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ELECTRONICS SERVICE MANUAL

T-04 Tuner

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Specifications

FM Tuner Section

Usable Sensitivity	11.2 dBf/2.0 μ V (mono)
DIN Sensitivity	1.1 μ V (26 dB S/N 75 ohms)

50 dB Quieting Sensitivity

Mono	14.6 dBf/3.0 μ V
Stereo	37.2 dBf/4.0 μ V

Signal to Noise Ratio (at 65 dBf) IHF A Weighted

Mono	75 dB
Stereo	73 dB

Harmonic Distortion (at 65 dBf)

100 Hz.....	0.08% (Mono) 0.1% (Stereo)
1 kHz.....	0.08% (Mono) 0.2% (Stereo)
6 kHz.....	0.08% (Mono) 0.3% (Stereo)

Frequency Response..... \pm 1 dB (30 Hz ~ 15 kHz)

Capture Ratio..... 1.5 dB

Alternate Channel Selectivity..... 70 dB (+ 400 kHz)

Spurious Response Ratio..... 85 dB

Image Response Ratio..... 70 dB

IF Response Ratio..... 90 dB

AM Suppression Ratio..... 60 dB

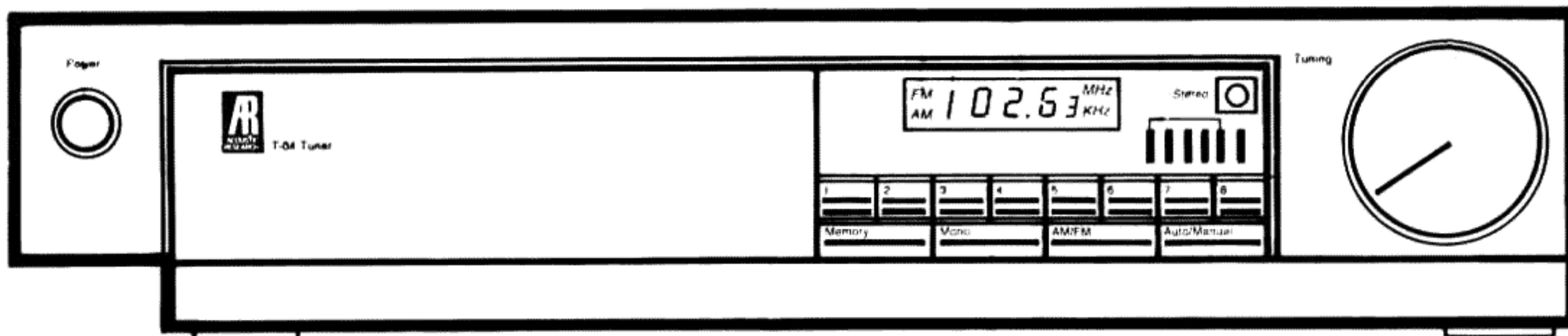
Muting Threshold..... 15 μ V

Stereo Separation

100 Hz.....	45 dB
1 kHz.....	48 dB
10 kHz.....	40 dB

AM Tuner Section

Selectivity	40 dB
Sensitivity (Loop Antenna).....	300 μ V
Signal to Noise Ratio.....	50 dB
Image Response Ratio.....	40 dB
IF Response Ratio.....	40 dB
Power Consumption.....	20 Watts
Dimension (Overall).....	430(W) \times 88(H) \times 352(D) 10 ^{15/16} " \times 3 ^{15/32} " \times 14 ^{1/16} "
Weight (net).....	5.3 kgs/11.66 lbs



FM IF, RF Alignment and FM MPX Alignment

Instruments: FM Signal Generator, (400Hz, 100% Modulated) T.H.D. analyzer, Oscilloscope, AC VTVM, DC Voltmeter, Tuning Meter

FM Stereo Generator, AC VTVM, Oscilloscope, Frequency Counter and THD Analyzer

Terminated : DC Voltmeter...Between 4 and E5 On TH-IF-152 P.C.B. (Step 1.2)

Tuning Meter...Between TP1 and TP2 On TH-IF-152 P.C.B. (Step 8)

Step	Generator		Tuning Dial Setting	Adjust	Adjust for
	Coupling	Frequency			
1	No use.		87.5 MHz	L106	3V reading on DC Voltmeter
2			108 MHz	CT116	23V reading on DC Voltmeter
3	Repeat steps 1 and 2 unit no further improvement is noticed.				
4	Antenna terminal	90 MHz	90 MHz	L101 L102 L103	Maximum reading on AC VTVM.
5				L105	Adjust balance of wave form
6		105 MHz	105 MHz	CT102 CT107 CT109	Maximum reading on AC VTVM.
7	Repeat steps 4.5 and 6 unit on further improvement is noticed				
8	Antenna terminal 1mV input	90 MHz	90 MHz	L151(A)	Adjusting center on Tuning Meter
9				L151(B)	Minimum reading on T.H.D. Analyzer
10	Repeat steps 8 and 9 unit no further improvement is noticed				
11	Antenna terminal 15 μ V input 10 μ V input (Europe)	90 MHz	90 MHz	VR165	Muting Level (Auto Position)
12	Antenna terminal 1mV input	90 MHz	90 MHz	VR167	Signal Indicator Level 5th LED light on
13	Antenna terminal 1mV input	98 MHz Pilot...10% 1 KHz...90% Mod.	98 MHz	VR308	Best separation No need to Adjust VCO

AM IF and RF Alignment

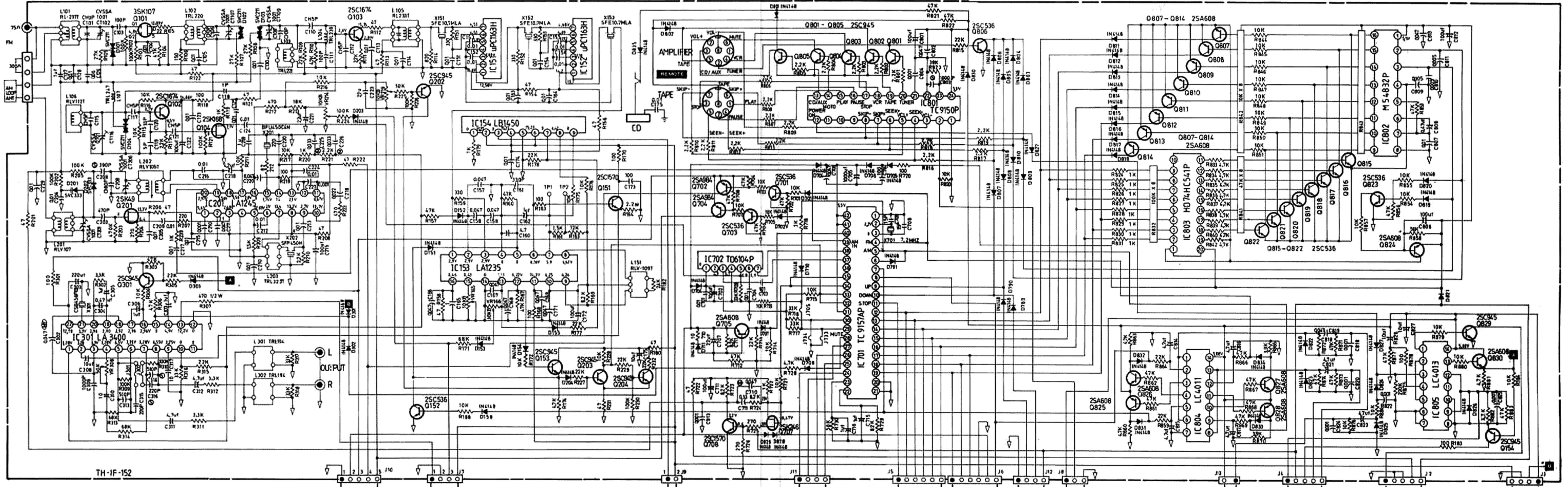
Instruments: AM signal Generator (400Hz 30% Modulated), AC VTVM, Oscilloscope, DC Voltmeter

Terminated : DC Voltmeter "Between 4 and E5 ON TH-IF-152 and TX-474 P.C.B.

Step	Generator		Tuning Dial Setting	Adjust	Adjust for
	Coupling	Frequency			
1	No use.		530 KHz (531 KHz) Europe	L202	3V reading on DC Volt meter
2			1600 KHz (1602 KHz) Europe	CT206	25V reading on DC Volt meter
3	Repeat steps 1 and 2 unit no further improvement is noticed.				
4	Test Loop Radiate signal into loop antenna	450 KHz	530 KHz	L203	Maximum reading on AC VTVM.
5		600 KHz	600 KHz	L201 L203	
6		1400 KHz	1400 KHz	CT201	
7	Repeat steps 5 and 6 unit no further improvement is noticed.				
8	Test Loop Radiate signal into loop ANT. 10mV input	1000 KHz	1000 KHz	VR214	Signal Indicator Lever 5th LED light on
9	Test Loop Radiate signal into loop ANT. 1mV input	1000 KHz	Auto Scanning	VR219	Stop Position

Schematic Diagram

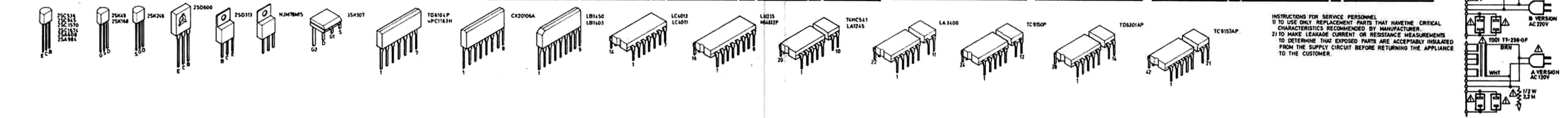
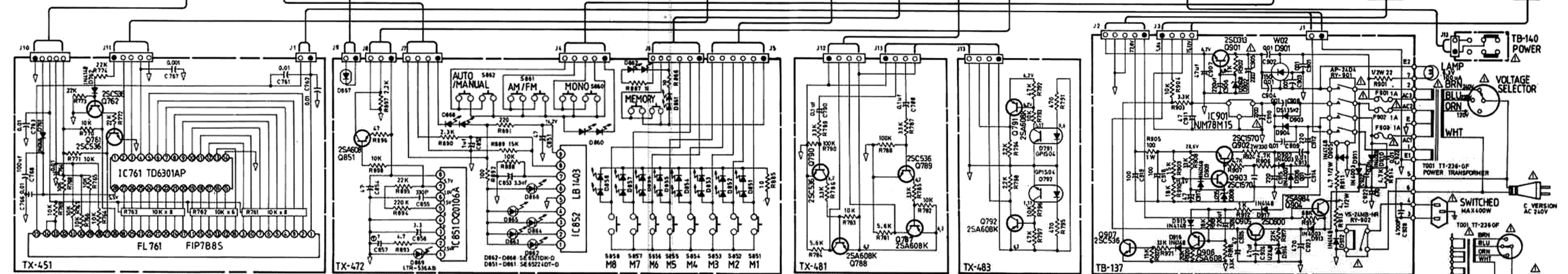
NOTE: PARTS AND CIRCUIT SUBJECT TO CHANGES FOR IMPROVEMENTS WITHOUT PRIOR NOTICE



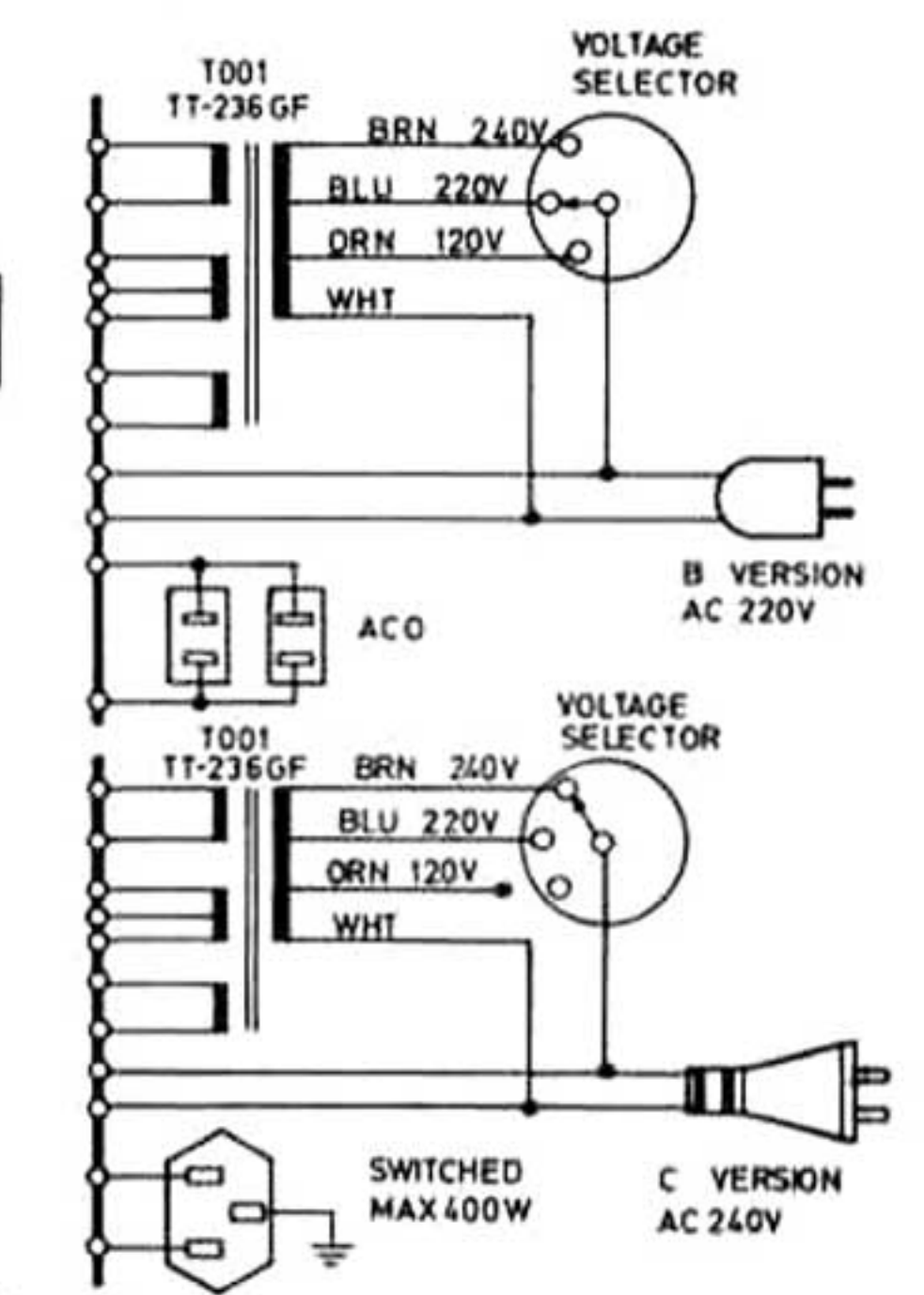
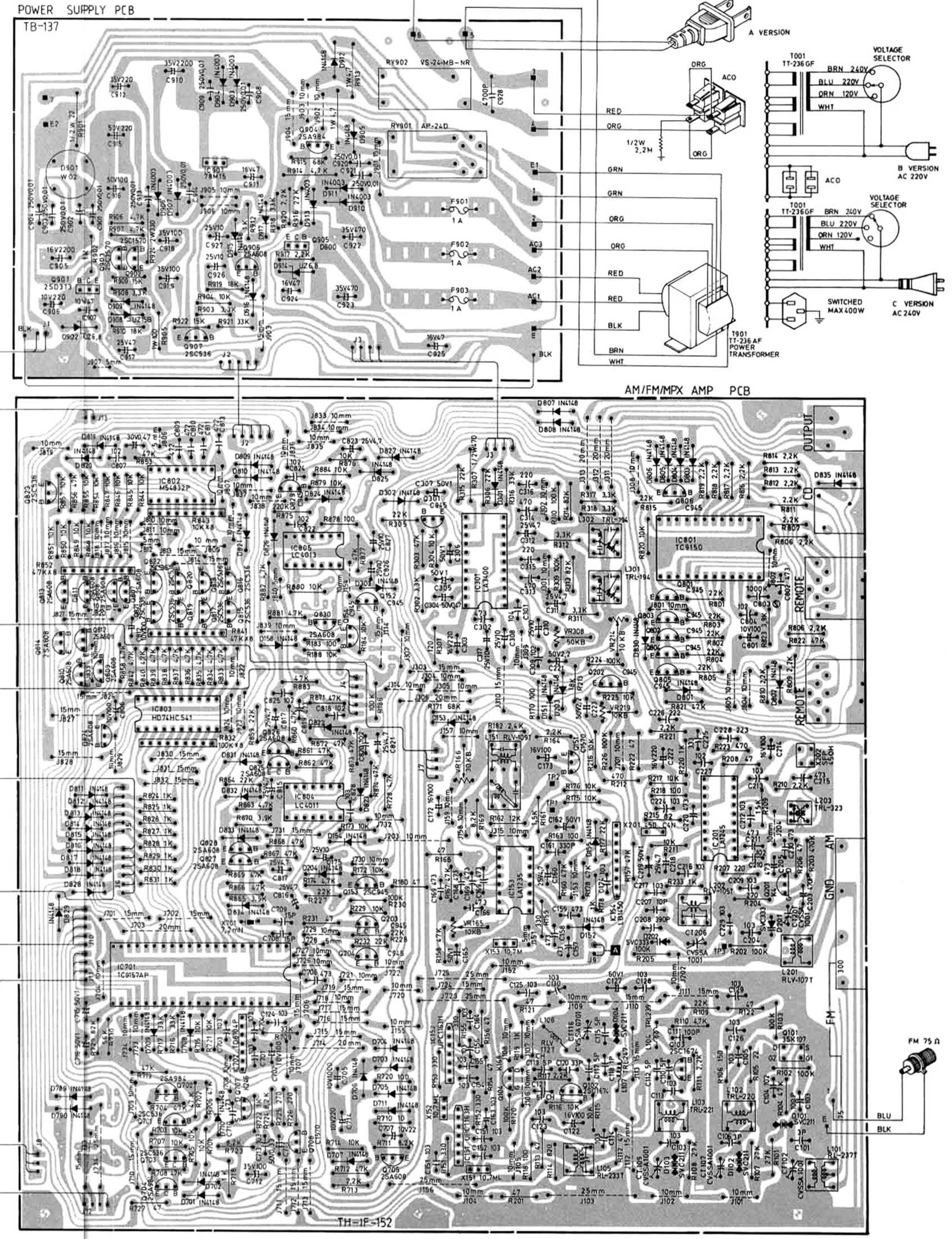
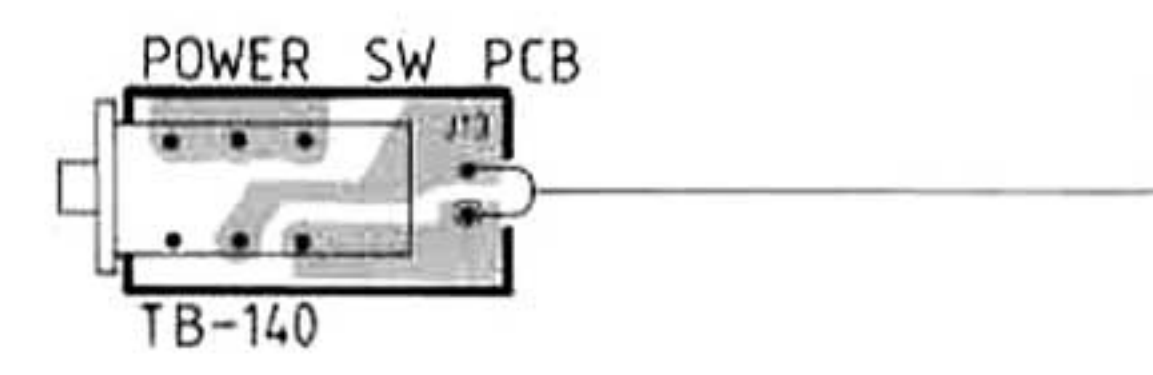
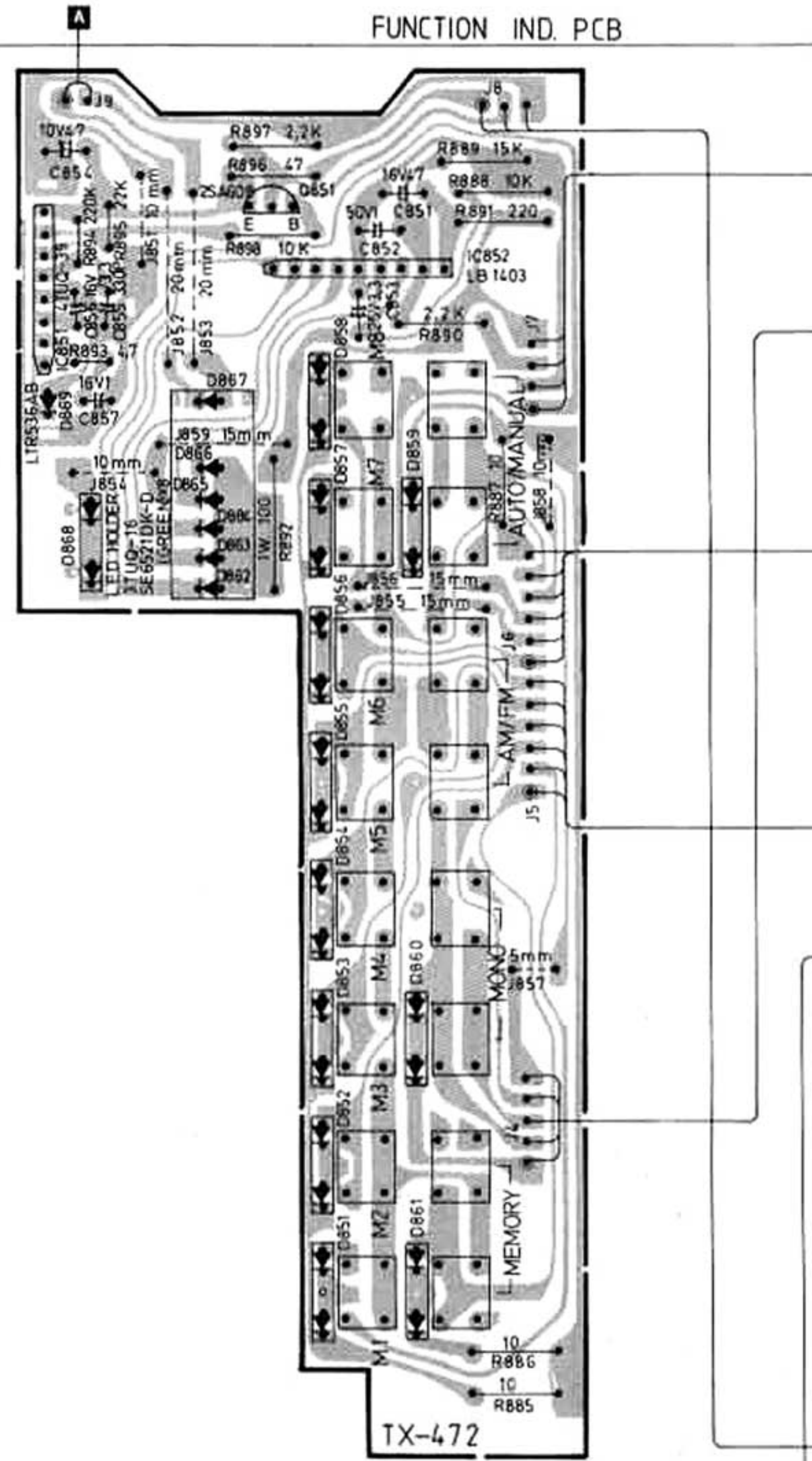
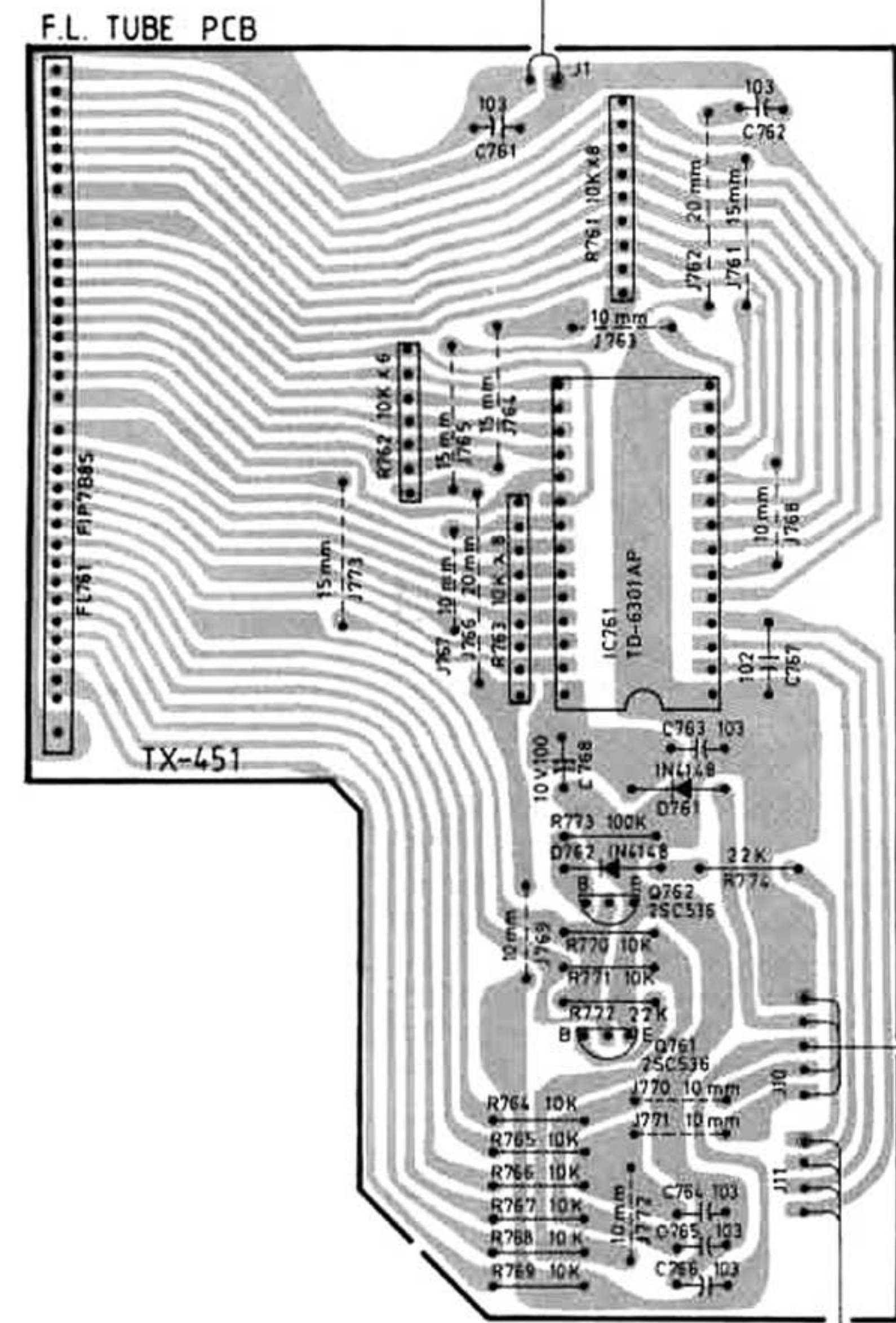
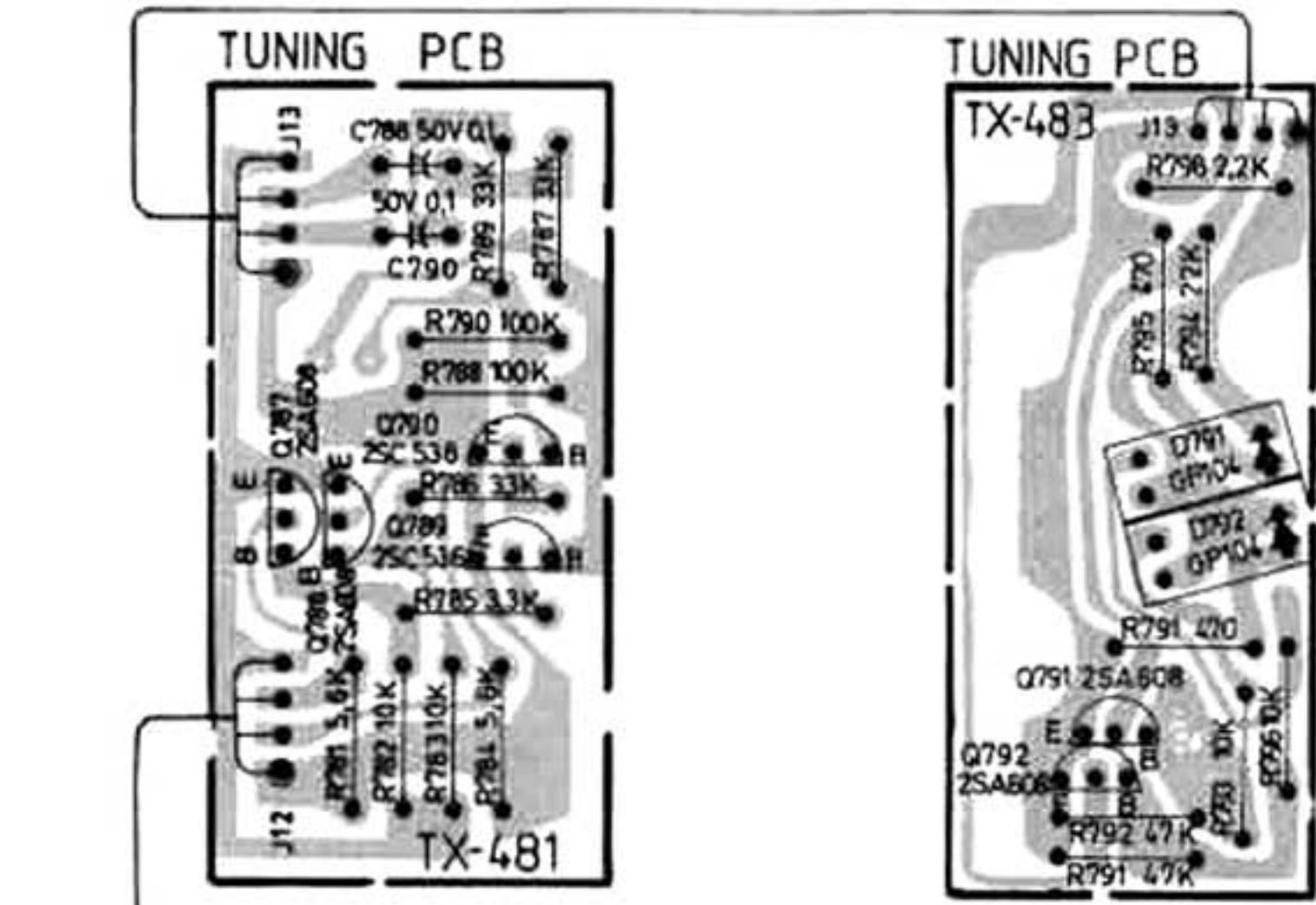
RESISTORS
 9% TOLERANCE UNLESS OTHERWISE NOTED
 K --- KILO OHM
 M --- MEGA OHM
 --- METAL RESISTORS 1/4 WATT
 RSU METAL OXIDE FILM RESISTORS
 NON MARK LOW NOISE TYPE CARBON RESISTORS

CAPACITORS
 --- LOW NOISE ELECTROLYTIC CAPACITORS
 --- NYLON FILM CAPACITORS
 --- POLYSTYRENE FILM CAPACITORS
 --- TANTALUM CAPACITORS
 --- ELECTROLYTIC CAPACITORS
 NON MARK CERAMIC CAPACITORS
 UNLESS OTHERWISE NOTED IN SCHEMATIC ALL CAPACITANCE VALUES ARE EXPRESSED

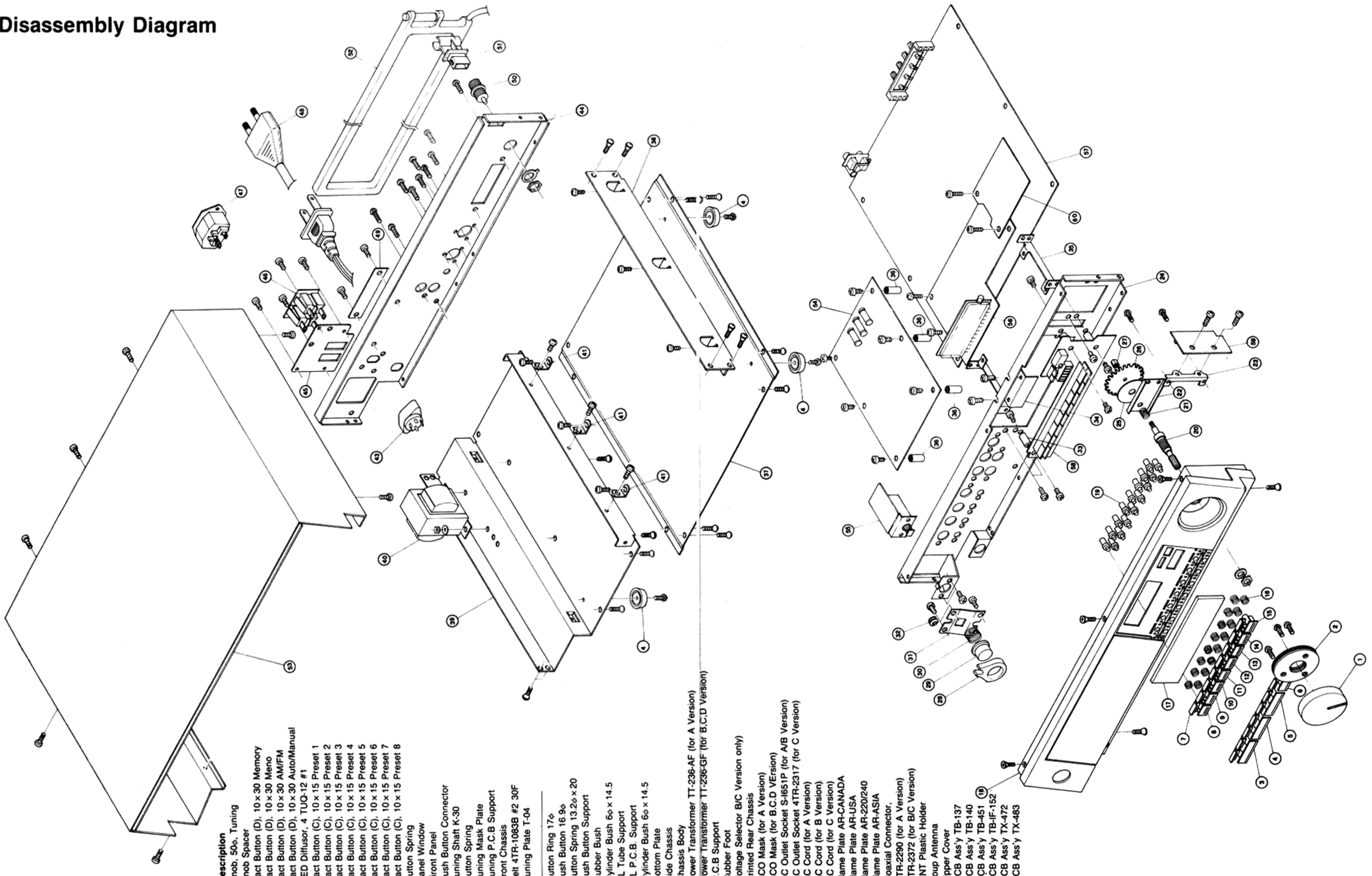
ITEM	SCHEMATIC LOCATION (LAST)
FM/IF AMP	R188 C175
AM/FM AMP	R238 C237
MPX	R318 C314
SWITCH	R780 C780
INDICATOR	R898 C857
POWER SUPPLY	R824 C819



Wiring Diagram



Disassembly Diagram



Key No.	Pats No.	Description
1	KB10001357	Knob, 50 ϕ , Tuning
2	SR00000780	Knob Spacer
3	KB20001883	Tact Button (D), 10 x 30 Memory
4	KB20001895	Tact Button (D), 10 x 30 Memo
5	KB20001901	Tact Button (D), 10 x 30 AM/FM
6	KB20001913	Tact Button (D), 10 x 30 Auto/Manual
7	OM00002080	LED Diffuser, 4 TUQ-12 #1
8	KB20001809	Tact Button (C), 10 x 15 Preset 1
9	KB20001810	Tact Button (C), 10 x 15 Preset 2
10	KB20001822	Tact Button (C), 10 x 15 Preset 3
11	KB20001834	Tact Button (C), 10 x 15 Preset 4
12	KB20001846	Tact Button (C), 10 x 15 Preset 5
13	KB20001858	Tact Button (C), 10 x 15 Preset 6
14	KB20001860	Tact Button (C), 10 x 15 Preset 7
15	KB20001871	Tact Button (C), 10 x 15 Preset 8
16	SN00000192	Button Spring
17	AW00000344	Panel Window
18	AA80000845	Front Panel
19	OM00002091	Push Button Connector
20	SF00000197	Tuning Shaft K-30
21	SN00000180	Button Spring
22	SP10005012	Tuning Mask Plate
23	SP10004846	Tuning P.C.B Support
24	AF80000299	Front Chassis
25	FE00000092	Felt 4TR-1083B #2 30F
26	SP10004858	Tuning Plate T-04
27	BU00000724	Button Ring 17 ϕ
28	KB20001652	Push Button 16.9 ϕ
29	SN00000180	Button Spring 13.2 ϕ x 20
30	SP10004901	Push Button Support
31	BU00000037	Rubber Bush
32	BC00000337	Cylinder Bush 6 ϕ x 14.5
33	SP10004780	FL Tube Support
34	SP10004779	FL P.C.B. Support
35	BC00000337	Cylinder Bush 6 ϕ x 14.5
36	AB00000160	Bottom Plate
37	AS01000180	Side Chassis
38	AM00001390	Chassis Body
39	AM00001390	Chassis Body
40	PT22004040	Power Transformer TT-236-AF (for A Version)
41	PT22004090	Power Transformer TT-236-GF (for B,C,D Version)
42	SP100004810	P.C.B Support
43	FT00000140	Rubber Foot
44	VC00000048	Voltage Selector B/C Version only
45	AR800006000	Printed Rear Chassis
46	SP10004767	ACO Mask (for A Version)
47	SA00001450	ACO Mask (for B,C,D Version)
48	CD00000218	AC Outlet Socket S-1651P (for A/B Version)
49	CD00000097	AC Outlet Socket 4TR-2317 (for C Version)
50	SA00001530	Coaxial Connector, 4TR-2290 (for A Version)
51	SA00001342	4TR-2372 (for B/C Version)
52	LB01130005	ANT Plastic Holder
53	AU00000617	Loup Antenna
54		Upper Cover
55		PCB Ass'y TB-137
56		PCB Ass'y TB-140
57		PCB Ass'y TB-451
58		PCB Ass'y TB-152
59		PCB Ass'y TX-472
		PCB Ass'y TX-483

RePair Parts List

Schematic Location	Parts No.	Description
TRANSISTORS, DIODES AND IC'S		
Q101	TR50000140	3SK107-F, FM RF Amp.
Q102, 103	TR30000133	2SC1674, FM O.S.C. Mix
Q104	TR50000139	2SK168-F, Buffer Amp.
Q151	TR30000327	2SC1570, Buffer Amp.
Q152	TR30000327	2SC536G, For Switching
Q153, 154	TR30000248	2SC945, For Switching
Q201	TR50000097	2SK49 (F, H), AM RF Amp
Q202 - 204	TR30000248	2SC945, For Switching
Q301	TR30000248	2SC945, For Switching
Q701, 703	TR30000327	2SC536G, For Switching
Q702, 704	TR10000140	2SA984K (E, F) For Switching
Q705	TR10000126	2SA608K (F, G) For Switching
Q707	TR50000127	2SK246-Y, Low Pass Filter
Q708	TR30000327	2SC1570, Low Pass Filter
Q761, 762	TR30000327	2SC536G, For Switch
Q787, Q788	TR10000126	2SA608K (F, G) For Switch
Q789, Q790	TR30000327	2SC536G, For Switch
Q791, Q792	TR10000126	2SA608K (F, G) For Switch
Q801 - 805	TR30000248	2SC945, For Switch
Q806	TR30000327	2SC536G, For Switch
Q807 - 814	TR10000126	2SA608K (F, G), For Switch
Q815 - 823	TR30000327	2SC536G, For Switch
Q824	TR10000126	2SA608K (F, G), For Switch
Q825, 830	TR10000126	2SA608K (F, G) For Switch
Q851	TR10000126	2SA608K (F, G) Buffer Amp
Q901	TR30000029	2SD313, Regulator
Q902, 903	TR30000431	2SC1570 (E, F) Regulator
Q904	TR10000140	2SA984K (E, F) For SW
Q905	TR40000069	2SD600K (E, F) Regulator
Q906	TR10000126	2SA608K (F, G) For SW
Q907	TR300000390	2SC536 (F), For Switch
IC151, 152	IC00001656	UPC1163H FM. IF. Amp
IC153	IC00001103	LA1235, FM IF Amp
IC154	IC00001620	LB1450 Tuning LED Driver
IC201	IC00001322	LA1245, AM IF Amp.
IC301	IC00001450	LA3400 FM MPX.Decoder
IC701	IC00001346	TC9157AP PLL. Synthesizer
IC702	IC00000482	TD6104P, Prescaller
IC761	IC00000573	TD6301AP, Driver For Frequency Display
IC801	IC00001498	TC9150P, Switch For Remote Control Receiver
IC802	IC00001644	M54832P, 8 Channel Selector
IC803	IC00001632	HD74HC541P Inverting Octal 3 Stata Buffer
IC804	IC00001462	LC4011, Auto/Manual Controller
IC805	IC00001528	LC4013, AM/FM Controller
IC851	IC00001589	CX20106A, Remote Control Receiver Amp.
IC852	IC00000925	LB1403, Signal Led Driver
IC901	IC00001267	NJM78M15, Regulator
D101 - 104	DD50000055	SVC211, Vari-Cap. FM Tuning
D151 - 158	DD10000100	IN4148, Diode
D201, 202	DD50000092	SVC333, Vari-Cap. AM Tuning
D203	DD10000100	IN4148, Diode
D204	DD50000092	SVC333, Vari-Cap. AM Tuning
D301 - 303	DD10000100	IN4148, Diode
D701 - 711	DD10000100	IN4148, Diode
D761, 762	DD10000100	IN4148, Diode
D789, 790	DD10000100	IN4148, Diode
D791, 792	DD70000050	GP1S04, Photo Interrupter
D801 - 834	DD10000100	IN4148, Diode
D851 - 861	DD40000812	SE65224DT-D, L.E.D
D862 - 868	DD40000824	SE6521DK-D, L.E.D
D869	DD70000048	LTR-536AB, Photo Diode
D901	DD10000123	W02/PB153M, Rectifier
D902	DD20000065	UZ-6.8B (M, H), Zener Regulator
D903, 904	DD10000068	DS-135C/IN4003, Diode
D905 - 907	DD10000068	IN4003, Diode

Schematic Location	Parts No.	Description
D908	DD20000090	UZ-15B (L), Zener Regulator
D909	DD10000100	IN4148, Diode
D910, 911	DD10000068	IN4003, Diode
D912	DD10000100	IN4148, Diode
D913	DD10000068	IN4003, Diode
D914	DD20000065	UZ-6.8B (M, H), Zener Regulator
D915 - 917	DD10000100	IN4148, Diode
COILS, VARIABLE RESISTORS, SWITCHES AND OTHERS		
L101	LC02370009	RL-237T, FM ANT Coil
L102	LC22200006	TRL-220, FM RF Coil
L103	LC22210000	TRL-221, FM RF Coil
L104	LM00000073	TRL-239 2.2μH, Micro Inductor
L105	LC02330000	RL-233T, FM IF Coil
L106	LC31120000	RLV-112T, FM OSC Coil
L107	LM00000346	RL-247T, Micro Inductor
L151	LC31090007	RLV-109T, IF Coil
L201	LC31070008	RLV-107A00, AM ANT Coil
L202	LC31050009	RLV-105T, AM OSC Coil
L203	LC23230006	TRL-323, AM IF Coil
L301, L302	LC21940006	TRL-194, FM MPX Filter
CT102	CF00000238	CVSSA1001 10PF, Film Trimmer Capacitor
CT107	CF00000238	CVSSA1001 10PF, Film Trimmer Capacitor
CT109	CF00000238	CVSSA1001 10PF, Film Trimmer Capacitor
CT116	CF00000240	CVSSA0701 7PF, Film Trimmer Capacitor
CT201	CF00000238	CVSSA1001 10PF, Film Trimmer Capacitor
CT206	CF00000238	CVSSA1001 10PF, Film Trimmer Capacitor
VR165	RV20000193	08-301 10KB, FM Muteing Adj.
VR166	RV20000284	08-301 30KB, FM Meter Adj.
VR214	RV20000193	08-301 10KB, AM Meter Adj.
VR219	RV20000193	08-301 10KB, AM Auto Stop Adj.
VR308	RV20000235	08-301 50K, Separation. Adj.
RL901	LY00000125	AP24D4, Relay
RL902	LY00000137	VS-24MB-NR, Relay
FL761	SH60000239	Key board Switch M1 - M8, Memory, Mono, AM/FM Auto/Manual
F901 - F903	FU12000070	Fuse, 250V 1A (UL)
	FU23000025	Fuse, 250V 1A (S)
T001	PT22004040	Power Transformer TT-236-AF (for A Version)
	PT22004090	Power Transformer TT-236-GF (for B/C Version)