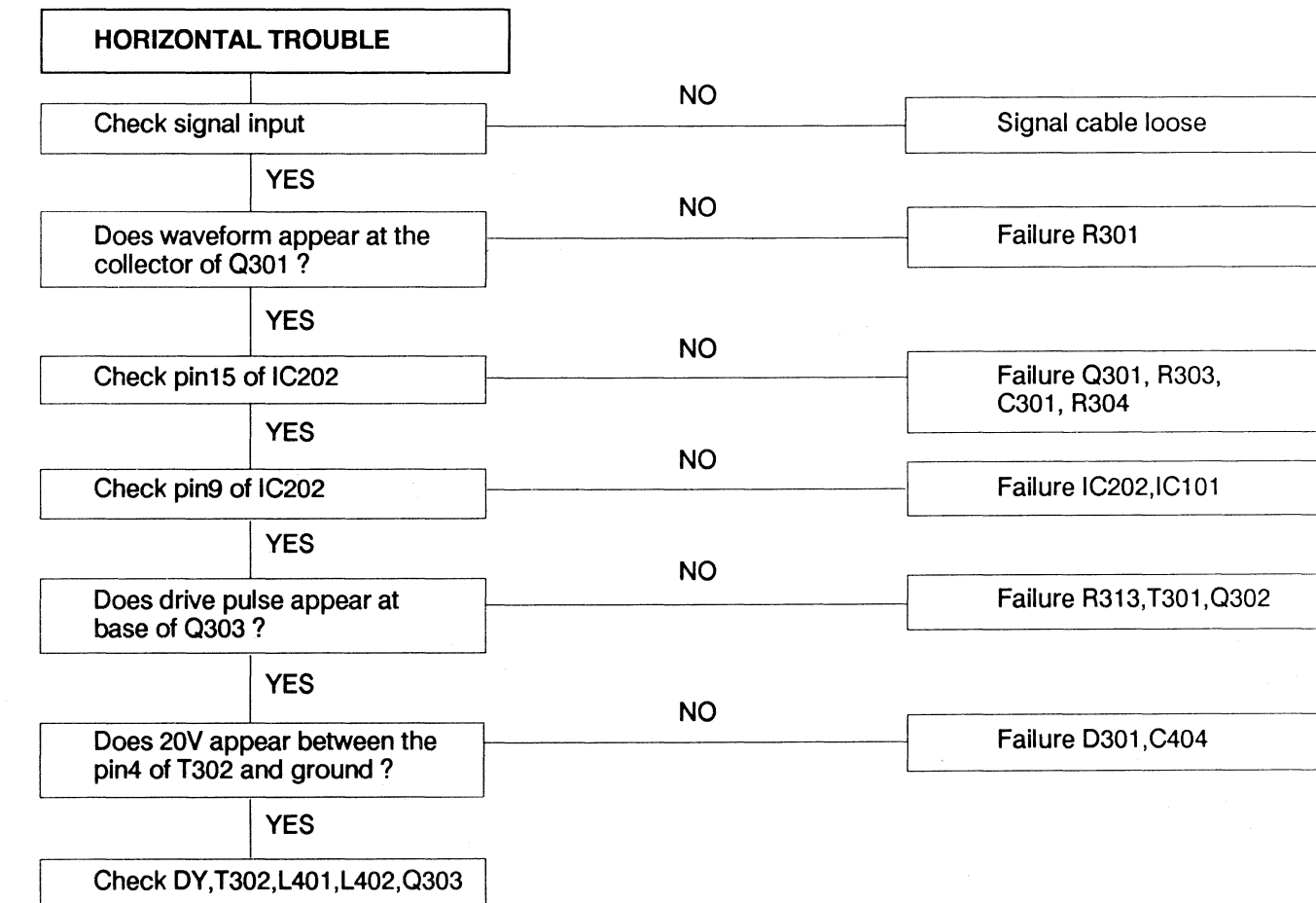
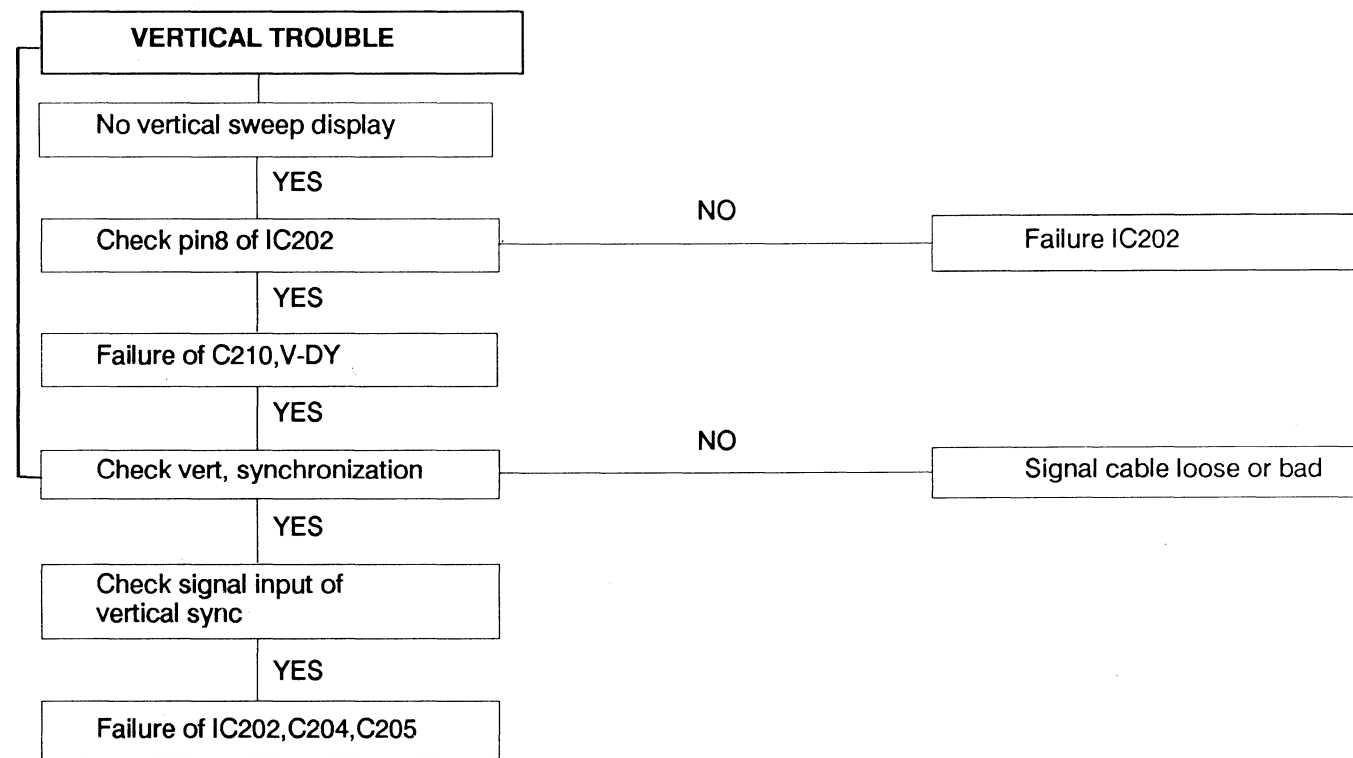


### BLOCK DIAGRAM

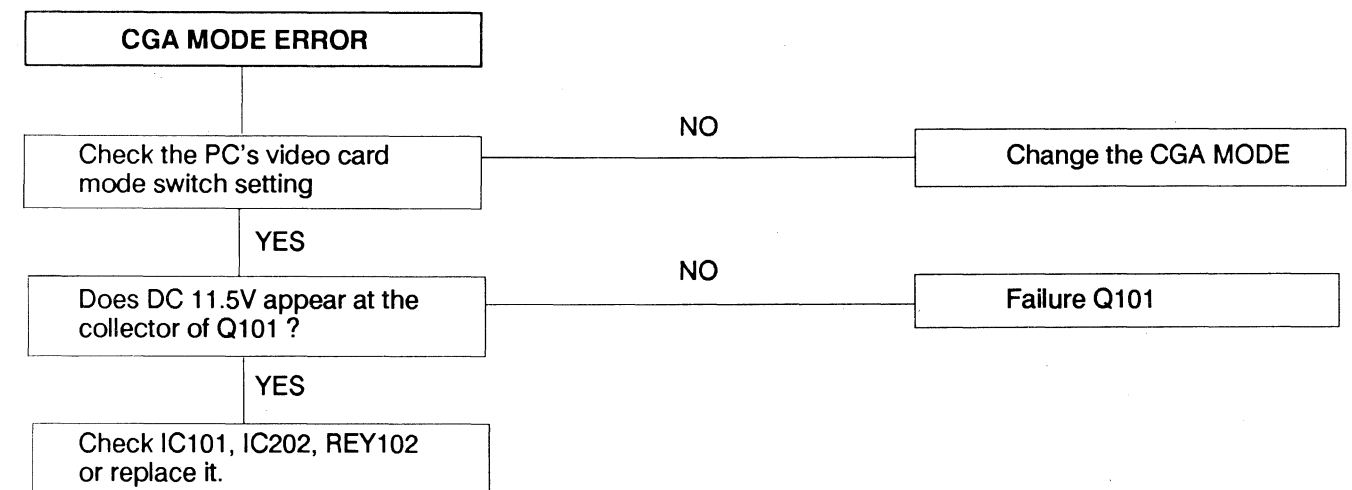
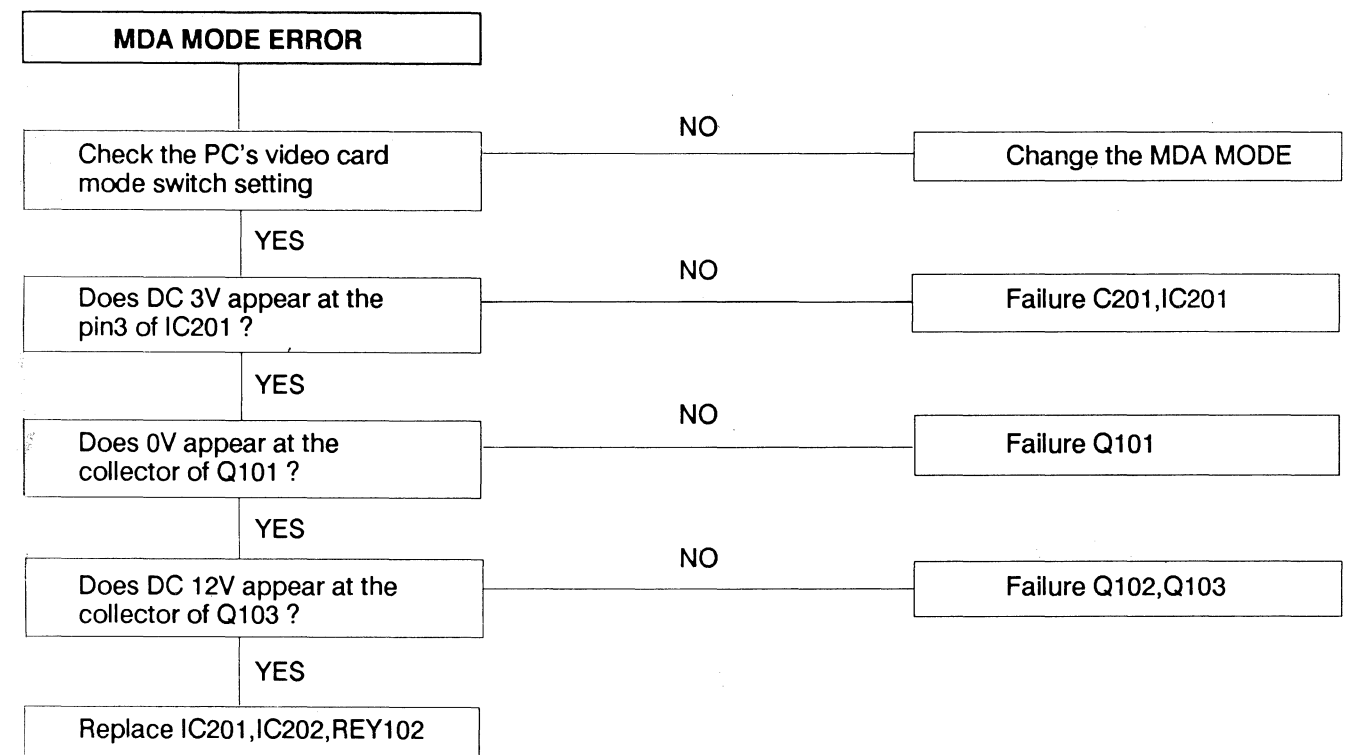


### TROUBLE SHOOTING GUIDE





### MODE CHANGE ERROR



\* When an error occur in mode change, Check IC101 or IC201 carefully.



# SCHEMATIC DIAGRAM

MODEL NO: MZ467\*

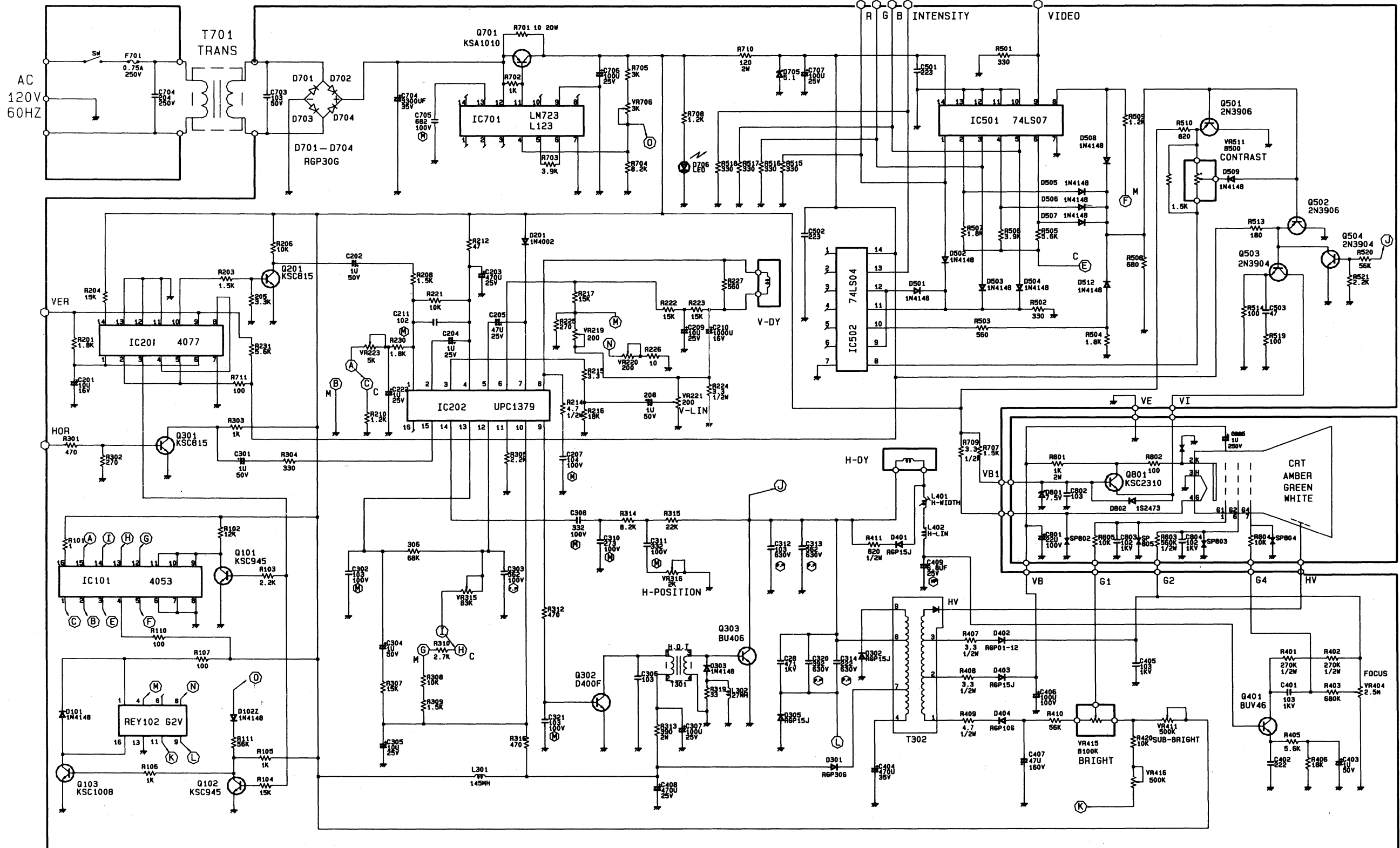
CHASSIS NO: GSK

## NOTES

1. RESISTOR VALUES ARE IN (OHM) K=1,000HM M=1,000,000HM.
2. ALL RESISTORS ARE 1/4W EXCEPT WHERE OTHERWISE INDICATED.
3. ALL CAPACITORS ARE 50V EXCEPT WHERE OTHERWISE INDICATED.
4. CAPACITORS VALUES ARE PF UNLESS OTHERWISE INDICATED, U=UF-TEN TO THE MINUS SIX FARAD.
5. \* THE SYMBOL OF GROUND
6. THIS IS FUNDAMENTAL CIRCUIT DIAGRAM, SOME PRODUCTION CHANGES MAY BE MADE WITHOUT REVISION OF THE DIAGRAM.

**WARNING:** THIS EQUIPMENT CONTAINS SAFETY CRITICAL COMPONENTS ALL PARTS SHOWN IN THE SHADE AREAS OF THE SCHEMATIC ARE SAFETY CRITICAL FOR CONTINUED SAFETY REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURERS RECOMMENDED PARTS REFER TO PARTS LIST FOR EXACT REPLACEMENTS.

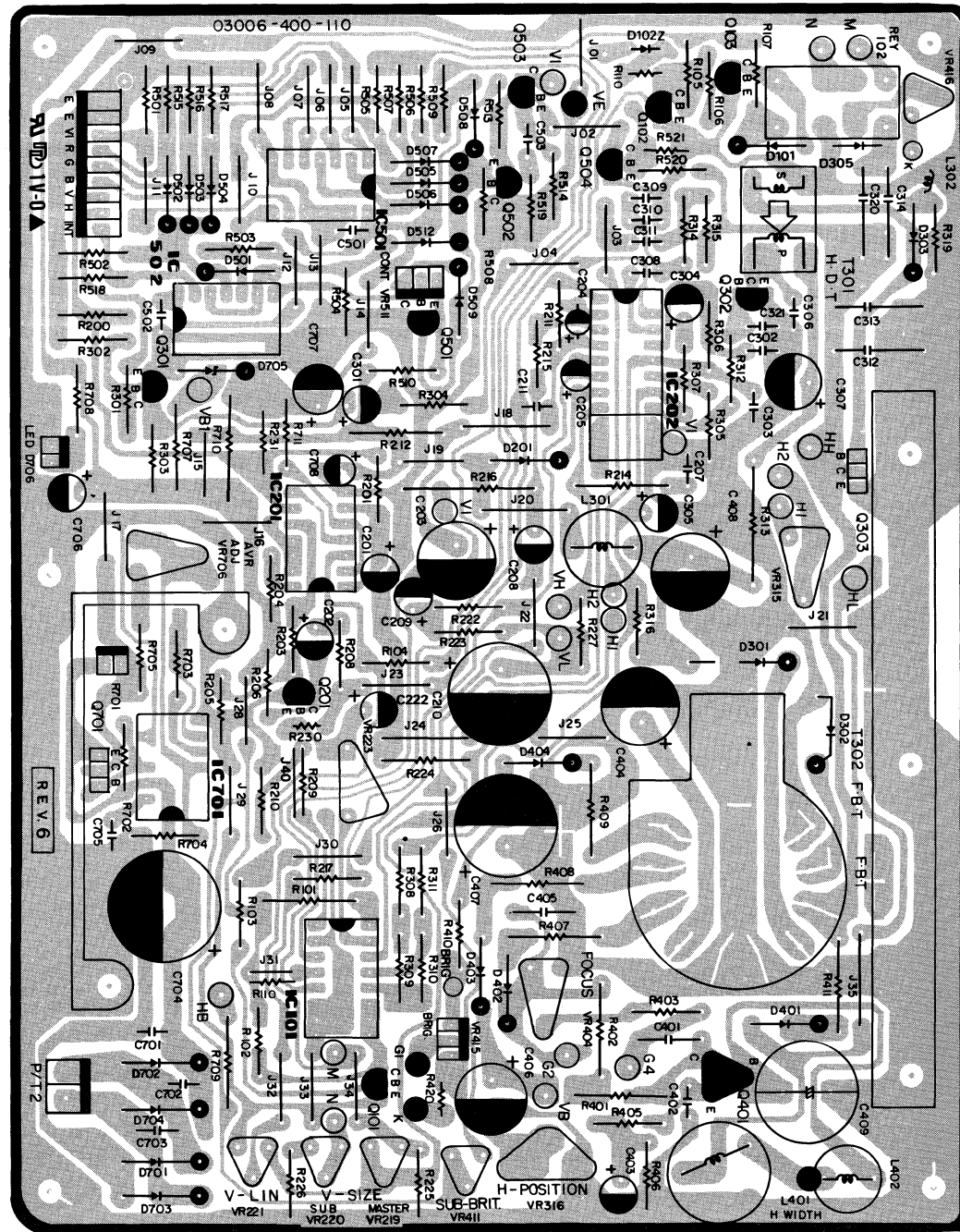
**AVERTISSEMENT:** CET EQUIPEMENT EQUIPE DE COMPOSANTS CRITIQUES POUR LA SECURITE TOUTES LES PIECES INDIQUEES DANS LES ZONES OMBREES DU SCHEMA SONT CRITIQUES POUR LA SECURITE POUR MAINTENIR LE DEGRE DE SECURITE DE L'APPAREIL NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SECURITE QUE PAR DES PIECES RECOMMANDEES PAR LE FABRICANT CONSULTER LA NOMENCLATURE DES PIECES POUR TROUVER LES PIECES DE RECHANGE EXACTE.



# PRINTED CIRCUIT BOARD

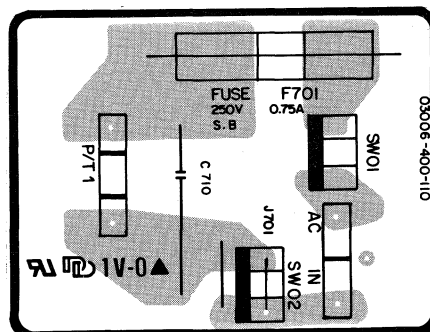
## Main PC Board

Top View

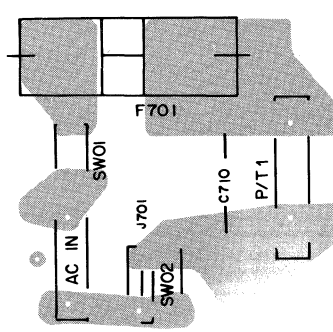


## Power PC Board

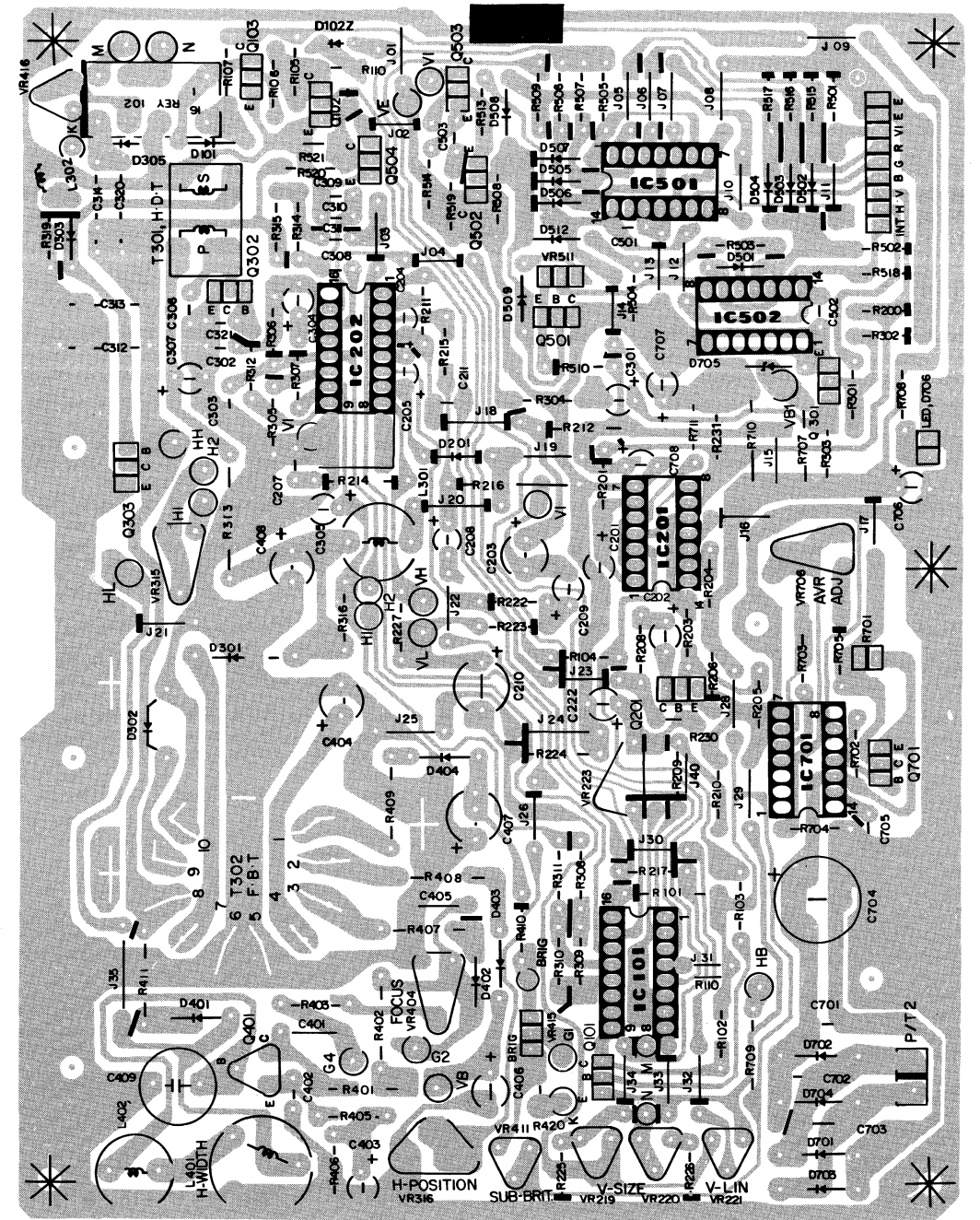
Top View



Bottom View

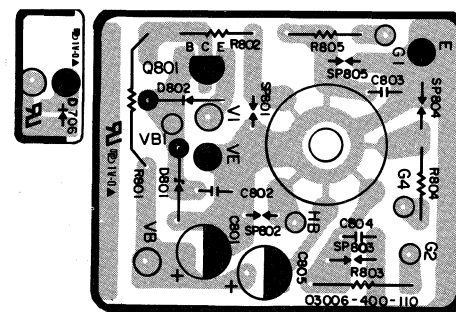


Bottom View

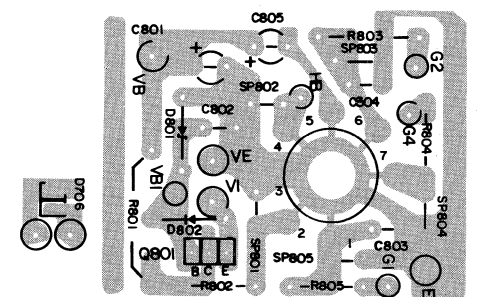


## CRT PC Board

Top View

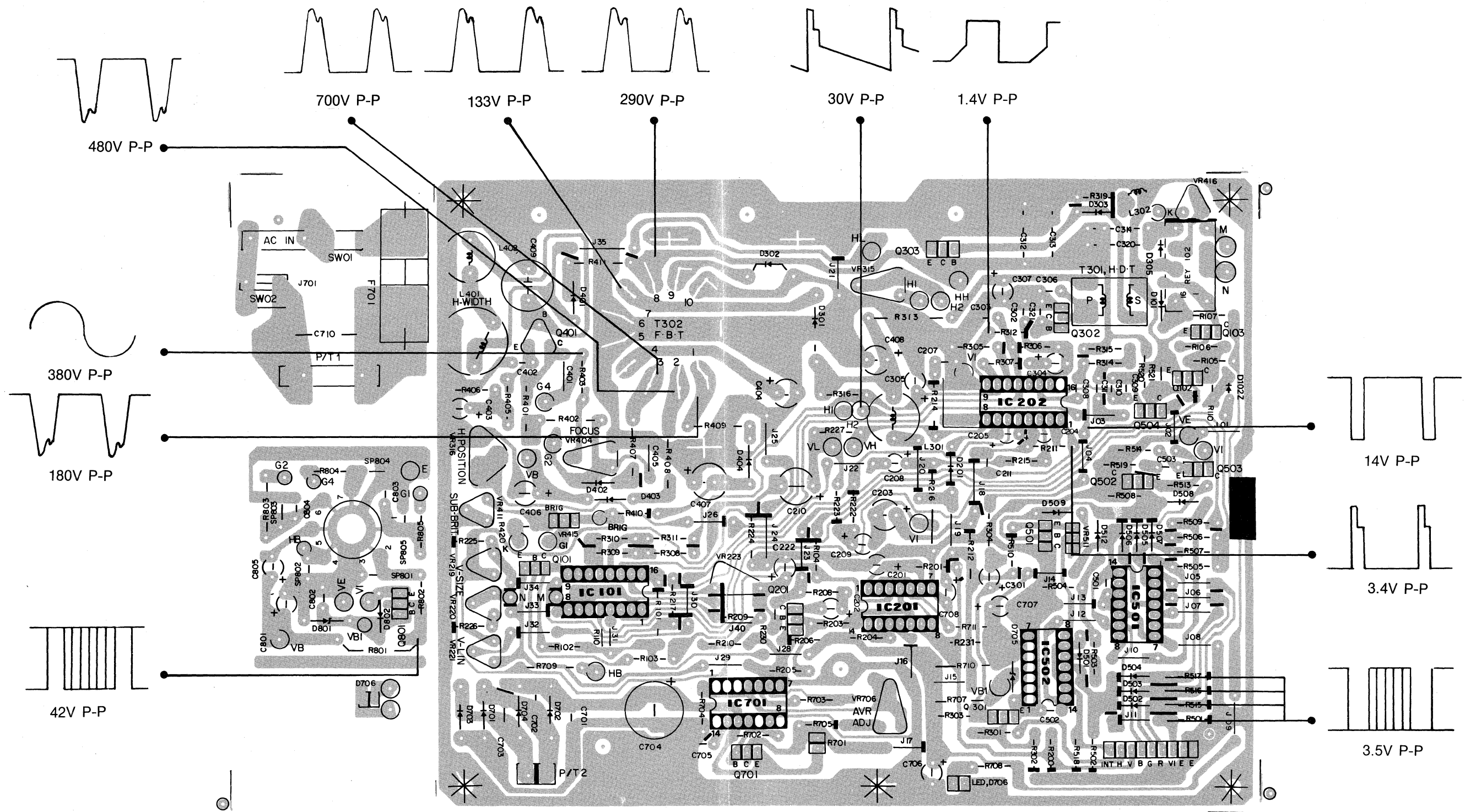


Bottom View

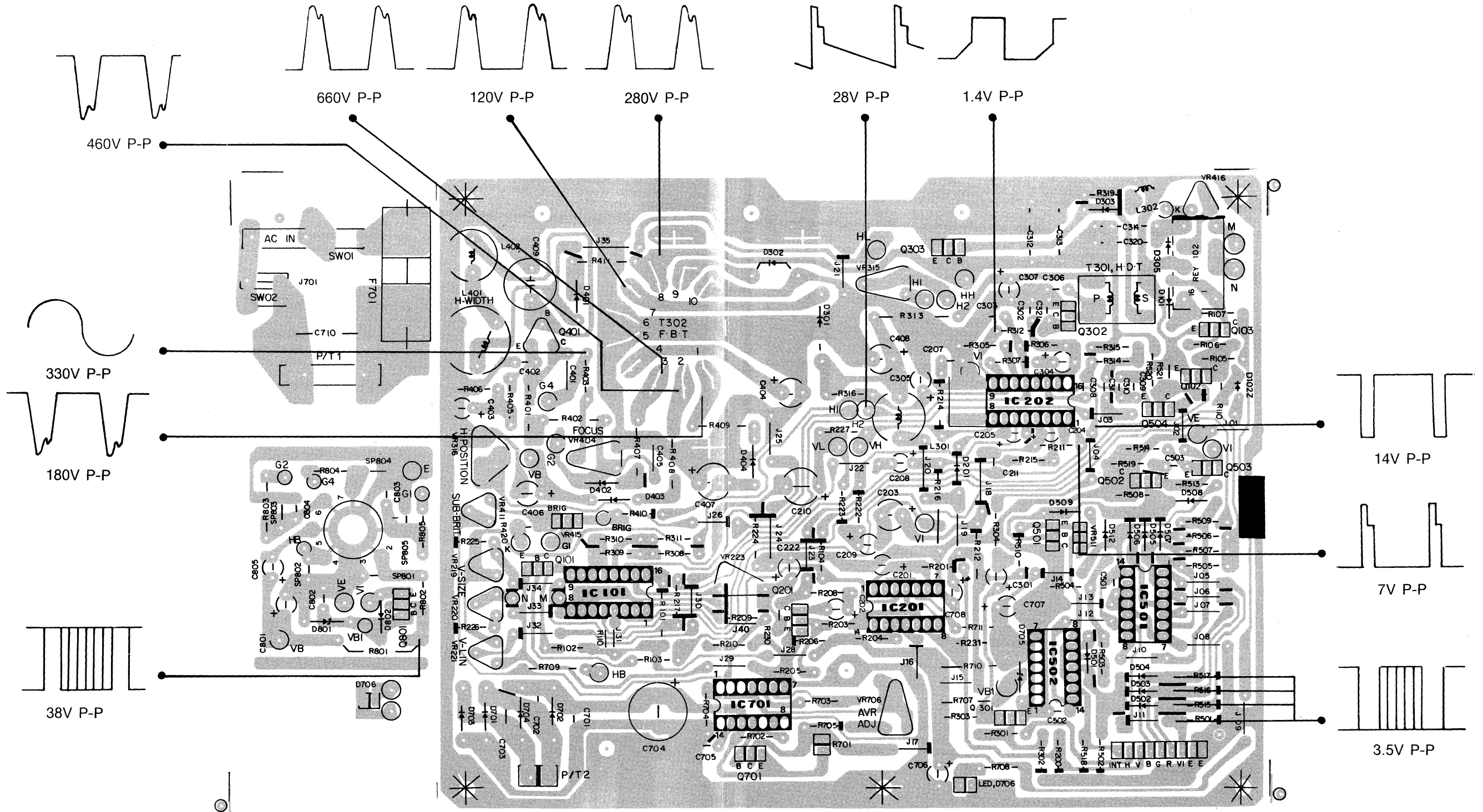




WAVEFORMS (CGA)



WAVEFORMS (MDA)



## PIN VOLTAGE OF IC

	UPC1379		4077		4053		7407		7404		L123	
	CGA	MDA	CGA	MDA	CGA	MDA	CGA	MDA	CGA	MDA	CGA	MDA
1	4.2	3.9	0	4	0	0	1.8	2.6	OPEN		OPEN	
2	6.8	6.8	4.4	4.4	0	0	2.2	0.1	OPEN		OPEN	
3	3.6	3.8	0	2.8	8.8	0	1.8	2.6	OPEN		OPEN	
4	11	11.5	0	3.6	9.4	10.5	2.2	0.1	OPEN		7.4	7.4
5	1.2	1.0	4.4	4.4	0	9.7	1.8	2.5	OPEN		7.4	7.4
6	1.9	2	0	4	0	0	2.2	0.1	OPEN		7.4	7.4
7	11.2	11.53	0	0	0	0	0	0	0	0	0	0
8	5.9	5.9	0	3.6	0	0	0	3.1	1.6	2.3	OPEN	
9	0.4	0.4	0	4	11.5	0	1.8	2.5	2.1	1.7	0	0
10	6.8	6.8	2.5	2.4	11.5	0	0	0	0	0	OPEN	
11	0	0	0	0	11.5	0	0	0	2.6	2.7	14.6	14.8
12	3.5	3.5	0	0	4.3	3.7	0	0	2.1	1.7	15.3	15.4
13	3.5	3.3	0	0	3.7	3.8	0	0	1.2	1.8	8.2	8.2
14	2.3	2.3	3.6	3.5	3.7	3.7	4.9	5.1	4.9	5.1	OPEN	OPEN
15	10.76	10.3	.	.	0.8	0	.	.	.	.	.	.
16	OPEN	OPEN	.	.	11.5	12	.	.	.	.	.	.

## REPLACEMENT PARTS LIST

(ELECTRICAL PARTS)

### IMPORTANT SAFETY NOTICE

Components identified by the symbol ! have special characteristic important for safety. When replacing any of these components use only manufacturer's specified parts.

NOTE : Tolerance F; +/-1%,J; +/-5%,K; +/-10%,M; +/-20%,P; +100%-0%,Z; +80%-20%

REF NO	DESCRIPTION	PART NO	REMARK
<b>RESISTOR</b>			
R101	R-CARBON;RD1/2T 1-J	1016-377-109	
R102	R-CARBON;RD1/4T 12K-J	1018-277-123	
R103	R-CARBON;RD1/4T 2.2K-J	1018-277-222	
R104	R-CARBON;RD1/4T 15K-J	1018-277-153	
R105	R-CARBON;RD1/4T 1K-J	1018-277-102	
R106	R-CARBON;RD1/4T 1K-J	1018-277-102	
R107	R-CARBON;RD1/4T 100-J	1018-277-101	
R110	R-CARBON;RD1/4T 330-J	1018-277-331	
R201	R-CARBON;RD1/4T 1.8K-J	1018-277-182	
R203	R-CARBON;RD1/4T 1.5K-J	1018-277-152	
R204	R-CARBON;RD1/4T 15K-J	1018-277-153	
R205	R-CARBON;RD1/4T 3.3K-J	1018-277-332	
R206	R-CARBON;RD1/4T 10K-J	1018-277-103	
R208	R-CARBON;RD1/4T 1.5K-J	1018-277-152	
R210	R-CARBON;RD1/4T 1.2K-J	1018-277-122	
R211	R-CARBON;RD1/4T 10K-J	1018-277-103	
R212	R-CARBON;RD1/2T 47-J	1016-377-470	
R214	R-CARBON;RD1/2T 3.3-J	1016-377-339	
R215	R-CARBON;RD1/4T 15K-J	1018-277-153	
R216	R-CARBON;RD1/4T 18K-J	1018-277-183	
R217	R-CARBON;RD1/4T 15K-J	1018-277-153	
R222	R-CARBON;RD1/4T 15K-J	1018-277-153	
R223	R-CARBON;RD1/4T 15K-J	1018-277-153	
R224	R-CARBON;RD1/2T 3.3-J	1016-377-339	
R225	R-CARBON;RD1/4T 270-J	1018-277-271	
R226	R-CARBON;RD1/4T 10-J	1018-277-100	
R227	R-CARBON;RD1/4T 560-J	1018-277-561	
R230	R-CARBON;RD1/4T 1.8K-J	1018-277-182	

REF NO	DESCRIPTION	PART NO	REMARK
R231	R-CARBON;RD1/4T 5.6K-J	1018-277-562	
R301	R-CARBON;RD1/4T 470-J	1018-277-471	
R302	R-CARBON;RD1/4T 270-J	1018-277-271	
R303	R-CARBON;RD1/4T 1K-J	1018-277-102	
R304	R-CARBON;RD1/4T 330-J	1018-277-331	
R305	R-CARBON;RD1/4T 2.2K-J	1018-277-222	
R306	R-CARBON;RD 1/4T 68K-J	1018-277-683	
R307	R-CARBON;RD 1/4T 15K-J	1018-277-153	
R308	R-CARBON;RD 1/4T 10K-J	1018-277-103	
R309	R-CARBON;RD 1/4T 1.5K-J	1018-277-152	
R310	R-CARBON;RD 1/4T 2.7K-J	1018-277-272	
R312	R-CARBON;RD 1/4T 470-J	1018-277-471	
R313	R-METAL OXIDE;RS 2P 39-J	1085-527-390	
R314	R-CARBON;RD 1/4T 8.2K-J	1018-277-822	
R315	R-CARBON;RD 1/4T 22K-J	1018-277-223	
R316	R-CARBON;RD 1/4T 470-J	1018-277-471	
R319	R-CARBON;RD 1/4T 33-J	1018-277-330	
R401	R-CARBON;RD 1/2T 270K-J	1016-377-274	
R402	R-CARBON;RD 1/2T 270K-J	1016-377-274	
R403	R-CARBON;RD 1/4T 680K-J	1018-277-684	
R405	R-CARBON;RD 1/4T 5.6K-J	1018-277-562	
R406	R-CARBON;RD 1/4T 18K-J	1018-277-183	
R407	R-CARBON;RD 1/2T 3.3-J	1016-377-339	
R408	R-CARBON;RD 1/2T 3.3-J	1016-377-339	
R409	R-CARBON;RD 1/2T 4.7-J	1016-377-479	
R410	R-CARBON;RD 1/4T 56K-J	1018-277-563	
R411	R-COMPOSITION;RC 1/2T 820-J	1028-378-821	
R420	R-CARBON;RD 1/4T 10K-J	1018-277-103	
R501	R-CARBON;RD 1/4T 330-J	1018-277-331	
R502	R-CARBON;RD 1/4T 330-J	1018-277-331	
R503	R-CARBON;RD 1/4T 560-J	1018-277-561	
R504	R-CARBON;RD 1/4T 1.8K-J	1018-277-182	
R505	R-CARBON;RD 1/4T 5.6K-J	1018-277-562	
R506	R-CARBON;RD 1/4T 3.9K-J	1018-277-392	
R507	R-CARBON;RD 1/4T 1.8K-J	1018-277-182	

REF NO	DESCRIPTION	PART NO	REMARK
R508	R-CARBON;RD 1/4T 680-J	1018-277-681	
R509	R-CARBON;RD 1/4T 1.2K-J	1018-277-122	
R510	R-CARBON;RD 1/4T 820-J	1018-277-821	
R513	R-CARBON;RD 1/4T 180-J	1018-277-181	
R514	R-CARBON;RD 1/4T 100-J	1018-277-101	
R515	R-CARBON;RD 1/4T 330-J	1018-277-331	
R516	R-CARBON;RD 1/4T 330-J	1018-277-331	
R517	R-CARBON;RD 1/4T 330-J	1018-277-331	
R518	R-CARBON;RD 1/4T 330-J	1018-277-331	
R519	R-CARBON;RD 1/4T 100-J	1018-277-101	
R520	R-CARBON;RD 1/4T 56K-J	1018-277-563	
R521	R-CARBON;RD 1/4T 2.2K-J	1018-277-222	
R701	R-CEMENT;RP 20P 10-J	1039-927-100	
R702	R-CARBON;RD 1/4T 1K-J	1018-277-102	
R703	R-CARBON;RD 1/4T 3.9K-J	1018-277-392	
R704	R-CARBON;RD 1/4T 8.2K-J	1018-277-822	
R705	R-CARBON;RD 1/4T 3K-J	1018-277-302	
R707	R-CARBON;RD 1/4T 1.5K-J	1018-277-152	
R708	R-CARBON;RD 1/4T 1.2K-J	1018-277-122	
R709	R-CARBON;RD 1/4T 3.3-J	1018-277-339	
R710	R-METAL OXIDE;RS 2P 120-J	1085-527-121	
R711	R-CARBON;RD 1/4T 100-J	1018-277-101	
R801	R-METAL OXIDE;RS 3P 1K-J	1045-627-102	
R802	R-CARBON;RD 1/4T 100-J	1018-277-101	
R803	R-CARBON;RD 1/2T 560K-J	1016-377-564	
R804	R-CARBON;RD 1/4T 10K-J	1018-277-103	
R805	R-CARBON;RD 1/4T 10K-J	1018-277-103	
<b>DIODE</b>			
D101	DIODE;1N4148	2169-301-417	
D102Z	DIODE;1N4148	2169-301-417	
D201	DIODE;1N4002	2169-201-067	
D301	DIODE;RGP30G	2169-206-190	
D302	DIODE;RGP15J	2169-206-177	
D303	DIODE;1N4148	2169-301-417	



REF NO	DESCRIPTION	PART NO	REMARK
D305	DIODE;RGP15J	2169-206-177	
D401	DIODE;RGP15J	2169-206-177	
D402	DIODE;RGP01-12	2169-206-020	
D403	DIODE;RGP15J	2169-206-177	
D404	DIODE;RGP10G	2169-206-107	
D501	DIODE;1N4148	2169-301-418	
D502	DIODE;1N4148	2169-301-418	
D503	DIODE;1N4148	2169-301-418	
D504	DIODE;1N4148	2169-301-418	
D505	DIODE;1N4148	2169-301-418	
D506	DIODE;1N4148	2169-301-418	
D507	DIODE;1N4148	2196-301-418	
D508	DIODE;1N4148	2169-301-418	
D509	DIODE;1N4148	2169-301-418	
D512	DIODE;1N4148	2169-301-418	
D701	DIODE;RGP30G	2169-206-190	
D702	DIODE;RGP30G	2169-206-190	
D703	DIODE;RGP30G	2169-206-190	
D704	DIODE;RGP30G	2169-206-190	
D705	DIODEZENER;RD5.1	2169-453-557	
D706	LED;KLG28E	2309-110-090	
D801	DIODEZENER;RD7.5	2169-403-097	
D802	DIODE;1S2473	2169-103-167	
<b>CAPACITOR</b>			
C201	C-ELECTROLYTIC;CE04W 16V 10MF	1608-903-110	
C202	C-ELECTROLYTIC;CE04W 50V 1MF	1608-906-109	
C203	C-ELECTROLYTIC;CE04W 25V 470MF	1609-401-710	
C204	C-TANTALIUM SOLID;CS25V 1MF-K	1629-201-140	
C205	C-ELECTROLYTIC;CE04W 25V 47MF	1608-904-470	
C207	C-POLYESTER;CQ921M 100V 0.1MF-J	1505-723-104	
C208	C-ELECTROLYTIC;CE04W 50V 1MF	1068-906-109	
C209	C-ELECTROLYTIC;CE04W 25V 10MF	1609-401-430	
C210	C-ELECTROLYTIC;CE04W 16V 1000MF	1609-401-510	
C211	C-POLYESTER;CQ921M 100V 0.033MF-K	1505-724-333	



REF NO	DESCRIPTION	PART NO	REMARK
C222	C-ELECTROLYTIC;CE04W 50V 1MF	1608-906-109	
C301	C-ELECTROLYTIC;CE04W 50V 1MF	1608-906-109	
C302	C-POLYESTER;CQ921M 100V 0.0068-J	1505-723-682	
C303	C-POLYPROPYLENE;CQ922M 50V 0.0056MF-J	1502-613-562	
C304	C-ELECTROLYTIC;CE04W 50V 1MF	1608-906-109	
C305	C-ELECTROLYTIC;CE04W 25V 10MF	1608-904-100	
C306	C-CERAMIC,HK;CK45 50V 0.01MF-Z	1417-344-103	
C307	C-ELECTROLYTIC;CE04W 25V 100MF	1609-401-680	
C308	C-POLYESTER;CQ921M 100V 0.0033-K	1505-724-332	
C310	C-POLYESTER;CQ921M 100V 0.027-J	1505-723-273	
C311	C-POLYESTER;CQ921M 100V 0.0033-K	1505-724-332	
C312	C-POLYPROPYLENE;CQ922M 630V 0.01MF-K	1502-554-103	
C313	POLYPROPYLENE;CQ922M 630V 0.0056MF-J	1502-553-562	
C314	C-POLYPROPYLENE;CQ922M 630V 0.0022MF-J	1502-553-222	
C320	C-POLYPROPYLENE;CQ922M 630V 0.0039MF-J	1502-553-392	
C321	C-POLYESTER;CQ921M 100V 0.01-J	1505-723-103	
C401	C-M,POLYESTER;CF922M 1KV 0.01MF-K	1519-005-010	
C402	C-CERAMIC HK;CK45 50V 2200-Z	1417-344-222	
C403	C-ELE CTROLYTIC;CE04W 50V 1MF	1608-906-109	
C404	C-ELECTROLYTIC;CE04W 35V 470MF	1603-905-471	
C405	C-M,POLYESTER;CF922M 1KV 0.01MF-K	1519-005-010	
C406	C-ELECTROLYTIC;CE04W 100V 100MF	1609-403-100	
C407	C-ELECTROLYTIC;CE04W 160V 47MF	1609-403-240	
C408	C-ELECTROLYTIC;CE04W 25V 470MF	1609-401-710	
C409	C-ELECTROLYTIC,NPHF;CE04P 25V 6.8MF	1609-802-020	
C501	C-CERAMIC,HK;CK45 50V 0.022M-Z	1417-344-223	
C502	C-CERAMIC,HK;CK45 50V 0.022M-Z	1417-344-223	
C503	C-CERAMIC TEMP;CC45 50V 47-J	1407-057-470	
C703	C-CERAMIC,HK;CK45B 1KV 470-K	1419-901-090	
C704	C-ELECTROLYTIC;CE04W 35V 3300MF	1609-401-970	
C705	C-POLYESTER;CQ921M 100V 0.0068-J	1505-723-682	
C706	C-ELECTROLYTIC;CE04W 25V 100MF	1608-904-101	
C707	C-ELECTROLYTIC;CE04W 25V 100MF	1608-904-101	
C708	C-ELECTROLYTIC;CE04W 25V 10MF	1608-904-100	
C710	C-METALIZE POLY FILM;250V AC 0.2MF	1565-512-224	

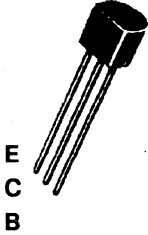
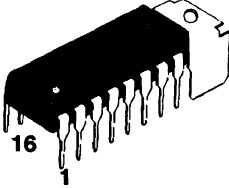
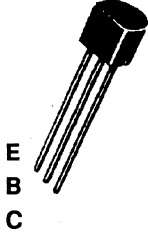
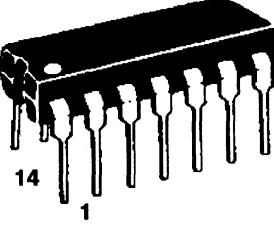
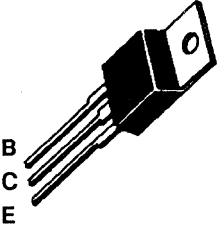
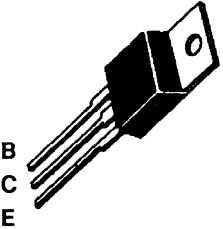
REF NO	DESCRIPTION	PART NO	REMARK
C801	C-ELECTROLYTIC;CE04W 100V 22MF	1603-908-220	
C802	C-CERAMIC,HK;CK45 B 50V 10000-K	1416-318-103	
C803	C-CERAMIC,HK;CK45B 1KV 1000-K	1416-618-102	
C804	C-CERAMIC,HK;CK45B 1KV 1000-K	1416-618-102	
C805	C-ELECTROLYTIC;CE04W 250V 1MF	1609-403-450	
<b>INTERGRATED CIRCUIT</b>			
IC101	IC-CMOS;HCF-4053BE	2109-104-120	
IC201	IC-CMOS;HCF-4077BE	2109-303-390	
IC202	IC-UPC 1379C	2119-101-370	
IC501	IC-TTL;SN74LS07	2109-101-880	
IC502	IC-TTL;SN74LS04	2109-101-050	
IC701	IC;LM723C	2119-601-980	
<b>TRANSISTOR</b>			
Q101	TRANSISTOR;KSC 945-Y	2139-302-747	
Q102	TRANSISTOR;KSC 945-Y	2139-302-747	
Q103	TRANSISTOR;KSC 1008-Y	2149-301-437	
Q201	TRANSISTOR;KSC 815-Y	2159-301-187	
Q301	TRANSISTOR;KSC 815-Y	2159-301-187	
Q302	TRANSISTOR;2SD 400-F	2139-401-390	
Q303	TRANSISTOR;BU406	159-301-410	
Q401	TRANSISTOR;BUV46	2139-401-730	
Q501	TRANSISTOR;2N3906	2139-401-757	
Q502	TRANSISTOR;2N3906	2139-401-757	
Q503	TRANSISTOR;2N3904	2139-301-070	
Q504	TRANSISTOR;2N3904	2139-301-070	
Q701	TRANSISTOR;KSA1010-Y	2149-102-240	
Q801	TRANSISTOR;KSC2310-Y	2139-302-247	
<b>VARIABLE RESISTOR</b>			
VR219	VR-SEMI;CET 117A B200	1241-110-004	
VR220	VR-SEMI;CET 117A B200	1241-110-004	
VR221	VR-SEMI;CET 117A B200	1241-110-004	
VR223	VR-SEMI;CET 92A B5K	1241-108-003	
VR315	VR-SEMI;CET 92A B3K	1241-108-005	

REF NO	DESCRIPTION	PART NO	REMARK
VR316	VR-SEMI;SN8285 B 2K CTS	1246-101-175	
	SHAFT-VR;NYLON66 DL-94V-2	5104-707-011	
VR404	VR-SEMI;CET 92A B2.5M	1241-108-012	
VR411	VR-SEMI;CET 117A B500K	1241-110-006	
VR415	VR-ROUND;18SN 10SK B100K	1241-102-905	
VR416	VR-SEMI;CET 117A B500K	1241-110-006	
VR511	VR-ROUND;18SN 10SK B500	1201-102-903	
VR706	VR-SEMI;CET 92A B3K	1241-108-005	
<b>TRANS &amp; COIL</b>			
T301 !	TRANS-HORIZ;19 X 5.5mm	2849-032-310	
T302 !	TRANS-FLYBACK;FMH-1245AL	2859-128-912	
T701 !	TRANS-POWER;AC120V S:16.5V 1.5A	2869-301-910	
L301	COIL-CHOKE;145MH(+/-)10%	2429-060-210	
L302	COIL-PEACKING;27MH-K	2429-837-010	
L401	COIL-HOR WIDTH;33MH(+/-)40%	2429-434-510	
L402	COIL-HOR LINEARITY;8.0MH	2449-734-110	
DY !	DEFL-YOKE;DMK-1493AL	2439-056-710	
REY102 !	RELAY;RZ2H12	4724-102-020	
<b>OTHER</b>			
CRT !	CRT-MONOCHROME;M32ECB2WD	2019-133-710	
	CRT-MONOCHROME;M32ECB2GR	2019-133-810	
	CRT-MONOCHROME;M32ECB2LA	2019-133-910	
VB	WIRE-VINYL U/C;1007#20-WHT	0528-702-009	
N	WIRE-VINYL U/C;1007#22-BLK	0528-702-200	
G1	WIRE-VINYL U/C;1007#22-RED	0528-702-202	
K+K	WIRE-VINYL U/C;1007#22-ORG	0528-702-203	
HB	WIRE-VINYL U/C;1007#22-YEL	0528-702-204	
H2+H2	WIRE-VINYL U/C;1007#22-YEL	0528-702-204	
VBI	WIRE-VINYL U/C;1007#22-GRN	0528-702-205	
M	WIRE-VINYL U/C;1007#22-GRN	0528-702-205	
H1+H1	WIRE-VINYL U/C;1007#22-BLU	0528-702-206	
V1+V1	WIRE-VINYL U/C;1007#22-WHT	0528-702-209	
VL	WIRE-VINYL U/C;1007#22-WHT	0528-702-209	
CRT+GD	WIRE-VINYL U/C;1015#22-BLK	0528-732-200	

REF NO	DESCRIPTION	PART NO	REMARK
HL	WIRE-VINYL U/C;1015#22-BLK	0528-732-200	
G2	WIRE-VINYL U/C;1015#22-BRN	0528-732-201	
HH	WIRE-VINYL U/C;1015#22-BRN	0528-732-201	
VI + VE	WIRE-SHELD U/C;1185#22-9 GRN	0539-062-205	
CONNEC-	CONNECTOR-WAFER;B3P-VH	3344-131-020	
TOR	CONNECTOR-WAFER;5045-02A	3344-106-020	
	CONNECTOR-WAFER;5273-02A	3344-112-010	
	CONNECTOR-PIN BASE;B9B-XH-A	3344-153-050	
	CONNECTOR-WAFER;5045-03A	3349-062-020	
FUSE !	FUSE;61S 250V 0.75A SLOW-B	4709-090-010	
F-CLIP	FUSE-CLIP;PBP3 1/2H 0.4T	3164-700-111	
SP801	LAMP-NEON;DMS 90-130V DC	2029-010-010	
SP802	LAMP-NEON;DMS 90-130V DC	2029-010-010	
SP803	SPARK-GAP;S-23(1KV)	4569-001-110	
SP804	SPARK-GAP;S-23(1KV)	4569-001-110	
SP805	LAMP-NEON;DMS 90-130V DC	2029-010-010	
C-SOCKET	SOCKET-CRT;7PIN	3354-700-910	
S/W !	SWITCH-PUSH;ESB8213V	3529-702-210	
PIN GT	PIN GT;18mm 2.35PI	3124-101-253	
E.PLATE	EARTH-PLATE;PBSP TO.3	4553-700-410	
MAGNET	MAGNET-RUBBER;10 GAUSS	4034-701-010	
	MAGNET-RUBBER;20 GAUSS	4034-701-020	
	MAGNET-RUBBER;30 GAUSS	4034-701-030	
	MAGNET-RUBBER;40 GAUSS	4034-701-110	
	MAGNET-RUBBER;50 GAUSS	4034-701-120	
<b>ASSY</b>			
	ASSY-ACCESSORY	0M901-000-8580	
	ASSY-MAIN PCB	0M904-000-4350	
	ASSY-CHASSIS FRAME	0M904-000-5280	
	ASSY-POWER SWITCH	0M905-000-2610	
	ASSY-LED	0M905-000-2750	
	ASSY-CONTRAST,BRIGHT VR	0M905-000-2870	
	ASSY-R,CEMENT	0M905-000-1770	
	ASSY-TR,POWER REGULATOR	0M905-000-1800	

REF NO	DESCRIPTION	PART NO	REMARK
	ASSY-TR,HORIZONTAL ASSY-POWER.PCB	0M905-000-1810 0M905-000-1760	
<b>SPECIAL ASSY</b>			
	ASSY SIGNAL CABLE;MZ467* U. S. A ASSY POWER CORD;HC-A121, SVT7.5	03052-400-720 03053-815-030	

## SEMICONDUCTOR LEAD IDENTIFICATION

SEMICONDUCTORS	DESCRIPTION	REF.NO.	SEMICONDUCTORS	DESCRIPTION	REF.NO.
	C2310 2SD400-F	Q801 Q302		UPC1379,KA2133	IC202
	KSC1008 KSC945 KSC815 2N3904 2N3906	Q103 Q101,Q102 Q201,Q301 Q503,Q504 Q501,Q502		L123CB LM723 74LS07 74ALS04 14053BCP 14077BCP	IC701  IC501 IC502 IC101 IC201
	BU 406	Q303			
	TIP42C,KSA1010 BUV46,KSC5021	Q701 Q401			

# MEMO

# MEMO



