

VHF FM HANDHELD TRANSCEIVER

DJ-F1T/E DJ-S1T/E

UHF FM HANDHELD TRANSCEIVER

DJ-F4T/E DJ-S4T/E

Service Manual

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ALINCO ELECTRONICS INC.

■ SPECIFICATIONS

■ GENERAL

Frequency Coverage	F1T & S1T: TX: 144.000-147.995 MHz RX: 138.000-173.995 MHz (AM Mode 118 — 136 MHz after Modification)
	F1E & S1E: TX: 144.000-145.995 MHz RX: 144.000-145.995 MHz
	F4T & S4T: TX: 440.000-449.995 MHz RX: 410.000-470.000 MHz
	F4E & S4E: TX: 430.000-440.000 MHz RX: 430.000-440.000 MHz
Memory Channel	40 Channels + 1 Call Channel
Channel Steps	5, 10, 12.5, 15, 20, and 25 kHz
Standard Shift Frequency	F1T/E & S1T/E: 600 kHz F4T & S4T: 5 MHz F4E & S4E: 7.6 MHz (Resettable by 5 kHz [Minimum] between 0 and 15.995 MHz)
Emission Type	F3
Antenna Impedance	50 Ω
Operating Voltage	rated 9V
Microphone Impedance	2 kΩ
Speaker Impedance	8 Ω
Dimensions	110 (H) × 53 (W) × 37 (D) mm (4.3 × 2.1 × 1.5 inch) (with Standard Battery Pack or Standard Dry Cell Battery Case) (without Projections)
Weight	F1T/E & F4T/E Approx. 375 g (13.2 oz) with Standard Battery Pack S1T/E & S4T/E Approx. 370 g (13 oz) with Standard Dry Cell Battery Case
Ground	Negative

■ TRANSMITTER

Output Power with Battery Pack EBP-16N (Standard for F1T/E & F4T/E)

Hi	Mid	Low
2 W (F1T/E & S1T/E) 1.5 W (F4T/E & S4T/E)	1 W	0.1 W

with Optional Battery Pack EBP-18N or at 13V

Hi	Mid	Low
5 W	1 W	0.1 W

with Dry Cell Battery Pack at 9V

Hi	Mid	Low
2.5 W (F1T/E & S1T/E) 2 W (F4T/E & S4T/E)	1 W	0.1 W

Modulation System	Variable Reactance Frequency Modulation
Max. Freq. Deviation	± 5 kHz
Spurious Emission	Less than 60 dB below carrier
Microphone	Built-in Electret Condenser

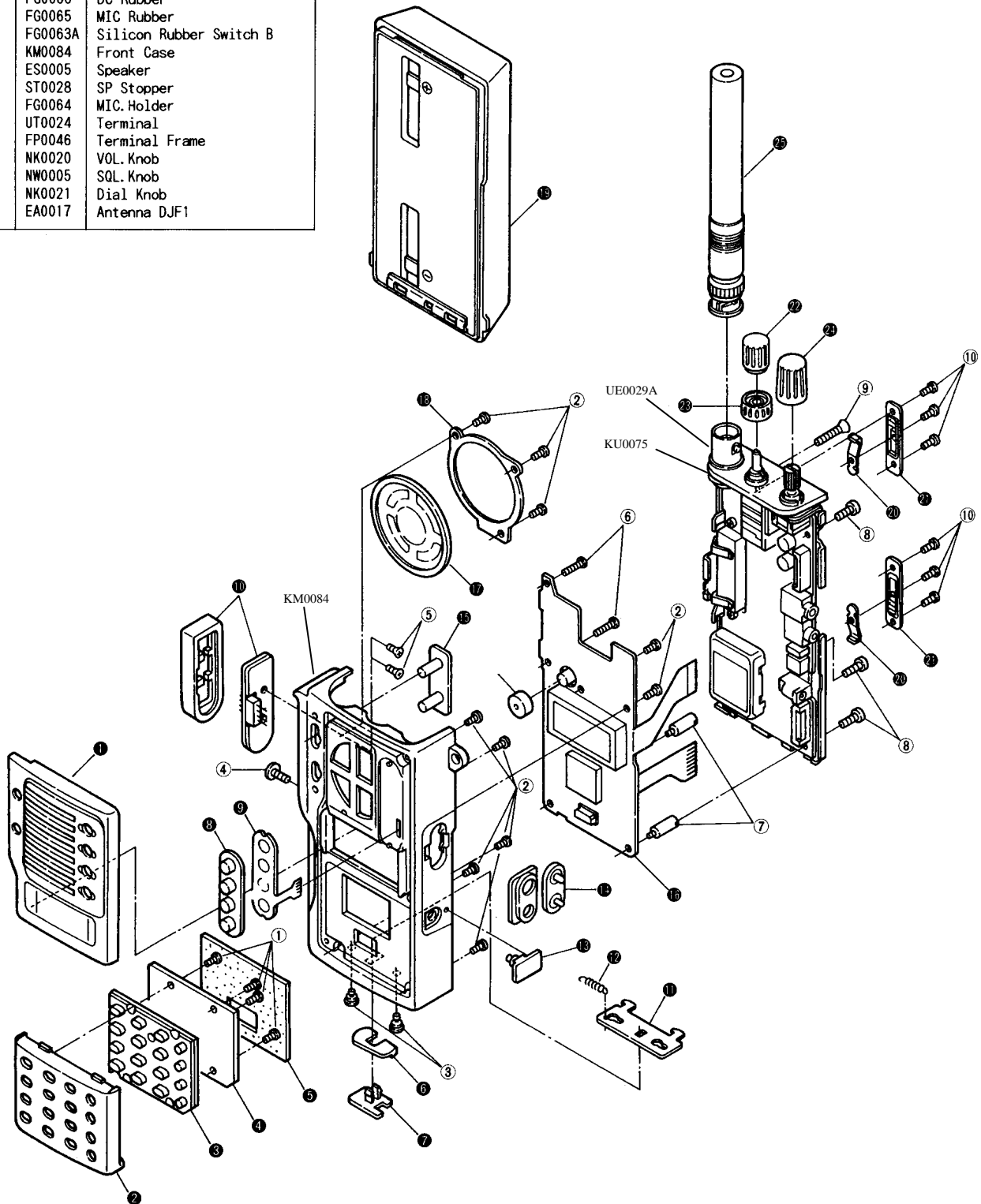
■ RECEIVER

Receiving System	Double-conversion superheterodyne
Sensitivity	12 dB SINAD less than -15 dBμ
Intermediate Frequencies	1st 23.05 MHz 2nd 455 kHz

■ DJ-F1T/E CABINET PARTS LOCATION

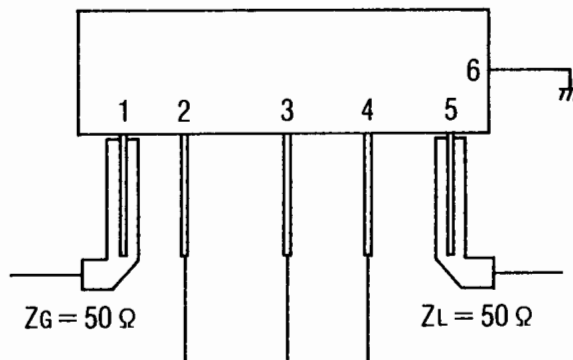
Mechanical Parts		
1	KM0121	Front Panel, F1T
	KM0081	Front panel DJ-S1
	KM0078	Front panel DJ-S1T
2	KM0114	Key Pad Panel
3	FG0069	Rubber Contact
4	UP0210	DJP3 key Board
5	FG0088	Anti-Water Drop Mat C
6	NB0041	Lock Knob
7	NB0040	Release Knob
8	FG0061A	Silicon Rubber Switch A
9	UP0198	SW P. O. Board
10	FG0058	PTT Rubber
11	FM0047	Release Plate
12	SC0005	Spring Coil
13	FG0066	DC Rubber
14	FG0065	MIC Rubber
15	FG0063A	Silicon Rubber Switch B
16	KM0084	Front Case
17	ES0005	Speaker
18	ST0028	SP Stopper
19	FG0064	MIC Holder
20	UT0024	Terminal
21	FP0046	Terminal Frame
22	NK0020	VOL. Knob
23	NW0005	SQL. Knob
24	NK0021	Dial Knob
25	EA0017	Antenna DJF1

Screw		
1	AF0015	0# Screw 2+3 BC
2	AF0005	0# Screw 2+3.5 N
3	SA0009	Supporter For Release Switch
4	AA0039	Screw 2+6 BC
5	AA0037	Screw 2+4
6	AF0017	0# Screw 2+8 N
7	SA0008	Supporter For Lock
8	AA0036	Screw 2+5 N
9	AA0038	Screw (flat) 2+16N
10	AF0016	0# Screw 2+2 BC



■ M67748L1 (MAIN UNIT IC-201)

- 1: INPUT
- 2: PREDRIVE + B
- 3: BIAS ± B
- 4: FINAL + B
- 5: OUTPUT
- 6: GAD (FIN)

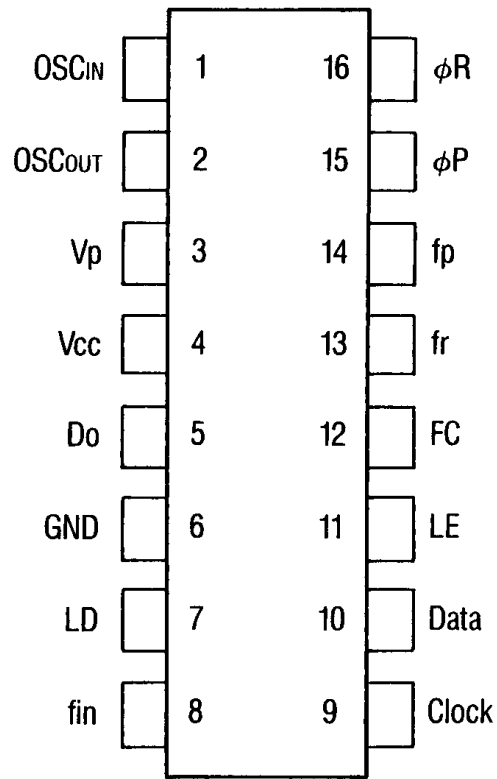


Electrical Characteristics

ITEM	SYMBOL	T _C (°C)	CONDITION	RATING			UNIT
				MIN.	TYPE	MAX.	
Output power	P _O	25	f = 135-150MHz, P _{in} = 20mW, V _{cc} = 12.5V, V _{bb} = 5V, Z _g = Z _l = 50Ω	7			W
Total efficiency	η _T	25	(ditto)	45			%
2nd spurious	2f _o	25	(ditto)			-20	dB
3rd spurious	3f _o	25	(ditto)			-25	dB
Input SWR	p _{in}	25	(ditto)			2.5	—
Output SWR	p _{out}	25	(ditto)		1.5		—

■ MB1504L (MAIN UNIT IC-202)

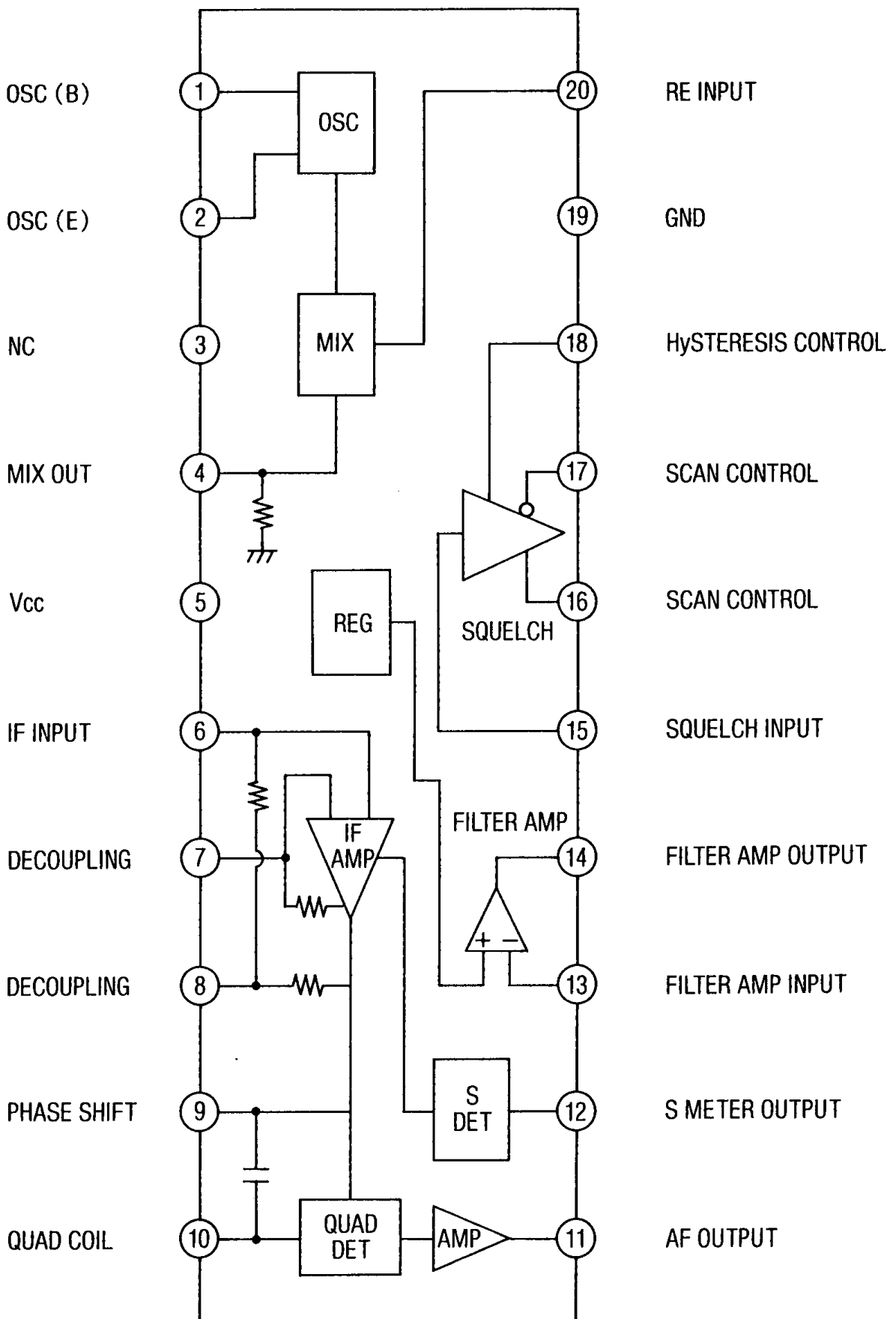
(TOP VIEW)



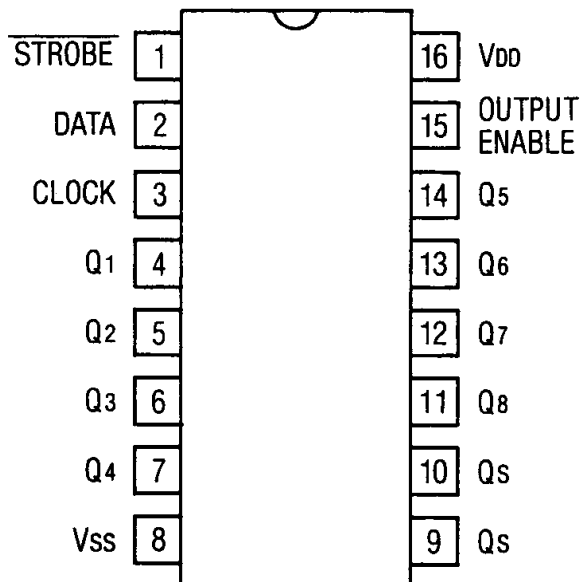
Pin Function Table

NO.	SYMBOL	I/O	RATING
1	OSCIN	I	Cristal oscillator input
2	OSCOUT	O	
3	Vp	—	Voltage for charge-pump
4	Vcc	—	Voltage for IC
5	Do	O	Charge-pump output
6	GND	—	Ground
7	LD	O	Lock detector output
8	fin	I	Frequency input
9	Clock	I	Serial interface (clock input)
10	Data	I	Serial interface data input
11	LE	I	Serial interface load enable input
12	FC	O	Do changer output
13	fr	O	Reference Frequency output
14	fp	O	Programmable counter output
15	φP	O	Charge-pump output
16	φR	O	

■ TK10487MT (MAIN UNIT IC-203)

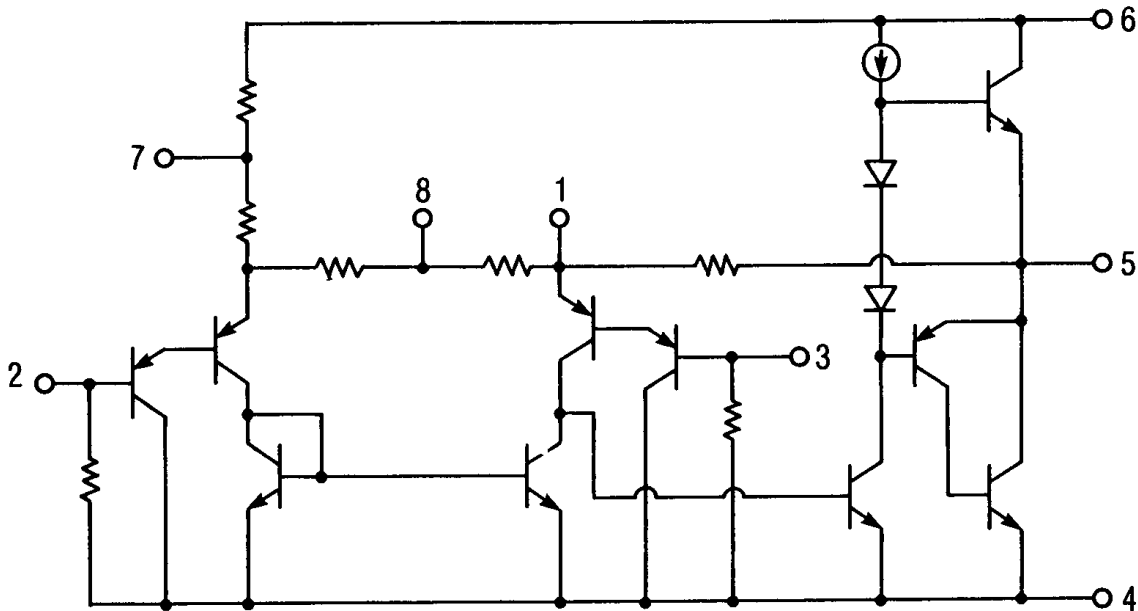
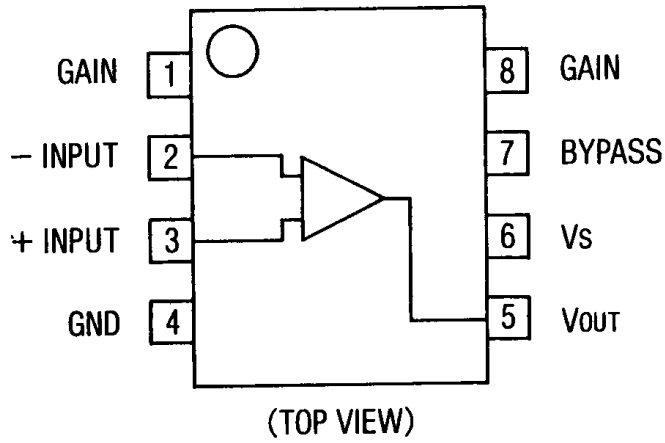


■ μ PD4094BG (MAIN UNIT IC-204)



CLOCK	OUTPUT ENABLE	$\overline{\text{STROBE}}$	DATA	PARALLEL OUTPUT		SERIES OUTPUT	
				Q1	Qn	Qs*	Q's
	L	x	x	High Impedance	High Impedance	D7	NO CHANGE
	L	x	x	High Impedance	High Impedance	NO CHANGE	D8
	H	L**	x	NO CHANGE	NO CHANGE	D7	NO CHANGE
	H	H	L	L	Q _{n-1}	D7	NO CHANGE
	H	H	H	H	Q _{n-1}	D7	NO CHANGE
	H	H	H	NO CHANGE	NO CHANGE	NO CHANGE	D8

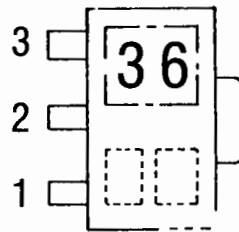
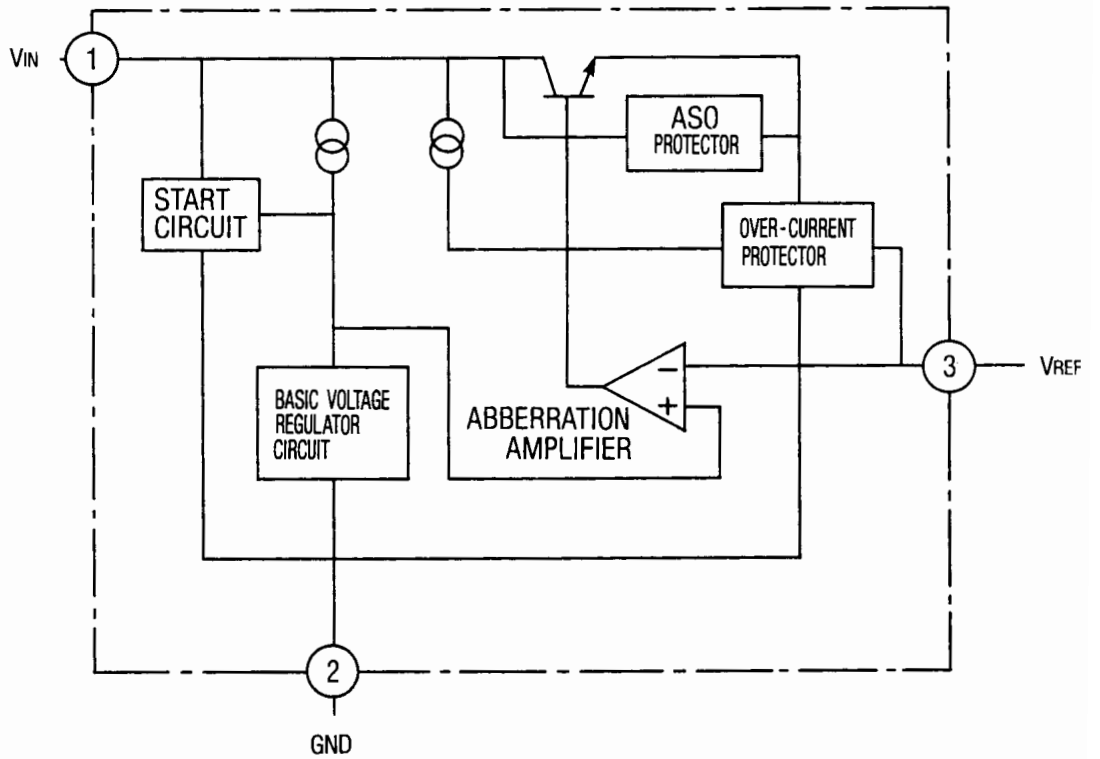
■ NJM386M (MAIN UNIT IC-205)



Electrical Characteristics

ITEM	CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply voltage		Vs	4	—	12	V
Reactive current	V _{IN} = 0V	I _o	—	4	8	mA
Output voltage	R _L = 8Ω, THD = 10%	P _{OUT}	250	325	—	mW
Output voltage	V _s = 9V, R _L = 16Ω, THD = 10%	P _{OUT}	—	500	—	mW
Voltage gain	f = 1kHz	A _v	—	26	—	dB
Voltage gain	f = 1kHz,	A _v	—	46	—	dB
Band width		BW	—	300	—	kHz
Total high distortion	R _L = 8Ω, P _{OUT} = 125mW f = 1kHz,	THD	—	0.2	—	%
Power supply rejection	f = 1kHz,	PSRR	—	50	—	dB
Input register		R _{IN}	—	50	—	KΩ
Input bias supply		I _{BIAS}	—	250	—	nA

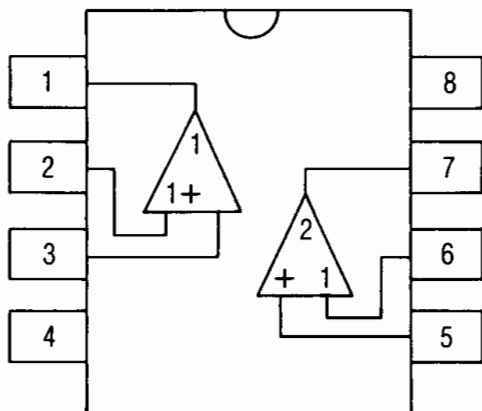
■ M5236ML (MAIN UNIT IC-206)



Electrical Characteristics

ITEM	SYMBOL	CONDITION	RATING			UNIT
			MIN.	TYP.	MAX.	
Input voltage	V_{IN}		3.5	—	36	V
Output voltage	V_O		1.5	—	33	V
Voltage difference	V_{I-O}		—	0.2	0.5	V
Standard voltage	V_{REF}		1.20	1.26	1.32	V
Input regulation	Reg_{-in}	$V_I = 15 \sim 20V$	—	0.02	0.1	%/V
Loaded regulation	Reg_{-L}	$I_L = 10 \sim 200mA$	—	0.02	0.1	%
Bias current	I_B		—	1.3	2.3	mA
Output voltage temp. coefficient	TCV_O	$T_a = 0 \sim +75^\circ C$	—	0.01	—	%/°C
Ripple rejection ratio	RR	$f = 120Hz, \sqrt{r} = 300mV_{rms}$ $V_{I-O} = 3V$	—	68	—	dB
Output noise voltage	V_{No}	$\Delta f = 20Hz \sim 100kHz$	—	33	—	μV_{rms}

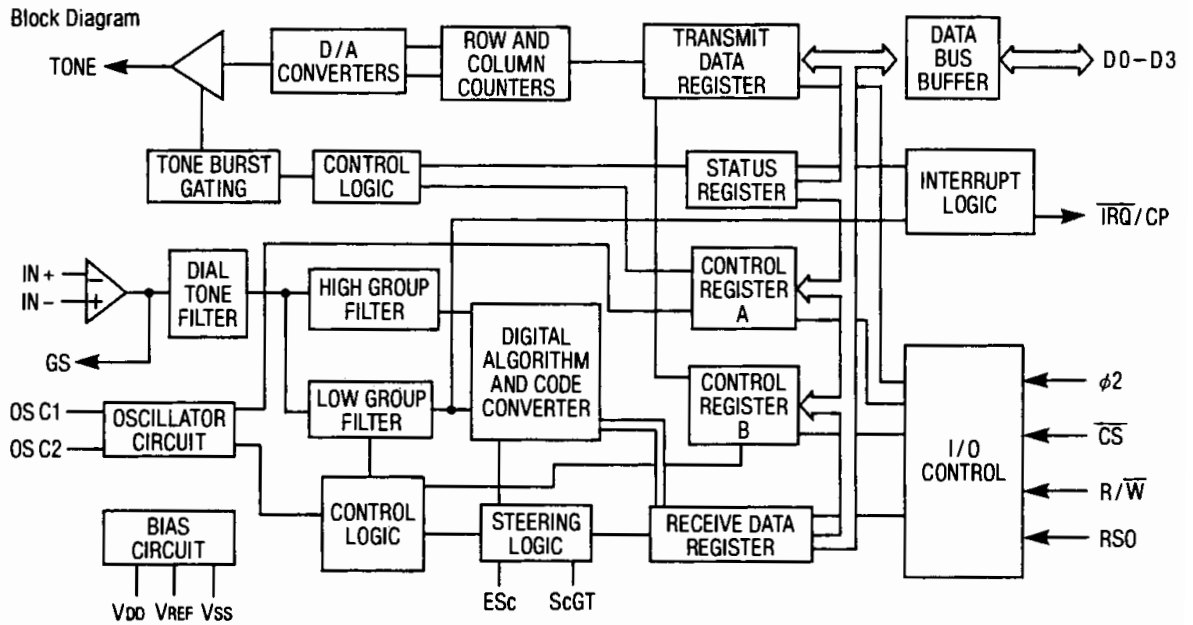
■ M5218 (MAIN UNIT IC-207)



Electrical Characteristics

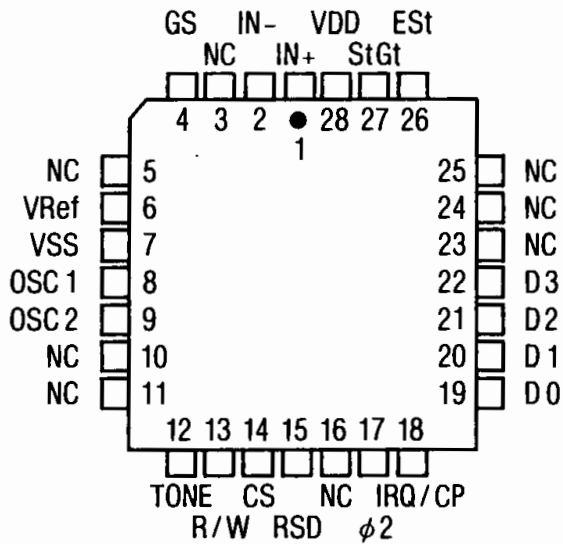
ITEM	SYMBOL	CONDITION	RATING			UNIT
			MIN.	TYP.	MAX.	
I. current circuit	I_{CC}	$V_{in} = 0$	—	3.0	6.0	mA
V. input offset	V_{IO}	$R_s \leq 10K\Omega$	—	0.5	6.0	mV
I. input offset	I_{IO}		—	5	200	nA
I. input bias	I_B		—	—	500	nA
R. input	R_{in}		0.3	5	—	$M\Omega$
G. open voltage	G_{VO}	$R_L \geq 2K\Omega, V_o = \pm 10V$	86	110	—	dB
V. max. output	V_{OM}	$R_L \geq 10K\Omega$	± 12	± 14	—	V
		$R_L \geq 2K\Omega$	± 10	± 13	—	V
Common mode range	V_{CM}		± 12	± 14	—	V
Common mode rejection	CMRR	$R_s \leq 10K\Omega$	70	90	—	dB
C. voltage rejection ratio	SVRR	$R_s \leq 10K\Omega$	—	30	150	$\mu V/V$
Power consumption	P_d		—	90	180	mW
Bandwidth	f_T		—	7	—	MHz
Through rate	SR	$G_v = 0dB, R_L = 2K\Omega$	—	2.2	—	$V/\mu s$
Input scale noise voltage	V_{NI}	$R_s = 1K\Omega, BW: 10Hz \sim 30kHz$	—	2.0	—	μV_{rms}

■ CM8880 (DTMF UNIT IC-601)

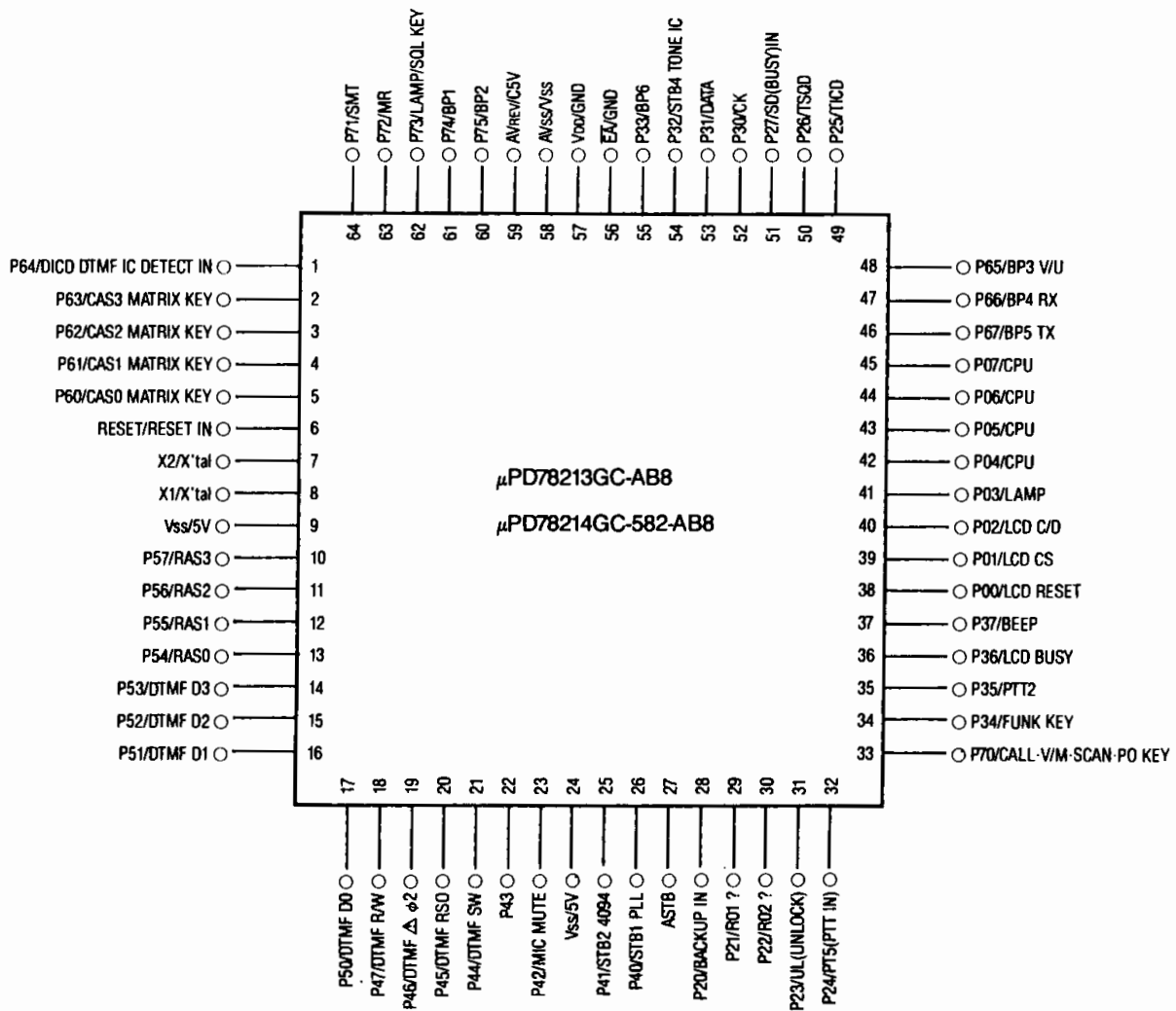


This is advance information and specifications are subject to change without notice.

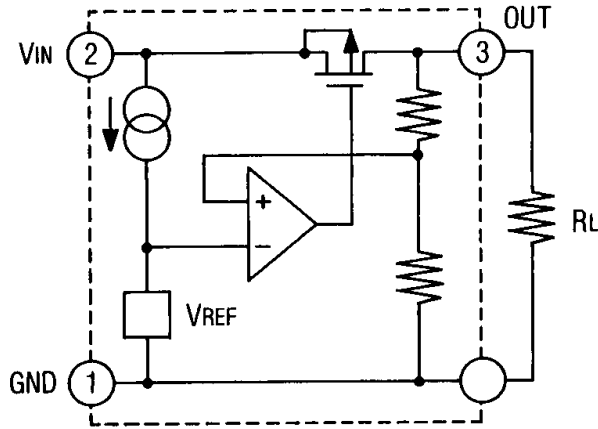
■ TM8880 (DTMF UNIT IC-602)



■ MPD78214GC582-AB8 (CPU UNIT IC-02)

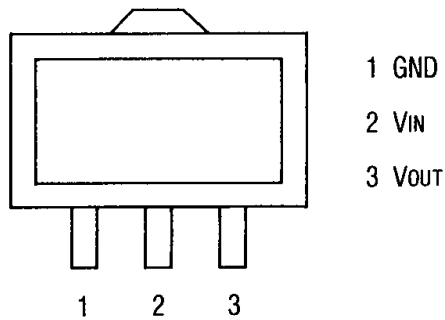


■S-81250HG (CPU UNIT IC-03)

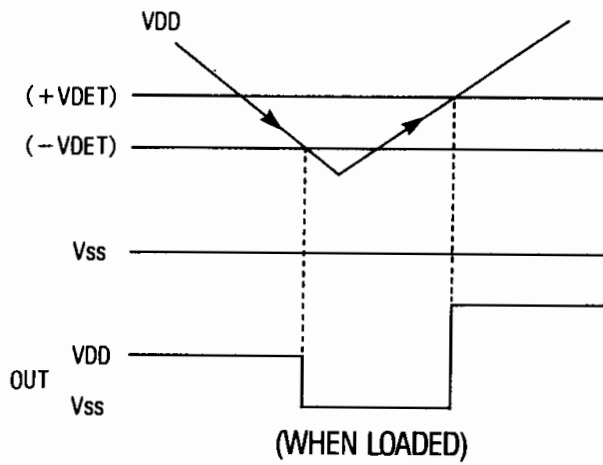
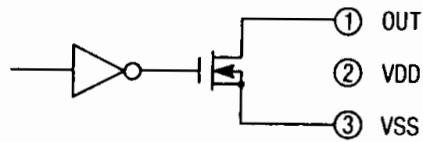
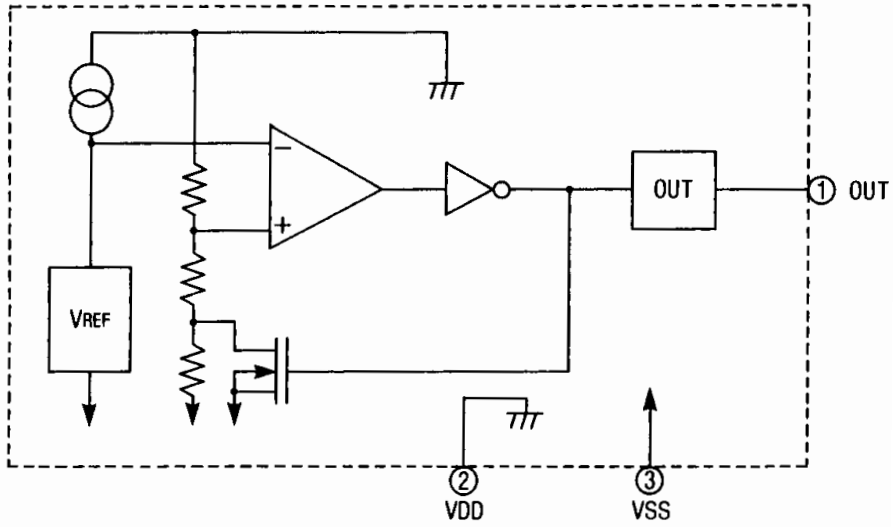


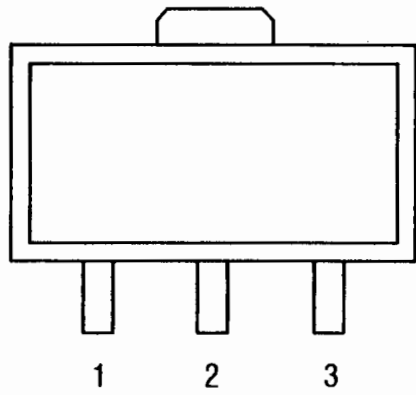
Electric Characteristics (+5V output/high-tention proof) (Unless specified; $T_a=25^{\circ}\text{C}$)

ITEM	SYMBOL	CONDITION	RATING			UNIT
			MIN.	TYP.	MAX.	
Output voltage	V_{OUT}	$V_{IN} = +7\text{V}$, $I_{OUT} = 10\text{mA}$	4.75	5.00	5.25	V
Output current	I_{OUT}	$V_{IN} = +7\text{V}$	40	50	—	mA
Load stability	ΔV_{OUT}	$1\text{mA} \leq I_{OUT} \leq 40\text{mA}$ $V_{IN} = +7\text{V}$	—	40	80	mV
In/output voltage difference	V_{diff}	$I_{OUT} = 1\text{mA}$	—	30	—	mV
Current consumption	I_{SS}	$V_{IN} = +7\text{V}$, No load	—	3.0	7.0	μA
Input stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} - V_{OUT}}$	$+6\text{V} \leq V_{IN} \leq +10\text{V}$	—	0.1	—	%/V
Input voltage	V_{IN}		—	—	12	V
Temperature coefficient of output voltage	$\frac{\Delta V_{OUT}}{\Delta T_a}$	$I_{OUT} = 10\text{mA}$ $-20^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	—	± 0.625	—	$\text{mV}/^{\circ}\text{C}$



■ S-8054HN (CPU UNIT IC-04)





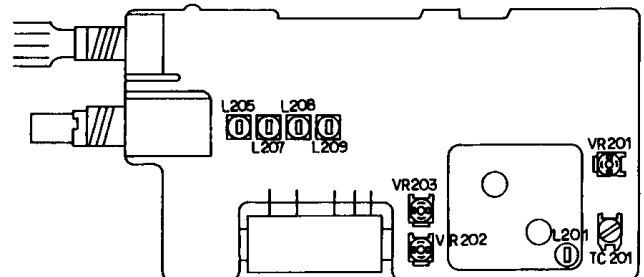
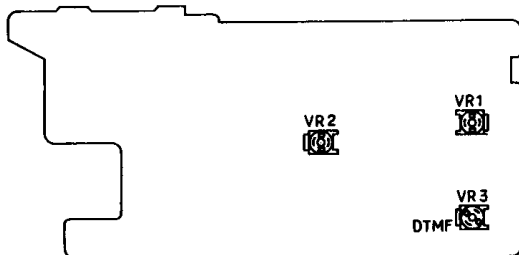
1 OUT
2 VDD
3 VSS

ITEM	SYMBOL	CONDITION	UNIT
Supply voltage range	VDD-VSS	12.0	V
Input voltage	V _{in}	VSS - 0.3 ~ VDD + 0.3	
Output voltage	V _{out}	VSS - 0.3 ~ 12	
Output current	I _{out}	50	mA
Power-loss allowance	P _d	200	mW
Operation temp.	T _{opr}	-20 ~ +70	°C
Storage temp.	T _{stg}	-40 ~ +125	
Solder	T _{solder}	260°C 10 sec.	

Ref. No.	Part Code	Part Name and Number	Ref. No.	Part Code	Part Name and Number	Ref. No.	Part Code	Part Name and Number		
R256	RK3058	Chip R, MCR03EZHJ473	R340	RK1107	Chip R, MCR18EZHJ000E					
R258	RK3001	Chip R, MCR03EZHJ000	R342	RK3060	Chip R, MCR03EZHJ683					
R259	RK3035	Chip R, MCR03EZHJ561	R343	RK3001	Chip R, MCR03EZHJ000					
R260	RK3042	Chip R, MCR03EZHJ222	TC201	CT0012	Trimmer C, CTZ-10AW					
R261	RK3001	Chip R, MCR03EZHJ000	VR201	RH0064	VR, MVR32HXBRN103					
R262	RK3072	Chip R, MCR03EZHJ684	VR202	RH0061	VR, MVR32HXBRN472					
R263	RK3046	Chip R, MCR03EZHJ472	VR203	RH0064	VR, MVR32HXBRN103					
R264	RK3070	Chip R, MCR03EZHJ474	VR204	RV0014	VR, RK09722115R1211					
R265	RK3044	Chip R, MCR03EZHJ332	X201	XQ0046	X'tal UM-5 23.505MHZ					
R266	RK3026	Chip R, MCR03EZHJ101	X202	XK0002	X'tal CDBM455C7					
R267	RK3067	Chip R, MCR03EZHJ274	X203	XQ0022	X'tal UM-1 12.8MHZ					
R268	RK3050	Chip R, MCR03EZHJ103	FL201	XC0004	CeramicFilter, CFUM455E					
R269	RK3046	Chip R, MCR03EZHJ472	FL202	XF0008	CeramicFilter, 23.05MHZ UM-5					
R270	RK3058	Chip R, MCR03EZHJ473	CN202	UE0110	Connector, 52030-1210					
R271	RK3054	Chip R, MCR03EZHJ223	CN203	UE0110	Connector, 52030-1210					
R272	RK3050	Chip R, MCR03EZHJ103	JK201	UJ0015	Jack, HEC1781-01-020					
R273	RK3042	Chip R, MCR03EZHJ222	JK202	UJ0022	Jack, HSJ1102-01-540					
R274	RK3026	Chip R, MCR03EZHJ101	JK203	UJ0019	Jack, HSJ1423-01-010					
R275	RK3062	Chip R, MCR03EZHJ104	RE201	UR0006	RE EC09P20-51					
R276	RK3046	Chip R, MCR03EZHJ472	MRCK08AA		Lead, #08 RED					
R277	RK3051	Chip R, MCR03EZHJ123	MRCK04AA		Lead, #04 RED					
R279	RK3042	Chip R, MCR03EZHJ222	YZ0058		Solder-Plated Wire					
R281	RK3026	Chip R, MCR03EZHJ101	QB0003		Ferrite Beads					
R282	RK3042	Chip R, MCR03EZHJ222	KEY BOARD UNIT							
R283	RK3047	Chip R, MCR03EZHJ562	PCB801	UP0210	DJP3 KEY BOARD					
R284	RK3026	Chip R, MCR03EZHJ101	CN0801	UE0133	Connector DF9A-11P-1V(22)					
R285	RK3026	Chip R, MCR03EZHJ151	R801	RK3024	Chip R, MCR03EZHJ680					
R286	RK3014	Chip R, MCR03EZHJ100	R802	RK3024	Chip R, MCR03EZHJ680					
R287	RK3066	Chip R, MCR03EZHJ224	D801	XL0016	Diode, SLM13MWT96B					
R288	RK3042	Chip R, MCR03EZHJ222	D802	XL0016	Diode, SLM13MWT96B					
R289	RK3046	Chip R, MCR03EZHJ472	D803	XL0016	Diode, SLM13MWT96B					
R290	RK3030	Chip R, MCR03EZHJ221	D804	XL0016	Diode, SLM13MWT96B					
R291	RK0105	Chip R, MCR10EZHJ2R2E	DTMF UNIT							
R292	RK3047	Chip R, MCR03EZHJ562	IC601	XA0169	IC CM8880-2PEIT					
R293	RK3053	Chip R, MCR03EZHJ183	Q0601	XU0021	Transistor FMC3 T98					
R294	RK3044	Chip R, MCR03EZHJ332	D0601	XD0129	Diode, 1SS318 TT11					
R295	RK3038	Chip R, MCR03EZHJ102	C601	CU3035	Chip C, CM105 W5R 102K					
R296	RK3042	Chip R, MCR03EZHJ222	C602	CU3035	Chip C, CM105 W5R 102K					
R297	RK3050	Chip R, MCR03EZHJ103	C603	CU3059	Chip C, CM105 Y5V 104Z					
R298	RK3056	Chip R, MCR03EZHJ333	C604	CS0050	Chip C, JMC 1A 475TRB					
R299	RK3038	Chip R, MCR03EZHJ102	C605	CU3059	Chip C, CM105 Y5V 104Z					
R300	RK3042	Chip R, MCR03EZHJ222	C606	CU3047	Chip C, CM105 W5R 103K					
R301	RK3038	Chip R, MCR03EZHJ102	C607	CU3017	Chip C, CM105 CH 330K					
R302	RK3046	Chip R, MCR03EZHJ472	C608	CU3017	Chip C, CM105 CH 330K					
R303	RK3034	Chip R, MCR03EZHJ471	C609	CU3047	Chip C, CM105 W5R 103K					
R304	RK3050	Chip R, MCR03EZHJ103	C610	CU3059	Chip C, CM105 Y5V 104Z					
R305	RK3043	Chip R, MCR03EZHJ272								
R306	RK3038	Chip R, MCR03EZHJ102								
R307	RK3054	Chip R, MCR03EZHJ223								
R308	RK3066	Chip R, MCR03EZHJ224								
R309	RK3047	Chip R, MCR03EZHJ562								
R310	RK3034	Chip R, MCR03EZHJ471								
R311	RK3026	Chip R, MCR03EZHJ101								
R312	RK3050	Chip R, MCR03EZHJ103								
R313	RK3056	Chip R, MCR03EZHJ333								
R314	RK3050	Chip R, MCR03EZHJ103								
R315	RK3050	Chip R, MCR03EZHJ103								
R316	RK3038	Chip R, MCR03EZHJ102								
R317	RK3038	Chip R, MCR03EZHJ102								
R318	RK3026	Chip R, MCR03EZHJ151								
R319	RK3026	Chip R, MCR03EZHJ101								
R320	RK3074	Chip R, MCR03EZHJ105	R601	RK3018	Chip R, MCR03 EZHT220					
R321	RK3038	Chip R, MCR03EZHJ102	R602	RK3066	Chip R, MCR03 EZHT224					
R322	RK3042	Chip R, MCR03EZHJ222	R603	RK3066	Chip R, MCR03 EZHT224					
R323	RK3056	Chip R, MCR03EZHJ333	R604	RK3062	Chip R, MCR03 EZHT104					
R324	RK3073	Chip R, MCR03EZHJ824	R605	RK3059	Chip R, MCR03 EZHT563					
R325	RK3050	Chip R, MCR03EZHJ103	R606	RK3058	Chip R, MCR03 EZHT473					
R326	RK3001	Chip R, MCR03EZHJ000	R607	RK3050	Chip R, MCR03 EZHT103					
R327	RK3046	Chip R, MCR03EZHJ472	R608	RK3038	Chip R, MCR03 EZHT102					
R328	RK3038	Chip R, MCR03EZHJ102	R609	RK3056	Chip R, MCR03 EZHT333					
R329	RK3038	Chip R, MCR03EZHJ102	X0601	XQ0021	X'tal DSMAT 3.58MHZ					
R330	RK3072	Chip R, MCR03EZHJ684		TT3008	Elastic Tube X'tal					
R331	RK3038	Chip R, MCR03EZHJ102		YZ0042	Cement G-17 1g					
R332	RK3038	Chip R, MCR03EZHJ102	CN601	UE0134	Connector, DF9A-13P-1V(22)					
R333	RK3050	Chip R, MCR03EZHJ103								
R334	RK3030	Chip R, MCR03EZHJ221								
R335	RK1018	Chip R, MCR18EZHJ101E								
R336	RK3026	Chip R, MCR03EZHJ101								
R337	RK3050	Chip R, MCR03EZHJ103								
R338	RK3062	Chip R, MCR03EZHJ104								
R339	RK3062	Chip R, MCR03EZHJ104								

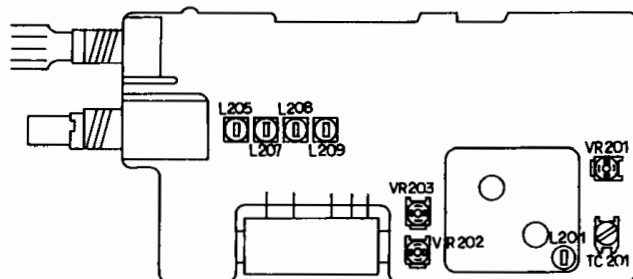
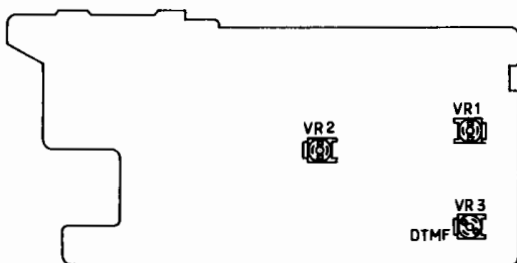
■ ADJUSTMENT F1-T/S1-T

Item	Adjustment method	Spec.
1. Standard frequency	Transmit at 146.03 on L.C.D. board, then adjust TC201 so that the frequency is 146.03MHz \pm 50Hz. Adjusting point TC201	146.03MHz \pm 50Hz
2. Output power		
1) High power	Transmit at 146.03MHz, then adjust VR202 so that the output power is 5.0W when operating power source at 13.8V. Adjusting point(s) VR202 main board	5W \pm 0.1W
2) Middle power	Transmit at 146.03MHz, then adjust VR203 so that the output power is 1.0W when operating power source at 13.8V. Adjusting point(s) VR203 main board	1W \pm 0.1W
3) Low power	Transmit at 146.03MHz, then verify that the output power is between 80mW and 200mW.	
3. Transmitting spurious	Transmit at 1144.03Hz, 146.03MHz and 147.99MHz, then verify the transmitting spurious is as follows when operating voltage is between 6V and 14V. High power under -60dB Low power..... under -50dB Also verify no queer oscillation is occurring.	High Power under -60dB Low Power under -50dB
4. Modulation		
1) MIC modulation adjustment	Transmit at 146.03MHz and input low frequency of 1kHz 50mV from MIC input terminal. Then adjust VR201 so that the modulation is 4.5kHz. Adjusting point(s) VR201 main board	4.5kHz \pm 0.1kHz
2) DTMF deviation	Transmit at 146.03MHz and press the ten-key [1]. Then adjust the VR3 so that the modulation is 3.1kHz. Adjusting point(s) VR3 CPU board	3.1kHz \pm 0.1kHz
3) Sub-audible tone modulation	Set the sub-audible tone at 88.5MHz, then adjust VR1 so that the frequency is 800Hz when transmitting at 146.03MHz. Adjusting point(s) VR1 CPU board	800Hz \pm 100Hz
5. Standard VCO voltage	At the receiving condition, adjust L104 so that the voltage of P/D is 0.7V with the frequency set at 146.03MHz. Adjusting point(s) VCO board L204 At the transmitting condition verify that the voltage of P/D is between 0.5V and 1.0V with the frequency set at 145.05MHz.	0.8 \pm 0.1V
6. AIR BAND	At the receiving frequency of 125.03MHz, input the signal of AM 1kHz 30% output 8dB μ (disconnection terminal) from SG. Then verify that the S/N is more than 10dB. And, receivable from 118.00MHz to 142.99MHz.	
7. VHF front-end adjusting	At the receiving frequency of 146.03MHz, adjust L205, L207, L208 and L209 so that the 12dB sind gets maximum sensitivity. Adjusting point(s) L205, L207, L208, L209 main board	
8. S meter	At the receiving frequency of 146.03MHz input the signal of 20dB μ from the transceiver tester. Then adjust VR2 so that the FU11 in S meter starts lighting. Adjusting point(s) VR2 CPU board	

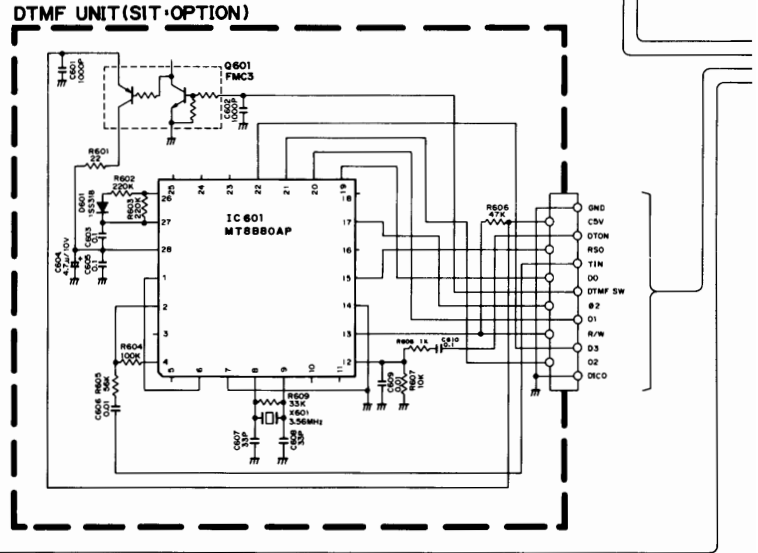
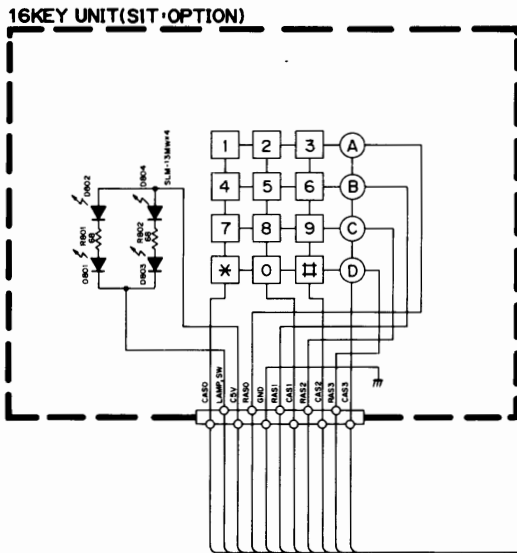
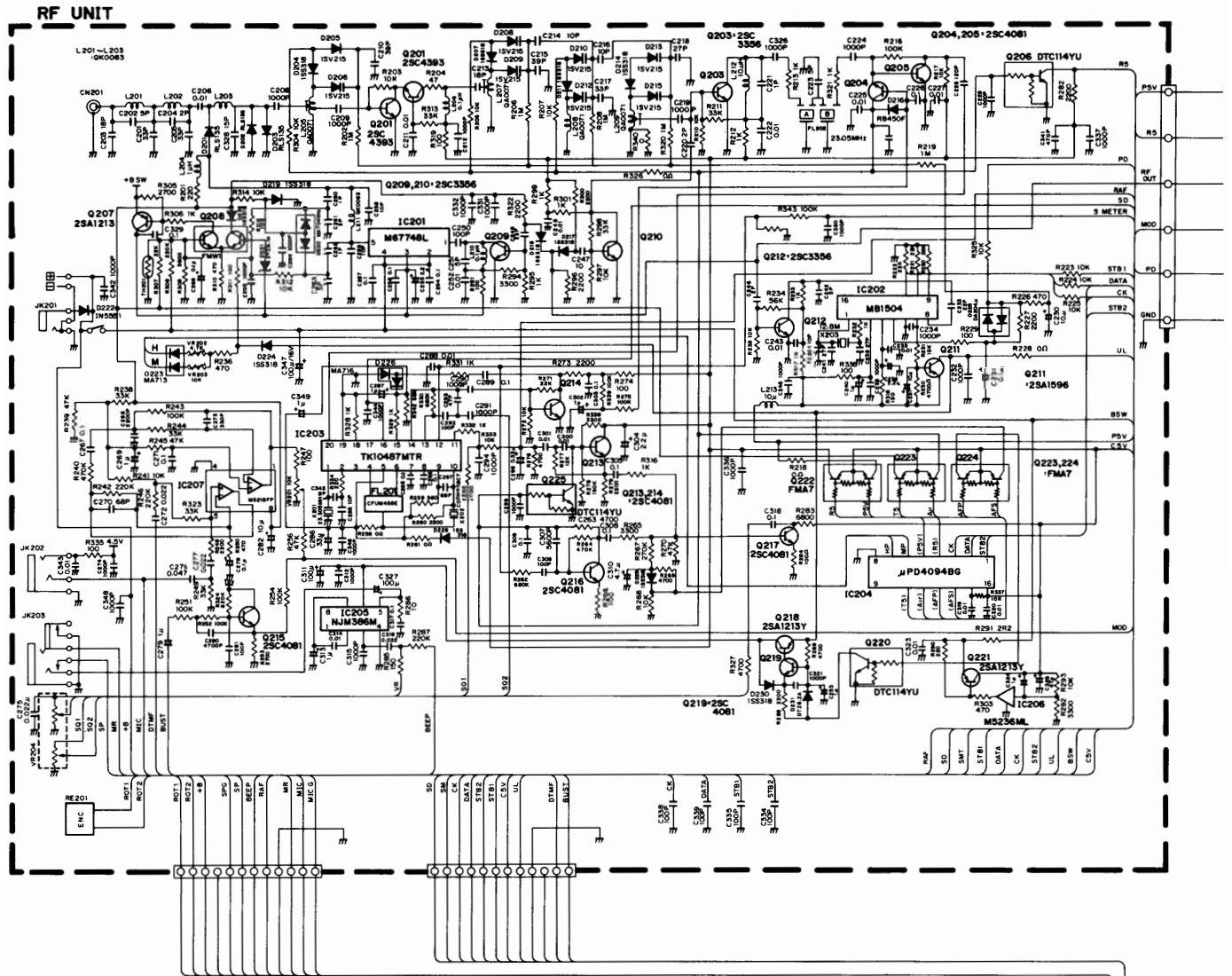


■ ADJUSTMENT F1-E/S1-E

Item	Adjustment method	Spec.
1. Standard frequency	Transmit at 145.05 on L.C.D. board, then adjust TC201 so that the frequency is 145.05MHz \pm 50Hz. Adjusting point(s) TC201	145.05MHz \pm 50Hz
2. Output power		
1) High power	Transmit at 145.05MHz, then adjust VR202 so that the output power is 5.0W when operating power source at 13.8V. Adjusting point(s) VR202 main board	5W \pm 0.1W
2) Middle power	Transmit at 145.05MHz, then adjust VR203 so that the output power is 1.0W when operating power source at 13.8V. Adjusting point(s) VR203 main board	1W \pm 0.1W
3) Low power	Transmit at 145.05MHz, then verify that the output power is between 80mW and 200mW.	
3. Transmitting spurious	Transmit at 145.05MHz, 144.05MHz and 145.95MHz, then verify the transmitting spurious is as follows when operating voltage is between 6V and 14V. High power under -60dB Low power..... under -50dB Also verify no queer oscillation is occurring.	High Power under -60dB Low Power under -50dB
4. Modulation		
1) MIC modulation adjustment	Transmit at 145.05MHz and input low frequency of 1kHz 50mV from MIC input terminal. Then adjust VR201 so that the modulation is 4.5kHz. Adjusting point(s) VR201 main board	4.5kHz \pm 0.1kHz
2) DTMF deviation	Transmit at 145.05MHz and press the ten-key [1]. Then adjust the VR3 so that the modulation is 3.1kHz. Adjusting point(s) VR3 CPU board	3.1kHz \pm 0.1kHz
3) Tone-burst modulation	Transmit at 145.05MHz, then adjust VR1 so that the modulation is 3.0kHz. Verify that the tone-burst is in the range of 1,750Hz \pm 20Hz at this time. Adjusting point(s) VR1 CPU board	3.0kHz \pm 0.1kHz
5. Standard VCO voltage	At the receiving condition, adjust L104 so that the voltage of P/D is 0.7V with the frequency set at 145.05MHz. Adjusting point(s) VCO board L204 At the transmitting condition verify that the voltage of P/D is between 0.5V and 1.0V with the frequency set at 145.05MHz.	0.7V \pm 0.1V
6. AIR BAND	At the receiving frequency of 125.03MHz, input the signal of AM 1kHz 30% output 8dB μ (disconnection terminal) from SG. Then verify that the S/N is more than 10dB. And, receivable from 118.00MHz to 142.99MHz.	
7. VHF front-end adjusting	At the receiving frequency of 145.05MHz, adjust L205, L207, L208 and L209 so that the 12dB sind gets maximum sensitivity. Adjusting point(s) L205, L207, L208, L209 main board	
8. S meter	At the receiving frequency of 145.95MHz input the signal of 20dB μ from the transceiver tester. Then adjust VR2 so that the FU11 in S meter starts lighting. Adjusting point(s) VR2 CPU board	

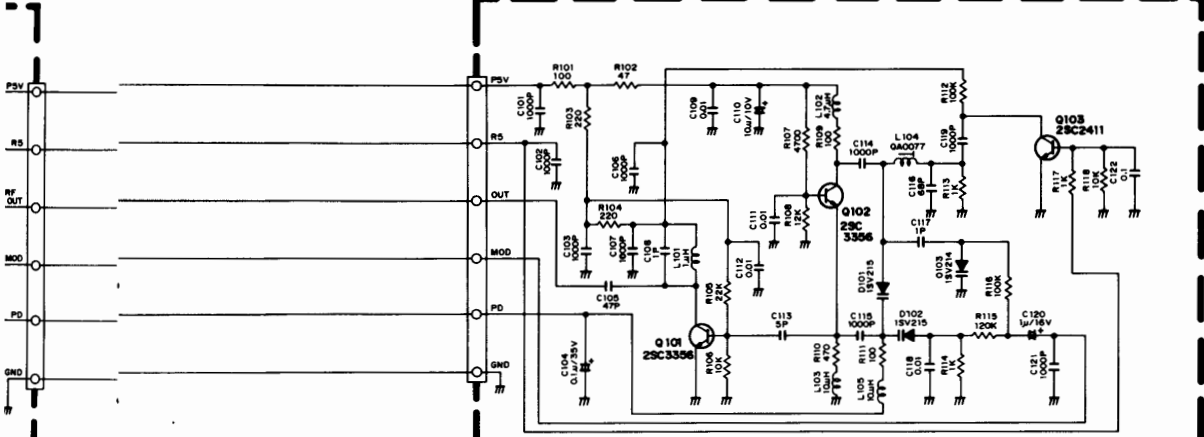


■ SCHEMATIC DIAGRAM

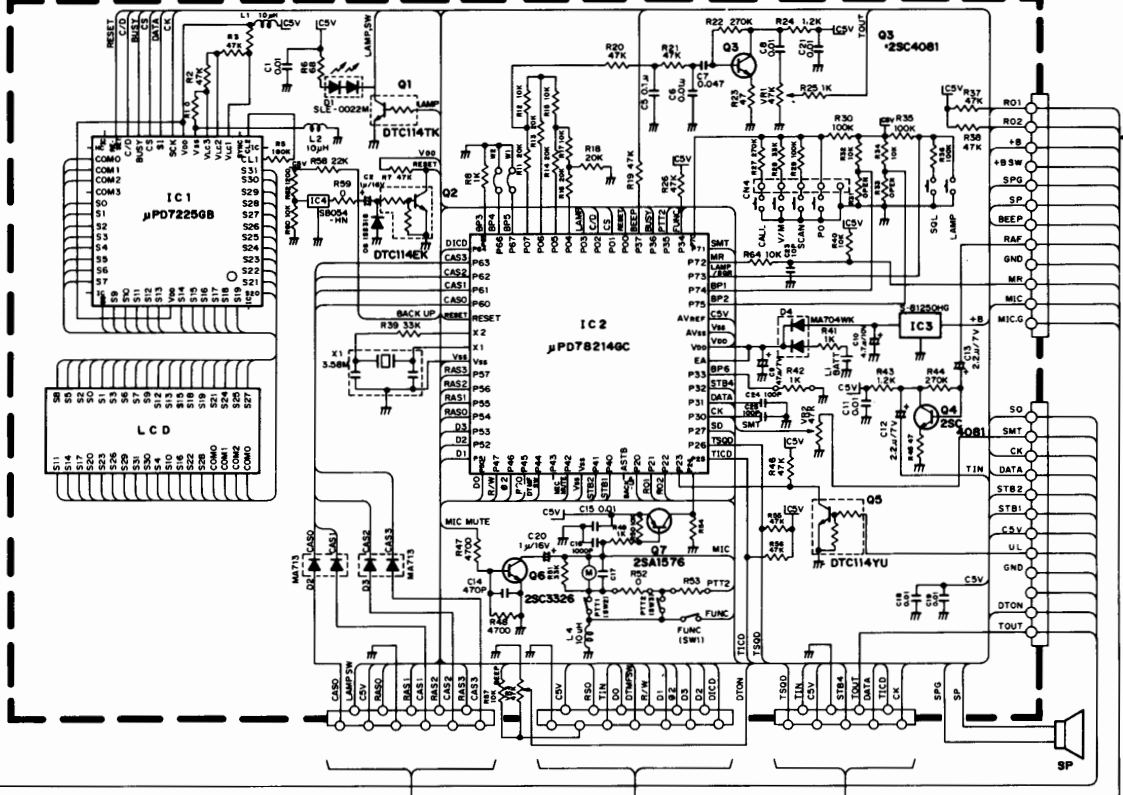


Specifications are subject to change without notice or obligation.

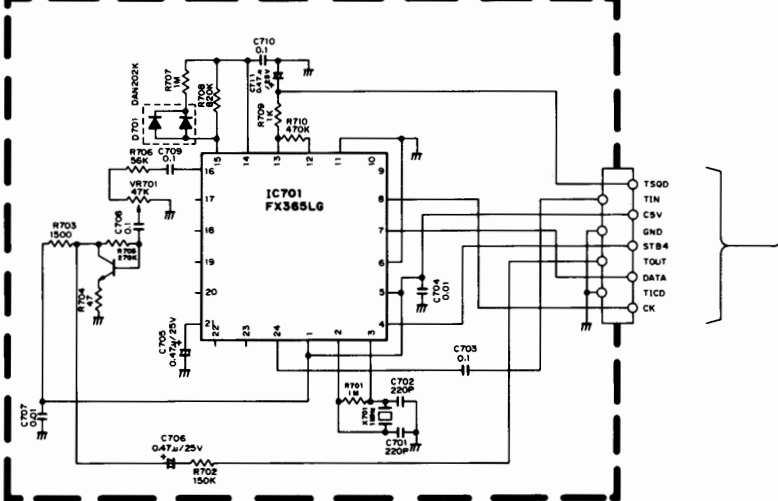
VCO UNIT



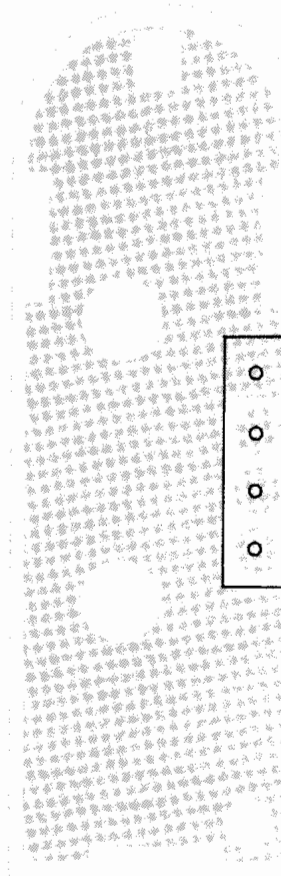
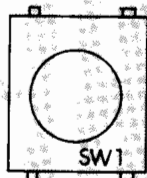
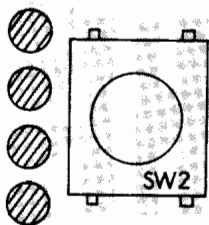
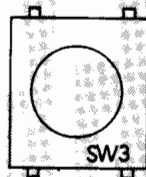
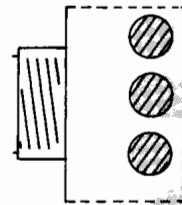
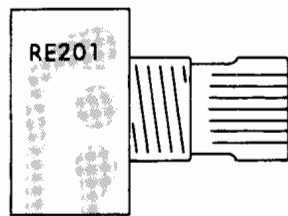
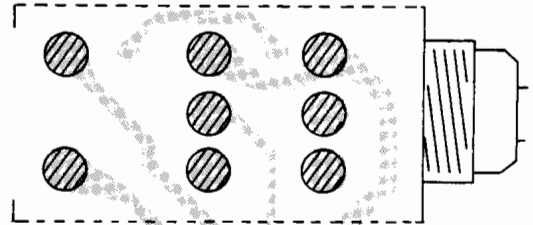
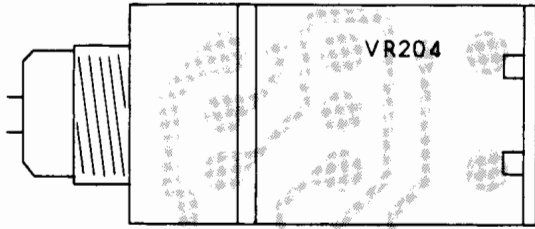
CPU UNIT



TSQ UNIT (FIT, SIT-OPTION)



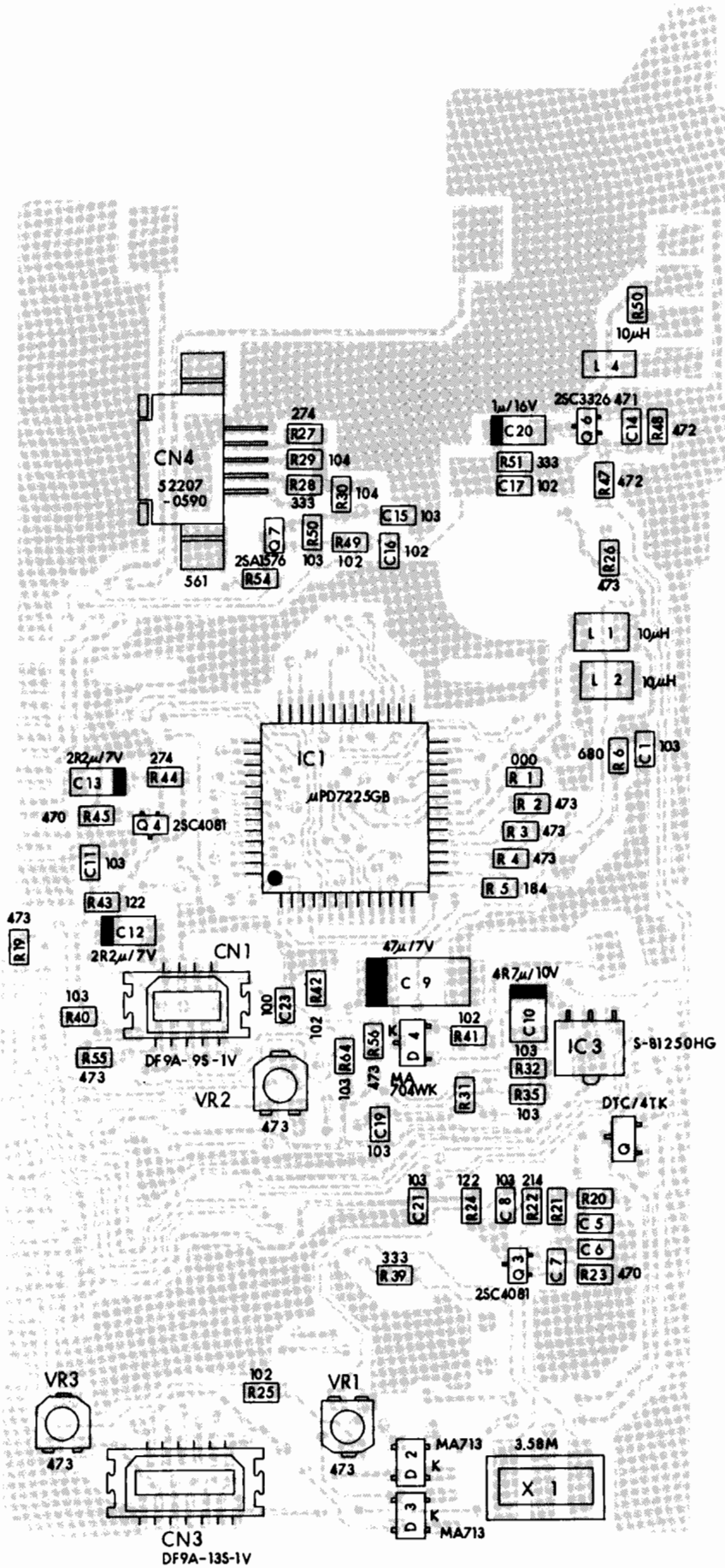
■ VR.RE.SW.PC BOARDS



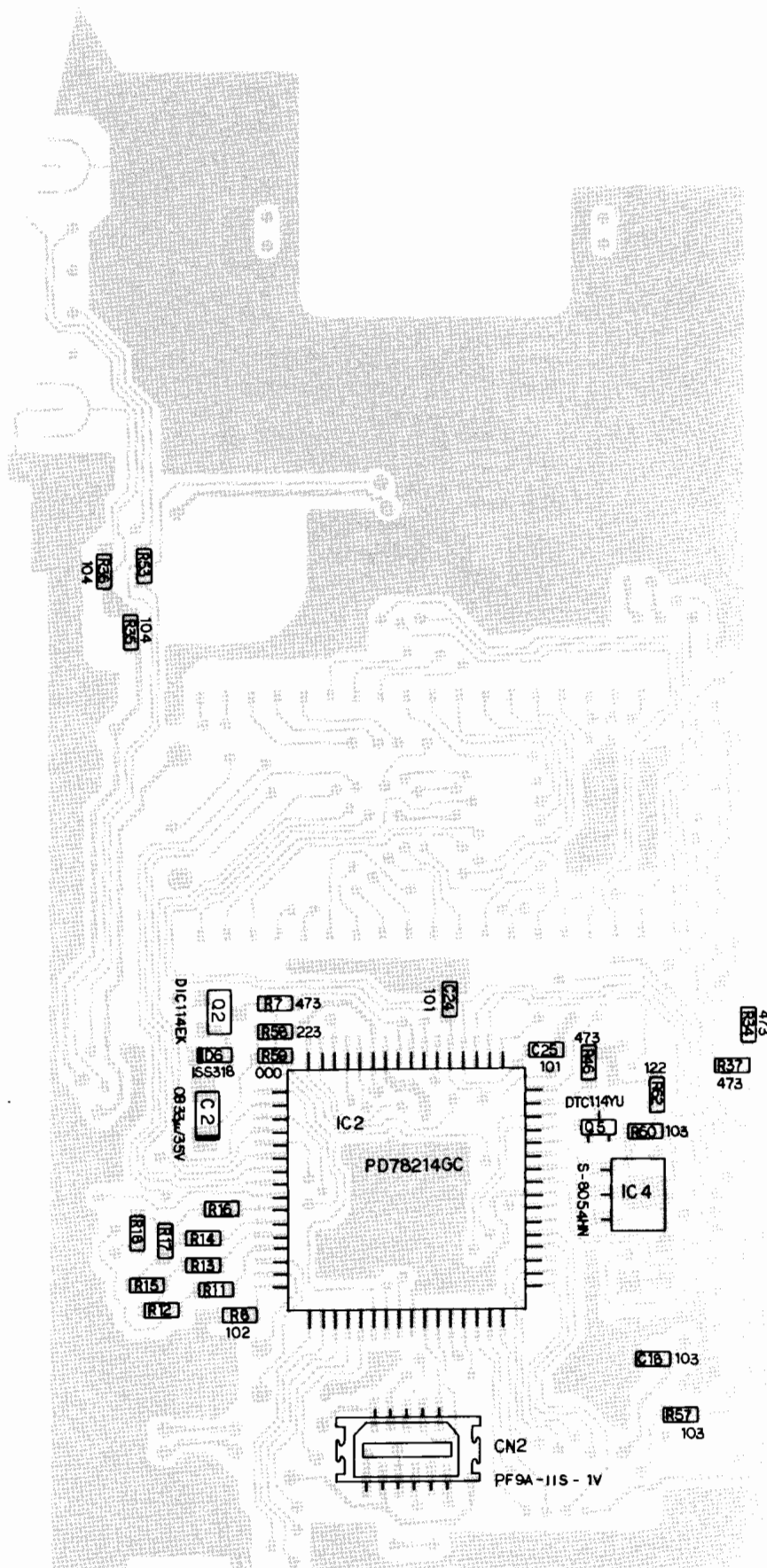
SW1.2.3 (SKHUAB)

■ CPU PC BOARD

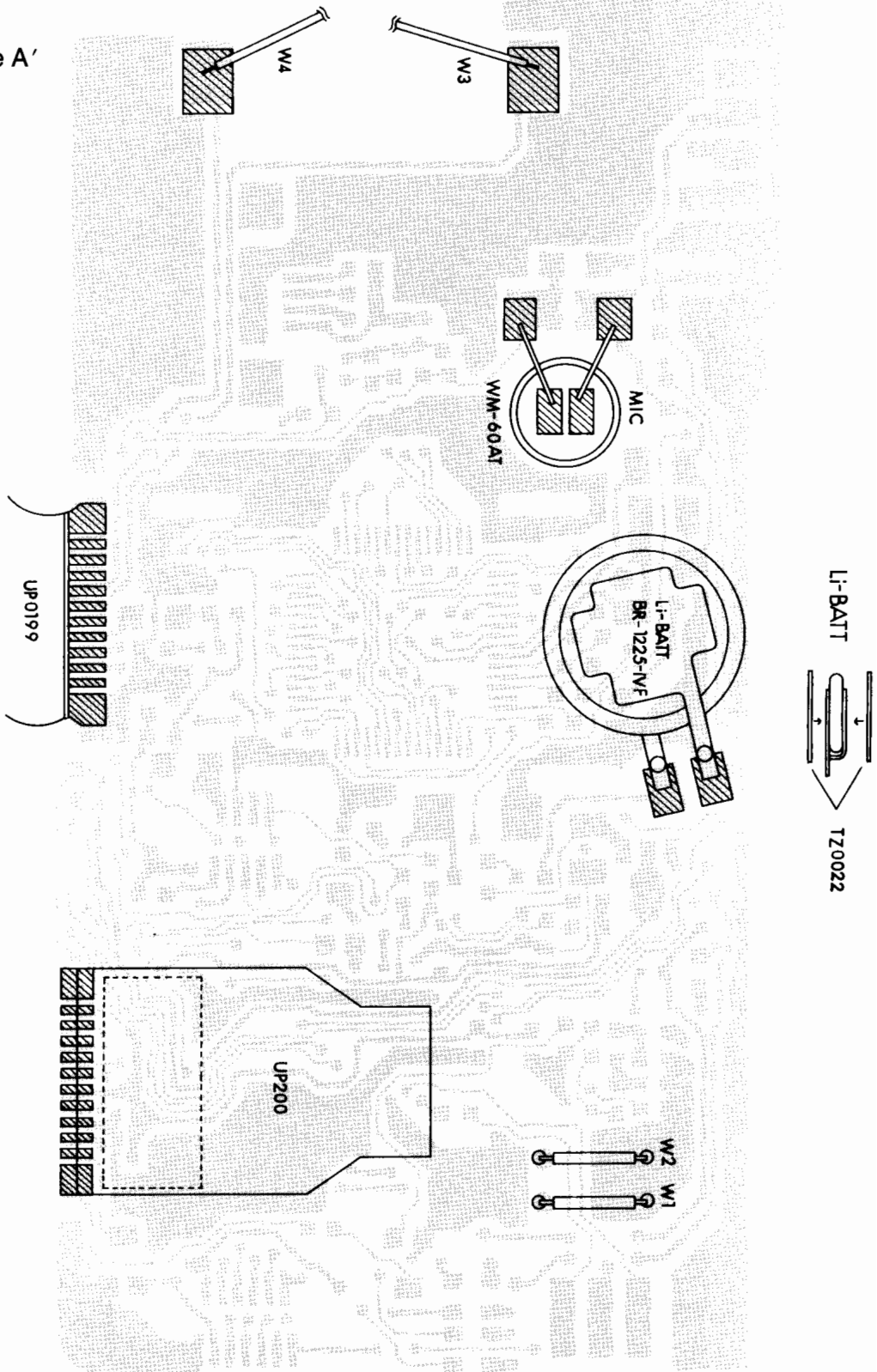
Side A



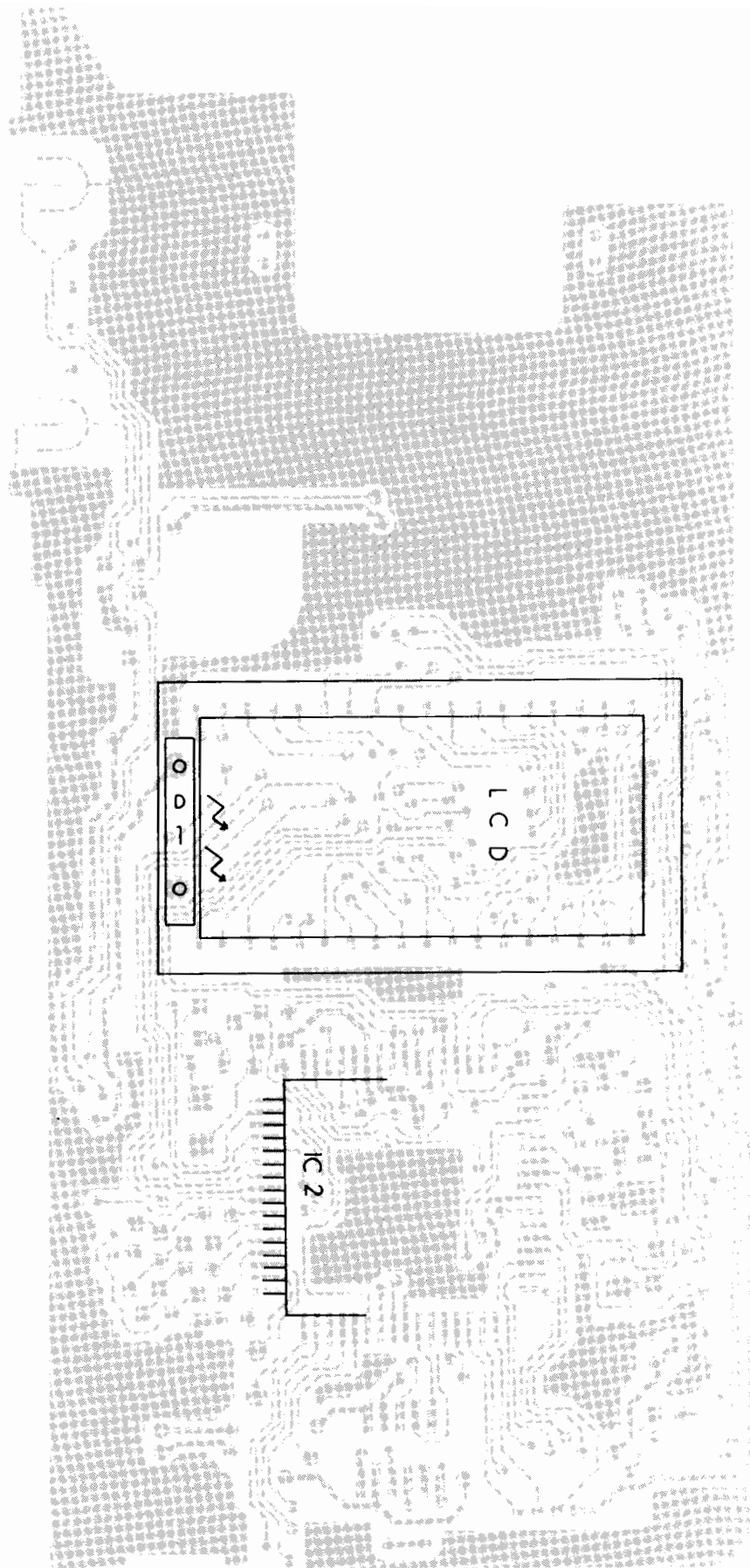
Side B



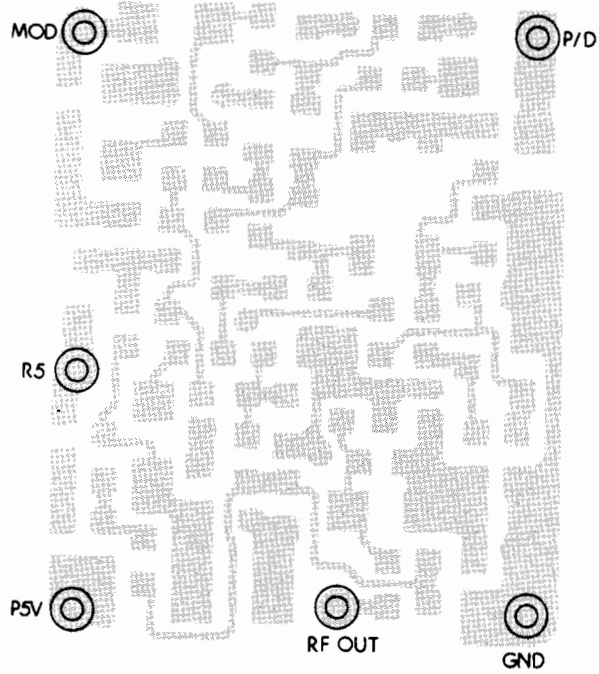
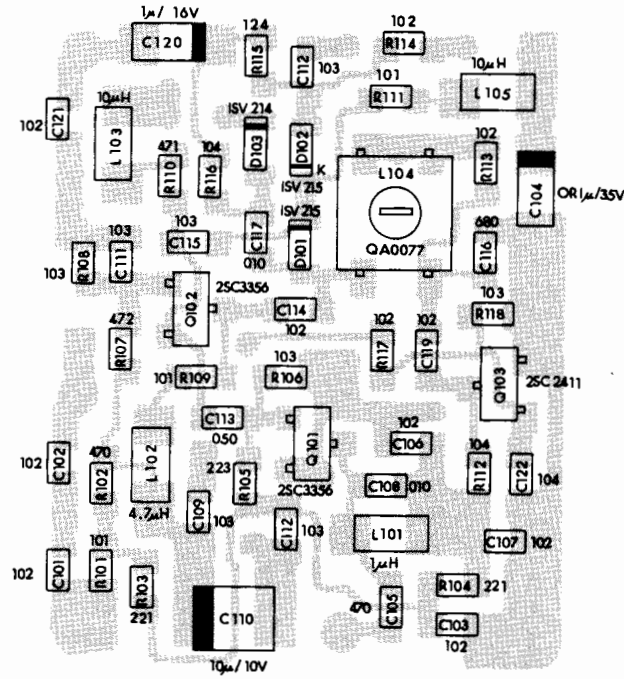
Side A'



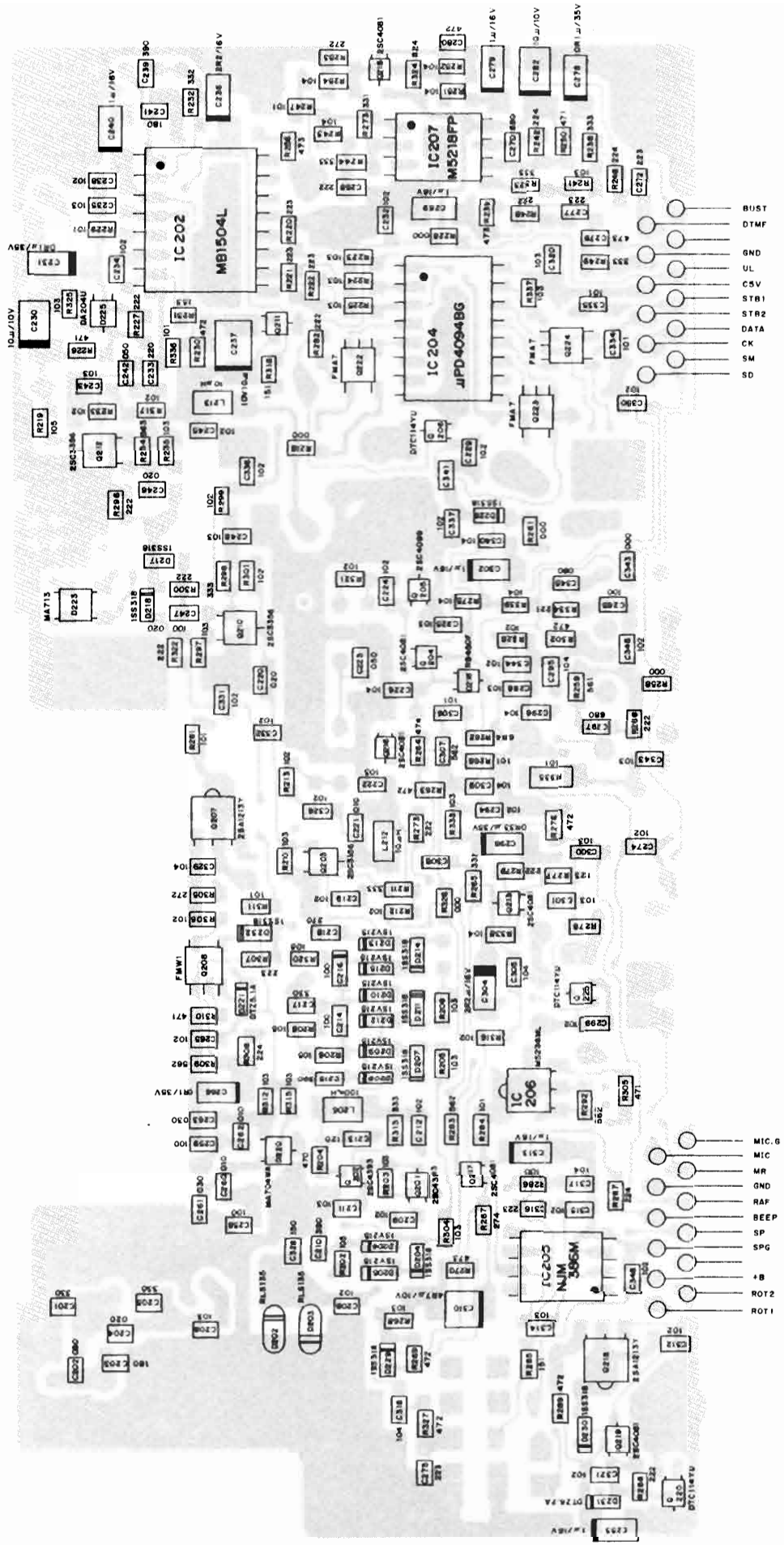
Side B'



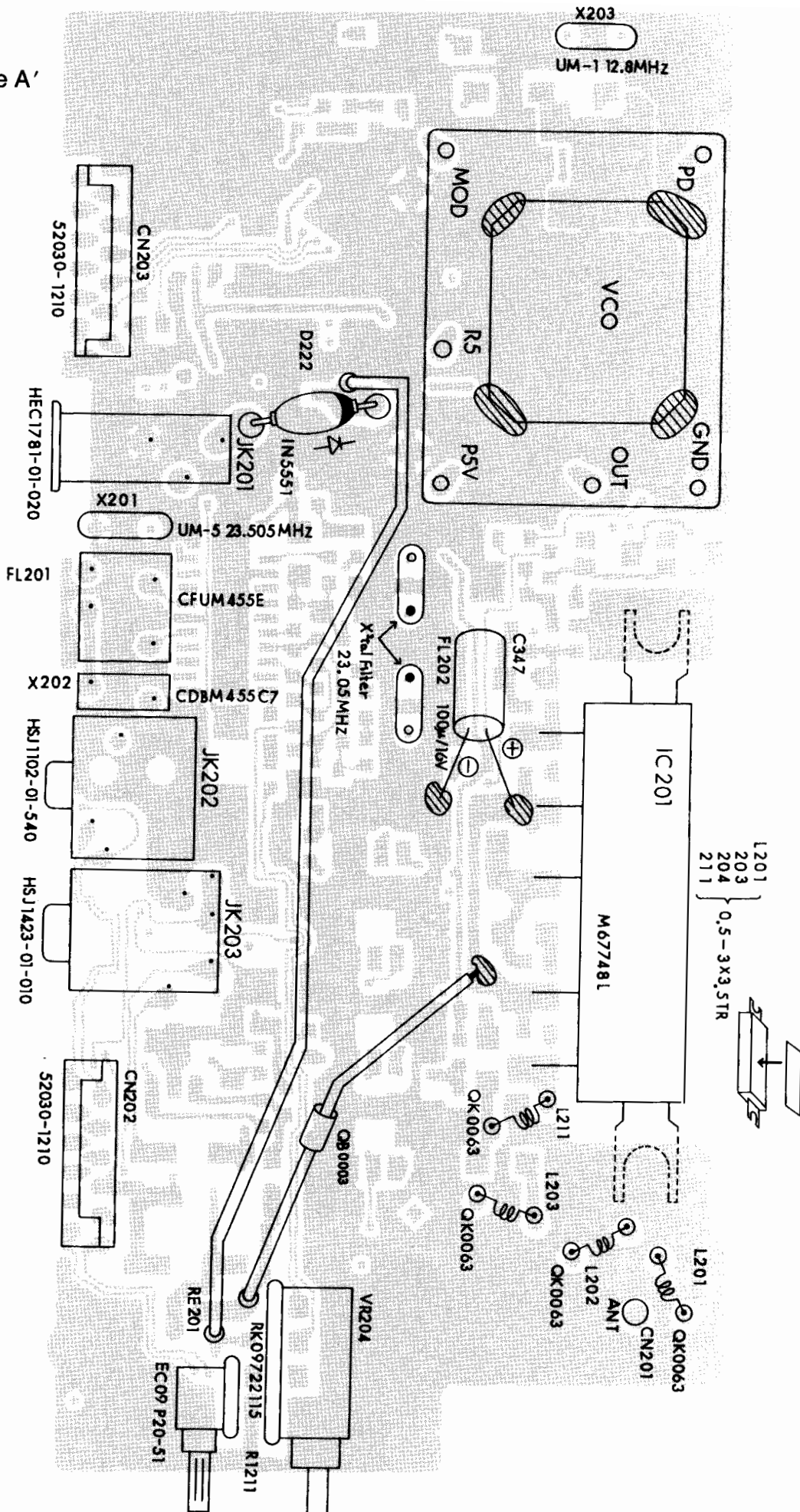
■ VCO PC BOARD



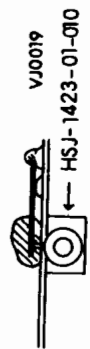
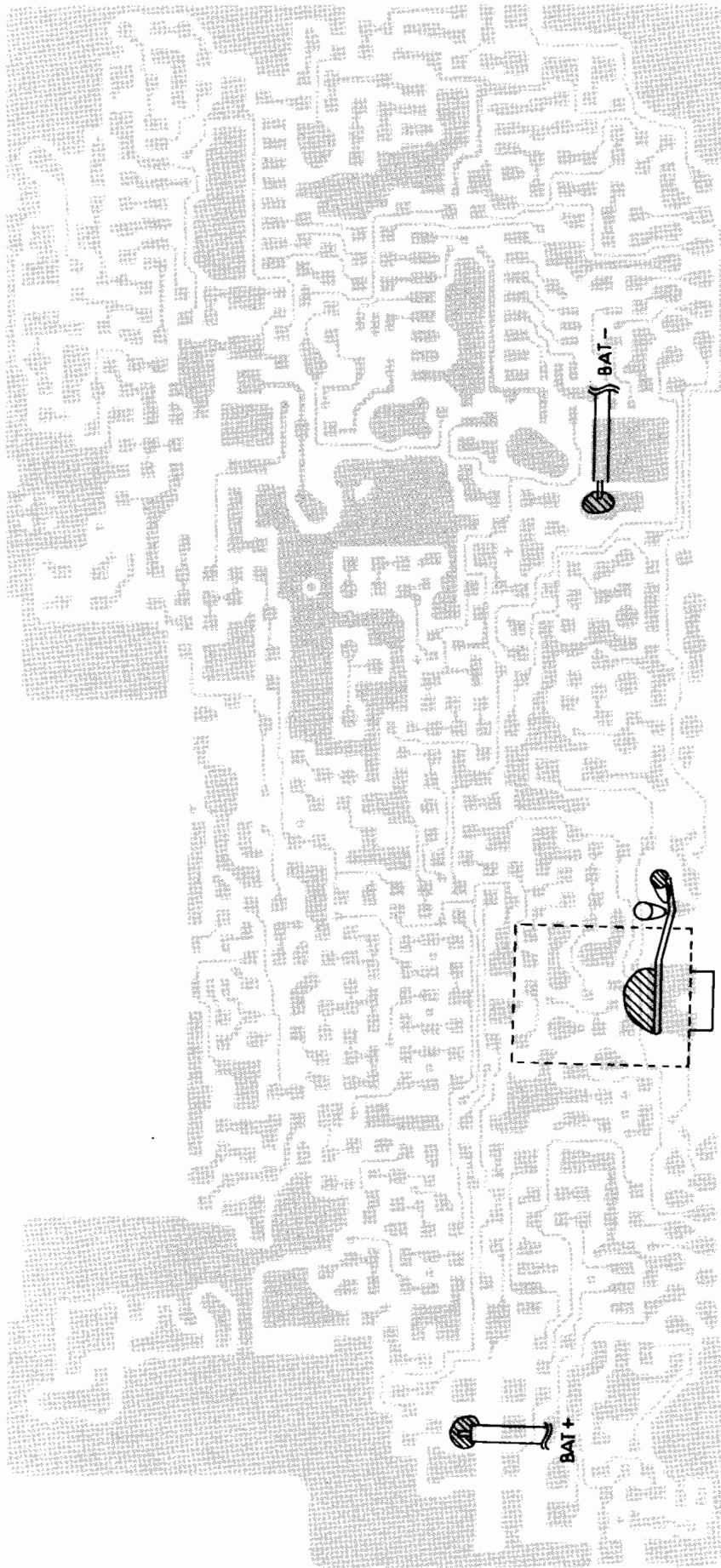
Side B



Side A'

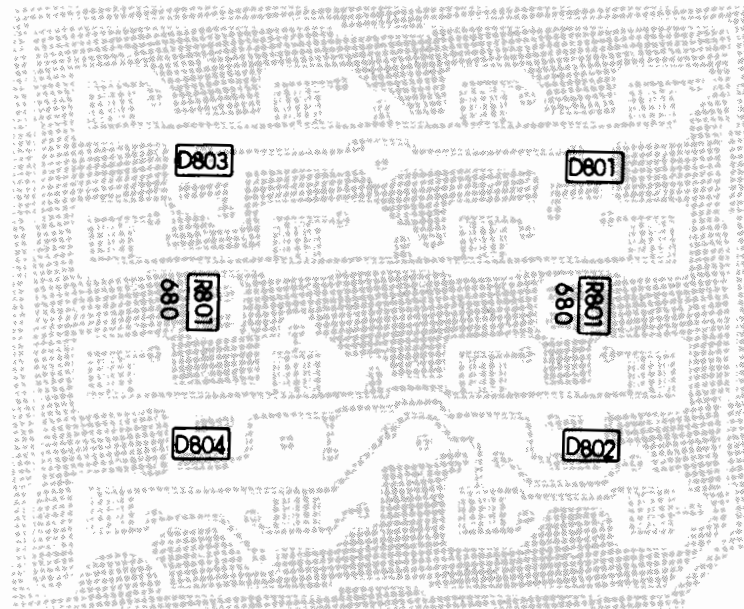


Side B'

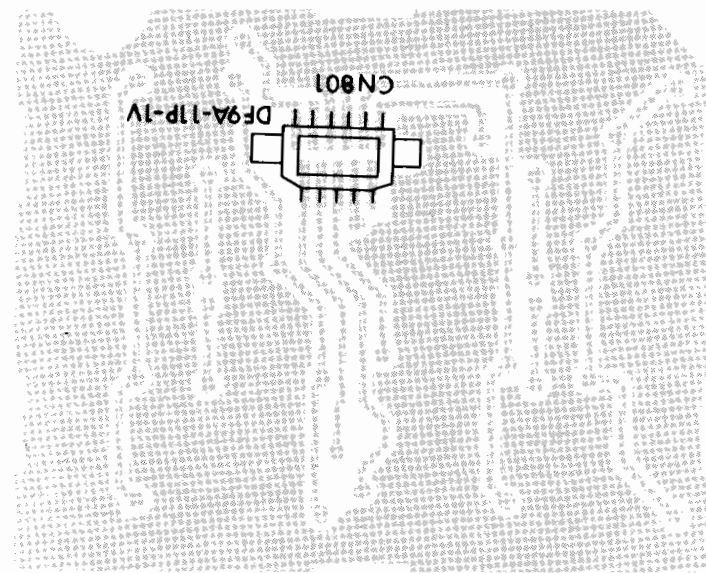


KEY BOARD

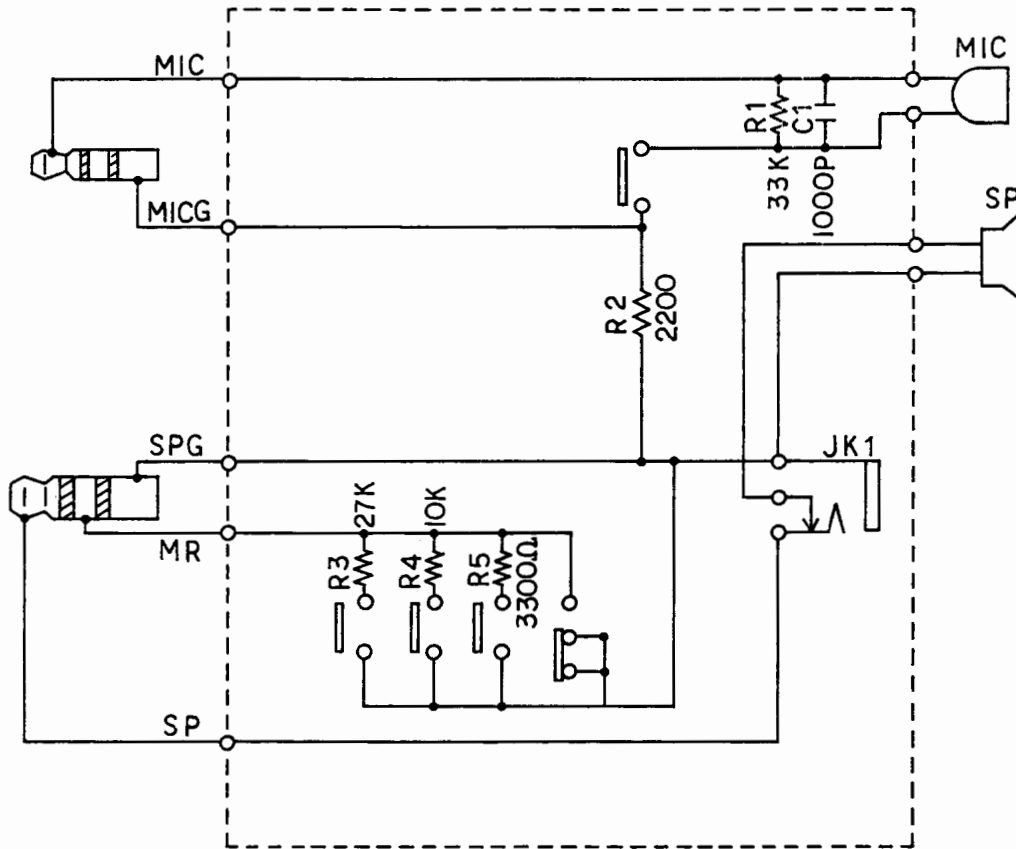
Side A



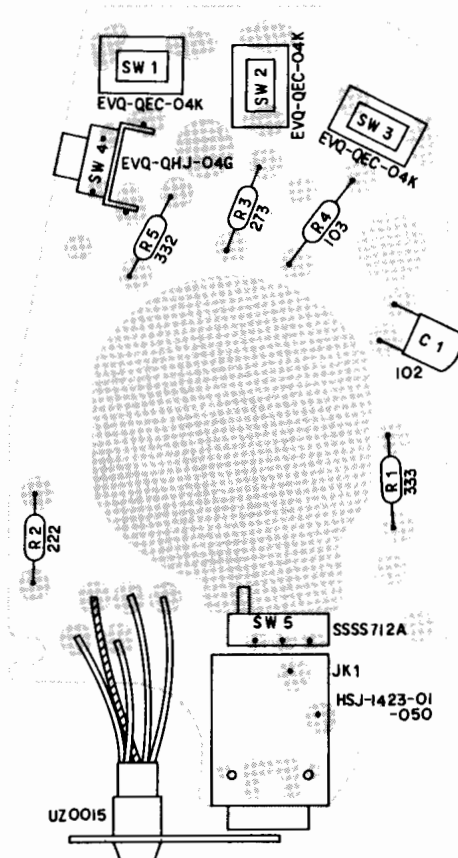
Side B



EMS-8 (REMOTE CONTROL SPEAKER/MICROPHONE)



Ref. No.	Part Code	Part Name and Number
R	RD0039U	Chip R, 1/4W 222
R1	RD0059	Chip R, 1/4W 333
R2	RD0039	Chip R, 1/4W 222
R3	RD0057	Chip R, 1/4W 273
R4	RD0052	Chip R, 1/4W 103
R5	RD0042	Chip R, 1/4W 332
C1	CK0003	Ceramic C, 50V 102Z
SW1	UU0007	Tact Switch, EVQ-QEC 04K
SW2	UU0007	Tact Switch, EVQ-QEC 04K
SW3	UU0007	Tact Switch, EVQ-QEC 04K
SW4	UU0009	Tact Switch, EVQ-QHJ 04G
SW5	US0018	Slide Switch, SSSS712A
JK1	UP0211	EMS8 Board
	UJ0016	Jack HSJ1423-01-050

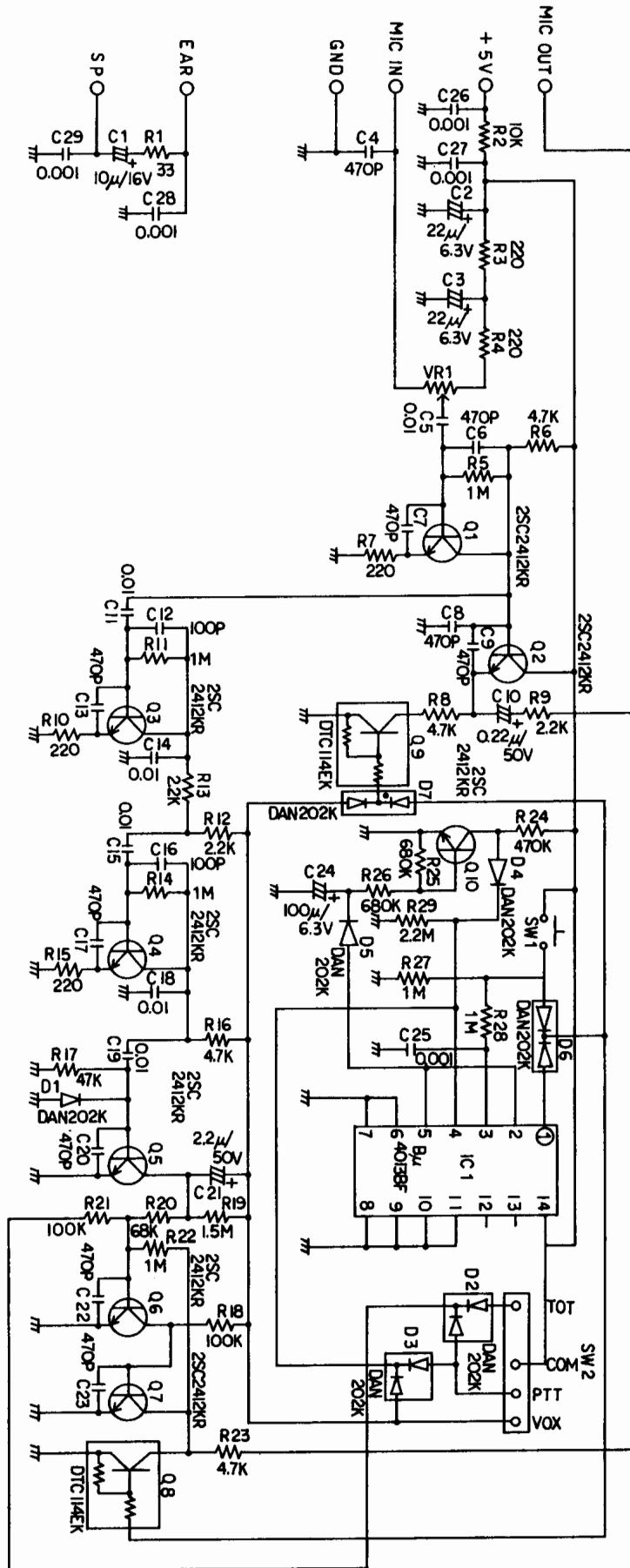


EME-10K (HEADSET W/PTT VOX)

Ref. No.	Part Code	Part Name and Number
C1	CE0044	Chemical C, 1.6V 10 μ F MS5
C2	CE0034	Chemical C, 6.3V 22 μ F MS5
C3	CE0034	Chemical C, 6.3V 22 μ F MS5
C4	CU3031	Chip C, CM105 W5R 471K 50VAT
C5	CU3052	Chip C, CM105 W5R 103K 25VAT
C6	CU3031	Chip C, CM105 W5R 471K 50VAT
C7	CU3031	Chip C, CM105 W5R 471K 50VAT
C8	CU3031	Chip C, CM105 W5R 471K 50VAT
C9	CU3031	Chip C, CM105 W5R 471K 50VAT
C10	CE0109	Chemical C, 50V 0.22 μ F MS5
C11	CU3052	Chip C, CM105 W5R 103K 25VAT
C12	CU3023	Chip C, CM105 CH 101K 50VAT
C13	CU3031	Chip C, CM105 W5R 471K 50VAT
C14	CU3052	Chip C, CM105 W5R 103K 25VAT
C15	CU3052	Chip C, CM105 W5R 103K 25VAT
C16	CU3023	Chip C, CM105 CH 101K 50VAT
C17	CU3031	Chip C, CM105 W5R 471K 50VAT
C18	CU3052	Chip C, CM105 W5R 103K 25VAT
C19	CU3052	Chip C, CM105 W5R 103K 25VAT
C20	CU3031	Chip C, CM105 W5R 471K 50VAT
C21	CE0200	Chemical C, 50V 2.2 μ F UW
C22	CU3031	Chip C, CM105 W5R 471K 50VAT
C23	CU3031	Chip C, CM105 W5R 471K 50VAT
C24	CE0037	Chemical C, 6.3V 100 μ F MS5
C25	CU3035	Chip C, CM105 W5R 102K 50VAT
C26	CU3035	Chip C, CM105 W5R 102K 50VAT
C27	CU3035	Chip C, CM105 W5R 102K 50VAT
C28	CU3035	Chip C, CM105 W5R 102K 50VAT
C29	CU3035	Chip C, CM105 W5R 102K 50VAT
D1	XD0040	Diode, DAN202K T96
D2	XD0040	Diode, DAN202K T96
D3	XD0040	Diode, DAN202K T96
D4	XD0040	Diode, DAN202K T96
D5	XD0040	Diode, DAN202K T96
D6	XD0040	Diode, DAN202K T96
D7	XD0040	Diode, DAN202K T96
Q1	XT0037	Transistor, 2SC2412K T96R
Q2	XT0037	Transistor, 2SC2412K T96R
Q3	XT0037	Transistor, 2SC2412K T96R
Q4	XT0037	Transistor, 2SC2412K T96R
Q5	XT0037	Transistor, 2SC2412K T96R
Q6	XT0037	Transistor, 2SC2412K T96R
Q7	XT0037	Transistor, 2SC2412K T96R

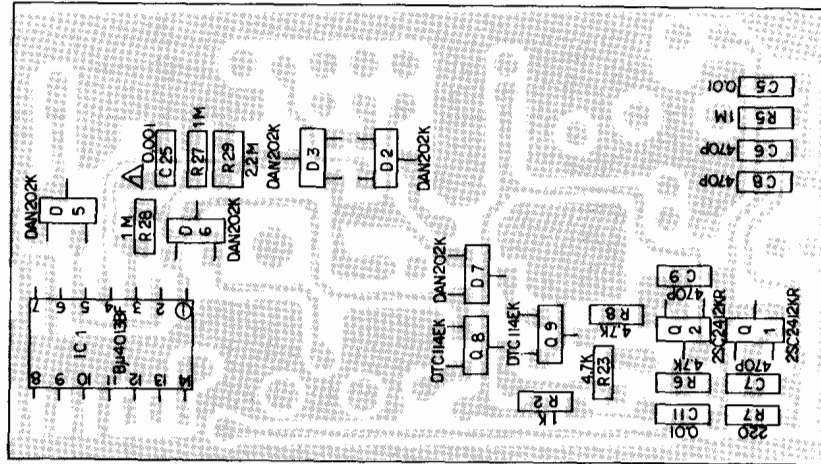
Ref. No.	Part Code	Part Name and Number
Q8	XU0012	Digital Transistor, DTC114EKT96
Q9	XU0012	Digital Transistor, DTC114EKT96
Q10	XT0037	Transistor, 2SC2412K T96R
R1	RK3020	Chip R, MCR03EZ0J 330
R2	RK3038	Chip R, MCR03EZ0J 102
R3	RK3030	Chip R, MCR03EZ0J 221
R4	RK3030	Chip R, MCR03EZ0J 221
R5	RK3074	Chip R, MCR03EZ0J 105
R6	RK3046	Chip R, MCR03EZ0J 472
R7	RK3030	Chip R, MCR03EZ0J 221
R8	RK3046	Chip R, MCR03EZ0J 472
R9	RK3042	Chip R, MCR03EZ0J 222
R10	RK3030	Chip R, MCR03EZ0J 221
R11	RK3074	Chip R, MCR03EZ0J 105
R12	RK3042	Chip R, MCR03EZ0J 222
R13	RK3042	Chip R, MCR03EZ0J 222
R14	RK3074	Chip R, MCR03EZ0J 105
R15	RK3030	Chip R, MCR03EZ0J 221
R16	RK3046	Chip R, MCR03EZ0J 472
R17	RK3058	Chip R, MCR03EZ0J 473
R18	RK3062	Chip R, MCR03EZ0J 104
R19	RK3076	Chip R, MCR03EZ0J 155
R20	RK3060	Chip R, MCR03EZ0J 683
R21	RK3062	Chip R, MCR03EZ0J 104
R22	RK3074	Chip R, MCR03EZ0J 105
R23	RK3046	Chip R, MCR03EZ0J 472
R24	RK3070	Chip R, MCR03EZ0J 474
R25	RK3072	Chip R, MCR03EZ0J 684
R26	RK3072	Chip R, MCR03EZ0J 684
R27	RK3074	Chip R, MCR03EZ0J 105
R28	RK3074	Chip R, MCR03EZ0J 105
R29	RK0090	Chip R, MCR10EZ0J 225
IC1	XA0123	IC, BU4013BF-T1
SW1	UU0009	Tact Switch, EVQ-QHJ-04G
SW2	US0016	Slide Switch, SSSS913L2
VR1	RH0062	Semi Valuable VR, EVM-LIG A00B23
	UP0187A	EME-10 Board

SCHEMATIC DIAGRAM OF EME-10K

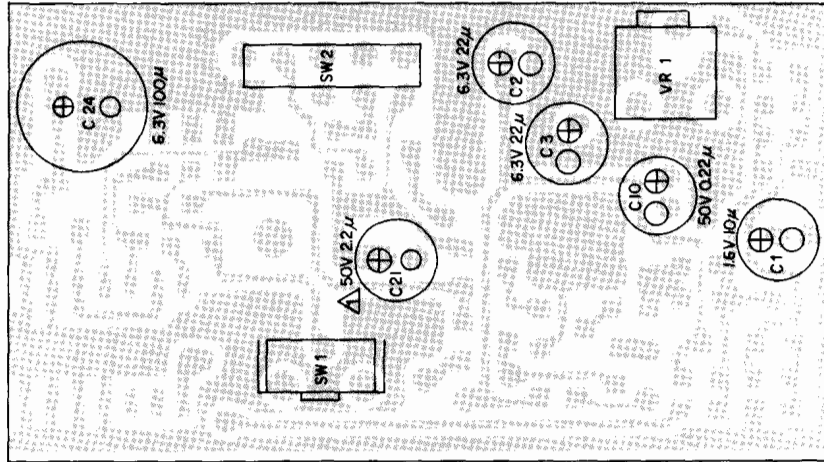


EME-10K PC BOARD

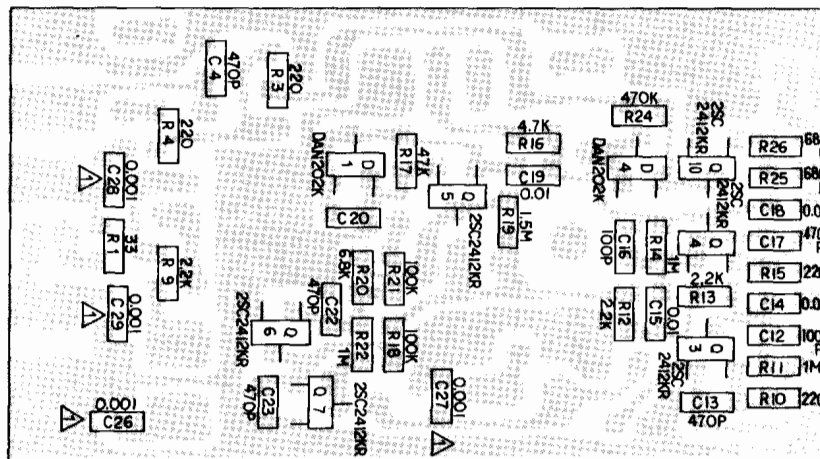
Side A



Side A'



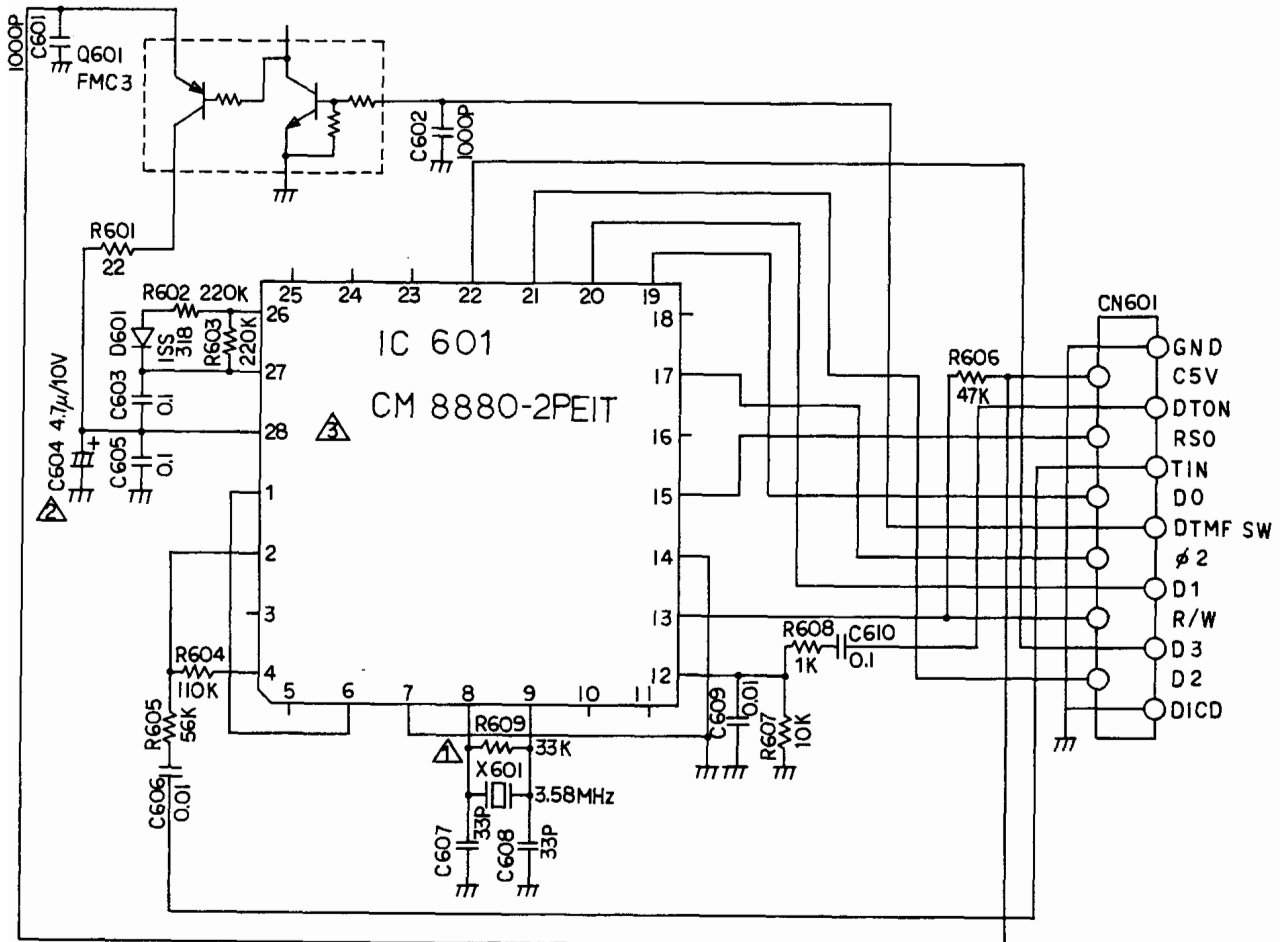
Side B



EJ-10U (DTMF ENC/DEC UNIT)

Ref. No.	Part Code	Part Name and Number
IC601	XA0169	IC, CM8880-2PEIT
Q0601	XU0021	Transistor, FMC3 T98
D0601	XD0129	Diode, 1SS318 TT11
	UP0212	DTMF Board
X0601	XQ0021	X'talDSMAT 3.58MHZ
	TT3008	Elastic Tube
CN601	UE0134	Connector, DF9A-13P-1V(22)
	YZ0042	Cement G-17 1g
	YZ0082	Mending Tape, 12mmW
C601	CU3035	Chip C, CM105 W5R 102K
C602	CU3035	Chip C, CM105 W5R 102K
C603	CU3059	Chip C, CM105 Y5V 104Z
C604	CS0050	Chip C, TMC-1A 475MTR
C605	CU3059	Chip C, CM105 Y5V 104Z

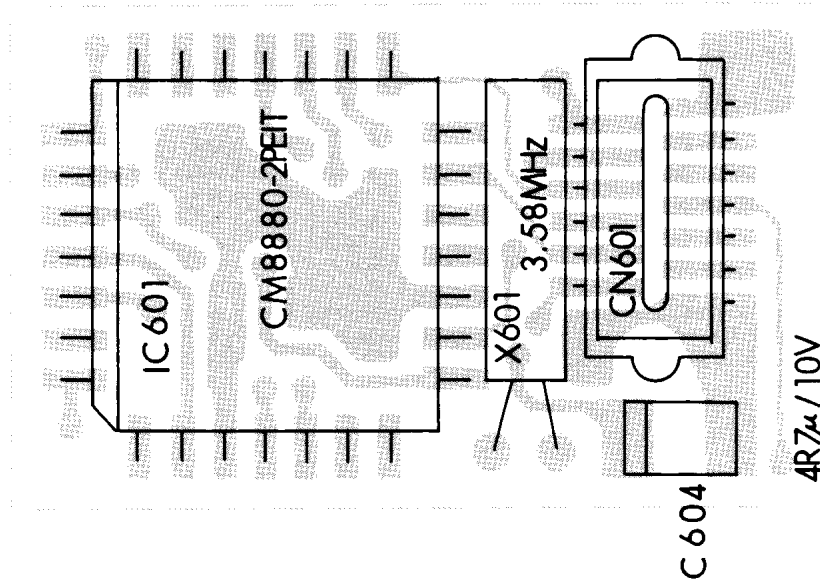
Ref. No.	Part Code	Part Name and Number
C606	CU3047	Chip C, CM105 W5R 103K
C607	CU3017	Chip C, CM105 CH 330K
C608	CU3017	Chip C, CM105 CH 330K
C609	CU3047	Chip C, CM105 W5R 103K
C610	CU3059	Chip C, CM105 Y5V 104Z
R601	RK3018	Chip R, MCR03 EZHJ220
R602	RK3066	Chip R, MCR03 EZHJ224
R603	RK3066	Chip R, MCR03 EZHJ224
R604	RK3062	Chip R, MCR03 EZHJ104
R605	RK3059	Chip R, MCR03 EZHJ563
R606	RK3058	Chip R, MCR03 EZHJ473
R607	RK3050	Chip R, MCR03 EZHJ103
R608	RK3038	Chip R, MCR03 EZHJ102
R609	RK3056	Chip R, MCR03 EZHJ333



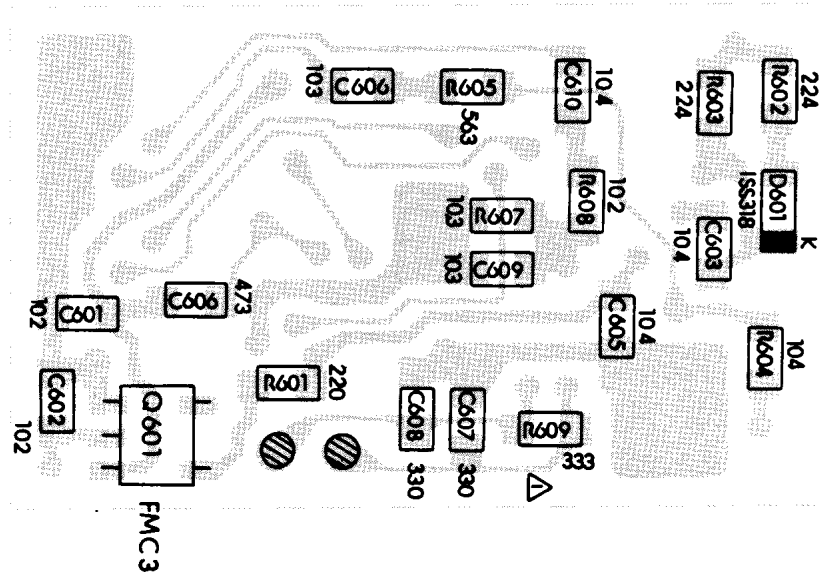
DTMF PC BOARD

EJ-20U

Side A



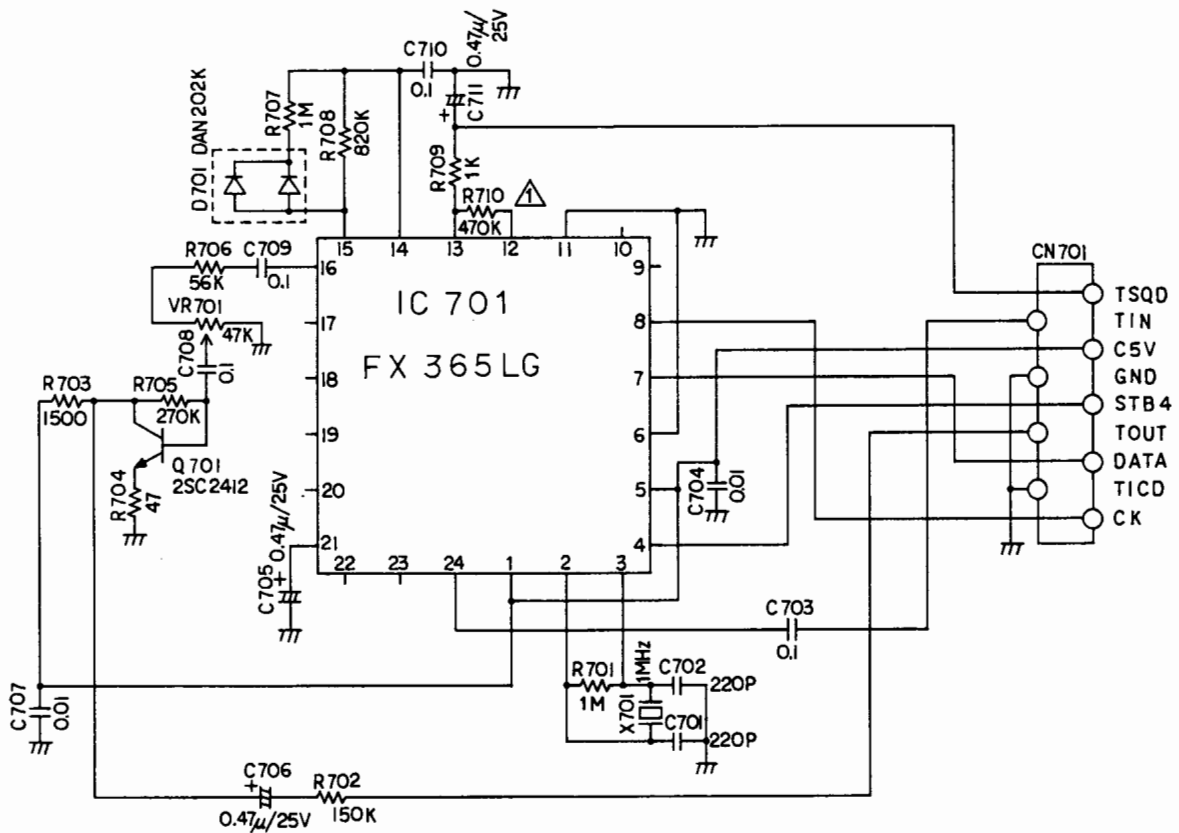
Side B



EJ-12U (TONE SQUELCH UNIT)

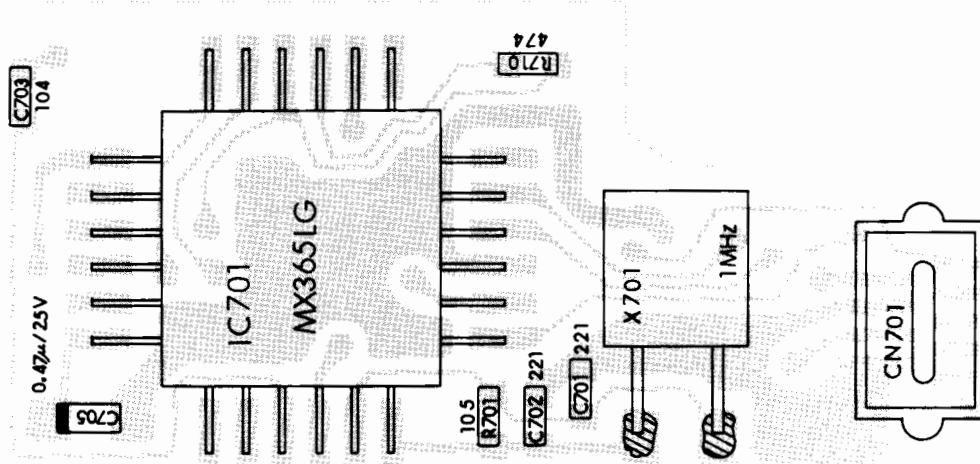
Ref. No.	Part Code	Part Name and Number
IC701	XA0163	IC, FX365LG/TR
Q701	XT0037	Transistor, 2SC2412K T96R
D701	XD0040	Diode, DAN202K T96R
VR701	RH0060	VR, MVR32 HXBRN473
X701	XB0006	X'tal CSB1000J221
CN701	UE0132	Connector, DF9A-9P-1V(22)
C701	CU3060	Chip C, CM105CH221K
C702	CU3060	Chip C, CM105CH221K
C703	CU3059	Chip C, CM105Y5V104Z
C704	CU3047	Chip C, CM105W5R103K
C705	CS0060	Chip C, TMC1E474TR

Ref. No.	Part Code	Part Name and Number
C706	CS0060	Chip C, TMC1E474TR
C707	CU3047	Chip C, CM105W5R103K
C708	CU3059	Chip C, CM105Y5V104Z
C709	CU3059	Chip C, CM105Y5V104Z
C710	CU3059	Chip C, CM105Y5V104Z
C711	CS0060	Chip C, TMC1E474TR
R701	RK3074	Chip R, MCR03EZJH105
R702	RK3064	Chip R, MCR03EZJH154
R703	RK3036	Chip R, MCR03EZJH152
R704	RK3022	Chip R, MCR03EZJH470
R705	RK3067	Chip R, MCR03EZJH274
R706	RK3059	Chip R, MCR03EZJH563
R707	RK3074	Chip R, MCR03EZJH105
R708	RK3073	Chip R, MCR03EZJH824
R709	RK3038	Chip R, MCR03EZJH102
R710	RK3070	Chip R, MCR03EZJH474

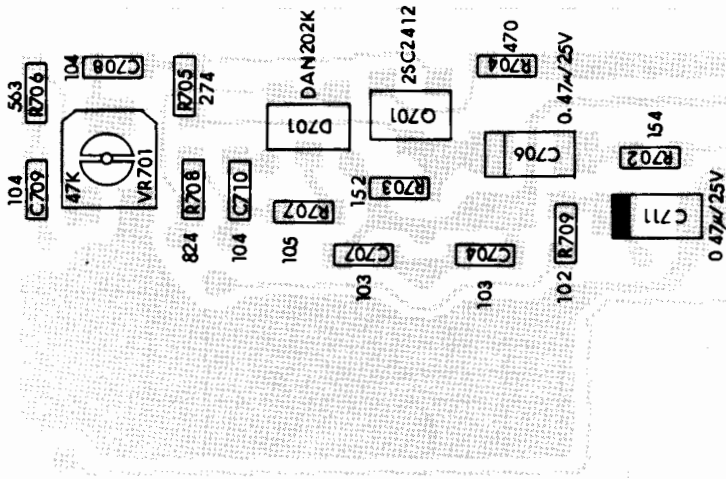


STONE SQUELCH UNIT PC BOARD

Side A



Side B



EDC-34 (QUICK CHARGER 120V)

Ref. No.	Part Code	Part Name and Number	Ref. No.	Part Code	Part Name and Number	Ref. No.	Part Code	Part Name and Number
R1		Resistor, 0.2W 4.7K Ω	R51		Resistor, 0.2W 3.3K Ω	Q12		Transistor, NPN 40V 100mA
R2		Resistor, 0.2W 1.5K Ω	R52		Resistor, 0.2W 10K Ω	Q13		Transistor, PNP 40V 100mA
R3		Resistor, 0.2W 10K Ω				Q14		Transistor, NPN 40V 100mA
R4		Resistor, 0.2W 6.8K Ω	C1		Ceramic Condenser, 50V 1 μ F	Q15		Transistor, PNP 40V 100mA
R5		Resistor, 1W 0.1 Ω	C2		Electric Condenser, 35V 470 μ F	Q16		Transistor, PNP 40V 100mA
R6		Resistor, 1W 1.2K Ω	C3		Film Condenser, 50V 821 μ F	IC1		Regulator,
R7		Resistor, 0.2W 680 Ω	C4		Ceramic Condenser, 50V 101pF	IC2		Regulator,
R8		Resistor, 0.2W 100 Ω	C5		Electric Condenser, 35V 220 μ F	IC3		Regulator,
R9		Resistor, 0.2W 1.5K Ω	C6		Ceramic Condenser, 50V 104pF	IC4		Regulator,
R10		Resistor, 0.2W 27K Ω	C7		Ceramic Condenser, 50V 101pF	IC5		IC
R11		Resistor, 0.2W 3.3K Ω	C8		Electric Condenser, 16V 100 μ F	IC6		CPU
R12		Resistor, 0.2W 220 Ω	C9		Electric Condenser, 35V 220 μ F	X1		Oscillator, 2.0MHz
R13		Resistor, 0.2W 100 Ω	C10		Ceramic Condenser, 50V 1 μ F	L1		Coil, 2A 180 μ H
R14		Resistor, 0.2W 220 Ω	C12		Ceramic Condenser, 50V 470pF	L2		Coil, 1A 200 μ H
R15		Resistor, 0.2W 130 Ω	C13		Ceramic Condenser, 50V 470pF	L3		Ferrite Beads
R16		Resistor, 1W 680 Ω	D1		Diode, 40V 2.5A	LED1		LED
R17		Resistor, 0.2W 12 Ω	D2		Diode, 40V 2.5A	LED2		LED
R18		Resistor, 0.2W 12 Ω	D3		Diode, 40V 100mA			LED, Spacer
R19		Resistor, 1W 0.22 Ω	D4		Diode, 40V 100mA	CN1		Jack
R20		Resistor, 0.2W 10K Ω	D5		Diode, 40V 2.5A	CN2		Jack
R21		Resistor, 0.5W 2.7K Ω	D6		Diode, 40V, 100mA	CN3		Terminal
R22		Resistor, 0.5W 2.7K Ω	D7		Diode, 40V 100mA	CN4		Terminal
R23		Resistor, 0.2W 10K Ω	D8		Diode, 40V 100mA	CN5		Terminal
R24		Resistor, 0.2W 10K Ω	D9		Diode, 40V 100mA	CN6		Terminal
R25		Resistor, 0.2W 33K Ω	D10		Diode, 100V 2A	F1		Fuse, 3.15A 125VULCSA
R26			D11		Diode, 40V 100mA	JP1		Cable, Φ 0.6 \times 10mm
R27		Resistor, 0.2W 33K Ω	D12		Diode, 40V 100mA	JP2		Cable, Φ 0.6 \times 10mm
R28		Resistor, 0.2W 39K Ω	D13		Diode, 40V 100mA	JP3		Cable, Φ 0.6 \times 15mm
R29		Resistor, 0.2W 47K Ω	D14		Diode, 40V 100mA	JP4		Cable, Φ 0.6 \times 7.5mm
R30		Resistor, 0.2W 22K Ω	D15		Diode, 40V 100mA	JP5		Cable, Φ 0.6 \times 5mm
R31		Resistor, 0.2W 10K Ω	D16		Diode, 40V 100mA	JP6		Cable, Φ 0.6 \times 12.5mm
R32		Resistor, 0.2W 3.3K Ω	D17		Diode, 100V 2A	JP7		Cable, Φ 0.6 \times 10mm
R33		Resistor, 0.2W 10K Ω	D18		Diode, 40V 100mA	JP8		Cable, Φ 0.6 \times 10mm
R34		Resistor, 0.2W 10K Ω	D19		Diode, 40V 2A	JP9		Cable, Φ 0.6 \times 5mm
R35		Resistor, 0.2W 2.7K Ω	Z1		Zenner Diode, 400mW 9V	JP10		Cable, Φ 0.6 \times 5mm
R36		Resistor, 0.2W 5.6K Ω	Q1		Transistor, PNP 40V 100mA	JP11		Cable, Φ 0.6 \times 5mm
R37		Resistor, 0.2W 3.3K Ω	Q2		Transistor, PNP 40V 100mA	JP12		Cable, Φ 0.6 \times 10mm
R38		Resistor, 0.2W 3.3K Ω	Q3		Transistor, NPN 40V 100mA	JP13		Cable, Φ 0.6 \times 12.5mm
R39		Resistor, 0.2W 1M Ω	Q4		Transistor, NPN 80V 3A	JP14		Cable, Φ 0.6 \times 10mm
R40		Resistor, 0.2W 1.5K Ω	Q5		Transistor, PNP 40V 100mA	JP15		Cable, Φ 0.6 \times 7.5mm
R41		Resistor, 0.2W 47K Ω	Q6		Transistor, PNP 40V 100mA	JP16		Cable, Φ 0.6 \times 5mm
R42		Resistor, 0.2W 10K Ω	Q7		Transistor, PNP 60V 5A	JP17		Cable, AWG24 \times 20mm
R43		Resistor, 0.2W 10K Ω	Q8		Transistor, NPN 40V 100mA			
R44		Resistor, 0.2W 2.7K Ω	Q9		Transistor, NPN 40V 100mA			
R45		Resistor, 0.2W 5.6K Ω	Q10		Transistor, NPN 40V 100mA			
R46		Resistor, 0.2W 2.7K Ω	Q11		Transistor, PNP 40V 100mA			
R47		Resistor, 0.2W 5.6K Ω						
R48		Resistor, 0.2W 3.3K Ω						
R49		Resistor, 0.2W 3.3K Ω						
R50		Resistor, 0.2W 3.3K Ω						

EDC-35 (QUICK CHARGER 220V)

Ref. No.	Part Code	Part Name and Number	Ref. No.	Part Code	Part Name and Number	Ref. No.	Part Code	Part Name and Number
R1		Resistor, 0.2W 4.7K Ω	R51		Resistor, 0.2W 3.3K Ω	Q12		Transistor, NPN 40V 100mA
R2		Resistor, 0.2W 1.5K Ω	R52		Resistor, 0.2W 10K Ω	Q13		Transistor, PNP 40V 100mA
R3		Resistor, 0.2W 10K Ω				Q14		Transistor, NPN 40V 100mA
R4		Resistor, 0.2W 6.8K Ω	C1		Ceramic Condenser, 50V 1 μ F	Q15		Transistor, PNP 40V 100mA
R5		Resistor, 1W 0.1 Ω	C2		Electric Condenser, 35V470 μ F	Q16		Transistor, PNP 40V 100mA
R6		Resistor, 1W 1.2K Ω	C3		Film Condenser, 50V 821 μ F	IC1		Regulator,
R7		Resistor, 0.2W 680 Ω	C4		Ceramic Condenser, 50V 101pF	IC2		Regulator,
R8		Resistor, 0.2W 100 Ω	C5		Electric Condenser, 35V 220 μ F	IC3		Regulator,
R9		Resistor, 0.2W 1.5K Ω	C6		Ceramic Condenser, 50V 104pF	IC4		Regulator,
R10		Resistor, 0.2W 27K Ω	C7		Ceramic Condenser, 50V 101pF	IC5		IC
R11		Resistor, 0.2W 3.3K Ω	C8		Electric Condenser, 16V 100 μ F	IC6		CPU
R12		Resistor, 0.2W 220 Ω	C9		Electric Condenser, 35V 220 μ F			
R13		Resistor, 0.2W 100 Ω	C10		Ceramic Condenser, 50V 1 μ F	X1		Oscillator, 2.0MHz
R14		Resistor, 0.2W 220 Ω	C12		Ceramic Condenser, 50V 470pF			
R15		Resistor, 0.2W 130 Ω	C13		Ceramic Condenser, 50V 470pF	L1		Coil, 2A 180 μ H
R16		Resistor, 1W 680 Ω				L2		Coil, 1A 200 μ H
R17		Resistor, 0.2W 12 Ω	D1		Diode, 40V 2.5A	L3		Ferrite Beads
R18		Resistor, 0.2W 12 Ω	D2		Diode, 40V 2.5A			
R19		Resistor, 1W 0.22 Ω	D3		Diode, 40V 100mA	LED1		LED
R20		Resistor, 0.2W 10K Ω	D4		Diode, 40V 100mA	LED2		LED
R21		Resistor, 0.5W 2.7K Ω	D5		Diode, 40V 2.5A			LED, Spacer
R22		Resistor, 0.5W 2.7K Ω	D6		Diode, 40V 100mA			
R23		Resistor, 0.2W 10K Ω	D7		Diode, 40V 100mA	CN1		Jack
R24		Resistor, 0.2W 10K Ω	D8		Diode, 40V 100mA	CN2		Jack
R25		Resistor, 0.2W 33K Ω	D9		Diode, 40V 100mA	CN3		Terminal
R26			D10		Diode, 100V 2A	CN4		Terminal
R27		Resistor, 0.2W 33K Ω	D11		Diode, 40V 100mA	CN5		Terminal
R28		Resistor, 0.2W 39K Ω	D12		Diode, 40V 100mA	CN6		Terminal
R29		Resistor, 0.2W 47K Ω	D13		Diode, 40V 100mA			
R30		Resistor, 0.2W 22K Ω	D14		Diode, 40V 100mA	F1		Fuse, 3.15A 125VULCSA
R31		Resistor, 0.2W 10K Ω	D15		Diode, 40V 100mA			
R32		Resistor, 0.2W 3.3K Ω	D16		Diode, 100V 2A	JP1		Cable, Φ 0.6 \times 10mm
R33		Resistor, 0.2W 10K Ω	D17		Diode, 40V 100mA	JP2		Cable, Φ 0.6 \times 10mm
R34		Resistor, 0.2W 10K Ω	D18		Diode, 40V 2A	JP3		Cable, Φ 0.6 \times 15mm
R35		Resistor, 0.2W 2.7K Ω	D19		Diode, 40V 100mA	JP4		Cable, Φ 0.6 \times 7.5mm
R36		Resistor, 0.2W 5.6K Ω				JP5		Cable, Φ 0.6 \times 5mm
R37		Resistor, 0.2W 3.3K Ω	Z1		Zener Diode, 400mW 9V	JP6		Cable, Φ 0.6 \times 12.5mm
R38		Resistor, 0.2W 3.3K Ω				JP7		Cable, Φ 0.6 \times 10mm
R39		Resistor, 0.2W 1M Ω				JP8		Cable, Φ 0.6 \times 10mm
R40		Resistor, 0.2W 1.5K Ω	Q1		Transistor, PNP 40V 100mA	JP9		Cable, Φ 0.6 \times 5mm
R41		Resistor, 0.2W 47K Ω	Q2		Transistor, PNP 40V 100mA	JP10		Cable, Φ 0.6 \times 5mm
R42		Resistor, 0.2W 10K Ω	Q3		Transistor, NPN 40V 100mA	JP11		Cable, Φ 0.6 \times 5mm
R43		Resistor, 0.2W 10K Ω	Q4		Transistor, NPN 80V 3A	JP12		Cable, Φ 0.6 \times 10mm
R44		Resistor, 0.2W 2.7K Ω	Q5		Transistor, PNP 40V 100mA	JP13		Cable, Φ 0.6 \times 12.5mm
R45		Resistor, 0.2W 5.6K Ω	Q6		Transistor, PNP 40V 100mA	JP14		Cable, Φ 0.6 \times 10mm
R46		Resistor, 0.2W 2.7K Ω	Q7		Transistor, PNP 60V 5A	JP15		Cable, Φ 0.6 \times 7.5mm
R47		Resistor, 0.2W 5.6K Ω	Q8		Transistor, NPN 40V 100mA	JP16		Cable, Φ 0.6 \times 5mm
R48		Resistor, 0.2W 3.3K Ω	Q9		Transistor, NPN 40V 100mA	JP17		Cable, AWG24 \times 20mm
R49		Resistor, 0.2W 3.3K Ω	Q10		Transistor, NPN 40V 100mA			
R50		Resistor, 0.2W 3.3K Ω	Q11		Transistor, PNP 40V 100mA			

■ BLOCK DIAGRAM

