220

GENERAL INFORMATION
SCHEMATIC DIAGRAM
PARTS LIST
ALIGNMENT MANUAL

NIKKO

am-fm-multiplex stereo tuner model fam- 220

NIKKO ELECTRIC MFG. CO., LTD. 4-1, 3-CHOME, TAMAGAWA OKUSAWA-CHO, SETAGAYA-KU, TOKYO, JAPAN.
NIKKO ELECTRIC CORPORATION OF AMERICA 16270 RAYMER STREET VAN NUYS CARIF. 91406 U.S.A

1. SPECIFICATIONS (FAM-220)

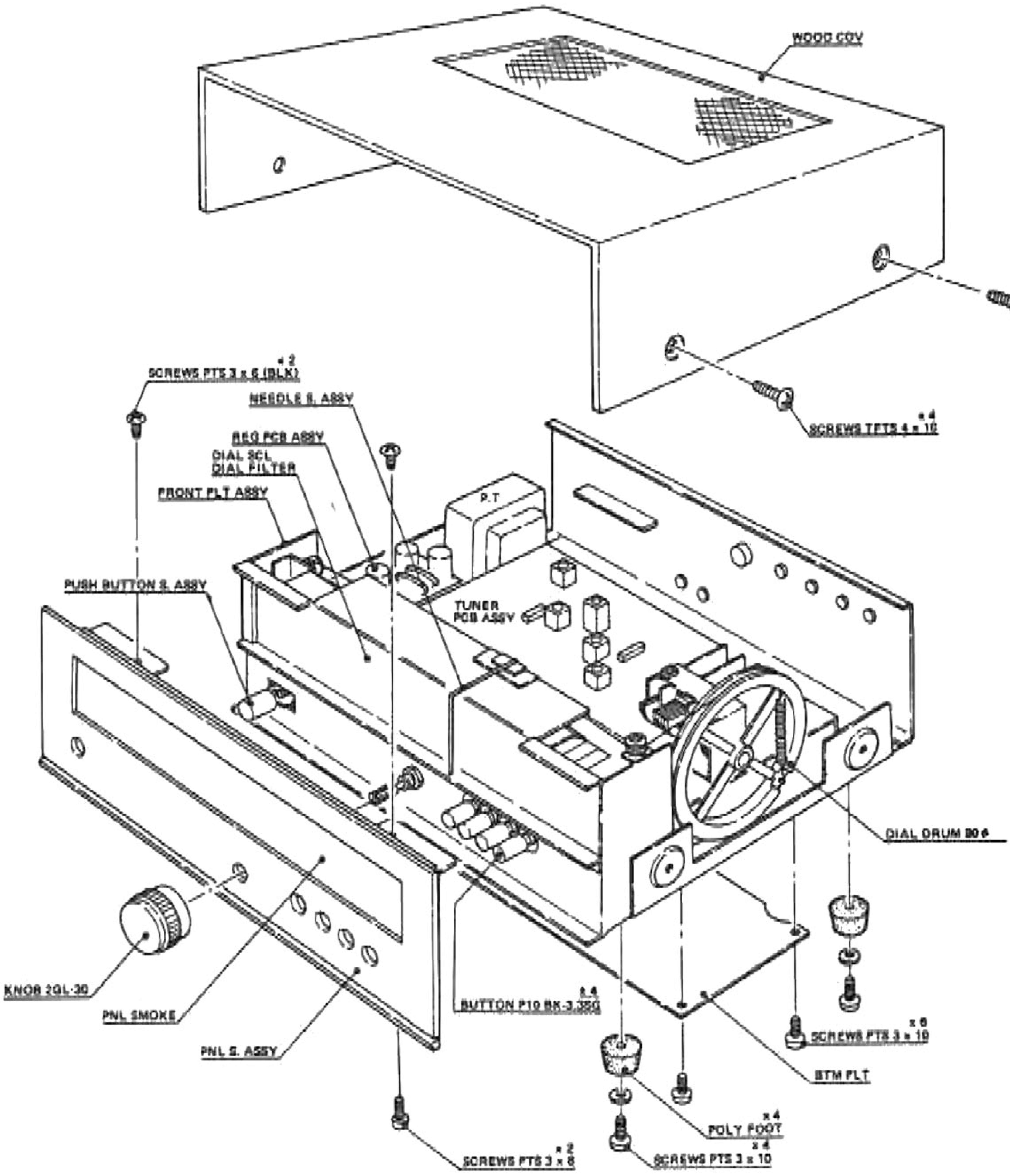
1.1 FM SECTION

	NOMINAL	LIMIT
Sensitivity (IHF)	2.0μV	3.0μV
Muting sensitivity	10μV	2~100μV
Image rejection at 98MHz	50dB	40dB
IF rejection at 98MHz	80dB	70dB
S/N	60dB	55dB
Selectivity ±400KHz	40dB	
Steses separation 1000Hz	38dB	30dB
Distortion 1000Hz	0.5%	1.0%
Output 100% MOD.	750mV	530~950mV

1.2 AM SECTION

Sensitivity (S/N = 20dB)	250μV/m	560μV/m
Image rejection at 1000KHz	45dB	35dB
IF rejection at 1000KHz	40dB	30dB
Selectivity ±10KHz	25dB	20dB
Output 30% MOD.	250mV	117~320mV

2.1 DISASSEMBLY DETAILS



FINAL ASSEMBLY

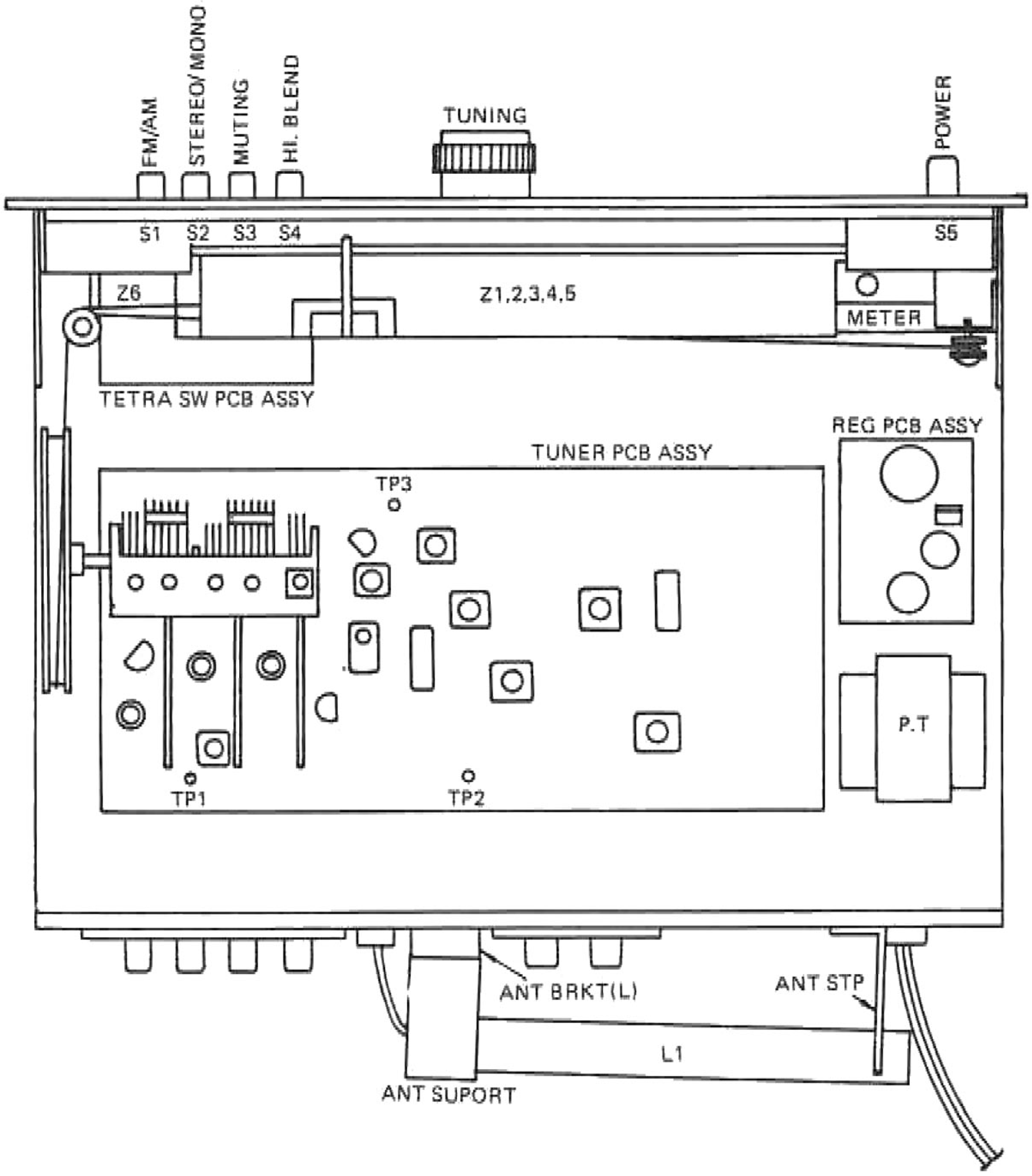
Parts No.	Description	Symbol	Parts No.	Description	Symbol
	CARTON BOX		785061 O	BUTTON P10BK-3.3SQ	PUSH SW
	PAD		*783077 O	WOOD COV	
960113 E	OWNS MANUAL		783082 O	WOOD COV	
*960114 E	OWNS MANUAL	DIN TYPE	732278 O	BTM PLT	
961090 E	DIAGRAM		790289 O	POLY FOOT	
788271 O	PNL S. ASS		962003 C	PIN PLUG CORD (RED)	
780161 O	PNL SMOKE		962003 E	PIN PLUG CORD (YEL)	
785067 O	KNOB 2GL-30	TUNING	458056 O	FM ANT (EX)	

* DIN TYPE

FRONT PLT ASSEMBLY

Parts No.	Description	Symbol	Parts No.	Description	Symbol
715186 O	DIAL SHFT S. ASS		780158 O	DIAL SCL	
749008 O	FLY WHL		700147 O	DIAL FILTER	
800410 S	SS 4x10 P=0.7		458125 O	METER SB-54	TUNING
712051 O	PULLY SHAFT		458128 O	FUSE HOLD 1P	
790115 O	PULLY		580806 O	PL-8 8V 0.3A	Z1, 2, 3, 4, 5
404037 O	PUSH SW	S5	580106 O	PL-12 12V 30MA	Z6
740059 O	PUSH BUTTON S. ASS	POWER SW			

2.2 COMPONTNT LAYOUT



CHASSIS ASSEMBLY

Parts No.	Description	Symbol	Parts No.	Description	Symbol
606002 J	PLUG CORD		740035 O	ANT STP	
740062 O	CORD STP SR-3P-4		740062 O	CORD STP SR-3P-4	
248103 Z	C-CAP 0 01MF 1.4kV	C2	515045	TR 2SC945	Q1
312225 K	RES 2 2M OHM 1/2P	R2	311333 J	RES 33K OHM 1/4P	R6, 4
110182 O	P.T T-1-182	CSA	311474 J	RES 470K OHM 1/4P	R5
110181 O	P.T T-1-181	UL	445042 O	SCW TER 4P (M)	ANT
*110183 O	P.T T-1-183	220V/240V	312225 K	RES 2.2M OHM 1/2P	R1
444021 O	PIN TER 2P	OUTPUT	245301 M	C-CAP 300P	C1
*453022 O	DIN CONCT 5P	OUTPUT	*455005 O	ANT JACK (AM)	AM ANT
120019 O	AM ANT COIL	L1	*455007 O	ANT JACK (FM)	FM ANT
740043 O	ANT SUPORT		458048 O	DIAL DRUM 80φ	
810420 S	PMS 4x20		744003 O	SPRING	
708094 O	ANT BRKT (L)		786020 O	NEEDLE S. ASS	

* DIN TYPE

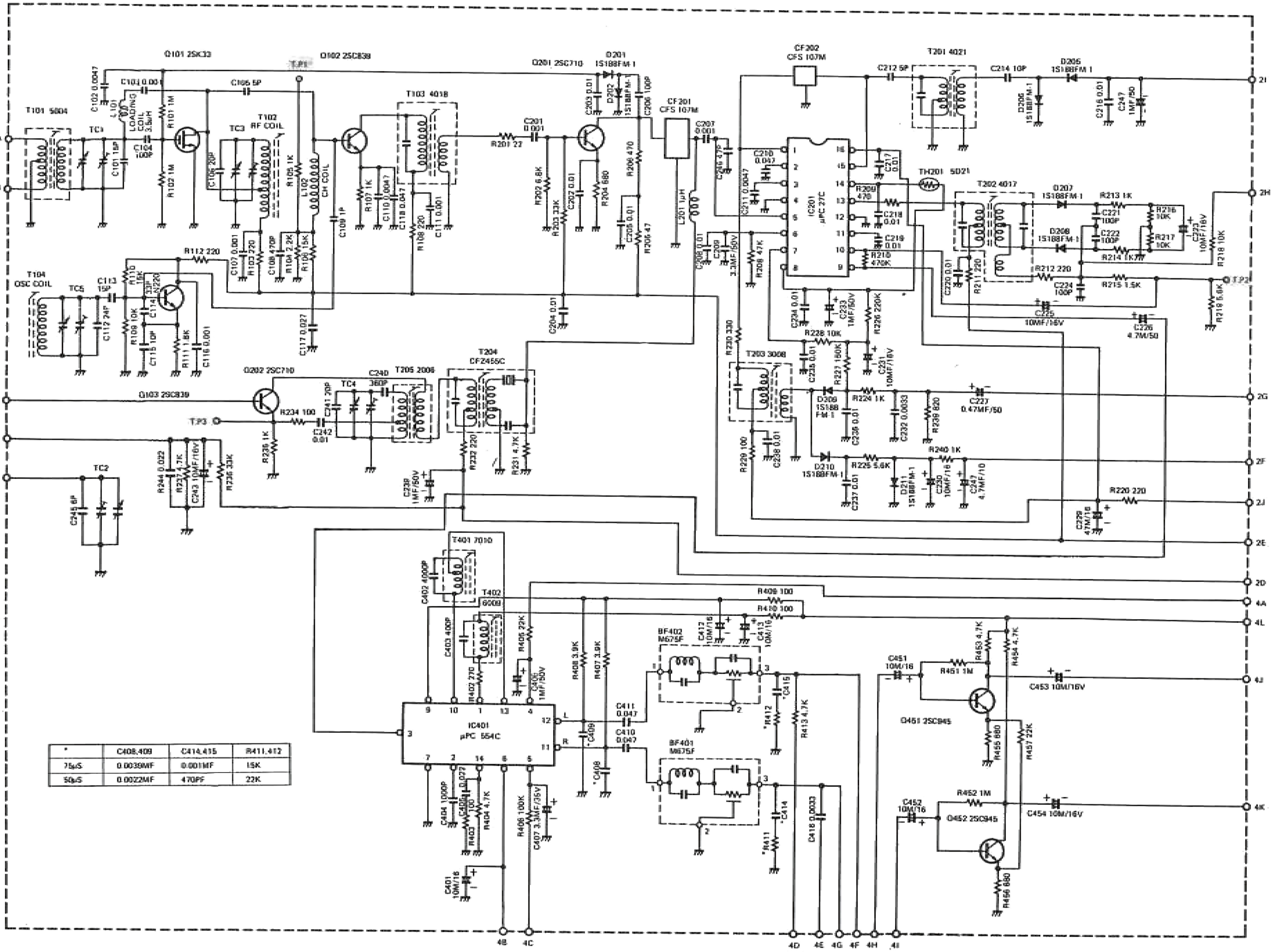
2.3 SCHEMATIC DIAGRAM, OVERALL

P. T.	V	R2
T – 1 – 181	120V (UL)	O
T – 1 – 182	120 (CSA)	O
T – 1 – 183	220/240	–
T – 1 – 184	100	–

DE - EMPHASIS	C408, 409	C414, 415
75μS	0.0039MF YP	0.001MF YP
50μS	0.0022MF YP	470PF

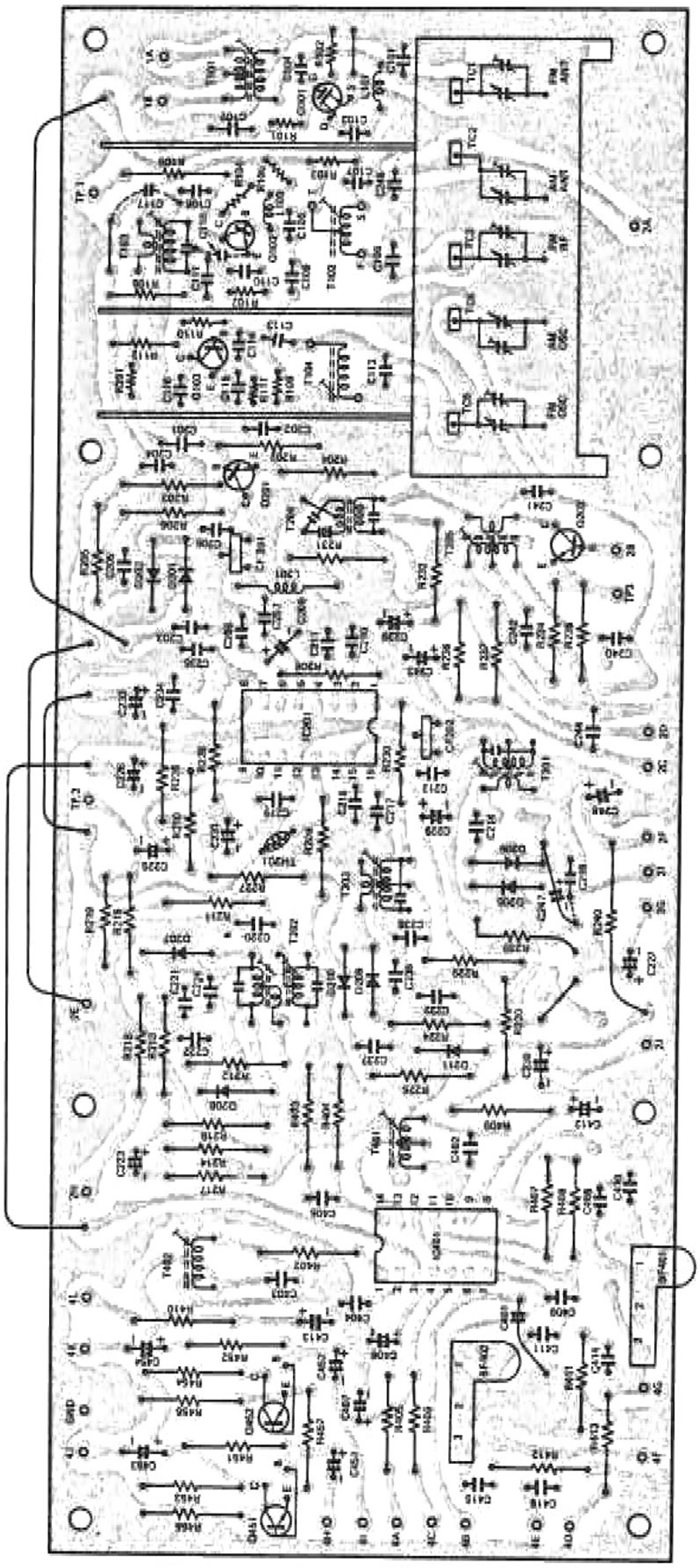
2.4 BLOCK DIAGRAM

2.5 TUNER ASSEMBLY (SCHEMATIC)



*	C408,409	C414,415	R411,412
75μS	0.0039MF	0.001MF	15K
50μS	0.0022MF	470PF	22K

TUNER PCB ASSEMBLY



TUNER PCB ASSEMBLY

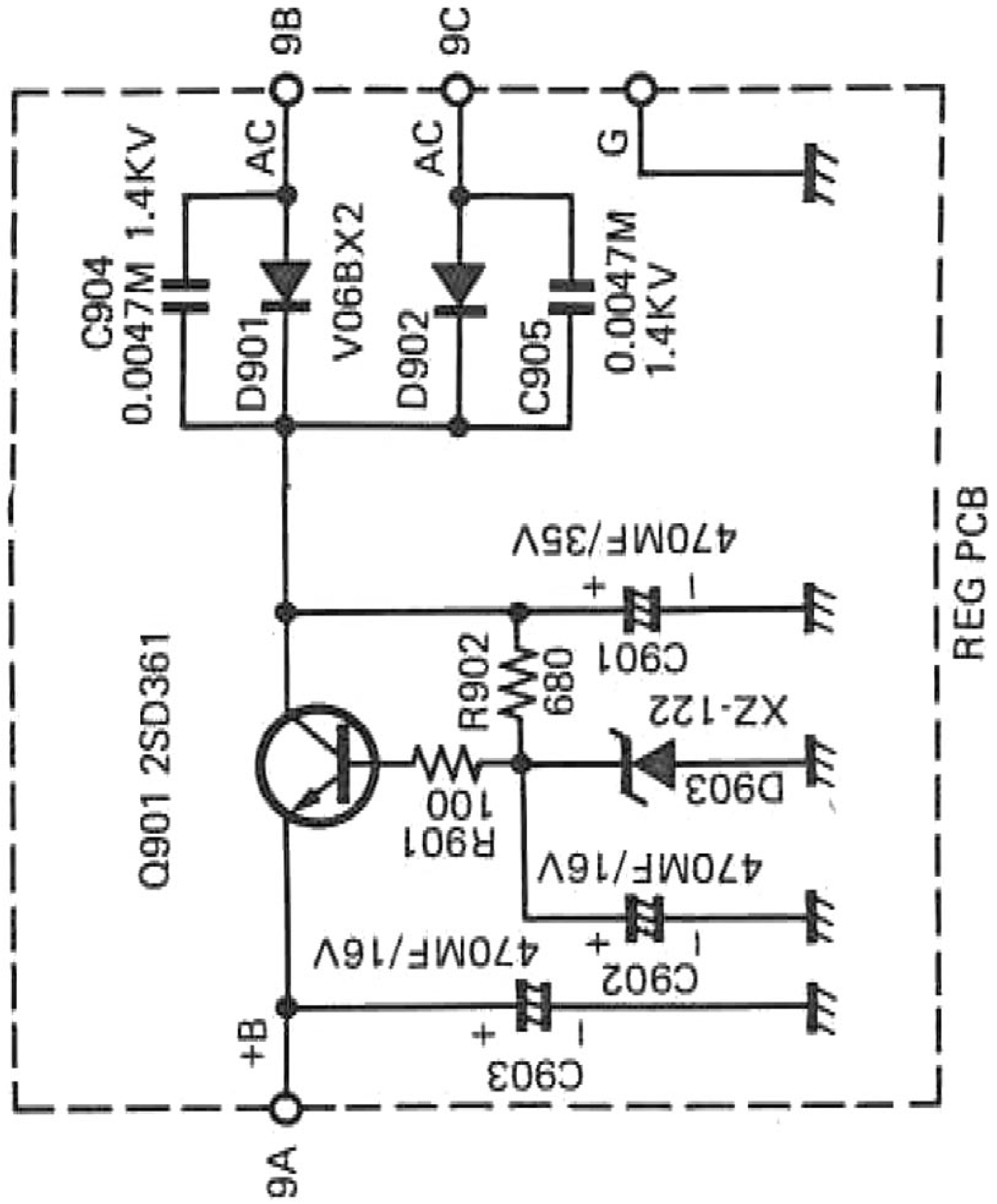
Parts No.	Description	Symbol
461227 O	TUNER PCB	
	FRONT END SECTION	
423510 O	V.C. C752C127	
121055 O	FM RF COIL	T102
458127 O	PIN 1.2SQ-20	
121054 O	FM CH COIL	L102
121024 O	PEAKING COIL	L101
121044 O	FM OSC COIL	T104
124018 O	FM IFT	T103
125004 O	FM ANT COIL	T101
515037 S	TR 2SC839	Q102, 103
516009 S	FET 2SK-33	Q101
321220 J	RES 22 OHM ELR 1/4	R201
321221 J	RES 220 OHM ELR 1/4	R103, 108, 112
311102 J	RES 1K OHM 1/4P	R105
321102 J	RES 1K OHM ELR 1/4	R107
321222 J	RES 2.2K OHM ELR 1/4	R104
321182 J	RES 1.8K OHM ELR 1/4	R111
321103 J	RES 10K OHM ELR 1/4	R109
321153 J	RES 15K OHM ELR 1/4	R106, 110
321105 J	RES 1M OHM ELR 1/4	R101, 102
245109 C	C-CAP 1PF 50V SL	C109

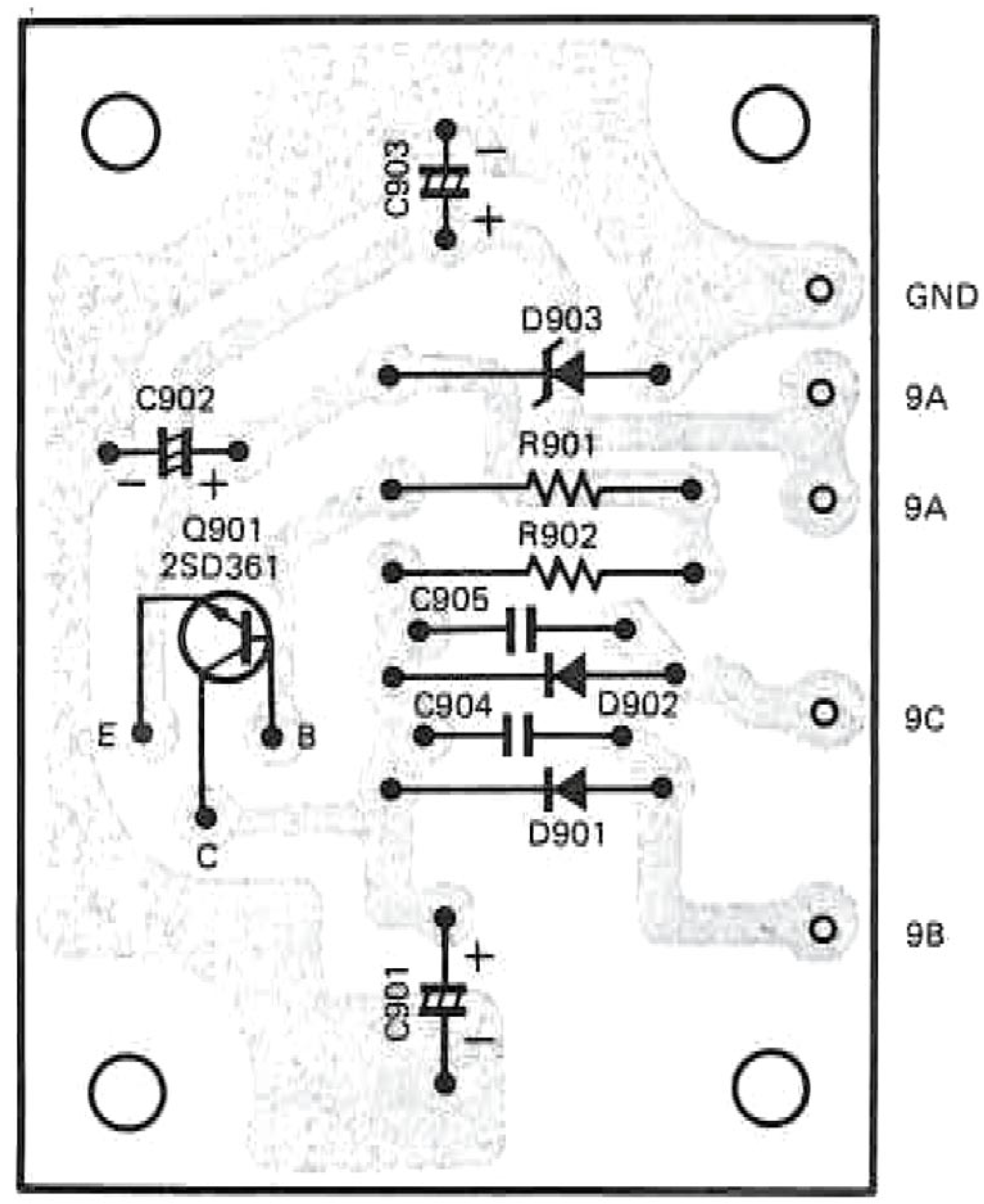
TUNER PCB ASSEMBLY

Parts No.	Description	Symbol
245509 D	C-CAP 5PF 50V SL	C105
245150 K	C-CAP 15PF 50V SL	C101
245200 K	C-CAP 20PF 50V SL	C106
245330 K	C-CAP 33PF 50V SL	C114
245101 M	C-CAP 100PF 50V SL	C104
245471 M	C-CAP 470PF 50V SL	C108
245102 Z	C-CAP 0.001MF 50V YG	C103, 107, 111, C116
245472 Z	C-CAP 0.0047MF 50V YG	C102, 110
245223 Z	C-CAP 0.022MF 50V YG	C118
249100 B	C-CAP 10PF NPO	C115 (BLK)
249150 H	C-CAP 15PF N330	C113 (GRN)
249240 Y	C-CAP 24PF N220	C112 (YEL)
249330 Y	C-CAP 33PF N220	C114
225473 M	M-CAP 0.047MF 50V ,	C117
	FM, AM, IF SECTION	
500009 G	D IS188FM-1	D1, 2, 5, 6, 7, 8, D10, 11
515041 S	TR 2SC710	Q201, 202
518032 S	IC μPC-27C	IC201
540017 O	TH 5D-21	TH201
124021 O	FM IFT	T201
123008 O	AM IFT	T203
128009 O	C-FILTER CFZ-455C	T204
122006 O	AM OSC (RED)	T205
124017 O	FM DET	T202
128017 O	C-FILTER CFZ-468C	T204
128014 A	CER. FIL CFS10.7M	CF201, 202
205105 W	E-CAP 50R1 MF	C230, 233, 239, C231, 247
205335 W	E-CAP 50R3.3 MF	C209
202106 W	E-CAP 16R10 MF	C223, 225, 243
202476 W	E-CAP 16R47 MF	C229
205474 W	E-CAP 50R0.47 MF	C227
205475 W	E-CAP 50R4.7 MF	C226
245609 D	C-CAP 6PF 50V SL	C245
245509 D	C-CAP 5PF 50V SL	C212
245100 D	C-CAP 10PF 50V SL	C214
245200 K	C-CAP 20PF 50V SL	C241
245101 K	C-CAP 100PF 50V SL	C206, 221, 222, C224
245102 Z	C-CAP 0.001MF 50V YG	C201, 207
245472 Z	C-CAP 0.0047MF 50V YG	C211
245332 Z	C-CAP 0.0033MF 50V YG	C232
245103 Z	C-CAP 0.01MF 50V YG	C202, 203, 204, C205, 208, 216, C217, 218, 219, C220, 237, 234, C235, 238, 242, C236
245223 M	C-CAP 0.022MF 50V YZ	C244
245470 M	C-CAP 47PF 50V SL	C246
225473 K	C-CAP 0.047MF 50V YZ	C210
235361 J	S-CAP 360PF 50V	C240
311470 J	RES 47 OHM 1/4P	R205
311101 J	RES 100 OHM 1/4P	R229, 234

Parts No.	Description	Symbol
311221 J	RES 220 OHM 1/4P	R211, 212, 220, R232
311331 J	RES 330 OHM 1/4P	R207, 230, 239
311471 J	RES 470 OHM 1/4P	R206, 209
311102 J	RES 1K OHM 1/4P	R213, 214, 224, R235
311152 J	RES 1.5K OHM 1/4P	R215
311562 J	RES 5.6K OHM 1/4P	R225
311472 J	RES 4.7K OHM 1/4P	R231, 237
311682 J	RES 6.8K OHM 1/4P	R202
311332 J	RES 3.3K OHM 1/4P	R219
311103 J	RES 10K OHM 1/4P	R216, 217, 228, R218
311333 J	RES 33K OHM 1/4P	R203, 236
311473 J	RES 47K OHM 1/4P	R208
311104 J	RES 100K OHM 1/4P	R238
311154 J	RES 150K OHM 1/4P	R227
311224 J	RES 220K OHM 1/4P	R226
311474 J	RES 470K OHM 1/4P	R210
	MPX SECTION	* 50μS
518022 S	IC MPC554C	IC401
126009 O	19kHz FIL.	T402
127010 O	38kHz T.	T401
128018 O	B-FIL. M675F	BF401, 402
311271 J	RES 270 OHM 1/4P	R402
311101 J	RES 100 OHM 1/4P	R403, 409, 410
311392 J	RES 3.9K OHM 1/4P	R407, 408
311472 J	RES 4.7K OHM 1/4P	R404, 413
311153 J	RES 15K OHM 1/4P	R411, 412
311223 J	RES 22K OHM 1/4P	R405, *411, *412
311104 J	RES 100K OHM 1/4P	R406
245471 K	C-CAP 470PF 50V SL	*C414, *415
245102 K	C-CAP 0.001MF 50VYP	C414, 415
245332 K	C-CAP 0.0033MF 50V YP	C416
245223 M	C-CAP 0.022MF 50V YP	C405
245339 K	C-CAP 0.0039MF 50V YP	C408, 409
245229 K	C-CAP 0.0022MF 50V YP	*C408, *409
235102 K	S-CAP 1000PF 50V	C404
235402 K	S-CAP 4000PF 50V	C402, 403
205105 W	E-CAP 50R1 MF	C406
202106 W	E-CAP 16R10 MF	C412, 413, 401
204335 W	E-CAP 35R3.3 MF	C407
225473 K	M-CAP 0.047MF 50V	C410, 411
	FLAT AMP SECTION	
515045 S	TR 2SC945	Q451, 452
311681 J	RES 680 OHM 1/4P	R455, 456
311472 J	RES 4.7K OHM 1/4P	R453, 454
311223 J	RES 22K OHM 1/4P	R457
311105 J	RES 1M OHM 1/4P	R451, 452
202106 W	E-CAP 16R10 MF	C451, 452, 453, C454

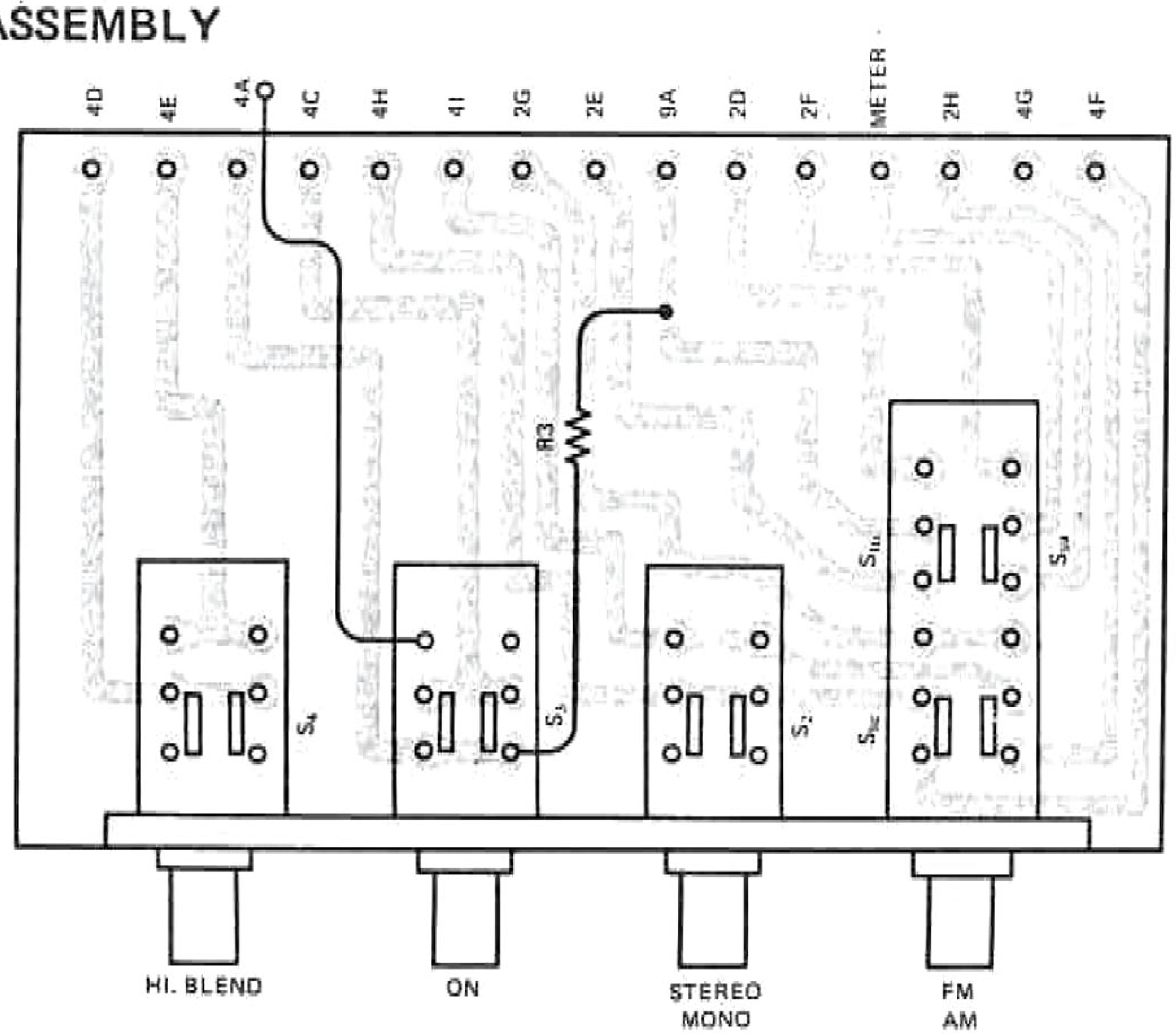
2.6 TUNER REG PCB ASSEMBLY





Parts No.	Description	Symbol	Parts No.	Description	Symbol
461237 O	TUNER REG PCB		311681 J	RES 680 OHM 1/4P	R902
513042 S	TR 2SD361	Q901	248472 Z	C-CAP 0.0047MF 1.4kV	C904, 905
560023 S	D V06B	D901, 902	202477 W	E-CAP 16R470 MF	C903, 902
502020 S	ZD XZ-122	D903	204477 W	E-CAP 35R470 MF	C901
311101 J	RES 100 OHM 1/4P	R901	458127 O	PIN 1.2SQ-20	

2.7 TETRA SW PCB S. ASSEMBLY



Parts No.	Description	Symbol	Parts No.	Description	Symbol
461234 O 404047 O	TETRA SW PCB TETRA PUSH SW SUB43	S1, 2, 3, 4	311473 J	RES 47K OHM 1/4P	R-3

3 TRANSISTOR SPECIFICATIONS

3.1 RIELD EFFECT TRANSISTOR COMPLEMENT

Type	Description	Class of Service	Maximum Ratings: BVDS (V)	VGDS (V)	IG (mA)	PT (mW)	Tstg (°C)	Tch (°C)	Electrical Characteristics (Typical Value) TA = 25°C: IGSS Condition	IGSS (nA)	IDSS Condition	IDSS (mA)	VGS Condition	VGS (V)	Yfs Condition	Yfs (mΩ)	Yos Condition	Yos (mΩ)	Ciss Condition	Ciss (PF)	Po Condition	Po (dB)	NF Condition	NF (dB)	Manufacture
2SK33	Si Dualgate N-Cannel	FM-RF AMP		20	10	150	−55 / 125	125	VDS =0 VGS =−1V	Max 100	VDS =10V VGS =0	2.5 / 20.0	VDS =10V ID =10μA	−1 / −8	VDS =10V VGS =0 100MHz	7			VDS =10V VGS =0 1MHz	0.5	VDS =10V VGS =0 100MHz	20	VDS =10V VGS =0 100MHz	2.5	MITSUBISHI
2SK30	Si Dualgate N-Channel	FM-RF AMP & MIXER		15	10	200	−55 / 150	150	VDS =0 VGS =−10V	Max 100	VDS =10V VGS =0	3 / 20	VDS =10V ID =20μA	−6	VDS =10V VGS =0 1kHz	7.5			VDS =10V VGS =0 1MHz	0.4	VDS =10V VGS =0 100MHz	17	VDS =10V VGS =0 100MHz	2.0	HITACHI
2SK34	Si N-Channel	AUDIO AMP		30	20	150	−55 / 125	125	VDS =0 VGS =−10V	Max. 10	VDS =10V VGS =0	0.3 / 12	VDS =10V ID =10μA	−0.3 / −6	VDS =10V VGS =0 1kHz	3	VDS =10 VGS =0 1MHz	8					VDS =10V ID =0.1mA 100Hz	3	MITSUBISHI

TRANSISTOR COMPLEMENT

Type	Description	Class of Service	Maximum Ratings (T_A=25°C) (Absolute Values): Collector to Base Voltage V_{CBO} (V)	Emitter to Base Voltage V_{EBO} (V)	Collector Current I_C (mA)	Emitter Current I_E (mA)	Collector Dissipation PC (mw)	Junction Temperature (°C)	Electrical Characteristics (Typical Value) T_A=25°C: Condition of Measurement V_{CE} (V)	I_E (μA)	hfe (hFE)	NF dB	fαb (fT) MHz	Cob pF	hie (real) Ω	Collector Cut-off Current I_{CBO} (max. μA)	V_{CB}	Emitter Cut-off Current I_{EBO} (max. μA)	V_{EB} (V)	Manufacture
2SA539	PNP Si E-P	Medium Amp	− 60	−5	−200		250	125	− 1	−50	80		200			0.1	− 45	0.1	−3	NEC
2SA545	PNP Si E-P	Medium Amp	− 70	−5	−200		400	125	− 1	−50	80		200			0.1	− 45	0.1	−3	NEC
2SA640	PNP Si E-P Al-P	Low Noise Amp	− 50	−5	− 30		250	125	− 3	− 0.5	300	27mV	100	8		100nA	− 40	100nA	−3	NEC
2SC710	NPN Si E-P	RF Amp	30	4	30		200	125	6	1	100	3	200	2.0		1	25	5	2	MITSUBISHI
2SC815	NPN Si E-P	Medium Amp	60	5	200		250	125	6	10	150		200	5.5	25	0.1	45	0.1	3	NEC
2SC839	NPN Si E-P	RF Amp	50	5	50		250	125	3	0.5	100	2.5	250	2.0		0.1	15	0.1	3	NEC
2SC853	NPN Si E-P	Medium Amp	70		200		400	125	10	10	110		90	7.5	40	0.1	60	0.1	8	NEC
2SC900	NPN Si E-P Al-P	Low Noise Amp	30	5	30		250	125	3	0.5	400	30mV	100			50nA	25	100nA	3	NEC
2SC945	NPN Si E-P	Small Signal Amp	50	5	100		250	125	6	1	180	4	300	4.5		0.1	40	0.1	3	NEC
2SC1222	NPN Si E-P Al-P	Low Noise Amp	50	5	30		250	125	3	0.5	400	27mV	100*			50nA	25	100nA	3	NEC
2SC1335	NPN Si E-P LTP	Low Noise Amp	30	5	100		200	125	12	2	500	3	230	1.8		0.5	18	0.5	2	HITACHI
2SC1507	NPN Si Triple Diffused	High Voltage Power	300	7	200		15W	150	10	10	80		80	4.5		100nA	200	100nA	5	NEC
2SD361	NPN Si E-P	Power Output	80	5	1.5A		10W	150	4	0.5A	110					1	25	1	5	MITSUBISHI
2SA671	PNP Si Triple Diffused	Power Output	− 50	−4	−3A		25W	150	− 4	−1A	100		32			100	− 20			HITACHI
2SC1061	NPN Si Triple Diffused	Power Output	50	4	3A		25W	150	4	1A	100		8			100	20			HITACHI
2SA489	PNP Si E-P Mesa	Power Output	− 70	−5	−4A		30W	150	− 5	−0.5A	100		3 min.	230		30	− 50	100	−5	TOSHIBA
2SC789	NPN Si Triple Diffused	Power Output	70	5	4A		30W	150	5	0.5A	100		3 min.	150		30	50	100	5	TOSHIBA
2SB536	PNP Si E-P	Power Output	−130	−5	−1.5A		20W	150	− 5	−0.3A	100					1	−120	1	−3	NEC
2SD381	NPN Si E-P	Power Output	130	5	1.5A		20W	150	5	0.3A	100					1	120	1	3	NEC
2SB539	PNP Si Triple Diffused	Power Output	−130	6	−10A		100W	150	− 5	−2A	100					0.1	−120	0.1	−5	NEC
2SD287	NPN Si Triple Diffused	Power Output	200	7	10A		100W	150	5	2A	100					0.3	100	0.3	5	NEC

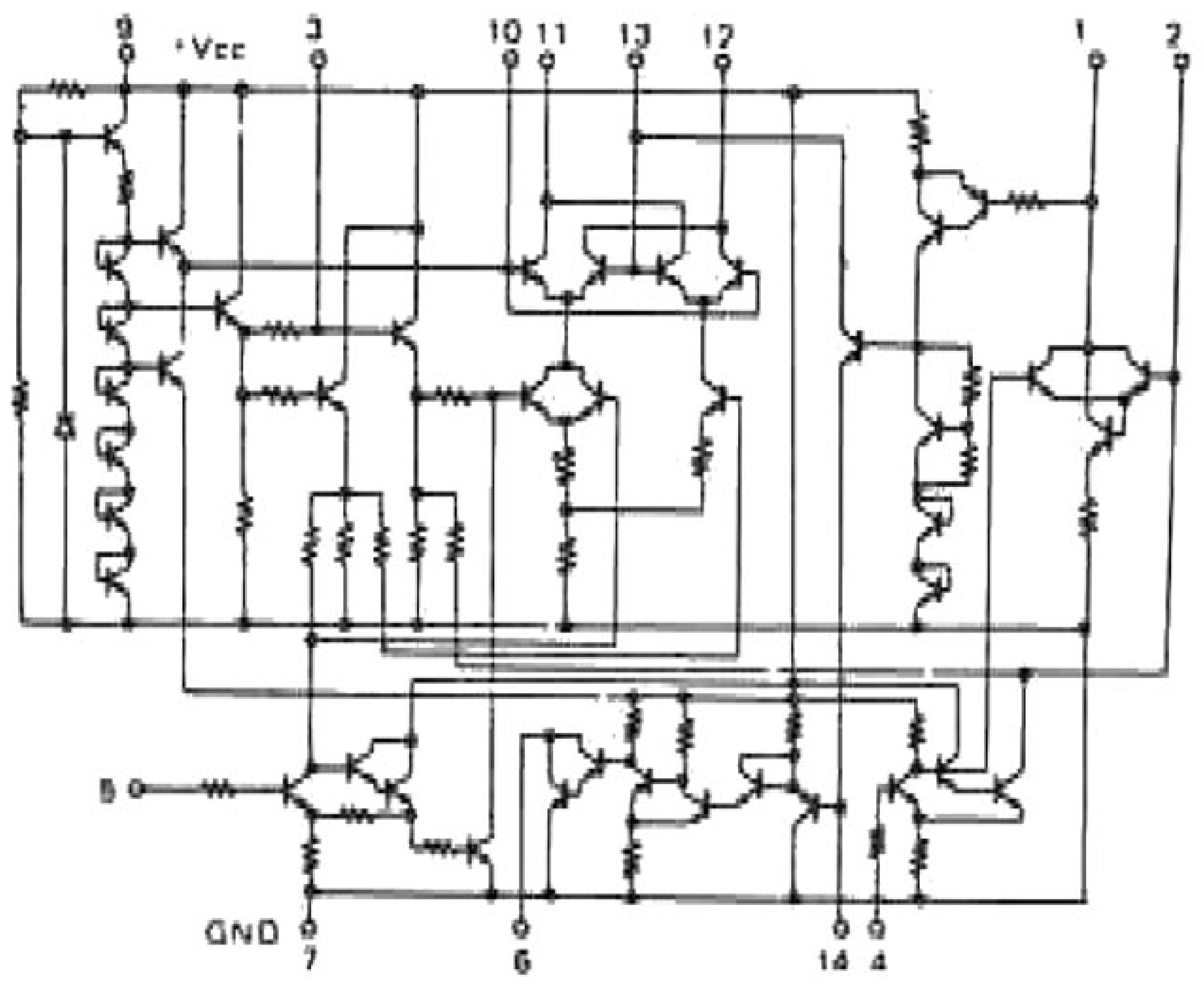
RECTIFIER, DIODE, ZENER-DIODE, THERMISTOR

Type	Description	Maximum Ratings (T_A=25°C): Peak Inverse Voltage (V)	Dissipation (mw)	Output current (mA)	Inverse current (A)	Surge current (A)	Junction Temperature (°C)	Electrical Characteristics (Typical Value) T_A=25°C: Condition		Condition		Condition		Manufacture
1S188 (1N60)	Ge Diode Point contact	Peak 40 35		50mA	V_R=10V 75μA	0.5A	70	γ 40MHz	min. 50%	C V_R=1V	0.8pF			KURAKE
V06B	Si Varistor	(Yellow) 100		1.1A		25A	165							HITACHI
KB-265	Si Varistor	6		30mA	V_R=6V 10μA		110	V_F I_F=3mA	1.24~ 1.38V	γ_F I_F=3mA	−4 mV/°C			KURAKE
SD-21	Thermistor						-10 ~ 85	R25°C	100Ω ±15%	K 50°C/25°C	2.24 ±8%			NEC
XZ-122	Si Zener Diode		500		V_R=10V 7μA		175	V_Z I_Z=5mA	11.9~ 12.6V	Rd I_Z=5mA	max. 15Ω			JRC
WZ-087	Si Zener Diode		500		V_R=4V 1μA		175	V_Z I_Z=10mA	7.7~ 8.5V	Rd I_Z=10mA	max. 10Ω			JRC
1B2C1	Si Rectifier unite	100		+2A	V_R=100V 0.4mA	60A	150	V_F I_F=2A	max. 1.2V					TOSHIBA
1B2Z1	Si Rectifier unite	100		−2A	0.4mA	60A	150	V_F I_F=2A	max. 1.2V					TOSHIBA
S2H820	Si Rectifier unite	200		8A	10μA	80A	150	V_F I_F=4A	max. 1.2V					SHINDENGEN

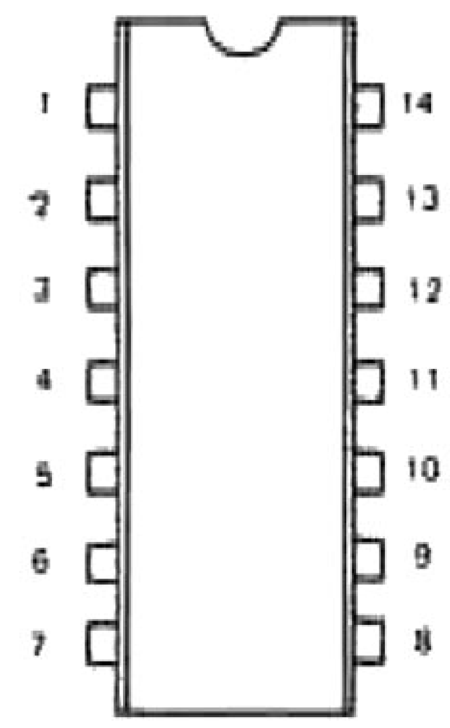
3.2 INTEGRATED CIRCUITS

Type	Class of Service	Maximum Ratings TA = 25°C					Electrical Characteristics (Typical Value)						Description & Manufacture
		Power Supply Vcc(V)	Power Dissipation Pd(mW)	Lamp Driver VL(V) IL(mA)	Operating Temp. Range TA(°C)	Storage Temp. Range (°C)	Input Impedance (KΩ)	Stereo Separation 1kHz (dB)	Channel Balance (dB)	SCA Rejection (dB)	Lamp Level (mV)	Muting Level (V)	
µPC 554C	FM MULTIPLEX STEREO DEMODULATOR	+15	* 400	15V 100mA	0 ~ +75	−40 ~ +125	20	45	0.2	55	12	1.08	MONOLITHIC NEC

µPC 554C SCHEMATIC DIAGRAM



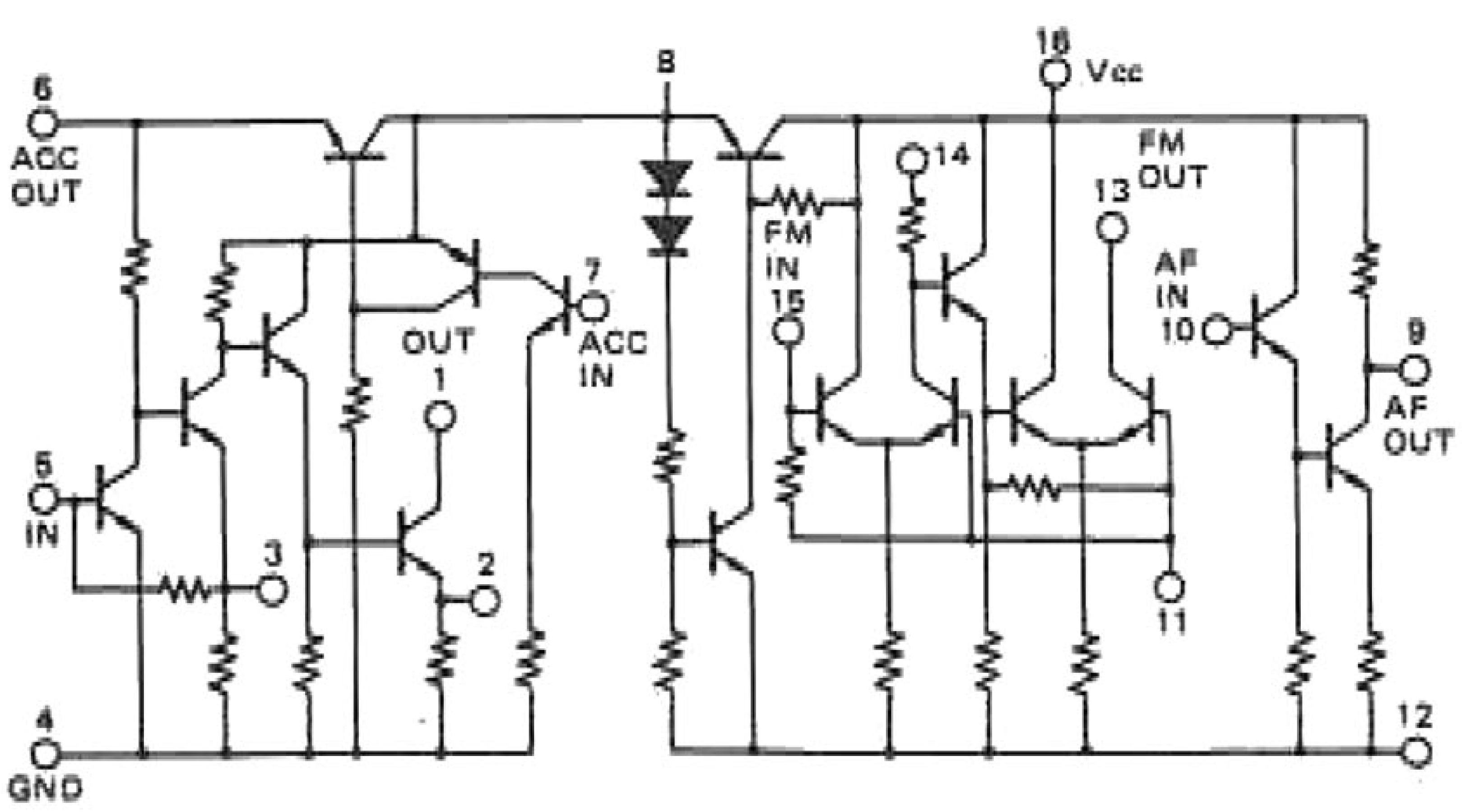
CONNECTION DIAGRAM (TOP VIEW)



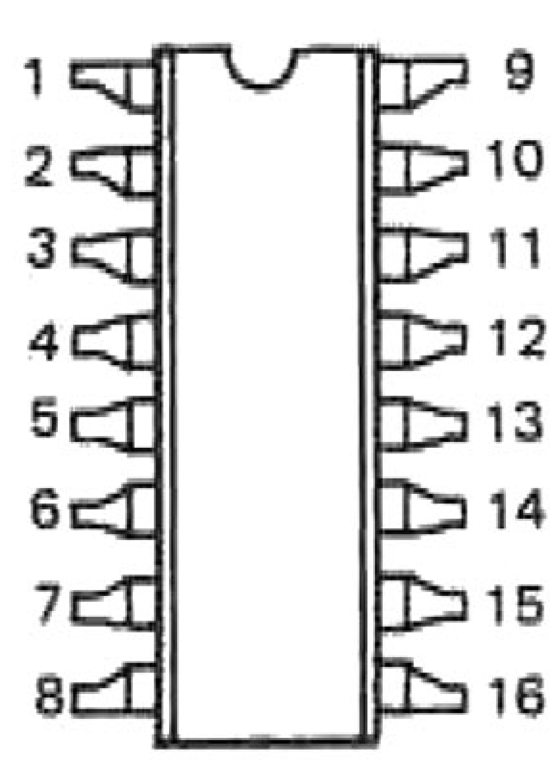
LINEAR INTEGRATED CIRCUITS

Type	Class of Service	Maximum Rating TA = 25°C				Electrical Characteristics (Typical Value)							Description & Manufacture
		Power Supply Vcc	Power Wrrent Icc	Operating Temp. Range Topt	Storage Temp. Range Tstg	gain R_L = 1kΩ R_G = 50Ω f=455kHz	f= 10.7MHz	f= 10.7MHz	Audio gain f=400Hz	AM Distortion	AM A,G,C	max. Input Voltage	
µPC 27C	AM/FM IF Amplifer	+12V	20mA	−15 ~ +75°C	−40 ~ +125°C	69dB	60dB	31dB	18dB	1.5%	70dB	200mV	Bipolar monolithic NEC

µ PC 27C SCHEMATIC DIAGRAM



CONNECTION DIAGRAM (TOP VIEW)



4 ALIGN MENTPROCEDVRE

4.1 TUNER SECTION ALIGNMENT

4.1.1 FRONT END ALIGNMENT

1. Start front end alignment after 4.1.2 FM, IF alignment.
2. Set the tuning dial pointer to zero (0) position on the dial glass panel. If the dial pointer fails to coincide with the zero (0) position at the left end of the knob rotation, have it reset to zero (0) position by sliding on the dial string (See 4.3 DIAL STRING PROCEDURES).
3. Connect Audio V.T.V.M. and Oscilloscope to Output.
4. Connect FM signal generator to FM Antenna Terminals. Set the output impedance of Generator to 300ohm balance or 75ohm unbalance. In this case, the modulation should be set to 400Hz or 1000Hz, and Deviation to 75KHz.
5. Repeat alignment as per the Figure 1.
   Make the Generator output as small as possible, so that the AF output may not be saturated.

STEP	Generator & Dial Freq.	Adjust	Indication & Remarks
1	88MHz	T104	Oscillator coil core Adjust for max. reading
2	108MHz	TC5	Oscillator Trimmer Adjust for max. reading
3	90MHz	T101 T102	ANT coil & RF coil core Adjust for max. reading
4	105MHz	TC1 TC3	ANT & RF Trimmer Adjust for max. reading
5	Repeat step 1 2 3 4 Align after complete tuning		

Fig. 1

4.1.2 FM-IF ALIGNMENT

1. Connect 10.7MHz Sweep Generator to Test point (TP1) at the Front end. Make the output impedance of the Sweep Generator as large as possible as far as the alignment is not hindered.
2. Connect the vertical input of Oscilloscope to the Test point (TP2) of TUNER Block.
3. Set the Tuning (Gang condenser) where no signal is present.
4. Turn the top core of IF Transformer (T103) in the Front end. Turn also the Ratio Detector (T202) primary core and secondary core (T203) in the TUNER Block and align to the S-figure characteristic which centers around 10.7MHz on Oscilloscope.
5. Change vertical input of Oscilloscope to Gate output (2I) of TUNER Block.
6. Turn the top core of IF Transformer (T201) in the TUNER Block and the maximum amplitude at 10.7MHz on Oscilloscope.

4.1.3 MULTIPLEX ALIGNMENT

1. Start Multiplex alignment after 4.1.2 FM-IF alignment.
2. In case this alignment is made by the Multiplex Generator with RF signal, set the Generator output at 300ohm balance or 75ohm unbalance and connect to FM Antenna Terminal.
3. In case the composite Multiplex Signal Generator is used for the checking purpose, detach AF output of TUNER Block (C226) and connect the Generator to the Multiplex side.
4. Before alignment, make the perfect alignment of the Multiplex Generator. For the alignment of the modulation such as phase, level etc. of 19KHz Pilot Signal, follow the alignment procedure as specified in Fig. 2.

STEP	Generator Mod. Freq.	Generator Mod. Dev.	V.T.V.M. connection	Alignment Adjust	Alignment Indication
1	pilot only 19KHz	7.5 KHz	IC401 No.14	T401 T402	Adjust for maximum reading D.C
2	Composite signal 1KHz left ch. only	40 KHz	OUTPUT Left	T401	Adjust for maximum reading
3	as above		OUTPUT Right	T401	Adjust for minimum reading

Fig. 2

5. Connect DC Meter & Audio V.T.V.M. to the Terminal in accordance with the steps specified in Fig. 2.
6. Make the perfect tuning by setting RF output level of Multiplex Generator at 500μV (54dB). Then follow the alignment procedures specified in Fig. 2.

4.1.4 AM-RF ALIGNMENT

1. Start AM-RF alignment after 4.1.5 AM IF alignment.
2. AM Signal Generator output should be connected to Test Loop or several turns of wire in Loop. The Modulation should be set to 400Hz or 1000Hz, 30%.
3. Couple Generator Loop with AM Antenna as loosely as possible.
4. Connect Audio V.T.V.M. to OUTPUT.

5. Make the alignment based on the alignment procedures specified in Fig. 3. Attenuate the output of Generator as much as possible, so that the AF output may not be saturated.

STEP	Generator & Dial Freq.	Adjust	Indication & Remarks
1	520KHz	T205	Oscillator Coil Core Adjust for Maximum Reading
2	1650KHz	TC4	Oscillator Trimmer Adjust for Maximum Reading
3	600KHz	L1	Antenna Coil Adjust for Maximum Reading
4	1400KHz	TC2	Antenna Trimmer Adjust for Maximum Reading
5	Repeat Steps 1 ~ 4 to obtain best tracking		

Fig. 3

4.1.5 AM-IF ALIGNMENT

1. Connect 455KHz (or 470KHz) Sweep Generator output to Test Loop or several turns of wire in Loop.
2. Couple Generator Loop with AM Antenna as loosely as possible.
3. Connect the vertical input of Oscilloscope to AF output Terminal (2E) in the Tuner Block.
4. Set the Tuning (Gang Condenser) at 1650KHz where it is fully open.
5. Turn IF Transformer top core (T204, T203) in TUNER Block. And adjust so as to get double-hang characteristic at 455KHz (or 470KHz) which is the center of ceramic filter characteristic, and the maximum amplitude on Oscilloscope.
6. By attenuating Sweep Generator output as much as possible, make repeated minute alignments specified in the paragraph 5.

4.2 DIAL STRING PROCEDURES

1. Set Dial Pointer (NEEDLE Subassembly) to the minimum frequency position (the extreme left).
2. Rotate Gang Condenser to the maximum capacity position.
3. As described in the drawing of Dial String procedure. DIAL Drum are to be fixed, after assurance for Ear Side position (Q1).
4. After the fixture of the one side of Dial String to the Spring (Q2), and hook other side of the Spring to the Ear Side of DIAL Drum (Q1).
5. Hook the dial string from the Ear Side of DIAL DRUM (Q3) to Pulley (P1).
6. Hook the dial string from Pulley (P1) to Needle subassembly (Q4), and then hook it to Pulley (P2), (P3).
7. Wind the dial string in three turns on the DIAL shaft, and then hook it to Pulley (P4).
8. Wind the dial string in 2/3 turn around DIAL Drum and then hook it to the Spring (Q2) so as to get the proper tension from Spring.
9. Check the movement of Needle by Tuning knob.
10. Make adjustment of position of Needle hooking point (Q4) so that it may be set at (0) and (100) on the Dial Scale (the extreme left and right) and make the final fixture.