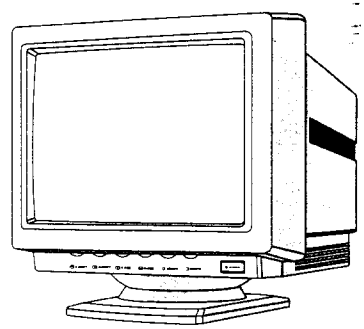
14" tripple vga colour monitor 7CM3209/60T/65T/66T/67T/68T/69T

7CM3279/60T/65T/66T

Service
Service
Service



Service Manual

TY60

Horizontal frequencies
31.47- 35.2- 35.5 KHz

Contents

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PHILIPS

CS41007 GB

Technical Data

General

Mains voltage	: 195.5 - 264.5 V
Mains frequency	: 50 Hz
Power consumption	: 80 W (typical) 100 W (max.)
Operating temperature	: 10°C to 40°C
Weight	: 12.8 kg
Width	: 356mm
Depth	: 395mm
Height	: 359mm

Picture tube

Size	: 14 inch
Light transmission (dark glass)	: 57 %
Deflection angle	: 90 Degrees
EHT voltage	: 24.5 kVolt
Pitch	: 0.28 mm

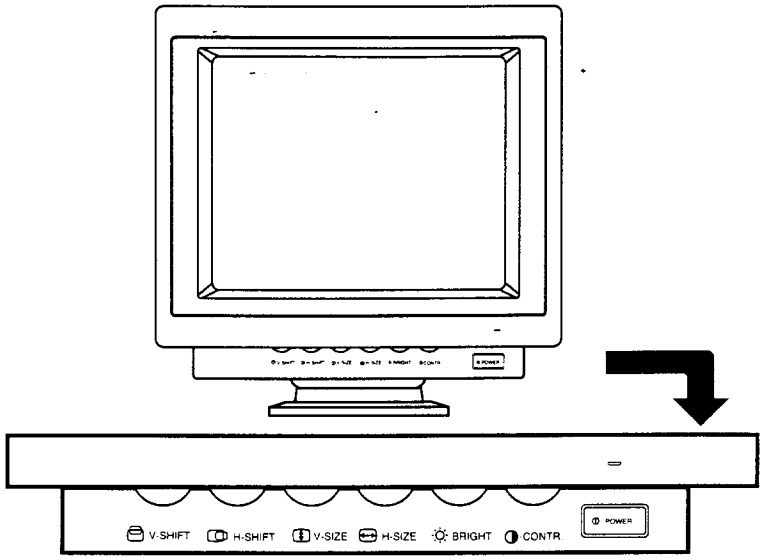
Video

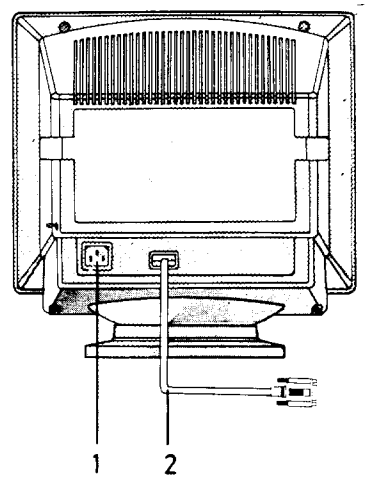
Dot rate	: 45 MHz
Display area	: horizontal 270mm : vertical 199mm
Image area	: horizontal 240mm +/- 3mm : vertical 180 mm +/- 3mm (5 mm for 35.5 kHz)
Vertical frequency	: 50 - 90 Hz
Sync. polarity	: positive or negative
Vertical shift range	: 10 mm Min.
Horizontal frequency	: 31.47/35.2/35.5 kHz
Catch-in range	: +/- 600 Hz
Sync. polarity	: positive or negative
Horizontal shift	: 10 mm Min.

RESOLUTION MODES

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
VGA+	35.2 kHz	56 Hz	Positive (+) Negative (-)	Positive (+) Negative (-)	800 * 600
8514A	35.5 kHz	87 Hz	Positive (+) Negative (-)	Positive (+) Negative (-)	1024 * 768 (interlaced)

Connection facilities



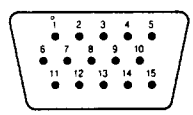


1. Power connector
2. "D" Shell interface cable

INPUT- OUTPUT SIGNALS

Pin	Signal	Sensitivity	Terminal impedance
1	Red Video input	RGB- analog 0-0.7 Vpp	75 Ω
2	Green Video input	RGB- analog 0-0.7 Vpp	75 Ω
3	Blue Video input	RGB- analog 0-0.7 Vpp	75 Ω
4	Ident output (connected to pin 10)		
5	Self test input (ground)		
6	Red Video ground		
7	Green Video ground		
8	Blue Video ground		
9	Not connected (no pin)		
10	Logic ground		
11	Ident output (connected to pin 10)		
12	Ident output (not connected)		
13	Horizontal sync.	TTL Level L=0 - 0.8 V H=2.4 - 5 V	2.2 kΩ (pull down)
14	Vertical sync.	TTL Level L=0 - 0.8 V H=2.4 - 5 V	2.2 kΩ (pull down)
15	Not connected		

INPUT–OUTPUT SIGNALS



Warnings and Notes

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:
   - Signal pattern: cross hatch
   - 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.

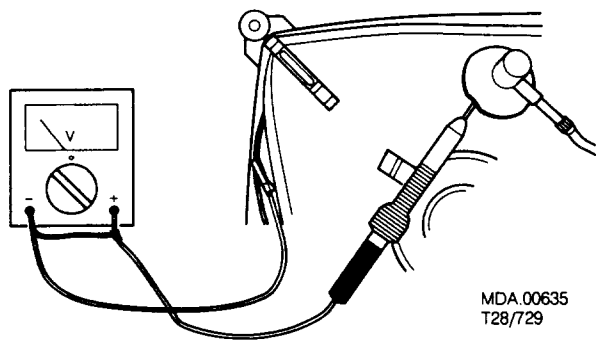


Fig.3.1

Electrical instructions

General:
When carry-out the electrical settings in many cases a video signal must be applied to the monitor. A computer with an "ATI1024 V6-1.04/PH Beta4" interface card (1024 * 768) is used as the video signal source. The signal pattern are selected from the "Service test software" package.

Installation instruction for the ATI card:
- Place the ATI interface card in the computer.
- Select the "VSETUP" file from the utility disk belonging to the card.
- Select "ANALOG MONITOR".
- Select the "NEC 3D" option.
- Re-boot your computer again !
- Put the floppy with the "Service test software" package in the computer and select the test pattern indicated for the following settings.

Electrical adjustments(Fig.7.1)

1. B+ supply voltage (3131, 3138)
- Select the "cross-hatch" pattern.
- Set the brightness control 3318 and the contrast control 3312 to minimum.
- Set trimming potentiometer 3138 and 3131 in the mid position (that is a pre-setting).
- Connect a DC voltmeter between capacitor 2123 and ground (B+ output).
- Switch on the monitor.
- First apply a video signal in the 31.5 kHz mode, then adjust trimming potentiometer 3131 until the D.C. voltmeter reads 87V.
- Switch the video signal to 35.2/35.5 kHz mode, adjust trimming potentiometer 3138 for the following supply voltages:
  a) 35.2 kHz mode ... 99V ± 0.5 V
  b) 35.5 kHz mode ... 99.2V ± 0.5 V

2. Horizontal synchronisation (3425, 3421)
- Select the "cross-hatch" pattern.
- Short the junction of resistor 3423 and capacitor 2410 to ground.
- First apply a video signal in the 31.5 kHz mode, then adjust trimming potentiometer 3425 until the picture is straight.
- Then switch video signal to 35.2/35.5 kHz mode, adjust trimming potentiometer 3421 until the picture is straight.
- Remove the short-circuit (to ground).

3. Picture geometry setting (general)
- For the following settings apply a video signal (cross-hatch) to the monitor.
- Pre-set H-Shift 3416 and V-Shift 3524 (external controls) to mid-position.
- Pre-set contrast control 3312 to click position and brightness control 3318 to maximum.

3.1 Horizontal image centring (3452,3413,3922)
- Apply a video signal in the 31.5 kHz mode (480 lines). Adjust potentiometer 3452 for the correct horizontal centring of the hole raster.
- Adjust potentiometer 3413 for the correct horizontal centring of the video display.
- Switch video signal to 35.2/35.5 kHz mode. Adjust potentiometer 3922 for the correct horizontal centring of the video display.

3.2 Vertical height (3539, 3926, 3537, 3923,3919)
- Apply a video signal in the 31.5 kHz mode (480 lines).
- Set external V-size control 3567 to mimimum position.
- Adjust potentiometer 3539 for a picture height of 160mm.
- Adjust external V-size control 3567 for a picture height of 180mm.
- With the same signal mode but with 400 lines.
- Set external V-size control 3567 to minimum position.
- Adjustpotentiometer 3926 for a picture height of 160mm.
- Adjust external V-size control 3567 for a picture height of 180mm.
- With the same signal mode but with 350 lines.
- Set external V-size control 3567 to min position.
- Adjust potentiometer 3537 for a picture height of 160mm.
- Adjust external V-size control 3567 for a picture height of 180mm.
- Switch video signal to 35.2kHz (600 lines).
- Set external V-size control 3567 to minimum position.
- Adjust potentiometer 3923 for a picture height of 160mm.
- Adjust external V-size control 3567 for a picture height of 180mm.
- Switch video signal to 35,5kHz (768 lines).
- Set external V-size control 3567 to minimum position.
- Adjust potentiometer 3919 for a picture height of 160mm.
- Adjust external V-size control 3567 for a picture height of 180mm.

3.3 Picture width (3553, 3925)
- Apply a video signal in the 31.5 kHz mode(480 lines).
- Set external H-size control 3568 to minimum position.
- Adjust potentiometer 3553 for a picture width of 225mm.
- Adjust external H-size control 3568 for a picture width of 240mm.
- Switch video signal to 35.2/35.5 kHz mode.
- Set external H-size control 3568 to minimum position.
- Adjust potentiometer 3925 for a picture width of 225mm.
- Adjust external H-size control 3568 for a picture width of 240mm.

3.4 East-west correction (3544, 3924)
- Apply a video signal in the 31.5 kHz (480 lines). Adjust potentiometer 3544 until the vertical lines on the left- and right-hand sides of the screen are as straight as possible.
- Switch video signal to 35.2/35.5 kHz mode. Adjust potentiometer 3924 until the vertical lines on the left- and right-hand sides of the screen are as straight as possible.

4. Adjustments of:
* VG2 (bottom knob on the line output transformer)
* Cut-off points of the picture tube (3373, 3376, 3379)
* White "D" (3321, 3324, 3327, 3316)

- Pre-set potentiometers 3321, 3324, 3327, 3379, 3376 and 3373 to the mid-position.
- Apply a video signal (full-white) in the 31.5 kHz mode (480 lines).
- Set brightness control 3318 at click

position and contrast 3312 and sub-contrast 3316 to minimum.
- Set VG2 potentiometer on the line output transformer to minimum.
- Adjust VG2 potentiometer to increase VG2 voltage until any colour among red, green and blue becomes "just visible"
- Adjust the potentiometer of the "two remaining" colours (3373, 3376 and 3379) to the same light output level, so that an optimal background (raster) colour is obtained.
- Adjust brightness control 3318 to maximum to double check the background (raster) colour. Then return it to click position.
- Set sub-contrast potentiometer 3316 at the mid-position and contrast control 3312 at click position.
- Adjust potentiometers 3321, 3324 and 3327 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.
- Adjust contrast control 3312 to maximum to double check the displayed colours.

5. Focussing
- Apply a video signal ("M" characters) in the 31.5 kHz mode (480 lines).
- Set brightness control 3318 at click position and contrast control 3312 to maximum.
- 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. Pulse duration setting monostable multivibrator (3819)
- Apply a signal in the 31.5 kHz mode.
- Connect an oscilloscope to pin 6 of 7801.
- Using trimming potentiometer 3819, set the time of the positive period of the pulse at pin 6 of 7801 to 30 ± 0.3μs.

PARTS INDICATED ON EXPLODED VIEW, MAIN PANEL

PARTS INDICATED ON EXPLODED VIEW

CABINET PARTS

100	4822 430 10369	Front 7CM3209
100	4822 430 10371	Front 7CM3279
101	4822 413 31659	Knob
102	4822 492 70913	Spring
103	4822 410 61332	Button (Power)
104	4822 502 30619	Screw
105	4822 438 10363	Back cover
106	4822 432 92585	Cover
107	4822 432 10828	Rotary disc
108	4822 462 10419	Pedestal
109	4822 462 40831	Pad

ELECTRICAL PARTS NOT ON PCB

150	4822 526 20183	Spoiler
151	4822 131 20425	CRT (M34KBV80X17) for 7CM3209/60T/65T/66T/67T/69T
151	4822 131 20403	CRT (M34KBV80X17-S) for 7CM3209/68T
151	4822 131 20428	CRT (M34KBV280X18) for 7CM3279/60T/65T/66T
152	4822 157 63287	Degaussing coil for /60T/65T/66T/68T/69T
152	4822 157 63308	Degaussing coil for /67T
153	4822 321 61371	Interface cable for /60T/65T/66T/68T
153	4822 321 61489	Interface cable for /67T/69T
154	4822 265 20403	Power socket
155	5322 253 30373	Fuse (2A) for /60T/65T/66T
155	4822 253 30175	Fuse (3A) for /67T
155	4822 070 32002	Fuse (2A) for /68T/69T

ACCESSORIES

200	4822 321 10676	Mains cord for /60T/69T
200	4822 321 10621	Mains cord for /65T/68T
200	4822 321 22554	Mains cord for /66T
200	4822 321 10764	Mains cord for /67T

MAIN PANEL

Various

	4822 276 11504	power switch
	4822 265 20235	2p (J15)
	4822 267 30987	2p (M102)
	4822 267 31461	2p
	4822 264 30312	2p (M105)
	4822 265 30896	3p
	4822 265 30375	4p (M405)
	4822 492 62076	spring for 7409
	5322 390 20011	silicon grease
	4822 466 92891	isol.pl. 7409
	4822 255 40893	isol.pl. 7101

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2102	4822 126 10177	4.7nF 400V
2103	4822 126 10177	4.7nF 400V
2104	4822 121 43516	47nF 400V
2108	4822 124 41819	100µF 20%
2108	4822 124 22682	330µF 10% (/67T)
2109	4822 121 43516	47nF 400V
2111	4822 124 41996	470µF 20% 35V
2112	4822 122 32569	220pF 2kV
2113	4822 121 41689	100nF 250V
2114	4822 124 22669	1µF 20% 50V
2115	4822 121 43917	15nF 20% 400V
2116	4822 121 43918	100nF 10% 400V
2117	4822 124 41996	470µF 20% 35V
2121	4822 122 33691	330pF 2kV
2122	4822 126 10783	100pF 5% 2kV
2123	4822 124 41991	100µF 20% 200V
2125	4822 124 41469	100µF 100V
2126	4822 121 43696	100nF 100V
2126	4822 124 42199	22µF 20% 50V (/67T)
2127	4822 122 33645	220pF 500V
2128	4822 124 41996	470µF 20% 35V
2129	4822 122 33645	220pF 500V
2131	4822 124 42143	1500µF 20% 25V
2132	4822 124 42145	100µF 20% 25V
2133	4822 124 42172	1000µF 16V
2134	4822 122 33645	220pF 500V
2135	4822 124 22681	47µF 20% 16V
2136	4822 122 33966	10nF 50V
2137	4822 124 42177	47µF 16V
2140	4822 122 33966	10nF 50V
2401	4822 121 43769	2.7nF 50V
2402	4822 122 33496	100nF 10% 63V
2404	4822 122 33496	100nF 10% 63V
2405	4822 121 43824	1.5nF 63V
2406	4822 121 43919	3.3nF 5% 63V
2407	4822 122 32442	10nF 50V
2408	5322 121 54065	2.7nF 1% 160V
2409	4822 122 32442	10nF 50V
2410	4822 122 32442	10nF 50V
2411	4822 124 22678	100µF 20% 16V
2412	4822 122 31784	4.7nF 10% 50V
2413	4822 124 22669	1µF 20% 50V
2414	4822 121 43686	220nF 10% 100V
2415	4822 122 33496	100nF 10% 63V
2416	4822 122 33969	27pF 5% 500V
2417	4822 121 43515	10nF 400V
2418	4822 124 42166	2.2µF 20% 63V
2419	4822 124 42177	47µF 16V
2420	4822 126 11454	470pF 2KV
2421	4822 121 43916	330nF 10% 250V
2422	4822 126 10783	100pF 5% 2KV only in 7CM3209
2423	4822 121 43677	5.6nF 5% 1.6KV
2424	4822 121 43678	15nF 5% 400V
2427	4822 121 43679	47nF 5% 250V
2428	4822 124 22461	6.8µF 50V
2429	4822 121 43679	47nF 5% 250V
2430	4822 122 33645	220pF 500V
2431	4822 124 22365	47µF 160V
2432	5322 124 41817	220µF 16V
2433	4822 121 40336	47nF 250V
2435	4822 124 22678	100µF 20% 16V
2436	4822 124 22681	47µF 20% 16V
2438	4822 124 40387	4.7µF 50% 160V
2440	4822 122 33496	100nF 10% 63V
2461	4822 121 43698	470nF 100V
2462	4822 121 43698	470nF 100V
2463	4822 121 43698	470nF 100V
2501	4822 122 32442	10nF 50V
2502	4822 121 43685	100nF 10% 100V
2503	4822 121 43696	100nF 100V
2504	4822 121 43713	330nF 100V
2505	4822 124 42173	220µF 35V
2506	4822 124 22362	1000µF 35V
2507	4822 122 32542	47nF 10% 63V
2508	4822 124 42173	220µF 35V
2509	4822 124 22669	1µF 20% 50V
2511	4822 121 43686	220nF 10% 100V
2512	4822 124 42357	33µF 25V
2514	4822 124 21502	4700µF 10% 25V
2515	4822 124 22686	10µF 16V
2516	4822 124 22669	1µF 20% 50V
2517	4822 124 22336	100µF 20% 40V
2518	4822 121 43686	220nF 10% 100V
2519	4822 122 32442	10nF 50V
2521	4822 122 33496	100nF 10% 63V
2522	4822 122 33496	100nF 10% 63V
2523	4822 122 33496	100nF 10% 63V
2524	4822 122 31644	2.2nF 10% 63V
2526	4822 124 22678	100µF 20% 16V
2527	4822 124 22678	100µF 20% 16V
2528	4822 122 32442	10nF 50V
2529	4822 122 33496	100nF 10% 63V
2531	4822 124 41659	4.7µF 20% 25V
2532	4822 124 41659	4.7µF 20% 25V
2801	4822 121 51592	3.9nF 5% 63V
2805	4822 122 32442	10nF 50V
2808	4822 121 51592	3.9nF 5% 63V

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3101	4822 116 40209	PTC
3101	4822 116 40126	PTC (/67T)
3102	4822 116 30341	6Ω 15%
3103	4822 050 23904	390k
3104	4822 050 23904	390k
3105	4822 116 80388	22k 5W
3106	4822 116 81822	68Ω 5% 1W
3107	4822 116 82453	0Ω43 5%
3108	4822 116 82453	0Ω43 5%
3109	4822 116 82453	0Ω43 5%
3110	4822 116 82451	2Ω0 5%
3111	4822 050 24701	470Ω
3112	4822 050 22702	2k7
3113	4822 050 21002	1k
3114	4822 050 22002	2k
3115	4822 050 24709	47Ω
3117	4822 050 21002	1k
3118	4822 050 21002	1k
3119	4822 113 80516	8Ω2 5% 10W
3119	4822 113 80517	5Ω6 10W (/67T)
3120	4822 116 52187	24Ω
3121	4822 050 23302	3k3
3122	4822 050 22203	22k
3123	4822 050 22203	22k
3124	4822 050 21004	100k
3125	4822 050 21002	1k
3126	4822 050 23901	390Ω
3127	4822 050 24302	4k3
3129	4822 050 21303	13k
3130	4822 052 10158	1.5Ω NFR25
3131	4822 101 10927	470Ω
3132	4822 050 22202	2k2
3135	4822 050 22203	22k
3136	4822 050 22702	2k7
3137	4822 050 21503	15k
3138	4822 100 11213	22k 30%
3139	4822 050 24303	43k

Spare parts list / Stückliste / Liste

MAIN PANEL

3141	4822 050 21502	1k5
3150	4822 116 30341	6Ω 15%
3151	4822 116 52191	33Ω
3152	4822 116 52188	27Ω
3153	4822 050 22003	20k
3154	4822 116 82872	82Ω 5%
3155	4822 116 52188	27Ω
3311	4822 051 10681	680Ω 2% 0.25W
3312	4822 102 10428	10k potmeter
3318	4822 102 10429	100k 20%
3401	4822 051 10272	2k7 2% 0.25W
3402	4822 051 10472	4k7 2% 0.25W
3403	4822 050 22702	2k7
3404	4822 051 10332	3k3 2% 0.25W
3405	4822 051 10104	100k 2% 0.25W
3406	4822 051 10332	3k3 2% 0.25W
3407	4822 051 10472	4k7 2% 0.25W
3408	4822 050 25604	560k
3409	4822 051 10104	100k 2% 0.25W
3410	4822 051 10272	2k7 2% 0.25W
3412	4822 051 10123	12k 2% 0.25W
3413	4822 100 11141	10k trimpotmeter
3415	4822 051 10103	10k 2% 0.25W
3416	4822 102 10444	2k 0.2W
3417	4822 051 10123	12k 2% 0.25W
3418	4822 050 24701	470Ω
3419	4822 051 10103	10k 2% 0.25W
3420	4822 050 26803	68k
3421	4822 100 11163	100k potmeter
3422	4822 050 27503	75k
3423	4822 050 21502	1k5
3424	4822 050 21802	1k8
3425	4822 100 11319	4k7
3426	4822 050 12202	2k2 1% 0.4W
3427	4822 050 21802	1k8
3428	4822 116 80551	180Ω 5% 2W
3429	4822 051 10154	150k 2% 0.25W
3430	4822 050 21303	13k
3431	4822 050 26801	680Ω
3432	4822 050 22201	220Ω
3433	4822 051 10123	12k 2% 0.25W
3434	4822 050 22203	22k
3435	4822 050 21505	1M5
3436	4822 116 82454	820Ω 5%
3437	4822 052 10478	4.7Ω NFR25
3438	4822 113 80582	27Ω 10% 5W
3439	4822 050 26809	68Ω
3440	4822 116 82455	7k 5 0.25W
3442	4822 051 10104	100k 2% 0.25W
3443	4822 052 10101	100Ω NFR25
3444	4822 052 10158	1.5Ω NFR25
3448	4822 116 82053	470Ω 5% 1W
3449	4822 116 82053	470Ω 5% 1W
3450	4822 050 21803	18k 1% 0.6W
3451	4822 052 10158	1.5Ω NFR25
3452	4822 100 20647	100Ω 2W potm.
3453	4822 116 80542	82Ω 1W
3454	4822 116 80542	82Ω 1W
3455	4822 050 21004	100k
3456	4822 116 80545	1k 0.5W
3457	4822 050 24703	47k
3458	4822 051 10104	100k 2% 0.25W
3459	4822 051 10102	1k 2% 0.25W
3460	4822 116 52215	220Ω
3461	4822 050 21002	1k
3462	4822 050 22203	22k
3463	4822 050 21004	100k
3464	4822 051 10103	10k 2% 0.25W
3465	4822 051 10103	10k 2% 0.25W
3466	4822 116 80556	120k
3467	4822 116 52215	220Ω
3469	4822 051 10223	22k 2% 0.25W
3470	4822 050 28203	82k
3471	4822 051 10182	1k8 2% 0.25W
3472	4822 050 22702	2k7
3473	4822 050 24701	470Ω
3474	4822 051 10272	2k7 2% 0.25W
3475	4822 051 10103	10k 2% 0.25W
3501	4822 051 20222	2k2 5% 0.1W
3502	4822 051 10102	1k 2% 0.25W
3503	4822 051 10102	1k 2% 0.25W
3504	4822 050 21009	10Ω
3505	4822 051 10822	8k2 2% 0.25W
3506	4822 051 10392	3k9 2% 0.25W
3507	4822 051 10472	4k7 2% 0.25W
3508	4822 052 10228	2.2Ω NFR25
3509	4822 051 10472	4k7 2% 0.25W
3510	4822 051 20222	2k2 5% 0.1W
3511	4822 051 10824	820k 2% 0.25W
3512	4822 050 22208	2.2Ω
3513	4822 116 52215	220Ω
3514	4822 116 82988	1k 2 1% 0.25W
3515	4822 050 22202	2k2
3516	4822 051 10101	100Ω 2% 0.25W
3517	4822 051 10479	47Ω 2% 0.25W
3518	4822 050 21001	100Ω
3519	4822 116 82642	2Ω 1W
3521	4822 116 82452	220Ω 5%
3522	4822 050 21802	1k8
3523	4822 050 25602	5k6
3524	4822 102 10428	10k potmeter
3525	4822 116 80553	150Ω 5% 1W
3526	4822 050 21004	100k
3527	4822 051 10471	470Ω 2% 0.25W
3528	4822 051 10102	1k 2% 0.25W
3531	4822 050 21003	10k
3532	4822 050 22202	2k2
3533	4822 050 24703	47k
3534	4822 051 10393	39k 2% 0.25W
3535	4822 051 10682	6k8 2% 0.25W
3537	5322 100 11544	220k
3539	5322 100 11544	220k
3540	4822 050 21003	10k
3541	4822 050 21004	100k
3542	4822 050 21503	15k
3544	4822 100 11141	10k trimpotmeter
3545	4822 050 21004	100k
3547	4822 053 20106	10M
3548	4822 051 10224	220k 2% 0.25W
3549	4822 050 24705	4M7
3550	4822 052 10478	4.7Ω NFR25
3551	4822 051 10125	1M 2 5% 0.25W
3552	4822 050 24705	4M7
3553	4822 100 11141	10k trimpotmeter
3554	4822 050 22704	270k
3555	4822 051 10472	4k7 2% 0.25W
3556	4822 051 10681	680Ω 2% 0.25W
3557	4822 051 10272	2k7 2% 0.25W
3559	4822 050 21003	10k
3561	4822 052 10278	2.7Ω NFR25
3562	4822 052 10478	4.7Ω NFR25
3563	4822 052 10478	4.7Ω NFR25
3565	4822 050 23304	330k
3566	4822 051 10124	120k 2% 0.25W
3567	4822 101 21188	100k 20% 0.2W
3568	4822 102 10428	10k potmeter
3569	4822 051 10472	4k7 2% 0.25W
3801	4822 051 10103	10k 2% 0.25W
3802	4822 051 10103	10k 2% 0.25W
3803	4822 050 12403	24k 1% 0.4W
3804	4822 050 12403	24k 1% 0.4W
3811	4822 051 10822	8k2 2% 0.25W
3812	4822 051 10123	12k 2% 0.25W
3815	4822 051 10203	20k 2% 0.25W
3819	4822 100 11392	47k potmeter

5101	4822 146 30882	power trafo
5104	4822 157 52233	10µH
5121	4822 156 21399	10µH
5123	4822 157 52234	100µH
5124	4822 157 52234	100µH
5401	4822 148 81081	hor. drive trafo
5402	4822 157 63715	4µH
5403	4822 157 62268	linearity coil
5404	4822 157 62267	coil for 7CM3209
5404	4822 157 62675	coil for 7CM3279
5405	4822 157 53185	drum coil
5406	4822 140 10388	LOT for 7CM3209
5406	4822 140 10405	LOT for 7CM3279

6101	4822 130 31933	1N5061
6102	4822 130 31933	1N5061
6103	4822 130 31933	1N5061
6104	4822 130 31933	1N5061
6105	5322 130 81917	SB140
6106	4822 130 31393	RGP10J
6107	4822 130 31393	RGP10J
6108	4822 130 30621	1N4148
6109	5322 130 31971	RGP15D
6110	4822 130 30621	1N4148
6111	4822 130 34167	BZX79-C6V2
6114	4822 130 30621	1N4148
6115	4822 130 30621	1N4148
6116	5322 130 81917	SB140
6117	4822 130 31393	RGP10J
6121	5322 130 33885	RGP15J
6122	5322 130 34574	1N4004G
6124	5322 130 33885	RGP15J
6125	5322 130 33885	RGP15J
6126	4822 130 31024	BZX79-B18
6127	4822 130 31607	RGP10D
6128	5322 130 33885	RGP15J
6129	5322 130 31971	RGP15D
6130	4822 130 34167	BZX79-F6V2
6131	5322 130 81917	SB140
6132	4822 130 30621	1N4148
6134	4822 130 30842	BAV21
6135	4822 130 34398	BZX79-B24
6401	4822 130 30621	1N4148
6402	4822 130 30621	1N4148
6403	4822 130 30621	1N4148
6404	4822 130 31607	RGP10D
6405	4822 130 31607	RGP10D
6406	4822 130 30842	BAV21
6407	4822 130 42489	RGP10G
6408	5322 130 81132	MUR4100E
6409	4822 130 80445	HER305
6410	5322 130 81132	MUR4100E
6412	5322 130 31971	RGP15D
6414	4822 130 30621	1N4148
6415	4822 130 30621	1N4148
6417	4822 130 34233	BZX79-C5V1
6419	4822 130 31607	RGP10D
6420	4822 130 30621	1N4148

MAIN PANEL, VIDEO PANEL

6421	4822 130 20245	SF0R5D43
6422	4822 130 30621	1N4148
6423	4822 130 30621	1N4148
6501	4822 130 30621	1N4148
6502	4822 130 30621	1N4148
6503	4822 130 30621	1N4148
6504	4822 130 30621	1N4148
6505	4822 130 31878	1N4003
6506	4822 130 30842	BAV21
6507	4822 130 30621	1N4148
6508	4822 130 30621	1N4148
6509	4822 130 31253	BZX79-C2V4
6511	4822 130 30621	1N4148
6801	4822 130 30621	1N4148
6802	4822 130 30621	1N4148

7101	4822 130 62282	2SC3679-0
7101	4822 130 62296	2SC3680 (/67T)
7102	4822 130 41344	BC337-40
7103	4822 130 80908	CNX62A
7104	4822 209 81726	L7812CV
7105	4822 130 41344	BC337-40
7106	4822 130 40995	BD434
7107	4822 130 41344	BC337-40
7108	4822 130 41087	BC638
7121	4822 130 62284	BDT60C
7122	4822 130 41782	BF422
7123	5322 130 24081	BT151-500R
7125	4822 130 44503	BC547C
7401	4822 130 41594	PH2369
7402	4822 130 41594	PH2369
7403	4822 209 10223	HEF4077BP
7404	5322 209 85602	N74LS123N
7405	5322 130 60068	BC558C
7406	4822 209 72804	MC1391P
7407	5322 130 60068	BC558C
7408	4822 130 41053	BC639
7409	4822 130 62933	BU2508A
7410	4822 130 41594	PH2369
7413	4822 130 44503	BC547C
7414	5322 130 60068	BC558C
7415	4822 130 44196	BC548C
7501	4822 130 44196	BC548C
7502	4822 209 62369	TDA1675
7503	4822 130 44104	BC328
7504	4822 130 44121	BC338
7505	4822 130 42231	BC557C
7506	4822 130 42231	BC557C
7507	4822 130 44196	BC548C
7508	4822 209 10263	HEF4052BP
7509	4822 130 44196	BC548C
7511	4822 130 42231	BC557C
7512	4822 130 60784	BDT61
7513	4822 130 44196	BC548C
7514	4822 130 44196	BC548C
7516	5322 130 60068	BC558C
7801	5322 209 10422	HEF4538BP

VIDEO PANEL

Various

1202	4822 212 23684	video panel for /60T/65T/66T/68T
1202	4822 212 23706	video panel assy for /67T/69T
	4822 265 30888	6p (M305)
	4822 701 12251	7p (M302)
	4822 265 41185	11p (M307)
	4822 255 70245	CRT holder F301
	4822 265 20366	1p (M304)

2301	4822 124 22686	10µF 16V
2302	4822 124 22686	10µF 16V
2303	4822 124 22686	10µF 16V
2304	4822 124 22686	10µF 16V
2305	4822 124 22669	1µF 20% 50V
2306	4822 126 10206	2.2nF 500V
2307	4822 122 33967	680pF 500V
2308	4822 122 33496	100nF 10% 63V
2309	4822 122 33496	100nF 10% 63V
2310	4822 122 40427	470pF 2kV
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 124 40804	22µF 20% 63V
2317	4822 124 22678	100µF 20% 16V
2319	4822 124 22681	47µF 20% 16V
2322	4822 122 33966	10nF 50V
2324	4822 124 22675	1µF 20% 160V
2326	4822 124 22675	1µF 20% 160V
2327	4822 124 40387	4.7µF 50% 160V
2328	4822 124 22686	10µF 16V
2331	4822 122 33966	10nF 50V
2333	4822 122 31765	100pF 5% 50V
2334	4822 122 31765	100pF 5% 50V
2335	4822 122 31765	100pF 5% 50V
2336	4822 122 33966	10nF 50V
2337	4822 124 42148	22µF 20% 100V
2338	4822 124 42147	10µF 20% 100V
2339	4822 124 42147	10µF 20% 100V
2340	4822 124 42147	10µF 20% 100V
2342	4822 121 43913	470nF 100V
2343	4822 121 43913	470nF 100V
2344	4822 121 43913	470nF 100V
2346	4822 124 42148	22µF 20% 100V
2351	4822 122 31971	10pF 10% 50V
2352	4822 122 31971	10pF 10% 50V
2353	4822 122 31971	10pF 10% 50V
2391	4822 122 32442	10nF 50V

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 116 80547	1k5 5% 0.5W
3305	4822 116 80548	15k 5% 0.5W
3307	4822 051 10103	10k 2% 0.25W
3308	4822 051 10103	10k 2% 0.25W
3309	4822 051 10103	10k 2% 0.25W
3310	4822 051 10562	5k6 2% 0.25W
3313	4822 051 20222	2k2 5% 0.1W
3314	4822 051 20222	2k2 5% 0.1W
3315	4822 051 10472	4k7 2% 0.25W
3316	4822 100 11141	10k trimpotmeter
3319	4822 051 10109	10Ω 2% 0.25W
3320	4822 051 10472	4k7 2% 0.25W
3321	4822 100 11597	100Ω trimpotmeter
3322	4822 051 10103	10k 2% 0.25W
3323	4822 051 10109	10Ω 2% 0.25W
3324	4822 100 11597	100Ω trimpotmeter
3325	4822 051 10103	10k 2% 0.25W
3326	4822 051 10339	33Ω 2% 0.25W
3327	4822 100 11597	100Ω trimpotmeter
3328	4822 051 10103	10k 2% 0.25W
3329	4822 052 10478	4.7Ω NFR25
3330	4822 051 10103	10k 2% 0.25W
3331	4822 051 10103	10k 2% 0.25W
3332	4822 051 10122	1k2 2% 0.25W
3333	4822 050 24703	47k
3334	4822 051 10472	4k7 2% 0.25W
3335	4822 116 80929	10k 5% 2W
3336	4822 051 10153	15k 2% 0.25W
3337	4822 050 21004	100k
3338	4822 051 10224	220k 2% 0.25W
3338	4822 051 10624	620k 2% 0.25W
3339	4822 050 21004	100k
3340	4822 052 10109	10Ω NFR25
3341	4822 051 10391	390Ω 2% 0.25W
3342	4822 050 22201	220Ω
3344	4822 050 22201	220Ω
3345	4822 051 10391	390Ω 2% 0.25W
3346	4822 050 22201	220Ω
3347	4822 050 28209	82Ω
3348	4822 116 83553	1k3 12% 3W
3349	4822 051 10391	390Ω 2% 0.25W
3350	4822 051 10273	27k 2% 0.25W
3352	4822 051 10829	82Ω 2% 0.25W
3353	4822 116 90536	120Ω 1% 0.125W
3354	4822 051 10829	82Ω 2% 0.25W
3355	4822 116 90536	120Ω 1% 0.125W
3356	4822 051 10829	82Ω 2% 0.25W
3357	4822 051 10391	390Ω 2% 0.25W
3358	4822 051 10102	1k 2% 0.25W
3359	4822 050 25601	560Ω
3361	4822 050 26801	680Ω
3362	4822 051 10479	47Ω 2% 0.25W
3364	4822 051 10479	47Ω 2% 0.25W
3365	4822 116 83553	1k 3 12% 3W
3366	4822 052 10109	10Ω NFR25
3367	4822 051 10479	47Ω 2% 0.25W
3370	4822 052 10109	10Ω NFR25
3371	4822 116 83553	1k 3 12% 3W
3372	4822 051 10223	22k 2% 0.25W
3373	5322 100 11539	100k trimpotmeter
3374	4822 051 10154	150k 2% 0.25W
3375	4822 051 10223	22k 2% 0.25W
3376	5322 100 11539	100k trimpotmeter
3377	4822 051 10154	150k 2% 0.25W
3378	4822 051 10223	22k 2% 0.25W
3379	5322 100 11539	100k trimpotmeter
3381	4822 051 10154	150k 2% 0.25W
3382	4822 051 10104	100k 2% 0.25W
3383	4822 051 10104	100k 2% 0.25W
3384	4822 051 10104	100k 2% 0.25W
3385	4822 051 10334	330k 2% 0.25W
3386	4822 051 10334	330k 2% 0.25W
3387	4822 051 10334	330k 2% 0.25W
3388	4822 051 20222	2k2 5% 0.1W
3391	4822 116 80549	220Ω 5% 0.5W
3392	4822 116 80549	220Ω 5% 0.5W
3393	4822 116 80549	220Ω 5% 0.5W

5302	4822 152 20587	7.5µH
5303	4822 157 52493	3.3µH
5304	4822 157 52493	3.3µH
5305	4822 157 52493	3.3µH

6301	4822 130 30621	1N4148
6302	4822 130 31878	1N4003
6303	4822 130 30621	1N4148
6304	4822 130 30842	BAV21
6305	4822 130 30842	BAV21
6306	4822 130 30842	BAV21

VIDEO PANEL, LED PANEL, EMI PANEL, TRI FREQ. PANEL

6307	4822 130 30621	1N4148
6308	4822 130 30621	1N4148
6309	4822 130 30621	1N4148
6310	4822 130 42489	BYD33G
6311	5322 130 33635	BZV85-C8V2
6315	4822 130 30842	BAV21
6316	4822 130 30842	BAV21
6317	4822 130 30842	BAV21
6318	4822 130 30842	BAV21
6319	4822 130 30842	BAV21
6321	4822 130 30842	BAV21
6322	4822 130 31878	1N4003
6323	4822 130 31878	1N4003

7301	4822 209 62364	LM1203
7303	5322 130 42136	BC848C
7304	4822 130 41053	BC639
7306	4822 130 42513	BC858C
7307	4822 130 62278	2SC3950E
7308	4822 130 62278	2SC3950E
7309	4822 130 62278	2SC3950E
7311	4822 130 62279	2SC3953E
7312	4822 130 62279	2SC3953E
7313	4822 130 62279	2SC3953E
7314	4822 130 41782	BF422
7315	4822 130 41646	BF423
7316	4822 130 41782	BF422
7317	4822 130 41646	BF423
7318	4822 130 41782	BF422
7319	4822 130 41646	BF423
7321	4822 130 41646	BF423
7322	4822 130 41646	BF423
7323	4822 130 41646	BF423

LED PANEL

Various

	4822 267 31366	2p connector
6137	4822 130 81701	LTL3238AS

EMI PANEL

Various

1330	4822 212 23683	EMI panel for /60T/65T/66T/68T
1330	4822 212 23968	EMI panel assy for /67T/69T
	4822 265 20367	2p connector
2183	4822 121 43385	47nF 20% 250V
2186	4822 122 33652	2.2nF 20% 400V
2186	4822 126 10788	220pF 250V
2188	4822 122 33652	2.2nF 20% 400V
2188	4822 126 10788	220pF 250V
2189	4822 121 51265	470nF 250V

3186	4822 053 21334	330k VR37
5102	4822 157 62256	line choke
5105	4822 157 62256	line choke

TRI FREQ. PANEL

Various

1208	4822 212 23974	Tri freq. panel assy
2901	4822 121 50539	4.7nF 1% 63V
2902	4822 122 33496	100nF 10% 63V
2903	4822 124 22686	10µF 16V
2904	4822 124 42031	2.2µF 20% 25V
3901	4822 051 10103	10k 2% 0.25W
3902	4822 050 25601	560Ω
3903	4822 051 10332	3k3 2% 0.25W
3904	4822 051 10104	100k 2% 0.25W
3905	4822 051 10104	100k 2% 0.25W
3906	4822 051 10332	3k3 2% 0.25W
3907	4822 051 10103	10k 2% 0.25W
3908	4822 051 10332	3k3 2% 0.25W
3910	4822 051 10273	27k 2% 0.25W
3911	4822 051 10103	10k 2% 0.25W
3912	4822 051 10103	10k 2% 0.25W
3913	4822 051 10273	27k 2% 0.25W
3914	4822 051 10103	10k 2% 0.25W
3915	4822 051 10273	27k 2% 0.25W
3916	4822 051 10103	10k 2% 0.25W
3917	4822 050 12002	2k 1% 0.4W
3918	4822 051 10103	10k 2% 0.25W
3919	4822 101 11003	220k 30% 0.1W
3920	4822 050 24702	4k7
3921	4822 051 10273	27k 2% 0.25W
3922	4822 100 11163	100k 30% LIN 0.1W
3923	4822 101 11003	220k 30% 0.1W
3924	4822 105 11023	1k 30% 0.1W
3925	4822 100 11213	22k 30%
3926	4822 101 11003	220k 30% 0.1W
3928	4822 051 10103	10k 2% 0.25W
3929	4822 050 12203	22k 1% 0.4W
3930	4822 051 10273	27k 2% 0.25W
3931	4822 051 10154	150k 2% 0.25W
3932	4822 050 22105	2M 1 1% 0.6W
3934	4822 051 10332	3k3 2% 0.25W

6901	4822 130 34233	BZX79-F5V1
6902	4822 130 30621	1N4148
6903	4822 130 30621	1N4148

7901	4822 209 80775	NE555N
7902	4822 130 44196	BC548C
7903	4822 130 44196	BC548C
7904	4822 130 44196	BC548C
7905	4822 130 44196	BC548C
7906	4822 130 44196	BC548C
7907	5322 130 60068	BC558C
7908	4822 130 44196	BC548C
7909	4822 130 44196	BC548C
7910	4822 130 44196	BC548C

General

To be able to perform measurements and repairs on the "main circuit board", the unit should first place it in the service position.
The connection between the interface cable and the "video board" should then be extended by means of an extension cable 4822 321 61254 (Fig.4.1).
The power connection may be made in one of the following ways:

A- Dismount the "EMI panel" and put it (isolated) aside the main panel.
B- Connect the cable from the power socket directly to the connector M105 on the main panel (in this case the mainsswitch is **not** operative !!).
C- Use some of the extension cables (cable A) of the set 4822 321 60582 (Fig.4.2).

Fig. 4.1

Repair instructions

1. EMI panel.

- Remove the back cover with pedestal assy.
- Remove the cable tie.
- Remove the 2-pins connectors cables.
- Remove the metal screws and plastic screw.
- Remove the EMI-panel assy.

2. Video / CRT panel.

- Remove the back cover with pedestal assy.
- Remove Video/CRT-panel assy.
- De-solder and remove one ground lead.
- De-solder six soldering tags and remove the metal shielding.

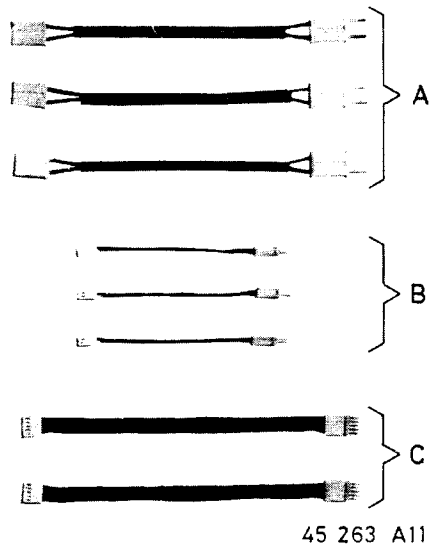


Fig. 4.2

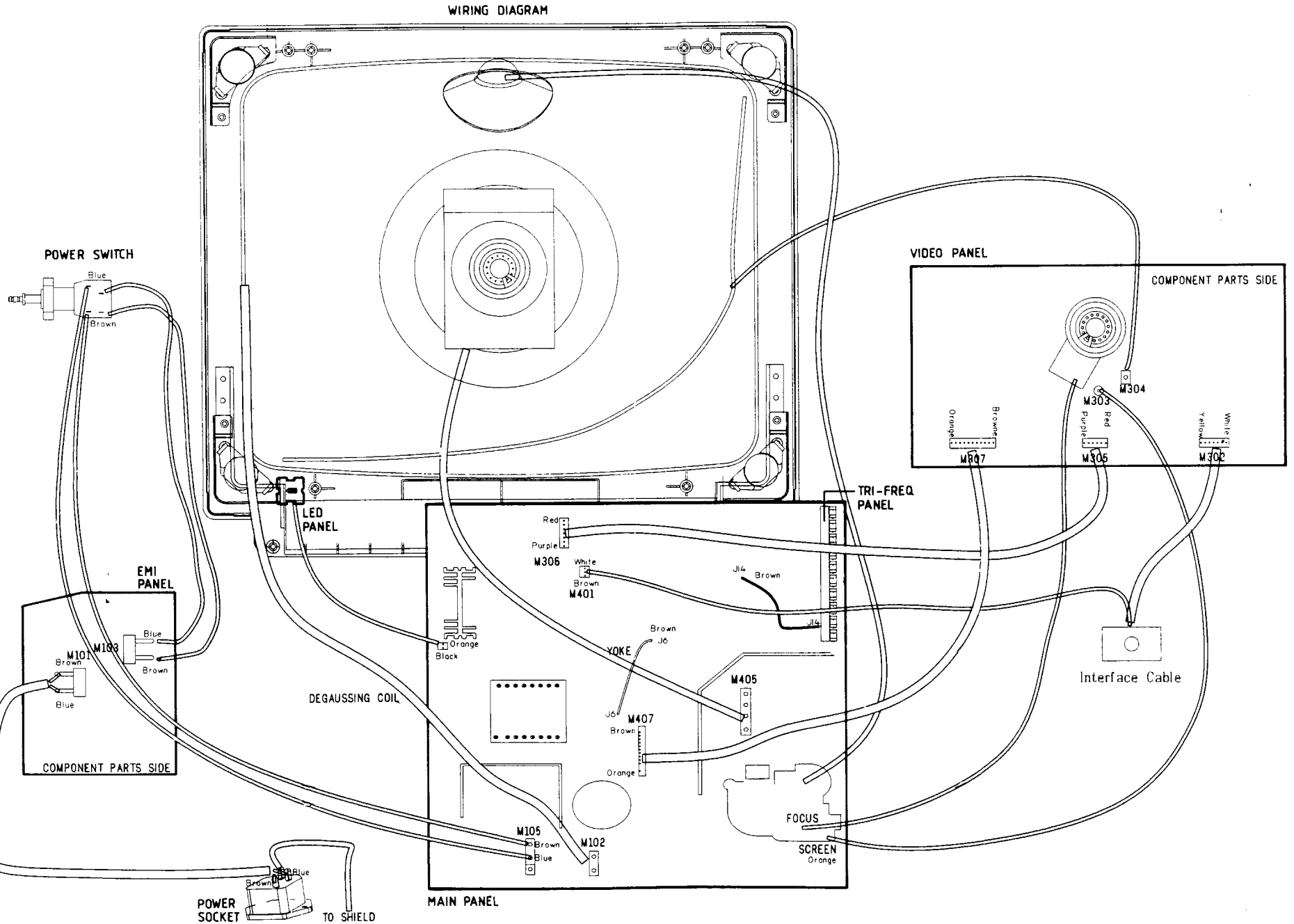
Mechanical instructions

A

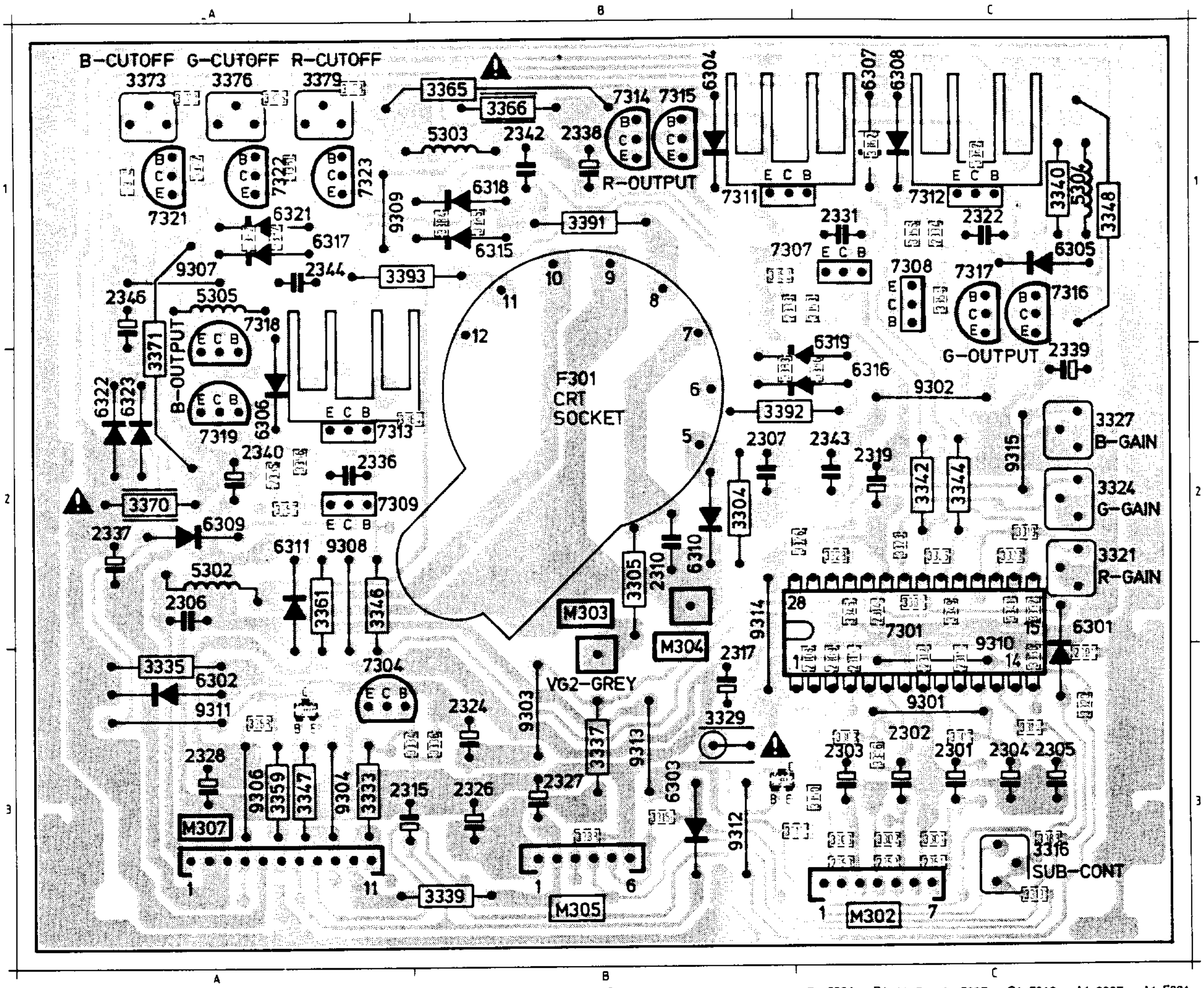
B

C

A11


WIRING DIAGRAM
POWER SWITCH
Blue
Brown
LED PANEL
EMI PANEL
M101
M103
Brown
Blue
Blue
Brown
COMPONENT PARTS SIDE
DEGAUSSING COIL
Orange
Black
Red
Purple
M306
White
Brown
M401
J14
Brown
J14
TRI-FREQ PANEL
Brown
J6
YOKE
J6
M405
M407
Brown
Orange
M105
Brown
Blue
M102
FOCUS
SCREEN
Orange
MAIN PANEL
POWER SOCKET
Blue
Brown
TO SHIELD
VIDEO PANEL
COMPONENT PARTS SIDE
M304
M303
M307
M305
M302
Orange
Brown
Purple
Red
Yellow
White
Interface Cable

VIDEO PCB BOARD
(viewed from the component side)



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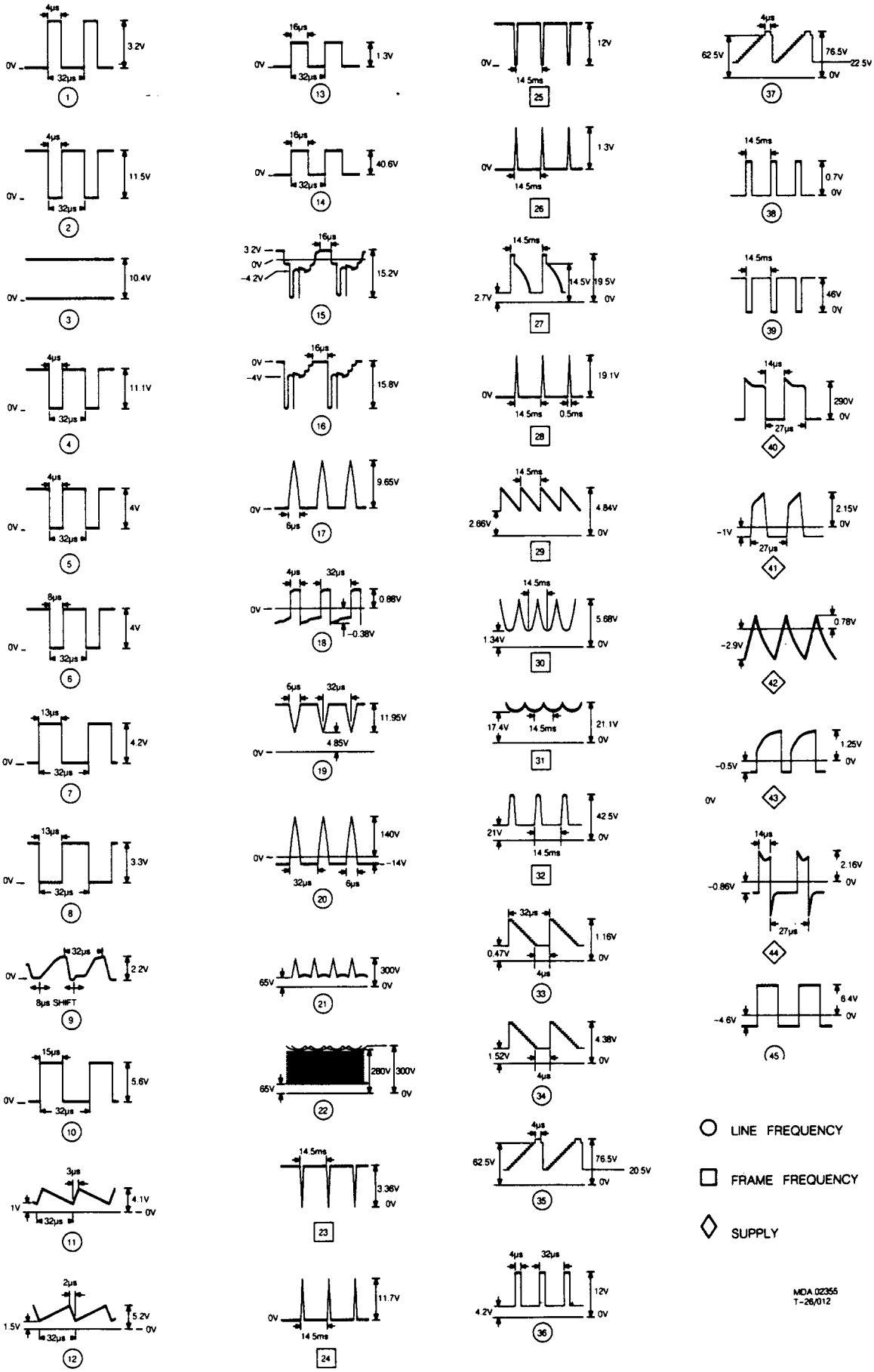
2302	C3	2312	C3	2328	A3	2342	B1	3303	C3	3316	C3
2303	C3	2313	C3	2331	C1	2343	C2	3304	B2	3318	B3
2304	C3	2314	C2	2333	B1	2344	A1	3305	B2	3320	C3
2305	C3	2315	A3	2334	C1	2346	A1	3306	C3	3321	C2
2306	A2	2317	B3	2335	A2	2351	C3	3307	C3	3323	C2
2307	B2	2319	C2	2336	A2	2352	C3	3309	C3	3324	C2
2308	C3	2322	C1	2337	A2	2353	C3	3310	B3	3327	C2
2309	C3	2324	B3	2338	B1	2391	C3	3313	C3	3328	C2

3329	B3	3340	C1	3352	C2	3364	A2	3376	A1	3391	B1
3330	C3	3341	C2	3353	C1	3365	B1	3377	A1	3392	B2
3331	C2	3342	C2	3354	C1	3366	B1	3378	A1	3393	A1
3332	C2	3344	C2	3354	C2	3367	C1	3379	A1	5302	A2
3333	A3	3346	A2	3355	C1	3370	A2	3381	A1	5303	B1
3334	A3	3347	A3	3356	A2	3371	A2	3382	A1	5304	C1
3335	A3	3348	C1	3358	A3	3372	A1	3383	B2	5305	A1
3336	B3	3349	C2	3359	A3	3373	A1	3386	C2	6301	C2
3337	B3	3350	C3	3361	A2	3374	A1	3387	A1	6302	A3
3339	B3	3352	B1	3362	C1	3375	A1	3388	C3	6303	B3

6304	B1	6317	A1	7307	C1	7318	A1	9307	A1	F301	B2
6305	C1	6318	B1	7308	C1	7319	A2	9308	A2	M302	C3
6306	A2	6319	C2	7309	A2	7321	A1	9309	A1	M303	B2
6307	C1	6321	A1	7311	B1	7322	A1	9310	C2	M304	B3
6308	C1	6322	A2	7312	C1	7323	A1	9311	A3	M305	B3
6309	A2	6323	A2	7313	A2	9301	C3	9312	B3	M307	A3
6310	B2	7301	C2	7314	B1	9302	C2	9313	B3		
6311	A2	7303	B3	7315	B1	9303	B3	9314	B2		
6315	B1	7304	A3	7316	C1	9304	A3	9314	B3		
6316	C2	7306	A3	7317	C1	9306	A3	9315	C2		

Elecrtical diagrams and P.C.B. lay-outs

WAVE FORMS



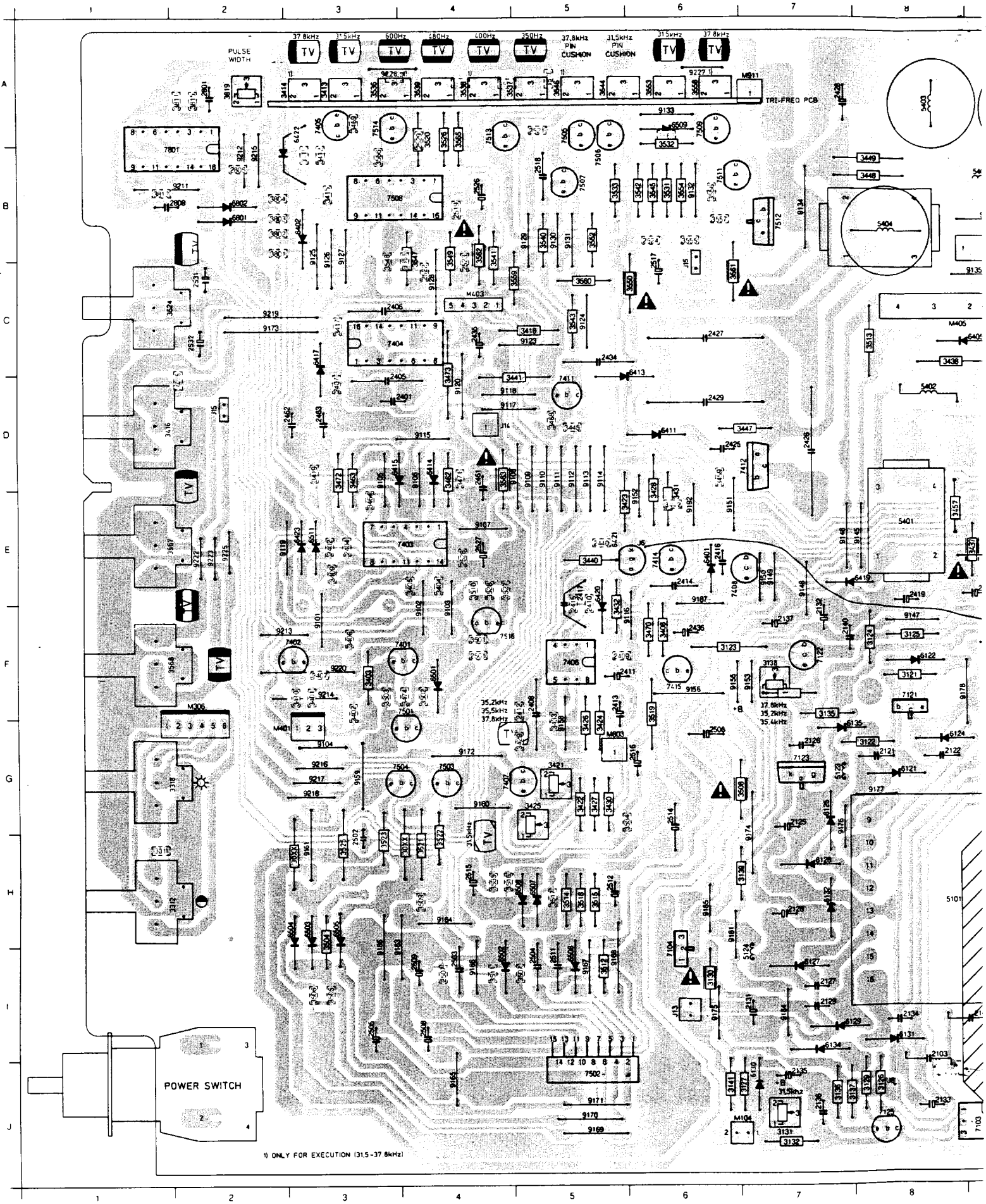
LINE FREQUENCY

FRAME FREQUENCY

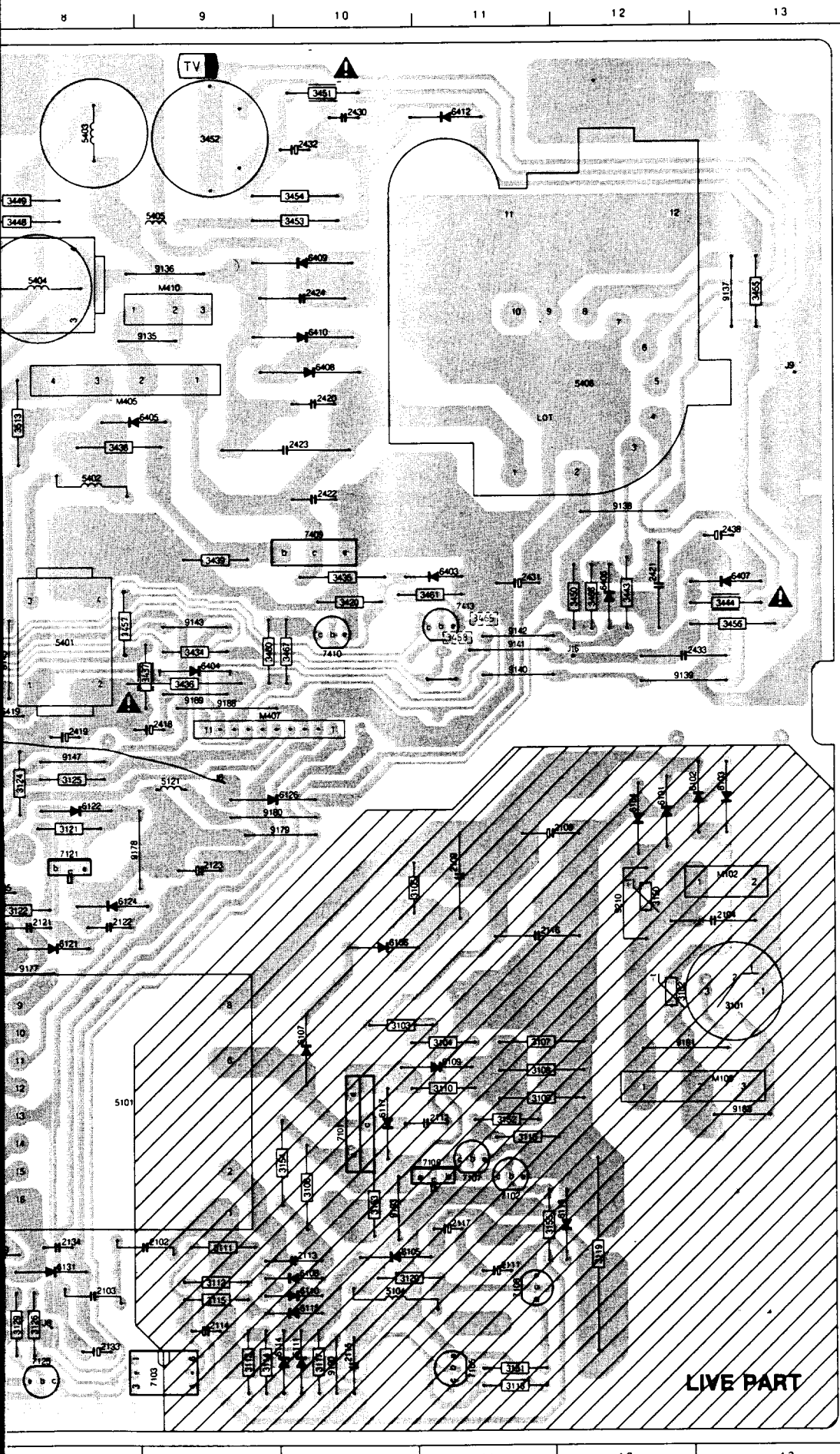
SUPPLY

MDA 02355
T-26/012

MAIN PCB BOARD
(viewed from the component side)



Elecrtical diagrams and P.C.B. lay-outs



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	2108	F12	3311	H2	3566	B3	9114	D5
	2109	F11	3312	F2	3567	E1	9115	D4
	2111	I11	3312	H1	3568	E1	9116	F6
	2112	H11	3318	E2	3569	B6	9117	D4
	2113	I10	3401	F3	3570	A5	9118	D4
A	2114	J9	3402	G3	3571	A4	9119	E2
	2115	J10	3403	F3	3572	A4	9120	D4
	2116	G11	3404	E4	3573	A3	9123	C5
	2117	I11	3405	E4	3801	B2	9124	C5
	2121	G8	3406	F3	3802	B2	9125	C3
	2122	G8	3407	F3	3803	B2	9126	C3
	2123	F9	3408	F6	3804	B2	9127	C3
	2125	G7	3409	E3	3811	A2	9128	C4
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	2131	I7	3414	A3	5104	J10	9133	A6
	2132	F7	3415	B3	5121	F9	9134	B7
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	2134	I8	3417	C3	5124	I7	9136	B9
	2135	J7	3418	C5	5401	E8	9137	B13
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	2140	F7	3421	G5	5404	B8	9140	E11
	2401	D3	3422	G5	5405	B9	9141	E11
	2402	E3	3423	E6	5406	C12	9142	E11
	2404	E3	3424	G5	6101	F12	9143	E9
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	2409	F5	3429	G5	6106	G10	9148	E7
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	2411	F5	3431	E6	6108	I10	9150	E7
	2412	G5	3432	F5	6109	H11	9151	E6
	2413	F5	3433	G5	6110	J10	9152	E6
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	2417	E5	3437	E9	6116	I12	9158	G5
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	2438	D13	3457	E11	6406	D12	9179	F9
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	2461	D4	3459	D6	6408	C10	9181	H6
	2462	D3	3460	E9	6409	B10	9183	H13
	2463	D3	3461	D11	6410	C10	9184	I7
	2501	F4	3462	D4	6411	D6	9185	H6
	2502	H3	3463	D3	6412	A11	9186	I3
	2503	I4	3464	E3	6413	D6	9187	E6
	2504	I5	3465	E11	6414	D4	9188	E9
	2505	I3	3466	E12	6415	D3	9189	E9
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	2515	H4	3474	F4	6502	I4	9213	F2
	2516	G6	3480	E11	6503	H3	9214	F3
	2517	C6	3501	F4	6504	H3	9215	B2
	2518	B5	3502	F4	6505	H3	9216	G3
	2519	B4	3503	F3	6506	I5	9217	G3
	2521	A5	3504	I3	6507	H5	9218	G3
	2522	C4	3505	I3	6508	H5	9219	C2
	2523	C4	3506	I3	6509	A6	9220	F3
	2524	B6	3507	I5	6511	E3	9227	A6
	2526	B4	3508	G7	6801	B2	9228	A3
	2527	E4	3509	H4	6802	B2	J13	I6
G	2528	E4	3510	E4	7102	I11	J14	D4
	2529	A4	3511	I4	7103	J9	J16	E11
	2531	C2	3512	I5	7104	I6	J6	E6
	2532	C2	3513	C8	7105	J11	J6	F9
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	30XX	H3	3518	H5	7123	G7	M105	H13
	3101	G13	3519	G6	7125	J8	M306	F2
	3102	G12	3520	B4	7401	F3	M401	G2
	3103	H10	3521	H4	7402	F2	M405	C8
	3104	H11	3522	H4	7403	E3	M407	E9
H	3105	G11	3523	H3	7404	C3	M410	B9
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	3112	I9	3532	B6	7411	D5		
	3113	J9	3533	B5	7412	D7		
	3114	J9	3534	G6	7413	E11		
	3115	J9	3535	H4	7414	E6		
	3116	H11	3536	A3	7415	F6		
	3117	J10	3537	A5	7501	F3		
	3118	G1	3538	A4	7502	J5		
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	3120	I10	3541	B6	7505	A5		
	3121	F8	3542	B6	7506	A5		
	3122	G8	3543	C5	7507	B5		
	3123	F6	3544	A5	7508	B3		
	3124	F8	3545	B6	7509	A6		
	3125	F8	3546	A5	7511	B6		
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	3127	J7	3548	C3	7513	A4		
	3129	J8	3549	C4	7514	A3		
	3130	I6	3550	C6	7516	F4		
	3131	J7	3551	C4	7801	B1		
	3132	J7	3552	B5	9101	F3		
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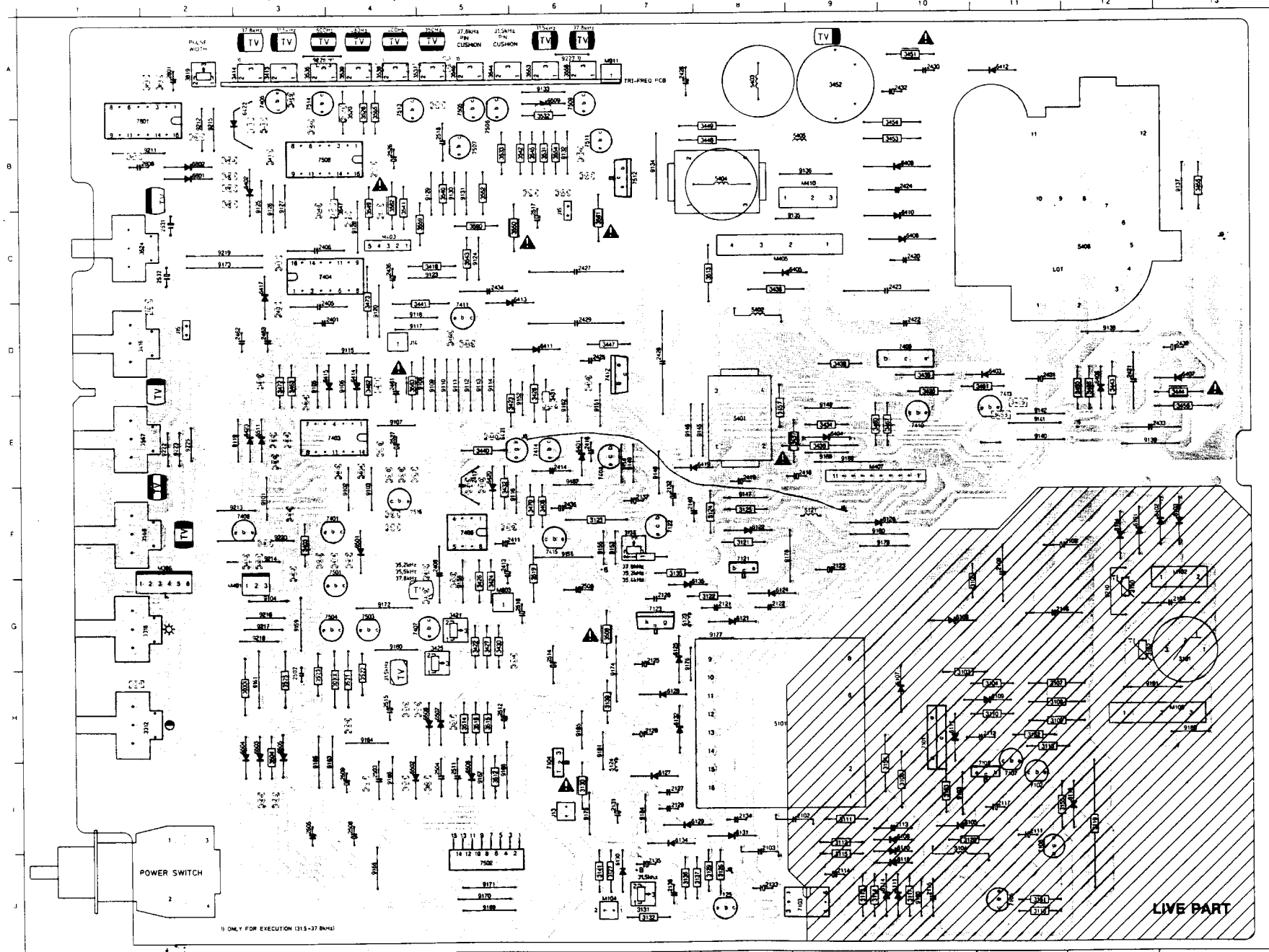
	3136	J7	3554	B6	9103	F3		
	3137	J7	3555	B6	9104	G3		
	3138	F7	3556	B6	9105	D3		
	3139	H7	3557	B6	9106	D4		
	3141	J6	3558	A6	9107	E4		
	3150	G12	3559	C5	9108	D5		
	3151	J11	3560	C5	9109	D5		
	3152	H11	3561	C6	9110	D5		

MAIN PCB BOARD
(viewed from the component side)



LOCATION OF ADJUSTING COMPONENTS

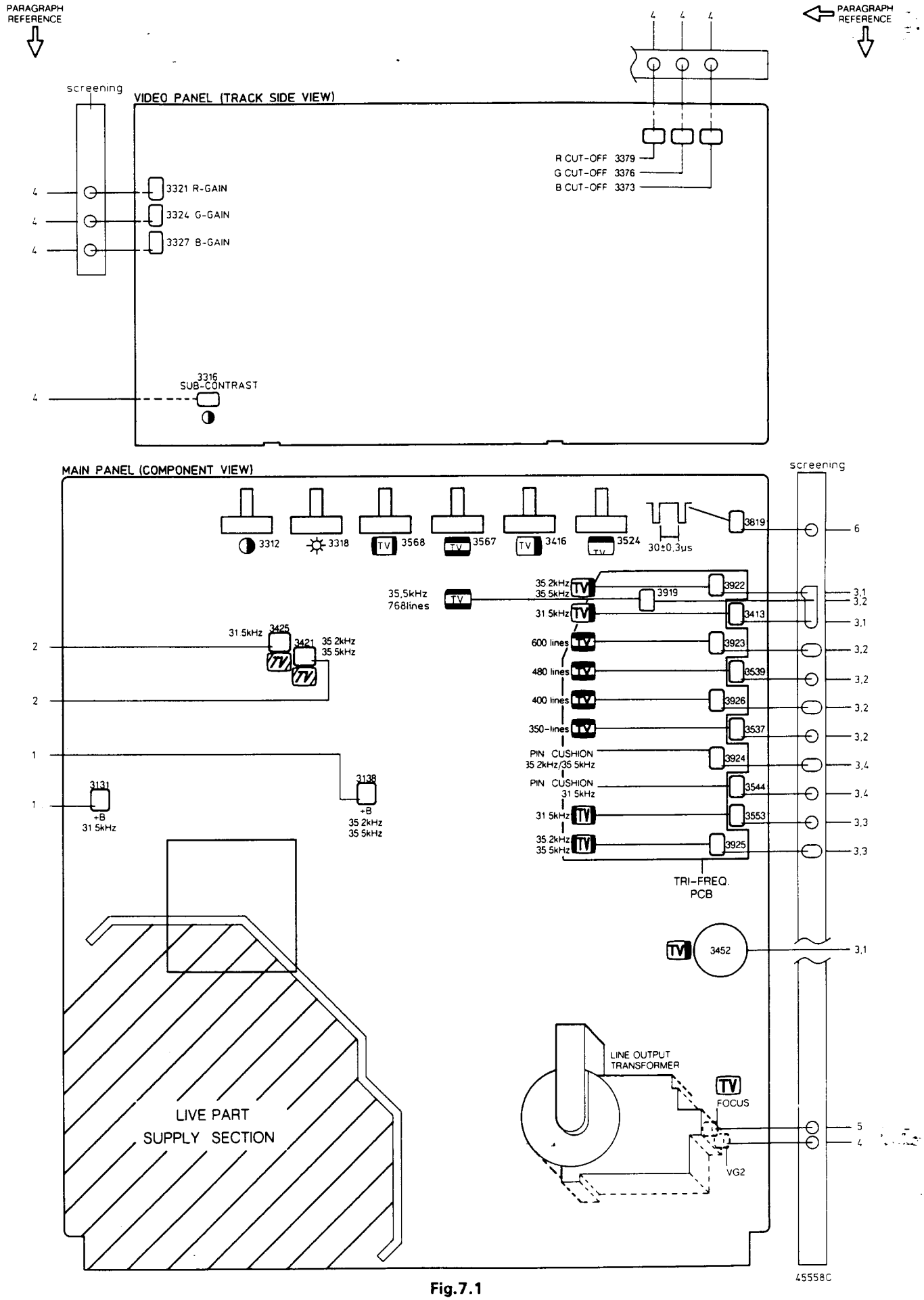


Fig.7.1

Repair tips

1. Servicing of SMDs (Surface Mounted Devices)

PARAGRAPH REFERENCE

1.1 General cautions on handling and storage

a. Oxidation on the terminals of SMDs results in poor soldering. Do not handle SMDs with bare hands.

b. 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.

c. 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

a. 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:

b. 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).

c. Remove the excess solder on the solder lands by means of litz wire or a solder sucker (see Fig. 8.1C).

Caution on removal:

a. When handling the soldering iron, use suitable pressure and be careful.

b. When removing the chip, do not use undue force with the pair of tweezers.

c. The soldering iron to be used (approx. 30 W) should preferably be equipped with a thermal control (soldering temperature: 225 to 250°C).

d. The chip, once removed, must **never** be reused.

1.3 Attachment of SMDs

a. 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).

b. Next complete the soldering of the terminals of the component (see Fig. 8.2B).

Caution when attaching SMDs:

a. 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.

b. Keep the SMD's body in contact with the printed board when soldering.

c. The soldering iron to be used (approx. 30 W) should preferably be equipped with a thermal control (soldering temperature: 225 to 250°C).

d. Soldering should not be done outside the solder land.

e. Soldering flux (of rosin) may be used, but should not be acidic.

f. After soldering, let the SMD cool down gradually at room temperature.

g. 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).

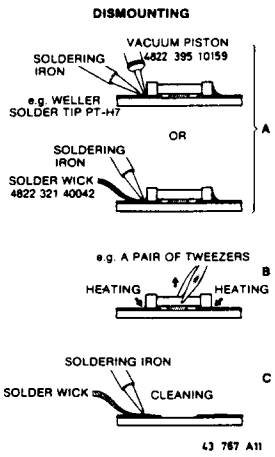


Fig. 8.1

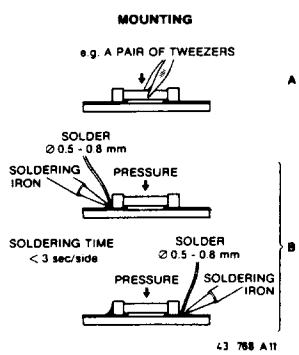


Fig. 8.2

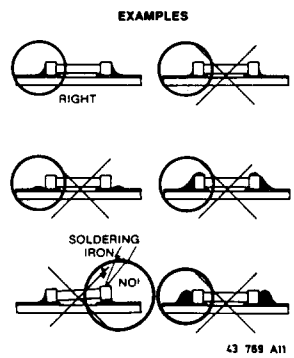
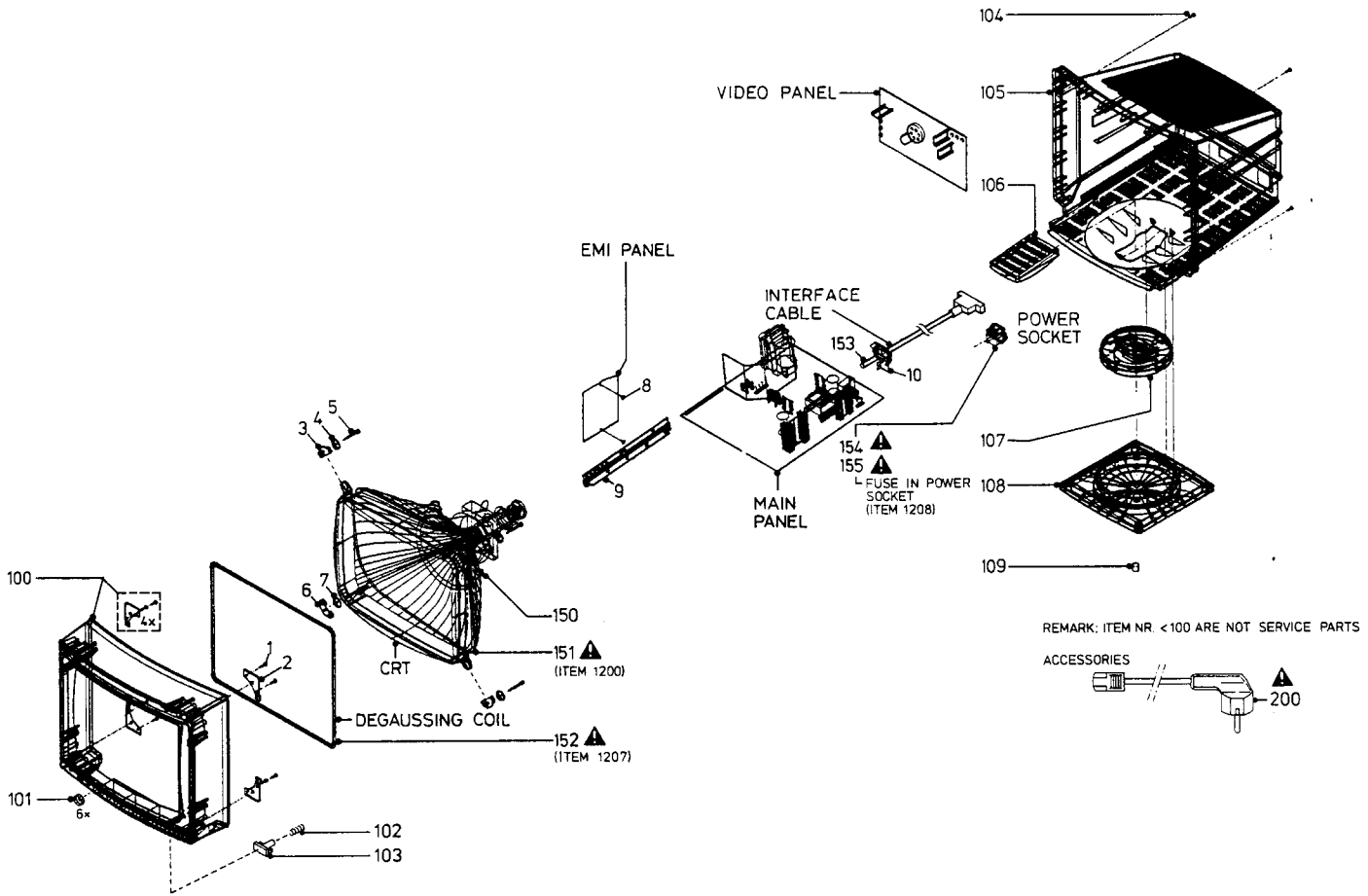
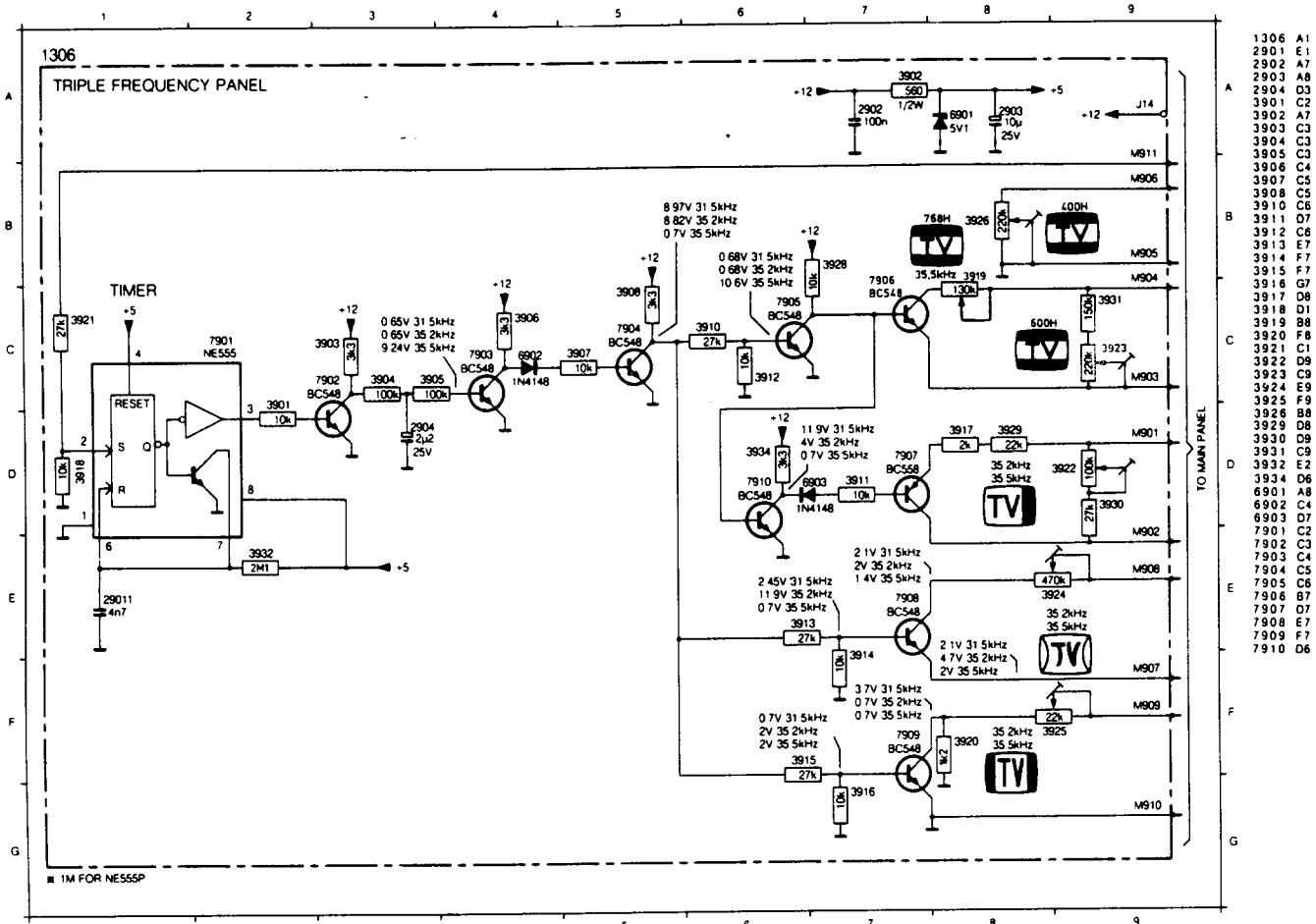


Fig. 8.3


104
105
106
VIDEO PANEL
EMI PANEL
INTERFACE CABLE
153
10
POWER SOCKET
8
9
MAIN PANEL
154
155
FUSE IN POWER SOCKET (ITEM 1208)
107
108
109
3
4
5
6
7
100
4x
1
2
150
CRT
151
(ITEM 1200)
DEGAUSSING COIL
152
(ITEM 1207)
101
6x
102
103
REMARK: ITEM NR. <100 ARE NOT SERVICE PARTS
ACCESSORIES
200

Elecrtical diagrams and P.C.B. lay-outs

TRI-FREQ PCB BOARD



1306 A1
2901 E1
2902 A7
2903 A8
2904 D3
3901 C2
3902 A7
3903 C3
3904 C3
3905 C3
3906 C4
3907 C5
3908 C5
3910 C6
3911 D7
3912 C6
3913 E7
3914 F7
3915 F7
3916 G7
3917 D8
3918 D1
3919 B8
3920 F8
3921 C1
3922 D9
3923 C9
3924 E9
3925 F9
3926 B8
3929 D8
3930 D9
3931 C9
3932 E2
3934 D6
6901 A8
6902 C4
6903 D7
7901 C2
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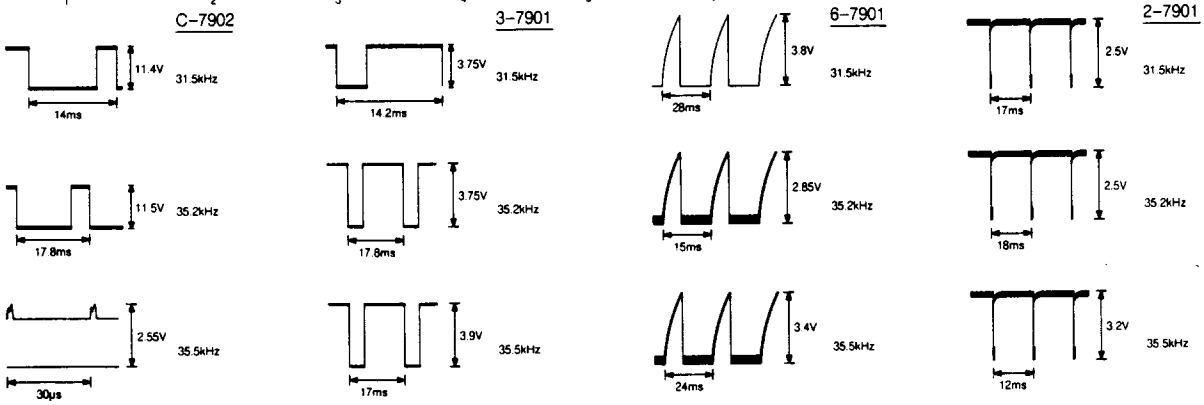
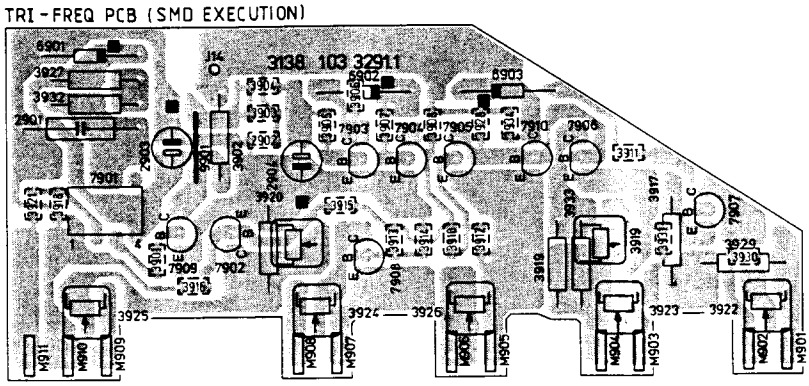
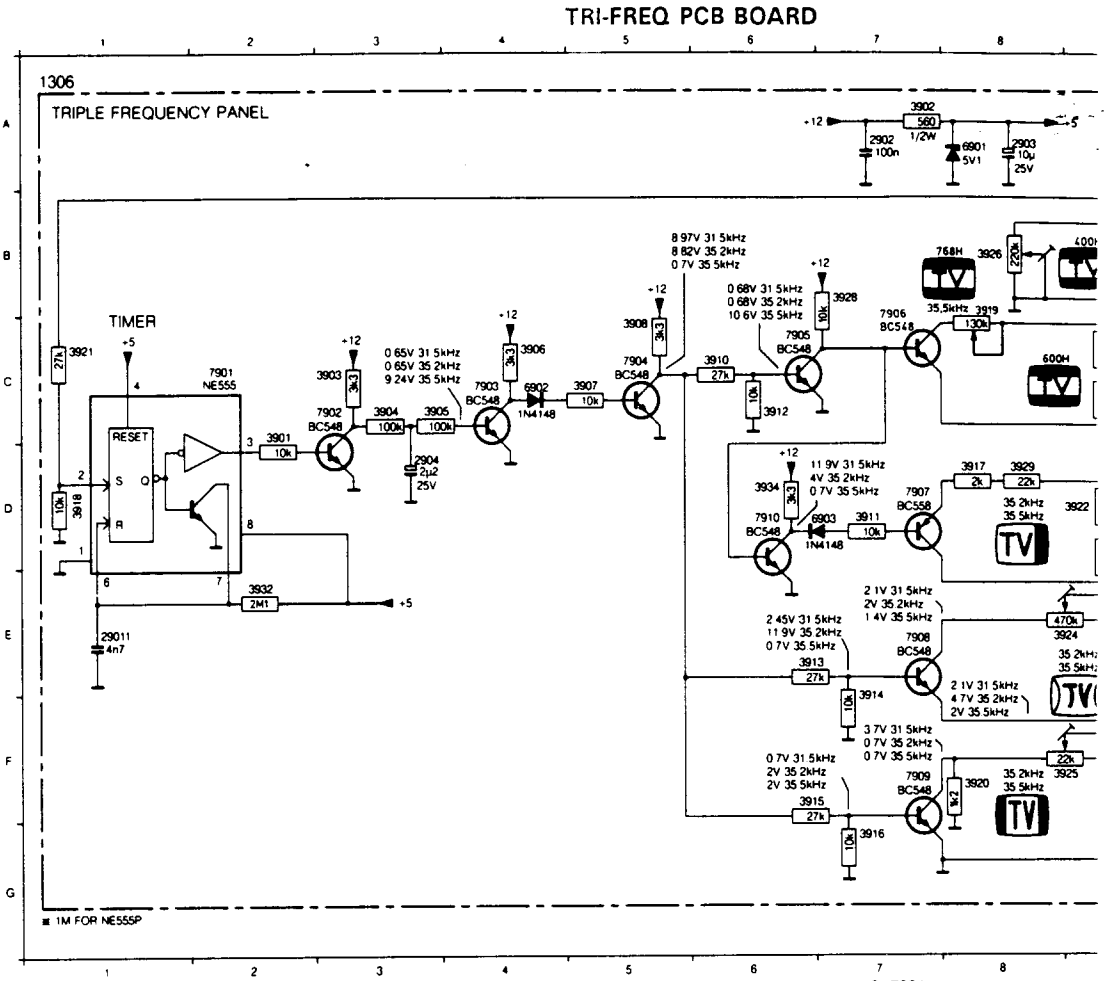
7903 C4
7904 C5
7905 C6
7906 B7
7907 D7
7908 E7
7909 F7
7910 D6

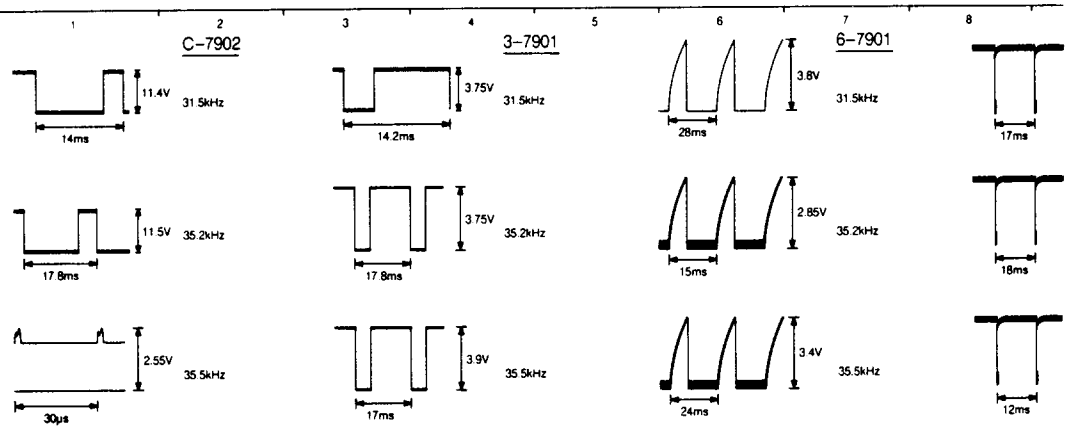


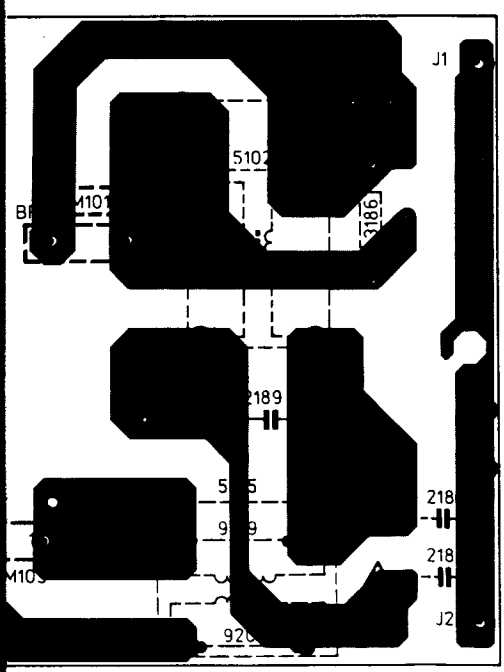
TRI-FREQ PCB (SMD EXECUTION)



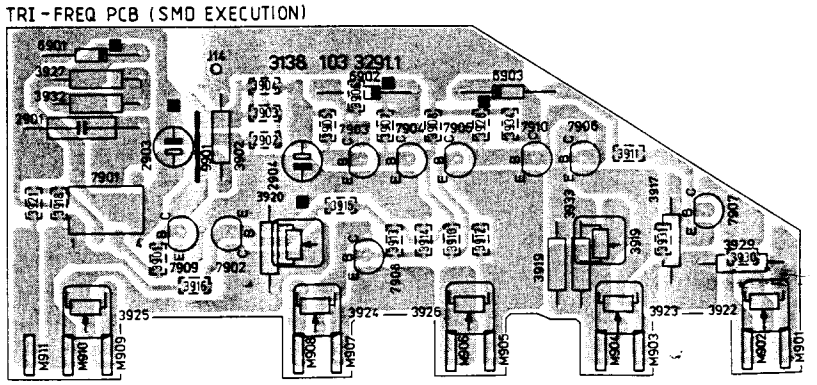
TRI-FREQ PCB BOARD

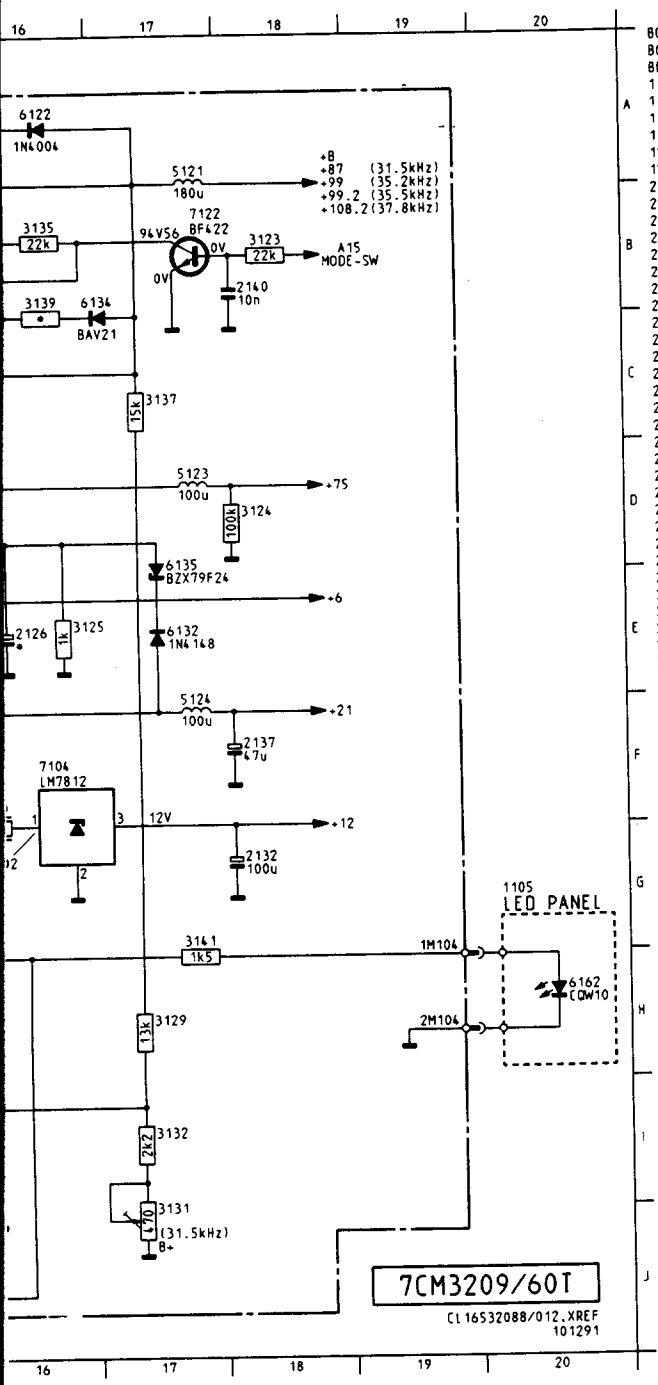




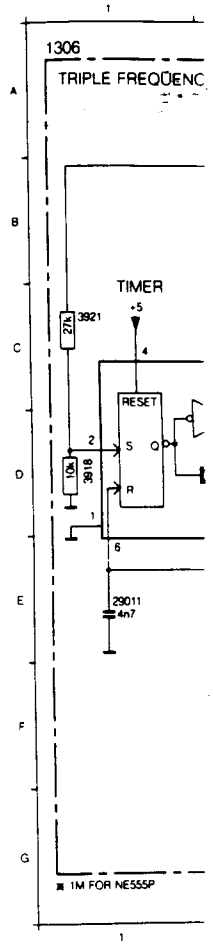


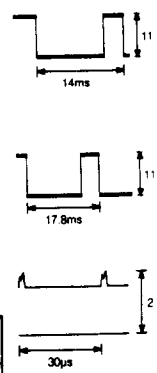
TRI-FREQ PCB (SMD EXECUTION)



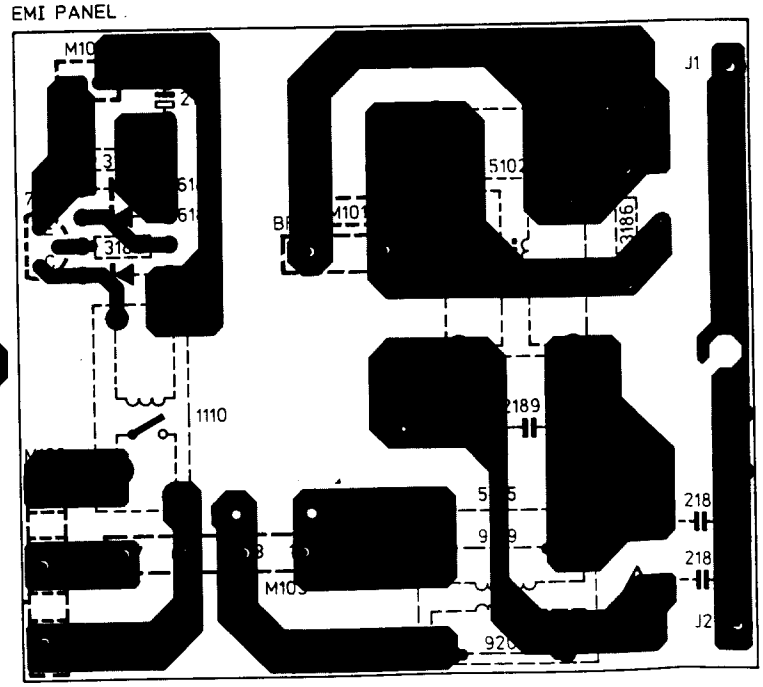


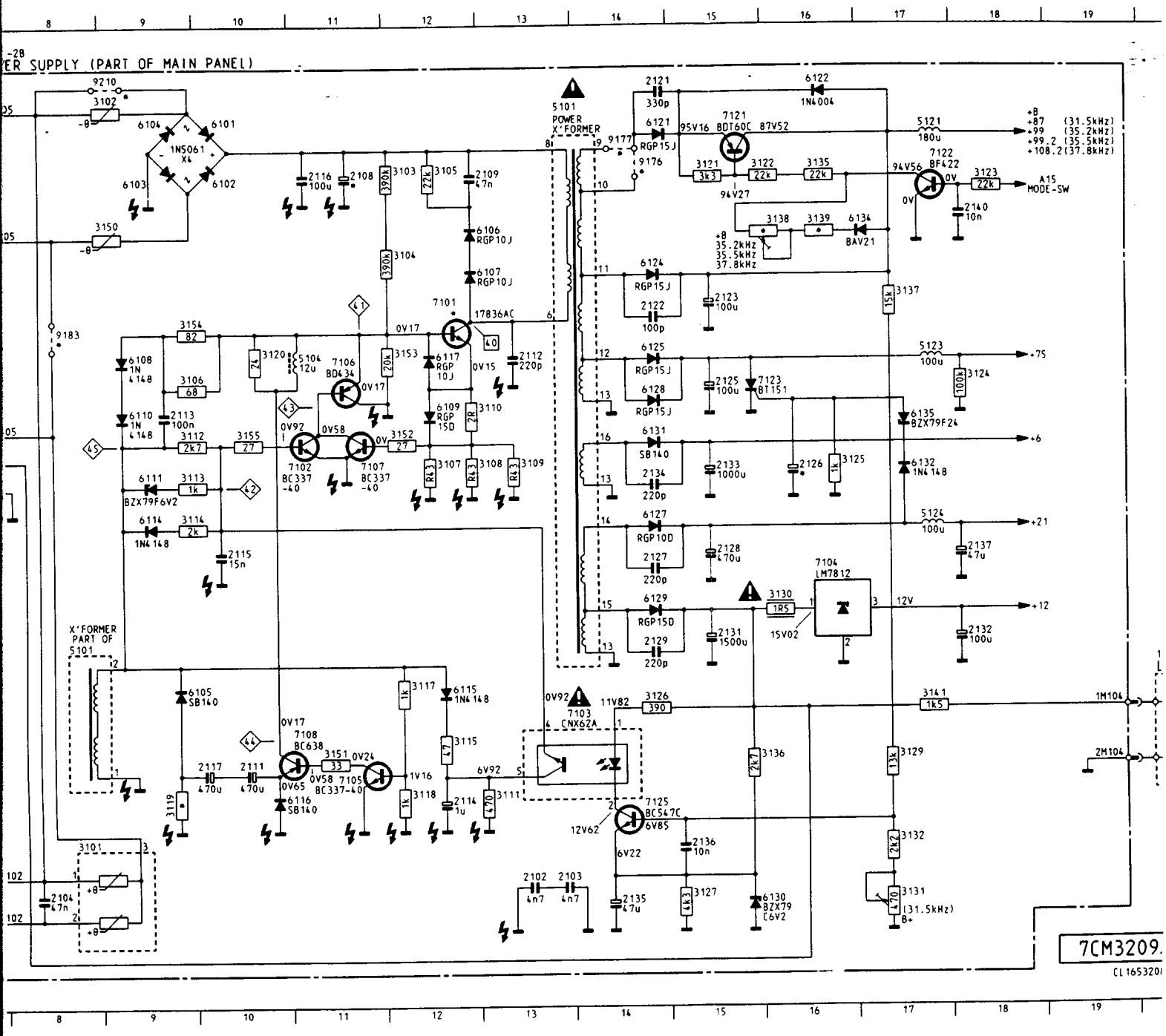
BC33	E11	3132	I17
BC33	E11	3135	B16
BD43	D11	3136	H15
1101	A 7	3137	C17
1105	G20	3138	B16
1106	A 2	3139	B16
1110	D 5	3141	G17
1207	I 6	3150	B 9
1208	A 1	3151	H11
2102	I13	3152	E12
2103	I13	3153	D12
2104	J 8	3154	C 9
2108	B11	3155	E10
2109	B12	3181	C 3
2111	H10	3182	D 3
2112	D13	3186	B 3
2113	D 9	5101	A13
2114	I12	5101	G 8
2115	F10	5102	B 4
2116	B11	5104	D11
2117	H10	5105	B 5
2121	A14	5121	A17
2122	C14	5123	D17
2123	C15	5124	F17
2125	D15	6101	A10
2126	E16	6102	B10
2127	F14	6103	B 9
2128	F15	6104	A 9
2129	G14	6105	G 9
2131	G15	6106	C13
2132	G18	6107	C13
2133	E15	6108	D 9
2134	E14	6109	D12
2135	J14	6110	D 9
2136	I15	6111	E 9
2137	F18	6114	F 9
2140	B18	6115	G12
2182	D 3	6116	I10
2183	B 3	6117	D12
2186	B 4	6121	A14
2188	B 4	6122	A16
2189	B 5	6124	C14
3101	I 8	6125	D14
3102	A 9	6127	F14
3103	B12	6128	D14
3104	C12	6129	F14
3105	B12	6130	J15
3106	D 9	6131	E14
3107	E12	6132	E17
3108	E13	6134	B17
3109	E13	6135	E17
3110	D13	6162	H20
3111	H13	6181	D 4
3112	E 9	6182	D 3
3113	E 9	6183	C 3
3114	F 9	7101	C12
3115	H12	7103	H14
3117	G12	7104	F16
3118	H12	7105	H11
3119	I 9	7108	H11
3120	D10	7121	A15
3121	B15	7122	B17
3122	B16	7123	D15
3123	B18	7125	I14
3124	D18	7185	D 4
3125	E16	9176	B14
3126	G14	9177	B14
3127	I15	9183	D 8
3129	H17	9199	A 5
3130	F16	9200	B 5
3131	I17	9210	A 9





EMI PANEL





ograms are average
asured under the following

trast for mechanical
).

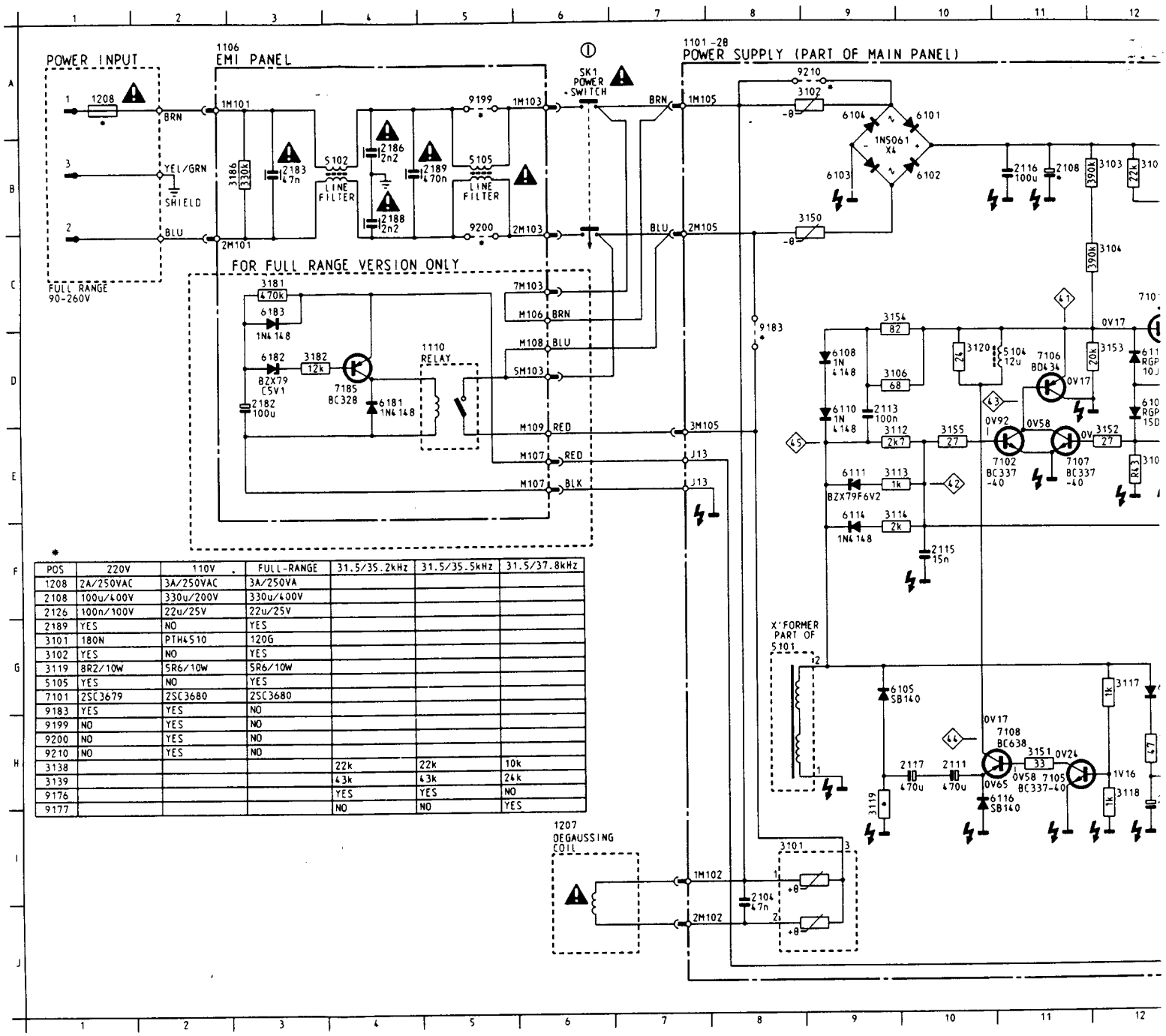
GB WARNING

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 set via a wrist wrap with resistance. Keep components and tools also at this potential.

ESD

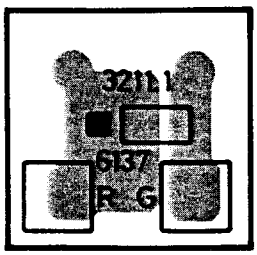
Elecrtical diagrams and P.C.B. lay-outs

POWER SUPPLY SCHEMATIC DIAGRAM



POS	220V	110V	FULL-RANGE	31.5/35.2kHz	31.5/35.5kHz	31.5/37.8kHz
1208	2A/250VAC	3A/250VAC	3A/250VA			
2108	100u/400V	330u/200V	330u/400V			
2126	100n/100V	22u/25V	22u/25V			
2189	YES	NO	YES			
3101	180N	PTH4510	120G			
3102	YES	NO	YES			
3119	8R2/10W	5R6/10W	5R6/10W			
5105	YES	NO	YES			
7101	2SC3679	2SC3680	2SC3680			
9183	YES	YES	NO			
9199	NO	YES	NO			
9200	NO	YES	NO			
9210	NO	YES	NO			
3138				22k	22k	10k
3139				43k	43k	24k
9176				YES	YES	NO
9177				NO	NO	YES

LED PC BOARD
(viewed from the component side)



45 265 A11

(GB) REMARKS

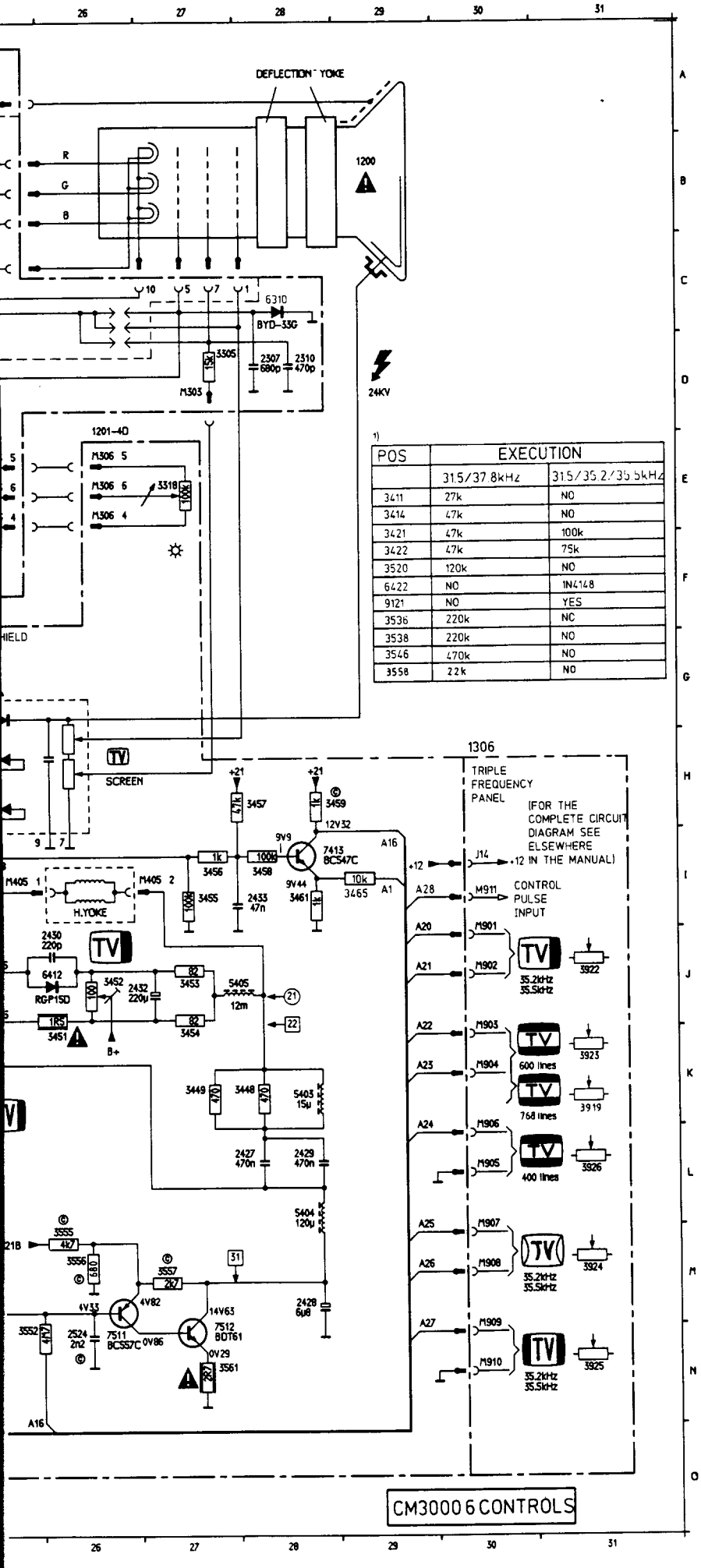
The direct voltages and oscillograms are average voltages. They have been measured under the following conditions.

- Signal pattern: cross hatch
- Adjust brightness and contrast for mechanical mid-position (click position).

(GB) W

All ICs and
susceptibl
Careless h
drastically
When repa
connected
of the set
Keep com
potential.

Electrical diagrams and P.C.B. lay-outs

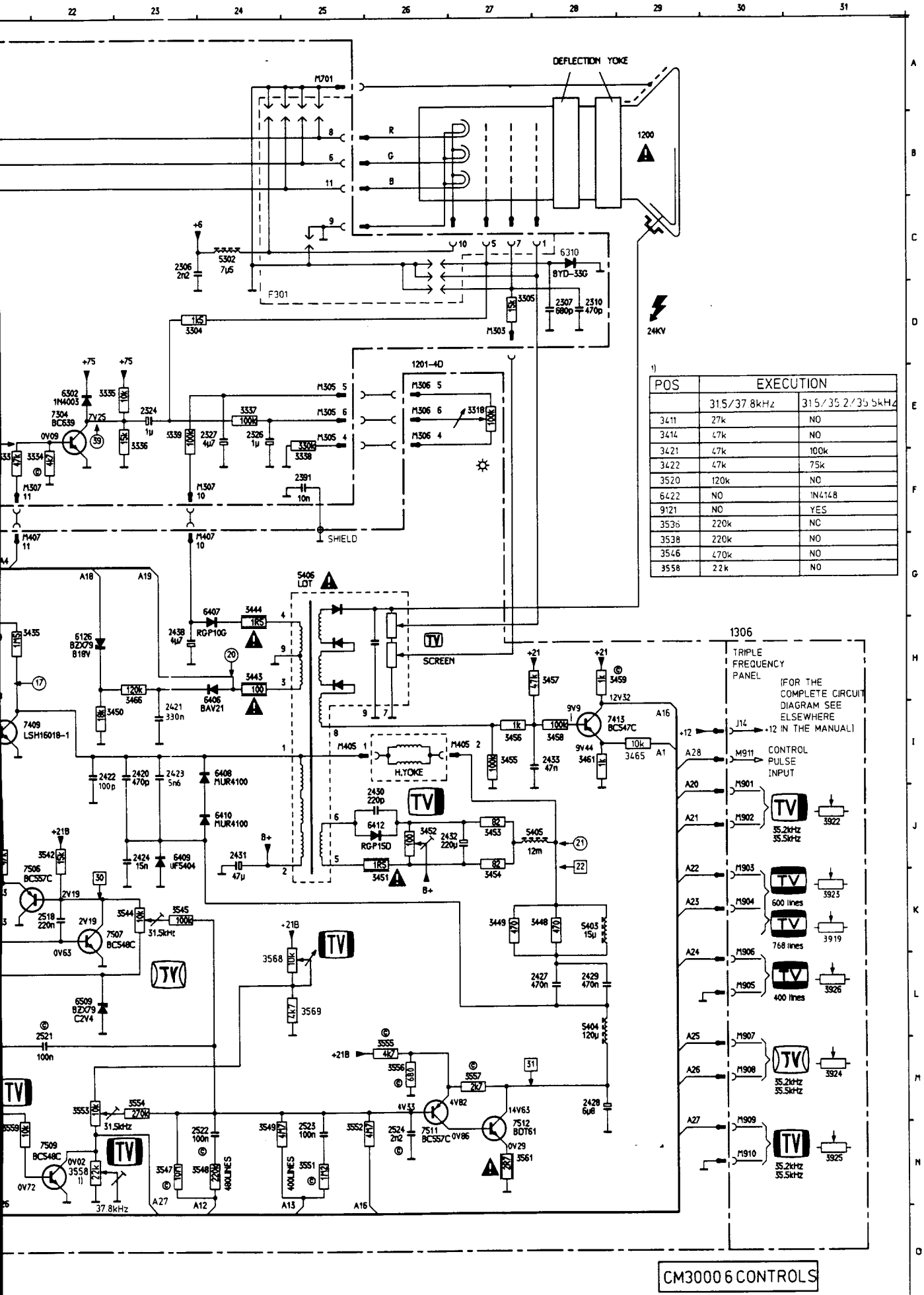


1)

POS	EXECUTION	
	31.5/37.8kHz	31.5/35.2/35.5kHz
3411	27k	NO
3414	47k	NO
3421	47k	100k
3422	47k	75k
3520	120k	NO
6422	NO	1N4148
9121	NO	YES
3536	220k	NC
3538	220k	NO
3546	470k	NO
3558	22k	NO

1200	B29	3340	C17	3538	N12	7509	N22
1201	G2	3341	B12	3539	N12	7511	N26
1201	D2	3342	B13	3540	M19	7512	N27
1201	E26	3343	C12	3541	L12	7513	M20
1202	A3	3344	C13	3542	J22	7514	N10
2301	B7	3345	E12	3544	K23	7516	G5
2302	C7	3346	D13	3545	K23	7802	J3
2303	D8	3347	F13	3546	M21	7802	J5
2304	B6	3348	C17	3547	N23	9121	N11
2305	E9	3350	E7	3548	N23		
2306	C23	3352	C14	3549	N24		
2307	D28	3353	B13	3550	N1		
2308	C8	3354	D14	3551	N25		
2309	C8	3355	C13	3552	N25		
2310	D28	3356	E14	3553	M22		
2311	C9	3357	E13	3554	M23		
2312	D8	3358	E13	3555	M26		
2313	E10	3359	F15	3556	M26		
2314	E10	3361	A13	3557	M27		
2315	F8	3362	B15	3558	Q22		
2317	A8	3364	D16	3559	N21		
2319	A8	3365	A17	3561	N27		
2322	D15	3366	A17	3562	L10		
2324	E23	3367	C15	3563	L1		
2326	E24	3370	E17	3565	M9		
2327	E24	3371	E17	3566	N10		
2328	A7	3372	E20	3567	L12		
2331	B16	3373	E20	3568	K25		
2333	C13	3374	E20	3569	L25		
2334	D13	3375	C20	3801	I7		
2335	E13	3376	C20	3802	K7		
2336	E16	3377	D20	3803	J7		
2337	B6	3378	A20	3804	K7		
2338	A17	3379	B20	3811	I3		
2339	C17	3381	B20	3812	I5		
2340	E17	3382	E19	3815	I3		
2342	B17	3383	C19	3819	I3		
2343	D17	3384	A19	3922	I31		
2344	F17	3385	B18	3923	K31		
2346	A6	3386	D18	3924	M31		
2351	C7	3387	E18	3925	N31		
2352	D6	3388	F10	3926	L31		
2353	D7	3391	B19	5302	C24		
2391	F25	3392	D19	5303	A16		
2401	N6	3393	F19	5304	C16		
2402	L3	3401	H2	5305	E16		
2404	H3	3402	L1	5401	I20		
2405	M6	3403	L1	5402	H20		
2406	K8	3404	K2	5403	K28		
2407	M2	3405	K2	5404	L28		
2408	I15	3406	G2	5405	J28		
2409	I11	3407	H1	5406	G25		
2410	H14	3408	N3	6126	H22		
2411	I10	3409	G3	6301	F11		
2412	H14	3410	H1	6302	E22		
2413	H13	3411	M7	6303	E8		
2414	I17	3412	N7	6304	B16		
2415	G16	3413	N7	6304	B16		
2416	H18	3414	M7	6305	C16		
2417	G17	3415	M8	6305	C16		
2418	I19	3416	N8	6306	E16		
2419	I20	3417	K8	6307	C14		
2421	I23	3418	M1	6308	D15		
2422	I22	3419	H11	6309	E15		
2423	I23	3420	H21	6310	C28		
2424	J23	3421	H12	6311	A13		
2427	L28	3422	H12	6315	B18		
2428	M28	3423	H13	6316	D18		
2429	L28	3424	I16	6317	E18		
2430	J26	3425	I12	6318	B19		
2431	J24	3426	I16	6319	D19		
2432	J26	3427	I13	6321	E19		
2433	I28	3428	I10	6322	A5		
2435	M2	3429	I14	6323	A5		
2436	O3	3430	I12	6401	I18		
2438	H23	3431	H17	6402	M9		
2440	H19	3432	H17	6403	H20		
2461	N18	3433	H13	6404	I19		
2462	N20	3434	G17	6405	H20		
2483	N19	3435	H21	6406	H24		
2501	H6	3436	I19	6407	G24		
2502	J10	3437	I20	6408	I24		
2503	K10	3438	H21	6409	J23		
2504	J12	3439	I21	6410	J24		
2505	N2	3440	H19	6412	J26		
2506	N2	3442	N4	6414	N18		
2507	L13	3443	H24	6415	N20		
2508	K13	3444	G24	6417	M2		
2509	L11	3448	K28	6419	H19		
2511	L15	3449	K27	6420	H17		
2512	L15	3450	I22	6421	H18		
2514	L17	3451	K26	6422	M7		
2515	L20	3453	J27	6423	K5		
2516	K20	3454	K27	6501	H7		
2517	O2	3455	I27	6502	K10		
2518	K22	3456	I27	6503	J10		
2519	M11	3457	H28	6504	K12		
2521	L22	3458	I28	6505	J13		
2522	N23	3459	H29	6506	L14		
2523	N25	3460	H19	6507	L16		
2524	N26	3461	I28	6508	L16		
2526	M10	3462	N18	6509	L22		
2527	M2	3463	N20	6511	H4		
2528	M2	3464	M16	6801	J7		
2529	N10	3465	J28	6802	J7		
2531	K18	3466	H23	7301	A9		
2532	K19	3467	G19	7303	E7		
2801	I4	3469	N8	7304	E22		
2805	J6	3470	N4	7306	F14		
2808	I5	3471	L4	7307	B13		
31.5k	N22	3472	K4	7308	C13		
3301	C6	3473	L5	7309	D13		
3302	D6	3474	L2	7311	B15		
3303	D7	3475	O8	7312	C15		
3304	D23	3501	H5	7313	E15		
3305	D27	3502	H6	7314	B16		
3307	B7	3503	H7	7315	B16		
3308	B7	3504	J10	7316	C16		
3309	B8	3505	J11	7317	D16		
3310	E7	3506	K11	7318	E16		
3311	D3	3507	K10	7319	F16		
3312	D3	3508	N1	7321	E19		
3313	E6	3509	J14	7322	C19		
3314	D8	3510	G4	7323	B19		
3315	D7	3511	L11	7401	K2		
3316	E7	3512	L15	7402	H2		
3318	E27	3513	J18	7403	M17		
3319	B12	3514	L16	7403	L3		
3320	E8	3515	K16	7403	G3		
3321	B12	3516	L17	7403	M19		
3322	B12	3517	L17	7404	M5		
3323	C12	3518	L15	7405	M8		
3324	C12	3519	L18	7406	G14		
3325	C12	3520	N11	7407	H11		
3326	D12	3521	J17	7408	H18		
3327	D12	3522	J18	7409	I21		
3328	E12	3523	L18	7410	G20		
3329	A7	3525	L17	7413	I28		
3330	E9	3526	N12	7414	M4		
3331	E12	3527	G6	7415	N4		
3332	F12	3528	G5	7501	G6		
3333	F21	3531	J21	7502	K11		
3334	F22	3532	K20	7503	K18		
3335	E22	3533	J21	7504	L18		
3336	E23	3534	K21	7505	J21		
3337	E24	3535	L21	7506	J21		
3338	F25	3536	M11	7507	K22		
3339	E23	3537	N12	7508	L11		

Electrical diagrams and P.C.B. lay-outs

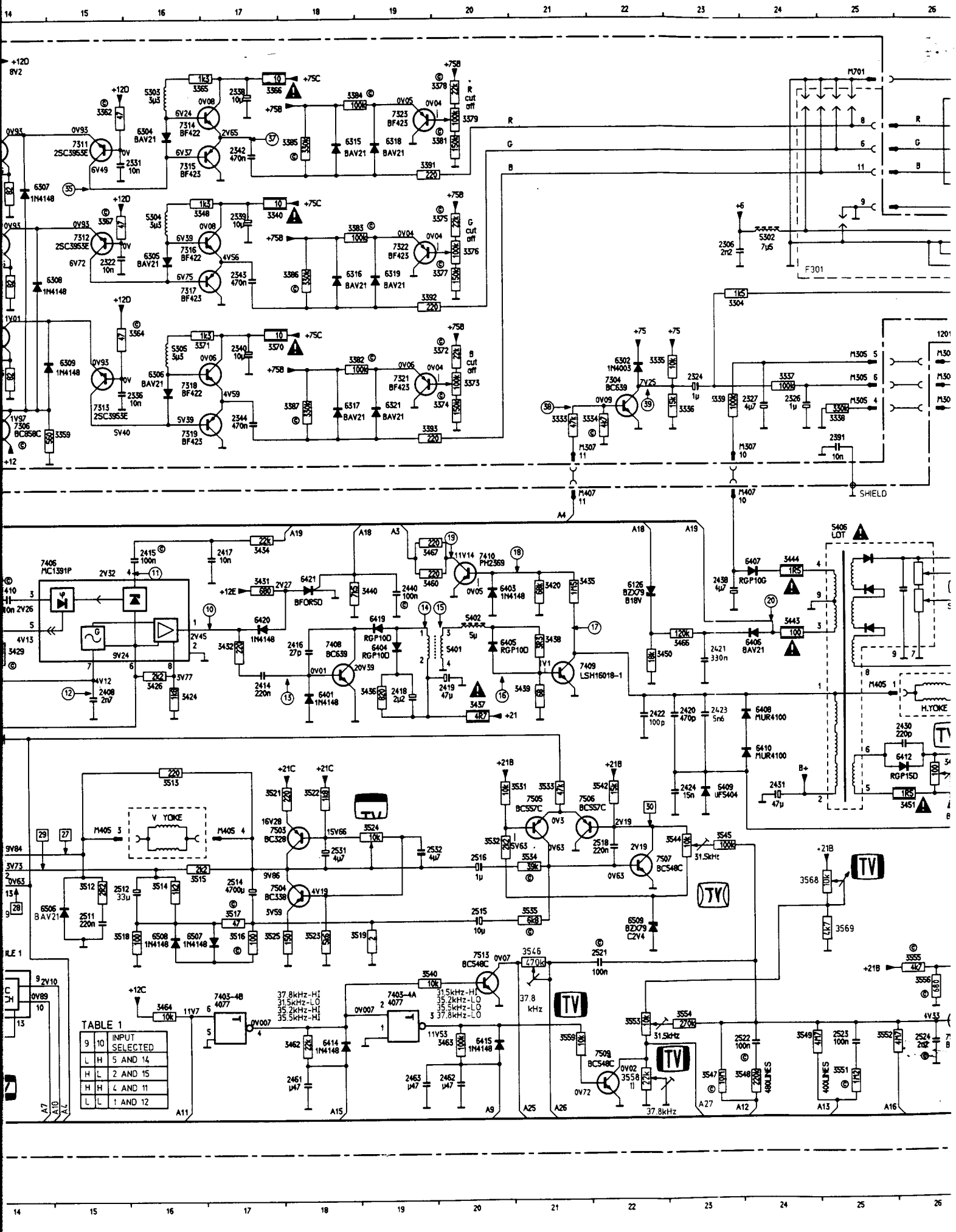


1)

POS	EXECUTION	
	31.5/37.8kHz	31.5/35.2/35.5kHz
3411	27k	NO
3414	47k	NO
3421	47k	100k
3422	47k	75k
3520	120k	NO
6422	NO	1N4148
9121	NO	YES
3536	220k	NC
3538	220k	NO
3546	470k	NO
3558	22k	NO

1200	B29	3340
1201	G2	3341
1201	D2	3342
1201	E26	3343
1202	A3	3344
2301	B7	3345
2302	C7	3346
2303	D8	3347
2304	B6	3348
2305	E9	3350
2306	C23	3352
2307	D28	3353
2308	C8	3354
2309	C8	3355
2310	D28	3356
2311	G9	3357
2312	D8	3358
2313	E10	3359
2314	E10	3361
2315	F6	3362
2317	A8	3364
2319	A8	3365
2322	D15	3366
2324	E23	3367
2326	E24	3370
2327	E24	3371
2328	A7	3372
2331	B16	3373
2333	C13	3374
2334	D13	3375
2335	E13	3376
2336	E16	3377
2337	B6	3378
2338	A17	3379
2339	G17	3381
2340	E17	3382
2342	B17	3383
2343	D17	3384
2344	F17	3385
2346	A6	3386
2351	C7	3387
2352	D6	3388
2353	D7	3391
2391	F25	3392
2401	N6	3393
2402	L3	3401
2404	H3	3402
2405	M6	3403
2406	K8	3404
2407	M2	3405
2408	I15	3406
2409	I11	3407
2410	H14	3408
2411	I10	3409
2412	H14	3410
2413	H13	3411
2414	I17	3412
2415	G16	3413
2416	H18	3414
2417	G17	3415
2418	I19	3416
2419	I20	3417
2421	I23	3418
2422	I22	3419
2423	I23	3420
2424	J23	3421
2427	L28	3422
2428	M28	3423
2429	L28	3424
2430	J26	3425
2431	J24	3426
2432	J26	3427
2433	I28	3428
2435	M2	3429
2436	C3	3430
2438	H23	3431
2440	H19	3432
2461	N18	3433
2462	N20	3434
2463	N19	3435
2501	H6	3436
2502	J10	3437
2503	K10	3438
2504	J12	3439
2505	N2	3440
2506	N2	3442
2507	L13	3443
2508	K13	3444
2509	L11	3448
2511	L15	3449
2512	L15	3450
2514	L17	3451
2515	L20	3453
2516	K20	3454
2517	O2	3455
2518	K22	3456
2519	M11	3457
2521	L22	3458
2522	N23	3459
2523	N25	3460
2524	N26	3461
2526	M10	3462
2527	M2	3463
2528	M2	3464
2529	N10	3465
2531	K18	3466
2532	K19	3467
2801	I4	3469
2805	J6	3470
2808	I5	3471
31.5k	N22	3472
3301	C6	3473
3302	D6	3474
3303	D7	3475
3304	D23	3501
3305	D27	3502
3307	B7	3503
3308	B7	3504
3309	B8	3505
3310	E7	3506
3311	D3	3507
3312	D3	3508
3313	E6	3509
3314	D8	3510
3315	D7	3511
3316	E7	3512
3318	E27	3513
3319	B12	3514
3320	E8	3515
3321	B12	3516
3322	B12	3517
3323	C12	3518
3324	C12	3519
3325	C12	3520
3326	D12	3521
3327	D12	3522
3328	E12	3523
3329	A7	3525
3330	E9	3526
3331	E12	3527
3332	F12	3528
3333	F21	3531
3334	F22	3532
3335	E22	3533
3336	E23	3534
3337	E24	3535
3338	F25	3536
3339	E23	3537

Elecrtical diagrams and P.C.B. lay-outs



GRAM

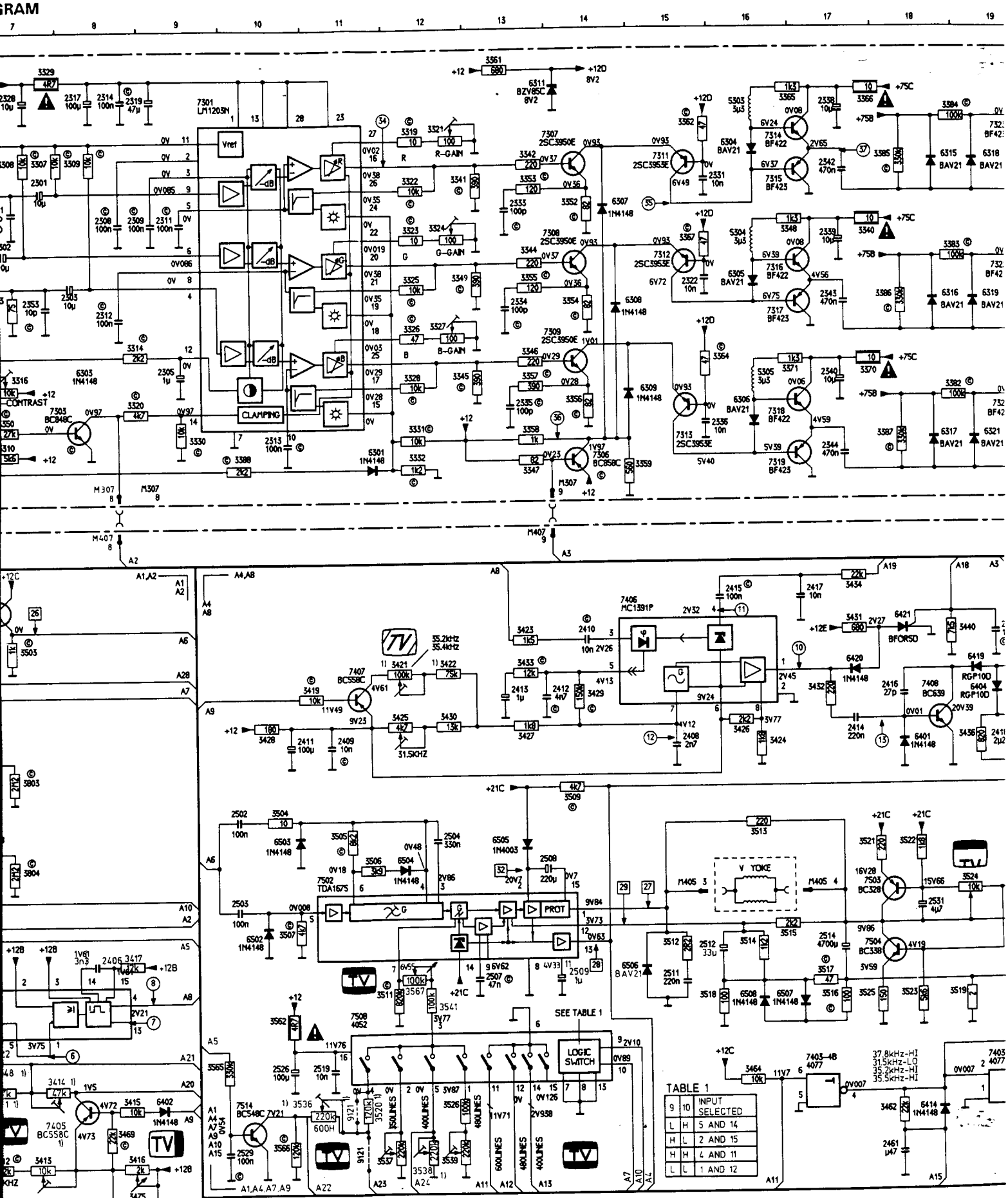


TABLE 1

9	10	INPUT SELECTED
L	H	5 AND 14
H	L	2 AND 15
H	H	4 AND 11
L	L	1 AND 12

Electrical diagrams and P.C.B. lay-outs

SIGNAL PROCESSING SCHEMATIC DIAGRAM