

# DJ-190

# Service Manual

## CONTENTS

+SPECIFICATIONS	2
+CIRCUIT DESCRIPTION	3
+SEMICONDUCTOR DATA	9
+EXPLODED VIEW	15
+PARTS LIST	18
+ADJUSTMENT	21
+PCBOARD VIEW	26
+CIRCUIT DIAGRAM	36
+BLOCK DIAGRAM	43

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## SPECIFICATIONS

	TX	RX
Frequency Coverage		
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:	57(W) x 151(H) x 27(D) mm	
(with EBP-37N without projections)	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 a 450 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 varicaps 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, L110 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 IC104 to 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 (IC105) 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 steps of 5, 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 ON 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 Circuits 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.

1. LCD Display Circuit

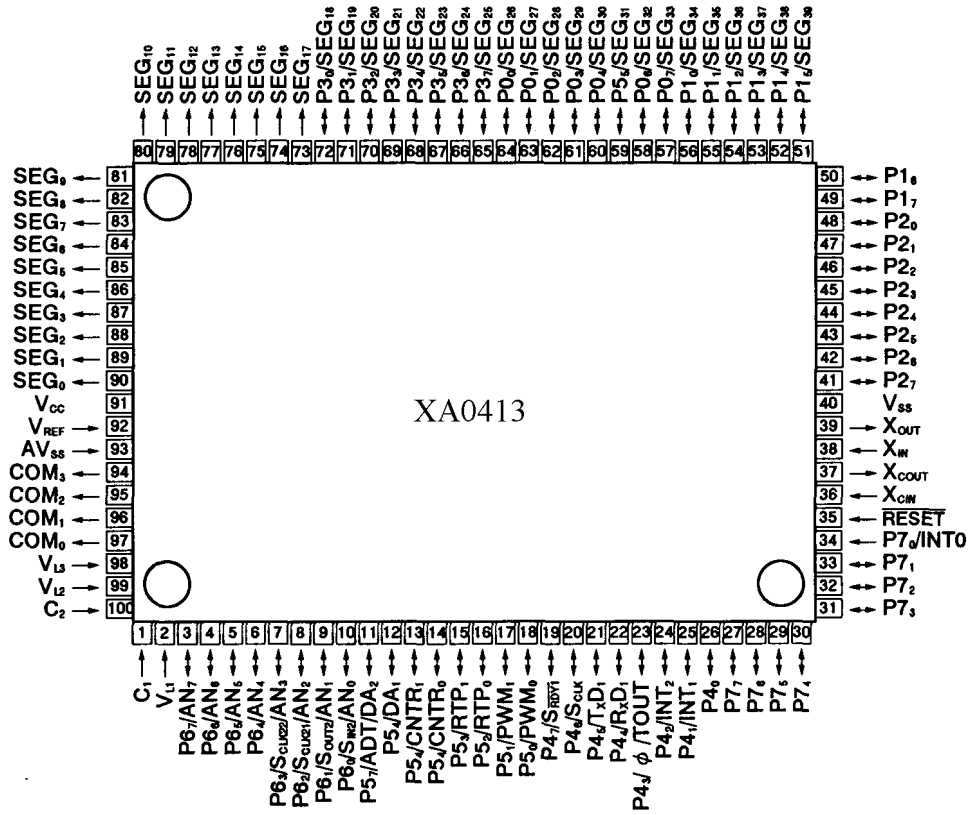
2. Display Lamp Circuit When the LAMP key is pressed, "H" is output from pin 45 of CPU (IC5) to the bases of Q1 then turn ON and the LEDs (D1, D3) Bight.

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/O	Logic	Description
1	C1	C1	-	-	-
2	VL1	VL1	I	A/D	LCD powersupply
3	P67/AN7	SMT	I	A/D	S-meter input
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	A/D	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	Active low	Monitor key input
11	P57/ADT/DA2	CTOUT	O	D/A	CTCSS tone output
12	P56/AD1	DTOUT	O	D/A	CTCSS tone detection input
13	P55/CNTR1	TSQD	I	Active low	Beep tone output/Band plan 3
14	P54/CNTR0	BEP	O	Pulse	CTCSS unit detection/Strobe signal to CTCSS unit
15	P53/RTPI	STB2	I/O	Active low/pulse	Microphone mute
16	P52/RTPO	MUTE	I/O	Activehigh	Serial clock output for PLL, CTCSS
17	P51/PWM1	CLK	O	Pulse	Serial data output for PLL CTCSS
18	P50/PWM0	DATA	O	Pulse	Band plan 6
19	P47/SRDY1	ACK	I/O	Pulse	Strobe for PLL IC
20	P46/SCLK1	STB1	O	Pulse	UART data transmission output
21	P45/TXD1	UTX	O	Pulse	UART data reception input
22	P44/RXD1	URX	I	Pulse	Tone burst (1750Hz) output (European version)
23	P43/D/TOUT	TBST	O	Pulse	Rotary encoder Input
24	P42/INT2	RE2	I	Active low	PTT input
25	P41/INT1	RE1	I	Active low	Deviation adjustment during transmission
26	P40	PTT	I	Activehigh	Deviation adjustment during transmission
27	P77	DSW	O	Active low	TX power ON/OFF output
28	P76	STD	I/O	Activehigh	PLL power ON/OFF output
29	P75	DSD	I	Pulse	AFAMP power ON/OFF output
30	P74	TEC	O	Active low	RX power ON/OFF output
31	P73	P3C	O	Active low	Backup signal detection input
32	P72	AFP	O	Active low	Resetinput
33	P71	R3C	O	Active low	-
34	P70/INT0	BU	I	Active low	-
35	RESET	RST	I	Active low	Main clock input
36	XCIN	XCIN	-	-	Main clock output
37	XCOUNT	XCOUNT	-	-	CPU ground
38	XIN	XIN	-	-	Power switch input
39	XOUT	XOUT	-	-	Serial clock for EEPROM
40	VSS	GND	-	-	C3 power ON/OFF output
41	P27	PSW	I	Active low	Serial data for EEPROM
42	P26	SCL	O	Pulse	Lamp ON/OFF
43	P25	C3C	O	Activehigh	Tone burst/LPT input
44	P24	SDA	O	Pulse	Band plan BP7 input
45	P23	LMP	O	Activehigh	Key matrix output
46	P22	T/KEY	I	Active low	-
47	P21	K00	I/O	-	-
48	P20	K01	O	-	-
49	P17	K02	O	-	-
50	P16	K03	O	-	-

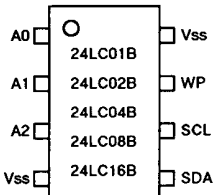
No.	Pin Name	Signal	I/O	Logic	Description
51	P15/SEG39	F/KEY	I	Active low	Function key input
52	P14/SEG38	K10	I	-	-
53	P13/SEG37	K11	I	-	-
54	P12/SEG36	K12	I	-	-
55	P11/SEG35	K13	I	-	-
56	P11/SEG34	K14	I	-	Key matrix input
57	P07/SEG33	SFT	O	-	VCO frequency range change
58	P06/SEG32	SD	O	Active low	Signal 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	-	-
63	P01/SEG27	DA1	O	-	-
64	P00/SEG26	DA0	O	-	DA converter for electronic volume and output power
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	-	-
79	SEG11	S11	O	-	LCD segment signal
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

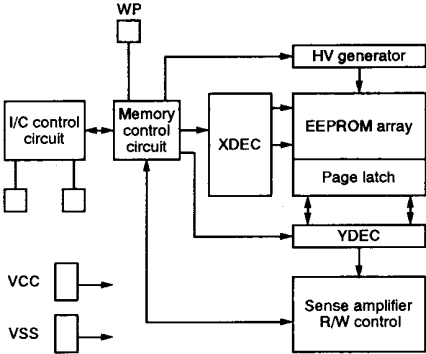
## 1) 24LC16BT-I/SN (XA0351)

### EEPROM

#### Pin Assignment

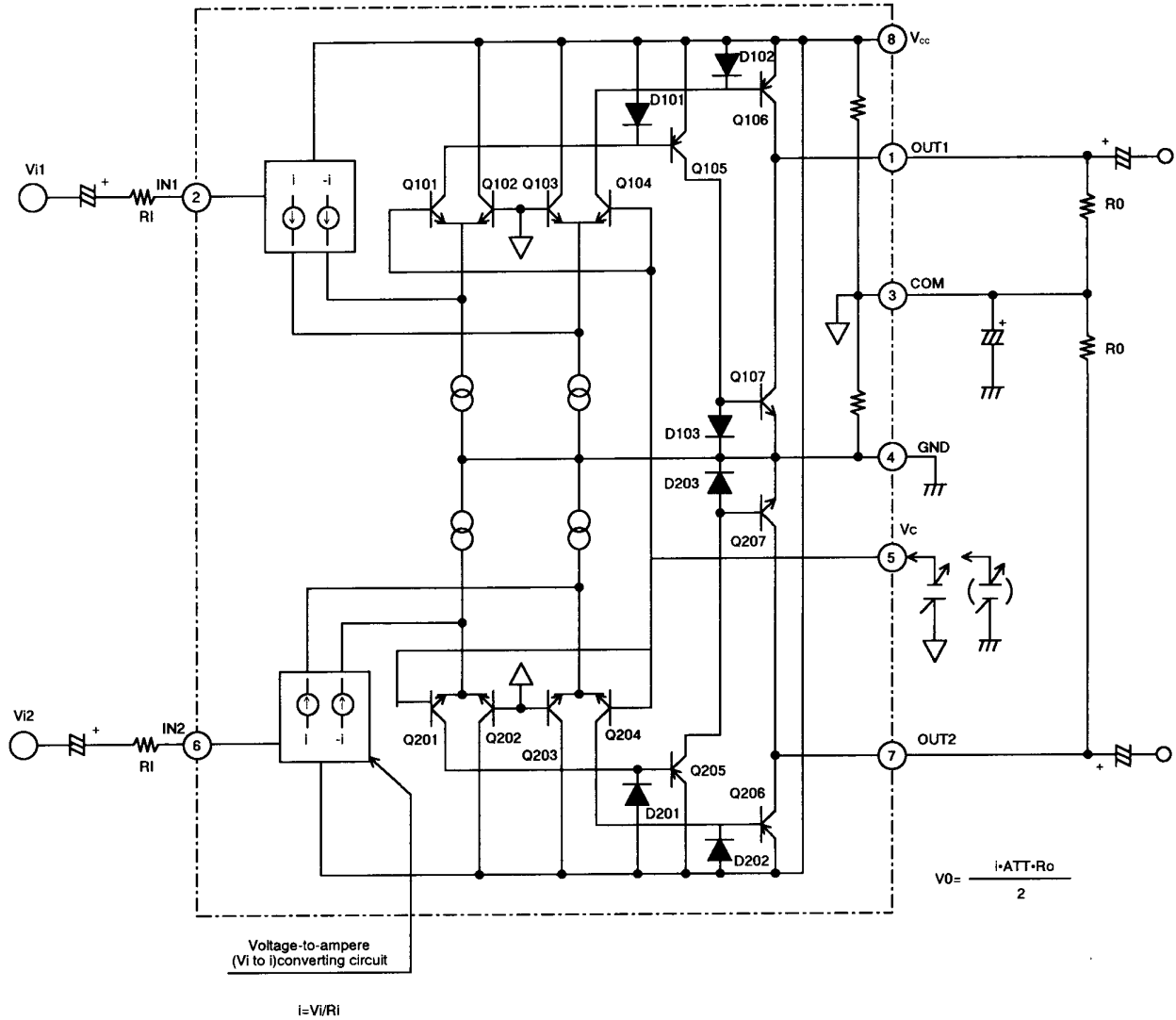


#### Block Diagram





## 2) M5222FP-600C (XA0385) Electronic Volume

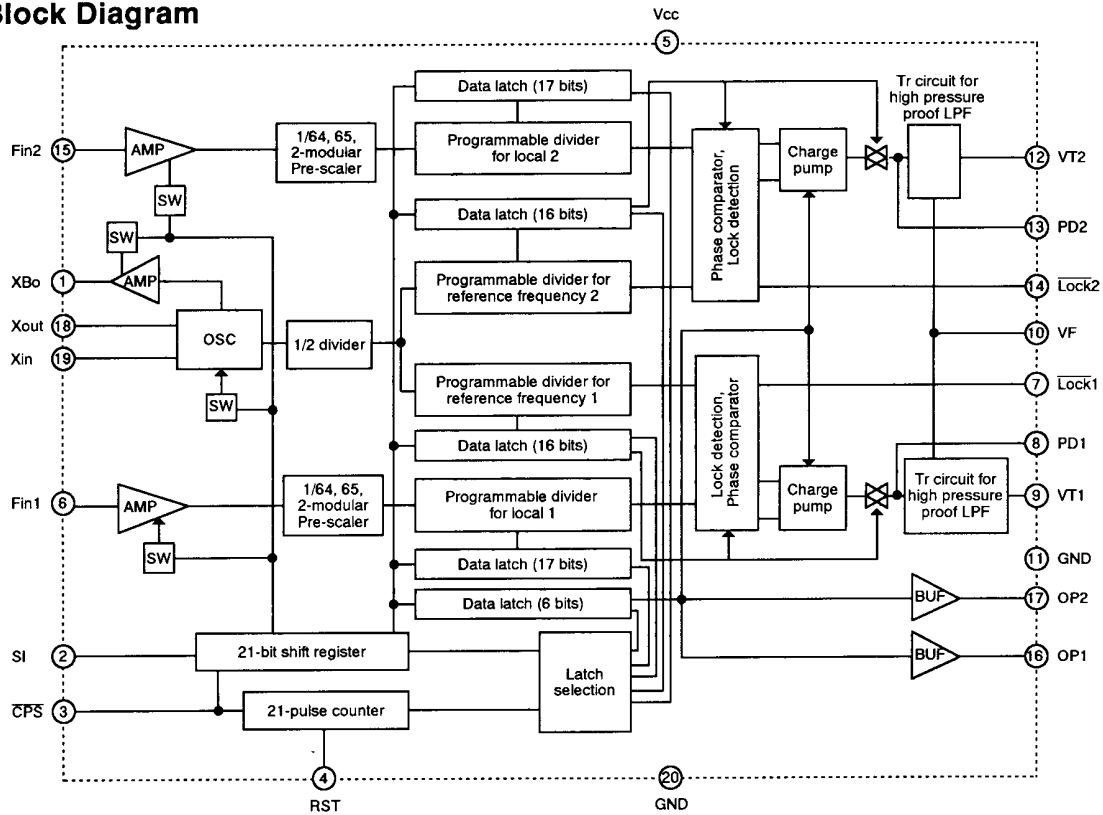


### 3) M64076GP (XA0352) PLL

#### Pin Assignment

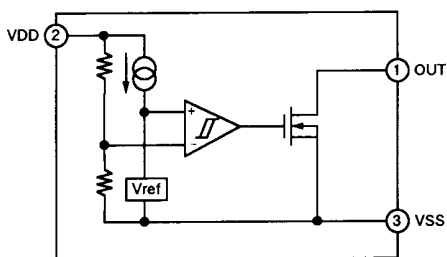
XBo	1	20	GND
SI	2	19	Xin
CPS	3	18	Xout
RST	4	17	OP2
Vcc	5	16	OP1
Fin1	6	15	Fin2
Lock1	7	14	Lock2
PD1	8	13	PD2
VT1	9	12	VT2
VF	10	11	GND

#### Block Diagram



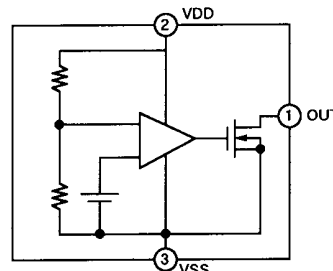
### 4) RH5VL25AA-T1 (XA0309) C-MOS Voltage Detector

#### Block Diagram



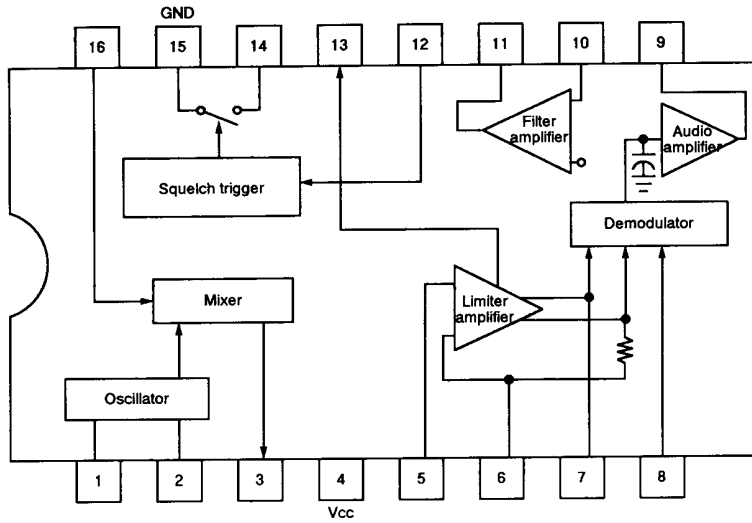
### 5) RH5VA32AA-T1 (XA0198) C-MOS Voltage Detector

#### Block Diagram

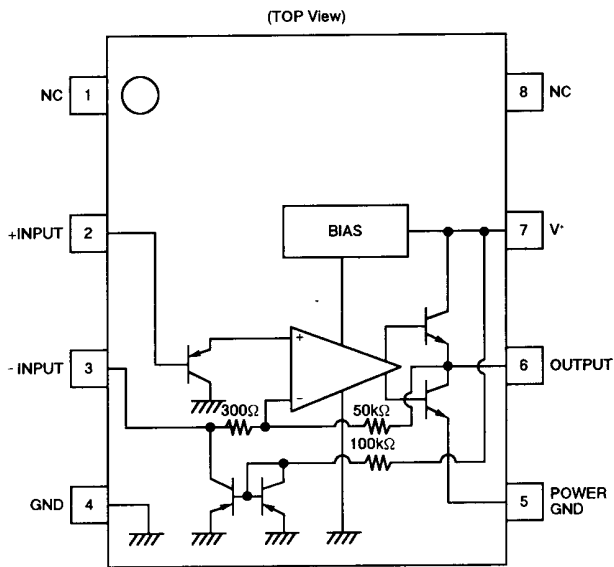


**6) MC3372VM-EL (XA0343)**  
**Narrow Band FM IF IC**

**Block Diagram**

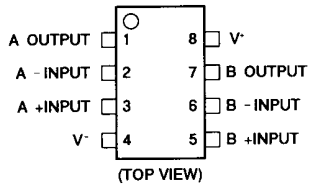


**7) NJM2070M T1 (XA0210)**  
**Audio Power Amplifier**

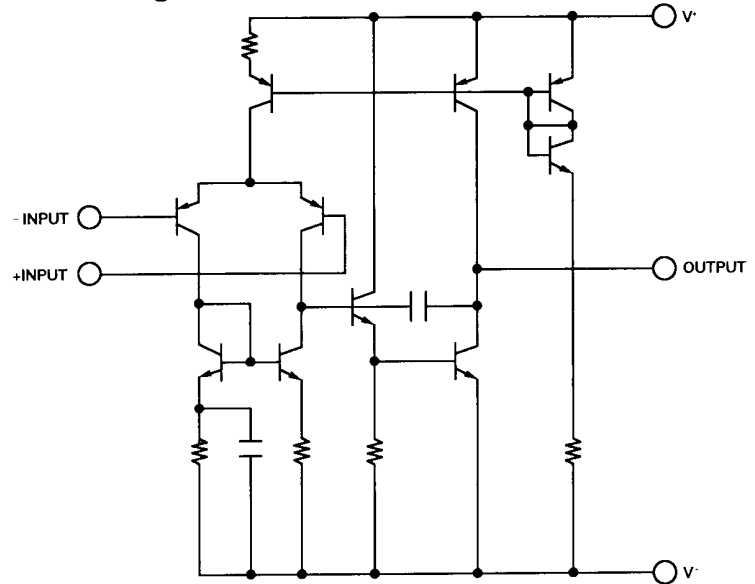


## 8) NJM2100M T1 (XA0209) Operational Amplifier

### Pin Assignment



### Block Diagram



## 9) Transistor, Diode, and LED Outline Drawings

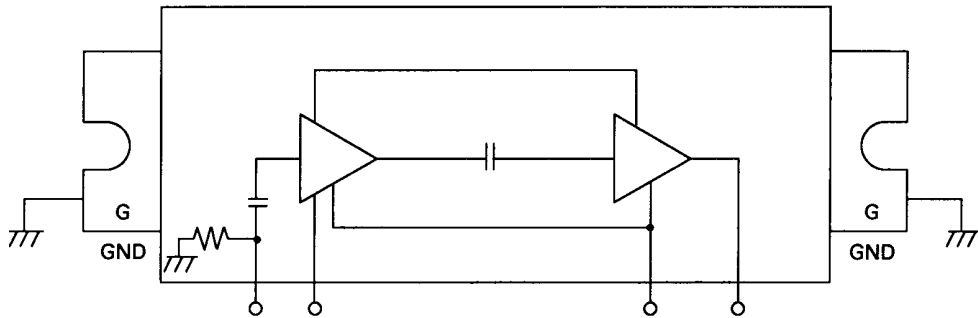
### Top View

DA204U T106 XD0130	FMA7XT 148 XU0027	MA716 TW XD0118	MA741WA TX XD0251	MA742 TX XD0250
UN211H TX XU0040	UN2214 TX XU0038	UN9111 TX XU0062	XP1501 TX XU0172	

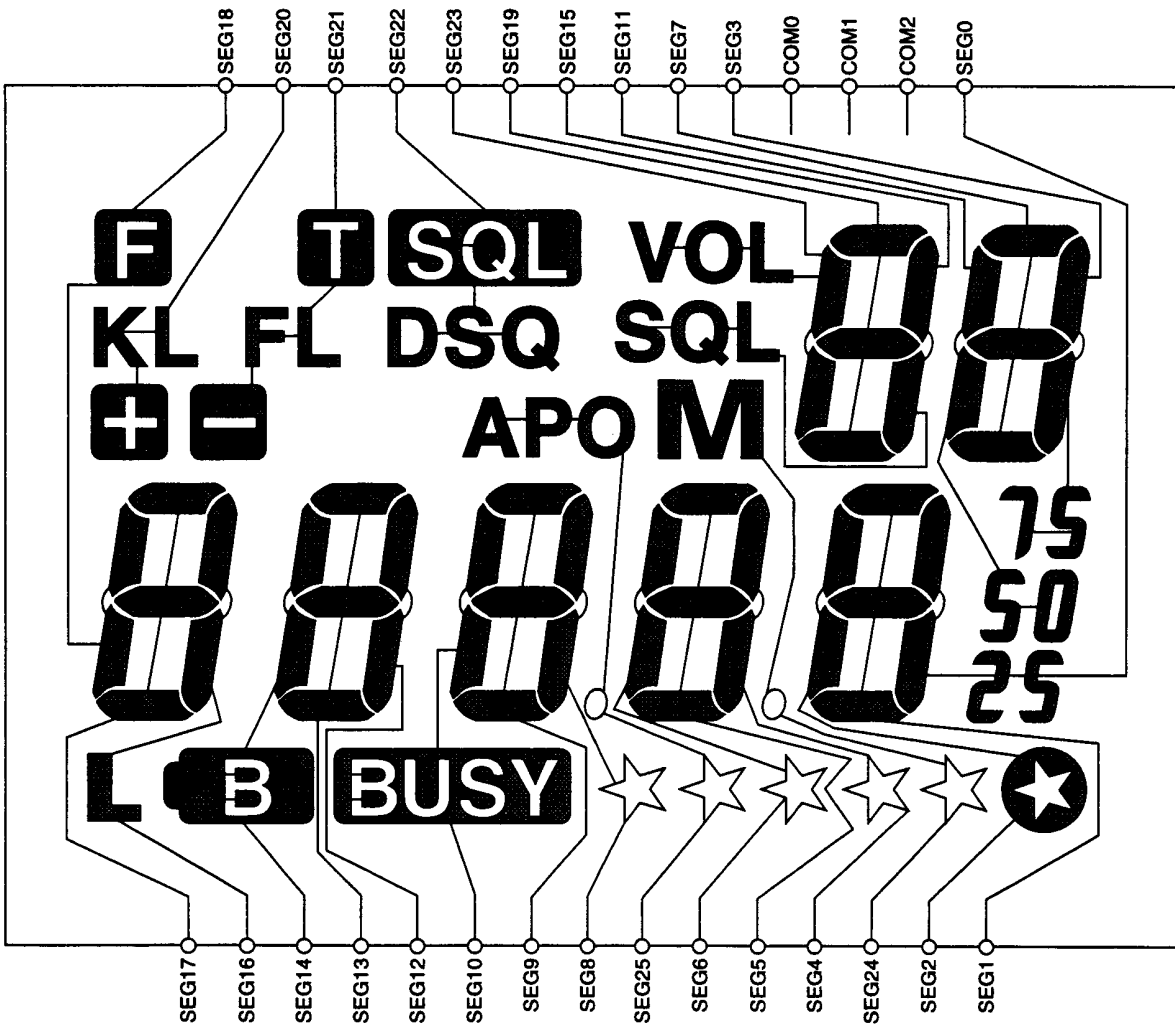
### 10) P. A. Module (IC101)

TA1 : XA0439  
TA2 : XA0421

T : XA0381

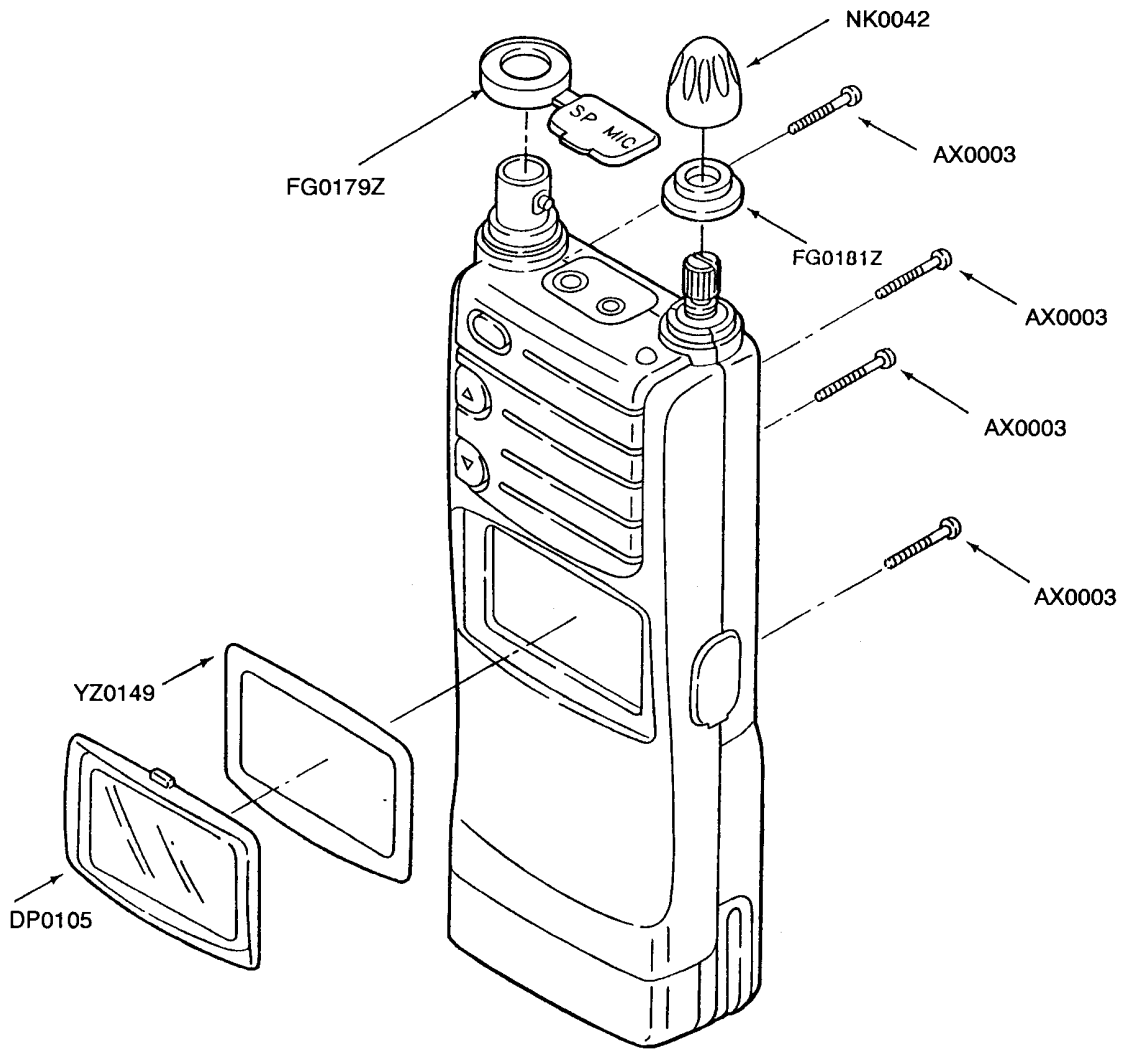


### 11) LCD Connection

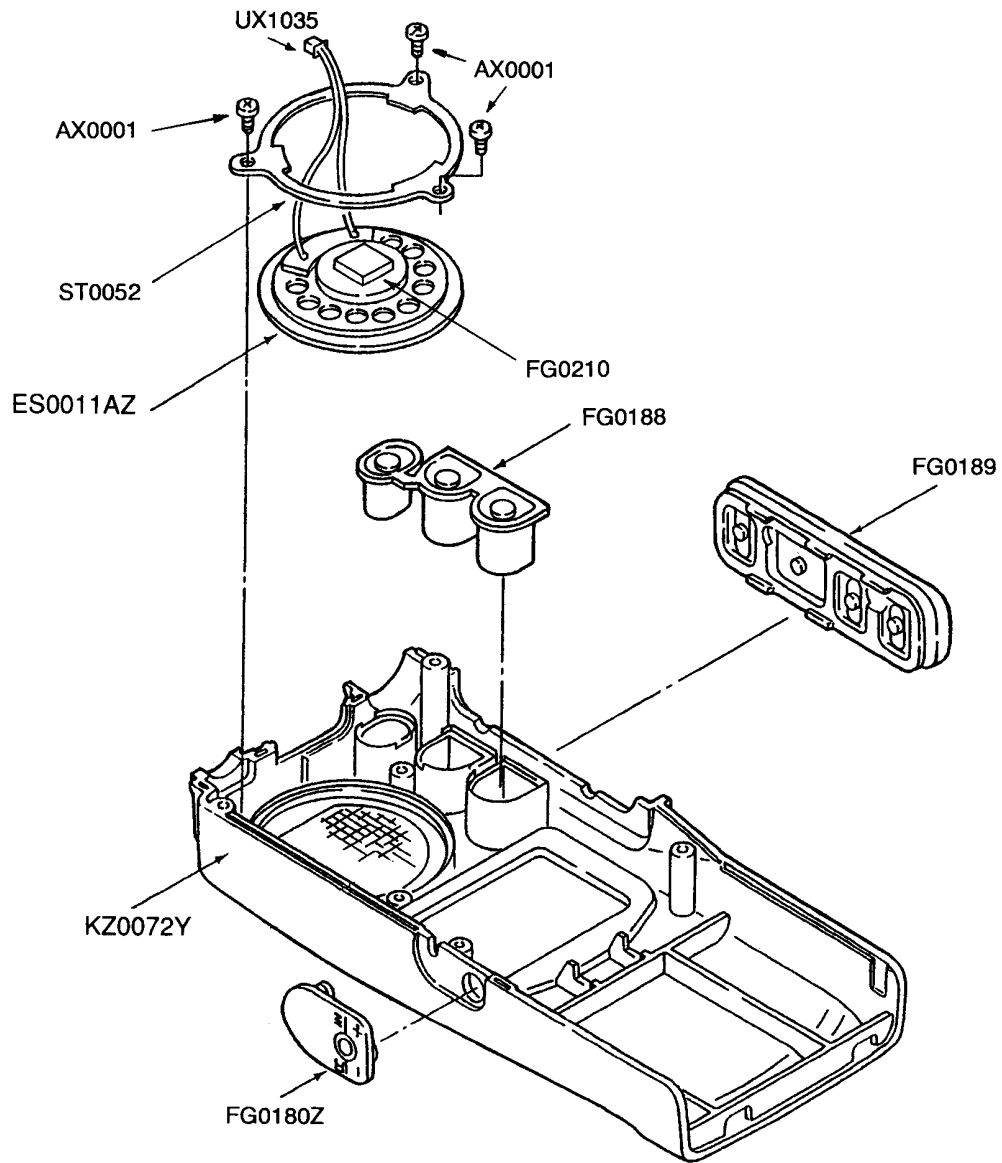


# EXPLODED VIEW

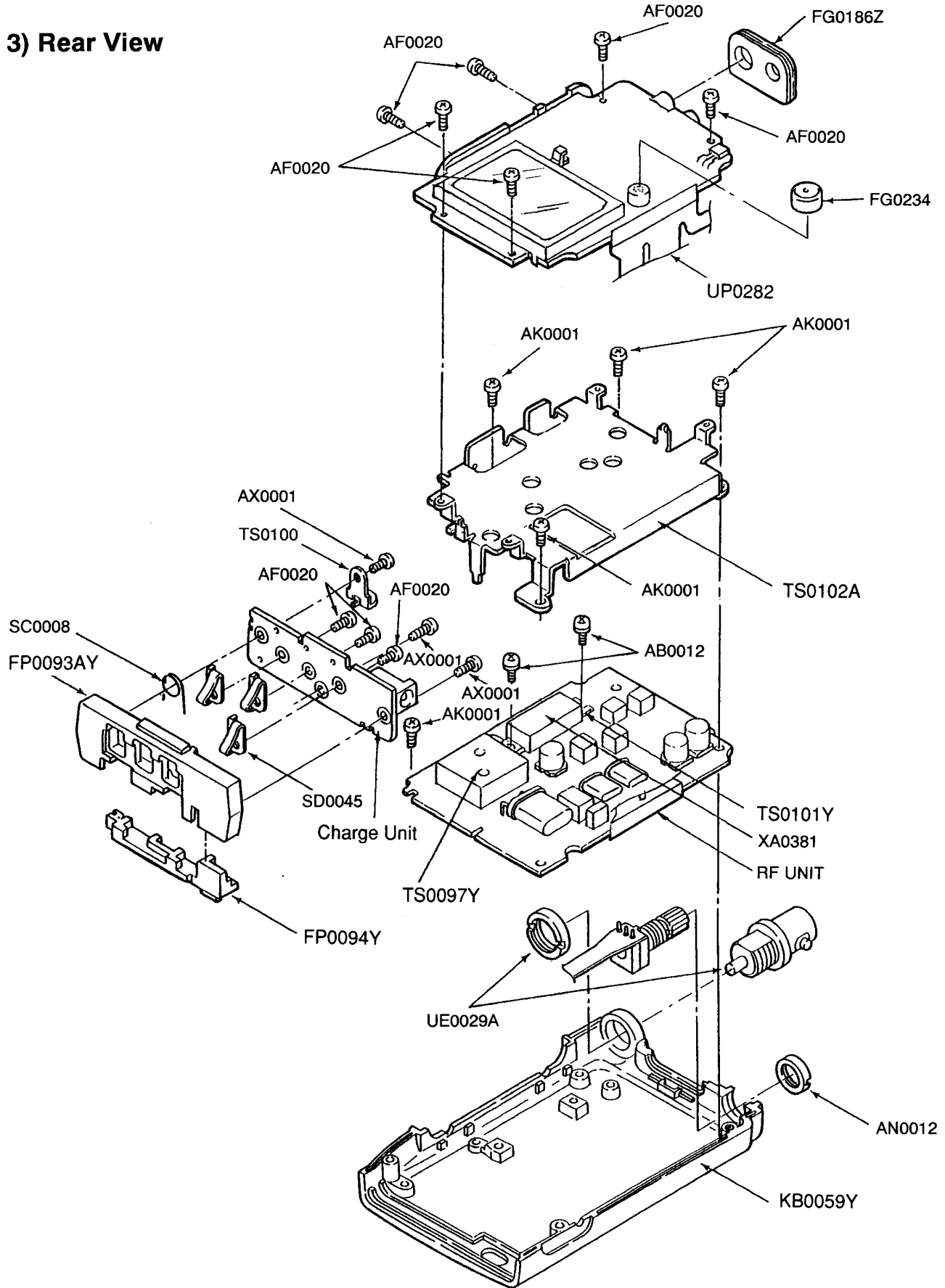
## 1) Front View 1



## 2) Front View 2



### 3) Rear View





## PARTS LIST

Ref.No.	PartsNo.	Description	Parts Name	Ver.	Ref.No.	PartsNo.	Description	Parts Name	Ver.	Ref.No.	Parts No.	Description	Parts Name	Ver.
C1	CU3035	Chip C	C1608BIH102KTA		IC5	XA0402	IC	M38267M8L-101FP		R35	RK3058	Chip R	ERJ3G5Y1473V	
C2	CU3035	Chip C	C1608BIH102KTA		IC6	XA0209	IC	NJ012100M TT		R36	RK1018	Chip R	ERJ8GEYJ101V	
C3	CS0206	Chip Tantal	TMCMDD0G107MTR		J1	MACL2GG	Wire	#30A11-025-H1		R37	RK3038	Chip R	ERJ3G5Y102V	
C4	CU3017	Chip C	C1608CHI1H330T-AS		JK1	UJ0019	Connector	H5J1495-01-010		R38	RK3041	Chip R	ERJ3G5Y1473V	
C5	CU3017	Chip C	C1608CHI1H330T-AS		JK2	UJ0022	Connector	H5J1102-01-540		R39	RK3038	Chip R	ERJ3G5Y102V	
C6	CS0208	Chip Tantal	TMCMCA01475MTR		L1	QC0003	Coil	MLF3216A1R0K-T		R40	RK3065	Chip R	ERJ3G5Y334V	
C7	CU3035	Chip C	C1608BIH102KTA		L2	QC0003	Coil	MLF3216A1R0K-T		R41	RK3065	Chip R	ERJ3G5Y184V	
C8	CU3035	Chip C	C1608BIH102KTA		L4	QC0003	Coil	MLF3216A1R0K-T		R42	RK3061	Chip R	ERJ3G5Y1823V	
C9	CS0206	Chip Tantal	TMCMDD0G107MTR		L5	QC0003	Coil	MLF3216A1R0K-T		R43	RK3058	Chip R	ERJ3G5Y1473V	
C10	CS0373	Chip Tantal	TMCMDDIC476MTR		L6	QC0442	Coil	MLF1608A1R0K-T		R44	RK3052	Chip R	ERJ3G5Y1223V	
C11	CS0206	Chip Tantal	TMCMDD0G107MTR		L7	QC0442	Coil	MLF1608A1R0K-T		R47	RK3052	Chip R	ERJ3G5Y153V	
C12	CU3059	Chip C	C1608F1E104ZTA		L8	QC0442	Coil	MLF1608A1R0K-T		R48	RK3062	Chip R	ERJ3G5Y104V	
C13	CS0057	Chip Tantal	TMCSA09225MTR		L9	QC0442	Coil	MLF1608A1R0K-T		R49	RK3048	Chip R	ERJ3G5Y1682V	
C14	CS0049	Chip Tantal	TMCSA01475MTR		L10	QC0442	Coil	MLF1608A1R0K-T		R52	RK3041	Chip R	ERJ3G5Y182V	
C15	CU3021	Chip C	C1608CHI1H680JTA		LCD1	EL0030	LCD	LCD.XH618		R53	RK3046	Chip R	ERJ3G5Y1472V	
C16	CU3035	Chip C	C1608BIH102KTA		MIC1	EY0012	Mic	EN-123T		R54	RK3062	Chip R	ERJ3G5Y104V	
C17	CU3035	Chip C	C1608BIH102KTA		O1	XU0064	Transistor	UN5210.TX		R55	RK3050	Chip R	ERJ3G5Y103V	
C18	CU3056	Chip C	C1608F1E473ZTA		Q3	XU0040	Transistor	UN211H.TX		R56	RK3066	Chip R	ERJ3G5Y1224V	
C19	CU3035	Chip C	C1608BIH102KTA		Q5	XU0040	Transistor	UN211H.TX		R57	RK3039	Chip R	ERJ3G5Y122V	
C20	CU3035	Chip C	C1608BIH102KTA		Q7	XU0014	Transistor	DTC144EKA T146		R58	RK3069	Chip R	ERJ3G5Y394V	
C21	CU3051	Chip C	C1608BIH102KTA		Q9	XU0064	Transistor	UN5210.TX		R59	RK3051	Chip R	ERJ3G5Y123V	
C22	CU3051	Chip C	C1608BIH102KTA		Q10	XU0064	Transistor	UN5210.TX		R60	RK3038	Chip R	ERJ3G5Y102V	
C23	CU3027	Chip C	C1608CHI1H221JTA		Q11	XU0095	Transistor	25C4081.T106R		R61	RK3054	Chip R	ERJ3G5Y1223V	
C24	CU3035	Chip C	C1608BIH102KTA		Q12	XU0064	Transistor	UN5210.TX		R62	RK3065	Chip R	ERJ3G5Y184V	
C25	CU3059	Chip C	C1608F1E104ZTA		Q13	XU0064	Transistor	UN5210.TX		R63	RK3056	Chip R	ERJ3G5Y1333V	
C26	CU3027	Chip C	C1608CHI1H221JTA		R1	RK3028	Chip R	ERJ3G5Y151V		R64	RK3058	Chip R	ERJ3G5Y1473V	
C27	CU3035	Chip C	C1608BIH102KTA		R3	RA0003	Chip R	ERJ3G5Y103V		R65	RK3058	Chip R	ERJ3G5Y1473V	
C28	CU3059	Chip C	C1608F1E104ZTA		R4	RK3050	Chip R	ERJ3G5Y103V		R66	RK3055	Chip R	ERJ3G5Y1273V	
C29	CU3035	Chip C	C1608BIH102KTA		R5	RK3038	Chip R	ERJ3G5Y102V		R67	RK3046	Chip R	ERJ3G5Y1472V	
C30	CU3035	Chip C	C1608BIH102KTA		R6	RK3058	Chip R	ERJ3G5Y1473V		R68	RK3061	Chip R	ERJ3G5Y823V	
C31	CU3035	Chip C	C1608BIH102KTA		R7	RK3038	Chip R	ERJ3G5Y102V		R69	RK3050	Chip R	ERJ3G5Y103V	
C32	CU3035	Chip C	C1608BIH102KTA		R8	RK3046	Chip R	ERJ3G5Y1472V		R70	RK3062	Chip R	ERJ3G5Y104V	
C33	CU3035	Chip C	C1608BIH102KTA		R9	RK3058	Chip R	ERJ3G5Y1473V		R71	RK3034	Chip R	ERJ3G5Y471V	
C34	CU3035	Chip C	C1608BIH102KTA		R10	RK3058	Chip R	ERJ3G5Y1473V		R72	RK3056	Chip R	ERJ3G5Y333V	
C35	CU3035	Chip C	C1608BIH102KTA		R11	RA0003	Chip R	NNR4E0AJ102E		R73	RK3051	Chip R	ERJ3G5Y123V	
C36	CU3035	Chip C	C1608BIH102KTA		R12	RK3038	Chip R	ERJ3G5Y102V		R75	RK3058	Chip R	ERJ3G5Y1473V	
C37	CU3026	Chip C	C1608CHI1H181JT-AS		R13	RK3038	Chip R	ERJ3G5Y102V		R76	RK3038	Chip R	ERJ3G5Y102V	
C38	CS0049	Chip Tantal	TMCSA1C105MTR		R14	RK3038	Chip R	ERJ3G5Y102V		R78	RK3038	Chip R	ERJ3G5Y102V	
C39	CU3059	Chip C	C1608F1E104ZTA		R15	RK3024	Chip R	ERJ3G5Y1680V		R79	RK3001	Chip R	ERJ3G5Y0R00V	E
C40	CU3059	Chip C	C1608F1E104ZTA		R16	RK3024	Chip R	ERJ3G5Y1680V		R80	RK3046	Chip R	ERJ3G5Y1472V	
C41	CU3059	Chip C	C1608F1E104ZTA		R18	RK3036	Chip R	ERJ3G5Y1681V		R82	RK3058	Chip R	ERJ3G5Y1473V	
C42	CS0063	Chip Tantal	TMCSA1V104MTR		R19	RK3074	Chip R	ERJ3G5Y105V		R83	RK3058	Chip R	ERJ3G5Y1473V	
C43	CU3047	Chip C	C1608BIH103KTA		R20	RK3038	Chip R	ERJ3G5Y102V		R84	RK3038	Chip R	ERJ3G5Y102V	E
C44	CU3035	Chip C	C1608BIH102KTA		R21	RK3038	Chip R	ERJ3G5Y102V		R86	RK3058	Chip R	ERJ3G5Y1473V	
C45	CU3059	Chip C	C1608F1E104ZTA		R22	RK3074	Chip R	ERJ3G5Y105V		R87	RK3046	Chip R	ERJ3G5Y1472V	
C46	CU3059	Chip C	C1608F1E104ZTA		R23	RK3043	Chip R	ERJ3G5Y1272V		R89	RK3038	Chip R	ERJ3G5Y102V	
C47	CU3059	Chip C	C1608F1E104ZTA		R24	RK3038	Chip R	ERJ3G5Y102V		R92	RK3001	Chip R	ERJ3G5Y0R00V	
C48	CU3059	Chip C	C1608F1E104ZTA		R26	RK3038	Chip R	ERJ3G5Y102V		R93	RK3042	Chip R	ERJ3G5Y1222V	
C49	U0282		DJG5 IF-RF		R28	RK3058	Chip R	ERJ3G5Y1473V		R94	RK3030	Chip R	ERJ3G5Y1221V	
C50	U0267		AXN420C330P		R30	RA0003	Chip R	MNR14E0AJ102E		R95	RK3030	Chip R	ERJ3G5Y1221V	
D1	XL0045	LED	PG1101F-TR		R31	RK3055	Chip R	ERJ3G5Y1273V		R96	RK3038	Chip R	ERJ3G5Y102V	
D3	XL0045	LED	PG1101F-TR		R32	RK3058	Chip R	ERJ3G5Y1473V		R97	RK3038	Chip R	ERJ3G5Y102V	
D7	XD0291	Diode	MA729-TX		R33	RK3058	Chip R	ERJ3G5Y1473V		R98	RK3070	Chip R	ERJ3G5Y1474V	
D9	XD0291	Diode	MA729-TX		R34	RK3058	Chip R	ERJ3G5Y1473V		R99	RK3001	Chip R	ERJ3G5Y0R00V	E
D10	XD0250	Diode	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											
R1001	RK3046	Chip R	ERJ3G5Y1472V		C701	CU3015	Chip C	C1608CHI1H220JTA		C701	CU3015	Chip C	C1608CHI1H220JTA	
R1002	RK3048	Chip R	ERJ3G5Y1682V		C702	CU3015	Chip C	C1608CHI1H220JTA		C702	CU3015	Chip C	C1608CHI1H220JTA	
R1003	RK3062	Chip R	ERJ3G5Y104V		C703	CU3023	Chip C	C1688CHI1H01JTA		C703	CU3023	Chip C	C1688CHI1H01JTA	
R1005	RK3058	Chip R	ERJ3G5Y1473V		C705	CS0237	Chip Tantal	TMCMCA1A475MTR		C705	CS0237	Chip Tantal	TMCMCA1A475MTR	
R1006	RK3038	Chip R	ERJ3G5Y102V		C709	CS0049	Chip Tantal	TMCSA1C105MTR		C709	CS0049	Chip Tantal	TMCSA1C105MTR	
R1007	RK3038	Chip R	ERJ3G5Y102V		C710	CU3059	Chip C	C1608F1E104ZTA		C710	CU3059	Chip C	C1608F1E104ZTA	
R1008	RK3001	Chip R	ERJ3G5Y0R00V		C711	CS0236	Chip Tantal	TMCMCA01685MTR		C711	CS0236	Chip Tantal	TMCMCA01685MTR	
R1009	RK3038	Chip R	ERJ3G5Y102V		C712	CU3035	Chip C	C1608BIH102KTA		C712	CU3035	Chip C	C1608BIH102KTA	
R1010	RK3038	Chip R	ERJ3G5Y1473V		C713	CU3019	Chip C	C1608CHI1H470JTA		C713	CU3019	Chip C	C1608CHI1H470JTA	
R1011	RK3038	Chip R	ERJ3G5Y102V		C714	CS0049	Chip Tantal	TMCSA1C105MTR		C714	CS0049	Chip Tantal	TMCSA1C105MTR	
R1012	RK3038	Chip R	ERJ3G5Y102V		C715	CS0049	Chip Tantal	TMCSA1C105MTR		C715	CS0049	Chip Tantal	TMCSA1C105MTR	
R1013	RK3001	Chip R	ERJ3G5Y0R00V		CN701	UE0274		AXN320C038P		CN701	UE0274		AXN320C038P	
X1	XQ0074	Crystal	SMD-49 4.19MHZ		UP0295A	UP0295A		E128U PCB		UP0295A	UP0295A		E128U PCB	
	UP0294B	P.C.B	CPU PCB		R701	RK3048	Chip R	ERJ3G5Y1682V		R701	RK3048	Chip R	ERJ3G5Y1682V	
	TL0016		Spread Sheet DJG5		R702	RK3089	Chip R	ERJ3G5Y1912V		R702	RK3089	Chip R	ERJ3G5Y1912V	
	FG0186Z		Jack Cap		R703	RK3066	Chip R	ERJ3G5Y1224V		R703	RK3066	Chip R	ERJ3G5Y1224V	
	DG0021		LCD Light DJG5		R704	RK3074	Chip R	ERJ3G5Y105V		R704	RK3074	Chip R	ERJ3G5Y105V	
	FG0182		LCD Rubber(A)DJG5		R705	RK3051	Chip R	ERJ3G5Y123V		R705	RK3051	Chip R	ERJ3G5Y123V	
	FG0183		LCD Rubber(B)DJG5		R707	RK3067	Chip R	ERJ3G5Y1274V		R707	RK3067	Chip R	ERJ3G5Y1274V	
	ST0053Y		LCD Holder DJ190		R710	RK3047	Chip R	ERJ3G5Y1562V		R710	RK3047	Chip R	ERJ3G5Y1562V	
	FG0234		Mic Holder		R715	RK3060	Chip R	ERJ3G5Y1683V		R715	RK3060	Chip R	ERJ3G5Y1683V	
	IT00272		Sheet Insulator		R716	RK3054	Chip R	ERJ3G5Y1223V		R716	RK3054	Chip R	ERJ3G5Y1223V	
	UR0012		Switch											

## RF Unit

Ref.No.	Parts No.	Description	Parts Name	Ver.
C101	CU3035	Chip C	C1608B1H102KTA	
C102	CU3035	Chip C	C1608B1H102KTA	
C103	CU3035	Chip C	C1608B1H102KTA	
C104	CU3035	Chip C	C1608B1H102KTA	
C105	CU3035	Chip C	C1608B1H102KTA	
C106	CU3017	Chip C	C1608B1H102KTA	
C107	CU3010	Chip C	C1608CH1H090CCTA	TE.TA.TAH
C107	CU3007	Chip C	C1608CH1H060CCTA	TA2
C108	CU3007	Chip C	C1608CH1H060CCTA	TA2
C110	CU3017	Chip C	C1608CH1H100CCTA	
C112	CU3011	Chip C	C1608CH1H100CCTA	
C113	CU3017	Chip C	C1608CH1H330JTA	TE.TA.TAH
C114	CU3013	Chip C	C1608CH1H150JTA	TA2
C114	CU3019	Chip C	C1608CH1H470JTA	TE.TA.TAH
C114	CU3013	Chip C	C1608CH1H150JTA	TA2
C115	CU3013	Chip C	C1608CH1H150JTA	
C116	CU3019	Chip C	C1608CH1H470JTA	TE.TA.TAH
C116	CU3012	Chip C	C1608CH1H120JTA	TA2
C117	CS0049	Chip Tantal	TMCSA1C105MTR	
C118	CU3035	Chip C	C1608B1H102KTA	
C119	CU3035	Chip C	C1608B1H102KTA	
C121	CU3004	Chip C	C1608CH1H030CCTA	TE.TA.TAH
C122	CU3003	Chip C	C1608CH1H020CCTA	TA2
C122	CU3004	Chip C	C1608CH1H030CCTA	TE.TA.TAH
C123	CU3015	Chip C	C1608CH1H220JTA	
C124	CU3035	Chip C	C1608B1H102KTA	
C125	CU3002	Chip C	C1608CH1H010CCTA	
C126	CU3002	Chip C	C1608CH1H010CCTA	
C127	CS0049	Chip Tantal	TMCSA1C105MTR	
C128	CU3035	Chip C	C1608B1H102KTA	
C129	CU3035	Chip C	C1608B1H102KTA	
C130	CS0220	Chip Tantal	TMCSA1C225MTR	
C131	CU3051	Chip C	C1608B1E223KTA	
C132	CU3047	Chip C	C1608B1H103XTA	
C133	CU3035	Chip C	C1608B1H103KTA	
C134	CU3035	Chip C	C1608B1H102KTA	
C135	CU3009	Chip C	C1608CH1H080CCTA	
C136	CU3047	Chip C	C1608B1H103KTA	
C137	CS0220	Chip Tantal	TMCSA1C225MTR	
C141	CU3035	Chip C	C1608B1H1020CCTA	TE.TA.TAH
C142	CU3002	Chip C	C1608CH1H010CCTA	TA2
C143	CU3003	Chip C	C1608CH1H020CCTA	
C144	CU3003	Chip C	C1608CH1H020CCTA	
C146	CU3007	Chip C	C1608CH1H060CCTA	
C148	CU3006	Chip C	C1608CH1H050CCTA	
C149	CU3011	Chip C	C1608CH1H100CCTA	
C150	CU3011	Chip C	C1608CH1H100CCTA	
C151	CU3004	Chip C	C1608CH1H030CCTA	
C152	CU3015	Chip C	C1608CH1H220JTA	
C153	CU3017	Chip C	C1608CH1H330JTA	
C154	CU3018	Chip C	C1608CH1H390JTA	
C155	CU3017	Chip C	C1608CH1H330JTA	
C156	CU3035	Chip C	C1608B1H102KTA	
C157	CU3035	Chip C	C1608CH1H060CCTA	
C158	CU3007	Chip C	C1608B1H102KTA	
C159	CU3059	Chip C	C1608JF1E104ZTA	
C160	CU3047	Chip C	C1608B1H103KTA	
C161	CU3047	Chip C	C1608B1H103KTA	
C163	CS0377	Chip Tantal	TMCSA1C105MTR	
C164	CS0049	Chip Tantal	TMCSA1C105MTR	
C165	CU3021	Chip C	C1608CH1H680JTA	
C166	CU3059	Chip C	C1608JF1E104ZTA	
C167	CU3016	Chip C	C1608CH1H220JTA	
C168	CU3015	Chip C	C1608CH1H220JTA	
C169	CS0049	Chip Tantal	TMCSA1C105MTR	
C170	CU3056	Chip C	C1608JF1E473ZTA	
C171	CU3059	Chip C	C1608JF1E104ZTA	
C172	CU3051	Chip C	C1608B1E223KTA	
C173	CU3053	Chip C	C1608JF1E333ZTA	
C174	CU3047	Chip C	C1608B1H103KTA	
C175	CS0382	Chip Tantal	TMCSA1C225MTR	
C176	CU3059	Chip C	C1608JF1E104ZTA	
C177	CS0220	Chip Tantal	TMCSA1C225MTR	
C178	CU3035	Chip C	C1608B1H102KTA	
C179	CU3027	Chip C	C1608CH1H220JTA	
C180	CU3035	Chip C	C1608B1H102KTA	
C181	CU3059	Chip C	C1608JF1E104ZTA	
C182	CU3035	Chip C	C1608B1H102KTA	
C183	CU3035	Chip C	C1608B1H102KTA	
C184	CU3035	Chip C	C1608B1H102KTA	
C185	CU3047	Chip C	C1608B1H103KTA	
C186	CE0308	Electrolytic C	6.3CV100BS	
C187	CU3035	Chip C	C1608B1H102KTA	
C188	CS0049	Chip Tantal	TMCSA1C105MTR	
C189	CU3047	Chip C	C1608B1H103KTA	
C190	CU3059	Chip C	C1608JF1E104ZTA	
C191	CU3035	Chip C	C1608B1H102KTA	
C192	CU3047	Chip C	C1608B1H103KTA	
C193	CU3047	Chip C	C1608B1H103KTA	
C194	CU3019	Chip C	C1608CH1H470JTA	
C195	CU3047	Chip C	C1608B1H103KTA	
C196	CS0232	Chip Tantal	TMCSA1V474MTR	
C197	CU3035	Chip C	C1608B1H102KTA	
C198	CE0308	Electrolytic C	6.3CV100BS	
C199	CE0308	Electrolytic C	6.3CV100BS	
C200	CU3035	Chip C	C1608B1H102KTA	
C201	CU3035	Chip C	C1608B1H102KTA	
C202	CU3047	Chip C	C1608B1H103KTA	
C203	CU3051	Chip C	C1608B1E223KTA	

## RF Unit

Ref.No.	Parts No.	Description	Parts Name	Ver.
Q105	XU10096	Transistor	C1608JF1E104ZTA	
Q106	XE00020	FET	16XV 100UV	
Q107	XE00009	FET	TMCSA0G106MTR	
Q107	XU10137	Transistor	C1608B1H102KTA	
Q108	XU10096	Transistor	C1608B1H102KTA	
Q109	XU10095	Transistor	C1608CH1H470JTA	
Q110	XU10088	Transistor	C1608B1H102KTA	
Q111	XU10088	Transistor	C1608B1H102KTA	
Q112	XU00027	Transistor	FM47AT148	
Q113	XU00172	Transistor	XPI1501-TX	
Q114	XU10088	Transistor	2SA1213Y TE12R	
Q115	XU10095	Transistor	2SC4081 T106R	
Q116	XU01072	Transistor	XPI1501-TX	
Q117	XU01075	Transistor	2SC5065-O(TE85L)	
Q118	XU01025	Transistor	DTA144EU/AT106	
Q119	XU00038	Transistor	UN2214 TX	
Q120	XU00062	Transistor	UN9111 TX	
R101	RK3028	Chip R	ERJ3GSYJ151V	
R102	RK3026	Chip R	ERJ3GSYJ101V	
R103	RK3026	Chip R	ERJ3GSYJ101V	
R104	RK3034	Chip R	ERJ3GSY447V	
R105	RK3046	Chip R	ERJ3GSY447V	
R106	RK3050	Chip R	ERJ3GSYJ103V	
R107	RK3046	Chip R	ERJ3GSY447V	
R108	RK3046	Chip R	ERJ3GSY447V	
R110	RK3026	Chip R	ERJ3GSYJ101V	
R111	RK3026	Chip R	ERJ3GSYJ101V	
R113	RK3050	Chip R	ERJ3GSYJ103V	TE.TA.TAH
R113	RK3051	Chip R	ERJ3GSYJ23V	TA2
R114	RK3050	Chip R	ERJ3GSYJ103V	
R115	RK3026	Chip R	ERJ3GSYJ101V	
R116	RK3050	Chip R	ERJ3GSYJ103V	
R117	RK3034	Chip R	ERJ3GSY447V	
R118	RK3051	Chip R	ERJ3GSYJ23V	TE.TA.TAH
R119	RK3038	Chip R	ERJ3GSYJ102V	
R121	RK3050	Chip R	ERJ3GSYJ103V	
R122	RK3030	Chip R	ERJ3GSYJ221V	
R123	RK3026	Chip R	ERJ3GSYJ101V	
R124	RK3022	Chip R	ERJ3GSY4470V	
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	

RF Unit/VCO Unit/Mechanical	Parts/PTT Unit/Belt Clip/Packing/Charge Unit	Ref.No.	Parts No.	Description	Parts Name	Ver.	Ref.No	Parts No.	Description	Parts Name	Ver.	Ref.No.	Parts No.	Description	Parts Name	Ver.
R144	RK3050 Chip R	R205	RK3030	Chip R	ERJ3GSYJ221V		R301	RK3026	Chip R	ERJ3GSYJ101V		SW401	UU0026	PTT Unit	ERJ3GSYJ101V	
R145	RK3074 Chip R	R206	RK3059	Chip R	ERJ3GSYJ563V		R302	RK3030	Chip R	ERJ3GSYJ221V		SW402	UU0018	Switch	ERJ3GSYJ221V	
R146	RK3074 Chip R	R209	RK3026	Chip R	ERJ3GSYJ101V		R303	RK3050	Chip R	ERJ3GSYJ103V		SW403	UU0018	Switch	ERJ3GSYJ103V	
R147	RK3074 Chip R	R210	RK3001	Chip R	ERJ3GSY0R00V		R304	RK3062	Chip R	ERJ3GSYJ104V		SW404	UU0018	Switch	ERJ3GSYJ104V	
R148	RK3060 Chip R	R211	RK3062	Chip R	ERJ3GSYJ104V		R305	RK3062	Chip R	ERJ3GSYJ104V					ERJ3GSYJ104V	
R149	RK3074 Chip R	R212	RK3001	Chip R	ERJ3GSY0R00V		R306	RK3062	Chip R	ERJ3GSYJ104V					ERJ3GSYJ104V	
R150	RK3034 Chip R	R213	RK3050	Chip R	ERJ3GSYJ103V		R307	RK3052	Chip R	ERJ3CSYJ153V					ERJ3CSYJ153V	
R153	RK3054 Chip R	R214	RK3050	Chip R	ERJ3GSYJ103V		R308	RK3042	Chip R	ERJ3GSYJ222V		AA0020	AA0020	Belt clip	ERJ3GSYJ222V	
R154	RK3042 Chip R	R215	RK3059	Chip R	ERJ3GSYJ563V		R309	RK3050	Chip R	ERJ3GSYJ03V		BB0009Y	BB0009Y	Screw	ERJ3GSYJ03V	
R155	RK3058 Chip R	R216	RK3062	Chip R	ERJ3GSYJ104V		R310	RK3037	Chip R	ERJ3GSYJ821V		BH0008A	BH0008A	Hand Strap DIS4I	ERJ3GSYJ821V	
R156	RK3041 Chip R	R219	RK3058	Chip R	ERJ3GSYJ473V		R311	RK3042	Chip R	ERJ3GSYJ222V		HP0003	HP0003	Belt Clip DIK1	ERJ3GSYJ222V	
R157	RK3041 Chip R	R220	RK3026	Chip R	ERJ3GSYJ101V			TS0097Y	Case	VCO Case					Protect.Bag 5x75x110	
R158	RK3059 Chip R	R221	RK3038	Chip R	ERJ3GSYJ102V			UT0030	Terminal	0.6Pin					Tape 20mm	
R159	RK3047 Chip R	TC101	CT0012	Trimmer	CTZ10AV				Mechanical Parts						Packing	
R160	RK3054 Chip R	X101	XO0076	Crystal	HC-49U 21.25MHZ			AB0012	Screw	PH/S MZ, 6+5 Fe/2pcs		HK0402A	HK0402A	Package	DJ190	
R161	RK3052 Chip R	X102	XK0003	Crystal	CDBX450C7			AF0020	Screw	0PH M2+3 Fe/6pcs		HM0153A	HM0153A	Package	Carton Box 10PCS DJG5T	
R162	RK3052 Chip R	XF101	XF0022	Filter	UM-1 21.7MHZ			AK0001	Screw	P0X BZ+4 FE/5pcs		HP0031	HP0031	Protect.Bag	5x100x200	
R163	RK3030 Chip R	XF102	XF0022	Filter	UM-1 21.7MHZ			AN0012	Screw	NUT N7X0.75 BR/B		HU0094	HU0094	P.MTL./Carton	DJG5T	
R164	RK3058 Chip R	FG0212	FG0212	Filter	Cushion DJ190			AX0003	Screw	0PH P2+16 FeAB/4pcs		HU0095	HU0095	Inter Ni-Cd Large		
R166	RK3046 Chip R	FG0215	FG0215	Shad Case	Cushion DJ191			DP0105	Screw	LCD Panel DJ190		HU0097	HU0097	Inter 10pcs. DJG5T		
R167	RK3038 Chip R	TS0101Y	TS0101Y	Shad Case	PM shield			DS0364B	Label	Serial No.		PH0009A	PH0009A	GUA Card Warranty Cert T		

## 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: 12dB SINAD
- \* 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  $1.1V \pm 0.1V$  (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  $\mu$  (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  $\mu$  (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 upper 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**

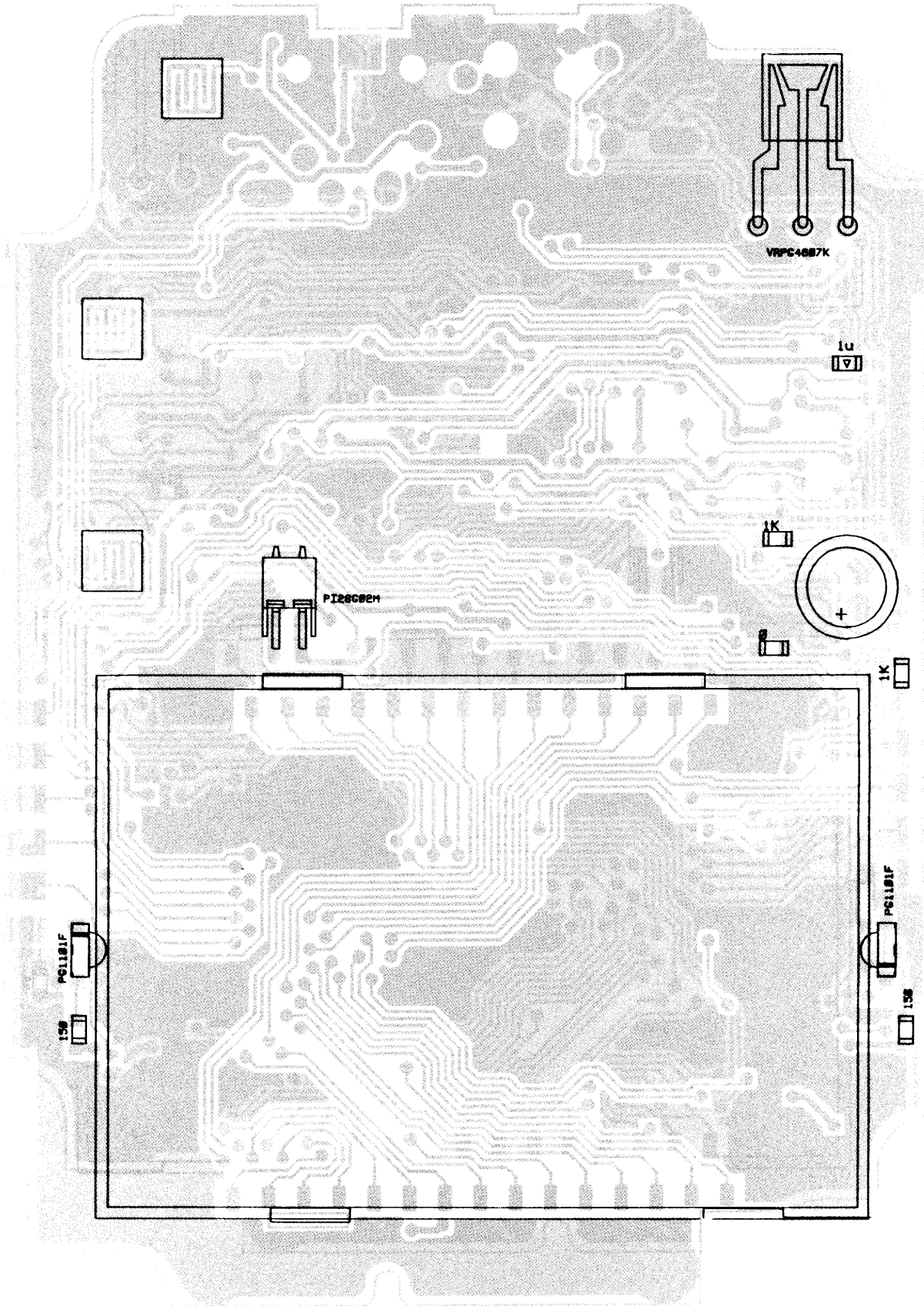
Sensitivity is adjusted by applying the optimum voltage from the CPU to the varicap of the tuning circuit. The coil manipulation for L109, L110, L111, and L112 is not required. If any of the coils is accidentally rotated, return it to the default position as described below, before adjusting the sensitivity.

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 appear 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.

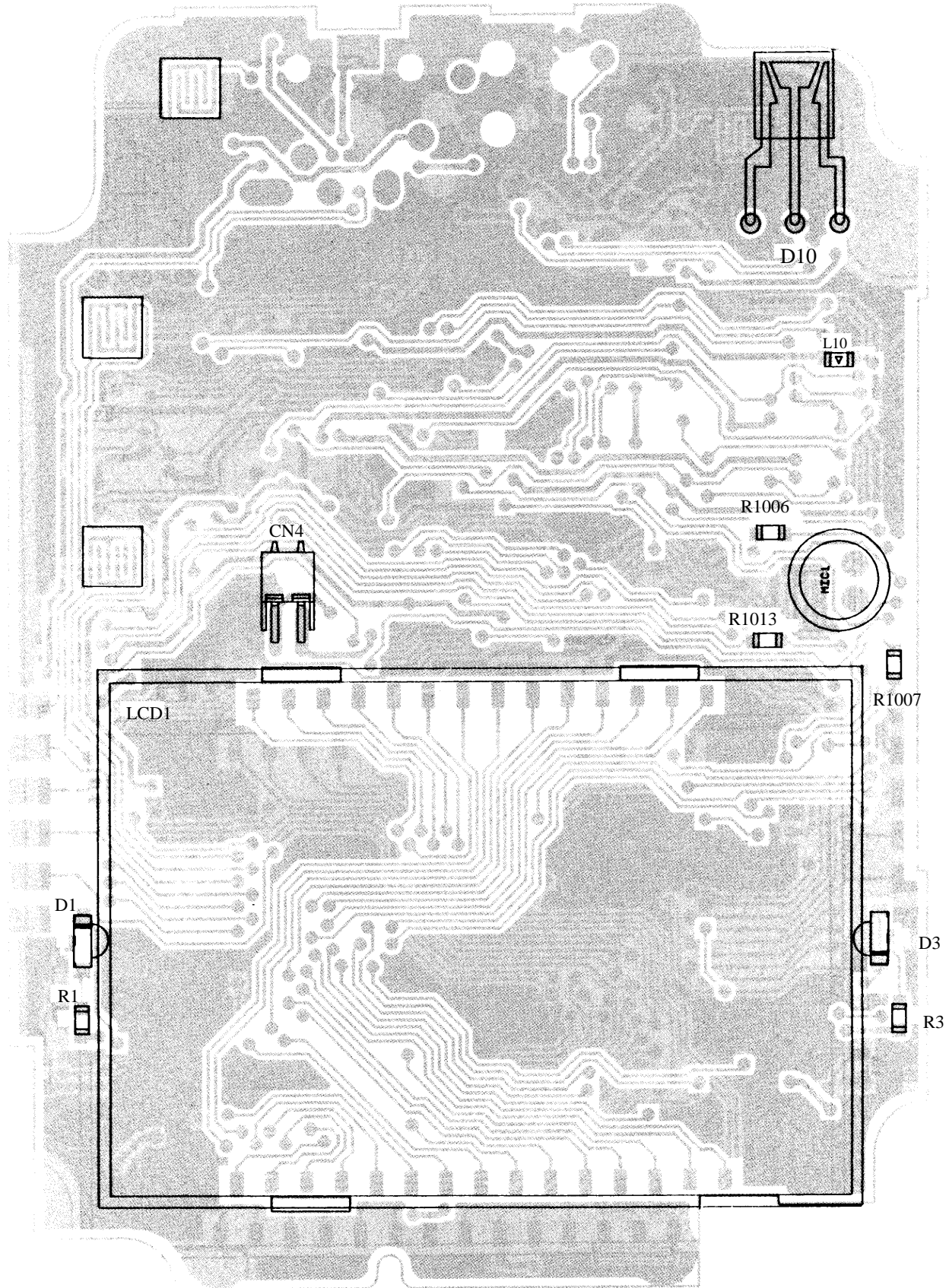


# PC BOARD VIEW

CPU Unit Side A (VALUE)



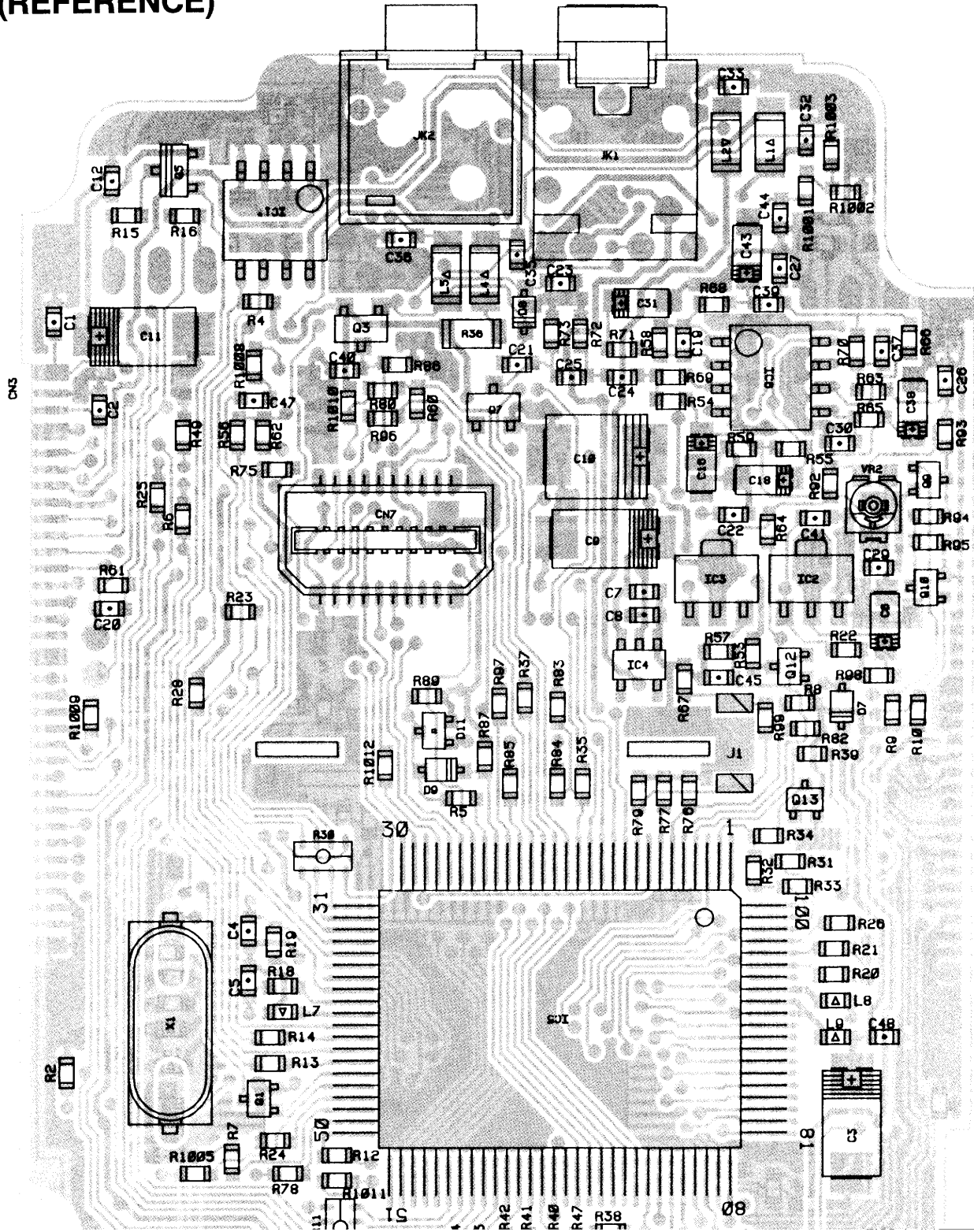
# CPU Unit Side A (REFERENCE)



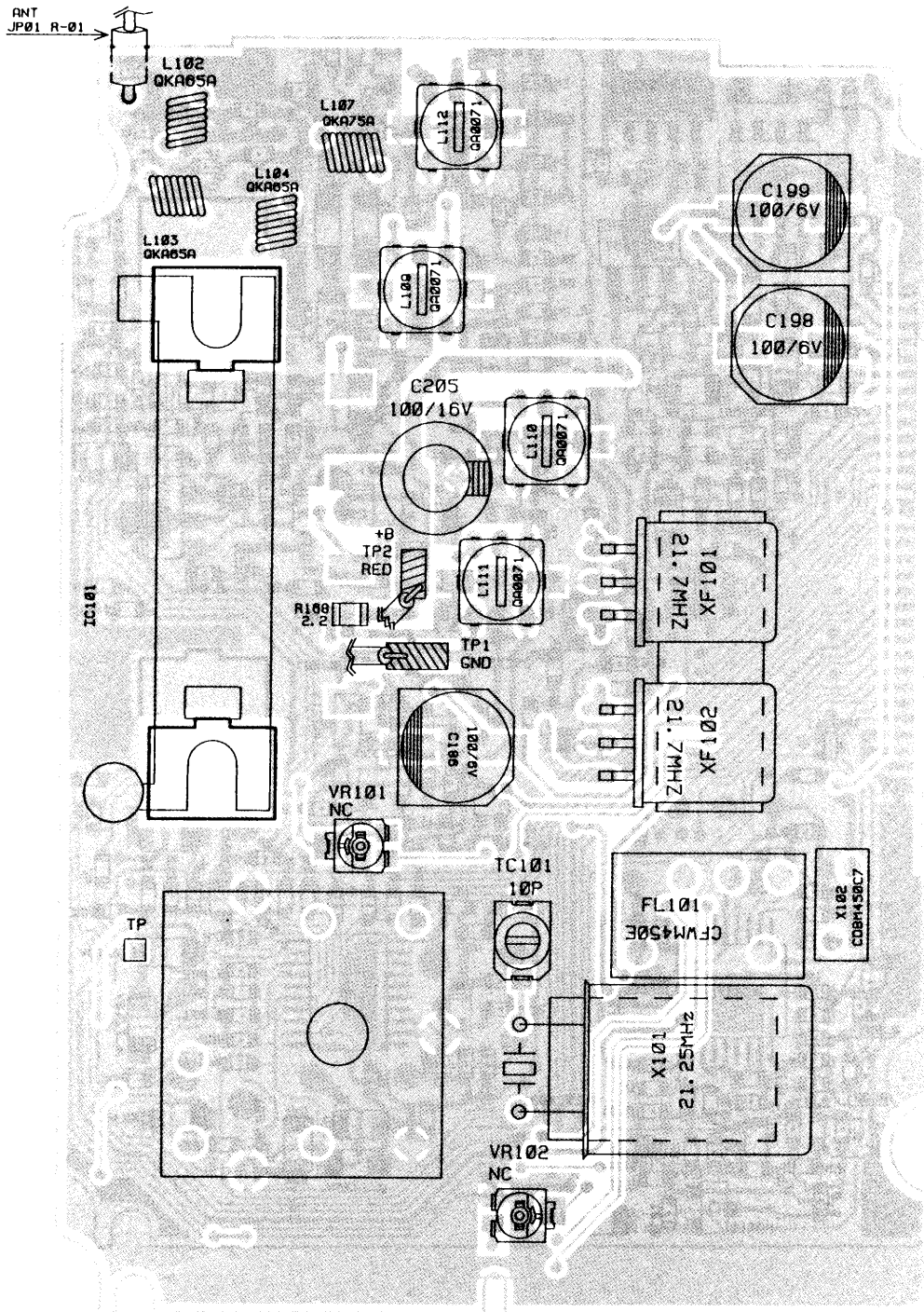


# CPU Unit Side B (REFERENCE)

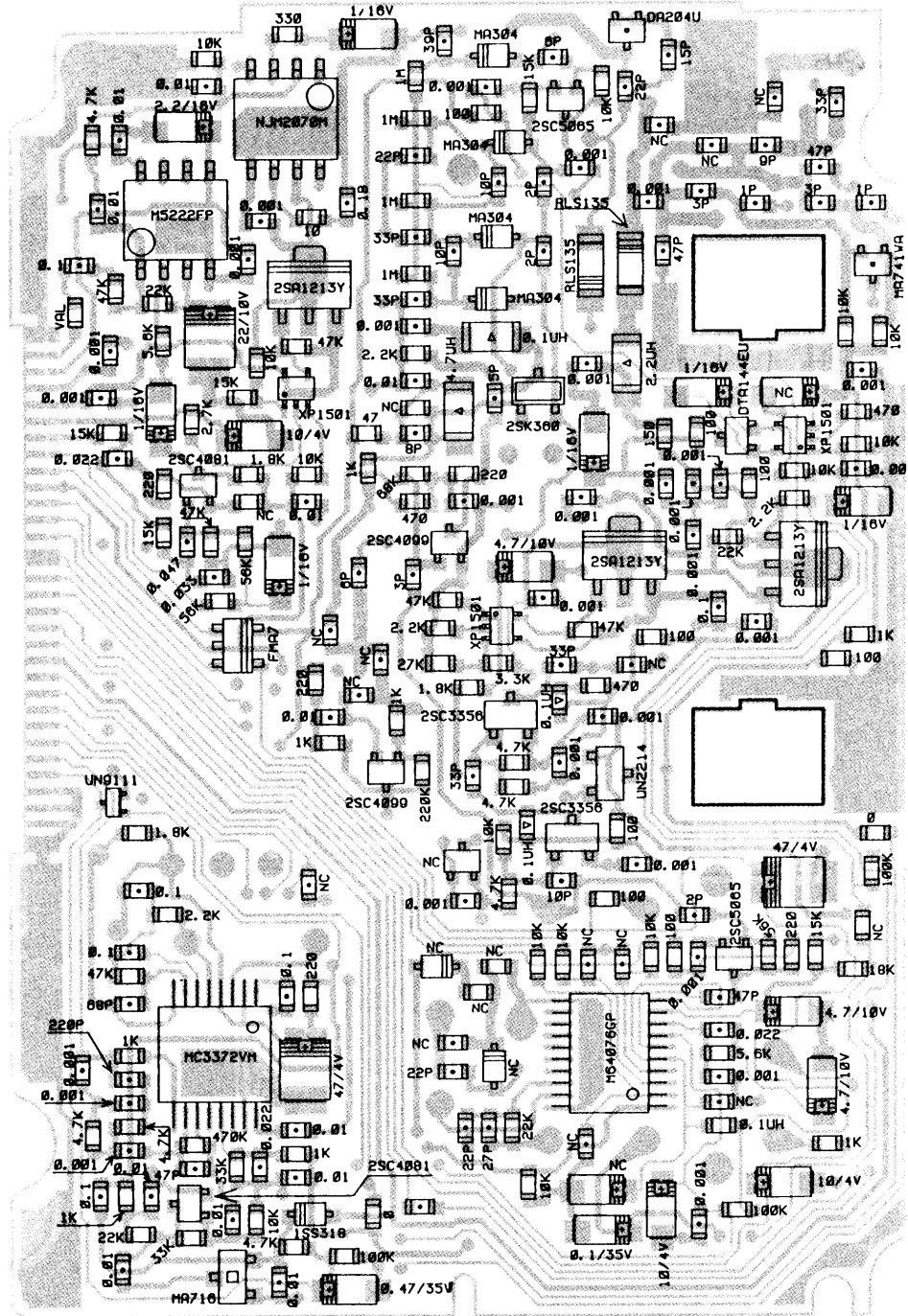
\* If IC1 is replaced, clone data must be transferred to the repaired radio from a brand new radio. For clone procedures, see page 24 of the Instruction Manual.



# RF Unit Side A (VALUE/REFERENCE)

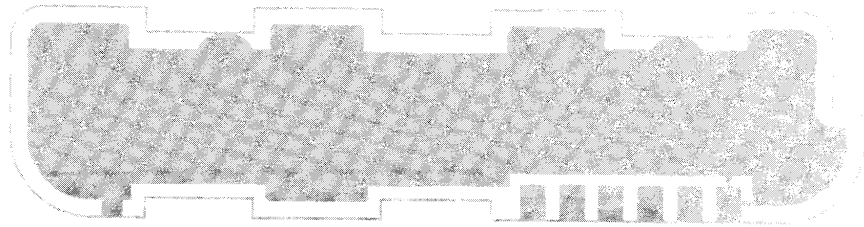


# RF Unit Side B (VALUE)

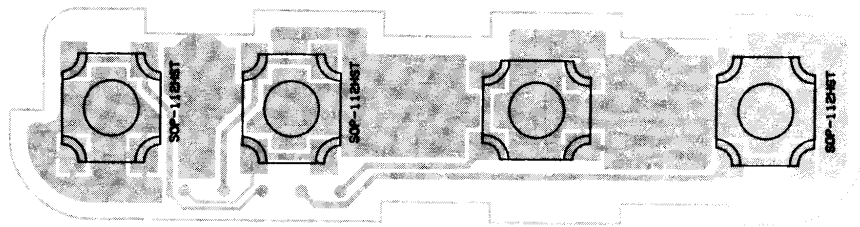




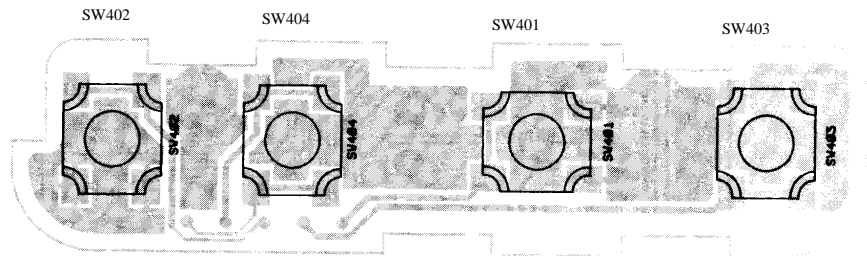
**PTT Unit Side A  
(VALUE/REFERENCE)**



**PTT Unit Side B  
(VALUE)**



**(REFERENCE)**



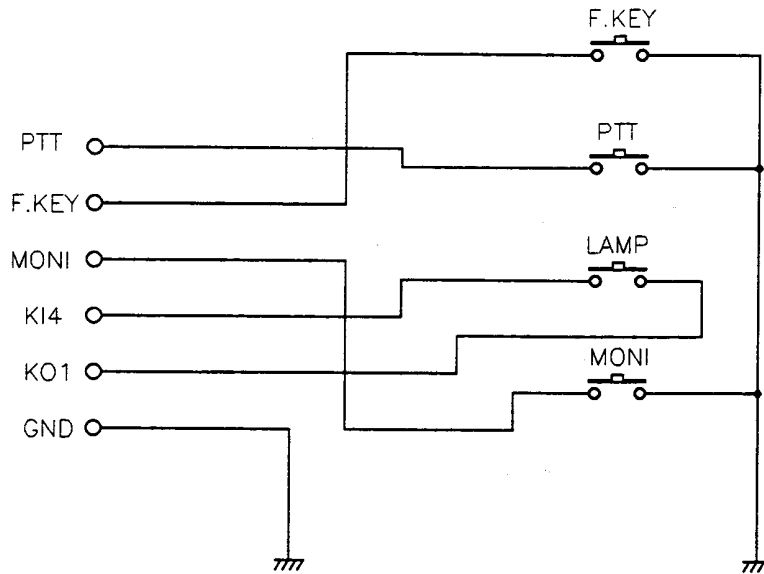




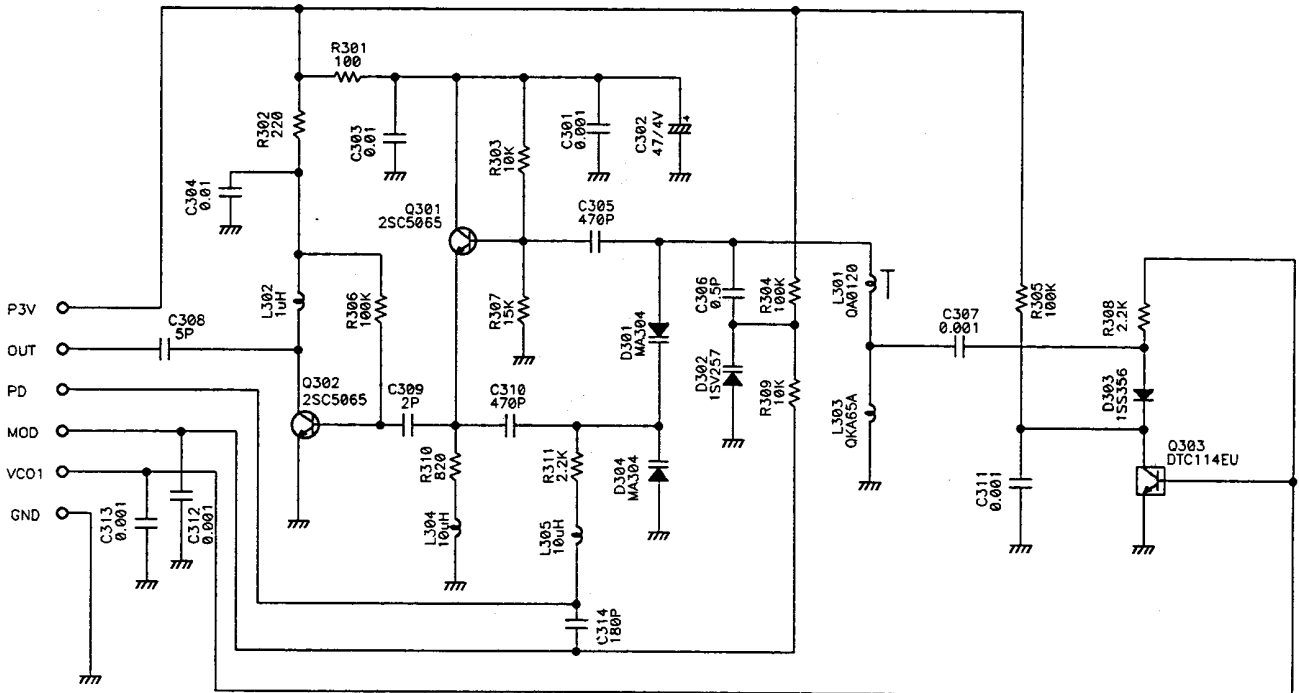


# CIRCUIT DIAGRAM

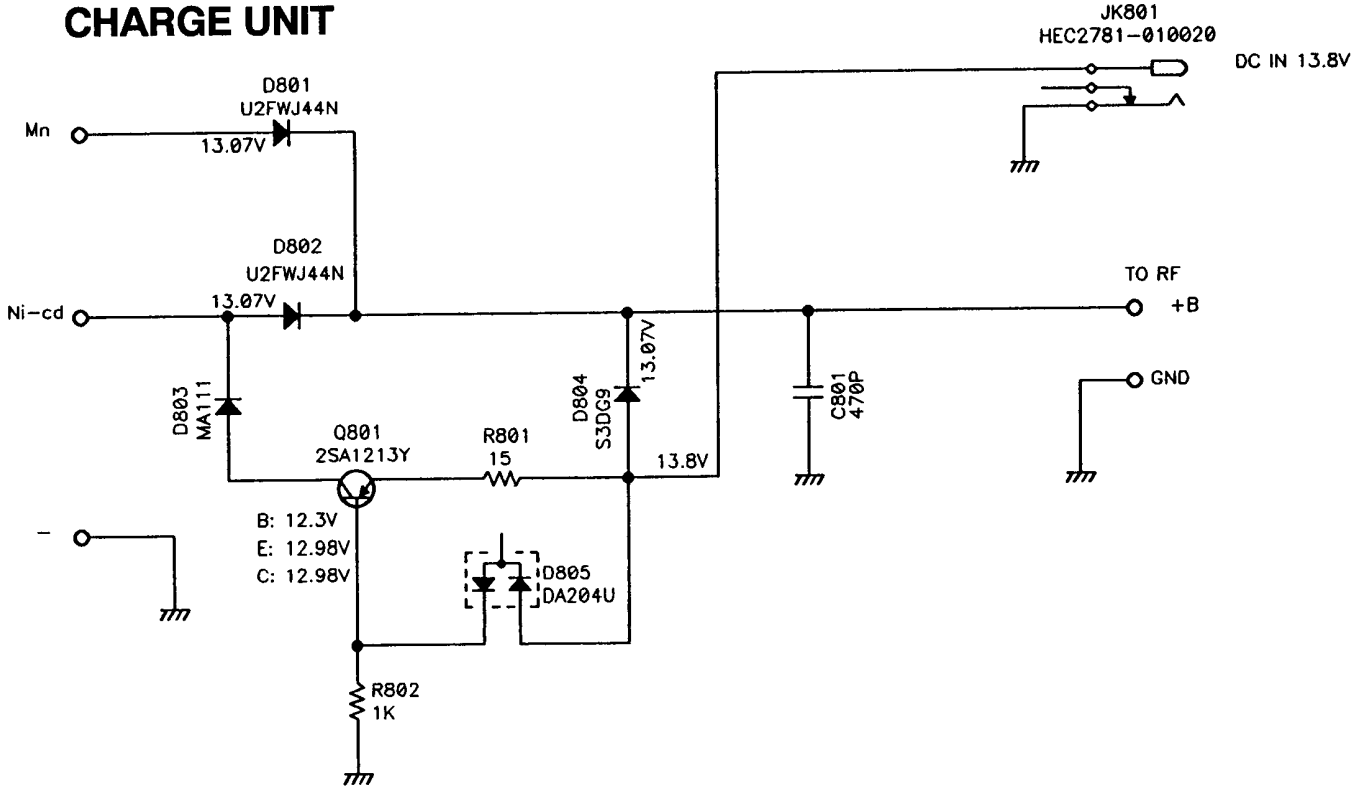
## PTT UNIT



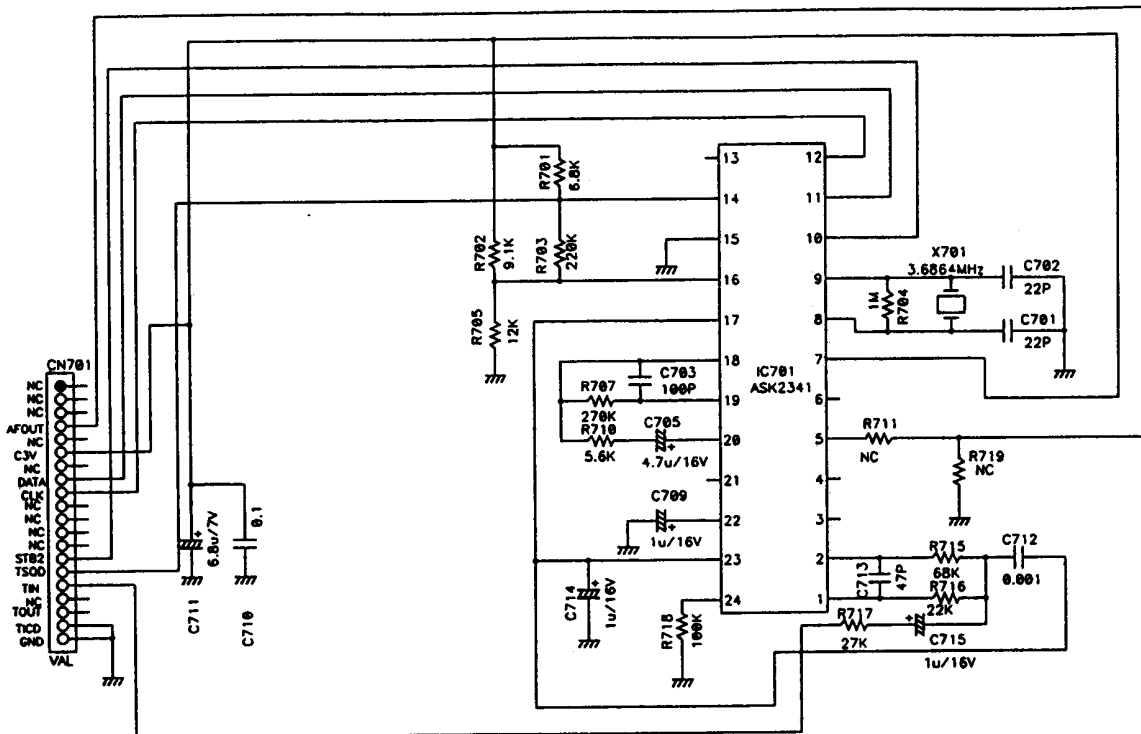
## VCO UNIT



# CHARGE UNIT

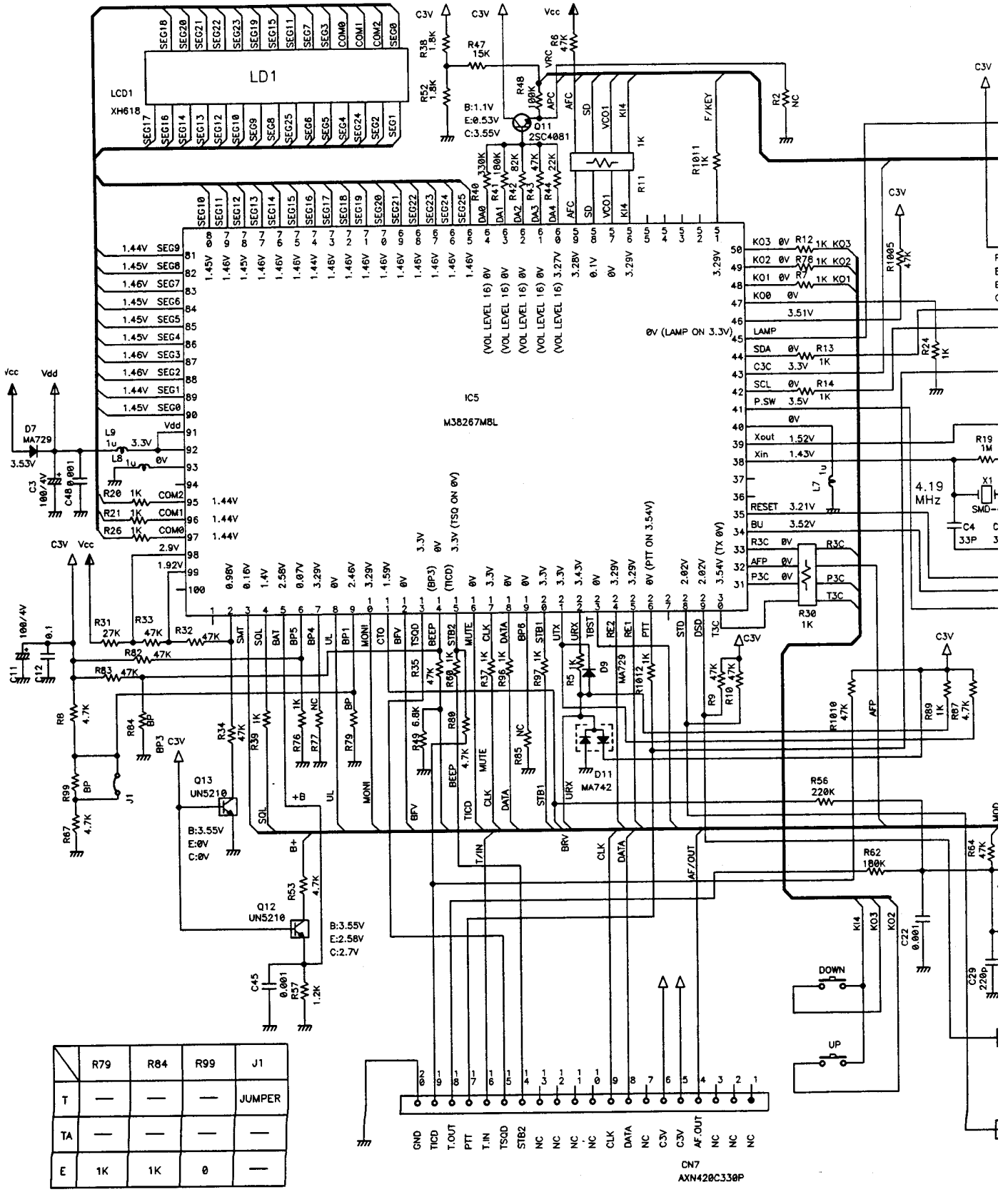


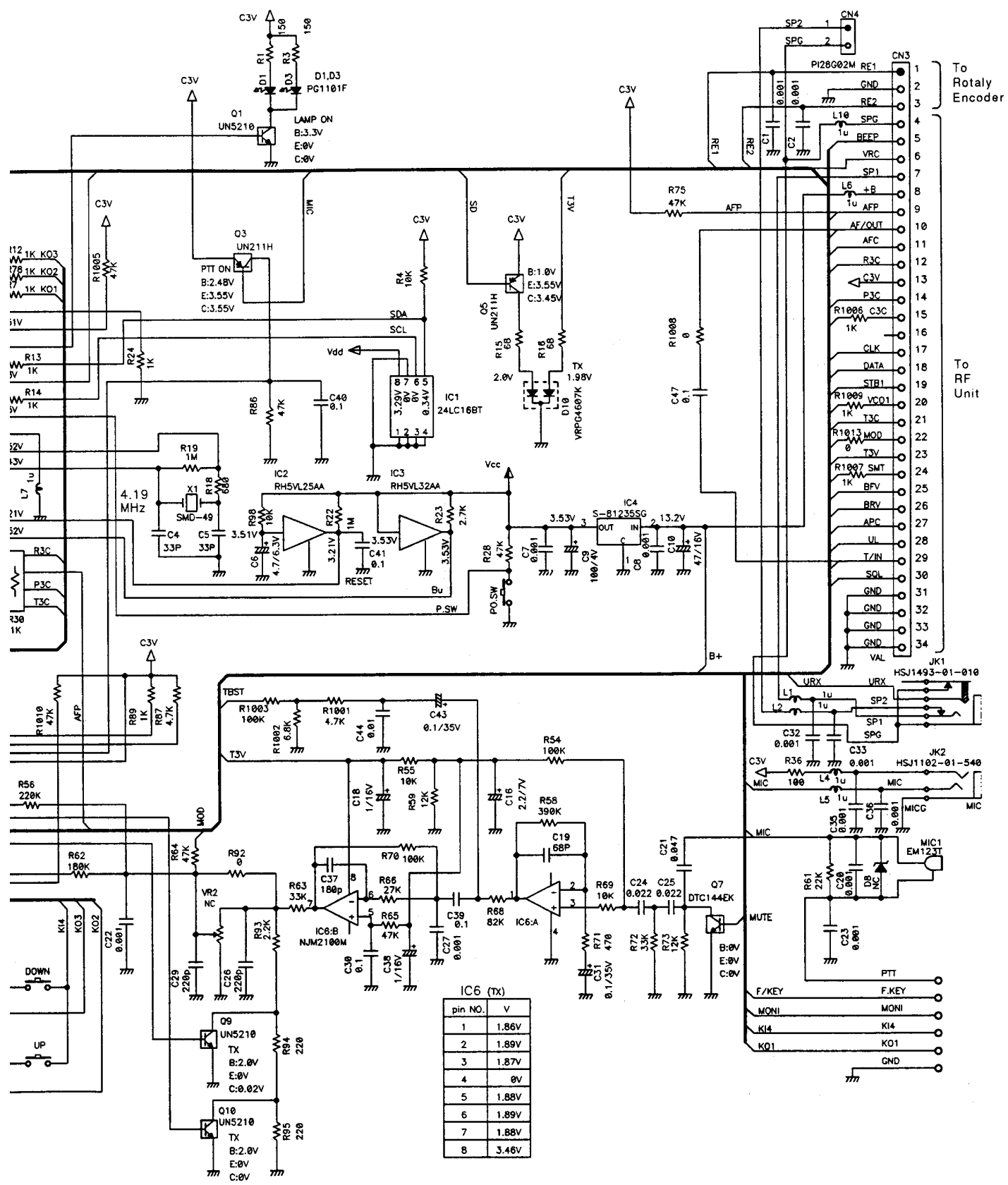
# TSQ UNIT



R718 WA BIAS DENNATU  
IC701NO DOUSADENNATU WO  
KETTUTEI

# CPU UNIT



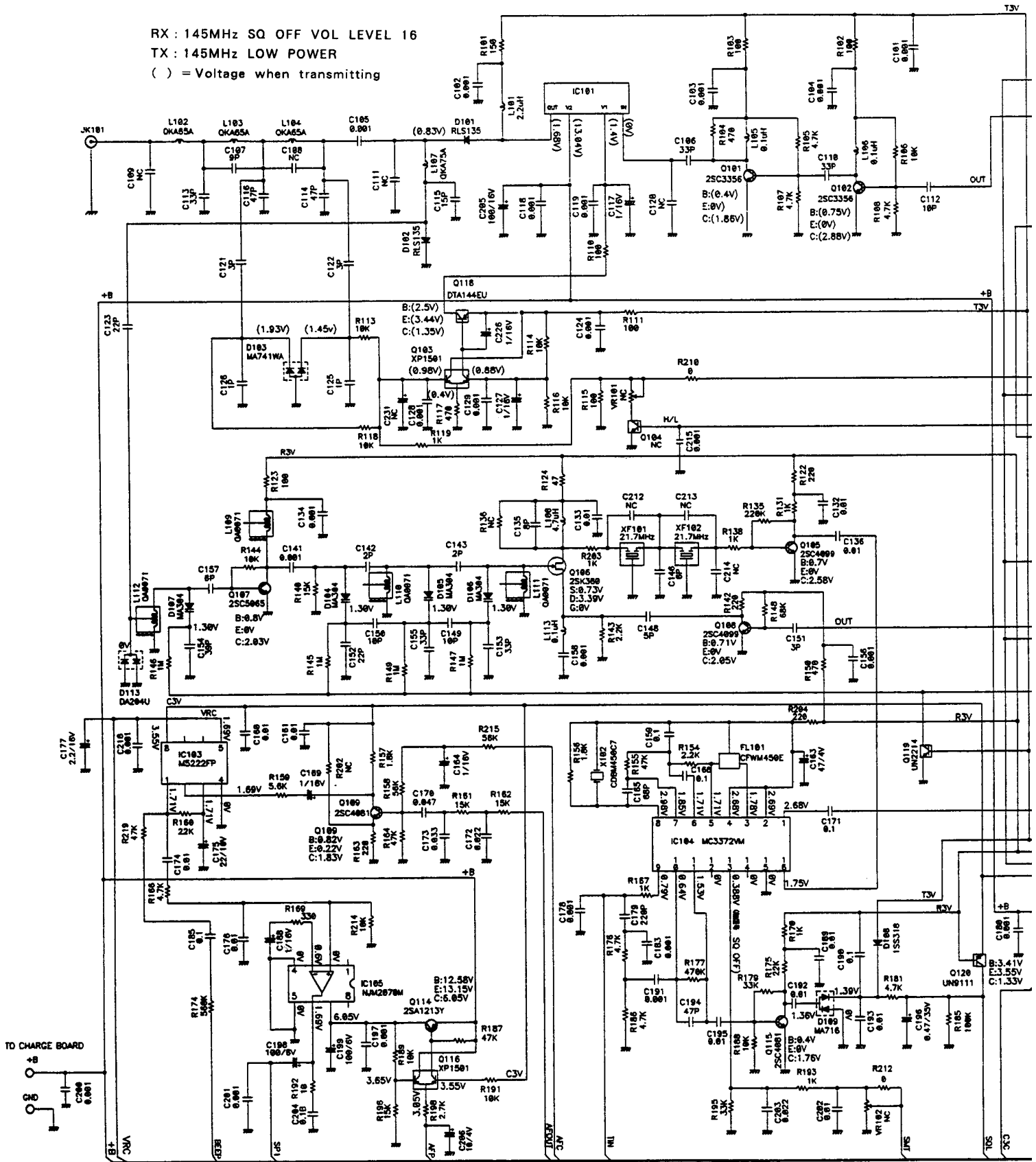


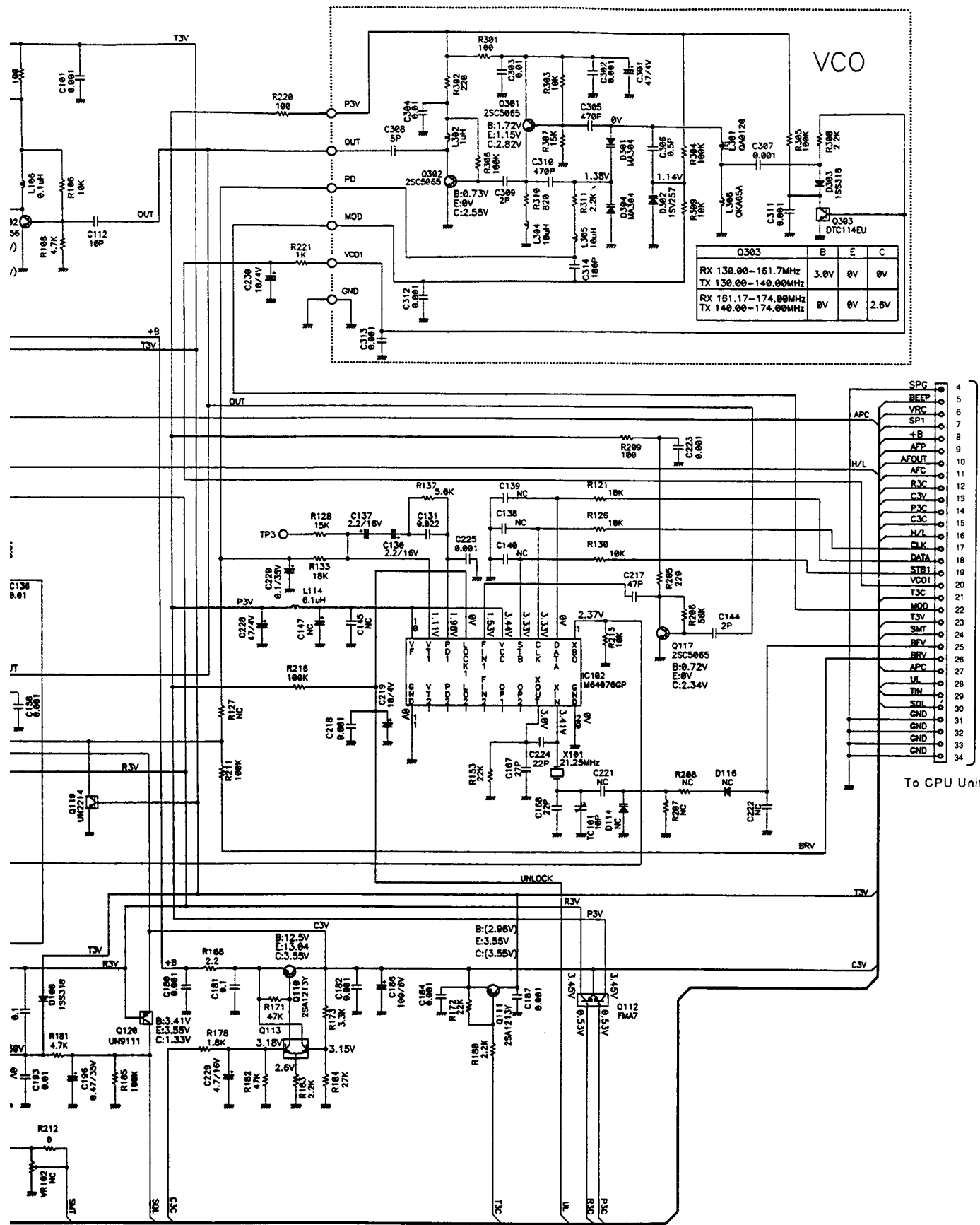
# RF UNIT

RX : 145MHz SQ OFF VOL LEVEL 16

TX : 145MHz LOW POWER

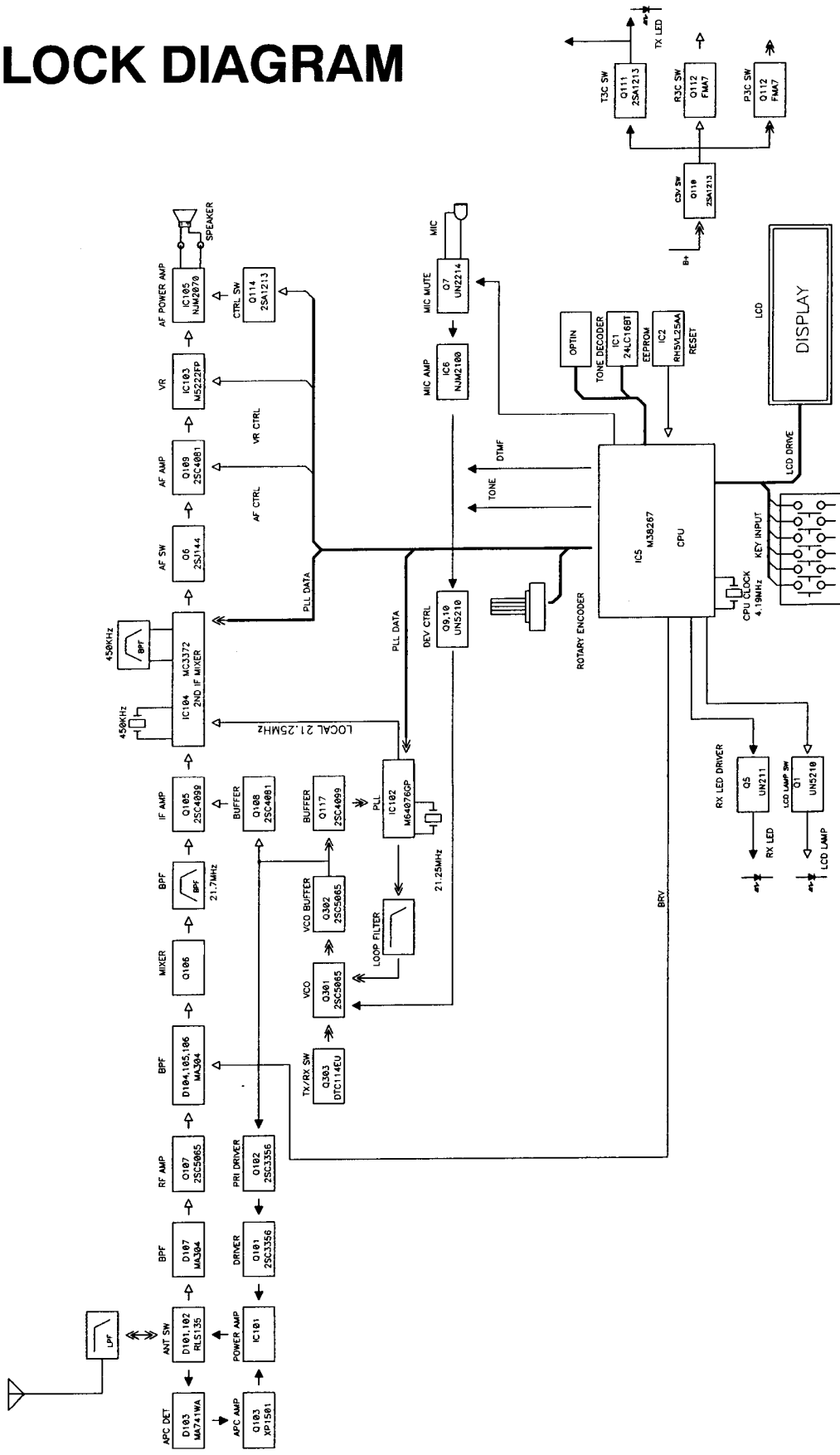
( ) = Voltage when transmitting







# BLOCK DIAGRAM



- TRANSMIT
- ← RECEIVE
- ↔ RECEIVE/TRANSMIT