DJ-190

Service Manual

CONTENTS

ALINCO INCORPORATED

TWIN 21 M.I.D. TOWER BUILDING 23F, 1-61, 2-CHOME,
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SPECIFICATIONS

Frequency Coverage	TX	RX
DJ-190T (u.s. Amateur version)	144.000 ~ 147.995MHz	135.000 ~ 173.995MHz
DJ-190E (European Amateur version)	144.000 ~ 145.995MHz	144.000 ~ 145.995MHz
DJ-190TA1 (commercial version VHFL)	135.000 ~ 155.000MHz	135.000 ~ 173.995MHz
DJ-190TA2 (commercial version VHFH)	150.000 ~ 173.995MHz	135.000 ~ 173.995MHz

Channel Step:	5, 10, 12.5, 15, 20, 25, 30kHzsteps
Memory Channels:	40 Channels
Antenna Impedance:	50ohm unbalanced
Frequency Stability:	+/-5 ppm
Microphone Input Impedance:	2kohm nominal.
Signal Type:	F3E (FM)
Offset Range:	0 ~ 99.995MHz
Deviation:	15kHz max.
TX Output (supply voltage):	1.5W (4.8V) / 3.5W (7.2V) / 5W (9.6 ~ 13.8V)
RX Sensitivity:	12dB SINAD better than - 16dBu
RX Selectivity:	-6dB/ +/- 12kHz
I.F.:	(1st) 21.25MHz / (2nd) 450kHz
Power Supply Requirements:	4.8 ~ 13.8V DC (4.8V DC standard)
Current Consumption at 13.8V DC:	Transmitting: Approx. 1.2 Amp. in High Power Setting Receiving: Squelched Approx. 24mA (BS on)
Operating Temperature:	-10 ~ +60*C, 14 ~ 140*F
Dimensions: (with EBP-37N without projections)	57(W) x 151(H) x 27(D) mm 2 1/4(W) x 6(H) x 1 1/16(D) inches
Weight:	Approx. 300g
Subaudible Tones (CTCSS) :	Encoder installed (50 tones)

CIRCUIT DESCRIPTION

1) Receiver System

The receiver system is a double superheterodyne system with a 21.7 MHz first IF and a450 kHz second IF.

1. Front End

The received signal at any frequency in the 130.00- to 173.995-MHz range is passed through the low-pass filter (L102, L103, L104, C113, C107, C116, and C114) and tuning circuit (L112 and D107), and amplified by the RF amplifier (Q107). The signal from Q107 is then passed through the tuning circuit (L109, L110, L111, and varicapsi D104, D105 and D106) and converted into 21.7 MHz by the mixer (Q106). The tuning circuit, which consists of L112, L109, varicaps D107 and D104, Ll110 L111, varicaps D105 and D106, is controlled by the tracking voltage from the CPU so that it is optimized for the reception frequency. The local signal from the VCO is passed through the buffer (Q108), and supplied to the source of the mixer (Q106). The radio uses the lower side of the superheterodyne system.

2. IF Circuit

The mixer mixes the received signal with the local signal to obtain the sum of and difference between them. The crystal filter (XF101 , XF102) selects 21.7 MHz frequency from the results and eliminates the signals of the unwanted frequencies. The first IF amplifier (Q105) then amplifies the signal of the selected frequency.

3. Demodulator Circuit

After the signal is amplified by the first IF amplifier (Q105), it is input to pin 16 of the demodulator IC (IC104). The second local signal of 21.25 MHz (shared with PLL IC reference oscillation), which is oscillated by the internal oscillation circuit in IC102 and crystal (X101), is input through pin 1 of IC104. Then, these two signals are mixed by the internal mixer in IC104 and the result is converted into the second IF signal with a frequency of 450 kHz. The second IF signal is output from pin 3 of IC104to the ceramic filter (FL101), where the unwanted frequency band of that signal is eliminated, and the resulting signal is sent back to the IC104 through pins 5 and 7.

The second IF signal input via pin 7 is demodulated by the internal limiter amplifier and quadrature detection circuit in IC104, and output as an audio signal through pin 9.

4. Audio Circuit

The audio signal from pin 9 of IC104 is compensated to the audio frequency characteristics in the de-emphasis circuit (R162, R161, C172, C173) and amplified by the AF amplifier (Q109). The signal is then input to pin 2 of the electronic volume (IC103) for volume adjustment, and output from pin 1. The adjusted signal is sent to the audio power amplifier (1C105) through pin 2 to drive the speaker.

5. Squelch Circuit

Part of the audio signal from pin 9 of IC104 is amplified by the noise filter amplifier consisting of R176, R186, R177, C179, C183, C191, and C194, and the internal noise amplifier in IC104. The desired noise of the signal is output through pin 11 of IC104, to be further amplified by the noise amplifier (Q115). The amplified noise signal is rectified by voltage doublers D109 and input to pin 4 of CPU (IC5).

2) Transmitter System 1. Modulator Circuit	The audio signal is converted to an electric signal in either the internal or external microphone, and input to the microphone amplifier (IC6). IC6 consists of two operational amplifiers; one amplifier (pins 1, 2, and 3) is composed of pre-emphasis and IDC circuits and the other (pins 5, 6, and 7) is composed of a splatter filter. The maximum frequency deviation is determined to its optimal value by switch circuits consisting of Q9 and Q10 and input to the cathode of the varicap of the VCO, to change the electric capacity in the oscillation circuit. This produces the frequency modulation.
2. Power Amplifier Circuit	The transmitted signal is oscillated by the VCO, amplified by the pre-drive amplifier (Q102) and drive amplifier (Q101), and input to the power module (IC101). The signal is then amplified by the power module (IC101) and led to the antenna switch (D101) and low-pass filter (L102, L103, L104, C113, C107, C116, and C114), where unwanted high harmonic waves are reduced as needed, and the resulting signal is supplied to the antenna.
3. APC Circuit	Part of the transmission power from the low-pass filter is detected by D103, converted to DC, and then amplified by a differential amplifier. The output voltage controls the bias voltage from pin 2 of the power module (IC101) to maintain the transmission power constant.
3) PLL Synthesizer Circuit 1.PLL	The dividing ratio is obtained by sending data from the CPU (IC5) to pin 2 and sending clock pulses to pin 3 of the PLL IC (IC102). The oscillated signal from the VCO is amplified by the buffer (Q117) and input to pin 6 of IC102. Each programmable divider in IC102 divides the frequency of the input signal by N according to the frequency data, to generate a comparison frequency of 5 or 6.25 kHz.
2. Reference Frequency Circuit	The reference frequency appropriate for the channel steps is obtained by dividing the 21.25 MHz reference oscillation (X101) by 4250 or 3400, according to the data from the CPU (IC5). When the resulting frequency is 5 kHz, channel stepsof5, 10, 15, 20, 25 and 30 kHz are used. When it is 6.25 kHz, the 12.5 kHz channel step is used.
3. Phase Comparator Circuit	The PLL (IC102) uses the reference frequency, 5 or 6.25 kHz. The phase comparator in the IC102 compares the phase of the frequency from the VCO with that of the comparison frequency, 5 or 6.25 kHz, which is obtained by the internal divider in IC102
4. PLL Loop Fitter Circuit	If a phase difference is found in the phase comparison between the reference frequency and VCO output frequency, the charge pump output (pin 8) of IC102 generates a pulse signal, which is converted to DC voltage by the PLL loop filter and input to the varicap of the VCO unit for oscillation frequency control.

5. VCO Circuit

A Colpitts oscillation circuit driven by Q301 directly oscillates the desired frequency. The frequency control voltage determined in the CPU (IC5) and PLL circuit is input to the varicaps (D301 and D304). This changes the oscillation frequency, which is amplified by the VCO buffer (Q302) and output from the VCO unit.

Note
The oscillation frequency is determined by turning Q301 0N and OFF.

Displayed frequencies	Q301
TX: 130.00 - 139.995 MHz RX: 130.00 - 161.695 MHz	OFF
TX: 140.00 - 173.995 MHz RX: 161.70 - 173.995 MHz	ON

4) CPU and Peripheral Cir

1. LCD Display Circuit

The CPU turns ON the LCD via segment and common terminals with 1/3 the duty and 1/3 the bias, at the frame frequency is 85Hz.

2. Display Lamp Circuit

When the LAMP key is pressed, "H" is output from pin 45 of CPU (IC5) to the bases of Q1 then turn ON and the LEDs (D1, D3) Bight.

3. Reset and Backup Circuits

When the power from the DC jack or external battery increases from 0 V to 2.5 or more, "H" level reset signal is output from the reset IC (IC2) to pin 35 of the CPU (IC5), causing the CPU to reset. The reset signal. however, waits at C6 and R98, and does not enter the CPU until the CPU clock (X1) has stabilized. When the external power drops to 3.2 V or below, the output signal from the backup IC (IC3), which has been input to pin 34 of the CPU, changes from "H" to "L" level. The CPU will then be in the backup state.

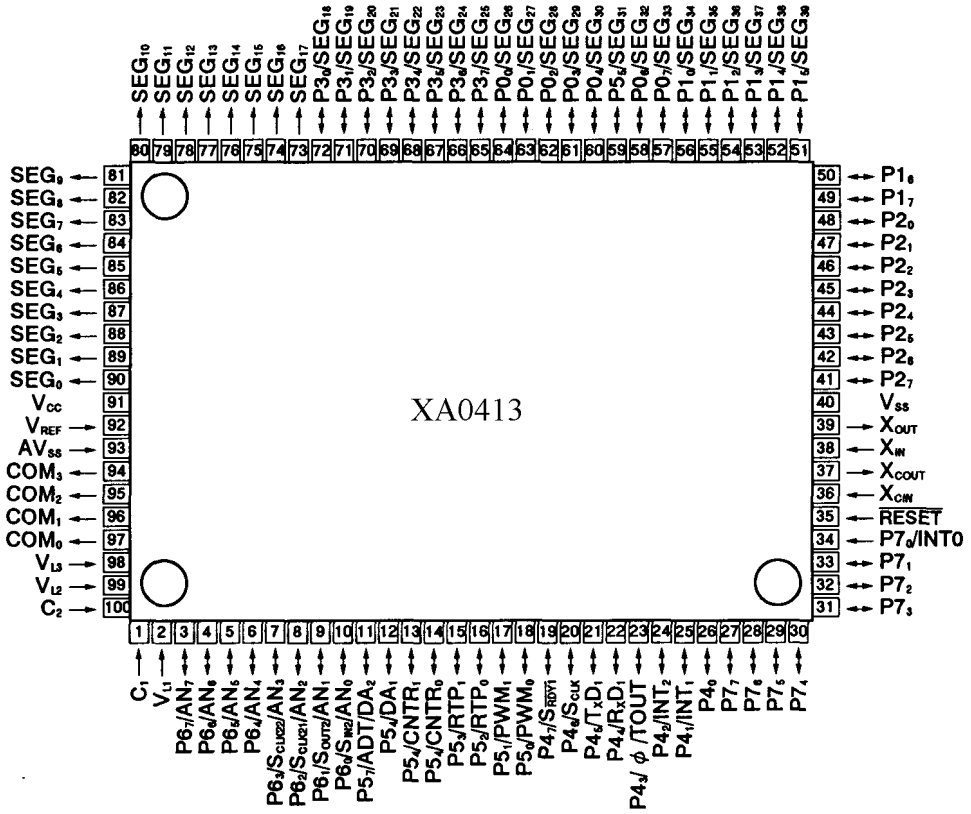
4. S(Signal)Meter Circuit

The DC potential of pin 13 of IC104 is input to pin 3 of the CPU (IC5), converted from an analog to a digital signal, and displayed as the S-meter signal on the LCD.

5. Tone Encoder

The CPU (IC5) is equipped with an internal tone encoder. The tone signal (67.0 to 254.1 Hz) is output from pin 11 of the CPU to the varicap of the VCO for modulation.

5) CPU Terminal Functions: M38267M8L (XA413)



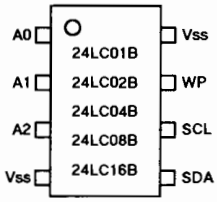
No.	Pin Name	Signal	I/0	Logic	Description
1	C1	C1	-	-	-
2	VL1	VL1	I	A/D	LCDpowersupply
3	P67/AN7	SMT	I	A/D	S-meterinput
4	P66/AN6	SQL	I	A/D	Noise level input for squelch
5	P65/AN5	BAT	I	A/D	Low battery detection input
6	P64/AN4	BP5	I	A/D	Band plan5
7	P63/CLK22/AN3	BP4	I		Band plan4
8	P62/CLK21/AN2	UL	I	Activehigh	PLL unlock signal input
9	P61/SOUT2/AN1	BP1,2	I	A/D	Band plans 1 and 2
10	P60/SIN2/ANO	MOM	I	Activelow	Monitor key input
11	P57/ADT/DA2	CTOUT	O	D/A	CTCSS tone output
12	P56/AD1	DTOUT	O	D/A	
13	P55/CNTR1	TSQD	I	Activelow	CTCSS tone detection input
14	P54/CNTRO	BEP	O	Pulse	Beep tone output/Band plan 3
15	P53/RTP1	STB2	I/O	Active low/pulse	CTCSS unit detection/Strobe signal to CTCSS unit
16	P52/RTP0	MUTE	I/O	Activehigh	Microphone mute
17	P51/PWM1	CLK	O	Pulse	Serial clock output for PLL, CTCSS
18	P50/PWM0	DATA	O	Pulse	Serial data output for PLL CTCSS
19	P47/SRDY1	ACK	I/0	Pulse	Band plan 6
20	P46/SCLK1	STB1	O	Pulse	Strobe for PLL IC
21	P45/TXD1	UTX	O	Pulse	UART data transmission output
22	P44/RXD1	URX	I	Pulse	UART data reception input
23	P43/D/TOUT	TBST	O	Pulse	Tone burst (1750Hz) output (European version)
24	P42/INT2	RE2	I	Activelow	
25	P41/1NT1	RE1	I	Activelow	Rotary encoder lnput
26	P40	PTT	I	Activehigh	PTT input
27	P77	DSW	O	Activelow	
28	P76	STD	I/O	Activehigh	Deviation adjustment during transmission
29	P75	DSD	I	Pulse	Deviation adjustment during transmission
30	P74	T3C	O	Active low	TX power ON/OFF output
31	P73	P3C	O	Active low	PLL power ON/OFF output
32	P72	AFP	O	Activelow	AFAMP power ON/OFF output
33	P71	R3C	O	Activelow	RX power ON/OFF output
34	P70/INT0	BU	I	Activelow	Backup signal detection input
35	RESET	RST	I	Activelow	Resetinput
36	XCIN	XCIN	-	-	-
37	XCOUNT	XCOUT	-	-	-
38	XIN	XIN	-	-	Main clock input
39	XOUT	XOUT	-	-	Main clock output
40	VSS	GND	-	-	CPU ground
41	P27	PSW	I	Activelow	Power switch input
42	P26	SCL	O	Pulse	Serial clock for EEPROM
43	P25	C3C	O	Activehigh	C3 power ON/OFF output
44	P24	SDA	O	Pulse	Serial data for EEPROM
45	P23	LMP	O	Activehigh	Lamp ON/OFF
46	P22	T/KEY	I	Activelow	Tone burst/LPTT input
47	P21	K00	I/O	-	Band plan BP7 input
48	P20	K01	O	-	Key matrix output
49	P17	K02	O	-	
50	P16	K03	O	-	

No.	Pin Name	Signa1	I/0	Logic	Description
51	P15/SEG39	F/KEY	I	Active low	Function key input
52	P14/SEG38	K10	I	-	
53	P13/SEG37	K11	I	-	
54	P12/SEG36	K12	I	-	
55	P11/SEG35	K13	l	-	
56	P11/SEG34	K14	I	-	Key matrix input
57	P07/SEG33	SFT	O	-	VCO frequency range change
58	P06/SEG32	SD	O	Active low	Signa detection output
59	P05/SEG31	AFC	O	Active high	AF tone control output
60	P04/SEG30	DA4	O	-	
61	P03/SEG29	DA3	O	-	
62	P02/SEG28	DA2	O	-	DA converter for electronic volume and output power
63	P01/SEG27	DA1	O	-	
64	P00/SEG26	DA0	O	-	
65	P37/SEG25	S25	O	-	
66	P36/SEG24	S24	O	-	
67	P35/SEG23	S23	O	-	
68	P34/SEG22	S22	O	-	
69	P33/SEG21	S21	O	-	
70	P32/SEG20	S20	O	-	
71	P31/SEG19	S19	O	-	
72	P30/SEG18	S18	O	-	
73	SEG17	S17	O	-	
74	SEG16	S16	O	-	
75	SEG15	S15	O	-	
76	SEG14	S14	O	-	
77	SEG13	S13	O	-	
78	SEG12	S12	O	-	LCD segment signal
79	SEG11	S11	O	-	
80	SEG10	S10	O	-	
81	SEG9	S9	O	-	
82	SEG8	S8	O	-	
83	SEG7	S7	O	-	
84	SEG6	S6	O	-	
85	SEG5	S5	O	-	
86	SEG4	S4	O	-	
87	SEG3	S3	O	-	
88	SEG2	S2	O	-	
89	SEG1	S1	O	-	
90	SEG0	SO	O	-	
91	VCC	VDD	-	-	CPU power terminal
92	VREF	VREF	-	-	AD converter power supply
93	AVSS	AVSS	-	-	AD converter ground
94	COM3	COM3	-	-	-
95	COM2	COM2	O	-	LCD COM2 output
96	COM1	COM1	O	-	LCD COM1 output
97	COM0	COM0	O	-	LCD COM0 output
98	VL3	VL3	I	-	LCD power supply
99	VL2	VL2	I	-	LCD power supply
100	C2	I	-	-	

SEMICONDUCTOR DATA

1) 24LC16BT-I/SN (XA0351)
EEPROM

Pin Assignment



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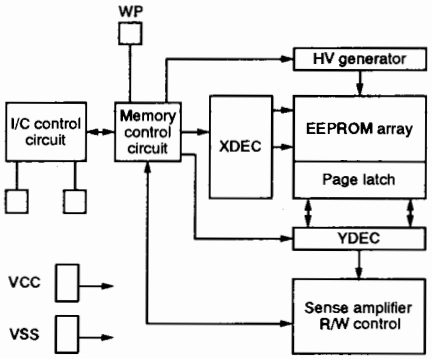
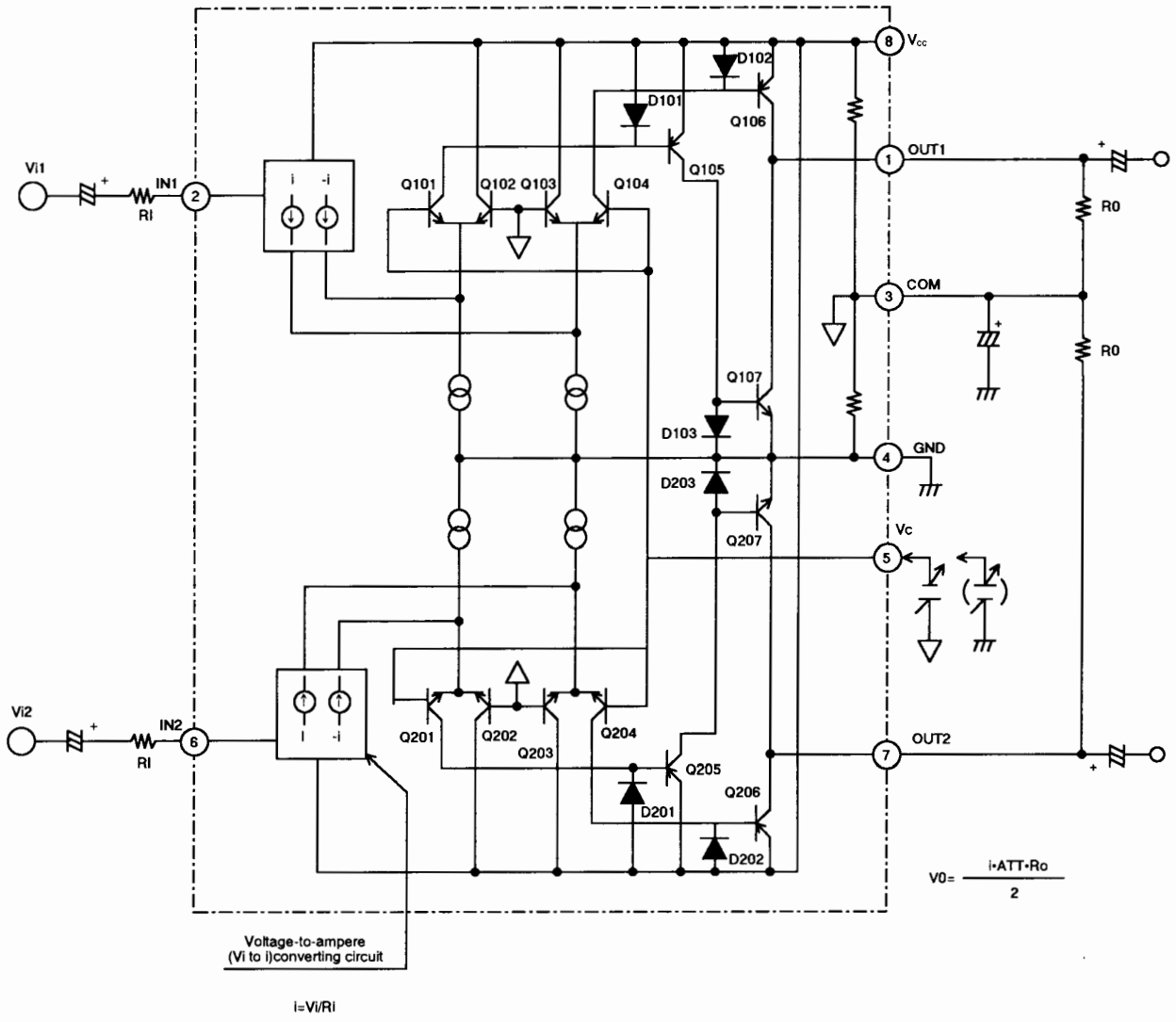
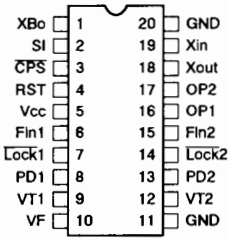


2) M5222FP-600C (XA0385) Electronic Volume



3) M64076GP (XA0352) PLL

Pin Assignment



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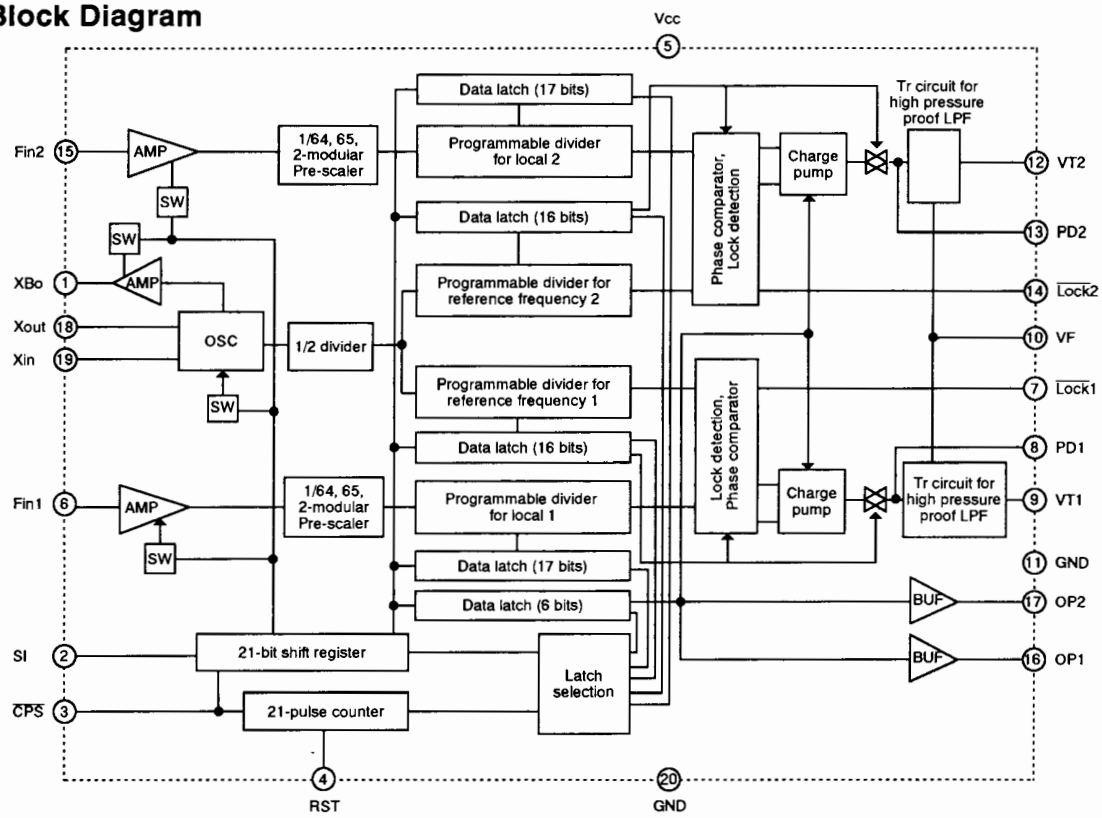
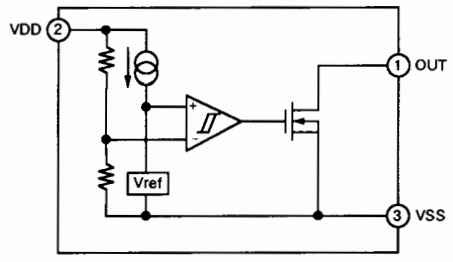


4) RH5VL25AA-T1 (XA0309) C-MOS Voltage Detector

Block Diagram



5) RH5VA32AA-T1 (XA0198) C-MOS Voltage Detector

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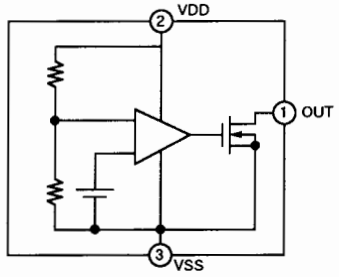
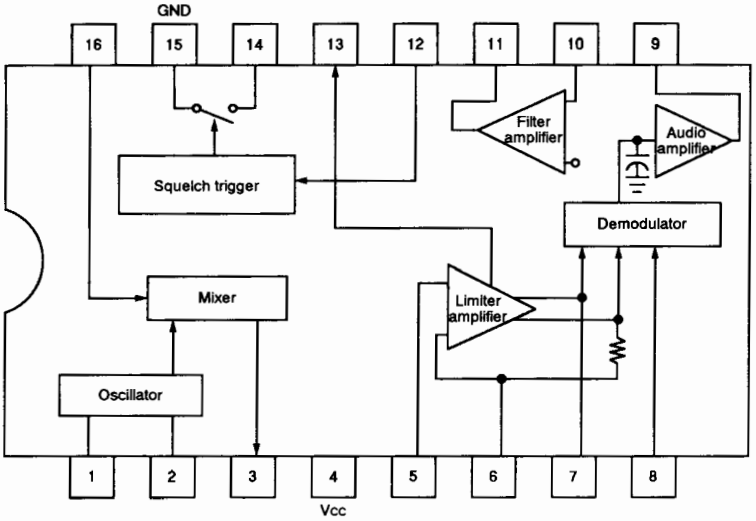
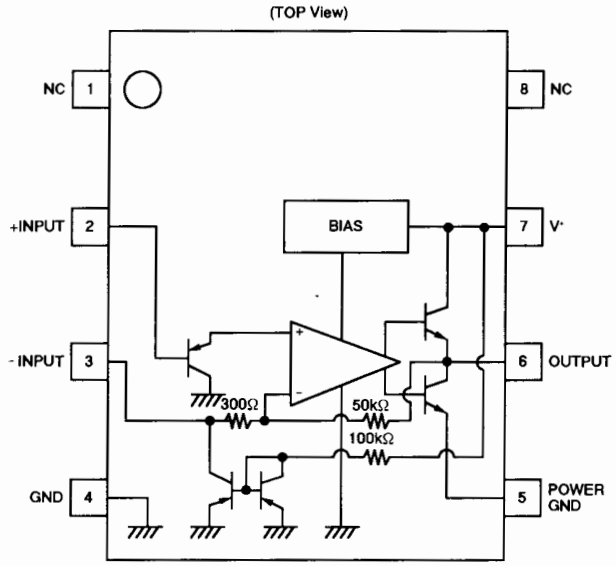


6) MC3372VM-EL (XA0343)
Narrow Band FM IF IC

Block Diagram

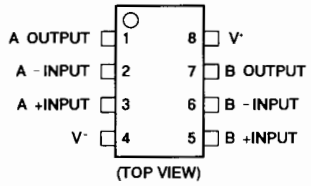


7) NJM2070M T1 (XA0210)
Audio Power Amplifier



8) NJM2100M T1 (XA0209)
Operational Amplifier

Pin Assignment



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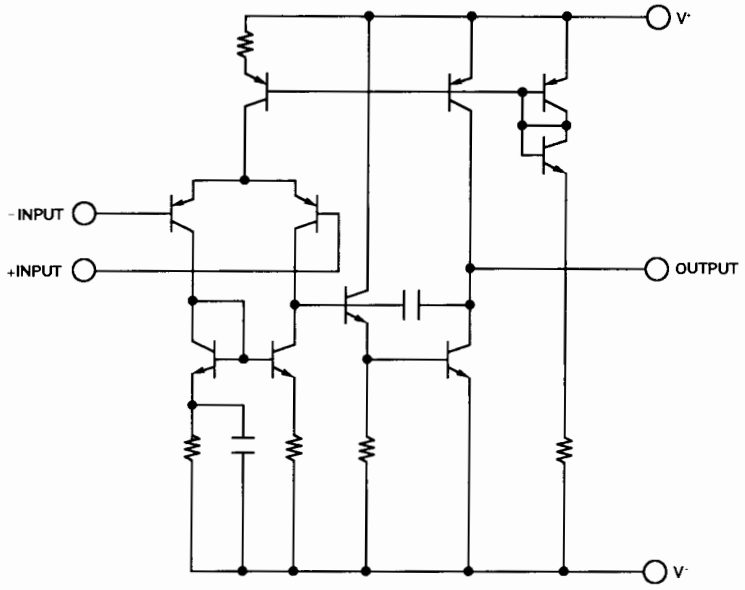


9) Transistor, Diode, and LED Ontline Drawings

Top View

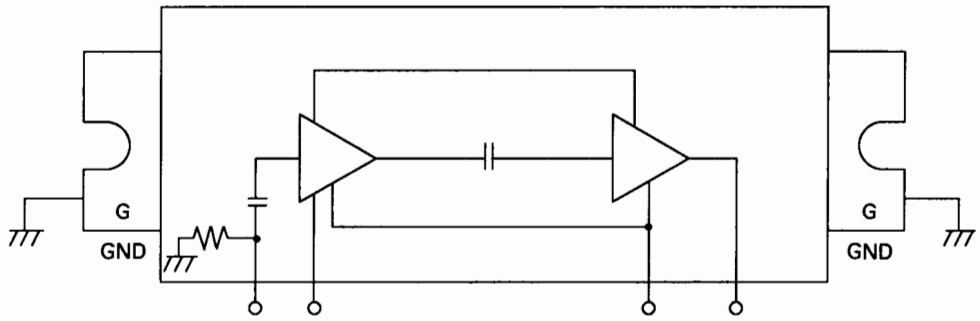
DA204U T106	FMA7XT 148	MA716 TW	MA741WA TX	MA742 TX
XD0130	XU0027	XD0118	XD0251	XD0250
	A 7			

UN211H TX	UN2214 TX	UN9111 TX	XP1501 TX
XU0040	XU0038	XU0062	XU0172
6 P	8 D	6 A	C1 C2 5 R B1 E B2

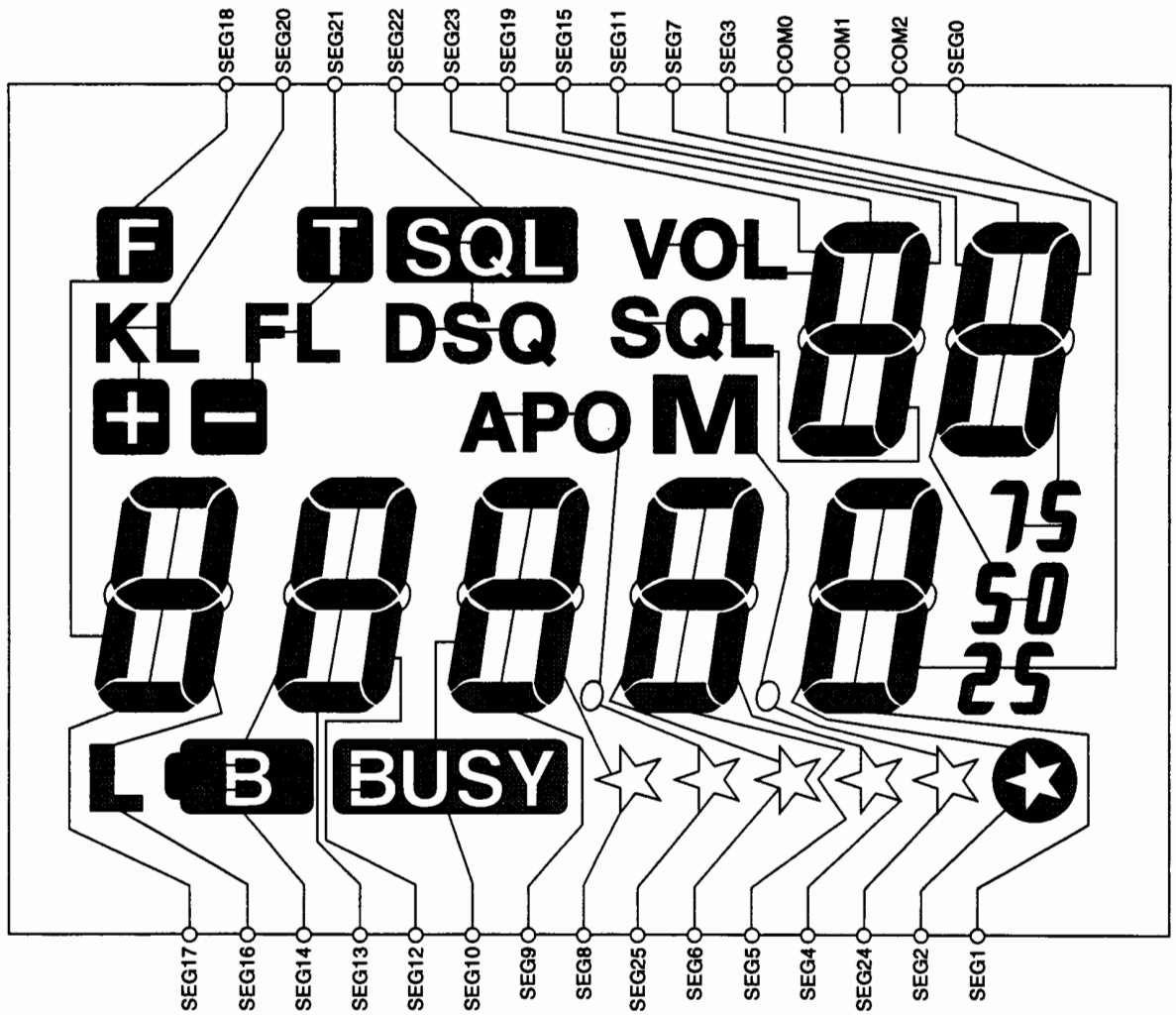
10) P. A. Module (IC101)

TA1 : XA0439
TA2 : XA0421

T : XA0381

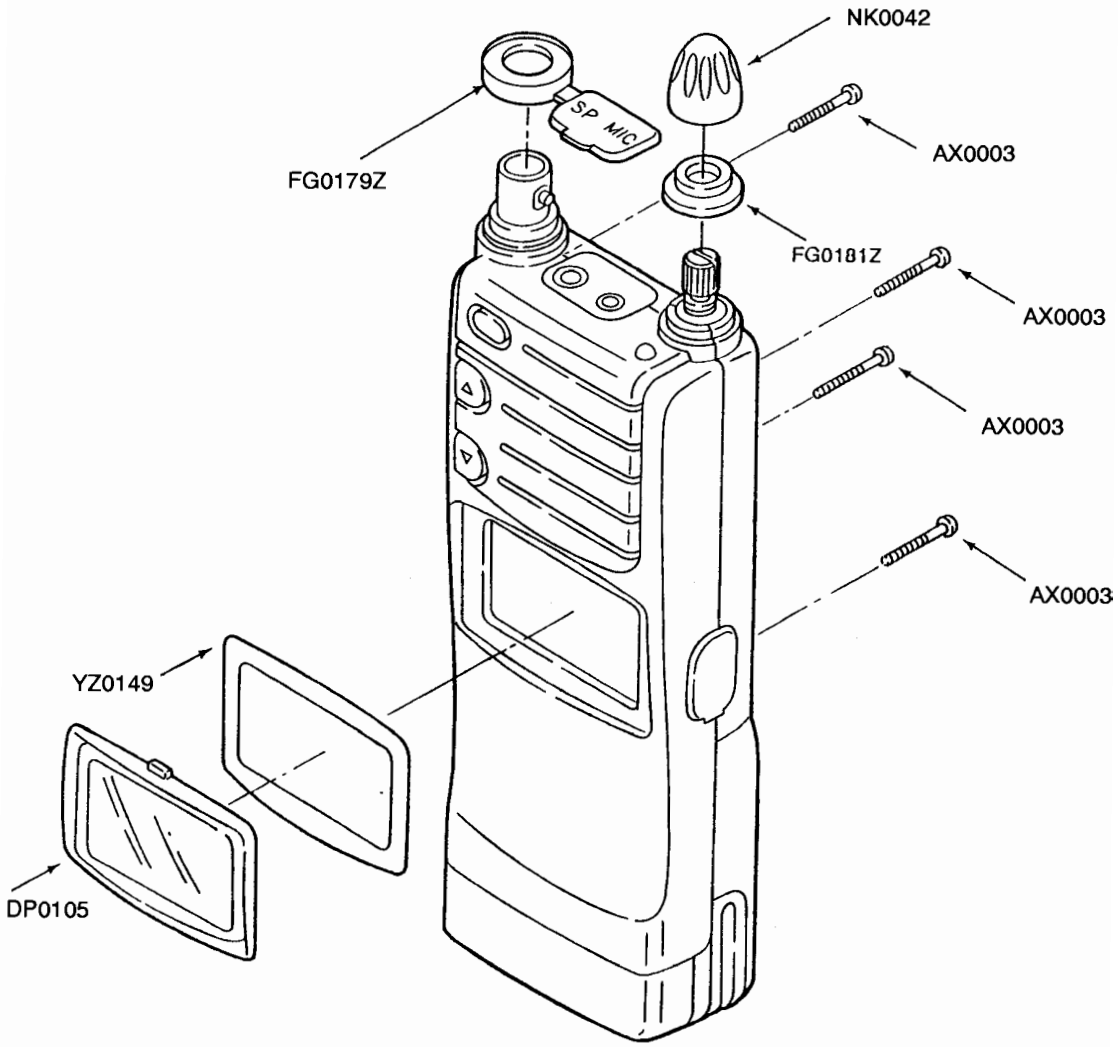


11) LCD Connection

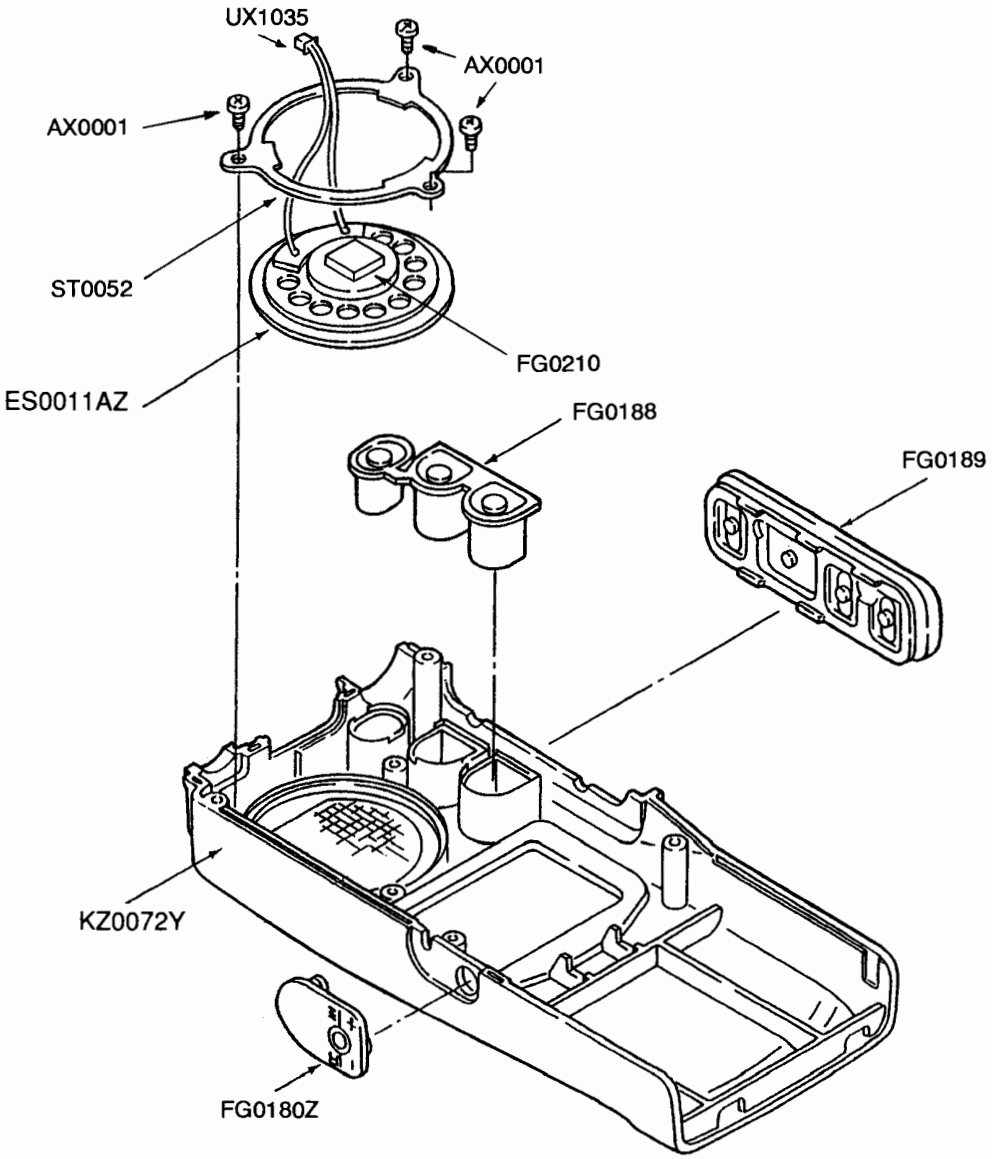


EXPLODED VIEW

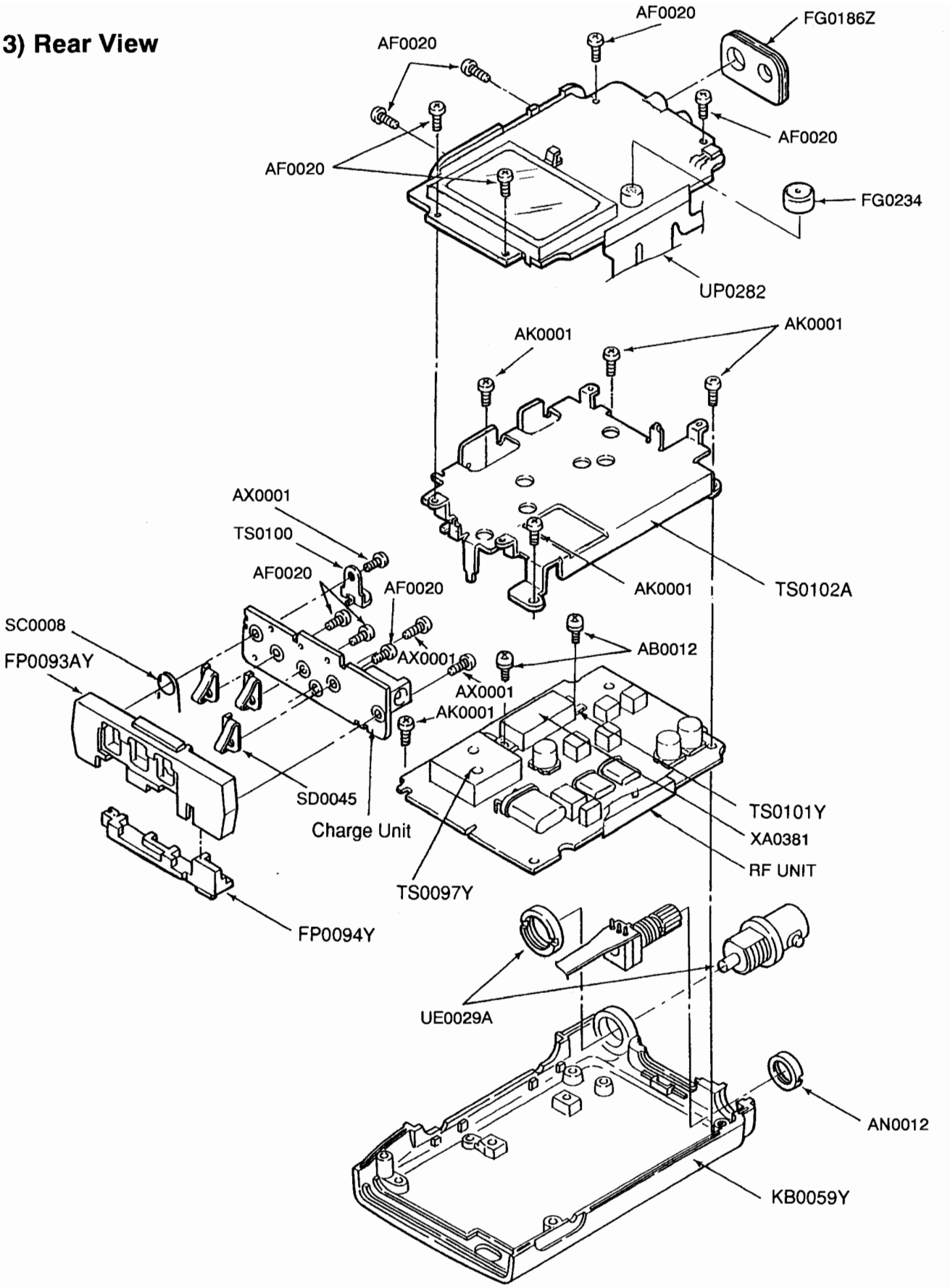
1) Front View 1



2) Front View 2



3) Rear View


AF0020
FG0186Z
AF0020
AF0020
AF0020
FG0234
UP0282
AK0001
AK0001
AK0001
AK0001
TS0102A
AX0001
TS0100
AF0020
AF0020
SC0008
FP0093AY
AB0012
AX0001
AX0001
AK0001
SD0045
Charge Unit
TS0101Y
XA0381
RF UNIT
TS0097Y
FP0094Y
UE0029A
AN0012
KB0059Y

PARTS LIST

CPU Unit/Tone Unit

Ref.No	PartsNo.	Description	Parts Name	Ver.
		CPU unit		
C1	CU3035	Chip C	C1608JB1H102KTA	
C2	CU3035	Chip C	C1608JB1H102KTA	
C3	CS0206	Chip Tantal	TMCMD0G107MTR	
C4	CU3017	Chip C	C1608CH1H330JT-AS	
C5	CU3017	Chip C	C1608CH1H330JT-AS	
C6	CS0208	Chip Tantal	TMCMA0J475MTR	
C7	CU3035	Chip C	C1608JB1H102KTA	
C8	CU3035	Chip C	C1608JB1H102KTA	
C9	CS0206	Chip Tantal	TMCMD0G107MTR	
C10	CS0373	Chip Tantal	TMCMD1C476MTR	
C11	CS0206	Chip Tantal	TMCMD0G107MTR	
C12	CU3059	Chip C	C1608JF1E104ZTA	
C16	CS0057	Chip Tantal	TMCSA0J225MTR	
C18	CS0049	Chip Tantal	TMCSA1C105MTR	
C19	CU3021	Chip C	C1608CH1H680JTA	
C20	CU3035	Chip C	C1608JB1H102KTA	
C21	CU3056	Chip C	C1608JF1E473ZTA	
C22	CU3035	Chip C	C1608JB1H102KTA	
C23	CU3035	Chip C	C1608JB1H102KTA	
C24	CU3051	Chip C	C1608JB1E223KTA	
C25	CU3051	Chip C	C1608JB1E223KTA	
C26	CU3027	Chip C	C1608CH1H221JTA	
C27	CU3035	Chip C	C1608JB1H102KTA	
C29	CU3027	Chip C	C1608CH1H221JTA	
C30	CU3059	Chip C	C1608JF1E104ZTA	
C31	CS0063	Chip Tantal	TMCSA1V104MTR	
C32	CU3035	Chip C	C1608JB1H102KTA	
C33	CU3035	Chip C	C1608JB1H102KTA	
C35	CU3035	Chip C	C1608JB1H102KTA	
C36	CU3035	Chip C	C1608JB1H102KTA	
C37	CU3026	Chip C	C1608CH1H181JT-AS	
C38	CS0049	Chip Tantal	TMCSA1C105MTR	
C39	CU3059	Chip C	C1608JF1E104ZTA	
C40	CU3059	Chip C	C1608JF1E104ZTA	
C41	CU3059	Chip C	C1608JF1E104ZTA	
C43	CS0063	Chip Tantal	TMCSA1V104MTR	
C44	CU3047	Chip C	C1608JB1H103KTA	
C45	CU3035	Chip C	C1608JB1H102KTA	
C47	CU3059	Chip C	C1608JF1E104ZTA	
C48	CU3059	Chip C	C1608JF1E104ZTA	
CN3	UP0282		DJG5 lF-RF	
CN4	UE0144		TE1208P128G02	
CN7	UE0267		AXN420C330P	
D1	XL0045	LED	PG1101F-TR	
D3	XL0045	LED	PG1101F-TR	
D7	XD0291	Diode	MA729-TX	
D9	XD0291	Diode	MA729-TX	
D10	XL0046	LED	VRPG4607K	
D11	XD0250	Diode	MA742 TX	
IC1	XA0351	IC	24LC16BT-1/SN	
IC2	XA0309	IC	RH5VL25AA-T1	
IC3	XA0198	IC	RH5VL32AA-T1	
IC4	XA0383	IC	S-81235SG-Q1-T1	

Ref.No.	PartsNo.	Description	Parts Name	Ver.
IC5	XA0402	IC	M38267M8L-l01FP	
IC6	XA0209	IC	NJM2100M T1	
J1	MACL2GG	Wire	#30A11l-025-H1	
JK1	UJ0019	Connector	HSJ1493-01-010	
JK2	UJ0022	Connector	HSJ1102-01-540	
L1	QC0003	Coil	MLF3216A1R0K-T	
L2	QC0003	Coil	MLF3216A1R0K-T	
L4	QC0003	Coil	MLF3216A1R0K-T	
L5	QC0003	Coil	MLF3216A1R0K-T	
L6	QC0442	Coil	MLF1608A1R0K-T	
L7	QC0442	Coil	MLF1608A1R0K-T	
L8	QC0442	Coil	MLF1608A1R0K-T	
L9	QC0442	Coil	MLF1608A1R0K-T	
L10	QC0442	Coil	MLF1608A1R0K-T	
LCD1	EL0030	LCD	LCD XH618	
MIC1	EY0012	Mic	EN-123T	
Q1	XU0064	Transistor	UN5210 TX	
Q3	XU0040	Transistor	UN211H TX	
Q5	XU0040	Transistor	UN211H TX	
Q7	XU0014	Transistor	DTC144EKA T146	
Q9	XU0064	Transistor	UN5210 TX	
Q10	XU0064	Transistor	UN5210 TX	
Q11	XT0095	Transistor	2SC4081 T106R	
Q12	XU0064	Transistor	UN5210 TX	
Q13	XU0064	Transistor	UN5210 TX	
R1	RK3028	Chip R	ERJ3GSYJ151V	
R3	RK3028	Chip R	ERJ3GSYJ151V	
R4	RK3050	Chip R	ERJ3GSYJ103V	
R5	RK3038	Chip R	ERJ3GSYJ102V	
R6	RK3058	Chip R	ERJ3GSYJ473V	
R7	RK3038	Chip R	ERJ3GSYJ102V	
R8	RK3046	Chip R	ERJ3GSYJ472V	
R9	RK3058	Chip R	ERJ3GSYJ473V	
R10	RK3058	Chip R	ERJ3GSYJ473V	
R11	RA0003	Chip R	NNRl4E0AJl02E	
R12	RK3038	Chip R	ERJ3GSYJ102V	
R13	RK3038	Chip R	ERJ3GSYJ102V	
R14	RK3038	Chip R	ERJ3GSYJ102V	
R15	RK3024	Chip R	ERJ3GSYJ680V	
R16	RK3024	Chip R	ERJ3GSYJ680V	
R18	RK3036	Chip R	ERJ3GSyJ681V	
R19	RK3074	Chip R	ERJ3GSYJ105V	
R20	RK3038	Chip R	ERJ3GSYJ102V	
R21	RK3038	Chip R	ERJ3GSYJ102V	
R22	RK3074	Chip R	ERJ3GSYJ105V	
R23	RK3043	Chip R	ERJ3GSYJ272V	
R24	RK3038	Chip R	ERJ3GSYJ102V	
R26	RK3038	Chip R	ERJ3GSYJ102V	
R28	RK3058	Chip R	ERJ3GSYJ473V	
R30	RA0003	Chip R	MNR14E0AJ102E	
R31	RK3055	Chip R	ERJ3GSYJ273V	
R32	RK3058	Chip R	ERJ3GSYJ473V	
R33	RK3058	Chip R	ERJ3GSYJ473V	
R34	RK3058	Chip R	ERJ3GSYJ473V	

Ref.No	Parts No.	Description	Parts Name	Ver.
R35	RK3058	Chip R	ERJ3GSYJ473V	
R36	RK1018	Chip R	ERJ8GEYJ101V	
R37	RK3038	Chip R	ERJ3GSYJ102V	
R38	RK3041	Chip R	ERJ3GSYJ182V	
R39	RK3038	Chip R	ERJ3GSYJ102V	
R40	RK3068	Chip R	ERJ3GSyJ334V	
R41	RK3065	Chip R	ERJ3GSYJ184V	
R42	RK3061	Chip R	ERJ3GSYJ823V	
R43	RK3058	Chip R	ERJ3GSYJ473V	
R44	RK3054	Chip R	ERJ3GSYJ223V	
R47	RK3052	Chip R	ERJ3GSYJ153V	
R48	RK3062	Chip R	ERJ3GSYJ104V	
R49	RK3048	Chip R	ERJ3GSYJ682V	
R52	RK3041	Chip R	ERJ3GSYJ182V	
R53	RK3046	Chip R	ERJ3GSYJ472V	
R54	RK3062	Chip R	ERJ3GSYJ104V	
R55	RK3050	Chip R	ERJ3GSYJ103V	
R56	RK3066	Chip R	ERJ3GSYJ224y	
R57	RK3039	Chip R	ERJ3GSYJ122V	
R58	RK3069	Chip R	ERJ3GSyJ394V	
R59	RK3051	Chip R	ERJ3GSYJ123V	
R60	RK3038	Chip R	ERJ3GSYJ102V	
R61	RK3054	Chip R	ERJ3GSYJ223V	
R62	RK3065	Chip R	ERJ3GSYJ184V	
R63	RK3056	Chip R	ERJ3GSYJ333V	
R64	RK3058	Chip R	ERJ3GSYJ473V	
R65	RK3058	Chip R	ERJ3GSYJ473V	
R66	RK3055	Chip R	ERJ3GSYJ273V	
R67	RK3046	Chip R	ERJ3GSYJ472V	
R68	RK3061	Chip R	ERJ3GSyJ823V	
R69	RK3050	Chip R	ERJ3GSYJ103V	
R70	RK3062	Chip R	ERJ3GSYJ104V	
R71	RK3034	Chip R	ERJ3GSyJ471V	
R72	RK3056	Chip R	ERJ3GSyJ333V	
R73	RK3051	Chip R	ERJ3GSVJ123V	
R75	RK3058	Chip R	ERJ3GSYJ473V	
R76	RK3038	Chip R	ERJ3GSYJ102V	
R78	RK3038	Chip R	ERJ3GSYJ102V	
R79	RK3001	Chip R	ERJ3GSY0R00V	E
R80	RK3046	Chip R	ERJ3GSYJ472V	
R82	RK3058	Chip R	ERJ3GSYJ473V	
R83	RK3058	Chip R	ERJ3GSYJ473V	
R84	RK3038	Chip R	ERJ3GSYJ102V	E
R86	RK3058	Chip R	ERJ3GSYJ473V	
R87	RK3046	Chip R	ERJ3GSYJ472V	
R89	RK3038	Chip R	ERJ3GSYJ102V	
R92	RK3001	Chip R	ERJ3GSY0R00V	
R93	RK3042	Chip R	ERJ3GSYJ222V	
R94	RK3030	Chip R	ERJ3GSYJ221V	
R95	RK3030	Chip R	ERJ3GSYJ221V	
R96	RK3038	Chip R	ERJ3GSYJ102V	
R97	RK3038	Chip R	ERJ3GSYJ102V	
R98	RK3070	Chip R	ERJ3GSYJ474V	
R99	RK3001	Chip R	ERJ3GSY0R00V	E

Ref.No.	PartsNo.	Description	Parts Name	Ver.
R1001	RK3046	Chip R	ERJ3GSYJ472V	
R1002	RK3048	Chip R	ERJ3GSYJ682V	
R1003	RK3062	Chip R	ERJ3GSYJ104V	
R1005	RK3058	Chip R	ERJ3GSYJ473V	
R1006	RK3038	Chip R	ERJ3GSYJ102V	
R1007	RK3038	Chip R	ERJ3GSYJ102V	
R1008	RK3001	Chip R	ERJ3GSY0R00V	
R1009	RK3038	Chip R	ERJ3GSYJ102V	
R1010	RK3058	Chip R	ERJ3GSYJ473V	
R1011	RK3038	Chip R	ERJ3GSYJ102V	
R1012	RK3038	Chip R	ERJ3GSYJ102V	
R1013	RK3001	Chip R	ERJ3GSY0R00V	
X1	XQ0074	Crystal	SMD-49 4.19MHZ	
	UP0294B	P.C.B	CPU PCB	
	TL0016		Spread Sheet DJG5	
	FG0186Z		Jack Cap	
	DG0021		LCD Light DJG5	
	FG0182		LCD Rubber(A)DJG5	
	FG0183		LCD Rubber(B)DJG5	
	ST0053Y		LCD Holder DJ190	
	FG0234		Mic Holdcr	
	TZ0072		Sheet Insulator	
	UR0012		Switch	
	Tone Unit (EJ-28U)			
C701	CU3015	Chip C	C1608CH1H220JTA	
C702	CU3015	Chip C	C1608CH1H220JTA	
C703	CU3023	Chip C	C1688CH1H101JTA	
C705	CS0237	Chip Tanta	TMCMA1A475MTR	
C709	CS0049	Chip Tanta	TMCSA1C105MTR	
C710	CU3059	Chip C	C1608JF1E104ZTA	
C711	CS0236	Chip Tanta	TMCMA0J685MTR	
C712	CU3035	Chip C	C1608JB1H102KTA	
C713	CU3019	Chip C	C1608CH1H470JTA	
C714	CS0049	Chip Tanta	TMCSA1C105MTR	
C715	CS0049	Chip Tanta	TMCSA1C105MTR	
CN701	UE0274		AXN320C038P	
	UP0295A		EJ28U PCB	
R701	RK3048	Chip R	ERJ3GSYJ682V	
R702	RK3089	Chip R	ERJ3GSYJ912V	
R703	RK3066	Chip R	ERJ3GSYJ224V	
R704	RK3074	Chip R	ERJ3GSYJ105V	
R705	RK3051	Chip R	ERJ3GSYJ123V	
R707	RK3067	Chip R	ERJ3GSYJ274V	
R710	RK3047	Chip R	ERJ3GSYJ562V	
R715	RK3060	Chip R	ERJ3GSYJ683V	
R716	RK3054	Chip R	ERJ3GSYJ223V	
R717	RK3055	Chip R	ERJ3GSYJ273V	
R718	RK3062	Chip R	ERJ3GSYJ104V	
IC701	XA0239	IC	AK2341	
	XQ0077	Crystal	38C 3.686400MHZ	
	TZ0069		EJ28U	
	HK0398A		Package	
	HP0029		Protec.Bag	

RF Unit

Ref.No	Parts No.	Description	Parts Name	Ver.
		RF Unit		
C101	CU3035	Chip C	C1608JB1H102KTA	
C102	CU3035	Chip C	C1608JB1H102KTA	
C103	CU3035	Chip C	C1608JB1H102KTA	
C104	CU3035	Chip C	C1608JB1H102KTA	
C105	CU3035	Chip C	C1608JB1H102KTA	
C106	CU3017	Chip C	C1608CH1H330JTA	
C107	CU3010	Chip C	C1608CH1H090CTA	T.E.TA.TAH
C107	CU3007	Chip C	C1608CH1H060CTA	TA2
C108	CU3007	Chip C	C1608CH1H060CTA	TA2
C110	CU3017	Chip C	C1608CH1H330JTA	
C112	CU3011	Chip C	C1608CH1H100CTA	
C113	CU3017	Chip C	C1608CH1H330JTA	T.E.TA.TAH
C113	CU3013	Chip C	C1608CH1H150JTA	TA2
C114	CU3019	Chip C	C1608CH1H470JTA	T.E.TA.TAH
C114	CU3013	Chip C	C1608CH1H150JTA	TA2
C115	CU3013	Chip C	C1608CH1H150JTA	
C116	CU3019	Chip C	C1608CH1H470JTA	T.E.TA.TAH
C116	CU3012	Chip C	C1608CH1H120JTA	TA2
C117	CS0049	Chip Tantal	TMCSA1C105MTR	
C118	CU3035	Chip C	C1608JB1H102KTA	
C119	CU3035	Chip C	C1608JB1H102KTA	
C121	CU3004	Chip C	C1608CH1H030CTA	T.E.TA.TAH
C121	CU3003	Chip C	C1608CH1H020CTA	TA2
C122	CU3004	Chip C	C1608CH1H030CTA	T.E.TA.TAH
C122	CU3003	Chip C	C1608CH1H020CTA	TA2
C123	CU3015	Chip C	C1608CH1H220JTA	
C124	CU3035	Chip C	C1608JB1H102KTA	
C125	CU3002	Chip C	C1608CH1H010CTA	
C126	CU3002	Chip C	C1608CH1H010CTA	
C127	CS0049	Chip Tantal	TMCSA1C105MTR	
C128	CU3035	Chip C	C1608JB1H102KTA	
C129	CU3035	Chip C	C1608JB1H102KTA	
C130	CS0220	Chip Tantal	TMCMA1C225MTR	
C131	CU3051	Chip C	C1608JB1E223KTA	
C132	CU3047	Chip C	C1608JB1H103XTA	
C133	CU3047	Chip C	C1608JB1H103KTA	
C134	CU3035	Chip C	C1608JB1H102KTA	
C135	CU3009	Chip C	C1608CH1H080CTA	
C136	CU3047	Chip C	C1608JB1H103KTA	
C137	CS0220	Chip Tantal	TMCMA1C225MTR	
C141	CU3035	Chip C	C1608JB1H102KTA	
C142	CU3003	Chip C	C1608CH1H020CTA	T.E.TA.TAH
C142	CU3002	Chip C	C1608CH1H010CTA	TA2
C143	CU3003	Chip C	C1608CH1H020CTA	
C144	CU3003	Chip C	C1608CH1H020CTA	
C146	CU3007	Chip C	C1608CH1H060CTA	
C148	CU3006	Chip C	C1608CH1H050CTA	
C149	CU3011	Chip C	C1608CH1H100CTA	
C150	CU3011	Chip C	C1608CH1H100CTA	
C151	CU3004	Chip C	C1608CH1H030CTA	

Ref.No.	Parts No.	Description	Parts Name	Ver.
C152	CU3015	Chip C	C1608CH1H220JTA	
C153	CU3017	Chip C	C1608CH1H330JTA	
C154	CU3018	Chip C	C1608CH1H390JTA	
C155	CU3017	Chip C	C1608CH1H330JTA	
C156	CU3035	Chip C	C1608JB1H102KTA	
C157	CU3007	Chip C	C1608CH1H060CTA	
C158	CU3035	Chip C	C1608JB1H102KTA	
C159	CU3059	Chip C	C1608JF1E104ZTA	
C160	CU3047	Chip C	C1608JB1H103KTA	
C161	CU3047	Chip C	C1608JB1H103KTA	
C163	CS0377	Chip Tantal	TMCMB0G476MTR	
C164	CS0049	Chip Tantal	TMCSA1C105MTR	
C165	CU3021	Chip C	C1608CH1H680JTA	
C166	CU3059	Chip C	C1608JF1E104ZTA	
C167	CU3016	Chip C	C1608CH1H270JTA	
C168	CU3015	Chip C	C1608CH1H220JTA	
C169	CS0049	Chip Tantal	TMCSA1C105MTR	
C170	CU3056	Chip C	C1608JF1E473ZTA	
C171	CU3059	Chip C	C1608JF1E104ZTA	
C172	CU3051	Chip C	C1608JB1E223KTA	
C173	CU3053	Chip C	C1608JF1E333ZTA	
C174	CU3047	Chip C	C1608JB1H103KTA	
C175	CS0382	Chip Tantal	TMCMB1A226MTR	
C176	CU3059	Chip C	C1608JF1E104ZTA	
C177	CS0220	Chip Tantal	TMCMA1C225MTR	
C178	CU3035	Chip C	C1608JB1H102KTA	
C179	CU3027	Chip C	C1608CH1H221JTA	
C180	CU3035	Chip C	C1608JB1H102KTA	
C181	CU3059	Chip C	C1608JF1E104ZTA	
C182	CU3035	Chip C	C1608JB1H102KTA	
C183	CU3035	Chip C	C1608JB1H102KTA	
C184	CU3035	Chip C	C1608JB1H102KTA	
C185	CU3047	Chip C	C1608JB1H103KTA	
C186	CE0308	Electrolytic C	6.3CV100BS	
C187	CU3035	Chip C	C1608JB1H102KTA	
C188	CS0049	ChipTanta1	TMCSA1C105MTR	
C189	CU3047	Chip C	C1608JB1H103KTA	
C190	CU3059	Chip C	C1608JF1E104ZTA	
C191	CU3035	Chip C	C1608JB1H102KTA	
C192	CU3047	Chip C	C1608JB1H103KTA	
C193	CU3047	Chip C	C1608JB1H103KTA	
C194	CU3019	Chip C	C1608CH1H470JTA	
C195	CU3047	Chip C	C1608JB1H103KTA	
C196	CS0232	Chip Tantal	TMCMA1V474MTR	
C197	CU3035	Chip C	C1608JB1H102KTA	
C198	CE0308	Electrolytic C	6.3CVl00BS	
C199	CE0308	Electrolytic C	6.3CV100BS	
C200	CU3035	Chip C	C1608JB1H102KTA	
C201	CU3035	Chip C	C1608JB1H102KTA	
C202	CU3047	Chip C	C1608JB1H103KTA	
C203	CU3051	Chip C	C1608JB1E223KTA	

RF Unit

Ref.No	Parts No.	Descrlptlon	Parts Name	Ver.
C204	CU3059	Chip C	C1608JF1E104ZTA	
C205	CE0373	Ek!ctrQlytic	16XV 100UV	
C206	CS0366	Chip Tantal	TMCMA0G106MTR	
C215	CU3035	Chip C	C1608JB1H102KTA	
C216	CU3035	Chip C	C1608JB1H102KTA	
C217	CU3019	Chip C	C1608CH1H470JTA	
C218	CU3035	Chip C	C1608JB1H102KTA	
C219	CS0366	Chip Tantal	TMCMA0G106MTR	
C220	CS0063	Chip Tantal	TMCSA1V104MTR	
C223	CU3035	Chip C	C1608JB1H102KTA	
C224	CU3015	Chip C	C1608CH1H220JTA	
C225	CU3035	Chip C	C1608JB1H102KTA	
C226	CS0049	Chip Tantal	TMCSA1C105MTR	
C228	CS0377	Chip Tantal	TMCMB0G476MTR	
C229	CS0237	Chip Tantal	TMCMA1A475MTR	
C230	CS0366	Chip Tantal	TMCMA0G106MTR	
D101	XD0066	Diode	RLS135 TE 11	
D102	XD0066	Diode	RLS135 TE 11	
D103	XD0251	Diode	MA741WA TX	
D104	XD0299	Diode	MA304-TX	
D105	XD0299	Diode	MA304-TX	
D106	XD0299	Diode	MA304-TX	
D107	XD0299	Diode	MA304-TX	
D108	XD0129	Diode	1SS318 TT11	
D109	XD0118	Diode	MA716 TX	
D113	XD0130	Diode	DA204U T106	
FL101	XC0018	Filter	CFWM450E	
JK101	RD0108		JPV01R-0l	
IC101	XA0381	IC	S-AV28	T.E.TA.TAH
IC101	XA0421	IC	PF0311	TA2
IC102	XA0352	IC	X64076GP	
IC103	XA0385	IC	M5222FP-600C	
IC104	XA0343	IC	MC3372VX-EL	
IC105	XA0210	IC	NJK2070XT1	
L101	QC0016	Coil	MLF3216A2R2K-T	
L102	QKA65A	Coil	XRl.5 3.5T 0.4	
L103	QKA65A	Coil	MR1.5 3.5T 0.4	
L104	QKA65A	Coil	MRl.5 3.5T 0.4	
L105	QC0430	Coil	MLF1608DR10K-T	
L106	QC0430	Coil	MLF1608DR10K-T	
L107	QKA75A	Coil	QRA75A	
L108	QC0090	Coil	MLF3216A4R7K-T	
L109	QA0071	Coil	LQA0071	
L110	QA0071	Coil	LQA0071	
L111	QA0071	Coil	LQA0071	
L112	QA0071	Coil	LQA0071	
L113	QC0009	Coil	MLF3216DR10K-T	
L114	QC0430	Coil	MLF1608DR10K-T	
Q101	XT0119	Transistor	2SC3356-T1BR24	
Q102	XT0119	Transistor	2SC3356-T1BR24	
Q103	XU0172	Transistor	XP1501-TX	

Ref.No.	Parts No.	Description	Parts Name	Ver.
Q105	XT0096	Transistor	2SC4099 T106N	
Q106	XE0020	FET	2SK3601GE TL	T.E.TA.
Q106	XE0009	FET	2SK302GR	
Q107	XT0137	Transistor	2SC5065-O(TE85L)	
Q108	XT0096	Transistor	2SC4099 T106N	
Q109	XT0095	Transistor	2SC4081 T106R	
Q110	XT0088	Transistor	2SA1213Y TE12R	
Q111	XT0088	Transistor	2SA1213Y TE12R	
Q112	XU0027	Transistor	FMA7AT148	
Q113	XU0172	Transistor	XP1501-TX	
Q114	XT0088	Transistor	2SA1213Y TE12R	
Q115	XT0095	Transistor	2SC4081 T106R	
Q116	XU0172	Transistor	XP1501-TX	
Q117	XT0137	Transistor	2SC5065-O(TE85L)	
Q118	XU0125	Transistor	DTA144EUAT106	
Q119	XU0038	Transistor	UN2214 TX	
Q120	XU0062	Transistor	UN9111 TX	
R101	RK3028	Chip R	ERJ3GSYJ151V	
R102	RK3026	Chip R	ERJ3GSYJ101V	
R103	RK3026	Chip R	ERJ3GSYJ101V	
R104	RK3034	Chip R	ERJ3GSYJ47lV	
R105	RK3046	Chip R	ERJ3GSYJ472V	
R106	RK3050	Chip R	ERJ3GSYJ103V	
R107	RK3046	Chip R	ERJ3GSYJ472V	
R108	RK3046	Chip R	ERJ3GSYJ472V	
R110	RK3026	Chip R	ERJ3GSYJ101V	
R111	RK3026	Chip R	ERJ3GSYJ101V	
R113	RK3050	Chip R	ERJ3GSYJ103V	T.E.TA.TAH
R113	RK3051	Chip R	ERJ3GSYJ123V	TA2
R114	RK3050	Chip R	ERJ3GSYJ103V	
R115	RK3026	Chip R	ERJ3GSYJ101V	
R116	RK3050	Chip R	ERJ3GSYJ103V	
R117	RK3034	Chip R	ERJ3GSYJ471V	
R118	RK3050	Chip R	ERJ3GSYJl03V	T.E.TA.TAH
R118	RK3051	Chip R	ERJ3GSYJ123V	TA2
R119	RK3038	Chip R	ERJ3GSYJ102V	
R121	RK3050	Chip R	ERJ3GSYJ103V	
R122	RK3030	Chip R	ERJ3GSYJ221V	
R123	RK3026	Chip R	ERJ3GSYJ101V	
R124	RK3022	Chip R	ERJ3GSYJ470V	
R126	RK3050	Chip R	ERJ3GSYJ103V	
R128	RK3052	Chip R	ERJ3GSYJ153V	
R130	RK3050	Chip R	ERJ3GSYJ103V	
R131	RK3038	Chip R	ERJ3GSYJ102V	
R133	RK3053	Chip R	ERJ3GSYJ183V	
R135	RK3066	Chip R	ERJ3GSYJ224V	
R137	RK3047	Chip R	ERJ3GSYJ562V	
R138	RK3038	Chip R	ERJ3GSYJ102V	
R140	RK3052	Chip R	ERJ3GSYJ153V	
R142	RK3030	Chip R	ERJ3GSYJ221V	
R143	RK3042	Chip R	ERJ3GSYJ222V	

Ref.No	Parts No.	Description	Parts Name	Ver.
R144	RK3050	Chip R	ERJ3GSY3103V	
R145	RK3074	Chip R	ERJ3GSYJ105V	
R146	RK3074	Chip R	ERJ3GSYJ105V	
R147	RK3074	Chip R	ERJ3GSYJ105V	
R148	RK3060	Chip R	ERJ3GSYJ683V	
R149	RK3074	Chip R	ERJ3GSYJ105V	
R150	RK3034	Chip R	ERJ3GSYJ47lV	
R153	RK3054	Chip R	ERJ3GSYJ223V	
R154	RK3042	Chip R	ERJ3GSYJ222V	
R155	RK3058	Chip R	ERJ3GSYJ473V	
R156	RK3041	Chip R	ERJ3GSYJ182V	
R157	RK3041	Chip R	ERJ3GSYJ182V	
R158	RK3059	Chip R	ERJ3GSYJ563V	
R159	RK3047	Chip R	ERJ3GSYJ562V	
R160	RK3054	Chip R	ERJ3GSYJ223V	
R161	RK3052	Chip R	ERJ3GSYJ153V	
R162	RK3052	Chip R	ERJ3GSYJ153V	
R163	RK3030	Chip R	ERJ3GSYJ221V	
R164	RK3058	Chip R	ERJ3GSYJ473V	
R166	RK3046	Chip R	ERJ3GSYJ472V	
R167	RK3038	Chip R	ERJ3GSYJ102V	
R168	RK0105	Chip R	ERJ3GSYJ2R2V	
R169	RK3032	Chip R	ERJ3GSYJ331V	
R170	RK3038	Chip R	ERJ3GSYJ102V	
R171	RK3058	Chip R	ERJ3GSYJ473V	
R172	RK3054	Chip R	ERJ3GSYJ223V	
R173	RK3044	Chip R	ERJ3GSYJ332V	
R174	RK3071	Chip R	ERJ3GSYJ564V	
R175	RK3054	Chip R	ERJ3GSYJ223V	
R176	RK3046	Chip R	ERJ3GSYJ472V	
R177	RK3070	Chip R	ERJ3GSYJ474V	
R178	RK3041	Chip R	ERJ3GSYJ182V	
R179	RK3056	Chip R	ERJ3GSYJ333V	
R180	RK3042	Chip R	ERJ3GSYJ222V	
R181	RK3046	Chip R	ERJ3GSYJ472V	
R182	RK3058	Chip R	ERJ3GSYJ473V	
R183	RK3042	Chip R	ERJ3GSYJ222V	
R184	RK3055	Chip R	ERJ3GSYJ273V	
R185	RK3062	Chip R	ERJ3GSYJ104V	
R186	RK3046	Chip R	ERJ3GSYJ472V	
R187	RK3058	Chip R	ERJ3GSYJ473V	
R188	RK3050	Chip R	ERJ3GSYJ103V	
R189	RK3050	Chip R	ERJ3GSYJ103V	
R191	RK3050	Chip R	ERJ3GSYJ3103	
R192	RK3014	Chip R	ERJ3GSYJ100V	?
R193	RK3038	Chip R	ERJ3GSYJ102V	
R195	RK3056	Chip R	ERJ3GSYJ333V	
R196	RK3052	Chip R	ERJ3GSYJ153V	
R198	RK3043	Chip R	ERJ3GSYJ272V	
R203	RK3038	Chip R	ERJ3GSYJ102V	
R204	RK3030	Chip R	ERJ3GSYJ221V	

Ref.No.	Parts No.	Description	Parts Name	Ver.
R205	RK3030	Chip R	ERJ3GSYJ221V	
R206	RK3059	Chip R	ERJ3GSYJ563V	
R209	RK3026	Chip R	ERJ3GSYJ101V	
R210	RK3001	Chip R	ERJ3GSY0R00V	
R211	RK3062	Chip R	ERJ3GSYJ104V	
R212	RK3001	Chip R	ERJ3GSY0R00V	
R213	RK3050	Chip R	ERJ3GSYJ103V	
R214	RK3050	Chip R	ERJ3GSYJ103V	
R215	RK3059	Chip R	ERJ3GSYJ563V	
R216	RK3062	Chip R	ERJ3GSYJ104V	
R219	RK3058	Chip R	ERJ3GSYJ473V	
R220	RK3026	Chip R	ERJ3GSYJ101V	
R221	RK3038	Chip R	ERJ3GSYJ102V	
TC101	CT0012	Trinner	CTZ10AV	
X101	XQ0076	Crystal	HC-49U 21.25MHZ	
X102	XK0003	Crystal	CDBX450C7	
XF101	XF0022	Filter	UM-1 21.7MHZ	
XF102	XF0022	Filter	UM-1 21.7MHZ	
	FG0212		Cushion DJ190	
	FG0215		Cushion DJ191	
	TS0101Y	Shad Case	PM shield	
	UP0292D	PCB		
		VCO Unit		
C301	CU3035	Chip C	C1608JB1H102KTA	
C302	CS0377	Chip Tantal	TMCMB0G476MTR	
C303	CU3047	Chip C	C1608JB1H103KTA	
C304	CU3037	Chip C	C1608JB1H103KTA	
C305	CU3031	Chip C	C1608JB1H471KTA	
C306	CU3006	Chip C	C1608CH1r1050CTA	
C307	CU3035	Chip C	C1608JB1H102KTA	
C308	CU3006	Chip C	C1608CH1t1050CTA	
C309	CU3003	Chip C	C1608CH1t1020CTA	
C310	CU3031	Chip C	C1608JB1H471KTA	
C311	CU3035	Chip C	C1608JB1H102KTA	
C312	CU3035	Chip C	C1608JB1H102KTA	
C313	CU3035	Chip C	C1608JB1H102KTA	
C314	CU3026	Chip C	C1608CH1H181JT-AS	
D301	XD0299	Diode	MA304-TX	
D302	XD0293	Diode	1SV257(TPH3)	
D303	XD0129	Diode	1SS318 TT11	
D304	XD0299	Diode	MA304-TX	
L301	QA0120	Coil	QA0120	T.E.TA.TAH
L301	QA0077A	Coil	QA077A	TA2
L302	QC0442	Coil	MLF1608A1R0K-T	
L303	QKA65A	Coil	KRl.5 3.5T 0.4	
L304	QC0454	Coil	MLF1608K100K-T	
L305	QC0454	Coil	MLF1608K100K-T	
Q301	XT0137	Transistor	2SC5065-O(TE85L)	
Q302	XT0137	Transistor	2SC5065-O(TE85L)	
Q303	XU0131	Transistor	DTC114EUA T106	

Ref.No	Parts No.	Description	Parts Name	Ver.
R301	RK3026	Chip R	ERJ3GSYJ101V	
R302	RK3030	Chip R	ERJ3GSYJ221V	
R303	RK3050	Chip R	ERJ3GSYJ103V	
R304	RK3062	Chip R	ERJ3GSYJ104V	
R305	RK3062	Chip R	ERJ3GSYJ104V	
R306	RK3062	Chip R	ERJ3GSYJ104V	
R307	RK3052	Chip R	ERJ3CSYJ153V	
R308	RK3042	Chip R	ERJ3GSYJ222V	
R309	RK3050	Chip R	ERJ3GSYJl03V	
R310	RK3037	Chip R	ERJ3GSYJ821V	
R311	RK3042	Chip R	ERJ3GSYJ222V	
	TS0097Y	Case	VC0 Case	
	UT0030	Terminal	0.6Pin	
		Mechanical Parts		
	AB0012	Screw	PH/S MZ. 6+5 Fe/2pcs	
	AF0020	Screw	0PH M2+3 Fe/6pcs	
	AK0001	Screw	P0X BZ+4 FE/5pcs	
	AN0012	Scrcv	NUT N7X0.75 BR/B	
	AX0003	Screw	0PH P2+16 FeAB/4pcs	
	DP0105		LCD Panel DJ190	
	DS0364B	Label	Serial No	T
	DS0388	Label	Serial No	E,TA,TAH
	FG0180Y	Ruber	DC Cap DJG5	
	FG0181Y	Ruber	Dial Ruber DJ190	
	FG0186Y	Ruber	Jack Rubber DJ190	
	FG0187Y	Ruber	Jack CapDJ190	
	FG0189Y	Rubcr	PTT Ruber DJ190	
	FG0234Y	Ruber	MIC Holder DJ190	
	NK0042Y	Knob	V0L Knob	
	PR0237	Laber	FCC Partl5	T
	PR0309	Laber	CE-Mark Label	E
	TS0103Y		RF Shield	
	YZ0149	Tape	LCD Tape DJG5	
	KB0059Y	Rear Case	DJ190	
	UE0029A	Conncctor	BNC CH7031B	
	AX0001	Screw	0PH P2+4 Fens/3pcs	
	ES0011BZ	Speaker	SP.036M9014	
	FG0188	Ruber	Front Key DJ190	
	FG0190Y		0N-A1R DJ190	
	FG0210Z		Speaker Custlion	
	KZ0072Y	Case Assy	Front Case DJ190	
	ST0052Y	Holder	SP Filture DJG5	
	UX1035	Wire	DJ180 W201	
	AF0020Z	Screw	0PH M2+3 Fe/3pcs	
	AX0001	Screw	0PH P2+4 Fe/3pcs	
	FP0093AY		Teaminal Frame	
	FP0094Y		Release Knob	
	SC0008A	Spring	Release DJG5	
	SD0045	Spring	Team. DJF5/3pcs	
	TS0100	Shield		

Ref.No.	Parts No.	Description	Parts Name	Ver.
		PTT Unit		
SW401	UU0026	Switch	EVQPLBA0S	
SW402	UU0018	Switch	S0P-110HST	
SW403	UU0018	Switch	S0P-111HST	
SW404	UU0018	Switch	S0P-112HST	
		Belt clip		
	AA0020	Screw	TH M2.6+4 Fe/2pcs	
	BB0009Y		Hand Strap DJS4l	
	BH0008A		Belt Clip DJK1	
	HP0003	Protect.Bag	5x75x110	
	YZ0121	Tape	20mm	
		Packing		
	HK0402A	Package	DJl90	
	HM0153A	Carton Box	10PCS DJG5T	
	HP0031	Protec.Bag	5x100x200	
	HU0094		P.MTL/Carton DJG5T	
	HU0095		1nter Ni-Cd Large	
	HU0097		1nter 10pcs. DJG5T	
	PH0009A	GUA Card	Warranty Cert T	
	PT0004A	Scrial No.	For Carton/2pcs	
	PK0057		Schematic Diagram	
	PS0227B	Manual	1nstruction DJ190T	
	EA57	Antenna	VHF L	E,T,TA
	EA58	Antenna	VHF F	TFH
	EBP36	Battery	Ni-Cd Battery Pack	TAH
	EBP37	Battery	Ni-Cd Battery Pack	T,E.,TA
	EDC63	Chager		T
	EDC64	Chager		E,TA,TAH
		Charge		
C801	CU3031	Chip C	C1608JB1H471KTA	
D801	XD0294	Diode	U2FWJ44N(TE12R)	
D802	XD0294	Diode	U2FWJ44N(TE12R)	
D803	XD0290	Diode	MA111-TX	
D804	XD0261	Diode	S3DG7	
D805	XD0130	Diode	DA204U T106	
Q801	XT0088	Transistor	2SA1213Y TE12R	
R801	RK0003	Chip R	2125 1/10 15ohn	
R802	RK3046	Chip R	1608 1/16 4.7 kohm	
JK801	UJ0015	Connector	HEC2781 010020	
	MBCK07A/	Wire	#28 02-70-02	
	MBCK07A/	Wire	#28R02-70-02	
	QB0020	Coil	H5DT6X1.5X3	
	TT3007	Tube	6.0x10mm	

ADJUSTMENT

1) Required Test Equipment

	The following items are required to adjust radio parameters:
1. Regulated power supply	Supply voltage:5 ~ 14 VDC Current : 3 A or more
2. Digital multi meter	Voltage range : FS = Approx. 20 V Current:10A or more Input resistance : High impedance
3. Oscilloscope	Measurable frequency : Audio frequency
4. Audio dummy load	Impedance: 8 ohm Dissipation: 1 W or more Jack:3.5 mm D
5. SSG	Output frequency:200 MHz or more Output level : -20 dB/0.1 a V ~ 120dB/1V Modulation : AM/FM
6. Spectrum Analyzer	Measuring range : Up to 2 GHz or more
7. Power meter	Measurable frequency:Up to 200 MHz Impedance : 50 ohm unbalanced Measuring range : 0.1W ~ 10 W
8. Audio voltmeter	Measurable frequency : Up to 100 kHz Sensitivity : 1 mV to 10 V
9. Audio generator	Output frequency : 67 Hz to 10 kHz Output impedance : 600 ohm , unbalanced
10. Distortion meter /SINAD meter	Measurable frequency : 1 kHz Input level : Up to 40 dB Distortion level : 1 % - 100%
11. Frequency counter	Measurable frequency : Up to 200 MHz Measurable stability : Approx. +/-0. 1 ppm
12. Linear detector	Measurable frequency : Up to 200 MHz Characteristics: Flat CN:60 dB or more

Note

* Standard modulation: 1 kHz +/-3.5 kHz/DEV
* Reference sensitivity: 12dBSINAD
*Specified audio output level : 200 mW at 8 ohm
*Standard audio output level : 50 mW at 8 ohm
*Use an RF cable (3D2W: 1 m) for test equipment.
*Attach a fuse to the RF test equipment.
*All SSG outputs are indicated by EMF.
* Supply voltage for the transceiver: 13.8 VDC

2) Adjustment Mode

The DJ - 190 does not require a serviceperson to manipulate the components on the printed - circuit board, except the trimmer and coil when adjusting frequency. Most of the adjustments for the transceiver are made by using the keys on it while the unit is in the adjustment mode. Because the adjustment mode temporarily uses the channels, frequency must be set on each channel before adjustments can be made. For instructions on how to program the channels, see the "DJ - 190 INSTRUCTION MANUAL" which came with the product. In consideration of the radio environment, the frequency on each channel must be near the value (+/- 1 MHz) listed in the table below. To enter the adjustment mode, turn the power off, hold down both the UP and DOWN keys, and press the POWER key. "chEc" appears on the LCD for about two seconds, and "C" appears indicating the unit is in the adjustment mode.

Channel frequencies used in the adjustment mode

Channel	Channel function	Frequency
1	Reference frequency adjustment	145 MHz
2	High power adjustment	* 145 MHz
3	Low power adjustment	* 145 MHz
4	Minimum frequency sensitivity adjustment	136 MHz
5	Medium frequency sensitivity adjustment	145 MHz
6	Maximum frequency sensitivity adjustment	173 MHz
7	S-meter (1) adjustment	* 145 MHz
8	S-meter (FULL) adjustment	* 145 MHz
9	Deviation	* 145 MHz
12	Tone 67 Hz test	* 145 MHz
13	Tone 88.5 Hz test	* 145 MHz
14	Tone 250.3 Hz test	* 145 MHz
15	Tone burst test	* 145 MHz
16	Aging (Not required to use)	145 MHz
20	VCO frequency shift change (Do not change).	-

* 162MHz for TA2 Version

Caution

■ Do not press the (UP) or (DOWN) key while channel 20 is selected in the adjustment mode. Otherwise, the VCO switch frequency will change, causing a malfunction.

Reference Frequency Adjustment

1. In the adjustment mode, select channel 1 by rotating the main tuning dial.
2. Press the (PTT) key to start transmission.
3. Rotate TC101 on the RF circuit board until the value on the frequency counter matches the one displayed on the LCD.
4. On 145.05MHz measure TP near the VCO and adjust L301 to obtain 1.1V ± 0.1V (If the second decimal point is flashing, the PLL is unlocked).

High Power Adjustment

1. In the adjustment mode, select channel 2 by rotating the main tuning dial.
2. Hold down the (F) key and press the (H/L) key to enter the high power mode ("L" at the lower-left of the display disappears).
3. Hold down the (PTT) key to start transmission.
4. While watching the reading of the TX power meter, set the output power to the value closest to 5 W by using the (UP) or (DOWN) keys.
5. When the (PTT) key is released, the output power at that time will be stored as the high power setting.

Low Power Adjustment

1. In the adjustment mode, select channel 3 by rotating the main tuning dial.
2. Hold down the (F) key and press the (H/L) key to enter the low power mode ("L" appears at the lower-left of the display).
3. Hold down the (PTT) key to start transmission.
4. While watching the reading of the TX power meter, set the output power to the value closest to 0.8 W by using the (UP) or (DOWN) keys.
5. When the (PTT) key is released, the output power at that time will be stored as the low power setting.

Minimum Frequency Sensitivity Adjustment

See "Note on Adjusting the Sensitivity" later in this section.

1. In the adjustment mode, select channel 4 by rotating the main tuning dial.
2. Using the (UP) or (DOWN) key, set the minimum frequency sensitivity.

Medium Frequency Sensitivity Adjustment

See "Note on Adjusting the Sensitivity" later in this section.

1. In the adjustment mode, select channel 5 by rotating the main tuning dial.
2. Using the (UP) or (DOWN) key, set the medium frequency sensitivity.

Maximum Frequency Sensitivity Adjustment

See "Note on Adjusting the Sensitivity" later in this section.

1. In the adjustment mode, select channel 6 by rotating the main tuning dial.
2. Using the (UP) or (DOWN) key, set the maximum frequency sensitivity.

S-meter (1) Adjustment

1. In the adjustment mode, select channel 7 by rotating the main tuning dial. The S-meter will show a single star (★).
2. Enter "0" dB μ (EMF) with the transceiver tester.
3. Press the (DOWN) key. The transceiver beeps indicating the new setting has been stored successfully.

S-meter (FULL) Adjustment

1. In the adjustment mode, select channel 8 by rotating the main tuning dial. The S-meter will show all six stars (★ ★ ★ ★ ★ ✪).
2. Enter "+20" dB μ (EMF) with the transceiver tester.
3. Press the (DOWN) key. The transceiver beeps indicating the new setting has been stored successfully.

Deviation

1. In the adjustment mode, select channel 9 by rotating the main tuning dial.
2. Input a 50 mVrms, 1 KMz signal with your transceiver tester through the external microphone jack.
3. With the tester, put the transceiver in the transmission mode.
4. Using the (UP) or (DOWN) key, set the deviation to the value closest to 4.5kHz. The deviation has three levels namely 0 to 2 which is displayed in the uper right corner of the LCD.

Tone 67 Hz Test

This function is only for checking the tone encoder, not adjusting it.

1. In the adjustment mode, select channel 12 by rotating the main tuning dial.
2. Press the (PTT) key. A 67 Hz tone is automatically sent.
3. Check the deviation with the transceiver tester.

Tone 88.5 Hz Test

1. In the adjustment mode, select channel 13 by rotating the main tuning dial.
2. Press the (PTT) key. An 88.5 Hz tone is automatically sent.
3. Check the deviation with the transceiver tester.

Tone 250.3 Hz Test

1. In the adjustment mode, select channel 14 by rotating the main tuning dial.
2. Press the (PTT) key. A 250.3 Hz tone is automatically sent.
3. Check the deviation with the transceiver tester.

Tone Burst Test

This function is only for checking the tone burst, not adjusting it.

1. In the adjustment mode, select channel 15 by rotating the main tuning dial.
2. Press the (PTT) key. A 1750 Hz tone burst is automatically sent.
3. Check the deviation with the transceiver tester.

Aging

Perform this aging test only when necessary.

1. In the adjustment mode, select channel 16 by rotating the main tuning dial. The transceiver automatically repeats transmission for a minute and reception for another minute.

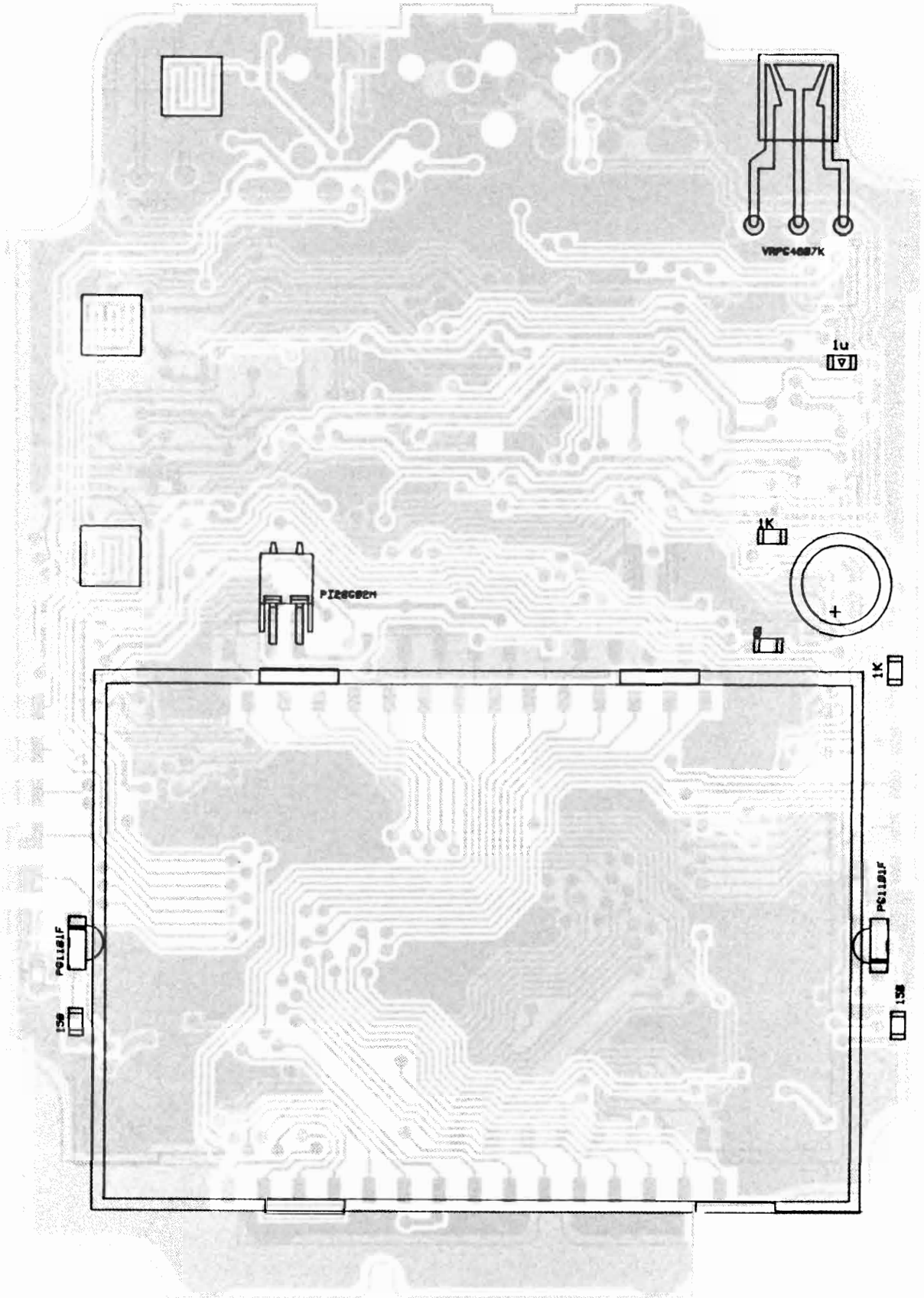
Note on Adjusting Sensitivity

Sensitivity is adjusted by applying the optimum voltage from the CPU to the varicap of the tuning circuit. The coil manipulation for L109, L110, L111, and L112 is not required. If any of the coils is accidentally rotated, return it to the default position as described below, before adjusting the sensitivity.

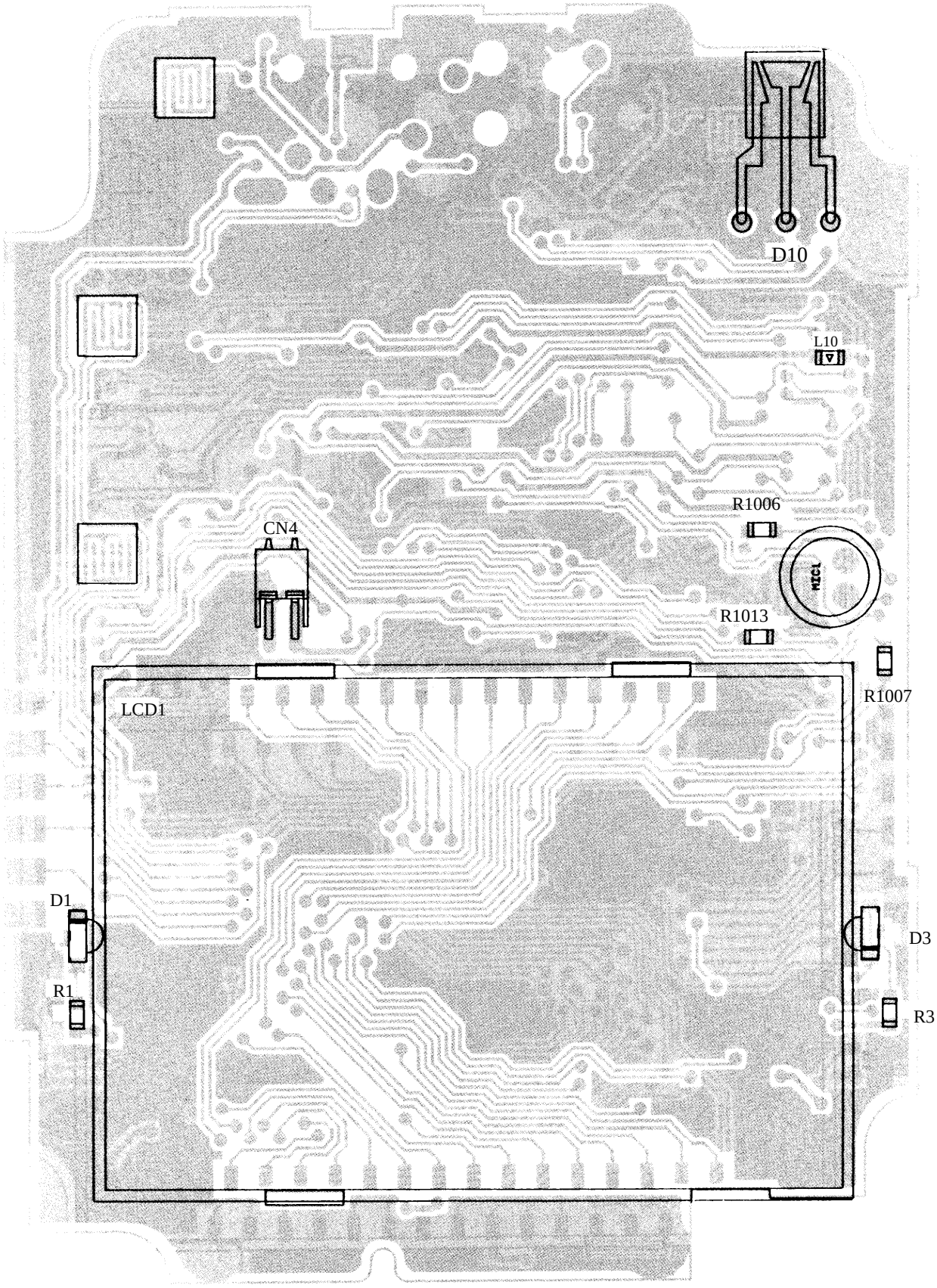
1. Program any frequency within 145MHz +/-1MHz on memory channel 5.
2. Holding down both the (UP) and (DOWN) key, press the POWER switch to turn the power ON. "chEc" will appears on the LCD for two seconds, and "C" appears.
3. Select channel 5 by rotating the main tuning dial.
4. Using the (UP) or (DOWN) keys, set the adjustment data to "7F" ("7F" appears in the channel number area on the LCD).
5. Turn the power OFF.
6. Holding down both the (UP) and (DOWN) key, turn the power ON. When the "C" no longer appears, the transceiver is in the normal status.
7. Set the reception frequency to 145 MHz +/-1MHz. Rotate the coil to maximize the sensitivity.

PC BOARD VIEW

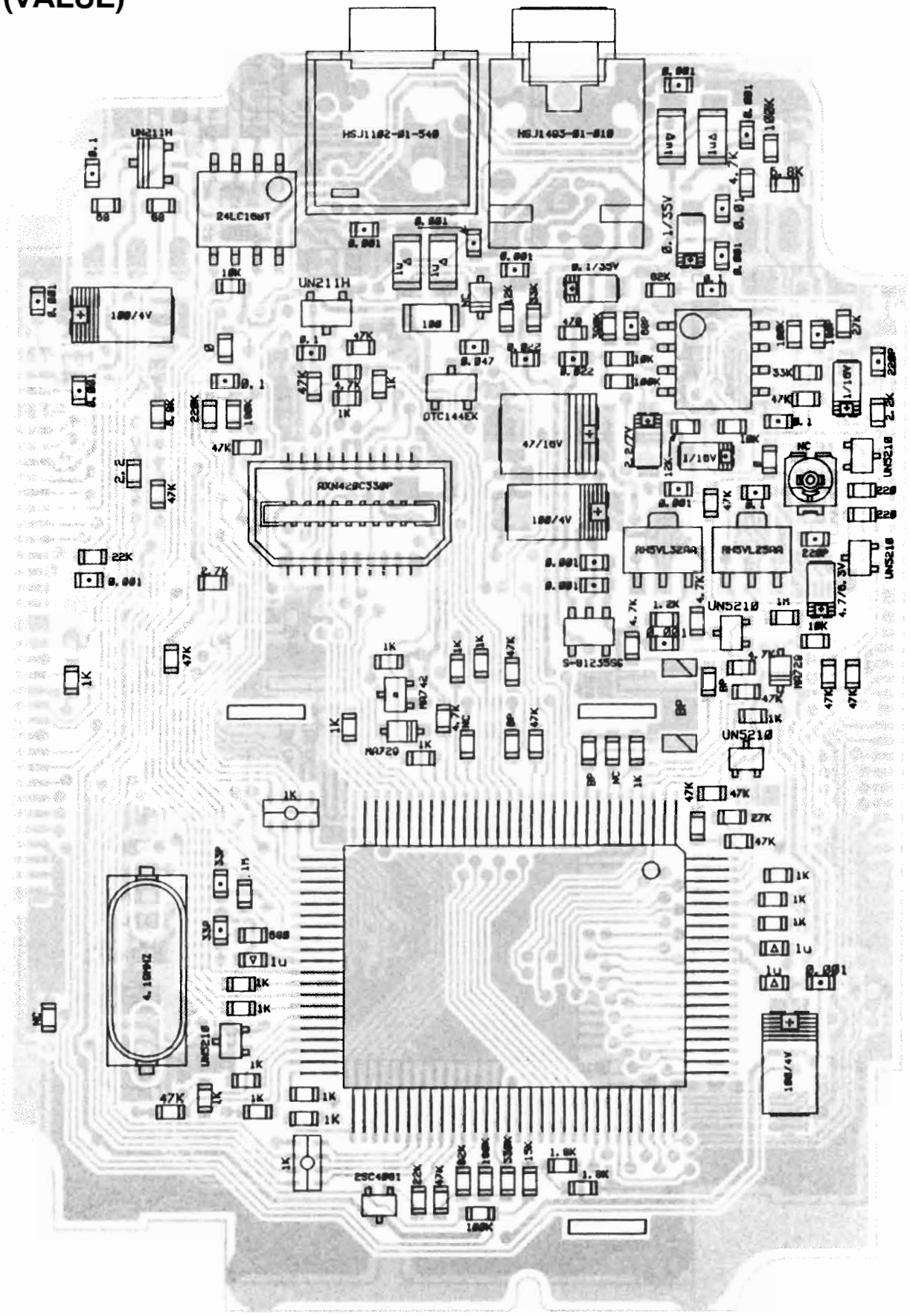
CPU Unit Side A (VALUE)



CPU Unit Side A (REFERENCE)

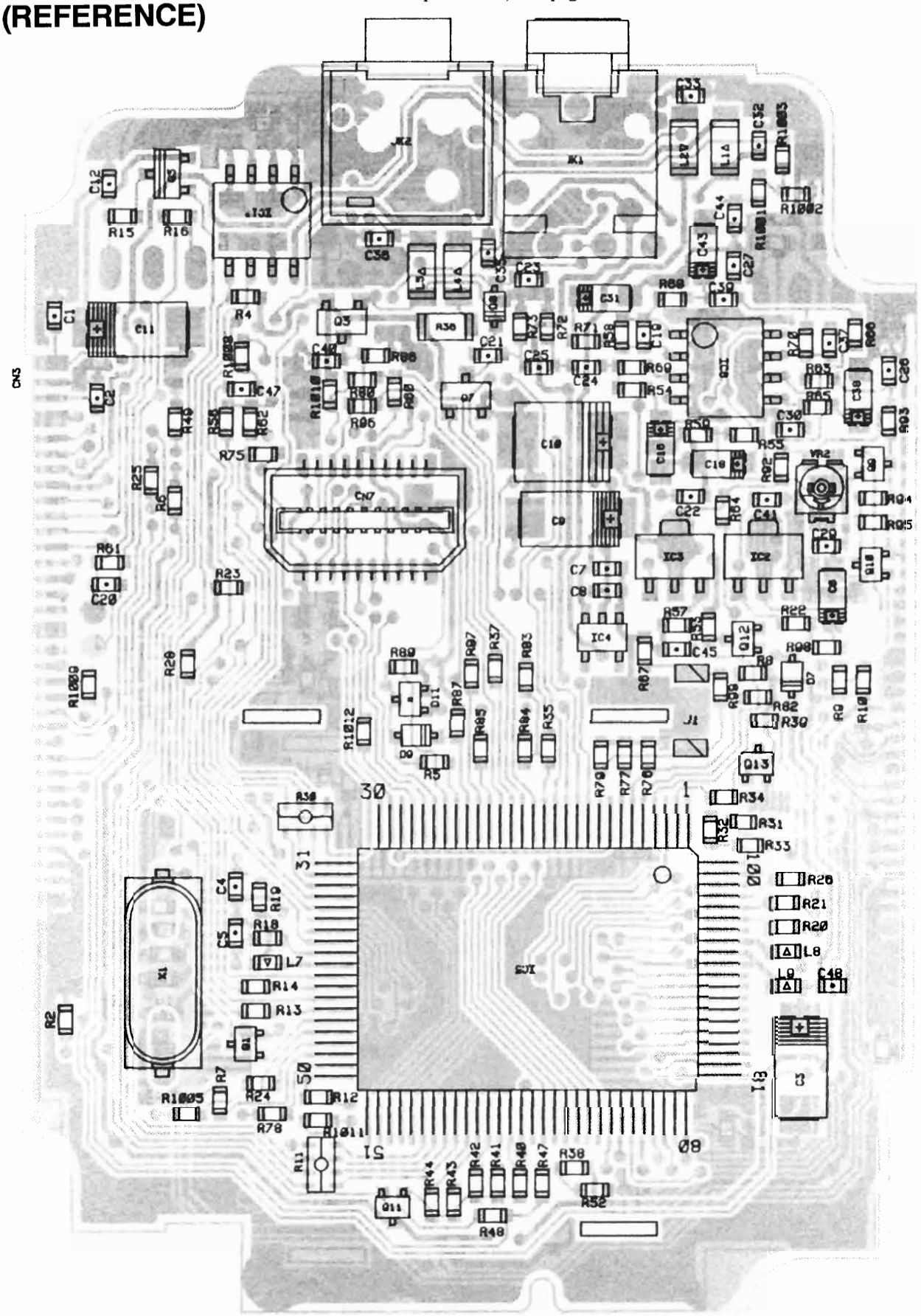


CPU Unit Side B
(VALUE)

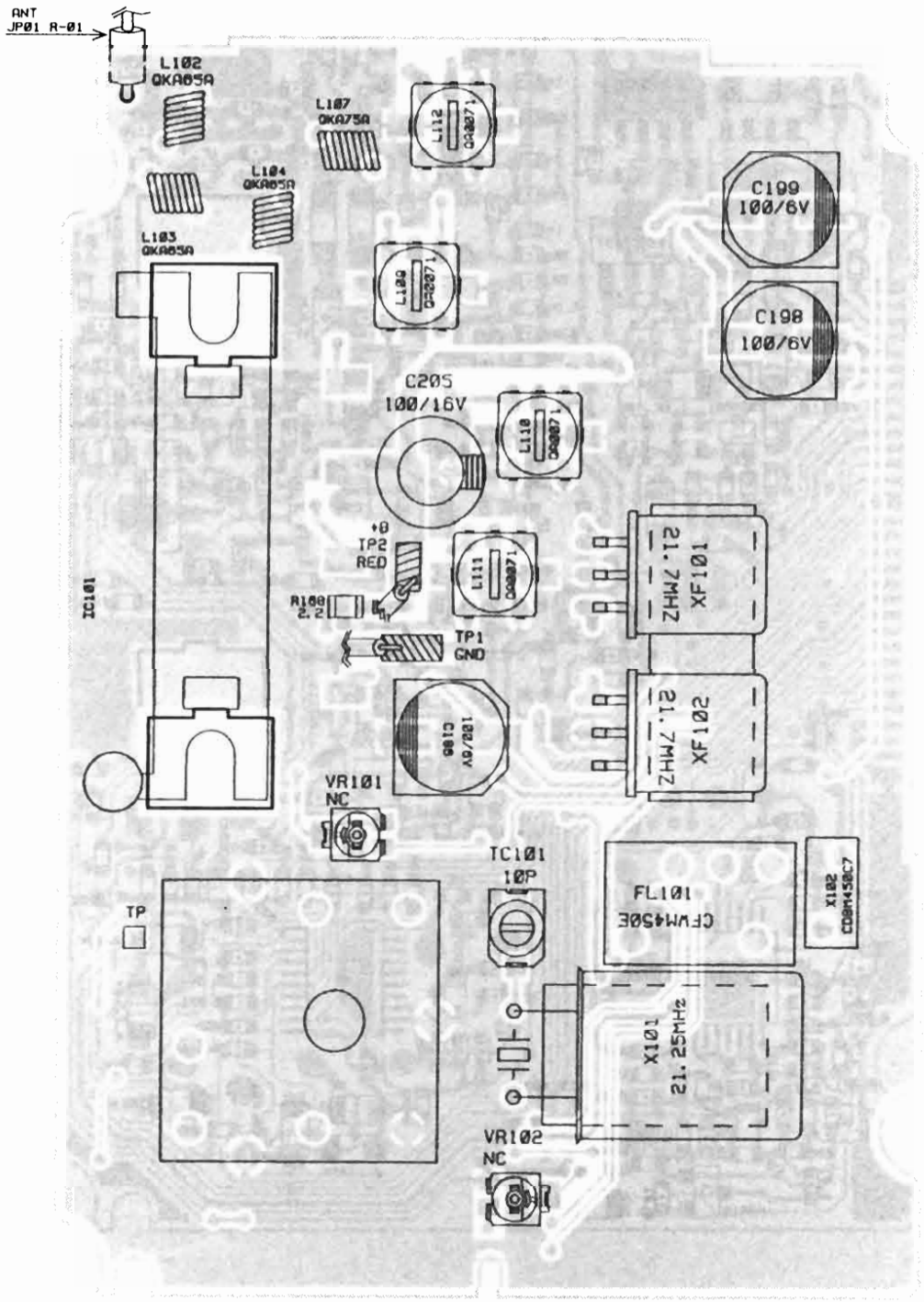


CPU Unit Side B (REFERENCE)

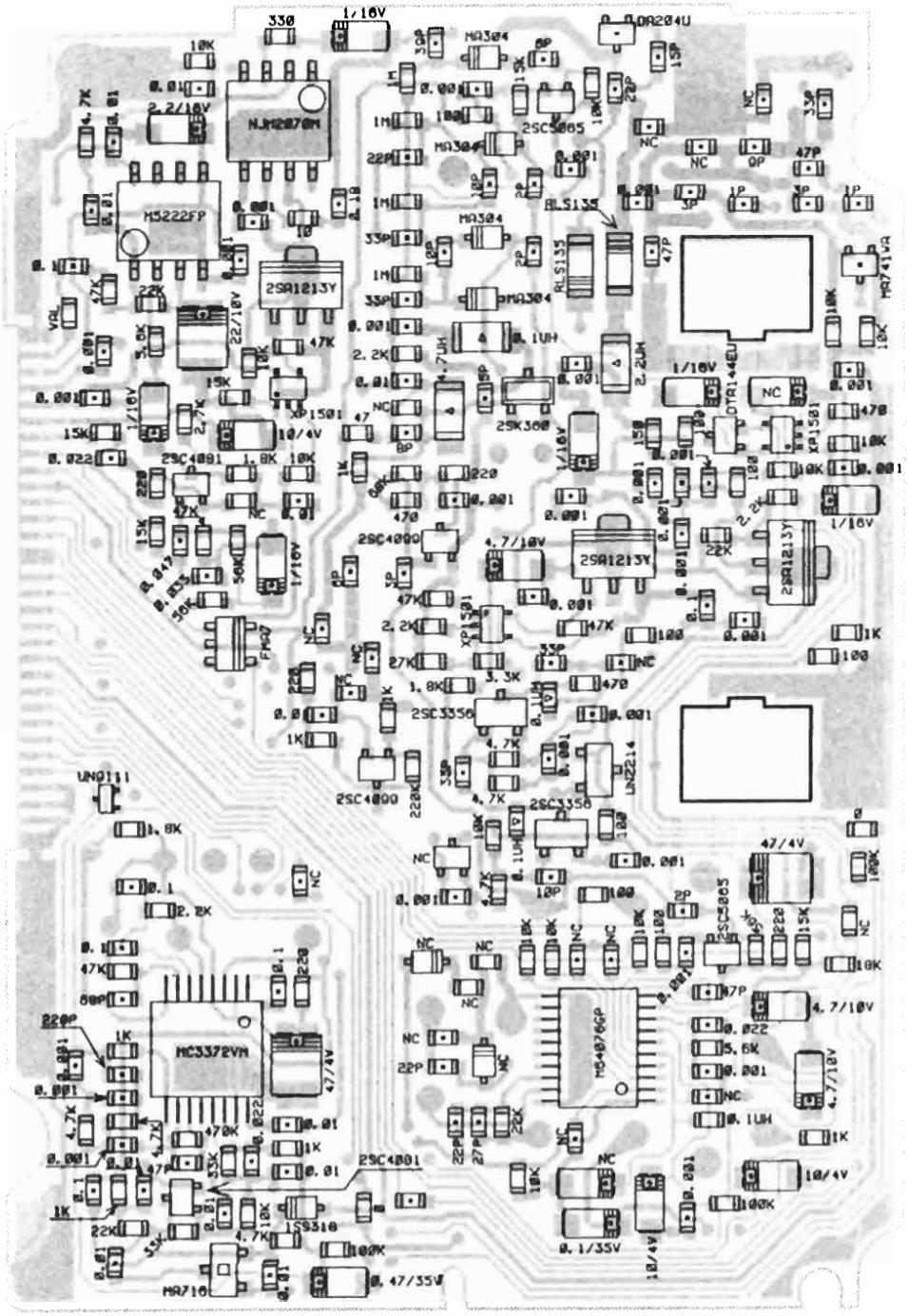
* If IC1 is replaced, clone data must be transfered to the repaired radio from a brand new radio. For clone procedures, see page 24 of the Inst-ruction Manual.



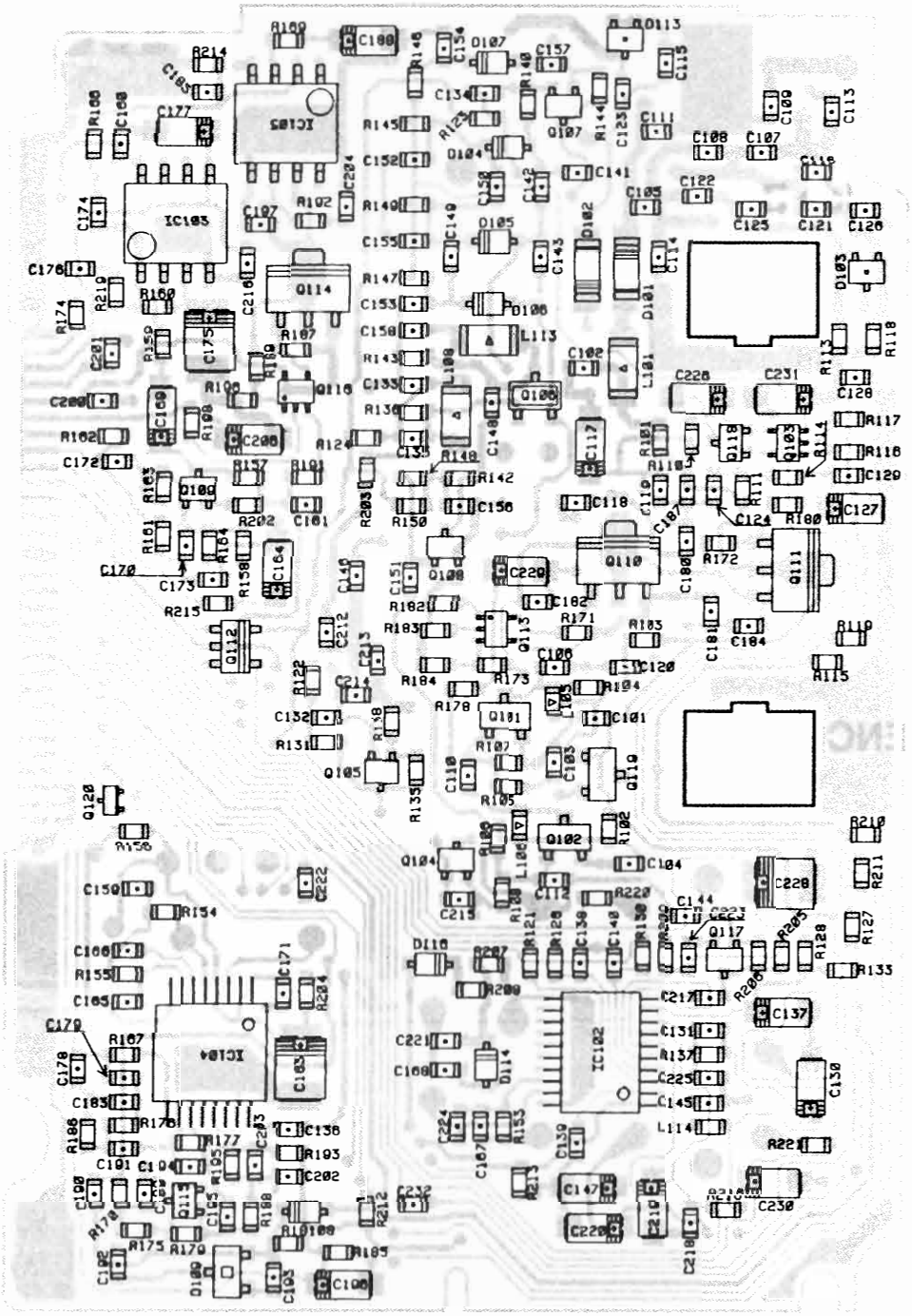
RF Unit Side A
(VALUE/REFERENCE)



RF Unit Side B
(VALUE)



RF Unit Side B
(REFERENCE)



PTT Unit Side A
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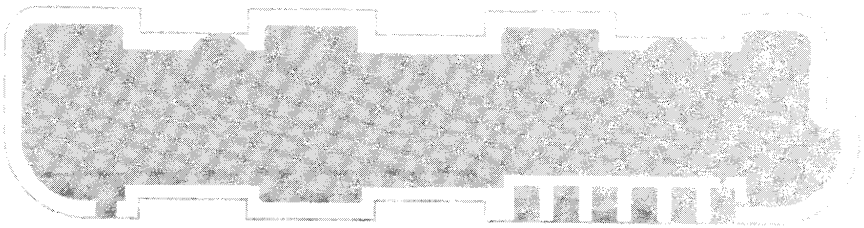

PTT Unit Side B
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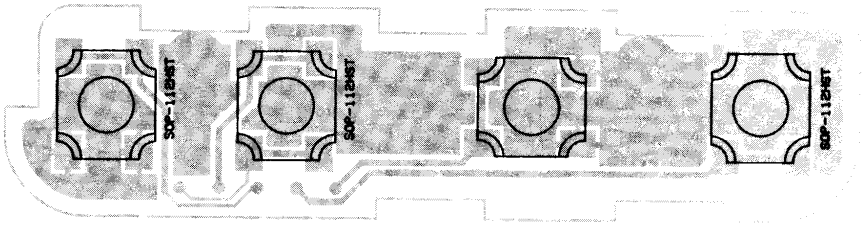

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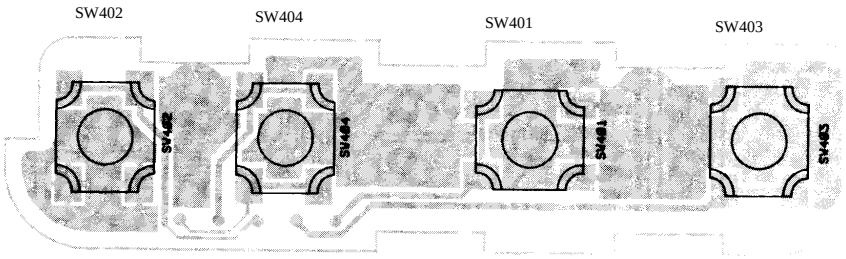
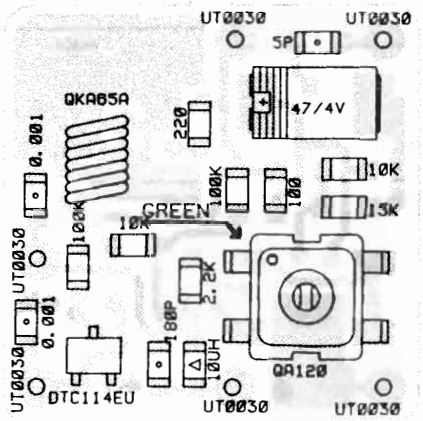


VCO Unit Side A
(VALUE)



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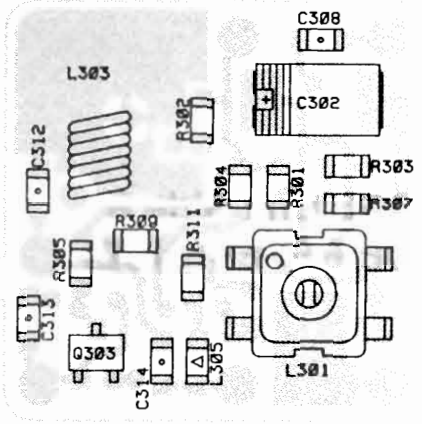
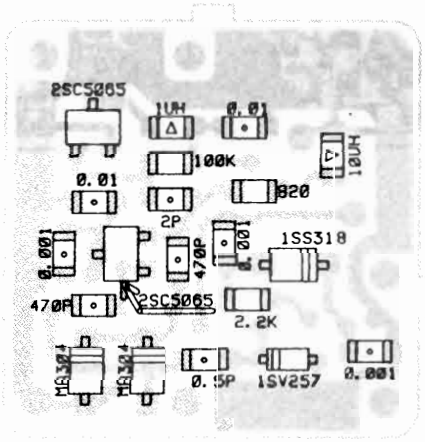
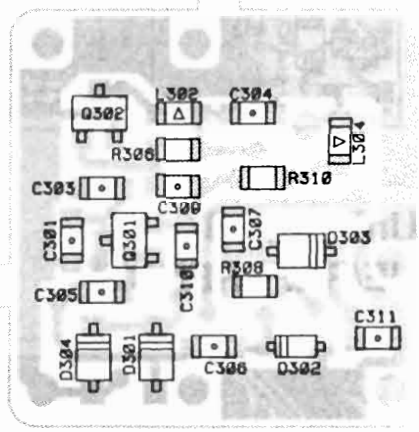


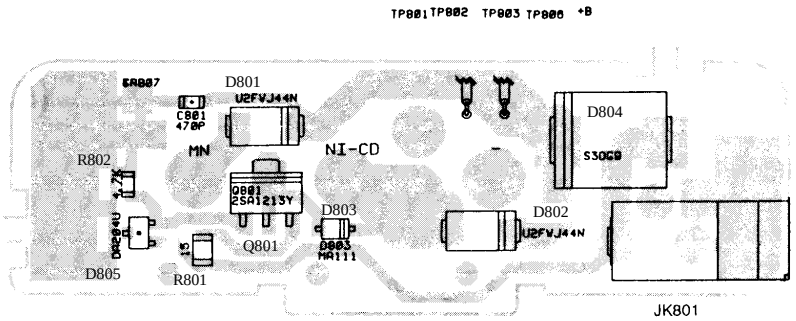
VCO Unit Side B
(VALUE)



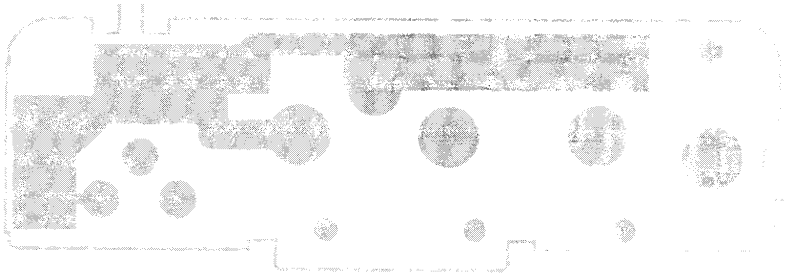
(REFERENCE)



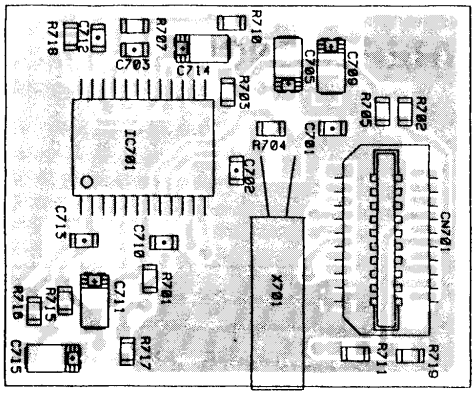
CHARGE Unit Side A (VALUE/REFERENCE)



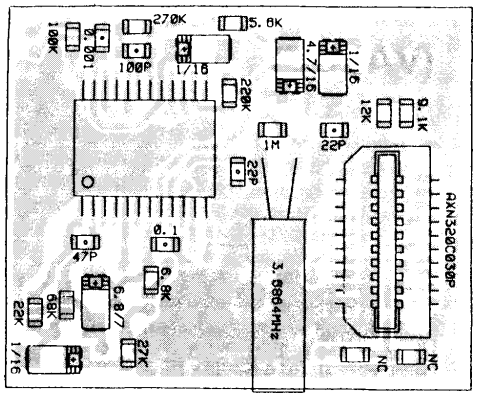
CHARGE Unit Side B (VALUE/REFERENCE)



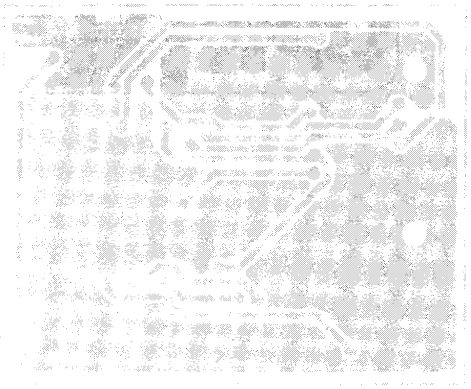
TSQ Unit Side A (VALUE)



(REFERENCE)

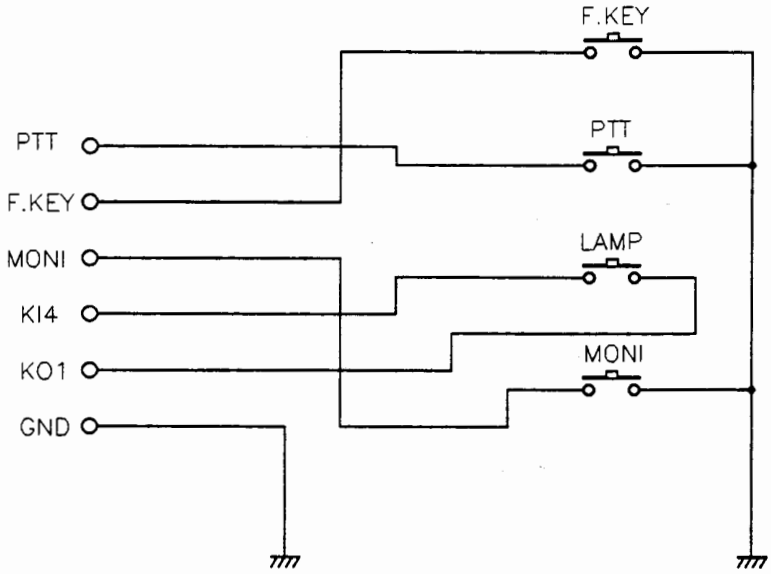


TSQ Unit Side B (VALUE/REFERENCE)

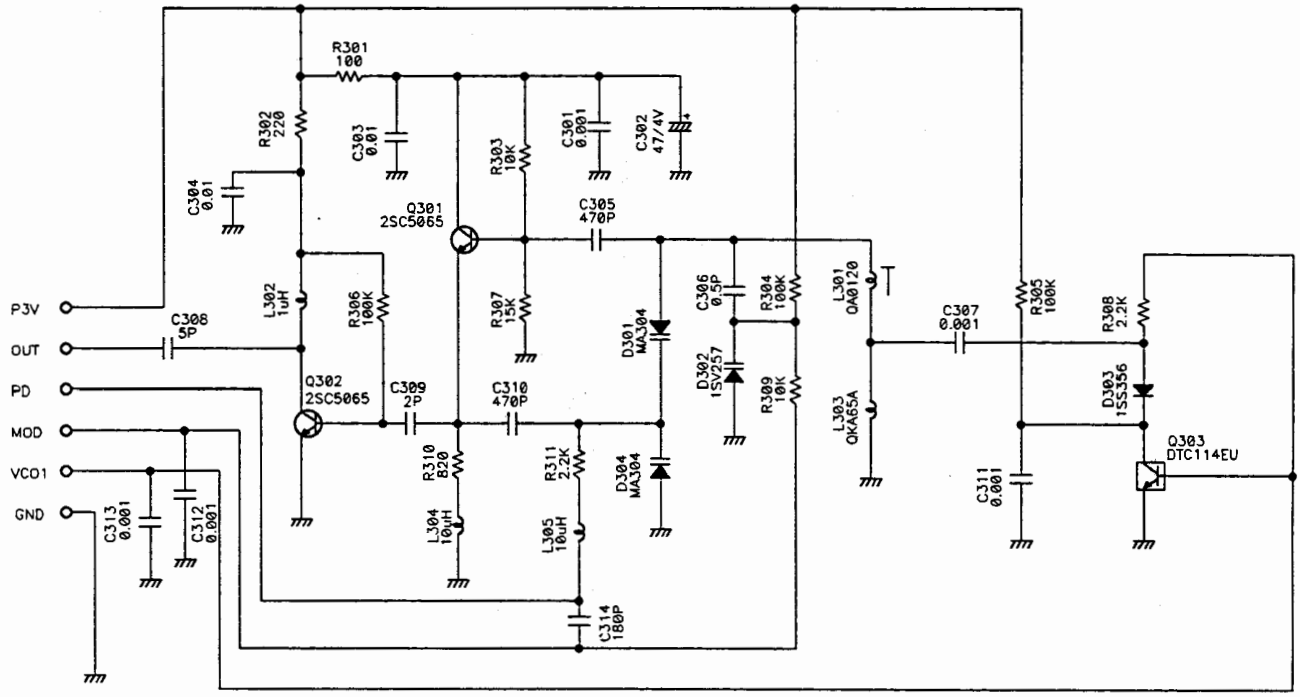


CIRCUIT DIAGRAM

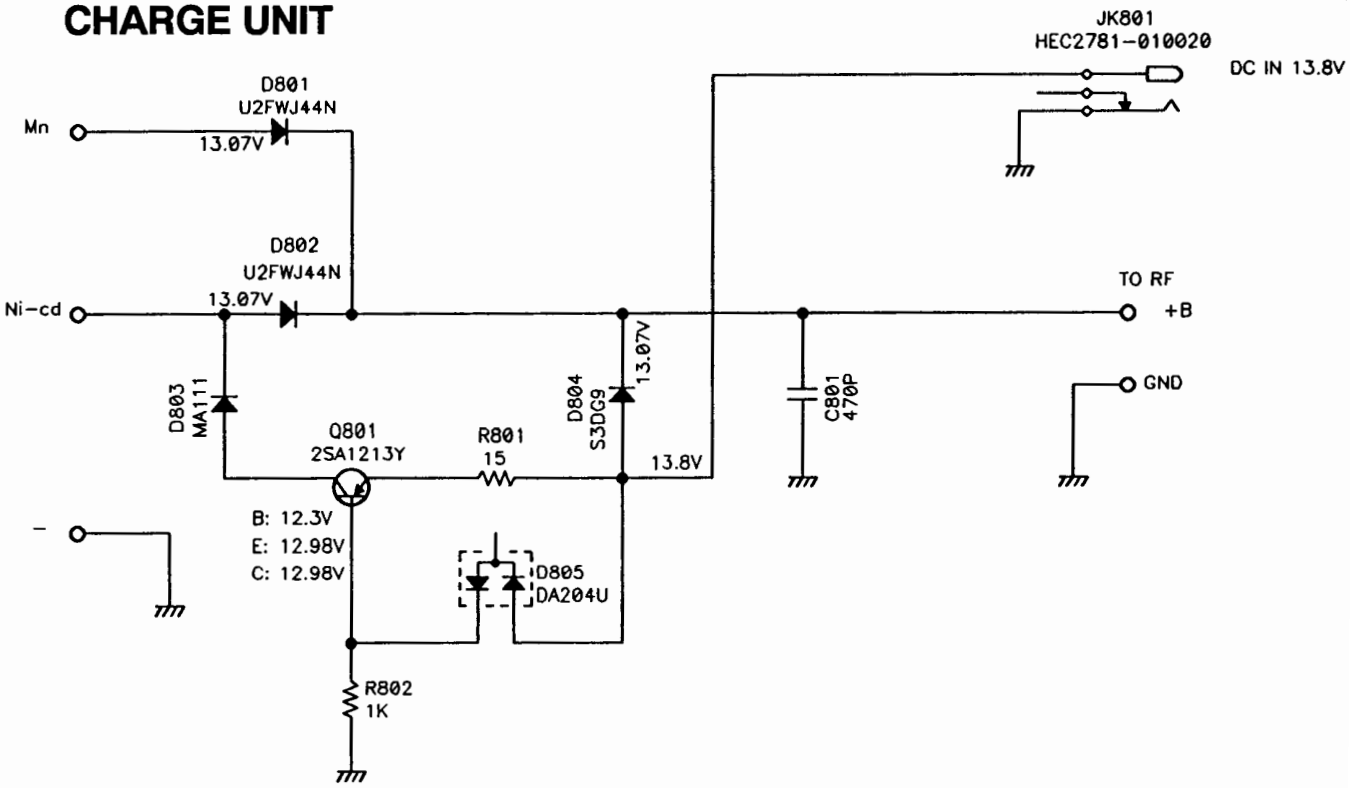
PTT UNIT



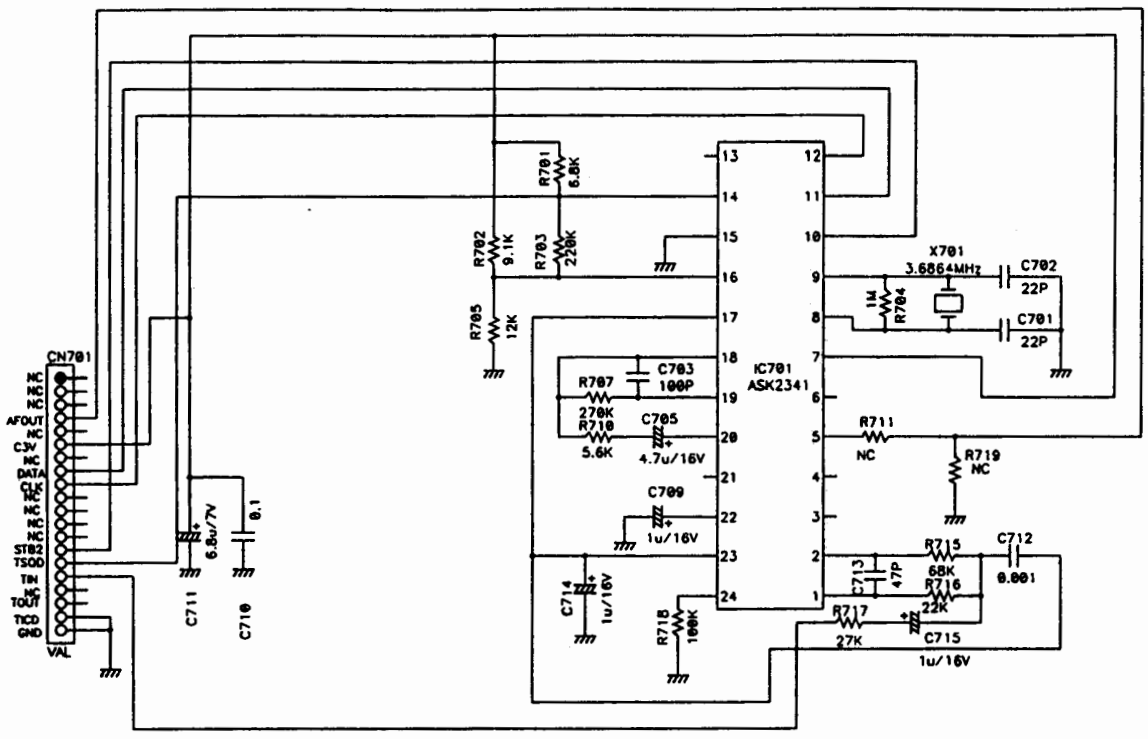
VCO UNIT



CHARGE UNIT

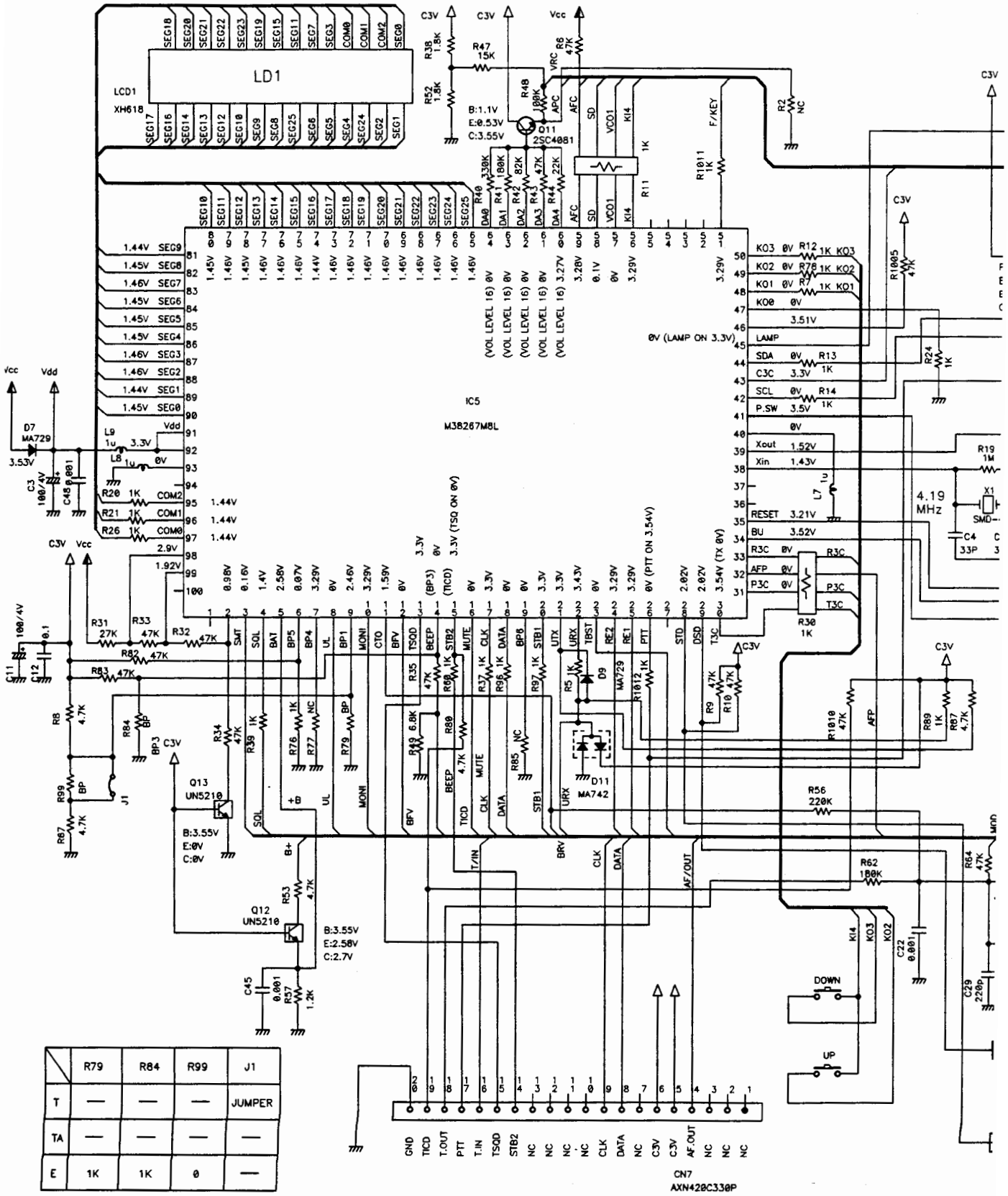


TSQ UNIT

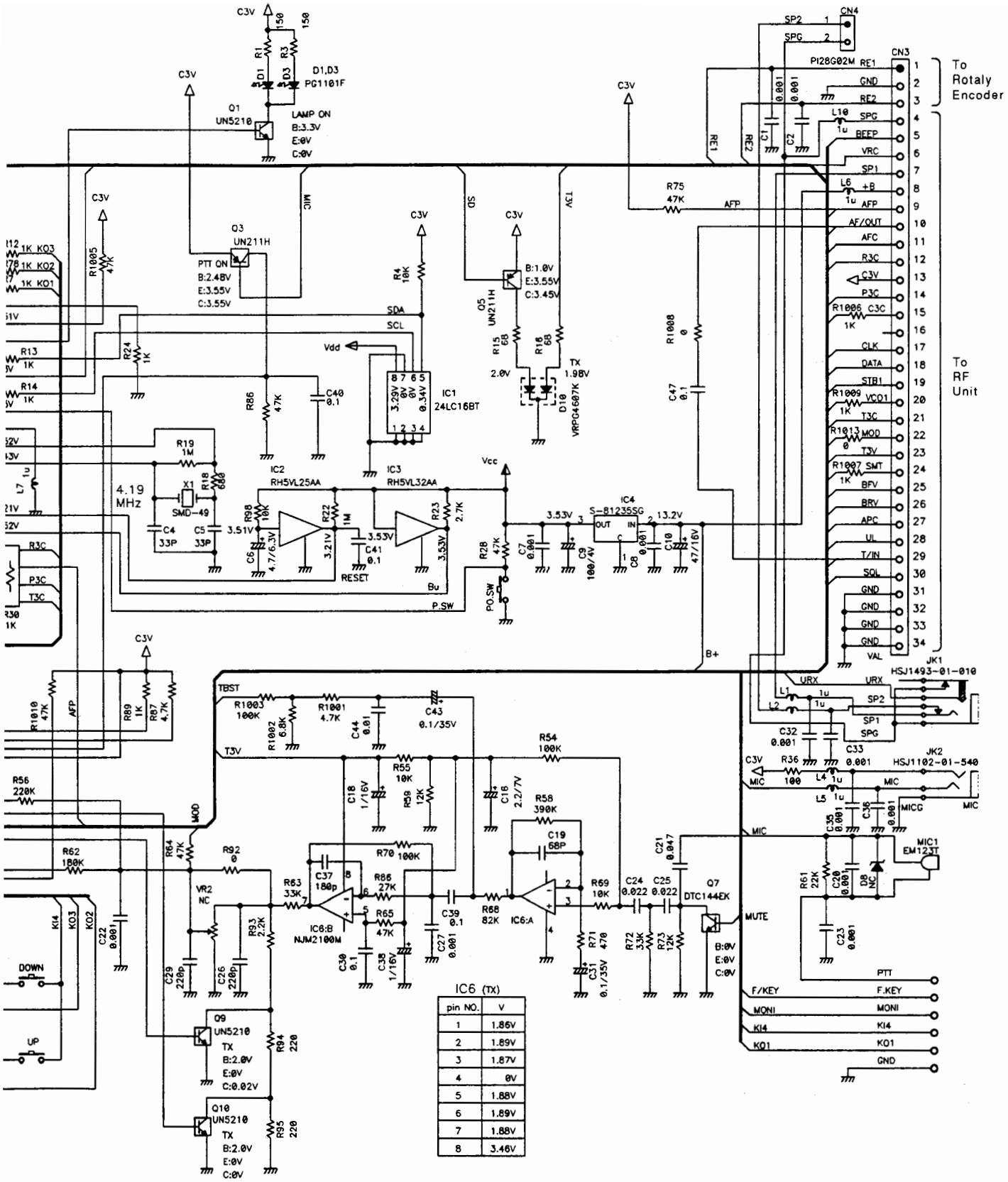


R718 WA BIAS DENNATU
IC701NO DOUSADENNATU WO
KETTUTEI

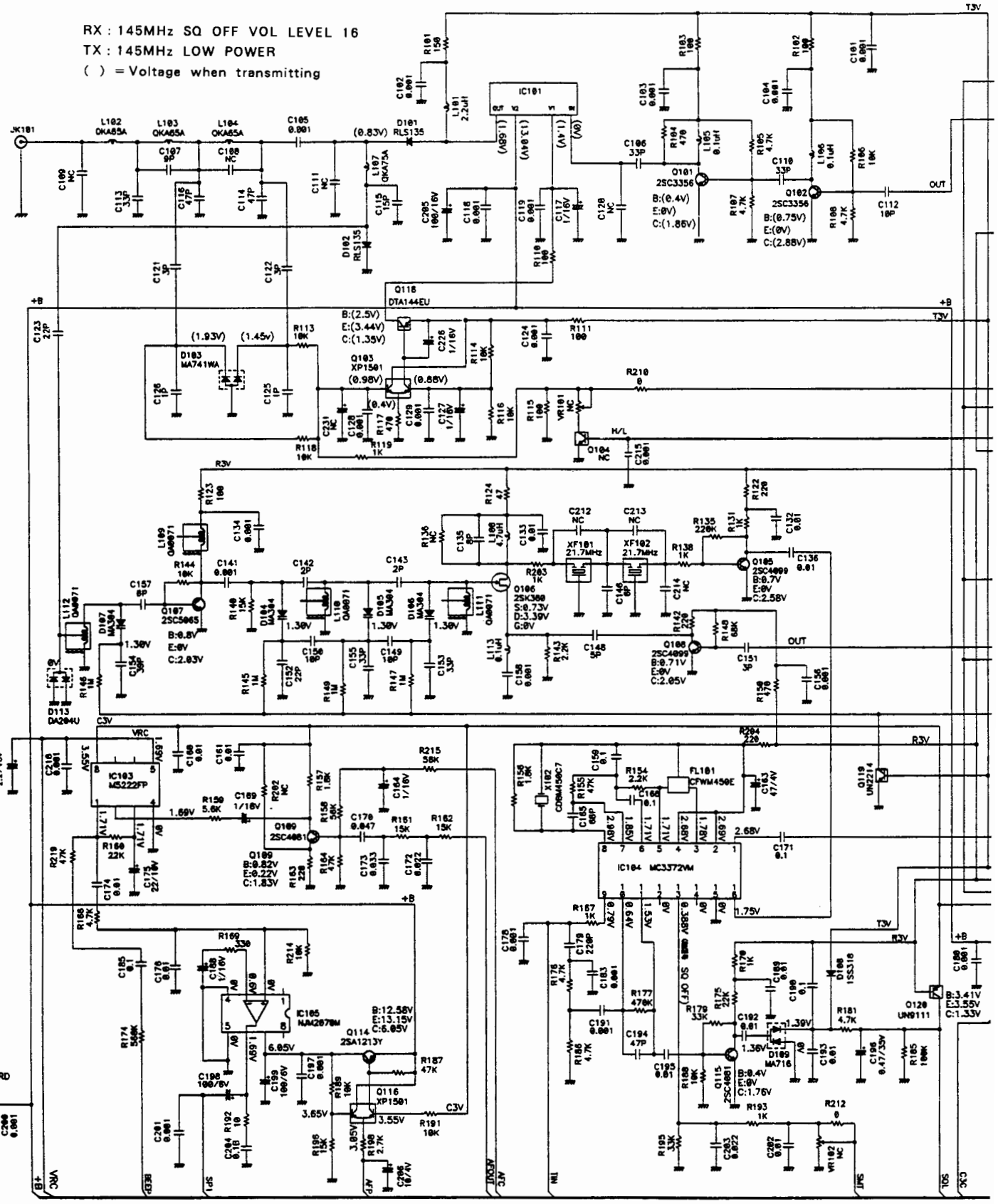
CPU UNIT

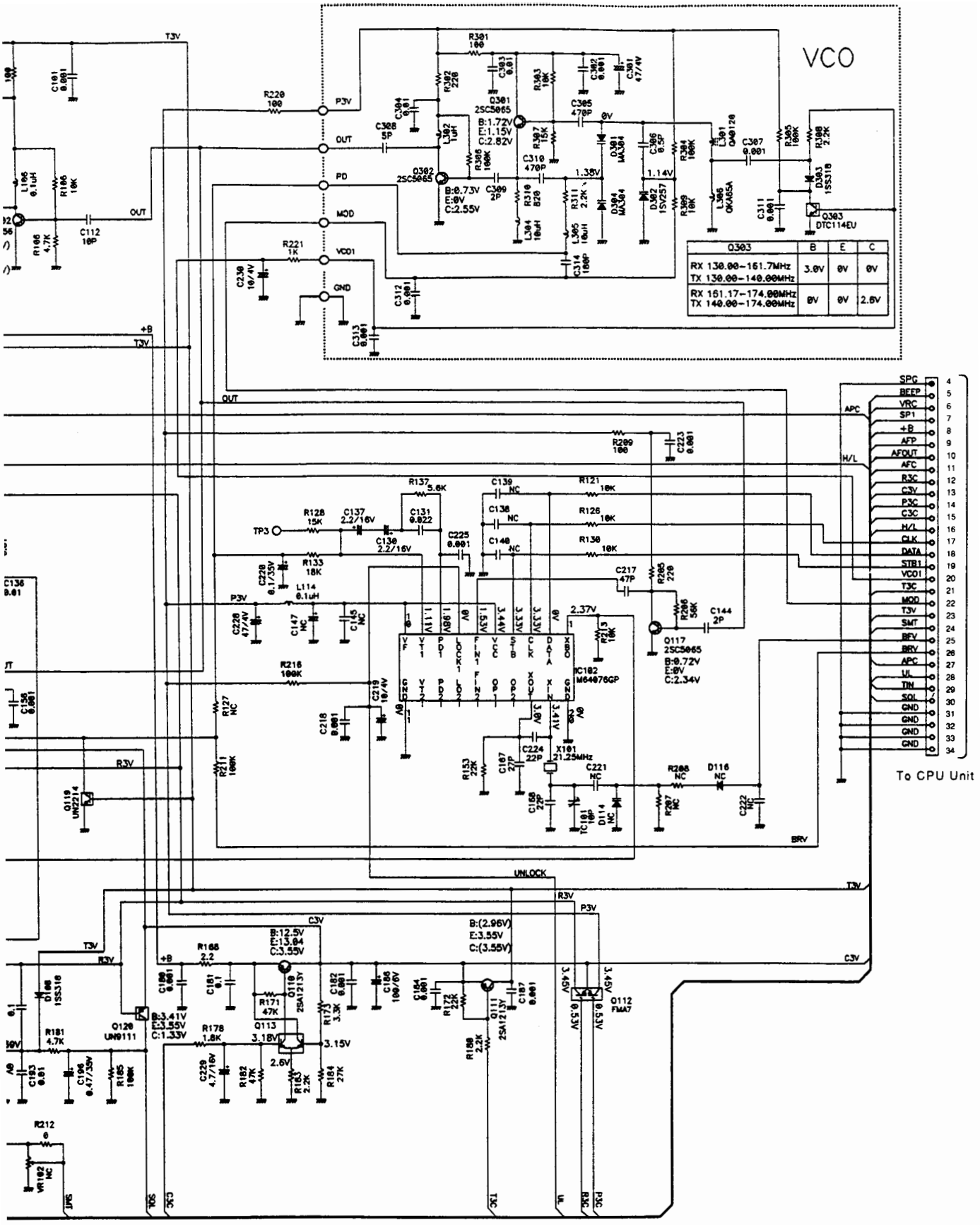


	R79	R84	R99	J1
T	—	—	—	JUMPER
TA	—	—	—	—
E	1K	1K	0	—


C3V
D1,D3
PG1101F
Q1
UN5210
LAMP ON
B:3.3V
E:0V
C:0V
Q3
UN211H
PTT ON
B:2.48V
E:3.55V
C:3.55V
Q5
UN211H
B:1.0V
E:3.55V
C:3.45V
TX
1.98V
2.0V
IC1
24LC16BT
IC2
RH5VL25AA
IC3
RH5VL32AA
IC4
S-81235SG
4.19
MHz
SMD-49
RESET
P.SW
PO.SW
CN4
SP2
SPG
CN3
PI28G02M
To
Rotaly
Encoder
To
RF
Unit
RE1
GND
RE2
SPG
BEEP
VRC
SP1
+B
AFP
AF/OUT
AFC
R3C
C3V
P3C
C3C
CLK
DATA
STB1
VCO1
T3C
MOD
T3V
SMT
BFV
BRV
APC
UL
T/IN
SQL
GND
GND
GND
VAL
B+
JK1
HSJ1493-01-010
URX
SP2
SP1
SPG
JK2
HSJ1102-01-540
MIC
MICG
MIC1
EM12ST
D8
NC
MUTE
PTT
F/KEY
MONI
KI4
KO1
GND
TBST
T3V
MOD
AFP
VR2
NC
IC6:B
NJM2100M
IC6:A
Q7
DTC144EK
B:0V
E:0V
C:0V
Q9
UN5210
TX
B:2.0V
E:0V
C:0.02V
Q10
UN5210
TX
B:2.0V
E:0V
C:0V
DOWN
UP
KI4
KO3
KO2
KO1
SDA
SCL
Vdd
Vcc
SD
13V
TBST
IC6 (TX)
pin NO.
V
1
1.86V
2
1.89V
3
1.87V
4
0V
5
1.88V
6
1.89V
7
1.88V
8
3.46V

RF UNIT


RX : 145MHz SQ OFF VOL LEVEL 16
TX : 145MHz LOW POWER
( ) = Voltage when transmitting
T3V
R3V
C3V
+B
VRC
IC101
IC103 M5222FP
IC104 MC3372VM
IC105 NJM2078M
Q101 2SC3356
Q102 2SC3356
Q103 XP1501
Q104 NC
Q105 2SC4099
Q106 2SK360
Q107 2SC5065
Q108 2SC4081
Q109
Q110 2SA1213Y
Q111
Q112
Q113 DA204U
Q114 2SA1213Y
Q115 2SC4081
Q116 XP1501
Q118 DTA144EU
Q119 UN2214
Q120 UN9111
XF101 21.7MHz
XF102 21.7MHz
FL101 CFWM450E
D101 RLS135
D102 RLS135
D103 MA741WA
D189 MA716
D193 1SS318
OUT
H/L
TO CHARGE BOARD
+B
GND


VCO
T3V
P3V
OUT
PD
MOD
VCO1
GND
+B
R3V
C3V
BRV
UNLOCK
APC
H/L
SPG
BEEP
VRC
SP1
AFP
AFOUT
AFC
R3C
C3V
P3C
C3C
CLK
DATA
STB1
MOD
SMT
BFV
BRV
APC
UL
TIN
SQL
GND
To CPU Unit
Q303 DTC114EU
Q303 | B | E | C
RX 130.00-161.7MHz TX 130.00-140.00MHz | 3.0V | 0V | 0V
RX 161.17-174.00MHz TX 140.00-174.00MHz | 0V | 0V | 2.6V
IC102 M64076GP
Q301 2SC5065
Q302 2SC5065
Q117 2SC5065
Q119 UN2214
Q120 UN9111
Q113
Q111 2SA1213Y
Q112 FMA7
X101 21.25MHz

BLOCK DIAGRAM