DR-130

Service Manual

CONTENTS

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

1) General

Frequency Coverage:

RX: 136.000 ~ 174.000MHz	(T version)
TX: 144.000 ~ 148.000MHz	(T version)
RX: 144.000 ~ 146.000MHz	(E/EZ version)
TX: 144.000 ~ 146.000MHz	(E/EZ version)
RX: 130.000 ~ 174.000MHz	(EA/TA version)
TX: 130.000 ~ 174.000MHz	(EA/TA version)
RX: 136.000 ~ 155.000MHz	(TE1 version)
TX: 136.000 ~ 155.000MHz	(TE1 version)
RX: 150.000 ~ 174.000MHz	(TE2 version)
TX: 150.000 ~ 174.000MHz	(TE2 version)

Frequency Resolution:	5, 10, 12.5, 15,20,25kHzsteps
Antenna Impedance:	50 ohm unbalanced
Power Supply Requirements:	DC 13.8 +/-10% Volts DC
Current Drain at l3.8V	
	Receiving: Squelched less than 800mA
	Transmitting: High/10.0A (approx.)
	Low/3.5A (approx.)
Dimensions:	140mm(W) x 40mm(H) x 154mm(D)
Weight:	0.86kg (approx.)

2) Transmitter

Output Power:	High: 50Watts (DR-130T/E)
	High: 35Watts (DR-130TE1/2)
	High:10Watts (DR-130EZ)
	Low: 5Watts (Approx.)
Emission Mode:	F3E(FM)
Modulation System:	Variable Reactance Frequency Modulation
Max. Frequency Deviation:	+/ -5kHz (Wide Version)
	+/ -2.5kHz (Narrow Version)
Spurious Emission:	-60dB or below carrier
Microphone:	Electret Condenser Microphone
Operating Mode:	Simplex/Semi-Duplex
Offset :	0ffset from 0 to 15.995MHz

3) Receiver

Receiving System:	Superheterodyne Dual Conversion
Intermediate Frequency:	1stIF: 17.2MHz
	2nd IF: 455kHz
	12dB SINAD less than -l6dBu (144.000MHz ~ 147.995MHz)
Sensitivity:	More than +/-6kHz at -6dB (Wide Version)
Selectivity:	Less than +/-15kHz at -60dB (Wide Version)
Audio Power Output:	More than 2.5W 10% Distortion
Speaker Impedance:	8 ohm

CIRCUIT DESCRTPTION

1) Receiver System

1. Front End

The signal from the antenna is passed through a low-pass filter and input to the voltage step up circuit consisting Of L14. The signal from L14 is led to the gate of Q1. D19 is the diode limiter circuit against the excessive input power of more than 20dBm. Q1 is the FETwhich has two gates. The voltage of the gate 2 is set higher to get the high gain and sensitivity. The signal from Q1 is led to the triple band pass filter (L4, L5, L6), and gets the high image rejection ratio.

2. Mixer Circuit

The signal from the triple band pass filter is converted into the first IF signal of 17.2MHz. The receiving signal is led to the gate 1 of Q2, and the first local oscillator signal is led to the gate 2 of Q2. To get the high conversion gain, the local oscillator signal voltage is set to about 1V. To reduce the high adjacent channel interference, the band width of the FL2 is set to 20kHz. The signal from FL2 is amplified by Q8, and input to FM IF system IC3 of TK10487.

3. IF Circuit

The TK10487 has the second local oscilltor circuit, mixer circuit, detector circuit, squelch circuit, and so on. Pin1 and 2 are the terminals of the crystal oscillator circuit. Pin2 (emitter) is connected to the ground via the resister R3 to prevent the oscillator from decreasing the power at the low temperature. Pin4 of IC3 is connected to FL1 directly because the matching resistor for ceramic filter is built-in. The quadrature circuit (pin10 of IC3) is connected to the ceramic resonator X2 for the temperature stability and good quality. The signal from pin11 of IC3 is connected to the LPF. The detected AF signal, which has flat frequency characteristics, is led to the control unit and used as both squelch signal and tone squelch signal. De-emphasis circuit consists of R31, R32, C26 and C27. The LPF amplifier consisting of Q5 and Q6 is located far away from the VR in the control unit, so it outputs the high voltage signal to prevent S/N from the deterioration. The squelch switch circuit consists of Q4 and Q16, and switches on/off at the point where there is no voltage to prevent from the switching noise. The S meter signal from pin12 of IC3 is led to the CPU in the control unit after adjusting the level at D20 and VR5. The S meter signal is thermal compensated by TH1 and stabilized. The noise amplifier consists of pin13 and 14, the built-in OP amplifier in IC3. The output signal of noise amplifier is amplified by Q14, rectified by D5, and then led to the pin15 (hysteresis comparator input) of IC3.

4. AF Circuit

IC4 is about 5W audio power amplifier IC. When the capacity of pin1 in C16 is increased more, the output incidental noise becomes smaller. The high-pitched tone becomes smaller at the same time, This radio's capacity of C16 is determined considering the high-pitched tone.

2) Transmitter System

1. Modulation Circuit

3) PLL Circuit

The microphone amplifier IC1 (IDC, LPF) consists of two operational amplifiers. The signal from the microphone is led to pre-emphasis circuit consisting of C36 and R47 and then to the limiter circuit. The limiter circuit uses the saturation of the OP amplifier. The amplified signal is input to the low-pass filter IC1A. The output signal from the microphone amplifier is passed through variable resistors VR2 for modulatlon adjustment and input to the VCO unit. Sub tone deviation is determined by R24, R25 and VR2. The radio does not have the adjustment variable resistor for sub tone deviation.

2. TX Amp. Circuit

The signal from VCO is ampriied by TX, RX wide band LO amplifier Q19. The signal from Ql9 is passed through the transmission/reception selector, and amplified byQ20 and Q15. The PA unit is driven at 200mW driving power.

3. PA Circuit

IC5 is 50W powered amplifier module. The output power is controlled by the voltage ofV1. The RF signal amplified 50W in PA is passed through D3 and three-stage transmission/reception low-pass filter, and input to the antenna connector.

4. ALC Circuit

The power detection circuit consisting of D17 and D18 rectifies the output signal voltage. The detected DC voltage is led to the VR1 (power adjust trimmer), and amplified by Q3, Q9 and Ql3. Output power is controlled by voltage of V1 in lC5 and collector voltage of Ql5. When the temperature goes up unusually, the power down circuit consisting of R101 and TH2 works to prevent the device from the destruction.

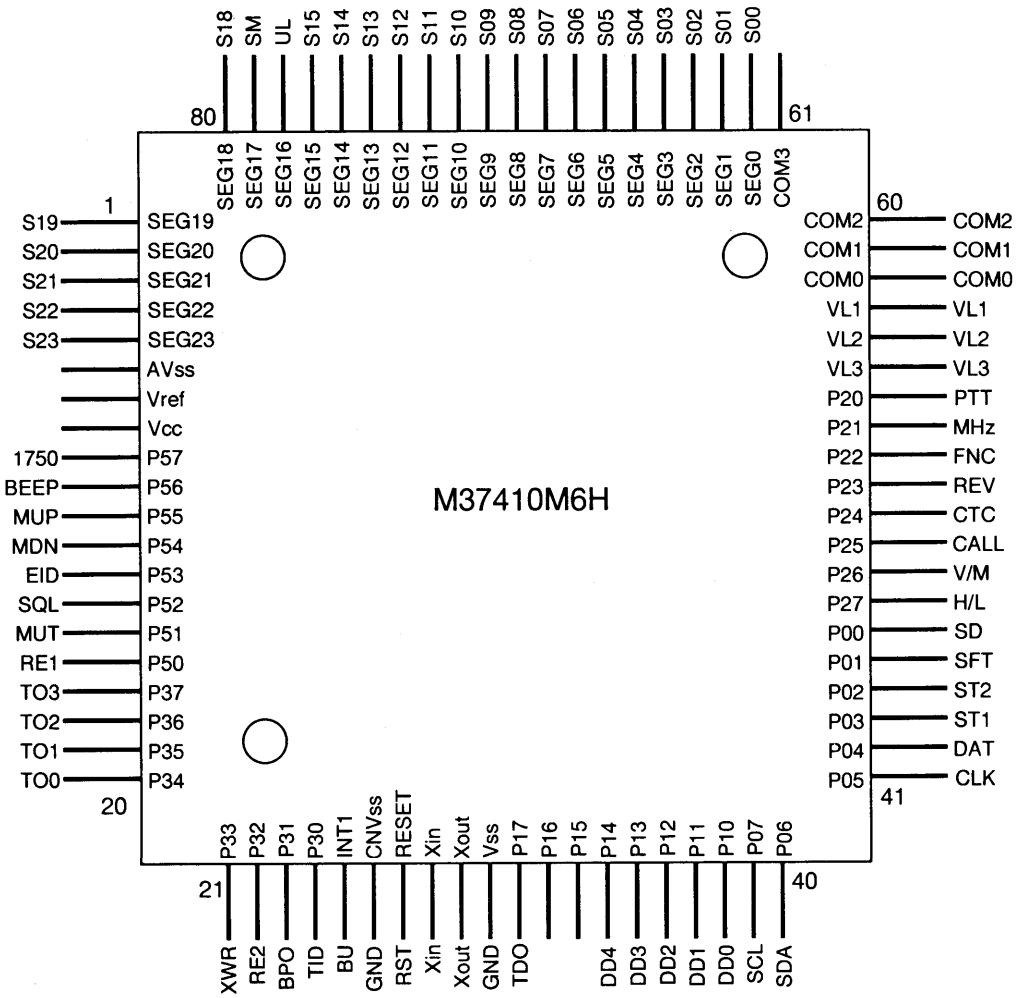
The VCO unit is designed for the PLL circuit, putting the VCO on one side, and PLL circuit on the other side.
Q301 in the VCO is grounded using the gate oscmator, and its frequency covers 134MHz to 174MHz without transmission/reception shift circuit.
lC301 is pulse swallow system based PLL IC with the built-in prescaler, which synthesizes 150MHzlband signal.
The loop filter consisting of Q302 and Q303 is the active type.

4) Terminal Function of Microprocessor

Port No.	I/O	Logic	PinName	Description
1	O		SEG19	LCDSegment19 Output
2	O		SEG20	LCDSegment20 Output
3	O		SEG21	LCDSegment21 Output
4	O		SEG22	LCDSegment22 Output
5	O		SEG23	LCDSegment23 Output
6	I		GND	AnalogGround 0V
7	I		Vref	Reference Voltage Input 5V
8	I		Vcc	CPU Power Supply hnput 5V
9	O		1750_	ToneBurstOutput
10	O	Clock	BEEP	BeepToneOutput
11	I	Active Low	MUP	Channel Up Input (Microphone Control)
12	I	Active Low	MDN	Channel Down Input (Microphone Control)
13	I	NoUse	EID	
14	O	Active Low	SQL	Squelch Control (L: Audio is off.)
15	O	ActiveHigh	MUT	Microphone Mute (H: Mic Amp is off.)
16	I	Active Low	REI	RotaryEncoder Input
17	O	Clock	TO3	ToneOutput
18	O	Clock	TO2	ToneOutput
19	O	Clock	TO1	ToneOutput
20	O	Clock	TO0	ToneOutput
21	I	ActiveHigh	XWR	EEPROM Write Status External Input
22	I	Active Low	RE2	RotaryEncoder Input
23	O	Active Low	BPO	Band Plan Detection Input (Common)
24	I	Active Low	TID	Tone Unit Detection Input
25	I	Active Low	BU	Back Up Signal Detection input
26	I		GND	Ground
27	I	Active Low	RST	ResetInput
28	I		Xin	Crystal Oscillator Terminal (3.58MHz)
29	O		Xout	Crystal Oscillator Terminal (3.58MHz)
30	I		GND	Ground
31	I	Active Low	TDO	CTCSS Tone Detection Output
32	O	Active High	DTD	For Trunking
33	O	NoUse		
34	I	Active Low	DD4	Band Plan 4 (V/U Selection)
35	I	Active Low	DD3	Band Plan 3 (445/435 Selection)
36	I	Active Low	DD2	Band Plan 2 (5k/12.5k Selection)
37	I	Active Low	DD1	Band Plan 1
38	I	Active Low	DD0	Band Plan 0
39	O	Clock	SCL	Clock Output for EEPROM

Port No.	I/O	Logic	PinName	Description
40	I/O	Clock	SDA	Data Output for EEPROM
41	O	Clock	CLK	Clock Output
42	O	Clock	DAT	DataOutput
43	O	Clock	ST1	Strobe Output for PLL IC
44	O	Clock	ST2	Strobe Output for CTCSS IC
45	I	Active Low	SFT	Shift Key Input
46	I	Active High	SD	Signal Detection Input
47	O	Active High	H/L	Transmission Power (H: Low Power)
48	I	Active Low	V/M	VFO/Memory Key Input
49	I	Active Low	CAL	Call Key Input
50	I	Active Low	CTC	CTCSS Mode Set Input
51	I	Active Low	REV	Reverse Key Input
52	I	Active Low	FNC	Function Key Input
53	I	Active Low	MHz	MHzKeyInput
54	I	Active Low	PTT	PTTKeyInput
55	I		LV3	Power Supply Input for LCD
56	I		LV2	Power Supply Input for LCD
57	I		LV1	Power Supply Input for LCD
58	I		COM0	LCD Common 0 Output
59	I		COM1	LCD Common 1 Output
60	I		COM2	LCD Common 2 Output
61	I	No Use		
62	O		SEG00	LCD Segment 00 Output
63	O		SEG01	LCD Segment 01 Output
64	O		SEG02	LCD Segment 02 Output
65	O		SEG03	LCD Segment 03 Output
66	O		SEG04	LCD Segment 04 Output
67	O		SEG05	LCD Segment 05 Output
68	O		SEG06	LCD Segment 06 Output
69	O		SEG07	LCD Segment 07 Output
70	O		SEG08	LCD Segment 08 Output
71	O		SEG09	LCD Segment 09 Output
72	O		SEG10	LCD Segment 10 Output
73	O		SEG11	LCD Segment 11 Output
74	O		SEG12	LCD Segment 12 Output
75	O		SEG13	LCD Segment 13 Output
76	O		SEG14	LCD Segment 14 Output
77	O		SEG15	LCD Segment 15 Output
78	I	ActiveHigh	UL	UnlockInput
79	I	Analog	SM	SignalMeterInput
80	O		SEG18	LCD Segment 18 Output

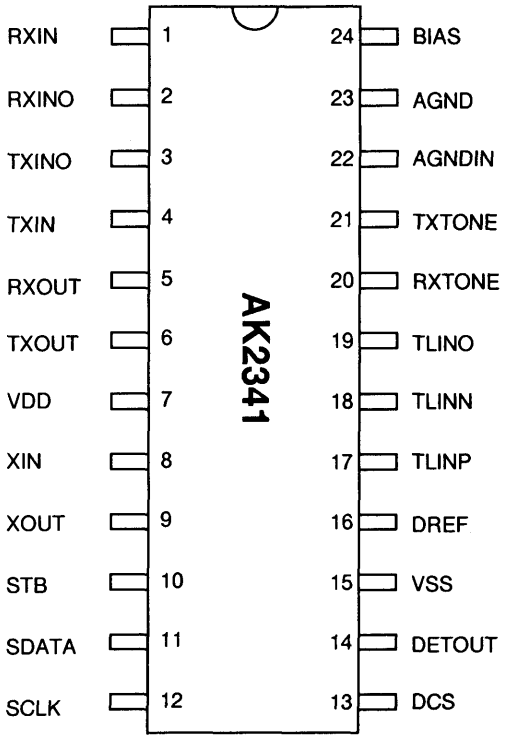
5) Terminal Connection of Microprocessor



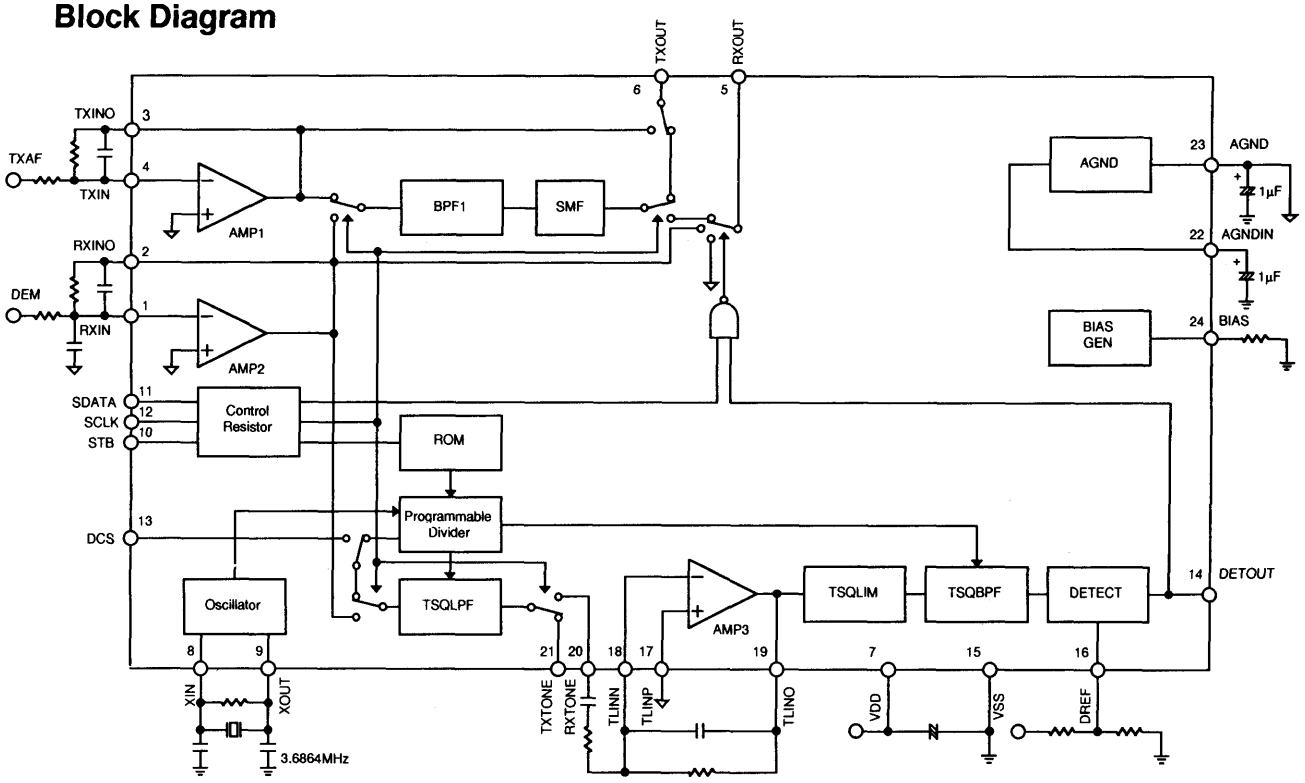
SEMICONDUCTOR DATA

1) AK2341 (XA0239)
CTCSS Encoder/Decoder

Pin No.	Pin Name	I/O	Function
1	RXIN	I	RX Signal Input
2	RXINO	O	AMP2 Output
3	TXINO	O	AMP1 Output
4	TXIN	I	TX Audio Input
5	RXOUT	O	RX Audio Output
6	TXOUT	O	TX Audio Output
7	VDD	-	Power Supply (1.8 ~ 5.5V)
8	XIN	I	Crystal Terminal (3.6864MHz)
9	XOUT	O	Crystal Terminal (3.6864MHz)
10	STB	I	Strobe for Serial Data
11	SDATA	I	Serial Data
12	SCLK	I	Serial Clock
13	DCS	I	DCS Input
14	DETOUT	O	Tone Detection Output (Detect: Low)
15	VSS	-	Ground
16	DREF	I	Tone Detection Level Adjust Input
17	TLINP	I	RX Tone Signal Reference Input
18	TLINN	I	RX Tone Signal Input
19	TLINO	O	AMP3 Output
20	RXTONE	O	RX Tone Signal Output
21	TXTONE	O	TX Tone Signal Output
22	AGNDIN	I	Analog Ground Input
23	AGND	O	Analog Ground Output
24	BIAS	I	Bias Input

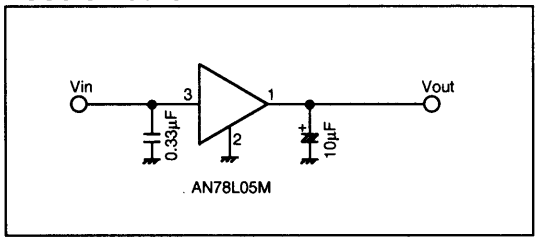


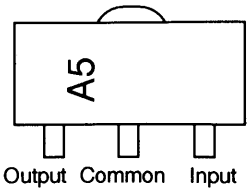
Block Diagram



2) AN78L05M (XA0238)
5V Voltage Regulator

Test Circuit

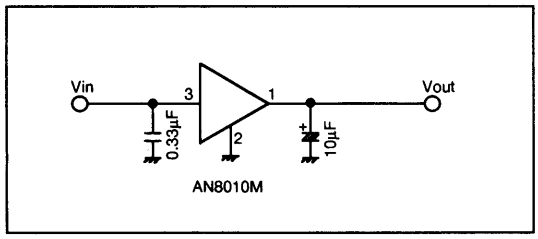


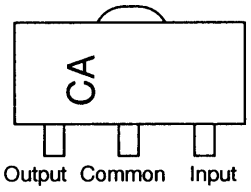


AN78L05M

3) AN8010M (XA0119)
Voltage Regulator

Test Circuit



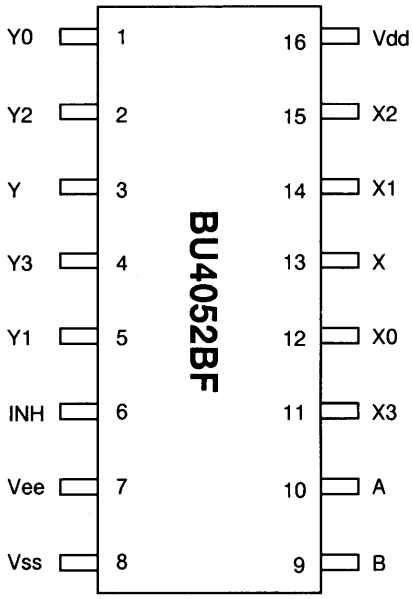


AN8010M

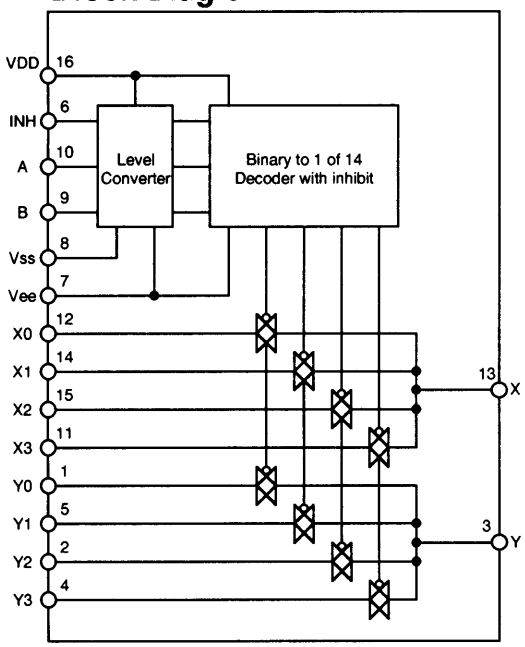
4) BU4052BF (XA0236)
Analog Multiplexers/Demultiplexers

Function Table

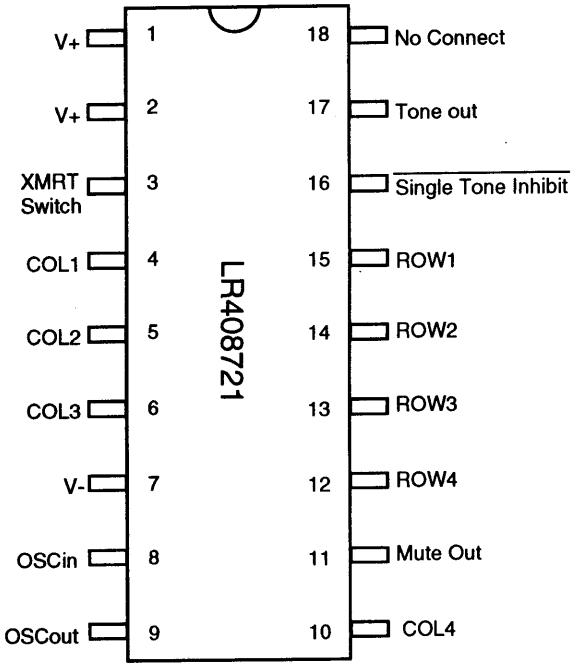
INHIBIT	A	B	ON Switch
Low	Low	Low	X0 Y0
Low	High	Low	X1 Y1
Low	Low	High	X2 Y2
Low	High	High	X3 Y3
High	Don't Care	Don't Care	None



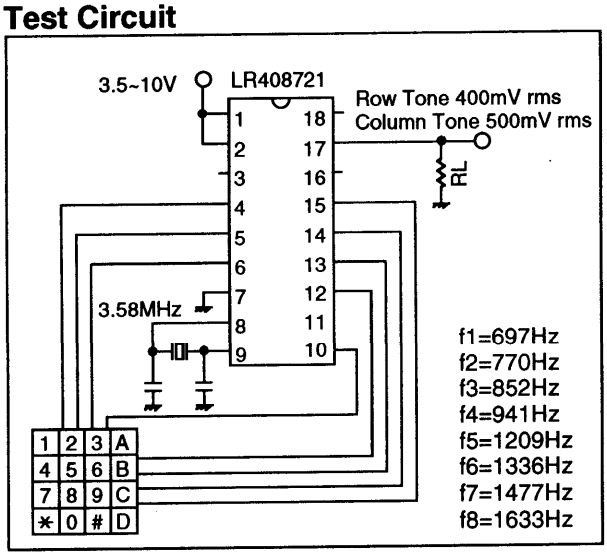
Block Diagram



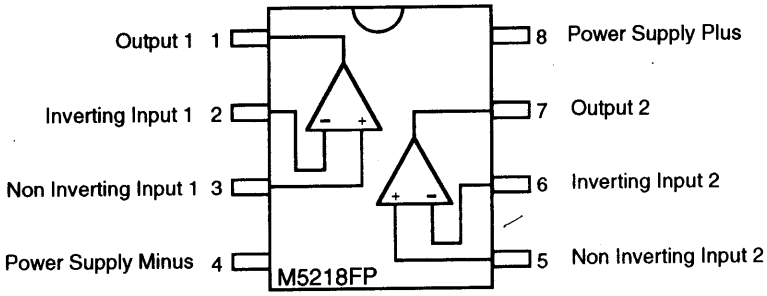
5) LR408721 (XA0042)
Tone Dialer



Test Circuit

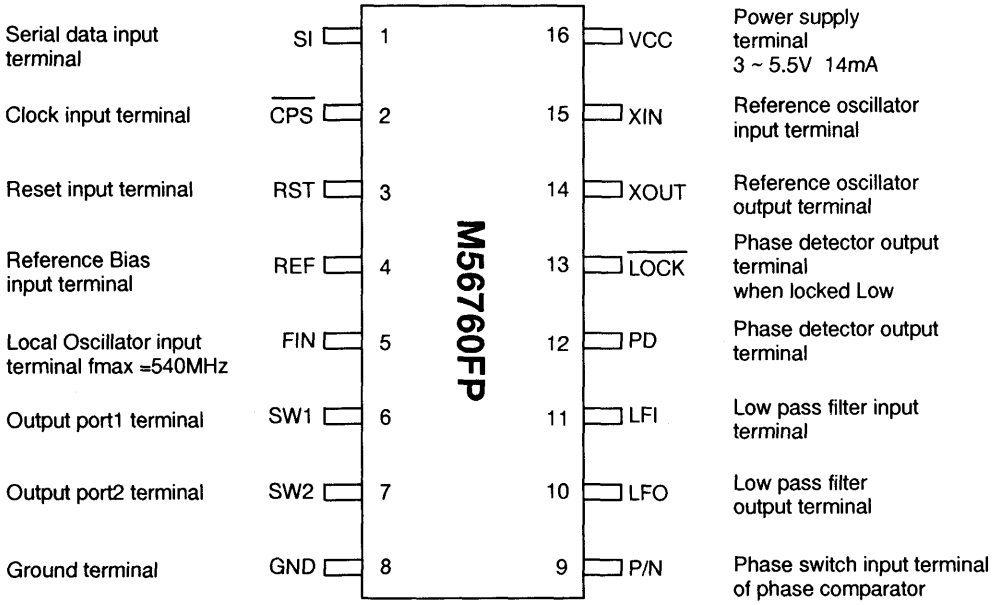


6) M5218FP (XA0068)
Dual Low Noise
Operational Amplifiers



7) M56760FP (XA0235)

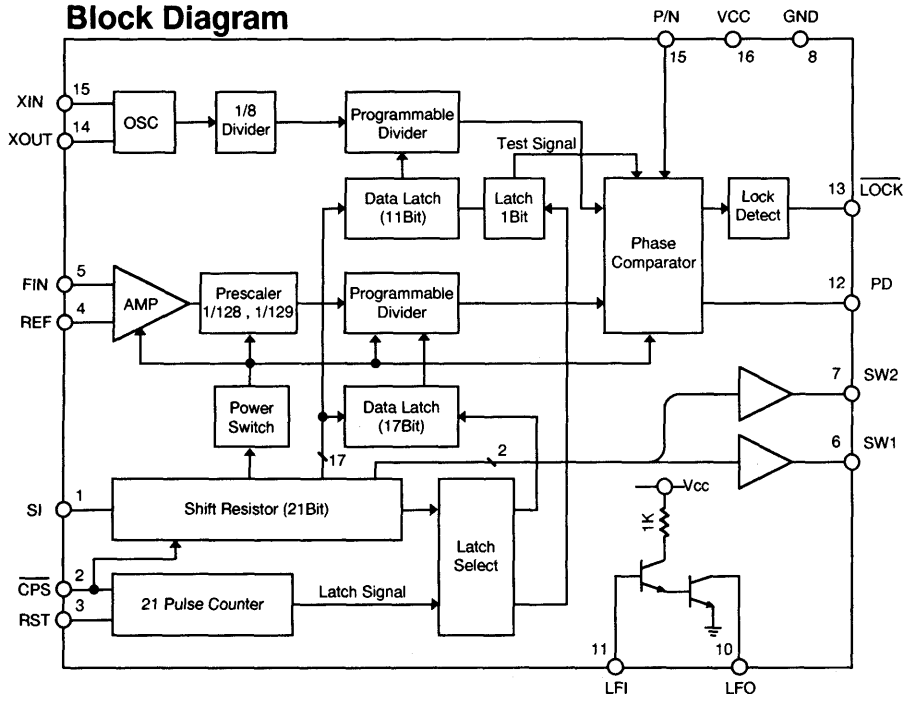
540MHz Frequency Synthesizer



Function Table

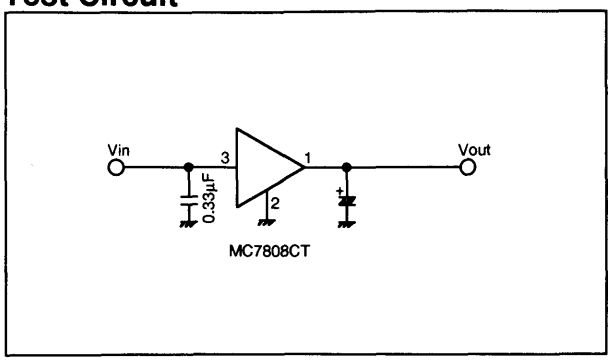
P/N input	Phase	PD output
High or Low	Locked	Hi-Z
High	Lead	High
High	Lag	Low
Low	Lead	Low
Low	Lag	High

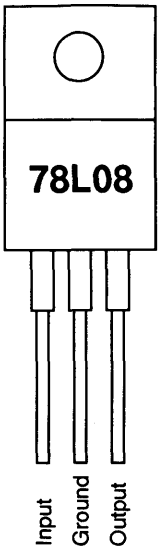
Block Diagram



8) MC7808CT (XA0082)
8V Voltage Regulator

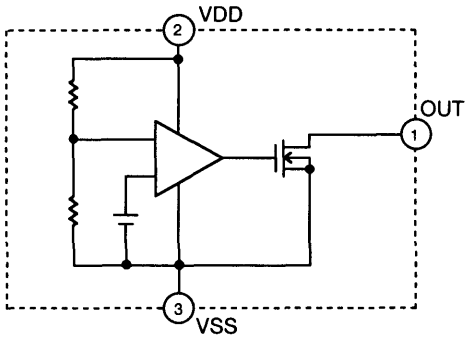
Test Circuit

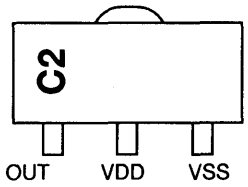




9) RH5VA32AA-T1 (XA0198)
C-MOS Voltage Detector

Equivalent Circuit

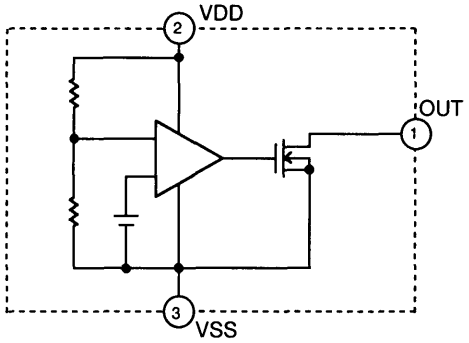


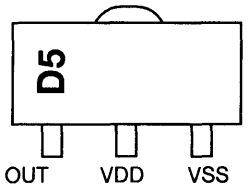


RH5VA32AA

10) RH5VA45AA-T1 (XA0208)
C-MOS Voltage Detector

Equivalent Circuit



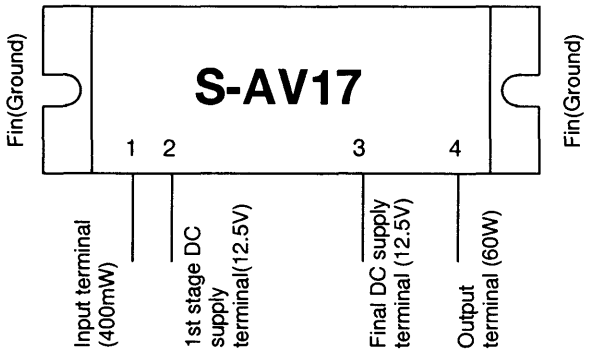


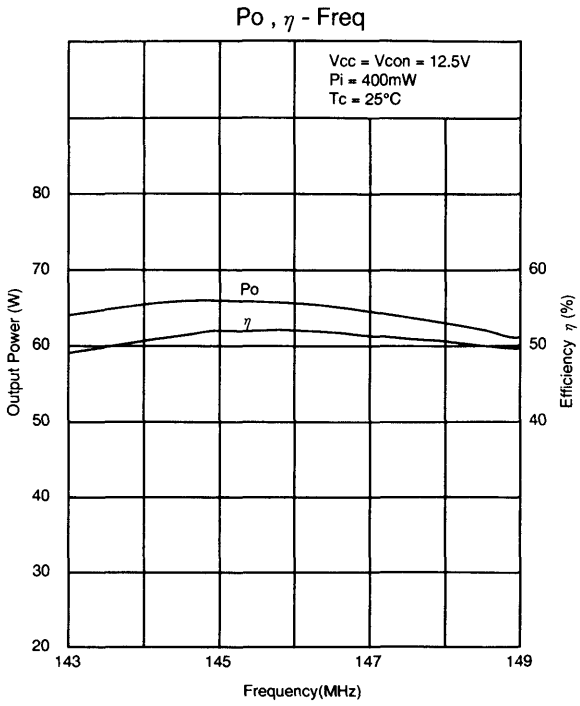
RH5VA45AA

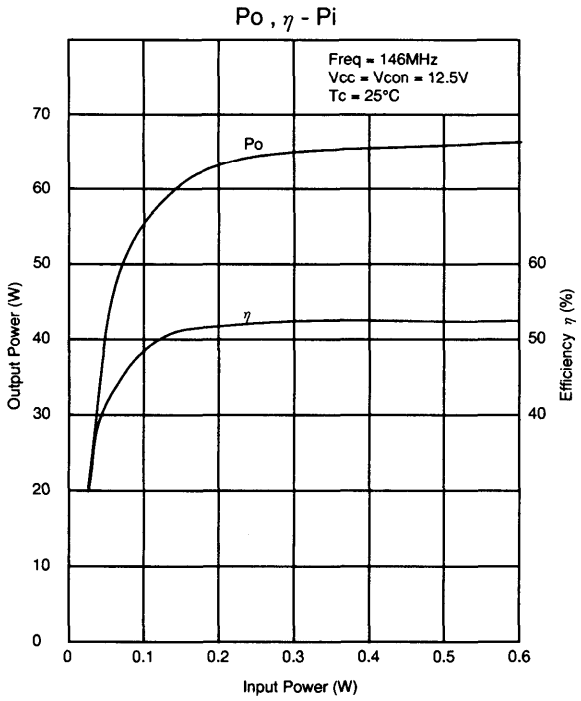
11) S-AV17 (XA0185)

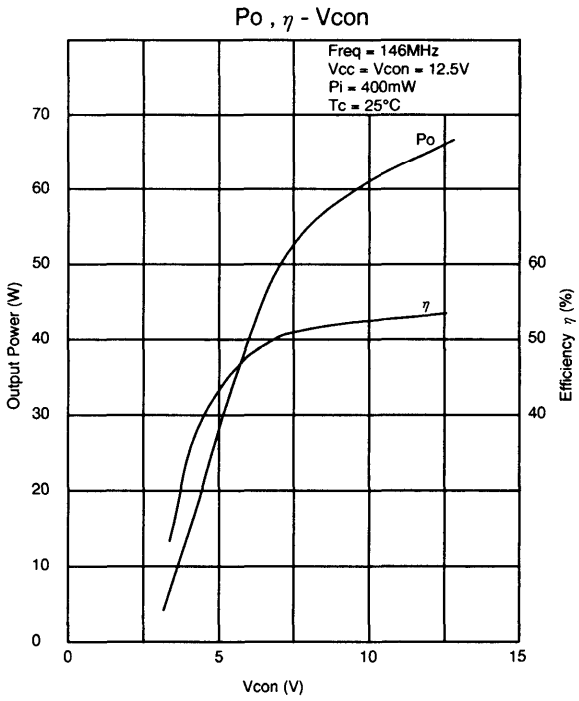
144 ~ 148MHz 60W

RF Power Module





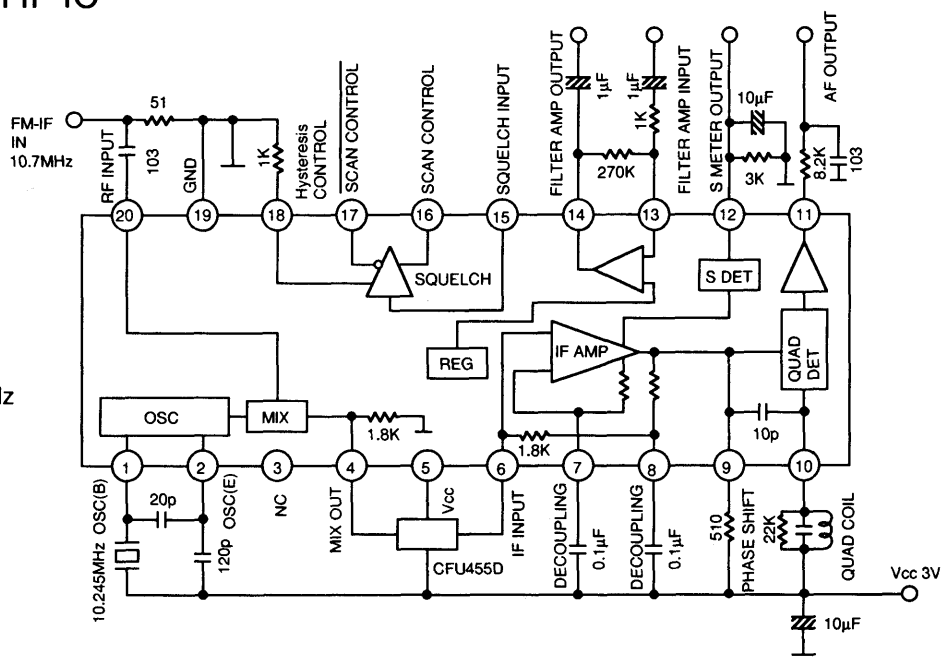




12) TK10487MTR (XA0144)

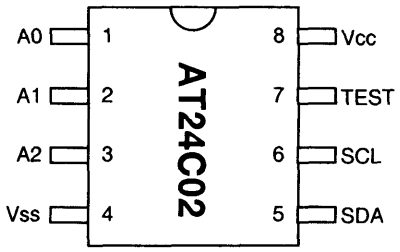
Narrow Band FM IF IC

Vcc=3V
F=10.7MHz
Icc 5mA
Limit 2μV -3dB
Vo 180mV Dev=3kHz
THD 1.0%



13) AT24C02N-10SI-2.7 (XA0364)

EEPROM 256 x 8Bit

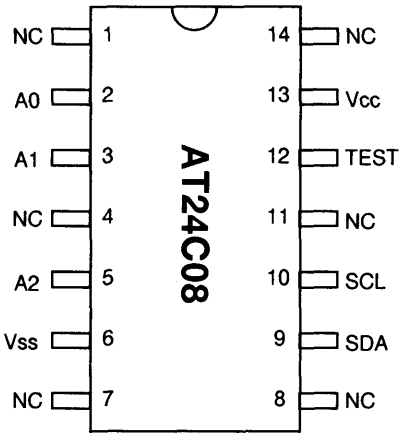


Pin Names

A0 ~ A2	Address inputs
SDA	Serial Data
SCL	Serial Clock
TEST	Write Control
Vss	Ground
Vcc	+5V

14) AT24C08-10SI-2.7 (XA0367)

EEPROM 1024 x 8Bit



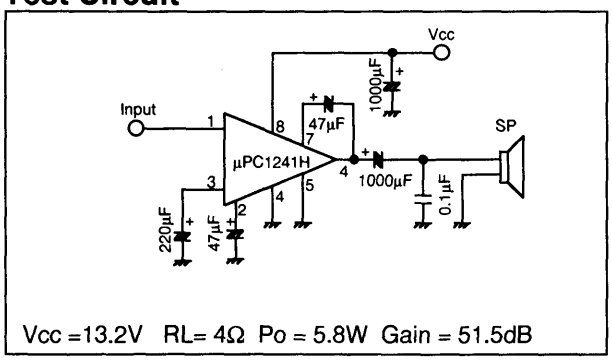
Pin Names

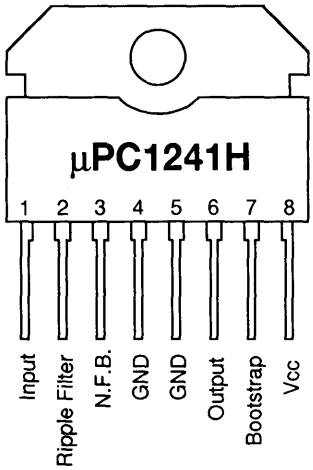
A0 ~ A2	Address inputs
SDA	Serial Data
SCL	Serial Clock
TEST	Hold at Vss
Vss	Ground
Vcc	+5V

15) μPC1241H (XA0079)

Audio Power Amplifiers

Test Circuit



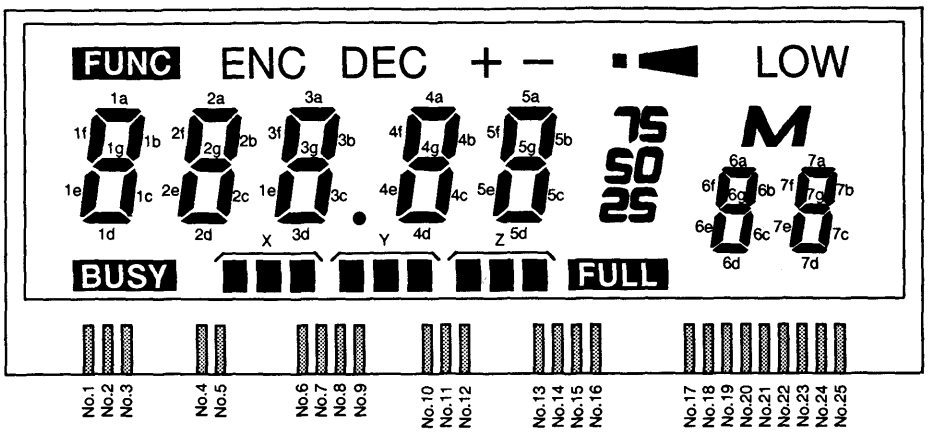


16) Transistor, Diode and LED Outline Drawings

Top View

1SS355	1SV215	DA204U	DAN202U	DAN235U	DTZ2.2A	DTZ5.1A	G3B
XD0254	XD0132	XD0130	XD0230	XD0246	XD0145	XD0136	XD0107
A	12	K	N	M	11	A1	
MA704WA	MA742	MA8110H	MI308	MI407	2SK508	2SK880	3SK131
XD0127	XD0250	XD0255	XD0014	XD0013	XE0010	XE0021	XE0012
M2P	M1U	1J	MI8	MI7	G K52 S D	G XY S D	G2 G1 V1 D S
TLSG264	2SA1576	2SA1736	2SB1132	2SB1292	2SC2412K	2SC2873	2SC2954
XL0029	XT0094	XT0099	XT0061	XT0112	XT0037	XT0099	XT0084
A(R) K A(G)	C FR B E	C LD B C E	C BA B C E	B1192 B C E	C BR B E	C MO B C E	C QK B C E
2SC3356	2SC4081LN	2SC4081	2SC4099	2SC4403	UMC2		UMC5
XT0030	XT0111	XT0095	XT0096	XT0114	XU0060		XU0152
C R24 B E	C LS B E	C BR B E	C JP B E	C LY B E			
DTA114YU	DTC114EU	DTC114YU	DTC124EU	DTC143TU			
XU0112	XU0131	XU0029	XU0140	XU0145			
C 54 B E	C 24 B E	C 64 B E	C 25 B E	C 03 B E	C1/B2 C2 C2 E1 B1 E2		C1/B2 C2 C5 E1 B1 E2
DTC144EU							
XU0148							
C 26 B E							

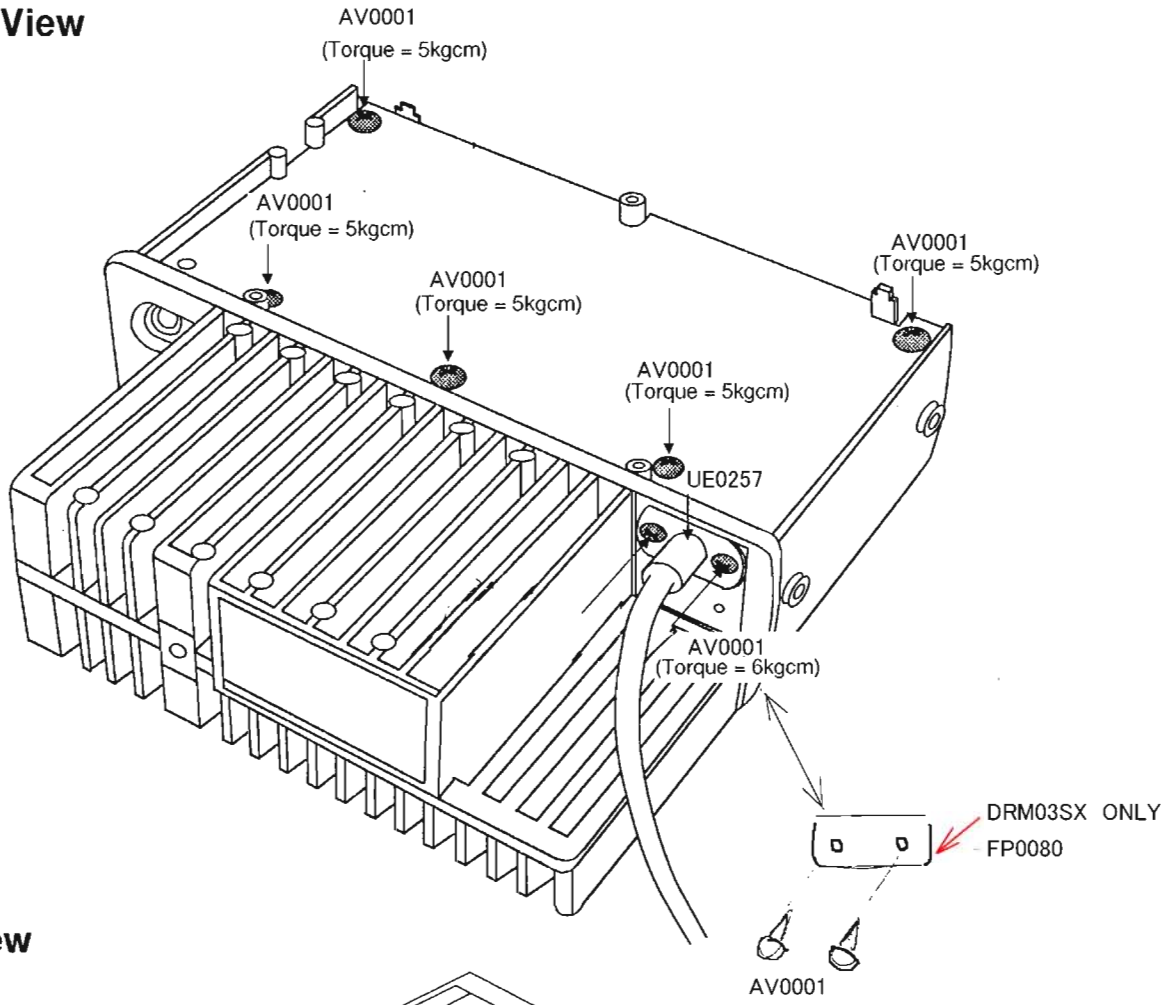
17) LCD Connection (EL0024)



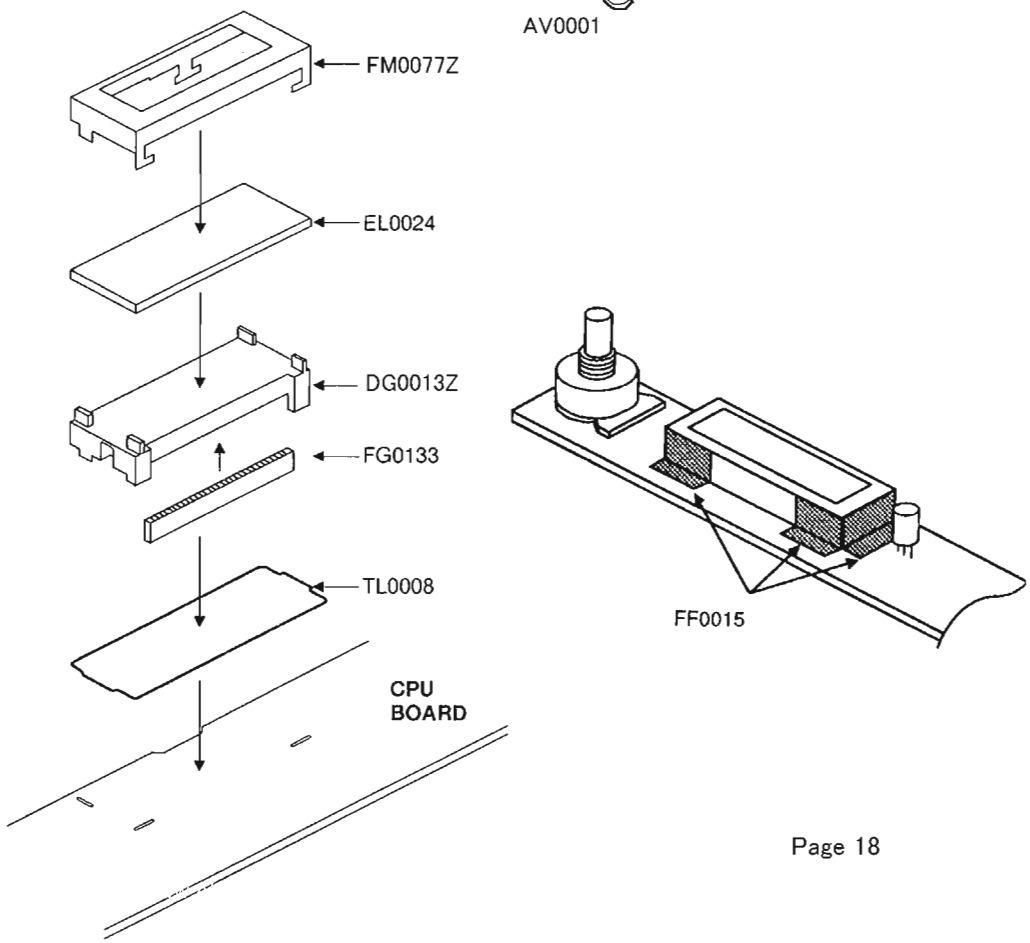
Pin No.	COMMON1	COMMON2	COMMON3
1	FUNC	1e	1f
2	1d	1g	1a
3	BUSY	1c	1b
4	ENC	2e	2f
5	2d	2g	2a
6	X	2c	2b
7	DEC	3e	3f
8	3d	3g	3a
9	●	3c	3b
10	Y	4e	4f
11	4d	4g	4a
12	+	4c	4b
13	Z	5e	5f
14	5d	5g	5a
15	−	5c	5b
16	FULL	25	50
17	75	6e	6f
18	6d	6g	6a
19	▪◀	6c	6b
20	M	7e	7f
21	7d	7g	7a
22	LOW	7c	7b
23		COM.1	
24			COM.2
25	COM.0		

EXPLODED VIEW

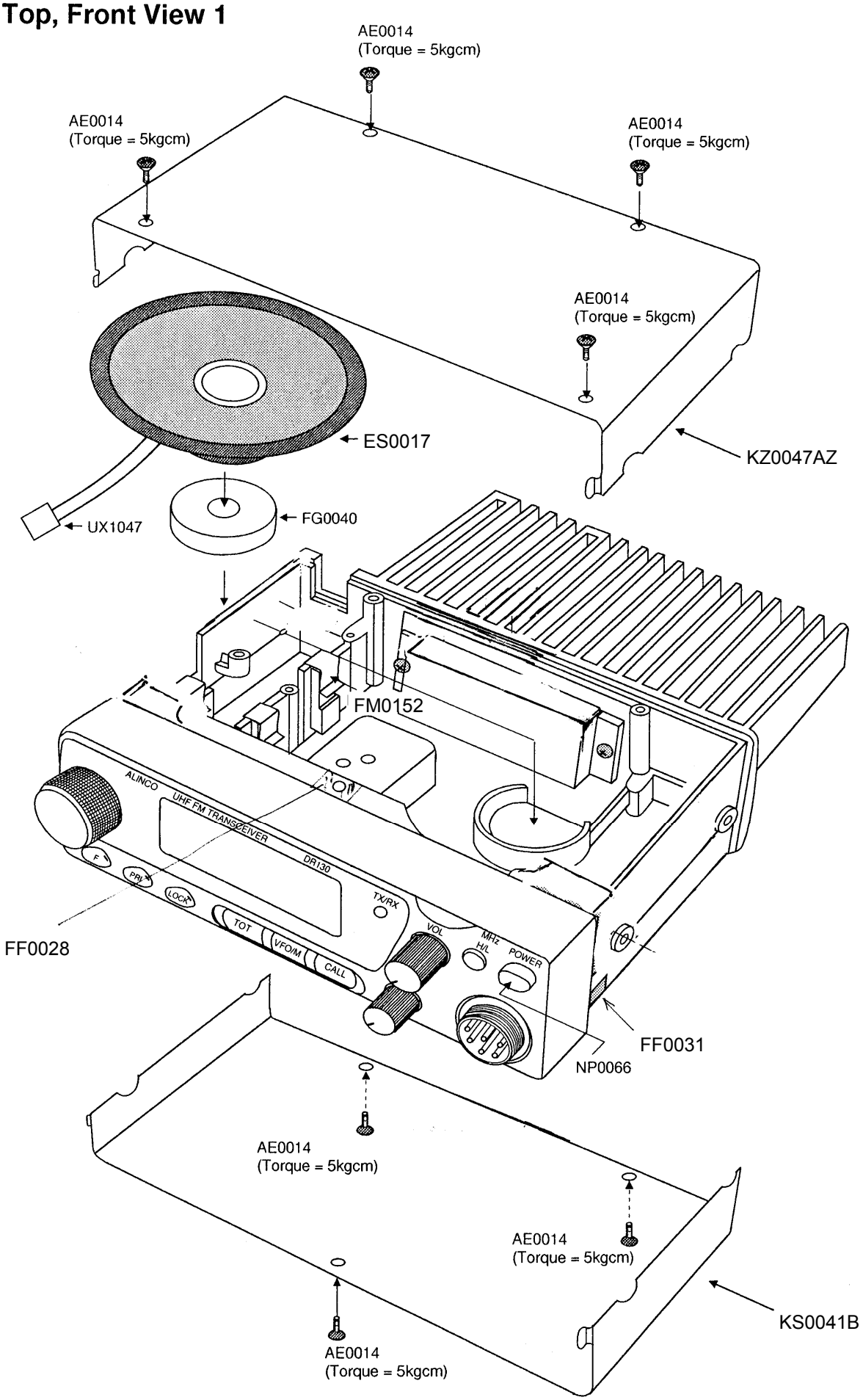
1) Bottom View



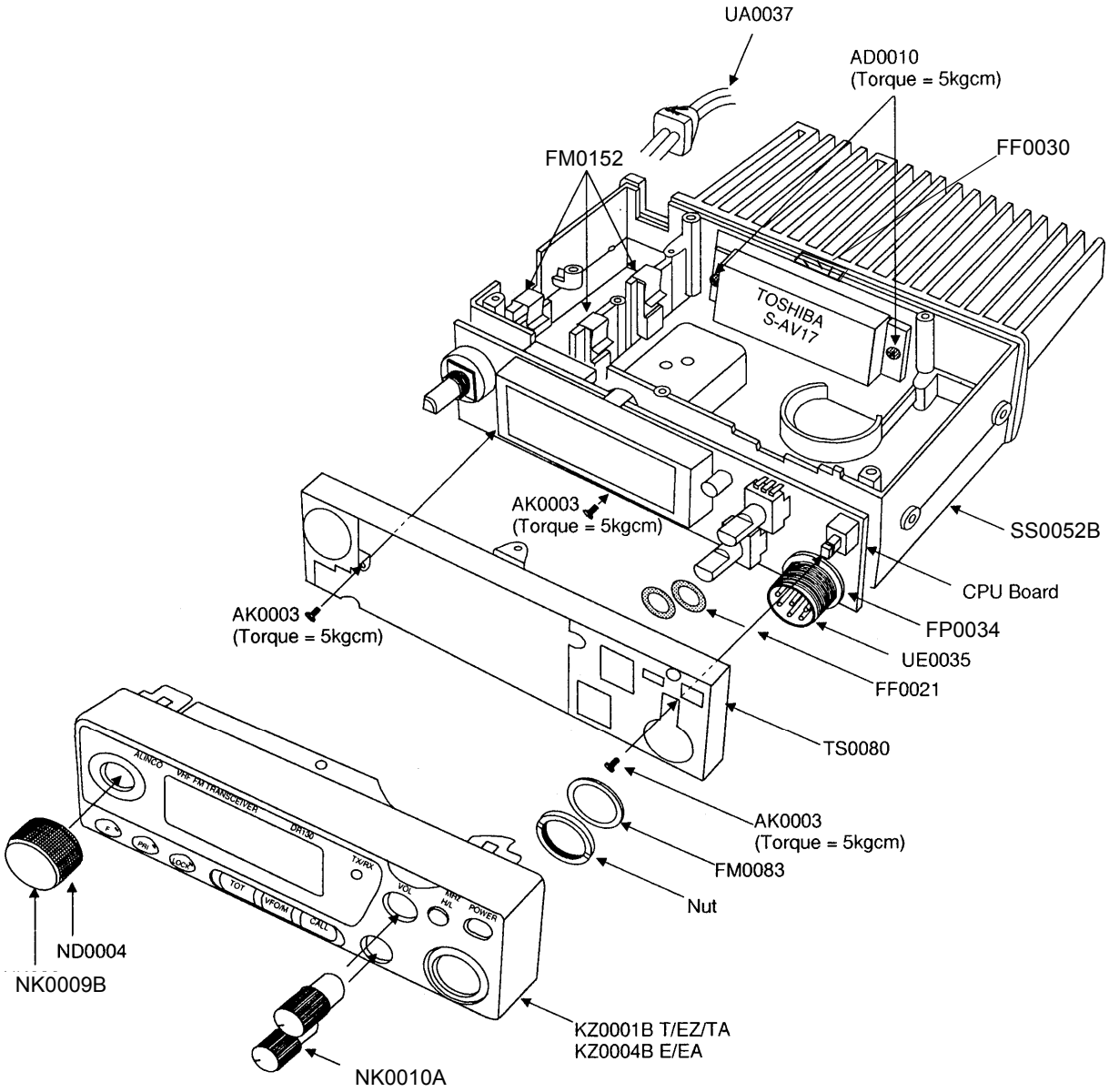
2) LCD View



3) Top, Front View 1



4) Top, Front View 2



VERSION TABLE

1)CPU UNIT

	W1	W2	W3/W4	R284	R294/R295	R286		R296	R297	CN204	IC208
T	JP	-	-	-	0	-		-	-	UE0165	-
E	JP	JP	-	0	0	-		-	-	UE0165	-
EZ	JP	JP	-	-	0	-		IK	1K	-	AT24CO8-10SI
EA	-	-	-	0	0	-		-	-	UE0165	-
TA	-	-	-	-	0	-		-	-	UE0165	-
TE1	-	-	JP	-	-	-		-	-	UE0165	-
TE2	-	-	JP	-	-	-		-	-	UE0165	-
	TX Free	RX Free	Tranking	12.5k/5k	Tranking	V/U					

2) MAIN UNIT

	C7	C43	C62	C63	C68	C71,74,75,7	C112	C139	C149
T/E/EZ/EA/TA	1000p	33p	47p	10u/16V	15p	47p	22p	22p	-
TE1	-	33p	100p	100u/16V	22p	56p	22p	12p	0.01uF
TE2	-	47p	33p	100u/16V	10p	1000p	18p	10p	0.01uF

	C150 153 154 155 156	C151	C152	D4	D11 12 13 16	D15	IC5	L4,5,6,14
T/E/EZ/EA/TA	-	-	-	-	1SV215	ISS355	S-AV7	QA0084
TE1	1000p	10u/20V	10u/35V	ISS355	1SV215	ISS355	M67781L	QA0084
TE2	1000p	10u/20V	10u/35V	ISS355	1SV214	-	M67781H	QA0100

	L12	P3	R43	R57	R101	R102	R111	R121	R122	R130	W5
T/E/EZ/EA/TA	QKA35D	-	47k	22	15k	1k	0	-	-	47k	-
TE1	QKA35D	0	47k	100	2.2k	4.7k	-	-	220	-	JP
TE2	QKA45D	0	27k	100	2.2k	4.7k	-	0	220	-	JP

3) VCO UNIT

	C315	C331	C332	D304	R315	R316	R332	R333	R334
T/E/EZ/EA/TA	3p	-	-	-	10k	100	-	-	-
TE1	3p	4700p	0.5p	1SV215	22k	56	8.2k	8.2k	220k
TE2	1p	4700p	0.5p	1SV215	22k	56	10k	8.2k	220k

PARTS LIST

NAIN Unit

Ref No	Parts No.	Description	Parts Name	Ver
		NAIN Unit		
C1	CU3035	Chip C.	C1608JB1H102KTA	
C2	CU3044	Chip C.	C1608JB1H562KTA	
C3	CU3100	Chip C.	C1608JB1C393ZTA	
C4	CU3044	Chip C.	C1608JB1H562KTA	
C5	CU3002	Chip C.	C1608CH1H010CTA	
C6	CU3002	Chip C.	C1608CH1H010CTA	
C7	CU3035	Chip C.	C1608JB1H102KTA	0
	-	-		1,2
C8	CS0049	Chip Tantal	TMCSA1C105MTR	
C9	CU3059	Chip C.	C1608JF1E104ZTA	
C10	CU3059	Chip C.	C1608JF1E104ZTA	
C11	CU3047	Chip C.	C1608JB1H103KTA	
C12	CU3047	Chip C.	C1608JB1H103KTA	
C13	CU3047	Chip C.	C1608JB1H103KTA	
C14	CU3047	Chip C.	C1608JB1H103KTA	
C15	CU3047	Chip C.	C1608JB1H103KTA	
C16	CU3102	Chip C.	C1608JB1C333KTA	
C17	CU3059	Chip C.	C1608JF1E104ZTA	
C18	CU8042	Chip C.	C2012JB1C104KTA	
C20	CU3035	Chip C.	C1608JB1H102KTA	
C21	CU3028	Chip C.	C1608CH1H271KTA	
C22	CU3035	Chip C.	C1608JB1H102KTA	
C23	CU3047	Chip C.	C1608JB1H103KTA	
C24	CU3059	Chip C.	C1608JF1E104ZTA	
C25	CU3102	Chip C.	C1608JB1C333KTA	
C26	CU3047	Chip C.	C1608JB1H103KTA	
C27	CU3049	Chip C.	C1608JB1E153KTA	
C28	CE0339	Electrolytic.C	16MV 10HW+TS	
C29	CE0343	Electrolytic.C	16MV 1000HC+T	
C30	CE0342	Electrolytic.C	16MV 470HC+TS	
C31	CS0049	Chip Tantal	TMCSA1C105MTR	
C32	CE0340	Electrolytic.C	16MV 47HC+TS	
C33	CE0337	Electrolytic.C	50MV 2R2SW+TS	
C34	CE0340	Electrolytic.C	16MV 47HC+TS	
C35	CU3035	Chip C.	C1608JB1H102KTA	
C36	CU3047	Chip C.	C1608J81H103KTA	
C38	CE0339	Electrolytic.C	16MV 10HW+TS	
C39	CU3031	Chip C.	C1608JH1H471KTA	
C40	CS0049	Chip Tantal	TMCSA1C105MTR	
C4l	CU3047	Chip C.	C1608JB1H103KTA	
C42	CU3035	Chip C.	C1608JB1H102KTA	
C43	CU3017	Chip C.	C1608CH1H330JTA	0.1
	CU3019	Chip C.	C1608CH1H470JTA	2
C44	CE0339	Electrolytic.C	16MV l0HW+TS	
C45	CU3035	Chip C.	C1608JB1H102KTA	
C46	CU3059	Chip C.	C1608JF1E104ZTA	
C47	CS0049	Chip Tantal	TMCXSA1C105MTR	
C48	CU3035	Chip C.	C1608JB1H102KTA	
C49	CU3024	Chip C.	C1608CH1H121KTA	
C50	CU3019	Chip C.	C1808CH1H470JTA	
C51	CE0339	Electrolytic.C	16MV 10HW+TS	
C52	CE0339	Electrolytic.C	16MV 10HW+TS	
C53	CS0049	Chip Tantal	TMCSA1C105MTR	
C54	CS0237	Chip Tantal	TMCMA1A475MTR	
C55	CU3035	Chip C.	C1608JB1H102KTA	
C56	CU3011	Chip C.	C1608CH1H100CTA	
C57	CU3031	Chip C.	C1608JH1H471KTA	
C58	CU3035	Chip C.	C1608JB1H102KTA	
C59	CU3018	Chip C.	C1608CH1H390JTA	
C60	CE0339	Electrolytic.C	16MV 10HW+TS	
C61	CU3022	Chip C.	C1608CH1H820JTA	
C62	CU3019	Chip C.	C1608CH1H470JTA	0
	CU3023	Chip C.	C1608CH1H101JTA	I
	CU3017	Chip C.	C1608CH1H330JTA	2
C63	CE0339	Electrolytic.C	16MV l0HW+TS	0
	CE0341	Electrolytic.C	16MV 100HC+TS	1,2
C64	CU3005	Chip C.	C1608CH1H040CTA	
C65	CC5068	Ceramic C.	RCC06SL390J-L46AU	
C66	CC5068	Ceramic C.	RCC06SL390J-L46AU	
C67	CC5068	Ceramic C.	RCC06SL390J-L46AU	
C68	CU3013	Chip C.	C1608CH1H150JTA	0
	CU3015	Chip C.	C1608CH1H220JTA	1
	CU3011	Chip C.	C1608CH1H100CTA	2
C69	CU3035	Chip C.	C1608JB1H102KTA	
C70	CU3015	Chip C.	C1608CH1H220JTA	
C71	CU3019	Chip C.	C1608CH1H470JTA	0
	CU3020	Chip C.	C1608CH1H560JTA	I
	CU3035	Chip C.	C1608JB1H102KTA	2
C72	CS0049	Chip Tantal	TMCSA1C105MTR	
C73	CU3035	Chip C.	C1608JB1H102KTA	
C74	CU3019	Chip C.	C1608CH1H470JT^	0
	CU3020	Chip C.	C1608CH1H560JTA	I
	CU3035	Chip C.	C1608JB1H102KTA	2
C75	CU3019	Chip C.	C1608CH1H470JTA	0
	CU3020	Chip C.	C1608CH1H560JTA	I
	CU3035	Chip C.	C1608JB1H102KTA	2
C76	CU3019	Chip C.	C1608CH1H470JT^	0
	CU3020	Chip C.	C1608CH1H560JTA	I
	CU3035	Chip C.	C1608JB1H102KTA	2
C77	CU3015	Chip C.	C1608CH1H220JTA	
C78	CU3035	Chip C.	C160GJB1H102KTA	
C79	CU3047	Chip C.	C1608JB1H103KTA	
C80	CU3005	Chip C.	C1608CH1H040CTA	
C81	CU3047	Chip C.	C1608JB1H103KTA	
C82	CU3035	Chip C.	C1608J81H102KTA	
C83	CU3035	Chip C.	C1608JB1H102KTA	
C84	CU3035	Chip C.	C1608JB1H102KTA	
C85	CU3035	Chip C.	C1608JB1H102tCTA	
C86	CU3035	Chip C.	C1608JB1H102KTA	
C87	CU3035	Chip C.	C1608JB1H102KTA	
C88	CU3064	Chip C.	C1608CH1H1R5CTA	
C89	CU3035	Chip C.	C1608JB1H102KTA	
C90	CU3035	Chip C.	C1608JB1H102KTA	
C9l	CU3035	Chip C.	C1608JB1H102KTA	
C92	CU3019	Chip C.	C1608CH1H470JTA	
C93	CU3035	Chip C.	C1608JB1H102KTA	
C94	CS0049	Chip Tantal	TMCSA1C105MTR	
C95	CU3035	Chip C.	C1608JB1H102KTA	
C96	CU3035	Chip C.	C1608JB1H102KTA	
C97	CU3019	Chip C.	C1608CH1H470JTA	
C98	CU0027	Chip C.	C2012CH1H470K	
C99	CU3019	Chip C.	C1608CH1H470JrTA	
C100	CU3035	Chip C.	C1608JB1H102KTA	
C101	CU3047	Chip C.	C1608JB1H103KTA	
C103	CU3012	Chip C.	C1608CH1H120DTA	
C104	CU3035	Chip C.	C1608JB1H102KTA	
C105	CE0340	Electrolytic.C	16MV 47HC+TS	
C106	CU3012	Chip C.	C1608CH1H120DTA	
C107	CU3035	Chip C.	C1608JB1H102KTA	
C108	CU3035	Chip C.	C1608JB1H102KTA	
C109	CU3003	Chip C.	C1608CH1H020CTA	
C110	CU3003	Chip C.	C1608CH1H020CTA	
C111	CU3035	Chip C.	C1608JB1H102KTA	
C112	CC5064	Ceramic C.	RCC05S L220J-L46AE	0,1
	CC5020	Ceramic C.	DD05-979SL-1 80J 500	2
C113	CU3035	Chip C.	C1608JB1H102KTA	
C114	CU3035	Chip C.	C1608JB1H102KTA	
C115	CU3023	Chip C.	C1608CH1H101JTA	
C116	CU3035	Chip C.	C1608JB1H102KTA	
C117	CU3035	Chip C.	C1608JB1H102KTA	
C118	CE0339	Electrolytic.C	16MV10HW+TS	
C119	CE0338	Electrolytic.C	25MV 4R7SW+TS	
C120	CU3035	Chip C.	C1608JB1H102KTA	
C121	CU3035	Chip C.	C1608JB1H102KTA	
C122	CE0341	Electrolytic.C	16MV 100HC+TS	
C123	CU7003	Chip C.	C3K31NAR102K	
C124	CU3035	Chip C.	C1608JB1H102KTA	
C125	CU3035	Chip C.	C1608JB1H102KTA	
C126	CU3064	Chip C.	C1608CH1H1R5CTA	
C127	CU3035	Chip C.	C1608JB1H102KTA	
C128	CU3035	Chip C.	C1608JB1H102KT	
C129	CU3035	Chip C.	C1608JB1H102KTA	
C130	CU3039	Chip C.	C1608JB1H222KTA	
C131	CU3036	Chip C.	C1608JB1H102KTA	
C132	CE0339	Electrolytic.C	16MV10HW+TS	
C133	CU3035	Chip C.	C1608JB1H102KTA	
C134	CU3023	Chip C.	C1608CH1H101JTA	
C135	CU3023	Chip C.	C16C8CH1H101JTA	
C139	CC5064	Ceramic C.	RCC05SL220J-L46A E	0
	CC5059	Ceramic C.	DD05-979SL120J500	1
	CC5058	Ceramic C.	DC05-979SL100J500	2
C140	CS0232	Chip Tantal	TMCMA1V474MTR	
C141	CU3035	Chip C.	C1608JB1H102KTA	
C147	CS0236	Chip Tantal	TMCMA0J685MTR	
C148	-			
C149	-			0
	CU3047	Chip C.	C1608JB1H103KTA	1,2
C150	-			0
	CU3035	Chip C.	C1608JB1H102KTA	1.2
C151	-			0
	CS0227	Chip Tantal	TMCMC1D106MTR	1.2

NAIN Unit

Ref No	Parts No.	Description	Parts Name	Ver
C152	-			0
	CS0375	Chip Tantal	TMCME1V106MTR	1,2
C153	-			0
	CU3035	Chip C.	C1608JB1H102KTA	I,2
C154	-			0
	CU3035	Chip C.	C1608JB1H102KTA	I,2
C155	-			0
	CU3035	Chip C.	C1608JB1H102KTA	1,2
C156	-			0
	CU3035	Chip C.	C1608JB1H102KTA	I,2
CN1	UE0191	Connector	11PSJE	
CN2	UE0191	Connector	11PSJE	
CN3	UE0043	Connector	PI22A02M	
D1	XD0136	Diode	DTZ5.1ATT11	
D2	XD0014	Diode	MI308	
D3	XD0013	Diode	MI407	
D4	-			0
	XD0254	Diode	1SS355	1,2
D5	XD0130	Diode	DA204U T106	
D6	XD0130	Diode	DA204U T106	
D8	XD0254	Diode	1SS385	
D9	XD0107	Diode	G3B	
D10	XD0254	Diode	1SS355	
D11	XD0132	Diode	1SV215TPH4	0,1
	XD0131	Diode	1SV214TPH4	2
D12	XD0132	Diode	1SV215TPH4	0,1
	XD0131	Diode	1SV214TPH4	2
D13	XD0132	Diode	1SV215TPH4	0.1
	XD0131	Diode	1SV214TPH4	2
D14	XD0246	Diode	DAN235U T106	
D15	XD0254	Diode	1SS385	0,1
	-			2
D16	XD0132	Diode	1SV215TPH4	0.1
	XD0131	Diode	1SV214TPH4	2
D17	XD0250	Diode	MA742-TX	
D18	XD0250	Diode	MA742-TX	
D19	XD0130	Diode	DA204U T106	
D20	XD0145	Diode	DTZ2.2A TT11	
FL1	XC0001	Filter	CFW455F	
FL2	XF0015	Filter	UM1-172M	
1C1	XA0068	IC	M5218FP-T01-1	
1C2	XA0082	IC	MC7808CT	
1C3	XA0144	IC	TK10487M	
1C4	XA0079	IC	uPC124lH	
1C5	XA0185	IC	S-AV17	0
	XA0273	IC	M67781L	1
	XA0274	IC	M67781H	2
1C6	XA0119	IC	AN8010M-E1	
JK1	UA0037	Connector	R-B2.0'0.2 Plug 15A	

0 : T/E/EZ/EA/TA
1: TE1
2: TE2
None: all models

MAIN Unit

Ref No	Parts No.	Description	Parts Name	Ver
JK2	UE0190	Connector	ANT Cable	
JK4	UJ0024	Connector	SJ1403JDIJ010	
L1	QC0063	Coil	NL322522TJ047M	
L2	QC0063	Coil	NL322522TJ347M	
L3	QC0048	Coil	NL322522T-100K	
L4	QA0084	Coil		0,1
	QA0100	Coil		2
L5	QA0084	Coil		0,1
	QA0100	Coil		2
L6	QA0084	Coil		0,1
	QA0100	Coil		2
L7	QC0067	Coil	N L322522T-R10M	
L8	QC0063	Coil	N L322522T-047M	
L9	QKA45E	Coil	MR 3.0 4.5 T 0.8	
L10	QKA45E	Coil	MR 3.0 4.5 T 0.8	
L11	QKA45E	Coil	MR 3.0 4.5 T 0.8	
L12	QKA35D	Coil		
L13	QKA95D	Coil	MR3.09.5T0.6	
L14	QA0084	Coil		0,1
	QA0100	Coil		2
L15	QC0067	Coil	N L322522T-R10M	
L16	QKA35D	Coil	MR3.03.5T0.6	
M106	SD0034		Earth Spdrg DR130	
Q1	XE0012	FET	3SK131V11. 12T1	
Q2	XE0012	FET	3SK131V11. 12T1	
Q3	XT0094	Transistor	2SA1576 T106R	
Q4	XT0095	Transistor	2SC4081 T106R	
Q5	XT0095	Transistor	2SC408I T106R	
Q6	XT0095	Transistor	2SC4081 T106R	
Q7	XT0061	Transistor	2SB1132 T100Q	
Q8	XT0096	Transistor	2SC4099 T106N	
Q9	XT0037	Transistor	2SC2412K T146R	
Q10	XU0131	Transistor	DTC114EU T106	
QII	XU0148	Transistor	DTC144EU T106	
Q12	XU0112	Transistor	DTA114YU T106	
Q13	XT0112	Transistor	2SBI292F	
Q14	XT0095	Transistor	2SC408I T106R	
Q15	XT0084	Transistor	2SC2954-TI	
Q16	XT0095	Transistor	2SC408I TI06R	
Q17	XU0152	Transistor	UMC5TR	
Q18	XE0001	Transistor	2SK880GR TE85L	
Q19	XT0114	Transistor	2SC4403	
Q20	XT0030	Transistor	2SCX3BB6-T1	
Q2I	XT0099	Transistor	2SA1736Y TEI2L	
Q22	XT0095	Transistor	2SC4081 T106R	
Q24	XU013I	Transistor	DTCI14EUTI06	
Q30	XU0148	Transistor	DTC144EU	

Ref No	Parts No.	Description	Parts Name	Ver
R1	RK0108	Chip R.	ERJ6GEYJ2R2V	
R2	RK2024	Chip R.	MCR50JZHJ471	
R3	RK3050	Chip R.	ERJ3GSYJ103V	
R4	RK307I	Chip R.	ERJ3GSYJ564V	
R5	RK3034	Chip R.	ERJ3GSYJ471V	
R6	RK3062	Chip R.	ERJ3GSYJ104V	
R7	RK3042	Chip R.	ERJ3GSYJ222V	
R8	RK3042	Chip R.	ERJ3GSYJ222V	
R9	RK3001	Chip R.	ERJ3GSYJ000V	
R10	RK3071	Chip R.	ERJ3GSYJ564V	
R11	RK3046	Chip R.	ERJ3GSYJ472V	
R12	RK3038	Chip R.	ERJ3GSYJ102V	
R13	RK3038	Chip R.	ERJ3GSYJ102V	
R14	RK3071	Chip R.	ERJ3GSYJ564V	
R15	RK3050	Chip R.	ERJ3GSYJ103V	
R16	RK4028	Chip R.	ERJ-12YJ151	
R17	RK3057	Chip R.	ERJ3GSYJ393V	
R18	RK3042	Chip R.	ERJ3GSYJ222V	
R19	RK3060	Chip R.	ERJ3GSYJ683V	
R20	RK3060	Chip R.	ERJ3GSYJ683V	
R21	RK3051	Chip R.	ERJ3GSYJ123V	
R22	RK3050	Chip R.	ERJ3GSYJ103V	
R23	RK3050	Chip R.	ERJ3GSYJ103V	
R24	RK3050	Chip R.	ERJ3GSYJ103V	
R25	RK3047	Chip R.	ERJ3GSYJ562V	
	RK3046	Chip R.	ERJ3GSYJ472V	2
R26	RK3026	Chip R.	ERJ3GSYJ101V	
R27	RK3038	Chip R.	ERJ3GSYJ102V	
R28	RK3058	Chip R.	ERJ3GSYJ473V	
R29	RK3042	Chip R.	ERJ3GSYJ222V	
R30	RK3045	Chip R.	ERJ3GSYJ392V	
R31	RK3054	Chip R.	ERJ3GSYJ223V	
R32	RK3057	Chip R.	ERJ3GSYJ393V	
R33	RK3038	Chip R.	ERJ3GSYJ102V	
R34	RK4018	Chip R.	ERJ-12YJ220	
R35	RK3050	Chip R.	ERJ3GSYJ103V	
R36	RK3038	Chip R.	ERJ3GSYJ102V	
R37	RK3045	Chip R.	ERJ3GSYJ392V	
R38	RK3054	Chip R.	ERJ3GSYJ223V	
R39	RK3032	Chip R.	ERJ3GSYJ331V	
R40	RK3054	Chip R.	ERJ3GSYJ223V	
R41	RK3042	Chip R.	ERJ3GSYJ222V	
R42	RK3041	Chip R.	ERJ3GSYJ182V	
R43	RK3058	Chip R.	ERJ3GSYJ473V	0
	RK3055	Chip R.	ERJ3GSYJ273V	2
R44	RK3014	Chip R.	ERJ3GSYJ100V	
R45	RK3026	Chip R.	ERJ3GSYJ101V	
R46	RK3001	Chip R.	EFU3GSYJ000V	
R47	RK3062	Chip R.	ERJ3GSYJ104V	
R48	RK3026	Chip R.	ERJ3GSYJ10IV	
R49	RK3038	Chip R.	ERJ3GSYJ102V	
R50	RK3071	Chip R.	ERJ3GSYJ564V	
R51	RK3054	Chip R.	ERJ3GSYJ223V	
R53	RK3044	Chip R.	ERJ3GSYJ332V	
R54	RK4034	Chip R.	ERJ-12YJ471	

Ref No	Parts No.	Description	Parts Name	Ver
R55	RK3050	Chip R.	ERJ3GSYJ103V	
R56	RK3050	Chip R.	ERJ3GSYJ103V	
R57	RK3018	Chip R.	ERJ3GSYJ220V	0
	RK3026	Chip R.	ERJ3GSYJ101V	1,2
R58	RK3038	Chip R.	ERJ3GSYJ102V	
R59	RK3053	Chip R.	ERJ3GSYJ183V	
R60	RK3034	Chip R.	ERJ36SYJ471V	
R61	RK3038	Chip R.	ERJ3GSYJ102V	
R62	RK3054	Chip R.	ERJ3GSYJ223V	
R63	RK3032	Chip R.	ERJ3GSYJ331V	
R64	RK3042	Chip R.	ERJ3GSYJ222V	I
R65	RK3026	Chip R.	ERJ3GSYJ101V	
R66	RK3050	Chip R.	ERJ3GSYJI03V	
R67	RK3026	Chip R.	ERJ3GSYJ101V	
R68	RK3030	Chip R.	ERJ3GSYJ221V	
R69	RK3050	Chip R.	ERJ3GSYJ103V	
R70	RK3051	Chip R.	ERJ3GSYJ123V	
R71	RK3026	Chip R.	ERJ3GSYJ101V	
R73	RK3052	Chip R.	ERJ3GSYJ153V	
R74	RK3052	Chip R.	ERJ3GSYJ153V	
R75	RK3052	Chip R.	ERJ3GSYJ153V	
R76	RK3026	Chip R.	ERJ3GSYJ101V	
R77	RK3050	Chip R.	ERJ3GSYJ103V	
R78	RK3026	Chip R.	ERJ3GSYJ101V	
R79	RK3038	Chip R.	ERJ3GSYJ102V	
R80	RK3050	Chip R.	ERJ3GSYJ103V	
R81	RK3052	Chip R.	ERJ3GSYJ153V	
R82	RK3038	Chip R.	ERJ3GSYJ102V	
R83	RK3022	Chip R.	ERJ3GSYJ470V	
R84	RK3034	Chip R.	ERJ3GSYJ471V	
R85	RK3043	Chip R.	ERJ3GSYJ272V	
R86	RK3045	Chip R.	ERJ3GSYJ392V	
R88	RK3014	Chip R.	ERJ3GSYJ100V	
R89	RK0028	Chip R.	ERJ6GSYJ471V	
R91	RK3001	Chip R.	ERJ3GSYJ000V	
R92	RK3038	Chip R.	ERJ3GSYJ102V	
R93	RK3062	Chip R.	ERJ3GSYJ104V	
R94	RK3050	Chip R.	ERJ3GSYJ103V	
R96	RK3071	Chip R.	ERJ3GSYJ564V	
R98	RK0069	Chip R.	ERJ6GSYJ104V	
R99	RK3052	Chip R.	ERJ3GSYJ153V	
R100	RK3044	Chip R.	ERJ3GSYJ332V	
R101	RK3052	Chip R.	EFU6GSYJ153V	0
	RK0039	Chip R.	ERJ6GSYJ222V	I,2
R102	RK3038	Chip R.	ERJ3GSYJ102V	0
	RK3046	Chip R.	ERJ3GSYJ472V	I.2
R103	RK3026	Chip R.	ERJ3GSYJ101V	
R104	RK3050	Chip R.	ERJ3GSYJ103V	
R105	RK3042	Chip R.	ERJ3GSYJ222V	
R106	RK3062	Chip R.	ERJ3GSYJ104V	
R107	RK0001	Chip R.	ERJ6GSYJ100V	
R108	RK3043	Chip R.	ERJ3GSYJ272V	
R109	RK3062	Chip R.	ERJ3GSYJ104V	
R111	RK3001	Chip R.	ERJ3GSYJ000V	0

MAIN Unit

Ref No	Parts No.	Description	Parts Name	Ver
R111	-			1.2
R112	RK3049	Chip R.	ERJ3GSYJ822V	
R113	RK3050	Chip R.	ERJ3GSYJ103V	
R114	RK3062	Chip R.	ERJ3GSYJ104V	
R115	RK3038	Chip R.	ERJ3GSYJ102V	
R116	RK3023	Chip R.	ERJ3GSYJ560V	
R121	-			0,1
	RK3001	Chip R.	ERJ3GSYJ000V	2
R122	-			0
	RK3030	Chip R.	ERJ3GSYJ221V	1.2
R123	RK3038	Chip R.	ERJ3GSYJ102V	
R130	RK3058	Chip R.	ERJ3GSYJ473V	0
	-			1.2
R131	RK3042	Chip R.	ERJ3GSYJ222V	2
TCI	CT0012	Trimmer	CTZ-10AW	
TH1	XS0012	Thermistor	TD5-C220DH	
TH2	XS0013	Thermistor	TD5-C2680DH	
VR1	RH0106	Trim. Pot	EVM1YSX50BQ4	
VR2	RH0103	Trim. Pot	EVMIYSX50B14	
VR4	RH0060	Trim. Pot	MVR32HXBRN473	
VR5	RH0106	Trim. Pot	EVM1YSX50BQ4	
VR6	RH0061	Trim. Pot	MVR32HXBRN472	
X1	XQ0054	Crystal	X49U-12.8MHz	
X2	XK0002	Discrinbnator	CDBM455C7	
X3	XQ0059	Crystal	X49U-16.745MHz	
	TS0092		VC0 Shield	
	TT1001	Tube	0.7 1mm x 6	
	TZ0049		Silicon Dumper	
	TZ0056		Silicon Dumper 49U	
	YZ0001		Silicon Grease G746	

0 : T/E/EZ/EA/TA
1: TE1
2: TE2
None: all models

CPU Unit

Ref No	Parts No.	Description	Parts Name	Ver
		CPU Unit		
C201	CU3035	Chip C.	C1608JB1H102KTA	
C202	CU3035	Chip C.	C1608JB1H102KTA	
C203	CU3035	Chip C.	C1608JB1H102KTA	
C204	CU3035	Chip C.	C1608JB1H102KTA	
C205	CU310I	Chip C.	C1608JB1C473KTA	
C206	CE0312	Electrolytic.C	ECEVICA100R	
C207	CU3035	Chip C.	C1608JB1H102KTA	
C208	CS0232	Chip Tantal	TMCMAI V474MTR	
C209	CU3035	Chip C.	C1608JB1H102KTA	
C210	CU3035	Chip C.	C1608JB1H102KTA	
C211	CU3035	Chip C.	C1608JB1H102KTA	
C212	CU3035	Chip C.	C1608JB1H102KTA	
C213	CU3035	Chip C.	C1608JB1H102KTA	
C215	CU3035	Chip C.	C1608JB1H102KTA	
C216	CU3059	Chip C.	C1608JF1E104ZTA	
C217	CU3051	Chip C.	C1608JB1E223KTA	
C218	CU3059	Chip C.	C1608JF1E104ZTA	
C219	CU3059	Chip C.	C1608JF1E104ZTA	
C220	CU3059	Chip C.	C1608JF1E104ZTA	
C221	CU3023	Chip C.	C1608CH1H101JTA	
C222	CU3023	Chip C.	C1608CH1H101JTA	
C223	CU3051	Chip C.	C1608JB1E223KTA	
C225	CU3023	Chip C.	C1608CH1H101JTA	
C226	CU3023	Chip C.	C1608CH1H101JTA	
C227	CU3035	Chip C.	C1608JB1H102KTA	
C229	CS0209	Chip Tanta[	TMCMB0J 106MTR	
C230	CU3035	Chip C.	C1608JB1H102KTA	
C231	CE0312	Electrolytic.C	ECEVICA100R	
C234	CU3035	Chip C.	C1608JB1H102KTA	
C235	CU3047	Chip C.	C1608JB1H103KTA	
C236	CU3031	Chip C.	C1608JH1H471KTA	
C237	CU3035	Chip C.	C1608JB1H102KTA	
C238	CU3035	Chip C.	C1608JB1H102KTA	
C239	CU3023	Chip C.	C1608CH1H101JTA	
C240	CU3023	Chip C.	C1608CH1H101JTA	
C241	CU3023	Chip C.	C1608CH1H101JTA	
C242	CU3035	Chip C.	C1608JB1H102KTA	
C243	CS0237	Chip Tanta1	TMCMAI A475MTR	
C244	CU3051	Chip C.	C1608JB1E223KTA	
C245	CS0237	ChIPTantal	TMCMAI A475MTR	
C246	CU3035	Chip C.	C1608JB1H102KTA	
C247	CU3085	Chip C.	C1608CH1H300JTA	
C248	CU3085	Chip C.	C1608CH1H300JTA	
C249	CS0218	ChipTantal	TMCMDI A476MTR	
C250	CU3043	Chip C.	C1608JB1H472KTA	
C251	CU3043	Chip C.	C1608JB1H472KTA	
C252	CU3059	Chip C.	C1608JF1E104ZTA	
CN201	UE0170	Connector	B9B-ZR	
CN2	UE0192	Connector	11R-JE	
CN2	UE0192	Connector	11RJE	
CN2	UE0165	Connector	B4B-ZR	
				EZ

Ref No	Parts No.	Description	Parts Name	Ver
D201	XD0255	Diode	MA8110H	
D202	XD0127	Diode	MA704WA TX	
D203	XD0230	Diode	DAN202UTl06	
D204	XD0230	Diode	DAN202UT106	
D205	XL0029	LED	TLSG264	
IC201	XA0289	IC	M37410M6H	
1C202	XA0364	IC	AT24CO2N-10SI-2.7	
IC205	XA0238	IC	AN78L05M	
IC206	XA0208	IC	RH5VA45AA-T1	
IC207	XA0198	IC	RH5VA32AA-T1	
IC208	-			
	XA0367	IC	AT24CO8-10SI-2.7	EZ
IC209	XA0236	IC	BU4052BF	
JK201	UE0035	Connector	FM214-8SMPY	
	EL0024		LCDDRW1	
PL201	EP0003	Lamp	BQO3l-30403A	
PL202	EP0003	Larnp	BQO31 -30403A	
Q201	XT0095	Transistor	2SC4081 TlO6R	
Q202	XT0113	Transistor	2SC2873Y TE1 2L	
Q203	XU0029	Transistor	DTC114YU T106	
Q204	XU0145	Transistor	DTC143TU T106	
Q205	XU0112	Transistor	DTA114YU T106	
Q206	XU0112	Transistor	DTA114YU T106	
Q208	XU0060	Transistor	UMC2TR	
Q209	XU0112	Transistor	DTA114YU T106	
R201	RK3062	Chip.R	ERJ3GSYJ104V	
R202	RK3052	Chip.R	ERJ3GSYJ153V	
R203	RK3072	Chip.R	ERJ3GSYJ684V	
R204	RK3052	Chip.R	ERJ3GSYJ158V	
R205	RK3043	Chip.R	ERJ3GSYJ272V	
R206	RK3026	Chip.R	ERJ3GSYJ101V	
R207	RK3038	Chip.R	ERJ3GSYJ102V	
R208	RK3026	Chip.R	ERJ3GSYJ101V	
R209	RK3074	Chip.R	ERJ3GSYJ105V	
R210	RK3052	Chip.R	ERJ3GSYJ153V	
R211	RK3062	Chip.R	ERJ3GSYJ104V	
R212	RK3054	Chip.R	ERJ3GSYJ223V	
R213	RK3070	Chip.R	ERJ3GSYJ474V	
R214	RK3058	Chip.R	ERJ3GSYJ473V	
R215	RK3102	Chip.R	ERJ3GSYJ203V	
R216	RK3050	Chip.R	ERJ3GSYJ103Y	
R217	RK3102	Chip.R	ERJ3GSYJ203V	
R218	RK3050	Chip.R	ERJ3GSYJ103Y	
R219	RK3102	Chip.R	EFU3GSYJ203V	
R220	RK3050	Chip.R	ERJ3GSYJ103Y	
R221	RK3102	Chip.R	ERJ3GSYJ203V	
R222	RK3102	Chip.R	ERJ3GSYJ203V	
R223	RK3058	Chip.R	ERJ3GSYJ473V	

Ref No	Parts No.	Description	Parts Name	Ver
R224	RK3055	Chip.R	ERJ3GSYJ273V	
R225	RK3046	Chip.R	ERJ3GSYJ472V	
R226	RK3070	Chip.R	ERJ3GSYJ474V	
R227	RK3038	Chip.R	ERJ3GSYJ102V	
R228	RK3038	Chip.R	ERJ3GSYJ102V	
R229	RK3038	Chip.R	ERJ3GSYJ102V	
R230	RK3038	Chip.R	ERJ3GSYJ102V	
R231	RK3038	Chip.R	ERJ3GSYJ102V	
R232	RK3050	Chip.R	ERJ3GSYJ103V	
R234	RK3038	Chip.R	ERJ3GSYJ102V	
R235	RK3038	Chip.R	ERJ3GSYJ102V	
R236	RK3074	Chip.R	ERJ3GSYJ105V	
R238	RK3038	Chip.R	ERJ3GSYJ102V	
R239	RK3082	Chip.R	ERJ3GSYJ104V	
R241	RK3062	Chip.R	ERJ3GSYJ104V	
R242	RK3062	Chip.R	ERJ3GSYJ104V	
R243	RK3062	Chip.R	ERJ3GSYJ104V	
R244	RK3062	Chip.R	ERJ3GSYJ104V	
R247	RK3050	Chip.R	ERJ3GSYJ103V	
R248	RK3050	Chip.R	ERJ3GSYJ103V	
R249	RK305O	Chip.R	EFu3GSYJ103V	
R250	RK3046	Chip.R	ERJ3GSYJ472V	
R251	RK3046	Chip.R	ERJ3GSYJ472V	
R252	RK3046	Chip.R	ERJ3GSYJ472V	
R253	RK3038	Chip.R	ERJ3GSYJ102V	
R254	RK3038	Chip.R	ERJ3GSYJ102V	
R255	RK0014	Chip.R	ERJ3GSYJ000V	
R256	RK3042	Chip.R	ERJ3GSYJ222V	
R257	RK3001	Chip.R	ERJ3GSYJ000V	
R258	RK3046	Chip.R	ERJ3GSYJ472V	
R259	RK3054	Chip.R	ERJ3GSYJ223V	
R260	RK3038	Chip.R	ERJ3GSYJ102V	
R261	RK3038	Chip.R	ERJ3GSYJ102V	
R262	RK3038	Chip.R	ERJ3GSYJ102V	
R263	RK3038	Chip.R	ERJ3GSYJ102V	
R264	RK3038	Chip.R	ERJ3GSYJ102V	
R265	RK3050	Chip.R	ERJ3GSYJ103V	
R267	RK3038	Chip.R	ERJ3GSYJ102V	
R268	RK3038	Chip.R	ERJ3GSYJ102V	
R269	RK3054	Chip.R	ERJ36SYJ223V	
R270	RK3001	Chip.R	ERJ3GSYJ000V	
R271	RK3062	Chip.R	ERJ3GSYJ104V	
R272	RK3058	Chip.R	ERJ3GSYJ473V	
R273	RK3058	Chip.R	ERJ3GSYJ473V	
R274	RK3038	Chip.R	ERJ3GSYJ102V	
R275	RK3062	Chip.R	ERJ3GSYJ104V	
R276	RK3034	Chip.R	ERJ3GSYJ471V	
R277	RK3034	Chip.R	ERJ3GSYJ471V	
R279	RK3001	Chip.R	ERJ3GSYJ000V	
R280	RK3038	Chip.R	ERJ3GSYJ102V	
R281	RK3038	Chip.R	ERJ3GSYJ102V	
R284	-	-	-	
	RK3001	Chip.R	ERJ3GSYJ000V	E/EA
R287	RK3001	Chip.R	ERJ3GSYJ000V	

CPU Unit

Ref No	Parts No.	Description	Parts Name	Ver
R288	RK3052	Chip.R	ERJ3GSYJ153V	
R289	RK3052	Chip.R	ERJ3GSYJ153V	
R290	RK3052	Chip.R	ERJ3GSYJ153V	
R291	RK3052	Chip.R	ERJ3GSYJ153V	
R292	RK3052	Chip.R	ERJ3GSYJ153V	
R293	RK3050	Chip.R	ERJ3GSYJ103V	
R294	RK3001	Chip.R	ERJ3GSYJ000V	0
	-		-	1.2
R295	RK3001	Chip.R	ERJ3GSYJ000V	0
	-		-	1,2
R296	-		-	
	RK3038	Chip.R	ERJ3GSYJ102V	EZ
R297	-		-	
	RK3038	Chip.R	ERJ3GSYJ102V	EZ
S201	UU0015	Switch	SKQD-90l	
S202	UU0015	Switch	SKQD-901	
S203	UU0015	Switch	SKQD-901	
S204	UU0015	Switch	SKQD-90l	
S205	UU0015	Switch	SKQD-901	
S206	UU0015	Switch	SKQD-90l	
S207	UU0015	Switch	SKQD-901	
S209	UQ0011	Switch	ESBJ64801	
S210	UR0002	Switch	EVQ-WQGFl 524B	
VR201	RV0009	Trim. Pot	EVU-F2AF20B14	
VR20	RV0009	Trim. Pot	EVU-F2AF20B14	
W1	MACL04AA		#30 Blue 02JD40-02	
			T/E/EZ	
W2	MRCL04AA		#30 Red 02JD40-02	EAEZ
X203	XQ0045	Crystal	DSMT3.58MHz18P	
	DG0003		LCD Light	
	FG0133		LCD Rubber Connector	
	FM0077		LCD Hokk!r	
	FP0034		Mic ebnnector SpacN>r	
	FP0069		Crystal Sheet	
	TL0008		LCD Finer	
	TT1002	Tube	Tube 1mm x 12	
	YZ0042	Adhesion	Bond G17	

0 : T/E/EZ/EA/TA
1: TE1
2: TE2
None: all models

Ref No	Parts No.	Description	Parts Name	Ver
		VCO Unit		
C301	CU3013	Chip C.	C1608CHIH	
C302	CU3016	Chip C.	C1608CHIH	
C303	CU3035	Chip C.	C1608JB1H102KTA	
C304	CS0063	Chip Tantal	TMCSAI V104MTR	
C305	CU3035	Chip C.	C1608JB1H102KTA	
C306	CU3047	Chip C.	C1608JB1H103KTA	
C307	CU3035	Chip C.	C1608JB1H102KTA	
C308	CS0235	Chip Tantal	TMCSA 1V334MTR	
C3O9	CU3043	Chip C.	C1608JB1H472KTA	
C310	CU3043	Chip C.	C1608JB1H472KTA	
C311	CS0220	Chip Tantal	TMCMA1C225MTR	
C312	CS0220	Chip Tantal	TMCMA1C225MTR	
C313	CU3035	Chip C.	C1608JB1H102KTA	
C314	CU3043	Chip C.	C1608JB1H472KTA	
C315	CU3004	Chip C.	C1608CH1H030CTA	0,1
	CU3002	Chip C.	C1608CH1H010CTA	2 I
C316	CU3035	Chip C.	C1608JB1H102KTA	
C317	CS0217	Chip Tantal	TMCMC 1A226MTR	
C318	CU3003	Chip C.	C1608CH1HO20CTA	
C319	CU3035	Chip C.	C1608JB1H102KTA	
C320	CU3015	Chip C.	C1608CH1H220JTA	
C321	CU3031	Chip C.	C1608JB1H471KTA	
C322	CU3035	Chip C.	C1608JB1H102KTA	
C323	CU3015	Chip C.	C1608CH1H220JTA	
C324	CU3035	Chip C.	C1608JB1H102KTA	
C325	CU3035	Chip C.	C1608JB1H102KTA	
C326	CU3059	Chip C.	C1608JF1E104ZTA	
C328	CU3035	Chip C.	C1608JB1H102KTA	
C329	CU3035	Chip C.	C1608JB1H1O2KTA	
C330	CU3035	Chip C.	C1608JB1H102KTA	
C331	-			0
	CU3043	Chip C.	C1608JB1H472KTA	1,2
C332	-			0
	CU3001	Chip C.	C1608CH1HOR5CTA	1,2
CN301	UE0188	Connector	B9P-BC-2	
CN302	UE0185	Connector	B6P-BC-2	
D301	XD0l32	Diode	1SV215TPH4	
D302	XD0132	Diode	1SV215TPH4	
D303	XD0130	Diode	DA204UT106	
D304	-			0
	XD0132	Diode	1SV215TPH4	1.2
IC301	XA0235	IC	M56760FP	
L302	QA0067	Coil	QA0067	
L303	QC0044	Coil	NL322522T-3R3M	1
	QC0043	Coil	NL322522T-2R2J-3	2
L304	QC0044	Coil	NL322522T-3R3M	1
	QC0040	Coil	NL322522T-1R2J-3	2
L305	QC0045	Coil	NL322522T-3R3M	
	QC0043	Coil	NL322522T-2R2J-3	
Q301	XE0010	FET	2SK5O8K52-T2B	
Q302	XT0111	Transistor	2SC4081 LN T106S	

Ref No	Parts No.	Description	Parts Name	Ver
Q303	XT0111	Transistor	2SC4081 LN T106S	
Q304	XT0096	Transistor	2SCAO99T 106N	
Q305	XT0096	Transistor	2SC4099T 106N	
Q306	XU0060	Transistor	UMC2TR	
R301	RK3022	ChIPR.	ERJ3GSYJ470V	
R302	RK3034	Chip R.	ERJ3GSYJ47lV	
R303	RK3034	Chip R.	ERJ3GSYJ471V	
R306	RK3046	Chip R.	ERJ3GSYJ472V	
R307	RK3058	Chip R.	ERJ3GSYJ473V	
R308	RK3046	Chip R.	ERJ3GSYJ472V	
R309	RK3046	Chip R.	ERJ3GSYJ472V	
R310	RK3040	Chip R.	ERJ3GSYJ152V	
R311	RK3044	Chip R.	ERJ3GSYJ332V	
R312	RK3026	Chip R.	ERJ3GSYJ101V	
R313	RK3044	Chip R.	ERJ3GSYJ332V	
R314	RK3022	Chip R.	ERJ3GSYJ470V	
R315	RK3050	Chip R.	ERJ3GSYJ103V	0
	RK3054	Chip R.	ERJ3GSYJ223V	1,2
R316	RK3026	Chip R.	ERJ3GSYJ101V	0,1
	RK3023	Chip R.	ERJ3GSYJ560V	2
R317	RK3018	Chip R.	ERJ3GSYJ220V	
R318	RK3050	Chip R.	ERJ3GSYJ103V	
R319	RK3038	Chip R.	EFU3GSYJ102V	
R320	RK3044	Chip R.	ERJ3GSYJ332V	
R321	RK300l	Chip R.	ERJ3GSYJ000V	
R322	RK3034	Chip R.	ERJ3GSYJ47lV	
R323	RK3054	Chip R.	ERJ3GSYJ223V	
R324	RK3034	Chip R.	ERJ3GSYJ471V	
R325	RK3054	Chip R.	ERJ3GSYJ223V	
R326	RK3026	Chip R.	ERJ3GSYJ101V	
R327	RK3026	Chip R.	ERJ3GSYJ10lV	
R328	RK3043	Chip R.	ERJ3GSYJ272V	
R329	RK3026	Chip R.	ERJ3GSYJ101V	
R331	RK3038	Chip R.	ERJ3GSYJ102V	
R332	-			0
	RK3049	Chip R.	ERJ3GSYJ821V	1
	RK3050	Chip R.	ERJ3GSYJ103V	2
R333	-			0
	RK3050	Chip R.	ERJ3GSYJ821V	1,2
R334	-			0
	RK3066	Chip R.	ERJ3GSYJ224V	I,2
	TS0081	Case	VCO Case	

Ref No	Parts No.	Description	Parts Name	Ver
		SP Unit		
	ES0017	Speaker	VS-57-O814-1.5W	
	FG0040		Speaker Cushion	
	UX1047		Wire	
		EJ19u		
C401	CU3035	ChIP.C	C1608JB1H102KTA	
IC401	XA0367	IC	AT24CO8-10SI-2.7	
R401	RK3038	ChIP.R	ERJ3GSYJ102V	
R402	RK3038	Chip.R	ERJ3GSYJ102V	
	FG0057		Cushion	
	UX1049		Wire EJI9u	
		Mechanical	Parts	
	AD0010	Screw	D3+8FeNi	
	AE0014	Screw	B2.6+8FeBG	
	AJ0017	Screw	2.6+6FeNi2	
	AK0003	Screw	OB2.6+ FeNi1	
	FF0015		Light Shield Cloth	
	FF0021		Volume Tape	
	FF0028		Cloth	
	FF0030		Cloth	
	FF0031		Cloth	
	FG0138		Rubber Cushin DR130	
	FM0152		IC Spring	
	FM0083	Washer	Spnrg Washer	
	ND0004		Dlal Cover	
	NK0009B		Dial Knob	
	NK0010		VolurTN3i Knob	
	NP0066		Power Switch Knob	
	KS0041B		Bottom Case	
	KZ0001B		Front Panel DR130T	T/EZ
				/TA
	KZ0004B		Front Panel DR130E	E/EA
	KZ0009A		Top Case	
	SS0052C		Chassis	
	TS0080		Front Shield Case	

Ref No	Parts No.	Description	Parts Name	Ver
		Others		
	EMS-5A		Microphone (E/EZ/EA)	
	EMS-11		Microphone	T/TA
	DS0260		Specifications Card	T/TA
	DS0280		Specifications Card	E/EA
	DS0281		Specifications Card	EZ
	PH0009		Registration Card	T
	PR0157		Seal TA	
	PR0161		Seal EA	
		Packing		
	AA0013	Screw	M5+20 FeCr	
	AE0012	Screw	Fe3PM4x8BC	
	AN0002	Nut	Nut M-5FeCr	
	AJ0093	Screw	M5+20FeCr	
	AZ0009	Washer	Sprirg SW-5FeCr	
	AZ0010		W-5FeCr	
	EF0005	Fuse	FGBO15A	
	ADFM78		Bracket	
	FM0079		Spanner	
	HH0042		CushionDR130	
	HK0306		Item Carton DR130	T/TA
	HK0308		Item Cafbn DR130	
			E/EA/EZ	
	HP0006	(Screw set)	Protection Bag	
	HP0009	(Code)	Protection Bag	
	HP0016	(Button cover)	Protection Bag	
	HP0028	(Instr. card)	Protection Bag	
	HP0037	(Brackt)	Protection Bag	
	HP0035	(Radio)	Protection Bag	
	HU0073		Fixture (A) DR130	
	HU0075		Fixture (B)	
	KZ0003		Button Cover	
	PK0047		Schematic Diagram	
	PR0215		Seat EZ	
	PS0181		Instrution Card	E/EA
	PS0182		Instrution Card	
			(T/TA/TE1/TE2/EZ)	
	PT0004A		Lot Nurrdber Sear	
	ADUA38		R-B2.x3M Receptacle 15A	
	YZ0118		Tape 50mm	
	YZ0121		Tape 10mm	

0 : T/E/EZ/EA/TA
1: TE1
2: TE2
None: all models

EJ20u /EMS-5A

Ref No	Parts No.	Description	Parts Name	Ver
		EJ20u		
C501	CS0236	Chip Tantal	TMCMAOJ685MTR	
C502	CU3059	Chip C.	C1608JF1E104ZTA	
C503	CS0230	Chip Tantal	TMCMA1E105MTR	
C504	CU3059	Chip C.	C1608JF1E104ZTA	
C505	CS0230	Chip Tanta1	TMCMA1E105MTR	
C506	CS0230	Chip Tantal	TMCMA1E105MTR	
C507	CS0230	ChIPTantal	TMCMA1E105MTR	
C508	CU3023	Chip C.	C1608CH1H10IJTA	
C509	CS0237	ChIP Tantal	TMCMA1A475MTR	
C510	CU3019	Chip C.	C1608CH1H470JTA	
C511	CU3035	Chip C.	C1608JB1H102KTA	
C512	CU3015	Chip C.	C16O8CH1H220KTA	
C513	CU3015	Chip C.	C1608CH1H220KTA	
CN501	UX1050	Wire	EJ20u	
IC501	XA0239	IC	AK2341	
Q501	XT0095	Tansistor	2SC4081 T106R	
R501	RK3040	Chip R.	ERJ3GSYJ152V	
R502	RK3022	Chip R.	ERJ3GSYJ470V	
R503	RK3067	Chip R.	ERJ3GSYJ274V	
R504	RK3038	Chip R.	ERJ3GSYJ102V	
R505	RK3051	Chip R.	EFJ3GSYJ123V	
R506	RK3089	Chip R.	ERJ3GSYJ912V	
R507	RK3067	Chip R.	ERJ3GSYJ274V	
R508	RK3047	Chip R.	ERJ3GSYJ562V	
R509	RK3068	Chip R.	ERJ3GSYJ334V	
R510	RK3054	Chip R.	ERJ3GSYJ223V	
R511	RK3054	Chip R.	ERJ3GSYJ223V	
R512	RK3055	Chip R.	ERJ3GSYJ273V	
R513	RK3074	Chip R.	EFU3GSYJ105V	
R514	RK3066	Chip R.	ERJ3GSYJ224V	
R515	RK3048	Chip R.	ERJ3GSYJ682V	
VR501	RH0106	Trim. Pot	EVM1YSX50BQ4	
X501	XQ0057	Crystal	DS-MAT3.6864MHz	
	HK0305		Carton	
	HP0029		Protection Bag	
	PG0057		Rubber Cushion	
	UP0243a		P.C.B.	
	YZ0042	Adhesion	Bond G17	

Ref No	Parts No.	Description	Parts Name	Ver
		EMS-5A		
C1	CC5029	Ceramic C.	X1E393KYA	
C2	CK0011	Ceramic C.	SC45J1C104Z-A	
C3	CE0037	Electrolytic.C	MS56.3V lOOuF	
C4	CK0003	Ceramic C.	50V102	
DI	XD0067	Diode	MA700	
RI	RD0031	Reststor	R20 1/4W 680	
R2	RD0021	Reststor	R20 1/4W 180	
R3	RD0039	Reststor	R20 1/4W 2.2K	
R4	RD0039	Resistor	R20 1/4W 2.2K	
R6	RD0040	Resistor	R20 1/4W 2.7K	
S1	US0015	Switd1	HSWO880-01-210	
S2	UU0009	Switch	EVQ-QHJ04G	
S3	UU0009	Switch	EVQ-QHJ04G	
S4	UM0002	Switch	MICn Switch SS-5	
	AS0142		Screw Set	
	DE0006		Stopper	
	EY0006	Microphone	WM-60AT	
	FG0045		Mic Rubber Cushion	
	HP0036		ProtectIOn Bag	
	KB0033		Rear Case	
	KM0071		Front Case	
	NP0041		PTT Button	
	NP0042		Up Button	
	NP0043		Down Button	
	NS0003		Slide Knob	
	SC0004		PTT Sprirg	
	UE0051A		Curl Code	
	UP0193		P.C.a.	
	UX0133	Wire	EMS-5	

Ref No	Parts No.	Description	Parts Name	Ver
		EMS-11		
C1	CU8003	Chip C.	C2012JF1E104Z	
C2	CU8035	Chip C.	C2012 B1E393K	
C3	CU8003	Chip C.	C2012JF1E104Z	
C4	CU8012	Chip C.	C2012JB1H471KTA	
C5	CU8012	Chip C.	C2012JB1H471KTA	
C6	CU8016	Chip C.	C2012JB1H102K	
C7	CE0315	Electrolytic.C	ECEV1CA470P	
C8	CK0004	Ceramic C.	CK45-F1H102ZTA	
CIO	CS0066	Chip Tantal	TMCSB 1D225MTR	
FAR1	XB000l	Crystal	FARC4CA0358000K01R	
ICl	XA0042	IC	LR40872	
Q1	XT0031	Tansistor	2SC2712Y TE85L	
R1	RK0062	ChIPR.	ERJ6GEYJ473V	
R2	RK0062	ChIPR.	ERJ6GEYJ473V	
R3	RK0035	ChipR.	ERJ6GEYJIO2V	
R4	RK0039	ChipR_	ERJ6GEYJ222V	
R5	RK0039	ChipR_	ERJ6GEYJ222V	
R7	RK0039	ChipR_	ERJ6GEYJ222V	
R8	RK0021	ChIPR.	ERJ6GEYJ181V	
R9	RK0040	ChipR.	ERJ6GEYJ272V	
R10	RK0069	ChipR.	ERJ6GEYJ104V	
R15	RK0025	ChIPR.	Efu6GEYJ331V	
R16	RK3001	ChipR.	ERJ3JSYJ000V	
R17	RK3001	ChipR.	ERJ3JSYJ000V	
SW1	UM0002	Switch	Micro Switch SS-5	
SW2	UU0009	Switch	EVQJQHJ-04G	
SW3	UU0009	Switch	EVCLQHJJO4G	
SW4	US0015	Switch	HSWO880JD1 -210	
VR1	RH0031	Trim. Pot	CVR42A-103AW1D	
W1	MACK02A	Wire	#28A02-020-02	
W2	MYCK02A	Wire	#28Y02-020-02	

EMS-11

Ref No	Parts No.	Description	Parts Name	Ver
	AJ0013	Screw	1M2.3+12FeCr	
	AJ0025	Screw	1M3.5+10FeN	
	AP0004	Screw	PM2+5FeCr	
	AP0008	Screw	PM3+8FeBC	
	DE0007		Stopper	
	EY0006	Microphone	WM-6OAT	
	FG0045		MIC Rubber Cushion	
	FG0055		Rubber Switch	
	HP0036		Protection Bag	
	KB0033		Rear Case	
	KM0153		Front Case	
	NP0041		PTT Button	
	NP0042		Up Button	
	NP0043		Down Button	
	NS0003		Slide Switch	
	SC0004		PTT Spring	
	TT1002	Tube	1.Ox1mm	
	UE0125A		Curl Code EMS3	
	UP0183B		P.C.B.	

0 : T/E/EZ/EA/TA
1: TE1
2: TE2
None: all models

ADJUSTMENT

1) Required Test Equipment

1. Digital Multimeter
   Voltage range: FS= 18V or so
   Input resistance: 1M ohm or more

2. Regulated Power Supply
   Supply voltage: 13.80V
   Current : 15A or more

3. Oscilloscope
   Measurable frequency: DC to 30MHz

4. Spectrum Analyzer
   Measuring range: Up to 2GHz or more

5. Tracking Generator
   Output frequency: Up to 2GHz or more

6. Audio Dummy Load
   Impedance: 8 ohm
   Dissipation: 5W or more

7. SSG
   Output frequency: 1GHz or more
   Output level: -20dB/0.1uV to 120dB/1V
   Moduration: FM

8. Frequency Counter
   Measurable frequency.I Up to 500MHz
   Measurements stability: 0.2ppm or so

9. Power Meter
   Measurable frequency.I Up to 500MHz
   Impedance: 50 ohm, unbalanced
   Measuring range: Full scale of 60W or so

10. Audio Voltmeter
   Measurable frequency: 50Hz to 10kHz
   Sensitivity: 1mV ~ 10V

11. Distortion Meter
   Measurable frequency 1kHz
   Input level: Up to 40dB
   Distortion level: 1% - l00%

12. Audio Generator
   Output frequency: 88.5Hz and lkHz
   Output impedance: 600 ohm, unbalanced

13. Linear Detector
   Measurable frequency Up to 500MHz
   Characteristics: Flat
   CN: 60dB or more

2) Adjustment for DR130

SSG Mod:1KHz +/-3.5KHz/DEV
SP terminal is connected to 8ohm dummy load.
RX speaker output level is 50 to 100mW

1. Power supply voltage is 13.8V. Power switch is off.
2. Turn the squelch and volume knobs counterclockwise.
3. Press and hold the "F"key,then turn on the power switch.
The display shows that the frequency is 145.00MHz

PLL Adjustment

Item	Condition	Measurement			Adjustment			Specification/ Remarks
		Test equipmen	Unit	Terminal	Unit	Parts	Method	
Frequency	Frequency:145.00MHz power: Low *1 PTT: ON	Freq.Counter Power Meter	Back	ANT	MAIN	TC1	145.00 MHz	+/- 100Hz
PLL VCO	Frequency:145.00MHz PTT: OFF *1	Digital Multimeter	Main	SD	PLL VCO	L302	2.0V Check	1.8-2.2V 0.7-1.0V

RX Adjustment (ALL SSG out =EMF)

Item	Condition	Measurement			Adjustment			Specification/ Remarks
		Test equipmen	Unit	Terminal	Unit	Parts	Method	
RX Sensitivity	Frequency:145.03MHz SSG out:0dBu *1	SSG Distortion Meter	Main	TP1	Main	L4-L6 L14	SINAD: MAX	Turn the coil L14, L4,L5,L6,L4,L5 to the MAX in order
	Frequency:145.03MHz SSG out:-10dBu *1						Check	SINAD is above12dB
	Frequency:134.00MHz SSG out:-2.0dBu *2							
	Frequency:174.00MHz SSG out:-2.0dBu *3							
S Meter	Frequency:145.03MHz SSG out: 15dBu *1 Mod: OFF	LCD S Meter	Front Panel		Main	VR5	Full flashing	
	Frequency:145.03MHz SSG out:0dBu *1 Mod: OFF						Check	S Meter does not light.
SQL	Frequency:145.03MHz SSG out:-10dBu *1 SQL VR:Threshold	LCD Busy	Front Panel		Main		Make sure that SQL is open	Busy ON

*1 or bond-center of your radio version
*2 or bond lower limit of your radio version
*3 or bond upper limit of your radio version

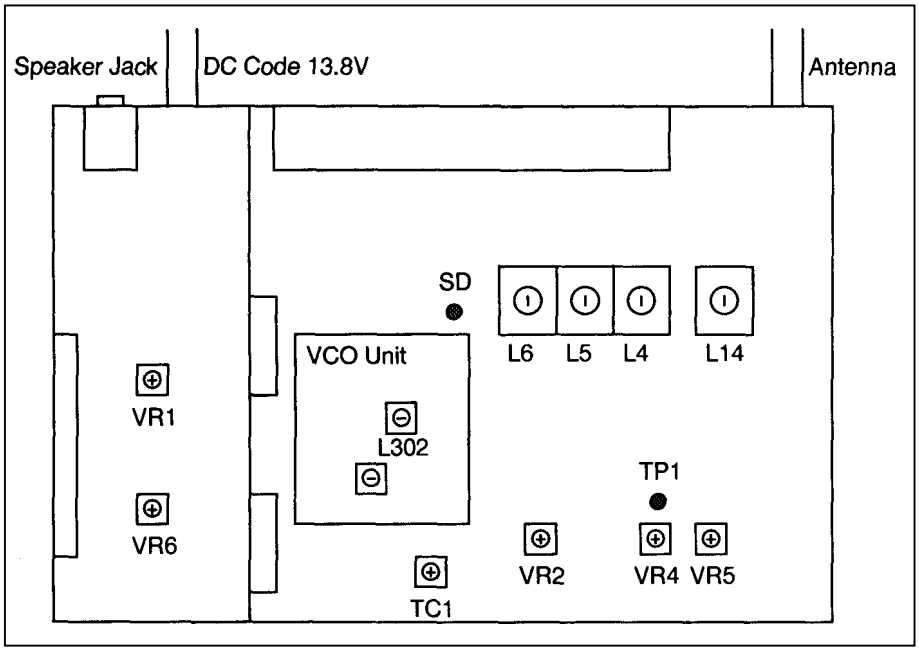
TX Adjustment

Item	Condition	Measurement			Adjustment			Specification/ Remarks
		Test equipmen	Unit	Terminal	Unit	Parts	Method	
High Power	VR1: max Power:High PTT: ON	Power Meter	Back	ANT	Main			
	Frequency:145.00MHz Power:High *1 PTT: ON					VR1	52w	+/- 1.0W Below 10.5A
	Frequency:130.00MHz Power:High *2 PTT: ON						Check	Above 5W (T.E.EZ)
	Frequency:174.00MHz or 155MHz Power:Low *3 PTT: ON						Check	Above 5W (T.E.EZ)
Low Power	Frequency:130.00MHz Power:Low *1 PTT: ON					VR5	5.0w	+/- 0.5W (T.E.EZ)
DEV	Frequency:145.00MHz Power: Low *1 AG:1KHz -30dBm PTT: ON	AG Linear Detecto Power Meter	Back	ANT	Main	VR2	4.7kHz /Dev	4.7 +/-0.2kHz/Dev
MIC Gain	Frequency:145.00MHz Power: Low *1 AG:1KHz -47dBm PTT: ON						4.0kHz /Dev	4.0 +/-0.2kHz/Dev
CTCSS Ton DEV	Frequency:145.00MHz Power: Low *1 AG: OFF PTT: ON ToneSW(88.5Hz):ON						Check	0.60-0.85kHz/Dev
Tone Burst DEV	Frequency:145.00MHz Power: Low *1 AG: OFF PTT: ON ToneSW:ON						Check	2.5-3.5kHz/Dev

*1 or bond-center of your radio version
*2 or bond lower limit of your radio version
*3 or bond upper limit of your radio version

If the logic boad EJ-21D or EJ21D exists ,first pull out the logic board
and re-connect W3,W4,W5, so that the radio comes back to conventional

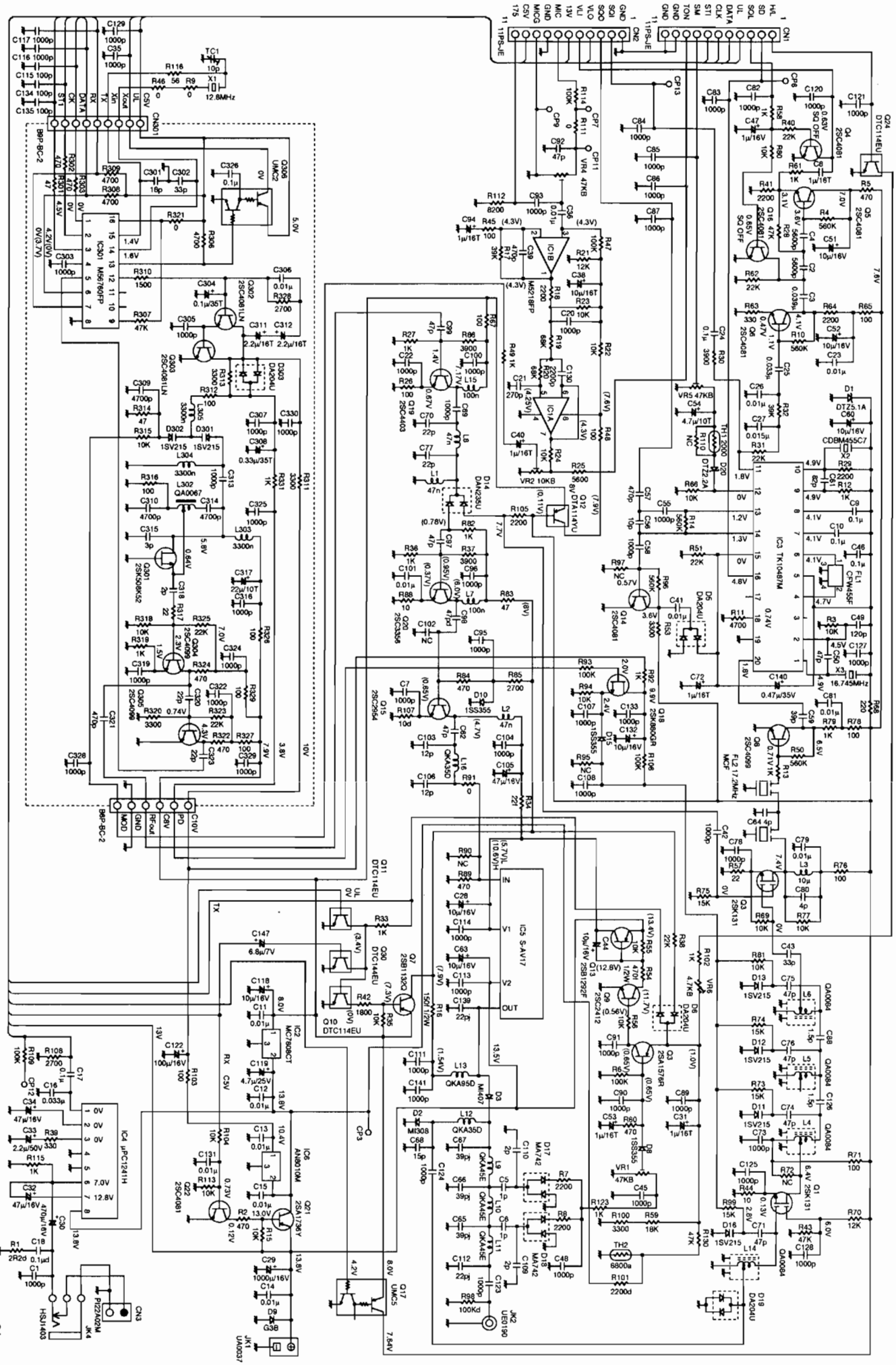
3) Adjustment Points

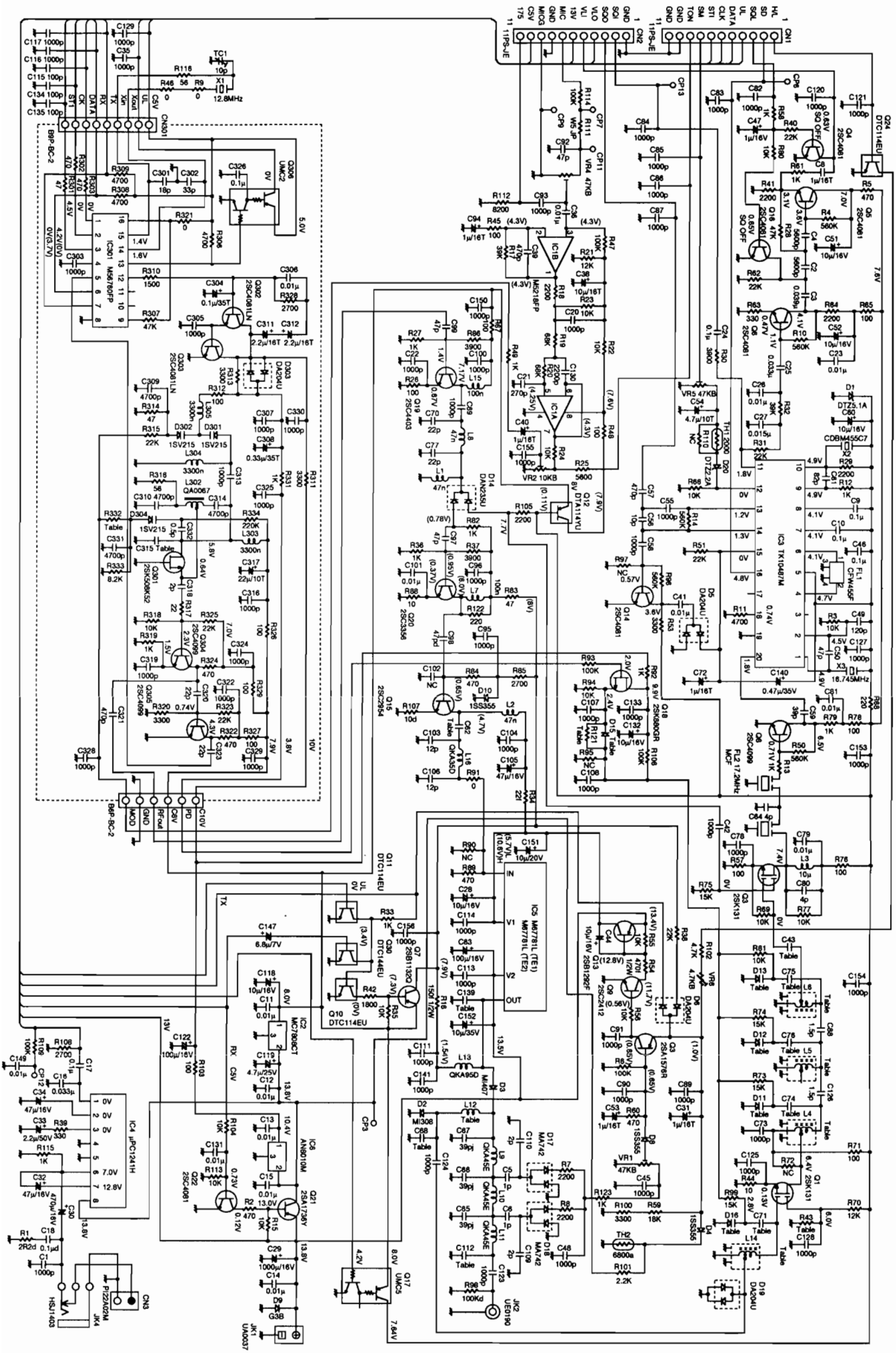


4) Adjustment Quick Reference

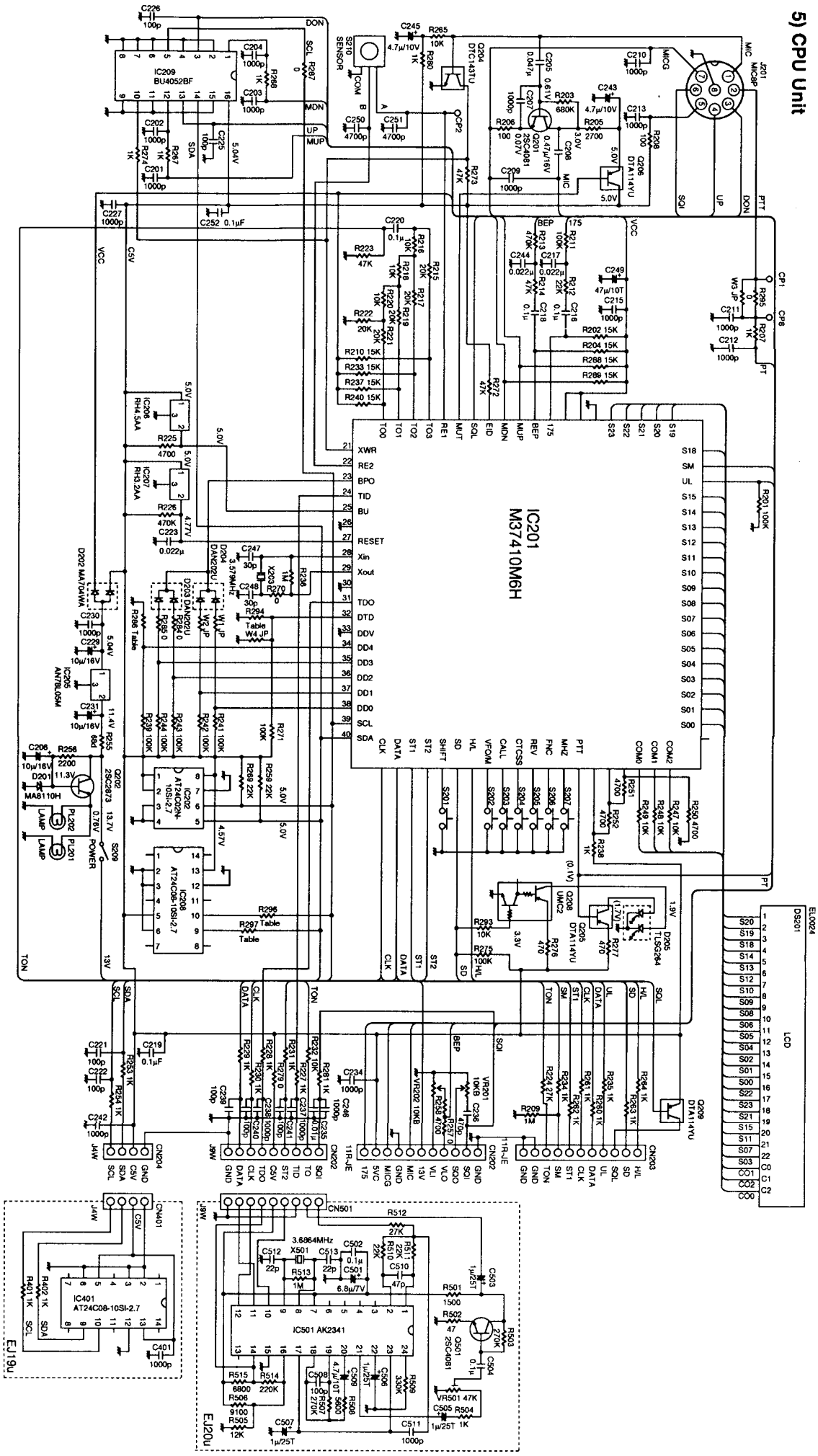
SSG Output = EMF

Parts	Item	Specifications	Specifications
L4	RX Sensitivity	-10dBpV (12dB SINAD)	-10dBpV (12dB SINAD)
L5	RX Sensitivity	-10dBpV (12dB SINAD)	-10dBpV (12dB SINAD)
L6	RX Sensitivity	-10dBpV (12dB SINAD)	-10dBpV (12dB SINAD)
L14	RX Sensitivity	-10dBpV (12dB SINAD)	-10dBpV (12dB SINAD)
L302	VCO Frequency	1.8V~2.2V	1.8V~2.2V
TC1	Reference Frequency	145.00MHz +/-100Hz	145.00MHz +/-100Hz
VR1	TX High Power	52W +/- 1.0W	52W +/- 1.0W
		10.5W +/- 0.5W (EZ)	10.5W +/- 0.5W (EZ)
VR2	Deviation	4.7kHz +/-0.2kHz	2.4kHz +/-0.1kHz
VR4	Mic Gain	4.0kHz +/-0.2kHz	2.0kHz +/-0.1kHz
VR5	S Meter	15dBu "Full"	15dBu "Full"
VR6	TX LowPower	5W+/-0.5W	5W+/-0.5W





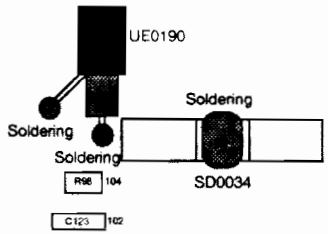
5) CPU Unit

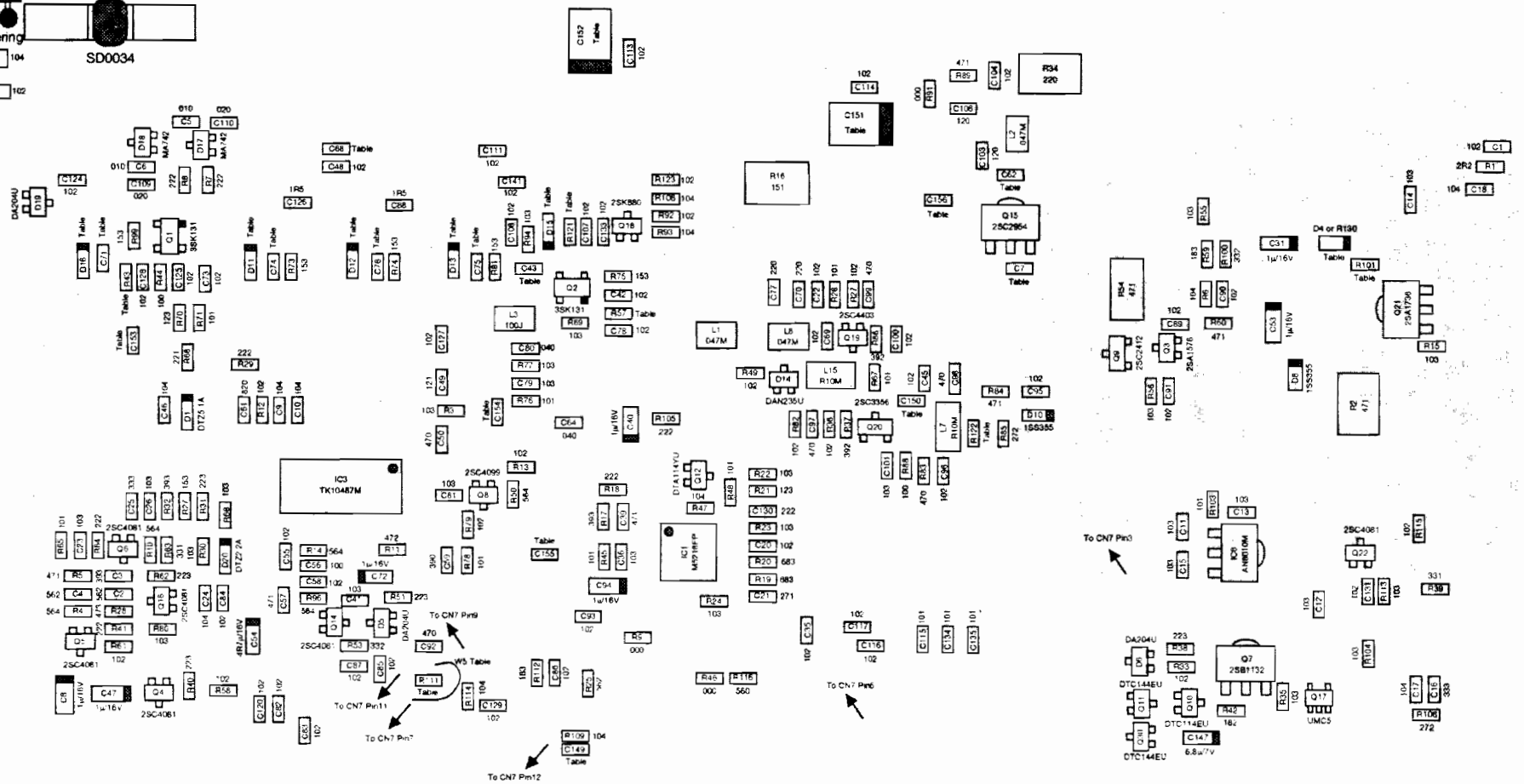


	W1	W2	W3	W4	R284	R294	R295	R296	R297	CN204	IC208
T	JP	-	-	-	0	0	0	-	-	-	-
E	JP	JP	-	-	0	0	0	-	-	-	-
EZ	JP	JP	-	-	0	0	0	1K	1K	0	AT24C08-10SI-2.7
EA	-	-	-	-	0	0	0	-	-	-	-
TA	-	-	-	-	0	0	0	-	-	-	-
TE1	-	-	-	-	-	-	-	-	-	-	-
TE2	-	-	JP	JP	-	-	-	-	-	-	-

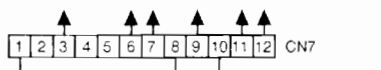
PC BOARD VIEW

1) Main Unit Side A

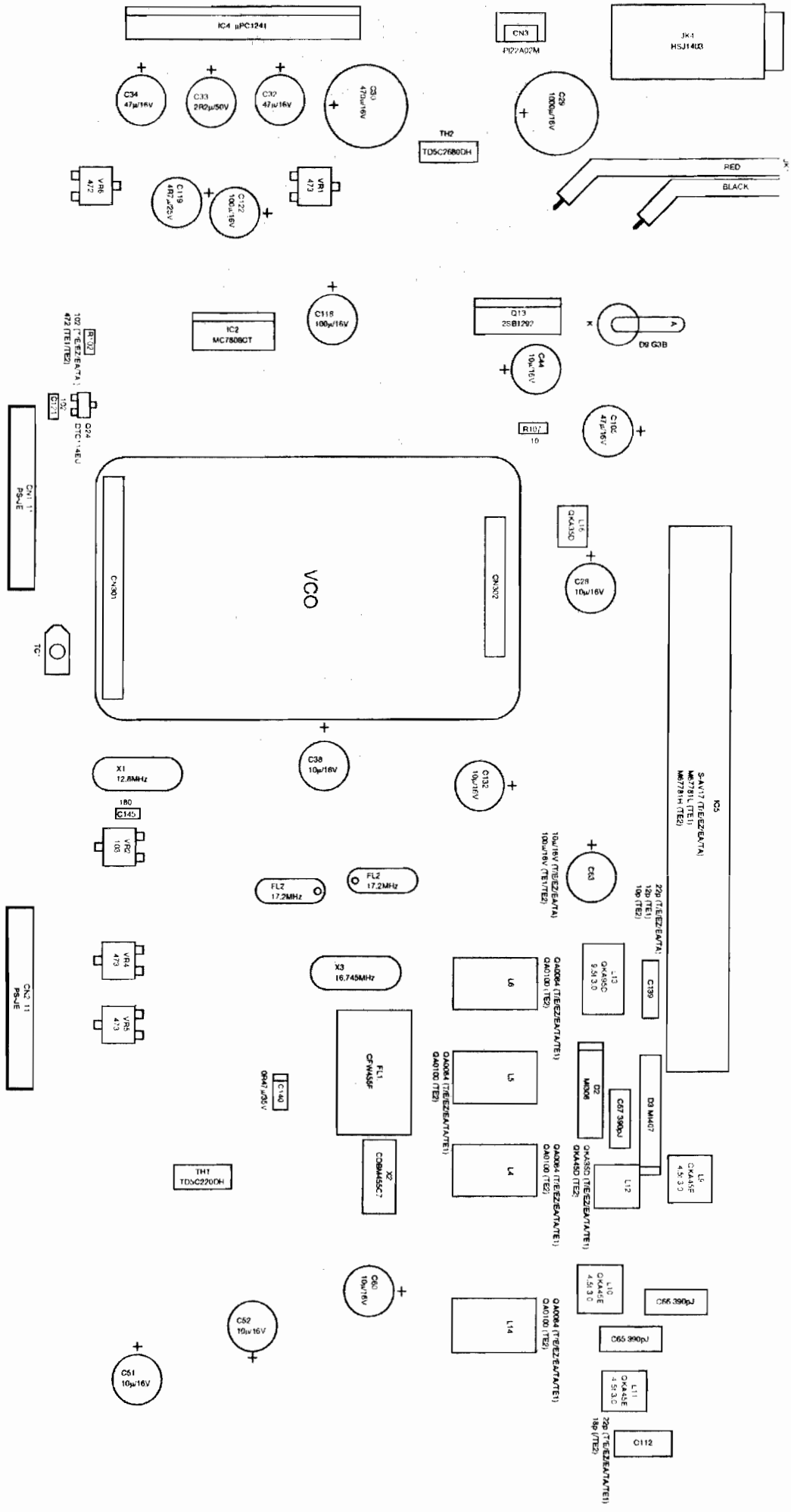




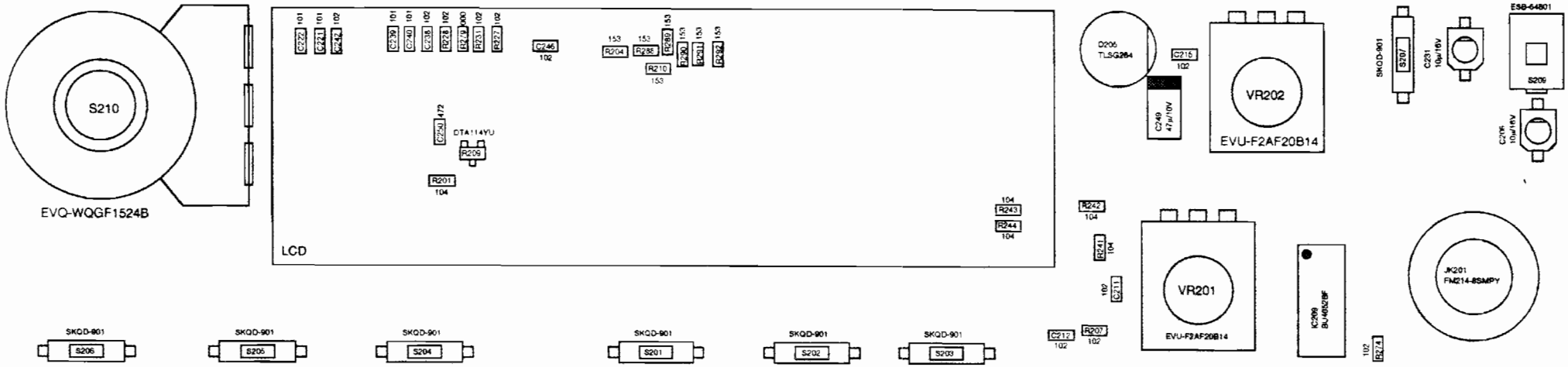
	C7	C43	C62	C68	C71, 74, 75, 76	C149	C150, 153, 154, 155, 156	C151	C152	D4	D11, 12, 13, 16	D15	R43	R57	R101	R111	R121	R122	R130	W5
T/E/EZ/EA/TA	1000p	33p	47p	15p	47p		-	-	-		1SV215	1SS355	47k	22	15k	0	-	-	47k	-
TE1		33p	100p	22p	56p	0.01μF	1000p	10μ/20V	10μ/35V	1SS355	1SV215	1SS355	47k	100	2.2k	-	-	220	-	JP
TE2	-	47p	33p	10p	1000p	0.01μF	1000p	10μ/20V	10μ/35V	1SS355	1SV214		27k	100	2.2k	-	0	220	-	JP



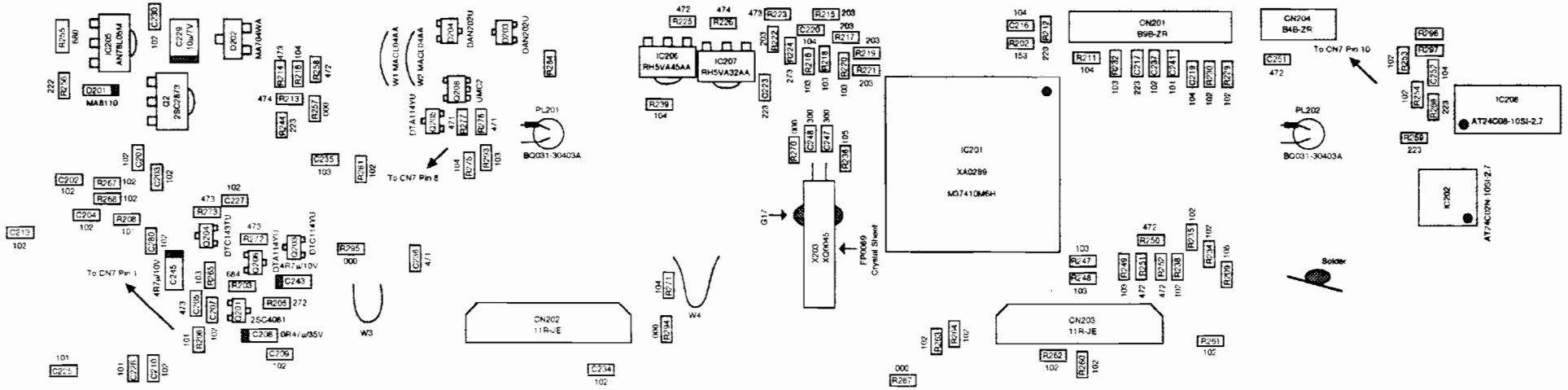
2) Main Unit Side B



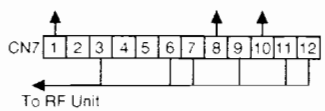
3) CPU Unit Side A



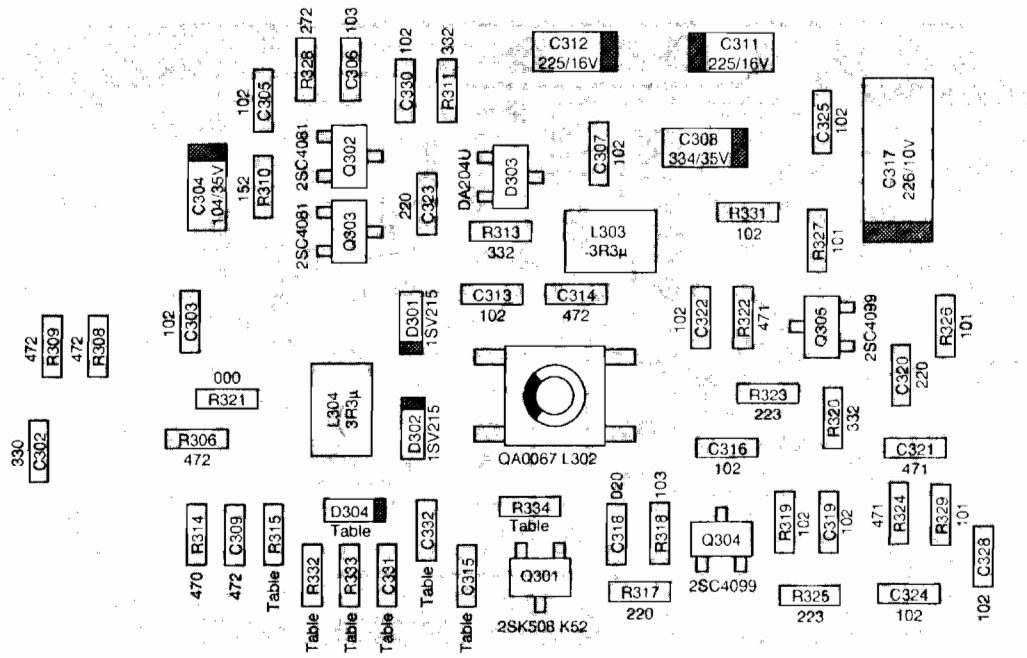
4) CPU Unit Side B



	W1	W2	W3	W4	R284	R294	R295	R296	R297	CN204	IC208
T	JP	-	-	-	-	0	0	-	-	-	-
E	JP	JP	-	-	0	0	0	-	-	-	-
EZ	JP	JP	-	-	-	0	0	1K	1K	0	AT24C08-10SI-2.7
EA	-	-	-	-	0	0	0	-	-	-	-
TA	-	-	-	-	-	0	0	-	-	-	-
TE1	-	-	JP	JP	-	-	-	-	-	-	-
TE2	-	-	JP	JP	-	-	-	-	-	-	-



5) VCO Unit Side A



6) VCO Unit Side B

	C315	C331	C332	D304	R315	R316	R332	R333	R334
T/E/EZ/EA/TA	3p	-	-	-	10k	100	-	-	-
TE1	3p	4700p	0.5p	1SV215	22k	56	8.2k	8.2k	220k
TE2	1p	4700p	0.5p	1SV215	22k	56	10k	8.2k	220k