



Company Name: Alinco, Inc.
EUT: DR-605T
FCC ID: EUGDR-605T
Client Reference Number DR-605T
Work Order Number: 990529

APPENDIX H:

SERVICE MANUAL

DR-605T/E/TE1/TE2

Service Manual

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SPECIFICATIONS

1) General

Frequency Range:

(Version T)	VHF BAND	136.000 ~ 173.995MHz (RX) 144.000 ~ 147.995MHz (TX)
	UHF BAND	420.000 ~ 470.000MHz (RX) 430.000 ~ 449.995MHz (TX)
(Version E)	VHF BAND	144.000 ~ 145.995MHz (RX/TX)
	UHF BAND	430.000 ~ 439.995MHz (RX/TX)
(Version TE1)	VHF BAND	136.000 ~ 173.995MHz (RX/TX)
	UHF BAND	400.000 ~ 420.000MHz (RX/TX)
(Version TE2)	VHF BAND	136.000 ~ 173.995MHz (RX/TX)
	UHF BAND	450.000 ~ 470.000MHz (RX/TX)

Modulation:

F3E (FM)

Antenna Impedance:

50Ω

Supply Voltage:

13.8 Volts DC

Ground:

Negative

Current Consumption

VHF TX 50W: 11.5A max. (T/E), 35W: 11.0A max. (TE1/TE2)
UHF TX 35W: 10.0A max.
RX 1.2A max.

Frequency Stability:

±10ppm max.

Dimensions (Body only):

140(W)mm x 40(H)mm x 176(D)mm

Weight:

1.1kg

Channel

VHF: 51 / UHF: 51 total 102

2) Transmitter

Output Power:

VHF BAND High: 50W / Low: approx. 5W (T/E)
High: 35W / Low: approx. 5W (TE1/TE2)
UHF BAND High: 35W / Low: approx. 5W

Modulator:

Reactance modulation

Spurious Emission:

-60dB max.

Max. Deviation:

±5kHz

Mod. Distortion (@60% mod.):

3% max. (300 to 3000Hz)

Microphone Impedance:

2kΩ

3) Receiver

Rx System:

Double Superheterodyne

Intermediate Frequency:

VHF: First: 21.7MHz / Second: 450kHz
UHF: First: 30.85MHz / Second: 455kHz

Sensitivity (12dB SINAD):

Main band: -16dBμ (0.16μV) or less

Selectivity:

-6dB: 12kHz min., -60dB: 28kHz max.

Squelch Sensitivity:

-20dBμ (0.1μV) or less

AF Output (@5% distortion):

2W or more (8Ω load)

Speaker Output Impedance:

8Ω

Note: Specifications are subject to change without notice or obligation.

Specifications guaranteed in the amateur band only. (T/E)

CIRCUIT DESCRIPTION

1) Frequency Configuration

- VHF and UHF bands have each PLL independently, and 2 IF systems are provided. Therefore 2 bands can be received simultaneously.
- The received signal of VHF band is mixed with the first local oscillator signal and converted into the first IF of 21.70MHz. Then the resulting signal is mixed with the second local oscillator signal of 21.25MHz and converted into 450kHz.
- The received signal of UHF band is mixed with the first local oscillator signal and converted into the first IF of 30.85kHz. Then the resulting signal is mixed with the second local oscillator signal of 30.395MHz and converted into 455kHz.

2) Receiver System

1. Receiver Circuit

The received signal from the antenna is passed through the duplexer (the circuit consists of low-pass filter for VHF and high-pass filter for UHF), and divided into the signals of VHF and UHF.

1-1 144M Band Receiver Circuit

After the received signal from the duplexer is passed through the band-pass filter via the antenna switch (D5, D6), the signal is amplified at RF amplifier Q11. The unwanted signal of the amplified signal is eliminated by the band-pass filter consisting of 3 varicaps. Next the signal is mixed with the first local oscillator signal at the first mixer Q12, and converted to the first IF. The unwanted signal is attenuated by the crystal filter circuit. Then the signal is fed to IC2 Pin16 after being amplified at IF amplifier Q7. In this IC2 the signal is mixed with the second oscillator signal and converted to the second IF, then it is output from Pin3. The output signal is attenuated the unwanted signal by the ceramic filter, and input again from IC2 Pin5. Next the signal is passed through the limiter amplifier and demodulated in the quadrature detection circuit of IC2 to be output from Pin9 as AF signal.

1-2 430M Band Receiver Circuit

The received signal from the duplexer is passed through the antenna switch (D206, D207), and amplified in the RF amplifier Q211. The amplified signal is attenuated the unwanted signal by the helical filter L218. The signal is amplified in RF amplifier Q212 and attenuated the unwanted signal again by the helical filter L219, then it is mixed with the first local oscillator signal at the first mixer Q213 and converted to the first IF. The unwanted signal is attenuated by the crystal filter circuit. Then the signal is fed to IC202 Pin16 after being amplified at IF amplifier Q214. In this IC202 the signal is mixed with the second oscillator signal and converted to the second IF, then it is output from Pin3. The output signal is attenuated the unwanted signal by the ceramic filter, and input again from IC202 Pin5. Next the signal is passed through the limiter amplifier and demodulated in the quadrature detection circuit of IC202 to be output from Pin9 as AF signal.

2. S (Signal) Meter Circuit

VHF:

The S meter signal DC voltage which is output from IC2 Pin13 is supplied to IC401 Pin10 via Trim. pot VR1, then it is digitized by A/D converter to be indicated on LCD as the S meter.

UHF:

The S meter signal DC voltage which is output from IC202 Pin13 is supplied to IC401 Pin5 via Trim. pot VR202 then it is digitized by A/D converter to be indicated on LCD as the S meter.

3. Squelch Circuit

VHF Squelch Circuit:

The AF signal which is output from IC2 Pin9 is input to Pin10. Only the noise is amplified by the active filter in IC2 and output from Pin11, then amplified by the noise amplifier Q6. The amplified noise is rectified to DC voltage by D2 and input to CPU IC401 Pin9 via Trim. pot VR2. In the IC the input voltage and the settled voltage by the squelch knob are compared to work the squelch ON/OFF. When the squelch is open, the squelch signal "H" is output from IC401 Pin41 and LED D401 (green) lights.

UHF Squelch Circuit:

The AF signal output from IC202 Pin9 is input to Pin10. Only the noise is amplified by the active filter in IC2 and output from Pin11, then amplified by the noise amplifier Q206. The amplified noise is rectified to DC voltage by D202 and input to CPU IC401 Pin5 via Trim. pot VR201. In the IC the input voltage and the settled voltage by the squelch knob are compared to work the squelch ON/OFF. When the squelch is open, the squelch signal "H" is output from IC401 Pin13 and LED D402 (green) lights.

3) Power Supply Circuit

1. VHF Power Supply Switch Circuit and Unlock Circuit

In the receiving mode, "H" is output from PLL shift register IC501 Pin16 according to the serial data from CPU, and Q17 and Q16 are turned ON, then 8V is added to 8RV line. In the transmitting mode, just same as the receiving mode, "H" is output from IC501 Pin17, and Q19 and Q18 are turned ON, then 8V is added to 8TV line. When PLL is unlocked, the unlock switch Q21 is turned ON because "H" is output from UL terminal of PLL-VCO unit. Then 8TV switch Q19 is turned OFF. Consequently, as 8TV line does not work, the unit does not transmit when PLL is unlocked.

2. UHF Power Supply Switch Circuit and Unlock Circuit

In the receiving mode, "H" is output from PLL shift register IC601 Pin16 according to the serial data from CPU, and Q217 and Q218 are turned ON, then 8V is added to 8RV line. In the transmitting mode, just same as the receiving mode, "H" is output from IC601 Pin17, and Q220 and Q219 are turned ON, then 8V is added to 8TV line. When PLL is unlocked, the unlock switch Q222 is turned ON because "H" is output from UL terminal of PLL-VCO unit. Then 8TV switch Q220 is turned

OFF. Consequently, as 8TV line does not work, the unit does not transmit when PLL is unlocked.

4) AF Signal Circuit

1. VHF AF Signal

The AF signal which is output from IF unit IC2 Pin9 is made the AF frequency characteristics 3kHz or below by the de-emphasis circuit (consisting of R19, C18, R13, C10, R12 and C9), then amplified by AF preamplifier Q3. Besides the amplified signal is made the AF frequency characteristics 300Hz or more by the de-emphasis circuit (consisting of C5, R8, C4, R3, C3). The de-emphasized AF signal ROV is muted and after the signal is adjusted by volume VR401, added to AF power amplifier IC3 Pin1 and amplified to drive the speaker.

2. UHF AF Signal

The AF signal which is output from IF unit IC202 Pin9 is made the AF frequency characteristics 3kHz or below by the de-emphasis circuit (consisting of R226, C213, R222, C211, R221 and C210), then amplified by AF preamplifier Q203. Besides the amplified signal is made the AF frequency characteristics 300Hz or more by the de-emphasis circuit (consisting of C207, R210, C206, R207, C205). The de-emphasized AF signal ROU is muted and after the signal is adjusted by volume VR402, added to AF power amplifier IC3 Pin1 and amplified to drive the speaker.

3. AF Mute Circuit

VHF:

When the squelch is turned ON and there is no input signal, the output control signal of the microcomputer IC401 Pin42 turns ON double mute switches Q2 and Q4, then the input signal of audio power amplifier IC3 is cut to mute the speaker output.

UHF:

When the squelch is turned ON and there is no input signal, the output control signal of the microcomputer IC401 Pin19 turns ON double mute switches Q204 and Q233, then the input signal of audio power amplifier IC3 is cut to mute the speaker output.

5) Transmitter System

1. Modulator Circuit VHF/UHF

After the voice is converted into the electric signal by the microphone, the signal is led to the microphone amplifier Q401 to be amplified. The microphone amplifier includes the pre-emphasis circuit. The amplified voice signal is added to the IDC circuit of operational amplifier IC203 and limited the band width. Each frequency deviation can be adjusted in VR3 (VHF) or VR204 (UHF). The signal is added to varicap of VHF/UHF VCO unit for reactance modulation.

2. Drive/PA Amplifier Circuit

VHF:

The transmit signal from VCO of VHF band is amplified by the younger amplifiers Q9, Q10, then input to the power module IC1. The signal amplified to the desired level in IC1, is passed through the low-pass filter, antenna switch, and low-pass filter in duplexer to attenuate the second and third harmonics enough, then supplied to the antenna.

UHF:

The transmit signal from VCO of VHF band is amplified by the younger amplifiers Q208, Q209, Q210 then input to the power module IC201. The signal amplified to the desired level in IC201, is passed through the low-pass filter, antenna switch, and low-pass filter in duplexer to attenuate the second and third harmonics enough, then supplied to the antenna.

3. APC circuit

VHF:

A part of output power from low-pass filter is detected by Diodes D7 and D8, and converted to DC. The detection voltage is passed through the APC circuit of UHF side (Q229, Q228, Q227), then it controls the APC voltage supplied to the younger amplifier Q10 and the power module IC1 to fix the output power.

UHF:

A part of output power from low-pass filter is detected by Diodes D208 and D209, and converted to DC. The detection voltage is passed through the APC circuit of UHF side (Q229, Q228, Q227), then it controls the APC voltage supplied to the younger amplifier Q210 and the power module IC201 to fix the output power.

6) PLL Circuit

1. PLL Synthesizer Circuit

VHF and UHF bands have their own units isolatedly. The sub unit is packed in a hard shield case so as not to be influenced by the circumstances. The crystal X2: 21.25MHz is oscillated in IC501 (VHF), and the output is fed to IC601 (UHF) via buffer Q13. The reference oscillating frequency (X2) is divided inside IC501 and IC601 to gain the reference frequency of 5kHz or 6.25kHz. The comparison frequency is divided by the pulse swallow system PLL IC501 and IC601 after VCO output is amplified in Q505 (VHF) and Q604 (UHF). In the result, the PLL synthesizer which has 5, 10, 12.5, 15, 20, 25, 30 and 50kHz steps is obtained.

The reference frequency of 21.25MHz is passed through the bufler of IC501 and output from Pin1 XBO, then input to IC2 Pin1 as VHF (144MHz band) 2nd local oscillator.

*As for TE1 and TE2, reference frequency of 21.25MHz is oscillated in X901: TCXO unit and fed to IC501(VHF).

2. V-VCO Circuit

The desired frequency is oscillated directly in Colpitts oscillating circuit consisting of FET Q502. VCO control voltage is added to the varicaps D502 and D503 to tune the oscillating frequency. While receiving RXV becomes "H", and Q501 and D501 are turned ON to shift the oscillating frequency.

3. U-VCO Circuit

The desired frequency is oscillated directly in Colpitts oscillating circuit consisting of FET Q601. VCO control voltage is added to the varicaps D602 and D603 to tune the oscillating frequency.

7) Front CPU and Peripheral Circuit

1. Microphone Key Input Circuit

PTT key:

Soon after the switch on the microphone (PTT) is turned ON, "L" level is input to CPU IC401 directly.

UP/DOWN key:

Soon after this switch is turned ON, the voltage is generated by the resistors that are connected to keys and supplied to IC401 Pin4 then A/D converted in CPU.

2. Lighting Circuit

When the power is turned ON, the voltage which is stabilized to 10.5V at Q405 and D407 is supplied to LMP401 and LMP402 to turn ON the lamp.

3. Reset and Backup Circuit

When the power is turned ON, "L" level of approximately 2 μ s or more is output from IC403 OUT (equipped with reset function), then "H" level is output to reset CPU IC401. When the power is turned OFF, IC405 output (BU) becomes "L" level and the transceiver goes into the backup mode. The contents of the memory is written on E2PROM IC402 in the backup mode. Then IC403 (equipped with reset function) becomes "L" level to reset the CPU.

4. Beep Sound Output Circuit

The square pulse is output from CPU IC401 Pin23 (BEEP), then it is integrated by CR and input to AF amplifier without passing through Volume VR.

8) Cross Band Repeater Circuit (T, TE1, TE2)

When the Squelch of VHF side is opened in the Cross Band Repeater mode, the AF signal ROV (VHF) is unmuted and amplified by IC203. The amplified modulation signal is added to modulation varicap of UHF VCO and transmitted from UHF side. When the Squelch of UHF side is opened in the Cross Band Repeater mode, the AF signal ROU (UHF) is unmuted and amplified by IC203. The amplified modulation signal is added to modulation varicap of VHF VCO and transmitted from VHF side.

9) Tone Burst Output Circuit

When Down key is pressed while holding the PTT key down, the square pulse is output from CPU IC401 Pin14 (B1750). It is amplified by IC203 after being integrated by CR. The amplified signal is added to each VCO modulation varicap to output.

10) CTCSS Tone Encoder Circuit

The mimic sine wave is output from IC401 Pin11. It is integrated by CR, and converted to analogue wave to obtain 50 waves within 67.0-254.1. The tone is added to VCO to output.

11) CTCSS Tone Decoder Circuit (EJ-24U)

In IC1(VHF) or IC2 (UHF), a kind of tone frequency is settled by the serial data selected from 50 kinds of frequencies within 67.0-254.1Hz . While receiving the voice and tone signals input from RAV (VHF) or RAU (UHF) are supplied to Pin1, and tone signal only is selected at the low-pass filter in IC. When the signal is accordance with the tone frequency which is settled by the serial data, "L" level is output to TDV (VHF) or TDU (UHF) terminal. The "L" level signal is input to IC401, Pin32 and Pin33, then the squelch is opened. When the tone signal is not accordance with the settled frequency, "H" level is output to the TDV (VHF) or TDU (UHF) terminal. The "H" level signal is input to IC401, Pin32 and Pin33, then the squelch is closed.

12) 9600bps Packet Circuit

In the 9600 packet mode, PTT is provided through the UART terminal of JK1 to IC401 Pin22, then it is transmitted in "L" level. The modulation signal from TNC is provided through 9600 PKT terminal of JK2. It is amplified and limited in Q29, unmuted in Q26 and Q27, and the VCO is modulated, then transmitted. The detection output of IF IC2 or IC202 is input to the signal switch IC4 via butter Q23 or Q235. The input V/U signal switches the input signal of IC4 according to the signal from CPU IC401 Pin33. Then the MAIN band signal is output from Pin1 to JK2.

13) Clone Circuit

In the Clone mode, the data which is output from IC401 Pin21 of Master unit is fed to the IC401 Pin22 of the Slave unit through the UART terminal JK1 and connecting cable.

14) CPU I/O Port

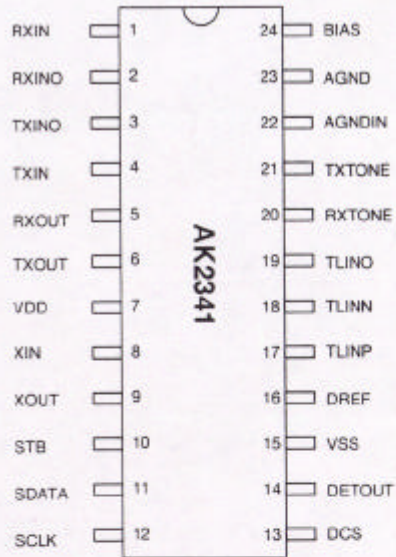
No.	Pin Name	Function	I/O	Logic	Description
1	C1	C1	-	-	NC
2	VL1	V1	-	-	LCD Power supply
3	P67/AN7	V/U	I	A/D	Key input (VHF/UHF/TOT key switch)
4	P66/AN6	UP/DN	I	A/D	Key input (UP/DOWN/CALL key switch)
5	P65/AN5	SMU	I	A/D	UHF side S meter voltage input
6	P64/AN4	SQU	I	A/D	UHF side SQ noise voltage input
7	P63/SCLK22/AN3	BP1	I	A/D	Destination setting (T=5V, E=3.2V)
8	P62SCLK21/AN2	BP2	I	A/D	Extension specification
9	P61/SOUT2/AN1	SQV	I	A/D	VHF side SQ noise voltage input
10	P60/SIN2/AN0	SMV	I	A/D	VHF side S meter voltage input
11	P57/ADT/DA2	TONE	O	D/A	CTCSS tone output (50 waves)
12	P56/DA1	MMUT	O	H	Microphone mute OFF control output (TX="H")
13	P55/CNTR1	SDU	O	H	UHF Squelch signal output (When squelch is open = "H")
14	P54/CNTR0	B1750	I/O	A/D/H	Extension specification (when PSW is ON)/ Tone burst output
15	P53/RTP1	DATU	O	Pulse	UHF side PLL data output
16	P52/RTP0	CKU	O	Pulse	UHF side PLL clock output
17	P51/PWM1	STPU	O	Pulse	UHF side PLL reset output
18	P50/PWM0	PTT	I	L	Key input (PTT)
19	P47/SROY1	MUTU	O	H	UHF side AF signal mute control output ("H" = Mute is ON)
20	P46/SCLK1	XMUT	O	L	AF unmute output in cross band repeater mode (XBR = "L")
21	P45/TXD	TXD	O	Pulse	Clone data output
22	P44/RXD	RXD	I	Pulse	Clone data input (9600 packet = PTT input "L" = TX)
23	P43/S/OUT	BEEP	O	H	Beep sound output
24	P42/INT2	ENC2	I	L	Rotary encoder B input
25	P41/INT1	ENC1	I	L	Rotary encoder A input
26	P40	UL	I	L	PLL, unlock input (L = unlock)
27	P77	TP	I	H	Trunking mode input (H = Trunking mode)
28	P76	MONI	I/O	L	Key input (MONITOR) / 9600 mode (PTT ON = "L")
29	P75	MHZ	I	L	Key input (MHz)
30	P74	V/M	I	L	Key input (VFO/MR switch)
31	P73	FUNC	I	L	key input (FUNC)
32	P72	TDV	I	L	VHF CTCSS tone detection (when the tone is detected = "L")
33	P71	TDU	I/O	L/H	UHF CTCSS tone detection/RX switch in 9600 mode (VHF=L)
34	P70/INT0	BU	I	L	Backup signal input ("L"=Backup)
35	RESET	RES	I	L	Reset signal input ("L"=Reset)
36	Xcin	XC1	-	-	NC
37	Xcout	XC0	-	-	NC
38	Xin	XIN	I	-	CPU clock input (4.1943MHz)
39	Xout	XOUT	O	-	CPU clock output (4.1943MHz)

No.	Pin Name	Function	I/O	Logic	Description
40	Vss	GND	-	-	GND
41	P27	SDV	O	H	VHF squelch signal output (when squelch is open = 'H')
42	P26	MUTV	-	-	VHF AF signal mute control output (H=Mute is ON)
43	P25	STPV	O	Pulse	VHF PLL reset output
44	P24	DATV	O	Pulse	VHF PLL/CTCSS data output
45	P23	CKV	O	Pulse	VHF PLL/CTCSS clock output
46	P22	SCL	O	Pulse	EEPROM clock output
47	P21	SDA	I/O	Pulse	EEPROM data input/output
48	P20	LOW	O	H	Transmitting output switch ('H'=Low output)
49	P17	STB2	O	Pulse	CTCSS UHF strobe signal output
50	P16	TID	I/O	Pulse	CTCSS board detection/CTCSS VHF strobe signal output
51	P15/SEG39	SEG39	O	H	Segment output for LCD
↓	↓	↓	↓	↓	↓
90	SEG0	SEG0	O	H	Segment output for LCD
91	Vcc	VCC	-	-	5V Power supply
92	Vref	AVCC	-	-	Reference power supply for A/D conversion
93	AVss	GND	-	-	GND
94	COM3	COM3	-	-	NC
95	COM2	COM2	O	-	Common output 2 for LCD
96	COM1	COM1	O	-	Common output 1 for LCD
97	COM0	COM0	O	-	Common output 0 for LCD
98	VL3	V3	-	-	Power supply for LCD
99	VL2	V2	-	-	Power supply for LCD
100	C2	C2	-	-	NC

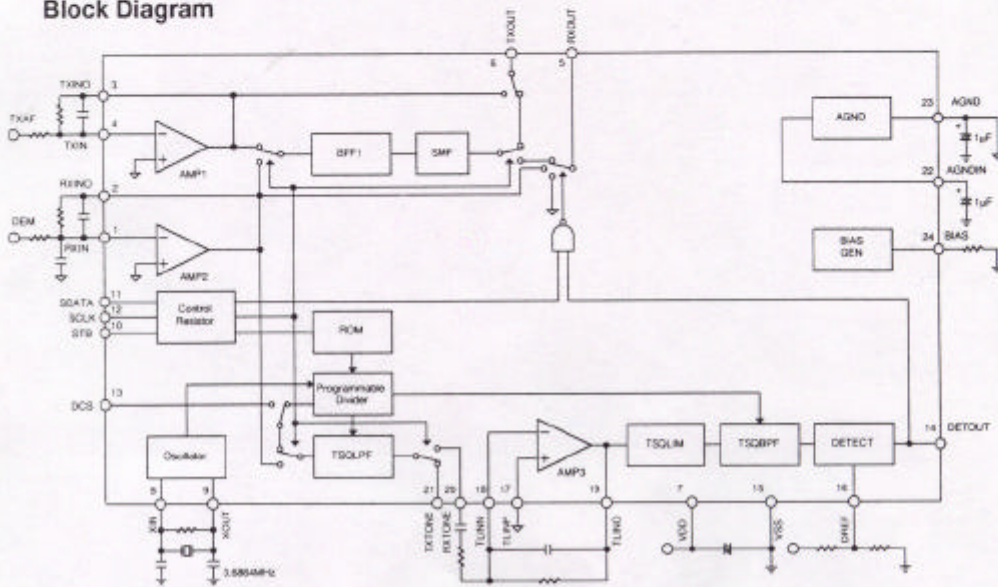
SEMICONDUCTOR DATA

1) AK2341 (XA0239) EJ24u (option) CTCSS Encoder/Decoder

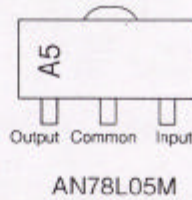
Pin No.	Pin Name	I/O	Function
1	RXIN	I	RX Signal Input
2	RXINO	O	AMP2 Output
3	TXINO	O	AMP1 Output
4	TXIN	I	TX Audio Input
5	RXOUT	O	RX Audio Output
6	TXOUT	O	TX Audio Output
7	VDD	-	Power Supply (1.8 - 5.5V)
8	XIN	I	Crystal Terminal (3.6864MHz)
9	XOUT	O	Crystal Terminal (3.6864MHz)
10	STB	I	Strobe for 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

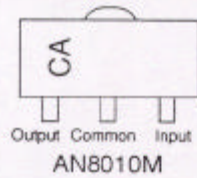
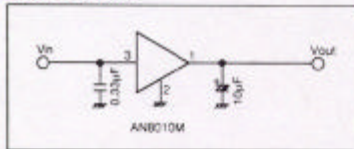


2) AN78L05M (XA0238)
5V Voltage Regulator

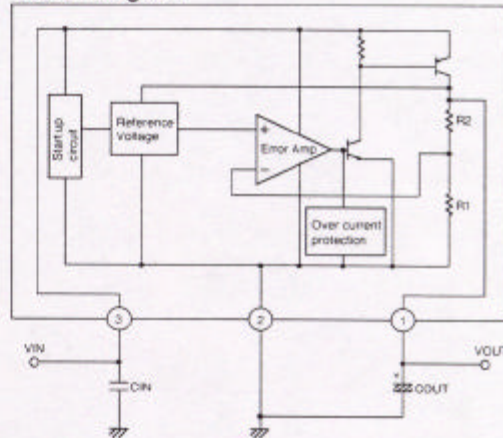


3) AN8010M (XA0119)
Voltage Regulator

Test Circuit



Block Diagram



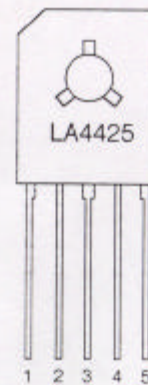
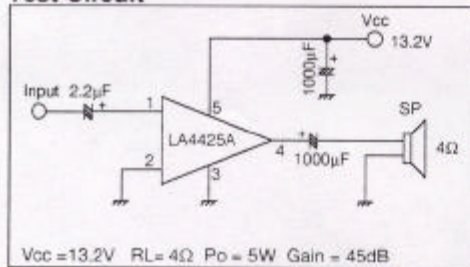
4) AT24C16N-10SI-2.7 (XA0368)
16K bits CMOS Serial EEPROM



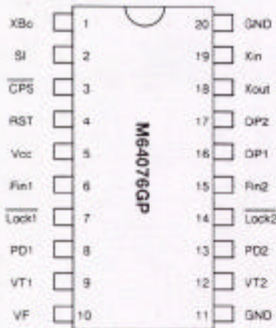
Pin Name	Function
A0 to A2	Address inputs
SDA	Serial Data
SCL	Serial Clock
Test	Test Input (GND or Vcc)
NC	No connection

5) LA4425A (XA0410)
5W Audio Power Amplifiers

Test Circuit

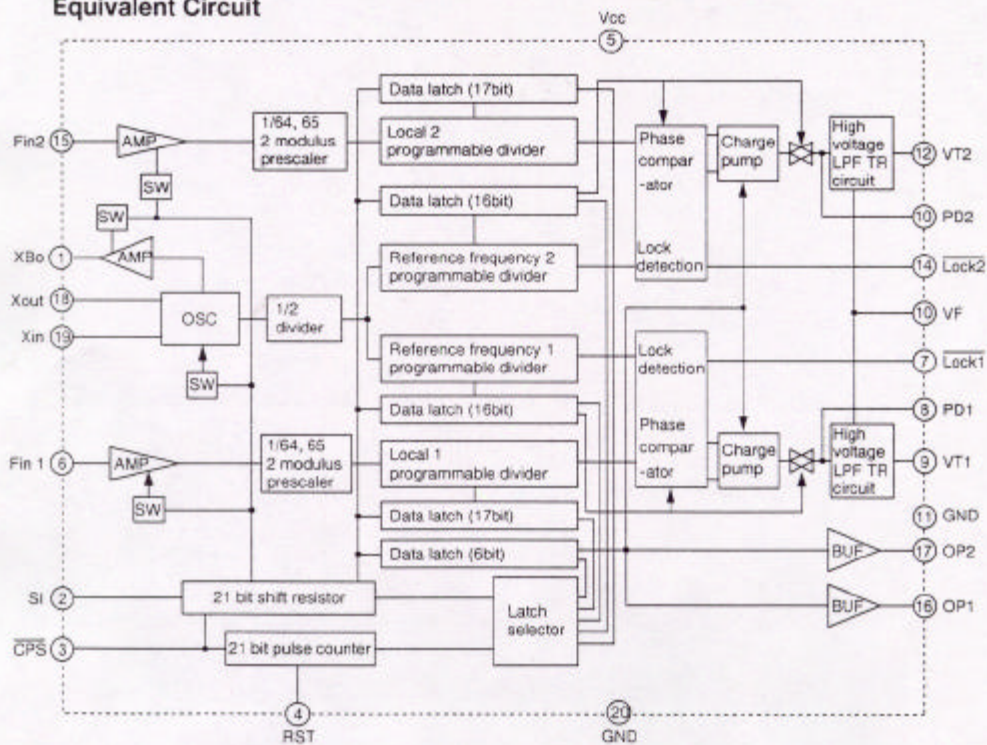


6) M64076GP (XA0352) Dual PLL Synthesizer

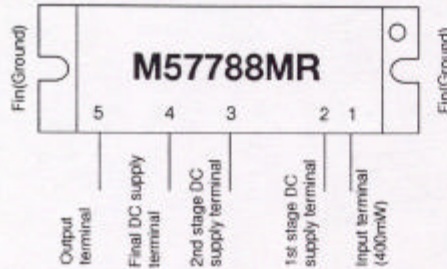


Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Power supply voltage	Vcc	Fin=80-520MHz Vin=10dBm	2.7	-	5.5	V
LPF supply voltage	VF		-	9	12	V
Local oscillator input level	Vin	Fin=80-520MHz Vcc=2.7-5.5V	-20	-	-4	dBm
Local oscillator input frequency	Fin	Vin=20-40dBm Vcc=2.7-5.5V	80	-	520	MHz
Xin input level	Vin	Vcc=2.7-5.5V Fin=10-25MHz Sine wave	0.4	-	1.4	Vp-p
Xin input frequency	Fxin	Vcc=2.7-5.5V Vin=0.4-1.4Vp-p	10	-	25	MHz

Equivalent Circuit



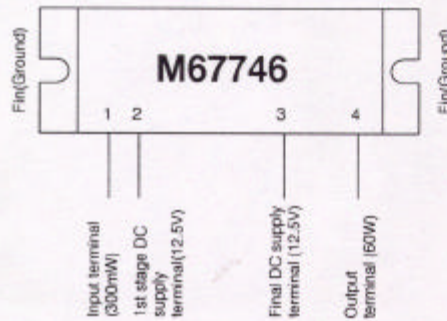
**7) M57738LR (XA0447)
M57788MR (XA0313)
M57788HR (XA0448)**
UHF FM 35W RF Power Module



Ratings	Symbol	Ratings	Unit
Supply voltage	Vcc	17.0	V
Total current	Icc	12	A
Input power	Pin	0.8	W
Output power	Po	50	W
Operation case temperature	Tc(op)	-30~+110	°C
Storage temperature	Tstg	-40~+110	°C

f=430~450MHz, Vcc1 ≦ 3.5V, Zg=Zl=50Ω

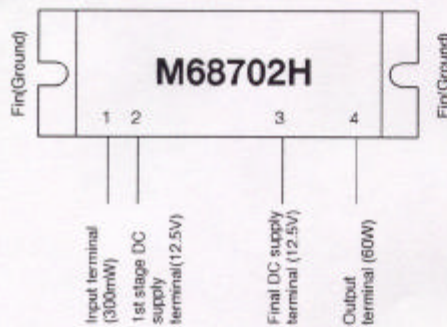
8) M67746 (XA0412)
144 ~ 148MHz 60W
RF Power Module



Ratings	Symbol	Ratings	Unit
Supply voltage	Vcc	17	V
Total current	Icc	20	A
Input power	Pin(max)	600	mW
Output power	Po(max)	70	W
Operation case temperature	Tc(op)	-30 to +110	°C
Storage temperature	Tstg	-40 to +110	°C

Zg=Zl=50Ω

9) M68702H (XA0444)
150 ~ 175MHz 60W
RF Power Module

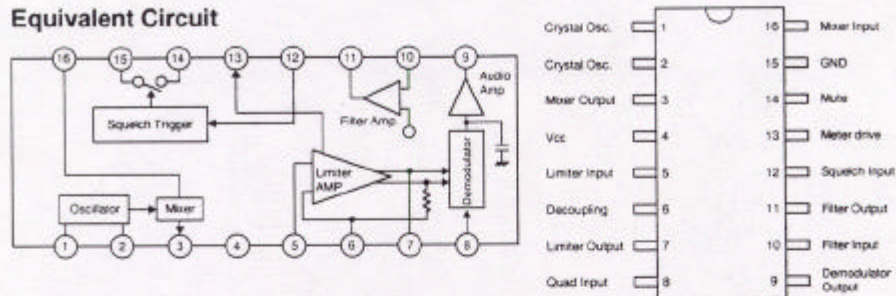


Ratings	Symbol	Ratings	Unit
Supply voltage	Vcc	17	V
Total current	Icc	20	A
Input power	Pin(max)	600	mW
Output power	Po(max)	75	W
Operation case temperature	Tc(op)	-30 to +110	°C
Storage temperature	Tstg	-40 to +110	°C

Zg=Zl=50Ω

10) MC3372VM (XA0343)
Low Power FM IF

Equivalent Circuit

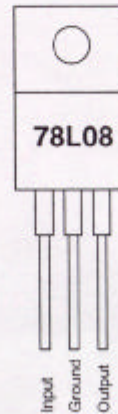
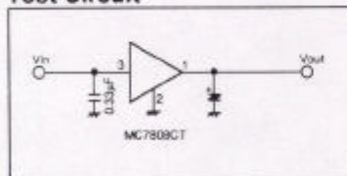


Ta=25°C

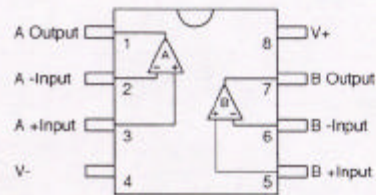
Parameter	Pin No.	Symbol	Ratings	Unit
Max. supply voltage	4	Vcc	2.4-9.0	Vdc
RF input voltage	16	Vrf	0.005-10	mVrms
RF input frequency	16	Frf	0.1-100	MHz
Oscillator input voltage	1	Vlocal	80-400	mVrms
IF frequency	-	Fif	455	kHz
Limiter amplifier input voltage	5	Vif	0-400	mVrms
Filter amplifier input voltage	10	Vfa	0.1-300	mVrms
Squelch input voltage	12	Vsq	0 or 2	Vdc
Mute sink current	14	Isq	0.1-30	mA
Temperature range	-	TA	-30-+75	°C

11) MC7808CT (XA0082)
8V Voltage Regulator

Test Circuit

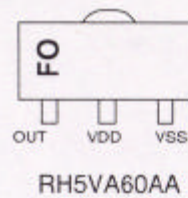
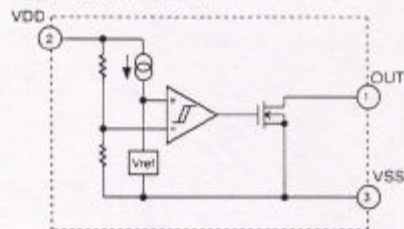


12) NJM4558 (XA0097)
Operational Amplifiers



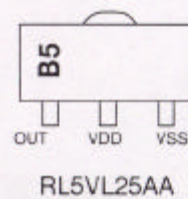
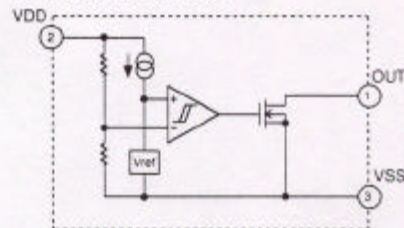
13) RH5VA60AA (XA0315)
C-MOS Voltage Detector

Equivalent Circuit



14) RN5VL25AA-T1 (XA0309)
C-MOS Voltage Detector

Equivalent Circuit

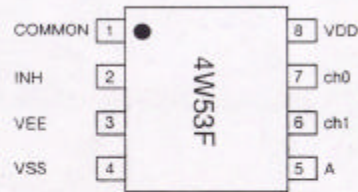


15) TC4W53FU (XA0348)
Multiplexer/Demultiplexer

Function Table

Control input		ON channel
INH	A	
L	L	ch 0
L	H	ch 1
H	*	NONE

* Dont Care

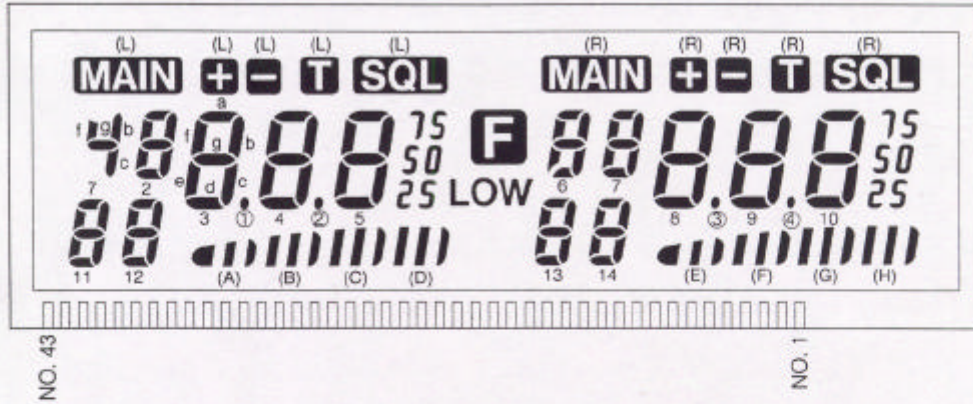


16) Transistor, Diode and LED Outline Drawings

Top View

1SS355 XD0254	1SS356 XD0272	1SV214 XD0131	1SV215 XD0132	1SV237 XD0141	1SV262 XD0300	1SV268 XD0301	DA204U XD0130
DAN202U XD0230	DAN235U XD0246	DTZ5.1A XD0136	DTZ11B XD0187	DSA3A1 XD0274	MA729 XD0291	MA742 XD0250	MA8110H XD0255
MI407 XD0013	RN731V XD0257	UDZ3.0B XD0304	LT1EP53A XL0039	2SK1577 XE0022	2SK508 XE0010	2SK880GR XE0021	3SK131V12 XE0028
3SK177 XE0024	3SK184S XE0013	2SA1182Y XT0017	2SA1576 XT0094	2SB1132 XT0061	2SB1292 XT0112	2SB1302 XT0126	2SC2412K XT0037
2SC2873 XT0113	2SC2954 XT0084	2SC3357 XT0048	2SC4081 XT0095	2SC4215 XT0124	2SC4245 XT0125	2SC5226 XT0146	DTC363EK XU0160
FMC2 XU0028	UN5112 XU0174	UN5114 XU0173	UN5211 XU0061	UN5213 XU0180	XN111M XU0046	XN1213 XU0054	XP1215 XU0178
C2 C2 C1B2	6B B E	6D B E	8A B E	8C B E	EK C2 C1	9L C2 C1	9M C2 C1

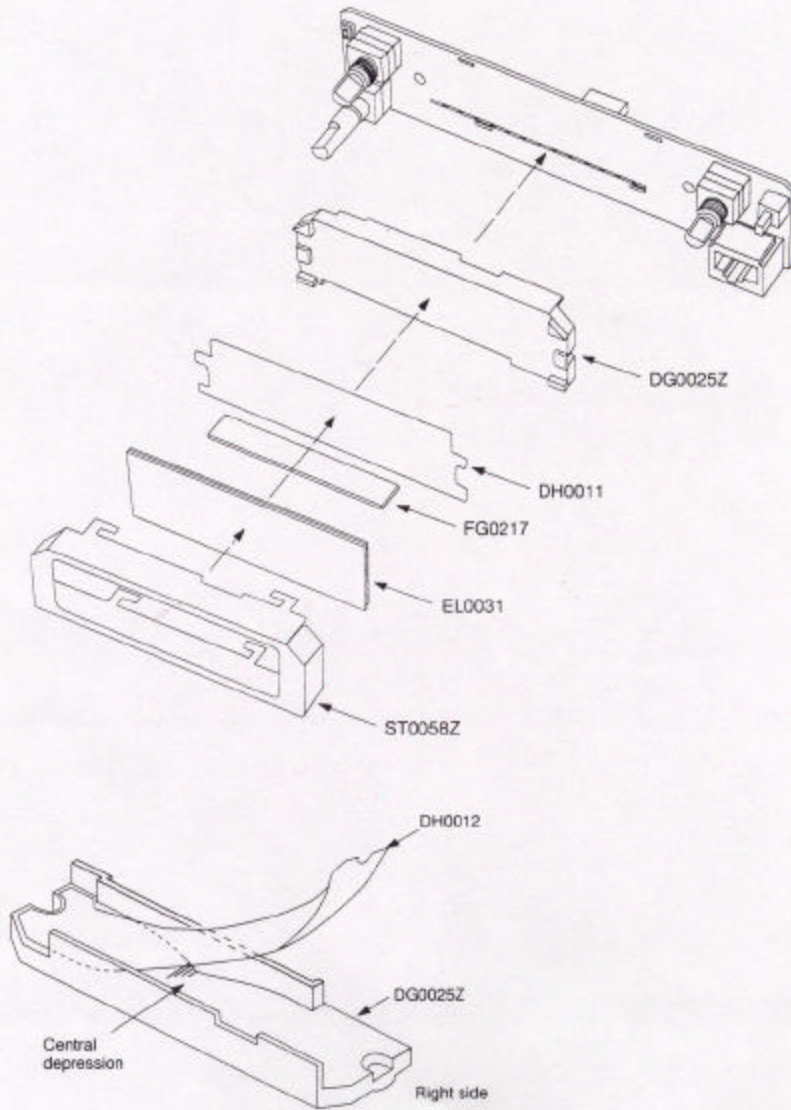
17) LCD Connection



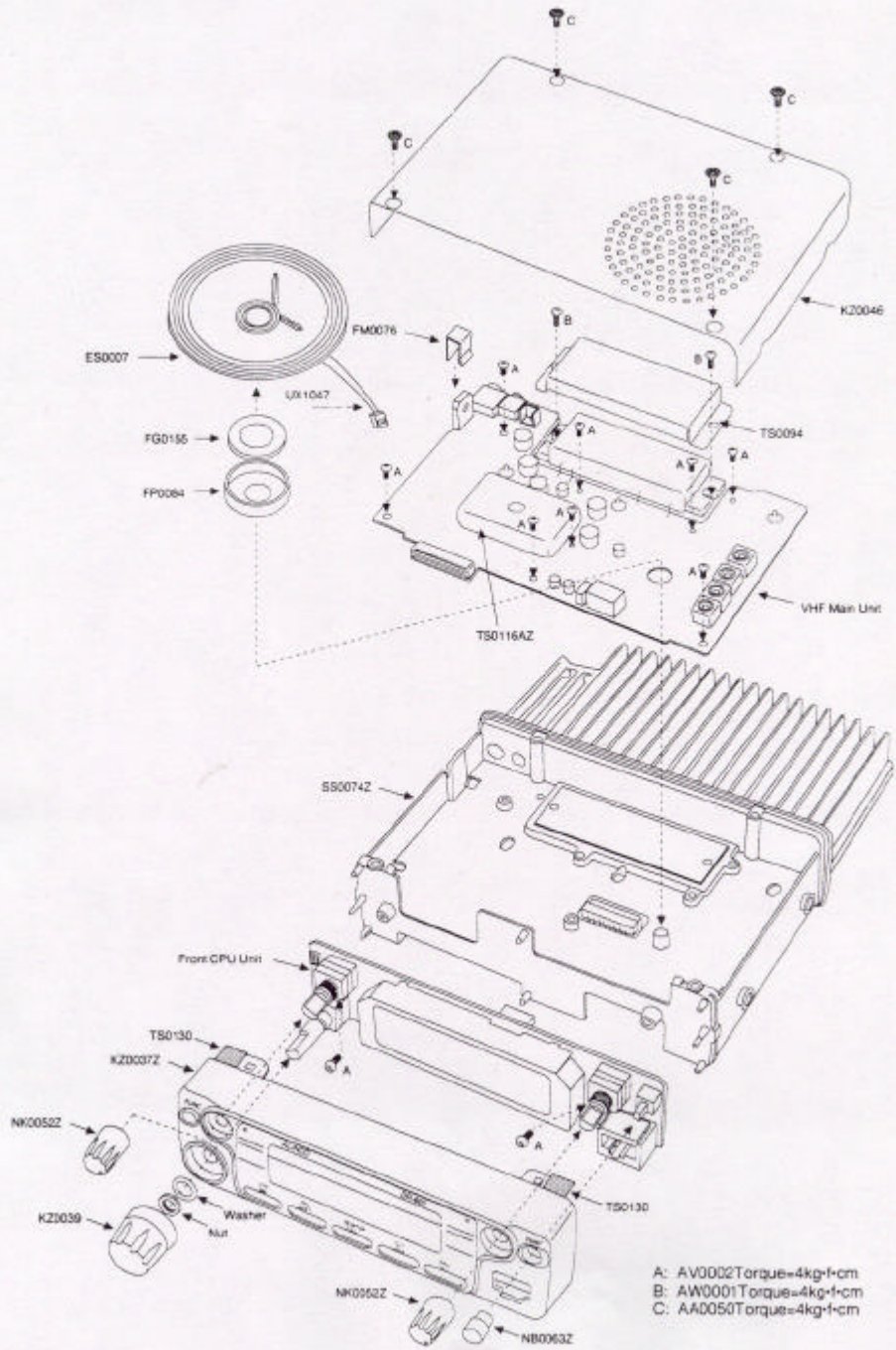
No.	COM.3	COM.2	COM.1	No.	COM.3	COM.2	COM.1
1	COM.3			26	5c	5b	(C) III
2		COM.2		27	5g	5a	5d
3			COM.1	28	5e	5f	② .
4	(R) SQL	(R) T	(H) III	29	4c	4b	(B) III
5	(R) 50	(R) 75	(R) 25	30	4g	4a	4d
6	10c	10b	(G) III	31	4e	4f	① .
7	10g	10a	10d	32	3c	3b	(A) III
8	10e	10f	④ .	33	3g	3a	3d
9	9c	9b	(F) III	34	3e	3f	(L) SQL
10	9g	9a	9d	35	2c	2b	(L) T
11	9e	9f	③ .	36	2g	2a	2d
12	8c	8b	(E) III	37	2e	2f	(L) □
13	8g	8a	8d	38	12c	12b	(L) □
14	8e	8f	(R) □	39	12g	12a	12d
15	7c	7b	(R) □	40	12e	12f	1bc
16	7g	7a	7d	41	11c	11b	1fg
17	7e	7f	7a	42	11g	11a	11d
18	14c	14b	6bcg	43	11e	11f	(L) MAIN
19	14g	14a	14d				
20	14e	14f	6e				
21	13c	13b	6f				
22	13g	13a	13d				
23	13e	13f	(R) MAIN				
24	LOW	F	(D) III				
25	(L) 50	(L) 75	(L) 25				

EXPLODED VIEW

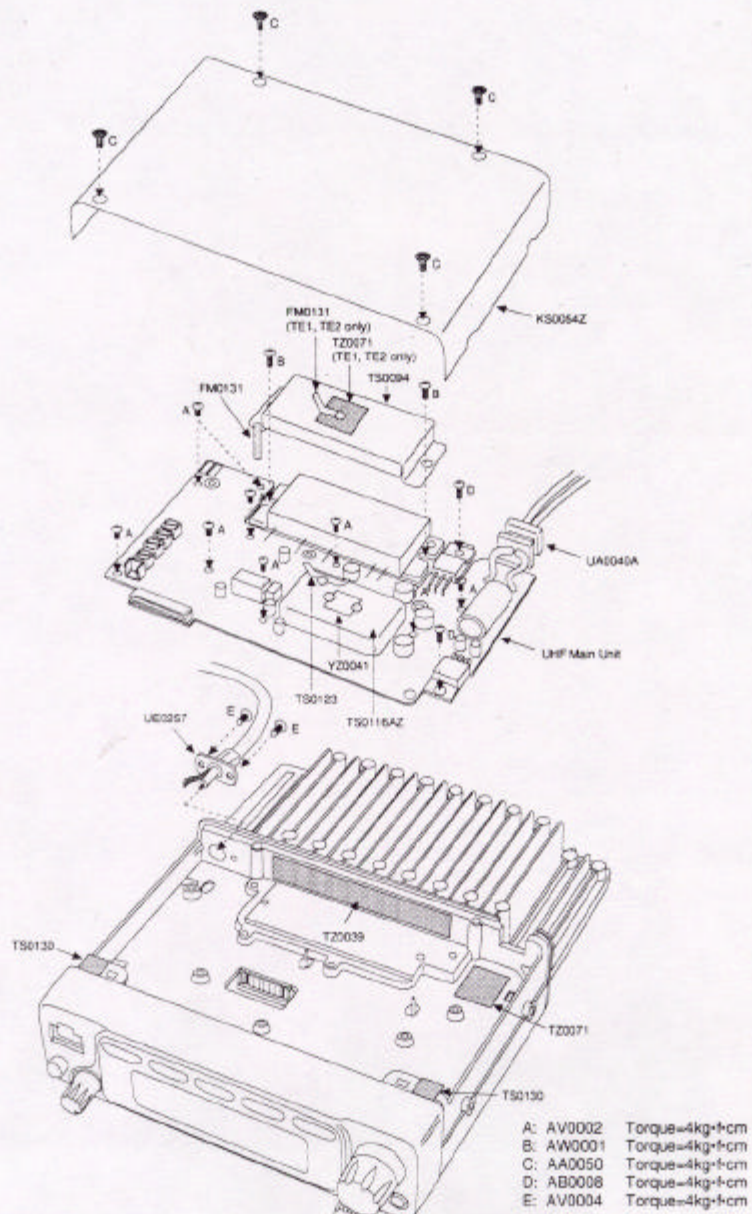
1) LCD Assembly



2) VHF Unit Assembly



3) UHF Unit Assembly



UHF MAIN Unit

Ref. No.	Part No.	Description	Part Name	Ver.
C201	CU3047	UHF MAIN Unit		
C202	CU3048	UHF MAIN Unit		
C203	CU3049	UHF MAIN Unit		
C204	CU3050	UHF MAIN Unit		
C205	CU3051	UHF MAIN Unit		
C206	CU3052	UHF MAIN Unit		
C207	CU3053	UHF MAIN Unit		
C208	CU3054	UHF MAIN Unit		
C209	CU3055	UHF MAIN Unit		
C210	CU3056	UHF MAIN Unit		
C211	CU3057	UHF MAIN Unit		
C212	CU3058	UHF MAIN Unit		
C213	CU3059	UHF MAIN Unit		
C214	CU3060	UHF MAIN Unit		
C215	CU3061	UHF MAIN Unit		
C216	CU3062	UHF MAIN Unit		
C217	CU3063	UHF MAIN Unit		
C218	CU3064	UHF MAIN Unit		
C219	CU3065	UHF MAIN Unit		
C220	CU3066	UHF MAIN Unit		
C221	CU3067	UHF MAIN Unit		
C222	CU3068	UHF MAIN Unit		
C223	CU3069	UHF MAIN Unit		
C224	CU3070	UHF MAIN Unit		
C225	CU3071	UHF MAIN Unit		
C226	CU3072	UHF MAIN Unit		
C227	CU3073	UHF MAIN Unit		
C228	CU3074	UHF MAIN Unit		
C229	CU3075	UHF MAIN Unit		
C230	CU3076	UHF MAIN Unit		
C231	CU3077	UHF MAIN Unit		
C232	CU3078	UHF MAIN Unit		
C233	CU3079	UHF MAIN Unit		
C234	CU3080	UHF MAIN Unit		
C235	CU3081	UHF MAIN Unit		
C236	CU3082	UHF MAIN Unit		
C237	CU3083	UHF MAIN Unit		
C238	CU3084	UHF MAIN Unit		
C239	CU3085	UHF MAIN Unit		
C240	CU3086	UHF MAIN Unit		
C241	CU3087	UHF MAIN Unit		
C242	CU3088	UHF MAIN Unit		
C243	CU3089	UHF MAIN Unit		
C244	CU3090	UHF MAIN Unit		
C245	CU3091	UHF MAIN Unit		
C246	CU3092	UHF MAIN Unit		
C247	CU3093	UHF MAIN Unit		
C248	CU3094	UHF MAIN Unit		
C249	CU3095	UHF MAIN Unit		
C250	CU3096	UHF MAIN Unit		
C251	CU3097	UHF MAIN Unit		
C252	CU3098	UHF MAIN Unit		
C253	CU3099	UHF MAIN Unit		

Note: Version = E1, Version@ = E2

UHF MAIN Unit

Ref. No.	Part No.	Description	Part Name	Ver.
C254	CU3100	UHF MAIN Unit		
C255	CU3101	UHF MAIN Unit		
C256	CU3102	UHF MAIN Unit		
C257	CU3103	UHF MAIN Unit		
C258	CU3104	UHF MAIN Unit		
C259	CU3105	UHF MAIN Unit		
C260	CU3106	UHF MAIN Unit		
C261	CU3107	UHF MAIN Unit		
C262	CU3108	UHF MAIN Unit		
C263	CU3109	UHF MAIN Unit		
C264	CU3110	UHF MAIN Unit		
C265	CU3111	UHF MAIN Unit		
C266	CU3112	UHF MAIN Unit		
C267	CU3113	UHF MAIN Unit		
C268	CU3114	UHF MAIN Unit		
C269	CU3115	UHF MAIN Unit		
C270	CU3116	UHF MAIN Unit		
C271	CU3117	UHF MAIN Unit		
C272	CU3118	UHF MAIN Unit		
C273	CU3119	UHF MAIN Unit		
C274	CU3120	UHF MAIN Unit		
C275	CU3121	UHF MAIN Unit		
C276	CU3122	UHF MAIN Unit		
C277	CU3123	UHF MAIN Unit		
C278	CU3124	UHF MAIN Unit		
C279	CU3125	UHF MAIN Unit		
C280	CU3126	UHF MAIN Unit		
C281	CU3127	UHF MAIN Unit		
C282	CU3128	UHF MAIN Unit		
C283	CU3129	UHF MAIN Unit		
C284	CU3130	UHF MAIN Unit		
C285	CU3131	UHF MAIN Unit		
C286	CU3132	UHF MAIN Unit		
C287	CU3133	UHF MAIN Unit		
C288	CU3134	UHF MAIN Unit		
C289	CU3135	UHF MAIN Unit		
C290	CU3136	UHF MAIN Unit		
C291	CU3137	UHF MAIN Unit		
C292	CU3138	UHF MAIN Unit		
C293	CU3139	UHF MAIN Unit		
C294	CU3140	UHF MAIN Unit		
C295	CU3141	UHF MAIN Unit		
C296	CU3142	UHF MAIN Unit		
C297	CU3143	UHF MAIN Unit		
C298	CU3144	UHF MAIN Unit		
C299	CU3145	UHF MAIN Unit		
C300	CU3146	UHF MAIN Unit		
C301	CU3147	UHF MAIN Unit		
C302	CU3148	UHF MAIN Unit		
C303	CU3149	UHF MAIN Unit		
C304	CU3150	UHF MAIN Unit		
C305	CU3151	UHF MAIN Unit		
C306	CU3152	UHF MAIN Unit		
C307	CU3153	UHF MAIN Unit		
C308	CU3154	UHF MAIN Unit		
C309	CU3155	UHF MAIN Unit		
C310	CU3156	UHF MAIN Unit		
C311	CU3157	UHF MAIN Unit		
C312	CU3158	UHF MAIN Unit		
C313	CU3159	UHF MAIN Unit		
C314	CU3160	UHF MAIN Unit		
C315	CU3161	UHF MAIN Unit		
C316	CU3162	UHF MAIN Unit		
C317	CU3163	UHF MAIN Unit		
C318	CU3164	UHF MAIN Unit		
C319	CU3165	UHF MAIN Unit		
C320	CU3166	UHF MAIN Unit		
C321	CU3167	UHF MAIN Unit		
C322	CU3168	UHF MAIN Unit		
C323	CU3169	UHF MAIN Unit		
C324	CU3170	UHF MAIN Unit		
C325	CU3171	UHF MAIN Unit		
C326	CU3172	UHF MAIN Unit		
C327	CU3173	UHF MAIN Unit		
C328	CU3174	UHF MAIN Unit		
C329	CU3175	UHF MAIN Unit		
C330	CU3176	UHF MAIN Unit		
C331	CU3177	UHF MAIN Unit		
C332	CU3178	UHF MAIN Unit		
C333	CU3179	UHF MAIN Unit		
C334	CU3180	UHF MAIN Unit		
C335	CU3181	UHF MAIN Unit		
C336	CU3182	UHF MAIN Unit		
C337	CU3183	UHF MAIN Unit		
C338	CU3184	UHF MAIN Unit		
C339	CU3185	UHF MAIN Unit		
C340	CU3186	UHF MAIN Unit		
C341	CU3187	UHF MAIN Unit		
C342	CU3188	UHF MAIN Unit		
C343	CU3189	UHF MAIN Unit		
C344	CU3190	UHF MAIN Unit		
C345	CU3191	UHF MAIN Unit		
C346	CU3192	UHF MAIN Unit		
C347	CU3193	UHF MAIN Unit		
C348	CU3194	UHF MAIN Unit		
C349	CU3195	UHF MAIN Unit		
C350	CU3196	UHF MAIN Unit		
C351	CU3197	UHF MAIN Unit		
C352	CU3198	UHF MAIN Unit		
C353	CU3199	UHF MAIN Unit		
C354	CU3200	UHF MAIN Unit		
C355	CU3201	UHF MAIN Unit		
C356	CU3202	UHF MAIN Unit		
C357	CU3203	UHF MAIN Unit		
C358	CU3204	UHF MAIN Unit		
C359	CU3205	UHF MAIN Unit		

Note: Version = T1, Version@ = E2

DHF MAIN UNIT

Ref. No.	Part No.	Description	Part Name	Ver.	Ref. No.	Part No.	Description	Part Name	Ver.
R200	XK40A	C	MC370M4L1		Q214	XK1015	Transistor	5T0205VFTRXU	
R203	XK80A	C	NM408M1T		Q216	XK1060	Transistor	7T0205VFTRXU	
R205	XK119	C	MA619M1E11		Q218	XK1061	Transistor	25B118E1000	
R206	XK80B	C	MC100CT		Q219	XK1004	Transistor	25B118E1000	
JK201	UEJ05A	Connector	AS130160-15		Q220	XK1065	Transistor	UMK013-TX	
JK202	UEJ05A	Connector	R162-PT-25V4415A		Q221	XK1010	Transistor	UMK013-TX	
L201	QCM061	Chp Coil	NL32522T103U		Q222	XK1008	Transistor	PM02	
L202	QCM060	Chp Coil	NL32522T102U		Q224	XK1004	Transistor	XM1713-TX	
L203	QCM060	Chp Coil	NL32522T102U		Q225	XK1006	Transistor	XM1116A-TX	
L204	QK4350	Coil	MRQ10_2ST-0.8		Q226	XK1061	Transistor	UMK611-TX	
L205	QK4160	Coil	MRQ10_1ST-0.8		Q227	XK1012	Transistor	25B120E*	
L206	QK409E	Coil	MRQ10_1ST-0.8		Q228	XK1004	Transistor	25B120E*	
L207	QK409D	Coil	MRQ10_1ST-0.8		Q229	XK1004	Transistor	25B1570T1061	
L208	QK425D	Coil	MRQ10_2ST-0.8		Q230	XK1026	Transistor	25B1302S-TD	
L209	QK415E	Coil	MRQ10_1ST-0.8		Q231	XK1005	Transistor	25C1080T1061	
L210	QK415E	Coil	MRQ10_1ST-0.8		Q232	XK1010	Transistor	07-CGMRNT146	
L211	QK415E	Coil	MRQ10_1ST-0.8		Q234	XK1010	Transistor	UMK013-TX	
L212	QK415E	Coil	MRQ10_1ST-0.8		Q235	XK1010	Transistor	25C1080T1061	
L213	QK415E	Coil	MRQ10_1ST-0.8		R201	PK3065	Chp R.	ERL035V127V	
L214	QK415E	Coil	MRQ10_1ST-0.8		R202	PK3065	Chp R.	ERL035V127V	
L215	QK412E	Coil	MRQ10_1ST-0.8		R203	PK3068	Chp R.	ERL035V127V	
L216	QCM068	Chp Coil	LN16A15A20A		R204	PK3068	Chp R.	ERL035V127V	
L217	QCM068	Chp Coil	LN16A15A20A		R205	PK3068	Chp R.	ERL035V127V	
L218	QK0114	Coil	ME-07310		R206	PK3068	Chp R.	ERL035V127V	
L219	QK0128	Coil	QK0128		R207	PK3068	Chp R.	ERL035V127V	
L219	QK0114	Coil	QK0114		R208	PK3068	Chp R.	ERL035V127V	
L219	QK0113	Coil	ME-07310		R209	PK3068	Chp R.	ERL035V127V	
L219	QK0113	Coil	ME-07310		R210	PK3068	Chp R.	ERL035V127V	
L219	QK0114	Coil	ME-07310		R211	PK3068	Chp R.	ERL035V127V	
L219	QK0114	Coil	ME-07310		R212	PK3068	Chp R.	ERL035V127V	
L219	QK0128	Coil	QK0128		R213	PK3068	Chp R.	ERL035V127V	
L220	QCM060	Chp Coil	NL32522T102U		R214	PK3068	Chp R.	ERL035V127V	
L220	QCM060	Chp Coil	NL32522T102U		R215	PK3068	Chp R.	ERL035V127V	
L221	QCM060	Chp Coil	NL32522T102U		R216	PK3068	Chp R.	ERL035V127V	
L221	QCM060	Chp Coil	NL32522T102U		R217	PK3068	Chp R.	ERL035V127V	
L221	QCM060	Chp Coil	NL32522T102U		R218	PK3068	Chp R.	ERL035V127V	
L221	QCM060	Chp Coil	NL32522T102U		R219	PK3068	Chp R.	ERL035V127V	
L227	QCM062	Chp Coil	LN16A15A20A		R220	PK3068	Chp R.	ERL035V127V	
Q201	XK1091	Transistor	UMK611-TX		R221	PK3068	Chp R.	ERL035V127V	
Q202	XK1096	Transistor	SSC1081T1066		R222	PK3068	Chp R.	ERL035V127V	
Q203	XK1096	Transistor	SSC1081T1066		R223	PK3068	Chp R.	ERL035V127V	
Q204	XK1096	Transistor	SSC1081T1066		R224	PK3068	Chp R.	ERL035V127V	
Q205	XK1014	Transistor	UMK611-TX		R225	PK3068	Chp R.	ERL035V127V	
Q206	XK1096	Transistor	SSC1081T1066		R226	PK3068	Chp R.	ERL035V127V	
Q207	XK1015	Transistor	SSC1081T1066		R227	PK3068	Chp R.	ERL035V127V	
Q208	XK1015	Transistor	SSC1081T1066		R228	PK3068	Chp R.	ERL035V127V	
Q209	XK1015	Transistor	SSC1081T1066		R229	PK3068	Chp R.	ERL035V127V	
Q210	XK1094	Transistor	SSC1081T1066		R230	PK3068	Chp R.	ERL035V127V	
Q211	XK3013	FET	SSK1463TX		R231	PK3068	Chp R.	ERL035V127V	
Q212	XK3013	FET	SSK1463TX		R232	PK3068	Chp R.	ERL035V127V	
Q213	XK3013	FET	SSK1463TX		R233	PK3068	Chp R.	ERL035V127V	

NAME: VERSION1.E1_Ver020_11E2

DHF MAIN UNIT

Ref. No.	Part No.	Description	Part Name	Ver.	Ref. No.	Part No.	Description	Part Name	Ver.
R244	PK3068	Chp R.	ERL035V110V		R251	PK3068	Chp R.	ERL035V110V	
R245	PK3068	Chp R.	ERL035V110V		R252	PK3068	Chp R.	ERL035V110V	
R246	PK3068	Chp R.	ERL035V110V		R253	PK3068	Chp R.	ERL035V110V	
R247	PK3068	Chp R.	ERL035V110V		R254	PK3068	Chp R.	ERL035V110V	
R248	PK3068	Chp R.	ERL035V110V		R255	PK3068	Chp R.	ERL035V110V	
R249	PK3068	Chp R.	ERL035V110V		R256	PK3068	Chp R.	ERL035V110V	
R250	PK3068	Chp R.	ERL035V110V		R257	PK3068	Chp R.	ERL035V110V	
R251	PK3068	Chp R.	ERL035V110V		R258	PK3068	Chp R.	ERL035V110V	
R252	PK3068	Chp R.	ERL035V110V		R259	PK3068	Chp R.	ERL035V110V	
R253	PK3068	Chp R.	ERL035V110V		R260	PK3068	Chp R.	ERL035V110V	
R254	PK3068	Chp R.	ERL035V110V		R261	PK3068	Chp R.	ERL035V110V	
R255	PK3068	Chp R.	ERL035V110V		R262	PK3068	Chp R.	ERL035V110V	
R256	PK3068	Chp R.	ERL035V110V		R263	PK3068	Chp R.	ERL035V110V	
R257	PK3068	Chp R.	ERL035V110V		R264	PK3068	Chp R.	ERL035V110V	
R258	PK3068	Chp R.	ERL035V110V		R265	PK3068	Chp R.	ERL035V110V	
R259	PK3068	Chp R.	ERL035V110V		R266	PK3068	Chp R.	ERL035V110V	
R260	PK3068	Chp R.	ERL035V110V		R267	PK3068	Chp R.	ERL035V110V	
R261	PK3068	Chp R.	ERL035V110V		R268	PK3068	Chp R.	ERL035V110V	
R262	PK3068	Chp R.	ERL035V110V		R269	PK3068	Chp R.	ERL035V110V	
R263	PK3068	Chp R.	ERL035V110V		R270	PK3068	Chp R.	ERL035V110V	
R264	PK3068	Chp R.	ERL035V110V		R271	PK3068	Chp R.	ERL035V110V	
R265	PK3068	Chp R.	ERL035V110V		R272	PK3068	Chp R.	ERL035V110V	
R266	PK3068	Chp R.	ERL035V110V		R273	PK3068	Chp R.	ERL035V110V	
R267	PK3068	Chp R.	ERL035V110V		R274	PK3068	Chp R.	ERL035V110V	
R268	PK3068	Chp R.	ERL035V110V		R275	PK3068	Chp R.	ERL035V110V	
R269	PK3068	Chp R.	ERL035V110V		R276	PK3068	Chp R.	ERL035V110V	
R270	PK3068	Chp R.	ERL035V110V		R277	PK3068	Chp R.	ERL035V110V	
R271	PK3068	Chp R.	ERL035V110V		R278	PK3068	Chp R.	ERL035V110V	
R272	PK3068	Chp R.	ERL035V110V		R279	PK3068	Chp R.	ERL035V110V	
R273	PK3068	Chp R.	ERL035V110V		R280	PK3068	Chp R.	ERL035V110V	
R274	PK3068	Chp R.	ERL035V110V		R281	PK3068	Chp R.	ERL035V110V	
R275	PK3068	Chp R.	ERL035V110V		R282	PK3068	Chp R.	ERL035V110V	
R276	PK3068	Chp R.	ERL035V110V		R283	PK3068	Chp R.	ERL035V110V	
R277	PK3068	Chp R.	ERL035V110V		R284	PK3068	Chp R.	ERL035V110V	
R278	PK3068	Chp R.	ERL035V110V		R285	PK3068	Chp R.	ERL035V110V	
R279	PK3068	Chp R.	ERL035V110V		R286	PK3068	Chp R.	ERL035V110V	
R280	PK3068	Chp R.	ERL035V110V		R287	PK3068	Chp R.	ERL035V110V	
R281	PK3068	Chp R.	ERL035V110V		R288	PK3068	Chp R.	ERL035V110V	
R282	PK3068	Chp R.	ERL035V110V		R289	PK3068	Chp R.	ERL035V110V	
R283	PK3068	Chp R.	ERL035V110V		R290	PK3068	Chp R.	ERL035V110V	
R284	PK3068	Chp R.	ERL035V110V		R291	PK3068	Chp R.	ERL035V110V	
R285	PK3068	Chp R.	ERL035V110V		R292	PK3068	Chp R.	ERL035V110V	
R286	PK3068	Chp R.	ERL035V110V		R293	PK3068	Chp R.	ERL035V110V	
R287	PK3068	Chp R.	ERL035V110V		R294	PK3068	Chp R.	ERL035V110V	
R288	PK3068	Chp R.	ERL035V110V		R295	PK3068	Chp R.	ERL035V110V	
R289	PK3068	Chp R.	ERL035V110V		R296	PK3068	Chp R.	ERL035V110V	
R290	PK3068	Chp R.	ERL035V110V		R297	PK3068	Chp R.	ERL035V110V	
R291	PK3068	Chp R.	ERL035V110V		R298	PK3068	Chp R.	ERL035V110V	
R292	PK3068	Chp R.	ERL035V110V		R299	PK3068	Chp R.	ERL035V110V	
R293	PK3068	Chp R.	ERL035V110V		R300	PK3068	Chp R.	ERL035V110V	
R294	PK3068	Chp R.	ERL035V110V		R301	PK3068	Chp R.	ERL035V110V	
R295	PK3068	Chp R.	ERL035V110V		R302	PK3068	Chp R.	ERL035V110V	
R296	PK3068	Chp R.	ERL035V110V		R303	PK3068	Chp R.	ERL035V110V	
R297	PK3068	Chp R.	ERL035V110V		R304	PK3068	Chp R.	ERL035V110V	
R298	PK3068	Chp R.	ERL035V110V		R305	PK3068	Chp R.	ERL035V110V	
R299	PK3068	Chp R.	ERL035V110V		R306	PK3068	Chp R.	ERL035V110V	
R300	PK3068	Chp R.	ERL035V110V		R307	PK3068	Chp R.	ERL035V110V	
R301	PK3068	Chp R.	ERL035V110V		R308	PK3068	Chp R.	ERL035V110V	
R302	PK3068	Chp R.	ERL035V110V		R309	PK3068	Chp R.	ERL035V110V	
R303	PK3068	Chp R.	ERL035V110V		R310	PK3068	Chp R.	ERL035V110V	
R304	PK3068	Chp R.	ERL035V110V		R311	PK3068	Chp R.	ERL035V110V	
R305	PK3068	Chp R.	ERL035V110V		R312</				

Unit VCO Unit / TCXO Unit

Part No.	Part Name	Description	Part Name	Qty	Part No.	Description	Part Name	Qty
9601	FE1	FE1	FE1-25050R65-12B	12	9601	TCXO Unit	TCXO Unit	12
9602	FE1	FE1	FE1-25050R65-12B	12	9602	TCXO Unit	TCXO Unit	12
9603	FE1	FE1	FE1-25050R65-12B	12	9603	TCXO Unit	TCXO Unit	12
9604	FE1	FE1	FE1-25050R65-12B	12	9604	TCXO Unit	TCXO Unit	12
9605	FE1	FE1	FE1-25050R65-12B	12	9605	TCXO Unit	TCXO Unit	12
9606	FE1	FE1	FE1-25050R65-12B	12	9606	TCXO Unit	TCXO Unit	12
9607	FE1	FE1	FE1-25050R65-12B	12	9607	TCXO Unit	TCXO Unit	12
9608	FE1	FE1	FE1-25050R65-12B	12	9608	TCXO Unit	TCXO Unit	12
9609	FE1	FE1	FE1-25050R65-12B	12	9609	TCXO Unit	TCXO Unit	12
9610	FE1	FE1	FE1-25050R65-12B	12	9610	TCXO Unit	TCXO Unit	12
9611	FE1	FE1	FE1-25050R65-12B	12	9611	TCXO Unit	TCXO Unit	12
9612	FE1	FE1	FE1-25050R65-12B	12	9612	TCXO Unit	TCXO Unit	12
9613	FE1	FE1	FE1-25050R65-12B	12	9613	TCXO Unit	TCXO Unit	12
9614	FE1	FE1	FE1-25050R65-12B	12	9614	TCXO Unit	TCXO Unit	12
9615	FE1	FE1	FE1-25050R65-12B	12	9615	TCXO Unit	TCXO Unit	12
9616	FE1	FE1	FE1-25050R65-12B	12	9616	TCXO Unit	TCXO Unit	12
9617	FE1	FE1	FE1-25050R65-12B	12	9617	TCXO Unit	TCXO Unit	12
9618	FE1	FE1	FE1-25050R65-12B	12	9618	TCXO Unit	TCXO Unit	12
9619	FE1	FE1	FE1-25050R65-12B	12	9619	TCXO Unit	TCXO Unit	12
9620	FE1	FE1	FE1-25050R65-12B	12	9620	TCXO Unit	TCXO Unit	12

Note: Version = E1, Version = T12

Mechanical Parts / PCB / SP Unit / Packing

Part No.	Part Name	Description	Part Name	Qty	Part No.	Description	Part Name	Qty
44000	Mechanical Parts	Mechanical Parts	2-44000	12	E10432	Packing	Packing	12
44001	Screw	Screw	2-44001	12	E10433	Microphone	Microphone	12
44002	Screw	Screw	2-44002	12	E10434	Microphone	Microphone	12
44003	Screw	Screw	2-44003	12	E10435	Microphone	Microphone	12
44004	Screw	Screw	2-44004	12	E10436	Microphone	Microphone	12
44005	Screw	Screw	2-44005	12	E10437	Microphone	Microphone	12
44006	Screw	Screw	2-44006	12	E10438	Microphone	Microphone	12
44007	Screw	Screw	2-44007	12	E10439	Microphone	Microphone	12
44008	Screw	Screw	2-44008	12	E10440	Microphone	Microphone	12
44009	Screw	Screw	2-44009	12	E10441	Microphone	Microphone	12
44010	Screw	Screw	2-44010	12	E10442	Microphone	Microphone	12
44011	Screw	Screw	2-44011	12	E10443	Microphone	Microphone	12
44012	Screw	Screw	2-44012	12	E10444	Microphone	Microphone	12
44013	Screw	Screw	2-44013	12	E10445	Microphone	Microphone	12
44014	Screw	Screw	2-44014	12	E10446	Microphone	Microphone	12
44015	Screw	Screw	2-44015	12	E10447	Microphone	Microphone	12
44016	Screw	Screw	2-44016	12	E10448	Microphone	Microphone	12
44017	Screw	Screw	2-44017	12	E10449	Microphone	Microphone	12
44018	Screw	Screw	2-44018	12	E10450	Microphone	Microphone	12
44019	Screw	Screw	2-44019	12	E10451	Microphone	Microphone	12
44020	Screw	Screw	2-44020	12	E10452	Microphone	Microphone	12
44021	Screw	Screw	2-44021	12	E10453	Microphone	Microphone	12
44022	Screw	Screw	2-44022	12	E10454	Microphone	Microphone	12
44023	Screw	Screw	2-44023	12	E10455	Microphone	Microphone	12
44024	Screw	Screw	2-44024	12	E10456	Microphone	Microphone	12
44025	Screw	Screw	2-44025	12	E10457	Microphone	Microphone	12
44026	Screw	Screw	2-44026	12	E10458	Microphone	Microphone	12
44027	Screw	Screw	2-44027	12	E10459	Microphone	Microphone	12
44028	Screw	Screw	2-44028	12	E10460	Microphone	Microphone	12
44029	Screw	Screw	2-44029	12	E10461	Microphone	Microphone	12
44030	Screw	Screw	2-44030	12	E10462	Microphone	Microphone	12
44031	Screw	Screw	2-44031	12	E10463	Microphone	Microphone	12
44032	Screw	Screw	2-44032	12	E10464	Microphone	Microphone	12
44033	Screw	Screw	2-44033	12	E10465	Microphone	Microphone	12
44034	Screw	Screw	2-44034	12	E10466	Microphone	Microphone	12
44035	Screw	Screw	2-44035	12	E10467	Microphone	Microphone	12
44036	Screw	Screw	2-44036	12	E10468	Microphone	Microphone	12
44037	Screw	Screw	2-44037	12	E10469	Microphone	Microphone	12
44038	Screw	Screw	2-44038	12	E10470	Microphone	Microphone	12
44039	Screw	Screw	2-44039	12	E10471	Microphone	Microphone	12
44040	Screw	Screw	2-44040	12	E10472	Microphone	Microphone	12
44041	Screw	Screw	2-44041	12	E10473	Microphone	Microphone	12
44042	Screw	Screw	2-44042	12	E10474	Microphone	Microphone	12
44043	Screw	Screw	2-44043	12	E10475	Microphone	Microphone	12
44044	Screw	Screw	2-44044	12	E10476	Microphone	Microphone	12
44045	Screw	Screw	2-44045	12	E10477	Microphone	Microphone	12
44046	Screw	Screw	2-44046	12	E10478	Microphone	Microphone	12
44047	Screw	Screw	2-44047	12	E10479	Microphone	Microphone	12
44048	Screw	Screw	2-44048	12	E10480	Microphone	Microphone	12
44049	Screw	Screw	2-44049	12	E10481	Microphone	Microphone	12
44050	Screw	Screw	2-44050	12	E10482	Microphone	Microphone	12

Note: Version = E1, Version = T12

ADJUSTMENT

1) Required Test Equipment

1. Digital Multimeter

2. Regulated Power Supply

Supply voltage: 13.8VDC
Current: 15A or more

3. Oscilloscope

Measurable frequency: Audio Frequency

4. Spectrum Analyzer

Measuring range: Up to 2GHz or more

5. Tracking Generator

Output frequency: Up to 2GHz or more

6. Dummy Load

Measurable frequency: Up to 500MHz
Impedance: 50Ω
Power: 50W or more

7. Speaker

Impedance: 8Ω

8. SSG

Output frequency: Up to 1GHz
Output level: -20dB/0.1μV to 120dB/1V
Modulation: AM/FM

9. Transceiver Tester

Up to 500MHz

a. Frequency Counter

b. Power Meter

Impedance: 50Ω
Measuring range: 50W or more

c. Audio Voltmeter

Measurable frequency: 50Hz ~ 10kHz
Sensitivity: 1mV ~ 10V

d. Distortion Meter

Measurable frequency: 1kHz
Input level: Up to 40dB
Distortion level: 1% ~ 100%

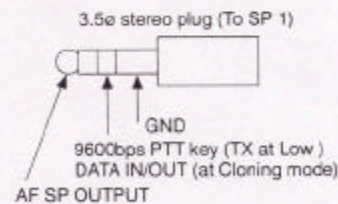
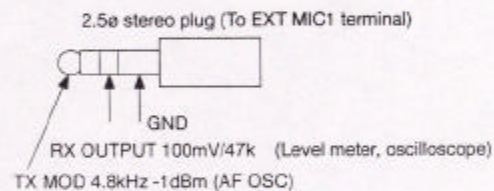
e. Audio Generator

Output frequency: 1kHz ~ 10kHz
Output impedance: 600Ω

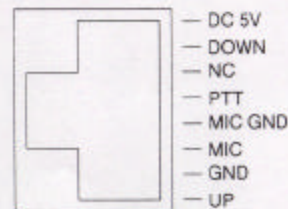
f. Linear Detector

10. 9600bps Hi-Speed Packet Testing

While holding the FUNC key down, press the VHF knob. "9600" is shown on the sub-band frequency display.



Mic terminal



Test Equipment

1. All SSG output is indicated by EMF.
2. AG output level connecting with the load is measured.
3. Standard Modulation: 1kHz \pm 3.5kHz/DEV
4. Audio Output level: 50mW~100mW at 8 Ω
5. Test Equipment level filter: HPF (30Hz~50Hz), LPF (10kHz~15kHz)
6. Coaxial cable: 5D2W 1m

Note:


1. Power supply voltage is 13.8V.
Power switch is off.
2. Turn the volume knobs counterclockwise.
3. SQ volume (press VHF or UHF after pressing FUNC key) S0=squelch is open. S9=tight is closed.
4. Press and hold the "F" key, then turn the power switch on.
The display lights full.

2) UHF PLL Adjustment

Item	Condition	Measurement			Adjustment			Specifications
		Equipment	Unit	Terminal	Unit	Parts	Method	
Reference Frequency	f=435.00 TX	Freq. Counter Power Meter	Back	UHF ANT	VHF Main	TC1	435.0000MHz	\pm 100Hz
PLL VCO	f=440.00 RX(T, E) f=410.00 RX(TE1) f=460.00 RX(TE2)	Digital Multimeter	UHF Main	TP3	UHF VCO	L606	3.40V (Adjust) 2.50V (Adjust) 3.20V (Adjust)	3.4V \pm 0.2V 2.5V \pm 0.2V 3.2V \pm 0.2V
	f=440.00 TX(T, E) f=410.00 TX(TE1) f=460.00 TX(TE2)						5.50V (Check) 4.50V (Check) 5.30V (Check)	5.0V~6.0V 3.8V~5.2V 4.7V~6.0V

3) UHF RX Adjustment

(*): f=445.00 (T), f=435.00 (E), f=410.00 (TE1), f=460.00 (TE2)

Item	Condition	Measurement			Adjustment			Specifications
		Equipment	Unit	Terminal	Unit	Parts	Method	
Herical coil	f=435.00 (445.00)	T.G. -30dBm	Back	UHF ANT	UHF Main	TC201 TC202 L218 L219	Max Gain	430M (E) 440M 438M (T) 450M 400M (TE1) 420M 450M (TE2) 470M 
		Spectrum Analyzer	UHF	TP2				
Sensitivity	f=438.00 (T) f=440.00 (T) f=449.99 (T) f=430.00 (E) f=435.00 (E) f=439.99 (E) f=400.00 (TE1) f=410.00 (TE1) f=420.00 (TE1) f=450.00 (TE2) f=460.00 (TE2) f=470.00 (TE2) SSG OUT: -9.0dBμ	SSG Distortion Meter Oscilloscope Level Meter	Back	UHF SP1			Check	SINAD is 12dB or more.
S Meter	f=445.00 (*) SSG OUT: 18.0dBμ	SSG LCD UHF S Meter	Front panel		UHF Main	VR202	Starts lighting "Full."	
	SSG OFF						Check	Does not light.
SQL level	f=445.00 (*) SSG OFF SQL LEVEL: 1	Digital Multimeter	Main	TP5	UHF Main	VR201	2.05V (Adjust)	2.05V±0.1V The squelch is closed.
Distortion	f=445.00 (*) SSG OUT: 60.0dBμ	SSG Distortion Meter Level Meter	Back	SP1			Check	4% or below
RX S/N	f=445.00 (*) SSG OUT: 60.0dBμ	SSG Level Meter Oscilloscope	Back	SP1			Check	40dB or more
9600bps Packet Out	f=445.00 (*) SSG OUT: 20.0dBμ f=4.8kHz 2.5kHz/DEV	SSG Level Meter Oscilloscope	Back	MIC1				100mV ±50mVrms /47kΩ

4) UHF TX Adjustment

(*): f=445.00 (T), f=435.00 (E), f=410.00 (TE1), f=460.00 (TE2)

Item	Condition	Measurement			Adjustment			Specifications
		Equipment	Unit	Terminal	Unit	Parts	Method	
High Power	f=445.00 (T) f=435.00 (E) f=410.00 (TE1) f=460.00 (TE2)	Power Meter Current Meter	Back	UHF ANT	UHF Main	VR203	Max	36W or more
Low Power	f=445.00 (*)					VR203	35W	±1.0W 11A or below
DEV	f=445.00 (*) AG: 1kHz -30dBm	Linear Det. Oscilloscope Power Meter AG				VR204	4.5kHz /DEV	4.5kHz ±0.2kHz /DEV
MIC Gain	f=445.00 (*) AG: 1kHz -46dBm							VR205
CTCSS Tone Level	f=445.00 (*) AG=0 TONE SW ENC 88.5Hz	Linear Det. Oscilloscope Power Meter					Check	0.5-1.3kHz /DEV
Tone Burst Level	f=445.00 (*) AG=0 PTT+DOWN key							Check
9600bps Packet IN	f=445.00 (*) AG: 4.8kHz -1dBm FUNC+VHF key	Linear Det. Oscilloscope AG					Check	2.0kHz ±0.5kHz /DEV

5) VHF PLL Adjustment

Item	Condition	Measurement			Adjustment			Specifications
		Equipment	Unit	Terminal	Unit	Parts	Method	
Reference Frequency	f=145.00 TX	Freq. Counter Power Meter	Back	VHF ANT			Check	±100Hz
PLL VCO	f=145.00 RX(T, E) f=173.99 RX(TE1, 2)	Digital Multimeter	VHF Main	TP1	VHF VCO	L505	2.80V 7.35V	±0.3V ±0.05V
							Check	2.8V±1.0V 7.35V±0.4V

6) VHF RX Adjustment

Item	Condition	Measurement			Adjustment			Specifications
		Equipment	Unit	Terminal	Unit	Parts	Method	
Gain	f=145.00 (T,E) f=165.00 (TE1) f=165.00 (TE2)	SSG Distortion Meter Oscilloscope Level Meter	Back	VHF SP1	VHF Main	L14 L15 L16 L17	Adjust the SSG output level around 0dBμ, and turn L14~L17 to make the wave form max.	SINAD is 12dB or more.
Sensitivity	f=144.00 (T) f=147.99 (T) f=144.00 (E) f=145.99 (E) f=150.00 (TE1,2) f=162.00 (TE1,2) f=173.99 (TE1,2) SSG OUT: -9.0dBμ	SSG Distortion Meter Oscilloscope Level Meter	Back	VHF SP1	VHF Main	L14~ L17	Adjust the SINAD sensitivity and wave form to the best.	SINAD is 12dB or more.
	f=136.00 SSG OUT: 0dBμ						Check	SINAD is 12dB or more.
S Meter	f=145.00 (T,E) f=165.00 (TE1,2) SSG OUT: 18dBμ	SSG LCD VHF S Meter	Front Panel		VHF Main	VR1	Starts lighting "Full."	
	SSG OFF						Check	Does not light.
SQL level	f=145.00 (T,E) f=165.00 (TE1,2) SSG OFF SQL Level 1	Digital Multimeter	VHF Main	TP4	VHF Main	VR2	2.05V (Adjust)	2.05V±0.1V The squelch is closed.

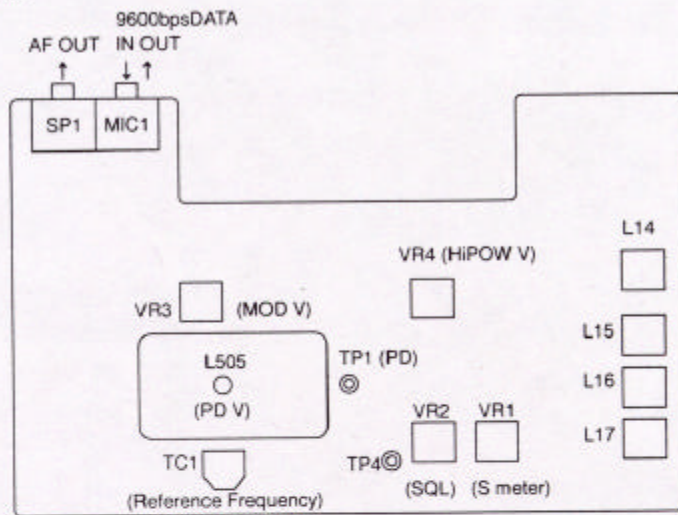
7) VHF TX Adjustment

(frequency) = TE1, TE2

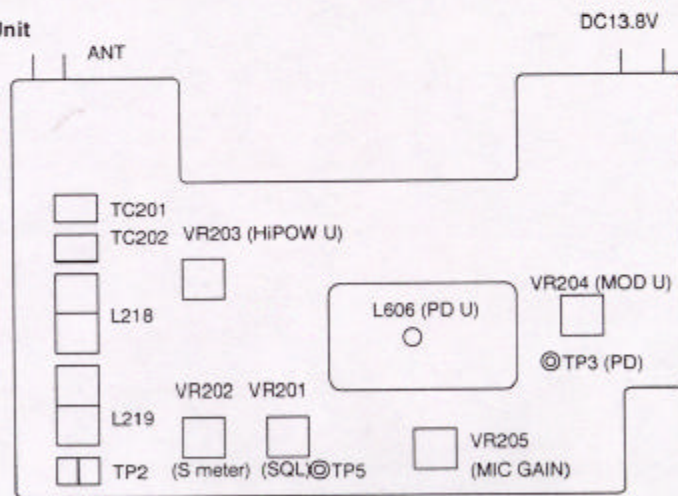
Item	Condition	Measurement			Adjustment			Specifications				
		Equipment	Unit	Terminal	Unit	Parts	Method					
High Power	f=145.00 (165.00)	Power Meter Current Meter	Back	VHF ANT	VHF Main	VR4	Max	55W or more (T,E) 45W or more (TE1,TE2)				
							52W (T,E) 35W (TE1,TE2)	±1.0W 11A or below				
							Check	48~55W 7A (T,E) 32~40W 11A (TE1,TE2)				
								Power is output.				
Low Power	f=145.00 (160.00)					Check	3~7W					
DEV	f=145.00 (160.00) AG: 1kHz -30dBm	Linear Det. Oscilloscope Power Meter	Back	VHF ANT	VHF Main	VR3	4.5kHz /DEV	4.5kHz ±0.2kHz /DEV				
MIC Gain	f=145.00 (160.00) AG: 1kHz -46dBm						Check	4.0 kHz ±0.3kHz /DEV				
CTCSS Tone Level	f=145.00 (160.00) AG=0 TONE SW ENC 88.5Hz							0.5~1.3kHz /DEV				
Tone Burst Level	f=145.00 (160.00) PTT+DOWN key							3.0kHz ±0.5kHz /DEV				
9600bps Packet IN	f=445.00 (*) AG: 4.8kHz -1dBm FUNC+VHF key						Check	2.0kHz ±0.5kHz /DEV				
X-BAND Repeater	f=145.00 f=445.00 (T) f=145.00 f=430.00 (E) f=160.00 f=410.00 (TE1) f=160.00 f=460.00 (TE2) XBR ON (VHF+PWR ON)										Check	3.5kHz ±0.5kHz /DEV

8) Adjustment Points

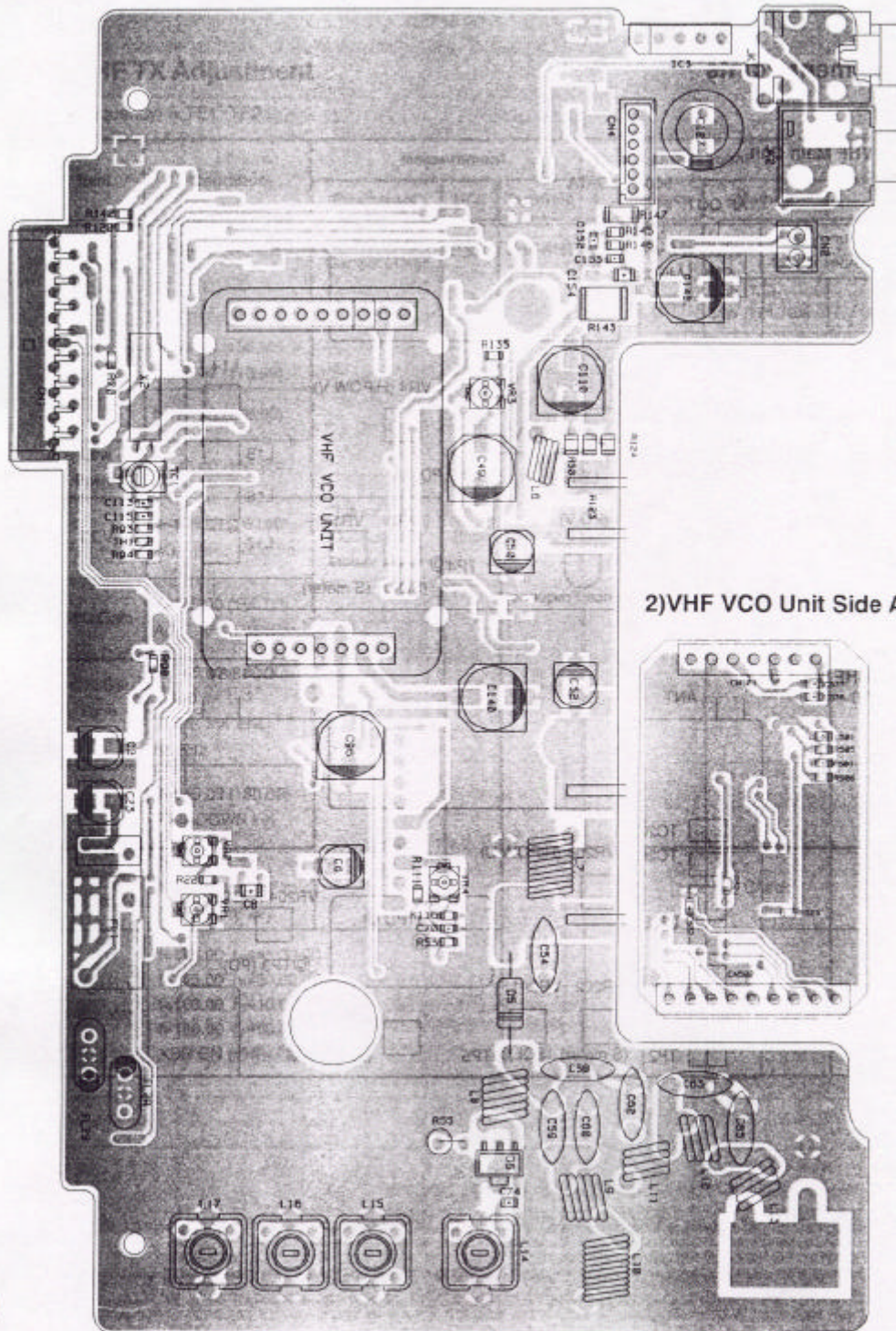
VHF Main Unit



UHF Main Unit

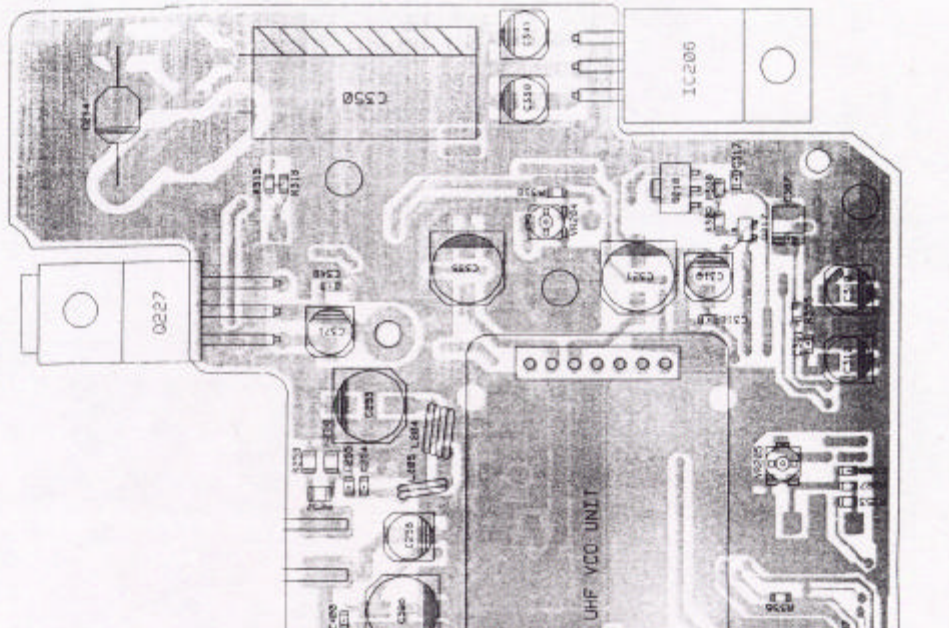


PC BOARD VIEW 1) VHF Main Unit Side A

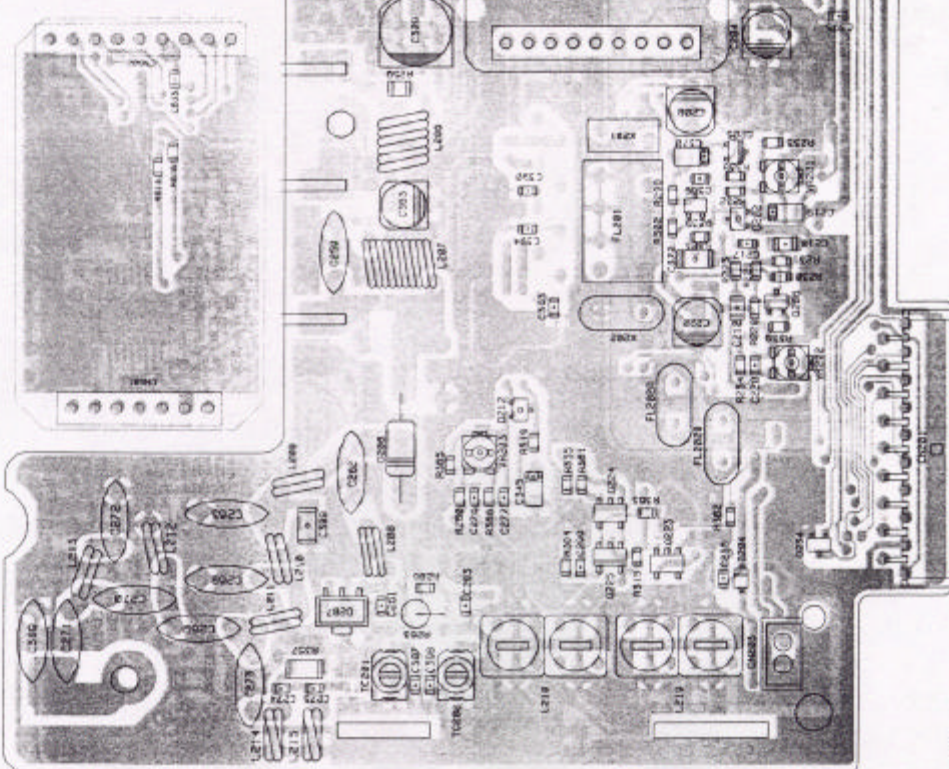


2) VHF VCO Unit Side A

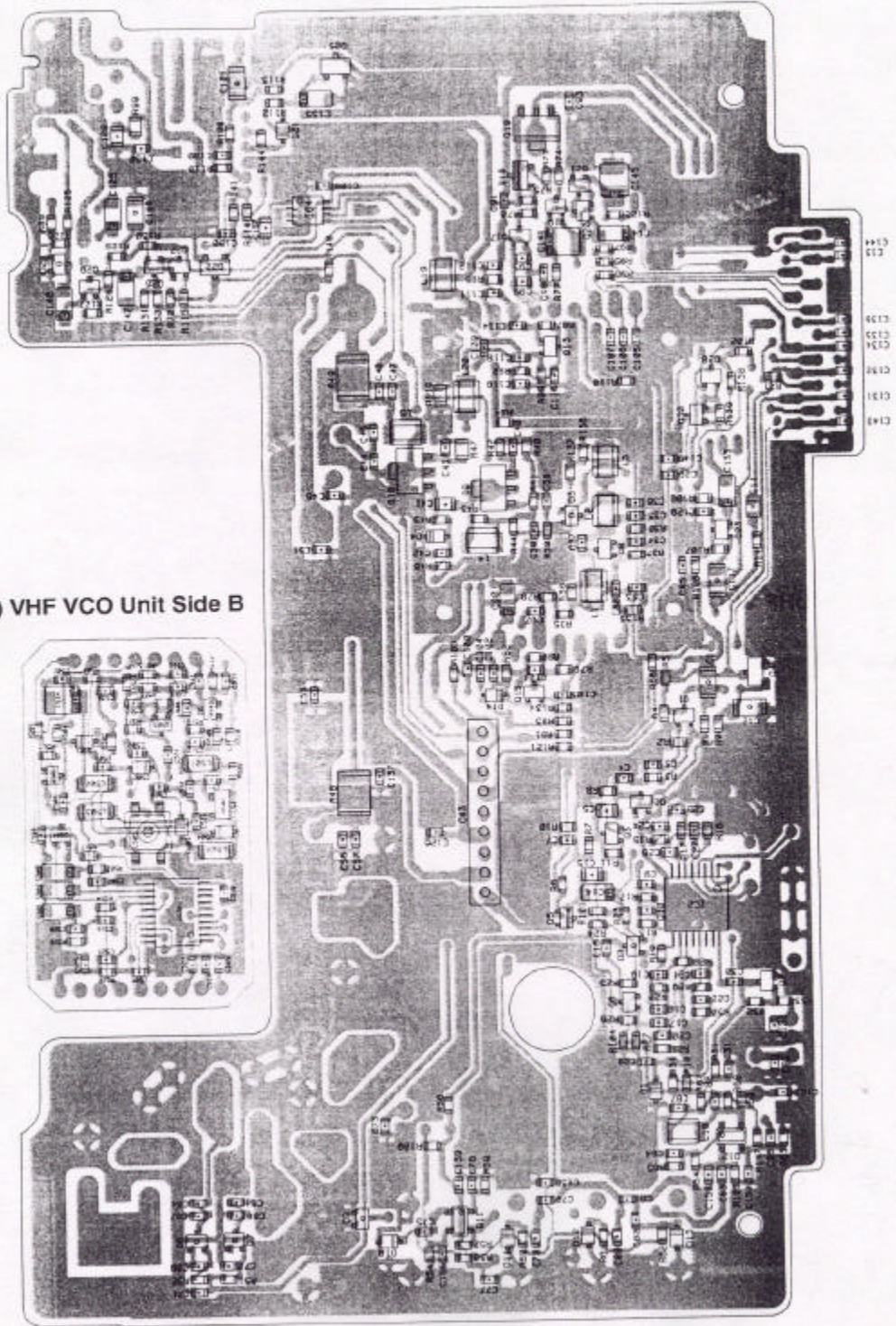
3) UHF Main Unit Side A



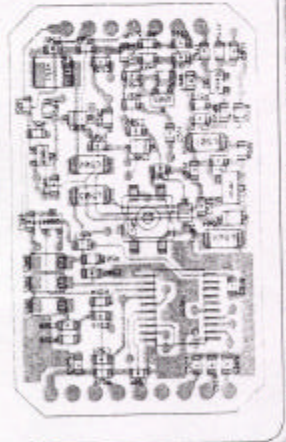
4) UHF VCO Unit Side A



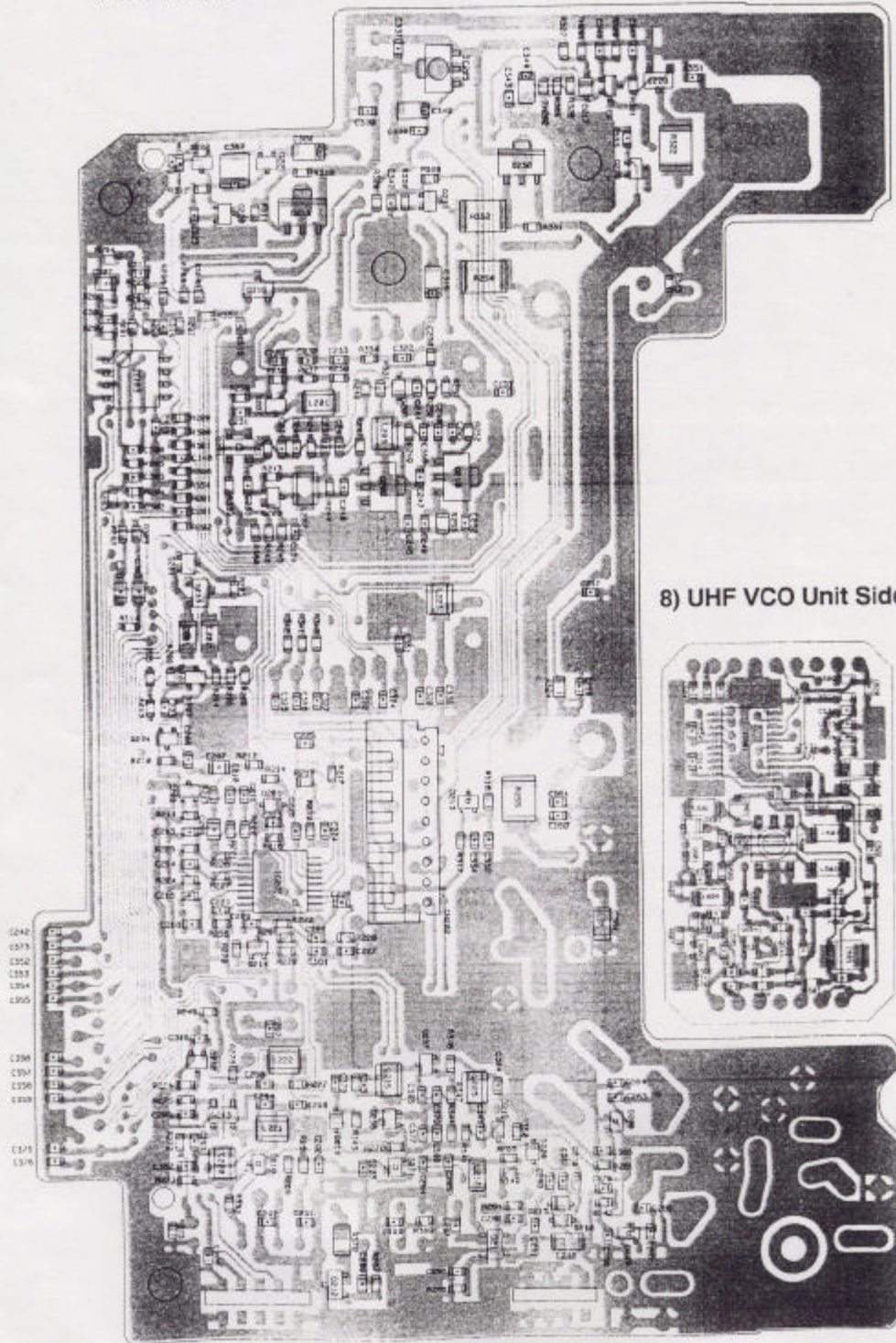
5) VHF Main Unit Side B



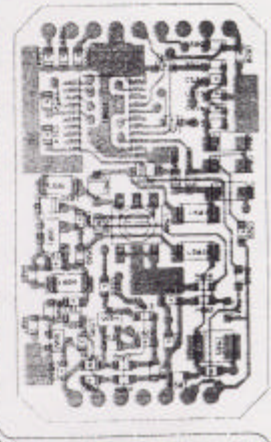
6) VHF VCO Unit Side B



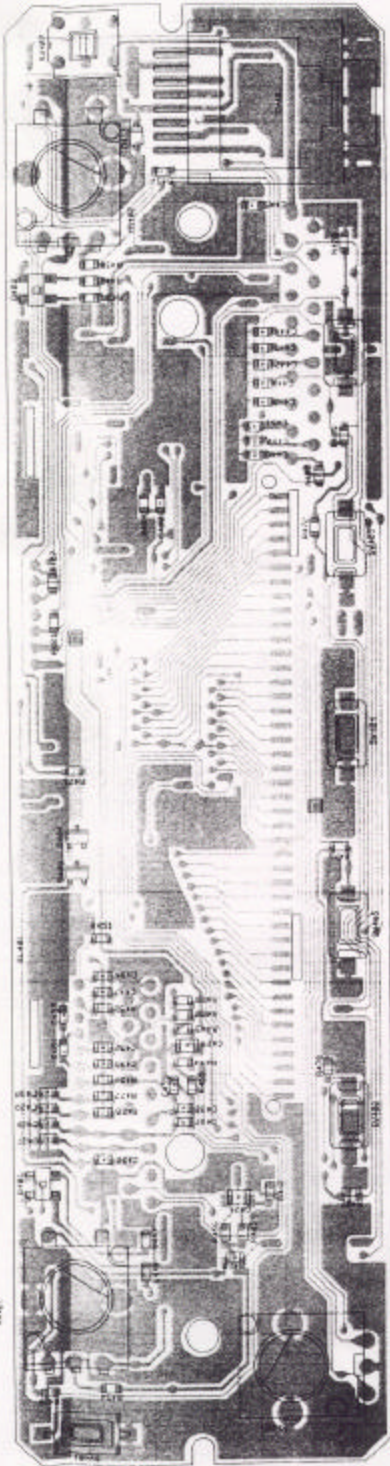
7) UHF Main Unit Side B



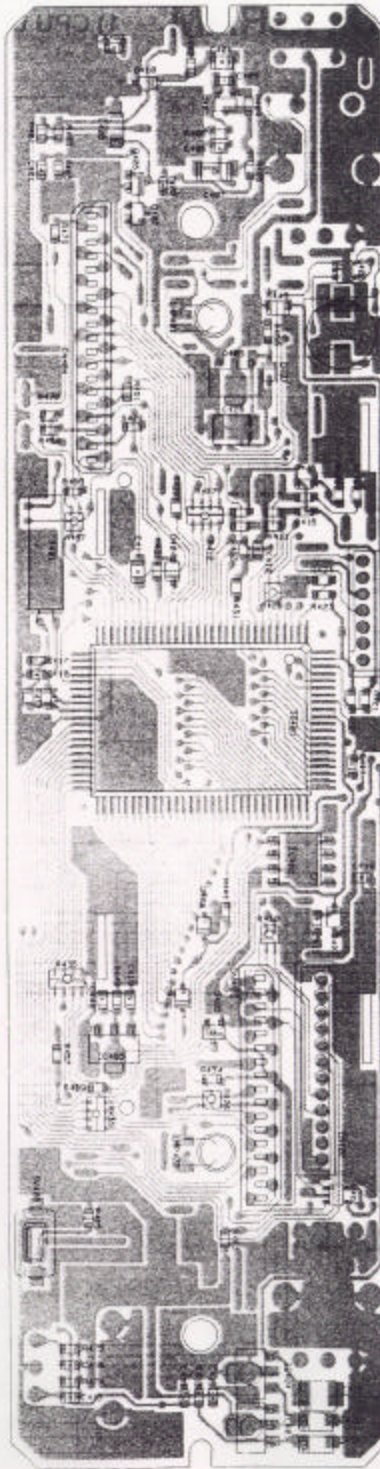
8) UHF VCO Unit Side B



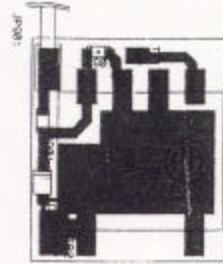
9) Front Unit Side A



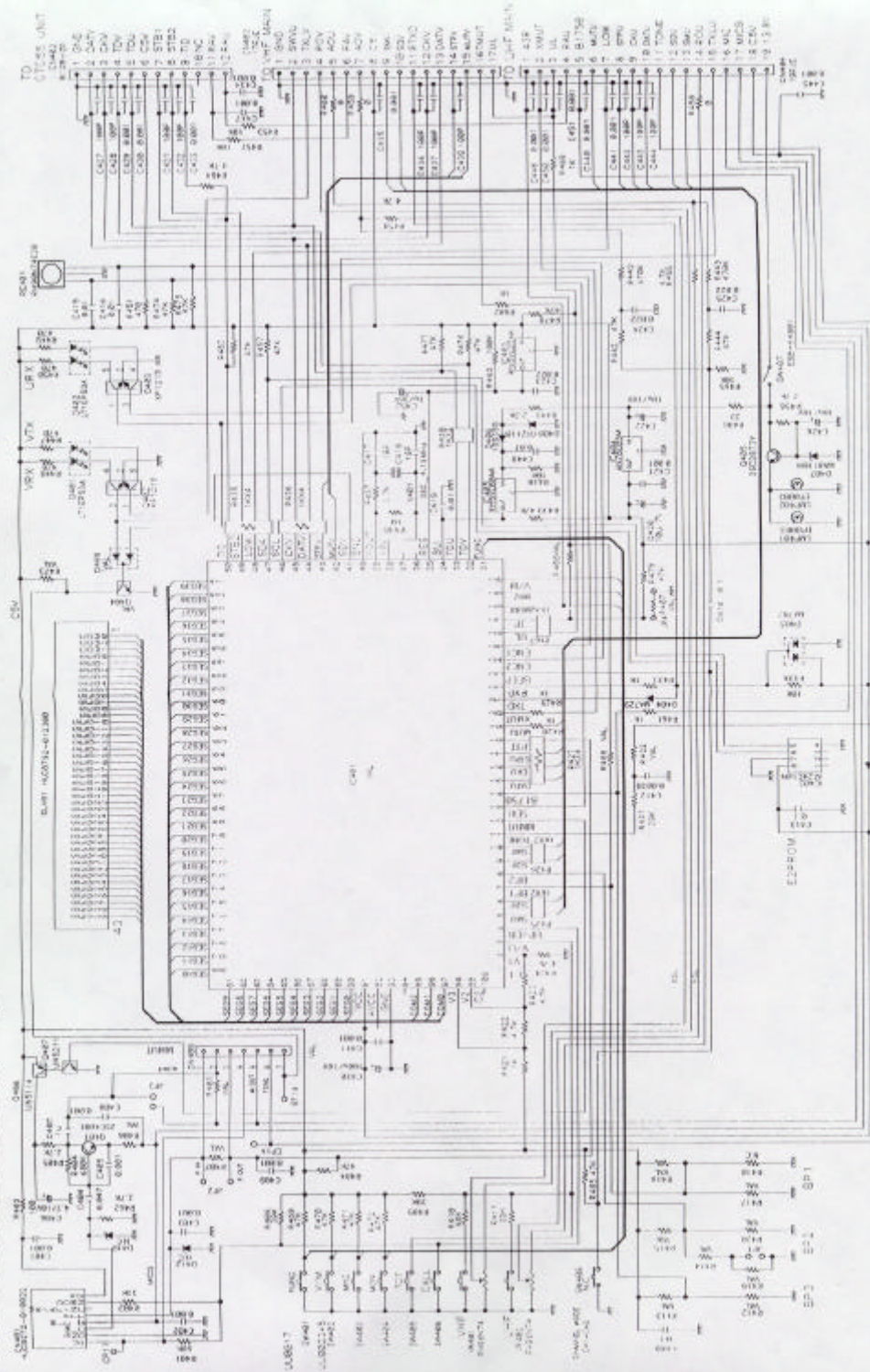
10) Front Unit Side B



11) TCXO Unit

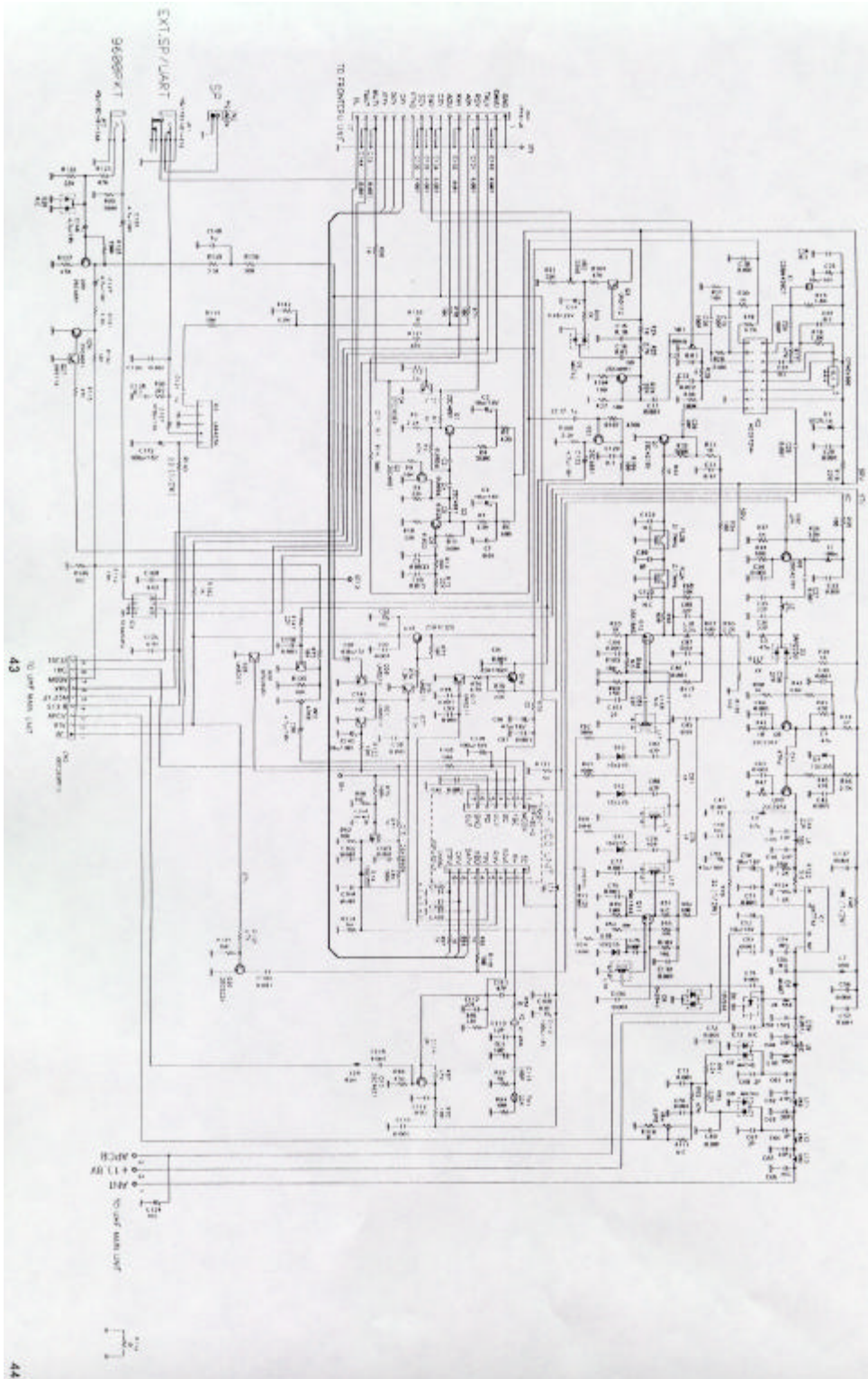


SCHEMATIC DIAGRAM 1) CPU unit

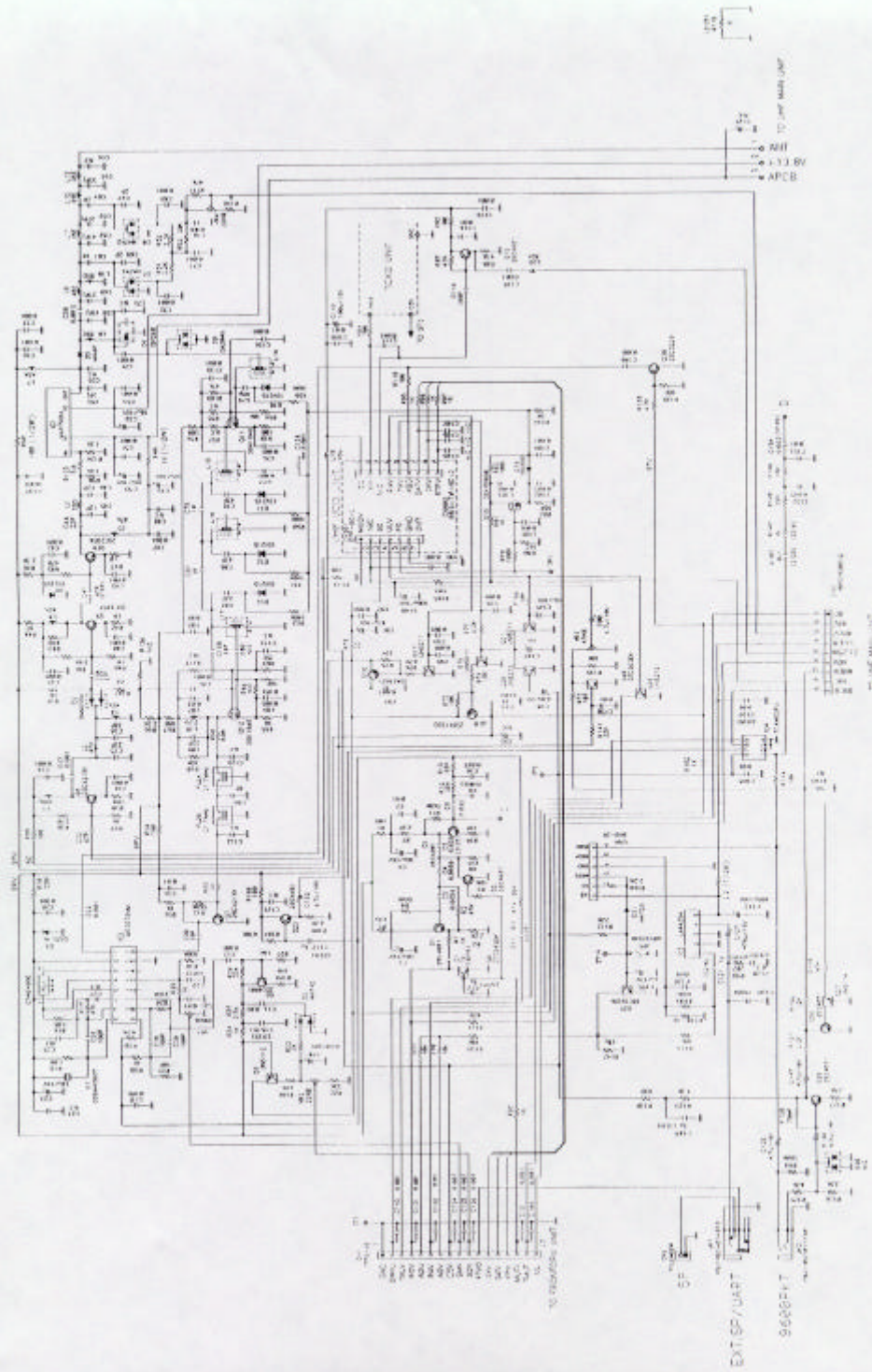


NO.	SYMBOL	DESCRIPTION	QTY.	REF.	UNIT	REMARKS
1	RES	RESISTOR	100	100	Ω	
2	CAP	CAPACITOR	50	200	μF	
3	DIODE	DIODE	10	300	1N4148	
4	IC	INTEGRATED CIRCUIT	1	400	4000000-012300	CPU
5	SW	SWITCH	1	500	1P10	KEYBOARD
6	CONN	CONNECTOR	1	600	100-pin	TO OTHERS UNIT
7	LED	LED	1	700	5mm	STATUS
8	RELAY	RELAY	1	800	12VDC	CONTROL
9	TRANS	TRANSISTOR	10	900	2N2222	DRIVER
10	DIODE	DIODE	5	1000	1N4001	RECTIFIER
11	RES	RESISTOR	200	1100	10k	PULL-UP
12	CAP	CAPACITOR	10	1200	0.1μF	DECOUPLING
13	DIODE	DIODE	2	1300	1N4148	CLAMPING
14	IC	INTEGRATED CIRCUIT	1	1400	74LS00	LOGIC
15	SW	SWITCH	1	1500	1P10	TEST
16	CONN	CONNECTOR	1	1600	5-pin	DEBUG
17	LED	LED	1	1700	5mm	DEBUG
18	RELAY	RELAY	1	1800	12VDC	CONTROL
19	TRANS	TRANSISTOR	10	1900	2N2222	DRIVER
20	DIODE	DIODE	5	2000	1N4001	RECTIFIER
21	RES	RESISTOR	200	2100	10k	PULL-UP
22	CAP	CAPACITOR	10	2200	0.1μF	DECOUPLING
23	DIODE	DIODE	2	2300	1N4148	CLAMPING
24	IC	INTEGRATED CIRCUIT	1	2400	74LS00	LOGIC
25	SW	SWITCH	1	2500	1P10	TEST
26	CONN	CONNECTOR	1	2600	5-pin	DEBUG
27	LED	LED	1	2700	5mm	DEBUG
28	RELAY	RELAY	1	2800	12VDC	CONTROL
29	TRANS	TRANSISTOR	10	2900	2N2222	DRIVER
30	DIODE	DIODE	5	3000	1N4001	RECTIFIER
31	RES	RESISTOR	200	3100	10k	PULL-UP
32	CAP	CAPACITOR	10	3200	0.1μF	DECOUPLING
33	DIODE	DIODE	2	3300	1N4148	CLAMPING
34	IC	INTEGRATED CIRCUIT	1	3400	74LS00	LOGIC
35	SW	SWITCH	1	3500	1P10	TEST
36	CONN	CONNECTOR	1	3600	5-pin	DEBUG
37	LED	LED	1	3700	5mm	DEBUG
38	RELAY	RELAY	1	3800	12VDC	CONTROL
39	TRANS	TRANSISTOR	10	3900	2N2222	DRIVER
40	DIODE	DIODE	5	4000	1N4001	RECTIFIER
41	RES	RESISTOR	200	4100	10k	PULL-UP
42	CAP	CAPACITOR	10	4200	0.1μF	DECOUPLING
43	DIODE	DIODE	2	4300	1N4148	CLAMPING
44	IC	INTEGRATED CIRCUIT	1	4400	74LS00	LOGIC
45	SW	SWITCH	1	4500	1P10	TEST
46	CONN	CONNECTOR	1	4600	5-pin	DEBUG
47	LED	LED	1	4700	5mm	DEBUG
48	RELAY	RELAY	1	4800	12VDC	CONTROL
49	TRANS	TRANSISTOR	10	4900	2N2222	DRIVER
50	DIODE	DIODE	5	5000	1N4001	RECTIFIER

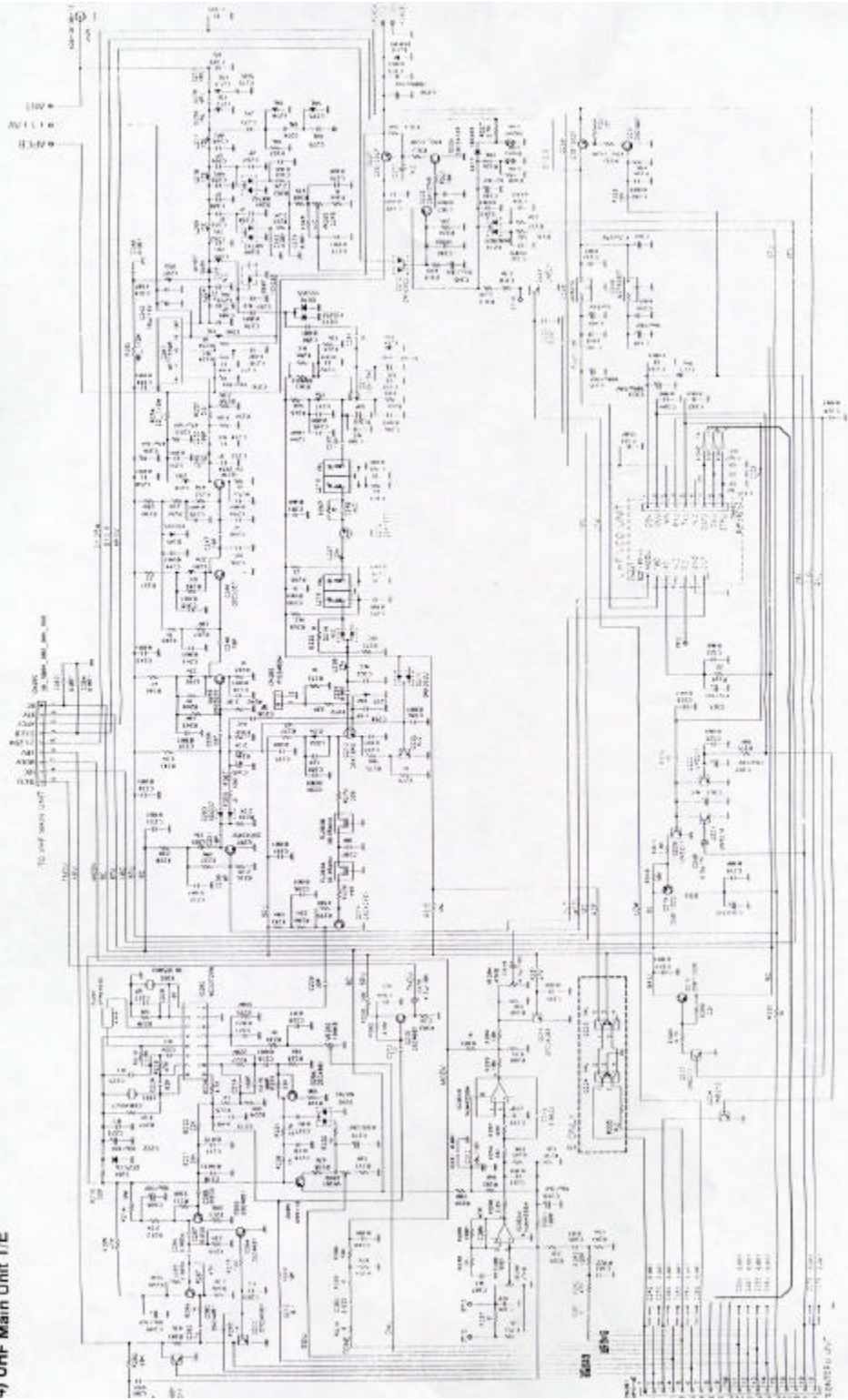
2) VHF Main Unit T/E



3) VHF Main Unit TE1/TE2

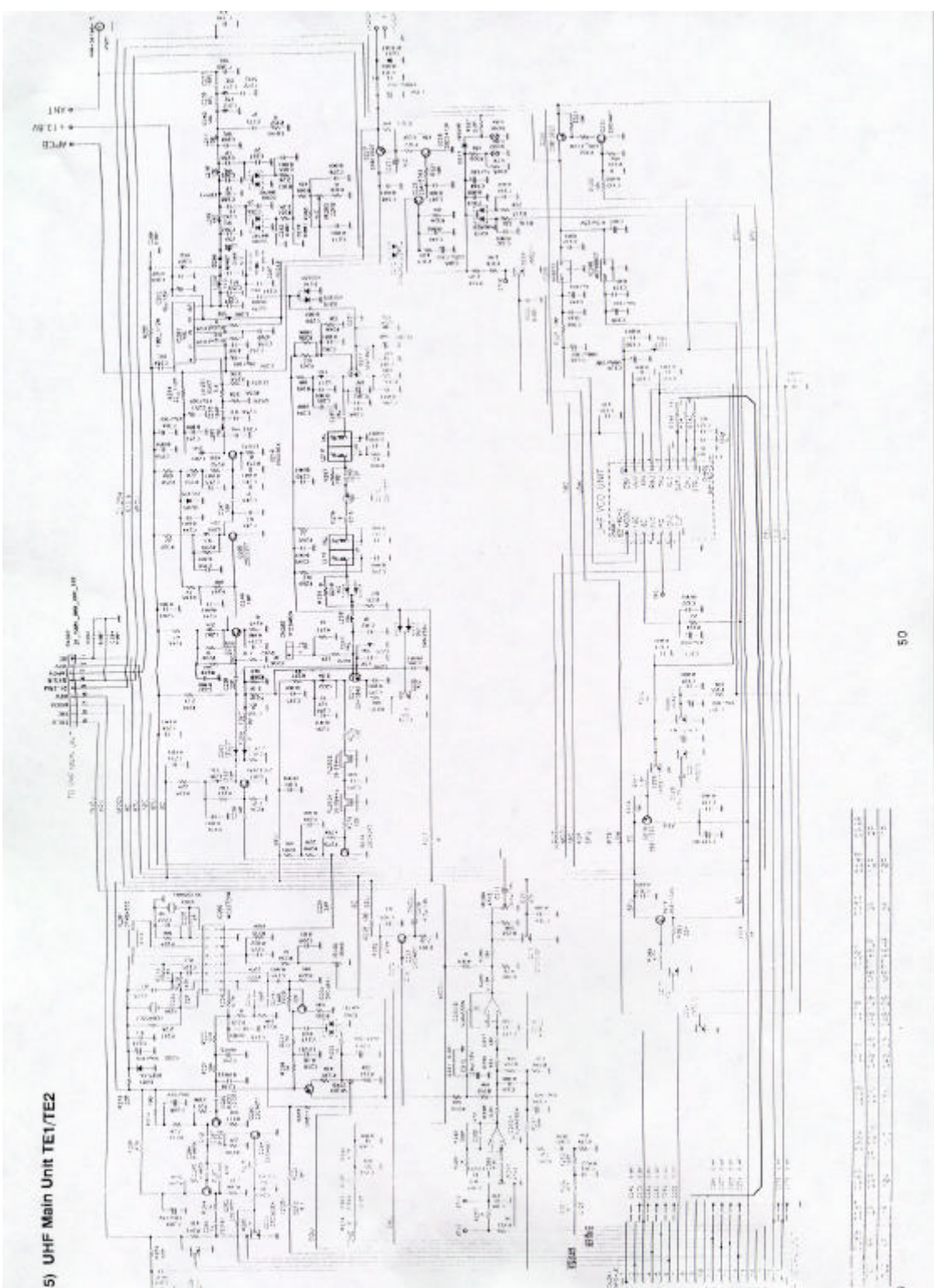


4) UHF Main Unit T/E



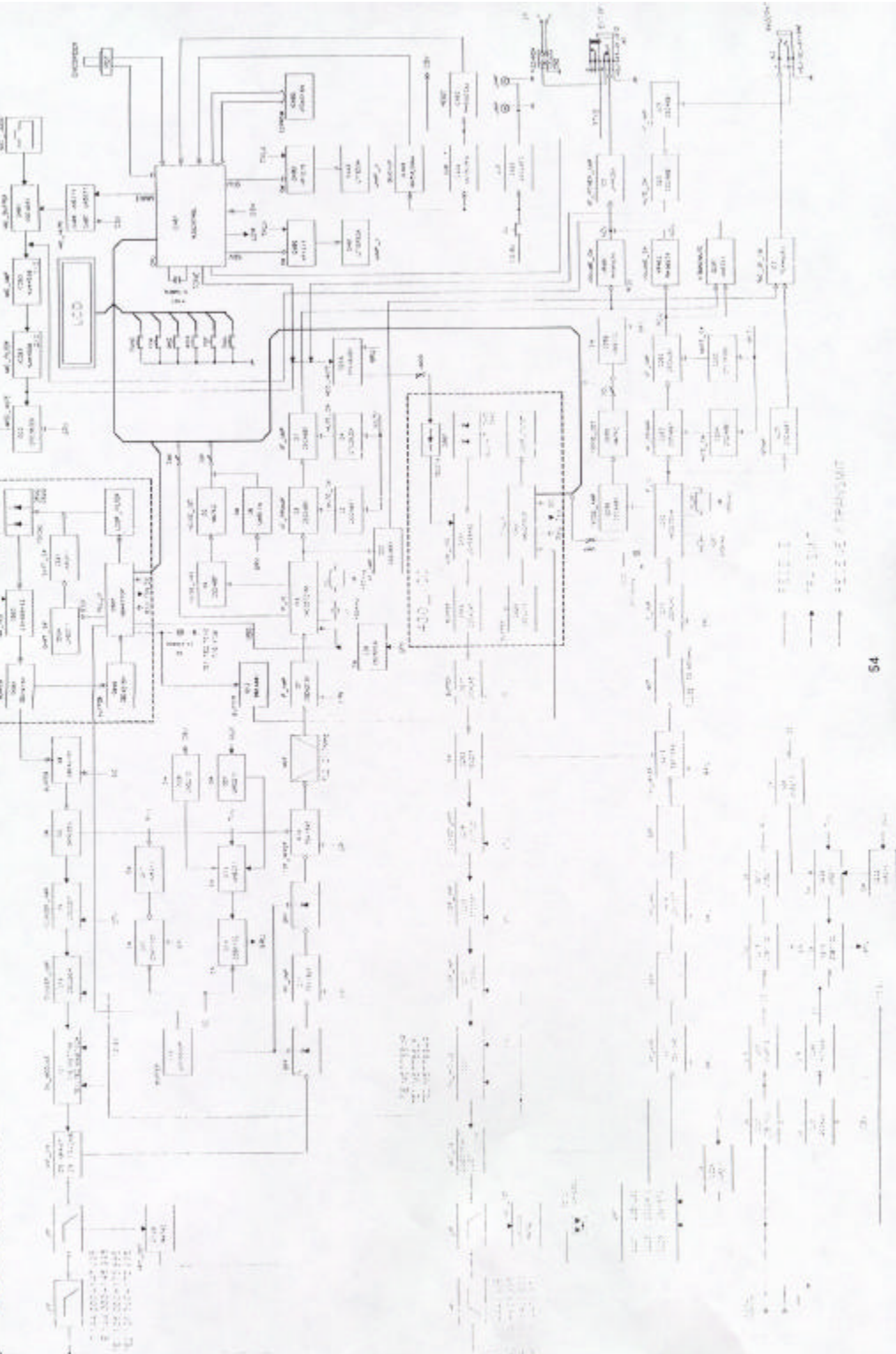
REF. NO.	DESCRIPTION	QTY.	UNIT
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5) UHF Main Unit TE1/TE2



REF. NO.	DESCRIPTION	QTY.	UNIT
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BLOCK DIAGRAM



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