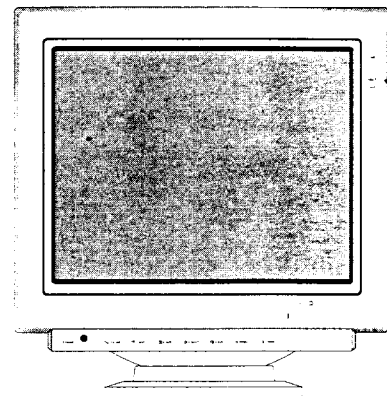


Service  
Service  
**Service**



# Service Manual

Horizontal frequencies  
30 tot 58 kHz

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**General**

Mains voltage : 195 - 264V  
 Mains frequency : 47 - 63 Hz  
 Power consumption : 85 W (nominal)  
                               : 100 W (max)  
 Operating temperature : 0°C to 40°C  
 Weight : 13.5 kg  
 Width x Depth x Height : 370 x 400 x 371.5 mm

**Picture tube**

Size : 15 inch  
 Light transmission : 57 % (dark glass)  
 Deflection angle : 90 Degree  
 EHT voltage : 25 kVolt  
 Pitch : 0.28 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**

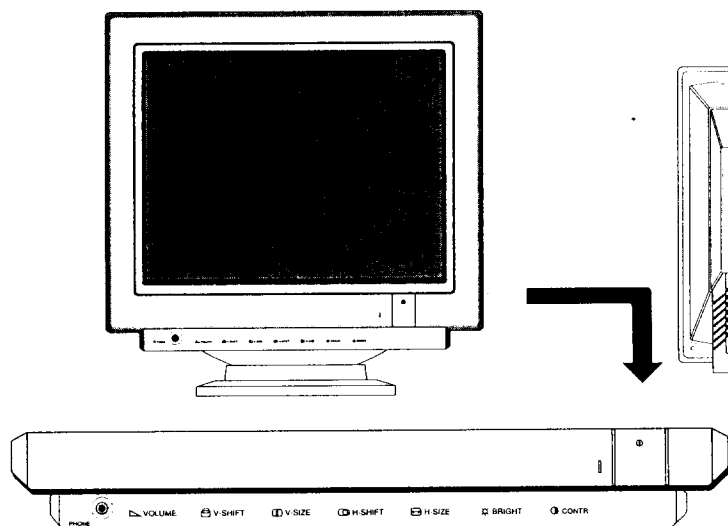
- Input signal : 150 mV<sub>rms</sub>/22kΩ  
 - Output : 1 W

\* Specifications are subject to change without notice !

**RESOLUTION MODES AND SYNC. POLARITIES**

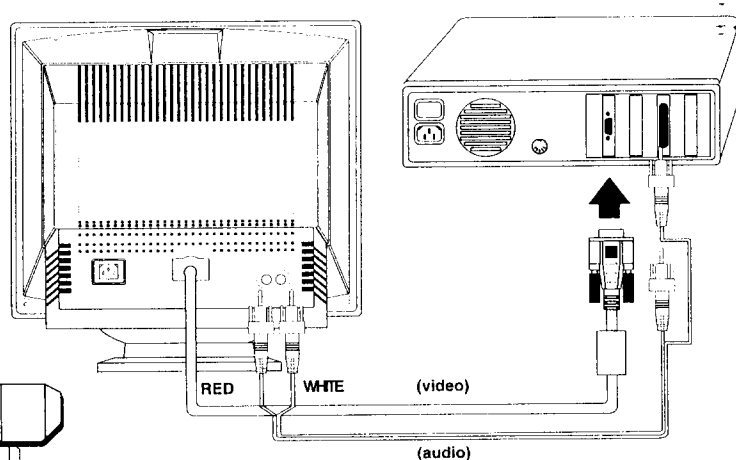
Modes	Horizontal frequencies	Vertical frequencies	H. sync. polarity	V. sync. polarity	Resolution Dot * lines
VGA	31,5 kHz	70 Hz	Positive (+)	Negative (-)	640 * 350
VGA	31,5 kHz	70 Hz	Negative (-)	Positive (+)	640 * 400
VGA	31,5 kHz	60 Hz	Negative (-)	Negative (-)	640 * 480
S-VGA	37.8 kHz	72 Hz	Positive (+)	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



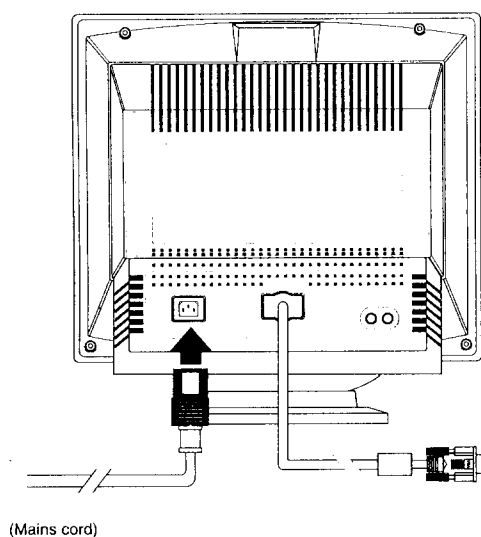
## Connection to the computer

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

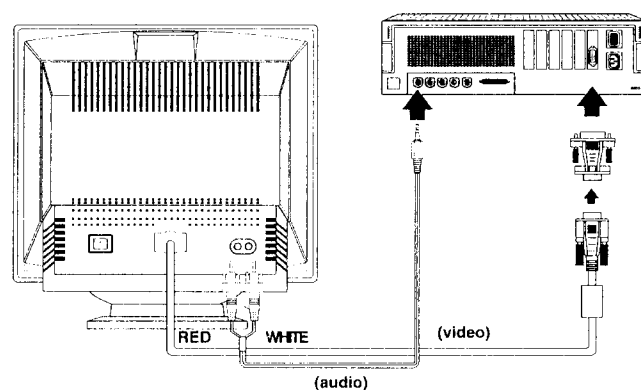


## Connection to the mains

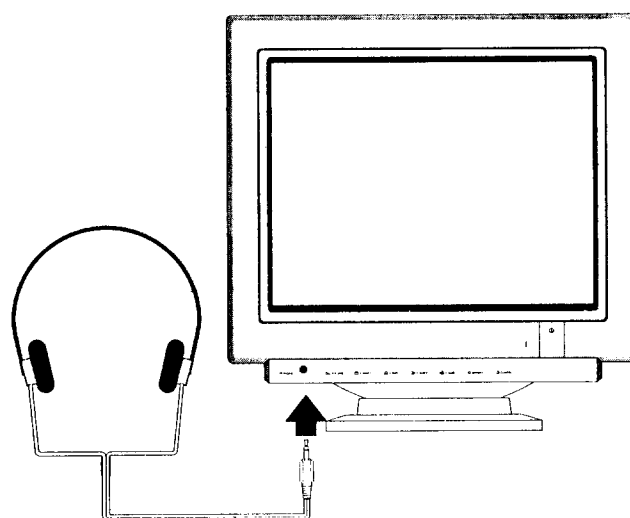
(Rear of the monitor)



2. Apple Macintosh series:

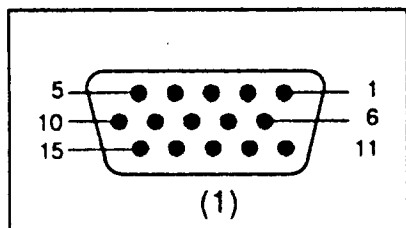


3. Earphone connection:

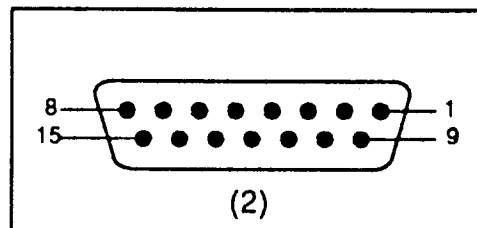


## Connection facilities

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



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



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

## 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 therefor 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.

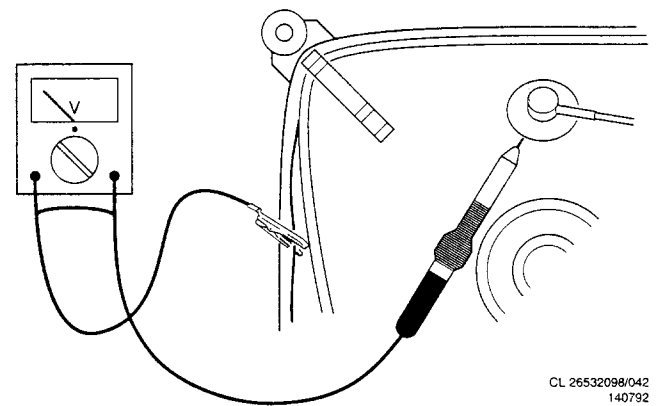


Fig. 3.1

## Mechanical instructions

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

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

### General

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

### Video panel

- Remove the rear cover (6 screws), see Fig. 4.2.
- Remove the metal shielding by desolder 8 lags.

### Main panel

- Remove the pedestal (click construction).
- Remove the rear cover (6 screws).
- Remove the video panel from CRT.
- Disconnect the desired cable trees.
- Slide the main panel out of bottom plate, first release plastic clamp, see Fig. 4.1.
- Place Main panel in service position as shown in Fig. 4.3.

### Remark:

3 extension cables are required for the service position of the Main panel.

- 4822 321 61698 2p to 2p cable to degaussing coil.
- 4822 321 61697 7p to 7p cable to ear phone panel.
- 4822 321 61699 2p to 2p extension cable to speaker.

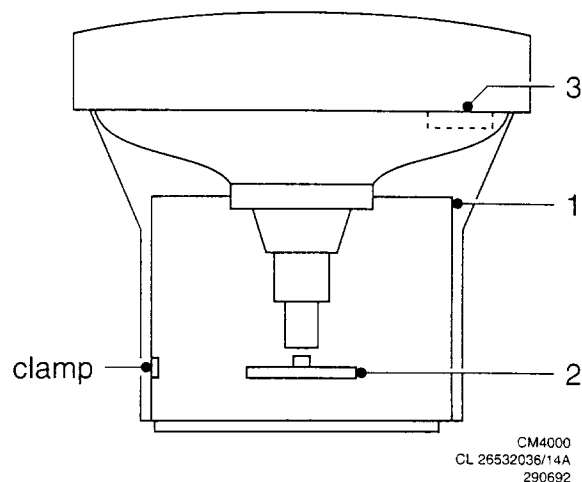


Fig. 4.1

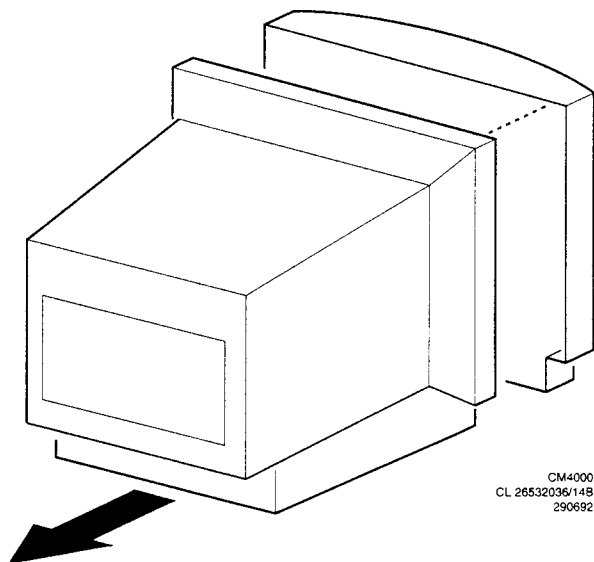


Fig. 4.2

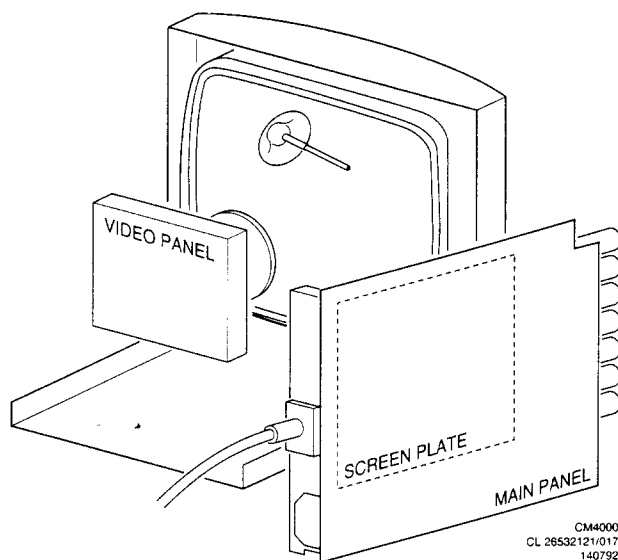


Fig. 4.3

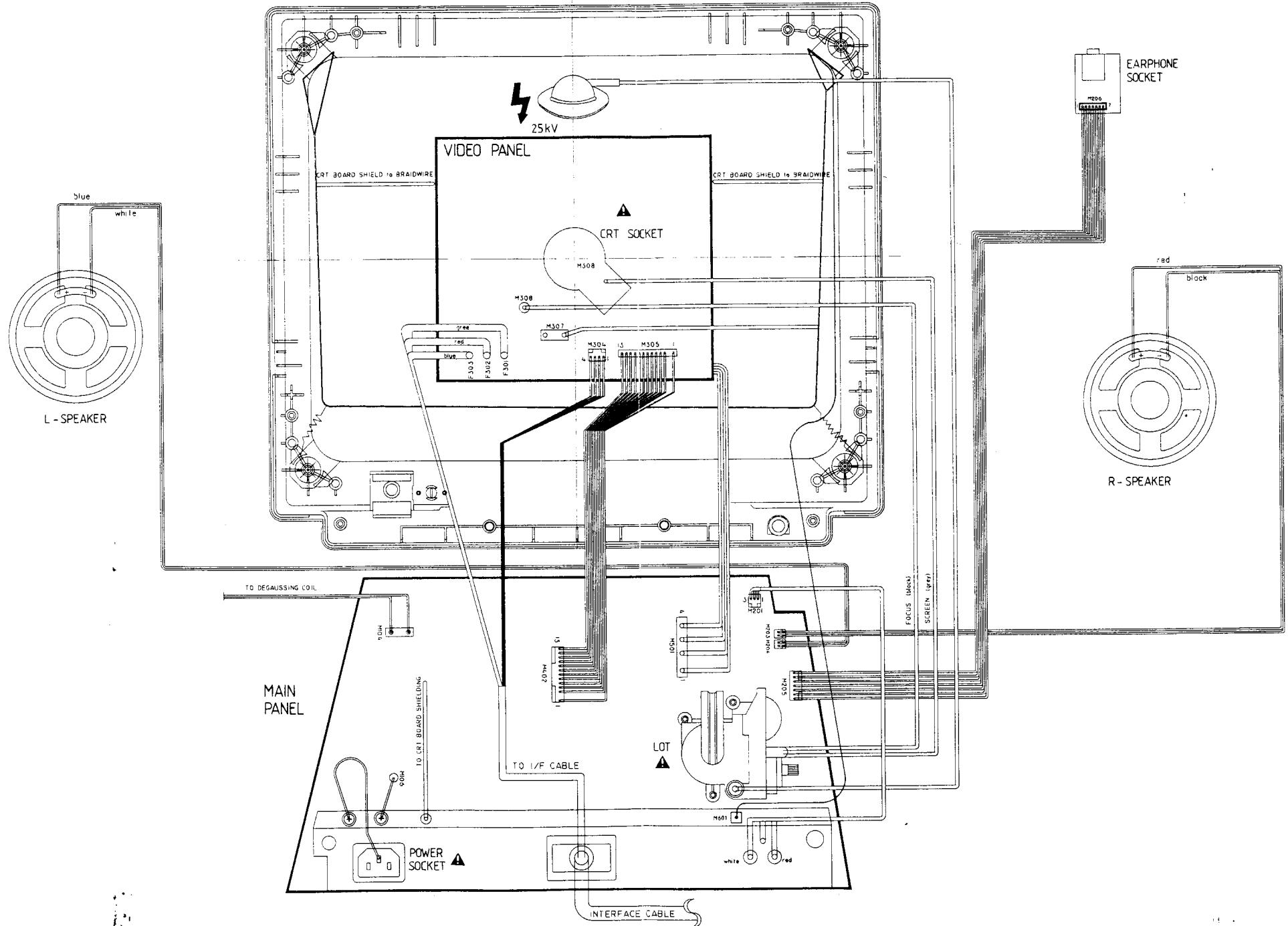
# Wiring diagram

4CM8270/..T

5.1

5.2

4CM8270/..T

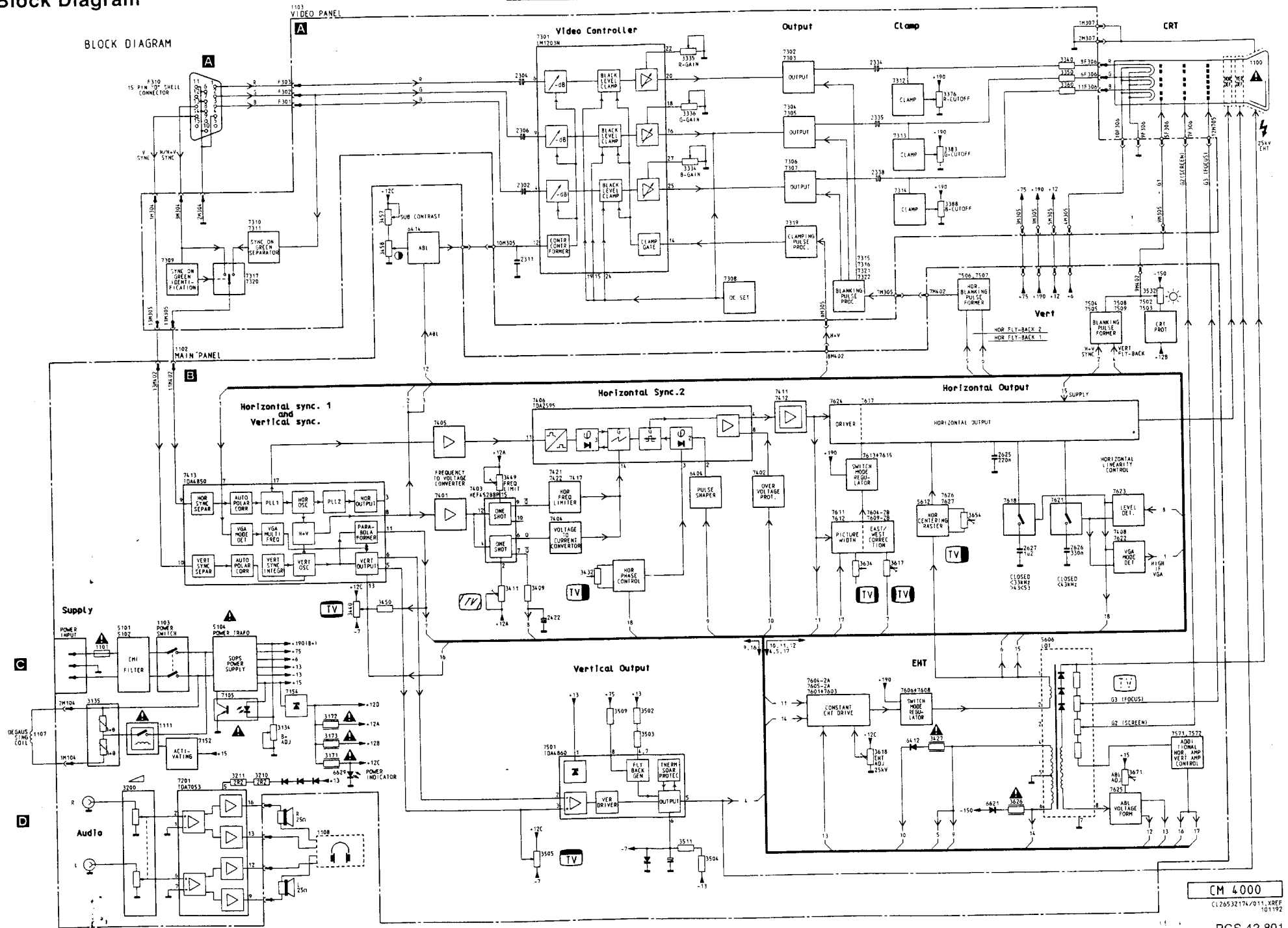


# Block Diagram

4CM8270..T 6.1

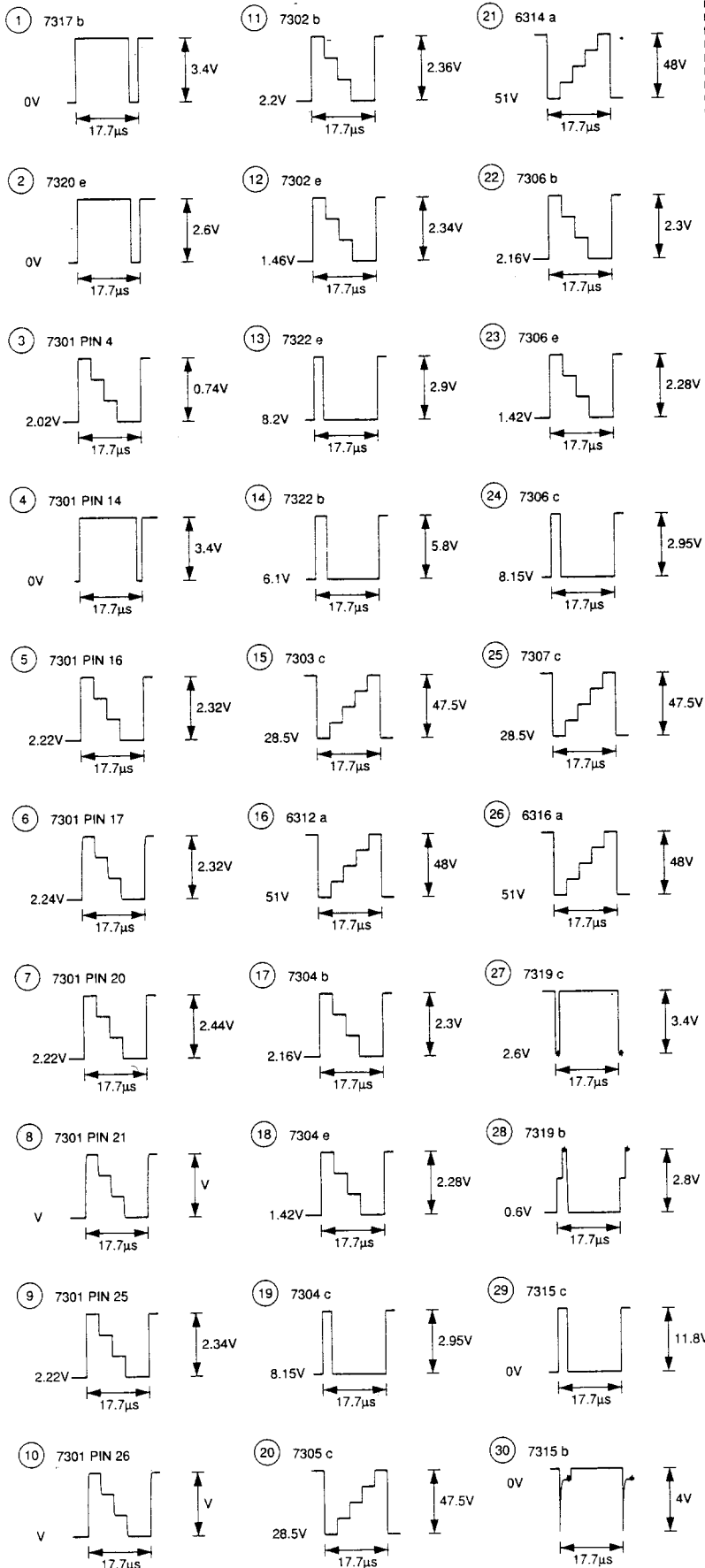
6.2 4CM8270..T

## BLOCK DIAGRAM

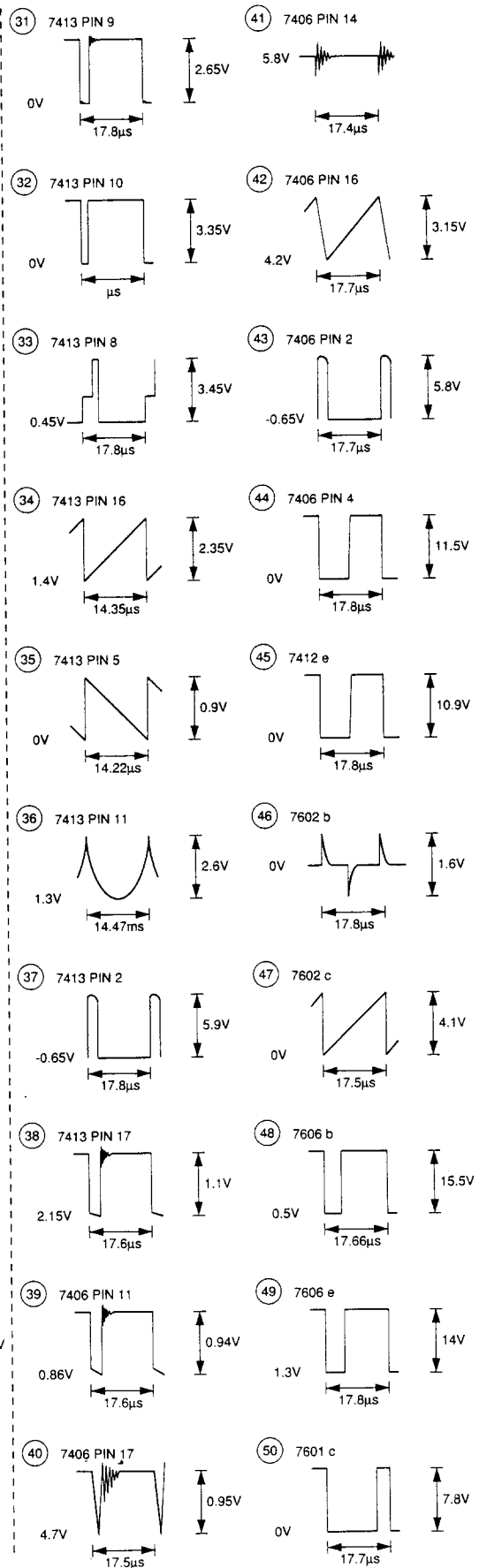


## WAVE FORMS FOR DIAGRAM

A



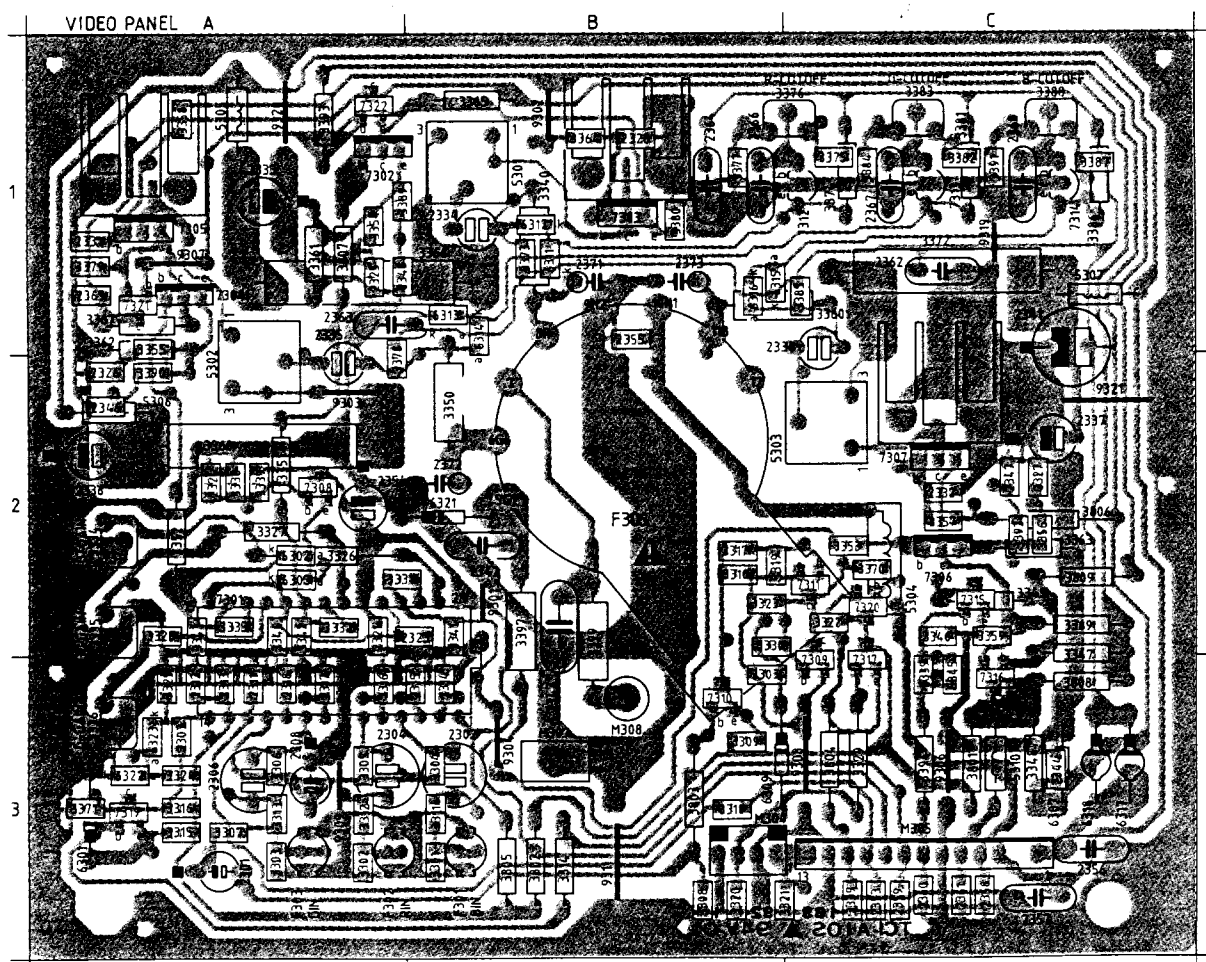
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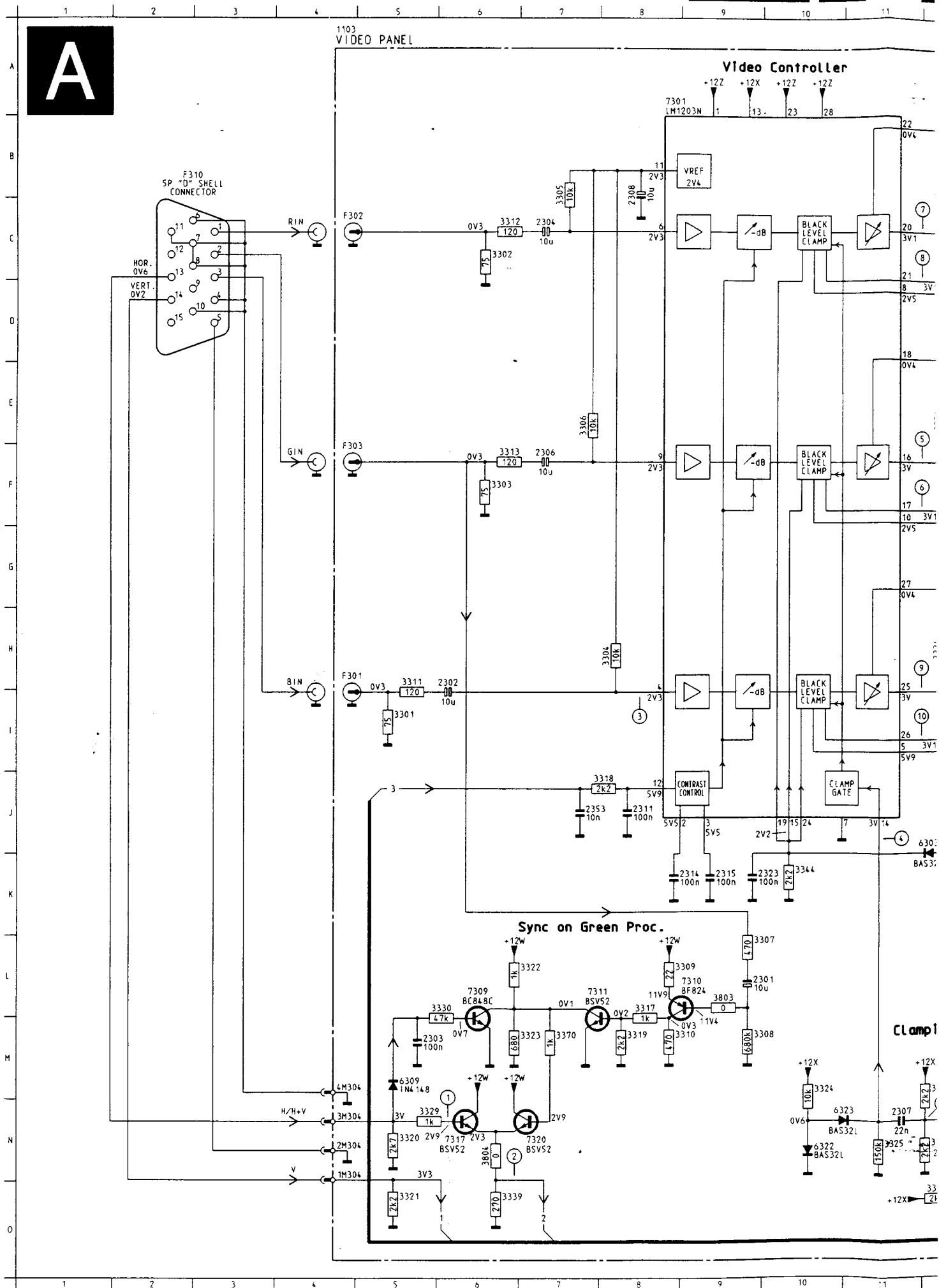


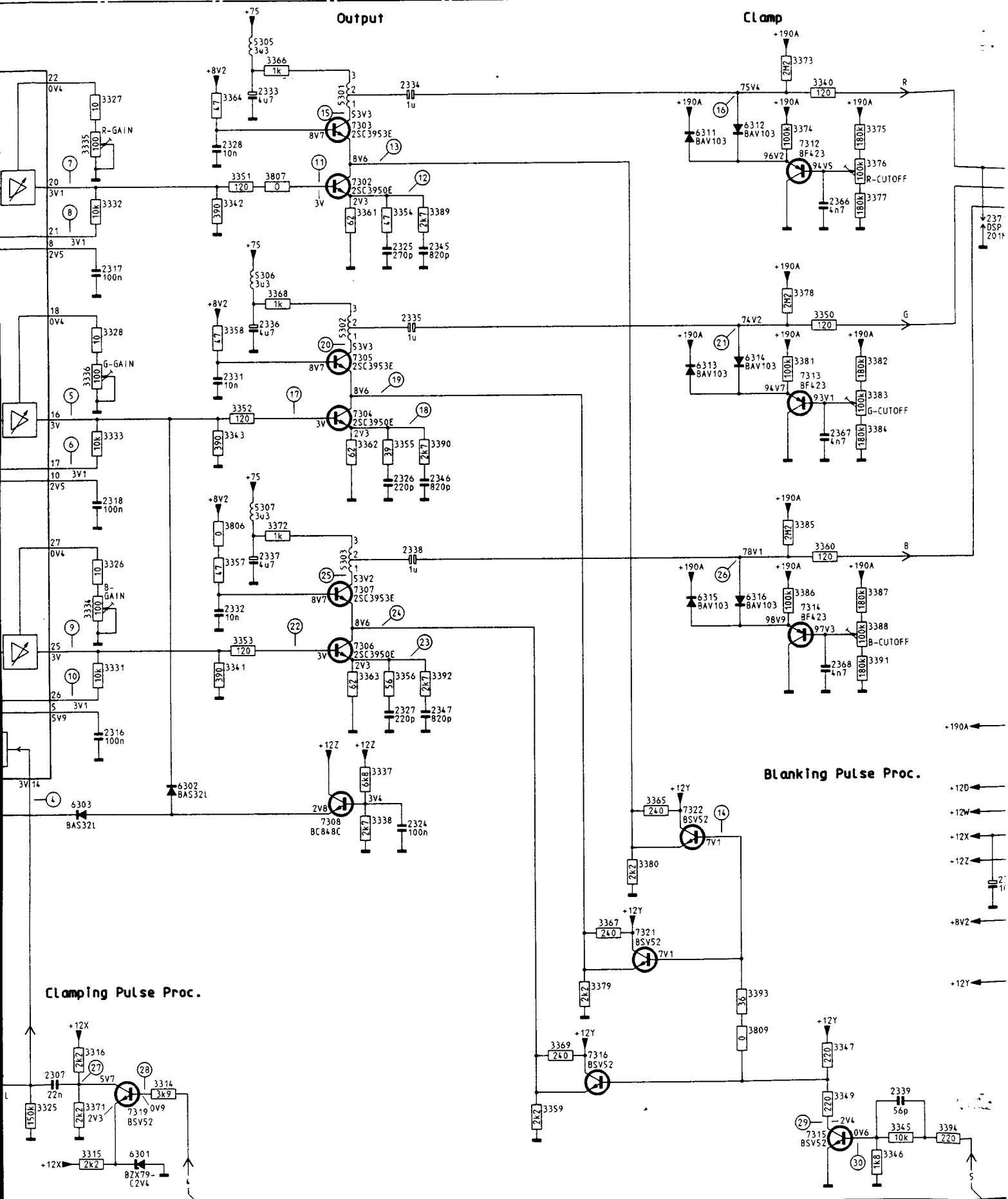
F301  
F302  
F303  
F306  
M304  
M307  
M308  
2301  
2302  
2303  
2304  
2306  
2307  
2308  
2311  
2312  
2313  
2314  
2315  
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2317  
2318  
2321  
2323  
2324  
2325  
2326  
2327  
2328

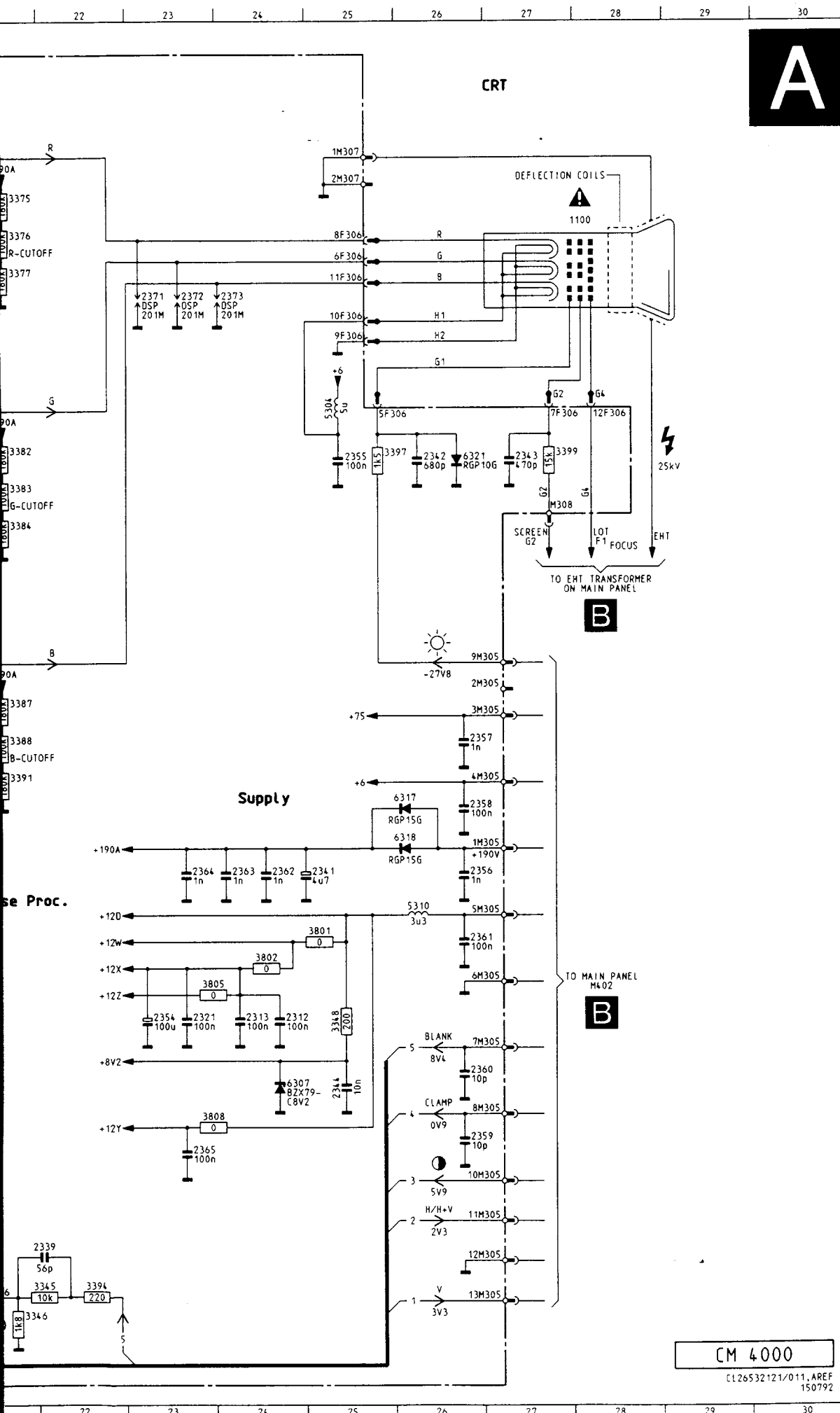
## Video panel

F301	B3	2331	A1	2366	B1	3324	A3	3352	A2	3380	B1	5306	A2	7311	C2
F302	A3	2332	C2	2367	C1	3325	A3	3353	C2	3381	C1	5307	C1	7312	C1
F303	A3	2333	A1	2368	C1	3326	A2	3354	A1	3383	C1	5310	C3	7313	C1
F306	C2	2334	B1	2371	B1	3327	A2	3355	A1	3384	C1	6301	A3	7314	C1
M304	B3	2335	A1	2372	B2	3328	A2	3356	C2	3385	C1	6302	A2	7315	C2
M307	B3	2336	A2	2373	B1	3329	C3	3357	C2	3386	C1	6303	A2	7316	C3
M308	B3	2337	C2	3301	B3	3330	B2	3358	A1	3387	C1	6307	C3	7317	C3
2301	A3	2338	B1	3302	A3	3331	A2	3359	C2	3389	A1	6309	B3	7319	A3
2302	B3	2339	C3	3303	A3	3332	A2	3360	C1	3390	A2	6311	B1	7320	C2
2303	B3	2341	C1	3304	B3	3333	A2	3361	A1	3391	C1	6312	B1	7321	A1
2304	A3	2342	B2	3305	A3	3334	A2	3362	A1	3392	C2	6313	B1	7322	A1
2306	A3	2343	B3	3306	A3	3335	A2	3362	C1	3393	A1	6314	B1	9301	B2
2307	A3	2344	C3	3307	A3	3336	A3	3363	C2	3394	C3	6315	B1	9302	B1
2308	A3	2345	A1	3308	B3	3337	A2	3364	B1	3397	B2	6316	B1	9303	A2
2311	A3	2346	A2	3309	B3	3338	C1	3365	B1	3399	B2	6317	C3	9304	B3
2312	A3	2347	C2	3310	B2	3338	A2	3366	B1	3801	C3	6318	C3	9306	C3
2313	A3	2353	C3	3311	B3	3339	C3	3367	A1	3802	B3	6321	B2	9307	A1
2314	B3	2354	A2	3312	A3	3340	B1	3368	A2	3803	B3	6322	A3	9308	C3
2315	B3	2355	B1	3313	A3	3341	B2	3369	C2	3804	C3	6323	A3	9309	A3
2316	A3	2356	C3	3314	B3	3342	A2	3370	C2	3805	B3	7301	A2	9311	B3
2317	A3	2357	C3	3315	A3	3343	A2	3371	A3	3806	C2	7302	A1	9319	C1
2318	A3	2358	C3	3316	A3	3344	A2	3372	C1	3807	A1	7303	B1	9320	A1
2321	A2	2359	C3	3317	B2	3345	C3	3373	B1	3808	C3	7304	A1	9321	C2
2323	B2	2360	C3	3318	B3	3346	C2	3374	C1	3809	C2	7305	A1		
2324	A2	2361	C3	3319	B2	3347	C3	3375	C1	5301	B1	7306	C2		
2325	A1	2362	C1	3320	B3	3348	C3	3376	C1	5302	A2	7307	C2		
2326	A2	2363	A1	3321	C3	3349	C2	3377	B1	5303	B2	7308	A2		
2327	C2	2364	B1	3322	C2	3350	B2	3378	A2	5304	C2	7309	C3		
2328	B1	2365	A1	3323	B2	3351	A2	3379	A1	5305	A1	7310	B3		









**A**

**B**

**B**

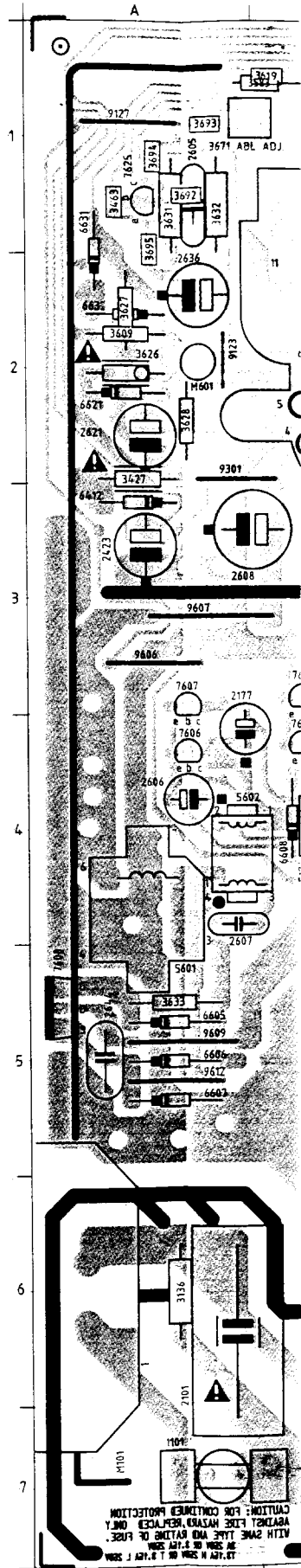
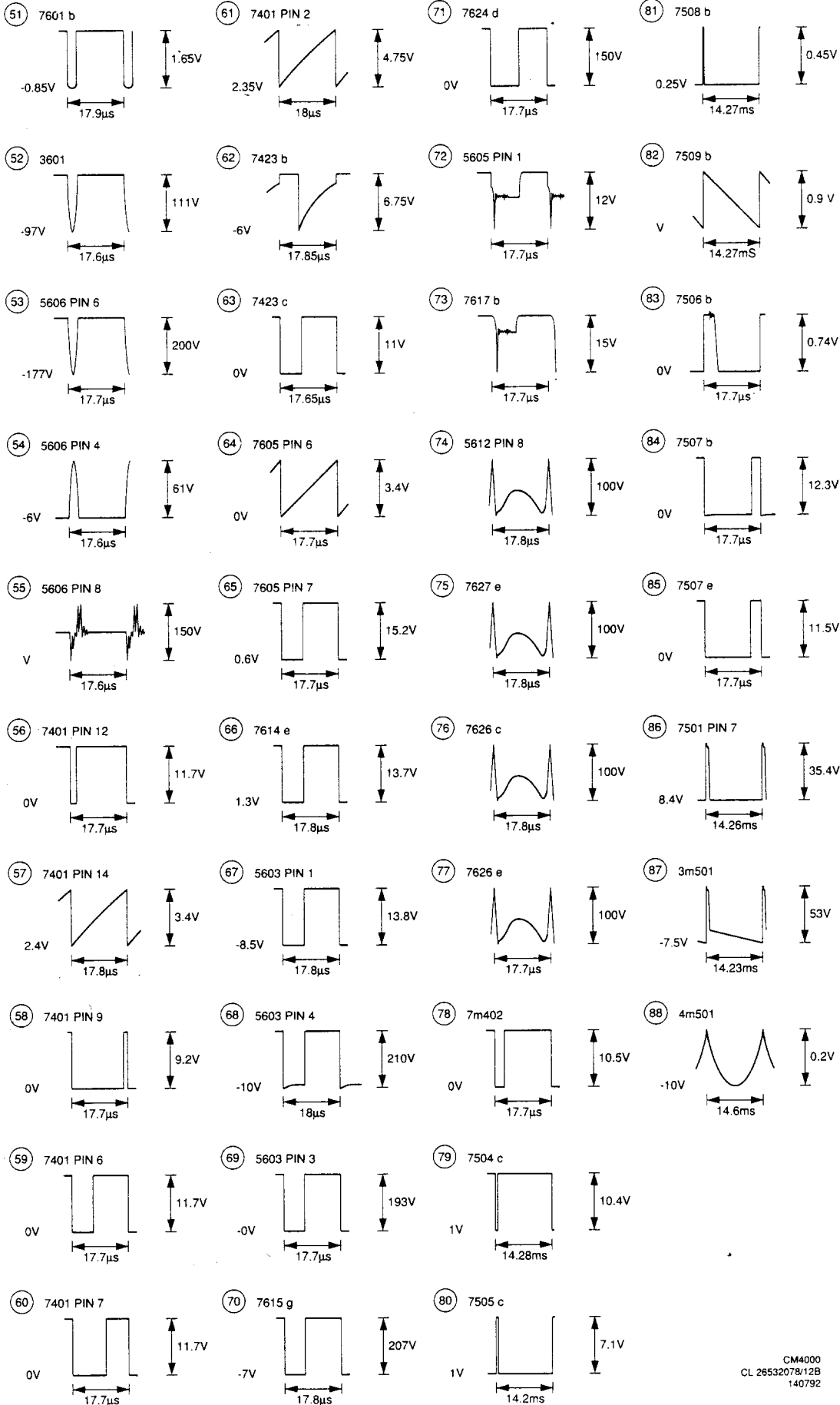
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150792

1100	C28	3358	E13
1103	A 4	3359	N17
2301	L 9	3360	G21
2302	H 6	3361	C15
2303	M 5	3362	F15
2304	C 7	3363	I15
2306	F 7	3364	B13
2307	N11	3365	J19
2308	B 8	3366	A14
2311	J 8	3367	L18
2312	K24	3368	D14
2313	K24	3369	M17
2314	K 8	3370	M 7
2315	K 9	3371	N12
2316	J12	3372	G14
2317	D12	3373	A20
2318	G12	3374	B20
2321	K23	3375	B21
2323	K 9	3376	C21
2324	K16	3377	C21
2325	D15	3378	D20
2326	G15	3379	M18
2327	I15	3380	K18
2328	B13	3381	E20
2331	E13	3382	E21
2332	H13	3383	E21
2333	B14	3384	F21
2334	B16	3385	G20
2335	E16	3386	H20
2336	E14	3387	H21
2337	G14	3388	H21
2338	G16	3389	C16
2339	N22	3390	F16
2341	J25	3391	I21
2342	E26	3392	I16
2343	E27	3393	M20
2344	L25	3394	N22
2345	D16	3397	E25
2346	G16	3399	E27
2347	I16	3801	J25
2353	J 7	3802	K24
2354	K23	3803	L 9
2355	E25	3804	N 6
2356	J26	3805	K23
2357	H26	3806	G13
2358	I26	3807	C14
2359	M26	3808	M23
2360	L26	3809	M20
2361	K26	5301	B15
2362	J24	5302	E15
2363	J24	5303	G15
2364	J23	5304	E25
2365	M23	5305	A14
2366	C21	5306	D14
2367	F21	5307	G14
2368	I21	5310	J26
2371	C23	6301	D12
2372	C23	6302	J13
2373	C24	6303	J12
3301	I 5	6307	L24
3302	C 6	6309	M 5
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3304	H 8	6312	B20
3305	B 7	6313	E19
3306	E 7	6314	E20
3307	L 9	6315	H19
3308	M 9	6316	H20
3309	L 8	6317	I26
3310	M 8	6318	I26
3311	H 5	6321	E26
3312	C 6	6322	N10
3313	F 6	6323	N11
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3315	O12	7302	C15
3316	M12	7303	B15
3317	L 8	7304	F15
3318	J 8	7305	E15
3319	M 8	7306	I15
3320	N 5	7307	H15
3321	O 5	7308	K15
3322	L 7	7309	L 6
3323	M 7	7310	L 9
3324	M10	7311	L 7
3325	N11	7312	B20
3326	G12	7313	E20
3327	B12	7314	H20
3328	E12	7315	N21
3329	N 5	7316	M18
3330	L 6	7317	N 6
3331	I12	7319	N12
3332	C12	7320	N 7
3333	F12	7321	L18
3334	H12	7322	K19
3335	B12		
3336	E12		
3337	J15		
3338	K15		
3339	O 6		
3340	B21		
3341	I13		
3342	C13		
3343	F13		
3344	K10		
3345	N22		
3346	O21		
3347	M21		
3348	K25		
3349	N21		
3350	E21		
3351	C14		
3352	F14		
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3354	C15		
3355	F15		
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3357	G13		

# WAVE FORMS FOR DIAGRAM

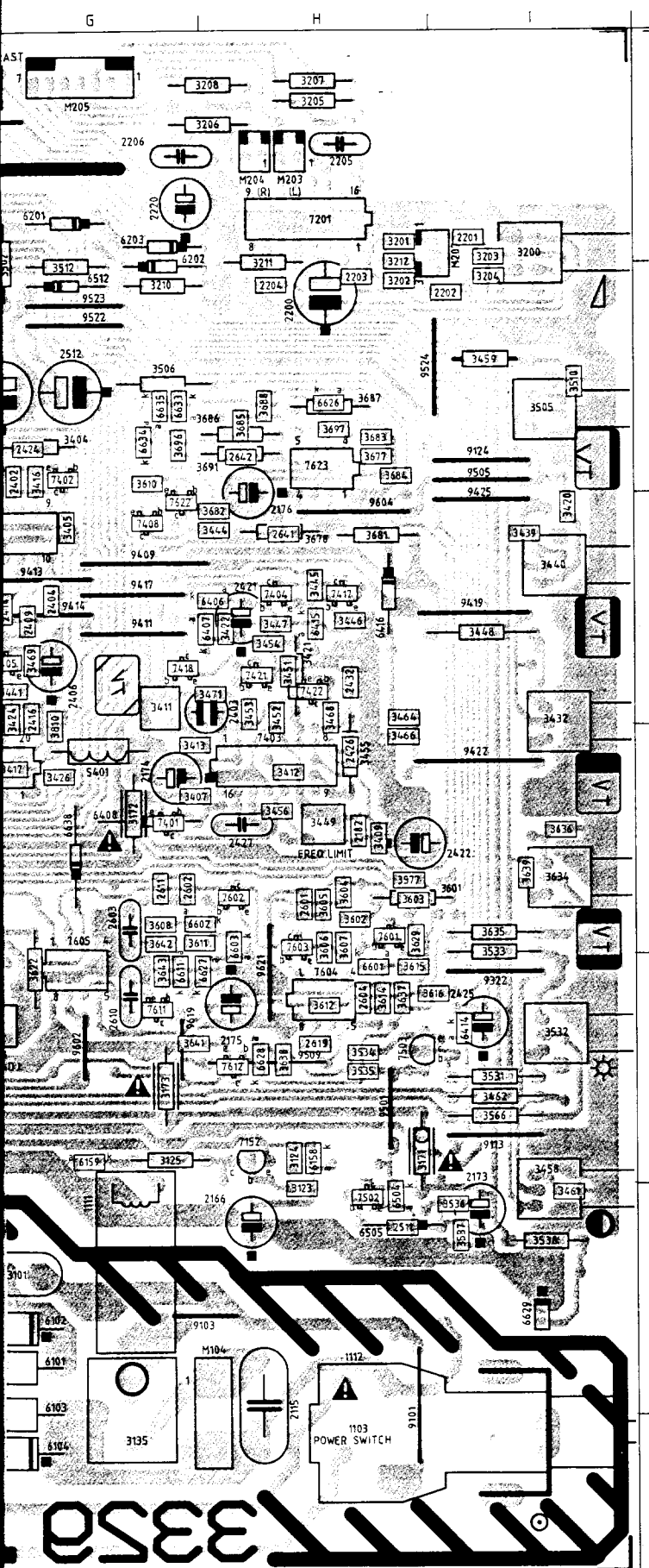
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B

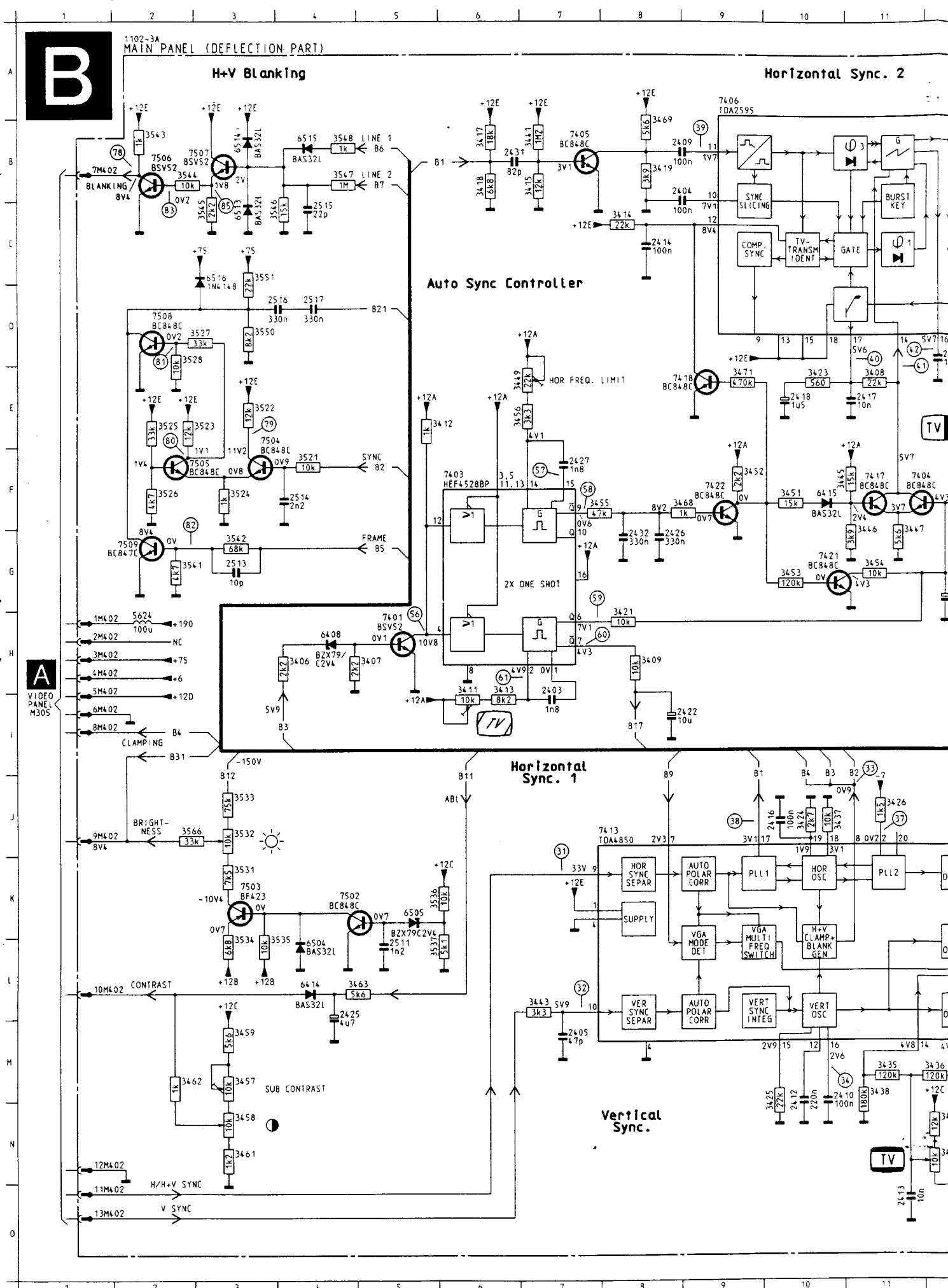


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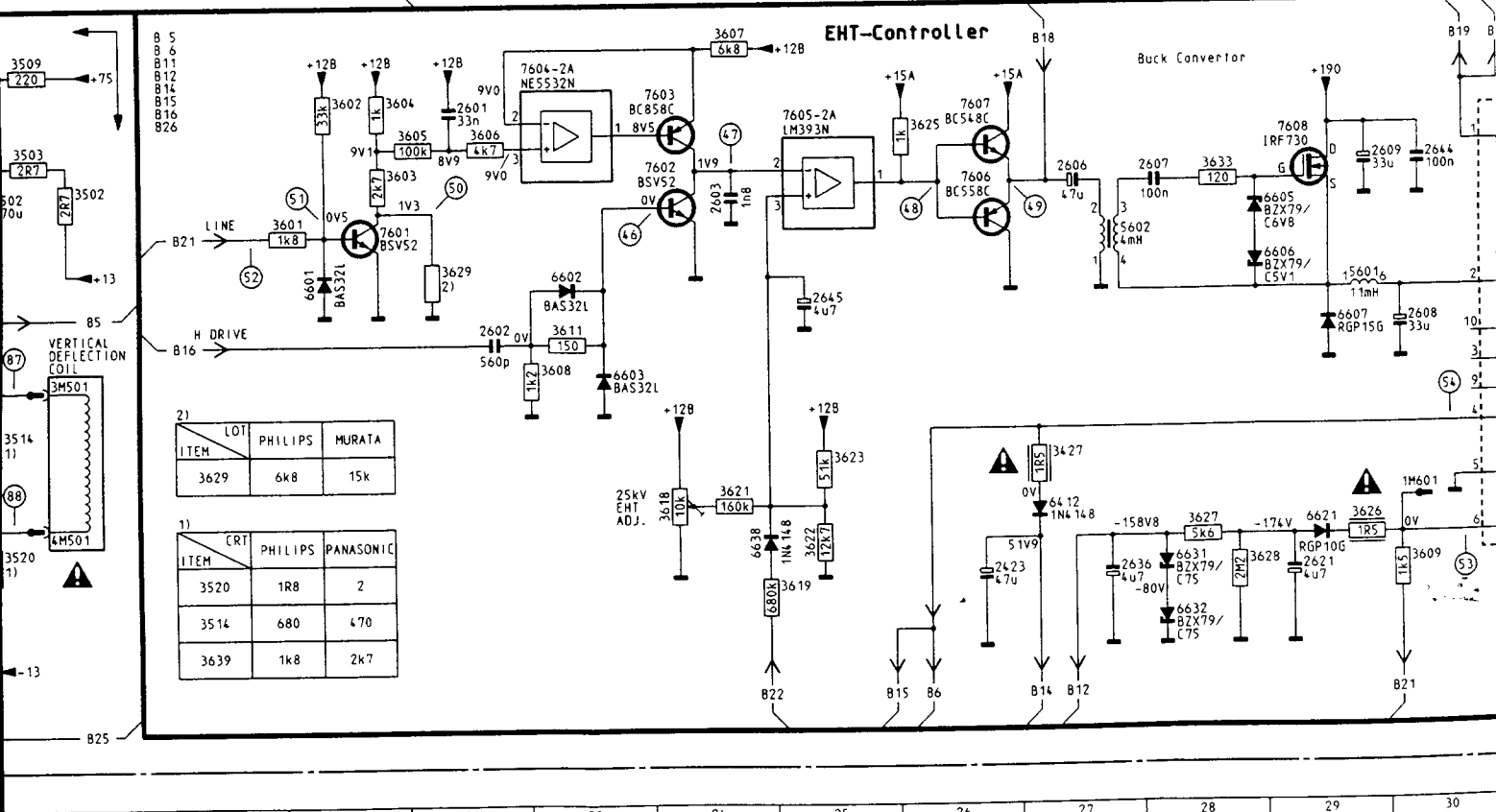
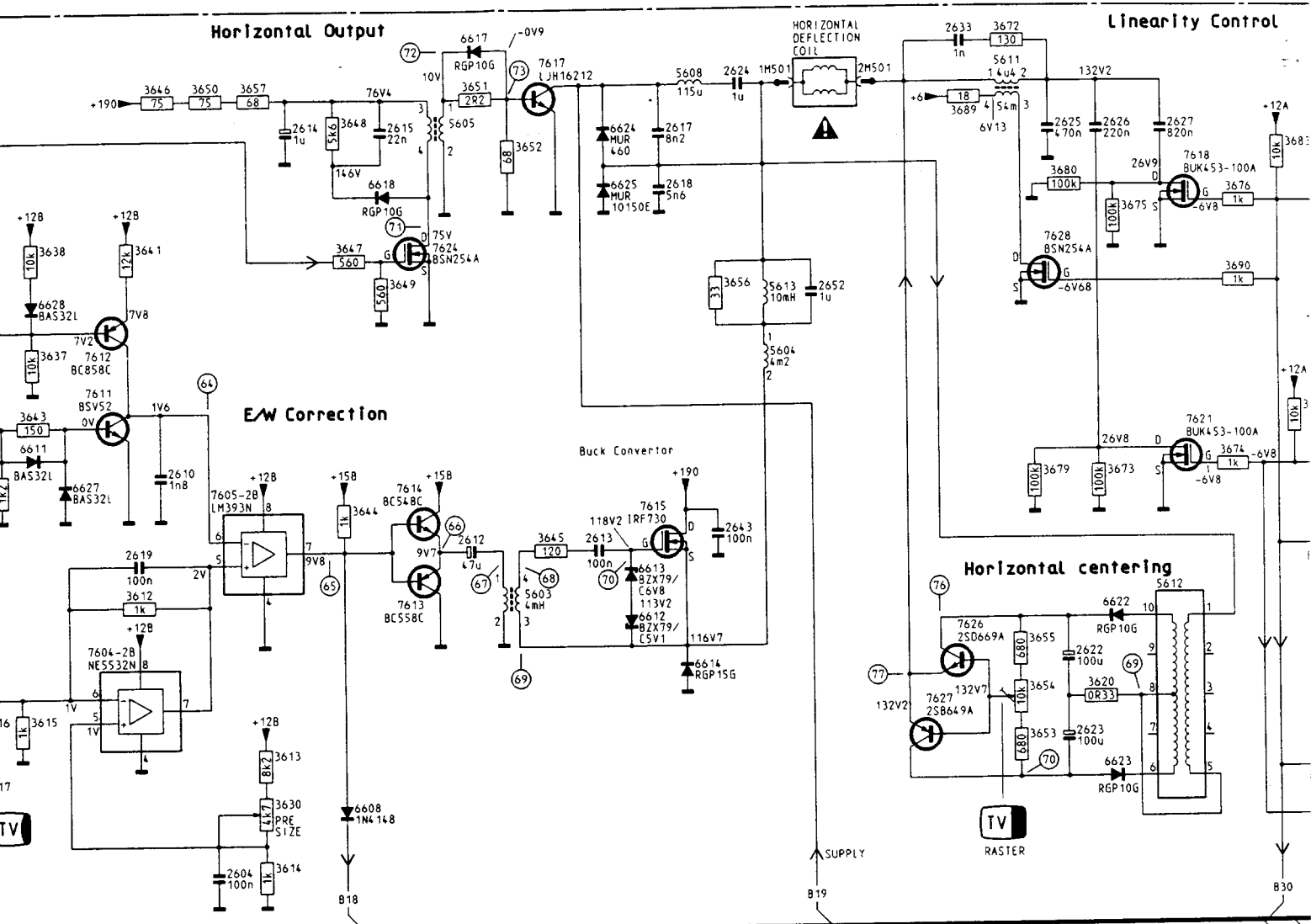


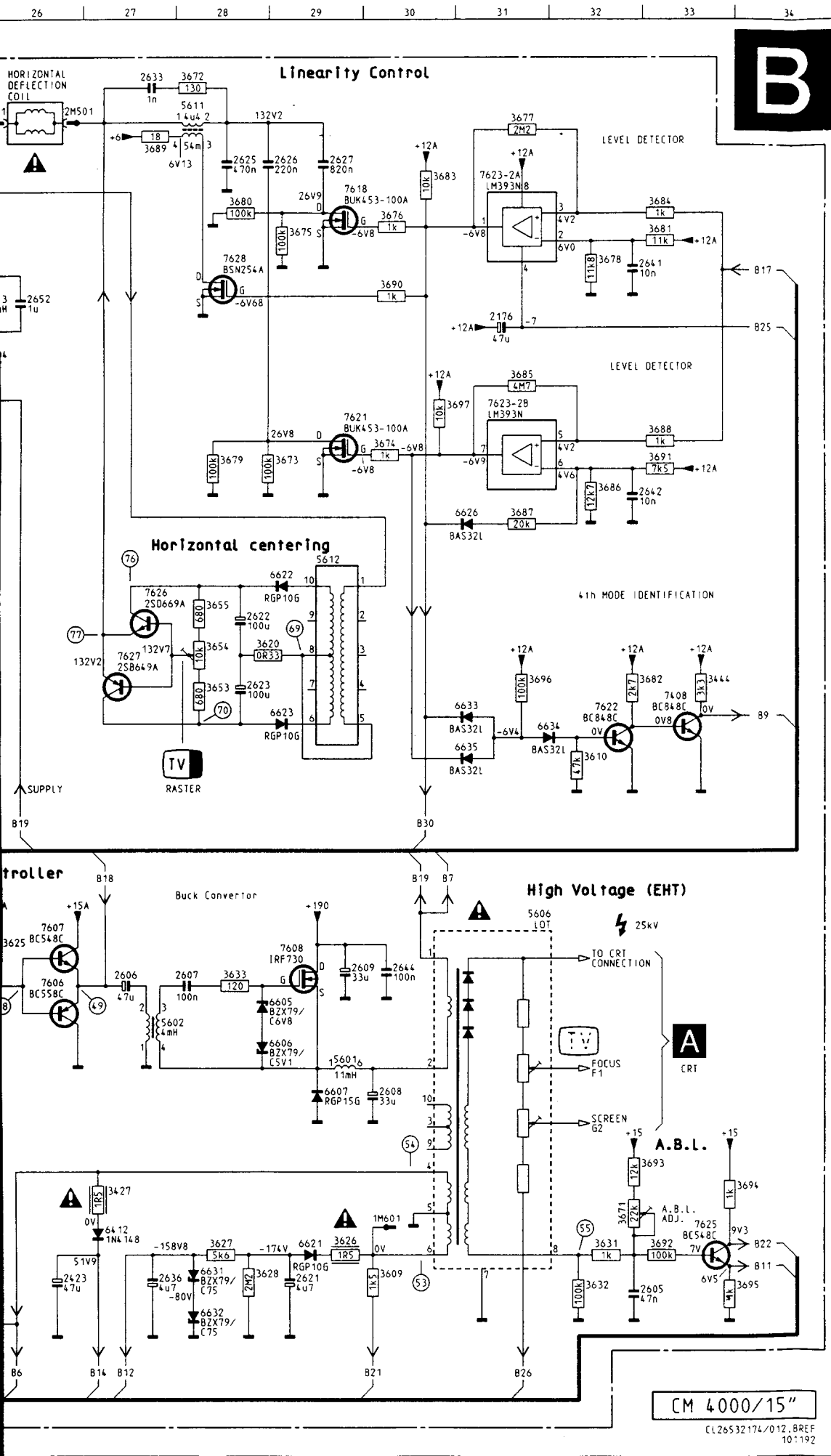


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1103 H7	2603 G4	3421 H3	3578 F4	5155 D4	6635 G2	9419 I3
1111 G6	2604 H5	3422 H3	3579 C1	5173 E4	6638 G4	9421 F4
2101 A6	2605 A1	3423 F3	3583 B1	5174 B4	7101 D7	9422 I4
2102 B6	2606 A4	3424 G3	3601 H4	5175 B4	7102 D6	9423 F4
2103 B6	2607 A4	3425 F3	3602 H4	5176 E4	7103 D6	9425 I3
2104 H6	2608 A3	3426 G4	3603 H4	5401 G4	7104 B6	9428 E4
2105 F6	2609 B4	3427 A2	3604 H4	5402 D1	7105 C5	9501 H5
2106 I6	2610 G5	3429 E3	3605 H4	5601 A5	7151 B5	9502 E2
2107 F6	2611 G4	3432 I3	3606 H4	5602 A4	7152 H5	9503 F2
2109 C6	2612 B3	3435 F3	3607 H4	5603 B4	7153 D4	9504 F1
2111 C6	2613 C3	3436 F3	3608 G4	5604 C4	7154 E5	9505 I2
2112 C6	2614 D3	3437 G3	3609 A2	5605 D3	7201 H1	9507 F1
2113 C6	2615 D3	3438 F3	3610 G2	5606 B1	7401 G4	9508 E4
2115 H6	2617 C2	3439 I3	3611 G4	5608 E2	7402 G2	9509 H5
2117 D6	2618 D1	3440 I3	3612 H5	5611 E2	7403 H4	9511 E4
2151 C5	2619 H5	3441 G3	3613 F5	5612 D2	7404 H3	9518 E3
2152 C5	2619 H5	3443 E4	3614 H5	5613 C3	7405 G3	9518 E3
2153 D5	2621 A2	3444 H3	3615 H5	5624 D4	7406 G3	9519 F4
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2155 E5	2623 E1	3446 H3	3617 F1	6102 G6	7411 F3	9523 G2
2156 E5	2624 D2	3447 H3	3618 G5	6103 G6	7412 F3	9524 I2
2157 D5	2625 D1	3448 I3	3619 B1	6104 G7	7413 F4	9525 E4
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2405 F4	3132 C4	3514 E2	3654 E2	6416 H3	7623 H2	
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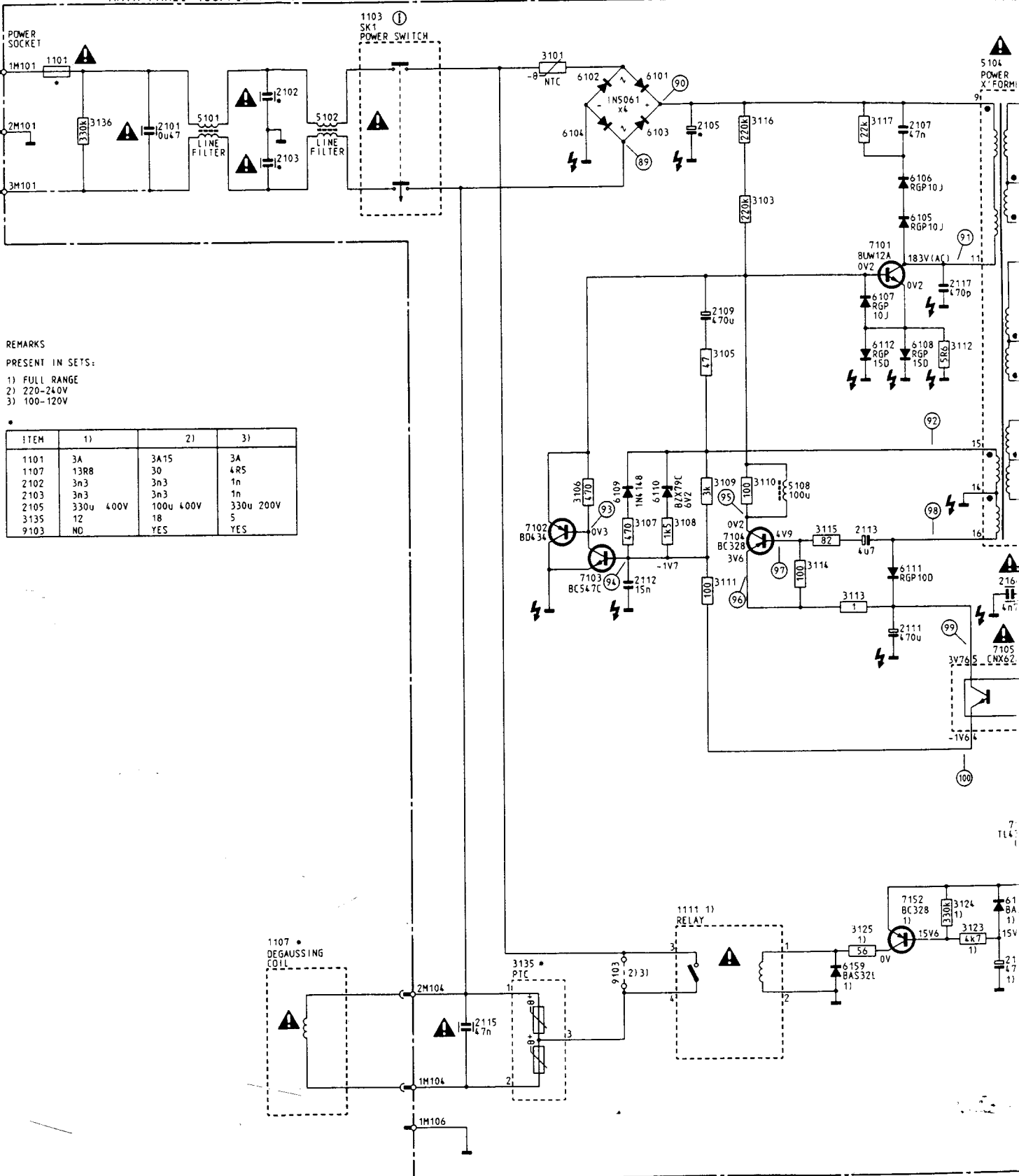




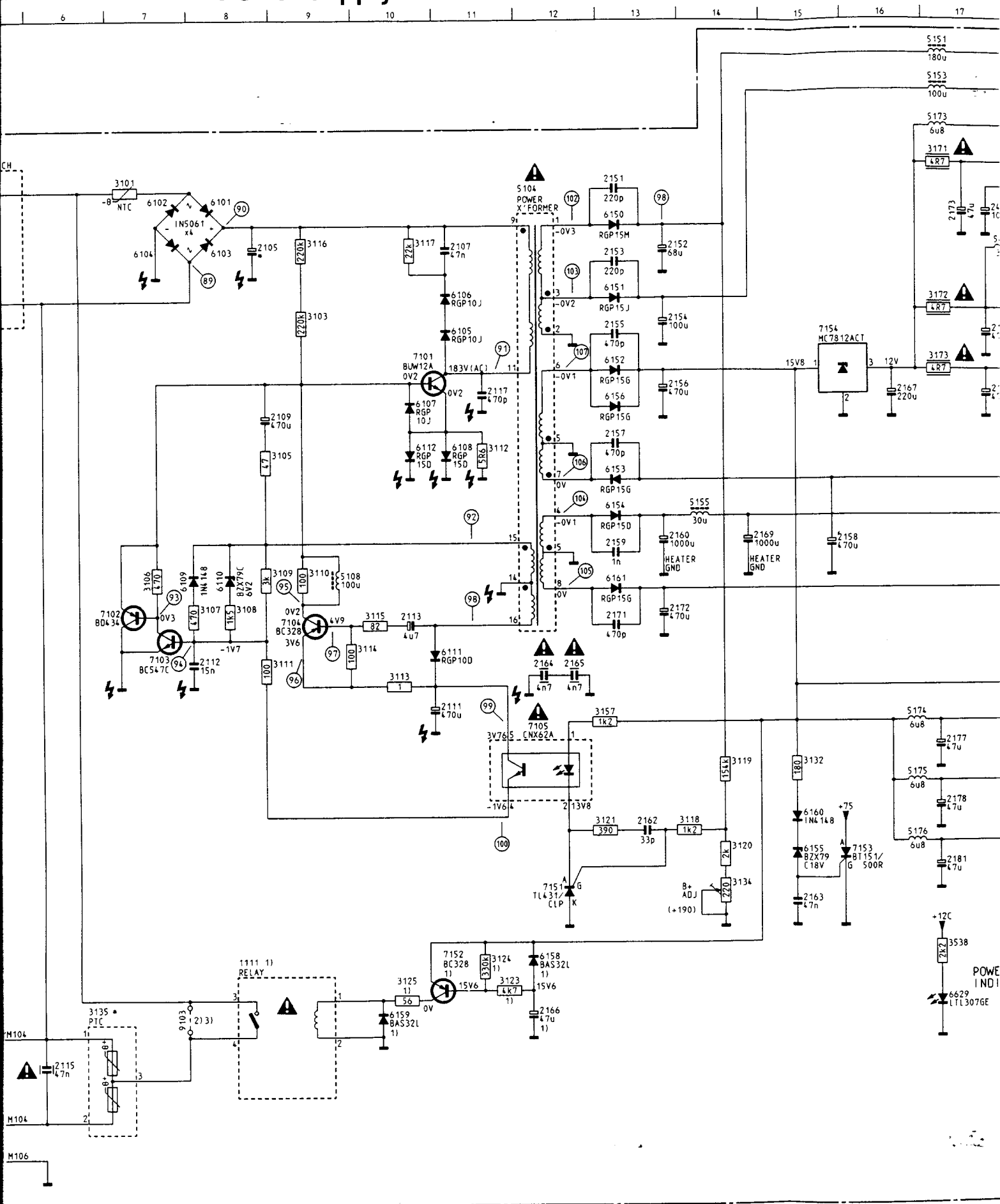


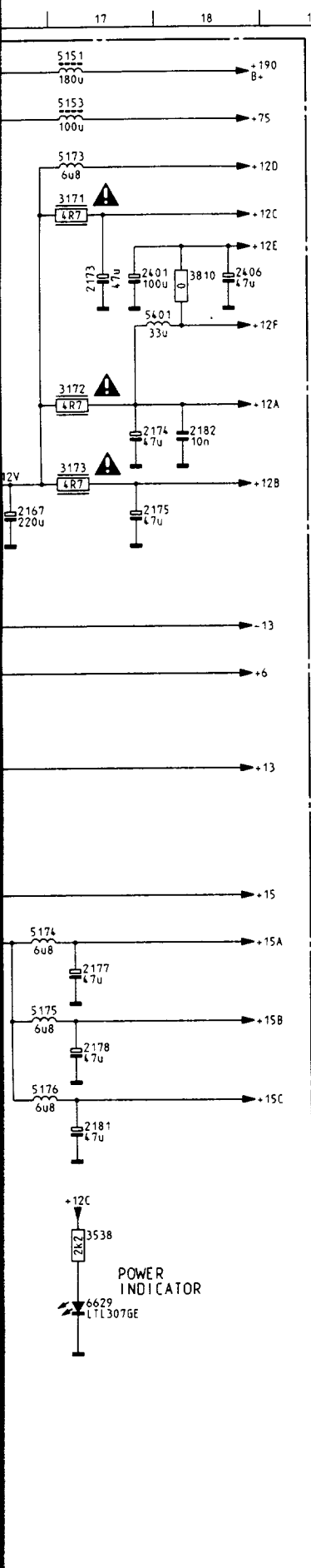
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2432	G 8	3508	M17	3690	C30	7622	H32
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2511	L 5	3513	N17	3695	N34	7626	F27
2512	O16	3514	M18	3696	G31	7627	G27
2513	E 3	3515	N18	3697	O30	7628	C28
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2645	L25	3583	G25	3602	K23		
2652	C26	3601	K21	3603	L23		
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3403	E16	3603	K21	3606	K28		
3404	E15	3604	J21	3607	L29		
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3418	B 6	3617	H18	3626	F31		
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3420	N12	3619	N25	3628	C19		
3421	H 8	3620	G28	3631	N28		
3422	G12	3621	M24	3632	N28		
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3424	J10	3623	M25	3634	H32		
3425	M10	3625	J26	3635	H31		
3426	J11	3626	M29	3638	N24		
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3437	J10	3636	D18	7613	J 7		
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3439	N12	3638	C19	7615	G14		
3440	N12	3639	C18	7616	H13		
3441	B 7	3641	C20	7617	F11		
3443	L 7	3642	E18	7618	E 9		
3444	G33	3643	D19	7621	G10		
3445	F11	3644	E22	7622	F 9		
3446	F11	3645	F23	7623	H10		
3447	F11	3646	A20	7501	J14		

C

1102-38  
MAIN PANEL (SUPPLY PART)

## Power supply

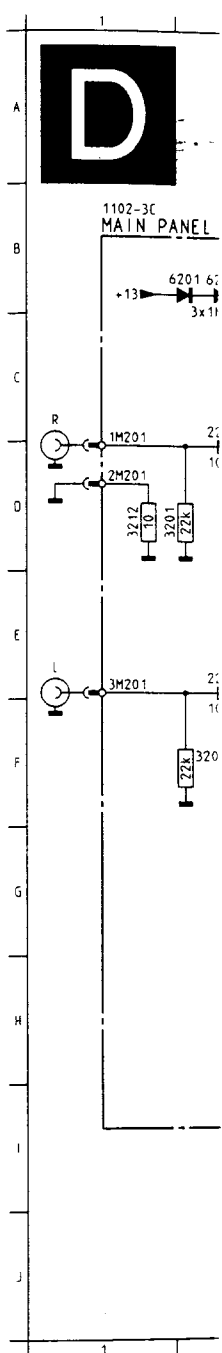
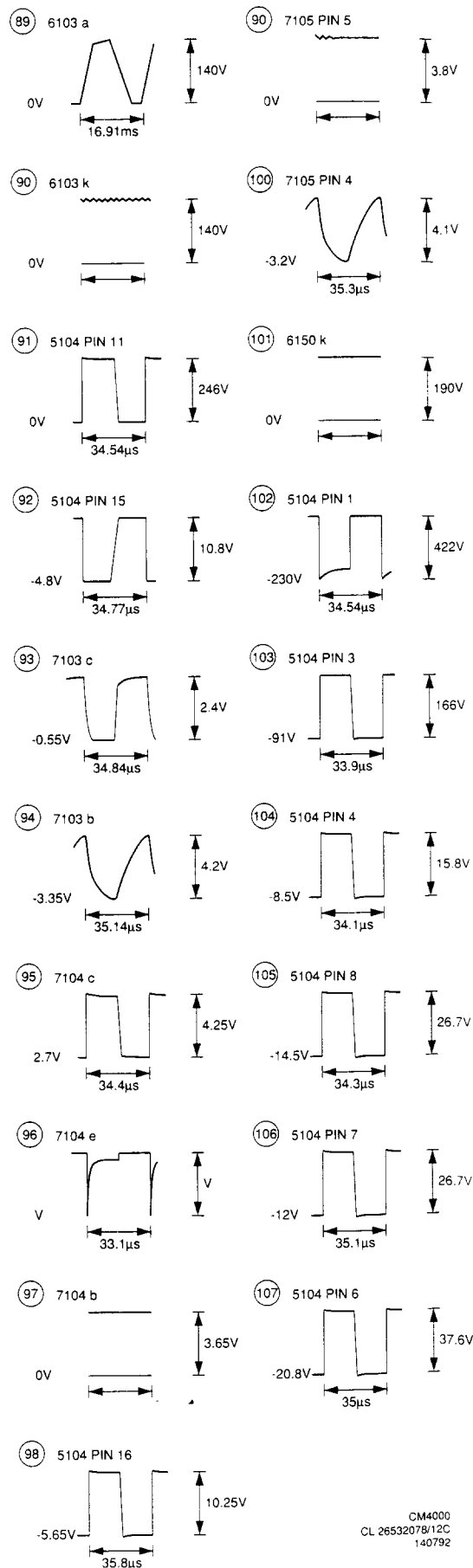
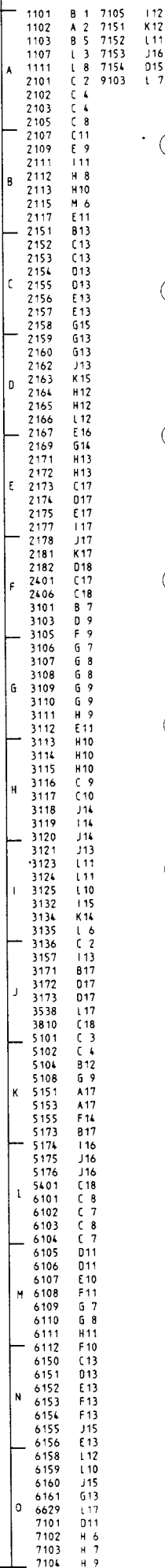




CM 4000

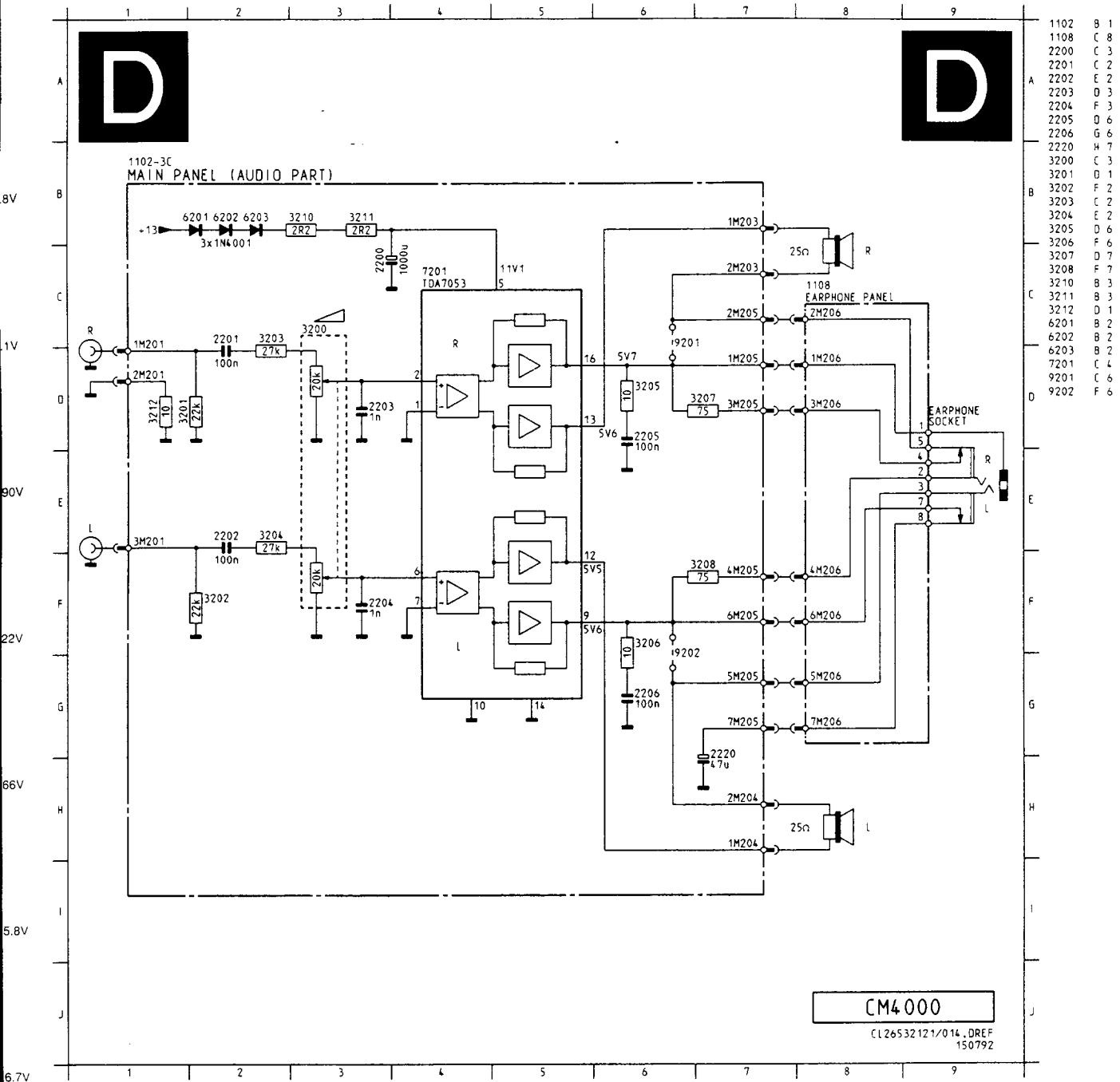
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## WAVE FORMS FOR FOR DIAGRAM

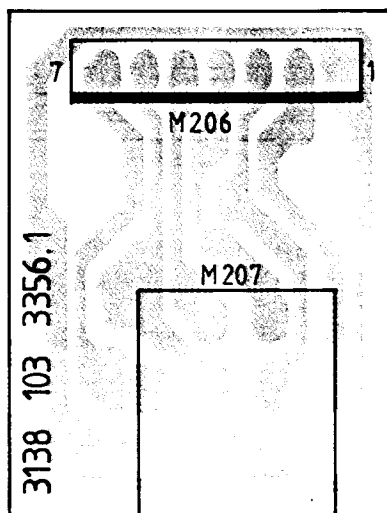


EARPH  
COMP. S

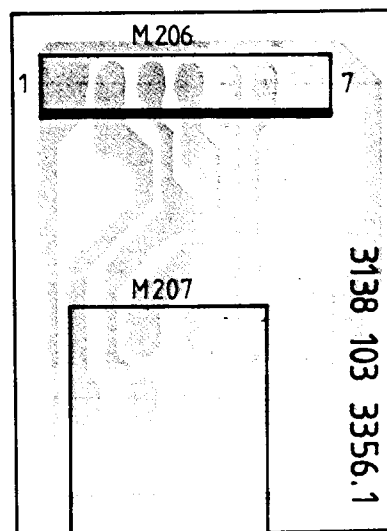
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EARPHONE PANEL  
COMP SIDE



EARPHONE PANEL  
SOLD. 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 31.5 kHz / 60 Hz mode.
- Select the "cross-hatch" pattern.
- Set the brightness front control 3532 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  $190V \pm 0.5V$ .

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

#### Method 1.

- Apply a video signal in the 1024\*768 with 56 kHz / 70 Hz 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 60.2 kHz / 70 Hz mode (with Chroma 2000).
- Select the "cross-hatch" pattern.
- Connect a DC Voltmeter between the joint of 3451, 3452, 3453 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.

	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	+/-	+/-

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

- Set the contrast front control 3458 to the maximum position.
- Set H-shift front control 3432 at mechanical mid-position.
- Apply a video signal in the 1024\*768 with 56 kHz / 70 Hz mode.
- Select the "cross-hatch" pattern.
- Turn off the power.
- Short the junction of 2414 and 7406 pin 12 to ground (e.g. to use jumper wire).
- Turn on the power.
- Adjust trimming potentiometer 3411 until the picture stands straight.
- Remove the grounding from junction of 2414 and 7406.
- Set H-size front control 3634 at mechanical mid-position.
- Set potentiometer 3654 for the correct horizontal centering of the whole raster.

### 4. High voltage EHT (3618)

- Connect a "high voltage voltmeter" between the high-voltage connection of the picture tube and earth.
- Set H-width front control 3634 at mechanical minimum position.
- Set the EHT trimming potentiometer 3618 so that the high-voltage voltmeter reads  $25kV \pm 0.2kV$ .

### 5. Focus setting

- Adjust H-shift front control 3432 until the video display at the horizontal centering.
- Apply a video signal in the 640\*480 with 31.5 kHz / 60 Hz mode.
- Select the "M" pattern.
- Set the brightness front control 3532 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 center to four corners) of the displayed screen is as sharp as possible.

## **6. Adjustment of pre-size (3630)**

- Apply a video signal in the 640\*480 with 31.5 kHz / 60 Hz mode.
- Select the "cross-hatch" pattern.
- Set the brightness front control 3532 and contrast front control 3458 in the mechanical mid-position.
- Adjust the H-width to minimum by H-size front control 3634.
- Adjust the pre-size to 238mm  $\pm$  1mm by trimming potentiometer 3630.

## **7. Adjustment of cut-off points**

- \* VG2 (bottom knob on the line output transformer)
  - \* Cut-off points of the picture tube (3376, 3383, 3388)
  - \* White "D" (3334, 3335, 3336)
- Pre-set trimming potentiometer 3334, 3335, 3336 and 3376, 3383, 3388 to the mechanical mid-position.
  - Apply a video signal (full white) in the 640\*480 with 31.5 kHz / 60 Hz mode.
  - Set the brightness front control 3532 to the click position and contrast front control 3458 to the mechanical minimum position.
  - Set VG2 potentiometer on the line output transformer to minimum.
  - Adjust VG2 potentiometer to increase VG2 until any colour among red, green and blue becomes "just visible".
  - The potentiometer adjustment of the "two remaining" colour (3376, 3383 and 3388) to the same light output level, so that an optimum background (raster) colour is obtained.
  - Adjust contrast front control 3458 to maximum for double checking the background (raster) colour.

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

- Set the contrast front control 3458 to maximum position.
- Set the brightness front control 3532 and the sub-contrast potentiometer 3457 in mid-position.
- Adjust potentiometer 3334, 3335 and 3336 to the same line output level so that an optimal display colour (white "D") is obtained.
- If necessary, adjust sub-contrast potentiometer 3457 for the optimal light output of the video display (until the brightness no longer increases).

## **8. Picture geometry setting**

- Set brightness front control 3532 and the contrast front control 3458 in the mechanical central position.
- Apply a video signal with cross-hatch pattern in the 640\*480 with 31.5 kHz / 60 Hz mode.

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

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

### **8.2 Horizontal width (3634)**

- Adjust potentiometer 3634 for a picture width of 260mm.

### **8.3 Vertical height (3440)**

- Adjust potentiometer 3440 for a picture height of 195mm.

### **8.4 Vertical centering (3505)**

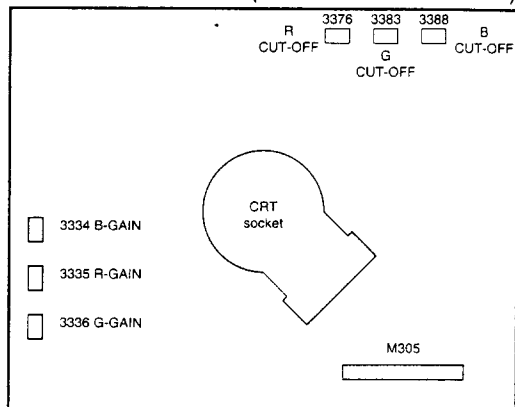
- Adjust potentiometer 3505 for the correct vertical centering of the video display.

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

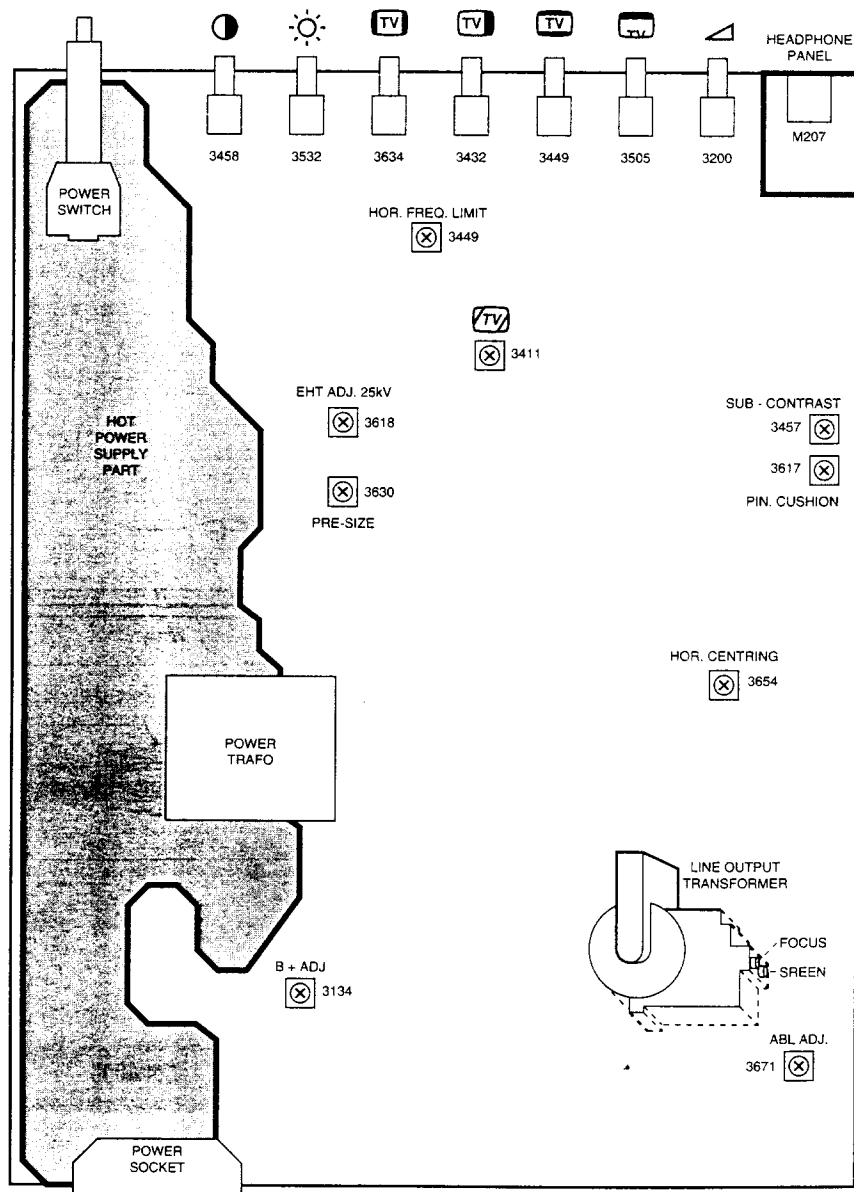
- Adjust potentiometer 3617 until the vertical lines on the left and right-hand sides of the screen are as straight as possible.

## LOCATION OF ADJUSTING COMPONENTS

VIDEO PANEL (TRACK SIDE VIEW)



MAIN PANEL (component view)



## Repair tips

### 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).

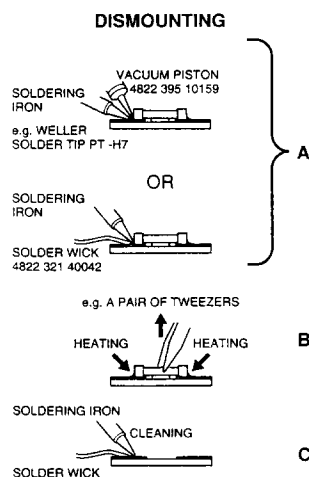


Fig. 8.1

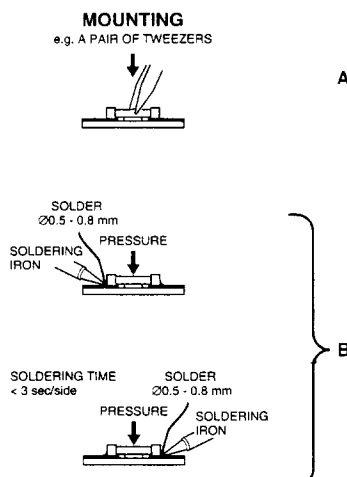


Fig. 8.2

### 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).

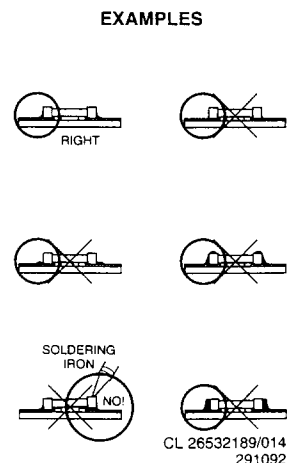
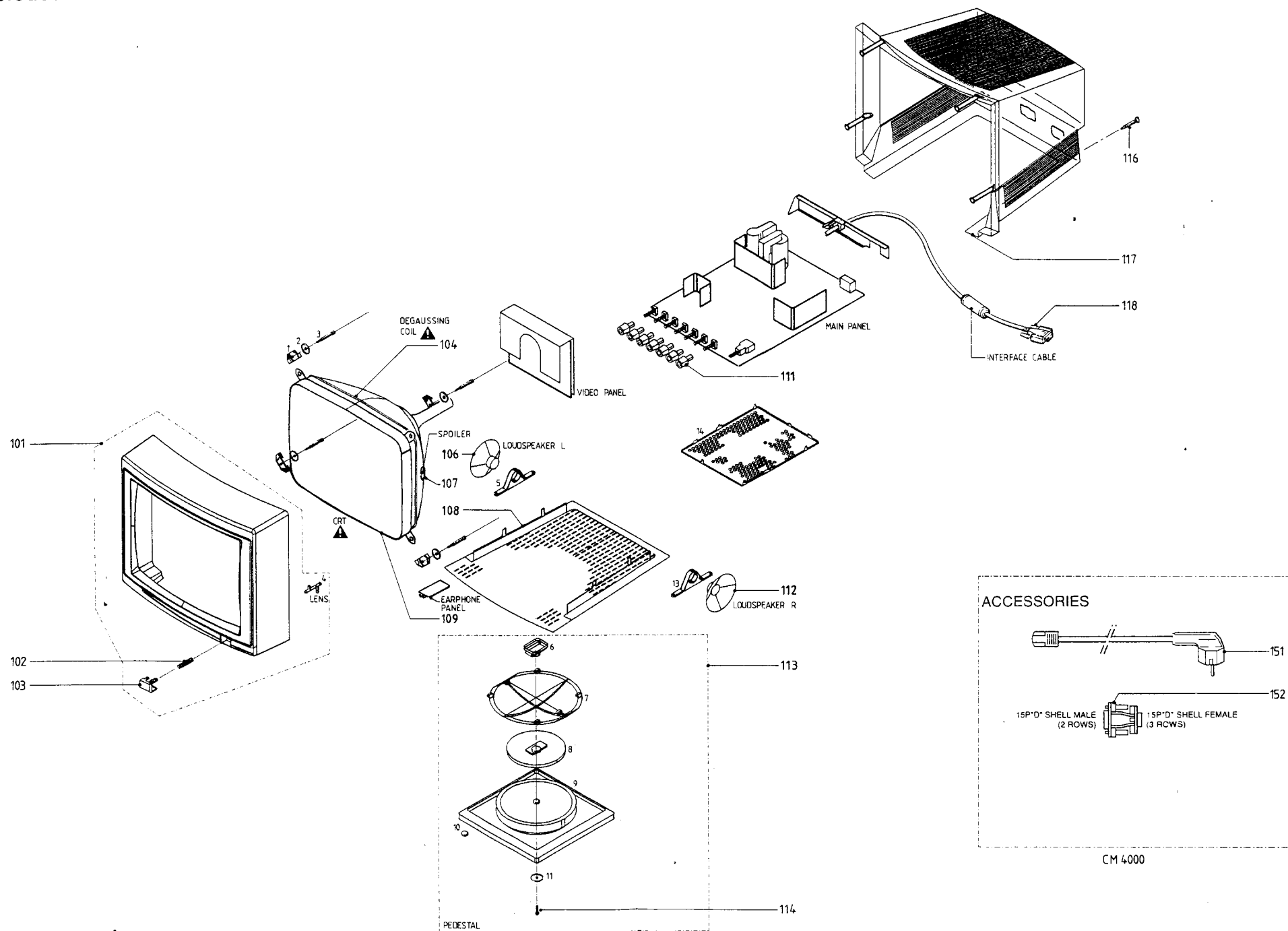


Fig. 8.3

# Exploded view

4CM8270/..T 9.1

9.2 4CM8270/..T



# Spare parts list

4CM8270/.. 10.1

## Parts indicated on exploded view

101	4822 430 10426	Front cabinet -/00T/05T/75T
	4822 430 10425	Front cabinet -/06T
102	4822 492 71179	Spring
103	4822 410 62375	Power knob -/00T/05T/75T
	4822 410 62373	Power knob -/06T
104	▲ 4822 157 70085	Degaussing coil -/00T/05T/06T (item 1107)
	4822 175 70297	Degaussing coil -/75T(item 1107)
106	4822 240 30642	Loudspeaker (L)
107	4822 526 20183	Spoiler
108	4822 432 11036	Bottom plate CRT,
109	▲ 4822 131 20529	M36KUT23XX22 (item 1100) -/00T/05T/06T)
	▲ 4822 131 20531	CRT, M36KUT23XX22 (item 1100)(-/75T)
111	4822 410 62374	Knob
112	4822 240 30642	Loudspeaker (R)
113	4822 462 10525	Pedestal
114	4822 502 13763	Screw
116	4822 502 21238	Screw
117	4822 438 10407	Rear cover(-/00T)
	4822 438 10406	Rear cover -/05T/06T/75T)
118	4822 321 61712	Interface cable

## Accessories

151	▲ 4822 321 10676	Pow. cord (-/00)
	▲ 4822 321 10621	Pow. cord (-/05)
	▲ 4822 321 22554	Pow. cord (-/06)
	▲ 4822 321 10764	Pow. cord (-/75)
152	4822 263 50197	Adaptor 15p "D" Shell female 3 rows to 15p "D" male 2 rows shell
	4822 321 61712	Interface cable Audio

## Auxiliary tools (extension cables)

4822 321 61697	7p to 7p cable (ear phone)
4822 321 61698	2p to 2p cable (degaussing coil)
4822 321 61699	2p to 2p cable (speaker)

## Main Panel B C D

### Various

1101	▲ 4822 253 50145	Fuse 3,15A -/00T/05T)
1101	▲ 4822 070 33152	Fuse 3,15A -/06T/75T)
	▲ 4822 276 12445	Power switch (SK1)
	▲ 4822 265 31003	Power socket
	4822 267 31525	RCA Jack (audio)
	4822 265 30375	4P (M501)
	4822 267 51173	13p, M402 -/00T/05T/06T)
	4822 267 51166	13p, M402 (-/75T)
	4822 701 12118	Fuse holder
	4822 267 30987	2p (M104)
	4822 265 41205	7p (M205)
	4822 265 30896	3p (M201)
	4822 265 20561	2p (M204)
	4822 267 31527	2p (M203)
	5322 390 20011	Silicon grease
	4822 492 62076	Fix. spring for 6625,7615,7617 7101,7154
	4822 466 93161	Isolating plate for 6625,7615,7617, 7608



2101	▲ 4822 121 51583	470nF 250V
2102	▲ 4822 126 12097	3,3nF 20% 250V
2103	▲ 4822 126 12097	3,3nF 20% 250V
2105	4822 124 41819	100µF 20% 400V
2107	4822 121 43516	47nF 400V
2109	4822 124 40198	470µF 20% 16V
2111	4822 124 40198	470µF 20% 16V
2112	4822 121 70107	15nF 10% 100V
2113	4822 124 40246	4,7µF 20% 63V
2115	▲ 4822 121 43385	47nF 20% 250V
2117	4822 126 12359	470pF 2KV
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 20% 63V
2157	4822 122 33646	470pF 10% 500V
2158	4822 124 42144	470µF 20% 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
2167	5322 124 41817	220µF 16V
2169	4822 124 42172	1000µF 16V
2171	4822 122 33646	470pF 10% 500V
2172	4822 124 42144	470µF 20% 63V
2173	4822 124 22681	47µF 20% 16V
2174	4822 124 22681	47µF 20% 16V
2175	4822 124 22681	47µF 20% 16V
2176	4822 124 22681	47µF 20% 16V
2177	4822 124 80132	47µF 20% 25V
2178	4822 124 80132	47µF 20% 25V
2181	4822 124 80132	47µF 20% 25V
2182	4822 122 32442	10nF 50V
2200	4822 124 42172	1000µF 16V
2201	4822 122 33496	100nF 10% 63V
2202	4822 122 33496	100nF 10% 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
2401	4822 124 22678	100µF 20% 16V
2402	4822 122 31965	220pF 5% 63V

2403	4822 121 70184	1,8nF 2% 100V
2404	4822 122 33496	100nF 10% 63V
2405	4822 122 31772	47pF 5% 50V
2406	4822 124 22681	47µF 20% 16V
2407	4822 122 33496	100nF 10% 63V
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 32442	10nF 50V
2418	4822 124 42198	1,5µF 20% 63V
2421	4822 124 22686	10µF 16V
2422	4822 124 22686	10µF 16V
2423	4822 124 42359	47µF 100V
2424	4822 122 32442	10nF 50V
2425	4822 124 41659	4,7µF 20% 25V
2426	4822 126 11456	330nF 10% 63V
2427	4822 121 70184	1,8nF 2% 100V
2431	4822 122 31839	82pF 10% 50V
2432	4822 126 11456	330nF 10% 63V
2501	4822 124 40255	100µF 20% 63V
2502	4822 124 40198	470µF 20% 16V
2503	4822 124 40198	470µF 20% 16V
2505	4822 121 43696	100nF 100V
2511	4822 122 32808	1,2nF 10% 63V
2512	4822 124 40198	470µF 20% 16V
2513	4822 122 31971	10pF 10% 50V
2514	4822 122 31644	2,2nF 10% 63V
2515	4822 122 32482	22pF 5% 63V
2516	4822 126 11456	330nF 63V
2517	4822 126 11456	330nF 63V
2571	4822 121 41719	1µF 100V
2581	4822 126 11456	330nF
2601	4822 122 31981	33nF ± 0,5pF 50V
2602	4822 122 31773	560pF 5% 50V
2603	4822 121 70185	1,8nF 2% 50V
2604	4822 122 33496	100nF 10% 63V
2605	4822 121 40336	47nF 10% 250V
2606	4822 124 80132	47µF 20% 25V
2607	4822 121 43696	100nF 100V
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 5% 50V
2612	4822 124 80132	47µF 20% 25V
2613	4822 121 43696	100nF 100V
2614	4822 124 41867	1µF 20% 250V
2615	4822 121 43694	22nF 100V
2617	4822 121 70165	8,2nF 5% 630V
2618	4822 121 43677	5,6nF 5% 1,6KV
2619	4822 122 33496	100nF
2621	4822 124 42155	4,7µF 250V
2622	4822 124 40207	100µF 20% 25V
2623	4822 124 42145	100µF 20% 25V
2624	4822 121 70236	1µF 400V
2625	4822 121 51585	470nF 250V
2626	4822 121 43691	220nF 250V
2627	4822 121 70243	820nF 250V
2633	4822 121 70188	1nF 400V
2636	4822 124 42155	4,7µF 250V
2641	4822 122 32442	10nF 50V
2642	4822 122 32442	10nF 50V
2643	4822 121 43918	100nF 10% 400V
2644	4822 121 43918	100nF 400V
2645	4822 124 41659	4,7µF 20% 25V
2652	4822 121 70095	1µF 10% 100V
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





# Spare parts list

4CM8270/.. 10.3

5101	4822 157 10292	Line choke
5102	4822 157 70275	Line choke
5104	▲ 4822 146 31164	Power transformer
5108	4822 157 70082	100µH
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
5176	4822 157 52494	6,8µH
5401	4822 157 63211	33µH
5402	4822 158 10887	Ferrite bead
5601	4822 157 70079	11mH
5602	4822 148 81272	Driver trafo
5603	4822 148 81272	Driver trafo
5604	4822 157 70081	4,2mH
5605	4822 142 40336	Line driver trafo
5606	▲ 4822 140 10445	LOT
5608	4822 157 70077	115µH
5611	4822 156 50095	4,4µH (linearity)
5612	4822 157 70078	Trafo
5613	4822 157 63218	10mH
5624	4822 157 53519	100µH



6101	4822 130 31933	1N5061
6102	4822 130 31933	1N5061
6103	4822 130 31933	1N5061
6104	4822 130 31933	1N5061
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	5322 130 31969	RGP15G
6153	5322 130 31969	RGP15G
6154	5322 130 31971	RGP15D
6155	4822 130 31024	BZX79-C18
6156	5322 130 31969	RGP15G
6160	4822 130 30621	1N4148
6161	5322 130 31969	RGP15G
6201	4822 130 31438	1N4001
6202	4822 130 31438	1N4001
6203	4822 130 31438	1N4001
6402	4822 130 80446	BAS32L
6403	4822 130 30621	1N4148
6404	4822 130 80446	BAS32L
6406	4822 130 80446	BAS32L
6407	4822 130 80446	BAS32L
6408	4822 130 31253	BZX79-C2V4
6409	4822 130 31024	BZX79-B18
6412	4822 130 30621	1N4148
6414	4822 130 80446	BAS32L
6415	4822 130 80446	BAS32L
6416	4822 130 30621	1N4148
6501	4822 130 31607	RGP10D
6502	4822 130 34281	BZX79-C15
6503	4822 130 34281	BZX79-C15
6504	4822 130 80446	BAS32L
6505	4822 130 31253	BZX79-C2V4
6512	4822 130 34278	BZX79-C6V8
6513	4822 130 80446	BAS32L
6514	4822 130 80446	BAS32L
6515	4822 130 80446	BAS32L
6516	4822 130 30621	1N4148
6571	4822 130 34197	BZX79-C12
6601	4822 130 80446	BAS32L
6602	4822 130 80446	BAS32L

6603	4822 130 80446	BAS32L
6605	4822 130 34278	BZX79-C6V8
6606	4822 130 34233	BZX79-C5V1
6607	5322 130 31969	RGP15G
6608	4822 130 30621	1N4148
6611	4822 130 80446	BAS32L
6612	4822 130 34233	BZX79-C5V1
6613	4822 130 34278	BZX79-C6V8
6614	5322 130 31969	RGP15G
6617	4822 130 42489	RGP10G
6618	4822 130 42489	RGP10G
6621	4822 130 42489	RGP10G
6622	4822 130 42489	RGP10G
6623	4822 130 42489	RGP10G
6624	4822 130 83239	MUR460
6625	4822 130 82584	MUR10150E
6626	4822 130 80446	BAS32L
6627	4822 130 80446	BAS32L
6628	4822 130 80446	BAS32L
6629	4822 130 82021	LTL307GE
6631	4822 130 34685	BZX79-C75
6632	4822 130 34685	BZX79-C75
6633	4822 130 80446	BAS32L
6634	4822 130 80446	BAS32L
6635	4822 130 80446	BAS32L
6638	4822 130 30621	1N4148



7101	5322 130 42114	BUW12A
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
7153	5322 130 24081	BT151-500R
7154	4822 209 81726	MC7812ACT
7201	4822 209 31668	TDA7053
7401	5322 130 44336	BSV52
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
7408	5322 130 42136	BC848C
7411	5322 130 60068	BC558C
7412	4822 130 44196	BC548C
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
7501	4822 209 31676	TDA4860
7502	5322 130 42136	BC848C
7503	4822 130 41646	BF423
7504	5322 130 42136	BC848C
7505	5322 130 42136	BC848C
7506	5322 130 44336	BSV52
7507	5322 130 44336	BSV52
7508	5322 130 42136	BC848C
7509	5322 130 42755	BC847C
7571	4822 130 42513	BC858C
7572	4822 130 42513	BC858C
7601	5322 130 44336	BSV52
7602	5322 130 44336	BSV52
7603	4822 130 42513	BC858C
7604	5322 209 86234	NE5532N
7605	4822 209 80797	LM393N
7606	5322 130 60068	BC558C
7607	4822 130 44196	BC548 C
7608	5322 130 62262	IRF730
7611	5322 130 44336	BSV52
7612	4822 130 42513	BC858C
7613	5322 130 60068	BC558C
7614	4822 130 44196	BC548C
7615	5322 130 62262	IRF730
7617	4822 130 62701	LJH16212

7618	4822 130 63131	BUK453-100A
7621	4822 130 63131	BUK453-100A
7622	5322 130 42136	BC848C
7623	4822 209 80797	LM393N
7624	4822 130 63081	BSN254A
7625	4822 130 44196	BC548C
7626	4822 130 62621	2SD669A
7627	4822 130 62616	2SB649A
7628	4822 130 63081	BSN254A

## Video panel A

### Various

1103	4822 212 30199	Video panel (complete).
	4822 265 20366	1p (M307)
	4822 267 41067	4p (M304)
	4822 267 41002	mini pin socket
	4822 255 70245	CRT socket
	5322 390 20011	Silicon grease



2301	4822 124 22686	10µF 16V
2302	4822 124 80276	10µF 20% 25V
2303	4822 122 33496	100nF 10% 63V
2304	4822 124 80276	10µF 20% 25V
2306	4822 124 80276	10µF 20% 25V
2307	4822 122 31797	22nF 10% 63V
2308	4822 124 22686	10µF 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 32142	270pF 5% 63V
2326	4822 122 31965	220pF 5% 63V
2327	4822 122 31965	220pF 5% 63V
2328	4822 122 32442	10nF 50V
2331	4822 122 32442	10nF 50V
2332	4822 122 32442	10nF 50V
2333	4822 124 80277	4,7µF 100V
2334	4822 121 70096	1µF 160V
2335	4822 121 70096	1µF 160V
2336	4822 124 80277	4,7µF 100V
2337	4822 124 80277	4,7µF 100V
2338	4822 121 70096	1µF 160V
2339	4822 122 31774	56pF 5% 50V
2341	4822 124 42155	4,7µF 250V
2342	4822 122 33967	680pF 5% 500V
2343	4822 126 11454	470pF 2KV
2344	4822 122 32442	10nF 50V
2345	4822 122 31974	820pF 10% 63V
2346	4822 122 31974	820pF 10% 63V
2347	4822 122 31974	820pF 10% 63V
2353	4822 122 32442	10nF 50V
2354	4822 124 22678	100µF 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
2359	4822 122 31971	10pF 10% 50V
2360	4822 122 31971	10pF 10% 50V
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
2366	4822 121 70191	4,7nF 5% 250V

2367	4822 121 70191	4,7nF 5% 250V
2368	4822 121 70191	4,7nF 5% 250V
2371	4822 252 60127	DSP201M
2372	4822 252 60127	DSP201M
2373	4822 252 60127	DSP201M



3301	4822 051 10759	75Ω 2% 0,25W
3302	4822 051 10759	75Ω 2% 0,25W
3303	4822 051 10759	75Ω 2% 0,25W
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	470Ω 2% 0,25W
3308	4822 111 90368	680k 2% 0,125W
3309	4822 051 10229	22Ω 2% 0,25W
3310	4822 051 10471	470Ω 2% 0,25W

3311	4822 051 51201	120Ω 1% 0,125W
3312	4822 051 51201	120Ω 1% 0,125W
3313	4822 051 51201	120Ω 1% 0,125W
3314	4822 050 13902	3k9 1% 0,4W
3315	4822 051 20222	2k2 5% 0,1W

3316	4822 051 20222	2k2 5% 0,1W
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	680Ω 2% 0,25W
3324	4822 051 10103	10k 2% 0,25W
3325	4822 051 10154	150k 2% 0,25W

3326	4822 050 21009	10Ω 1% 0,6W
3327	4822 050 21009	10Ω 1% 0,6W
3328	4822 051 10109	10Ω 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	100Ω pot.m.
3335	4822 100 11597	100Ω pot.m.

3336	4822 100 11597	100Ω pot.m.
3337	4822 051 10682	6k8 2% 0,25W
3338	4822 051 10272	2k7 2% 0,25W
3339	4822 051 10271	270Ω 2% 0,25W
3340	4822 050 21201	120Ω 1% 0,6W

3341	4822 051 10391	390Ω 2% 0,25W
3342	4822 051 10391	390Ω 2% 0,25W
3343	4822 051 10391	390Ω 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 116 52215	220Ω 5% 0,5W
3348	4822 050 22001	200Ω 1% 0,6W
3349	4822 116 52215	220Ω 5% 0,5W
3350	4822 050 21201	120Ω 1% 0,6W

3351	4822 050 21201	120Ω 1% 0,6W
3352	4822 050 21201	120Ω 1% 0,6W
3353	4822 051 51201	120Ω 1% 0,125W
3354	4822 051 10479	47Ω 2% 0,25W
3355	4822 051 10399	39Ω 2% 0,25W

3356	4822 051 10569	56Ω 2% 0,25W
3357	4822 051 10479	47Ω 2% 0,25W
3358	4822 051 10479	47Ω 2% 0,25W
3359	4822 051 20222	2k2 5% 0,1W
3360	4822 050 21201	120Ω 1% 0,6W

3361	4822 050 26209	62Ω 1% 0,6W
3362	4822 050 26209	62Ω 1% 0,6W
3363	4822 050 26209	62Ω 1% 0,6W
3364	4822 051 10479	47Ω 2% 0,25W
3365	4822 050 12401	240Ω 1% 0,4W

3366	4822 116 80552	1k 5% 3W
3367	4822 050 12401	240Ω 1% 0,4W
3368	4822 116 80552	1k 5% 3W
3369	4822 050 12401	240Ω 1% 0,4W
3370	4822 051 10102	1k 2% 0,25W

3371	4822 051 20222	2k2 5% 0,1W
3372	4822 116 80552	1k 5% 3W
3373	4822 050 12403	2M2 1% 0,4W
3374	4822 116 52234	100k 5% 0,5W
3375	4822 051 10184	180k 2% 0,25W

3376	5322 100 11539	100k pot.m.
3377	4822 051 10184	180k 2% 0,25W
3378	4822 050 12403	2M2 1% 0,4W
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 pot.m.
3384	4822 051 10184	180k 2% 0,25W
3385	4822 050 12403	2M2 1% 0,4W

3386	4822 116 52234	100k 5% 0,5W
3387	4822 051 10184	180k 2% 0,25W
3388	5322 100 11539	100k pot.m.
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	4822 116 52215	220Ω 5% 0,5W
3397	4822 116 80547	1k 5% 0,5W

3399	4822 116 80548	15k 5% 0,5W
3801	5322 116 51882	0Ω 0,25W
3802	5322 116 51882	0Ω 0,25W
3803	5322 116 51882	0Ω 0,25W
3804	5322 116 51882	0Ω 0,25W

3805	5322 116 51882	0Ω 0,25W
3806	5322 116 51882	0Ω 0,25W
3807	5322 116 51882	0Ω 0,25W
3808	5322 116 51882	0Ω 0,25W
3809	5322 116 51882	0Ω 0,25W

5301	4822 157 70086	T-coil
5302	4822 157 70086	T-coil
5303	4822 157 70086	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



6301	4822 130 31253	BZX79-C2V4
6302	4822 130 80446	BAS32L
6303	4822 130 80446	BAS32L
6307	4822 130 34382	BZX79-C8V2
6309	4822 130 30621	1N4148

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
6321	4822 130 42489	RGP10G
6322	4822 130 80446	BAS32L

6323	4822 130 80446	BAS32L
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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

## Spare parts list

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
7319	5322 130 44336	BSV52
7320	5322 130 44336	BSV52

7321	5322 130 44336	BSV52
7322	5322 130 44336	BSV52

## Headphone Panel D

4822 267 31526 Head phone jack