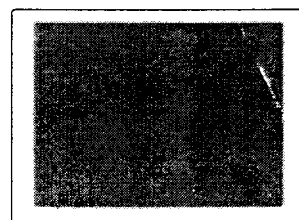


Service  
Service  
**Service**



PHILIPS  
4CM4770

# Service Manual

Horizontal frequencies  
30 tot 58 kHz

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## Technical Data

**General**  
 Mains voltage : 195 - 264V  
 Mains frequency : 47 - 63 Hz  
 Power consumption : 85 W (nominal)  
                           120 W (max)  
 Operating temperature : 0°C to 40°C  
 Weight : 18.8 kg  
 Width x Depth x Height : 422 x 440 x 425 mm

**Picture tube**  
 Size : 17 inch  
 Light transmission : 53.5 % (dark glass)  
 Deflection angle : 90 Degree  
 EHT voltage : 25 kVolt  
 Pitch : 0.31 mm

**Video**  
 Dot rate : 75 MHz  
 Video signal : 0.7 Vpp/75Ω

**Sync. signal**  
 Vertical frequency : 50 - 100 Hz  
 Horizontal frequency : 30 to 58 kHz  
  
 - separated H/V sync. : TTL-level  
 - composite H/V sync. : TTL-level  
 - composite sync. : on Green  
 - sync. polarity : positive or negative

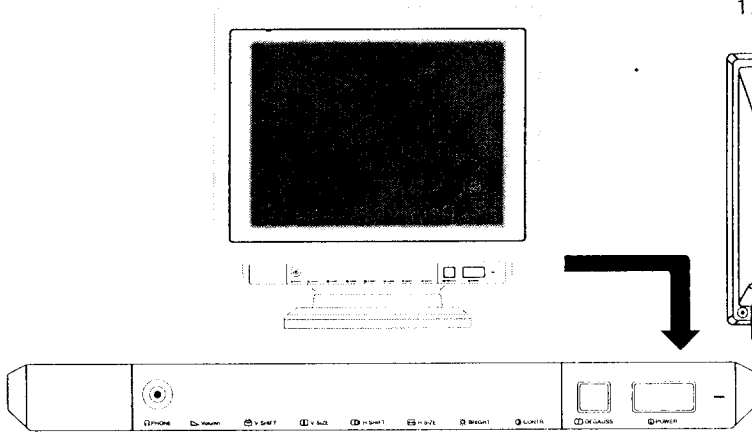
**Audio**  
 - Input signal : 150 mV<sub>rms</sub>/22kΩ  
 - Output : 1 W

\* Specifications are subject to change without notice !

### RESOLUTION MODES AND SYNC. POLARITIES

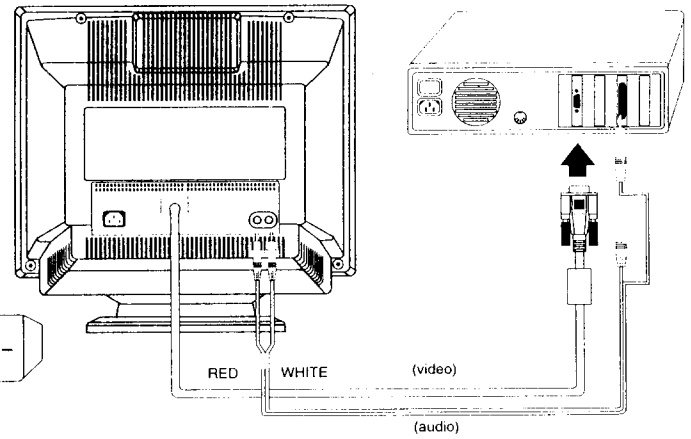
Modes	Horizontal frequencies	Vertical frequencies	H. sync. polarity	V. sync. polarity	Resolution Dot * lines
VGA	31,5 kHz	70 Hz	Positive (+)	Negative (-)	640 * 350
VGA	31,5 kHz	70 Hz	Negative (-)	Positive (+)	640 * 400
VGA	31,5 kHz	60 Hz	Negative (-)	Negative (-)	640 * 480
S-VGA	37.8 kHz	72 Hz	Positive (+)	Positive (+)	640 * 480
MAC-II	35.0 kHz	67 Hz	Compositie Sync on green (-)	Compositie Sync on green (-)	640 * 480
S-VGA	35.2 kHz	56 Hz	Negative (-) Positive (+)	Negative (-) Positive (+)	800 * 600
S-VGA	37.8 kHz	60 Hz	Positive (+)	Positive (+)	800 * 600
S-VGA	48.1 kHz	72 Hz	Positive (+)	Positive (+)	800 * 600
APPLE	49.8 kHz	75 Hz	Negative (-) Positive (+)	Negative (-) Positive (+)	832 * 624
8514A	35.5 kHz	87 Hz	Positive (+)	Positive (+)	1024 * 768 Interlaced
	48.4 kHz	60 Hz	Negative (-)	Negative (-)	1024 * 768
	56.5 kHz	70 Hz	Negative (-) Positive (+)	Negative (-) Positive (+)	1024 * 768

## Controls

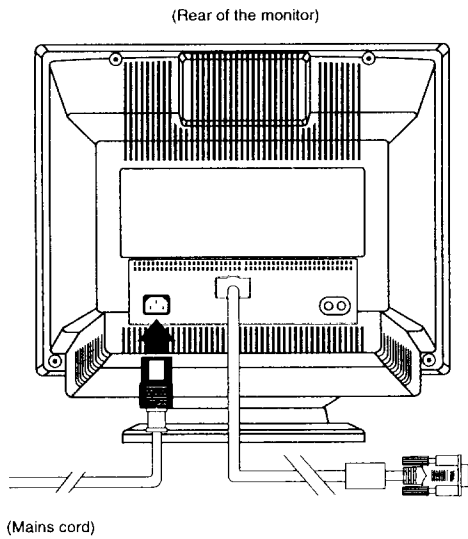


## Connection to the computer

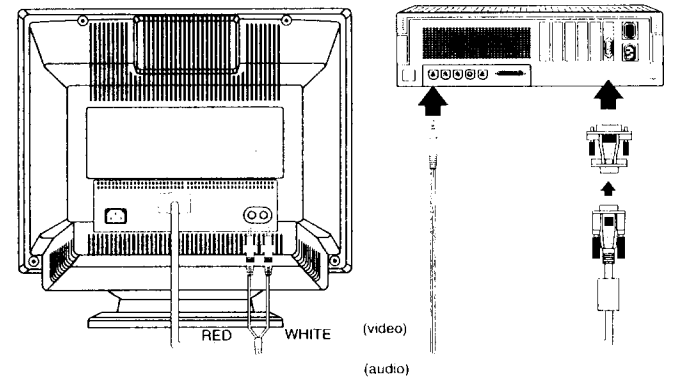
1. IBM PC, PC/XT, PC/AT, PS/2 or the compatibles:



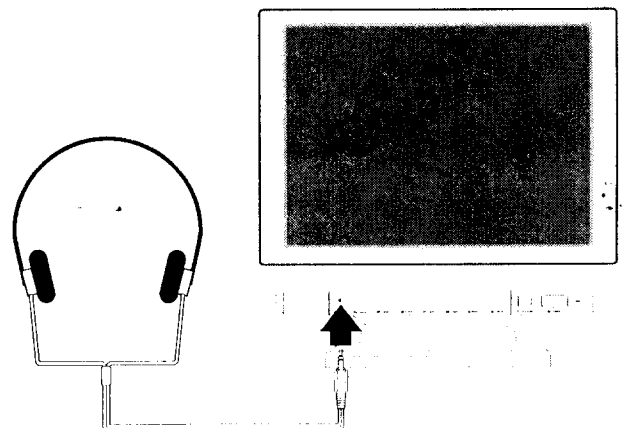
## Connection to the mains



2. Apple Macintosh series:

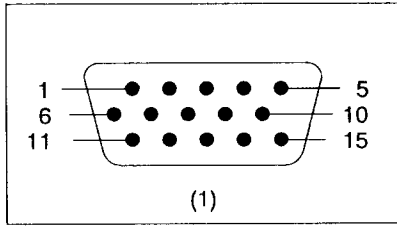


3. Earphone connection:

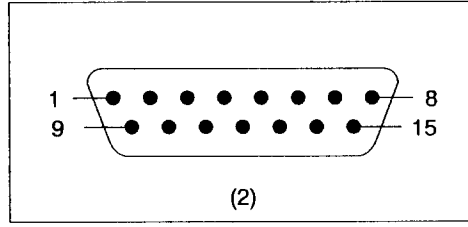


## Connection facilities

Pin assignment 15p "D" shell  
(3 rows)



Pin assignment 15p "D" shell  
(2 rows)



CL38532020/020  
200193



### INPUT- OUTPUT SIGNALS

15 pins D-Shell connector

D-Shell adapter (3 rows to 2)

Pin	Assignment	Sensitivity	Terminal impedance	Assignment	Sensitivity	Terminal impedance
1	Red Video input	RGB-analog	75Ω	Red ground		
2	Green Video input/ sync. on green	RGB-analog	75Ω	Red Video input/ Composite sync.	RGB-analog	75Ω
3	Blue Video input	RGB-analog	75Ω	Sync. ground		2.2 Ωk
4	Ident output (connected to 10)			Green Video input	RGB-analog	75Ω
5	Self test input (ground)			Green ground		
6	Red Video ground			Sense		
7	Green Video ground			Not connected		
8	Blue Video ground			Blue Video input	RGB-analog	75Ω
9	Not connected (no pin)			Sense 2		
10	Logic ground			Comp-sync + V-sync ground		
11	Ident output (connected to 10)			V-sync		
12	Not connected			Blue Video ground	r	2.2kΩ pull down
13	Horizontal sync. (or Hor. + Vert. sync)	TTL Level L=0-0.8V H=2.4 -5V	2.2 Ωk pull down	H-sync ground		2.2kΩ pull down
14	Vertical sync.	TTL Level L=0-0.8V H=2.4 -5V	2.2 Ωk pull down	H-sync		
15	Not connected (no pin)					

## Warnings

1. Safety regulations require that the unit should be returned in its original conditions and that components identical to the original components are used. The safety components are indicated by the symbol .
2. In order to prevent damage to ICs and transistors, all high-voltage flash-overs must be avoided. In order to prevent damage to the picture tube, the method shown in Fig. 3.1 should be used to discharge the picture tube. Use a high-voltage probe and a multimeter (position DC-V). Discharge until the meter reading is 0 V (after approx. 30s).
3. **ESD**   
All ICs and many other semiconductors are sensitive to electrostatic discharges (ESD). Careless handling during repair can drastically shorten the life. Make sure that during repair you are connected by a pulse band with resistance to the same potential as the earth of the unit. Keep components and tools also at this same potential.
4. When repairing a unit, always connect it to the mains voltage via an isolating transformer.
5. Be careful when taking measurements in the high-voltage section and on the picture tube panel.
6. It is recommended that safety goggles are worn when replacing the picture tube.
7. When making settings, use plastic rather than metal tools.  
This will prevent any short-circuit and the danger of a circuit becomes unstable.
8. Never replace modules or other components while the unit is switched on.
9. Together with the deflection unit the picture tube is used as an integrated unit. Adjustment of this unit during repair is therefore not recommended.
10. After repair the wiring should be fastened once more in the cable clamps for this purpose.

## Notes

1. The direct voltages and oscillograms are average voltages. They have been measured by using the Service testsoftware and under the following conditions:
  - Mode: 1024 \* 768 (56.5kHz/70Hz)
  - Signal pattern: grey scale
  - Adjust brightness and contrast control for the mechanical mid-position (click position)
2. The picture tube panel has printed spark gaps. Each spark gap is connected between an electrode of the picture tube and the Aquadag coating.
3. The semiconductors indicated in the circuit diagram(s) and in the parts lists are completely interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.

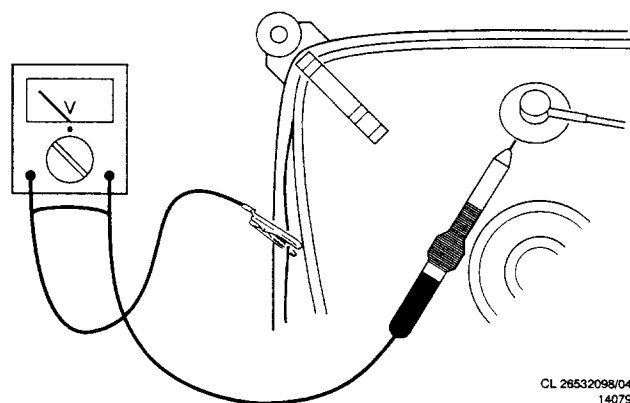


Fig. 3.1

# Mechanical instructions

## Location of the Panels (see Fig. 4.1)

1. Deflection + Supply panel (1102)
2. Video panel (1103)
3. Ear phone panel (1108)
4. Control panel (1110)

## General

To be able to perform measurements and repairs on the "circuit boards", these unit should placed in the service position first:

## Video panel

- Remove the rear cover (4 screws), see Fig. 4.2.
- Remove the metal shielding by desolder 8 lags.

## Main panel and control panel

- Remove the rear cover (4 screws).
- Turn the set 90 degrees counter-clockwise.
- Remove the pedestal with the metal shielding (4 screws).
- Fig. 4.3 shows the service position.

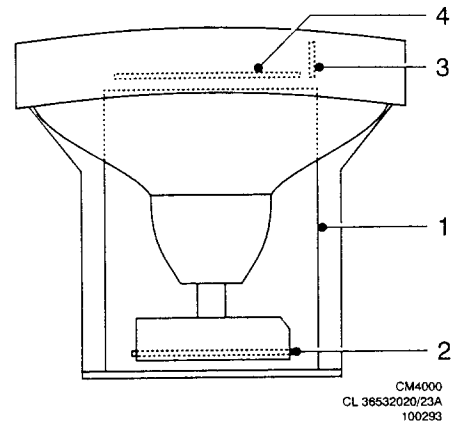


Fig. 4.1

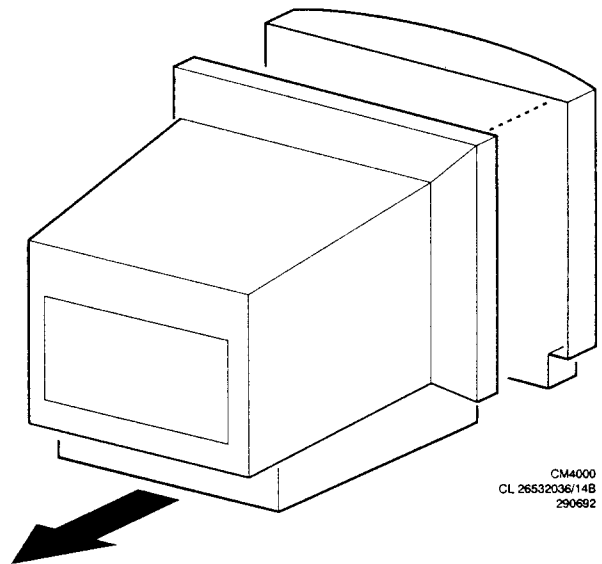


Fig. 4.2

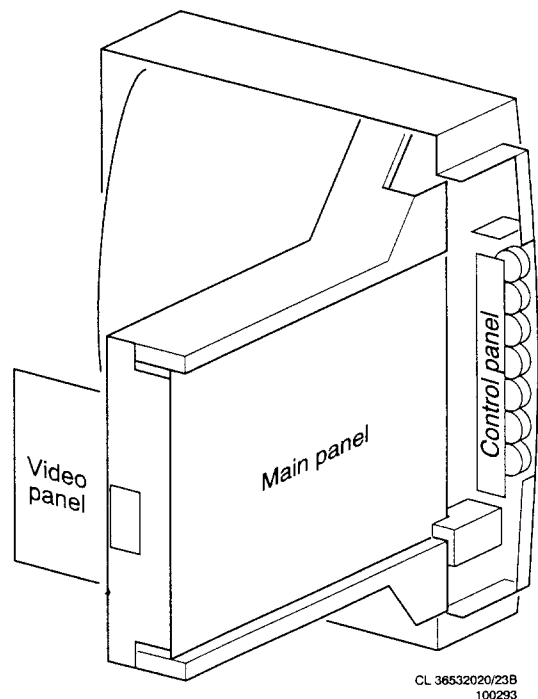
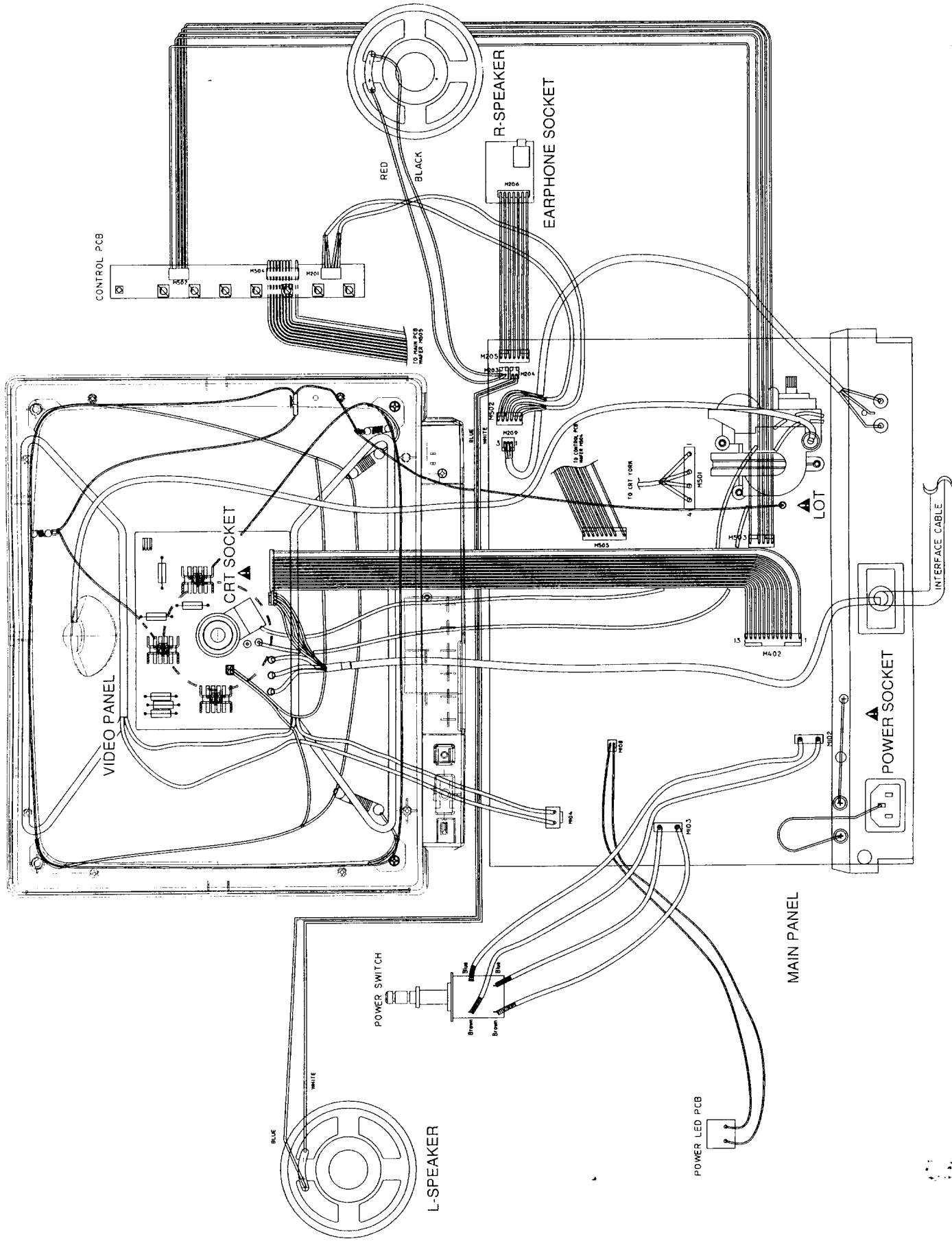
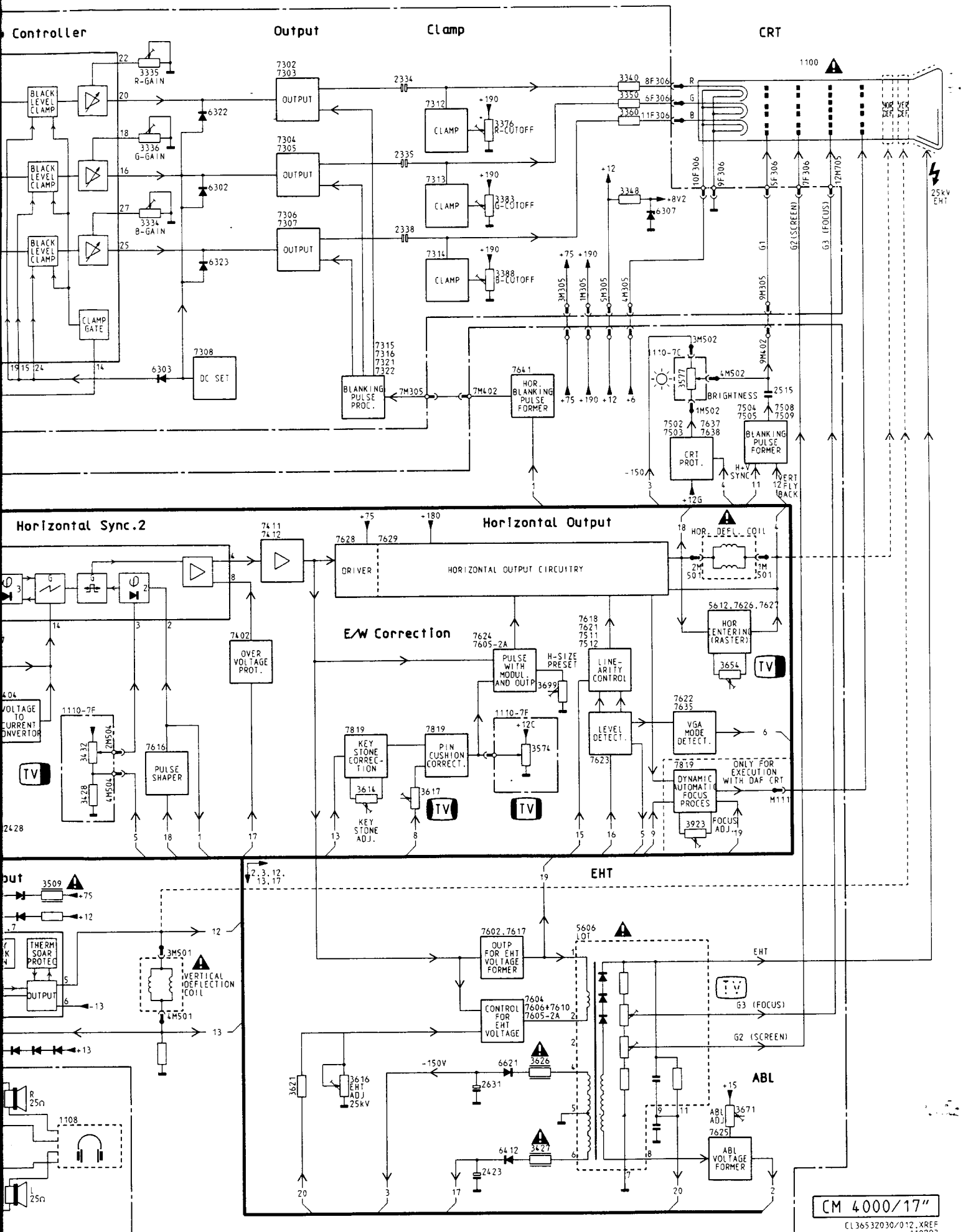


Fig. 4.3





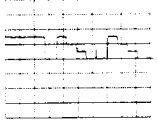




CM 4000/17"

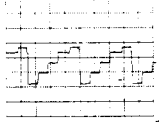
CL 36532030/012\_XREF 110293

A1 7301-6



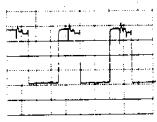
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Δv=7.6v AC

A9 7307-c



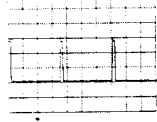
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Δv=49.6v AC

A17 7310-c



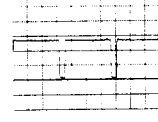
T=17.7us  
Δv=0.8v AC

A25 7318-3,6



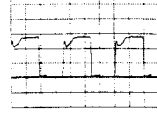
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Δv=5.5v AC

B1 7413-9



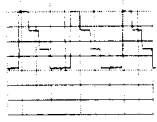
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Δv=2.5v AC

B9 7628-c



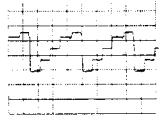
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Δv=138v AC

A2 7301-20



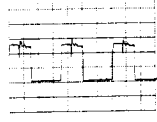
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Δv=3.96v AC

A10 6312(+)



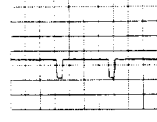
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Δv=53.6v AC

A18 7311-b



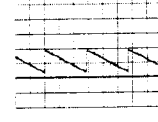
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Δv=0.6v AC

A26 7318-1



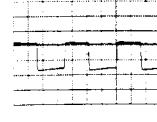
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Δv=2.5v AC

B2 7413-5,6



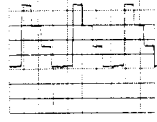
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Δv=0.74v AC

B10 7628-b



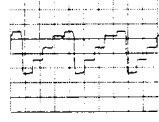
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Δv=9.2v AC

A3 7301-16



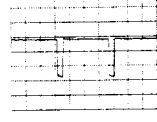
T=17.7us  
Δv=4.2v AC

A11 6314(+)



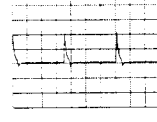
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Δv=56.8v AC

A19 7320-e



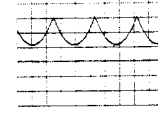
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Δv=2.5v AC

A27 7318-4



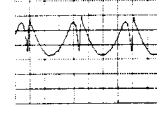
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Δv=4.76v AC

B3 7413-11



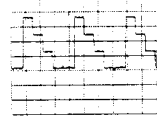
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Δv=1.92v AC

B11 7626-b



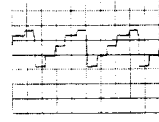
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Δv=52v AC

A4 7301-25



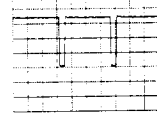
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Δv=3.48v AC

A12 6316(+)



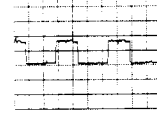
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Δv=48.8v AC

A20 7317-b



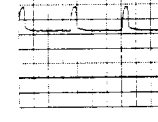
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Δv=3.36v AC

A28 7319-b



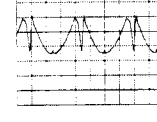
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B4 7413-17



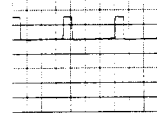
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B12 7626-c



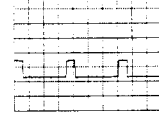
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A5 7302-c



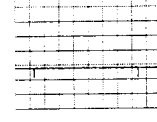
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A13 7322-b



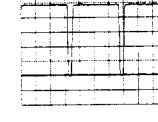
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Δv=5.8v AC

A21 M304-4



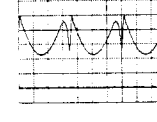
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Δv=3.4v AC

B5 7405-c



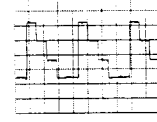
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Δv=4.8v AC

B13 7626-e



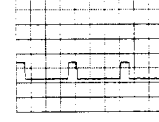
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A6 7302-e



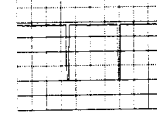
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Δv=3.8v AC

A14 7321-b



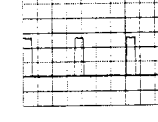
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Δv=5.6v AC

A22 7301-14



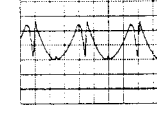
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B6 7406-2



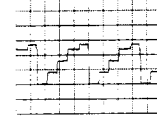
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Δv=5.3v AC

B14 7627-c



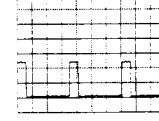
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A7 7303-c



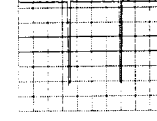
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A15 7315-c



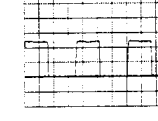
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A23 7318-8



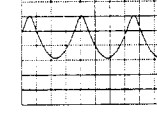
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B7 7406-4



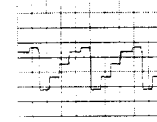
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B15 7618-g



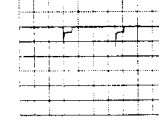
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A8 7305-c



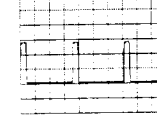
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Δv=57.6v AC

A16 7315-b



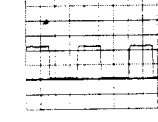
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Δv=2.8v AC

A24 7318-11



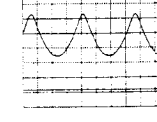
T=17.7us  
Δv=5.4v AC

B8 7407-e



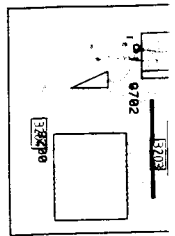
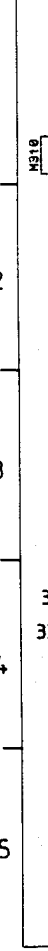
T=17.7us  
Δv=10.6v AC

B16 7621-g



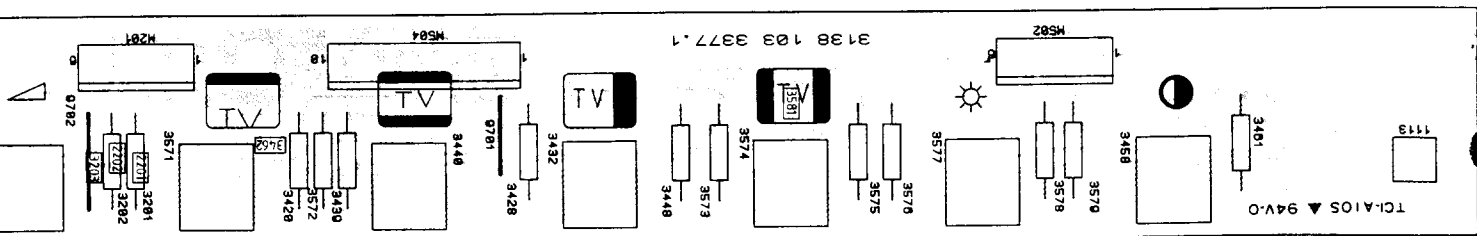
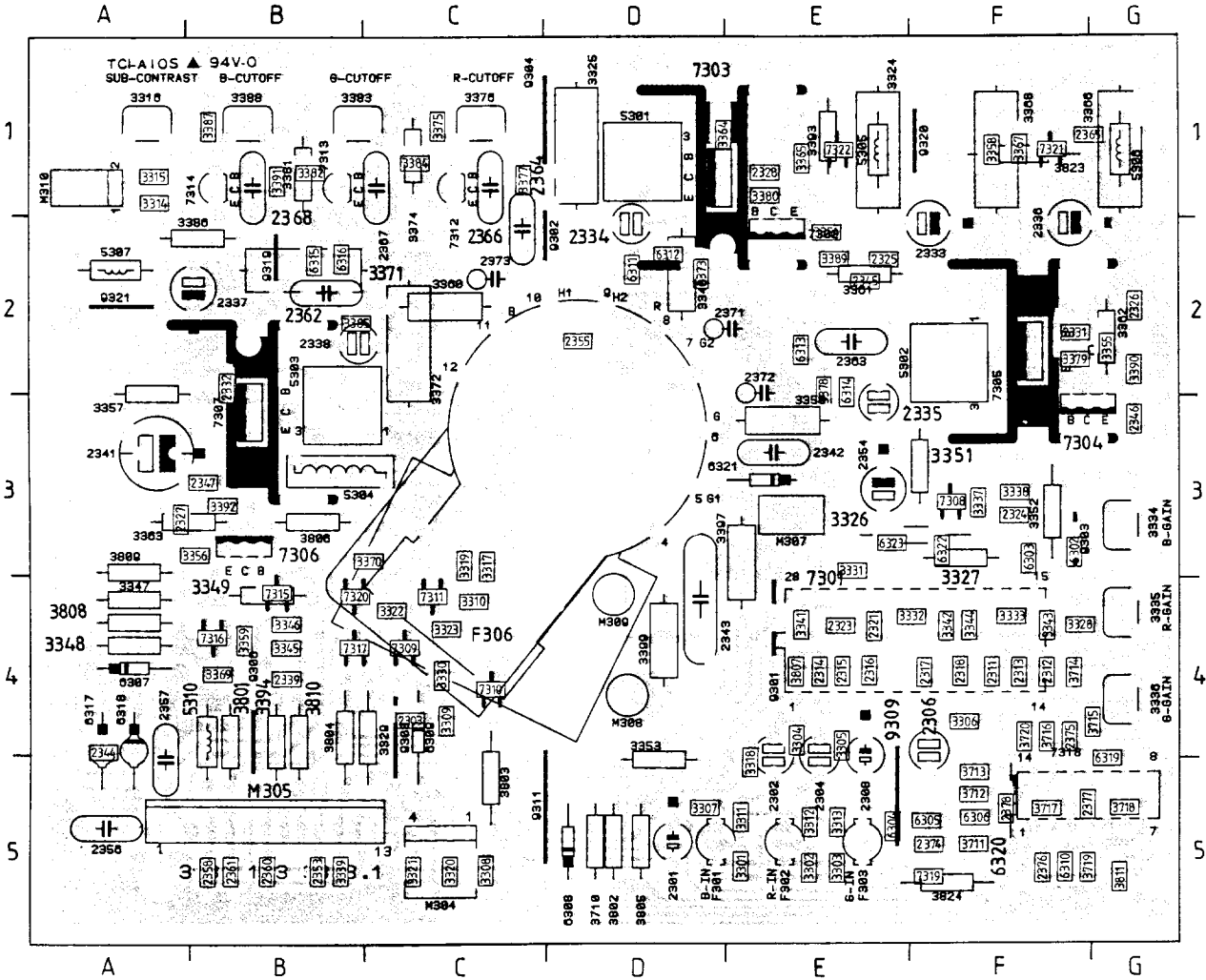
T=17.7us  
Δv=57.6v AC

- 2301 D5
- 2302 E5
- 2303 C4
- 2304 E5
- 2306 F4
- 2308 E5
- 2311 F4
- 2312 F4
- 2313 F4
- 2314 E4
- 2315 E4
- 2316 E4
- 2317 F4
- 2318 F4
- 2321 E4
- 2323 E4
- 2324 F3
- 2325 E2
- 2326 G2
- 2327 B3
- 2328 E1
- 2331 G2
- 2332 B2
- 2333 F2
- 2334 D2
- 2335 E3
- 2336 F2
- 2337 B2
- 2338 C2
- 2339 B4
- 2341 A3



# Video panel / Control panel

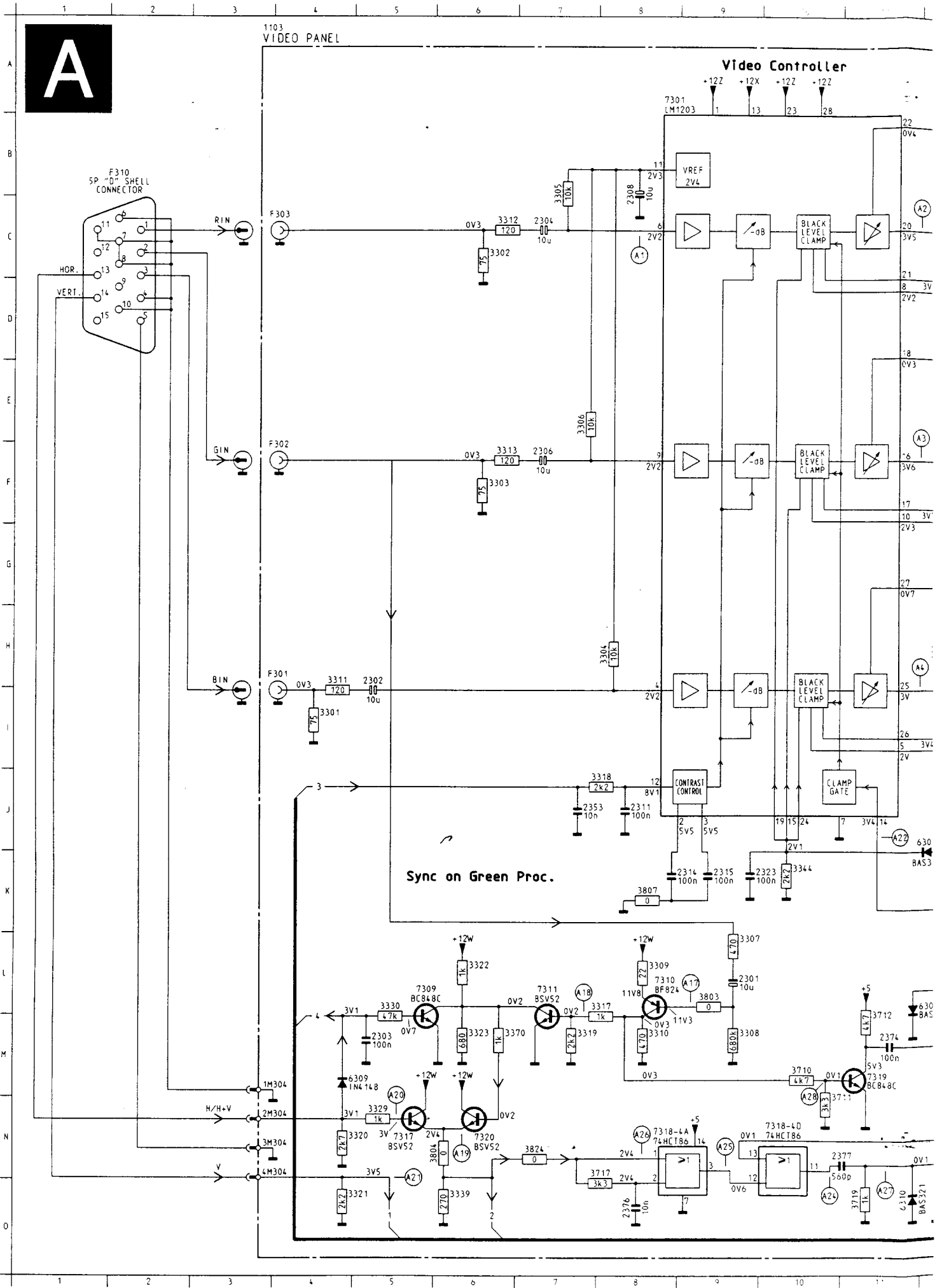
2301 D5	2342 E3	3305 E4	3336 G4	3367 F1	3713 F4	6308 D5	7316 B4
2302 E5	2343 D4	3306 F4	3337 F3	3368 F1	3714 G4	6309 C4	7317 C4
2303 C4	2344 A4	3307 D5	3338 F3	3369 B4	3715 G4	6310 F5	7320 G5
2304 E5	2345 E2	3308 C5	3339 B5	3370 C3	3717 F5	6311 D2	7320 C4
2306 F4	2346 G3	3309 C4	3340 D2	3371 B2	3718 G5	6312 D2	7321 F1
2308 E5	2347 B3	3310 C4	3341 E4	3372 C2	3719 G5	6313 E2	7322 E1
2311 F4	2353 B5	3311 E5	3342 F4	3373 D2	3720 F4	6314 E2	9301 E4
2312 F4	2354 E3	3312 E5	3343 F4	3374 C1	3801 B4	6315 B2	9302 D2
2313 F4	2355 D2	3313 E5	3344 F4	3375 C1	3802 D5	6316 B2	9303 G3
2314 E4	2356 A5	3314 A1	3345 B4	3376 C1	3803 C5	6317 A4	9304 D1
2315 E4	2357 A5	3315 A1	3346 B4	3377 C1	3804 B4	6318 A4	9306 B4
2316 E4	2358 B5	3316 A1	3347 A4	3378 E2	3805 D5	6319 G4	9308 C4
2317 F4	2360 B5	3317 C3	3348 A4	3379 G2	3806 B3	6320 F5	9309 F5
2318 F4	2361 B5	3318 E5	3349 B4	3380 E1	3807 E4	6321 E3	9311 D5
2321 E4	2362 B2	3319 C3	3350 E3	3381 B1	3808 A4	6322 F3	9319 B2
2323 E4	2363 E2	3320 C5	3351 F3	3382 B1	3809 A3	6323 E3	9320 F1
2324 F3	2364 C2	3321 C5	3352 F3	3383 C1	3810 B4	7301 F4	9321 A2
2325 E2	2365 G1	3322 C4	3353 D5	3384 C1	3811 G5	7302 E2	F301 D5
2326 G2	2366 C1	3323 C4	3354 E2	3385 C2	3823 F1	7303 E1	F302 E5
2327 B3	2367 C1	3324 E1	3355 G2	3386 B2	3824 F5	7304 G3	F303 E5
2328 E1	2368 B1	3325 D1	3356 B3	3387 B1	5301 D1	7305 F2	F306 D3
2331 G2	2371 E2	3326 F3	3357 A3	3388 B1	5302 F2	7306 B3	M304 C5
2332 B2	2372 E3	3327 F3	3358 F1	3389 E2	5303 B3	7307 B3	M305 B5
2333 F2	2373 C2	3328 G4	3359 B4	3390 G2	5304 B3	7308 F3	M307 E3
2334 D2	2376 F5	3329 C4	3360 C2	3391 B1	5305 E1	7309 C4	M308 D4
2335 E3	2377 G5	3330 C4	3361 E2	3392 B3	5306 G1	7310 C4	M309 D4
2336 F2	2378 F5	3331 E3	3362 G2	3393 E1	5307 A2	7311 C4	M310 A1
2337 B2	3301 E5	3332 F4	3363 B3	3394 B4	5310 B4	7312 C1	
2338 C2	3302 E5	3333 F4	3364 E1	3397 E3	6302 G3	7313 B1	
2339 B4	3303 E5	3334 G3	3365 E1	3399 D4	6303 F3	7314 B1	
2341 A3	3304 E4	3335 G4	3366 G1	3710 D5	6307 A4	7315 B4	

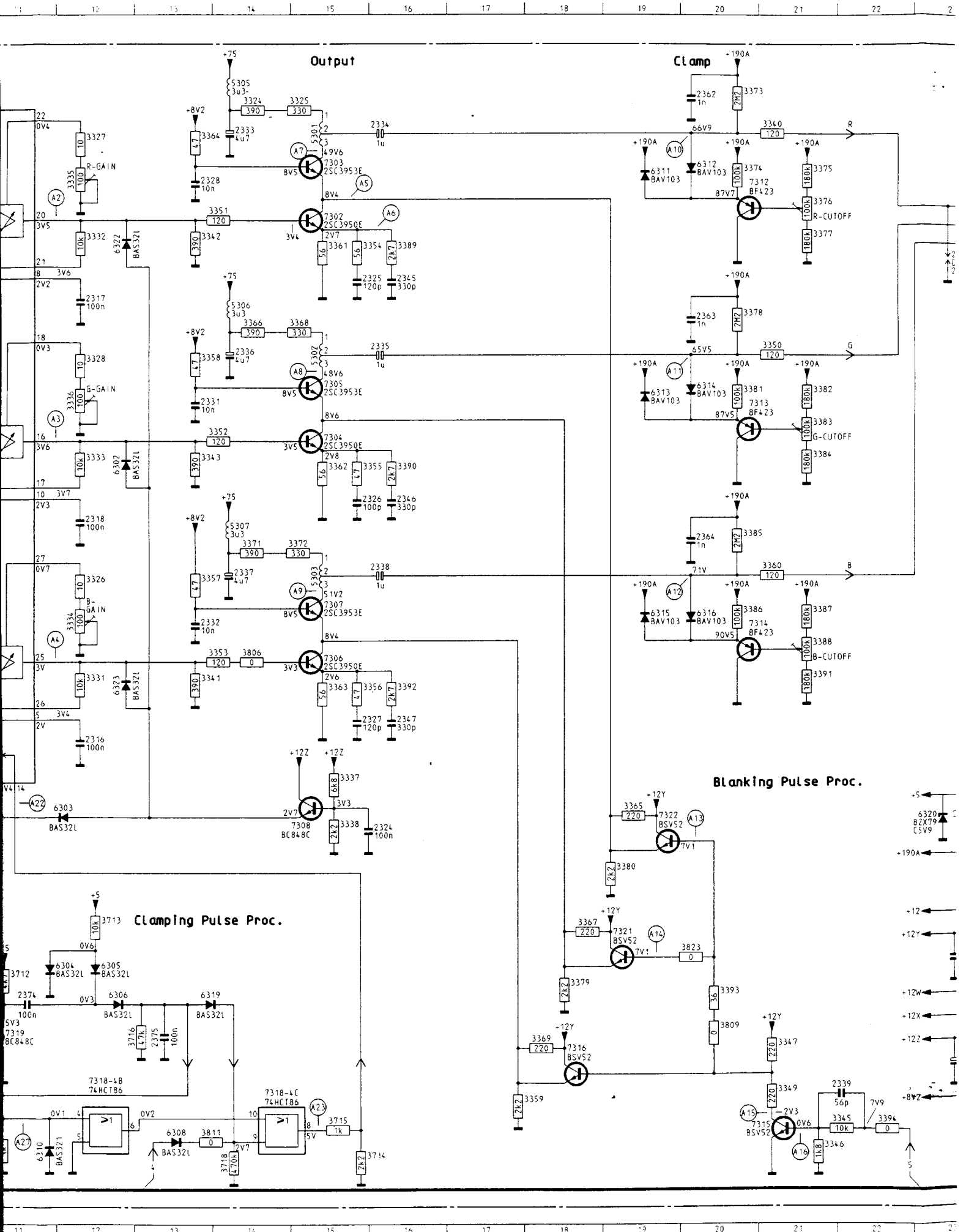




1103 VIDEO PANEL

Video Controller



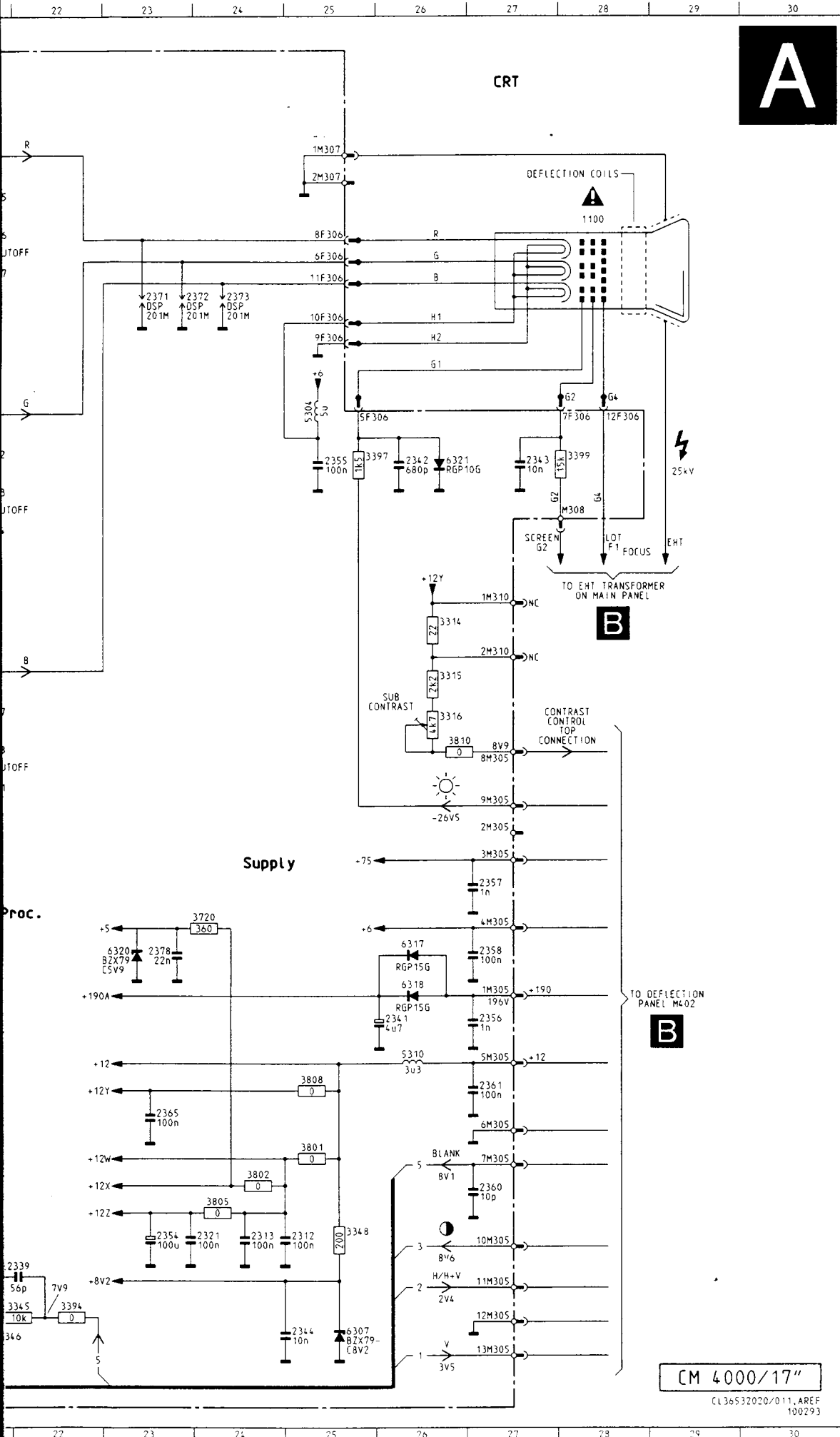


Output

Clamp

Blanking Pulse Proc.

Clamping Pulse Proc.



1100	C28	3358	E13	7321	L19
1103	A 3	3359	N17	7322	K19
2301	L 9	3360	G21		
2302	H 5	3361	C15		
2303	M 5	3362	F15		
2304	C 7	3363	I15		
2306	F 7	3364	B13		
2308	B 8	3365	J19		
2311	J 8	3366	D14		
2312	N25	3367	L18		
2313	N24	3368	D15		
2314	K 8	3369	M18		
2315	K 9	3370	M 6		
2316	J12	3371	G14		
2317	D12	3372	G15		
2318	G12	3373	A20		
2321	N24	3374	B20		
2322	K 9	3375	B21		
2324	K16	3376	C21		
2325	D15	3377	C21		
2326	G15	3378	D20		
2327	I15	3379	M18		
2328	B13	3380	K19		
2331	E13	3381	E20		
2332	H13	3382	E21		
2333	B14	3383	E21		
2334	B16	3384	F21		
2335	E16	3385	G20		
2336	E14	3386	H20		
2337	G14	3387	H21		
2338	G16	3388	H21		
2339	N22	3389	C16		
2341	K26	3390	F16		
2342	E26	3391	I21		
2343	E27	3392	I16		
2344	O25	3393	M20		
2345	D16	3394	N22		
2346	G16	3397	E25		
2347	I16	3399	E28		
2353	J 7	3710	M10		
2354	N23	3711	M10		
2355	E25	3712	L11		
2356	K27	3713	L12		
2357	J27	3714	O15		
2358	K27	3715	N15		
2360	M27	3716	M13		
2361	L27	3717	N 8		
2362	A20	3718	O14		
2363	D20	3719	O11		
2364	G20	3720	J24		
2365	L23	3801	M25		
2371	C23	3802	M24		
2372	C23	3803	L 9		
2373	C24	3804	N 6		
2374	M11	3805	M24		
2375	M13	3806	H14		
2376	O 8	3807	K 8		
2377	N11	3808	L25		
2378	K23	3809	M20		
3301	I 4	3810	H26		
3302	C 6	3811	O13		
3303	F 6	3823	L20		
3304	H 8	3824	N 7		
3305	B 7	5301	B15		
3306	E 7	5302	E15		
3307	L 9	5303	G15		
3308	M 9	5304	E25		
3309	L 8	5305	A14		
3310	M 8	5306	D14		
3311	H 4	5307	G14		
3312	C 6	5310	L26		
3313	F 6	6302	F12		
3314	G26	6303	J12		
3315	H26	6304	L11		
3316	H26	6305	L12		
3317	L 8	6307	O25		
3318	J 8	6308	M12		
3319	M 7	6308	O13		
3320	N 4	6309	M 4		
3321	O 4	6310	O11		
3322	L 6	6311	B19		
3323	M 6	6312	B20		
3324	A14	6313	E19		
3325	A15	6314	E20		
3326	G12	6315	H19		
3327	B12	6316	H20		
3328	E12	6317	J26		
3329	N 5	6318	K26		
3330	L 5	6319	M13		
3331	I12	6320	K23		
3332	C12	6321	E26		
3333	F12	6322	C12		
3334	H12	6323	I12		
3335	B12	7301	A 8		
3336	E12	7302	C15		
3337	J15	7303	B15		
3338	K15	7304	F15		
3339	D 6	7305	E15		
3340	B21	7306	I15		
3341	I13	7307	H15		
3342	C13	7308	K15		
3343	F13	7309	L 5		
3344	K10	7310	L 8		
3345	N22	7311	L 7		
3346	O21	7312	B20		
3347	M21	7313	E20		
3348	M25	7314	H20		
3349	N21	7315	N21		
3350	E21	7316	M18		
3351	C14	7317	N 5		
3352	F14	7318	N 8		
3353	H14	7318	N10		
3354	C15	7318	N12		
3355	F15	7318	N14		
3356	I15	7319	M11		
3357	G13	7320	N 6		

**A**

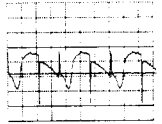
**B**

**B**

CM 4000/17"

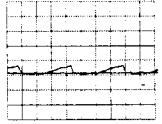
CL36532020/011,AREF 100293

B17 7512-c



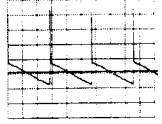
T=17.7us  
Δv=5.04v AC

B25 7638-c



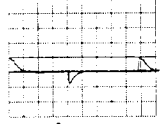
T=17.7us  
Δv=0.56v AC

B33 7501-5



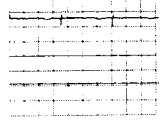
T=14.2ms  
Δv=50.8v AC

B41 7615-b



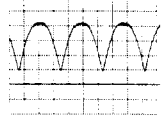
T=17.7us  
Δv=1.76v AC

B49 7604-3



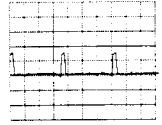
T=17.7us  
Δv=1.68v AC

B57 7911-b



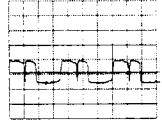
T=14.2ms  
Δv=3.24v AC

B18 7401-b



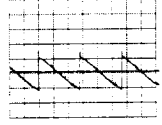
T=17.7us  
Δv=0.86v AC

B26 7638-b



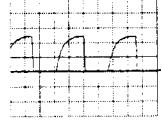
T=17.7us  
Δv=1.6v AC

B34 7509-b



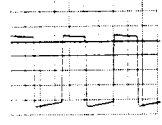
T=14.2ms  
Δv=1.3v AC

B42 7409-c



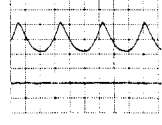
T=17.7us  
Δv=12v AC

B50 7602-b



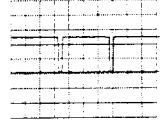
T=17.7us  
Δv=9.76v AC

B58 7911-c



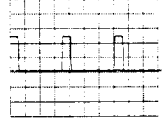
T=14.2ms  
Δv=200v AC

B19 7401-c



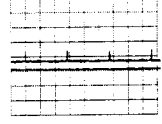
T=17.7us  
Δv=12.2v AC

B27 7616-c



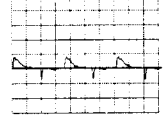
T=17.7us  
Δv=11.8v AC

B35 7508-b



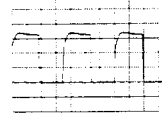
T=14.5ms  
Δv=0.36v AC

B43 7410-b



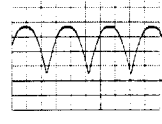
T=17.7us  
Δv=1.56v AC

B51 7602-c



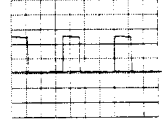
T=17.7us  
Δv=68v AC

B59 7911-e



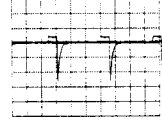
T=14.2ms  
Δv=3.28v AC

B20 7403-9



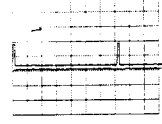
T=17.6us  
Δv=12.4v AC

B28 7641-b



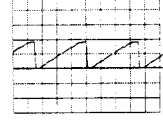
T=17.7us  
Δv=6v AC

B36 7505-c



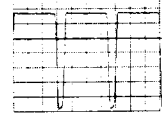
T=14.2ms  
Δv=7.4v AC

B44 7410-c



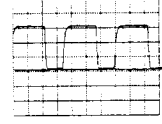
T=17.7us  
Δv=9.2v AC

B52 7617-b



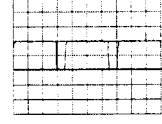
T=17.7us  
Δv=656v AC

B21 7613-b



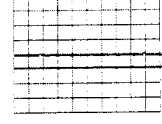
T=17.7us  
Δv=14.6v AC

B29 7641-c



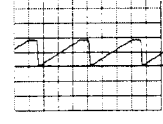
T=17.7us  
Δv=10v AC

B37 7505-e



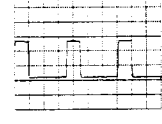
T=14.2ms  
Δv=0.16v AC

B45 7605-2



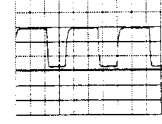
T=17.7us  
Δv=8.2v AC

B53 7606-e



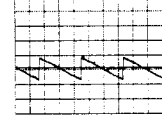
T=17.7us  
Δv=12.6v AC

B22 7613-e



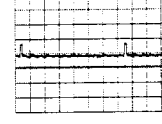
T=17.7us  
Δv=13.4v AC

B30 7619-14



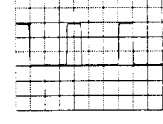
T=14.2ms  
Δv=1.6v AC

B38 7504-b



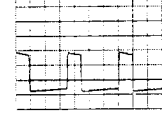
T=14.2ms  
Δv=0.96v AC

B46 7605-1



T=17.7us  
Δv=14.2v AC

B54 7608-g



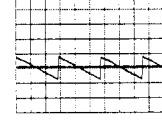
T=17.7us  
Δv=13.2v AC

B23 7624-g



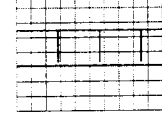
T=17.7us  
Δv=13.8v AC

B31 7619-12



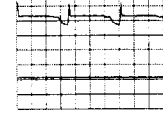
T=14.1ms  
Δv=1.56v AC

B39 7504-c



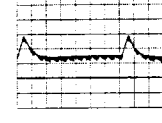
T=14.2ms  
Δv=11v AC

B47 7604-1



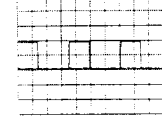
T=17.7us  
Δv=2.88v AC

B55 7625-b



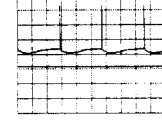
T=14.2ms  
Δv=3.36v AC

B24 7624-d



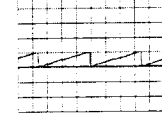
T=17.7us  
Δv=180v AC

B32 7501-4



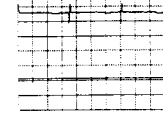
T=14.2ms  
Δv=28.4v AC

B40 7605-6



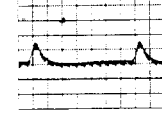
T=17.7us  
Δv=4.6v AC

B48 7604-2

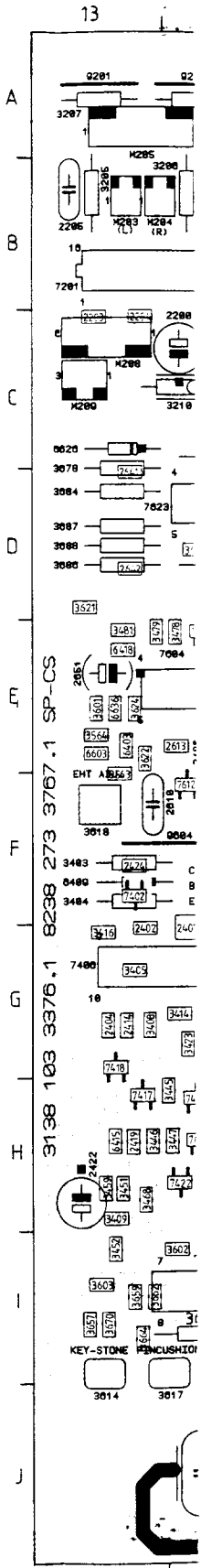


T=17.7us  
Δv=2.56v AC

B56 7625-e



T=14.2ms  
Δv=3.52v AC



# Main panel

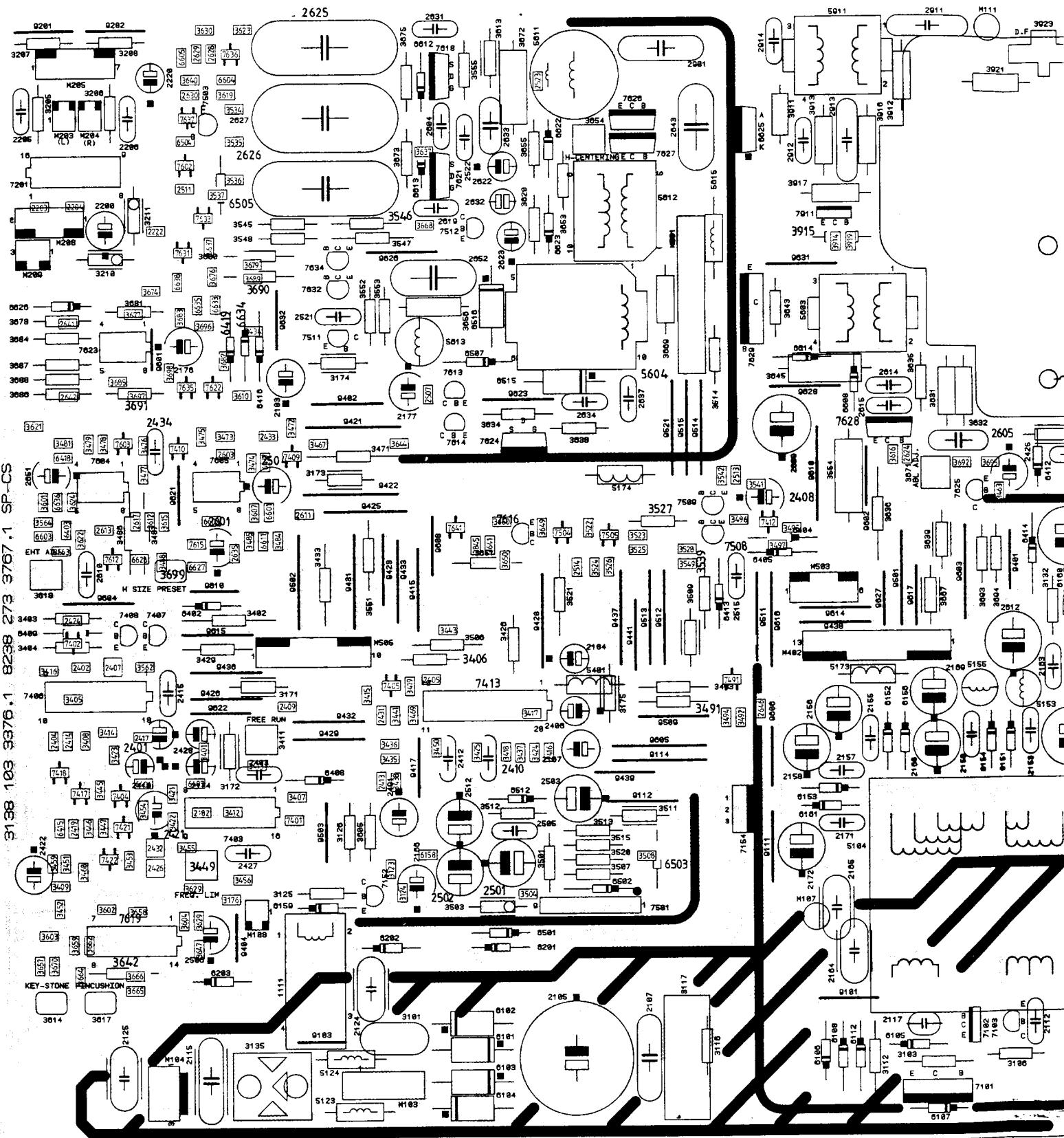
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6.9

6.1

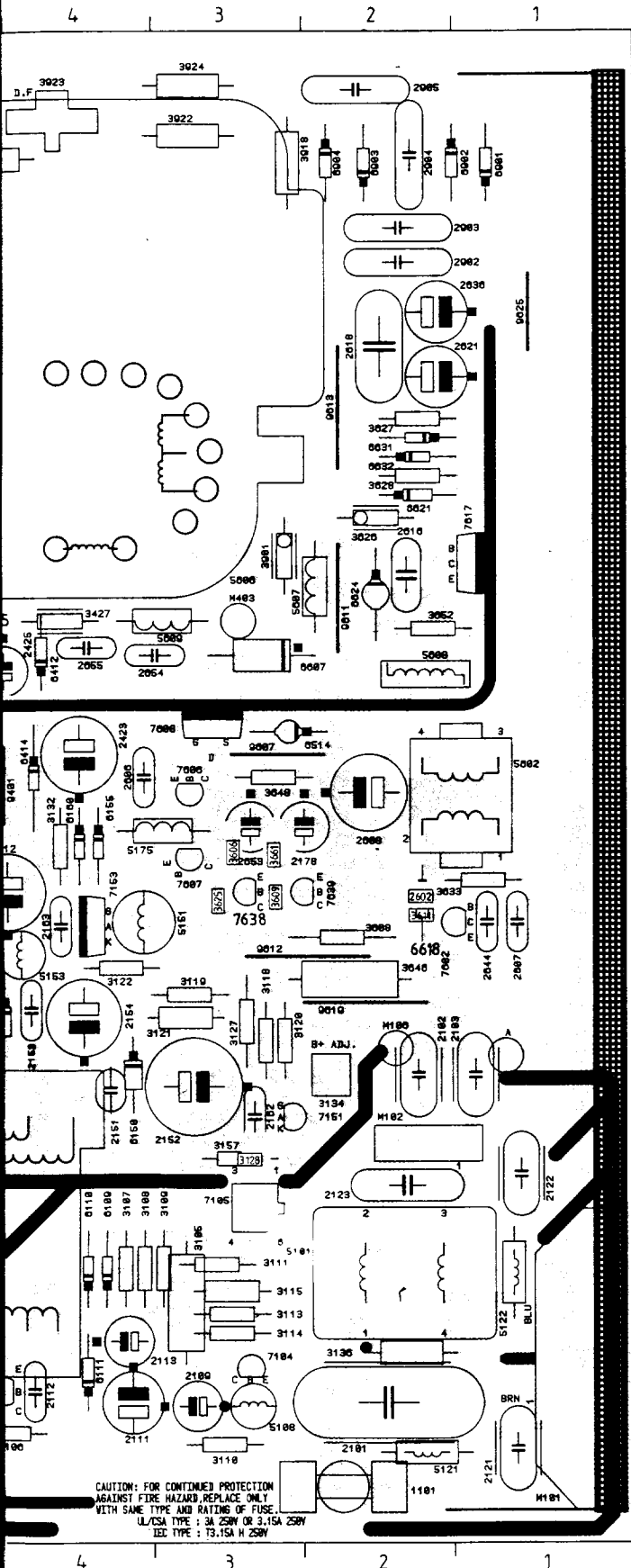
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3188 103 3876.1 8238 273 3767.1 SP-CS

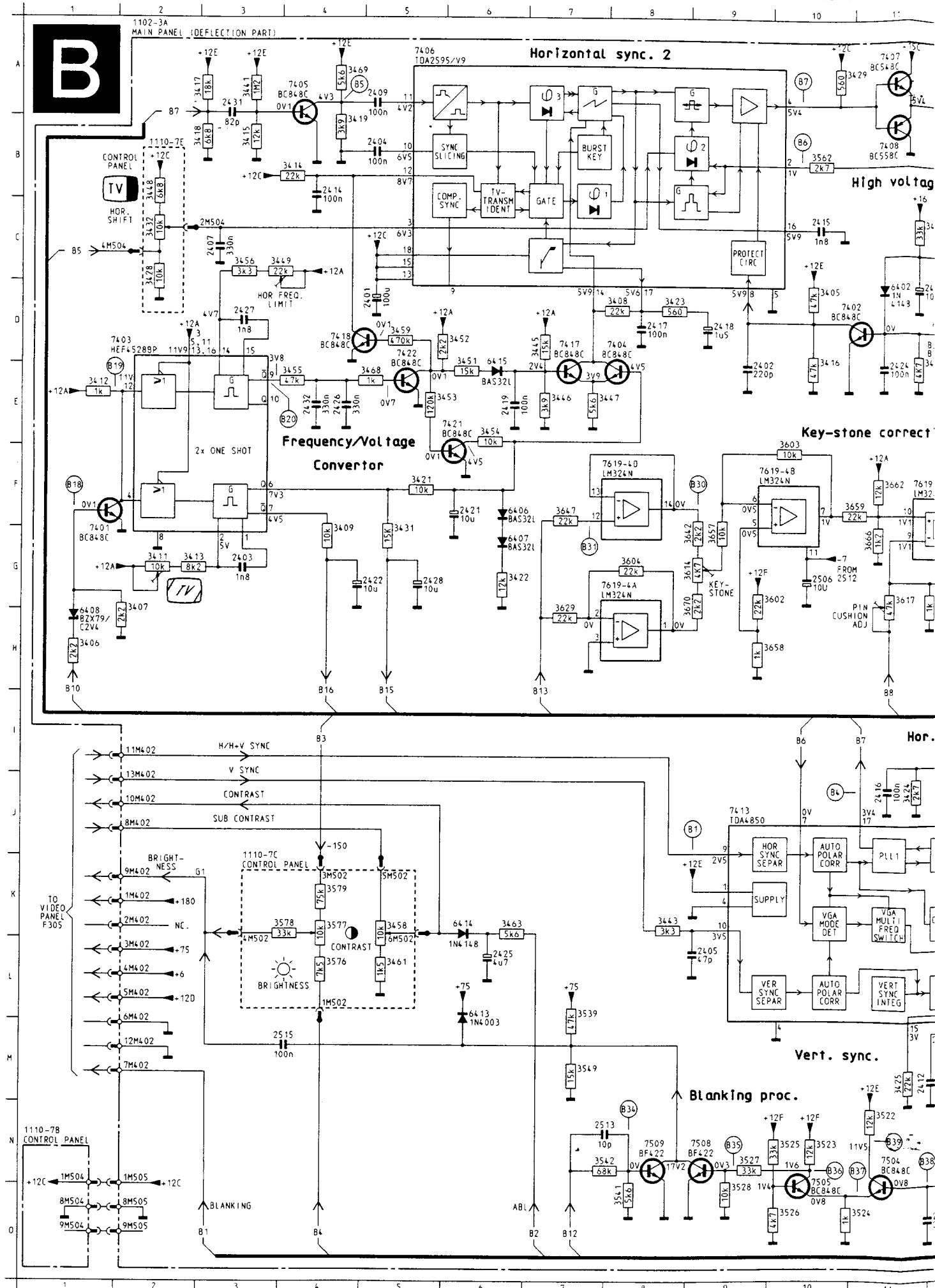


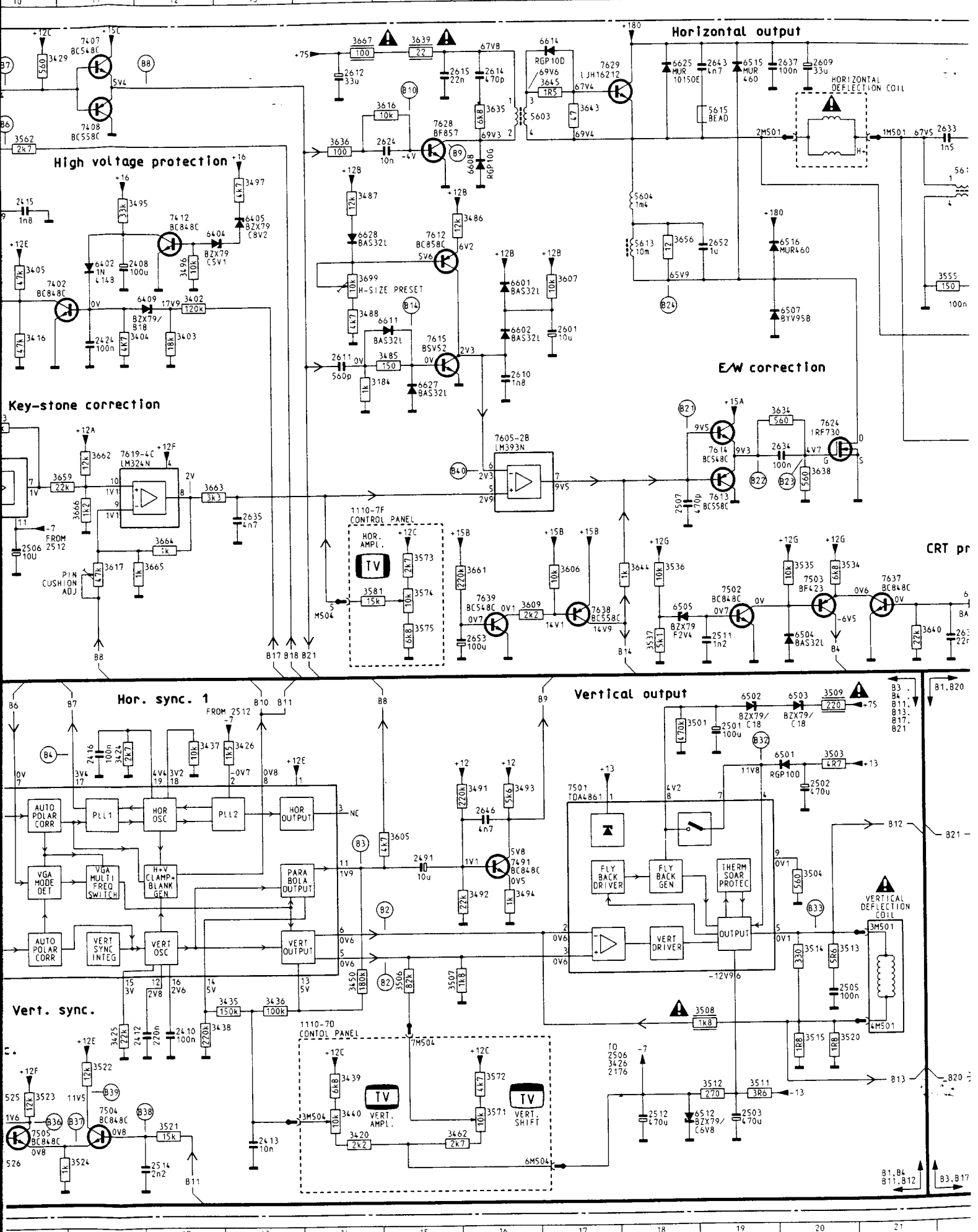
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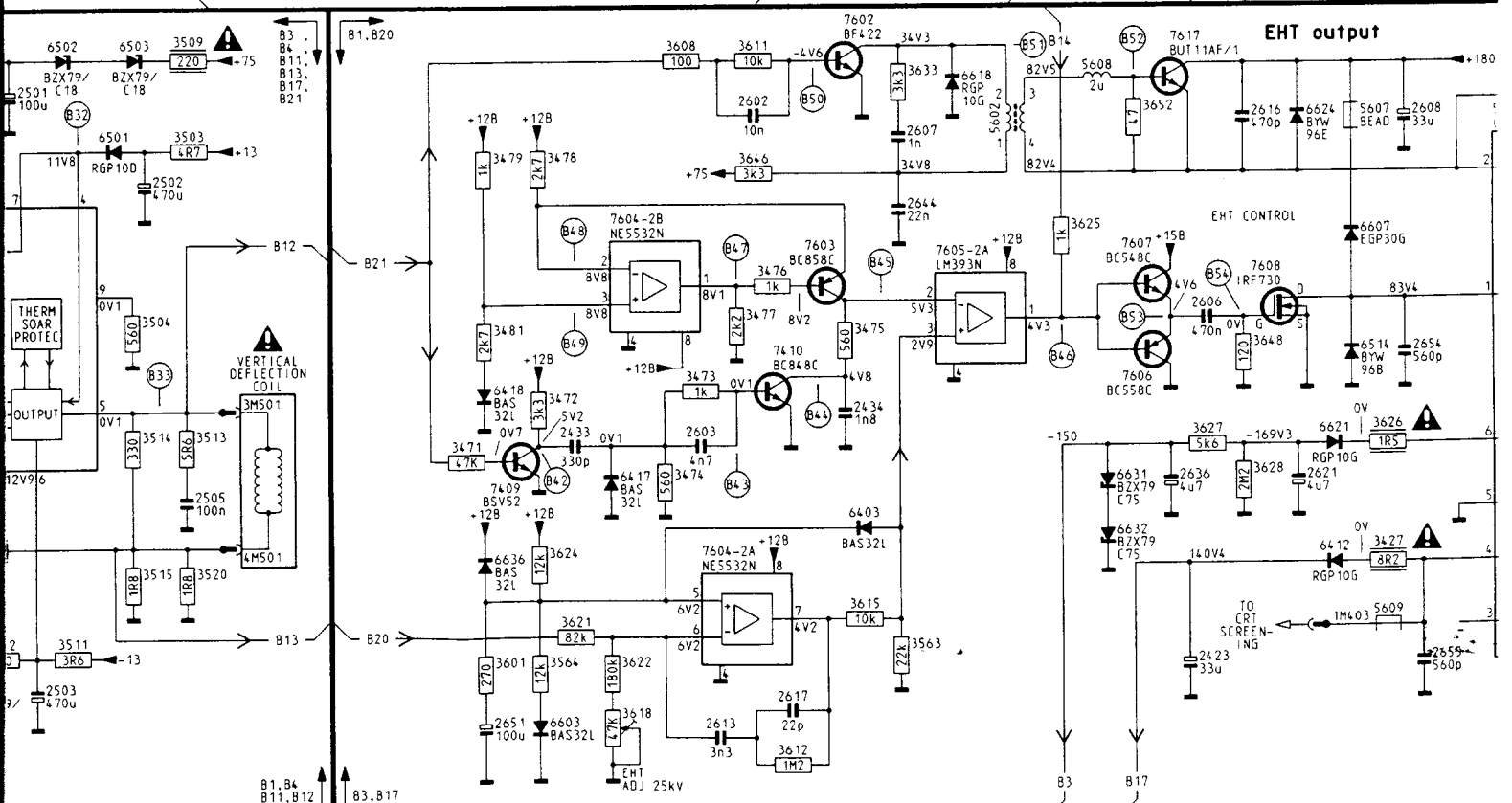
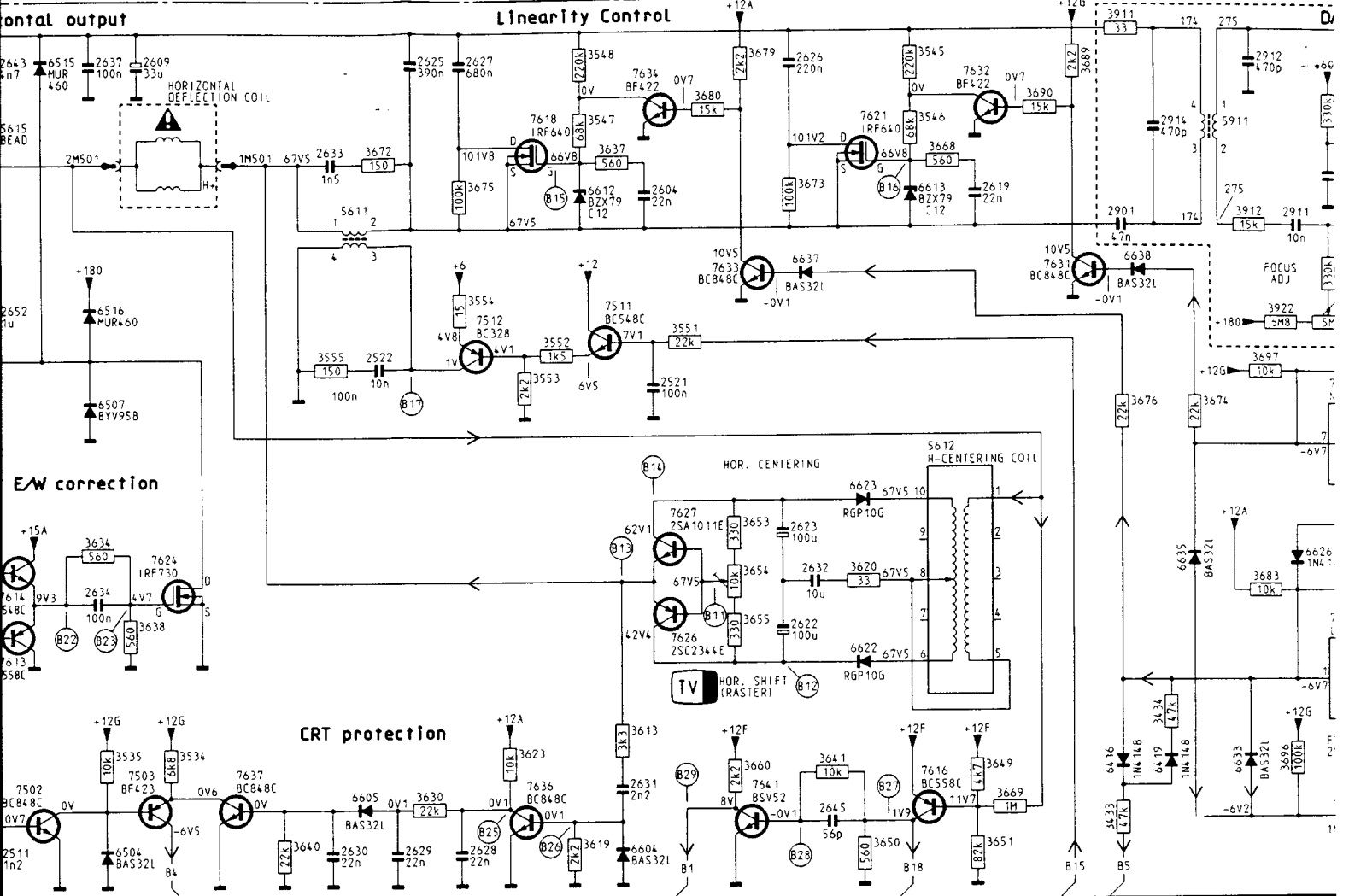


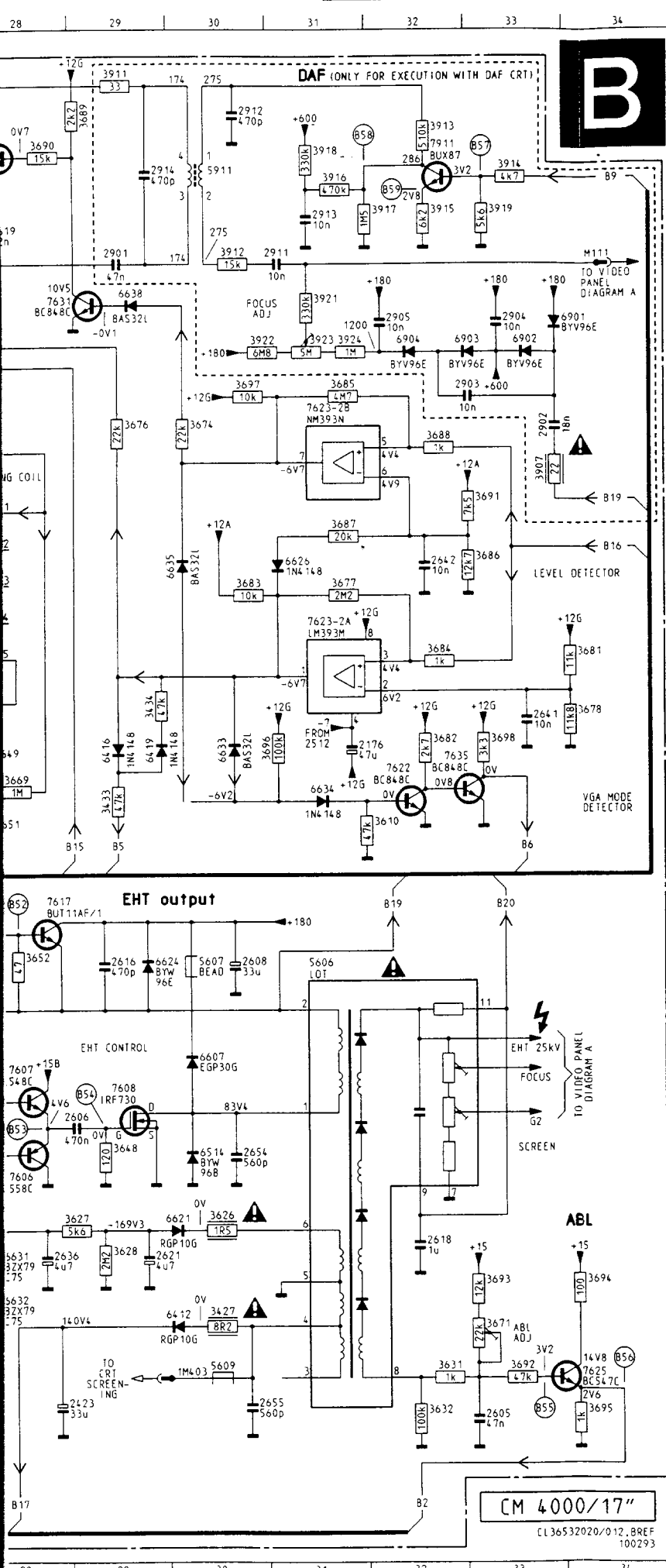


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1111 I11	2612 F5	3423 G12	3613 A9	5124 J10	7101 J5	9521 D8
2101 J2	2613 E13	3424 G9	3614 I13	5151 F4	7102 I5	9601 D12
2102 G2	2614 D6	3425 G9	3615 E12	5153 G4	7103 I5	9602 E6
2103 G1	2615 D6	3426 F9	3616 E6	5155 G5	7104 I3	9603 F5
2105 J8	2616 D2	3427 D4	3617 I13	5173 F6	7105 H3	9604 F13
2107 J8	2617 E12	3429 F12	3618 F13	5174 E8	7151 H3	9605 G8
2109 J3	2618 C2	3430 E4	3619 A11	5175 F3	7152 H10	9606 G7
2111 J4	2619 B10	3431 G12	3620 B9	5401 G8	7153 F4	9607 E3
2112 I4	2621 C2	3433 F11	3621 D13	5602 F2	7154 H7	9608 E10
2113 I4	2622 B9	3434 C11	3622 E13	5603 C6	7201 B13	9610 F12
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2117 I5	2624 E5	3436 G10	3624 E13	5606 C4	7402 F13	9612 G3
2121 J1	2625 A11	3437 G9	3625 F3	5607 D2	7403 H11	9613 C2
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2125 J12	2629 A12	3445 G13	3629 I12	5612 B8	7407 F12	9617 F5
2151 G4	2630 A12	3446 H13	3630 A12	5613 D10	7408 F12	9618 E5
2152 G3	2631 A10	3447 H13	3631 D5	5615 C7	7409 D11	9619 G2
2153 G4	2632 B9	3449 H12	3632 D5	5911 A6	7410 D12	9621 E12
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2155 G6	2634 D8	3451 H13	3634 D9	6102 I9	7413 G9	9623 D9
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2159 G5	2641 C13	3455 H12	3638 D8	6106 J6	7422 H13	9628 D6
2160 G5	2642 D13	3456 H11	3639 E5	6107 J5	7491 F7	9631 C6
2162 H3	2643 B7	3459 H13	3640 A12	6108 J6	7501 H8	9632 C11
2163 F4	2644 G1	3463 E5	3641 E9	6109 I4	7502 B12	M101 I1
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2166 H10	2651 E13	3469 G10	3644 D10	6112 J6	7505 E8	M104 J12
2167 G8	2652 C10	3471 E10	3645 D6	6150 G4	7508 E7	M106 G2
2169 G5	2653 F3	3472 D11	3646 G2	6151 G5	7509 E7	M107 I6
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2174 G12	2901 A8	3475 D12	3649 E9	6154 G5	7602 F2	M203 B13
2176 D12	2902 B2	3476 D12	3650 E9	6155 F4	7603 D12	M204 B13
2177 D10	2903 B2	3477 E12	3651 E9	6156 G5	7604 E13	M205 A13
2178 F3	2904 A2	3478 D13	3652 D2	6158 H10	7605 E11	M208 B13
2182 H12	2905 A2	3479 D13	3653 B8	6159 H11	7606 F3	M209 C13
2183 D11	2911 A5	3481 D13	3654 B8	6160 F4	7607 F3	M402 F6
2184 F8	2912 B6	3484 E11	3655 B9	6161 H6	7608 E3	M403 D3
2200 B12	2913 B6	3485 E11	3656 C10	6201 I9	7612 E12	M501 C7
2203 B3	2914 A7	3486 E12	3657 I13	6202 I10	7613 D9	M503 F6
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2205 A13	3103 J5	3488 E12	3659 I13	6402 F12	7615 E12	
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2222 C12	3107 I4	3493 G8	3662 I13	6405 E7	7618 A10	
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2416 G9	3122 G4	3514 D7	3677 C12	6503 H8	7635 D12	
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2424 F13	3132 F4	3525 E8	3684 C13	6516 C9	9101 I6	
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2426 H12	3135 J11	3527 E8	3686 D13	6601 E11	9111 H7	
2427 H11	3136 I2	3528 E7	3687 D13	6602 E12	9112 H8	
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2432 H12	3172 G11	3536 B11	3690 C11	6605 A12	9202 A12	
2433 D11	3173 E10	3537 B12	3691 D12	6607 E3	9401 E4	
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2503 H8	3206 B12	3546 B10	3696 C12	6614 D6	9421 D10	
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2505 H9	3208 A12	3548 C11	3698 D12	6621 D2	9423 E10	
2506 H12	3210 C12	3549 E7	3699 E12	6622 B9	9425 E10	
2507 D10	3211 B12	3551 E10	3901 D3	6623 B9	9426 G11	
2511 B12	3402 F11	3552 C10	3911 B7	6624 D2	9428 F9	
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2521 C10	3407 G11	3563 E13	3916 B6	6631 C2	9436 F11	
2522 B9	3408 G13	3564 E13	3917 B6	6632 C2	9437 F8	
2523 A9	3409 H13	3601 E13	3918 A3	6633 C12	9438 F6	
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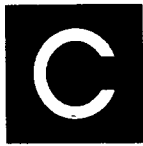




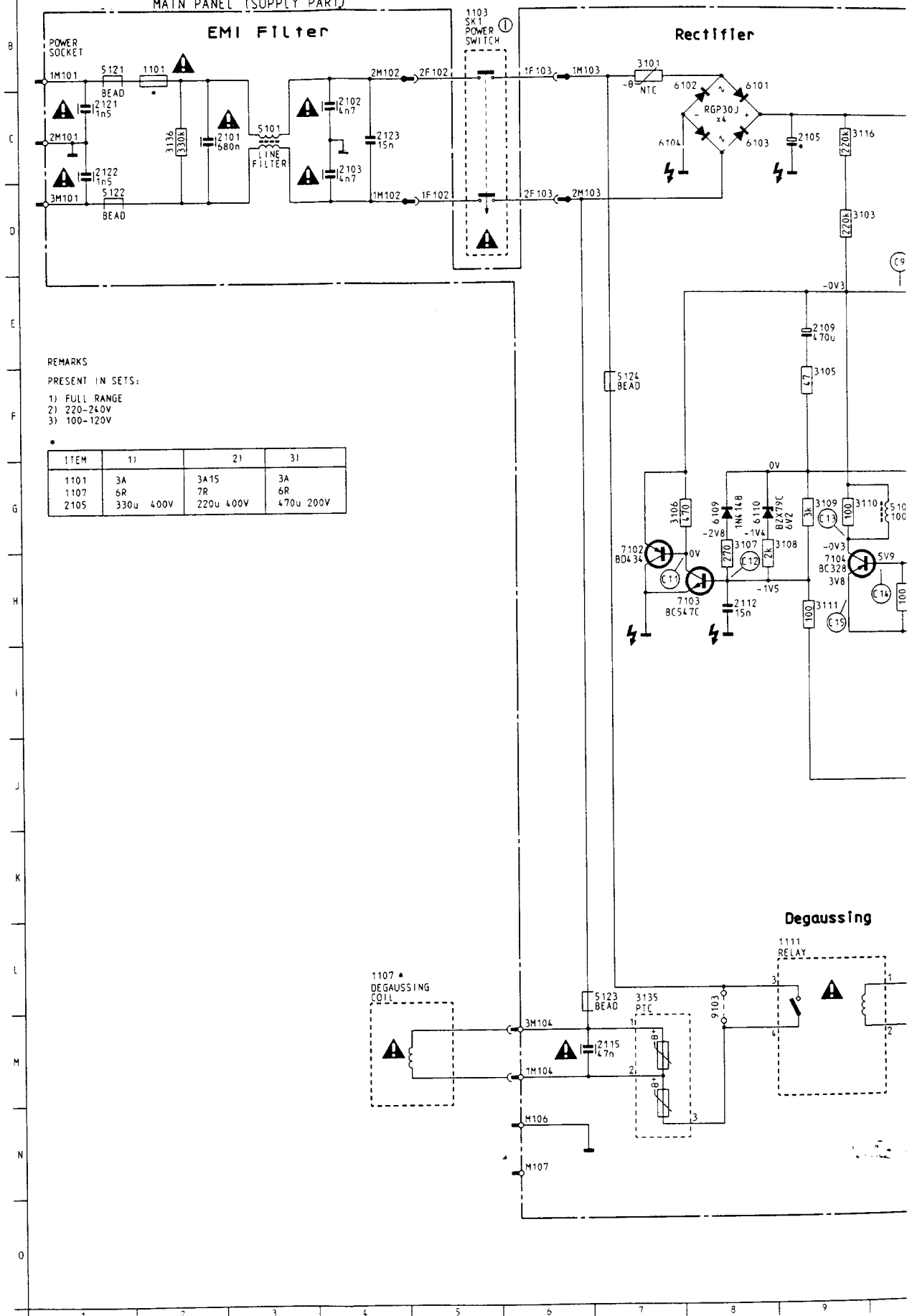




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1110	N	1	3422	G	6	3611	I25	6408	H	1	
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2403	G	3	3426	J13	3615	N26	6414	K	6		
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2405	L	9	3428	C	2	3617	G11	6416	H29		
2407	C	3	3429	A10	3618	N24	6417	M24			
2408	D11	3431	F	5	3619	H24	6418	L23			
2409	A	5	3432	C	2	3620	F27	6419	H29		
2410	M12	3433	H29	3621	N23	6501	J20				
2412	M11	3434	G29	3622	N24	6502	I19				
2413	O13	3435	M13	3623	G23	6503	I20				
2414	3	4	3436	M13	3624	M23	6504	H20			
2415	C10	3437	J12	3625	K27	6505	H18				
2416	J11	3438	M12	3626	L30	6507	O20				
2417	D	8	3439	N14	3627	L29	6512	N18			
2418	D	9	3440	N14	3628	M29	6514	L30			
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2423	N28	3446	E	7	3632	N32	6602	D16			
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2425	L	6	3448	B	2	3634	F20	6604	H24		
2426	E	4	3449	C	3	3635	B16	6605	H22		
2427	D	3	3450	M14	3636	B14	6607	K30			
2428	G	5	3451	E	6	3637	B24	6608	B16		
2431	A	3	3452	D	6	3638	F20	6611	O15		
2432	E	4	3453	E	5	3639	A15	6612	B24		
2433	L23	3454	E	6	3640	H21	6613	B27			
2434	L26	3455	E	4	3641	H26	6614	A17			
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2501	I19	3458	K	5	3643	B17	6621	L30			
2502	J20	3459	D	5	3644	G18	6622	G27			
2503	N19	3461	L	5	3645	A17	6623	E27			
2505	M20	3462	O15	3646	J25	6624	J29				
2506	G10	3463	K	6	3647	F	7	6625	A18		
2507	G18	3468	E	5	3648	K29	6626	F31			
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2512	N18	3471	L22	3650	H27	6628	C14				
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2514	O12	3473	L24	3652	J28	6632	M28				
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2521	D25	3475	K26	3654	F26	6634	H31				
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2604	B25	3481	K23	3659	F11	6901	C33				
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2625	A23	3512	N19	3679	A26	7501	J17				
2626	A26	3513	L20	3680	B25	7502	H19				
2627	A23	3514	L20	3681	F34	7503	H20				
2628	H23	3515	M20	3682	G32	7504	M11				
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2632	F26	3523	N10	3686	F33	7511	C24				
2633	B22	3524	O11	3687	E31	7512	O23				
2634	F20	3525	N10	3688	D32	7602	I26				
2635	G13	3526	O10	3689	A29	7603	K26				
2636	M28	3527	N	9	3690	B28	7604	K24			
2637	A20	3528	N	9	3691	E33	7604	M24			
2641	G33	3534	G20	3692	N33	7605	F16				
2642	F32	3535	G20	3693	M33	7605	K26				
2643	A19	3536	G18	3694	M34	7606	L28				
2644	J26	3537	H18	3695	N34	7607	K28				
2645	H26	3539	L	7	3696	H31	7608	K29			
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2653	H16	3546	B27	3907	E33	7619	E19				
2654	L30	3547	B24	3911	A29	7616	H27				
2655	N30	3548	A24	3912	C30	7617	I28				
2901	C29	3549	M	7	3913	A32	7618	B24			
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2904	C33	3553	O24	3916	B31	7619	F	9			
2905	C32	3554	C23	3917	B32	7619	F11				
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3407	G	2	3577	K	4	5607	J30	7631	C29		
3408	D	8	3578	K	4	5608	I28	7632	A28		
3409	F	4	3579	K	4	5609	N30	7633	C26		
3411	G	2	3581	H14	5611	C22	7634	A25			
3412	E	1	3601	N23	5612	E27	7635	H33			
3413	G	2	3602	G	9	5613	C18	7636	H24		
3414	B	4	3603	F10	5615	B19	7637	H21			
3415	B	3	3604	G	8	5911	B30	7638	A17		
3416	O10	3605	K15	6402	D11	7639	A16				



1102-38  
MAIN PANEL (SUPPLY PART)



REMARKS

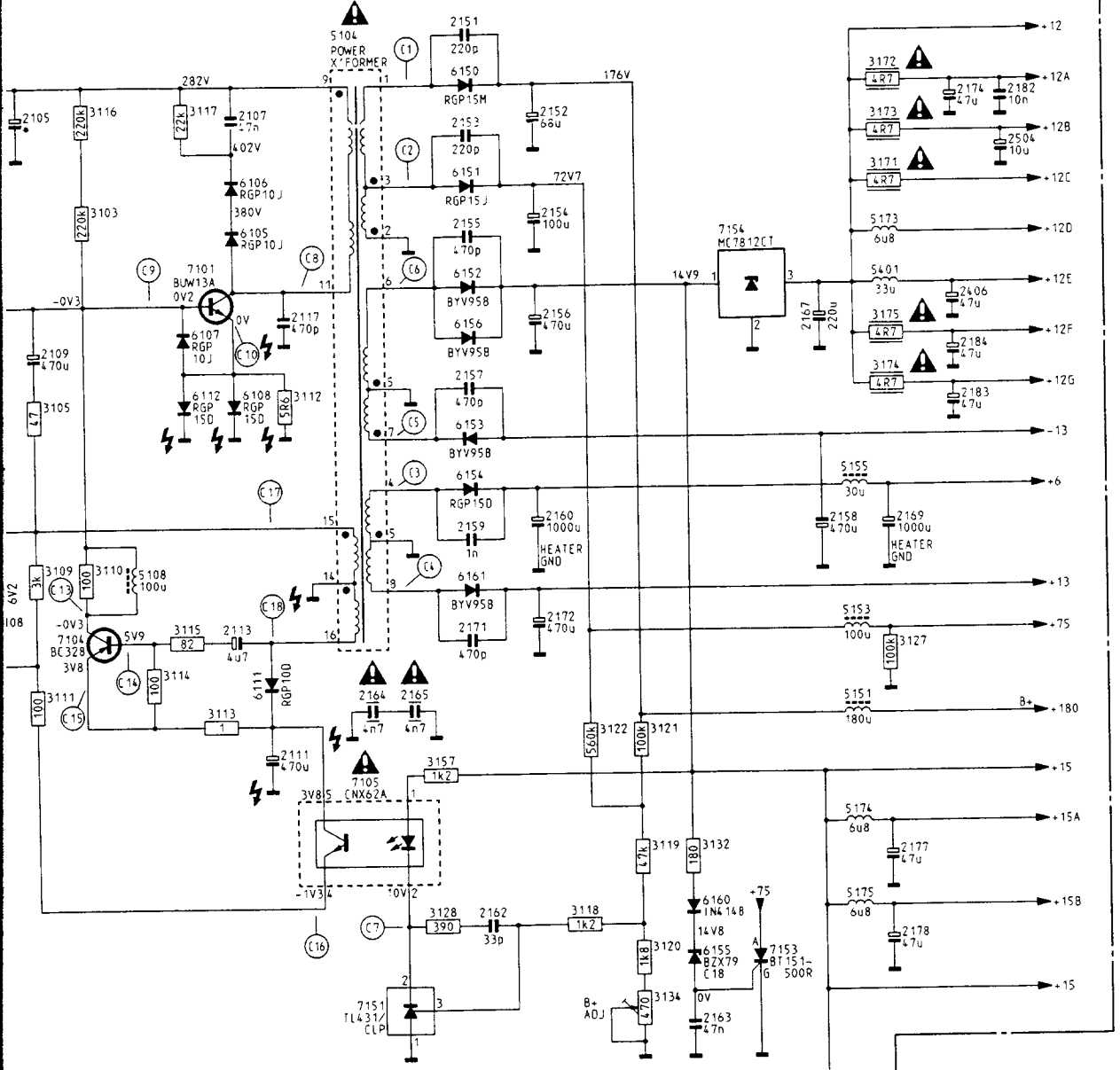
PRESENT IN SETS:

- 1) FULL RANGE
- 2) 220-240V
- 3) 100-120V

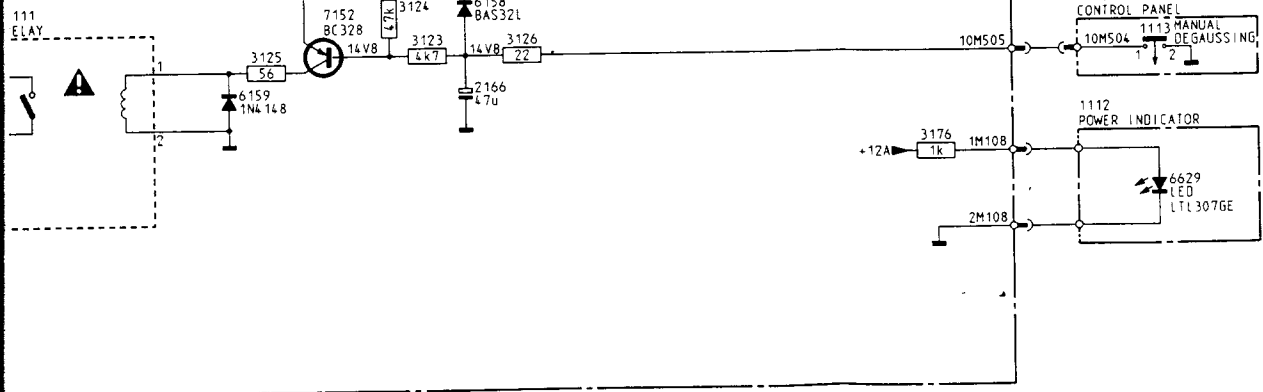
ITEM	1)	2)	3)
1101	3A	3A15	3A
1107	6R	7R	6R
2105	330u 400V	220u 400V	470u 200V



Sops Control



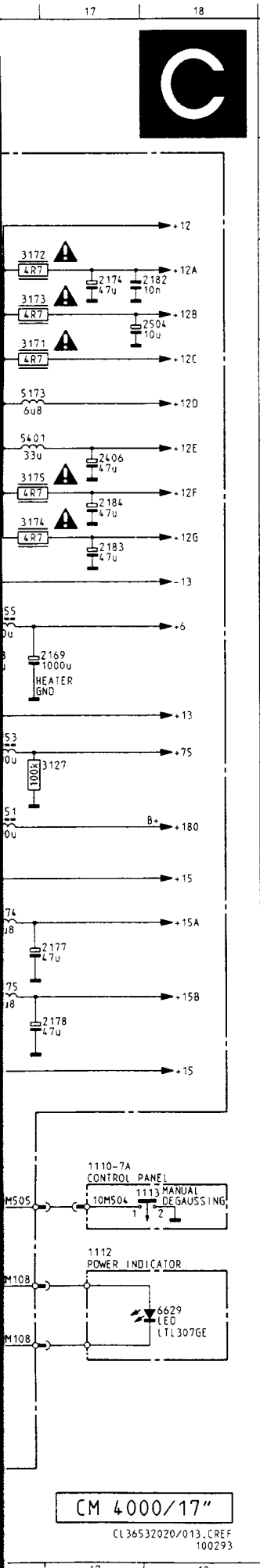
Degaussing



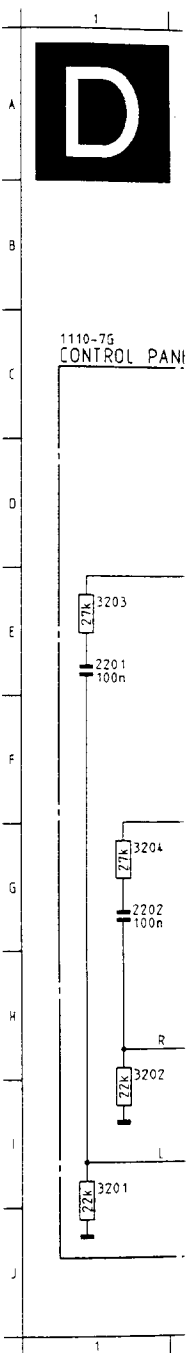
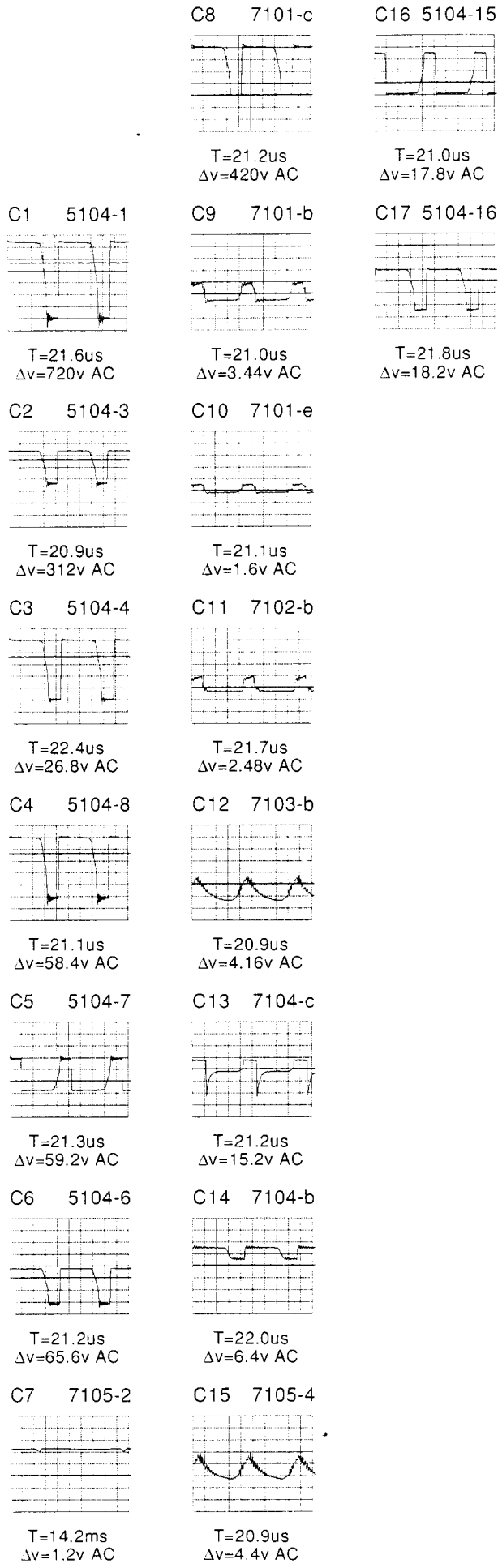
CM 4000/17"

CL36532020/013.CREF  
100293

1101	B 2	6154	F:3
1102	A 2	6155	J:5
1103	B 5	6156	E:13
1107	L 4	6158	L:12
1110	L:17	6159	L:10
1111	L 9	6160	J:5
1112	H:17	6161	G:13
1113	L:18	6629	M:18
2101	C 2	7101	D:11
2102	C 4	7102	H 7
2103	C 4	7103	H 8
2105	C 9	7104	H 9
2107	C:11	7105	L:12
2109	E 9	7151	K:12
2111	L:11	7152	L:11
2112	H 8	7153	J:5
2113	H:11	7154	D:15
2115	M 7	9103	L 8
2117	E:11		
2121	C 1		
2122	C 1		
2123	C 4		
2151	B:13		
2152	C:13		
2153	C:13		
2154	D:13		
2155	D:13		
2156	E:13		
2157	E:13		
2158	G:16		
2159	G:13		
2160	G:13		
2162	J:13		
2163	K:15		
2164	H:12		
2165	H:12		
2166	L:12		
2167	E:16		
2169	G:16		
2171	H:13		
2172	H:13		
2174	C:17		
2177	J:16		
2178	J:16		
2182	C:18		
2183	F:17		
2184	E:17		
2406	E:17		
2504	C:18		
3101	B 7		
3103	D 9		
3105	F 9		
3106	G 7		
3107	G 8		
3108	G 9		
3109	G 9		
3110	G 9		
3111	H 9		
3112	E:11		
3113	H:11		
3114	H:10		
3115	H:10		
3116	C 9		
3117	C:10		
3118	J:14		
3119	L:14		
3120	J:14		
3121	H:14		
3122	H:14		
3123	L:12		
3124	L:12		
3125	L:11		
3126	L:13		
3127	H:16		
3128	J:12		
3132	L:15		
3134	K:14		
3135	L 7		
3136	C 2		
3157	L:12		
3171	D:16		
3172	C:16		
3173	C:16		
3174	E:16		
3175	E:16		
3176	M:16		
5101	C 3		
5104	B:12		
5108	G:10		
5121	B 1		
5122	D 1		
5123	L 7		
5124	F 7		
5151	H:16		
5153	H:16		
5155	F:16		
5173	D:16		
5174	L:16		
5175	J:16		
5401	E:16		
6101	C 8		
6102	C 8		
6103	C 8		
6104	C 8		
6105	D:11		
6106	D:11		
6107	E:10		
6108	F:11		
6109	G 8		
6110	G 8		
6111	H:11		
6112	F:10		
6150	C:13		
6151	D:13		
6152	E:13		
6153	F:13		



1101	B 2	6154	F13
1102	A 2	6155	J15
1103	B 5	6156	E13
1107	L 4	6158	L12
1110	L17	6159	L10
1111	L 9	6160	J15
1112	M17	6161	G13
1113	L18	6629	M18
2101	C 2	7101	D11
2102	C 4	7102	H 7
2103	C 4	7103	H 8
2105	C 9	7104	H 9
2107	C11	7105	L12
2109	E 9	7151	K12
2111	L11	7152	L11
2112	H 8	7153	J15
2113	H11	7154	D15
2115	M 7	9103	L 8
2117	E11		
2121	C 1		
2122	C 1		
2123	C 4		
2151	B13		
2152	C13		
2153	C13		
2154	D13		
2155	D13		
2156	E13		
2157	E13		
2158	G16		
2159	G13		
2160	G13		
2162	J13		
2163	K15		
2164	H12		
2165	H12		
2166	L12		
2167	E16		
2169	G16		
2171	H13		
2172	H13		
2174	C17		
2177	J16		
2178	J16		
2182	C18		
2183	F17		
2184	E17		
2406	E17		
2504	C18		
3101	B 7		
3103	D 9		
3105	F 9		
3106	G 7		
3107	G 8		
3108	G 9		
3109	G 9		
3110	G 9		
3111	H 9		
3112	E11		
3113	H11		
3114	H10		
3115	H10		
3116	C 9		
3117	C10		
3118	J14		
3119	L14		
3120	J14		
3121	H14		
3122	H14		
3123	L12		
3124	L12		
3125	L11		
3126	L13		
3127	H16		
3128	J12		
3132	L15		
3134	K14		
3135	L 7		
3136	C 2		
3157	I12		
3171	D16		
3172	C16		
3173	C16		
3174	E16		
3175	E16		
3176	M16		
5101	C 3		
5104	B12		
5108	G10		
5121	B 1		
5122	D 1		
5123	L 7		
5124	F 7		
5151	H16		
5153	H16		
5155	F16		
5173	D16		
5174	L16		
5175	J16		
5401	E16		
6101	C 8		
6102	C 8		
6103	C 8		
6104	C 8		
6105	D11		
6106	D11		
6107	E10		
6108	F11		
6109	G 8		
6110	G 8		
6111	H11		
6112	F10		
6150	C13		
6151	D13		
6152	E13		
6153	F13		

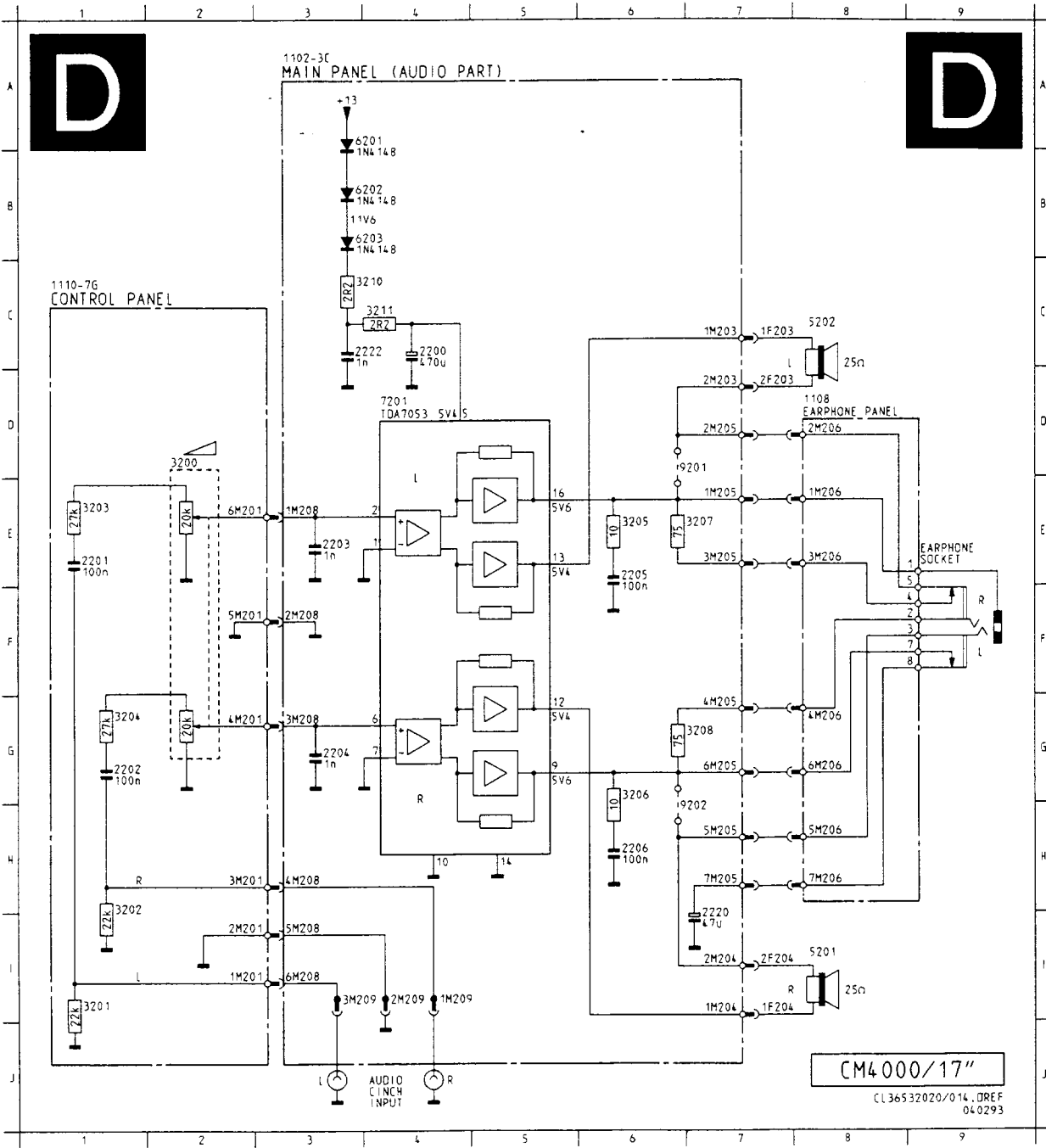


Earphone panel c

CM 4000/17"

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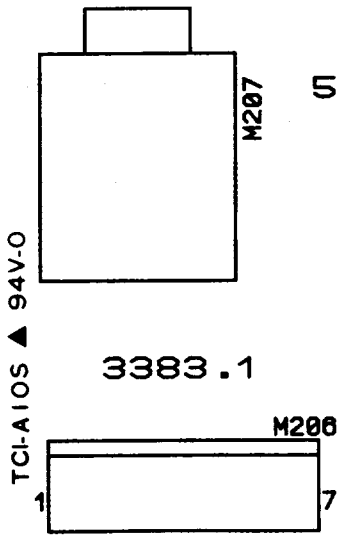




1102	A 3
1108	O 8
1110	C 1
2200	C 4
2201	E 1
2202	G 1
2203	E 3
2204	G 3
2205	E 6
2206	H 6
2220	I 7
2222	C 3
3200	D 2
3201	I 1
3202	H 1
3203	E 1
3204	G 1
3205	E 6
3206	G 6
3207	E 6
3208	G 6
3210	C 3
3211	C 4
5201	I 8
5202	C 8
6201	A 3
6202	B 3
6203	B 3
7201	D 4
9201	D 6
9202	H 6

CM4000/17"  
CL36532020/014, DREF  
040293

Earphone panel comp. side



## General:

When carry-out the electrical settings in many cases a video signal must be applied to the monitor.  
A computer with an "ATI VGA 1024 V6-1.04 / PH BETA 4" interface card (1024\*768) is used as the video signal source. The signal patterns are selected from the service test software package.

## Installation instructions for the ATI interface card:

- Place the monitor (if possible) in east-west direction.
- Place the ATI interface card in the computer.
- Select the "Vsetup" file from the "utility disk" belonging to the card.
- Select "8 bits" or "16 bits" ROM operation depends on the computer type.
- Select "analog monitor"
- Select "Magnavox CM5000" as the monitor type.
- Re-boot your computer again.
- Put the floppy disk with the "service test software" package in the computer and select the test pattern indicated for the following settings.

### 1. B+ supply voltage (3134)

- Apply a video signal in the 640\*480 with 31.5kHz / 60Hz mode.
- Select the "cross-hatch" pattern.
- Set the brightness front control 3577 and the contrast front control 3458 to the minimum position.
- Pre-set trimming potentiometer 3134 and 3618 in mid position.
- Connect a DC voltmeter between the "+" pole of capacitor 2152 (on power supply) and ground (common ground).
- Set the B+ trimming potentiometer 3134 so that the reading on the DC voltmeter is  $180V \pm 0.5V$ .

### 2. High voltage EHT (3618)

- Turn off the power.
- Connect a "high voltage voltmeter" between the high-voltage connection of the picture tube and earth.
- Turn on the power.
- Set the contrast front control 3458 to the maximum position.
- Set H-width front control 3574 at mechanical minimum position.
- Set the EHT trimming potentiometer 3618 so that the high-voltage voltmeter reads  $25kV \pm 0.2kV$ .
- Turn off the power.
- Remove the "high voltage voltmeter" from the picture tube.
- Turn on the power again.

### 3. Line frequency limit adjustment (3449)

Method 1.

- Apply a video signal in the 1024\*768 with 56kHz / 70Hz mode.
- Select the "cross-hatch" pattern.
- Connect an oscilloscope to pin 9 of 7403.
- Using potentiometer 3449, set the timing of pulses at pin 9 of 7403 to  $2.4 \pm 0.02 \mu s$ .

Method 2.

- Apply a video signal in the 60.194kHz / 70.07Hz mode (with Chroma 2000).
- Select the "cross-hatch" pattern.
- Connect a DC Voltmeter between the collector of 7422 and ground (common ground).
- Adjust the trimming potentiometer 3449 so that the reading on the DC voltmeter is 4.0 V.

Chroma 2000 timing chart for special mode 60.194kHz / 70.07Hz.

	Horizontal	Vertical
Frame border	0.000 $\mu s$	0.000 ms
Total size	16.613 $\mu s$	14.272 ms
Display size	12.800 $\mu s$	13.599 ms
Rear porche	1.920 $\mu s$	0.513 ms
Sync width	1.813 $\mu s$	0.106 ms
Sync polarity	+/-	+/-

### 4. Horizontal synchronisation (3411, 3654)

- Set the contrast front control 3458 to the maximum position.
- Apply a video signal in the 1024\*768 with 56kHz / 70Hz mode.
- Select the "cross-hatch" pattern.
- Turn off the power.
- Short the junction of 2414 and 7406 pin 12 to ground.
- Turn on the power.
- Adjust trimming potentiometer 3411 until the picture stands straight.
- Turn off the power.
- Remove the grounding from junction of 2414 and 7406.
- Turn on the power.
- Set potentiometer 3654 for the correct horizontal centering of the whole raster.

### 5. Focus setting

- Apply a video signal in the 640\*480 with 31.5kHz / 60Hz mode.
- Select the "M" pattern.
- Set the brightness front control 3577 to mid-position and contrast front control 3458 to maximum position.
- Adjust focus potentiometer (top knob on the line output transformer) so that the picture at 2/3 of the diagonal lines (from centre to four corners) of the displayed screen is as sharp as possible.

## 6. Adjustment of pre-size (3699) for "Apple-MAC"

- Apply a video signal in the 640\*480 with 35.0kHz / 67Hz mode.
- Select the "cross-hatch" pattern.
- Set the brightness front control 3577 and contrast front control 3458 in the mechanical mid-position.
- Adjust the H-width to maximum by H-size front control 3574.
- Adjust the pre-size such that the picture reach to edge by 3699.

Chroma 2000 timing chart for special mode  
35.0kHz / 67Hz. 640\*480 pixel = 30.240MHz.

	Horizontal	Vertical
Frame border	0.000 $\mu$ s	0.000 ms
Total size	28.571 $\mu$ s	14.272 ms
Display size	21.164 $\mu$ s	13.599 ms
Rear porche	3.175 $\mu$ s	0.513 ms
Sync width	2.116 $\mu$ s	0.106 ms
Sync polarity	+/-	+/-
Serration pulse	RS343A type	sync on screen
Pulse width	2.116 $\mu$ s	
No. per H	1	

## 7. Adjustment of cut-off points

- \* VG2 (bottom knob on the line output transformer)
- \* Cut-off points of the picture tube (3378, 3383, 3388)
- \* White "D" (3334, 3335, 3336, 3316)

- Pre-set trimming potentiometers 3334, 3335, 3336 and 3378, 3383, 3388 to the mechanical mid-position.
- Apply a video signal (full white) in the 640\*480 with 31.5kHz / 60 Hz mode.
- Set the brightness front control 3577 to the click position and contrast front control 3458 to the mechanical minimum position.
- Set VG2 potentiometer on the line output transformer to minimum position.
- Using the VG2 setting key, increase the VG2 voltage until a colour is just visible (the colour may be red, green or blue).
- Then set the cut-off points trimming potentiometer belonging to the two colours not yet visible (3378, 3383 or 3388) so that an optimum white background (raster) colour is obtained.
- Set the contrast front control 3458 to maximum in order to check that the background (raster) colour remains the same even at maximum contrast.
- Then set the contrast front control 3458 to the central position again.

### 7.1 White "D" (3334, 3335, 3336, 3316)

- Set the contrast front control 3458 to maximum position.
- Set the brightness front control 3577 at centre click position.
- Adjust potentiometer 3334, 3335 and 3336 to the same light output level so that an optimal display colour (white "D") is obtained.
- If necessary, adjust sub-contrast potentiometer 3316 for the optimal light output of the video display (until the brightness no longer increases).

## 8. Picture geometry setting

- Set brightness front control 3577 and the contrast front control 3458 in the mechanical central position.
- Apply a video signal with cross-hatch pattern in the 640\*480 with 31.5kHz / 60Hz mode.

### 8.1 Horizontal image centering (3654, 3432)

- Set potentiometer 3654 for the correct horizontal centering of the whole raster.
- Adjust H-shift front control 3432 for the correct horizontal centering of the video display.

### 8.2 Horizontal width (3574)

- Adjust H-size front control 3574 for a picture width of 300mm

### 8.3 Vertical centering (3571)

- Adjust V-shift front control 3571 for the correct vertical centering of the video display.

### 8.4 Vertical height (3440)

- Adjust V-size front control 3440 for a picture height of 225mm.

### 8.5 East-west pincushion correction (3617)

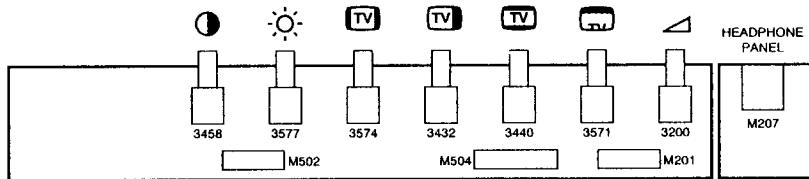
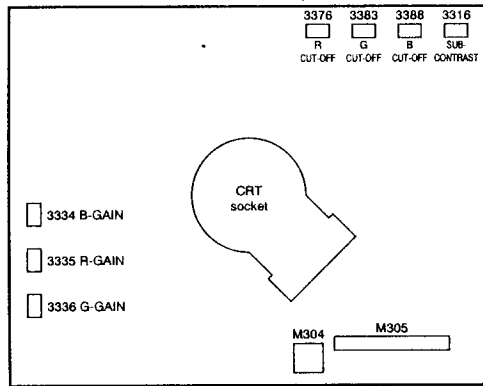
- Adjust potentiometer 3617 until the vertical lines on the left and right-hand sides of the screen are as straight as possible.

### 8.6 Trapezoid correction (3614)

- Adjust potentiometer 3614 so that an optimum square cross-hatch pattern is obtained.

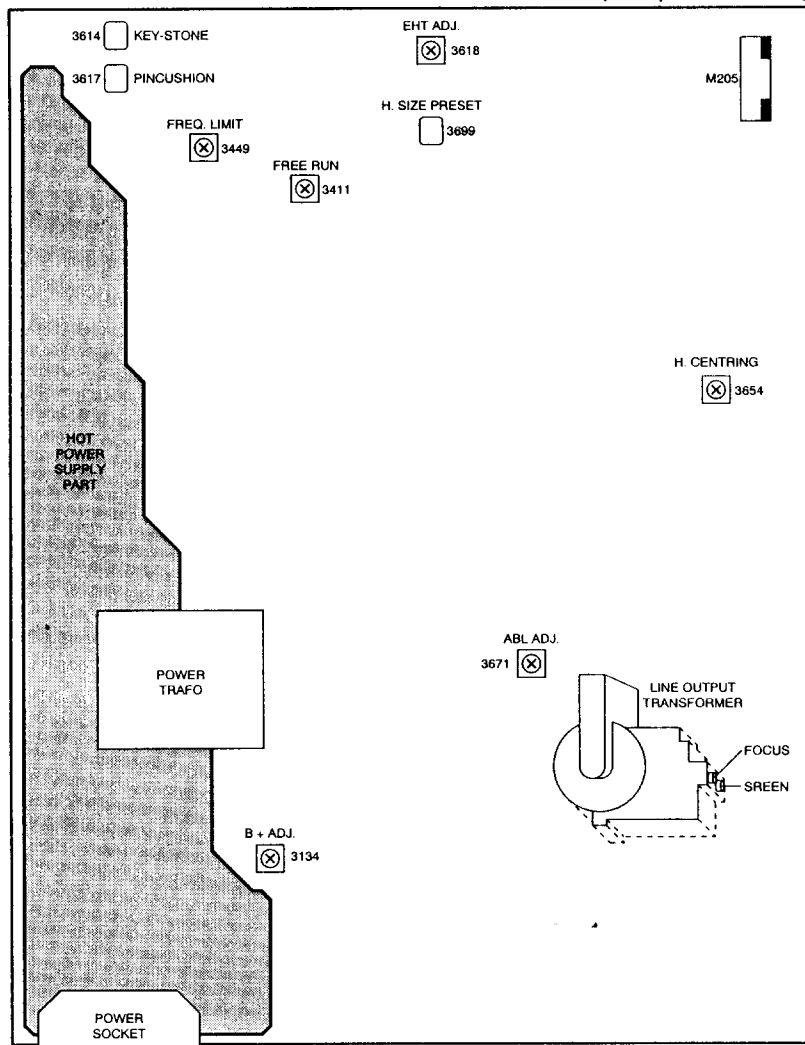
LOCATION OF ADJUSTING COMPONENTS

VIDEO PANEL (track side view)



CONTROL PANEL

MAIN PANEL (component view)



CL 36532020/017  
260193

## **9. Static convergence (see Fig.)**

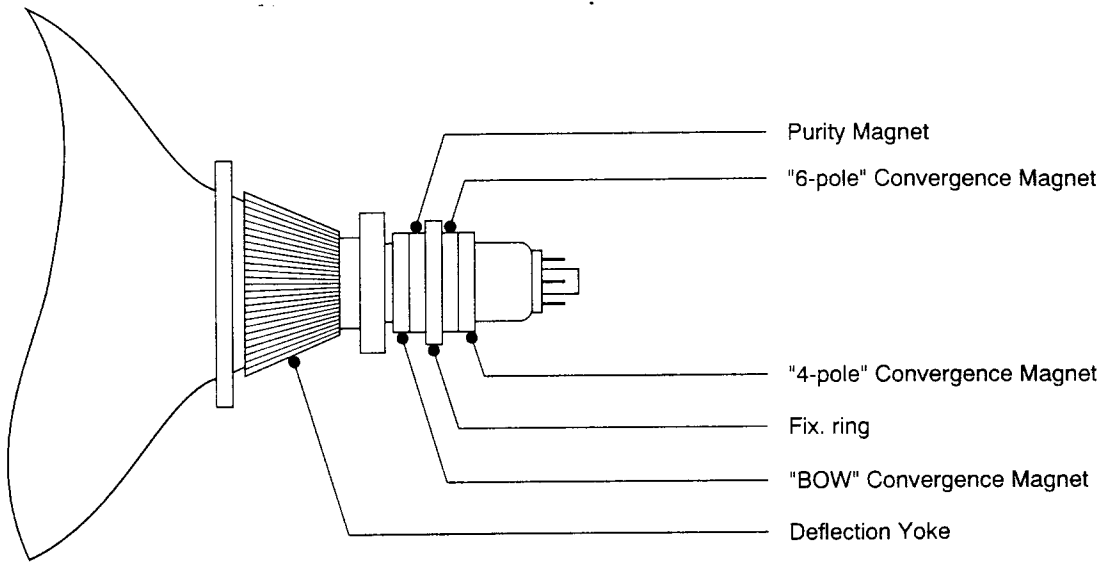
### **Introduction:**

Slight deviation in the static convergence can be corrected by using three permanent pairs of magnets which are fitted around the neck of the picture tube. These are the 4-pole magnet and the 6-pole magnet. The 4-pole magnet move the outermost electron beams (R and B) parallel in the opposite direction from the other. The 6-pole magnet moves the outermost electron beams (R, B and G) parallel in the opposite direction from the other. The magnetic field of the above magnets do not affect the centre of the picture tube neck.

### **Setting:**

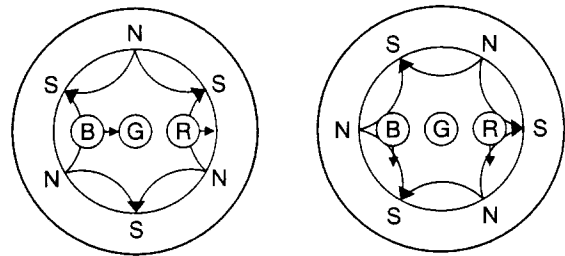
- Before the static convergence setting can be made, the monitor must be switched on for 30 minutes.
- The focus setting must be made correctly (see focus setting).
- Signal: Cross-hatch pattern in the 1024\*768 56kHz / 70Hz mode.
- Set the "tabs" of the 4-pole magnet in the neutral position.  
This is when the "tabs" are opposite one another. In this position the magnets do not affect the deflection of the "R" and "B" electron beams.
- Set the "tabs" of the 6-pole magnet in the neutral position, this is when the "tabs" are opposite one another. In this position the magnets do not affect the deflection of the "R B" and "G" electron beams.
- First set the 4-pole magnet optimally.
- Then set the 6-pole magnet optimally.
- If the convergence is not optimal now, then adjust to the optimal setting with the 4-pole magnet and then with the 6-pole magnet.

# STATIC CONVERGENCE SYSTEM



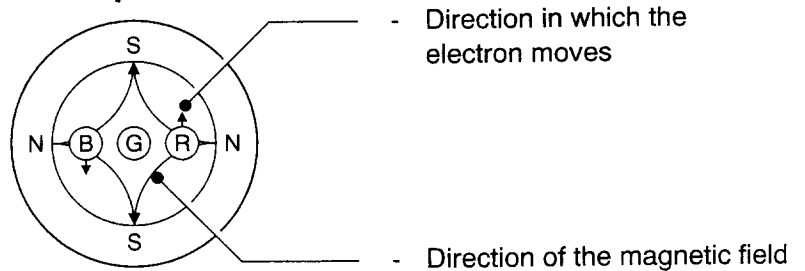
## "6-pole"

"B" and "R" electron beam movement as a result of the 6-pole magnet



## "4-pole"

"B" and "R" electron beam movement as a result of the 4-pole magnet



**Warning**

All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically.

When repairing, make sure that you are connected with the same potential as the mass of the unit via a wrist wrap with resistance.



Keep components and tools also at the same potential !

## 1. Servicing of SMDs (Surface Mounted Devices)

### 1.1 General cautions on handling and storage

- Oxidation on the terminals of SMDs results in poor soldering. Do not handle SMDs with bare hands.
- Avoid using storage places that are sensitive to oxidation such as places with sulphur or chlorine gas, direct sunlight, high temperatures or a high degree of humidity.  
The capacitance or resistance value of the SMDs may be affected by this.
- Rough handling of circuit boards containing SMDs may cause damage to the components as well as the circuit boards. Circuit boards containing SMDs should never be bent or flexed. Different circuit board materials expand and contract at different rates when heated or cooled and the components and/or solder connections may be damaged due to the stress. Never rub or scrape chip components as this may cause the value of the component to change. Similarly, do not slide the circuit board across any surface.

### 1.2 Removal of SMDs

- Heat the solder (for 2-3 seconds) at each terminal of the chip. By means of litz wire and a slight horizontal force, small components can be removed with the soldering iron. They can also be removed with a solder sucker (see Fig. 8.1A) or:
- While holding the SMD with a pair of tweezers, take it off gently using the soldering iron's heat applied to each terminal (see Fig. 8.1B).
- Remove the excess solder on the solder lands by means of litz wire or a solder sucker (see Fig. 8.1C).

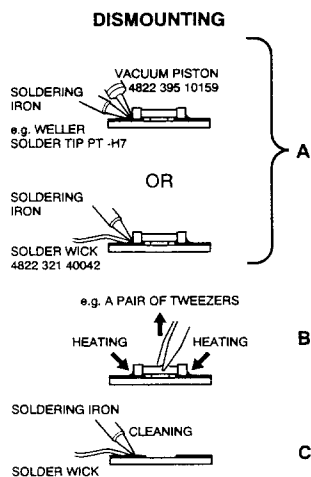


Fig. 8.1

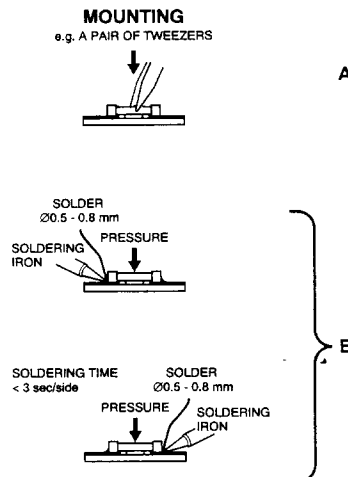


Fig. 8.2

**Caution on removal:**

- When handling the soldering iron, use suitable pressure and be careful.
- When removing the chip, do not use undue force with the pair of tweezers.
- The soldering iron to be used (approx. 30 W) should preferably be equipped with a thermal control (soldering temperature: 225 to 250°C).
- The chip, once removed, must **never** be reused.

**1.3 Attachment of SMDs**

- Locate the SMD on the solder lands by means of tweezers and solder the component on one side. Ensure that the component is positioned correctly on the solder lands (see Fig. 8.2A).
- Next complete the soldering of the terminals of the component (see Fig. 8.2B).

**Caution when attaching SMDs:**

- When soldering the SMD terminals, do not touch them directly with the soldering iron. The soldering should be done as quickly as possible; care must be taken to avoid damage to the terminals of the SMDs themselves.
- Keep the SMD's body in contact with the printed board when soldering.
- The soldering iron to be used (approx. 30 W) should preferably be equipped with a thermal control (soldering temperature: 225 to 250°C).
- Soldering should not be done outside the solder land.
- Soldering flux (of rosin) may be used, but should not be acidic.
- After soldering, let the SMD cool down gradually at room temperature.
- The quantity of solder must be proportional to the size of the solder land. If the quantity is too great, the SMD might crack or the solder lands might be torn loose from the printed board (see Fig. 8.3).

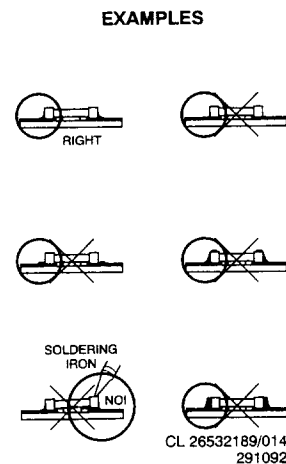
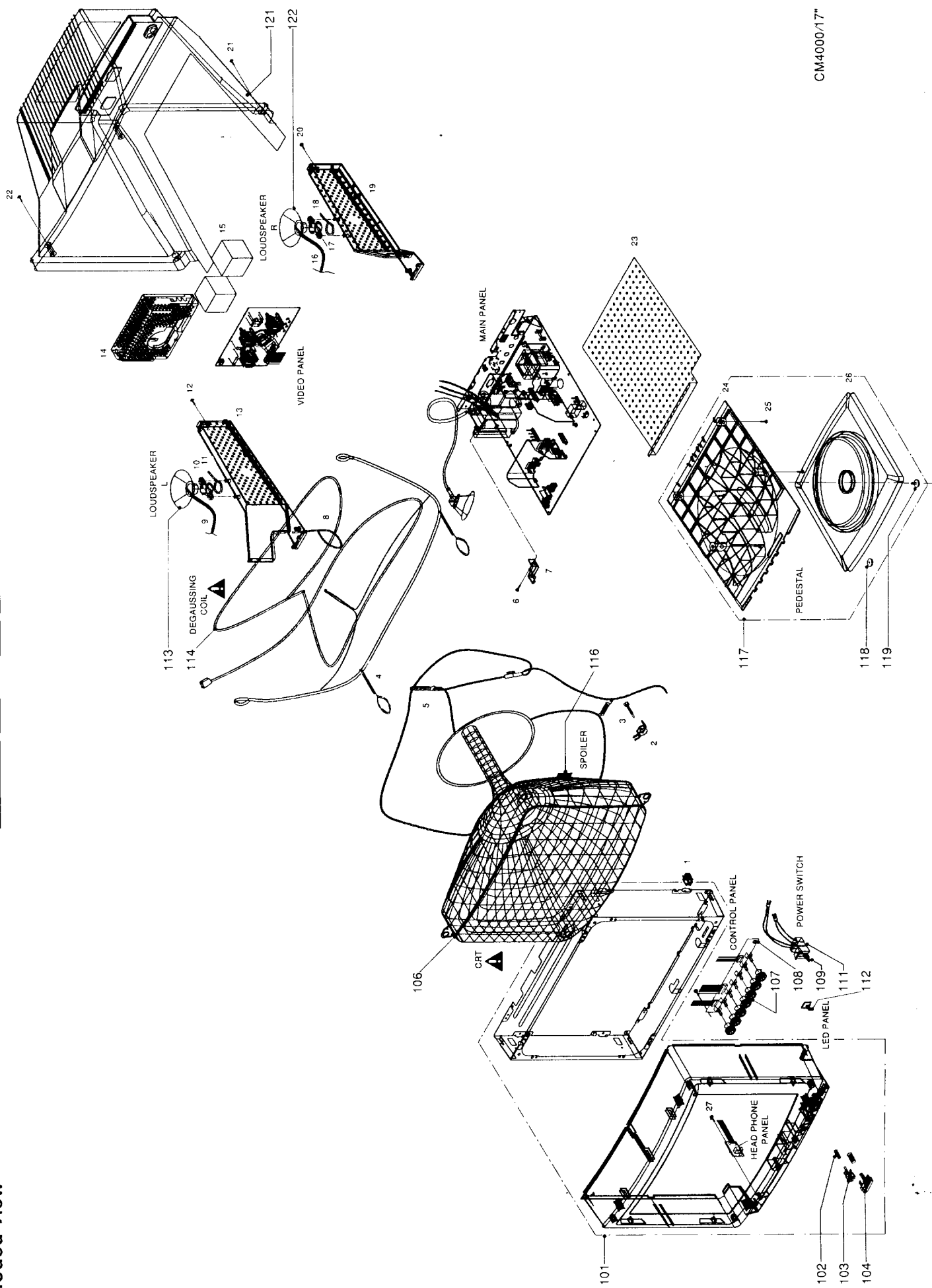


Fig. 8.3





## Parts indicated on exploded view

101	4822 413 41782	Front cabinet
102	4822 492 52324	Spring for buttons
103	4822 410 61226	Degaussing push button
104	4822 410 61812	Power push button
106▲	4822 131 20537	CRT M41KXN23XX01(F)
107	4822 413 41784	Control knob
108	4822 276 13249	Degaussing switch
109▲	4822 276 11504	Power switch
111	4822 432 92868	Housing for switch
112	4822 130 82021	LED LTL307GE
113	4822 240 30642	Loudspeaker L
114▲	4822 157 70484	Degaussing coil
116	4822 526 20183	Spoiler
117	4822 462 10541	Pedestal
118	4822 466 61517	Pad
119	4822 502 13763	Screw
121	4822 438 20235	Rear cover
122	4822 240 30642	Loudspeaker R

## Accessories

▲	4822 701 12461	Mains cord /00T
▲	4822 321 10621	Mains cord /05T
▲	4822 321 10977	Mains cord /06T
▲	4822 321 10942	Mains cord /75T
	4822 321 61711	Interface cable
	4822 263 50197	Adapter 15P D-Shell
	4822 321 61985	Interface cable audio
	4822 736 53347	Users manual

## Main panel

## Various

1101▲	4822 253 50145	Fuse 3.15A
1111	4822 280 70358	Relay
	4822 492 71337	Clamping spring for fuse
	4822 267 30987	2P Connector M102, M103
	4822 265 30891	2P Connector M104
	4822 265 20561	2P Connector M108, M204
	4822 267 31527	2P Connector M203
	4822 265 30896	3P Connector M209
	4822 265 30375	4P Connector M501
	4822 265 30888	6P Connector M208
	4822 265 31079	6P Connector M503
	4822 265 41205	7P Connector M205
	4822 265 41311	10P Connector M505
▲	4822 265 31003	AC Power socket
	4822 267 31525	RCA Audio jack
	4822 492 62076	Spring for transistors
	4822 255 40893	Plate for transistors
	5322 390 20011	Silicon grease

## —II—

2101▲	4822 121 70205	680nF 20% 250V
2102▲	4822 122 33535	4.7nF 20% 400V
2103▲	4822 122 33535	4.7nF 20% 400V
2105	4822 124 80532	220µF 400V
2107	4822 121 41984	47nF 10% 400V
2109	4822 124 40198	470µF 20% 16V
2111	4822 124 40198	470µF 20% 16V
2112	4822 121 43512	15nF 100V
2113	4822 124 40246	4.7µF 20% 63V
2115▲	4822 121 43385	47nF 20% 250V
2117	4822 126 12267	470pF 10% 2kV
2121▲	4822 122 33417	1.5nF 400V
2122▲	4822 122 33417	1.5nF 400V
2123	4822 121 70302	15nF 20% 250V
2151	4822 126 12356	220pF 10% 2kV
2152	4822 124 42158	68µF 20% 250V
2153	4822 126 12358	220pF 10% 500V
2154	4822 124 40755	100µF 20% 100V
2155	4822 122 33646	470pF 10% 500V
2156	4822 124 42144	470µF 63V
2157	4822 122 33646	470pF 10% 500V
2158	4822 124 42144	470µF 63V
2159	5322 122 32331	1nF 10% 100V
2160	4822 124 42172	1000µF 16V
2162	4822 126 11098	33pF 5% 50V
2163	4822 121 43695	47nF 10% 100V
2164▲	4822 122 33535	4.7nF 20% 400V
2165▲	4822 122 33535	4.7nF 20% 400V
2166	4822 124 80132	47µF 20% 25V
2167	4822 124 22666	220µF 20% 16V
2169	4822 124 42172	1000µF 16V
2171	4822 122 33646	470pF 10% 500V
2172	4822 124 42144	470µF 63V
2174	4822 124 22681	47µF 20% 16V
2176	4822 124 80132	47µF 20% 25V
2177	4822 124 80132	47µF 20% 25V
2178	4822 124 80132	47µF 20% 25V
2182	4822 122 32442	10nF 50V
2183	4822 124 22681	47µF 20% 16V
2184	4822 124 22681	47µF 20% 16V
2200	4822 124 42144	470µF 63V
2203	5322 122 31647	1nF 10% 63V
2204	5322 122 31647	1nF 10% 63V
2205	4822 121 43696	100nF 100V
2206	4822 121 43696	100nF 100V
2220	4822 124 22681	47µF 20% 16V
2222	5322 122 31647	1nF 10% 63V

## —II—

2401	4822 124 22678	100µF 20% 16V
2402	4822 122 31965	220pF 2% 63V
2403	4822 121 70185	1.8nF 2% 50V
2404	4822 122 33496	100nF 10% 63V
2405	4822 122 31772	47pF 2% 63V
2406	4822 124 22681	47µF 20% 16V
2407	4822 126 11456	330nF 10% 63V
2408	4822 124 22678	100µF 20% 16V
2409	4822 122 33496	100nF 10% 63V
2410	4822 121 43696	100nF 100V
2412	4822 121 43699	220nF 100V
2413	4822 122 32442	10nF 50V
2414	4822 122 33496	100nF 10% 63V
2415	4822 121 70185	1.8nF 2% 50V
2416	4822 122 33496	100nF 10% 63V
2417	4822 122 33496	100nF 10% 63V
2418	4822 124 42198	1.5µF 20% 63V
2419	4822 122 33496	100nF 10% 63V
2421	4822 124 22686	10µF 16V
2422	4822 124 22686	10µF 16V
2423	4822 124 42161	33µF 20% 250V
2424	4822 122 33496	100nF 10% 63V
2425	4822 124 40246	4.7µF 20% 63V
2426	4822 126 11456	330nF 10% 63V
2427	4822 121 70185	1.8nF 2% 50V
2428	4822 124 23539	10µF 20% 50V
2431	4822 122 31839	82pF 2% 63V
2432	4822 126 11456	330nF 10% 63V
2433	5322 122 31842	330pF 2% 63V
2434	4822 121 70185	1.8nF 2% 50V
2491	4822 124 22686	10µF 16V
2501	4822 124 40255	100µF 20% 63V
2502	4822 124 42144	470µF 63V
2503	4822 124 42144	470µF 63V
2504	4822 124 22686	10µF 16V
2505	4822 121 43696	100nF 100V
2506	4822 124 22686	10µF 16V
2507	4822 122 31727	470pF 2% 63V
2511	4822 122 32808	1.2nF 10% 63V
2512	4822 124 40198	470µF 20% 16V
2513	4822 122 31971	10pF 2% 63V
2514	4822 122 31644	2.2nF 10% 63V
2515	4822 121 43696	100nF 100V
2521	4822 121 43696	100nF 100V
2522	4822 121 43693	10nF 100V
2601	4822 124 22686	10µF 16V
2602	4822 122 32442	10nF 50V
2603	4822 122 31784	4.7nF 10% 50V
2604	4822 121 43907	22nF 20% 250V
2605	4822 121 40336	47nF 10% 250V
2606	4822 121 43698	470nF 100V
2607	4822 122 33968	1nF 5% 500V
2608	4822 124 42161	33µF 20% 250V
2609	4822 124 42161	33µF 20% 250V
2610	4822 121 70185	1.8nF 2% 50V
2611	4822 122 31773	560pF 2% 63V
2612	4822 124 42161	33µF 20% 250V
2613	5322 122 33446	3.3nF 10% 63V
2614	4822 122 33646	470pF 10% 500V
2615	4822 121 43907	22nF 20% 250V
2616	4822 126 12267	470pF 10% 2kV
2617	4822 122 32482	22pF 2% 63V
2618	4822 121 70301	1µF 100V
2619	4822 121 43907	22nF 20% 250V
2621	4822 124 42155	4.7µF 250V
2622	4822 124 42145	100µF 20% 25V
2623	4822 124 42145	100µF 20% 25V
2624	4822 122 32442	10nF 50V
2625	4822 121 40479	390nF 10% 250V
2626	4822 121 43691	220nF 250V
2627	4822 121 70203	680nF 250V

## Main panel

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2628 4822 122 31797 22nF 10% 63V  
 2629 4822 122 31797 22nF 10% 63V  
 2630 4822 122 31797 22nF 10% 63V  
 2631 4822 126 10206 2.2nF 10% 500V  
 2632 4822 124 80276 10µF 20% 25V

2633 4822 121 43906 1.5nF 10% 400V  
 2634 4822 121 43696 100nF 100V  
 2635 4822 122 31784 4.7nF 10% 50V  
 2636 4822 124 42155 4.7µF 250V  
 2637 4822 121 41689 100nF 10% 250V

2641 4822 122 32442 10nF 50V  
 2642 4822 122 32442 10nF 50V  
 2643 4822 126 12096 4.7nF 5% 1.6kV  
 2644 4822 121 43907 22nF 20% 250V  
 2645 4822 122 31774 56pF 2% 63V

2646 4822 122 31784 4.7nF 10% 50V  
 2651 4822 124 22678 100µF 20% 16V  
 2652 4822 121 70095 1µF 10% 100V  
 2653 4822 124 42145 100µF 20% 25V  
 2654 4822 126 11455 560pF 10% 2kV

2655 4822 122 40425 560pF 10% 500V

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3101 4822 116 30425 7Ω 15% NTC  
 3103 4822 050 22204 220k 1% 0.6W  
 3105 4822 116 83915 47Ω 5% 3W  
 3106 4822 050 24701 470Ω 1% 0.6W  
 3107 4822 116 52217 270Ω 5% 0.5W

3108 4822 050 12002 2k 1% 0.4W  
 3109 4822 050 23002 3k 1% 0.6W  
 3110 4822 050 21001 100Ω 1% 0.6W  
 3111 4822 050 21001 100Ω 1% 0.6W  
 3112 4822 050 25608 5Ω6 1% 0.6W

3113 4822 050 21008 1Ω 1% 0.6W  
 3114 4822 050 21001 100Ω 1% 0.6W  
 3115 4822 116 82872 82Ω 5%  
 3116 4822 050 22204 220k 1% 0.6W  
 3117 4822 116 80388 22k 5W

3118 4822 050 21202 1k2 1% 0.6W  
 3119 4822 050 24703 47k 1% 0.6W  
 3120 4822 050 21802 1k8  
 3121 4822 053 10104 100k 5% 1W  
 3122 4822 050 25604 560k 1% 0.6W

3123 4822 051 10472 4k7 2% 0.25W  
 3124 4822 051 10473 47k 5% 0.25W  
 3125 4822 050 25609 56Ω 1% 0.6W  
 3126 4822 116 52186 22Ω 5%  
 3127 4822 050 21004 100k 1% 0.6W

3128 4822 051 10391 390Ω 2% 0.25W  
 3132 4822 050 21801 180Ω 1% 0.6W  
 3134 4822 101 10927 470Ω Potmeter  
 3135 4822 116 40144 12Ω PTC  
 3136 4822 053 21334 330k 5% 0.5W

3157 4822 050 21202 1k2 1% 0.6W  
 3171▲ 4822 052 10478 4Ω7 5% 0.33W  
 NFR25  
 3172▲ 4822 052 10478 4Ω7 5% 0.33W  
 NFR25

3173▲ 4822 052 10478 4Ω7 5% 0.33W  
 NFR25  
 3174▲ 4822 052 10478 4Ω7 5% 0.33W  
 NFR25

3175▲ 4822 052 10478 4Ω7 5% 0.33W  
 NFR25

3176 4822 051 10102 1k 2% 0.25W  
 3205 4822 050 21009 10Ω 1% 0.6W  
 3206 4822 050 21009 10Ω 1% 0.6W  
 3207 4822 050 27509 75Ω 1% 0.6W

3208 4822 050 27509 75Ω 1% 0.6W  
 3210 4822 050 22208 2Ω2 1% 0.6W  
 3211 4822 050 22208 2Ω2 1% 0.6W  
 3402 4822 116 80556 120k 1% 0.25W

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3403 4822 050 21803 18k 1% 0.6W  
 3404 4822 116 80942 4k7 1% 0.25W  
 3405 4822 051 10473 47k 2% 0.25W  
 3406 4822 050 22202 2k2 1% 0.6W  
 3407 4822 051 20222 2k2 5% 0.1W

3408 4822 051 10223 22k 2% 0.25W  
 3409 4822 051 10103 10k 2% 0.25W  
 3411 4822 100 20166 10k Potmeter  
 3412 4822 051 10102 1k 2% 0.25W  
 3413 4822 051 10822 8k2 2% 0.25W

3414 4822 051 10223 22k 2% 0.25W  
 3415 4822 051 10123 12k 2% 0.25W  
 3416 4822 051 10473 47k 2% 0.25W  
 3417 4822 051 20183 18k 5% 0.1W  
 3418 4822 051 10682 6k8 2% 0.25W

3419 4822 051 10392 3k9 2% 0.25W  
 3421 4822 051 10103 10k 2% 0.25W  
 3422 4822 051 10123 12k 2% 0.25W  
 3423 4822 051 10561 560Ω 2% 0.25W  
 3424 4822 051 10272 2k7 2% 0.25W

3425 4822 051 10223 22k 2% 0.25W  
 3426 4822 050 21502 1k5 1% 0.6W  
 3427▲ 4822 052 10828 8Ω2 5% 0.33W  
 NFR25

3429 4822 050 15601 560Ω 1% 0.4W  
 3431 4822 051 10153 15k 2% 0.25W

3433 4822 050 24703 47k 1% 0.6W  
 3434 4822 051 10473 47k 2% 0.25W  
 3435 4822 051 10154 150k 2% 0.25W  
 3436 4822 051 10104 100k 2% 0.25W  
 3437 4822 051 10103 10k 2% 0.25W

3438 4822 051 10224 220k 2% 0.25W  
 3441 4822 051 10125 1M2 5% 0.25W  
 3443 4822 051 10332 3k3 2% 0.25W  
 3445 4822 051 10153 15k 2% 0.25W  
 3446 4822 051 10392 3k9 2% 0.25W

3447 4822 051 10562 5k6 2% 0.25W  
 3449 4822 100 11213 22k Potmeter  
 3450 4822 051 10184 180k 2% 0.25W  
 3451 4822 051 10153 15k 2% 0.25W  
 3452 4822 051 20222 2k2 5% 0.1W

3453 4822 051 10124 120k 2% 0.25W  
 3454 4822 051 10103 10k 2% 0.25W  
 3455 4822 051 10473 47k 2% 0.25W  
 3456 4822 051 10332 3k3 2% 0.25W  
 3459 4822 051 10474 470k 2% 0.25W

3463 4822 051 10562 5k6 2% 0.25W  
 3468 4822 051 10102 1k 2% 0.25W  
 3469 4822 051 10562 5k6 2% 0.25W  
 3471 4822 050 24703 47k 1% 0.6W  
 3472 4822 051 10332 3k3 2% 0.25W

3473 4822 051 10102 1k 2% 0.25W  
 3474 4822 051 10561 560Ω 2% 0.25W  
 3475 4822 051 10561 560Ω 2% 0.25W  
 3476 4822 051 10102 1k 2% 0.25W  
 3477 4822 051 20222 2k2 5% 0.1W

3478 4822 051 10272 2k7 2% 0.25W  
 3479 4822 051 10102 1k 2% 0.25W  
 3481 4822 051 10272 2k7 2% 0.25W  
 3484 4822 051 10102 1k 2% 0.25W  
 3485 4822 051 10151 150Ω 2% 0.25W

3486 4822 050 21203 12k 1% 0.6W  
 3487 4822 050 21203 12k 1% 0.6W  
 3488 4822 051 10472 4k7 2% 0.25W  
 3491 4822 116 81849 220k 5%  
 3492 4822 051 10223 22k 2% 0.25W

3493 4822 116 52289 5k6 5% 0.5W  
 3494 4822 051 10102 1k 2% 0.25W  
 3495 4822 051 10333 33k 2% 0.25W  
 3496 4822 051 10103 10k 2% 0.25W  
 3497 4822 051 10472 4k7 2% 0.25W

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3501 4822 050 14704 470k 1% 0.4W  
 3503 4822 050 24708 4Ω7 1% 0.6W  
 3504 4822 051 10561 560Ω 2% 0.25W  
 3506 4822 050 28203 82k 1% 0.6W  
 3507 4822 050 21802 1k8

3508▲ 4822 051 10182 1k8 2% 0.25W  
 3509▲ 4822 052 11221 220Ω 5% 0.5W  
 NFR25

3511 4822 050 23608 3Ω6 1% 0.6W  
 3512 4822 050 22701 270Ω 1% 0.6W  
 3513 4822 050 15608 5Ω6 1% 0.4W

3514 4822 050 23301 330Ω 1% 0.6W  
 3515 4822 050 21808 1Ω8 1% 0.6W  
 3520 4822 050 21808 1Ω8 1% 0.6W  
 3521 4822 050 11503 15k 1% 0.4W  
 3522 4822 051 10123 12k 2% 0.25W

3523 4822 051 10123 12k 2% 0.25W  
 3524 4822 051 10102 1k 2% 0.25W  
 3525 4822 051 10333 33k 2% 0.25W  
 3526 4822 051 10472 4k7 2% 0.25W  
 3527 4822 116 52271 33k 5% 0.5W

3528 4822 051 10103 10k 2% 0.25W  
 3534 4822 051 10682 6k8 2% 0.25W  
 3535 4822 051 10103 10k 2% 0.25W  
 3536 4822 051 10103 10k 2% 0.25W  
 3537 4822 051 10512 5k1 2% 0.25W

3539 4822 050 24703 47k 1% 0.6W  
 3541 4822 051 10562 5k6 2% 0.25W  
 3542 4822 051 10683 68k 2% 0.25W  
 3545 4822 050 22204 220k 1% 0.6W  
 3546 4822 050 26803 68k 1% 0.6W

3547 4822 050 26803 68k 1% 0.6W  
 3548 4822 050 22204 220k 1% 0.6W  
 3549 4822 051 10153 15k 2% 0.25W  
 3551 4822 050 22203 22k 1% 0.6W  
 3552 4822 050 21502 1k5 1% 0.6W

3553 4822 050 22202 2k2 1% 0.6W  
 3554 4822 053 12159 15Ω 5% 3W  
 3555 4822 050 21501 150Ω 1% 0.6W  
 3562 4822 051 10272 2k7 2% 0.25W  
 3563 4822 051 10223 2k2 2% 0.25W

3564 4822 051 10123 12k 2% 0.25W  
 3601 4822 051 10271 270Ω 2% 0.25W  
 3602 4822 051 10223 22k 2% 0.25W  
 3603 4822 051 10103 10k 2% 0.25W  
 3604 4822 051 10223 22k 2% 0.25W

3605 4822 050 24702 4k7 1% 0.6W  
 3606 4822 051 10103 10k 2% 0.25W  
 3607 4822 051 10103 10k 2% 0.25W  
 3608 4822 050 21001 100Ω 1% 0.6W  
 3609 4822 051 20222 2k2 5% 0.1W

3610 4822 051 10473 47k 2% 0.25W  
 3611 4822 051 10103 10k 2% 0.25W  
 3612 4822 051 10125 1M2 5% 0.25W  
 3613▲ 4822 052 11332 3k3 5% 0.5W  
 NFR25

3614 4822 100 11319 4k7 Potmeter  
 3615 4822 051 10103 10k 2% 0.25W  
 3616 4822 051 10103 10k 2% 0.25W  
 3617 4822 100 11392 47k Potmeter  
 3618 4822 100 11392 47k Potmeter  
 3619 4822 051 20222 2k2 5% 0.1W

3620 4822 116 83982 0Ω33  
 3621 4822 051 10823 82k 2% 0.25W  
 3622 4822 051 10184 180k 2% 0.25W  
 3623 4822 051 10103 10k 2% 0.25W  
 3624 4822 051 10123 12k 2% 0.25W

3625 4822 051 10102 1k 2% 0.25W  
 3626▲ 4822 052 10158 1Ω5 5% 0.33W  
 NFR25  
 3627 4822 050 25602 5k6 1% 0.6W  
 3628 4822 050 22205 2M2 1% 0.6W

## Spare parts lists

## Main panel

3629	4822 051 10223	22k 2% 0.25W
3630	4822 051 10223	22k 2% 0.25W
3631	4822 116 80545	1k 5% 0.5W
3632	4822 116 82974	100k 5% 0.5W
3633	4822 050 23302	3k3 1% 0.6W
3634	4822 050 25601	560Ω 1% 0.6W
3635	4822 050 26802	6k8 1% 0.6W
3636	4822 050 21001	100Ω 1% 0.6W
3637	4822 051 10561	560Ω 2% 0.25W
3638	4822 050 25601	560Ω 1% 0.6W
3639▲	4822 052 10229	22Ω 5% 0.33W NFR25
3640	4822 051 10223	22k 2% 0.25W
3641	4822 051 10103	10k 2% 0.25W
3642	4822 050 22202	2k2 1% 0.6W
3643	4822 050 24709	47Ω 1% 0.6W
3644	4822 051 10102	1k 2% 0.25W
3645	4822 117 10294	1.5Ω 5% 3W
3646	4822 116 83629	3k3 5% 3W
3647	4822 051 10223	22k 2% 0.25W
3648	4822 050 21201	120Ω 1% 0.6W
3649	4822 051 10472	4k7 2% 0.25W
3650	4822 051 10561	560Ω 2% 0.25W
3651	4822 050 28203	82k 1% 0.6W
3652	4822 050 24709	47Ω 1% 0.6W
3653	4822 050 23301	330Ω 1% 0.6W
3654	4822 100 20166	10k Potmeter
3655	4822 050 23301	330Ω 1% 0.6W
3656	4822 116 83966	12Ω 2W
3657	4822 051 10103	10k 2% 0.25W
3658	4822 051 10102	1k 2% 0.25W
3659	4822 051 10223	22k 2% 0.25W
3660	4822 051 20222	2k2 5% 0.1W
3661	4822 051 10224	220k 2% 0.25W
3662	4822 051 10123	12k 2% 0.25W
3663	4822 051 10332	3k3 2% 0.25W
3664	4822 051 10102	1k 2% 0.25W
3665	4822 051 10102	1k 2% 0.25W
3666	4822 051 10122	1k2 2% 0.25W
3667▲	4822 052 10101	100Ω 5% 0.33W NFR25
3668	4822 051 10561	560Ω 2% 0.25W
3669	4822 116 80546	1M 5% 0.5W
3670	4822 051 20222	2k2 5% 0.1W
3671	4822 100 11213	22k Potmeter
3672	4822 116 82984	150Ω 5% 3W
3673	4822 116 52234	100k 5% 0.5W
3674	4822 051 10223	22k 2% 0.25W
3675	4822 116 52234	100k 5% 0.5W
3676	4822 051 10223	22k 2% 0.25W
3677	4822 050 12403	2.2M 0.125W
3678	4822 116 30436	11k8 1%
3679	4822 051 20222	2k2 5% 0.1W
3680	4822 050 11503	15k 1% 0.4W
3681	4822 050 21103	11k 1% 0.6W
3682	4822 051 10272	2k7 2% 0.25W
3683	4822 051 10103	10k 2% 0.25W
3684	4822 050 11002	1k 1% 0.4W
3685	4822 051 10475	4M7 5% 0.25W
3686	4822 116 30437	12k7 1%
3687	4822 050 22003	20k 1% 0.6W
3688	4822 050 11002	1k 1% 0.4W
3689	4822 051 20222	2k2 5% 0.1W
3690	4822 050 11503	15k 1% 0.4W
3691	4822 116 82455	7k5 0.25W
3692	4822 051 10473	47k 2% 0.25W
3693	4822 050 21203	12k 1% 0.6W
3694	4822 050 21001	100Ω 1% 0.6W
3695	4822 051 10102	1k 2% 0.25W
3696	4822 051 10104	100k 2% 0.25W
3697	4822 051 10103	10k 2% 0.25W
3698	4822 051 10332	3k3 2% 0.25W

3699	4822 100 20166	10k Potmeter
5101	4822 157 10292	14mH line filter
5104	4822 146 31224	Power transformer
5108	4822 157 52234	100μH
5121	4822 157 70483	Bead coil
5122	4822 157 70483	Bead coil
5123	4822 157 70483	Bead coil
5124	4822 157 70483	Bead coil
5151	4822 156 21399	180μH
5153	4822 157 52234	100μH
5155	4822 157 70076	30μH
5173	4822 157 52494	6.8μH
5174	4822 157 52494	6.8μH
5175	4822 157 52494	6.8μH
5401	4822 157 63211	33μH
5602	4822 142 40327	Driver transformer
5603	4822 142 40327	Driver transformer
5604	4822 142 40326	1.4mH
5606	4822 140 10433	Line output transformer
5607	4822 157 70483	Bead coil
5608	4822 242 71344	2μH
5609	4822 157 70483	Bead coil
5611	4822 156 50103	Transformer
5612	4822 148 81317	H Centering trafo
5613	4822 157 63218	10mH
5615	4822 158 10887	Bead coil
6101	4822 130 80572	RGP30J
6102	4822 130 80572	RGP30J
6103	4822 130 80572	RGP30J
6104	4822 130 80572	RGP30J
6105	4822 130 31393	RGP10J
6106	4822 130 31393	RGP10J
6107	4822 130 31393	RGP10J
6108	5322 130 31971	RGP15D
6109	4822 130 30621	1N4148
6110	4822 130 34167	BZX79-C6V2
6111	4822 130 31607	RGP10D
6112	5322 130 31971	RGP15D
6150	5322 130 31969	RGP15M
6151	5322 130 33885	RGP15J
6152	4822 130 41486	BYV95B
6153	4822 130 41486	BYV95B
6154	5322 130 31971	RGP15D
6155	4822 130 31024	BZX79-C18
6156	4822 130 41486	BYV95B
6158	4822 130 80446	BAS32L
6159	4822 130 30621	1N4148
6160	4822 130 30621	1N4148
6161	4822 130 41486	BYV95B
6201	4822 130 30621	1N4148
6202	4822 130 30621	1N4148
6203	4822 130 30621	1N4148
6402	4822 130 30621	1N4148
6403	4822 130 80446	BAS32L
6404	4822 130 34233	BZX79-C5V1
6405	4822 130 34382	BZX79-C8V2
6406	4822 130 80446	BAS32L
6407	4822 130 80446	BAS32L
6408	4822 130 80655	BZX79-F2V4
6409	4822 130 31024	BZX79-B18
6412	4822 130 42489	RGP10G
6413	4822 130 31878	1N4003
6414	4822 130 30621	1N4148
6415	4822 130 80446	BAS32L
6416	4822 130 30621	1N4148
6417	4822 130 80446	BAS32L

6418	4822 130 80446	BAS32L
6419	4822 130 30621	1N4148
6501	4822 130 31607	RGP10D
6502	4822 130 31024	BZX79-C18
6503	4822 130 31024	BZX79-C18
6504	4822 130 80446	BAS32L
6505	4822 130 80655	BZX79-F2V4
6507	4822 130 41486	BYV95B
6512	4822 130 34278	BZX79-C6V8
6514	4822 130 41486	BYV95B
6515	4822 130 83239	MUR460
6516	4822 130 83239	MUR460
6601	4822 130 80446	BAS32L
6602	4822 130 80446	BAS32L
6603	4822 130 80446	BAS32L
6604	4822 130 80446	BAS32L
6605	4822 130 80446	BAS32L
6607	4822 130 83128	EGP30G
6608	4822 130 42489	RGP10G
6611	4822 130 80446	BAS32L
6612	4822 130 34197	BZX79-C12
6613	4822 130 34197	BZX79-C12
6614	4822 130 31607	RGP10D
6618	4822 130 42489	RGP10G
6621	4822 130 42489	RGP10G
6622	4822 130 42489	RGP10G
6623	4822 130 42489	RGP10G
6624	5322 130 32042	BYW96E
6625	4822 130 82584	MUR10150E
6626	4822 130 30621	1N4148
6627	4822 130 80446	BAS32L
6628	4822 130 80446	BAS32L
6631	4822 130 34685	BZX79-C75
6632	4822 130 34685	BZX79-C75
6633	4822 130 80446	BAS32L
6634	4822 130 30621	1N4148
6635	4822 130 80446	BAS32L
6636	4822 130 80446	BAS32L
6637	4822 130 80446	BAS32L
6638	4822 130 80446	BAS32L
7101	5322 130 42047	BUW13A
7102	4822 130 40995	BD434
7103	4822 130 44503	BC547C
7104	4822 130 44104	BC328
7105▲	4822 130 80908	CNX62A
7151	4822 209 81397	TL431CLP
7152	4822 130 44104	BC328
7153	5322 130 24081	BT151-500R
7154	4822 209 81726	MC7812CT
7201	4822 209 31668	TDA7053
7401	5322 130 42136	BC848C
7402	5322 130 42136	BC848C
7403	4822 209 10866	HEF4528BP
7404	5322 130 42136	BC848C
7405	5322 130 42136	BC848C
7406	4822 209 63299	TDA2595/V9
7407	4822 130 44196	BC548C
7408	5322 130 60068	BC558C
7409	5322 130 44336	BSV52
7410	5322 130 42136	BC848C
7412	5322 130 42136	BC848C
7413	4822 209 31669	TDA4850
7417	5322 130 42136	BC848C
7418	5322 130 42136	BC848C
7421	5322 130 42136	BC848C
7422	5322 130 42136	BC848C
7491	5322 130 42136	BC848C
7501	4822 209 32382	TDA4861
7502	5322 130 42136	BC848C
7503	4822 130 41646	BF423

## Spare parts lists

## Main panel

7504	5322 130 42136	BC848C
7505	5322 130 42136	BC848C
7508	4822 130 41782	BF422
7509	4822 130 41782	BF422
7511	4822 130 44196	BC548C
7512	4822 130 44104	BC328
7602	4822 130 41782	BF422
7603	4822 130 42513	BC858C
7604	5322 209 86234	NE5532N
7605	4822 209 80797	LM393N
7606	5322 130 60068	BC558C
7607	4822 130 44196	BC548C
7608	5322 130 62262	IRF730
7612	4822 130 42513	BC858C
7613	5322 130 60068	BC558C
7614	4822 130 44196	BC548C
7615	5322 130 44336	BSV52
7616	5322 130 60068	BC558C
7617	4822 130 42679	BUT11AF/1
7618	5322 130 63002	IRF640(SGS)
7619	4822 209 80587	LM324N
7621	5322 130 63002	IRF640(SGS)
7622	5322 130 42136	BC848C
7623	4822 209 80797	LM393N
7624	5322 130 62262	IRF730
7625	4822 130 44503	BC547C
7626	4822 130 63274	2SC2344E
7627	4822 130 63275	2SA1011E
7628	4822 130 60832	BF857
7629	4822 130 62701	LJH16212
7631	5322 130 42136	BC848C
7632	4822 130 41782	BF422
7633	5322 130 42136	BC848C
7634	4822 130 41782	BF422
7635	5322 130 42136	BC848C
7636	5322 130 42136	BC848C
7637	5322 130 42136	BC848C
7638	5322 130 60068	BC558C
7639	4822 130 44196	BC548C
7641	5322 130 44336	BSV52

## Video panel

## Various

1103	4822 212 30614	Video panel complete
	4822 265 20366	1P Connector M307
	4822 265 30893	4P Connector M304
	4822 265 10274	Mini pin socket
	4822 255 70245	CRT socket
	5322 390 20011	Silicon grease

## -II-

2301	4822 124 22686	10 $\mu$ F 16V
2302	4822 124 80276	10 $\mu$ F 20% 25V
2303	4822 122 33496	100nF 10% 63V
2304	4822 124 80276	10 $\mu$ F 20% 25V
2306	4822 124 80276	10 $\mu$ F 20% 25V
2308	4822 124 22686	10 $\mu$ F 16V
2311	4822 122 33496	100nF 10% 63V
2312	4822 122 33496	100nF 10% 63V
2313	4822 122 33496	100nF 10% 63V
2314	4822 122 33496	100nF 10% 63V
2315	4822 122 33496	100nF 10% 63V
2316	4822 122 33496	100nF 10% 63V
2317	4822 122 33496	100nF 10% 63V
2318	4822 122 33496	100nF 10% 63V
2321	4822 122 33496	100nF 10% 63V
2323	4822 122 33496	100nF 10% 63V
2324	4822 122 33496	100nF 10% 63V
2325	4822 122 31766	120pF 2% 63V
2326	4822 122 31765	100pF 2% 63V
2327	4822 122 31766	120pF 2% 63V
2328	4822 122 32442	10nF 50V
2331	4822 122 32442	10nF 50V
2332	4822 122 32442	10nF 50V
2333	4822 124 80277	4.7 $\mu$ F 100V
2334	4822 121 70096	1 $\mu$ F 160V
2335	4822 121 70096	1 $\mu$ F 160V
2336	4822 124 80277	4.7 $\mu$ F 100V
2337	4822 124 80277	4.7 $\mu$ F 100V
2338	4822 121 70096	1 $\mu$ F 160V
2339	4822 122 31774	56pF 2% 63V
2341	4822 124 42155	4.7 $\mu$ F 250V
2342	4822 122 33967	680pF 5% 500V
2343	4822 126 12651	10nF 20% 2kV
2344	4822 122 32442	10nF 50V
2345	5322 122 31842	330pF 5%
2346	5322 122 31842	330pF 5%
2347	5322 122 31842	330pF 5%
2353	4822 122 32442	10nF 50V
2354	4822 124 22678	100 $\mu$ F 20% 16V
2355	4822 122 33496	100nF 10% 63V
2356	4822 122 33968	1nF 5% 500V
2357	4822 122 33968	1nF 5% 500V
2358	4822 122 33496	100nF 10% 63V
2360	4822 122 31971	10pF 2% 63V
2361	4822 122 33496	100nF 10% 63V
2362	4822 122 33968	1nF 5% 500V
2363	4822 122 33968	1nF 5% 500V
2364	4822 122 33968	1nF 5% 500V
2365	4822 122 33496	100nF 10% 63V
2371	4822 252 60127	SPARK GAP
2372	4822 252 60127	SPARK GAP
2373	4822 252 60127	SPARK GAP
2374	4822 122 33496	100nF 10% 63V
2375	4822 122 33496	100nF 10% 63V
2376	4822 122 32442	10nF 50V
2377	4822 122 31773	560pF 2% 63V
2378	4822 122 31797	22nF 10% 63V
3301	4822 051 10759	75 $\Omega$ 2% 0.25W
3302	4822 051 10759	75 $\Omega$ 2% 0.25W
3303	4822 051 10759	75 $\Omega$ 2% 0.25W

## -III-

3301	4822 051 10759	75 $\Omega$ 2% 0.25W
3302	4822 051 10759	75 $\Omega$ 2% 0.25W
3303	4822 051 10759	75 $\Omega$ 2% 0.25W

## -IV-

3304	4822 051 10103	10k 2% 0.25W
3305	4822 051 10103	10k 2% 0.25W
3306	4822 051 10103	10k 2% 0.25W
3307	4822 051 10471	470 $\Omega$ 2% 0.25W
3308	4822 111 90368	680k 2% 0.125W
3309	4822 051 10229	22 $\Omega$ 2% 0.25W
3310	4822 051 10471	470 $\Omega$ 2% 0.25W
3311	4822 051 51201	120 $\Omega$ 1% 0.125W
3312	4822 051 51201	120 $\Omega$ 1% 0.125W
3313	4822 051 51201	120 $\Omega$ 1% 0.125W
3314	4822 051 10229	22 $\Omega$ 2% 0.25W
3315	4822 051 10102	1k 2% 0.25W
3316	4822 100 11319	4k7 Potmeter
3317	4822 051 10102	1k 2% 0.25W
3318	4822 051 20222	2k2 5% 0.1W
3319	4822 051 20222	2k2 5% 0.1W
3320	4822 051 10272	2k7 2% 0.25W
3321	4822 051 20222	2k2 5% 0.1W
3322	4822 051 10102	1k 2% 0.25W
3323	4822 051 10681	680 $\Omega$ 2% 0.25W
3324	4822 053 12391	390 $\Omega$ 5% 3W
3325	4822 053 12331	330 $\Omega$ 5% 3W
3326	4822 050 21009	10 $\Omega$ 1% 0.6W
3327	4822 050 21009	10 $\Omega$ 1% 0.6W
3328	4822 051 10109	10 $\Omega$ 2% 0.25W
3329	4822 050 11002	1k 1% 0.4W
3330	4822 051 10473	47k 2% 0.25W
3331	4822 051 10103	10k 2% 0.25W
3332	4822 051 10103	10k 2% 0.25W
3333	4822 051 10103	10k 2% 0.25W
3334	4822 100 11597	100 $\Omega$ Potmeter
3335	4822 100 11597	100 $\Omega$ Potmeter
3336	4822 100 11597	100 $\Omega$ Potmeter
3337	4822 051 10682	6k8 2% 0.25W
3338	4822 051 20222	2k2 5% 0.1W
3339	4822 051 10271	270 $\Omega$ 2% 0.25W
3340	4822 050 21201	120 $\Omega$ 1% 0.6W
3341	4822 051 10391	390 $\Omega$ 2% 0.25W
3342	4822 051 10391	390 $\Omega$ 2% 0.25W
3343	4822 051 10391	390 $\Omega$ 2% 0.25W
3344	4822 051 20222	2k2 5% 0.1W
3345	4822 051 10103	10k 2% 0.25W
3346	4822 051 10182	1k8 2% 0.25W
3347	4822 050 22201	220 $\Omega$ 1% 0.6W
3348	4822 050 22001	200 $\Omega$ 1% 0.6W
3349	4822 050 22201	220 $\Omega$ 1% 0.6W
3350	4822 050 21201	120 $\Omega$ 1% 0.6W
3351	4822 050 21201	120 $\Omega$ 1% 0.6W
3352	4822 050 21201	120 $\Omega$ 1% 0.6W
3353	4822 050 21201	120 $\Omega$ 1% 0.6W
3354	4822 051 10569	56 $\Omega$ 2% 0.25W
3355	4822 051 10479	47 $\Omega$ 2% 0.25W
3356	4822 051 10479	47 $\Omega$ 2% 0.25W
3357	4822 050 24709	47 $\Omega$ 1% 0.6W
3358	4822 051 10479	47 $\Omega$ 2% 0.25W
3359	4822 051 20222	2k2 5% 0.1W
3360	4822 050 21201	120 $\Omega$ 1% 0.6W
3361	4822 050 25609	56 $\Omega$ 1% 0.6W
3362	4822 050 25609	56 $\Omega$ 1% 0.6W
3363	4822 050 25609	56 $\Omega$ 1% 0.6W
3364	4822 051 10479	47 $\Omega$ 2% 0.25W
3365	4822 051 10221	220 $\Omega$ 2% 0.25W
3366	4822 053 12391	390 $\Omega$ 5% 3W
3367	4822 051 10221	220 $\Omega$ 2% 0.25W
3368	4822 053 12331	330 $\Omega$ 5% 3W
3369	4822 051 10221	220 $\Omega$ 2% 0.25W
3370	4822 051 10102	1k 2% 0.25W
3371	4822 053 12391	390 $\Omega$ 5% 3W
3372	4822 053 12331	330 $\Omega$ 5% 3W
3373	4822 050 12403	2.2M 0.125W
3374	4822 116 52234	100k 5% 0.5W

## Video panel



3375 4822 051 10184 180k 2% 0.25W  
 3376 5322 100 11539 100k Potmeter  
 3377 4822 051 10184 180k 2% 0.25W  
 3378 4822 050 12403 2.2M 0.125W  
 3379 4822 051 20222 2k2 5% 0.1W

3380 4822 051 20222 2k2 5% 0.1W  
 3381 4822 116 52234 100k 5% 0.5W  
 3382 4822 051 10184 180k 2% 0.25W  
 3383 5322 100 11539 100k Potmeter  
 3384 4822 051 10184 180k 2% 0.25W

3385 4822 050 12403 2.2M 0.125W  
 3386 4822 116 52234 100k 5% 0.5W  
 3387 4822 051 10184 180k 2% 0.25W  
 3388 5322 100 11539 100k Potmeter  
 3389 4822 051 10272 2k7 2% 0.25W

3390 4822 051 10272 2k7 2% 0.25W  
 3391 4822 051 10184 180k 2% 0.25W  
 3392 4822 051 10272 2k7 2% 0.25W  
 3393 4822 116 83988 36Ω  
 3394 5322 116 51882 0Ω

3397 4822 116 80547 1k5 5% 0.5W  
 3399 4822 116 80548 15k 5% 0.5W  
 3710 4822 050 24702 4k7 1% 0.6W  
 3711 4822 051 10332 3k3 2% 0.25W  
 3712 4822 051 10472 4k7 2% 0.25W

3713 4822 051 10103 10k 2% 0.25W  
 3714 4822 051 20222 2k2 5% 0.1W  
 3715 4822 051 10102 1k 2% 0.25W  
 3716 4822 051 10473 47k 2% 0.25W  
 3717 4822 051 10332 3k3 2% 0.25W

3718 4822 051 10474 470k 2% 0.25W  
 3719 4822 051 10102 1k 2% 0.25W  
 3720 4822 051 10361 360Ω 2% 0.25W  
 3801 5322 116 51882 0Ω  
 3802 5322 116 51882 0Ω

3803 5322 116 51882 0Ω  
 3804 5322 116 51882 0Ω  
 3805 5322 116 51882 0Ω  
 3806 5322 116 51882 0Ω  
 3807 4822 051 10008 0Ω

3808 5322 116 51882 0Ω  
 3809 5322 116 51882 0Ω  
 3810 5322 116 51882 0Ω  
 3811 4822 051 10008 0Ω  
 3823 5322 116 51882 0Ω

3824 5322 116 51882 0Ω

5301 4822 158 30254 T-COIL  
 5302 4822 158 30254 T-COIL  
 5303 4822 158 30254 T-COIL  
 5304 4822 157 53189 5μH  
 5305 4822 157 52493 3.3μH

5306 4822 157 52493 3.3μH  
 5307 4822 157 52493 3.3μH  
 5310 4822 157 52493 3.3μH



6302 4822 130 80446 BAS32L  
 6303 4822 130 80446 BAS32L  
 6304 4822 130 80446 BAS32L  
 6305 4822 130 80446 BAS32L  
 6306 4822 130 80446 BAS32L

6307 4822 130 34382 BZX79-C8V2  
 6308 4822 130 80446 BAS32L  
 6309 4822 130 30621 1N4148  
 6310 4822 130 80446 BAS32L  
 6311 4822 130 80877 BAV103

6312 4822 130 80877 BAV103  
 6313 4822 130 80877 BAV103  
 6314 4822 130 80877 BAV103



6315 4822 130 80877 BAV103  
 6316 4822 130 80877 BAV103  
 6317 5322 130 31969 RGP15G  
 6318 5322 130 31969 RGP15G  
 6319 4822 130 80446 BAS32L

6320 4822 130 34233 BZX79-C5V1  
 6321 4822 130 42489 RGP10G  
 6322 4822 130 80446 BAS32L  
 6323 4822 130 80446 BAS32L



7301 4822 209 62364 LM1203  
 7302 4822 130 62278 2SC3950E  
 7303 4822 130 62279 2SC3953E  
 7304 4822 130 62278 2SC3950E  
 7305 4822 130 62279 2SC3953E

7306 4822 130 62278 2SC3950E  
 7307 4822 130 62279 2SC3953E  
 7308 5322 130 42136 BC848C  
 7309 5322 130 42136 BC848C  
 7310 4822 130 60383 BF824

7311 5322 130 44336 BSV52  
 7312 4822 130 41646 BF423  
 7313 4822 130 41646 BF423  
 7314 4822 130 41646 BF423  
 7315 5322 130 44336 BSV52

7316 5322 130 44336 BSV52  
 7317 5322 130 44336 BSV52  
 7318 5322 209 11473 PC74HCT86P  
 7319 5322 130 42136 BC848C  
 7320 5322 130 44336 BSV52

7321 5322 130 44336 BSV52  
 7322 5322 130 44336 BSV52

## Headphone panel

4822 267 31526 Headphone jack

## LED panel

6629 4822 130 82021 LED LTL307GE

## Control panel

1110 4822 212 30613 Control panel complete

1113 4822 276 13249 Degaussing switch



2201 4822 122 33496 100nF 10% 63V  
 2202 4822 122 33496 100nF 10% 63V



3200 4822 102 10465 2X20k  
 3201 4822 050 22203 22k 1% 0.6W  
 3202 4822 050 22203 22k 1% 0.6W  
 3203 4822 051 10273 27k 2% 0.25W  
 3204 4822 051 10273 27k 2% 0.25W

3420 4822 050 22202 2k2 1% 0.6W  
 3428 4822 050 21003 10k 1% 0.6W  
 3432 4822 100 20817 10k Potmeter  
 3439 4822 050 16802 6k8 1% 0.4W  
 3440 4822 100 20817 10k Potmeter

3448 4822 050 16802 6k8 1% 0.4W  
 3458 4822 100 20817 10k Potmeter  
 3461 4822 050 21502 1k5 1% 0.6W  
 3462 4822 051 10272 2k7 2% 0.25W  
 3571 4822 100 20817 10k Potmeter

3572 4822 050 24702 4k7 1% 0.6W  
 3573 4822 050 12702 2k7 1% 0.4W  
 3574 4822 100 20817 10k Potmeter  
 3575 4822 050 16802 6k8 1% 0.4W  
 3576 4822 050 27502 7k5 1% 0.6W

3577 4822 100 20821 10k Potmeter  
 3578 4822 116 52271 33k 5% 0.5W  
 3579 4822 050 27503 75k 1% 0.6W  
 3581 4822 051 10153 15k 2% 0.25W