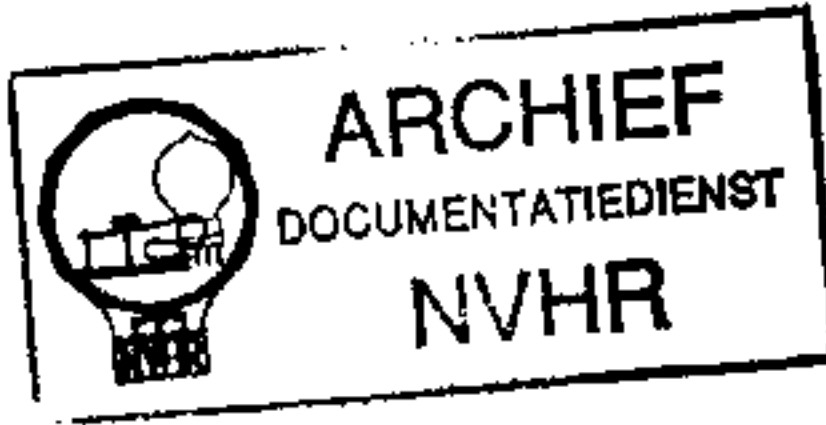


Service
Service
Service

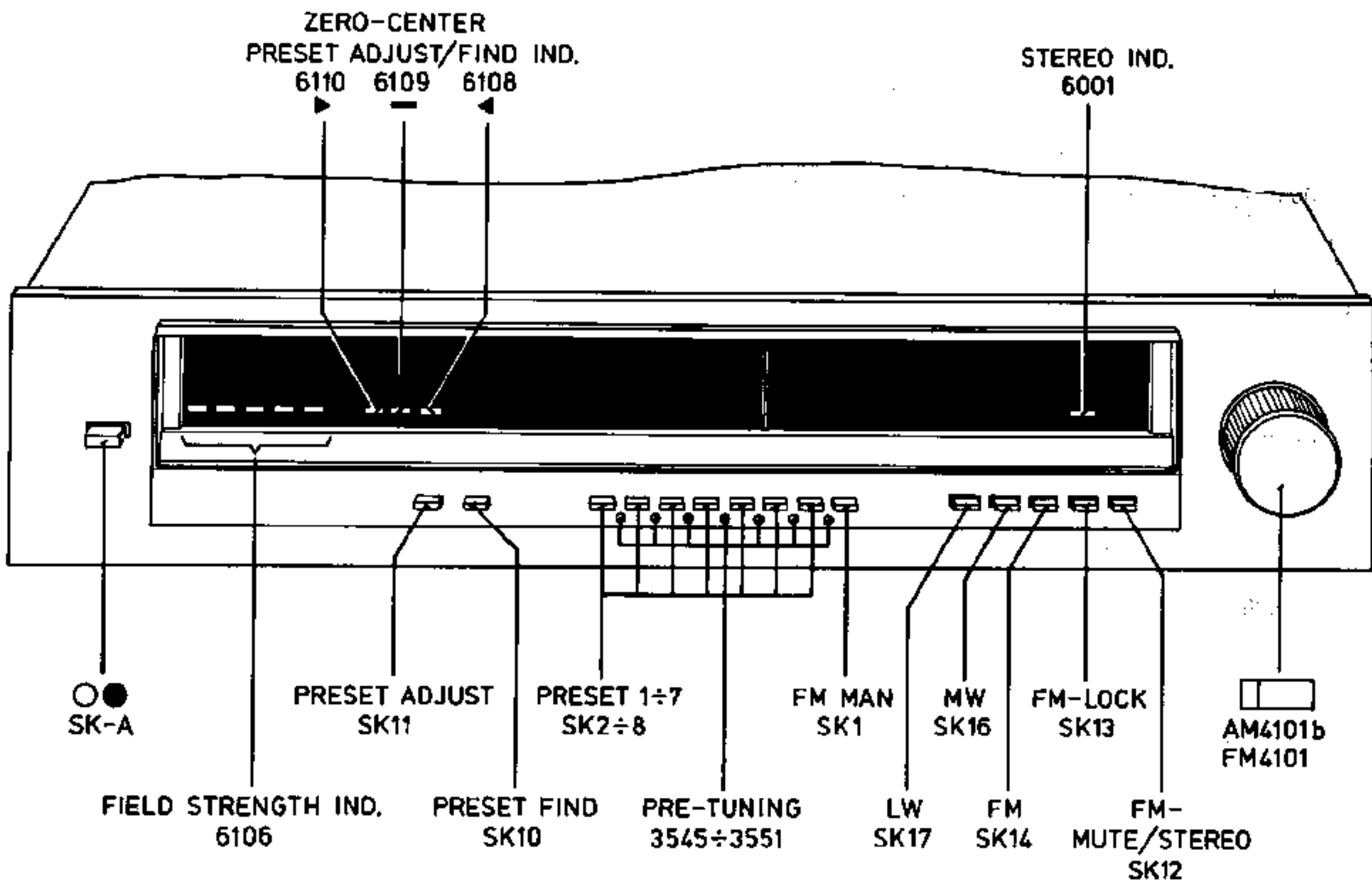
Met dank aan www.radiomuseum-hengelo.nl

Ned. Ver. v. Historie v/d Radio



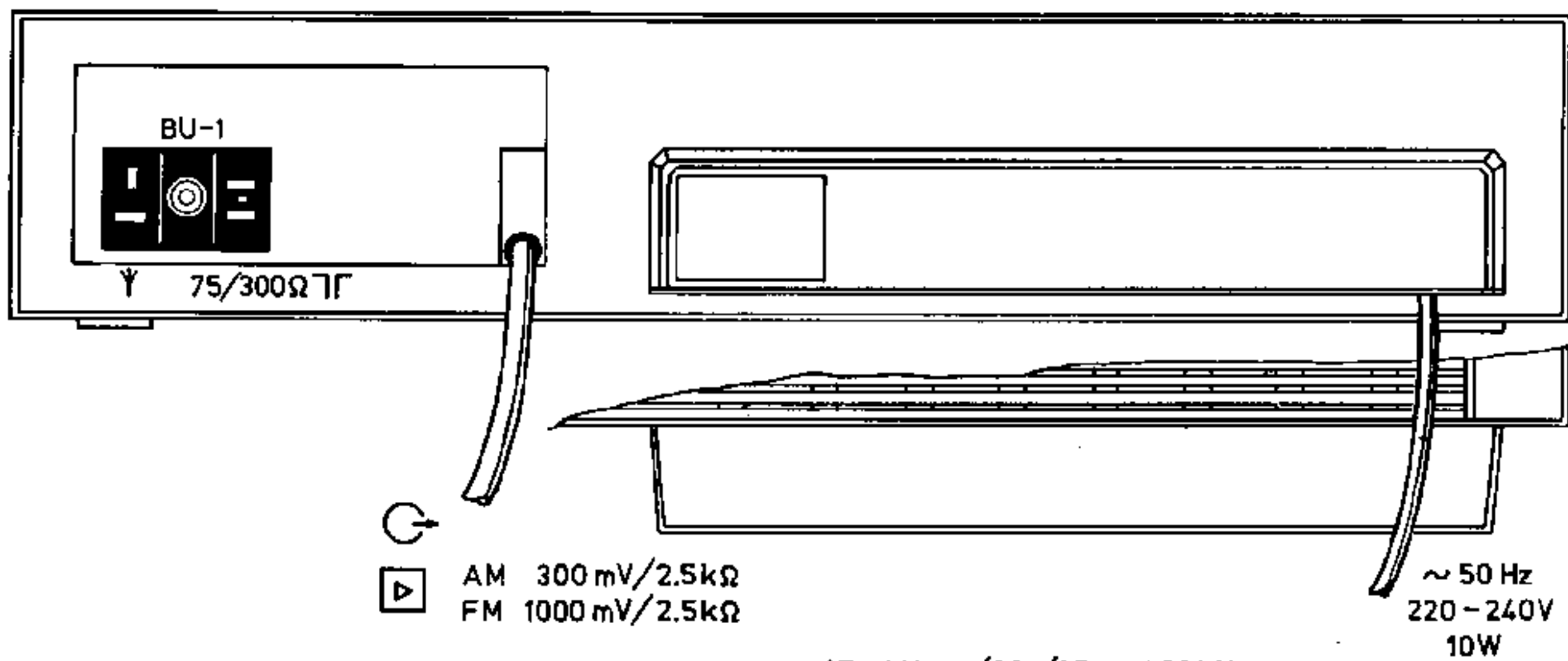
24619A12

Service Manual



24 244 A12





▶ AM 300 mV/2.5kΩ
▶ FM 1000 mV/2.5kΩ

IF AM	/00 /05	468 kHz
	/15 /18	452 kHz
IF FM		10.7 MHz

~ 50 Hz
 220-240V
 10W

24 246 A12

GB

Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified, be used.

F

Les normes de sécurité exigent que l'appareil soit remis à l'état d'origine et que soient utilisées les pièces de rechange identiques à celles spécifiées.

NL

Veiligheidsbepalingen vereisen, dat het apparaat bij reparatie in zijn oorspronkelijke toestand wordt teruggebracht en dat onderdelen, identiek aan de gespecificeerde, worden toegepast.

D

Bei jeder Reparatur sind die geltenden Sicherheitsvorschriften zu beachten. Der Originalzustand des Geräts darf nicht verändert werden; für Reparaturen sind Original-Ersatzteile zu verwenden.

I

Le norme di sicurezza esigono che l'apparecchio venga rimesso nelle condizioni originali e che siano utilizzati i pezzi di ricambio identici a quelli specificati.

GB

For more detailed technical specifications please consult commercial documentation.

NL

Voor meer uitgebreide technische specificaties gelieve de commerciële documentatie te raadplegen.

F

Pour l'obtention de données techniques plus détaillées veuillez consulter la documentation commerciale.

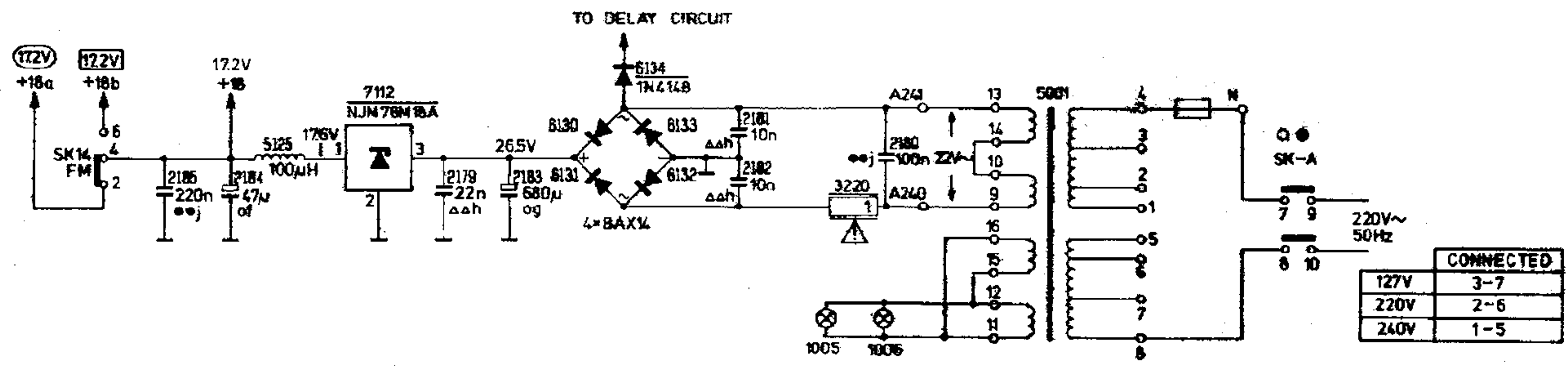
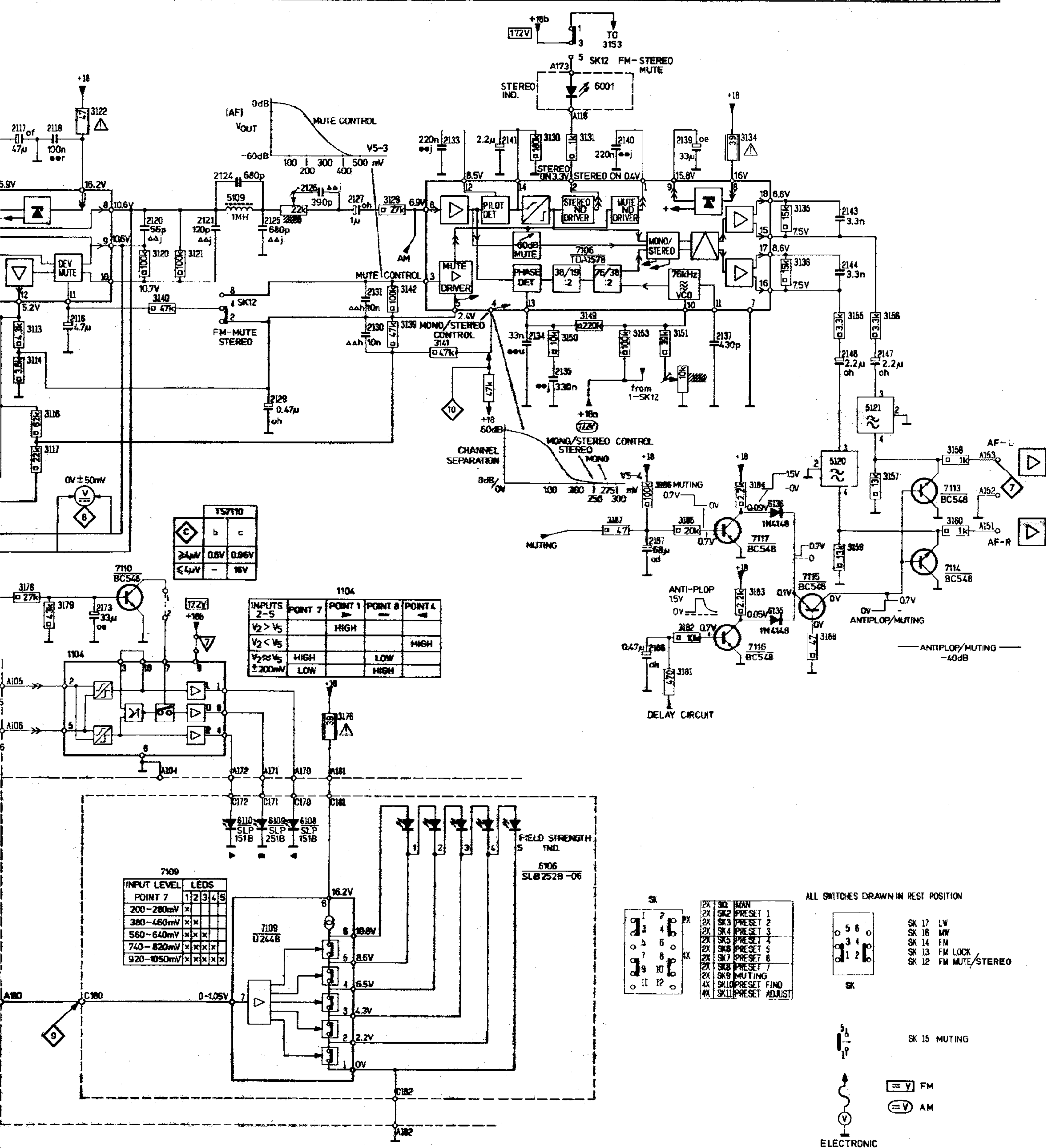
D

Für eine mehr detaillierte technische Spezifikation verweisen wir auf die kommerzielle Dokumentation.

I

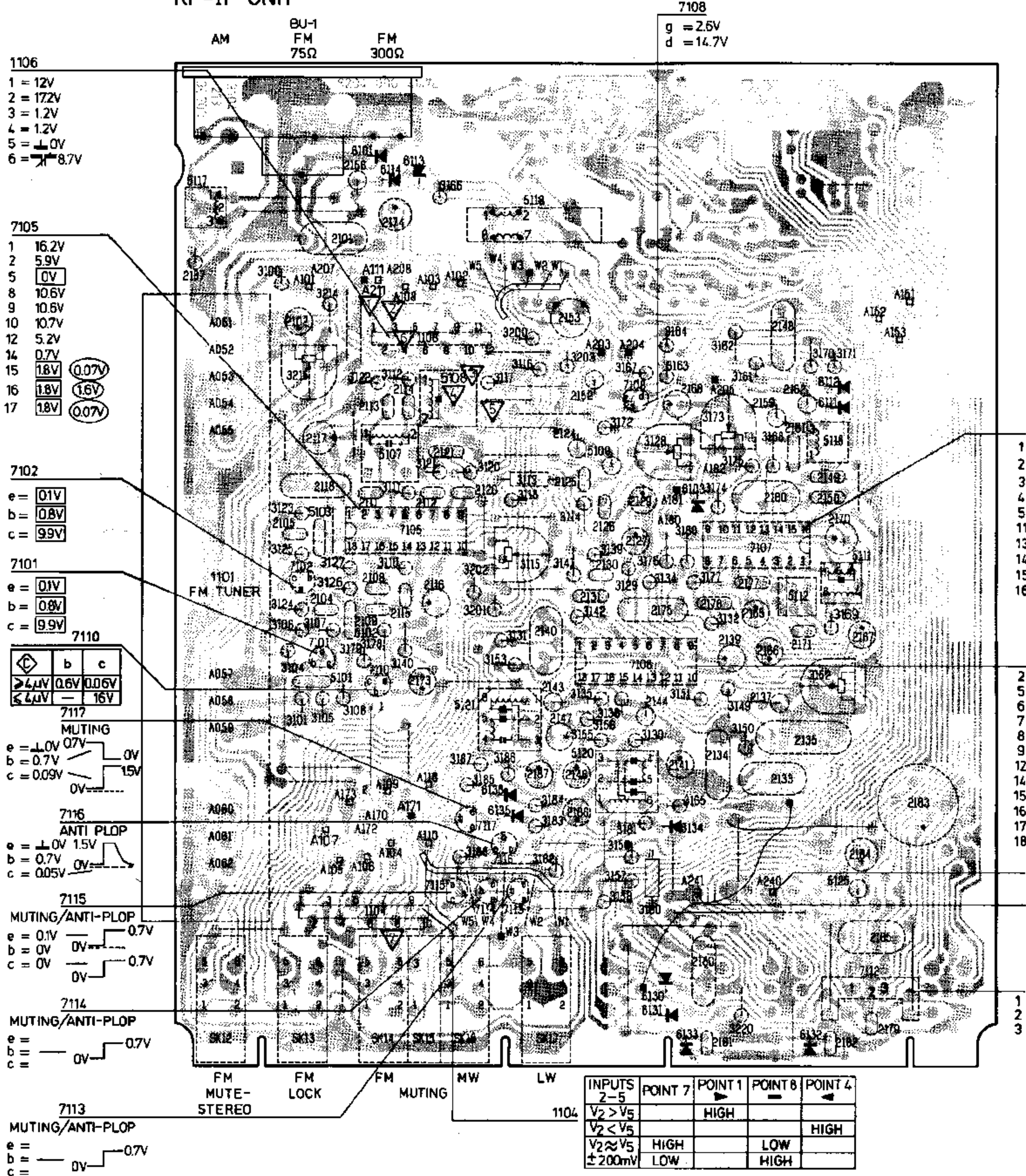
In modo da ottenere dati tecnici più particolareggiati, vi preghiamo di riferirvi alla documentazione commerciale.

210-218	219	2120	2121	2185, 2129, 2184, 2124-2127	2130, 2131, 2179	2133, 2183	2141	2134	2135, 2180-2182, 2140, 2186, 2187, 2139	2137	2143, 2144, 2146	2147
72, 3178, 3179	3122	3120, 3148	3128	3176	3129, 3139, 3142	3141, 3130, 3149, 3150, 3131, 3220, 3151-3153, 3181-3188	3134-3136	3155-3160			5120	5121
			5109	5125		6138-6134, 6106	6001		6135, 6136			
	7110		7109	7112		7106			7115-7117		7113, 7114	



MISC	1101	6001.6114.6113.1106	6135.6135	7108.7106.6103	7107	6111.6112
MISC		7102.7101.1104.7110.7105	7113...7117	6130.6131.5134.6133		6132 7112
S	5117	5101...5103.5107	5108	5121.5118	5109.5120	5112.5115.5111.5125
C	2157	2102.2101.2156.2174	2121.2120.2124...	2127.2153.2152.2129...	2131.2159	2162.2168...2150
C		2105.2104	2111...2118		2140.2143.2147.2144.2141.2175...	2177.2165...2168.2171.2170
C			2109.2108.2173		2187.2186.2146.2181.2180.2134.2139.2137.2133.2135.2179.2182...	2185
R		3100.3215.3215.3122.3110...	3112.3166.3120.3113...	3118.3200.3203.3172.3167.3128.3161...	3164.3168...	3171
R		3104...3108.3123...	3127.3179.3178.3121.3202.3201.3131.3141.3142.3139.3129.3180.3173...	3177.3132		3152
R		3101	3140	3153.3181...3188.3155...	3160.3136.3135.3165.3149...	3151.3220

RF-IF UNIT



7108
g = 2.5V
d = 14.7V

- 1106
- 1 = 12V
 - 2 = 172V
 - 3 = 1.2V
 - 4 = 1.2V
 - 5 = 0.0V
 - 6 = 8.7V

- 7105
- 1 16.2V
 - 2 5.9V
 - 5 0V
 - 8 10.6V
 - 9 10.6V
 - 10 10.7V
 - 12 5.2V
 - 14 0.7V
 - 15 1.8V (0.07V)
 - 16 1.8V (1.6V)
 - 17 1.8V (0.07V)

- 7102
- e = 01V
 - b = 08V
 - c = 99V

- 7101
- e = 01V
 - b = 08V
 - c = 9.9V

7110

	b	c
$\geq 4\mu V$	0.6V	0.06V
$\leq 4\mu V$	-	16V

- 7117
MUTING
- e = 0.0V 0.7V
 - b = 0.7V 0V
 - c = 0.09V 15V

- 7116
ANTI PLOP
- e = 0.0V 1.5V
 - b = 0.7V 0V
 - c = 0.05V 0V

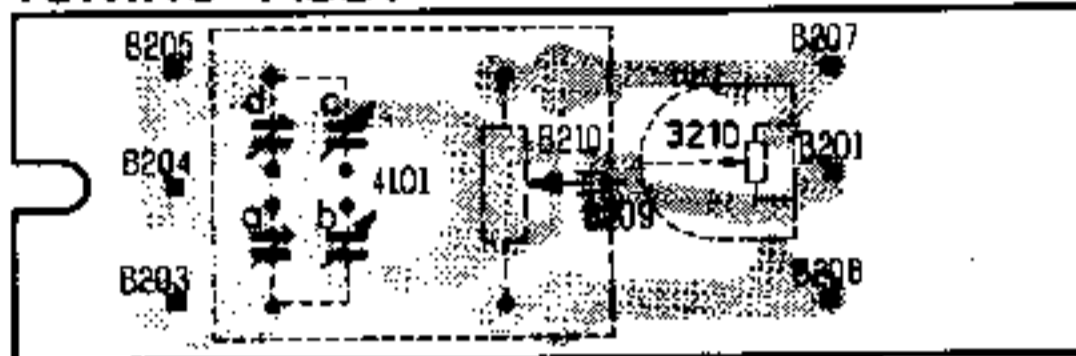
- 7115
MUTING/ANTI-PLOP
- e = 0.1V 0.7V
 - b = 0V 0V
 - c = 0V 0.7V

- 7114
MUTING/ANTI-PLOP
- e = 0.7V
 - b = 0V
 - c = 0V

- 7113
MUTING/ANTI-PLOP
- e = 0.7V
 - b = 0V
 - c = 0V

INPUTS 2-5	POINT 7	POINT 1	POINT 8	POINT 4
$V_2 > V_5$		HIGH		
$V_2 < V_5$				HIGH
$V_2 \approx V_5$	HIGH		LOW	
$\pm 200mV$	LOW		HIGH	

TUNING ASSY



DISPLAY ASSY

PRESET ADJUST/FINDER IND.
ZERO CENTER IND.

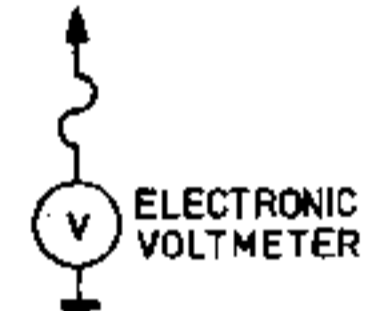
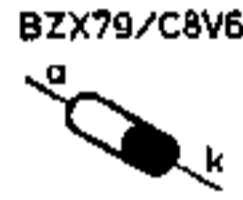
6106
FIELD STRENGTH IND.
1 2 3 4 5

6110 6109 6108
▶ | ◀



7109

- 1 = 0V 5 = 8.8V
- 2 = 2.2V 6 = 10.8V
- 3 = 4.3V 7 = 0-1.05V
- 4 = 6.5V 8 = 16.2V



...V FM
...V AM

NJM 78M 18A



7107

- 1 = 16.3V
- 2 = 1.65V (0V)
- 3 = 2V
- 4 = 2.1V
- 5 = 2V
- 11 = 15V
- 13 = 16.3V
- 14 = 2.6V
- 15 = 2.6V
- 16 = 0V

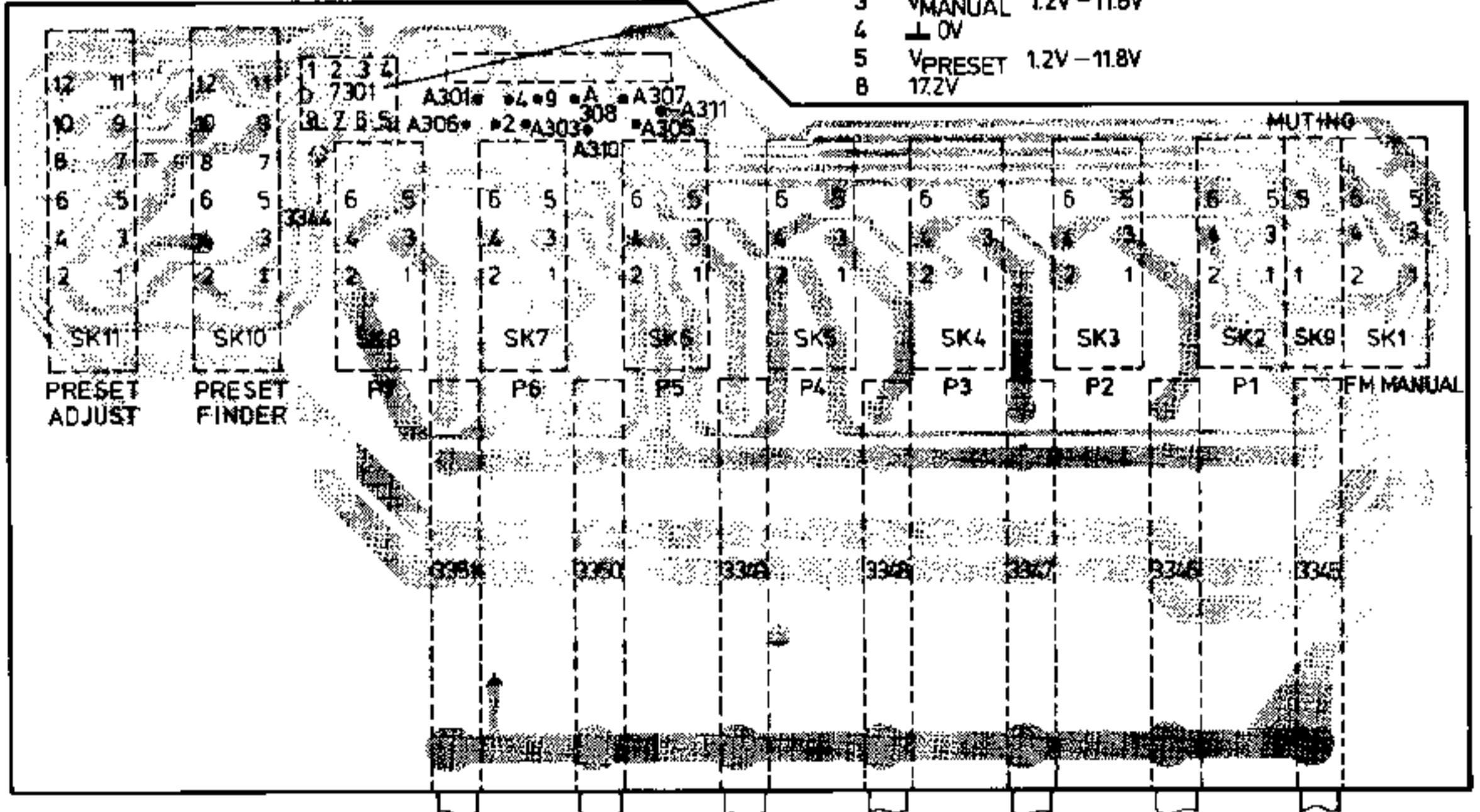
7106

- 2 = STEREO ON 0.4V
- 5 = 2.4V
- 6 = 6.9V
- 7 = 0V
- 8 = 16.1V
- 9 = 15.8V
- 12 = 8.5V
- 14 = STEREO ON 3.3V
- 15 = 7.5V
- 16 = 7.5V
- 17 = 8.6V
- 18 = 8.6V

7112

- 1 = 17.6V
- 2 = 0V
- 3 = 26.5V

PRESET UNIT



7301

- 3 V_{MANUAL} 1.2V-11.8V
- 4 0V
- 5 V_{PRESET} 1.2V-11.8V
- 8 17.2V



FM-IF

FM SK-14 FM man. SK-1 FM lock off SK-13 FM mute off SK-12	98 MHz ΔF 250 kHz (sweep range 75-110 MHz)		4101			 4.1 V \pm 30 mV	
	98 MHz 1 mV ΔF 75 kHz					 	
					5058 5053 5052	 	
	98 MHz				3112 	5107	
					5108		
					5108	 0 V \pm 50 mV	

FM-RF

FM SK-14 FM man. SK-1 FM lock off SK-13 FM mute off SK-12	108.4 MHz + 1 kHz mod.				5055	 Max.	
	87.2 MHz + 1 kHz mod.		A		3215		
	95 MHz + 1 kHz mod.		B		3210		

A.G.C./FIELDSTRENGTH IND.

FM SK-14 FM man. SK-1 FM mute off SK-12 FM lock off SK-13	98 MHz 0.5 mV				3115	 A.G.C. 6 V
					3173	 1.05 V All LED's on

STEREO DECODER

FM SK-14 FM man. SK-1 FM stereo on SK-12 LM lock off SK-13	98 MHz 0.5 mV 1 kHz mod. R= 90% mod. L= 0 9% pilot.				3128	 Min.
	No signal				3152	 Counter 76 kHz \pm 1 kHz

SK-							
-----	--	--	--	--	--	--	--

AM-IF

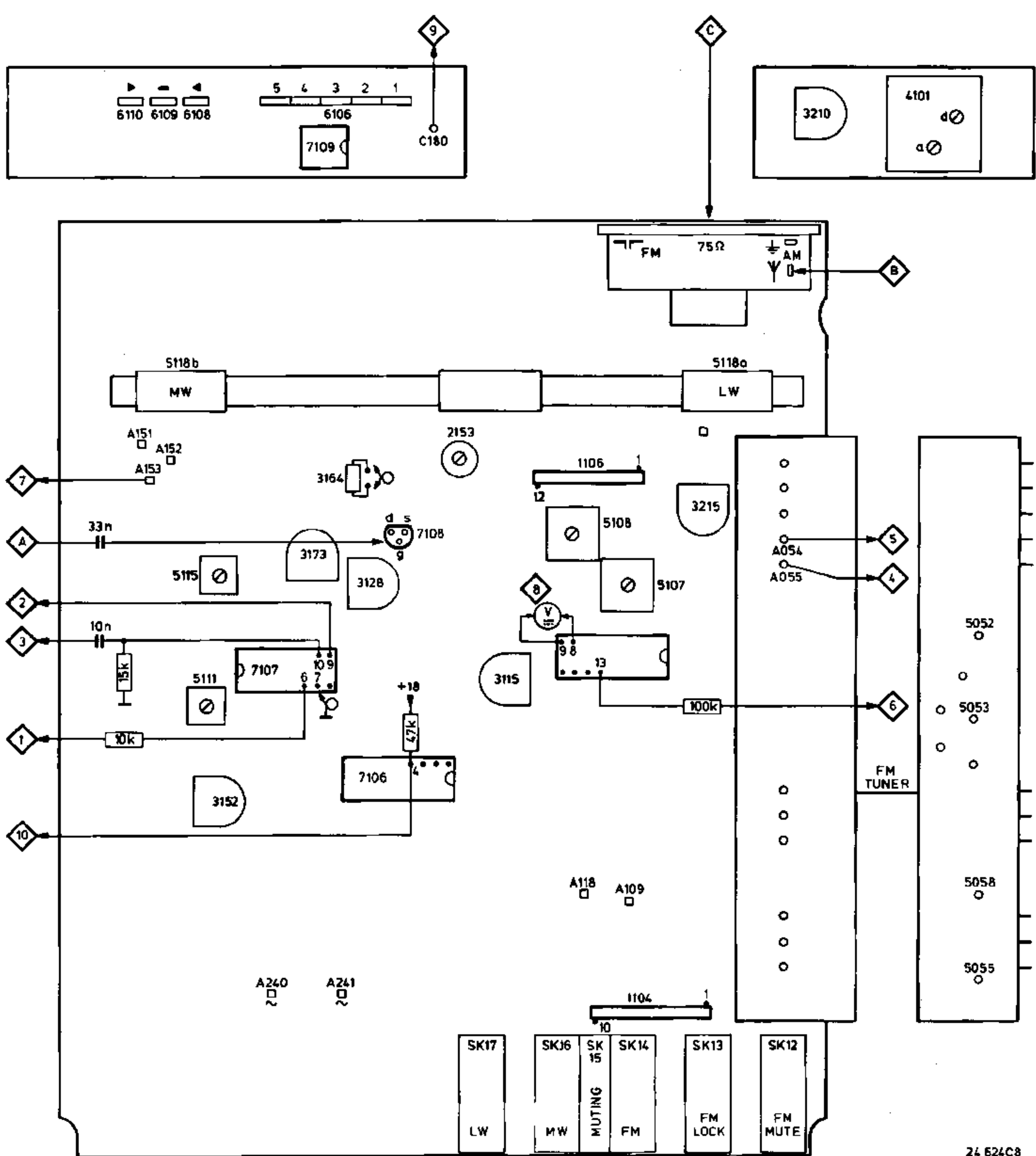
MW-SK-16	452/468 kHz via 33 nF (sweeprange 0.4-0.5 kHz)		4101 Max. Cap.	7. IC7107 			
					5111		

AM-RF

LW SK-17	147 kHz + 1 kHz mod.		4101 Max. cap.		5115	 Max.	
MW SK-16	1635 kHz + 1 kHz mod.		4101 Min. cap.		4101d	 Max.	
LW SK-17	155 kHz + 1 kHz mod.				5118a		 Max.
	250 kHz + 1 kHz mod.				2153		
MW SK-16	560 kHz + 1 kHz mod.				5118b		
	1500 kHz + 1 kHz mod.				4101a		

* AM-RF $f_{osc} = f_{RF} + f_{IF}$

				10 IC7107 		 Counter via 10 nF	
--	--	--	--	---------------	--	--------------------------	--



GB

- 1 Place the peak of the band-pass curve in the middle of the picture by shifting the sweep frequency.
- 2 Adjust for maximum height and symmetry.
- 3 Adjust for linearity and symmetry of the S-curve.
- 4 Connect point 4 IC7106 via 47 kΩ to +18.

NL

- 1 De top van de doorlaatkromme door verschuiven van de wobbelfrequentie in het midden van het scherm plaatsen.
- 2 Afregelen op maximum hoogte en symmetrie.
- 3 Afregelen op lineariteit en symmetrie van de S-kromme.
- 4 Punt 4 IC7106 aansluiten via 47 kΩ op +18.

D

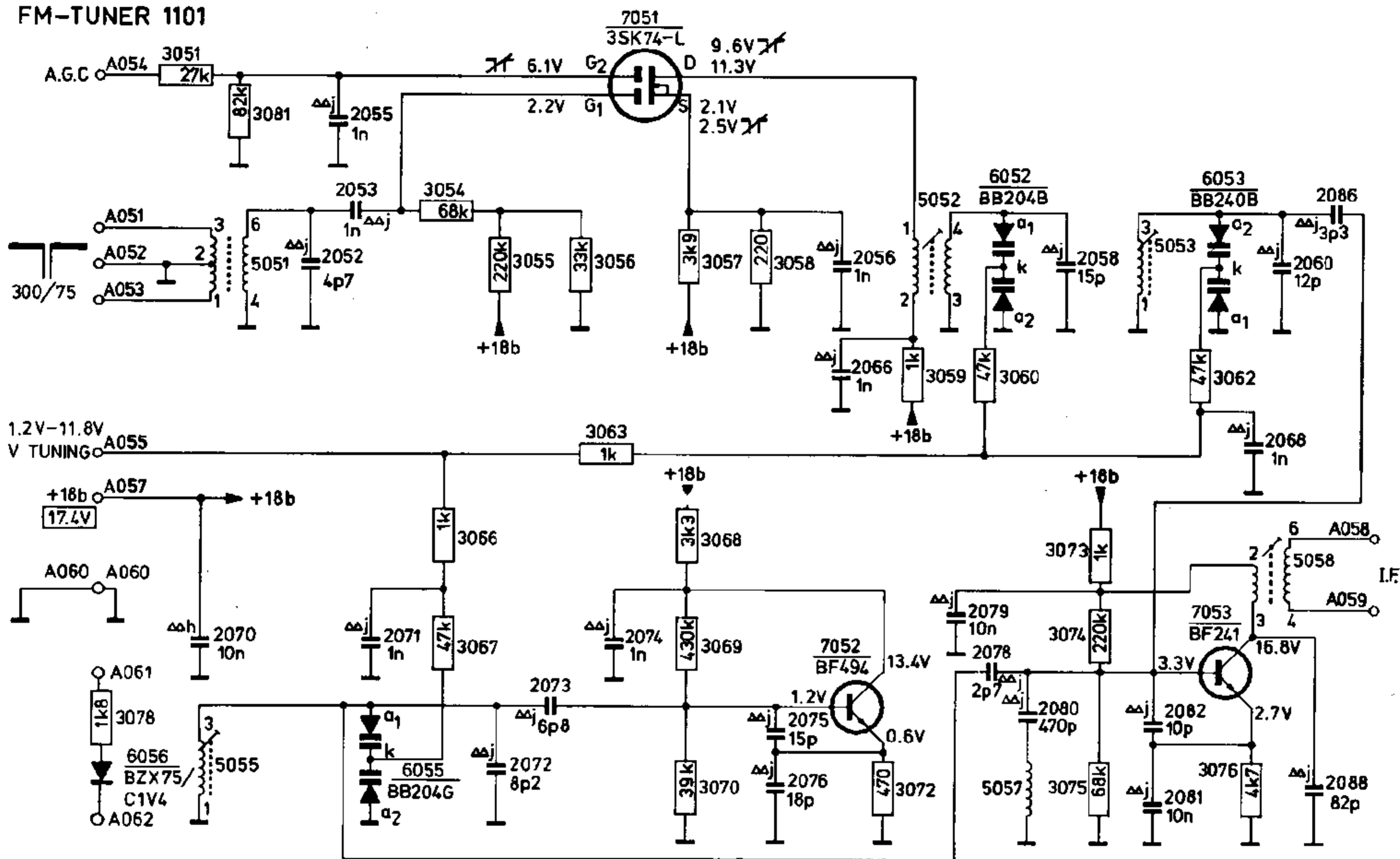
- 1 Die Spitze der Durchlasskurve in der Mitte des Bildes legen dadurch, dass man die Wobelfrequenz verschiebt.
- 2 Abgleichen auf Maximalhöhe und Symmetrie.
- 3 Abgleichen auf Linearität und Symmetrie der S-Kurve.
- 4 Punkt 4 IC7106 anschliessen via 47 kΩ an +18.

F

- 1 Le top de la courbe de réponse doit être amené au centre de l'écran par glissement de la fréquence de modulation.
- 2 Ajuster sur hauteur et symétrie maximum.
- 3 Ajuster pour la linéarité et la symétrie de la courbe en S.
- 4 Raccorder le point 4 IC7106 à travers une résistance de 47 kΩ à +18.

MISC.	6056	5055.5051	6055	7051	7052	5052	6052.5057	5053	6053.7053.5058		
C	2070	2052.2055.2053.2071	2072.2073	2074	2075.2076.2056.2066.2078+2080	2058	2082.2081	2060.2088.2086			
R	3051	3081	3067.3066.3054+3056	3063	3068	3070.3057.3058.3072	3059	3060	3073-3075	3062	3076

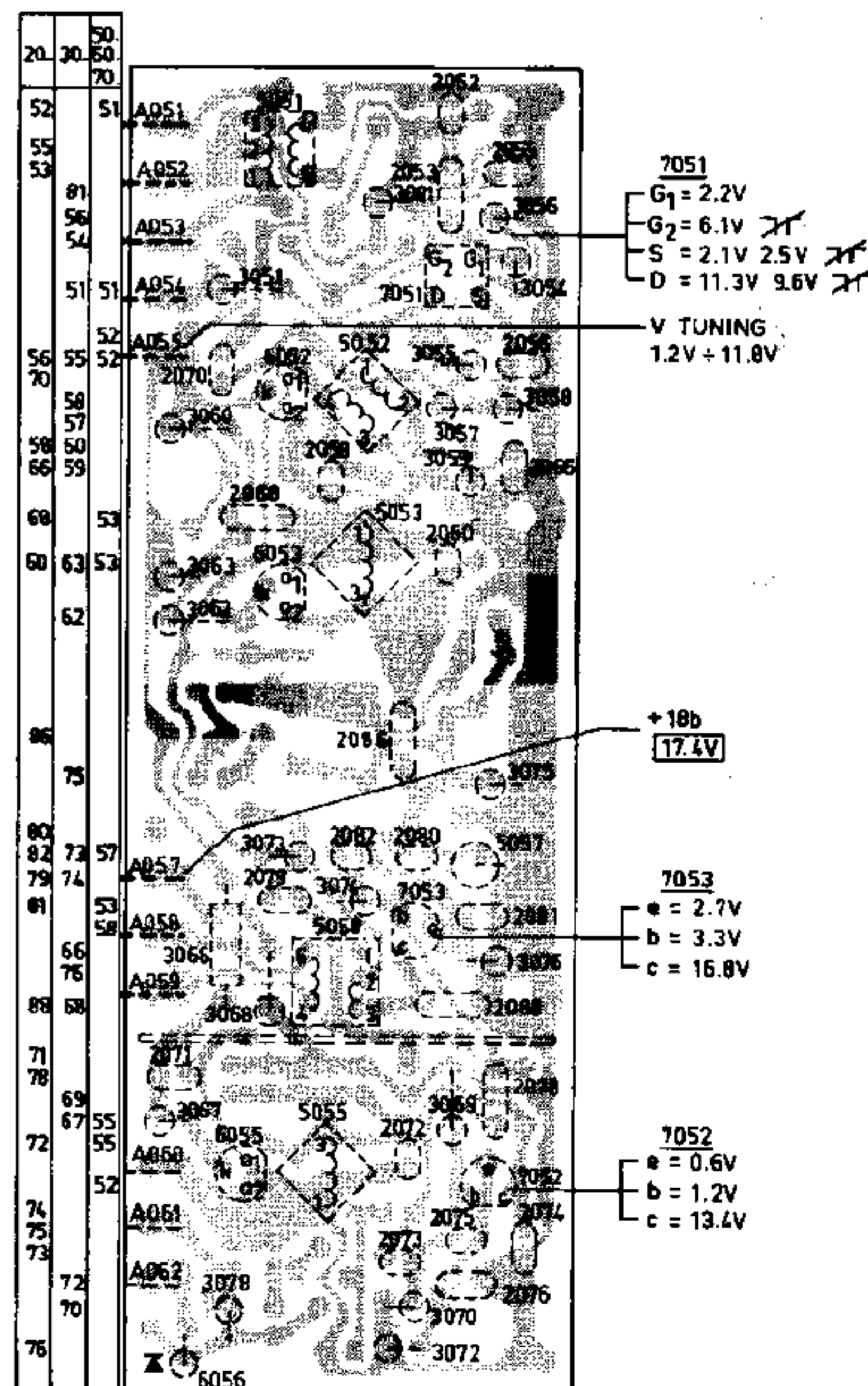
FM-TUNER 1101



ALL RESISTERS ARE FILM RES. SFR25 0.33W

22 243 C12/A

FM TUNER 1101



22213A12/A

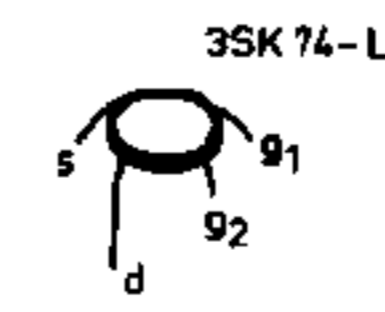
I

- 1 Portare la cresta della curva di risposta al centro dello schermo per mezzo di scivolamento della frequenza di modulazione.
- 2 Regolare per altezza e simmetria massima.
- 3 Regolare per linearità e simmetria della curva ad S.
- 4 Collegare il punto 4 IC7106 tramite una resistenza di 47 kΩ su di +18.

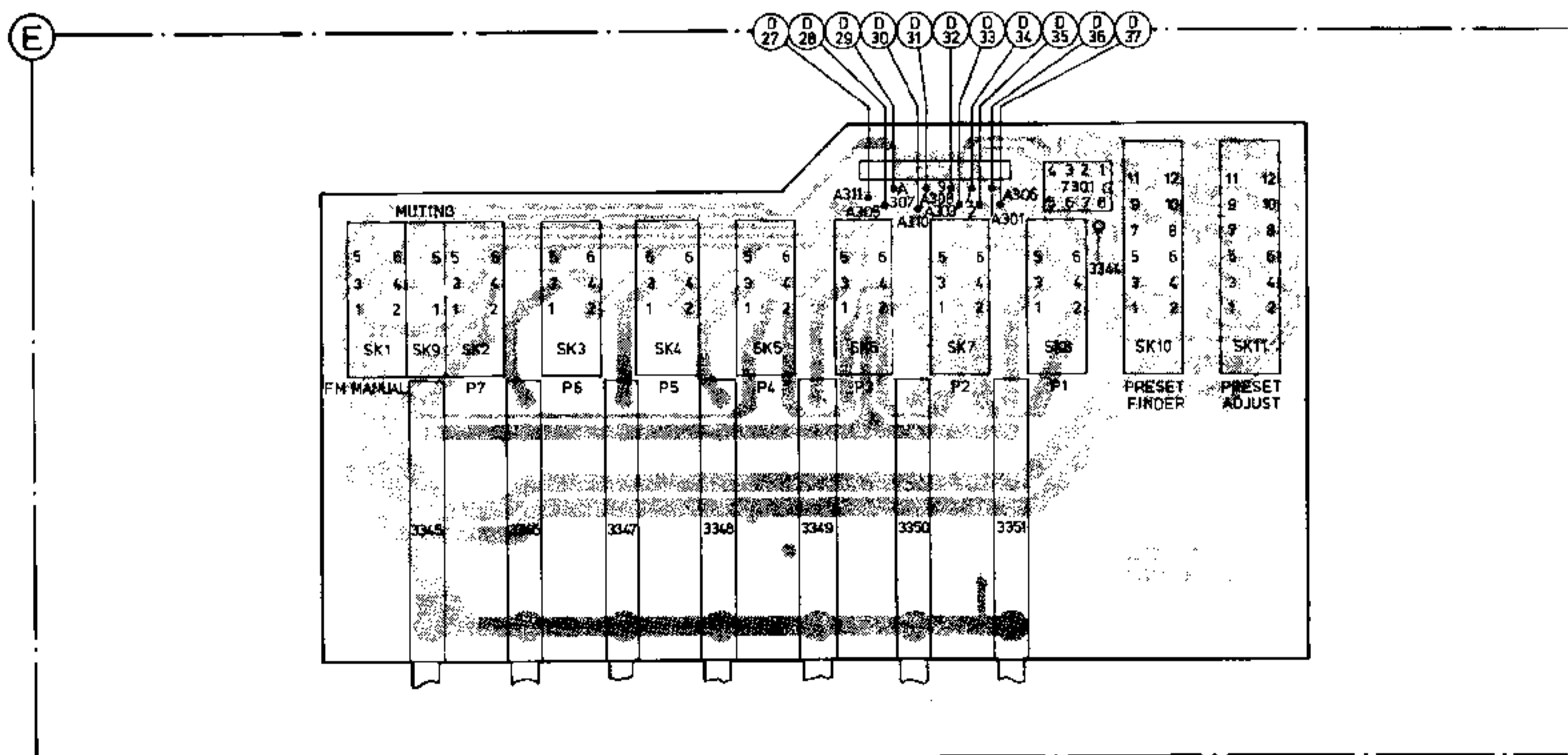
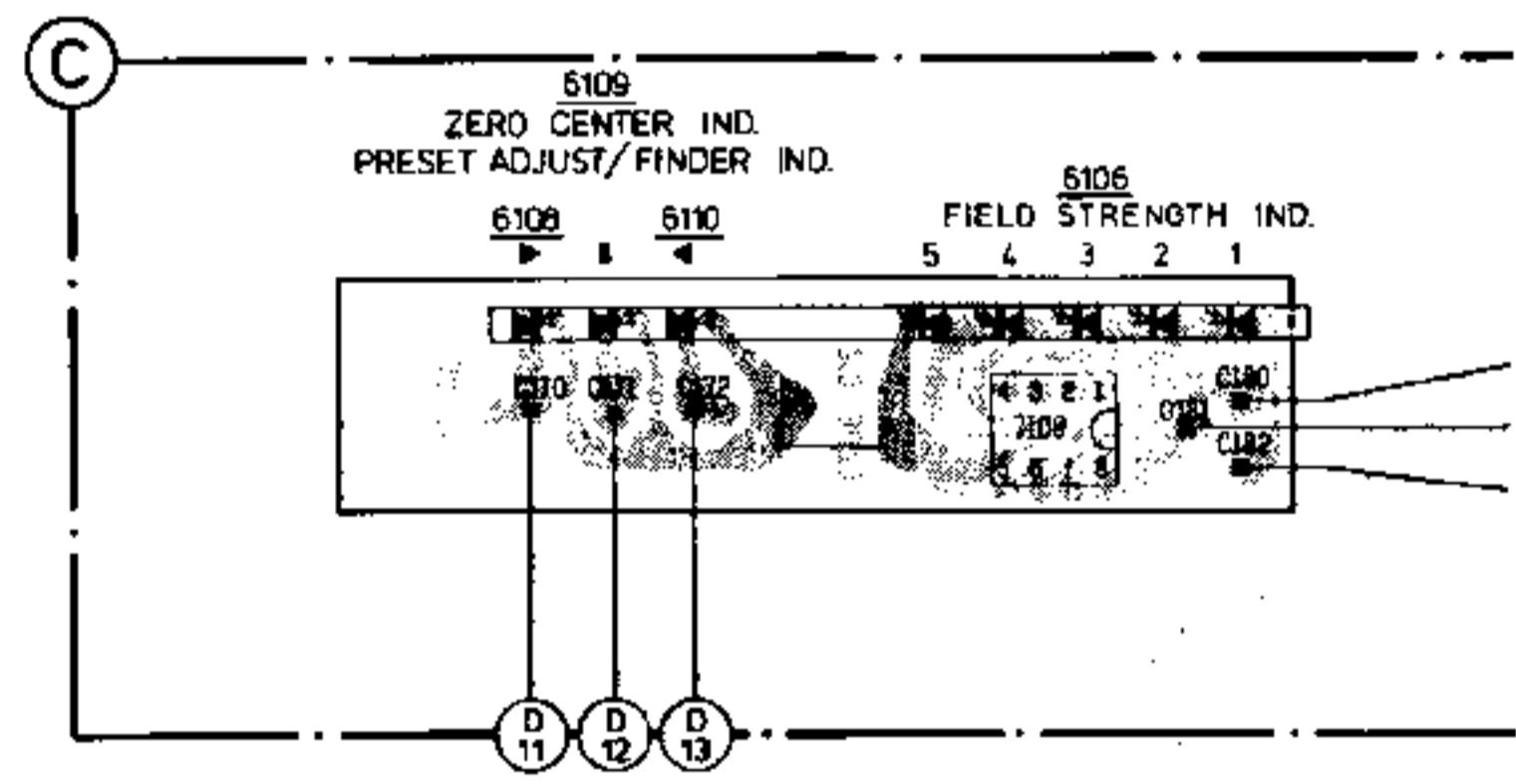
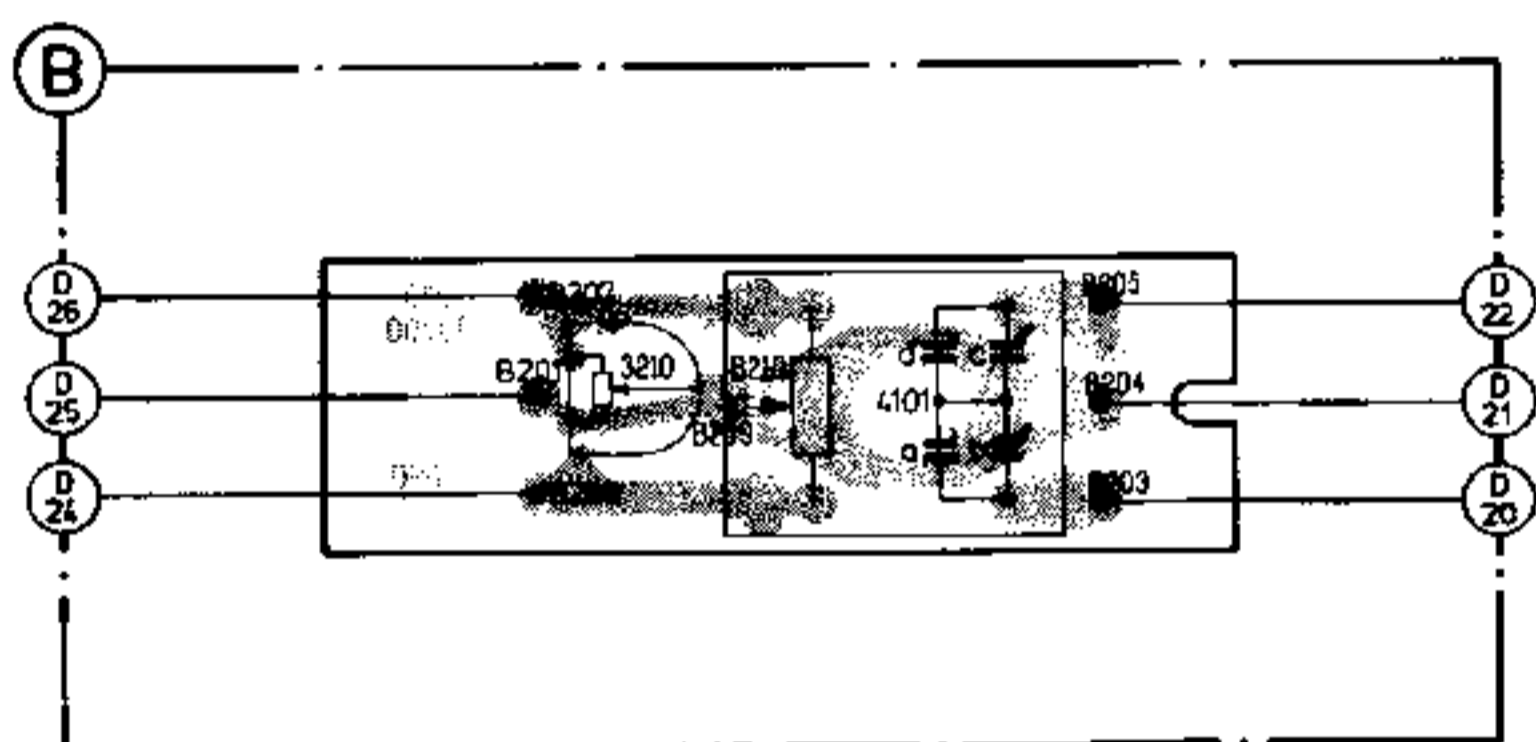
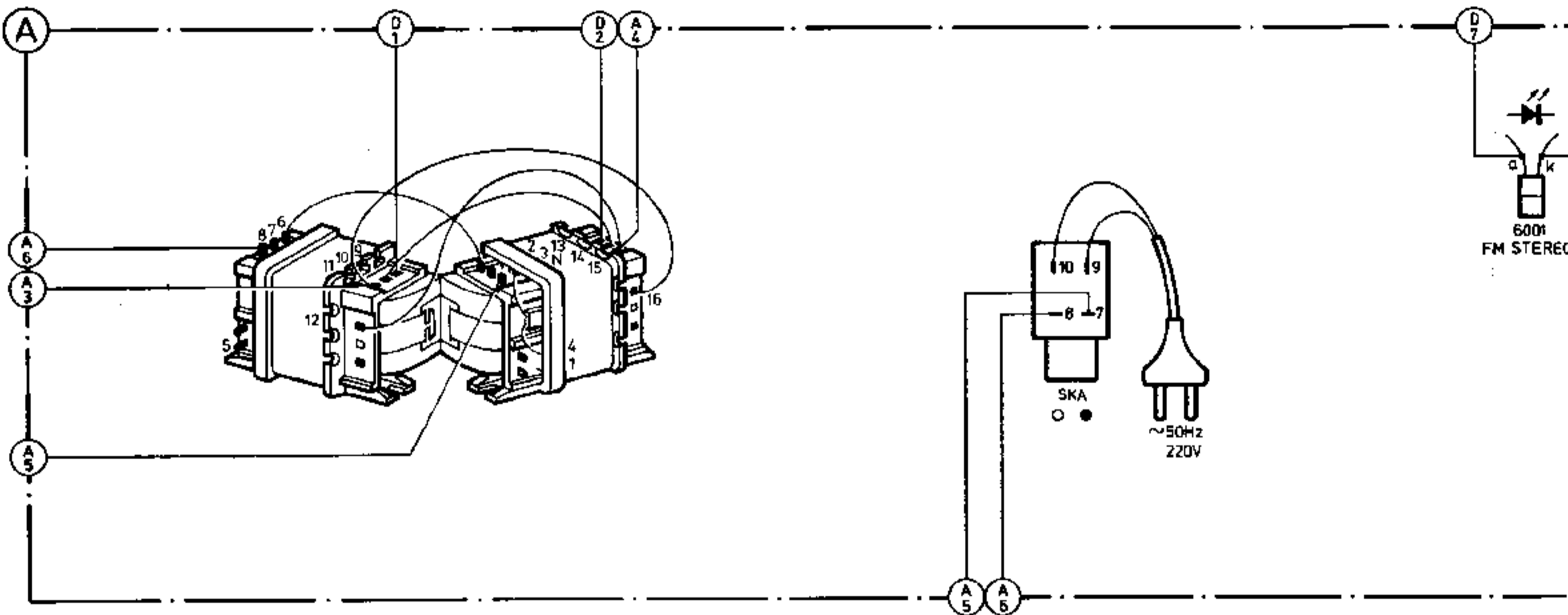
6052, 6053, 6055



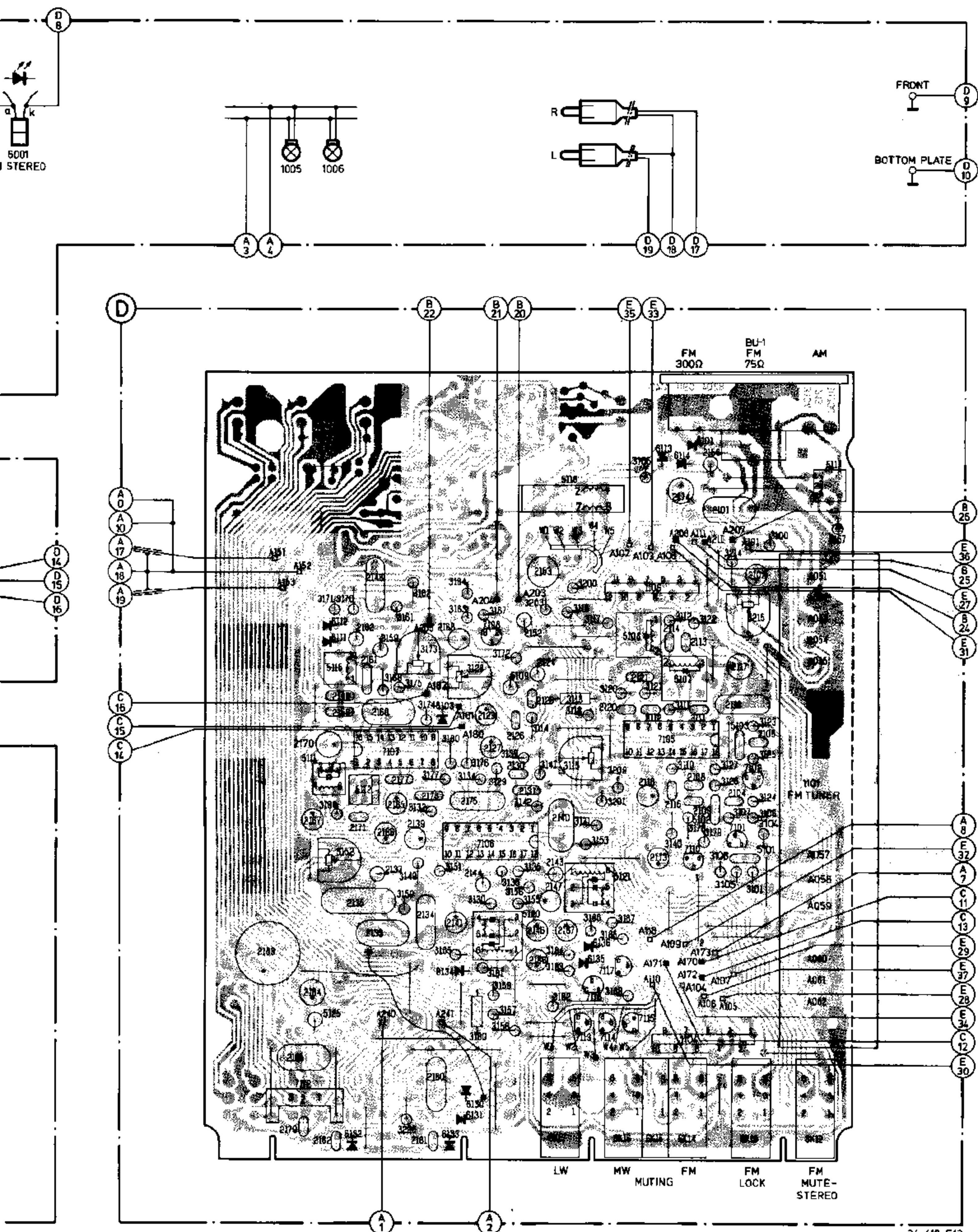
7051



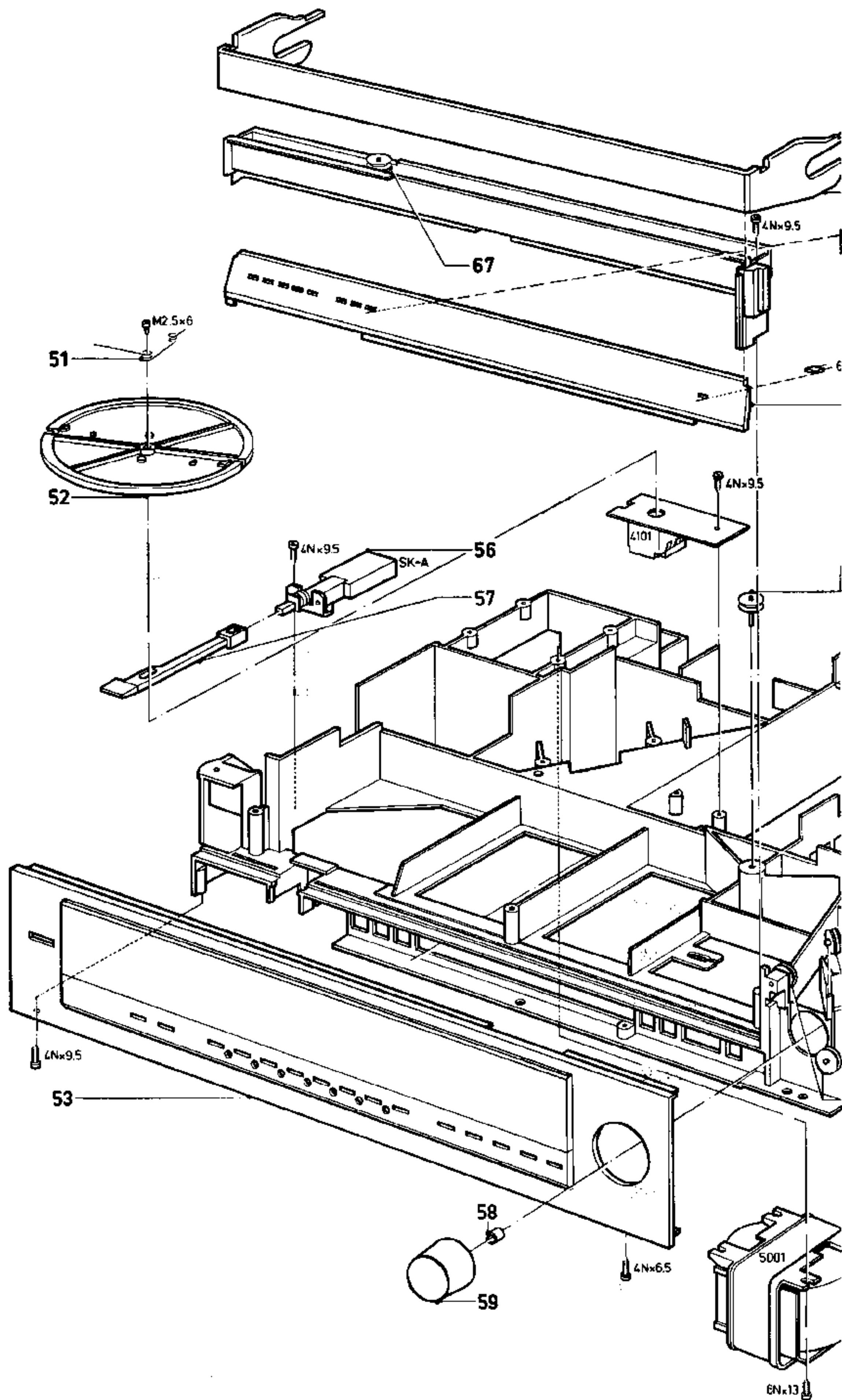
MISC	4101	6108, 6109, 6110	7109, 6106	5002
MISC		7301		
S				
C				
C				
C				
R				
R	3210			
R	3345	3346	3347	3348
				3349
				3350
				3351
				3344

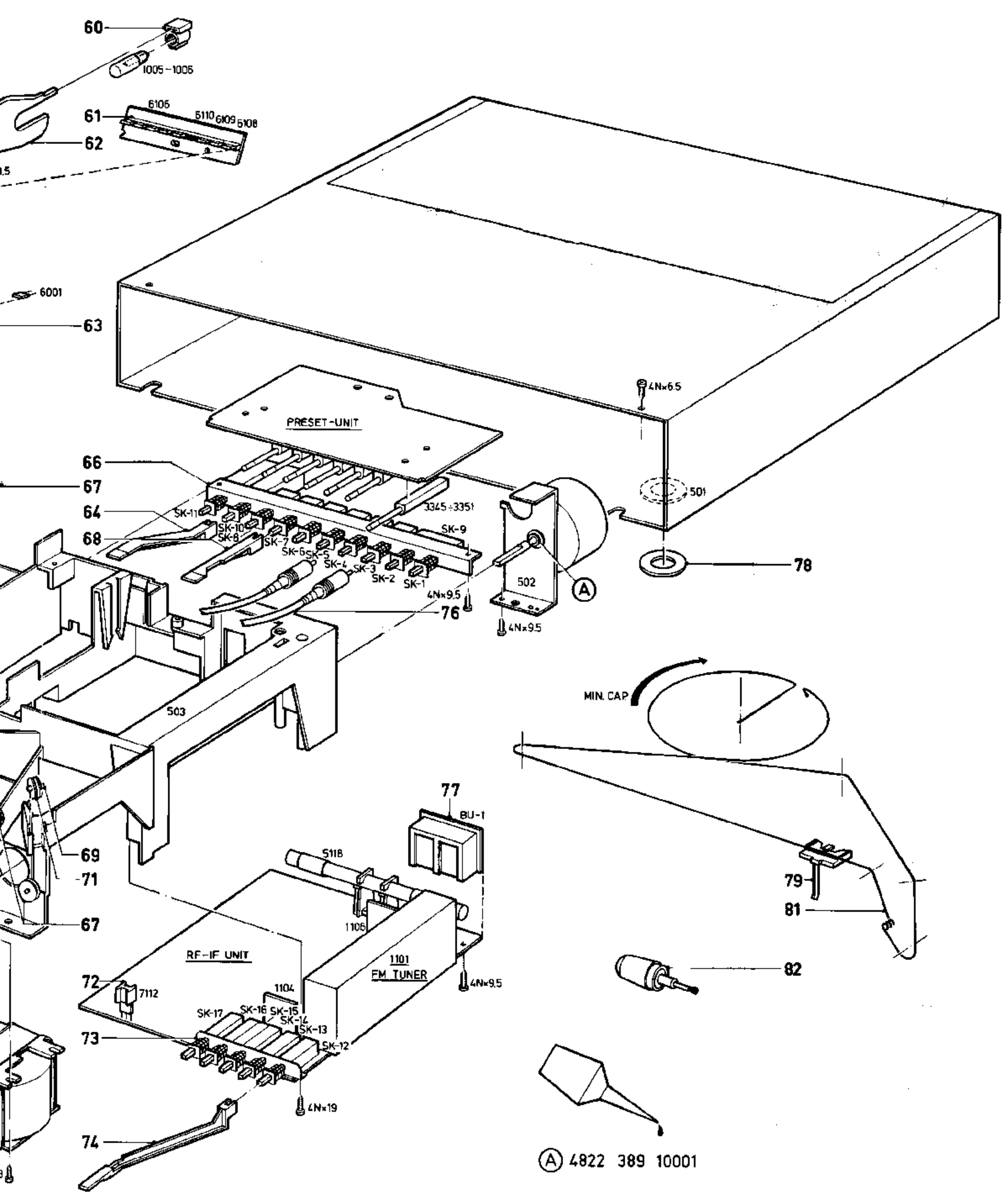


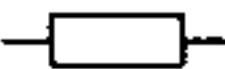





6002	1005.1006.6111.6112	7107	6103.7106.7108	6135.6136	1106.6113.6114.6001	1101
	7112	6132	6133.6134.6131.6130	7113..7117	7105.7110.1104.7101.7102	
	5125.5111.5115.5112		5120.5109	5118.5121	5108	5107.5101...5103
	2148...2150.2159...	2152.2129...	2131.2152.2153.2124...	2127.2120.2121		2174.2156.2101.2102
	2170.2171.2165...	2168.2175...	2177.2141.2144.2147.2143.2140		2111...2118	2104.2105
	2162...2165.2179.2135.2133.2137.2139.2134.2180.2181.2146.2186.2187					2173.2108.2109
	3168...	3171.3161...	3164.3128.3167.3172.3203.3200.3113...	3118.3120.3166.3110...	3112.3122.3214.3215.3100	
	3152	3132.3173...	3177.3180.3129.3139.3142.3141.3131.3201.3202.3121.3178.3179.3123...	3127.3104...	3108	
	3220.3149...	3151.3165.3135.3136.3155...	3160.3181...	3188.3153	3140	3101

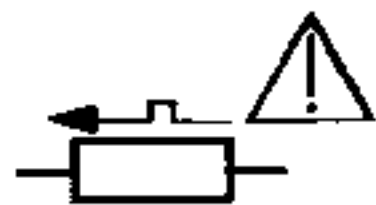


51	4822 492 31667
52	4822 528 80847
53	4822 454 10957
53-/28	4822 454 10965
56	4822 276 10807
57	4822 410 40254
58	4822 492 60268
59	4822 413 40987
60	4822 255 10151
61	4822 255 40226
62	4822 454 10941
63	4822 454 10958
64	4822 410 40259
66	4822 276 80235
67	4822 528 80802
68	4822 410 40258
69	4822 535 91151
71	4822 528 80156
72	4822 255 40232
73	4822 276 50271
74	4822 410 40253
76	4822 321 20482
77	4822 265 40145
78	4822 462 40409
79	4822 450 80712
81	4822 321 30213
82	4822 395 50133





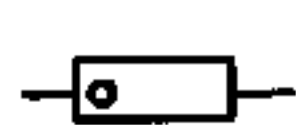
-MISCELLANEOUS-					
1005-1006	Dial lamp 6.3 V 250 mA	4822 134 40446	3115,3152	} Trim potm. 10 kΩ	4822 100 10035
1101	FM tuner	4822 210 10225	3173,3215		
1104	} Thi-Fi unit Ind. drive 1-WID-1	4822 214 50225	3122,3180	Safe res. 47 Ω	4822 111 30526
1106		} Thi-Fi unit Tuning Volt. Gen. T.V.G.	4822 111 90057	3128	Trim potm. 22 kΩ
4101	Varco-potm.		4822 158 60459	3134,3176	Safe res. 39 Ω
5001	Mains trafo	4822 146 60098	3210	Trim potm. 470 kΩ	4822 100 10107
	Trafo fuse	4822 252 20007	3220	Safe res. 1 Ω	4822 111 30483
			3345-3351	Preset potm. 100 kΩ	4822 100 30022
					
2116	Elco Alum. 4.7 μF 25 V	4822 124 21054	6001	LED green SLP251B	4822 130 31461
2124	Micro poco 680 pF	5322 121 54174	6052,6053	BB204B	4822 130 34449
2137	Micro poco 430 pF	5322 121 54129	6055	BB204G	5322 130 34825
2141	Elco Low Leak 2.2 μF 50 V	4822 121 50807	6056	BZX75-C1V4	4822 130 34047
2143,2144	Micro poco 3.3 nF	5322 121 54049	6101,6103	1N4148	4822 130 30621
2152	Micro poco 68 pF	4822 121 50563	6106	LED array SLP252B-06	4822 130 31459
2153	Trimmer 22 pF	4822 125 50045	6108,6110	LED red SLP151B	4822 130 31476
2156	Micro poco 3.6 nF	4822 121 50088	6109	LED green SLP251B	4822 130 31461
2157	Micro poco 390 pF	5322 121 54128	6111,6112	BAW62	4822 130 30613
2159	Micro poco 309 pF	4822 121 50628	6113,6114	BZX79-B8V2	4822 130 34382
2162	Micro poco 294 pF	4822 121 50617	6130-6133	BAX14	4822 130 34193
			6134-6136	1N4148	4822 130 30621
			-IC-  		
5051		4822 146 40267	7051	3SK74-L	4822 130 41603
5052		4822 157 51065	7052	BF494	4822 130 44195
5053,5055		4822 157 51171	7053	BF241	4822 130 40898
5057	0.47 μH	4822 157 50967	7101,7102	BF494	4822 130 44195
5058		4822 153 50206	7105	TDA1576	4822 209 80872
5101,5102,5103	} Cer. resonator 10.7 MHz	4822 242 70355	7106	TDA1578	4822 209 80873
5107,5108			4822 153 50235	7107	TDA1072
5109	1 MH	4822 157 50975	7108	BF245C	4822 130 41065
5111		4822 156 30767	7109	U244B	4822 130 31415
5112	Cer. resonator 468 kHz	4822 242 70275	7110,7113,7114,7116	} BC548	4822 130 40938
5112	Cer. resonator 452 kHz	4822 266 20069	7117		
5115		4822 157 51255	7112	NJM78M18A	4822 209 80675
5117	114 kHz	4822 156 20743	7115	BC558	4822 130 40941
5118	Ferroceptor	4822 158 60457	7301	NE532AN	4822 209 80818
5120,5121	Low pass filter	4822 158 60464			
5125	Choke 100 μH	4822 157 50964			



SPRING RESISTOR



SAFETY RESISTOR



0.2 W < 220kΩ 5%
(CR16) > 270kΩ 10%



0.33 W ≤ 1MΩ 5%
(CR25) > 1MΩ 10%



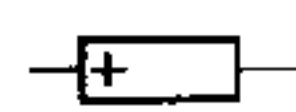
0.5 W ≤ 1MΩ 5%
(CR37) > 1MΩ 10%



0.67 W ≤ 1MΩ 5%
(CR52) > 1MΩ 10%



1.15 W ≤ 1.6 MΩ 5%
(CR68) > 1.6 MΩ 10%



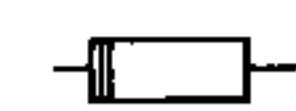
0.5 W HIGH VOLTAGE
(VR37) RESISTOR 5%



4 W WIRE WOUND
(WR0617) RESISTOR 5%



7 W WIRE WOUND
(WR0825) RESISTOR 5%



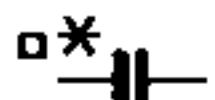
11 W WIRE WOUND
(WR0842) RESISTOR 5%



CERAMIC PLATE



POLYESTER FLAT FILM



POLYESTER MEPOLESCO



SINGLE ELCO

* a = 2.5 V g = 40 V r = 250 V
 b = 4 V h = 63 V s = 350 V
 c = 6.3 V j = 100 V u = 400 V
 d = 10 V l = 125 V v = 500 V
 e = 16 V m = 150 V w = 630 V
 f = 25 V q = 200 V x = 1000 V