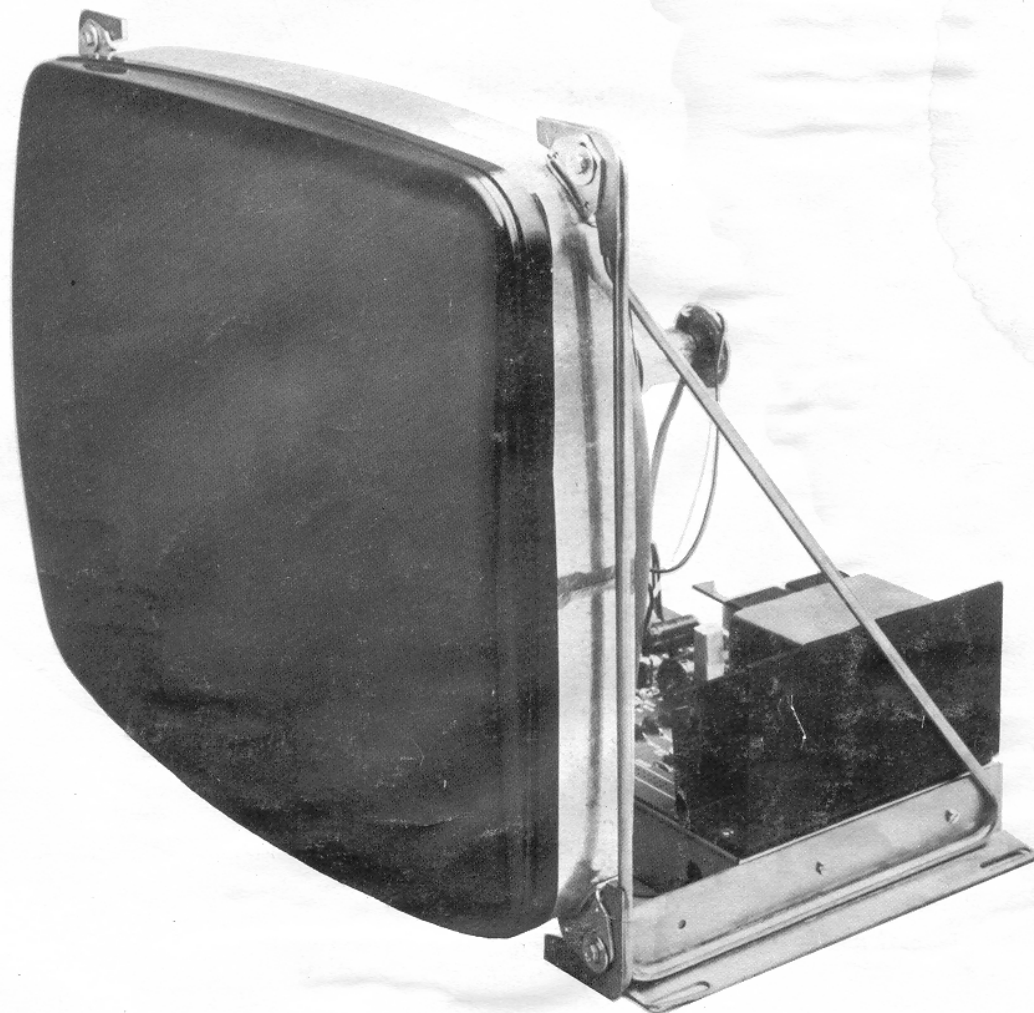


VG 978 TV MONITOR DISPLAY FOR VIDEOGAMES

SERVICE MANUAL



VG 978 - CHASSIS CODE N° 083000
VG 978 - 20" DISPLAY CODE N° 083001

GENERAL DESCRIPTION

The **VG 978** TV MONITOR have been designed to give you the best performances and reliability.

Our Display Monitor is build up on strong metal frame and the circuits are all solid state in order to insure long life.

It is containing:

- 1 - POWER SUPPLY TRANSFORMER with very low stray flux, low power consumption and it works at 50 Hz or 60 Hz (on demand)
- 16 - SILICON DIODES
- 1 - HV SILICON DIODE
- 12 - SILICON TRANSISTORS
- 2 - INTEGRATED CIRCUITS

All the others components are very good selected.

TV MONITOR DISPLAY

- Mains Specifications -

— POWER SUPPLY INPUT	110 V.ac/220 V.ac - 50 Hz $\pm$ 10%
— POWER CONSUMPTION	35 Watts
— VIDEO INPUT	Composite Video 0,5 $\div$ 3 Vpp (70% video - 30% Sync) Non Composite Video 0,35 $\div$ 5 Vpp—
— INPUT IMPEDANCE	Terminated 470 Ohm Unterminated 10 Kohm
— BANDWIDTH	7 Mhz $\div$ 12 Mhz at - 1 db adjustable
— SENSITIVITY	0,3 Vpp (Non Composite Video) for 50 Vpp on CRT—
— VIDEO AMPLIFIER	DC Restored
— SYNC INPUT	- Composite Sync 1 $\div$ 5 Vpp negative input impedance 10 Kohm - Horizontal Sync 2 $\div$ 5 Vpp positive input impedance 20 Kohm - Vertical Sync 2 $\div$ 5 Vpp positive input Impedance 20 Kohm
— SCANNING FREQUENCY	Horizontal 15.625 Hz - Vertical 50 Hz Horizontal 15.750 Hz - Vertical 60 Hz
— PICTURE TUBE	20BM6 (A50-120W) 20" - 114° deflection 24BM1 (A61-120W) 24" - 114° deflection
— HIGH VOLTAGE	17 KV rated voltage at 0 microampere of picture tube current
— HORIZONTAL RETRACE TIME	12 microseconds maximum
— RESOLUTION	560/800 lines minimum at picture centre
— CONTROL POSSIBILITY	Scanning phase control with reference to signal video input
— ADJUSTMENTS	- Power supply voltage dc - Brightness - Contrast - Vertical frequency - Vertical amplitude - Vertical linearity - Horizontal frequency - Horizontal phase - Horizontal linearity - Horizontal amplitude - Focus
— ENVIRONMENT OPERATION	Maximum ambient temperature 50° C
— AUDIO (TONE BURST AMPLIFIER)	Optional

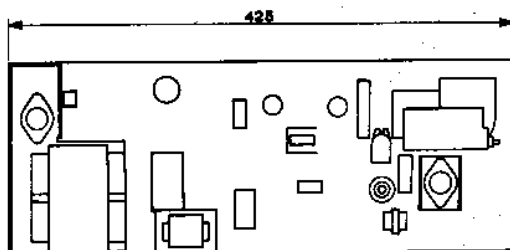
VG 978 - CHASSIS

CODE 083000

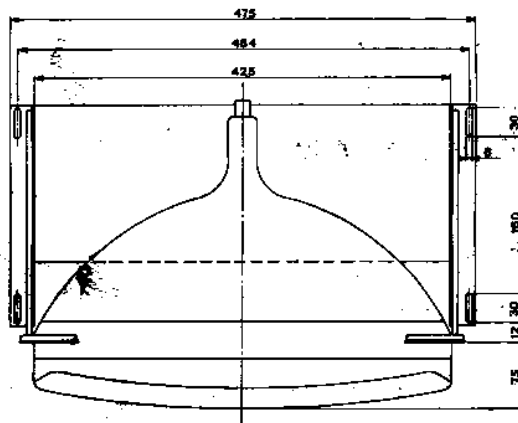
VG 978 - 20" DISPLAY

CODE 083001

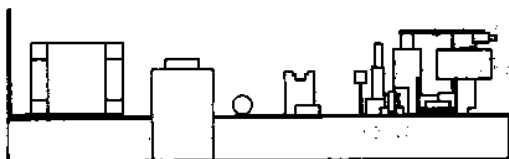
TOP VIEW



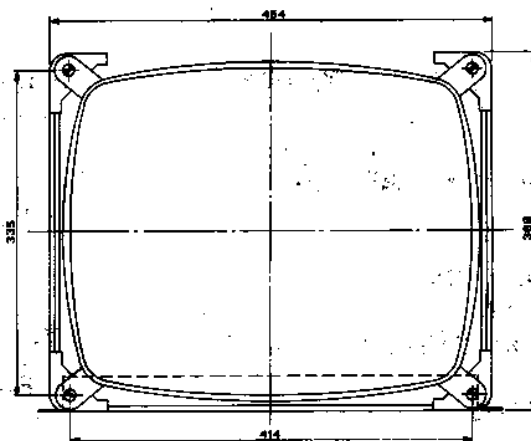
TOP VIEW



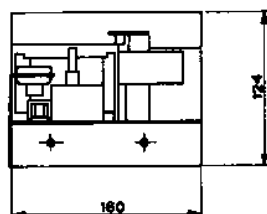
REAR VIEW



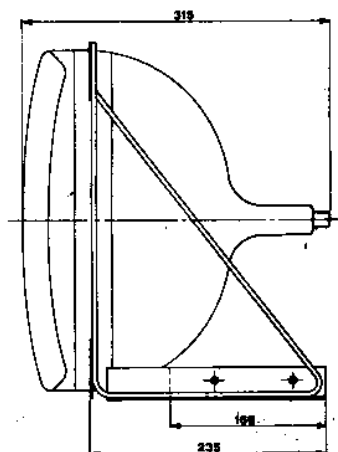
FRONT VIEW

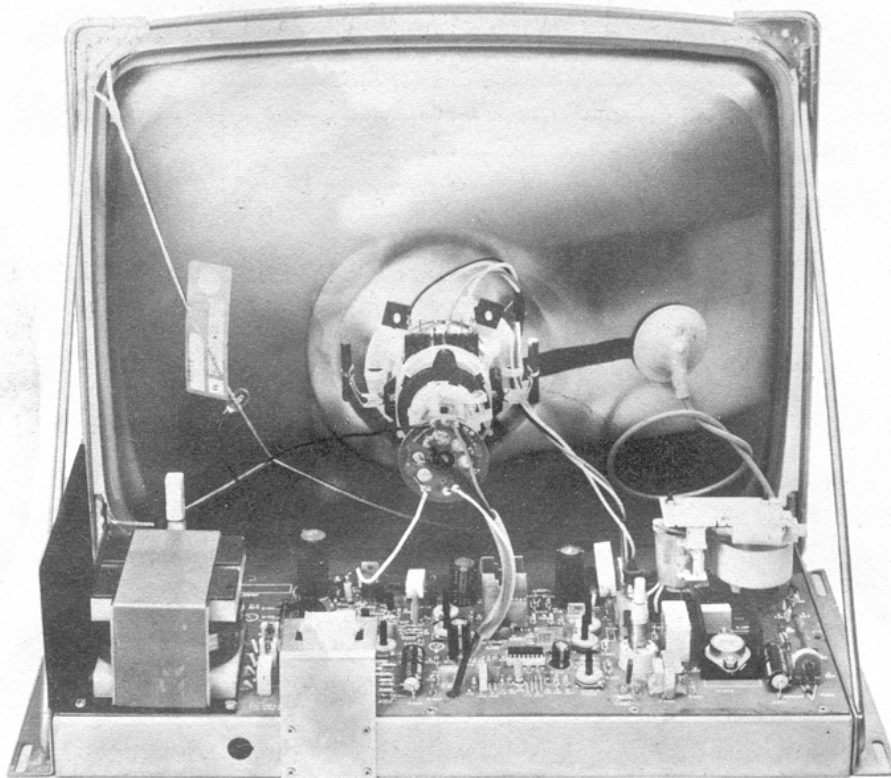


SIDE VIEW

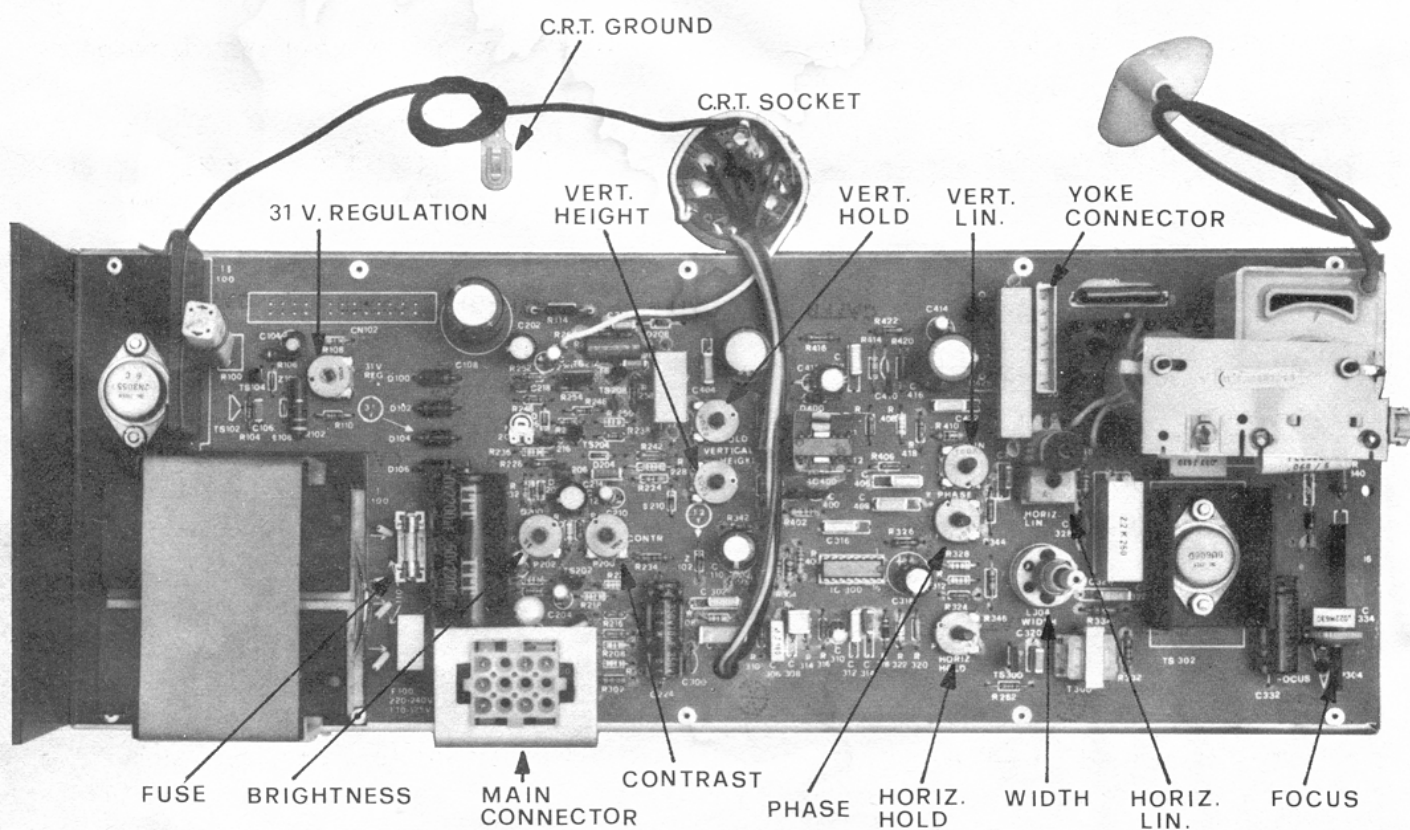


SIDE VIEW



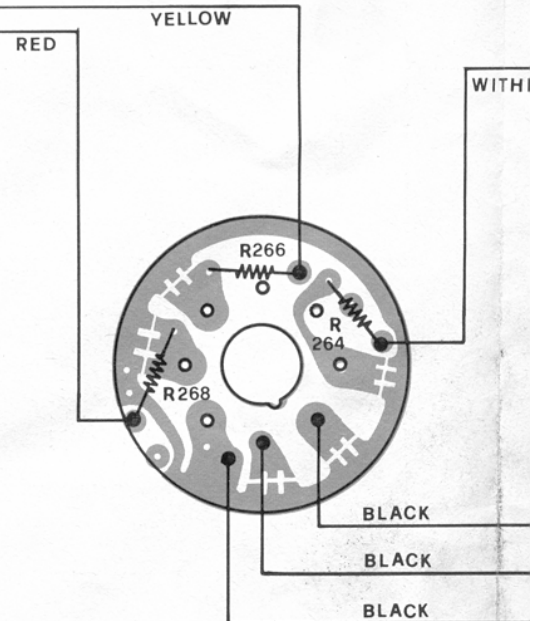
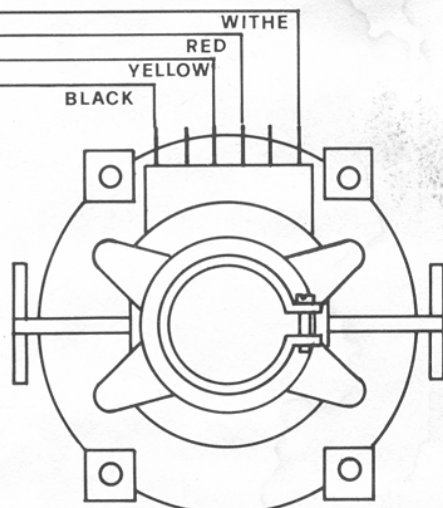
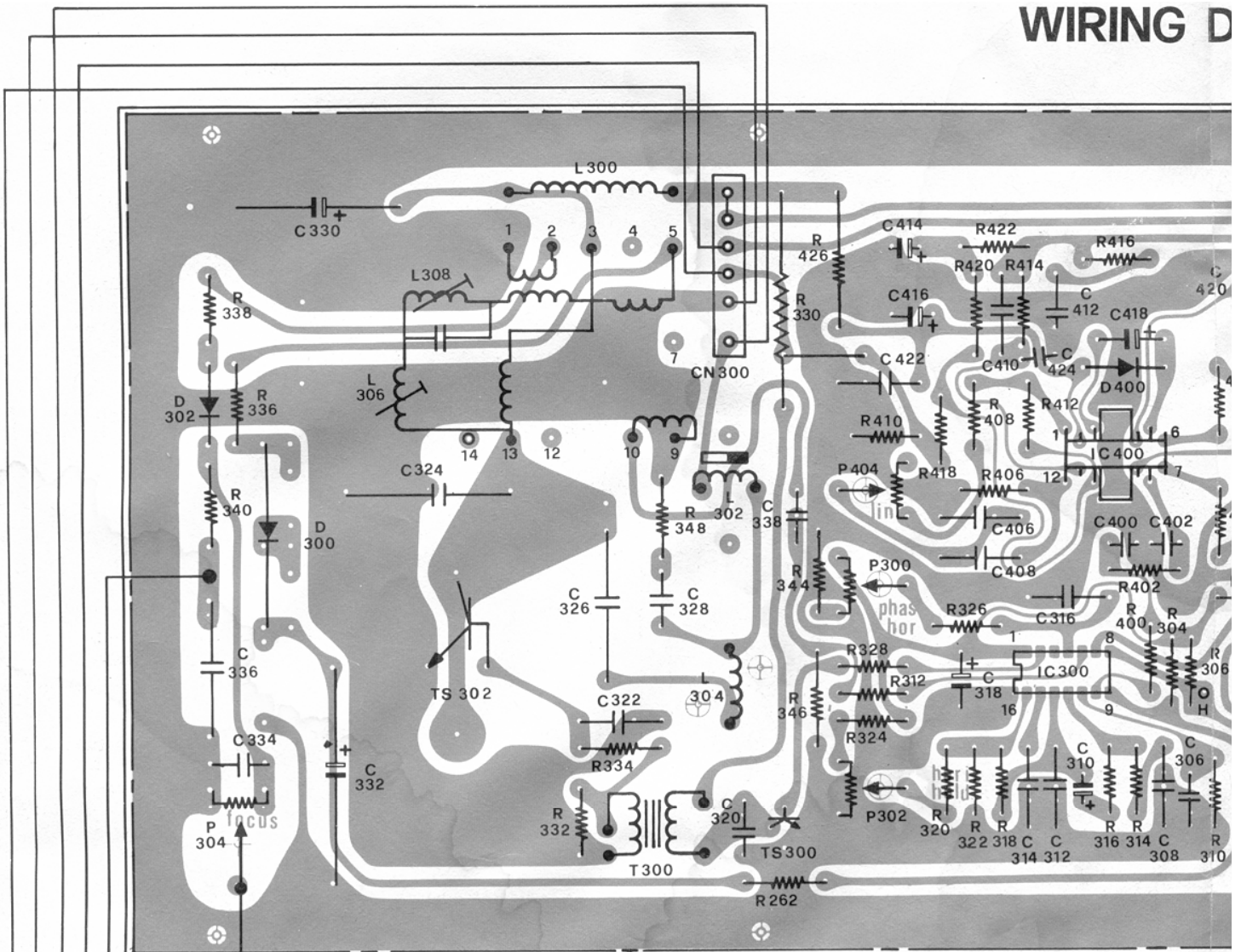


VG 978 - DISPLAY - REAR VIEW



VG 978 - CHASSIS - TOP VIEW

WIRING D



BOTTOM

[illegible]

BLACK TO CRT GROUND

C B L 9 - 78

YELLOW

BLACK

BLACK

BLACK

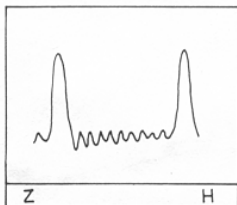
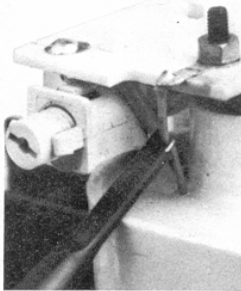
RED

RED

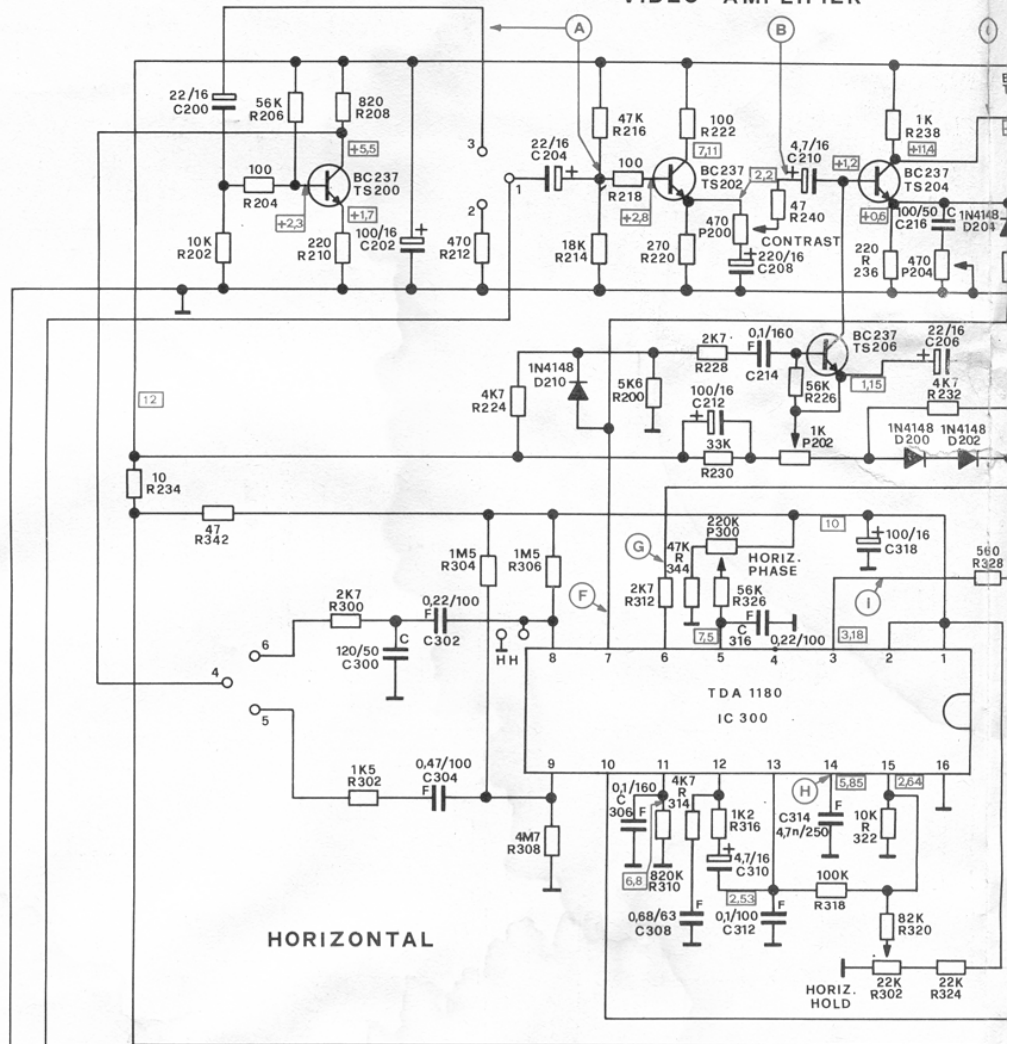
1 VIEW

NOTES:

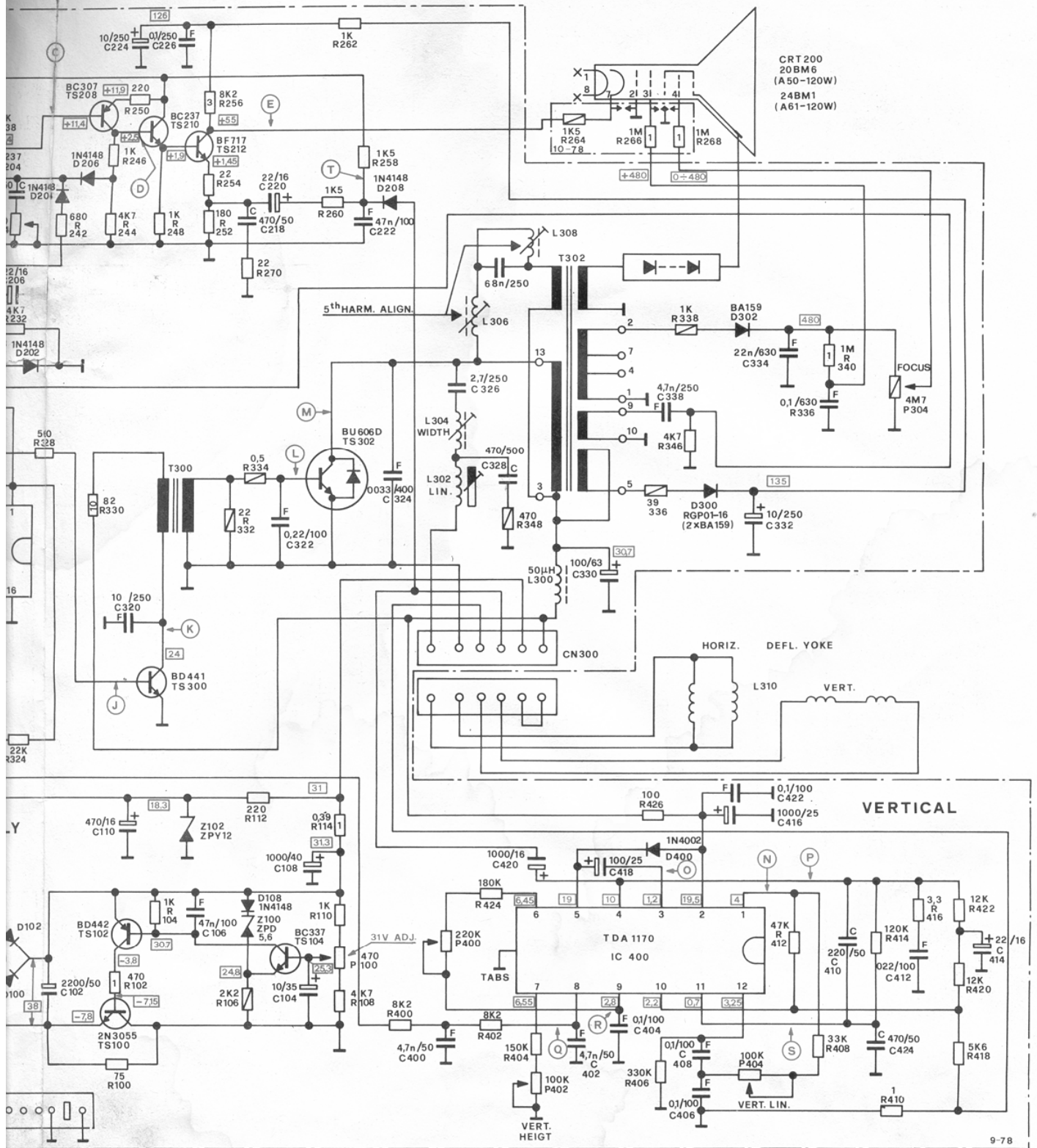
- 1) UNLESS OTHERWISE INDICATED, ALL RESISTORS ARE IN OHMS, 0.25 W/J AND CERAMIC CAPACITORS ARE IN PICOFARADS, THE OTHER CAPACITORS ARE IN MICROFARADS. REFER TO PARTS LIST FOR COMPLETE DESCRIPTION.
- 2) D.C. VOLTAGES TAKEN WITH RESPECT TO CHASSIS GROUND, WITH 1V. P-P INPUT COMPOSITE VIDEO, VOLTAGE READINGS ARE $\pm 10\%$.
- 3) FOR HORIZONTAL FREQUENCY ADJUSTMENT TO SHORT CIRCUIT TP H-H AND TO REGULATE HORIZONTAL-HOLD TRIMMER SO THAT THE IMAGE SHOULD APPEAR SETTLED ON THE SCREEN.
- 4) 5th HARMONIC CALIBRATION IN ORDER TO OBTAIN BETTER PERFORMANCES YOU SHOULD HAVE TO MAKE A PRECISE TUNE COILS ALINEMENT ON T 302 TRANSFORMER ACCORDING TO NEXT POINTS:
 - a) execute every adjustment of sync, geometry, amplitude and linearity with your desired signal;
 - b) connect the signal tracing probe of oscillograph on T 302 insulated terminal (see fig.) so that you can see wave form (Z);
 - c) adjust the brightness on minimum level so that to see the raster indistinctly;
 - d) adjust L 308 up to reduce on minimum the oscillation amplitude that you can see on wave form (Z).
 - e) adjust L 306 up to obtain the maximum horizontal amplitude, thereafter to adjust again L 308 so that you should have obtain the smaller amplitude of above mentioned oscillations.



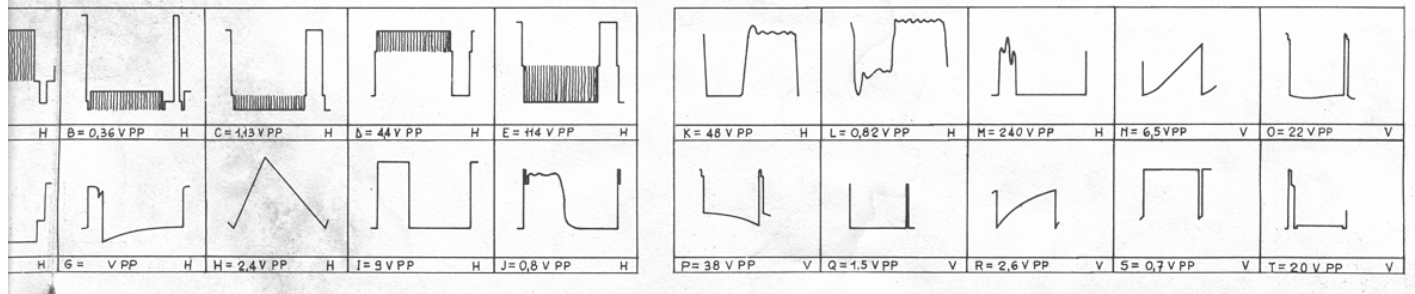
VIDEO AMPLIFIER



ATIC DIAGRAM

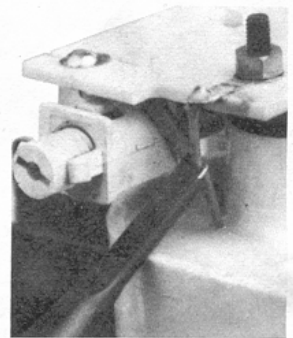


WAVEFORMS



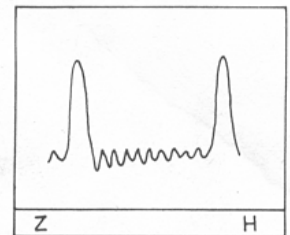
OPERATING INSTRUCTIONS

1. The TV Monitor works normally at 220 Vac / 50 Hz and with CCIR standard composite video signal.
2. If it is necessary connect 110 Vac, you must reverse the connections of T 100 as indicated on print circuit.
3. For horizontal frequency adjustment to short circuit TP H-H and to regulate horizontal-hold trimmer so that the image should appear settled on the screen.
4. **5th HARMONIC CALIBRATION**



In order to obtain better performances you should have to make a precise tune coils alinement on T 302 transformer according to next points:

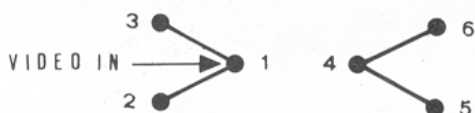
- a) execute every adjustment of sync, geometry, amplitude and linearity with your desired signal;
- b) connect the signal tracing probe of oscillograph on T 302 insulated terminal (see fig.) so that you can see wave form (Z);
- c) adjust the brightness on minimum level so that to see the raster indistinctly;
- d) adjust L 308 up to reduce on minimum the oscillation amplitude that you can see on wave form (Z);
- e) adjust L 306 up to obtain the maximum horizontal amplitude, thereafter to adjust again L 308 so that you should have obtain the smaller amplitude of above mentioned oscillations.



INPUT CONNECTIONS

Composite video input 0,5 ÷ 2,5 Vpp.

Connection for 470 Ohm input impedance



Connection for 5 K Ohm input impedance



Composite and non composite video input 0,5 ÷ 2,5 Vpp.

Composite negative sync input 1 ÷ 5 Vpp. with 10 K Ohm input impedance

Connection for 470 Ohm input impedance



Connection for 10 K Ohm input impedance

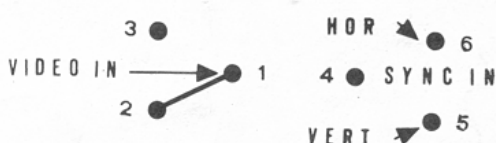


Composite and non composite video input 0,5 ÷ 2,5 Vpp.

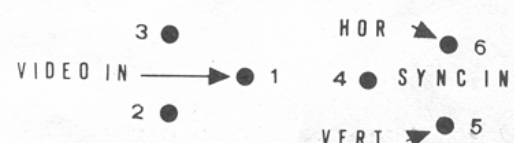
Horizontal positive sync input 2 ÷ 5 Vpp. with 40 K Ohm input impedance

Vertical positive sync input 2 ÷ 5 Vpp. with 25 K Ohm input impedance

Connection for 470 Ohm input impedance



Connection for 10 K Ohm input impedance



REPLACEMENT PARTS LIST

POWER SUPPLY

REF.		PART N.	REF.		PART N.
RESISTORS					
R100	Resistor 75 Ohm 15 W-J	309000	R212	Resistor 470 Ohm 0,25 W-J	301471
R102	Resistor 470 Ohm 1 W-J	303471	R214	Resistor 18K Ohm 0,25 W-J	301183
R104	Resistor 1 K Ohm 0,25 W-J	301102	R216	Resistor 47K Ohm 0,25 W-J	301473
R106	Resistor 2K2 0,5 W-J	302222	R218	Resistor 100 Ohm 0,25 W-J	301101
R108	Resistor 4K7 0,25 W-J	301472	R220	Resistor 270 Ohm 0,25 W-J	301271
R110	Resistor 1 K Ohm 0,25 W-J	301102	R222	Resistor 100 Ohm 0,25 W-J	301101
R112	Resistor 220 Ohm 4 W-J	306221	R224	Resistor 4K7 0,25 W-J	301472
R114	Resistor 0,39 Ohm 1 W-J	303E39	R226	Resistor 56K Ohm 0,25 W-J	301563
CAPACITORS					
C100	Film capacitor 0,1MFD 250VAC M-P15	312600	R228	Resistor 2K7 0,25 W-J	301272
C102	Electr. capacitor 2200 MFD 50V-AX	313500	R230	Resistor 33K Ohm 0,25 W-J	301333
C104	Electr. capacitor 10 MFD 35V - P.C.	313300	R232	Resistor 4K7 0,25 W-J	301472
C106	Film capacitor 0,047 MFD 250V P10-M	311303	R234	Resistor 10 Ohm 0,25 W-J	301100
C108	Electr. capacitor 1000 MFD 40V - P.C.	313400	R236	Resistor 220 Ohm 0,25 W-J	301221
C110	Electr. capacitor 470 MFD 16V - P.C.	313100	R238	Resistor 1K Ohm 0,25 W-J	301102
DIODES AND TRANSISTORS					
D100	Rectifier Diode BY251 1F. 3A VR 200V	402001	R240	Resistor 47 Ohm 0,25 W-J	301470
D102	Rectifier Diode BY251 1F. 3A VR 200V	402001	R242	Resistor 680 Ohm 0,25 W-J	301681
D104	Rectifier Diode BY251 1F. 3A VR 200V	402001	R244	Resistor 4K7 0,25 W-J	301472
D106	Rectifier Diode BY251 1F. 3A VR 200V	402001	R246	Resistor 1K Ohm 0,25 W-J	301102
D108	Diode 1N4148	401000	R248	Resistor 1K Ohm 0,25 W-J	301102
Z100	Zener 5,6V ZPD 5V6 - 0,5 W	406001	R250	Resistor 220 Ohm 0,25 W-J	301221
Z102	Zener 12V ZPY 12 - 1,3 W	406002	R252	Resistor 180 Ohm 0,25 W-J	301181
TS100	Transistor 2N3055	413000	R254	Resistor 22 Ohm 0,25 W-J	301220
TS102	Transistor BD442	413001	R256	Resistor 8K2 3 W-J	305822
TS104	Transistor BC337	411001	R258	Resistor 1K5 0,25 W-J	301152
CONTROLS AND TRANSFORMERS					
T100	Power Transformer	340001	R260	Resistor 1K5 0,25 W-J	301152
P100	Carbon Trimmer 470 Ohm 0,25 W	351000	R262	Resistor 1K Ohm 0,25 W-J	301102
CONTROLS					
P200	Carbon Trimmer 470 Ohm 0,25 W	351000	R264	Resistor 1K5 0,5 W-J	303105
P202	Carbon Trimmer 1K Ohm 0,25 W	351001	R266	Resistor 1M Ohm 1 W-J	303105
P204	Miniature Trimmer 470 Ohm 0,125 W	351002	R268	Resistor 1M Ohm 1 W-J	303105
CAPACITORS					
C200	Electr. capacitor 22 MFD - 16V - P.C.	313101	R270	Resistor 22 Ohm 0,25 W-J	301220
C202	Electr. capacitor 100 MFD - 16V - P.C.	313102			
C204	Electr. capacitor 22 MFD - 16V - P.C.	313101			
C206	Electr. capacitor 22 MFD - 16V - P.C.	313101			
C208	Electr. capacitor 220 MFD - 16V - P.C.	313103			
C210	Electr. capacitor 4E7 MFD - 16V - P.C.	313104			
C212	Electr. capacitor 100 MFD - 16V - P.C.	313102			
C214	Film 0,1 MFD - 100V - M - P10	311101			
C216	Ceramic capacitor 100 PF - 25V - M	310000			
C218	Ceramic capacitor 470 PF - 25V - M	310001			
C220	Electr. capacitor 22MFD - 16V - P.C.	313101			
C222	Film cap. 0,047 MFD - 250V - M - P10	311303			
C224	Electr. capacitor 10 MFD - 250V - AX	313900			
C226	Film cap. 0,1 MFD - 250V - M - P10	311300			

VIDEO AMPLIFIER

RESISTORS		
R202	Resistor 10K Ohm 0,25 W-J	301103
R204	Resistor 100 Ohm 0,25 W-J	301101
R206	Resistor 56K Ohm 0,25 W-J	301563
R208	Resistor 820 Ohm 0,25 W-J	301821
R210	Resistor 220 Ohm 0,25 W-J	301221

C200	Electr. capacitor 22 MFD - 16V - P.C.	313101
C202	Electr. capacitor 100 MFD - 16V - P.C.	313102
C204	Electr. capacitor 22 MFD - 16V - P.C.	313101
C206	Electr. capacitor 22 MFD - 16V - P.C.	313101
C208	Electr. capacitor 220 MFD - 16V - P.C.	313103
C210	Electr. capacitor 4E7 MFD - 16V - P.C.	313104
C212	Electr. capacitor 100 MFD - 16V - P.C.	313102
C214	Film 0,1 MFD - 100V - M - P10	311101
C216	Ceramic capacitor 100 PF - 25V - M	310000
C218	Ceramic capacitor 470 PF - 25V - M	310001
C220	Electr. capacitor 22MFD - 16V - P.C.	313101
C222	Film cap. 0,047 MFD - 250V - M - P10	311303
C224	Electr. capacitor 10 MFD - 250V - AX	313900
C226	Film cap. 0,1 MFD - 250V - M - P10	311300

REF.

PART N.

REF.

PART N.

DIODES, TRANSISTORS AND C.R.T.

D200	Silicon diode 1N4148	401000
D202	Silicon diode 1N4148	401000
D204	Silicon diode 1N4148	401000
D206	Silicon diode 1N4148	401000
D208	Silicon diode 1N4148	401000
D210	Silicon diode 1N4148	401000
TS200	Transistor BC237	411002
TS202	Transistor BC237	411002
TS204	Transistor BC237	411002
TS206	Transistor BC237	411002
TS208	Transistor BC307	411003
TS210	Transistor BC237	411002
TS212	Transistor BF 717/757	412001
CRT200	Cathode ray tube 20BM6/A50-120W	440000
	or 24BM1/A61-120W	440001

CAPACITORS

C300	Ceramic capacitor 120 PF 50V-K	310709
C302	Film capacitor 0,22 MFD 100V-M-P15	311100
C304	Film capacitor 0,47 MFD 100V-M-P15	311101
C306	Film capacitor 0,1 MFD 100V-M-P10	311201
C308	Film capacitor 0,68 MFD 63V-M-P15	311000
C310	Electr. capacitor 4E7 MFD 16V - P.C.	313104
C312	Film capacitor 0,1 MFD 100V-M-P10	311201
C314	Film capacitor 4E7 nF 630V-J-P10	311500
C316	Film capacitor 0,22 MFD 100V-M-P15	
C318	Electr. capacitor 100 MFD 16V - P.C.	313102
C320	Film capacitor 10 nF 250V-M-P10	311400
C322	Film capacitor 0,22 MFD 100V-M-P15	311100
C324	Film capacitor 0,033 MFD 400V-J	312300
C326	Film capacitor 2E7 MFD 250V-K-P27,5	311302
C328	Ceramic capacitor 470 PF 500V-M	310300
C330	Electr. capacitor 100 MFD 63V-AX	313600
C332	Electr. capacitor 10 MFD 250V-AX	313900
C334	Film capacitor 22 nF 630V-M-P10	311501
C336	Film capacitor 0,1 MFD 630V-M-P22,5	311502
C338	Film capacitor 47 nF 250V-M-P10	311303

HORIZONTAL

RESISTORS

R300	Resistor 2K7	0,25 W-J	301272
R302	Resistor 1K5	0,25 W-J	301152
R304	Resistor 1M5	0,25 W-J	301155
R306	Resistor 1M5	0,25 W-J	301155
R308	Resistor 4M7	0,25 W-J	301475
R310	Resistor 820 Ohm	0,25 W-J	301821
R312	Resistor 2K7	0,25 W-J	301272
R314	Resistor 4K7	0,25 W-J	301472
R316	Resistor 1K2	0,25 W-J	301122
R318	Resistor 100K Ohm	0,25 W-J	301104
R320	Resistor 82K Ohm	0,25 W-J	301823
R322	Resistor 10K Ohm	0,25 W-J	301103
R324	Resistor 22K Ohm	0,25 W-J	301223
R326	Resistor 56K Ohm	0,25 W-J	301563
R328	Resistor 560 Ohm	0,25 W-J	301561
R330	Resistor 82 Ohm	10 W-J	309001
R332	Resistor 22 Ohm	0,5 W-J	302220
R334	Resistor 0E5 Ohm	0,5 W-J	3020E5
R336	Resistor 39 Ohm	0,5 W-J	302390
R338	Resistor 1K Ohm	0,5 W-J	302102
R340	Resistor 1M Ohm	1 W-J	303105
R342	Resistor 47 Ohm	0,25 W-J	301470
R344	Resistor 47K Ohm	0,25 W-J	301473
R346	Resistor 4K7	0,25 W-J	301472
R348	Resistor 470 Ohm	0,5 W-J	302471

CONTROLS

P300	Carbon trimmer 220K Ohm	- 0,25 W	351003
P302	Carbon trimmer 22K Ohm	- 0,25 W	351004
P304	Carbon trimmer 4M7 Ohm	- 0,5 W	351005

DIODES - TRANSISTORS AND I.C.

D300	Fast recovery diode RGP 01-16	403000
	or 2X BA159	403001
D302	Fast recovery diode BA159	403001
TS300	Transistor BD441	413002
TS302	Transistor B406-D	413003
IC300	Integrated circuit-TDA 1180	420000

TRANSFORMERS AND COILS

L300	Chocker 50 uH	342003
L302	Linearti-Hor.	341000
L304	Horiz. Width	341001
T300	Horiz. Dryver	341002
T302	H.V. Transformer	341003
	Deflection Yoke	341004

VERTICAL

RESISTORS

R400	Resistor 8K2	0,25 W-J	301822
R402	Resistor 8K2	0,25 W-J	301822
R404	Resistor 150K Ohm	0,25 W-J	301154
R406	Resistor 330K Ohm	0,25 W-J	301334
R408	Resistor 33K Ohm	0,25 W-J	301333
R410	Resistor 1 Ohm	0,25 W-J	3011E0
R412	Resistor 47K Ohm	0,25 W-J	301473

REF.		PART N.	REF.		PART N.
DIODES AND I.C.					
R414	Resistor 120K Ohm 0,25 W-J	301124	D400	Silicon diode 1N4002	402002
R416	Resistor 3E3 Ohm 0,25 W-J	3013E3	IC400	Integrated circuit - TDA1170	420001
R418	Resistor 5K6 Ohm 0,25 W-J	301562	IC400	Integrated circuit - TDA1170	420001
R420	Resistor 12K Ohm 0,25 W-J	301123			
R422	Resistor 12K Ohm 0,25 W-J	301123			
R424	Resistor 180K Ohm 0,25 W-J	301184			
R426	Resistor 100 Ohm 4 W-J	306101			
MECHANICAL PARTS					
			CN100	Mate-N-Lock AMP 1-480709/0	251000
				PIN 1/2/3/4/5/6 - AMP 350218/1	251001
			PTF100	Fuse holder 5 x 20 - P.C.	255000
			F100	Fuse 0,63 A-M	331001
			CN300-M	Male Connector PCP-CFM-6	250000
			CN300-F	Female Connector CFF6	252001
				CRT Socket - CN 25	253000
				CRT Socket - PCB 10-78	110001
				Trimmer Schaft Ø 4 L20 mm	236000
				Lateral C.R.T. support right	100002
				Lateral C.R.T. support left	100003
				Spring for Resistor R100	102001
				I.C. 16 PINS Socket AMP 00530177/2	254000
			DS100	Heat Sink TS100	101000
			DS300	Heat Sink TS300	101001
				Frame	100005
				Support for CN100	100004
				PCB 9-78	100002
CONTROLS					
P400	Carbon trimmer 220K Ohm 0,25 W	351003			
P402	Carbon trimmer 100K Ohm 0,25 W	351006			
P404	Carbon trimmer 100K Ohm 0,25 W	351006			
CAPACITORS					
C400	Ceramic capacitor 4E7 nF 50V-M	310100			
C402	Ceramic capacitor 4E7 nF 50V-M	310100			
C404	Film capacitor 0,1 MFD 160V-J-P10	311200			
C404	Film capacitor 0,1 MFD 160V-J-P10	311200			
C406	Film capacitor 0,1 MFD 160V-J-P10	311200			
C408	Film capacitor 0,1 MFD 160V-J-P10	311200			
C410	Ceramic capacitor 220 PF 50V-K	310712			
C412	Film capacitor 0,22 MFD 100V-M-P15	311102			
C414	Electr. capacitor 22 MFD 16V-P.C.	313101			
C416	Electr. capacitor 1000 MFD 25V-P.C.	313200			
C418	Electr. capacitor 100 MFD 25V-P.C.	313201			
C240	Electr. capacitor 1000 MFD 16V-P.C.	313105			
C424	Ceramic capacitor 470 PF 50V-M	310101			



Classener Str. 27 • D-6302 LICH / Germany • ☎ 064 04 / 2071-72 • Telex 482 890 games

Technical Service

☎ 064 04 / 2073