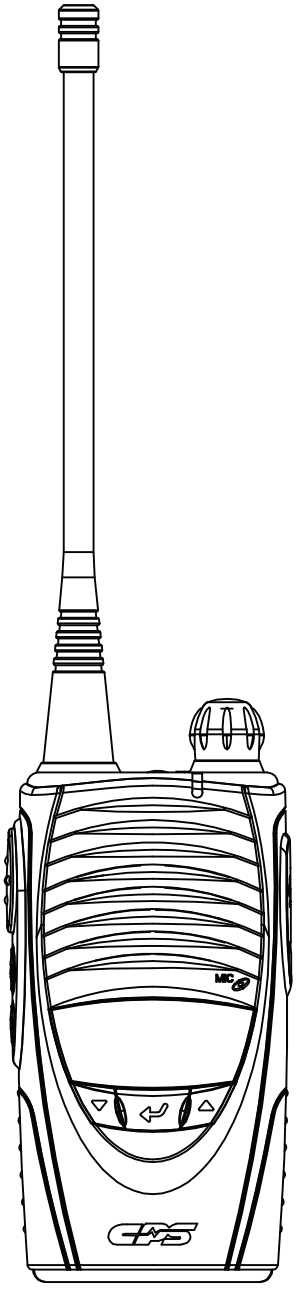
CP330

VHF/UHF FM
Handheld Transceiver

Service Manual



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1 GENERAL INFORMATION

1.1 Introduction

The CP330 Professional combines quality and versatility into a compact, light and portable professional two-way radio with state-of-the-art design and easy-to-use features.

1.2 Key Features

- Frequency Range (CP330V/U/P) : 136-174 MHz / 400-470 MHz / 350-390 MHz)
- 512 Channels in 16 Groups
- Built-in 53 CTCSS Tones / 208 DCS Codes
- Voice Compression and Expansion Technology – Delivers strong and clear audio quality through voice processing technology and 4-step squelch control.
- 1 Watt High Power Speaker
- Dual Tone Modulation Frequency (DTMF) Signaling
- 2-Tone / 5-Tone Signaling – Enables private or selective group signaling with up to 30 pre-programmed numbers providing caller identification.
- Scramble function – Ensures message security.
- Adjustable Transmission Power – Helps conserve battery life using low-power output under favorable communications condition.
- 7.4V 2200mAH Li-ion High Capacity Battery – Lightweight lithium-ion battery with extended battery life.
- Voice Activated Transmission (VOX) – Allows for hands-free transmission of message without pressing the PTT button.
- 12.5kHz / 25kHz Selective Channel Spacing
- Channel Scan/Priority Channel Scan – Scans for activity across different communications channels or pre-defined priority channels.
- Extension of Talk Range via Programmable Repeater function
- Monitor function – Enables monitoring of weak radio signals.
- Busy Channel Lockout – prevents the radio from listening to or transmit ting over its group.
- Time-Out Timer – Alerts you if the PTT button is keyed for a prolonged period.
- Software Programming/Cloning
- Emergency button – send out emergency signals with user ID when pressed.

- Lone Worker function – Provides added security to remote workers or individuals by automatically sending out emergency signals after a predetermined time lapse without response.
- Remote Radio Stun/Unstun – An administrator can send a signal to stun or unstun a radio (making it incapable for use or returning it to operational use) in the event it is stolen or used illegally.

1.3 Accessories

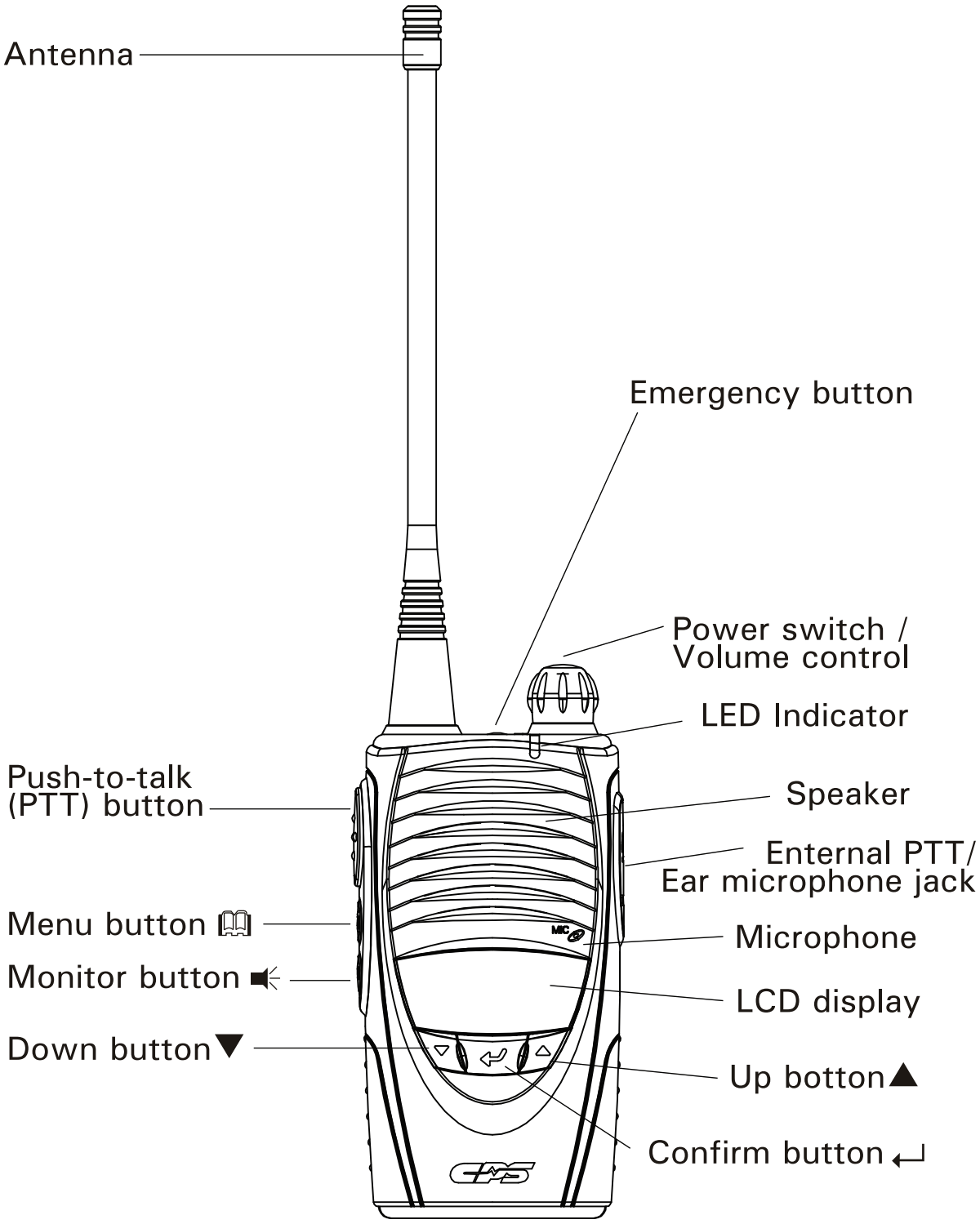
- CB33 2200mAH Li-ion high capacity battery pack
- CS33 Rapid charger with stand
- AT33 Antenna
- BC33 Belt clip
- Owner's manual
- Warranty card

1.4 Optional Accessories

- EM22C Ear microphone
- PC33 Programming cable
- CC33 Cloning cable
- RC33 Repeater cable
- PS33 Programming software
  (download from http://www.cps-telecom.com FREE)

2 CONTROLS AND INDICATORS

2.1 Controls and Indicators



2 CONTROLS AND INDICATORS

2.1.1. Power switch/Volume control

Switch on/off the radio and adjust the volume of the speaker by turning the power knob clockwise/anti-clockwise.

2.1.2. Push-To-Talk (" PTT") button

Press and hold the PTT button for transmission.

2.1.3. ▲ & ▼ keys

Press ▲ or ▼ to select channels, navigate menu functions, and adjust transmission power.

2.1.4. Confirm key ↵

Press ↵ to confirm selection.

2.1.5. Menu key 🕮

Press and hold 🕮 for about 2 seconds to enter the Menu mode, which has the following selection sequence:
ConnP (Compander) > GrouP (Change group) > Id ANI (User ID) > SCrR (Scramble) > SQUELCH (Squelch) > Sound (Key Sound) > H-FrEE (VOX) > LONE-UU (Lone Worker) > Repeat (Repeater)

2.1.6. Monitor key

Press to monitor weak radio signals. Press and hold for about 2 seconds until a "beep" sound is heard to stay in monitor mode. Press again to abort and return to Standby mode.

2.1.7. Emergency button

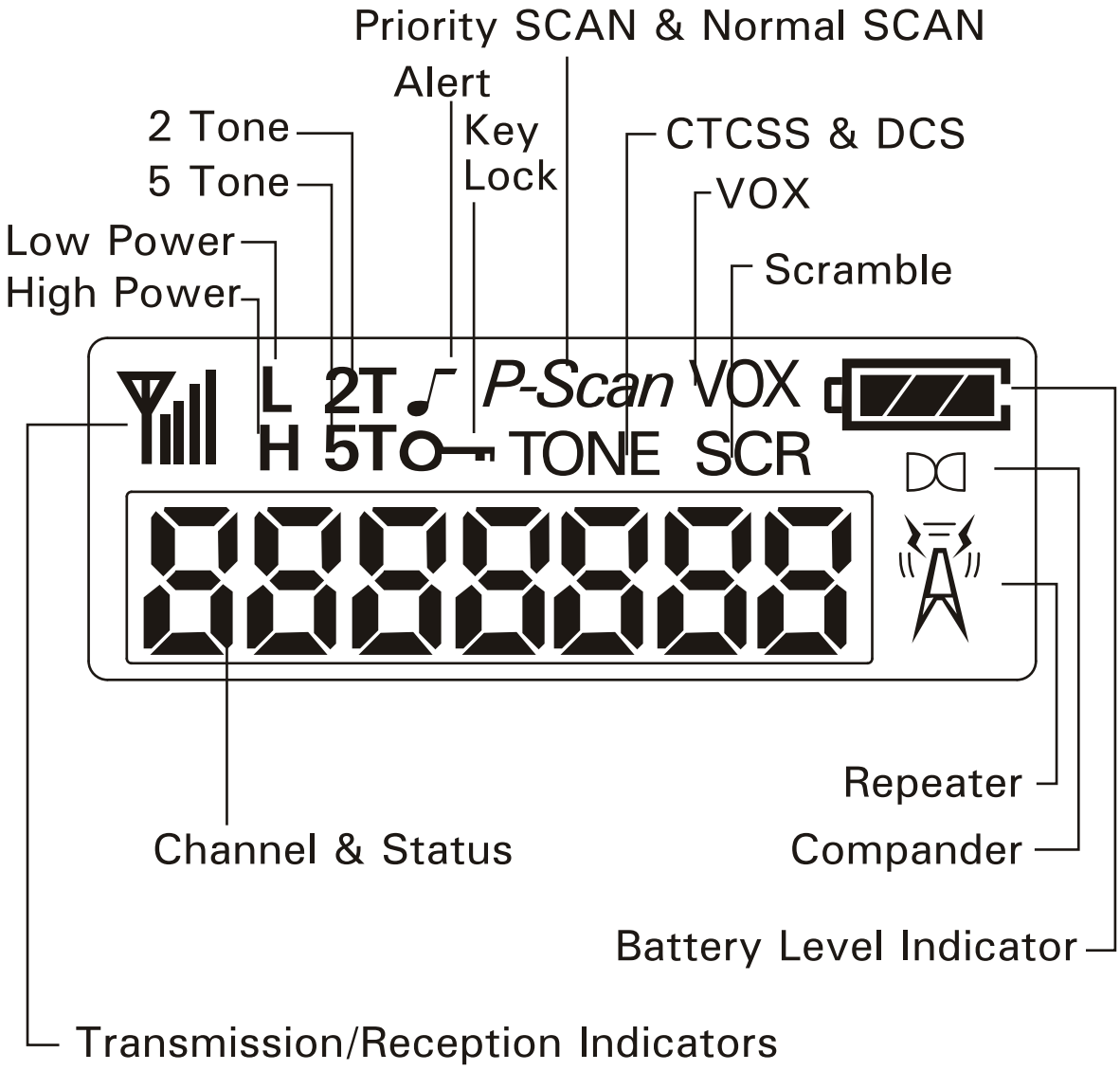
When pressed and held for about 2 seconds, a siren will be sounded without transmission (programmable) or distress signals with user ID will be transmitted to other users of the same frequency channel.

2.1.8. Ear microphone / Programming cable / Cloning cable connector

2.1.9. LED Indicator

Red : Transmitting
Green : Receiving
Green blinks : CTCSS/DCS error
Red blinks : Low battery level

2.2 LCD display



3 OPERATION

3.1 Power On/Off

Switch on the radio by turning the power knob clockwise until the speaker is at a desired volume level. As soon as the power is on, the LCD display becomes lit and shows the user ID if applicable. Switch off the radio by turning the power knob anti-clockwise fully.

3.2 Transmission

Press and hold the PTT button while speaking at about 5-10 cm from the microphone for transmission (indicated by the red LED). Release the PTT button to return to the Standby mode.

3.3 Reception Selection

The green LED will be on during reception of signals.

3.4 Channel

Press ▲ or ▼ to switch channel and a “beep” sound will be heard when a new channel is selected. If only one channel is preset, the channel number will not be changed and a different “beep” sound will be generated. To switch between channels quickly, press and hold ▲ or ▼ until the desired channel is selected.

3.5 Transmission Power Adjustment

Press the PTT button and ▲ to select high power output“H”. Press the PTT key and ▼ to select low power output “L”.

3.6 Channel Scan

While in General mode, press and hold 🕮 & ↵ for about 0.5 second to activate the channel scan function. The radio will automatically scan for activity until an active channel is detected. Press ▲ or ▼ to temporarily skip the detected channel and continue the scan. Press 🕮 once to abort the channel scan function.

3.7 Priority Channel Scan

Priority channels can be pre-defined through software programming. Press and hold 🕮 & ↵ for about 0.5 second to initiate priority channel scan, as indicated by "P" and "Scan" on the LCD display. The scanning sequence is

Only pre-defined channels will be scanned for activity. When an active channel is detected, you may press ▲ or ▼ to temporarily skip the detected channel and move on to the next priority channel. Press 🕮 once to abort the function.

3.8 Monitor function

Press to monitor weak radio signals. Press and hold for about 2 seconds until a "beep" sound is heard to stay in monitor mode. Press again to abort and return to Standby mode.

3.9 2-Tone/5-Tone Signaling

Software programming enables 2-tone / 5-tone private or selective group signaling with up to 30 pre-programmed numbers providing caller identification.

3.10 Call Mode (one to one)

While in General mode, press ↵ for about 2 seconds to enter Call mode. To place a call to a single party (e.g. "ID:54321"), select "ID:54321" using ▲ & ▼ , press 🕮 to call and then press and hold the PTT button while speaking as in normal transmission The called party will enter into "Open" mode for communication.

General Mode

Call Mode

3.11 Call Mode (one to group)

To make a group call while in Call mode, the group must be set up through software programming. Select the group to be called (e.g. “5AAAA” where A denotes all digits) using ▲ & ▼ , press 🕮 to call and then press and hold the PTT button while speaking. The called party will enter into “Open” mode for communication.

3.12 Reset

Press 🕪 once to turn the called radio back to “Close” mode.

3.13 Emergency Call

Press and hold the Emergency button for about 2 seconds to activate or deactivate the Emergency Mode, during which a siren will be sounded without transmission (programmable) or distress signals with user ID will be transmitted to other users of the same frequency channel.

3.14 Radio Stun/Unstun

An administrator can send a signal to stun a radio (making it incapable for use) in the event it is stolen or used illegally. Conversely, the radio can be returned to operational use after receiving an unstun signal from the administrator.

3.15 Keypad Lock

Press 🕮 followed by ▲ within 0.5 second to activate keypad lock. The keypad lock icon 🔑 on the LCD display indicates that all keys are disabled except for the PTT button and 🕪. To deactivate, press 🕮 followed by ▼.

3.16 Programming at Menu Mode

Press and hold 🕮 for about 2 seconds to enter the Menu mode, which has the following selection sequence:
ConnP (Compander) > GrouP (Change group) > Id ANI (User ID) > SCrR (Scramble) > SQUELCH (Squelch) > Sound (Key Sound) > H-FrEE (VOX) > LONE-UU (Lone Worker) > Repeat (Repeater)
Select the menu item using ▲ & ▼ and then press ↵ to confirm selection. Press ▲ or ▼ to choose between "ON /OFF" or "y (yes) / n (no)" and press ↵ to confirm selection. To exit, press 🕮 once. If no selection is confirmed after 10 seconds, the radio will automatically exit the Menu mode without saving.
Note that "Repeat" is a programmable function and will only be included in the menu selection sequence if it has been preset through software programming.

3.17 Software Programming

Press and hold 🕮 while turning on the radio to enter the programming mode, as indicated by "-Prog-" on the LCD display. Connect the radio to the computer through the programming cable connector (via ear microphone port) and begin downloading preset data onto the radio. Upon completion, disconnect the programming cable, turn off the radio and turn on the radio again to return to normal operations.

3.18 Cloning

To copy the contents from one radio to another (e.g. radio A to radio B), press and hold the PTT button while switching on the source radio ("-CLON-" will be displayed on radio A), and press and hold 🕮 while switching on the receiving radio ("-Prog-" will be displayed on radio B). Connect the two radios by inserting the cloning cable into the ear microphone port of each radio. Press the ↵ key of the source radio to initiate the copying process. After completion, disconnect the cloning cable and switch off both radios before switching them back on for the copied contents to take effect.

4 BATTERY PACK

4.1 Installing/Removing a CB33 Battery Pack

- Slide the battery pack onto the radio until it is securely in place and locked.
- To remove, turn off the radio, press down the lock lever and slide the battery pack away from the radio.

4.2 CS33 Rapid Charger

- Insert DC plug of the adapter into the charging port of the CS33 Rapid Charger.
- Plug the adapter into the appropriate AC power outlet.
- Turn off the radio.
- Insert the radio (with battery) into the charging pocket.
- At completion, remove the radio from the charging pocket and unplug the charger from the power outlet.

5 CTCSS / DCS TABLE

CTCSS TABLE

No.	Frequency	No.	Frequency	No.	Frequency	No.	Frequency
1	67.0	14	107.2	27	167.9	40	159.8
2	71.9	15	110.9	28	173.8	41	183.5
3	74.4	16	114.8	29	179.9	42	189.9
4	77.0	17	118.8	30	186.2	43	196.6
5	79.7	18	123.0	31	192.8	44	199.5
6	82.5	19	127.3	32	203.5	45	206.5
7	85.4	20	131.8	33	210.7	46	229.1
8	88.5	21	136.5	34	218.1	47	254.1
9	91.5	22	141.3	35	225.7	48	165.5
10	94.8	23	146.2	36	233.6	49	171.3
11	97.4	24	151.4	37	241.8	50	177.3
12	100.0	25	156.7	38	250.3	51	60.7
13	103.5	26	162.2	39	69.3	52	62.5

5 CTCSS / DCS TABLE

DCS TABLE

No.	DCS Code	No.	DCS Code	No.	DCS Code	No.	DCS Code
1	023	28	172	55	431	82	743
2	025	29	174	56	432	83	754
3	026	30	205	57	445	84	053
4	031	31	223	58	464	85	122
5	032	32	226	59	465	86	036
6	043	33	243	60	466	87	145
7	047	34	244	61	503	88	212
8	051	35	245	62	506	89	225
9	054	36	251	63	516	90	246
10	065	37	261	64	532	91	252
11	071	38	263	65	546	92	255
12	072	39	265	66	565	93	266
13	073	40	271	67	606	94	274
14	074	41	306	68	612	95	325
15	114	42	311	69	624	96	332
16	115	43	315	70	627	97	356
17	116	44	331	71	631	98	446
18	125	45	343	72	632	99	452
19	131	46	346	73	654	100	454
20	132	47	351	74	662	101	455
21	134	48	364	75	664	102	462
22	143	49	365	76	703	103	523
23	152	50	371	77	712	104	526
24	155	51	411	78	723		
25	156	52	412	79	731		
26	162	53	413	80	732		
27	165	54	423	81	734		

6 SPECIFICATIONS

GENERAL	CP330V	CP330U	CP330P
Frequency Range	136-174 MHz	400-470 MHz	350-390 MHz
Channel	512 channels in 16 groups		
Channel Spacing	12.5 kHz / 25 kHz electable		
Operating Voltage	7.4 VDC		
Modulation	FM		
Dimension	103 x 56 x 35mm		
Weight (including battery)	252 g		

TRANSMITTER

Output Power	5W	4W
Frequency Stability	± 2.5ppm (-30°C ~ +60°C)	
Spurious and Harmonics	65 dB	60 dB
Hum and Noise	35 dB	
Audio Distortion	3%	
Audio Frequency Response	+3, -3 dB from 6 dB per Octave de-emphasis characteristic from 300~3000Hz	

RECEIVER

Sensitivity (12 dB SINAD)	0.2 uV (-120 dBm)	
Squelch Sensitivity (Threshold)	0.158 uV (-123 dBm)	
Selectivity	70 dB	75 dB
Intermodulation Rejection	60 dB	65 dB
Spurious and Image Rejection	70 dB	
Audio Output Power	1 W, 16 Ω	

7 CIRCUIT DESCRIPTION OF CP-SERIES PRODUCT

7.1 Circuit Composition of CP-series Product

A circuit of CP-series radio consists of the RF circuit that decides the communication quality and performance and the logic circuit that controls functions. The RF circuit is divided into the transmitter and the receiver. The transmitter consists of the synthesizer (TX frequency generator), the power drive, the TX module, the APC part, and the antenna switch. The receiver includes the front end, the mixer, the local drive, the crystal filter, the IF amplifier, and the IF IC. The logic circuit has a microprocessor Unit (MPU) that controls all functions, the audio chip, the ALC, the IDC circuit, the low-pass filter limiting 3KHz or lower audio data, 2/5-tone detection filter, the DTMF generator, the audio amplifier, the PTT, the wall charger, the LCD, and the VOX detector.

7.2 Transmitter

7.2.1 Synthesizer

As shown in Figure 7-1, the synt hesizer consists of the TXCO (reference frequency generator), the PLL IC(U52), the LPF filter, and the VCO.

The TCXO (U53) is a core component to generate reference frequencies for CP-Series radios and uses 12.8MHz (at -30ºC ~ +60ºC, ±2.5ppm). To improve frequency accuracy and modulate tone signals, the TCXO uses R109, R110, and VR22 outside. By turning VR22 in “+” way, the user can increase the voltage and decrease the frequency, and vice versa.

The PLL IC is composed of a binary 19bit reference counter, a prescaler, and a 18bit programmable divider, and is controlled by the program.

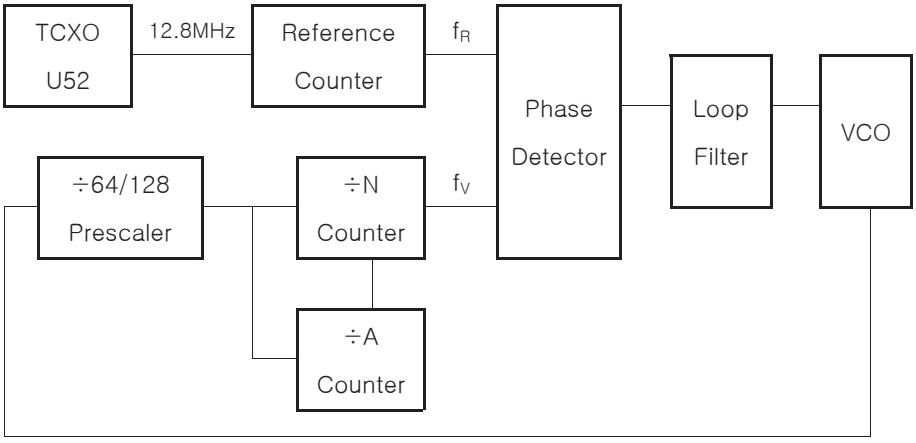


Figure 7-1) Structure of the Synthesizer

7.2.2 VCO(Voltage Controlled Oscillator)

The VCO are divided into TX VCO and RX VCO. The control voltage provided by the synthesizer decides the oscillation frequency.

The RX VCO starts to operate when the TR (Q34) for Power switch is turned on, and the oscillation frequency is decided by capacities of Q21, D14, L53, C124, C125, C127 and C128.

The TX VCO starts to operate when the TR (Q33) for Power switch is turned on, and the oscillation frequency is decided by capacities of Q22, D55, D16, L55, C133, C134, C135, C136, C137 and C138.

Q23 and peripheral devices function take a role of buffers amplifying frequencies that are oscillated by the TX VCO and the RX VCO and suppress external influences.

7.2.3 Power Drive

TX drive (Q24, Q25 and Q26) is to amplify the RF power, which VCO generates, to 5V at the final amplification FET (Q27).

The TX drive includes amplifiers in three phases. The amplifier in the first phase (Q24) functions at A level, and the other amplifier in the second phase (Q25 and Q26) functions at AB level so that the FET (Q27) can generate enough output. Q28 and Q29 supply power into the power drive suitable for the voltage that the APC circuit controls.

7.2.4 Power FET and APC Circuit

The power FET (Q27) is amplifying final RF carrier to 5W. L35, C511, C515, C516 and C517 match the antenna switch with the power FET.

The APC controller (U54A and U54B) helps the power FET (Q27) to maintain the RF power at 5W.

C520 detects the output power in the final end, and converts it into DC power using D204, C531, R521 and C532. Converted DC power is stabilized by the buffer amplifier (U54A) and supplied to Pin No.6 of the comparator (U54B). Pin No.5 of the comparator (U54B) receives the reference power from the digital board and compares it with the voltage that Pin No.6 received.

The input voltage of the comparator (U54B) is compared to maintain the RF power consistently by controlling Q28 and Q29.

7.2.5 Antenna Switch

The antenna switch is equipped with a low-pass filter that switches Tx output and Rx input signals and removes spurious upon transmission.

Tx and Rx switching is made by pin diodes D101, D102 and D103.

The low-pass filters (L38, L39, L40, C522, C523, C524, C525, C526, C527, C528 and C529) remove other frequencies than the desired signals.

7 CIRCUIT DESCRIPTION OF CP-SERIES PRODUCT

7.3 Receiver

7.3.1 Front End

The front end selects signals of the desired band among RF signals in the free space and amplifies them. The front end consists of the filter and the Low Noise Amplifier (LNA). For CP-Series model, the tunable high pass filter has a 2 x 2 parallel structure. The LNA performs single-phased amplification for CP-Series. Variable capacitance diodes D301, D302, D305 and D306 are are decided by DA_BPF voltage supplied by the digital board, and they function with coils L301, L302, L307 and L308 in the serial resonance circuit to configure the band pass filter.

7.3.2 Mixer

The mixer (Q13) generates IF frequencies (21.4MHz for CP-330V, and 45.3MHz for CP-330U) in which received RF signals and the local signals generated in the VOC are mixed. The highest local signal level is 4dBm (±2dBm), and at this time, the conversion gain is approximately 4dBm.
To prevent spurious harmonics, Q13 that is a n-channel dual gate MOS-FET has been used to separate local signals from the received RF signals.

7.3.3 Local Drive

The frequency level occurring in the Rx VCO is -6dBm (±2dBm) and not enough to be supplied to the mixer. The local drive (Q20) is used to prevent Rx VCO from oscillating due to strong signals and low level of the Rx VCO.

7.3.4 Crystal Filter and IF AMP

The crystal filter (XF3) is made of a pair. The pass band width of the crystal filter is ±6KHz and has been designed to be used under both 12.5KHz and 25KHz of the channel interval.
The IF AMP (Q14) amplifies low-frequency signals that the X-TAL filter selected into 25dB.

7.3.5 IF Detector Circuit

The IF IC (U51) consists of the second mixer, two ceramic filters, the discriminator, the noise squelch, and a 12.5/25KHz switch. If the second mixer is for XV-1000, 20.945MHz (X31) of the local frequency should be used, or if the second mixer is for XU-1000, 44.845MHz (X31) of the the local frequency should be used to generate 455KHz. Then, 455KHz signals will pass the ceramic filter (F33, F34) again and decide the selectivity for the adjacent channels. The discriminator functions as a mixed signal to operate the quadrature detection circuit detects audio signals by moving 455KHz center frequency by 90°. The damping resistor (R385) decides the audio signal size. If the resistance is higher, the audio signal size will be high, or if the resistance is low, the audio signal size will be low.

7 CIRCUIT DESCRIPTION OF CP-SERIES PRODUCT

7.4 Logic Part

The logic part consists of the Micro Processor Unit (MPU), the audio processor chip, DCS filtert, the 2/5-tone detection circuit, the DTMF generating circuit, the audio amplifying circuit, the VOX circuit, the LCD circuit, and the LED indicators.

7.4.1 Micro Processor Unit (MPU)

The MPU (U101) is a single 8bit chip microcomputer manufactured by Samsung (model name: S3F88285XZ0).

General specification of the MPU is as follows:

-. 16K Bytes of In-System self-programmable flash

-. 2614K Byte internal RAM

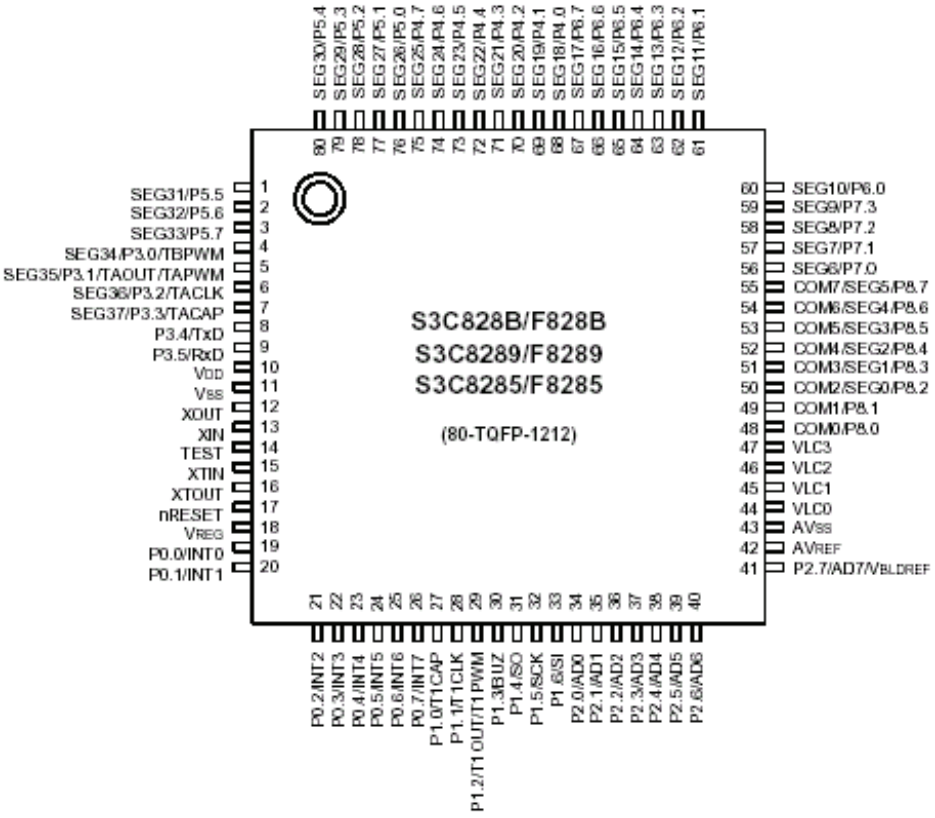
-. Tow 8-bit Timer/Counters or one 16-bit Timer/Counters

-. 8-channel, 10-bit ADC

-. Byte-oriented tow-wire serial interface

-. Programmable serial USART

-. 80 TQFP



(Figure 7-2) MPU pin assignment

7.4.3 2/5-Tone Circuit

The 2/5-tone signal processed in the AK2347(103) are converted into digital signals through the comparator inside U106A. Then, 2-tone and 5-tone data are detected by P1.0 of the MPU (U101).

7.4.4 DTMF Generator

The DTMF generating circuit generates dual tones through the ports (P5.0, P5.1, P5.2, P5.3, and P5.4) of the MPU (U101).

7.4.5 Audio Amplifier

The audio amplifying circuit (U108) amplifies the audio data for the speakers. R283, R280 is to match the audio signals for matching resistors.

The VR12 adjusts the volume and turns on/off the radio. Q60 and Q61 supply power to the audio amplifier.

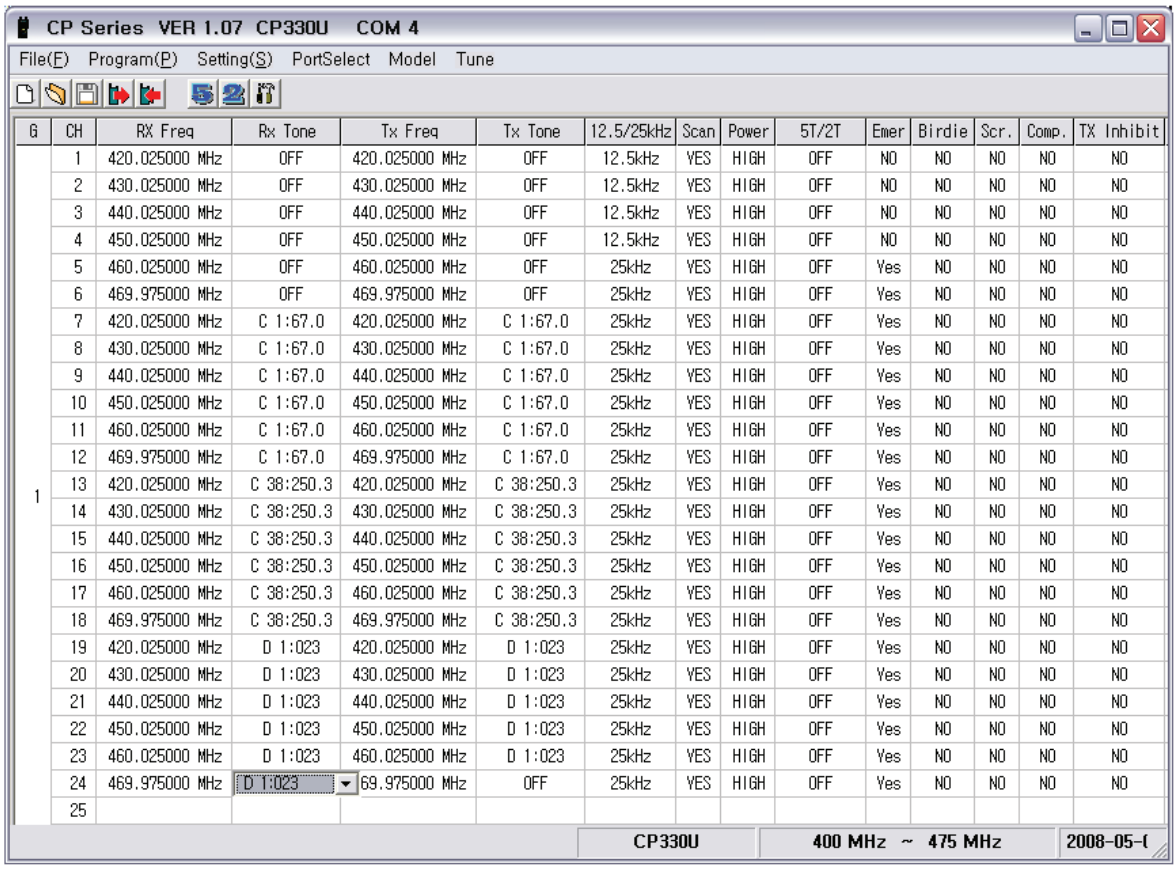
8 PROGRAM INSTALLATION

After CP/U Series PC Program1.00.EXE is acted, install with the basic value on screen.

This Program can be used in Windows2000 version or in higher version than Windows2000, and don't use this program in Windows98 version or in lower version than Windows98.

In case of installing the Program in the Windows98 version, a new format on PC may be required.

8.2 Frequency Input Window



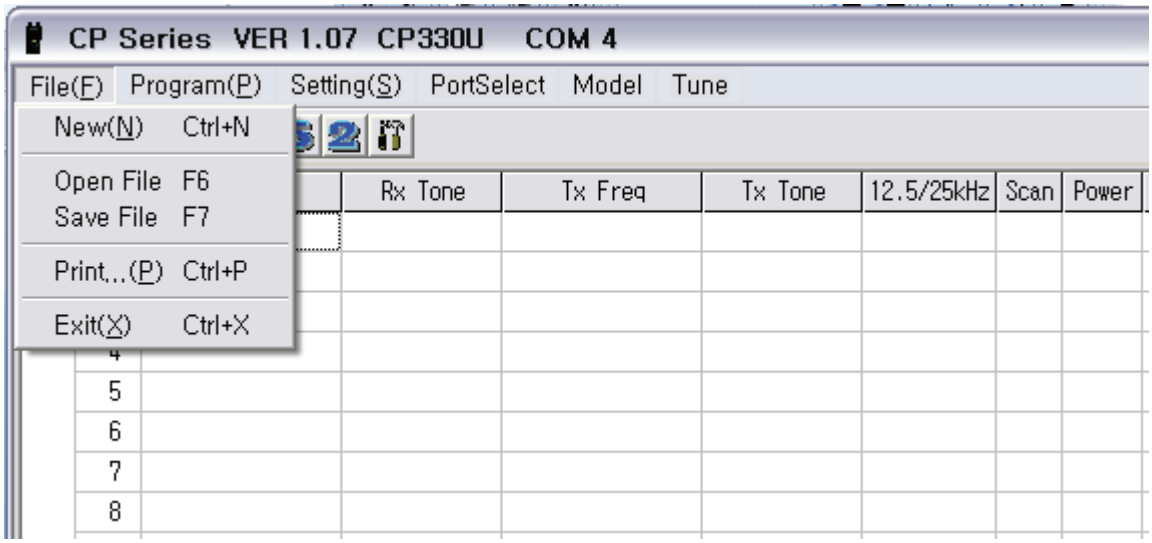
G	CH	RX Freq	Rx Tone	Tx Freq	Tx Tone	12.5/25kHz	Scan	Power	5T/2T	Emer	Birdie	Scr.	Comp.	TX Inhibit
1	1	420.025000 MHz	OFF	420.025000 MHz	OFF	12.5kHz	YES	HIGH	OFF	NO	NO	NO	NO	NO
	2	430.025000 MHz	OFF	430.025000 MHz	OFF	12.5kHz	YES	HIGH	OFF	NO	NO	NO	NO	NO
	3	440.025000 MHz	OFF	440.025000 MHz	OFF	12.5kHz	YES	HIGH	OFF	NO	NO	NO	NO	NO
	4	450.025000 MHz	OFF	450.025000 MHz	OFF	12.5kHz	YES	HIGH	OFF	NO	NO	NO	NO	NO
	5	460.025000 MHz	OFF	460.025000 MHz	OFF	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	6	469.975000 MHz	OFF	469.975000 MHz	OFF	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	7	420.025000 MHz	C 1:67.0	420.025000 MHz	C 1:67.0	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	8	430.025000 MHz	C 1:67.0	430.025000 MHz	C 1:67.0	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	9	440.025000 MHz	C 1:67.0	440.025000 MHz	C 1:67.0	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	10	450.025000 MHz	C 1:67.0	450.025000 MHz	C 1:67.0	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	11	460.025000 MHz	C 1:67.0	460.025000 MHz	C 1:67.0	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	12	469.975000 MHz	C 1:67.0	469.975000 MHz	C 1:67.0	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	13	420.025000 MHz	C 38:250.3	420.025000 MHz	C 38:250.3	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	14	430.025000 MHz	C 38:250.3	430.025000 MHz	C 38:250.3	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	15	440.025000 MHz	C 38:250.3	440.025000 MHz	C 38:250.3	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	16	450.025000 MHz	C 38:250.3	450.025000 MHz	C 38:250.3	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	17	460.025000 MHz	C 38:250.3	460.025000 MHz	C 38:250.3	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	18	469.975000 MHz	C 38:250.3	469.975000 MHz	C 38:250.3	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	19	420.025000 MHz	D 1:023	420.025000 MHz	D 1:023	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	20	430.025000 MHz	D 1:023	430.025000 MHz	D 1:023	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	21	440.025000 MHz	D 1:023	440.025000 MHz	D 1:023	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	22	450.025000 MHz	D 1:023	450.025000 MHz	D 1:023	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	23	460.025000 MHz	D 1:023	460.025000 MHz	D 1:023	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	24	469.975000 MHz	D 1:023	69.975000 MHz	OFF	25kHz	YES	HIGH	OFF	Yes	NO	NO	NO	NO
	25													

The user should input RX/TX frequency within the range displayed on the status bar.

The sequence of frequency input screen is as follows : **RX Tone, TX Tone, 12.5/25KHz**(Narrow/Wide), **Scan, Power, 5T/2T, Emer**(Emergency), **Birdie, Scr** (Scrambler), **Comp**(Compander), **TX Inhibit** and the user can choose his desired function.

If the data already exists, the data is not changed automatically.

8 PROGRAM INSTALLATION

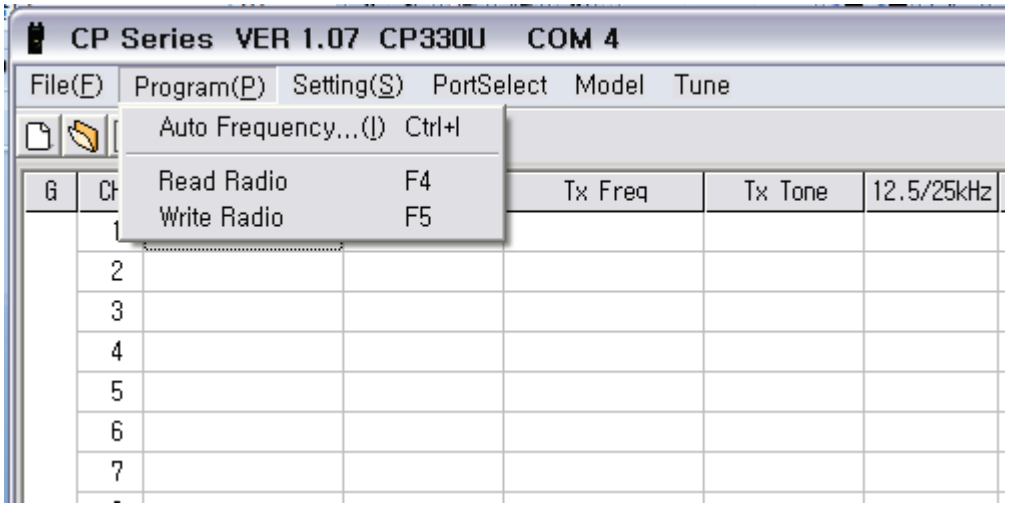


• New : Erase the stored data and return to the initial stage.

• Open File : Read the data of group and channel, etc stored in *. xpfre file.

• Save File : Store the data in *. xpfre file.

• Print : Print the value of data displayed on the screen.

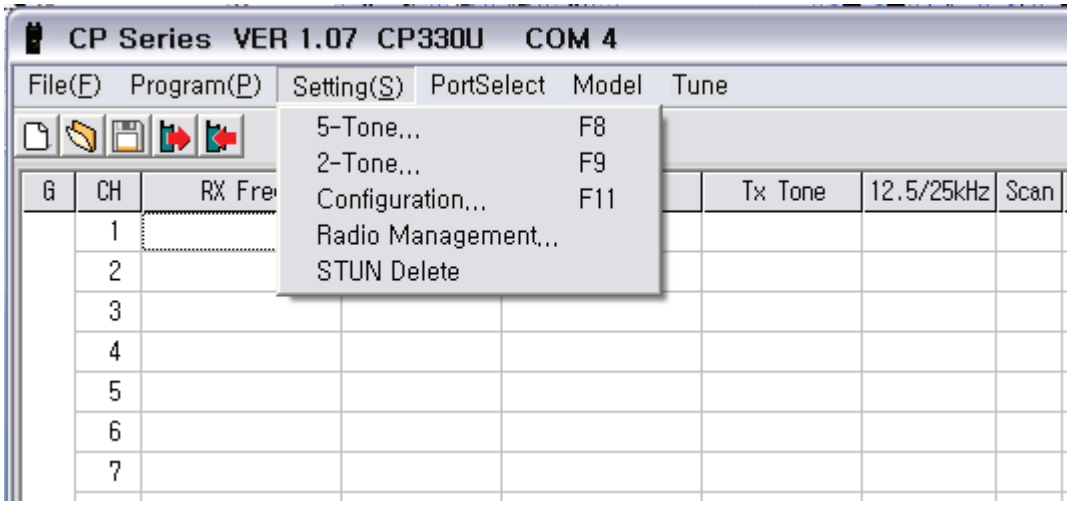


• Auto Frequency : Use in case of making consecutive frequency input.

• Read Radio : Read the data stored in Radio.

• Write Radio : Write in Radio the data displayed on the screen.

8 PROGRAM INSTALLATION

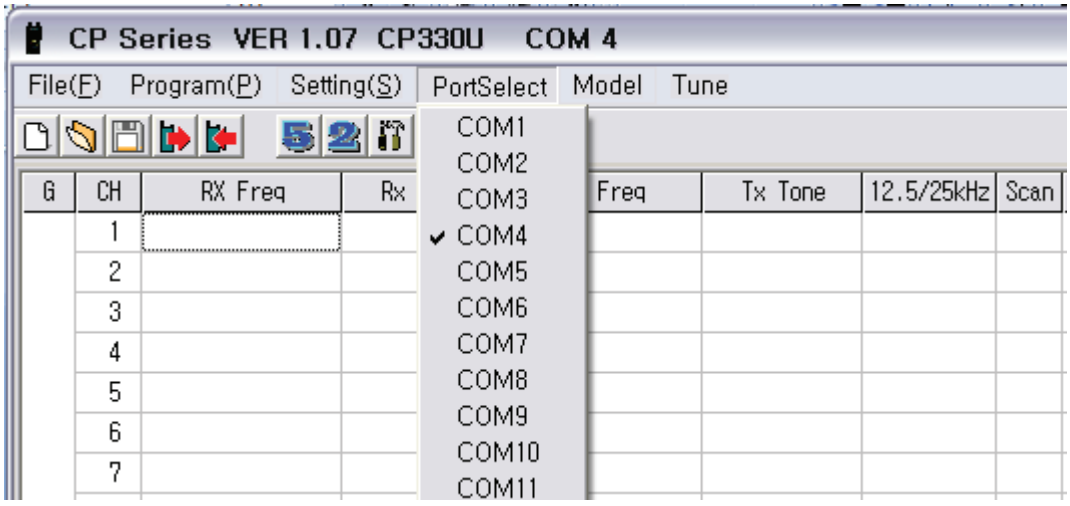


• 5Tone : Set up the ID and the others related with 5Tone.

• 2Tone : Set up the ID and the others related with 2Tone.

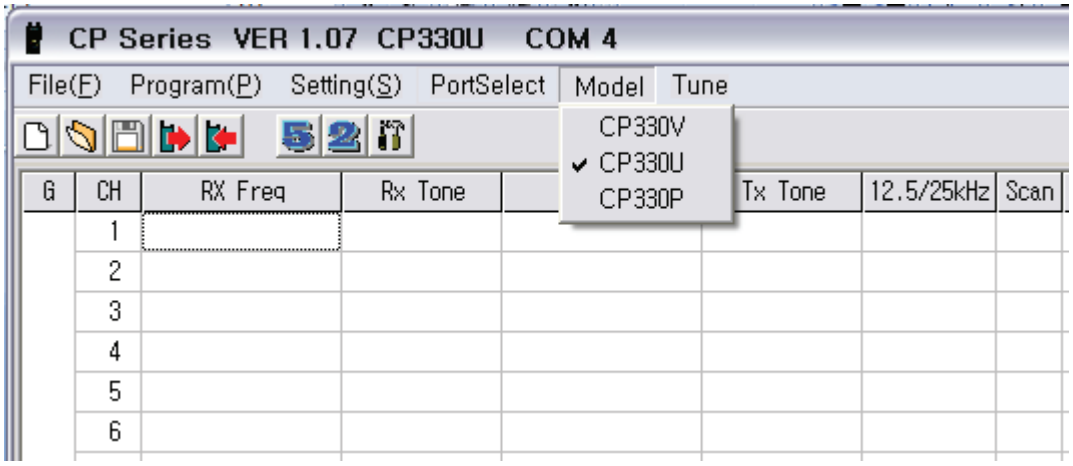
• Configuration : Set up the contents related with the operation of Radio.

• STUN Delete : Return to the normal mode after UNSTUN of STUN Radio.

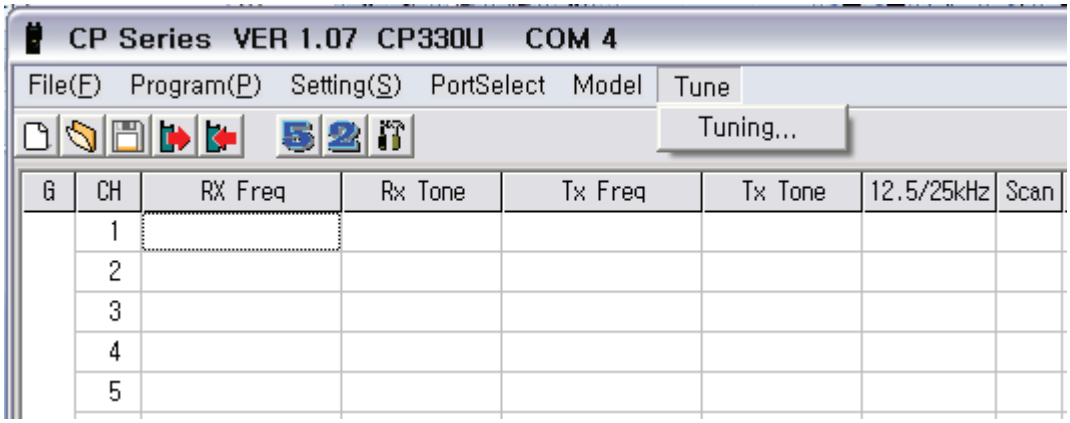


PortSelect : Make Comport setting and the Comport supports up to max.24numbers.

8 PROGRAM INSTALLATION

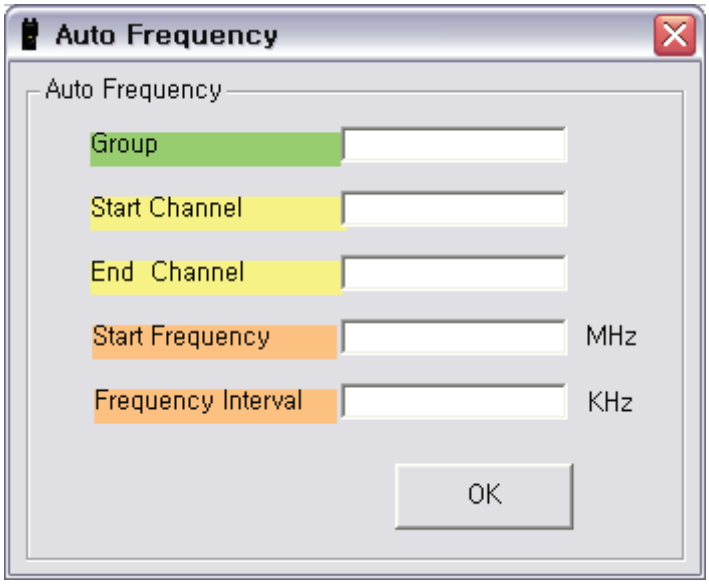


• Model : Select a Model, CP-330V, CP-330U and CP-330P. The frequency range is 136~174MHz for CP-330V, 405~470MHz for CP-330U and 350~390MHz for CP-330P.



• Tuning : End-Users can not use this Tune Mode and this is for manufacturer & A/S center.

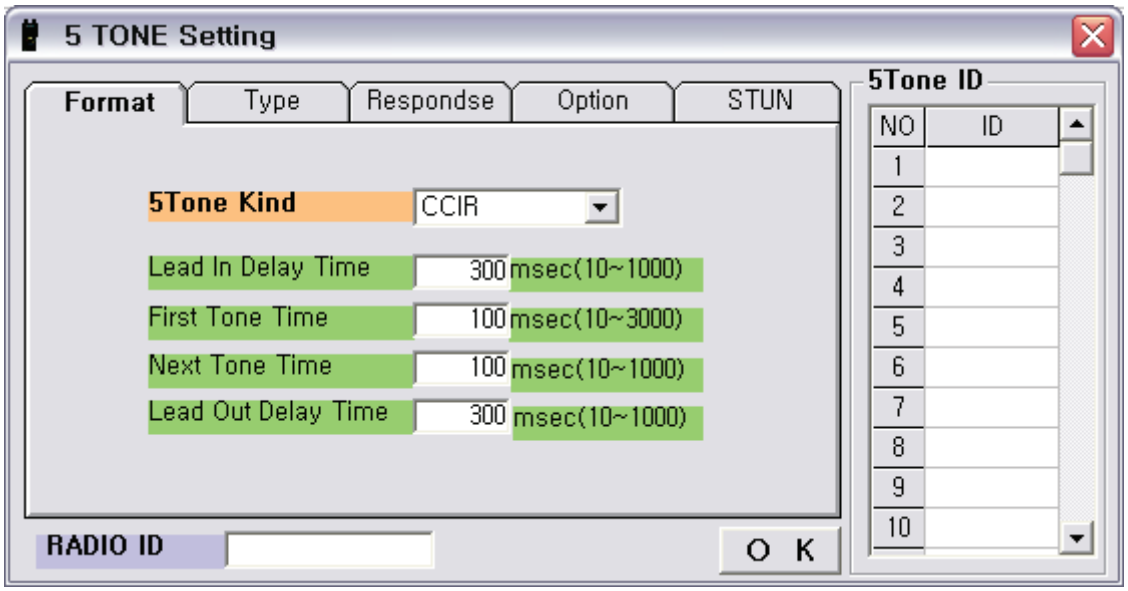
8.3 Auto Frequency



This screen is for the convenience of user and the user can use this screen in convenience when he want to input in a regular frequency spacing after group setting.

- **Group** : Designate the group to make frequency input.
- **Start Channel** : Designate the channel# 1 on the frequency screen.
- **End Channel** : Designate the channel to be stored at the end on the frequency screen.
- **Start Frequency** : Designate the frequency to be stored at the first.
- **Frequency Interval** : Designate the spacing between frequencies to be stored consecutively.

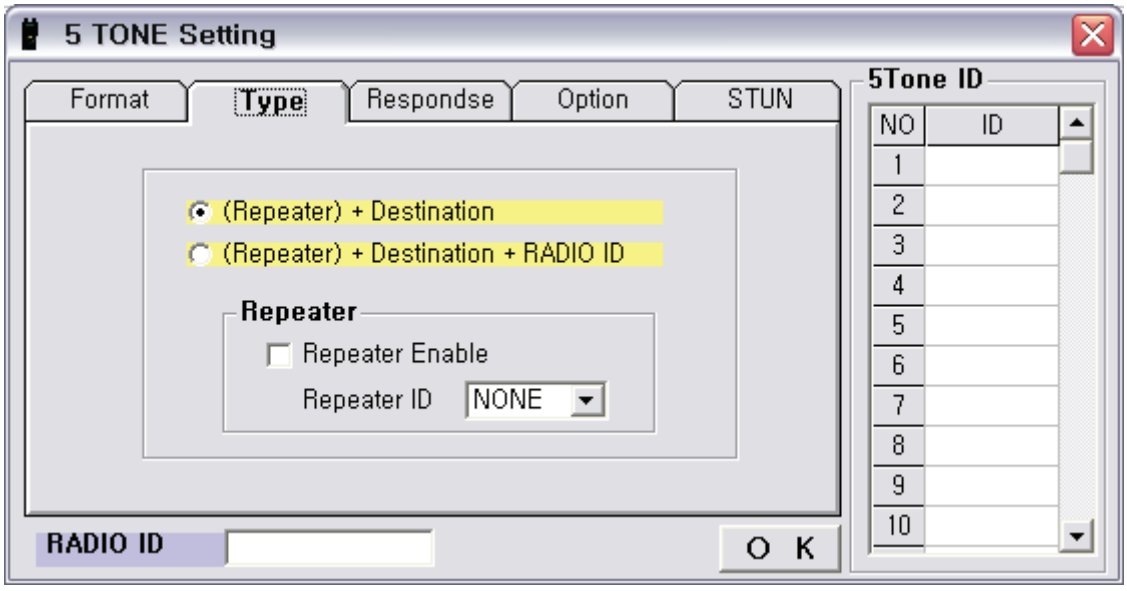
8.4 5 Tone



• It is possible to input the 5Tone IDs up to max. 30 numbers.
• It is possible to input ID in 2~7 digits.
• It is possible to use the ID of 'A' which has the meaning of all.

Among the 30 IDs in My Radio ID, you can choose the ID number you want to use and please make sure to designate your own ID to operate the 5 Tone with no problem.

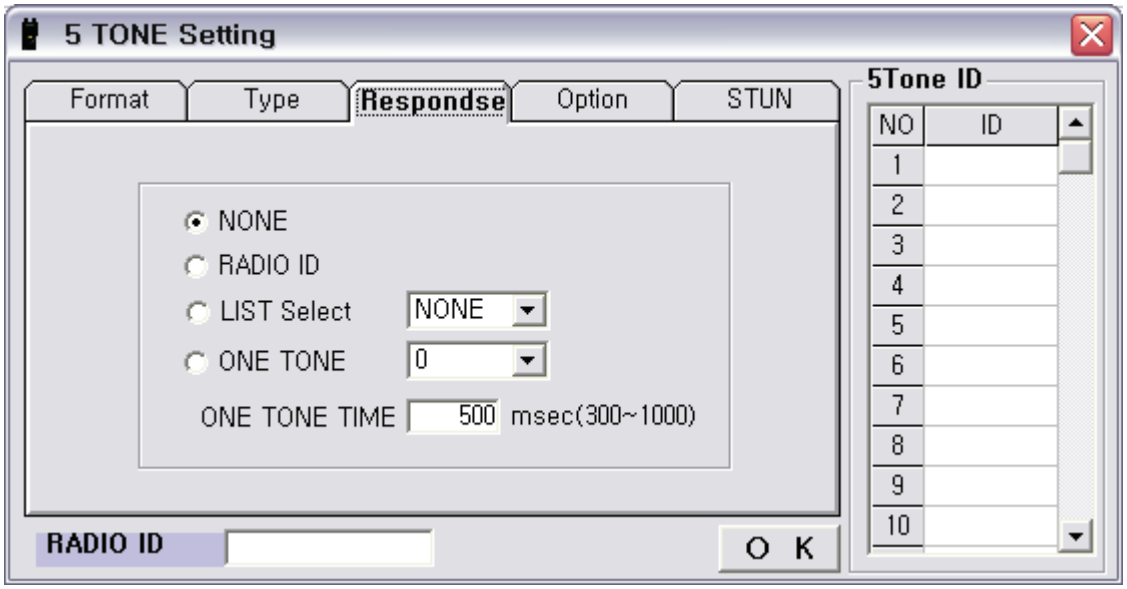
• 5TONE Kind : Select 5TONE standard set.
• Lead In Delay Time : This is the delay time from when the TX of 5TONE ANI or 5TONE CALL is requested to when the first signal is generated.
• First Tone Length : This means the time when the first tone out of 5 tone signals is generated.
• Next Tone Length : This means the tone generation time each of the remaining 4 tones.
• Lead Out Delay Time : This is the delay time between the transmission of 5TONE ANI or 5TONE CALL and the following operation.



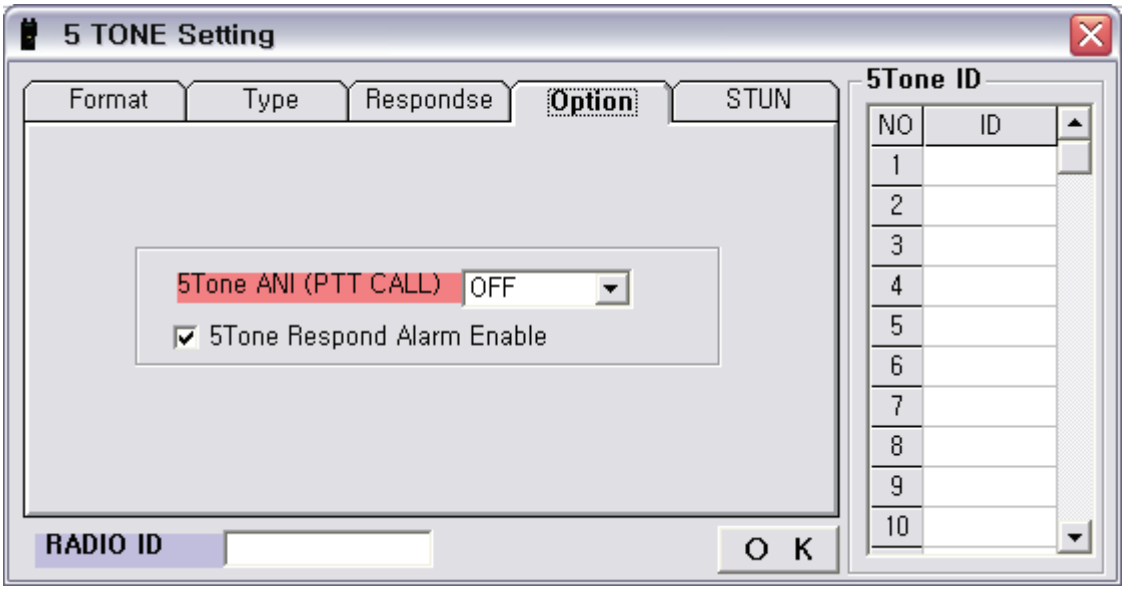
Type is screen for selection of transmission method.

Either TX of your party's ID only or your party's ID + Radio ID(your ID), you can select.

Also, it is possible to transmit by selecting Repeater ID(select from LIST by using Combo box).

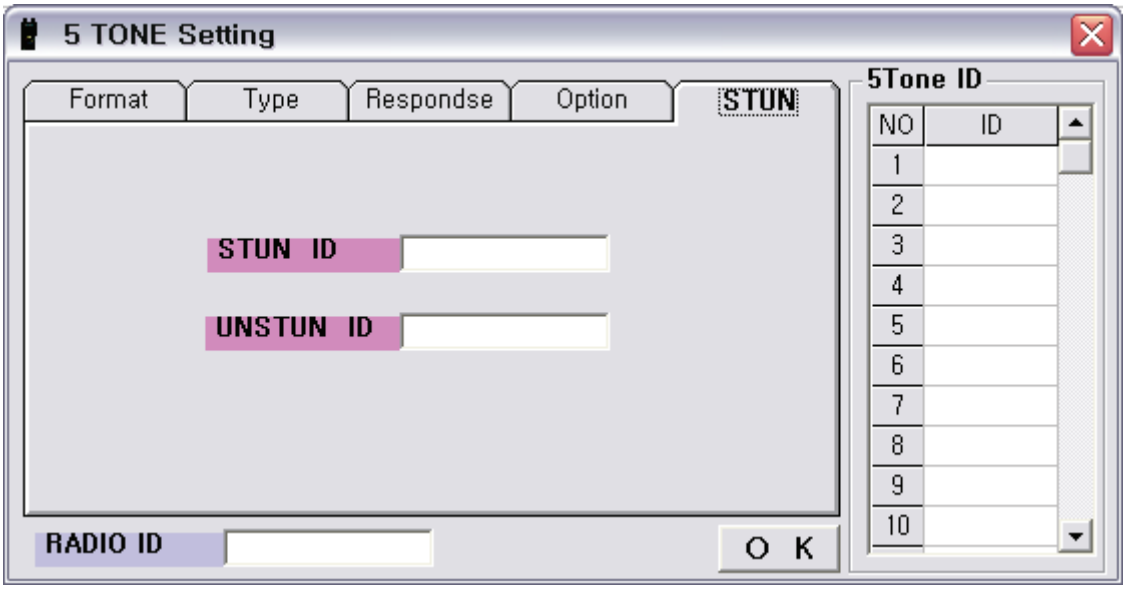


Response is the function for setting of the response signal when receiving 5Tone CALL from your party, and after selection from the various IDs, you can make a response.



Option is the function for setting of transmitting the designated RADIO ID(your ID) when pressing the PTT button at the general RX mode. There are the 3 setting methods of Before TX / After TX / OFF.

5Tone Respond Alarm Enable is the function for setting of Alarm ON or Alarm OFF when Radio receives a CALL signal.



STUN function is used when using STUN / UNSTUN ID.

STUN / UNSTUN ID is made in 2~7 digits.

After setting of the above menu, select CALL mode. Then, it is possible to make a personal call and a group call by using 5TONE and each CALL memory has the CALL IDs up to 30 numbers.

The setting of CALL memory and 5TONE is made by PC Programming.

If pressing the "Enter" button for 2 seconds at the general mode, the mode is converted to CALL mode. If you press the channel button(▲,▼) at the CALL mode, the display shows the CALL number of the current available CALL channel.

(Figure 8-1) General Mode

(Figure 8-2) Call Mode

8.4.1 1:1 Call at call mode

Press the "Enter" button for a long period (about 2 seconds) at the general mode in order to enter into the call mode.

1) Select your party to call by using the channel buttons(▲,▼). If you (ID : 12345) want to call your party(ID : 54321), select him(ID : 54321) by using the channel buttons(▲,▼) at the call mode.

Figure11-3) Set-up of your party's ID 54321

2) You can call the party(ID : 54321) by pressing the **"P"** button and the Radio(ID : 54321) which received the call signal is operated by 2 methods as follows.

If the TX Radio is set up with (Repeater) + Destination + RADIO ID, the RX Radio shows the party's ID(12345) on the LCD.

But if the TX Radio is set up with (Repeater) + Destination, the RX Radio shows your own ID(54321) on the LCD.

Even though your party's Radio is in general mode, the Radio will be converted to the call mode automatically after receiving a call.

(Figure 8-4) Display shown on the RX Radio when transmitting with (Repeater) + Destination + RADIO ID

3) After the call is completed, the Transmission and the Reception can be made by PTT at the same method as normal call.

4) If pressing the **"Enter"** button for a long period (about 2 seconds), the release is made with a Beep sound.

5) Also, if pressing and depressing the "M" button at the side within 2 seconds, the release signal of **5Tone** is transmitted.

8.4.2 Group(1:N) Call at call mode

1) In order to make the Group call at the call mode, the following should be set up at the PC Programming.

2) If the 1st party(ID:13579) and the 2nd party(ID:12468) are in one group, the "1AAAA" which is a call number / call name is allocated. ("A"means that all the numbers are applied.)

3) If the caller makes a call to the 1st party & the 2nd party at the same time, the caller's Radio selects the parties with ID "1AAAA"and by pressing the "P" button on the Radio, the 1st & 2nd party's Radios display ID:1AAAA. After the call is completed, the Transmission and the Reception have no restriction, which means that the RX/TX will be free.

(Figure 8-5) Group Call of Radio (after receiving a call)

8.4.3 RESET

If you want to finish the call after completing the call mode, please use the following methods.

1) At the Call mode, press and depress the Monitor button(M). (The call signal will be transmitted to the party's Radio with the "C" tone at the end of the party's ID number.)

	Radio 1	Radio 2	Radio 3
RADIO ID	12345	12349	67890
LIST	12345 12349 1234A 67890	12349 1234A	67890 12345

Example of Personal Call

If Radio 1 makes a call to Radio 2 with Radio ID of 12349 in the LIST, Radio 2 recognizes the ID and responds to the call. But Radio 3 doesn't respond to the ID because it is not his ID.

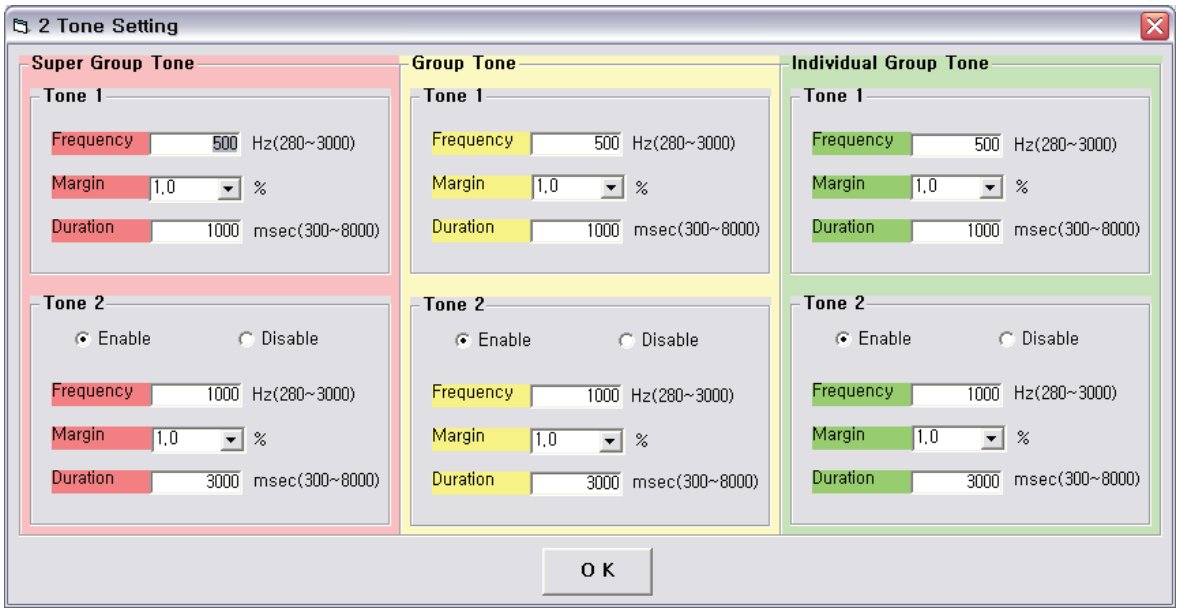
If Radio 3 makes a call to Radio 1 with Radio ID of 12345, Radio 1 recognizes the ID and responds to the call.

At the Radio 2 , there is not the same ID in the LIST but since the group ID of 1234A exists in the LIST, the screen displays the ID.- Group Call Concept

Example of Group Call

If Radio 1 makes a call to Radio 2 with Radio ID of 1234A in the LIST, Radio 2 recognizes the ID and responds to the call. But Radio 3 doesn't respond to the ID of 1234A because it is not included in the Group.

8.5. 2Tone

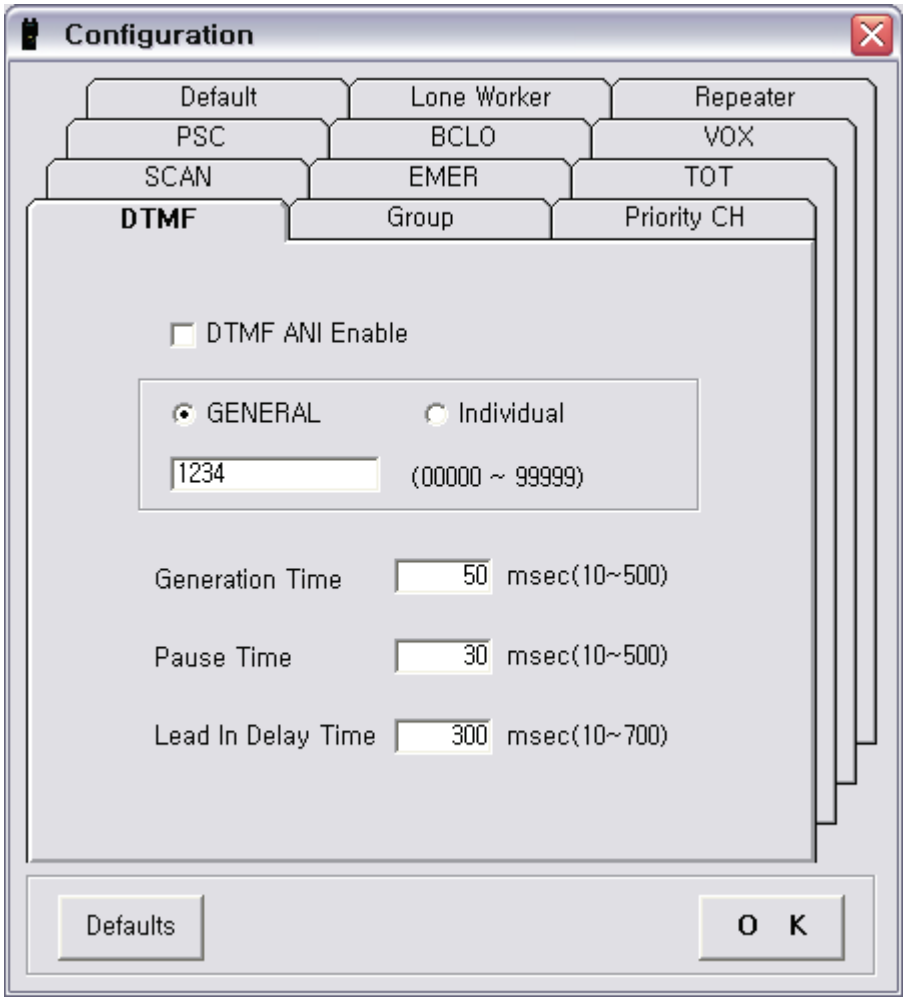


The 2 Tone consists of Super Group Tone/ Group Tone / Individual Group Tone.

- Each Group Tone consists of Tone1 and Tone2.
- Tone2 can do Enable/ Disable.
- Frequency input is between 280~3000Hz.
- Margin can be selected between 0.5 ~ 10.0.
- Duration means Tone generation time and it is possible to input the duration directly.

8.6 Configuration

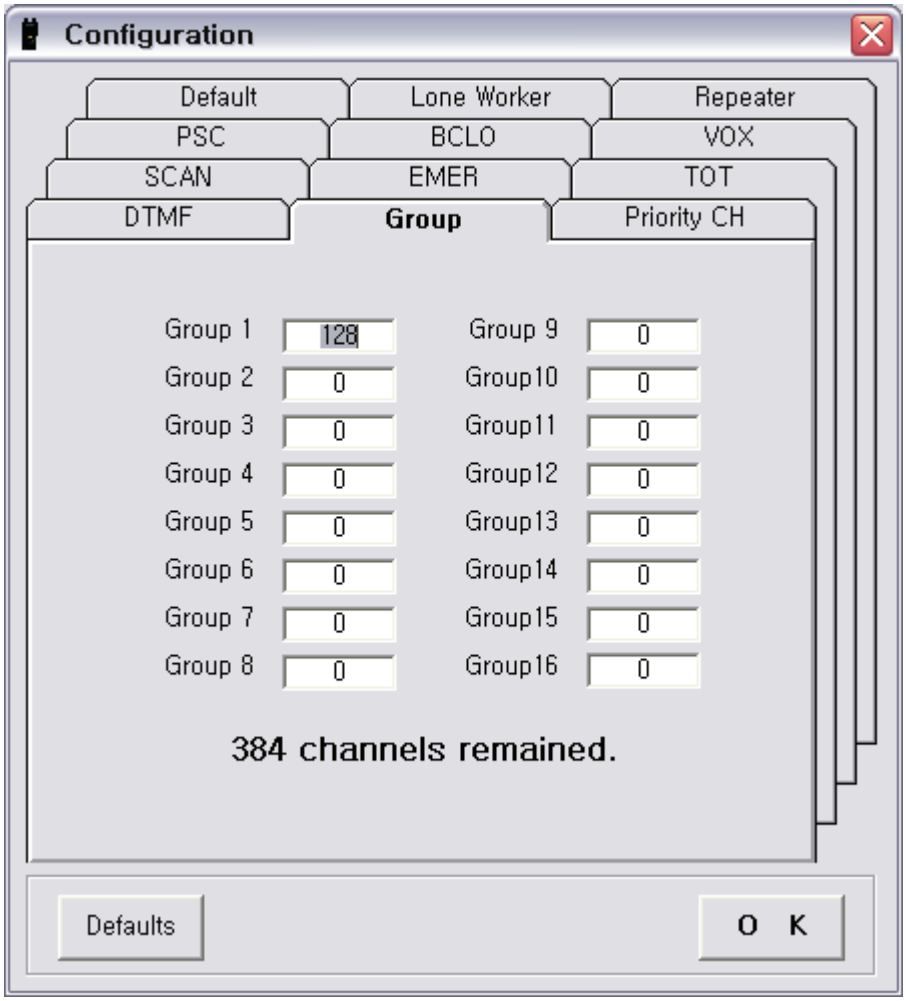
8.6.1 DTMF



If end-user presses the PTT switch, the TX is started and at that time, introduce the setting method of DTMF ANI.

- **DTMF ANI Enable** : When starting the TX of DTMF ID, decide yes or no of transmission. Make input of DTMF ID.
- **Generation Time** : It is the time for generation of DTMF ID signal of one digit.
- **Pause Time** : It is the time to make no signal between DTMF ID and ID.
- **Lead In Delay Time** : It is the delay time from when DTMF ID is requested to be generated to when the first signal is generated.

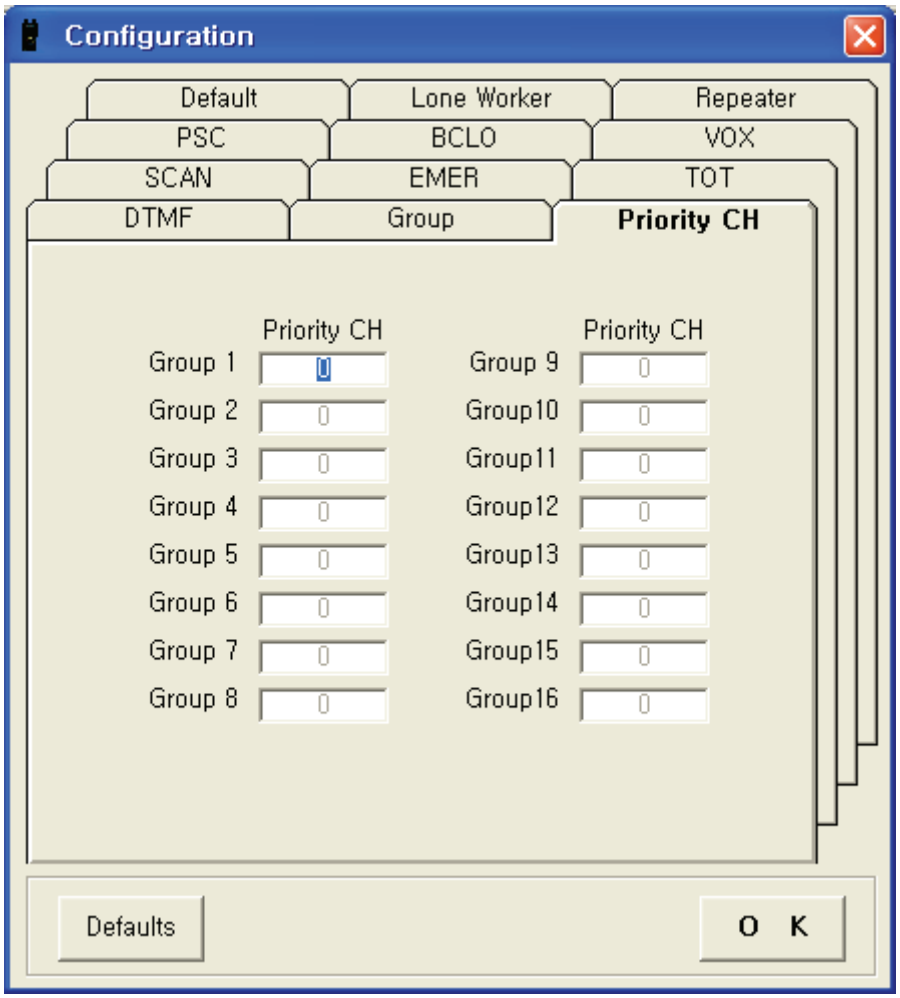
8.6.2 Group



This Radio is designed to use 16 Groups and 512 Channels.

It means that one Group can use up to max.512 Channels and if the 512 Channels are divided by 16 Groups, each Group can use 32 Channels.

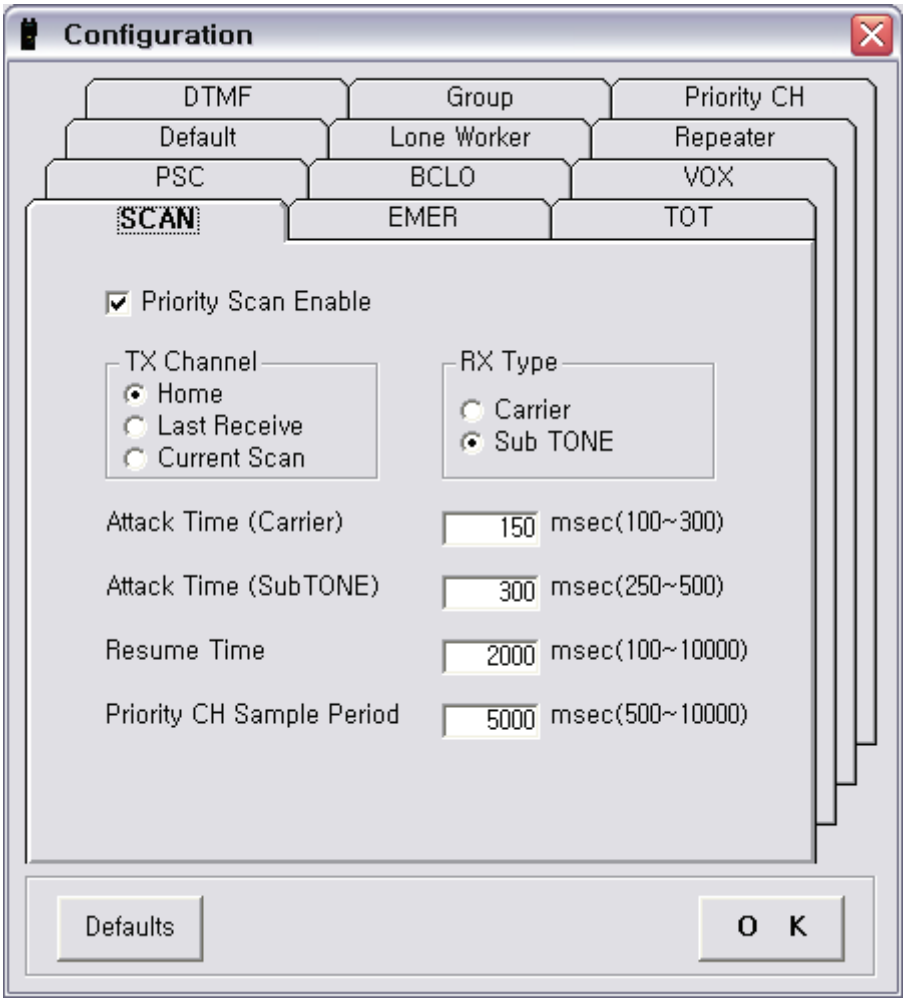
8.6.3 Priority CH



The above window is for setting the Priority Scan Channel of each Group.

Only the Group with the allocated channel is activated and editable, and when channel setting, only the channel which is set up as scan channel can be Priority Scan Channel.

8.6.4 SCAN



The above window is related to the setting of Scan operation.

The Scan List of Scan Channel is registered by setting the SCAN to “Yes” at the frequency input window.

- Priority Scan Enable : Decide whether to use the Priority Channel scanning method or not when operating scanning.
- TX Channel : In case of making transmission during scanning, set the TX Channel.
- Home : The channel before starting scanning is Home channel.
- Last Receive : During scanning, transmit the last channel which is received.
- Current Scan : Transmit the channel being scanned at present.
- RX Type : During scanning, set the condition to stop scanning.
- Carrier : If the frequency is matched, the reception is made after the stop of scanning.

• Sub TONE : The matching of both frequency and sub-audio makes it possible to receive after the stop of scanning.

• Attack Time(Carrier) : It is the time for checking whether a suitable carrier exists or not.

• Attack Time(Sub TONE) : It is the time for checking whether Sub-audio is matched or not.

• Resume Time : It is the time for checking whether after Carrier or Sub-Tone is matched, or RX is completed, the following signal exists or not without moving to the next channel.

• Priority CH Sample Period : It is the interval for regular checking of priority channel when during priority scanning, the scanning stops in a normal channel and when user wants to check the call status during conversation.

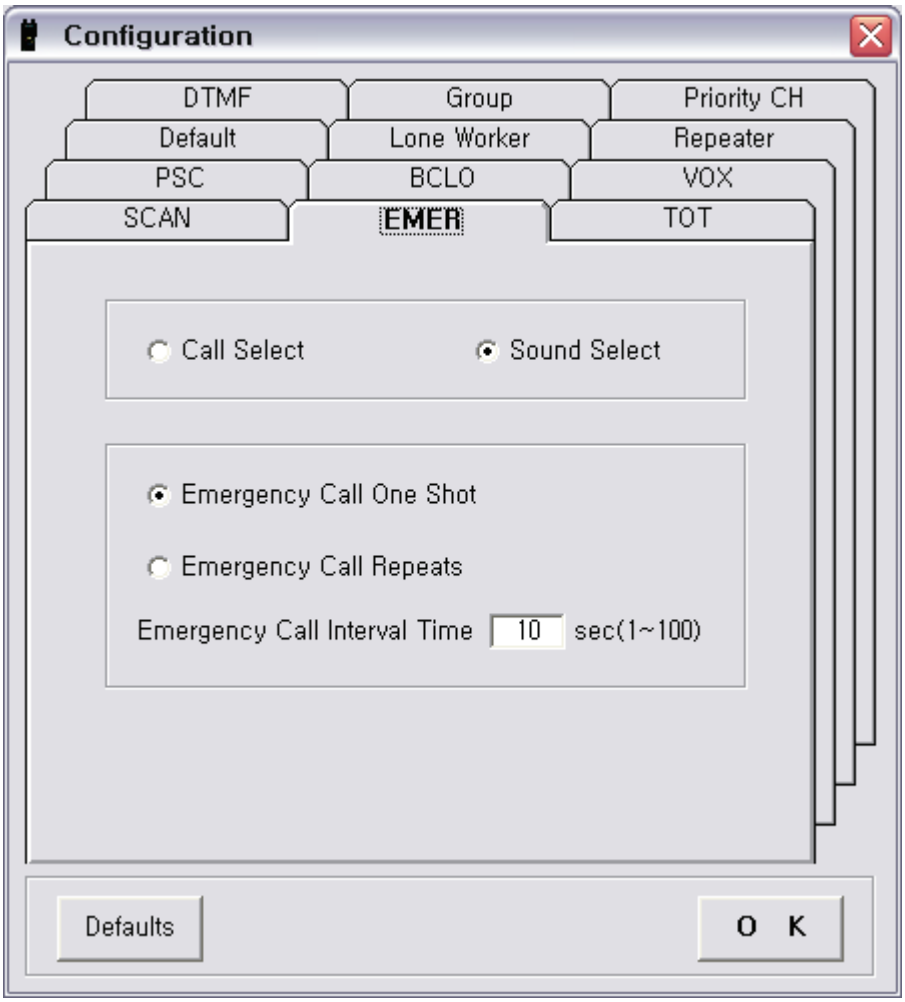
☞ 1) During scanning, if the Radio which is set up in Carrier Type receives No Tone(matched) Carrier, the Audio is not opened and the status indication LED blinks in green color during the Resume Time, which means the scanning will be started.

☞ 2) If the Radio registered in scan list channels 1, 2, 3, 5, 7 receives an unwanted signal at channel#3 during scanning, press “ENTER”key. Then, the channel#3 will be deleted from the scan list.

If you want to return to the channel#3 in scan list,

①turn┌ turn on again after the power off. ② turn on again after the scanning off.

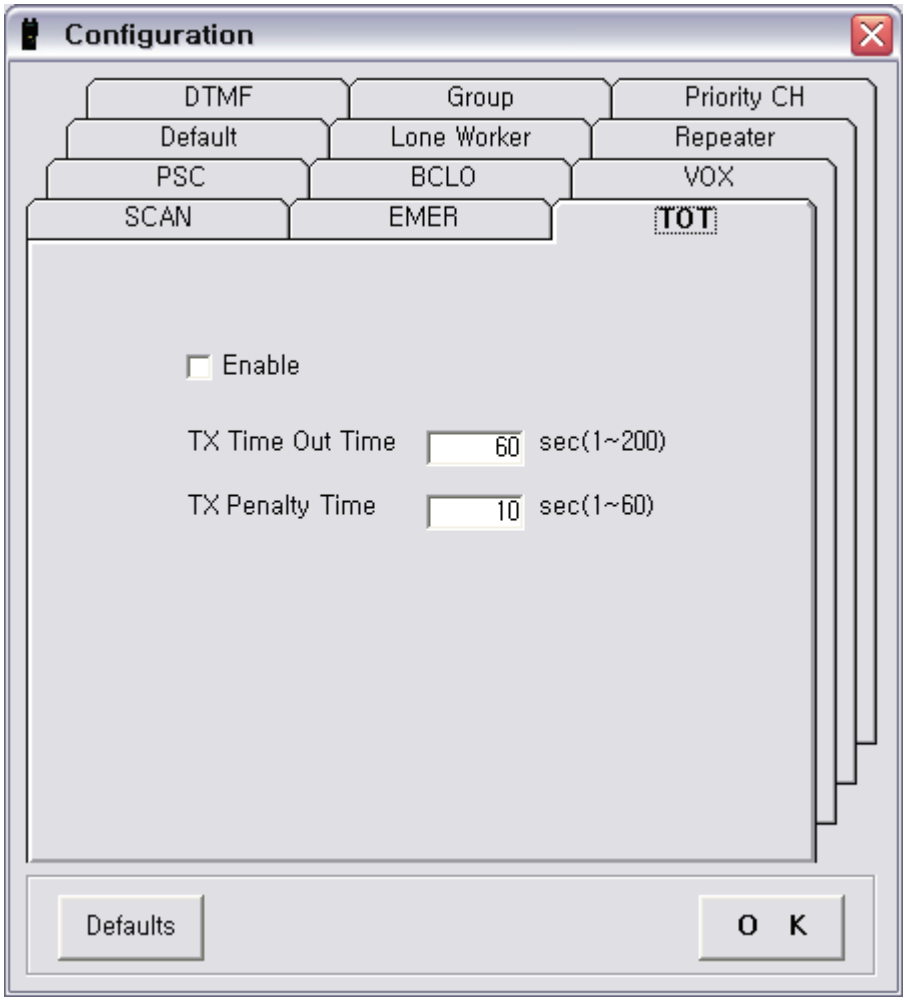
8.6.5 EMER(Emergency)



This is related to the setting of Emergency Call.

- Call Select : Tranmit an emergency call signal to the party by using 5Tone.
- Sound Select : Generate emergency call sound through the speaker in the Radio.
- Emergency Call One Shot : Transmit a signal in one time when making emergency call.
- Emergency Call Repeats : Transmit emergency call signal repeatedly per a fixed time when making emergency call.

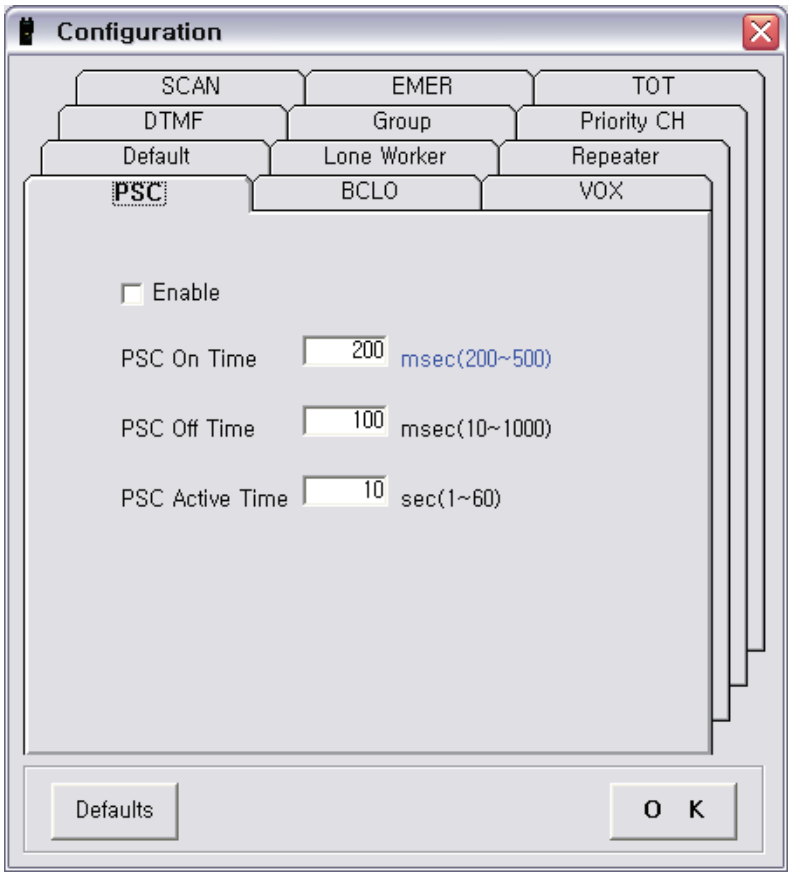
8.6.6 TOT (Time Out Time)



This is related to **TOT(Time Out Time)** for prevention against one user's continuous transmission. If a Radio exceeds the TOT time, **Tx Penalty Time** will be applied and the transmission will be automatically stopped.

- **Enable** : Decide whether the TOT will be used or not.
- **TX Time Out Time** : This is the available maximum transmission time when the TOT is applied.
- **TX Penalty Time** : This is the penalty time for transmission prohibition when the TOT time is exceeded.

8.6.7 PSC (Power Save Control)



This is the setting method for reduction of battery consumption current in order to use the battery of Radio for longer period.

• Enable : Decide whether the PSC will be used or not.

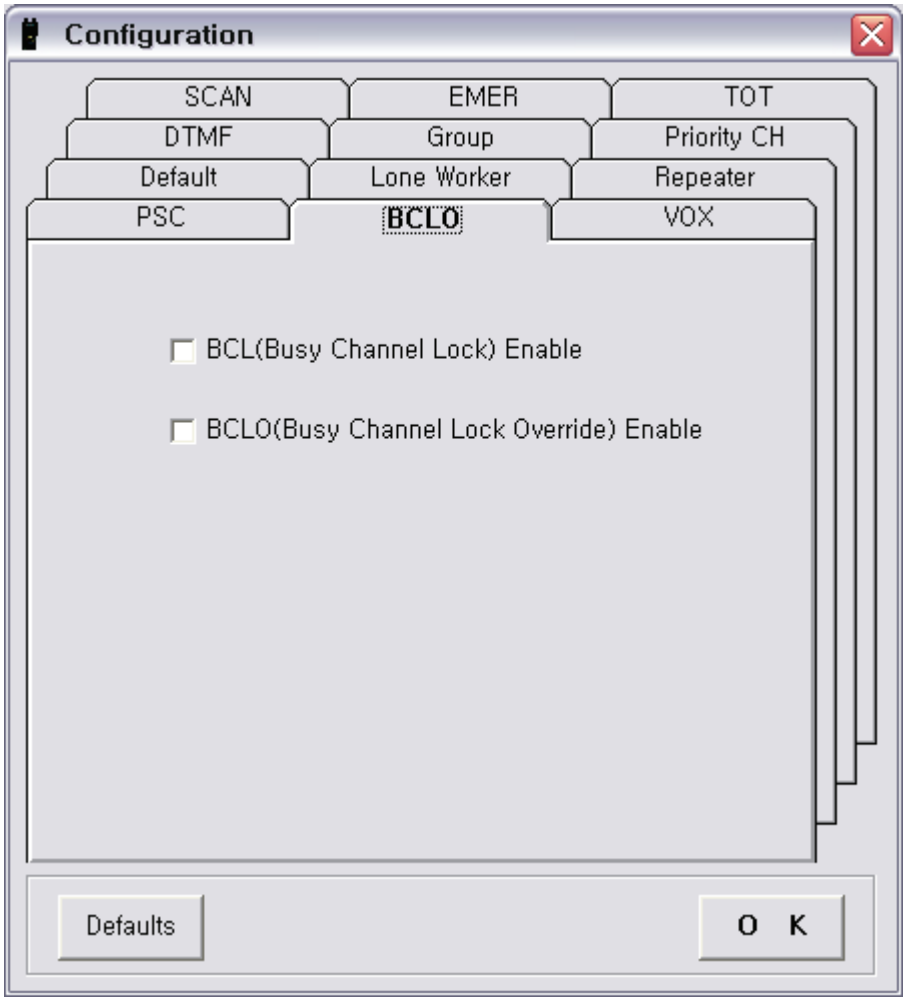
• PSC On Time : This is the time when the reception terminal is turned on during the operation of PSC.

• PSC Off Time : This is the time when the reception terminal is turned off during the operation of PSC.

• PSC Active Time : This is the time when the PSC operation is started after completion of the below operations.

- After transmission is finished
- After reception is finished
- After the channel is changed
- After the other operations are completed

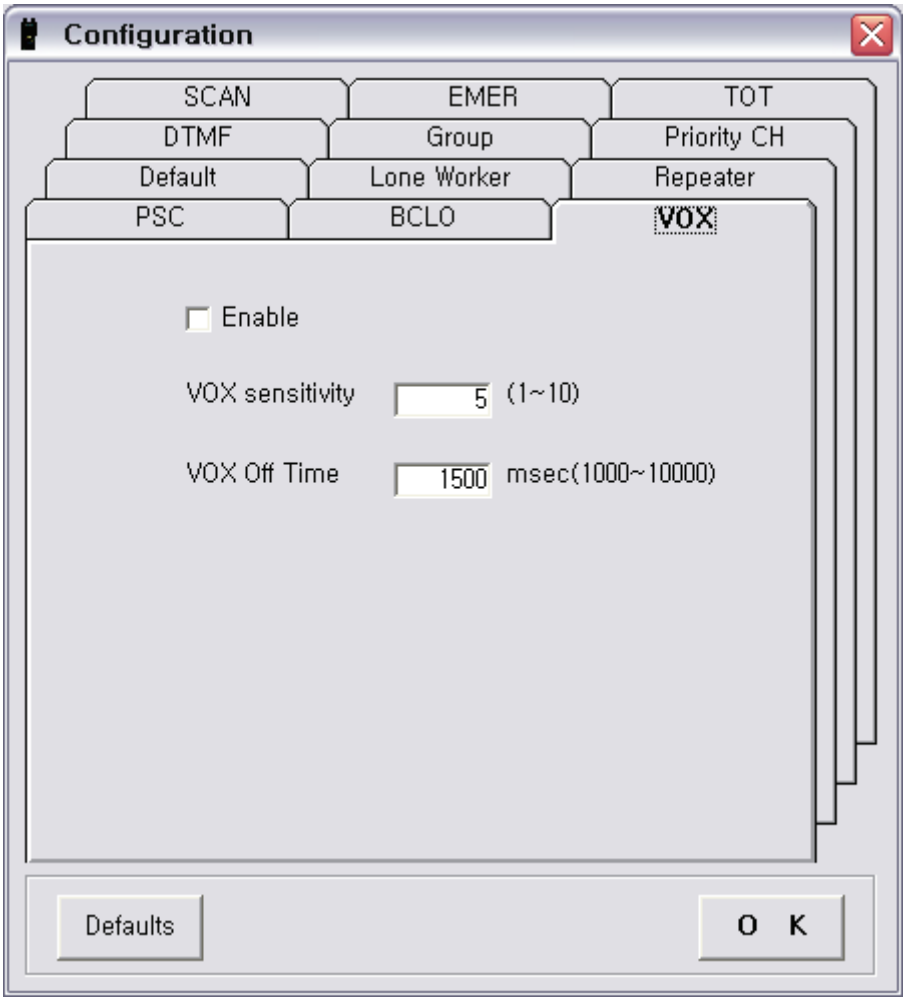
8.6.8 BCLO (Busy Channel Lock Override)



Not to interrupt other users using the same frequency, the user can change the BCL (Busy Channel Lock)/BCLO(Busy Channel Lock Override) which limit transmission.

Carrier	Receive	CH-set	Tone Match	BCL	BCLO	TX
ON	-	No Tone	-	ON	OFF	×
					ON	
	Tone	Tone	Match		OFF	×
					ON	
	Tone	Tone	Mismatch		OFF	×
					ON	×
	-	-	-	OFF	-	
OFF	-	-	-	-	-	

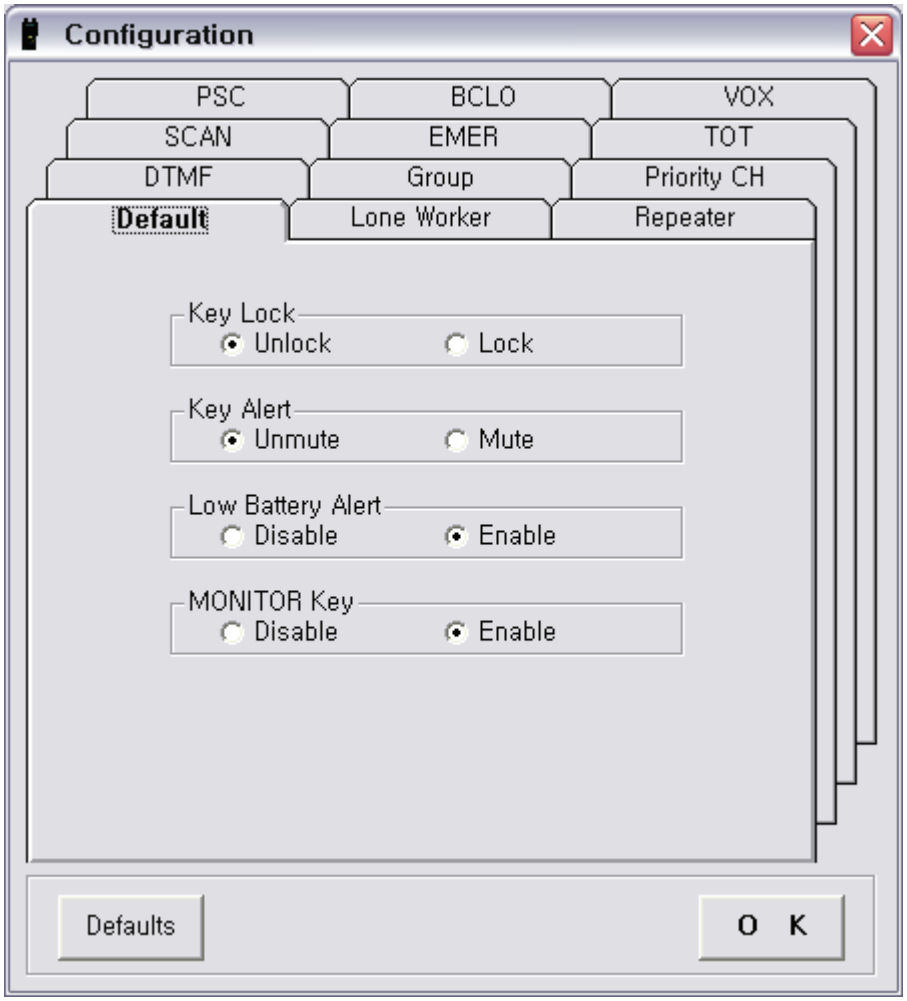
8.6.9 VOX (Voice Operation Transmit)



This is related to VOX which recognizes and transmits the audio signal inputted through microphone.

- **Enable** : Decide whether the VOX will be used or not.
- **VOX Sensitivity** : Decide the sensitivity of VOX transmission on input signal.
- **VOX Off Time** : In order to improve the cut-off problem when VOX transmission, the Radio is designed to stop the transmission in case of no constant audio signal during the VOX Off Time after PTT is pressed.

8.6.10 Default



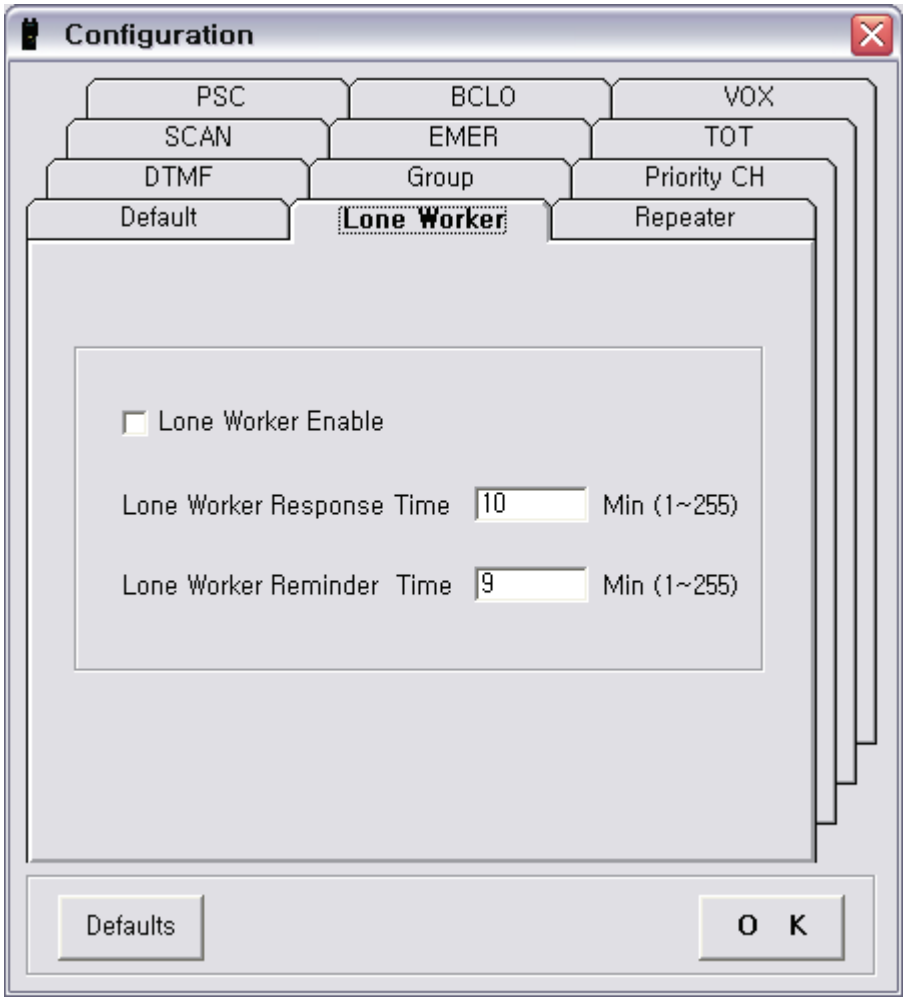
The user can change the selected data of each Flag related to the Radio operation.

• Key Lock : Decide whether the Key operation needs to be prohibited or not.

• Key Alert : Decide whether the Key alert is needed or not.

• Low Battery Alert : Decide whether when the battery voltage is low, the Low Battery Alert is needed or not.

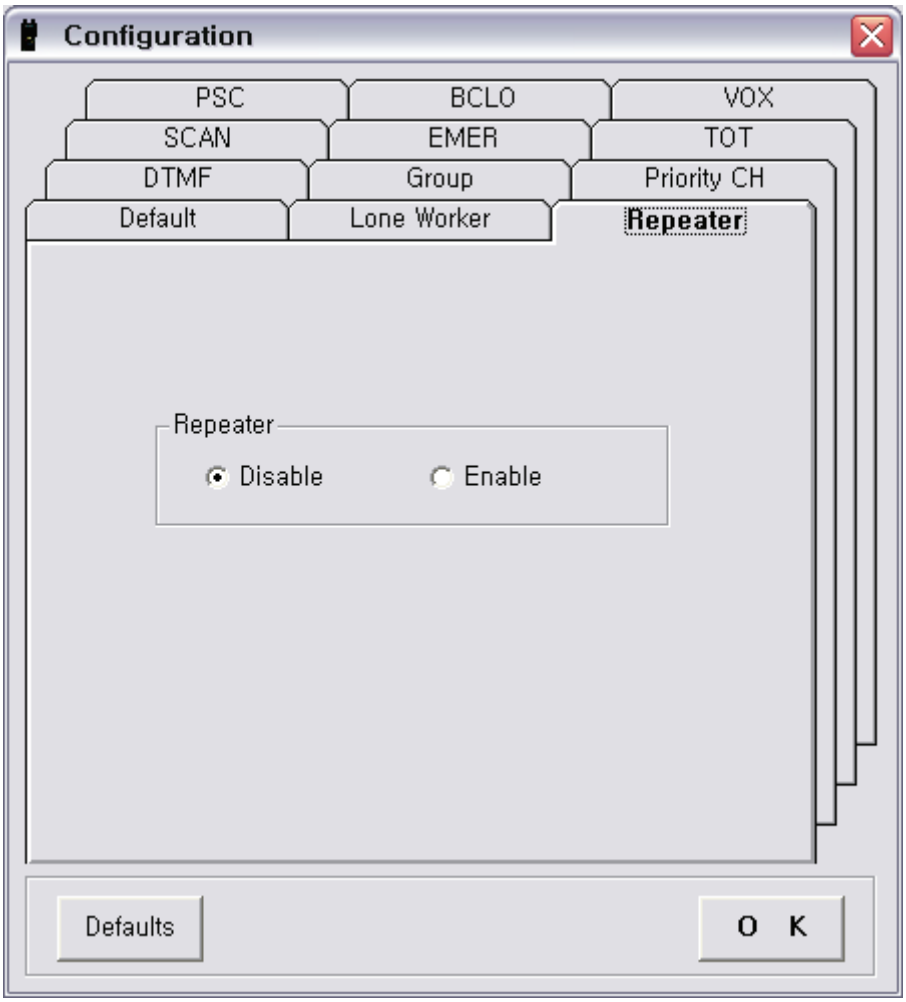
8.6.11 Lone Worker



If not pressing the designated button within a period of time(Lone Worker Response Time) when night patrol or guarding, the Radio recognizes as an emergency situation and makes the emergency call automatically.

- Lone Worker Enable : Decide the Enable or the Disable of this function.
- Lone Worker Response Time : This is the time for recognition of emergency situation.
- Lone Worker Reminder Time : This is the interval time of alert for reminding the status of Lone Worker.

8.6.12 Repeater

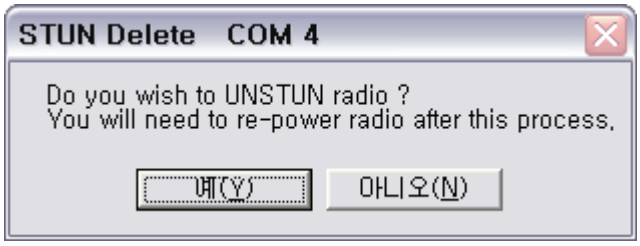


This is the function for using the Radio as a Repeater.

The Enabled Repeater activates the Repeater function at the Menu of Radio.

8.7 STUN Delete

If making deletion of the STUN designated in the Radio without moving to a separate screen, the Radio is converted to the normal mode.

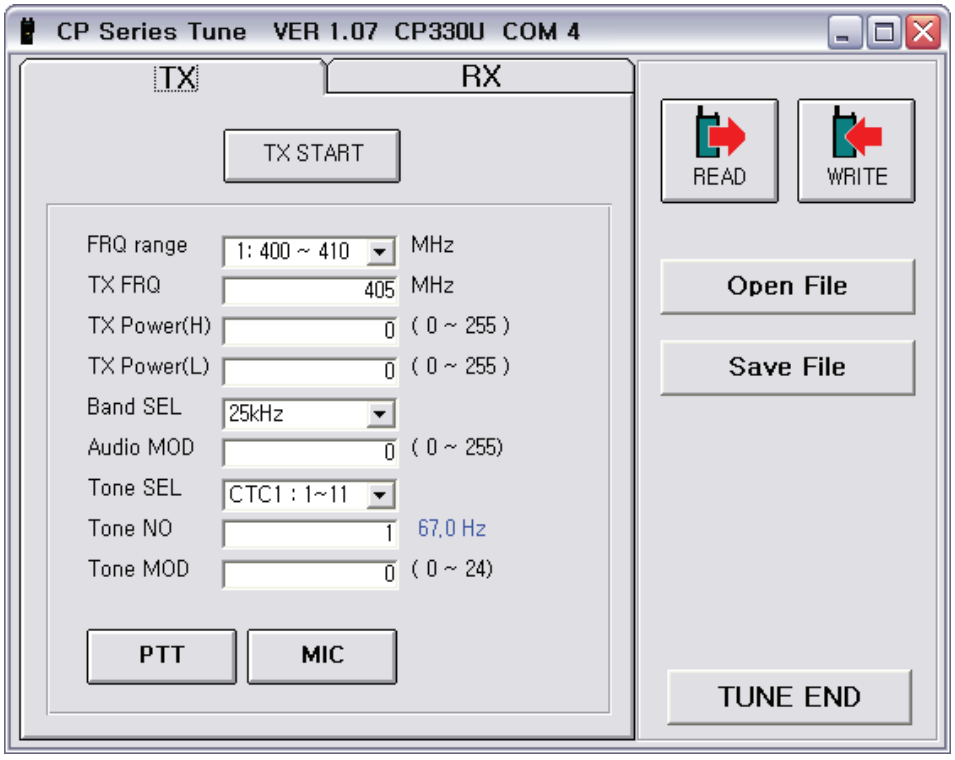


8.8 Tune Mode

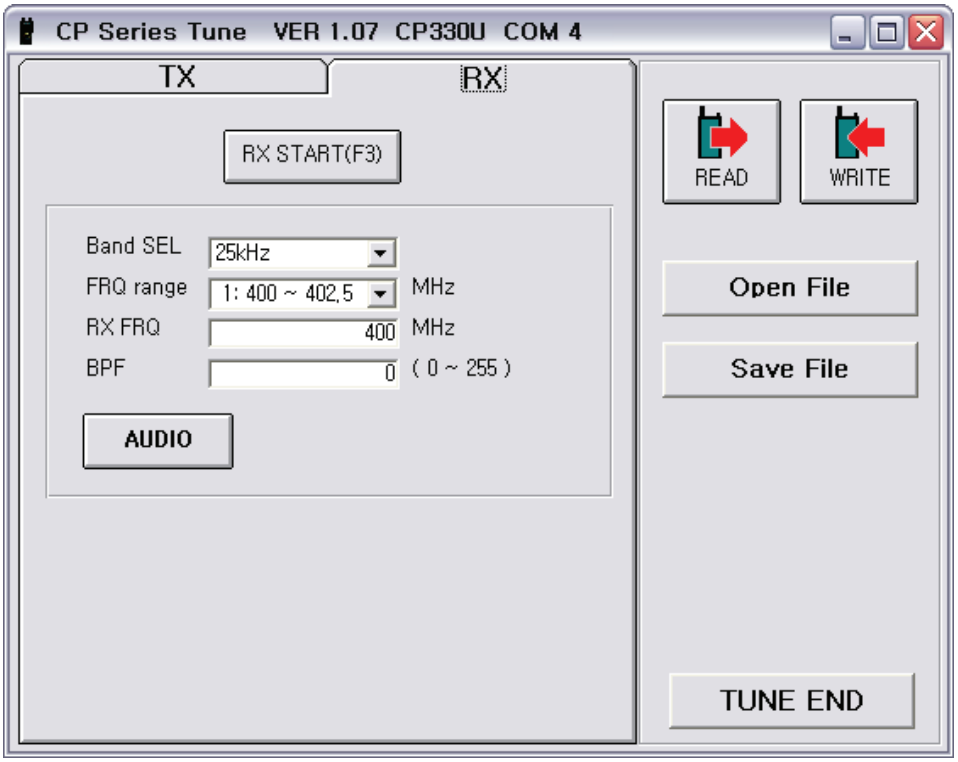
Tune mode is for adjustment of Radio performance and it adjusts the TX output power, the Audio modulation, the Sub-tone modulation and the BPF of RX Front-end, etc. The TX characteristics are divided into 8 levels as per each frequency range and in case of CTCSS, the TX characteristics are divided & adjusted by 3 levels within one frequency range.

If the equipment is used in 12.5/25KHz, the Audio modulation, the Sub-tone modulation, CTCSS, and DCS should be adjusted each in narrow band(12.5KHz) and wide band(25KHz).

The RX BPF is divided into 32 levels as per the frequency range and the BPFs should be adjusted in one band out of the narrow band and the wide band.



8 PROGRAM INSTALLATION



- **Read** : Read the data saved in Radio.
- **Write** : Write the data displayed on the window to the Radio.
- **Read File** : Read the data saved in the *. xptun file.
- **Write File** : Save the data in the *. xptun file.
- **TX START** : Test the performance related to transmission.
- **PTT** : Turn on and off the TX power output.
- **MIC** : Open or close the route of microphone input signal.
- **RX START** : Test the performance related to reception.
- **Audio** : Turn on and off the RX audio signal output.

8.8.1 Tuning Process

1) First, read the Tuning data saved in Radio.

Press the 'TX START' button for tuning of TX performance and press the 'RX START' button for tuning of RX performance.

Move to the next step by using the mouse or the 'SPACE' key.

After the above, make sure to press the 'ENTER' key. If the 'ENTER' key is pressed,

the current items will be activated to be able to adjust and then, make adjustment.

The change of Tuning value can be made by Up arrow key / Down arrow key or by direct input.

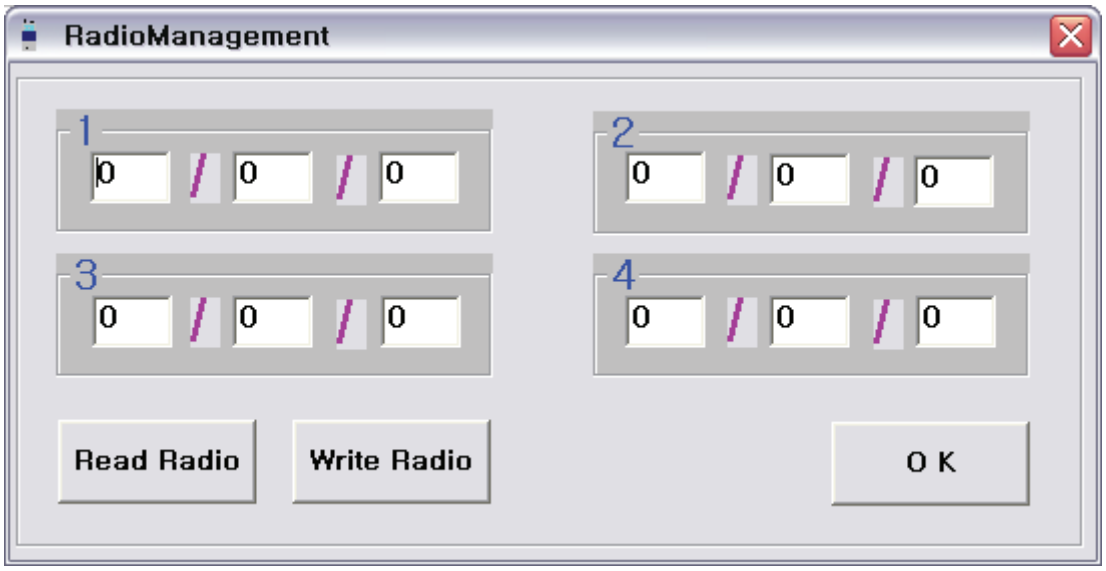
The Tuning procedure should be proceeded in the above sequences but if pressing the 'ENTER' key even at any step, the Tuning can be made at the present step.

After completing the Tuning, the changed values can be saved in the Radio.

Note : After pressing the 'ENTER' key, the Packet transmission is made in several times between PC and Radio and the next step is proceeded after a little waiting time.

Caution : The Tuning is related directly to the performance of Radio and so, the execution should be proceeded very carefully.

8.9 Radio Management Window



The above window shows the information and records for management of each Radio.

It is possible to save the information for total 4 kinds of year/month/date.

• Radio Write : This function is for saving only the contents on this window separately to the Radio. Of course, you may execute the 'Radio Write' at the frequency window.

• OK : Move to the frequency window.

9. CP Series Measurement & Maintenance

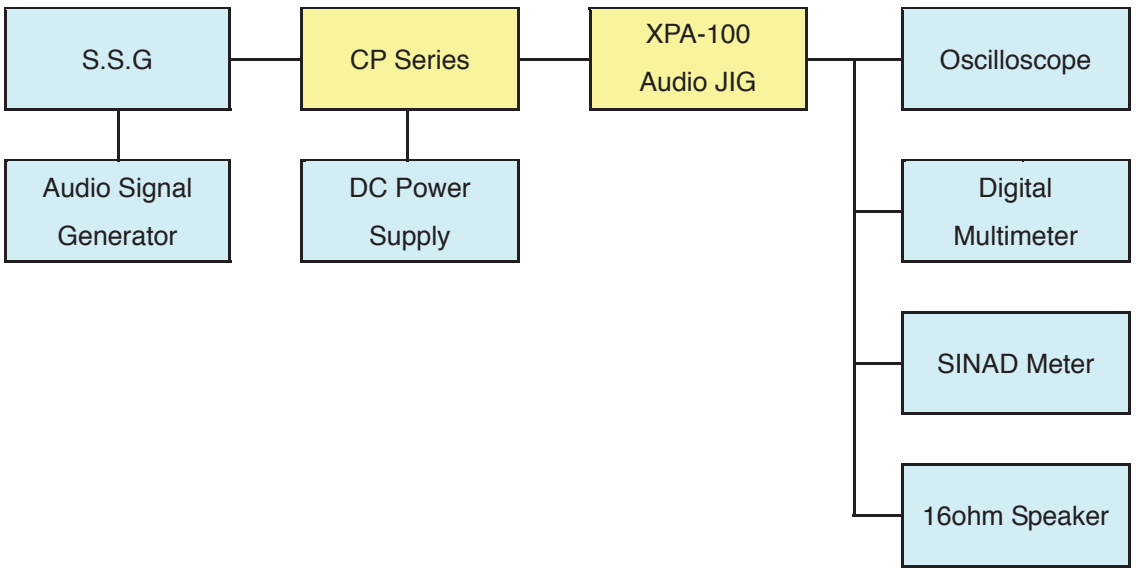
9.1 Required measurement devices

For measuring the CP series, the below equipment are needed. If HP8920B is used for measurement, the blue color blocks of measurement connection and methods for CP series can be checked with it all together.

XPA-100 Audio JIG is required for measuring CP series.

1) Signal Source Generator(SSG)
2) Oscilloscope
3) DC Power Supply
4) Digital Multimeter
5) SINAD Meter
6) Distortion Meter
7) Audio Signal Generator
8) 16ohm Speaker(or 16ohm load)
9) 50ohm pseudo load

9.2 Radio Alignment Test Setup



(Figure 9-1) CP Series Radio Alignment Test Setup

9.3 Tuning procedure with HP8920

General

For tuning the CP series, the below is required.

1) CP-Series Tuning Program
2) Radio (CP-330V, CP-330U, CP-330P)
3) Computer(over 386 CPU processor)
4) XPJ-100(Test JIG)
5) HP8920A or HP8920B

HP8920 setting method

1) An antenna and a jig cable are connected as Figure 9-2)
2) Audio Output of HP8920 is connected to TX input of XPJ-100(Test JIG) and Audio input of HP8920 is connected to RX Output of XPJ-100(Test JIG).
3) DC+7.5V is supplied to the radio for test.
4) After all cables are connected as the measurement method with HP8920 of Figure 9-2), set TX mode.
5) Set HP8920 as Filter1 = 20Hz, Filter2 = 15KHz, De-emphasis = OFF, Detector = PK±2
6) Set HP8920 as AF Gen1 = 1KHz, AF Gen Lvl = OFF.
7) Next adjustment and measurement method will be processed by the followings.

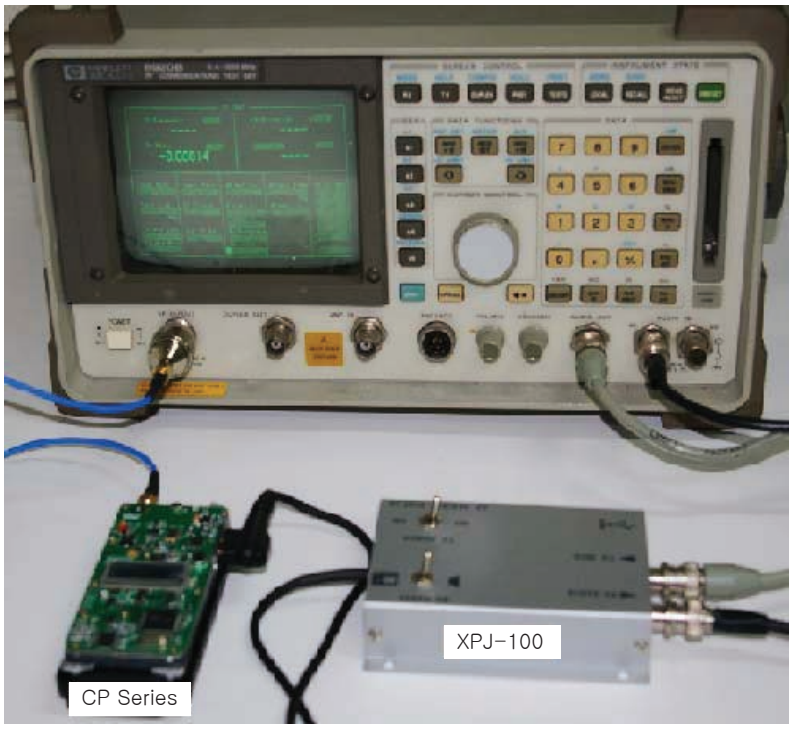


Figure 9-2) Measurement withHP8920

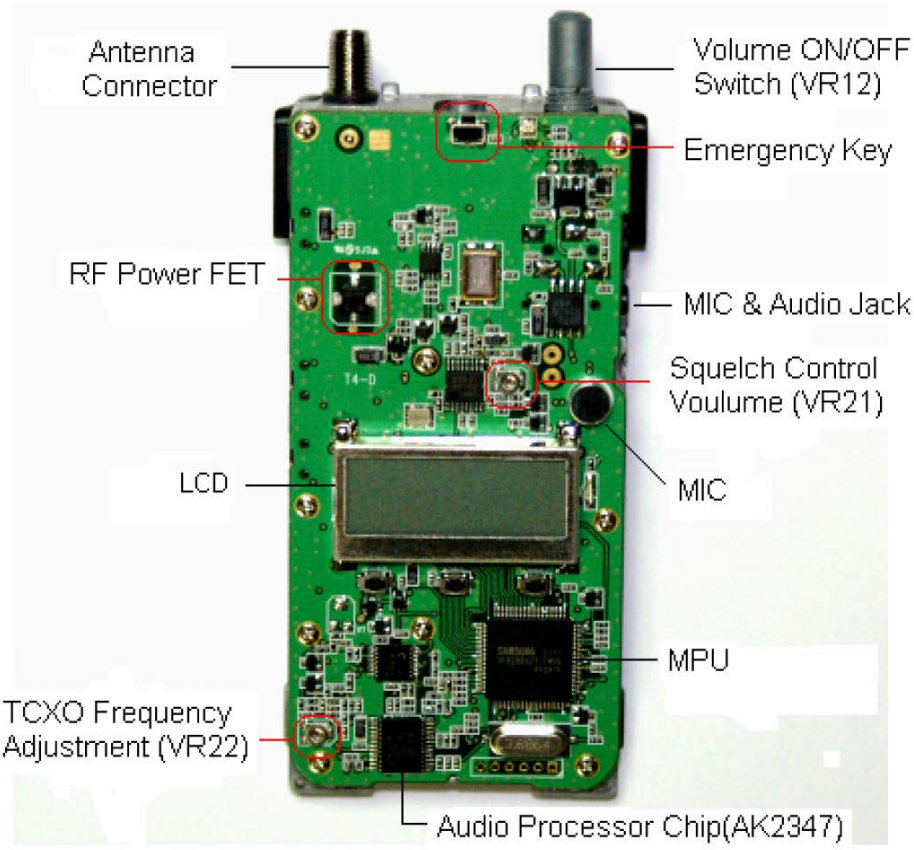


Figure 9-3) Main Bo ard Component Side

When CP Series PC Program is loaded in the computer, the window such as Figure 9-4) is displayed.

For tuning, execute “Tune” mode.

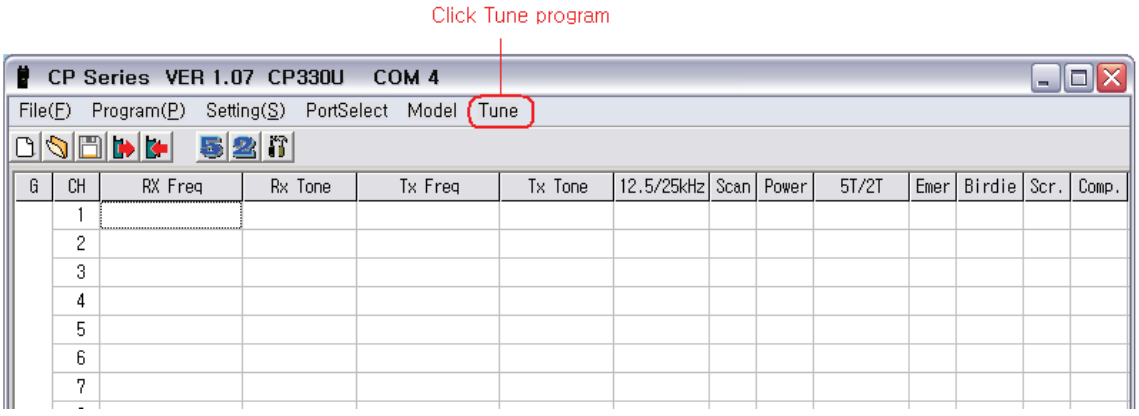


Figure 9-4) Tune Mode Program

The window of Figure 9-5) i s presented in the monitor.

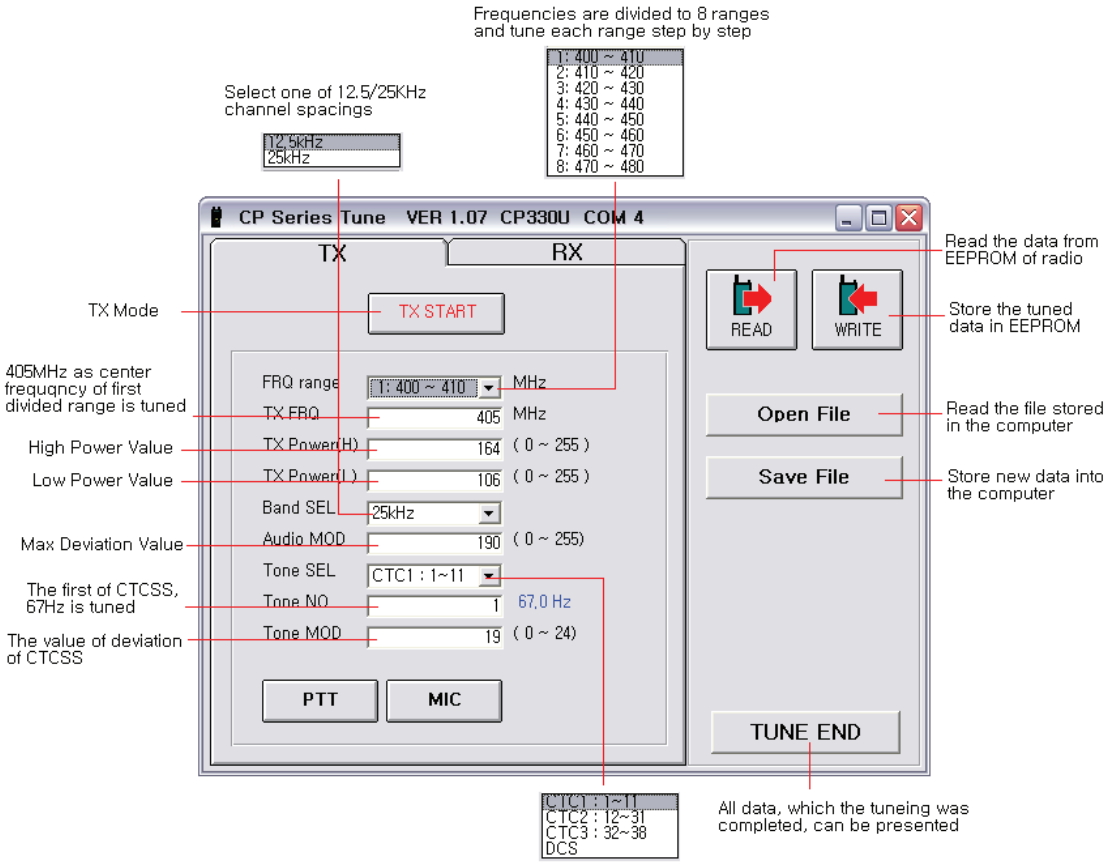


Figure 9-5) CP Series TX Tune Main Program Window

9.4 Frequency Alignment

1) After the radio is connected to XPJ-100(Test JIG), the word " PROG-"will come out on the LCD if the power is on.

2). When CP Series PC Program is loaded, the main program window of XP Series Tune is displayed.

3) When the frequency range is set after TX mode setting, the representative frequency is showed up.

4) When TX switch of XPJ-100(Test JIG) is on, TX Power is activated.

5) Adjust it with VR22 while you see the frequency counter of HP8920.

Model Name	Frequency Range	Target
CP-330V	136 ~ 174 MHz	±150 Hz
CP-330U	405 ~ 475 MHz	±150 Hz
CP-330P	350 ~ 390 MHz	±150 Hz

Table 9-1) Reference Oscillator Alignment

9 MEASUREMENT & MAINTENANCE

9.5 TX Power Alignment

The radio has tow power level settings, a high power level. and a low power level setting.

High Power Alignment

1) After a cursor is put on the window of TX power(H), push “Enter” key.
2) Set the High power with↑, ↓ keys.
   Move the cursor on the next window.

Low Power Alignment

1) After a cursor is put on the window of TX power(L), push “Enter” Key.
2) Set the Low power with↑, ↓ keys.
   Move the cursor on the next window.

Model Name	High Power	Low Power
CP-330V	5W ± 0.2Watt	2W ± 0.1Watt
CP-330U	4W ± 0.2Watt	2W ± 0.1Watt
CP-330P	5W ± 0.2Watt	2W ± 0.1Watt

Table 9-2) Transmitter Power Setting

9.6 Max Deviation Alignment

1) After a cursor is on the window of Audio MOD, push “ Enter” key. Deviation is presented on the measurement.
2) Max Deviation is adjusted with ↑, ↓ keys.
   Move the cursor on the next window.

Channel Spacing	Max Deviation
12.5 KHz	1.9~2.1 KHz
25 KHz	3.9~4.2 KHz

Table 9-3) Max Deviation Setting

9.7 CTCSS/DCS Transmit Deviation Limit Alignment

1) Tone SEL window includes three range windows of CTCSS and one DCS window.
2) Adjustment range of each windows CTC1 : CTCSS 01~11
   CTC2 : CTCSS 12~31
   CTC3 : CTCSS 32~38
   DCS : All codes

3) Adjust each frequency ranges and CTCSS/DCS at 12.5/25Khz.

Channel Spacing	CTCSS	DCS
12.5 KHz	350~500 Hz	350~500 Hz
25 KHz	650~850 Hz	650~850 Hz

Table 9-4) CTC SS, DCS Range

After completion of TX mode adjustment, go to RX mode adjustment.

9.8 2TONE/5TONE Transmit Deviation Limit

Channel Spacing	2 Tone	5 Tone
12.5 KHz	1.6 ~ 1.8 KHz	1.6 ~ 1.8KHz
25 KHz	3.2 ~ 3.7 KHz	3.2 ~ 3.7 KHz

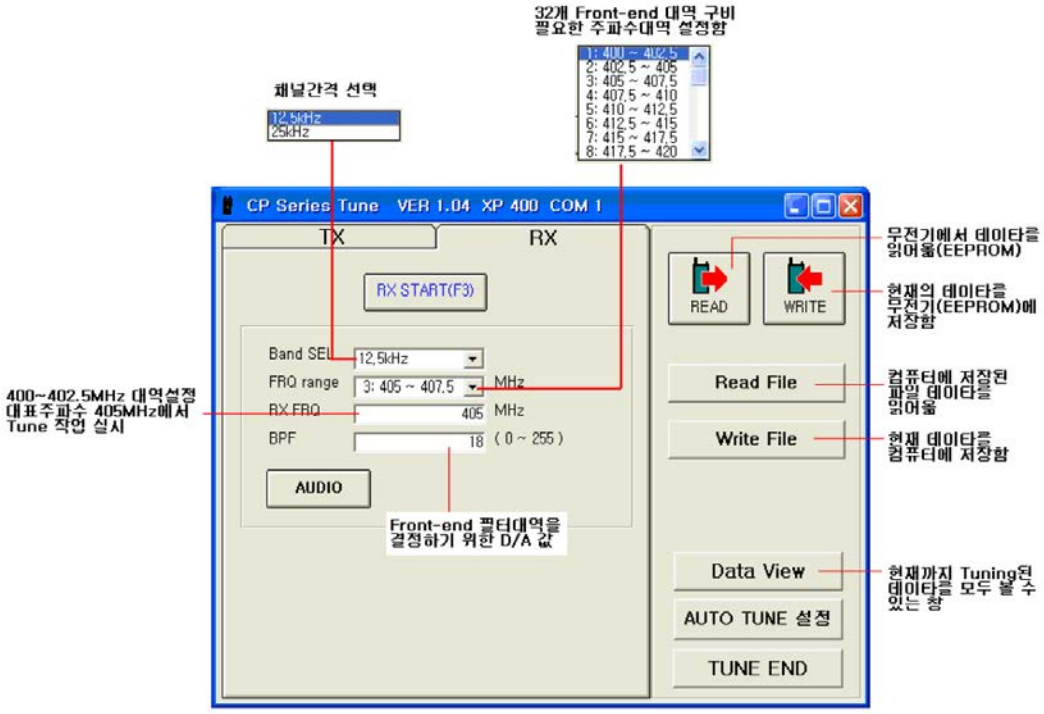
(Table 9-5) Signaling Deviation Range

9.9 Front-end Filter Alignment

The Front-end is made of Tunable filter, which is specified by BPF_CON voltage. BPF_CON voltage is regulated within 0~3.3Volt. Each model range is controlled as 2.5MHz, for example CP330U(405~475Mhz) is adjusted as 32 steps(FRQ range).

1) After all cables are connected as Figure 9-2 with HP8920, set RX mode.
2) Appointed frequencies from Tune program is input to HP8920.
3) Audio level is controlled to 1V with volume switch.
4) The sensitivity of radio is kept over 12dB SINAD @-119dBm and BPF_CON voltage is regulated with ↑, ↓ keys.
5) After completing the adjustment of sensitivity, adjust all frequencies while changing Tune to the next frequency.
6) After completing the adjustment of sensitivity, store all adjusted data into a radio.

9 MEASUREMENT & MAINTENANCE



(Figure 9-6) CP Series RX Tune Main Program Window

채널간격 선택: Select one of 12.5Khz & 25Khz

32개 Front-end : select the required frequency range among 32 ranges(front-end)

400~402.5Mhz: If the range such as 400~402.5Mhz is selected, the tune will be executed at 405Mhz as representative frequency .

무전기에서: retreat the data from EEPROM

현재의 데이터: Store the data into EEPROM

컴퓨터 : retreat the file stored in the computer

현재 데이터: Store the file in the computer

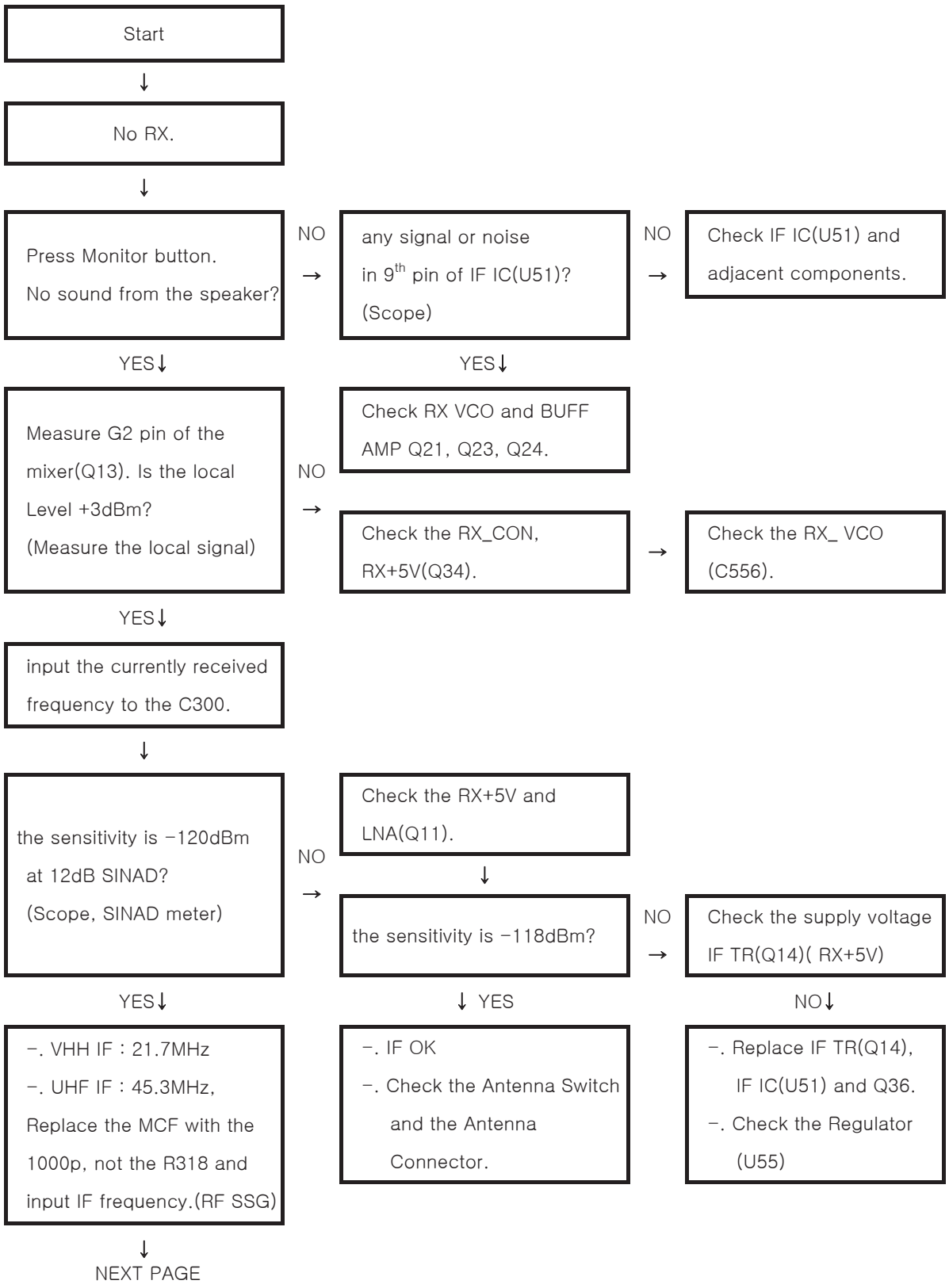
현재까지: All tuned data is showed up

9.9 Squelch Alignment

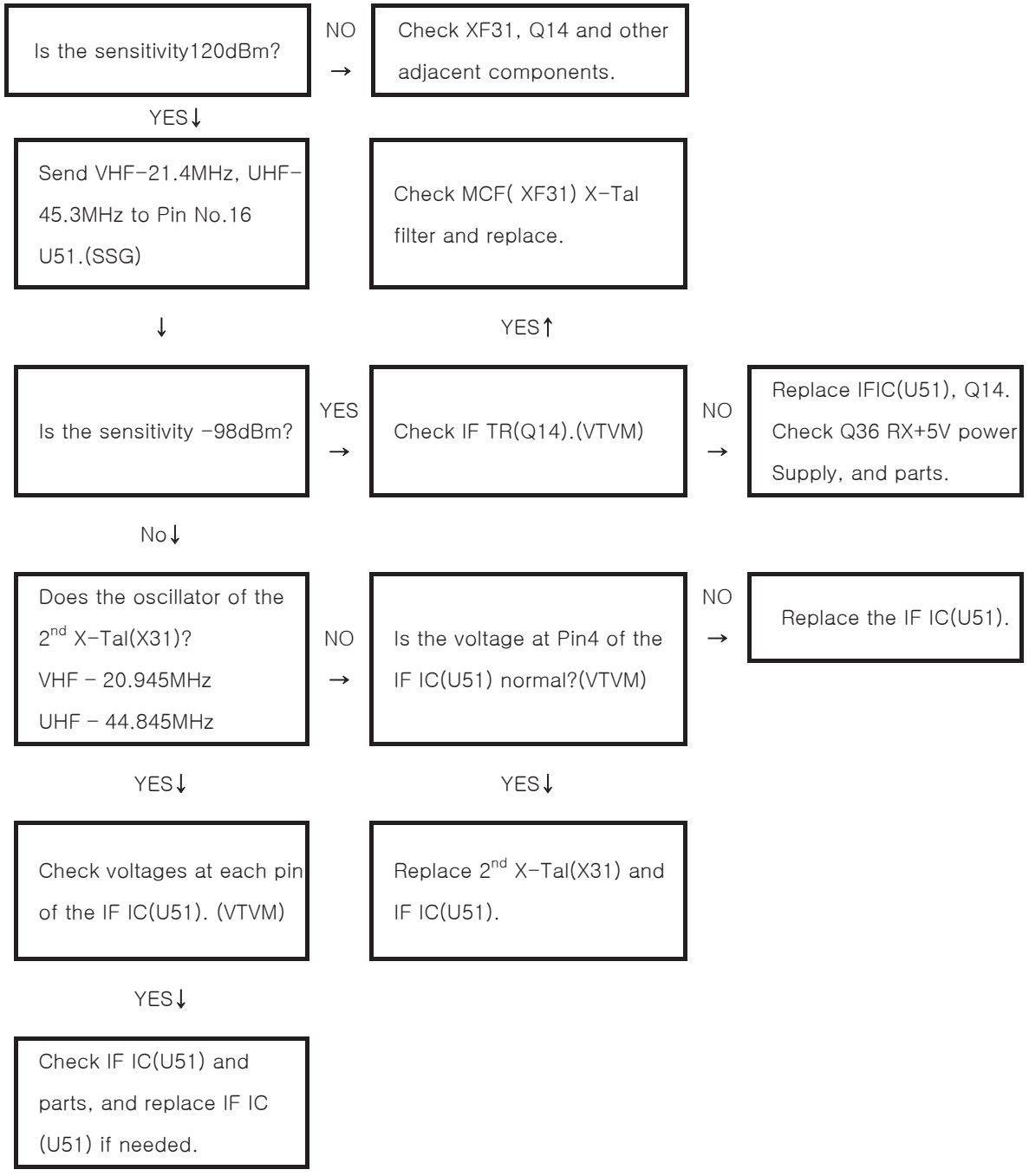
1) Set the programmed channel.
2) Set RX mode after all cables are connected as Figure 9-3) with HP8920.
3) Audio level is set at 1V with volume switch.
4) The sensitivity of radio is set over 12dB SINAD@-119dBm.
5) If the radio is under 12dB SINAD@-119dBm, it is considered as failure.
6) While the signal is reduced, control VR10 Squelch on at 8~10dBm of SINAD value.
7) If it is under the set value, turn VR10 clockwise. If it is over the value, turn VR10 counter-clockwise.

10 TROUBLESHOOTING FLOW CHART

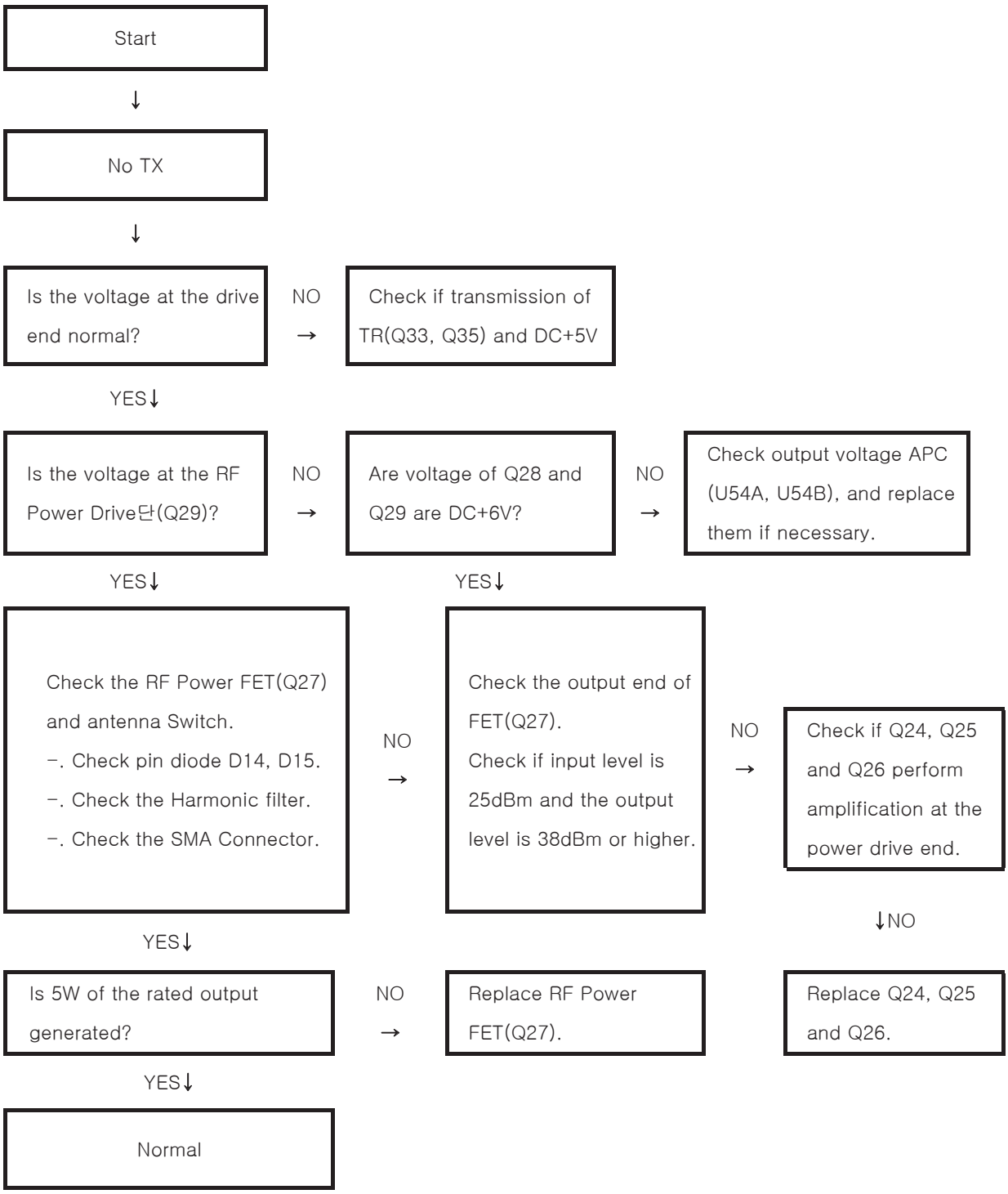
10.1 Reception Trouble



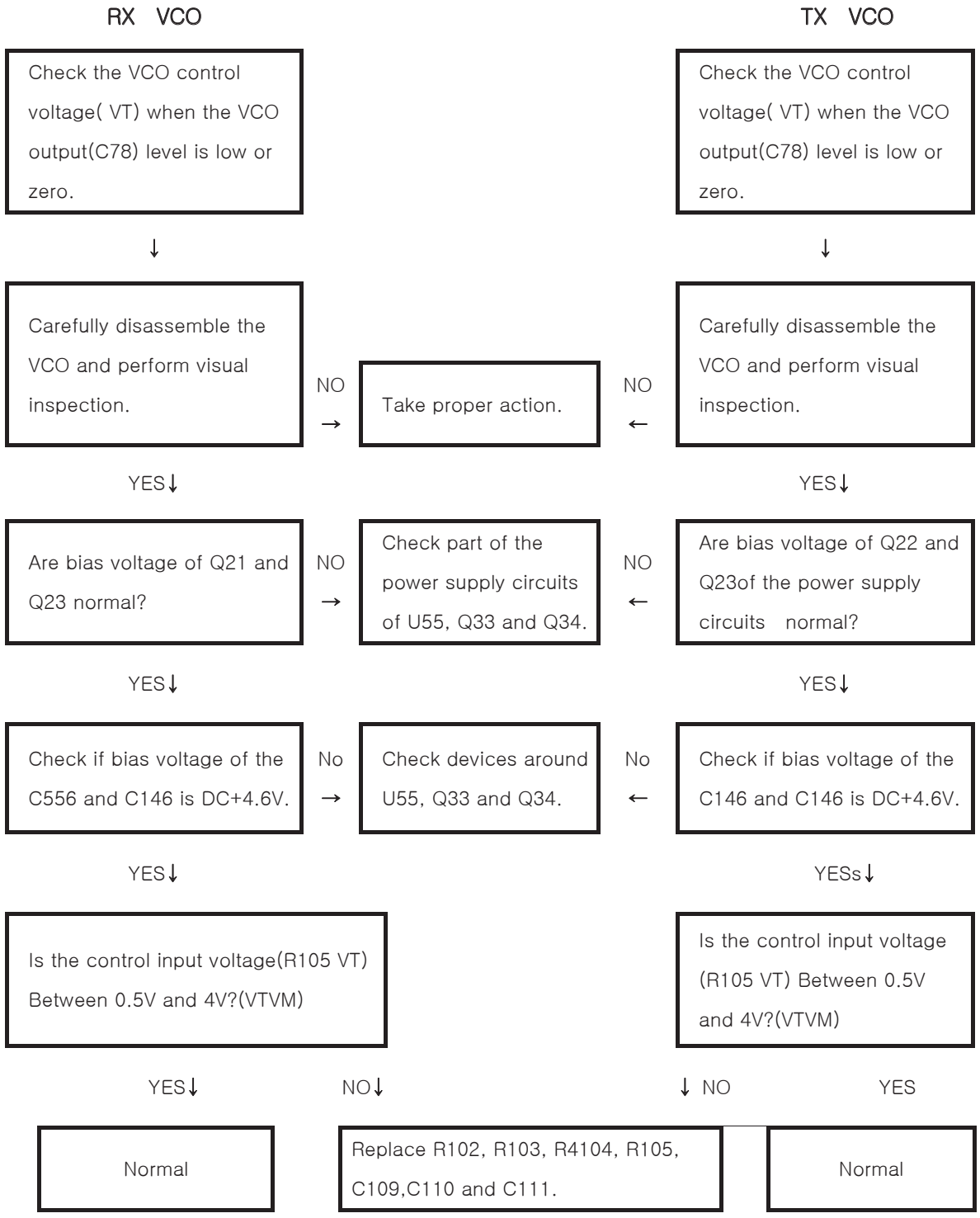
10 TROUBLESHOOTING FLOW CHART

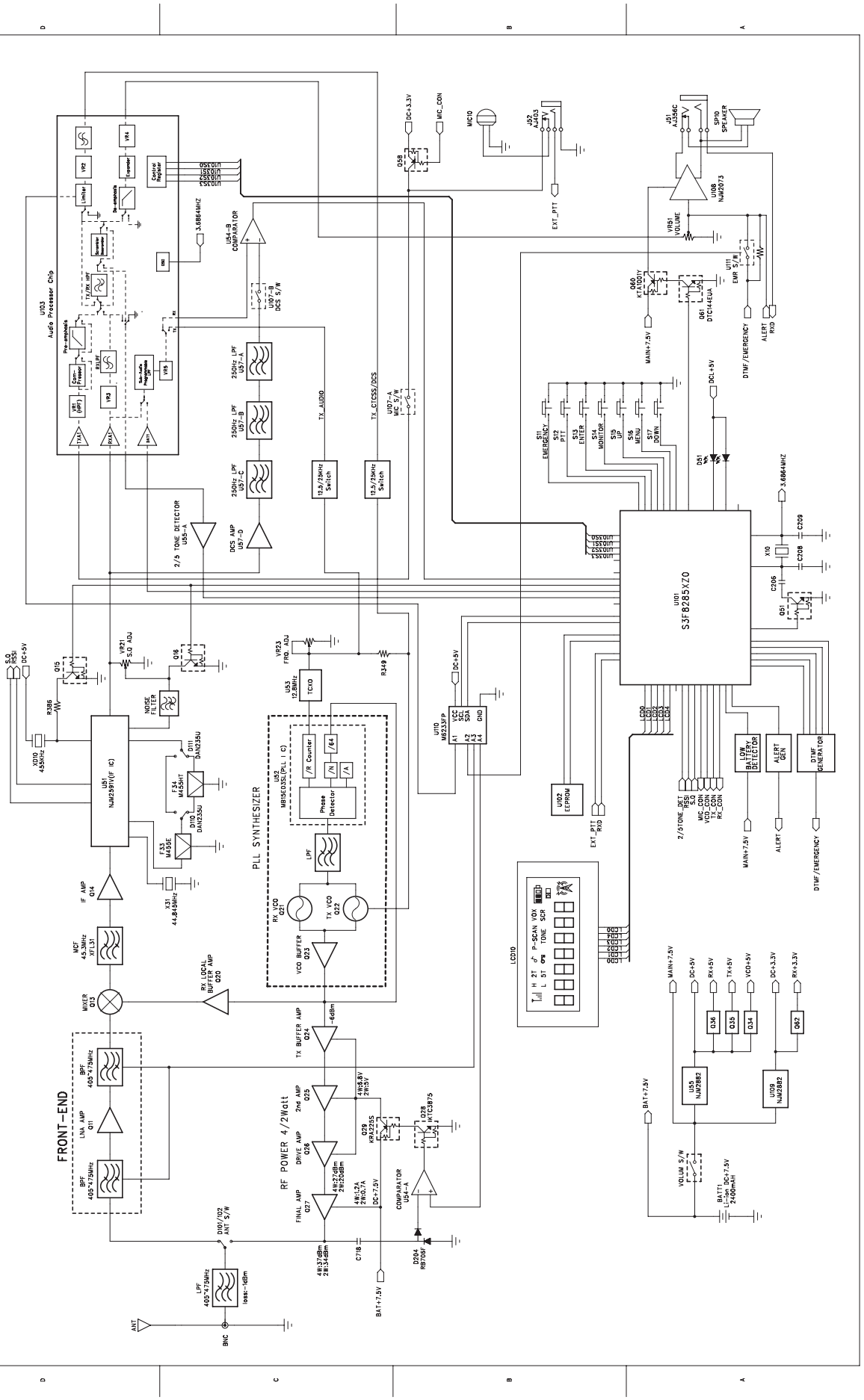


10.2 Transmission Trouble

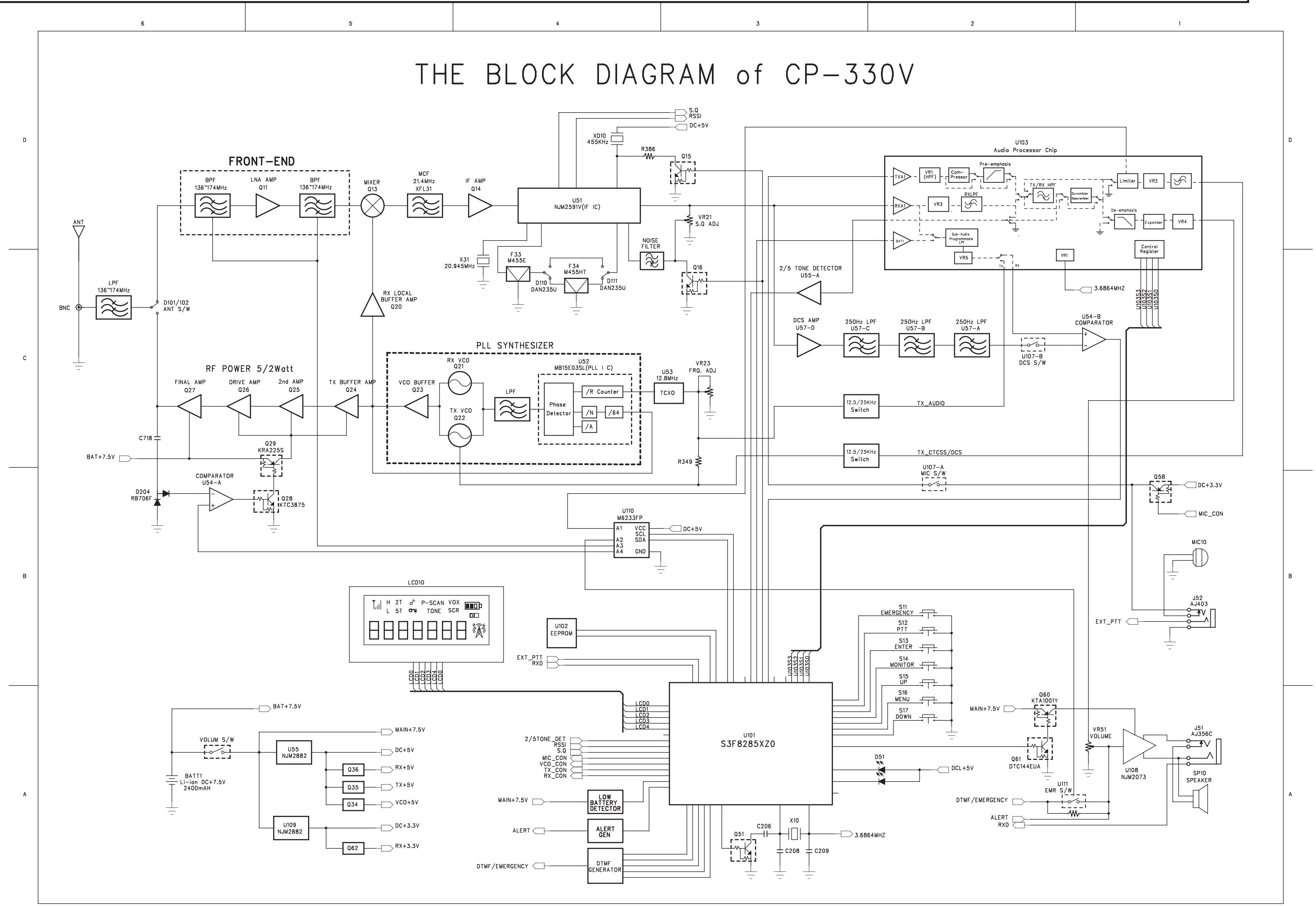


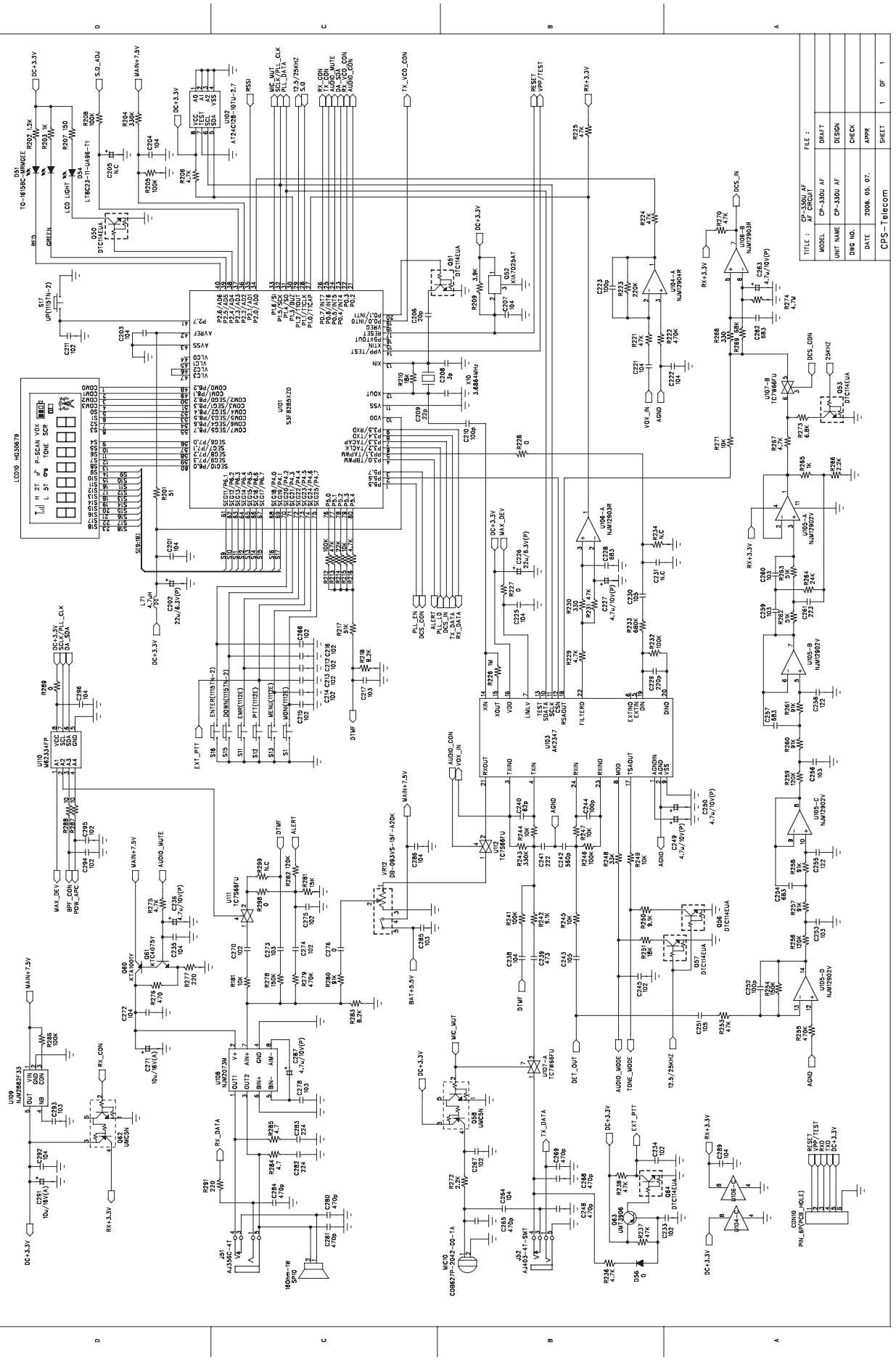
10.3 VCO Part Trouble

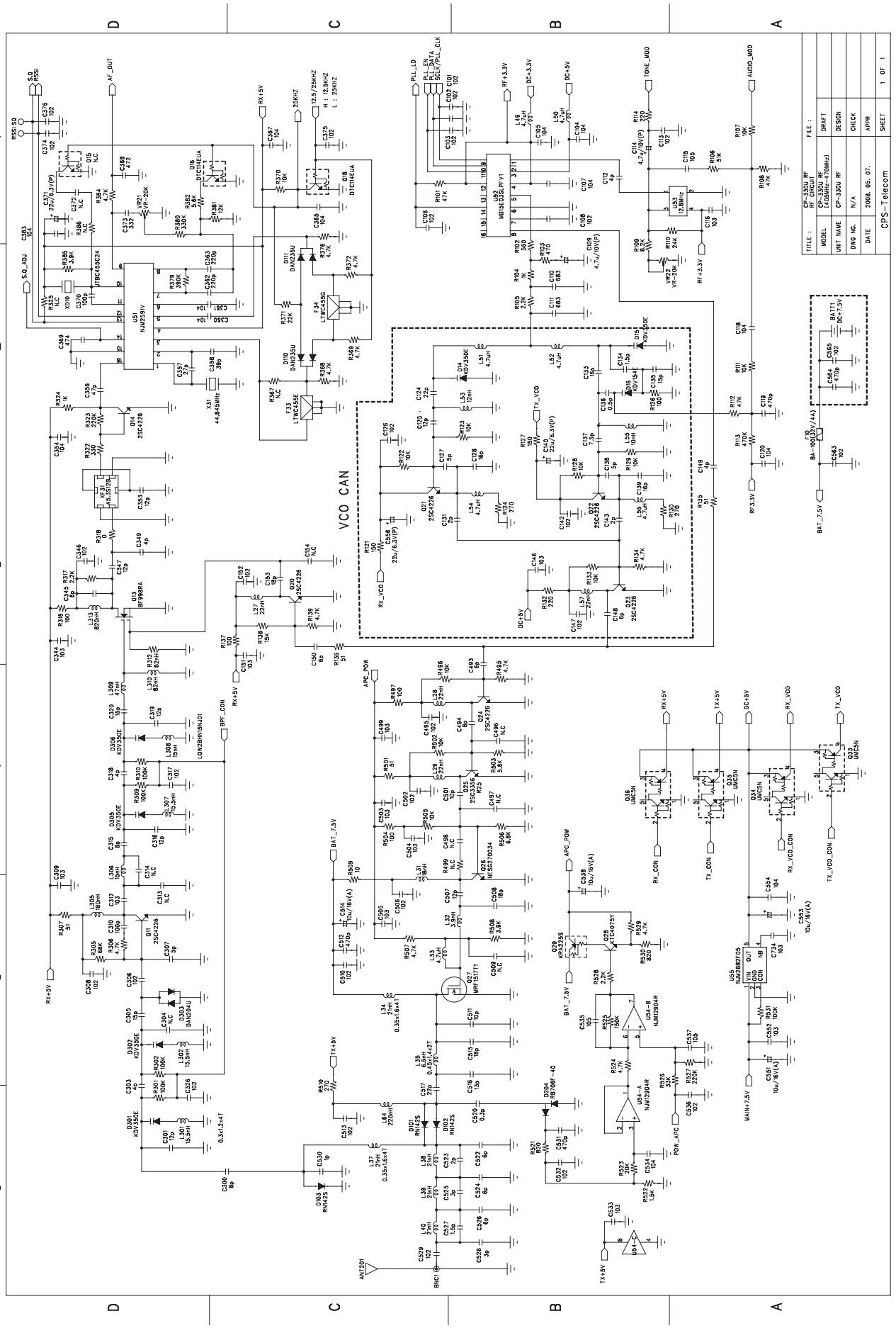


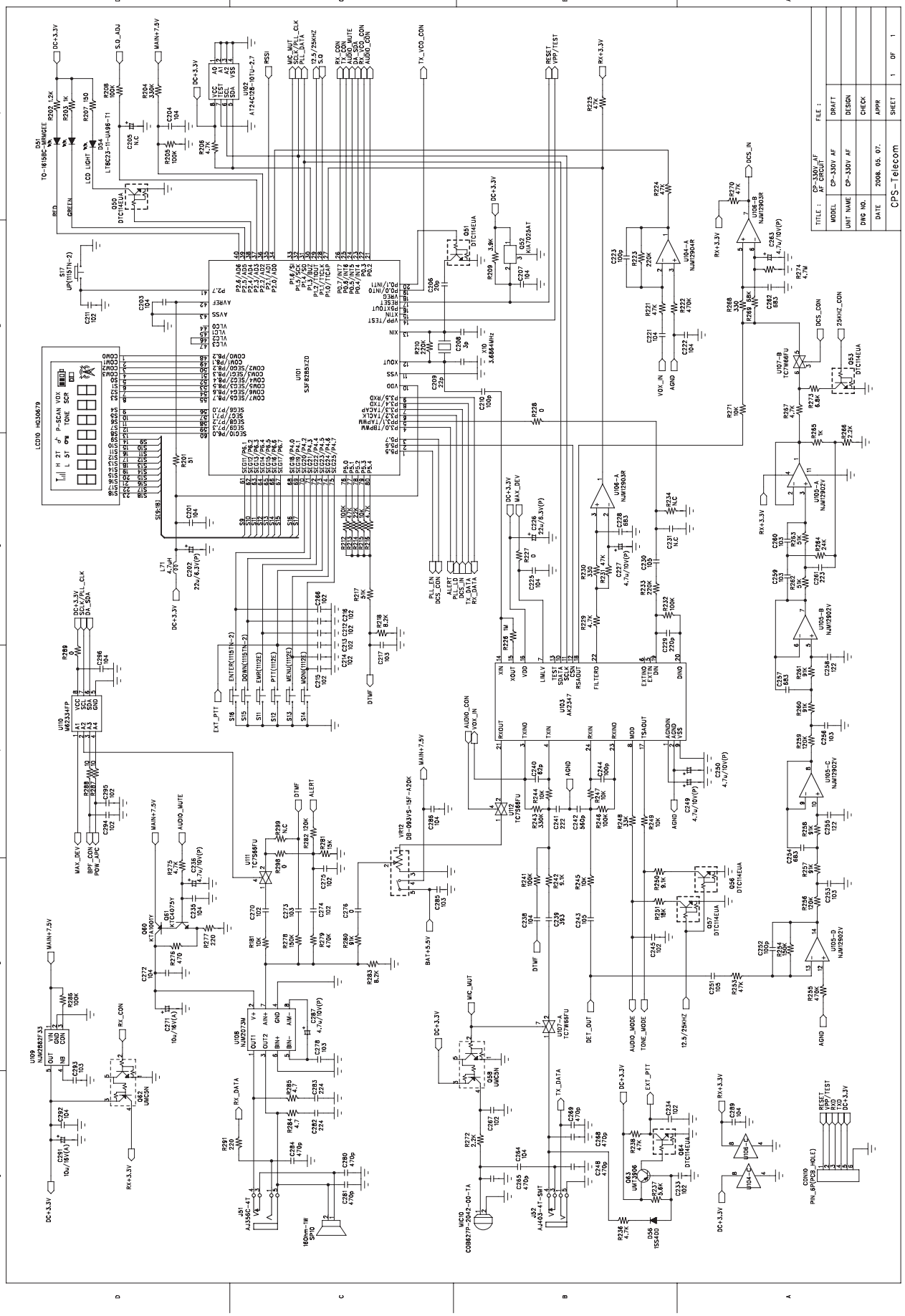

THE BLOCK DIAGRAM of CP-330U
FRONT-END
PLL SYNTHESIZER
RF POWER 4/2Watt
S3F8285X20
U101
U51 NJW2591V(IF IC)
U52 MB15E03SL(PLL IC)
U103 Audio Processor Chip
U54-B COMPARATOR
U54-A COMPARATOR
U55-A 2/3 TONE DETECTOR
U57-A 250Hz LPF
U57-B 250Hz LPF
U57-C 250Hz LPF
U57-D DCS AMP
U107-A MIC S/W
U107-B DCS S/W
U53 12.8MHz TCXO
U110 M24C32P
U102 EEPROM
U108 NJW2073
U55 NJW2882
U109 NJW2882
LCD10
LOW BATTERY DETECTOR
ALERT GEN
DTMF GENERATOR
MIC10
SPK10 SPEAKER
EXT_PTT
TX_AUDIO
TX_CTCSS/DCS
MAIN+7.5V
DC+5V
DC+3.3V
RX+5V
TX+5V
VCO+5V
RX+3.3V
BAT+7.5V
ANT
BNC

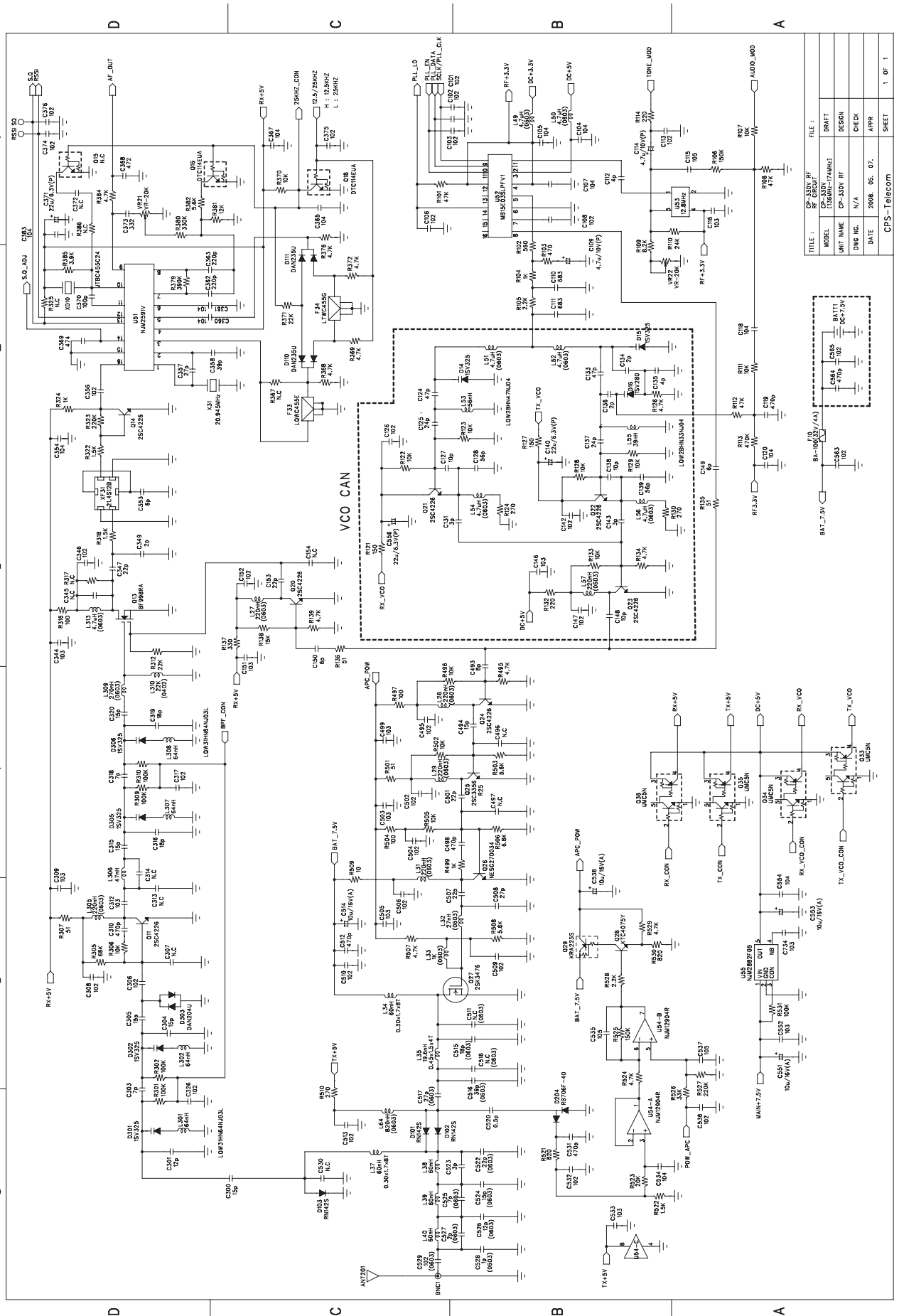
11.1 BLOCK DIAGRAM - CP330V



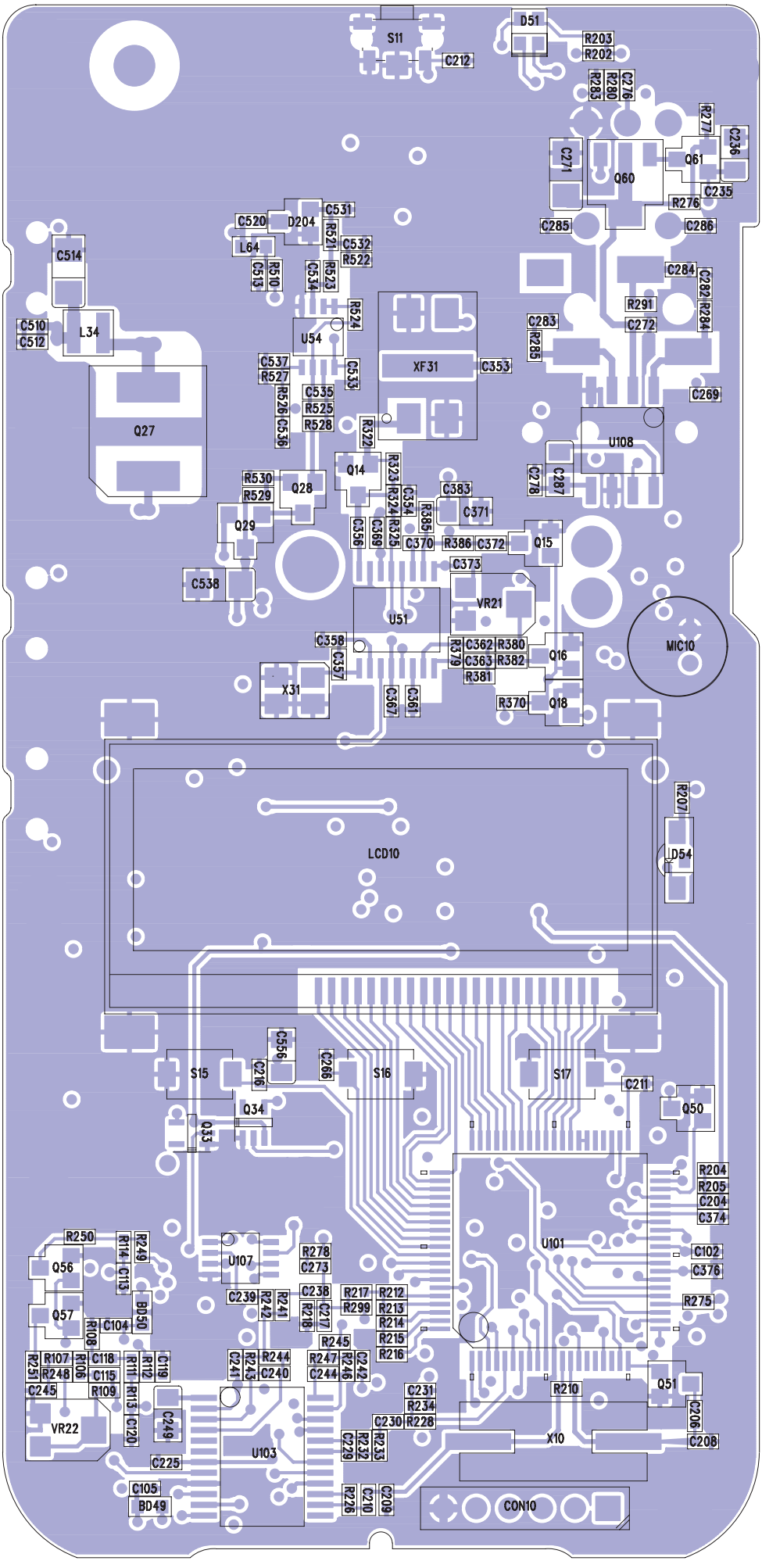



VCO CAN
TITLE : CP-330U RF CIRCUIT
FILE :
MODEL CP-330U RF [405MHz~470MHz]
DRAFT
UNIT NAME CP-330U RF
DESIGN
DWG NO. N/A
CHECK
DATE 2008. 05. 07.
APPR
CPS-Telecom
SHEET 1 OF 1

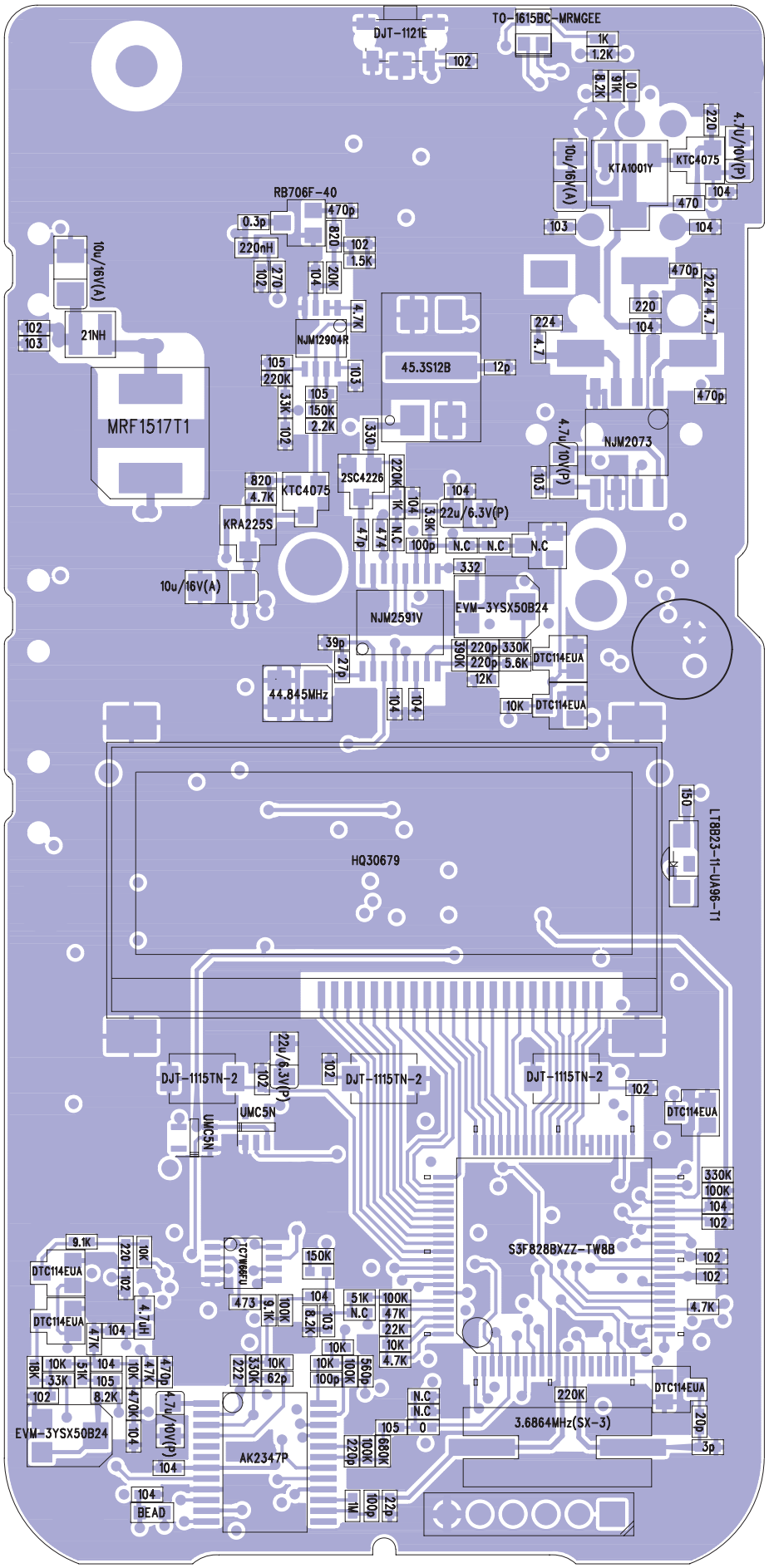



VCO CAN
TITLE : CP-330V RF CIRCUIT
FILE :
MODEL CP-330V [136MHz~174MHz]
DRAFT
UNIT NAME CP-330V RF
DESIGN
DWG NO. N/A
CHECK
DATE 2008. 05. 07.
APPR
CPS-Telecom
SHEET 1 OF 1

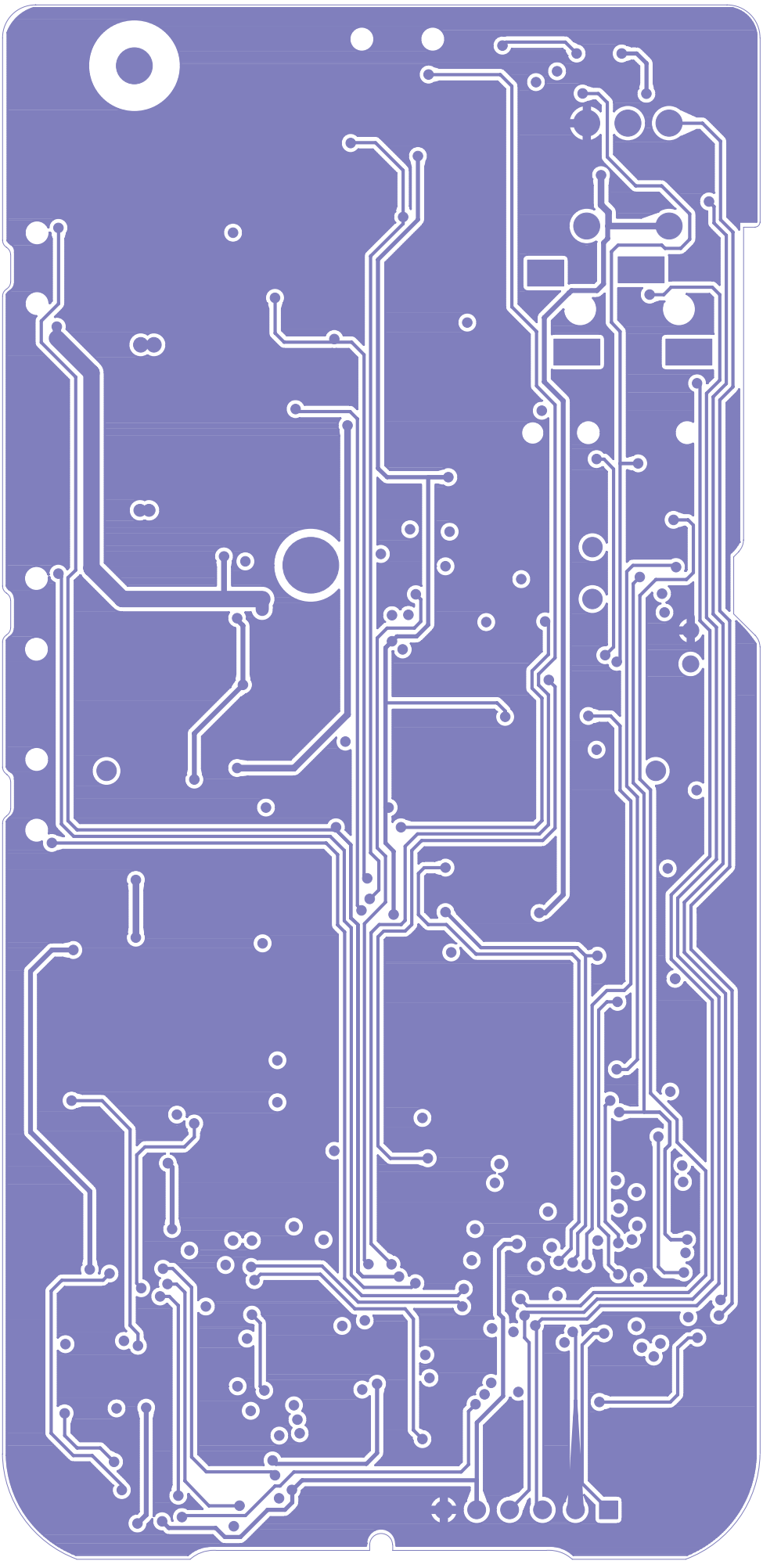
11.3 PCB MAP VIEW - CP330U



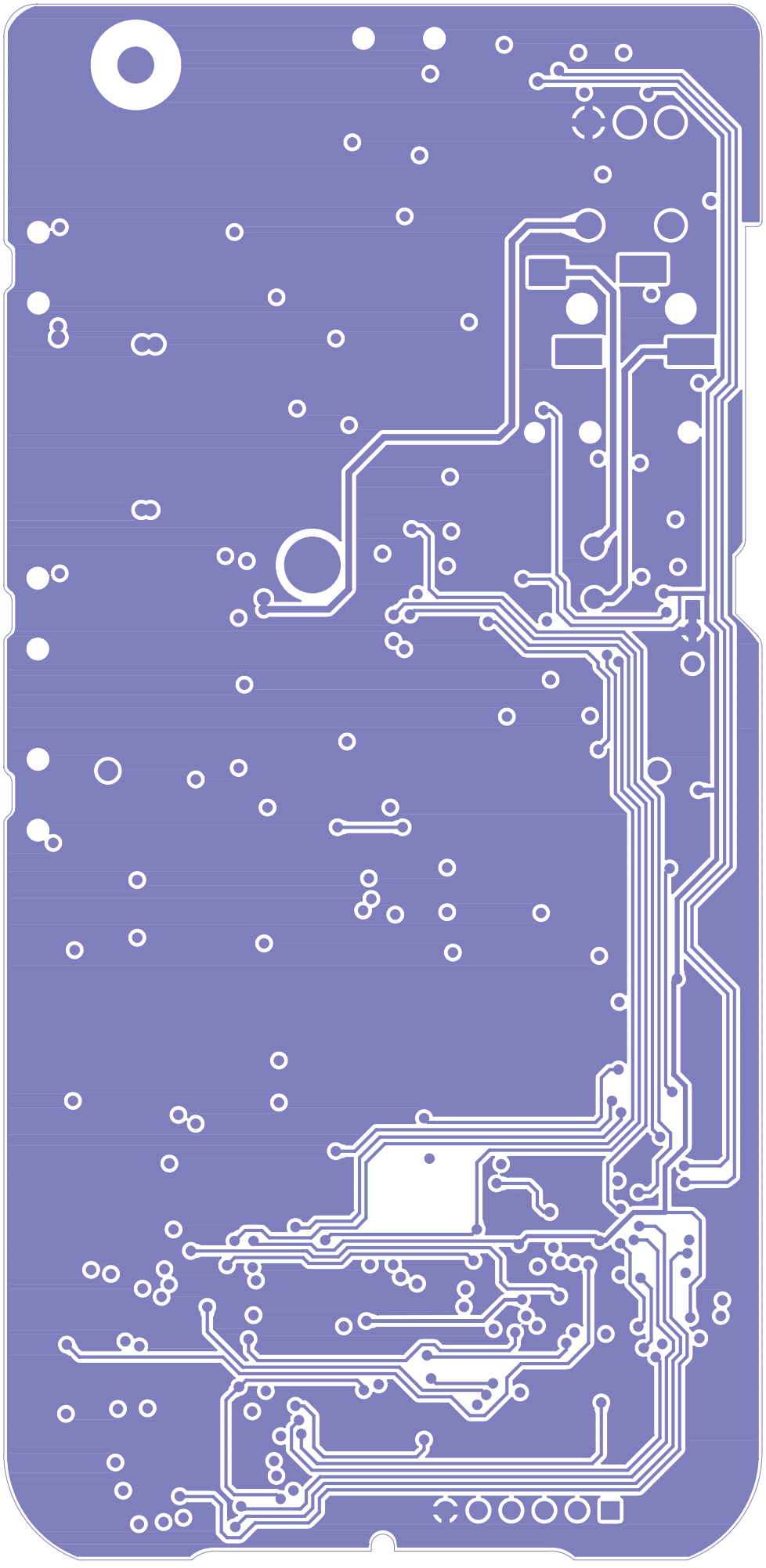
11.3 PCB MAP VIEW - CP330U



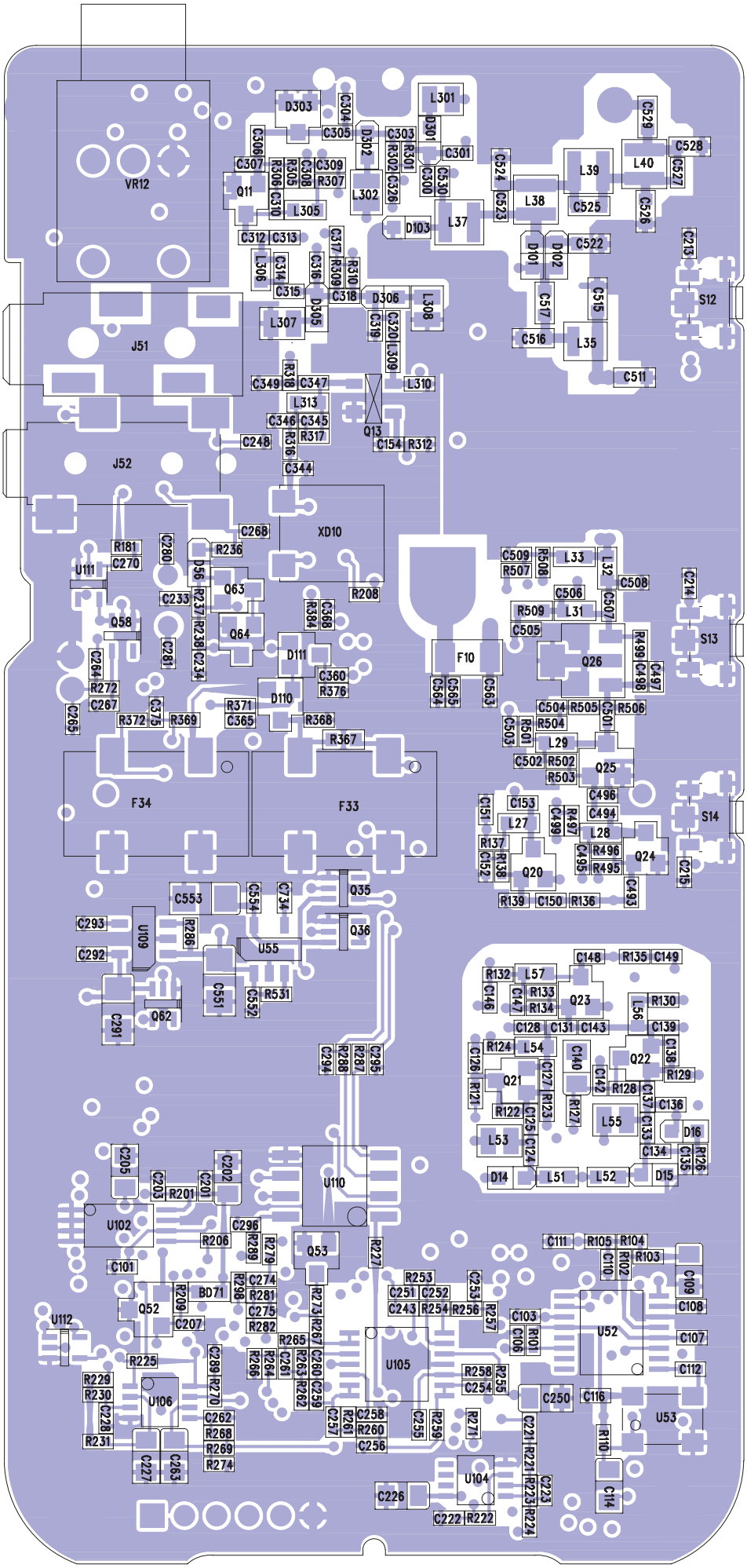
11.3 PCB MAP VIEW - CP330U

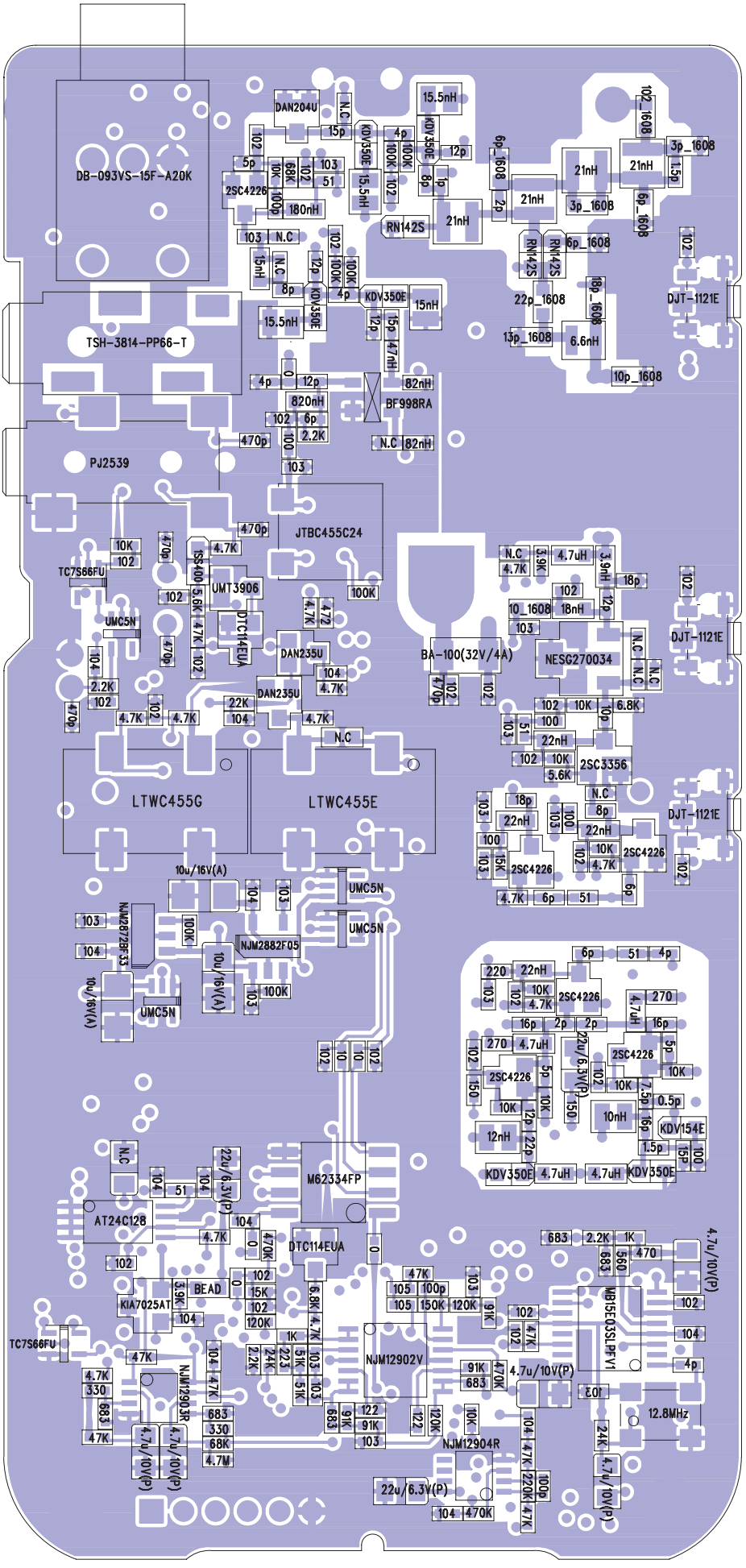


11.3 PCB MAP VIEW - CP330U



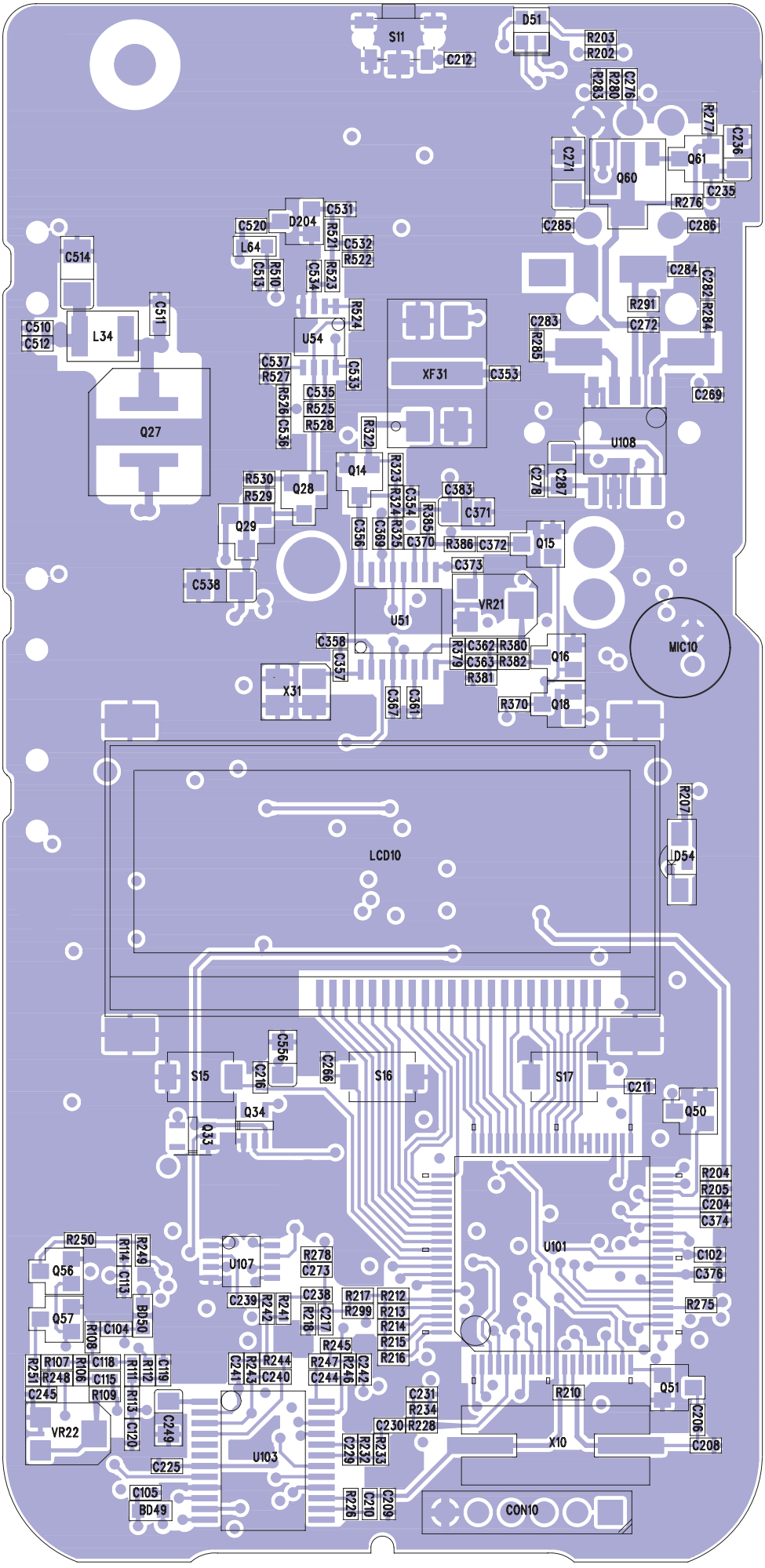
11.3 PCB MAP VIEW - CP330U



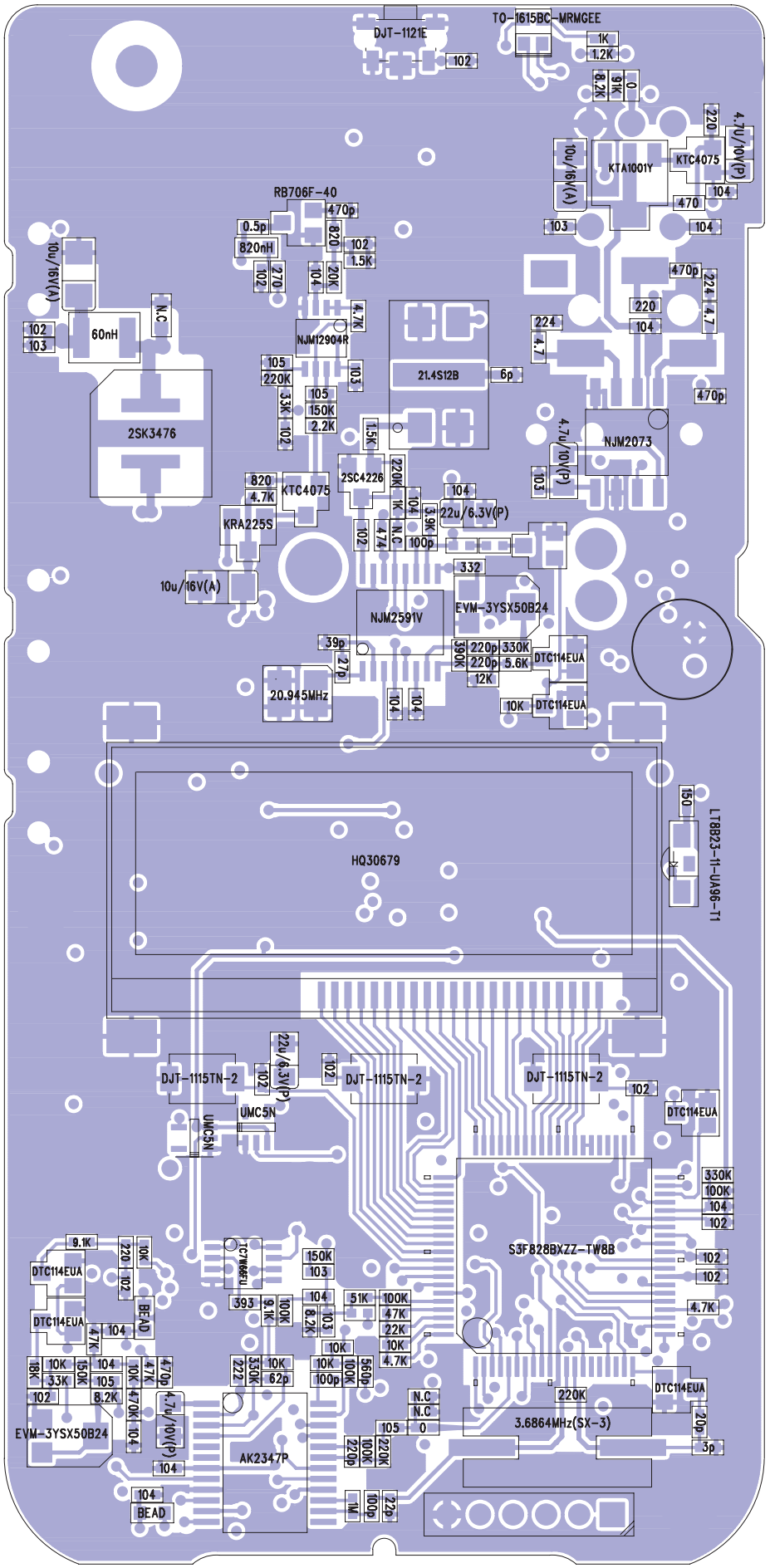


XP4-R3_N/W_BOTTOM 20080217

11.3 PCB MAP VIEW - CP330V

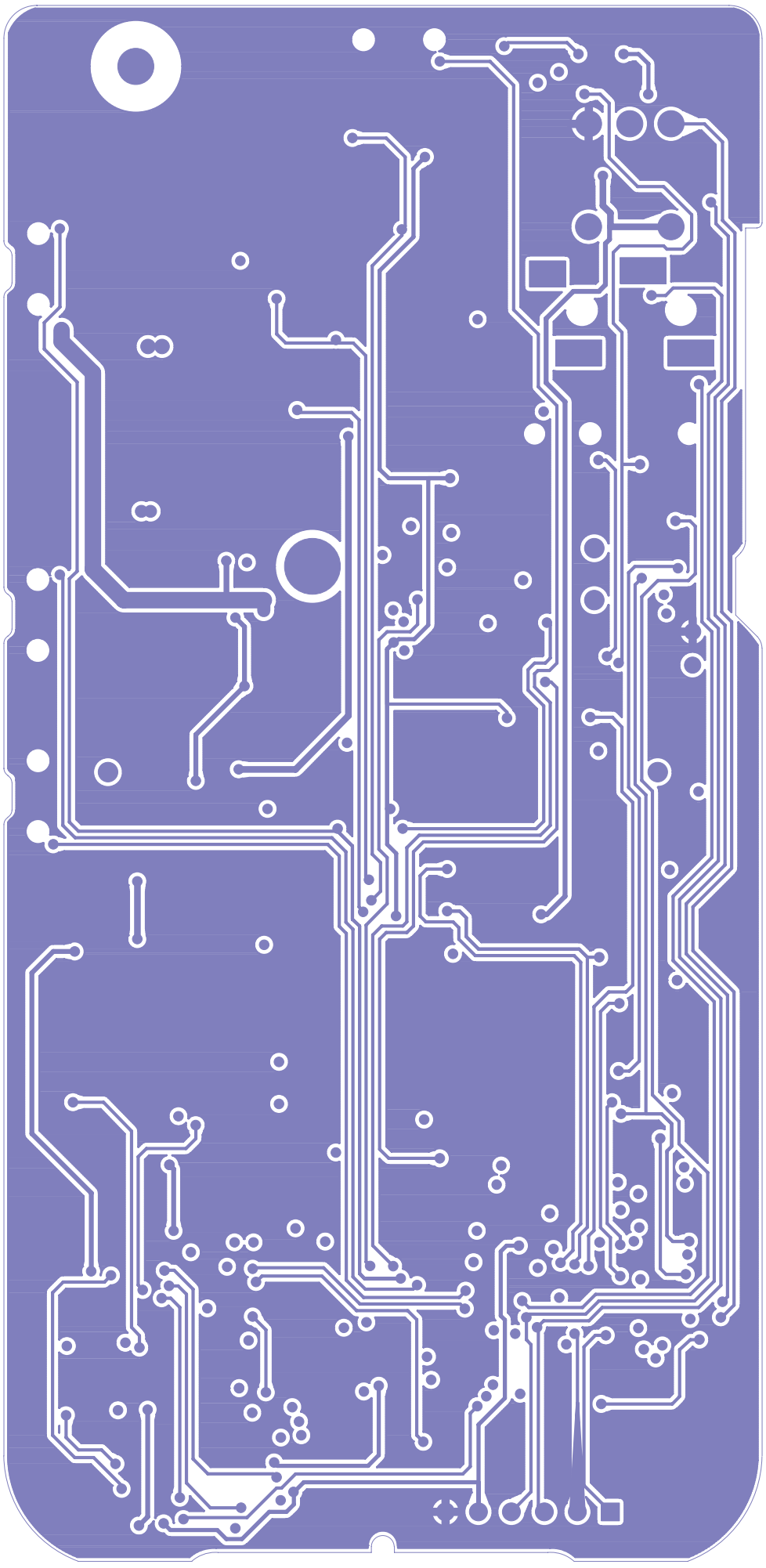


11.3 PCB MAP VIEW - CP330V

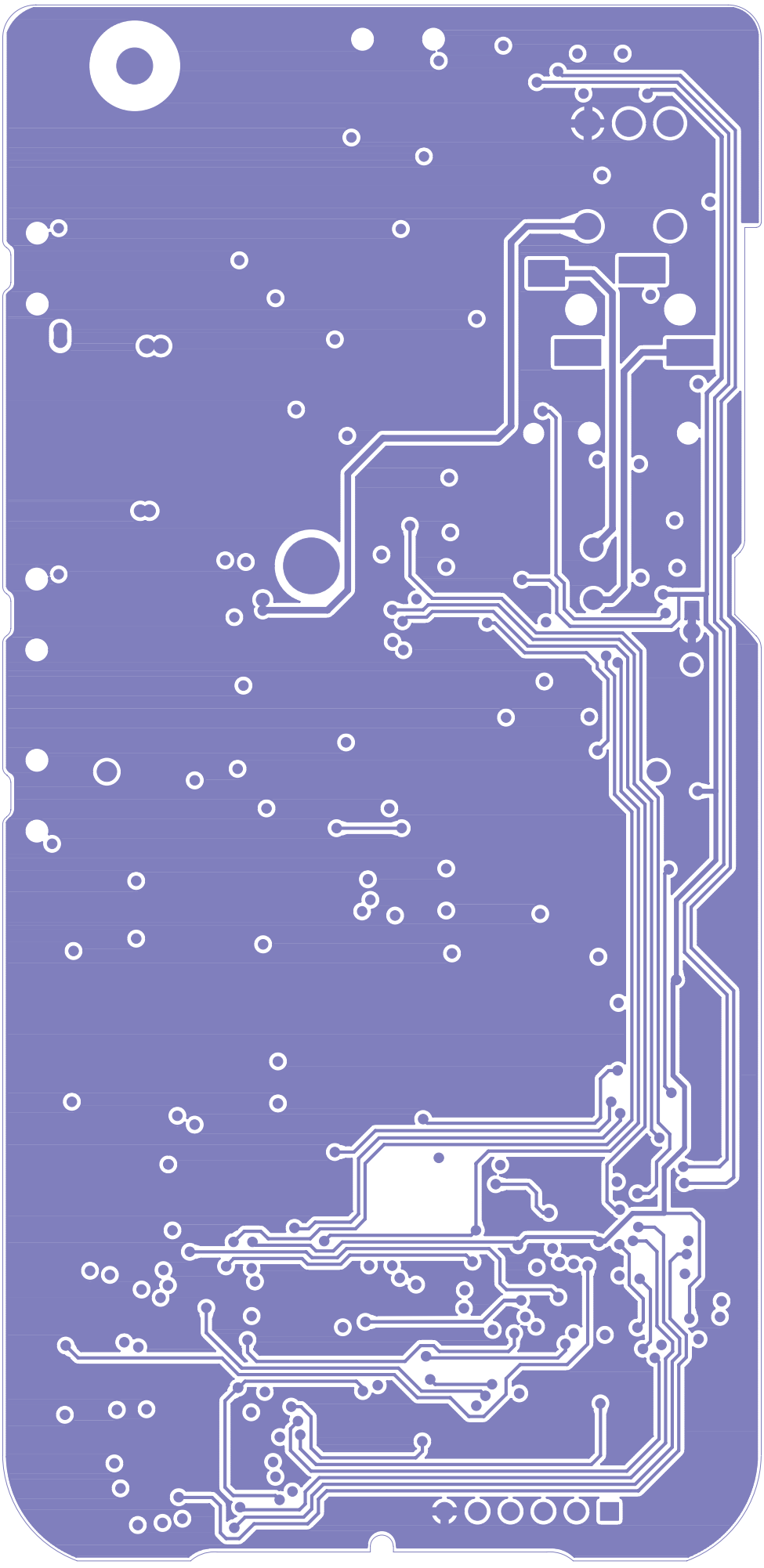


XP1-R3_N/W_TOP 20080217

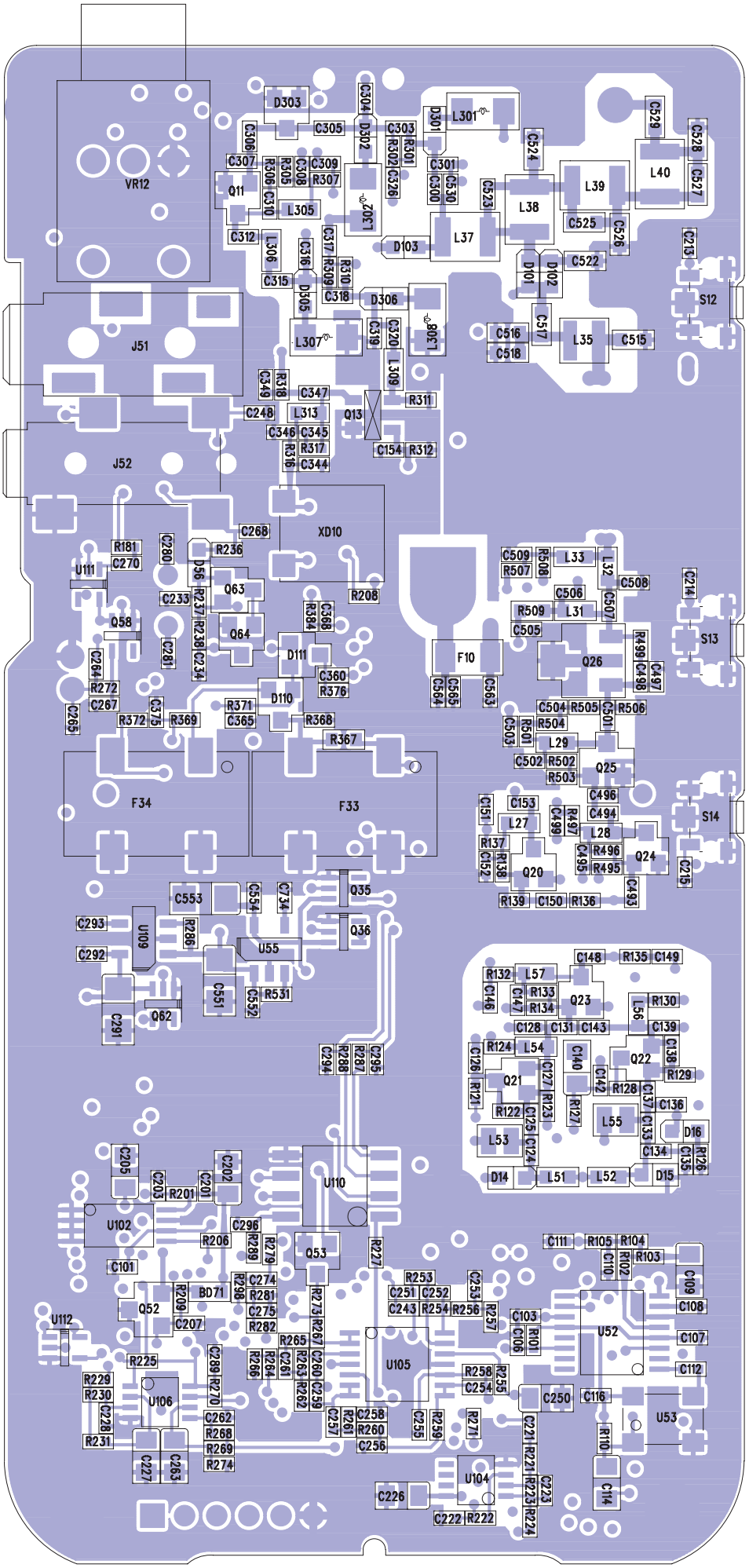
11.3 PCB MAP VIEW - CP330V

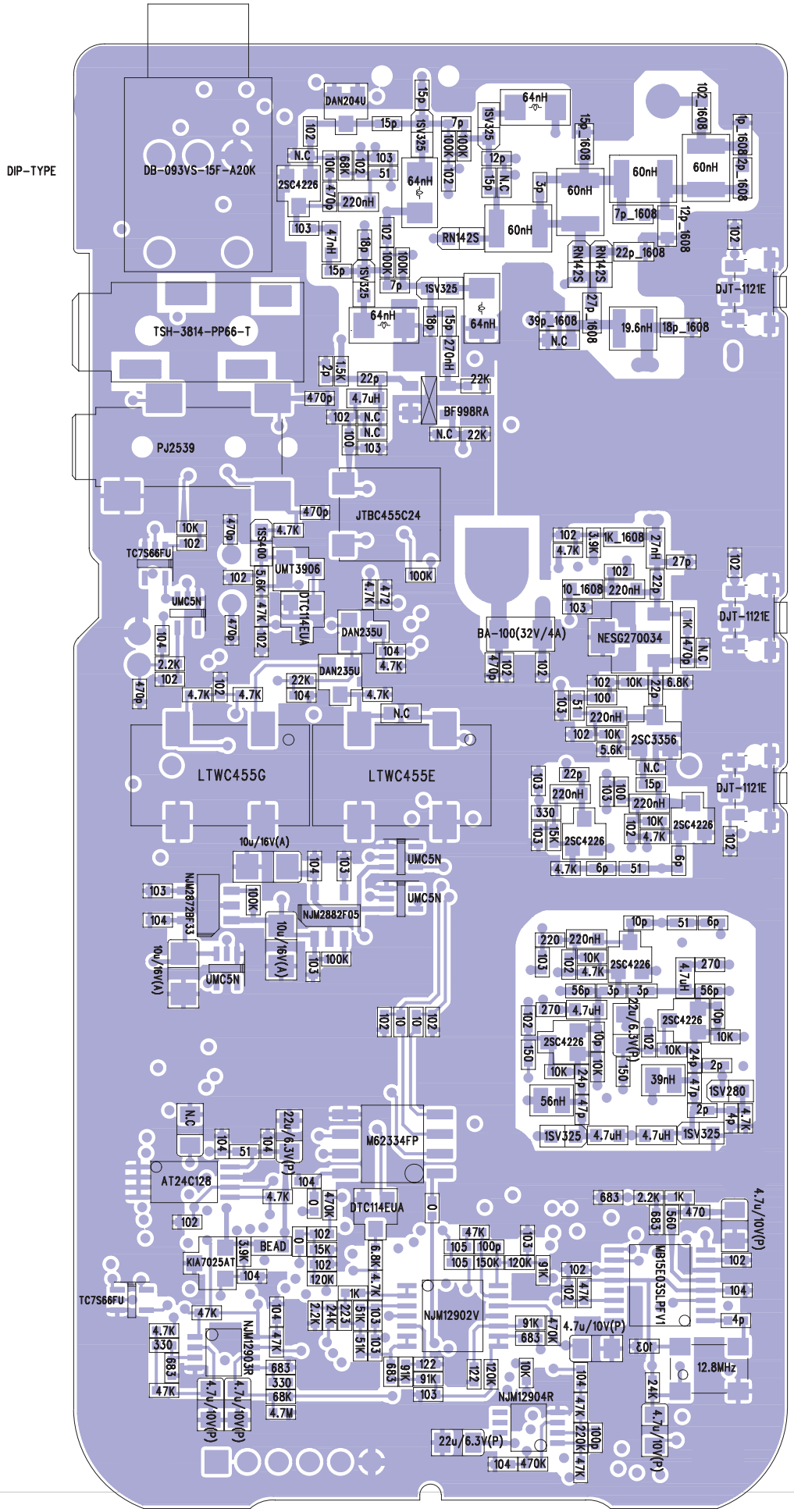


11.3 PCB MAP VIEW - CP330V



11.3 PCB MAP VIEW - CP330V





XP1-R3_N/W_BOTTOM 20080217

11.4 PARTS LIST - CP330U

Part Type	Description	Manufacturer	Value	Q'ty	Ref Des
			ANT	1	ANT201
	Battery Pack		DC+7.5V	1	BATT1
	GRM36C0G 0R3C 50PT	MURATA	0.3p	1	C520
CAP,CER,SMD	GRM36C0G 0R5C 50PT	MURATA	0.5p	1	C136
CAP,CER,SMD	GRM36C0G 010C 50PT	MURATA	1p	1	C530
CAP,CER,SMD	GRM36C0G 100D 50PT	MURATA	10p	1	C501
CAP,CER,SMD	GRM36C0G 101J 50PT	MURATA	100p	5	C210, C223, C244, C252, C310
CAP,CER,SMD	GRM36X7R 102K 50PT	MURATA	102	45	C101, C102, C103, C106, C108, C113, C126, C142, C147, C152 C211, C212, C213, C214, C215, C216, C233, C234, C245, C255 C258, C266, C267, C270, C274, C275, C294, C295, C306, C308 C317, C326, C374, C375, C376, C495, C502, C504, C506, C510 C513, C532, C536, C563, C565
CAP,CER,SMD	GRM36X7R 103K 25PT	MURATA	103	21	C116, C146, C151, C217, C253, C256, C259, C260, C273, C278 C285, C293, C309, C312, C244, C499, C503, C505, C533, C552 C734
CAP,CER,SMD	GRM36X7R 104K 16PT	MURATA	104	27	C104, C105, C107, C118, C120, C203, C204, C207, C221, C222 C225, C235, C238, C264, C272, C286, C289, C292, C296, C354 C360, C361, C365, C367, C383, C534, C554
CAP,CER,SMD	GRM36Y5V 105Z 6.3PT	MURATA	105	6	C115, C230, C243, C251, C535, C537
CAP,CER,SMD	GRM36C0G 120J 50PT	MURATA	12p	6	C125, C301, C316, C319, C347, C353
CAP,CER,SMD	GRM36C0G 1R5C 50PT	MURATA	1.5p	1	C134
CAP,CER,SMD	GRM36C0G 1R5C 50PT	MURATA	15p	3	C135, C305, C320
CAP,CER,SMD	GRM36C0G 160J 50PT	MURATA	16p	3	C128, C133, C139
CAP,CER,SMD	GRM36C0G 180J 50PT	MURATA	18p	1	C153
CAP,CER,SMD	GRM36C0G 020C 50PT	MURATA	2p	2	C131, C143
CAP,CER,SMD	GRM36C0G 020C 50PT	MURATA	20p	2	C206, C357
CAP,CER,SMD	GRM36C0G 220J 50PT	MURATA	22p	3	C124, C209, C507
CAP,CER,SMD	GRM36X7R 221K 50PT	MURATA	220p	3	C229, C362, C363
CAP,CER,SMD	GRM36X7R 222K 50PT	MURATA	222	1	C241
CAP,CER,SMD	GRM36X7R 223K 16PT	MURATA	223	1	C261
CAP,CER,SMD	GRM36X5R 224K 10PT	MURATA	224	2	C282, C283
CAP,CER,SMD	GRM36C0G 270J 50PT	MURATA	27p	1	C508

CAP,CER,SMD	GRM36C0G 030C 50PT	MURATA	3p	1	C208
CAP,CER,SMD	GRM36X7R 332K 50PT	MURATA	332	1	C373
CAP,CER,SMD	GRM36C0G 040C 50PT	MURATA	4p	5	C112, C149, C303, C318, C349
CAP,CER,SMD	GRM36C0G 470J 50PT	MURATA	47p	1	C356
CAP,CER,SMD	GRM36X7R 471K 50PT	MURATA	470p	11	C119, C248, C265, C268, C269, C280, C281, C284, C512, C531 C564
CAP,CER,SMD	GRM36X7R 472K 50PT	MURATA	472	1	C368
CAP,CER,SMD	GRM36X5R 474K 6.3PT	MURATA	474	1	C369
CAP,CER,SMD	GRM36C0G 050C 50PT	MURATA	5p	3	C127, C138, C307
CAP,CER,SMD	GRM36X7R 561K 50PT	MURATA	560p	1	C242
CAP,CER,SMD	GRM36X7R 561K 50PT	MURATA	562	1	C262
CAP,CER,SMD	GRM36X5R 563K 10PT	MURATA	563	1	C239
CAP,CER,SMD	GRM36C0G 060D 50PT	MURATA	6p	3	C148, C150, C345
CAP,CER,SMD	GRM36C0G 620J 50PT	MURATA	62p	1	C240
CAP,CER,SMD	GRM36X5R 683K 10PT	MURATA	683	5	C110, C111, C228, C254, C257
CAP,CER,SMD	GRM36C0G 7R5D 50PT	MURATA	7.5p	1	C137
CAP,CER,SMD	GRM36X5R 683K 10PT	MURATA	8p	3	C300, C315, C494
CAP,CER,SMD	GRM36C0G 820J 50PT	MURATA	82p	1	C370
	GRM39C0G [illegible]	MURATA	1.5p	1	C527
	GRM39C0G 020C 50(0603)	MURATA	2p	1	C523
	GRM39C0G 030C 50(0603)	MURATA	3p	2	C525, C528
	GRM39C0G 060D 50(0603)	MURATA	6p	3	C522, C524, C526
	GRM39C0G 100D 50(0603)	MURATA	10p	1	C511
	GRM39C0G 130D 50(0603)	MURATA	13p	1	C516
	GRM39C0G 180J 50(0603)	MURATA	18p	1	C515
	GRM39C0G 220J 50(0603)	MURATA	22p	1	C517
	GRM39C0G 471J 50(0603)	MURATA	470p	1	C1
	GRM39X7R 102K 50(0603)	MURATA	102	2	C529, C2
			N.C	17	C154, C205, C231, C304, C313, C314, C372, C496, C497, C498 C509, Q15, R234, R299, R325, R367, R386, R499
TANTAL CAPACITOR,SMD	TEESVA1C106M8R	NEC	10u/16V(A)	6	C271, C291, C514, C538, C551, C553

TANTAL CAPACITOR,SMD	TEESVP0J226M8R			5	
TANTAL CAPACITOR,SMD	TEESVP1A475M8R	NEC	4.7u/10V(P)	8	C109, C114, C227, C236, C249, C250, C263, C287
CHIP COIL	LQW18AN3N9C00	Murata	3.9nH	1	L32
CHIP COIL	LQW18AN18NG00	Murata	18nH	1	L31
CHIP COIL	LQW18AN22NG00	Murata	22nH	1	L29
COIL,FIXED,SMD	LQW2BHN10NJ04	Murata	10nH	1	L55
COIL,FIXED,SMD	LQW2BHN12NJ04	Murata	12nH	1	L53
COIL , FIXED , SMD	LQW2BHN15NJ04	Murata	15nH	1	L308
CERAMIC,INNDUCTOR,SM D	CI-B 1005 820JJT	Ceratech	82nH	2	L310, R312
CERAMIC,INNDUCTOR,SMD		Ceratech	22nH	3	L27, L28, L57
CERAMIC,INNDUCTOR,SMD		Ceratech	180nH	1	L305
CERAMIC,INNDUCTOR,SMD		Ceratech	15nH	1	L306
CERAMIC,INNDUCTOR,SMD		Ceratech	220nH	1	L64
CERAMIC,INNDUCTOR,SMD		Samsung	820nH	1	L313
CERAMIC,INNDUCTOR,SMD		Samsung	4.7uH	8	L33, L49, L50, L51, L52, L54, L56, L71
COIL,SPRING,SMD	0.45x1.4x2T	Hoesung Coil	6.6nH	1	L35
COIL,SPRING,SMD	0.30x1.2x4T	Hoesung Coil	15.5nH	3	L301, L302, L307
COIL,SPRING,SMD	0.35x1.6x4T	Hoesung Coil	21nH	5	L34, L37, L38, L39, L40
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	0	6	C276, R227, R228, R289, R298, R318
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	10	3	R287, R288, R509
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	100	5	R126, R137, R316, R497, R504
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	1K	4	R104, R203, R265, R324
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	1M	1	R226
RES ,CF,SMD	1005 5% TYPE	ROHM, WAISIN	10K	20	R107, R111, R122, R123, R128, R129, R133, R181, R215, R244 R245, R247, R249, R368, R369, R372, R376, R496, R502, R505
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	100K	13	R205, R208, R212, R232, R241, R246, R280, R286, R301, R302 R309, R310, R531
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	1.2K	1	R202
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	12K	1	R381
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	120K	3	R256, R259, R282
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	150	3	R121, R127, R207
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	1.5K	1	R522

RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	15K	2	R138, R281
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	150K	2	R278, R525
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	18K	1	R251
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	20K	1	R523
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	220	4	R114, R132, R277, R291
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	2.2K	5	R105, R266, R272, R317, R528
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	22K	2	R214, R371
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	220K	4	R210, R223, R323, R527
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	24K	2	R110, R264
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	270	3	R124, R130, R510
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	2.7K	1	R385
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	330	3	R230, R268, R322
RES.CF.SMD	1005 5% TYPE	ROHM, WAISIN	33K	2	R248, R526
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	3.9K	3	R209, R382, R508
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	4.7	2	R284, R285
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	470	2	R103, R276
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	4.7K	15	R134, R139, R206, R216, R229, R236, R267, R271, R275, R306 R384, R495, R507, R524, R529
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	47K	12	R101, R108, R112, R213, NR221, R224, R225, R231, R238, R253 R270, R370
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	470K	5	R113, R222, R254, R255, R279
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	4.7M	1	R274
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	51K	4	R106, R217, R262, R263
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	560	1	R102
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	5.6K	2	R237, 503
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	6.8K	1	R506
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	68K	2	R269, R305
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	680K	1	R233
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	820	2	R521, R530
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	8.2K	3	R109, R218, R283
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	9.1K	2	R242, R250
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	91K	4	R257, R258, R260, R261
DISPLAY,LCD	HQ30679	P&L	HQ30679	1	LCD10

ZIBERA	ZIBERA	P&L	ZIBERA	1	
MIC	COB627P-2044-00-TA	SANICO	COB627P-2042-00-TA	1	MIC10
RF TR,SMD	2SC4226-T1-A/JM-R25	NEC	2SC4226	7	Q11, Q14, Q20, Q21, Q22, Q23, Q24
RF TR,SMD	2SC3356-T1B-A/JM	NEC	2SC3356	1	Q25
RF FET,SMD	NESG260034	NEC	NESG260034	1	Q26
TR,SMD	UMC5N	ROHM	UMC5N	6	Q33, Q34, Q35, Q36, Q58, Q62
TR,SMD	UMT3906(T106)	ROHM	UMT3906	1	Q63
TR,SMD	DTC115EUA	ROHM	DTC115EUA	1	Q16
TR,SMD	DTC114EUA	ROHM	DTC114EUA	6	Q18, Q50, Q51, Q56, Q57, Q64
TR,SMD	KTC4075Y	ROHM	KTC4075Y	2	Q28, Q61
DIODE,PIN,SMD	RN142S	ROHM	RN142S	3	D101, D102, D103
DIODE,SMD	DAN235U	ROHM	DAN235U	2	D110, D111
DIODE,SMD	RB706F-40	ROHM	RB706F-40	1	D204
DIODE,SMD	DAN204U	ROHM	DAN204U	1	D303
DIODE,SMD	1SS400(TE61)	ROHM	1SS400	1	D56
RF FET,SMD	MRF1517T1	Motorola	MRF1517T1	1	Q27
RF FET ,SMD	BF998RA	VISHAY	BF998RA	1	Q13
PCB	PCB(2-LAYER)	Youknow	BATT	1	

Part Type	Description	Manufacturer	Value	Q'ty	RefDes
RES,CF,SMD		ROHM, WAISIN	0	6	C276, R227, R228, R289, R298, R318
CAP,CER,SMD	GRM36C0G 0R5C 50PT	MURATA	0.5p	1	C520
CAP,CER,SMD	GRM36C0G 010C 50PT	MURATA	1p	1	C528
CAP,CER,SMD	GRM36C0G 100D 50PT	MURATA	10p	3	C127, C138, C148
CAP,CER,SMD	GRM36C0G 101J 50PT	MURATA	100p	5	C210, C223, C244, C252, C370
CAP,CER,SMD	GRM36X7R 102K 50PT	MURATA	102	49	C101, C102, C103, C106, C108, C113, C126, C142, C147, C152 C211, C212, C213, C214, C215, C216, C233, C234, C245, C255 C258, C266, C267, C270, C274, C275, C294, C295, C306, C308 ____, ____ C317, C326, C346, C356, C374, C375, C376, C495, C502, C504 C506, C509, C510, C513, C529, C532, C536, C563, C565
CAP,CER,SMD	GRM36X7R 103K 25PT	MURATA	103	21	C116, C146, C151, C217, C253, C256, C259, C260, C273, C278 C285, C293, C309, C312, C344, C499, C503, C505, C533, C552 C734
CAP,CER,SMD	GRM36X7R 104K 16PT	MURATA	104	28	C104 , C105 , C107 , C118 , C120 , C201 , C203 , C204 , C207 , C221 C222, C225, C235, C238, C264, C272, C286, C289, C292, C296 C354, C360, C361, C365, C367, C383, C534, C554
CAP,CER,SMD	GRM36Y5V 105Z 6.3PT	MURATA	105	6	C115, C230, C243, C251, C535, C537
CAP,CER,SMD	GRM36C0G 120J 50PT	MURATA	12p	2	C301, C526
CAP,CER,SMD	GRM36C0G 1R5C 50PT	MURATA	15p	7	C300, C304, C305, C315, C320, C494, C524
CAP,CER,SMD	GRM36C0G 180J 50PT	MURATA	18p	3	C316, C319, C515
CAP,CER,SMD	GRM36C0G 020C 50PT	MURATA	2p	3	C134, C136, C527
CAP,CER,SMD	GRM36C0G 020C 50PT	MURATA	20p	1	C206
CAP,CER,SMD	GRM36C0G 220J 50PT	MURATA	22p	8	C153, C209, C345, C347, C357, C501, C507, C522
CAP,CER,SMD	GRM36X7R 221K 50PT	MURATA	220p	3	C229, C362, C363
CAP,CER,SMD	GRM36X7R 222K 50PT	MURATA	222	1	C241
CAP,CER,SMD	GRM36X7R 223K 16PT	MURATA	223	1	C261
CAP,CER,SMD	GRM36X5R 224K 10PT	MURATA	224	2	C282, C283
CAP,CER,SMD	GRM36C0G 240J 50PT	MURATA	24p	2	C125, C137
CAP,CER,SMD	GRM36C0G 270J 50PT	MURATA	27p	2	C508, C517
CAP,CER,SMD	GRM36C0G 030C 50PT	MURATA	3p	4	C131, C143, C208, C518, C523
CAP,CER,SMD	GRM36X7R 332K 50PT	MURATA	332	1	C373
CAP,CER,SMD	GRM36C0G 390J 50PT	MURATA	39p	2	C358, C516
CAP,CER,SMD	GRM36C0G 040C 50PT	MURATA	4p	3	C112, C135
CAP,CER,SMD	GRM36C0G 470J 50PT	MURATA	47p	3	C124, C133

CAP,CER,SMD	GRM36X7R 471K 50PT	MURATA	470p	13	C119, C248, C265, C268, C269, C280, C281, C284, C310, C498 C512 , C531 , C564
CAP,CER,SMD	GRM36X7R 472K 50PT	MURATA	472	1	C368
CAP,CER,SMD	GRM36X5R 474K 6.3PT	MURATA	474	1	C369
CAP,CER,SMD	GRM36C0G 560J 50PT	MURATA	56p	2	C128, C139
CAP,CER,SMD	GRM36X7R 561K 50PT	MURATA	560p	1	C242
CAP,CER,SMD	GRM36X7R 562K 50PT	MURATA	562	1	C262
CAP,CER,SMD	GRM36X5R 563K 10PT	MURATA	563	1	C239
CAP,CER,SMD	GRM36C0G 060D 50PT	MURATA	6p	3	C149, C150, C353
CAP,CER,SMD	GRM36C0G 620J 50PT	MURATA	62p	1	C240
CAP,CER,SMD	GRM36X5R 683K 10PT	MURATA	683	5	C110, C111, C228, C254, C257
CAP,CER,SMD	GRM36C0G 070D 50PT	MURATA	7p	3	C303 , C318 , C325
CAP,CER,SMD	GRM36C0G 080D 50PT	MURATA	8p	1	C493
TANTAL CAPACITOR,S M	TEESVA1C106M8R	NEC	10u/16V(A)	6	C271, C291, C514, C538, C551, C553
TANTAL CAPACITOR,S M	TEESVP0J226M8R	NEC	22u/6.3V(P)	5	C140, C202, C226, C371, C556
TANTAL CAPACITOR,S M	TEESVP1A475M8R	NEC	4.7u/10V(P)	8	C109, C114, C227, C236, C249, C250, C263, C287
			N.C	18	C154 , C205 , C231 , C301 , C313 , C314 , C337 , C396 , C498 , C497 C511, C530, Q15, R234, R299, R325, R367, R386
CERAMIC,INNDUCTOR, CI-B	1005 270JJT	Ceratech	27nH	1	L32
CERAMIC,INNDUCTOR, CI-B	1005 471JJT	Ceratech	47nH	1	L306
CERAMIC,INNDUCTOR,SMD		Ceratech	220nH	6	L27, L28, L29, L31, L57, L305
CERAMIC ,INNDUCTOR ,SMD		Ceratech	270nH	1	L309
CERAMIC,INNDUCTOR,SMD		Ceratech	820nH	2	L64, L313
CERAMIC,INNDUCTOR,SMD		Ceratech	4.7uH	7	L49, L50, L51, L52, L54, L56, L71
COIL,FIXED,SMD	LQW2BHN39NJ04	MURATA	39nH	1	L55
COIL,FIXED,SMD	LQW2BHN56NJ04	MURATA	56nH	1	L53
COIL,FIXED,SMD	LQW31HN64NJ03L	MURATA	64nH	4	L301, L302, L307, L308
COIL,SPRING,SMD	0.45x1.5x4T	Hoesung Coil	19.6nH	1	L35
COIL,SPRING,SMD	0.30x1.7x8T	Hoesung Coil	60nH	5	L34, L37, L38, L39, L40
RES,CF,SMD	1005 5% TYPE	ROHM, WAISIN	10	3	R287, R288, R509
RES,CF,SMD	1006 5% TYPE	ROHM, WAISIN	100	3	R316, R497, R504
RES,CF,SMD	1007 5% TYPE	ROHM, WAISIN	1K	7	L33, R104, R203, R265, R322, R324, R499,

RES,CF,SMD	1008 5% TYPE	ROHM, WAISIN	10K	19	R107, R111, R122, R123, R128, R129, R133, R181, R215, R244 R245, R247, R249, R271, R306, R370, R496, R502, R505
RES,CF,SMD	1009 5% TYPE	ROHM, WAISIN	100K	13	R205, R208, R212, R232, R241, R246, R280, R286, R301, R302 R309, R310, R531
RES,CF,SMD	1010 5% TYPE	ROHM, WAISIN	1M	1	R226
RES CF SMD	1011 5% TYPE	ROHM WAISIN	1 2K	1	R202
RES,CF,SMD	1012 5% TYPE	ROHM, WAISIN	12K	1	R381
RES,CF,SMD	1013 5% TYPE	ROHM, WAISIN	120K	3	R256, R259, R282
RES,CF,SMD	1014 5% TYPE	ROHM, WAISIN	150	3	R121, R127, R207
RES,CF,SMD	1015 5% TYPE	ROHM, WAISIN	1.5K	1	R522
RES,CF,SMD	1016 5% TYPE	ROHM, WAISIN	15K	2	R138, R281
RES,CF,SMD	1017 5% TYPE	ROHM, WAISIN	150K	2	R278, R525
RES,CF,SMD	1018 5% TYPE	ROHM, WAISIN	18K	1	R251
RES,CF,SMD	1019 5% TYPE	ROHM, WAISIN	180K	1	R106
RES,CF,SMD	1020 5% TYPE	ROHM, WAISIN	20K	1	R523
RES,CF,SMD	1021 5% TYPE	ROHM, WAISIN	220	4	R114, R132, R277, R291
RES,CF,SMD	1022 5% TYPE	ROHM, WAISIN	2.2K	5	R105, R266, R272, R317, R528
RES,CF,SMD	1023 5% TYPE	ROHM, WAISIN	220K	5	R210, R223, R254, R323, R527
RES,CF,SMD	1024 5% TYPE	ROHM, WAISIN	22K	4	L310, R214, R312, R371
RES,CF,SMD	1025 5% TYPE	ROHM, WAISIN	24K	2	R110, R264
RES,CF,SMD	1026 5% TYPE	ROHM, WAISIN	240K	1	R233
RES,CF,SMD	1027 5% TYPE	ROHM, WAISIN	270	3	R124, R130, R510
RES,CF,SMD	1028 5% TYPE	ROHM, WAISIN	330	3	R137, R230, R268
RES,CF,SMD	1029 5% TYPE	ROHM, WAISIN	33K	2	R248, R526
RES,CF,SMD	1030 5% TYPE	ROHM, WAISIN	330K	3	R204, R243, R380
RES,CF,SMD	1031 5% TYPE	ROHM, WAISIN	3.9K	2	R209, R385
RES,CF,SMD	1032 5% TYPE	ROHM, WAISIN	390K	1	R379
RES,CF,SMD	1033 5% TYPE	ROHM, WAISIN	4.7	2	R284, R285
RES,CF,SMD	1034 5% TYPE	ROHM, WAISIN	470		R103, R276
RES,CF,SMD	1035 5% TYPE	ROHM, WAISIN	4.7K	18	R126, R134, R139, R206, R216, R229, R236, R267, R275, R368 R369, R372, R376, R384, R495, R507, 524, R529
RES,CF,SMD	1036 5% TYPE	ROHM, WAISIN	47K	11	R101, R108, R112, R213, R221, R224, R225, R231, R238, R253 R270
RES,CF,SMD	1037 5% TYPE	ROHM, WAISIN	470K	4	R113, R222, R255, R279

RES,CF,SMD	1038 5% TYPE	ROHM, WAISIN	4.7M	1	R274
RES,CF,SMD	1039 5% TYPE	ROHM, WAISIN	51	5	R135, R136, R201, R307, R501
RES,CF,SMD	1040 5% TYPE	ROHM, WAISIN	51K	3	R217, R262, R263
	1041 5% TYPE	ROHM ,WAISIN	560	1	R102
RES,CF,SMD	1042 5% TYPE	ROHM, WAISIN	5.6K	4	R237, R382, R502, R508
RES,CF,SMD	1043 5% TYPE	ROHM, WAISIN	6.8K	1	R506
RES,CF,SMD	1044 5% TYPE	ROHM, WAISIN	68K	2	R269, R305
RES,CF,SMD	1045 5% TYPE	ROHM, WAISIN	820	2	R521, R530
RES,CF,SMD	1046 5% TYPE	ROHM, WAISIN	8.2K	3	R109, R218, R283
RES,CF,SMD	1047 5% TYPE	ROHM, WAISIN	9.1K	3	R242, R250, R273
RES,CF,SMD	1048 5% TYPE	ROHM, WAISIN	91K	4	R257, R258, R260, R261
RF FET,SM	BF998R	VISHA	BF998R	1	Q13
IC,MEM,EEPROM,SMD	AT24C128-10TU-2.7	ATMEL	AT24C128-10TU-2.7	1	U102
TR,SMD	KRA225S	KEC	KRA225S	1	Q29
TR,SMD	KIA7025AT	KEC	KIA7025AT	1	Q52
TR,SMD	KTA1001Y	KEC	KTA1001Y	1	Q60
IC,LINER,OTHER,SMD	MB15E03SLPFV1	FUJITSU	MB15E03SLPFV1	1	U52
RF TR,SMD	2SC4226-T1-A/JM-R25	NEC	2SC4226	7	Q11, Q14, Q20, Q21, Q22, Q23, Q24
RF TR,SMD	2SC3356-T1B-A/JM	NEC	2SC3356	1	Q25
RF FET,SMD	NESG260034	NEC	NESG2700341Q26		
DIODE,PIN,SMD	RN142S	ROHM	RN142S	3	D101, D102, D103
DIODE,SMD	1SS400(TE61)	ROHM	1SS400	1	D56
DIODE,SMD	RB706F-40	ROHM	RB706F-401D204		
DIODE,SMD	DAN204U	ROHM	DAN204U1D303		
DIODE,SMD	DAN235U	ROHM	DAN235U2D110, D111		
TR,SMD	DTC114EUA	ROHM	DTC11	4	EUA8Q16, Q18, Q50, Q51, Q53, Q56, Q57, Q64
TR,SMD	UMC5N	ROHM	UMC5N	6	Q33, Q34, Q35, Q36, Q58, Q62,
TR,SMD	UMT3906(T106)	ROHM	UMT39061Q63		
TR,SMD	KTC4075Y	ROHM	KTC4075Y2Q28, Q61		
DISPLAY,LED,SMD	TO-1615BC-MRMGEE	Oasis	TO-1615BC-MRMGEE	1	D51

DISPLAY,LED,SMD	LT8C23-11-UA96-T1	LEDTECH	LT8C23-11-UA96-T1	1	D54
FUSE,SMD	BA-100(32V/4A)	AEM	BA-100(32V/4A)1F10		
DISPLAY,LCD	HQ30679	P&L	HQ30679	1	LCD10
ZIBERA	ZIBERA	P&L	ZIBERA	1	
MIC	COB627P-2044-00-TA	SANICO	COB627P-2042-00-TA	1	MIC10
SW,TACT,SMD	1112E	DAEJIN Switch	1112E	4	S11, S12, S13, S14(EMR, PTT, MENU, MONI)
SW,TACT,SMD	1115TN-2	DAEJIN Switch	1115TN-23S15, S16, S17(DOWN, ENTER, UP)		
Speaker	SM-4017W-M2	Sinmyong	16Ohm-1W1SP10		
DIDODE,VVC,SMD	1SV325	TOSHIBA	1SV325	6	D14, D15, D301, D302, D305, D306
DIDODE,VVC,SMD	1SV280	TOSHIBA	1SV280	1	D16
IC,LOGIC,40,SMD	TC7W66FU	TOSHIBA	TC7W66FU1U107		
IC,LOGIC,40,SMD	TC7S66FU	TOSHIBA	TC7S66FU2U111, U112		
RF FET,SMD	2SK3476	TOSHIBA	2SK3476	1	Q27
IC,LINEAR,OPAMP,SM D	NJM12902V	JRC	NJM12902V	1	U105
IC,LINEAR,OPAMP,SM D	NJM12903R	JRC	NJM12903R	1	U106
IC,LINEAR, AUDIO AM P	NJM2073M	JRC	NJM2073M	1	U108
IC,LINEAR, IFIC,SMD NJM	2591V	JRC	NJM2591V	1	U51
IC,LINEAR,OPAMP,SM D	NJM12904R	JRC	NJM12904R	2	U54, U104
IC,REGULATOR,SMD NJM	2882F33	JRC	NJM2882F33	1	U109
IC,REGULATOR,SMD NJM	2882F05	JRC	NJM2882F05	1	U55
CON,JACK	AJ356C-4T	DongBoo	AJ356C-4T	1	J51
CON,JACK,SMD	AJ403-4T-SMT	DongBoo	AJ403-4T-SMT	1	J52
VR,ROTARY	DB-093VS-15F-A20K	DongBoo	DB-093VS-15F-A20K	1	VR12
VR,SEMI,SMD EVM	-3YSX50B24	PANASONIC	VR-20K	2	VR21, VR22
OSC,12.8MHz,SMD	DV-5-2.5F2	Sinsung	12.8MHz	1	U53
XTAL,SMD	3.6864MHz(SX-3)	Sinsung	3.6864MHz	1	X10
XTAL,SMD	20.945MHz(SMD_3.2 x 2.5)	Sinsung	20.945MHz	1	X31
FILTER,IF,XTAL,SMD	21.4S12B(SMF-1_7.0 x 5.0	Sinsung	21.4S12B	1	XF31
DISCRIMINATOR,SMD	JTBC455C24-TF	CQ	JTBC455C24	1	XD10
FILTER,CERAMIC,SMD LTW	C455E	CQ	LQWC455E	1	F33
FILTER,CERAMIC,SMD	LTWC455G	CQ	LTWC455G	1	F34
BATT,CONTACT,SMD 425	002MB002G106ZL	SUWYIN	425002MB002G106ZL	1	
PCB	PCB(4-LAYER)	Youknow	MAIN	1	
PCB	PCB(2-LAYER)	Youknow	BATT	1	

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