



***PROFESSIONAL  
TWO-WAY RADIO***

**PT558**

**FM PORTABLE RADIO  
SERVICE MANUAL**



**DANGEROUS!**

Do not connect the AC power or DC power over 8.6V with any connector or terminals of the radio. Otherwise it will cause fire or electric shock or damage to the radio.

**WARNING!**

Do not reverse power connection.

It may cause harm to the radio if signal input on the antenna connector is bigger than 20 dBm (100mW).

Do not turn on the power before the antenna or load connection is completed.

If the antenna has been damaged, do not use the radio. Damaged antenna may cause lightly burning on skin.

Though the radio is waterproof, it's better avoid putting it in rain or snow, or any other liquid to ensure its life and performance.

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## Chapter 1 Introduction

### 1.1 Introduction

This manual applies to the service and maintenance of PT558 series of FM mobile radios, and is designed for the engineers and professional technicians that have been trained by Kirisun. In this manual you can find all the information of product service. Kirisun reserves the rights to modify the product structure and specification without notice in order to enhance product performance and quality. You can also log on our website [www.kirisun.com](http://www.kirisun.com) to download the latest service manual or contact your local dealer or us.

Read this manual before repairing the product.

### 1.2 Service Precautions

#### Safety

Avoid skin contacting with the antenna connector and PCB.

Do not reverse the power polarities.

Do not turn on the power before the antenna and load connection is completed.

Do not use the radio if the antenna has been damaged. Contacting the damaged antenna will cause lightly burning on the skin.

Repairing service can only conducted by professional technicians.

#### Electromagnetism Interference

It's prohibited to use or repair the radio in the following places:

Hospital, health center, air port

Any area with a potentially explosive atmosphere (where the air contains gas, dust and smog, etc.), such as the storage or transportation facilities.

Any area of dynamite or exploder.

#### Component Replacement

All the components used in repair service should be supplied by Kirisun.

Other components of the same models available on the market are not surely able to use in this product and we do not guarantee the quality of the product using such components.

Please fill in a component application forms if you want to apply for any components from Kirisun.

The following is one sample form that might be used to apply for any components from Kirisun.

#### Component Application

Model	Component	No .	Model/ Specifications	Material Serial No .	Quantity
PT558-3	FET	Q11	RD07MVS1	105-RD07MV-001	1
PT558-3	Triode	Q5	2SC5108 (Y)	104-SC5108-001	1
PT558-3	Belt Clip		KBK-05		1

### 1.3 Service

All the Kirisun products are subject to the service warranty.

The main unit of the radio is guaranteed for service of 18 months. In one of the following situations, charge free service will not available. No valid service warranty or original invoice.

Malfunction caused by disassembling, repairing or reconstructing the radio by the users without permission.

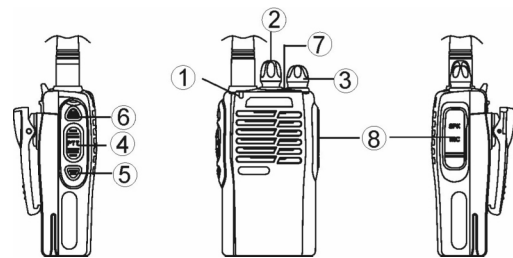
Wearing and tearing or any man-made sabotage such as mechanical damage, burning or water leaking.

Product serial number has been damaged or the product trademark is difficult to identify.

After the warranty expires, lifetime service is still available. And we also provide service components to service stations.

## Chapter 2 Radio Overview and Function Keys

### 2.1 Radio Overview



#### ① LED Indicator

Lights red while transmitting; lights green while receiving a signal.

Flashes red while in low battery power.

#### ② Channel Selector

Rotate to select channel 1-16.

#### ③ Power/Volume Switch

Turn clockwise to switch on the radio.

Turn counterclockwise till a click is heard to switch off the radio.

Rotate it to adjust the volume after turning on the radio.

#### ④ PTT (Push-to-talk)

To make a call, press and hold the PTT button, then speak into the microphone in normal voice.

Release the PTT button to receive a call.

#### ⑤ Monitor Button

Press to disable the SQUELCH, and release to enable the SQUELCH again.

#### ⑥ Channel Annunciation Button

Press it in standby state, and the channel number will be annunciated. If press and hold this button, and at the same time switch on the radio again, the type of voice annunciation of channel number will be changed.

#### ⑦ Emergency Button

Press and hold this button for over 2 seconds to activate warning tone. Press it again to exit the emergency alert state.

Note: When warning tone sounds, all of the buttons are disabled.

#### ⑧ Microphone/Speaker Jacks

For connecting external Microphone/Speaker.

## Chapter 3 ElectroCircuit

### 3.1 Frequency Configuration

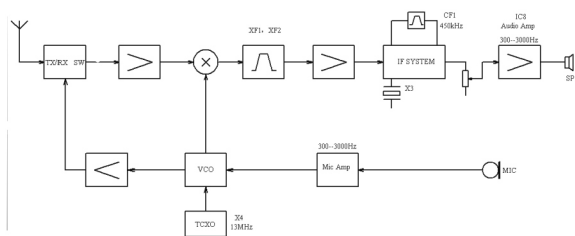


Figure 3.1 Frequency Configuration

This radio adopts the 2nd Mixer, the 1st IF 49.95MHz, the 2nd IF 450kHz.

The receiver's first local oscillation is generated by the frequency synthesizer. The second local oscillation is generated by the crystal oscillator.

The transmitter signals are generated by frequency synthesizer.

The reference frequency of frequency synthesizer is generated by TCXO.

### 3.2 Receiver (RX)

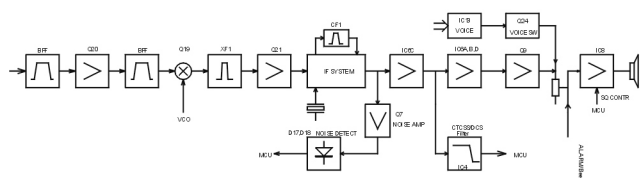


Figure 3.2 Receiver Illustration

#### The Receiver Front Terminal

Signals from the antenna pass through the RX/TX switch (D1, D2, D4, D5); and then undesirable out-of-band signals will be filtered out at the band pass filter (BPF) consisting of C227, L8, L15, C70, C126, C218, L9, C217, L10, C127; then signals are amplified at the low noise amplifier (LNA) consisting of Q20 and its peripheral components.

The output from the LNA passes the BPF consisting of L5, L6, L7, C228, C124, and C132 for filtering and then is sent to the first grade frequency mixer (Q19).

MCU produces output voltages and alters the capacitance of the variable capacitor diodes D21, D22, D23, D24, D26, D30 to control the center frequency of the band-pass filter.

#### The First Frequency Mixer

After mixing the receiving signals and the first local oscillation signals from the frequency synthesizer, the 1st IF signals (49.95MHz) are generated. The first IF signals pass the crystal filter (XF1, XF2), which will filter the signals of adjacent channel and those out of band.

#### IF Circuit

The 1st IF signals from the crystal filter are amplified at the first IF amplifier (Q21), and then are sent to the IF processing IC (IC5, MC3361). The IF IC consists of the 2nd frequency mixer, the 2nd local oscillator, IF amplifier, limiter, phase frequency detector, and noise amplifier.

IC5 inner circuit and X3 (49.5MHz) compose the 2nd local oscillator. The 2nd local oscillation (49.5MHz) and the 1st IF signal (49.95MHz) are mixed at IC5 to generate the 2nd IF (450kHz).

After the 2nd IF signal is amplified and its amplitude is limited at IC5, and then filtered at porcelain filter (CF1,450kHz), IC5 demodulates and sends out audio signals.

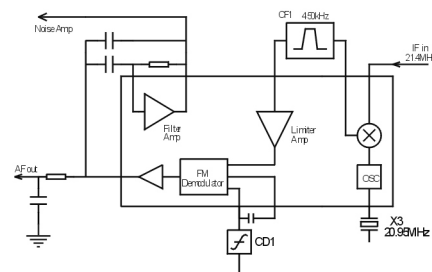


Figure 3.3 IF System

#### Receiver Audio Signal Processing

IC6 and its peripheral circuit compose the receiver audio signal processing circuit. IC5 sends audio signals to IC6-C for amplification, and then to IC4 (CTCSS signaling filtering circuit) and IC6-D. After the signals are amplified, de-emphasized, filtered at IC6 and other cells, the HF (high frequency) and LF (low frequency) will be eliminated, and the remaining 300-3000Hz audio is sent to Q9 for amplification and then to volume potentiometer for adjustment and finally sent to the audio amplifier (IC8).

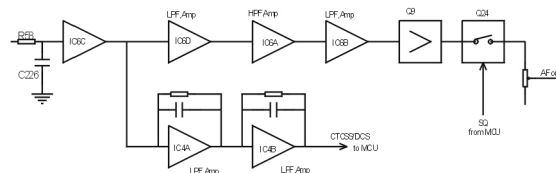


Figure 3.4 Receiver Audio Processing

#### Squelch Circuit

Demodulation output from IC5 is sent to the selection frequency noise amplifier, which consists of IC5 inner noise amplifier and C107, R124, R152, C33, and C35, to be filtered off the noise. After being amplified at Q7, noise is sent to D17 and D18 for wave checking and then sent to MCU, which determines the noise volume to control the squelch.

#### Audio Amplifier

IC8 and peripheral components construct the audio amplifier. Receiving audio signals, voice indication signals, indication tone signals and warning tone signals are collected for audio amplification to drive the speaker. Warning tone has no volume control.

When AFCO is at the high level, Q37, Q8, Q33, and Q38 will be connected, and IC8 starts working and voice comes out from the speaker.

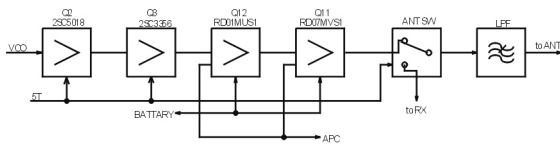
- Q36: Receiving audio signal switch
- Q35: Warning tone switch
- Q25: Indication tone switch

**CTCSS Signal Filtering**

The IC5 demodulated output audio signals may contain CTCSS (continuous tone coded squelch system) and DCS (digital coded squelch). The frequency spectrum of CTCSS/DCS is 2-250Hz. The filtering circuit constructed by IC4 can filter out the signals out of the CTCSS/DCS frequency spectrum to ensure MCU to decode CTCSS/DCS more precisely.

**3.3 Transmitter (TX)**

**Transmitter Amplifier**

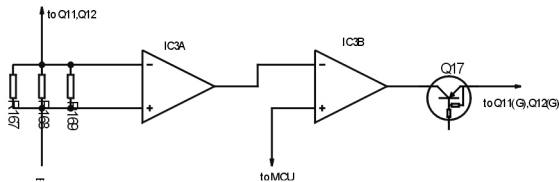


**Figure 3.5 Amplifier and Antenna Switch Diagram**

The modulated signals from VCO are amplified at Q2, Q3, and Q12 and then are sent to Q11 for amplification. Q11 output power: 4.5W.

The Q11 and Q12 gate offset is controlled by APC circuit. Changing gate-offset voltage can control the transmitter output power conveniently.

**APC (Auto Power Control)**



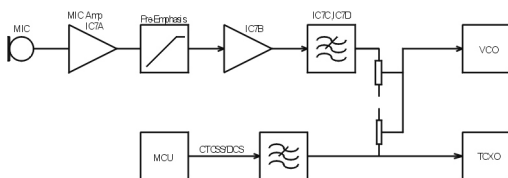
**Figure 3.6 APC Circuit**

R167, R168, and R169 are the amplifier current checker; IC3A is the sample amplifier of the amplification current; IC3B is the power comparison amplifier.

If the transmitter output power is too big, the amplifier current will increase, IC3A output will mount, IC3B output voltage decrease, the offset voltage added to Q11 and Q12 will decrease, and then the transmitter output power will decrease. Vice versa, such can ensure steady transmitter output power in different working circumstances.

MCU changes the input power to IC3B to set the power.

**Transmitter Audio Signal Processing**



**Figure 3.7 Transmitter Audio Circuit**

IC7 and the peripherals components construct the transmitter audio processing circuit. After the audio signals from MIC are

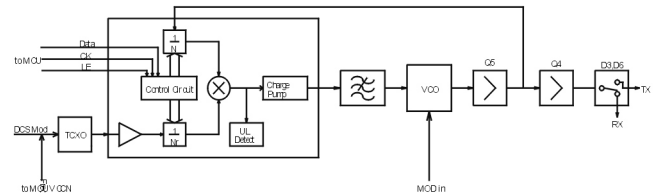
amplified, the amplitude of them is limited, and are filtered, they are sent to VCO together with CTCSS/DCS for modulation.

D13, D308, and Q24 constitute AGC circuit which decreases signal amplitude to avoid signal distortion when MIC signal is too big.

Q34 is the power switch of audio processing circuit. It supplies power to IC7 only when in transmitting and it is controlled by MCU.

J2 is the external MIC socket. When external MIC is used, the inner MIC will cut off automatically, but PTT will remain activated.

**3.4 Frequency Synthesizer**



**Figure 3.8 Frequency Synthesizer**

The radio adopts PLL (Phase Locked Loop) frequency synthesizer.

The frequency synthesizer consists of standard oscillator, voltage controlled oscillator (VCO), programmable frequency demultiplier, phase comparator, and low pass filter.

Q14, L30, C120, C88, C142, C180, D8, and D9 constitute RX VCO. D12 is the modulation circuit of VCO.

IC1 (MB15E03) is PLL integrated circuit, including programmable reference frequency demultiplier, programmable swallowing frequency demultiplier, phase comparator, and charge pump.

R244, c193, R202, R40, C207, R141, C205, R2, and C204 construct the low pass filter.

The standard frequency is supplied by X4 (TCXO, 13MHz).

The standard frequency from TCXO (Temperature Control Transistor Oscillator) are demultiplied by the programmable reference frequency demultiplier at IC1 to acquire 5kHz or 6.25kHz reference frequency (controlled by MCU according to the preset channel frequency).

The oscillation frequency from VCO is sent to IC1, and demultiplied by swallowing frequency demultiplier and compared with reference frequency to acquire the error signals. Then pass the low pass filter and are sent to VCO to change VCO oscillation frequency to the preset value, and then VCO is locked.

$$N = FVCO / FR$$

N: Frequency demultiplication times

FVCO: VCO oscillation frequency

FR: Reference frequency

Check Loss of Lock: When PLL is in loss of lock, IC pin14 sends out low level signals to MCU, which controls the transmitter not to transmit and initiate warning tone.

Q6: Power filter to supply more pure power to reduce the noise of the frequency synthesizer.

**3.5 Voice Indication Circuit**

The radio features voice indication, which is very useful at night or in the environment of dim light.





**DCS**

DCS (digital code squelch) is a kind of continuous digital code modulated with voice signals on carrier wave to control squelch.

83 groups of standard codes (positive and inverse code) are available. See table 3.2.

DCS signals generated by MCU (PWM wave shape) pass the low pass filter to be filtered off the high frequency over 300Hz and then are sent to VCO and TCXO for modulation. VCO modulates the high frequency of DCS signals; TCXO modulates the low frequency of DCS signals.

CTCSS/DCS signals from the receiver are sent to MCU for modulation. MCU determines whether the DCS encoding of the receiving signals is identical with that set on the radio and decides whether to turn on the speaker.

**Table 3.2 DCS Encoding List**

023	114	174	315	445	631
025	115	205	331	464	632
026	116	223	343	465	654
031	125	226	346	466	662
032	131	243	351	503	664
043	132	244	364	506	703
047	134	245	365	516	712
051	143	251	371	532	723
054	152	261	411	546	731
065	155	263	412	565	732
071	156	265	413	606	734
072	162	271	423	612	743
073	165	306	431	624	754
074	172	311	432	627	

**3.7 Semiconductor Component**
**MCU Description**
**Table 3.3 Microprocessor (M38034) Port Description**

Pin No.	Port Name	Pin Name	I/O	Function
1	TI	P1	I	QT/DQT signal input
2	BUSY	P2	I	Busy signal input
3	BATT	P3	I	Battery voltage check
4	ALARM	P4	I	Alarm key check
5	TO	P5	O	QT/DQT output
6	BEEP	P6	O	Beep output/warning tone output
7	PF1	P7	I	Voice indication key check
8	ENC0	P8	I	Encoding input
9	ENC2	P9	I	Encoding input
10	ENC3	P10	I	Encoding input
11	ENC1	P11	I	Encoding input
12	NC	P12	I	Not used
13	PTT	P13	I	[PTT] key input, connected with RXD
14	TXD	P14	O	RS-232C input
15	RXD	P15	I	RS-232C input
16	MONI	P16	I	[MONI] key input
17	SELF	P17	I	Self programming L: Model setting mode
18	CNVSS	P18	I	Connect 10K resistor with VSS
19	RST	P19	I	Reset input
20	INT0	P20	I	Power check input

21	ENC-SEL	P21	I	Encoding switch selection. Connect the pull down resistor with VSS.
22	XIN	P22	I	(7.3MHz) Oscillator
23	XOUT	P23	O	
24	VSS	P24	I	Earthing
25	SHIFT	P25	O	Clock frequency shift H: Open
26	PABC	P26	O	Final power supply H: Open
27	OSCSI	P27	I	VCO crystal selection. Connect the pull down resistor with VSS H: 13, L: 16.8
28	WNTC	P28	O	Wide/Narrow band control H: Wide, L: Narrow
29	PS	P29	O	PLL power saving control H: Normal working, L: Power saving
30	SDA	P30	I/O	E <sup>2</sup> PROM data wire
31	SCL	P31	O	E <sup>2</sup> PROM clock wire
32	UL	P32	I	PLL unlock check pin H: Locked, L: Loss of lock
33	DT	P33	O	PLL data output
34	CK	P34	O	PLL clock output
35	LE	P35	O	PLL IC enabling pin H: Latched
36	5MC	P36	O	Power control except CPU and E <sup>2</sup> PROM L: Open
37	AFCO	P37	O	Audio amplification power H:Open
38	RX	P38	O	TX/RX VCO Selection H: Receiving
39	GLD	P39	O	Green indicator control H: Light
40	RLED	P40	O	Red indicator control H: Light
41	SAVE	P41	O	Battery power saving control H: Power supply, L: Power saving
42	MUTE	P42	O	Squelch control H: Mic squelch L: Audio squelch
43	5RC	P43	O	Receiving power control L: Open
44	5TC	P44	O	Transmitter power control H: Open
45	W588C	P45	O	Voice indication H: Voice annunciation of channel
46	AC	P46	O	Alert control H: Control by voice volume. It must be in low battery level when in emergency alert state.
47	DAOUT1	P47	O	D/A output 1
48	DAOUT0	P48	O	D/A output 0
49	DAOUT7	P49	O	D/A output 7 frequency regulated output VCCN
50	DAOUT6	P50	O	D/A output6
51	DAOUT5	P51	O	D/A output5
52	DAOUT4	P52	O	D/A output4
53	DAOUT3	P53	O	D/A output3
54	DAOUT2	P54	O	D/A output2
55	NC	P55	O	Not used
56	APC	P56	O	TX: Auto power control output RX: BPF tuning output
57	VCC	P57	I	CPU power 5V input
58	VREF	P58	I	Connected with VCC
59	AVSS	P59	I	Connected with VSS
60	IF_SEL	P60	I	IF selection. Connect the pull down resistor with VSS H: 49.95, L: 21.4

61	BUSY_V	P61	I	Voice indication of circuit busy check
62	DATA_V	P62	I/O	Voice indication data
63	SCLK_V	P63	I/O	Voice indication clock
64	NC	P64	I	Not used

### 3.4 Semiconductor Function Description

Position	Type	Function Description
IC1	MB15E03	Frequency synthesizer
IC4	NJM2904	APC, Voltage comparison, drive
IC5	MC3361	Receiver's 2nd local oscillation, 2nd IF amplification, amplitude limit, demodulation, noise amplification
IC6	NJM2902	Receiver demodulation signal amplification, filtering
IC7	NJM2902	MIC amplification, amplitude limit, filtering
IC8	KIA6278F	Receiver audio amplifier
IC9	AT24C08	E <sup>2</sup> PROM, memory channel frequency data, function setting parameter, Debugging state parameters
IC10	M38034	MCU
IC11	PST9140NR	MCU reset circuit
IC12	HT7150-1	Low voltage difference, low power consumption, and regulator
IC15	W588A080	Voice storage IC
Q2	2SC5108	Transmitter 1st amplification
Q3	2SC3356	Transmitter 2nd amplification
Q4	2SC5108	VCO buffering amplifier
Q5	2SC5108	VCO buffering amplifier
Q6	2SC4617	VCO power filter
Q7	2SC4738	Noise amplifier
Q9	2SC4617	Receiver audio signals amplification
Q10	2SC1623	5V regulated output current stretcher
Q11	RD07MVS1	Transmitter final power amplifier
Q12	RD01MUS1	Transmitter power amplifier drive
Q17	DTA144EE	APC output switch
Q19	3SK318	The 1st frequency mixer
Q20	3SK318	Receiver HF amplifier
Q21	KTC4082	The 1st IF amplifier
Q22	DTC144EE	Red LED drive
Q23	DTC144EE	Green LED drive
Q24	2SK1824	Voice indication switch
Q26	DTC144EE	5C switch
Q29	KTA1298	5T switch
Q30	KTA1298	5V regulated output current stretcher
Q31	KTA1298	5R switch
Q32	KTA1298	5C switch
Q34	DTA144EE	Power switch of MIC amplification unit
Q35	2SK1824	Audio output switch of receiver. Cut off when in emergency alert state.
Q36	2SK1824	Receiver audio output switch

**Table 3.5 Diode Function Description**

Position	Type	Function Description
D1	MA77	Transmitter antenna switch diode
D2	MA77	Transmitter antenna switch diode
D3	HSC277	VCO output switch
D4	HSC277	Antenna switch
D5	HSC277	Antenna switch
D6	HSC277	VCO output switch
D7	HSC277	5V regulated output current stretcher
D8	HVC376B	VCO oscillation variable capacitance diode
D9	HVC376B	VCO oscillation variable capacitance diode
D12	MA360	VCO modulation diode
D14	HZU5ALL	APC output voltage-limiting diode
D15	MA2S111	Loss of lock check diode
D16	MA2S111	VCO power filtering accelerating diode
D17	1N4148	Noise detector
D18	1N4148	Noise detector
D20	LEDGreen	Receiving indication
D25	MA2S111	APC individual diode
D28	LED Red	Transmitting indication
D29	LEDGreen	Receiving Indication

**Table 3.6: XF1、XF2 Crystal Filter Features**

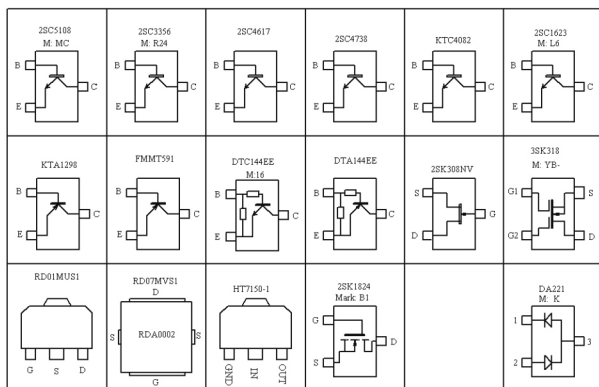
Item	Specified Value
Nominal center frequency	49.95MHz
Transmission bandwidth	± 7.5kHz or bigger within 3dB
40dB Barrage bandwidth	± 20.0kHz or smaller
Pulse	1.0dB or smaller
Insertion loss	3.0dB or smaller
Guarantee attenuation	80dB or bigger within fo-910kHz
Terminal resistance	---

**Table 3.7 CF1 LTVPC450EB Features**

Item	Specified Value
Nominal center frequency	450kHz
6Db bandwidth	± 3.5kHz or bigger
50dB bandwidth	± 12.5kHz or smaller
Pulse	2.0dB or smaller within f0 ± 4kHz
Insertion loss	6.0dB or smaller
Guarantee attenuation	35.0dB or bigger within f0 ± 100kHz
Terminal resistance	2.0k Ω



Figure 3.8 Semiconductor Component Packaging Illustration:



## Chapter 4 Function Description and Parameter Setting

### 4.1 Major Functions

#### 4.1.1 16 Channels/15 Channels +Scanning Channel

The radio stores 16 channels including one scanning channel.

#### 4.1.2 Scanning Function Control

If you switch the channel to channel 16, the radio is in the scanning state. After starting scanning, it will pause when receiving signals.

If you switch the channel to channel 1-15, the scanning function is inactivated.

##### 4.1.2.1 Carrier Wave Control Scanning

If the radio scanning setting is “carrier wave control scanning”, switch the channel to channel 16 to set the radio in the scanning working mode.

Each channel can be set the scanning added/deleted function solely: if the setting is scanning added, the channel will be added in the scanning list; if the setting is scanning deleted, the channel will not be in the scanning list.

The radio starts scanning from channel 1 to 16 repeatedly in the consequence of the scanning list. If signals are detected on a channel (if the channel is set with receiving signaling the carrier wave must match the signaling), the radio pauses on that channel and will restarts scanning 0.5~5 seconds (scanning delay time) after the signals disappear.

If you switch the channel to channel 1~15, scanning is inactivated.

##### 4.1.2.2 Time Control Scanning

If the radio scanning setting is “time control scanning”, switch the channel to channel 16 to set the radio in the scanning working mode.

Each channel can be set scanning added/deleted function solely: if the setting is scanning added, the channel will be added in the scanning list; if the setting is scanning deleted, the channel will not be in the scanning list.

The radio starts scanning from channel 1 to 16 repeatedly in the consequence of the scanning list. If signals are detected on a channel (if the channel is set with receiving signaling the carrier wave must match the signaling), the radio pauses on that channel and will restarts scanning 0.5~5 seconds (scanning delay time) after the signals disappear.

If you switch the channel to channel 1~15, scanning is inactivated.

#### 4.1.2.3 Priority Channel

You can set one channel in the scanning list as the priority channel, which has the highest priority during scanning. The radio scans the first non-priority channel in the scanning list and then scans the priority channel, the next non-priority channel in the scanning list, and then the priority channel again. It goes on scanning in such sequence.

#### 4.1.2.4 Revert Channel

If you press PTT button when the radio is in scanning state, the radio will transmit on the “revert channel”, which has 6 types:

Selected channel: The first channel in the scanning list.

Selected channel + current channel: If the radio is in the state of scanning pause, it will transmit on the current communication channel. Otherwise it will transmit on the first channel in the scanning list.

Priority channel: The radio will always transmit on the priority channel set in the scanning list when pressing PTT.

Priority channel + current channel: If the radio is in the state of scanning pause, the radio will transmit on the current communication channel. Otherwise it will transmit on the priority channel in the scanning list.

Last called channel: The last channel that received signals.

Last called channel + current channel: If the radio is in the state of scanning pause, the radio will transmit on the current communication channel. Otherwise it will transmit on the last called channel.

The current communication channel is the channel on which the radio pauses in the 4 following situations:

- 1、When the radio receives signals and does not restart scanning, the radio will stay on the current channel.
- 2、The radio will stay on the current channel during 0.5~5 seconds (scanning delay time) after signals disappear.
- 3、The radio will stay on the current channel when pressing the PTT during scan.
- 4、After releasing the PTT to end transmitting, during the preset transmitting dwell time, the radio will stay on the current channel. After the preset transmitting dwell time 0.5~5 seconds, the radio will restart scanning again.

#### 4.1.2.5 Retrace Period

If the priority channel has been set in the scanning list and retrace period is also set, when the radio receives signals on a non-priority channel and pauses scanning, it will retrace the priority channel in a certain period (0.3~5s). If signals are detected on the priority channel, it will stay on the priority channel; if no signal is detected on the priority channel, it returns to the original channel it stays on.

#### 4.1.3 CTCSS/DCS

CTCSS/DCS can realize selective calls and group calls. On the same channel, only the two parties whose CTCSS/DCS are identical can communicate. CTCSS/DCS signaling code on the channel is preset.

#### 4.1.4 TOT

The purpose of the time-out timer is to prevent any single person from overlong using a channel to transmit and affecting the whole group communication.

If the radio transmits longer than the preset TOT time limit, the radio will stop transmitting and warning tone sounds. To stop the warning tone, release the PTT button. Press the PTT again you can resume transmitting.

#### 4.1.5 Auto Power Saving

When no signals are being received or no operations are being

conducted for over 10 seconds, the battery power saving will be activated. When it is receiving signals or in operating state, battery power saving is inactive.

#### 4.1.6 Low Battery Warning

When the battery power appears low, the indicator flashes. If the battery power is lower than the preset value during transmitting, the status indicator flashes red. When the speaker sounds warning tone, the radio will stop transmitting.

#### 4.1.7 Monitor

When no signals are being received, the radio squelch circuit mutes the speaker.

Press the MONI key to cut off the squelch control circuit, and you will hear noise from speaker (no matter whether there are signals). Such operation is very useful when you want to adjust voice volume or receive weak signals (to avoid voice intermittence when in weak signals).

When you press the MONI key, the green indicator lights, and the radio is in the state of monitoring.

#### 4.1.8 Busy Channel Lockout

If “busy channel lockout” has been activated, transmitting signals is prohibited on the busy channel. If you press the PTT to transmit on the busy channel, the speaker will sound busy channel lockout tone, and you cannot transmit signals.

#### 4.1.9 PC Programmable

You can program the radio functions and adjust some parameters by PC programming software KSP20.

#### 4.1.10 Wired Clone

The radio can transfer the stored data to another radio of the same mode by a specified cable.

#### 4.1.11 Squelch Level Selection

The purpose of the squelch is to mute the speaker noise when no signals are received or the signals are weak. When the squelch is activated, you can hear noise from the speaker; when the squelch is inactivated, you will not hear noise from the speaker. Selecting the squelch level is to select which the signal strength level is strong enough to enable the squelch or weak enough to disable the squelch. Over high squelch level will make the radio unable to receive signals efficiently when signals are weak; over low squelch level will make the radio communication affected by noise or other irrelevant signals. The squelch level has 0-9 options.

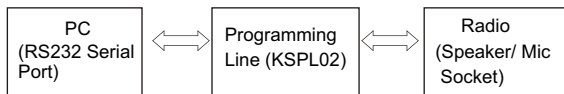
#### 4.1.12 Beep Tone

This option controls power on tone, channel busy tone and TOT tone.

### 4.2 Parameter Setting (PC Mode)

The radio parameters have been programmed in the factory. The user can program the radio parameters such as working frequency, channels, CTCSS/DCS, auto scanning. We designed a user friendly and convenient Chinese/English programming software KSP20 for users to set parameters on the radio. The programming steps are as follows:

- a. Install the programming software KSP 20 on the computer.
- b. Connect the radio to the computer serial port with the specified programming line (KSPL02). See Figure 4.1



- a. Turn on the computer power.
- b. Turn on the radio power.
- c. Click the KSP20 program to run the programming software.
- d. Click the “Tools” in the KSP20 pull-down menu, and click “Read Data” to read the radio parameters into the computer; click “Write Data” to transfer the PC programming parameters into the radio.

e. You can program the following parameters with the KSP20 software.

- 1) The RX and TX frequency of each channel.
- 2) The receiving and transmitting signaling of each channel.
- 3) Busy channel lockout option.
- 4) TOT
- 5) Squelch level option.
- 6) Power saving option.
- 7) Beep tone option.
- 8) Monitor mode option.
- 9) Scan mode option.
- 10) Scan the revert channel option.
- 11) Scan the priority channel option.

For more details, please refer to the “Help” in the KSP20 software.

#### Notice:

- 1) Turn off the radio before connection.
- 2) When the radio is being read data, the indicator lights green and it's prohibited to press the PTT button; when the radio is being written data, the indicator lights red.
- 3) Before the first time editing, you should read data from the radio and backup the data.
- 4) If the radio cannot work normally after being written in with the editing data, open the data backup and rewrite the backup into the radio.
- 5) Model information is important radio data and is prohibited to modify.
- 6) After programming, you need to turn on the radio power again to make the radio resume the normal work.

### 4.3 Computer Test Mode:

Connect the radio to the radio communication port with the specified programming line (KSPL02). See Figure 4.1.

Warning: Before enter the computer test mode, connect a HF load of 50 Ω to the radio antenna connector or connect the radio to a comprehensive test device.

Under the computer test mode, you can modify the following parameters with KSP20 programming software:

- 1) Frequency tuning;
- 2) Transmitting power;
- 3) Low voltage threshold;
- 4) The 9th squelch level;
- 5) The 3rd squelch level;
- 6) Sub-audio wide band modulation degree;
- 7) Sub-audio narrow band modulation degree;
- 8) Wide band sub-audio center.

### 4.4 Wired Clone (It can be prohibited by programming software)

When the wired clone function is activated, the radio can enter the wired clone mode. After entering the wired clone mode, the

radio will not exit it automatically and you have to turn on the radio again to enter the user's mode. Operating steps are as follows:

1) Turn on the radio with the MONI key pressed, and 2 seconds later the red light flashes twice and two beep tones sound, and then the radio enters the wired clone mode.

2) Press the PTT button on the host radio to activate/inactivate the wired clone mode on the sub radio. But the wired clone mode of the host radio will not be changed. When pressing the PTT button, the green light flashing twice and one beep mean to activate the clone mode; the red light flashing twice and two beeps mean to inactivate the clone mode. When entering clone mode, the default setting of the sub radio receiving data is to prohibit wired clone mode.

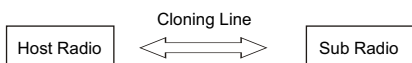
3) Press the MONI key, red light flashes, and it starts cloning. After cloning is finished, the red light turns dim.

**Note:** You can activate/inactivate the wired clone mode. Short circuit the two SELF terminals, enter the model setting mode and then the manually adjustment function and wired clone function will become active automatically. If you press the MONI key at this moment, the wired clone function will be prohibited.

You can also activate/inactivate the wired clone mode by PC programming software.

If the wired clone function has been prohibited, it cannot enter the wired clone mode. The wired clone mode has been prohibited in the factory.

The cloning data includes all the data in “ 4.2 Parameter Setting” but the adjustment parameters in “ 4.3 Computer Test Mode” .



## Chapter 5 Service Assemble and Disassemble

The radio is a precision communication equipment. Please be careful when assemble or disassemble the radio during service.

### 5.1 Removing and Installing the Battery

To remove the battery, push the latch upwards and remove the battery away from the radio. (See Figure 5.1)

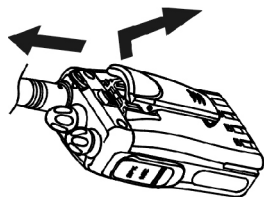


Figure 5.1

To install the battery, match the tow bulges at the bottom of the battery with the corresponding grooves at the radio aluminum alloy frame and insert it in. Then press the upper end of the battery till the latch secure.



Figure 5.2

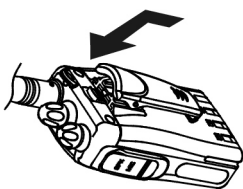


Figure 5.3

### 5.2 Removing and Installing the Belt Clip

To remove the belt clip, use your nail or a tool to lift the metal spring piece in the belt clip from the topside, and then pull the belt clip away from the radio.

To install the belt clip, match the upper head of the belt clip with the glides on the rear of the battery, and then press the belt clip downwards to lock it in place. (See Figure 5.4)

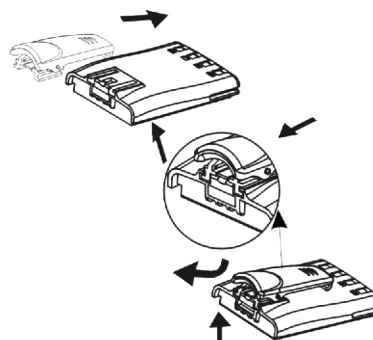


Figure 5.4

### 5.3 Removing the Casing from the Chassis

- 1) Remove the knobs;
- 2) Remove the two knob nuts and the antenna nut;
- 3) Remove the two cross head screws that fix the top cover at the top;
- 4) Remove the two cross head screws that fix the aluminum alloy frame at the bottom;
- 5) Pull the aluminum alloy frame out of the casing.

See Figure 5.5

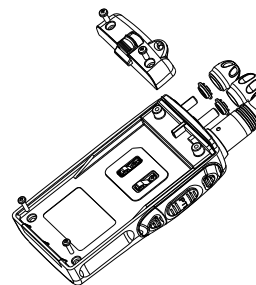


Figure 5.5

### 5.4 Remove the Chassis from the Main Board

- 1) Remove the screw of from the PCB;
- 2) Melt the solder at the antenna point with a electric soldering iron and take off the main board;
- 3) Take away the two screws and the antenna connector.

See Figure 5.6.

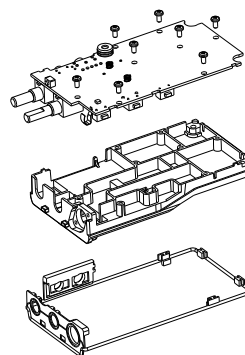
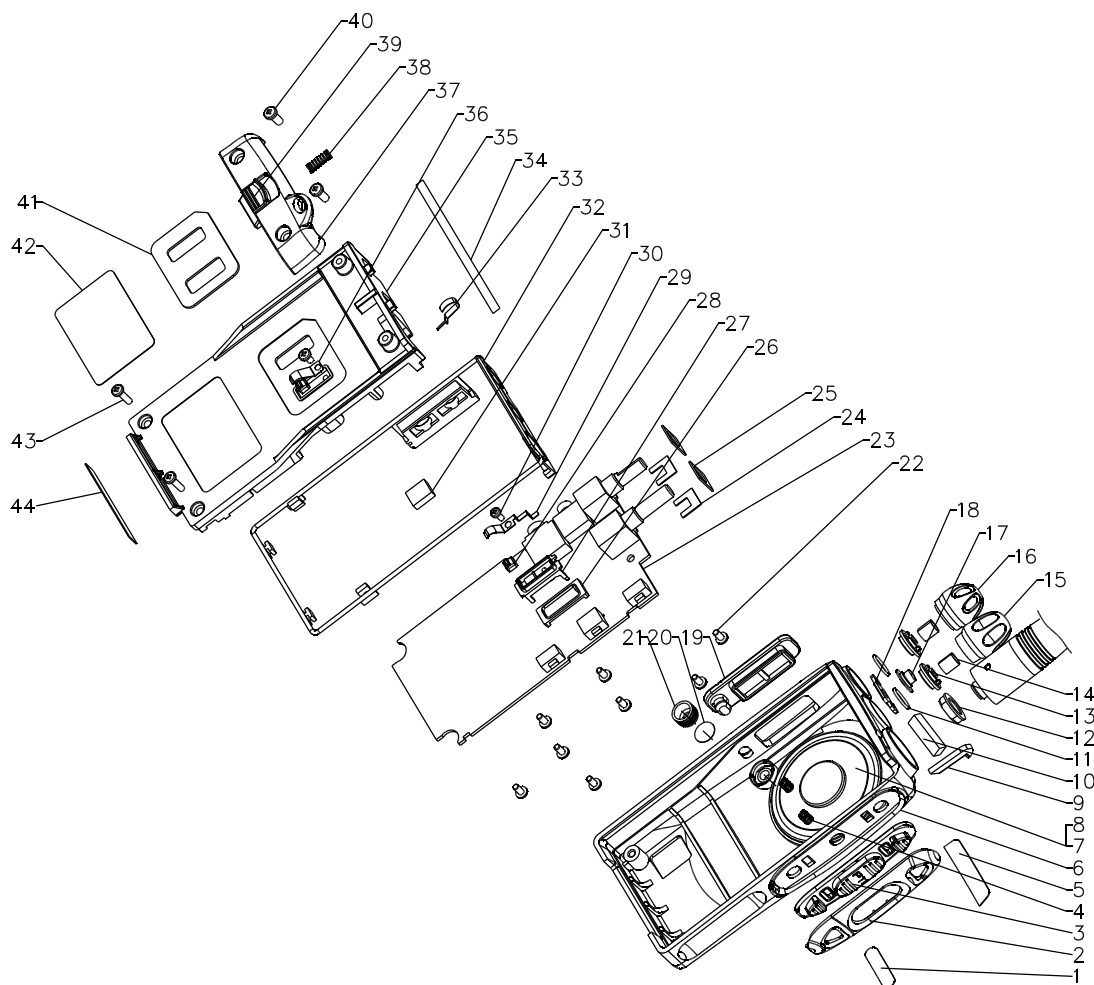


Figure 5.6

**5.7 Exploded View**


NO.	MATERIAL NO.	DESCRIPTION	QTY
21	202-000558-R09	MIC CAP	1
20	204-006800-006	MIC WASHER	1
19	202-000558-R01	MIC COVER	1
18	201-000558-R08	EMERGENCY BUTTON COVER	1
17	202-000558-R03	EMERGENCY BUTTON	1
16	201-000558-R02	VOLUME KNOB	1
15	201-000558-R03	CHANNEL KNOB	1
14	203-003208-009	KNOB CIRCLIP	2
13	203-000558-R02	SWITCH NUT	2
12	203-005583-R02	ANTENNA NUT	1
11	202-000558-R04	SWITCH WATER PROOF WASHER	2
10	204-005583-001	ANTENNA WASHER	1
9	201-000558-R09	LIGHT PIPE	1
8	204-000558-R01	SPEAKER WATERPROOF NET	2
7	121-100000-007	SPEAKER	1
6	201-005583-004	FRONT COVER	1
5	401-0101E1-R57	LOGO LABEL	1
4	203-000558-004	SPEAKER SPRING	2
3	202-000558-R02	PTT BUTTON	1
2	201-000558-R04	PTT BUTTON FRAME	1
1	401-0101E1-R58	MODEL LABEL	1

44	204-000558-R03	AL LABEL	1
43	301-20080G-R01	M2 SCREW	2
42	401-0201C1-R06	AL LABEL	1
41	204-000558-R02	WATERPROOF LABEL	1
40	301-25050J-R01	M2.5 SCREW	2
39	201-000558-014	PUSH FASTENER	1
38	203-000558-005	PUSH FASTENER SPRING	1
37	201-000558-R05	TOP COVER	1
36	203-003208-R04	NEGATIVE POLE CHIASSIS SPACE	1
35	203-005583-001	ALUMINUM CHASSIS	1
34	204-000558-R05	AL ALLOY LABEL	1
33	203-003208-R01	ANTENNA SPRING	1
32	202-000558-R07	WATERPROOF WASHER	1
31	202-003208-007	INSULATING WASHER	1
30	302-17040G-001	M1.7 SCREW	1
29	203-003208-R02	POSITIVE POLE CHIASSIS SPACE	1
28	202-000558-R08	POSITIVE TERMINAL WASHER	2
27	201-000558-R07	POSITIVE TERMINAL FRAME	1
26	202-000558-R06	WASHER	1
25	204-003208-R05	WASHER	2
24	204-000558-R04	WASHER	2
23		PCB BOARD	1
22	301-20040G-001	M2 SCREW	9

## Chapter 6 Radio Debugging

Before test/debugging, make sure all the equipments have been well connected to the ground.

Before test/debugging, make sure the antenna output terminal has been connected properly to the corresponding devices and load.

The transmitter output must pass RF power attenuator before being connected to the standard signal source/ frequency deviator/ frequency spectrum.

When testing the receiver, make sure not to conduct transmitting operation.

When in debugging/testing/service, make sure static free measures for human body and equipments.

### 6.1 Service Equipment and Software.

The following equipments and software in Table 6.1 are necessary for the service and test of the radio.

Table 6.1 For Test and Service: Equipment and Software

No.	Item	Specifications
1	Computer	Higher than P2, compatible with IBM PC, WINDOWS 98/ME/2000/XP
2	Programming	KSP-20
3	Software	KSPL02
4	Programming Line	KCL01
5	Cloning Line	Output voltage: 7.5V, Output current: $\geq 5A$
6	DC Regulated Power	Test range: 0.5---10W Frequency range: 100MHz500MHz Impedance: 50 $\Omega$ SWR $\leq$ 1.2
7	RF power meter	Frequency range: 0.1600MHz Frequency precision: Higher than $\pm 1 \times 10^6$ Sensitivity: Higher than 100mV
8	Frequency Meter	Frequency range: DC600MHz Test range: 0-- $\pm 5$ KHz
9	Frequency Deviator	Input impedance: Higher than 10M $\Omega$ /V DC, with the ability of testing voltage, current, impedance.
10	Digital Multimeter	Frequency range: 2---3000Hz Output level: 1---500mV
11	Audio Signal Generator	Attenuation: 40dB or 50dB Supporting power: Bigger than 10W
12	RF power Attenuator	Frequency range: 10MHz---1000MHz Output level: 0.1uV~32mV (-127dBm~ 17dBm)
13	Standard signal source	Frequency range: DC~20MHz Test range: 10mV~20V
14	Oscillograph Audio voltmeter	Test range: 10mV~10V

The equipments in item 6, 7, 8, 10, 11, and 12 can be replaced by a comprehensive test instrument.

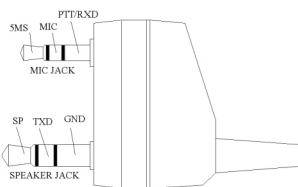


Figure 6.1 External Speaker/Mic Connector Definition

### 6.2 Debugging Items

During the course of maintenance, the radio needs to be tested and debugged after replacing components. Some certain radio parameters can be modified (computer mode) with our KSP 20 programming software. The modifiable parameters are as follows:

- 1) Frequency difference
- 2) TX power
- 3) Low battery power warning threshold
- 4) Squelch level
- 5) CTCSS frequency deviation
- 6) DCS frequency deviation

#### Debugging Procedures

a. Enter the computer test mode. Access method refers to the instruction in 4.2 parameter setting.

b. Select the “Test Mode” option to enter the computer test mode.

c. Select the options that you want to adjust and adjust the parameters on the computer.

d. After adjustment, exit the computer test mode.

### 6.3 Debugging

#### 6.3.1 VCO Modification

Turn off the power saving mode. Set the frequency at the low frequency. In receiving status, test the PD power with the digital multimeter. Adjust the trimming capacitor C180 to make the PD power at  $1V \pm 0.1V$ .

Set the TX frequency at high frequency, press the PTT button, test the PD power with the digital multimeter. The power should lower than 3.5V.

#### 6.3.2 PLL Frequency Adjustment

Under the computer test mode, select “frequency tune” option and click “adjustment” to enter. Adjust the TX frequency among 0~255 to the specified value. (Frequency error should less than 200Hz.)

#### 6.3.3 TX Frequency Adjustment

Under the computer test mode, select “high power, low frequency” and click “adjustment” to enter. Adjust the TX power among 0~255 to 4W. And watch the working current and make sure it not higher than 1.5A.

Adjust “high power, medium frequency”, “high power, high frequency” to set the TX power at 4W.

#### 6.3.4 TX Low Power Warning

Adjust the power to 6.8V.

Under the computer test mode, select “the low power threshold”, and click “adjustment” to enter. Adjust the figure among 0~255 to make the red light flash.

#### 6.3.5 Frequency Deviation Adjustment

Input 100mV, 1000Hz audio signals from the radio MIC, and adjust the potentiometer VR2 to set the TX frequency deviation at  $\pm 2.2$ kHz.

#### 6.3.6 DCS TX Signal Wave Shape and Frequency Adjustment

Under the computer test mode, select “DCS wide band modulation”, and click “adjustment” to enter. Adjust the



potentiometer VR1, and watch the demodulation signals. The wave shape should be smooth (close to square wave) and then adjust the figure to set the frequency deviation at 0.35kHz.

### 6.3.7 CTCSS Frequency Deviation Adjustment

Under the computer test mode, select “ CTCSS wide band modulation ” , and click “ adjustment ” to enter. Adjust the figure to set the frequency deviation at 0.35kHz.

### 6.3.8 Receiver Sensitivity

Repeat adjusting L9, L10, L6, and L5 to make the frequencies at highest sensitivity.

### 6.3.9 Receiver Squelch Setting

Under the computer test mode, select “ the 9th squelch ” and click “ adjustment ” to enter. Input the receiver with the signals of 1kHz modulation frequency, 3kHz frequency deviation, and -117dBm level. Adjust the figure to make the green light flash.

Under the computer test mode, select “ the 1st squelch ” and click “ adjustment ” to enter. Input the receiver with the signals of 1kHz modulation frequency, 3kHz frequency deviation, and 124dBm level. Adjust the figure to make the green light flash.

### 6.4 Debugging

The above debugging refers to Table3, Table4, and Table 5.

**Table 6.3 Voltage Controlled Oscillator (VCO)**

Item	Test Condition	Test Equipment	Test Point	Adjustment Part	Requirement	Note
Setting	Battery Power: 7.5V	Digital Multimeter	PD			
Locked Power	CH:RX Low Frequency			C180	1.0V ± 0.1V	Adjustment
	CH:TX High Frequency				Lower than 3.5V	Watch

**Table 6.4 Receiver**

Item	Test Condition	Test Equipment	Test Point	Adjustment Part	Requirement	Note
Band Pass Filter		Spectroanalyzer/ Comprehensive Test Device	Before Mixing	L9、L10 L7、L6、 L5	ModePass Band 25MHz, smooth wave Shape	Not recommend the user to adjust it!
Audio Level	Ch: RX center frequency RF OUT: -53dBm (501 μ V) MOD:1kHz DEV: ± 1.5 (kHz) Audio Load:16 Ω	RF Audio Signal Generator Oscillator	Speaker Connector		(Turn the volume knob clockwise) Audio power > 0.3 W	Inner speaker power > 1.2W

Item	Test Condition	Test Equipment	Test Point	Adjustment Part	Requirement	Note
Sensitivity	CH: MF CH: LF CH: HF RF OUT: -116dBm (0.35 μ V) MOD:1kHz DEV: ± 1.5kHz (W/N)	RF Audio Signal Generator Oscillator Audio Voltmeter Distortion Test Device /Comprehensive Test Device	Speaker Connector	L9、L10 L7、L6、 L5	SINAD: 12dB or higher	
	Ch: RX Center Frequency			Computer Test Mode	Computer Test Mode After adjustment, squelch activation is normal.	
	9th RF OUT: -117dBm					
	3rd RF OUT: -124dBm					After adjustment, squelch activation is normal.

**Table 6.5 Transmitter**

Item	Test Condition	Test Equipment	Test Point	Adjustment Part	Requirement	Note
TX Frequency		Frequency Meter/ Comprehensive Test Device	Anten	Computer Test Mode	Within ±200Hz	
DCS Wave Shape (Balance)		Oscillator / Comprehensive Test Device		VR1	Wave shape is close to smooth square wave.	
Power		Power Meter/ Comprehensive Test Device/ Ammeter		Computer Test Mode	Adjust to 4W	Within ±200Hz
Maximum Modulation Frequency Deviation	CH: TX Center Frequency AG:1kHz/ 70mV	Frequency Deviation Meter/ Comprehensive Test Device		VR2	Adjust to ±2.2kHz	±200 Hz
Modulation Sensitivity	AG:1kHz/ 7mV				Checking frequency deviation: 1.1kHz~2.0kHz	



Item	Test Condition	Test Equipment	Test Point	Adjustment Part	Requirement	Note
CTCSS DEV	CTCSS: 67Hz	Frequency Deviation Meter/ Comprehensive Test Device	Antenna	Computer Test Mode	Adjust to $\pm 0.35\text{kHz}$	$\pm 50\text{Hz}$
DCS DEV	DCS: 023N				Adjust to $\pm 0.35\text{kHz}$	$\pm 50\text{Hz}$
Battery Power Warning	Battery Terminal: 6.8V				After adjustment, the indicator flashes.	

### Chapter 7 Major Specifications

#### 7.1 General Specification

Model	PT558-03
Frequency	446MHz
Modulation	11K $\phi$ F3E
Number of Channels	16(15+S)
Channel Spacing	12.5 kHz
MF	1st MF: 49.95 Mhz 2nd MF: 450kHz
Working Voltage	7.5V negative grounding
Working Temperature	-25 $^{\circ}\text{C}$ ~ +55 $^{\circ}\text{C}$
Antenna Impedance	50 $\Omega$
Mic Impedance	2k $\Omega$
Battery (Standard)	Model: KB-58A, Li-Poly Battery DC 7.2V , 1200mAh
Dimension (WXHXD)	56 mmx120 mmx29 mm
Weight	235 (With battery and Antenna)

#### 7.2 Receiver

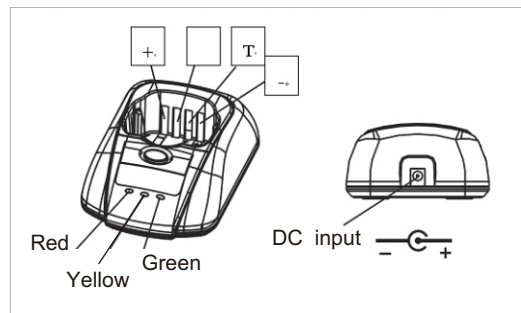
Available Sensitivity (12dB SINAD)	$\pm 0.35 \mu\text{V}$
Squelch Activation Sensitivity	$\leq 0.20 \mu\text{V}$ @level 3 squelch
Receiver Surplus Output	$\leq -40\text{dB}$
Modulation Receiving Bandwidth	$\leq 3.5\text{kHz}$
Adjacent Channel Selectivity	$\geq 60\text{dB}$
Intermediation Reject Ratio	$\geq 60\text{dB}$
Spurious Response Reject Ratio	$\geq 70\text{dB}$
Audio Output Power	500mW, @distortion $\leq 5\%$ , 4 $\Omega$
Receiving Current Sinking	$\leq 250\text{mA}$
Standby Current (Average)	$\leq 25\text{mA}$

RF Power	4.0W @7.5V DC
Frequency Stability	$\leq \pm 2.5 \times 10^{-6}$
Maximum Modulation Frequency Deviation	$\pm 2.5\text{kHz}$
Modulation Sensitivity	16mV
Modulation (300~3000Hz)	$\leq 3\%$
Adjacent Channel RF Power	$\leq -60\text{dB}$
Spurious and Harmonics	$\leq -70 \text{ dB}$
Residential Frequency Modulation	$\leq -40 \text{ dB}$
Transmitting Current Sinking	$\leq 1.8\text{A}$ @ 7.5V DC

### Chapter 8 Trouble Shooting

No.	PROBLEM	SOLUTION
1	No display after switching on the radio.	A. Battery power may be insufficient. Recharge or change the battery pack. B. The power switch is broken, and please change it. C. The CPU is broken, and please change it. D. The regulator IC12 is broken, and please change it.
2	PLL is unlocked. (Beep sounds)	A. The PLL crystal oscillator C4 is broken, and please change it. B. The oscillating tube is broken, and please change it. C. The oscillating tube is broken, and please change it.
3	Cannot talk to or hear other group members.	A. Make sure the two communication radios are using the channel of the same frequency. B. Make sure the CTCSS/DCS tone is the same as that of your group members. C. Out of the effective communication range.
4	Cannot receive signals.	A. The antenna is not well connected, and please screw the antenna again until secure. B. The sensitivity is too low and trimmer L9, L10, L7, L6, and L5. C. HF amplifier Q20 is broken, and please change it. D. The squelch level is too high and the squelch cannot be activated. Reset the squelch level with a computer. E. Mixer tube Q19 is broken, and please change it. F. MF processing chip IC5 is broken, and please change it.

No.	PROBLEM	SOLUTION
5	The indicator lights red when in transmitting but no voice can be heard.	<p>A. The power amplifier tube Q11 is broken and there is no power output and please change it with a new tube.</p> <p>B. The microphone is broken, and please change it with a new one.</p> <p>C. The operational amplifier IC3 is broken, and please change it with a new one.</p>
6	The indicator lights green when in receiving but no voice can be heard.	<p>A. The speaker is broken, and please change it with a new one.</p> <p>B. The audio amplifier IC8 is broken and please change it with a new one.</p> <p>C. The switch tube Q36 and Q35 is broken, and please change it with a new one.</p> <p>D. The operational amplifier IC6 is broken, and please change it with a new one.</p>
7	Cannot program the radio parameters normally.	<p>A. Make sure the programming cable is well connected.</p> <p>B. The computer RS-232 serial port output is unmoral, and please fix the computer.</p> <p>C. The MIC is not well connected with the SPK socket. Check the socket and if it is unable to work normally please change it with a new one.</p>



LED red: Charging indication  
 LED yellow: Power indication  
 LED green: Charging completion

Note: After putting the battery pack that has been discharged completely into the charger, its red indicator needs about 1~2 minutes to turn light.

## Chapter 9 KBC-58L Charger

### 9.1 Charger Specifications

- A) Idling Input Current:  $\leq 30\text{mA}$
- B) Charging Terminal Maximum Idling Voltage:  $\leq 8.8\text{V}$
- C) Constant current charging:  $200\sim 270\text{mA}$
- D) Maximum Charging Time: 7 hours
- E) Maximum Charging Voltage Limit:  $8.45\pm 0.1\text{V}$

### 9.2 Charging and Charging Indicator

A) When DC inputs power voltage 14~20V, the indicator lights yellow.

B) When the battery is inserted into the charger, the red and yellow indicator lights. (The battery power is lower than  $8.1\pm 0.1\text{V}$ .) (When the voltage is lower than 6.0V, the red indicator become light slowly after about 20 seconds.)

C) When the battery voltage is lower than  $8.1\pm 0.1\text{V}$ , the charger charge the battery with constant current. (Charging current is  $200\sim 270\text{mA}$ . It needs 3~4 hours to charge a battery that has been discharged completely.)

D) When the battery voltage is higher than  $8.1\pm 0.1\text{V}$ , the charging current will decrease gradually; when the battery voltage is  $8.2\sim 8.4\text{V}$ , the charging current will decrease quickly; when the battery voltage is  $8.4\sim 8.5\text{V}$ , the charging current will close to zero (then the charger begins constant voltage output) and charging stops. This course takes about 2~3 hours.

E) When the battery voltage is  $8.2\sim 8.4\text{V}$ , the red, yellow and green indicator lights. When the battery voltage is  $8.3\sim 8.5\text{V}$ , the red indicator becomes dime and the green and yellow indicator light.

## Appendix 1 Abbreviations

AMP	amplify, amplifier
ANT	antenna
APC	automatic power control
BPF	band pass filter
CTCSS	continuous tone control squelch system
DCS	digital code squelch
DEMOMD	demodulation
E <sup>2</sup> PROM	electrically erasable programmable read-only memory
HPF	high pass filter
IDC	instantaneous deviation control
IF	intermediate frequency
LED	Light-Emitting Diode
LNA	low noise amplifier
LPF	low pass filter
MCU	micro control unit
MIC	microphone
MOD	modulation
MONI	monitor
PLL	phase lock loop
PTT	push-to-talk
RX	receiver
SPK	speaker
TCXO	temperature compensated crystal oscillators
TX	transmitter
UL	un-lock
VCO	voltage control oscillator

**Appendix 2 Spare List**

No.	Material Serial No.	Name/Specification	Position	Quantity
1	201-000558-R02	PT558 volume knob / PC+ABS,black		1
2	201-000558-R03	PT558 encoder knob / PC+ABS,blak		1
3	201-000558-R05	PT558 upper cover / PC+ABS,black		1
4	201-000558-014	PT558 latch / PC+ABS,black		1
5	202-000558-R01	PT558 Earpiece-Mic jack panel cover / black silica gel(enhanced elasticity)hardness70		1
6	203-005583-R02	Pt558 antenna nut		1
7	203-005583-R02	PT558 witch nut brass black passivation		2
8	203-000558-005	PT558 latch spring, carbon spring steel wire 0.35 nickle plating		1
9	203-003208-R02	PT3208 positive terminal phosphorus copper gold plating		1
10	203-003208-R04	PT3208 negative terminal phosphorus copper gold plating		1
11	301-20040G-001	Woven belly-tooth screw,M2.0x4.0 flat round cross head, nickle plating	PCB, antenna head, negative terminal screw	9
12	301-20080G-R02	Woven belly-tooth screw,M2.0x8.0 flat round cross head, nickle plating	Aluminium alloy bracket fixing	2
13	301-25050J-R01	Woven belly-tooth screw,M2.5x5.0 flat round cross head,black zinc plating	Upper cover fixing	2
14	302-17040G-001	Self-tapping screw, 1.7x4.0 flat round cross head nickle plating	Positive terminal screw	1
15	102-MC3361-R01	IF(MF) modulation IC/MC3361BP,lead-free	IC5	1
16	103-L190YG-R01	Chip LBD/ 0603,green,CL-190YG-CD, lead-free	D20, D29	2
17	103-MHC190-R02	Chip LBD/ 0603,red,HSMH-C190,lead-free	D28	1
18	104-MT717T-001	Chip triode / FMMT717TA	Q8, Q30	2
19	104-TA1298-R01	Chip triode / KTA1298(Y),lead-free	Q29, Q31, Q32	3
20	105-RD01MU-R01	Chip FET(field-effect transistor)/ RD01MUS1,lead-free	Q12	1
21	105-RD07MV-R01	Chip FET(field-effect transistor)/ RD07MVS1,lead-free	Q11	1
22	106-RD835E-001	Carbon-film encoder switch / RD835E-GA1-16C-0F01 18mm BAND HONGHUA	SW2	1
23	108-455C24-R01	Plug-in phase frequency detector/ JTBM455C24,lead-free	L57	1
24	108-CF450H-R01	Plug-in porcelain filter/ LTM450HT,450kHz 3kHz,lead-free	CF1	1
25	108-XF4995-R01	Plug-in IF filter / 49.95MHz±7.5KHz,U-5*2,lead-free	XF1, XF2	1
26	110-110473-R01	Chip trimming resistor/ MVR22HXBRN473,47K±25%,B Linear,lead-free	VR2	1
27	110-110683-R01	Chip trimming resistor/ MVR22HXBRN683,68K±25%,B Linear,lead-free	VR1	1
28	110-220103-008	Volume switch / RD810S-JA1-A103-0C61	SW1	1
29	121-200000-001	MIC / B6027AP402-65	MIC1	1
30	122-113M00-001	Chip transistor / 13MHz±2.5PPm	X4	1
31	122-17M300-R01	Chip crystal resonator/ CSTCR7M30G53-R0,7.3M,lead-free	X2	1
32	122-249M50-001	Plug-in crystal oscillator/ 49.5MHz±10PPM,UM-1	X3	1
33	124-050000-005	2.5mm Earphone socket/ SP/MIC,EJ-2507-CCPA	J1	1
34	124-050000-R04	3.5mm MIC socket / SP/MIC,ST-212,lead-free	J2	1
35	603-0W558A-001	Voice recording IC IC / W588A080,binding	Ic15	1

**Appendix 3 Framework Component List**

No.	Material Serial No.	Description	Position	Quantity
1	121-100000-R11	Speaker / 428648,4Ω,0.5W,Φ40,lead-free	1	
2	201-000558-014	PT558 push fastener / PC+ABS,black,060522 remould	1	
3	201-000558-R02	PT558 volume knob / PC+ABS,black,lead-free	1	
4	201-000558-R03	PT558 channel/encoder knob / PC+ABS,black,lead-free	1	
5	201-000558-R04	PT558 PTT cover / PC+ABS,black,lead-free	1	
6	201-000558-R05	PT558 top cover / PC+ABS,black,lead-free	1	
7	201-000558-R07	PT558 positive pole terminal chassis / PC+ABS,black,lead-free	1	
8	201-000558-R08	PT558 emergency button press panel/ PC+ABS,black,lead-free	1	
9	201-000558-R09	PT558 light guide lens/ PMMA,transparent,lead-free	1	
10	201-005583-004	PT558-03 front cover / PC+ABS,black,(to fix the 558 antenna), 060605 remould	1	
11	202-000558-R01	PT558 jack panel cover/ black silica gel(enhanced elasticity), hardness 70,lead-free	1	
12	202-000558-R02	PT558PTT button / black silica gel,hardness 50,lead-free	1	
13	202-000558-R03	PT558 emergency button/ orange silica gel(enhanced elasticity),hardness 60,lead-free	1	

14	202-000558-R04	PT558 switch waterproof washer / black silica gel,hardness 60,lead-free	2	
15	202-000558-R06	PT558 chassis waterproof gasket/ black silica gel,hardness 60,lead-free	1	
16	202-000558-R07	PT558 big waterproof washer/ black silica gel (enhanced elasticity) ,hardness 40,lead-free	1	
17	202-000558-R08	PT558 positive/negative terminal spacer/ black silica gel,hardness 40,lead-free	2	
18	202-000558-R09	PT558 micropohone seal /orange silica gel,hardness 40,lead-free	1	
19	202-003208-R07	PT3208 insulating spacer / thermally conductive rubber,2*6*9,blue,lead-free	1	Under the FET (field-effect transistor)
20	203-000558-005	PT558 push fastener spring / carbon spring wire $\phi$ 0.35,nickle plating	1	
21	203-000558-R02	PT558 switch nut / brass,black passivation,lead-free	2	
22	203-003208-009	PT3208 knob retaining ring, / stainless steel ring ,0.18THK	2	
23	203-003208-R01	PT3208 antenna terminal/ stainless steel nickel plating,PT3208446用,lead-free	1	
24	203-003208-R02	PT3208 positive pole terminal/ phosphorus copper gold plating,lead-free	1	
25	203-003208-R04	PT3208 negative pole terminal/ phosphorus copper gold plating,lead-free	1	
26	203-005583-001	PT558-03 Al alloy chassis / ADC12,abrasive, polished, (558 fixed antenna)	1	
27	203-005583-R02	PT558-03 antenna nut /hexagon brass,black passivation,lead-free	1	
28	204-000558-R01	PT558 speaker waterproof net/ black waterproof cloth,lead-free	1	
29	204-000558-R02	PT558 waterproof spacer/ PORON,black,self-adhesive 0.8THK,lead-free	1	
30	204-000558-R03	PT558 rating plate1 / PVC black,self-adhesive 0.3THK,lead-free	1	
31	204-000558-R05	PT558 rating plate / PVC,black dull, 0.1mm thick, self-adhesive,lead-free	1	
32	204-005583-001	PT558-03 antenna terminal spacer/ black sponge,4mm thick,self-adhesive(to fix the 558 antenna)	1	
33	204-006800-006	PT6800 MIC spacer / dustproof net,black	1	
34	301-20030G-003	Woven belly-tooth screw/ M2.0*3.0 flat round cross head nickel plating,diameter $\phi$ 3.2	1	Negative terminal screw
35	301-20040G-001	Woven belly-tooth screw/ M2.0*4.0 flat round cross head nickel plating	8	PCB, antenna connector
36	301-20080G-R02	Woven belly-tooth screw/ M2.0*8.0 flat round cross head nickel plating	2	To fix the Al alloy chassis
37	301-25050J-R01	Woven belly-tooth screw/ M2.5*5.0 flat round cross head nickel plating	2	To fix the top cover
38	302-17040G-001	Self-tapping screw/ M1.7*4.0 flat round cross head nickel plating	1	Positive terminal screw
39	602-005583-004	PT558-03 electronic material / 446MHz,0.5W/4W,narrow band,RD07+RD01,M38039FFHFP(FLASH)	1	
40	710-445447-005	Antenna / 558-03 fixed antenna,445-447MHz,cold-resistant material,no colored dot,6.0 bottom exposed	1	
41	204-000558-R04	Potentionmeter washer	2	

**Appendix 4 Electrical Component List**

1	101-004200-002	PT4200PCB / U phase,PT4200U-060531	1	
2	102-9140NR-R01	Reset IC / PST9140NR,lead-free	1	IC11
3	102-A6278F-R01	Audio power amplifier / KIA6278F,AUDIO,AMP,lead-free	1	IC8
4	102-AT2408-R01	Memory IC / AT24C08N-10SI2.7,lead-free	1	IC9
5	102-B15E03-R01	PLL IC / MB15E03SL,PLL, 16-PIN,SSOP,lead-free	1	IC1
6	102-HT7130-R01	Regulator IC / HT7130-1,SOT-89,lead-free	1	IC14
7	102-HT7150-R01	Regulator IC / HT7150-1,lead-free	1	IC12
8	102-M2902V-R01	Operational amplifier / NJM2902V,OP-AMP,lead-free	3	IC4, IC6, IC7
9	102-M2904V-R01	Operational amplifier/ NJM2904V,OP-AMP,lead-free	1	IC3
10	102-M38039-R02	MCU / M38039FFHFP,FLASH,lead-free	1	IC10
11	102-MC3361-R01	IF (FM) demodulation IC / MC3361BP,lead-free	1	IC5
12	103-00MA77-R01	Chip HF switch diode / MA77,0805,lead-free	1	D1
13	103-0MA360-R01	Chip variable capacitor diode / 0805,MA360(PANASONIC),lead-free	1	D12
14	103-1SS372-R01	Chip switch diode / 1SS372(TOSHIBA),lead-free	1	D13
15	103-A2S111-R01	Chip switch diode / 0603,MA2S111(PANASONIC),lead-free	3	D15, D16, D25
16	103-DAN222-R01	Chip switch diode / DAN222,(ROHM),lead-free	1	D308
17	103-HSC277-R01	Chip diode / wave phase switch ,HSC277(HITACHI),lead-free	4	D3, D4, D6, D7
18	103-HVC376-R01	Chip variable capacitor diode / HVC376B,lead-free	2	D8, D9
19	103-HZU5AL-R01	Chip regulator diode/ HZU5ALL(HITACHI),lead-free	1	D14
20	103-IN4148-R01	Chip diode / IN4148,lead-free	2	D17, D18
21	103-L190YG-R01	Chip LED(light emitting diode)/ 0603,green,CL-190YG-CD,lead-free	2	D20, D29
22	103-MHC190-R02	Chip LED(light emitting diode)/ 0603,red,HSMH-C190,lead-free	1	D28
23	104-A123JE-R01	Chip triode / DTA123JE(ROHM),lead-free	1	Q17
24	104-A144EE-R01	Chip triode / DTA144EE(ROHM),lead-free	1	Q34
25	104-C144EE-R01	Chip triode / DTC144EE(ROHM),lead-free	6	Q22, Q23, Q26, Q27, Q33, Q37
26	104-MT717T-R01	Chip triode / FM717T,lead-free	2	Q8, Q30
27	104-SC1623-R01	Chip triode / 2SC1623,lead-free	1	Q10

28	104-SC3356-R01	Chip triode / 2SC3356,lead-free	1	Q3
29	104-SC4617-R01	Chip triode / 2SC4617(S)(ROHM),lead-free	2	Q6, Q9
30	104-SC4738-R01	Chip triode / 2SC4738(GR),AF,AMPLIFIER(TOSHIBA),lead-free	1	Q7
31	104-SC4919-R01	Chip triode / 2SC4919,MUTING,CIRCUIT(SANYO),lead-free	1	Q24
32	104-SC5108-R01	Chip triode / 2SC5108Y(TOSHIBA),lead-free	3	Q2, Q4, Q5
33	104-TA1298-R01	Chip triode / KTA1298(Y),lead-free	3	Q29, Q31, Q32
34	104-TC4082-R01	Chip triode / KTC4082,(KEC),lead-free	1	Q21
35	105-2SK508-R01	Chip FET (field-effect transistor) / 2SK508NV(K52),lead-free	1	Q14
36	105-3SK318-R01	Chip FET (field-effect transistor) / 3SK318,lead-free	2	Q19, Q20
37	105-RD01MU-R01	Chip FET (field-effect transistor) / RD01MUS1,lead-free	1	Q12
38	105-RD07MV-R01	Chip FET (field-effect transistor) / RD07MVS1,lead-free	1	Q11
39	105-SK1588-R01	Chip FET (field-effect transistor) / 2SK1588(NEC),lead-free	1	Q38
40	105-SK1824-R01	Chip FET (field-effect transistor) / 2SK1824,lead-free	4	Q13, Q25, Q35, Q36
41	106-0BA010-R01	Button switch / SKHLLBA010,imported,lead-free	1	K1
42	106-454548-R01	Touch switch / 4.5*4.5*4.8,lead-free	2	K2, K4
43	106-LBE010-R01	Chip touch switch / SKRTLBE010,lead-free	1	K3
44	106-RD835E-R01	Carbon film channel/Encoder switch/ RD835E-GA1-16C-0F01 18mm BAND ,lead-free	1	Sw2
45	108-455C24-R01	Plug-in phase frequency detector / JTBM455C24,lead-free	1	L57
46	108-CF450H-R01	Plug-in porcelain filter/ LTM450HT,450kHz $\pm$ 3kHz,lead-free	1	CF1
47	108-XF4995-R01	Plug-in IF filter/ 49.95MHz $\pm$ 7.5KHz,U-5*2,lead-free	2	XF1, XF2
48	109-040000-R01	Chip resistor / 0402,0R $\pm$ 5%,lead-free	15	C67, C166, C247, C276, C277, R4, R24, R30, R99, R154, R174, R217, R255, R260, R261
49	109-040100-R01	Chip resistor / 0402,10R $\pm$ 5%,lead-free	4	R98, R127, R200, R238
50	109-040101-R01	Chip resistor / 0402,100R $\pm$ 5%,lead-free	4	R12, R94, R128, R237
51	109-040102-R01	Chip resistor / 0402,1K $\pm$ 5%,lead-free	15	R29, R41, R42, R48, R49, R50, R111, R129, R130, R131, R157, R184, R195, R199, R273
52	109-040103-R01	Chip resistor / 0402,10K $\pm$ 5%,lead-free	18	R109, R120, R121, R122, R123, R126, R133, R140, R194, R205, R206, R212, R228, R254, R264, R266, R268, R295
53	109-040104-R01	Chip resistor / 0402,100K $\pm$ 5%,lead-free	5	R105, R113, R114, R115, R116
54	109-040105-R01	Chip resistor / 0402,1M $\pm$ 5%,lead-free	2	R160, R162
55	109-040122-R01	Chip resistor / 0402,1.2K $\pm$ 5%,lead-free	1	R188
56	109-040123-R01	Chip resistor / 0402,12K $\pm$ 5%,lead-free	1	R208
57	109-040124-R01	Chip resistor / 0402,120K $\pm$ 5%,lead-free	4	R6, R7, R8, R9
58	109-040153-R01	Chip resistor / 0402,15K $\pm$ 5%,lead-free	8	C187,C188,C189,C265,R64, R76, R142, R192
59	109-040154-R01	Chip resistor / 0402,150K $\pm$ 5%,lead-free	1	R201
60	109-040182-R01	Chip resistor / 0402,1.8K $\pm$ 5%,lead-free	1	R224
61	109-040183-R01	Chip resistor / 0402,18K $\pm$ 5%,lead-free	2	R218, R219
62	109-040184-R02	Chip resistor / 0402,180K $\pm$ 5%,lead-free	1	R67
63	109-040203-R01	Chip resistor / 0402,20K $\pm$ 5%,lead-free	10	R27,R207,R225,R226,R227,R240,R263, R265, R267, R269
64	109-040221-R01	Chip resistor / 0402,220R $\pm$ 5%,lead-free	3	R214, R215, R216
65	109-040222-R01	Chip resistor / 0402,2.2K $\pm$ 5%,lead-free	1	R294
66	109-040223-R01	Chip resistor / 0402,22K $\pm$ 5%,lead-free	3	R209, R210, R211
67	109-040224-R01	Chip resistor / 0402,220K $\pm$ 5%,lead-free	2	R87, R164
68	109-040272-R01	Chip resistor / 0402,2.7K $\pm$ 5%,lead-free	1	R223
69	109-040273-R01	Chip resistor / 0402,27K $\pm$ 5%,lead-free	4	R46, R171, R172, R257
70	109-040274-R01	Chip resistor / 0402,270K $\pm$ 5%,lead-free	2	R86, R231
71	109-040332-R01	Chip resistor / 0402,3.3K $\pm$ 5%,lead-free	2	R59, R60
72	109-040333-R01	Chip resistor / 0402,33K $\pm$ 5%,lead-free	3	R196, R258, R290
73	109-040334-R01	Chip resistor / 0402,330K $\pm$ 5%,lead-free	1	R82
74	109-040392-R01	Chip resistor / 0402,3.9K $\pm$ 5%,lead-free	2	R221, R222
75	109-040393-R01	Chip resistor / 0402,39K $\pm$ 5%,lead-free	3	R53, R149, R153
76	109-040394-R01	Chip resistor / 0402,390K $\pm$ 5%,lead-free	1	R165
77	109-040471-R01	Chip resistor / 0402,470R $\pm$ 5%,lead-free	1	R3
78	109-040472-R01	Chip resistor / 0402,4.7K $\pm$ 5%,lead-free	7	R118, R39, R125, R155, R156, R204, R248
79	109-040473-R01	Chip resistor / 0402,47K $\pm$ 5%,lead-free	7	R17, R18, R19, R20, R21, R22, R292
80	109-040474-R01	Chip resistor / 0402,470K $\pm$ 5%,lead-free	3	R166, R232, R293
81	109-040562-R01	Chip resistor / 0402,5.6K $\pm$ 5%,lead-free	3	R63, R65, R132
82	109-040563-R01	Chip resistor / 0402,56K $\pm$ 5%,lead-free	6	R173, R175, R176, R177, R178, R291
83	109-040564-R01	Chip resistor / 0402,560K $\pm$ 5%,lead-free	1	R163
84	109-040682-R01	Chip resistor / 0402,6.8K $\pm$ 5%,lead-free	1	R220





85	109-040683-R01	Chip resistor / 0402,68K $\pm$ 5%,lead-free	2	R78, R245
86	109-040821-R01	Chip resistor / 0402,820R $\pm$ 5%,lead-free	1	R33
87	109-040822-R01	Chip resistor / 0402,8.2K $\pm$ 5%,lead-free	2	R229, R230
88	109-040823-R01	Chip resistor / 0402,82K $\pm$ 5%,lead-free	1	R52
89	109-040913-R01	Chip resistor / 0402,91K $\pm$ 5%,lead-free	2	R77, R213
90	109-060000-R01	Chip resistor / 0603,0R $\pm$ 5%,lead-free	15	L16, C1, C86, C266, C273, L22, L34, L42, R23, R28, R81, R141, R182, R241, R262
91	109-060100-R01	Chip resistor / 0603,10R $\pm$ 5%,lead-free	4	R95, R96, R97, R101
92	109-060101-R01	Chip resistor / 0603,100R $\pm$ 5%,lead-free	4	R88, R89, R90, R180
93	109-060102-R01	Chip resistor / 0603,1K $\pm$ 5%,lead-free	6	R37, R38, R47, R234, R256, R54
94	109-060103-R01	Chip resistor / 0603,10K $\pm$ 5%,lead-free	10	R75,R92,R117,R119,R124,R136,R137,R138,R139, R203
95	109-060104-R01	Chip resistor / 0603,100K $\pm$ 5%,lead-free	8	R80, R102, R158, R197, R235, R243, R247, R249
96	109-060122-R01	Chip resistor / 0603,1.2K $\pm$ 5%,lead-free	1	R69
97	109-060124-R01	Chip resistor / 0603,120K $\pm$ 5%,lead-free	2	R5, R66
98	109-060150-R01	Chip resistor / 0603,15R $\pm$ 5%,lead-free	1	R31
99	109-060151-R01	Chip resistor / 0603,150R $\pm$ 5%,lead-free	1	R179
100	109-060154-R02	Chip resistor / 0603,150K $\pm$ 1%,lead-free	6	R143, R144, R145, R146, R147, R170
101	109-060181-R01	Chip resistor / 0603,180R $\pm$ 5%,lead-free	3	R70, R71, R189
102	109-060220-R01	Chip resistor / 0603,22R $\pm$ 5%,lead-free	3	L54, R73, R93
103	109-060222-R01	Chip resistor / 0603,2.2K $\pm$ 5%,lead-free	4	R2, R185, R186, R187
104	109-060224-R01	Chip resistor / 0603,220K $\pm$ 5%,lead-free	1	R233
105	109-060271-R01	Chip resistor / 0603,270R $\pm$ 5%,lead-free	2	R34, R35
106	109-060272-R01	Chip resistor / 0603,2.7K $\pm$ 5%,lead-free	1	R40
107	109-060274-R01	Chip resistor / 0603,270K $\pm$ 5%,lead-free	1	R85
108	109-060330-R01	Chip resistor / 0603,33R $\pm$ 5%,lead-free	1	R72
109	109-060332-R01	Chip resistor / 0603,3.3K $\pm$ 5%,lead-free	4	R55, R56, R57, R58
110	109-060393-R01	Chip resistor / 0603,39K $\pm$ 5%,lead-free	2	R68, R193
111	109-060470-R01	Chip resistor / 0603,47R $\pm$ 5%,lead-free	2	R15, R32
112	109-060471-R01	Chip resistor / 0603,470R $\pm$ 5%,lead-free	1	R25
113	109-060472-R01	Chip resistor / 0603,4.7K $\pm$ 5%,lead-free	4	R151, R152, R159, R183
114	109-060473-R01	Chip resistor / 0603,47K $\pm$ 5%,lead-free	4	R10, R11, R13, R14
115	109-060561-R01	Chip resistor / 0603,560R $\pm$ 5%,lead-free	2	R202, R244
116	109-060562-R01	Chip resistor / 0603,5.6K $\pm$ 5%,lead-free	4	R44, R61, R62, R191
117	109-060563-R01	Chip resistor / 0603,56K $\pm$ 5%,lead-free	2	R16, R239
118	109-060564-R01	Chip resistor / 0603,560K $\pm$ 5%,lead-free	1	R148
119	109-060683-R01	Chip resistor / 0603,68K $\pm$ 5%,lead-free	1	R190
120	109-060822-R01	Chip resistor / 0603,8.2K $\pm$ 5%,lead-free	1	R36
121	109-060823-R01	Chip resistor / 0603,82K $\pm$ 5%,lead-free	1	R51
122	109-070000-R01	Chip resistor / 0805,0R $\pm$ 5%,lead-free	1	L63
123	109-100R47-R01	Chip resistor / 1206,0.47R $\pm$ 5%,lead-free	3	R167, R168, R169
124	110-110473-R01	Chip trimming resistor/ MVR22HXBRN473,47K $\pm$ 25%,B Linear,lead-free	1	VR2
125	110-110683-R01	Chip trimming resistor/ MVR22HXBRN683,68K $\pm$ 25%,B Linear,lead-free	1	VR1
126	110-220103-R08	Volume switch/ RD810S-JA1-A103-0C61,lead-free	1	SW1
127	112-043100-R01	Chip capacitor / 0402,10P $\pm$ 0.5P,50V,C0G,lead-free	1	C257
128	112-043101-R01	Chip capacitor / 0402,100P $\pm$ 5%,50V,C0G,lead-free	2	C171, C196
129	112-043102-R01	Chip capacitor / 0402,1000P $\pm$ 10%,50V,X7R,lead-free	8	C75,C105,C106,C110, C111, C263, C278, C310
130	112-043103-R01	Chip capacitor / 0402,0.01uF $\pm$ 10%,50V,X7R,lead-free	8	C50,C149,C155,C159,C160,C161,C162,C279
131	112-043104-R02	Chip capacitor / 0402,0.1uF $\pm$ 10%,16V,X7R,lead-free	11	C85,C101,C167,C168,C173,C176,C177,C178,C271,C286, C307
132	112-043105-R01	Chip capacitor / 0402,1uF $\pm$ 10%,50V,X7R,lead-free	4	C170, C235, C252, C303
133	112-043152-R01	Chip capacitor / 0402,1500P $\pm$ 10%,50V,X7R,lead-free	1	C289
134	112-043183-R01	Chip capacitor / 0402,0.018uF $\pm$ 10%,25V,X7R,lead-free	1	C156
135	112-043222-R01	Chip capacitor / 0402,2200P $\pm$ 10%,50V,X7R,lead-free	1	C215
136	112-043223-R01	Chip capacitor / 0402,0.022uF $\pm$ 10%,50V,X7R,lead-free	3	C242, C243, C245
137	112-043273-R01	Chip capacitor / 0402,0.027uF $\pm$ 10%,50V,X7R,lead-free	2	C179, C185
138	112-043332-R01	Chip capacitor / 0402,3300P $\pm$ 10%,50V,X7R,lead-free	1	C113
139	112-043333-R01	Chip capacitor / 0402,0.033uF $\pm$ 10%,16V,X7R,lead-free	2	C224, C244
140	112-043392-R01	Chip capacitor / 0402,3900P $\pm$ 10%,50V,X7R,lead-free	4	C82, C222, C238, C284
141	112-043393-R01	Chip capacitor / 0402,0.039uF $\pm$ 10%,50V,X7R,lead-free	1	C223

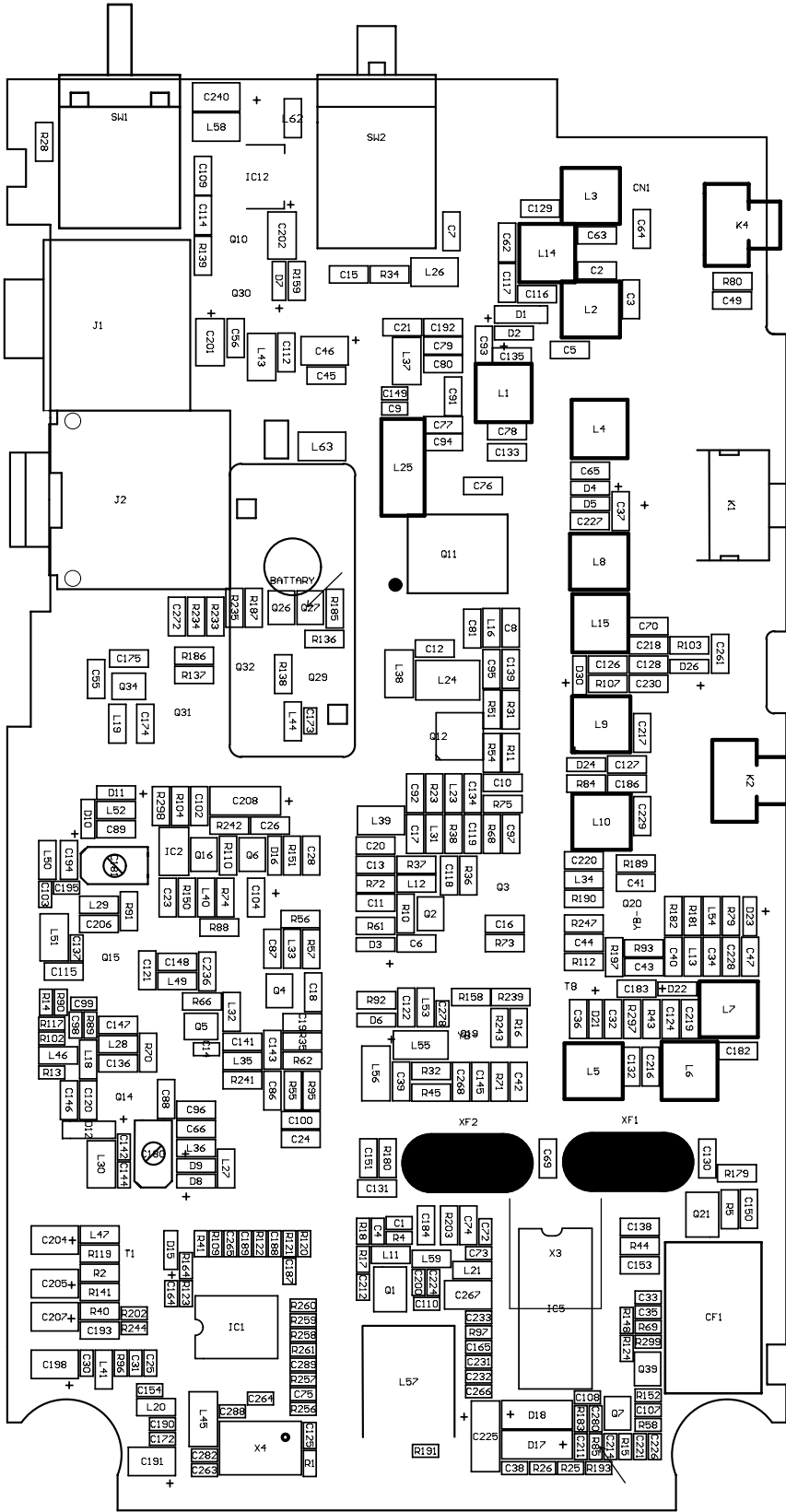


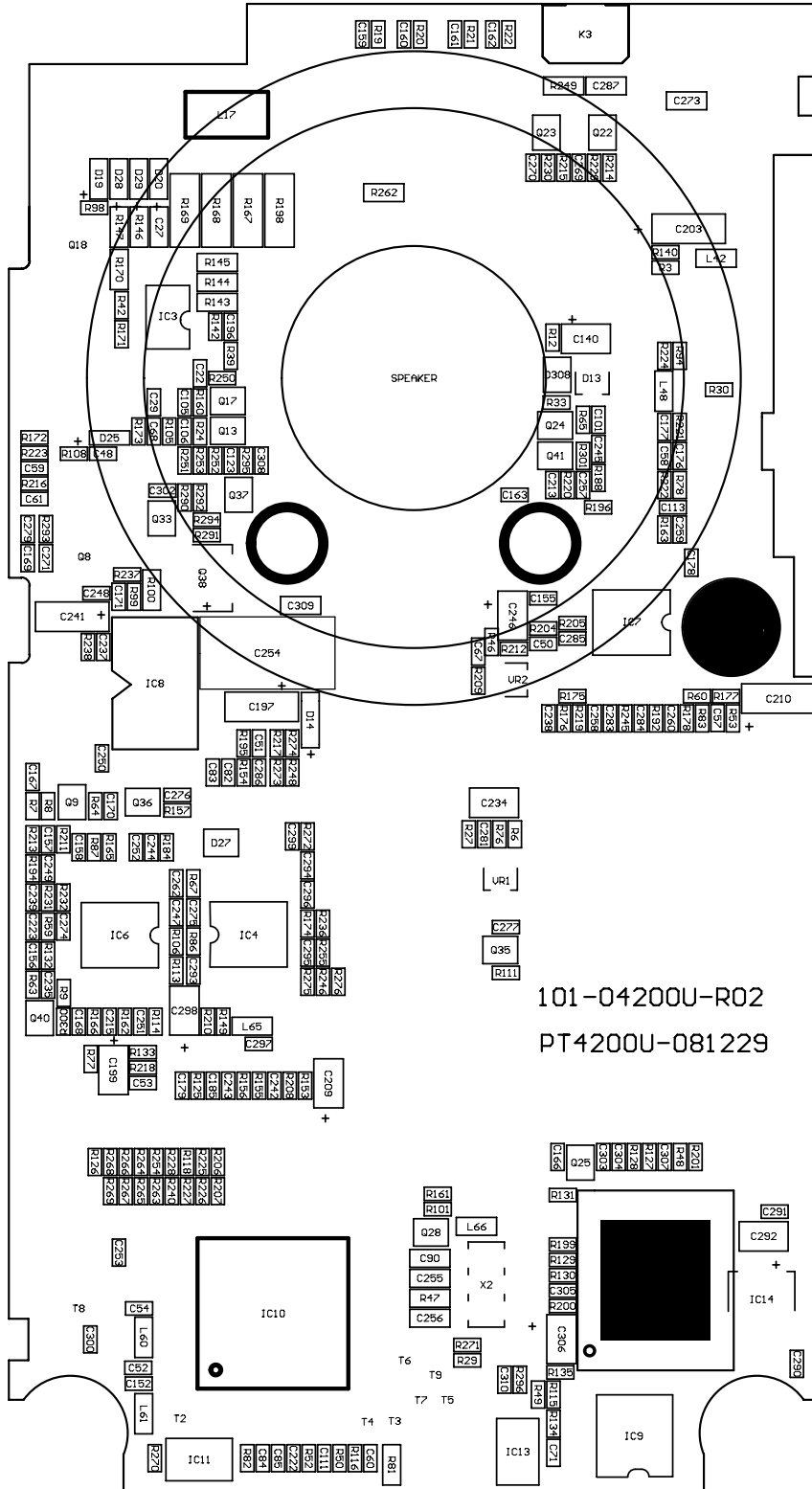
142	112-043471-R01	Chip capacitor / 0402,470P ± 10%,50V,X7R,lead-free	33	C4, C9, C22, C29,C48,C51,C52,C53,C54, C57, C58, C59,C60, C61,C71,C83,C84, C125, C152, C163,C248,C258,C269,C270,C274,C275, C290, C291,C305,C308,R161,R270,R271
143	112-043472-R01	Chip capacitor / 0402,4700P ± 10%,25V,C0G,lead-free	1	C285
144	112-043473-R01	Chip capacitor / 0402,0.047uF ± 10%,16V,X7R,lead-free	4	C212, C213, C253, C283
145	112-043474-R01	Chip capacitor / 0402,0.47uF ± 10%,16V,X7R,lead-free	2	C169, C302
146	112-043560-R01	Chip capacitor / 0402,56P ± 5%,50V,C0G,lead-free	1	C184
147	112-043562-R01	Chip capacitor / 0402,5600P ± 10%,16V,X7R,lead-free	1	C251
148	112-043681-R01	Chip capacitor / 0402,680P ± 10%,16V,X7R,lead-free	1	C260
149	112-043683-R01	Chip capacitor / 0402,0.068uF ± 10%,16V,X7R,lead-free	1	C259
150	112-043822-R01	Chip capacitor / 0402,8200P ± 10%,16V,X7R,lead-free	4	C157, C158, C239, C249
151	112-063100-R01	Chip capacitor / 0603,10P ± 0.5P,50V,C0G,lead-free	2	C135, C142
152	112-063101-R01	Chip capacitor / 0603,100P ± 5%,50V,C0G,lead-free	1	C93
153	112-063102-R01	Chip capacitor / 0603,1000P ± 10%,50V,X7R,lead-free	16	C96,C95,C97,C98,C99,C100,C107,C108, C109, C112,C114, C150, C151, C172,C264, C272
154	112-063103-R01	Chip capacitor / 0603,0.01uF ± 10%,50V,X7R,lead-free	4	C79, C153, C190, C280
155	112-063104-R01	Chip capacitor / 0603,0.1uF ± 10%,50V,X7R,lead-free	8	C74, C165,C174 C175, C193, C204, C231, C232
156	112-063105-R01	Chip capacitor / 0603,1uF ± 10%,50V,X7R,lead-free	4	C25, C30, C207, C233
157	112-063120-R01	Chip capacitor / 0603,12P ± 5%,50V,C0G,lead-free	2	C92, C133
158	112-063150-R01	Chip capacitor / 0603,15P ± 5%,50V,C0G,lead-free	3	C72, C73, C91
159	112-063152-R01	Chip capacitor / 0603,1500P ± 10%,50V,X7R,lead-free	2	C33, C35
160	112-063180-R01	Chip capacitor / 0603,18P ± 5%,50V,C0G,lead-free	1	C69
161	112-063182-R01	Chip capacitor / 0603,1800P ± 10%,50V,X7R,lead-free	1	C226
162	112-0631R5-R01	Chip capacitor / 0603,1.5P ± 0.25P,50V,C0G,lead-free	1	C62
163	112-063200-R01	Chip capacitor / 0603,20P ± 5%,50V,C0G,lead-free	3	C94, C134, C144
164	112-063220-R01	Chip capacitor / 0603,22P ± 5%,50V,C0G,lead-free	3	C143, C255, C256
165	112-063221-R01	Chip capacitor / 0603,220P ± 5%,50V,C0G,lead-free	1	C309
166	112-0632R0-R01	Chip capacitor / 0603,2P ± 0.25P,50V,C0G,lead-free	3	C2, C3, C88
167	112-063300-R01	Chip capacitor / 0603,30P ± 5%,50V,C0G,lead-free	1	C227
168	112-063333-R01	Chip capacitor / 0603,0.033uF ± 10%,16V,X7R,lead-free	1	C221
169	112-063360-R01	Chip capacitor / 0603,36P ± 5%,50V,C0G,lead-free	1	C139
170	112-0633R0-R01	Chip capacitor / 0603,3P ± 0.25P,50V,C0G,lead-free	5	C87, C90, C120, C131, C136
171	112-0633R5-R01	Chip capacitor / 0603,3.5P ± 0.25P,50V,C0G,lead-free	1	C63
172	112-063471-R01	Chip capacitor / 0603,470P ± 10%,50V,X7R,lead-free	38	C5,C6,C7,C10,C11,C12,C13,C14,C15,C16, C17, C18,C19,C20,C21,C24,C26,C27,C28, C31, C34, C36,C37,C38,C39,C40,C41,C42,C43, C44, C45, C49,C55,C56, C154, C220, C268, C287
173	112-063472-R01	Chip capacitor / 0603,4700P ± 10%,50V,X7R,lead-free	1	C214
174	112-063473-R01	Chip capacitor / 0603,0.047uF ± 10%,16V,X7R,lead-free	1	C211
175	112-063474-R01	Chip capacitor / 0603,0.47uF+80%--20%,16V,Y5V,lead-free	3	C8, C80, C192
176	112-0634R0-R01	Chip capacitor / 0603,4P ± 0.25P,50V,C0G,lead-free	1	C129
177	112-0635R0-R01	Chip capacitor / 0603,5P ± 0.25P,50V,C0G,lead-free	7	C116, C117, C118, C119, C122, C145, C229
178	112-0637R0-R01	Chip capacitor / 0603,7P ± 0.5P,50V,C0G,lead-free	4	C70, C132, C182, C230
179	112-0638R0-R01	Chip capacitor / 0603,8P ± 0.5P,50V,C0G,lead-free	4	C78, C138, C141, C228
180	112-063R50-R01	Chip capacitor / 0603,0.5P ± 0.1P,50V,C0G,lead-free	5	C146, C147, C217, C218, C219
181	112-063R75-R01	Chip capacitor / 0603,0.75P ± 0.25P,50V,C0G,lead-free	1	C216
182	112-072225-R01	Chip Ta capacitor / TP model,SIZE P,2.2uF ± 20%,10V,lead-free	3	C140, C209, C246
183	112-072475-R01	Chip Ta capacitor / TP model,SIZE P,4.7uF ± 20%,10V,lead-free	5	C46, C201, C202, C240, C292
184	112-073105-R01	Chip capacitor / 0805,1uF+80%--20%,16V,Y5V,lead-free	2	C267, C306
185	112-073225-R01	Chip capacitor / 0805,2.2uF+80%--20%,10V,Y5V,lead-free	1	C234
186	112-102105-R01	Chip Ta capacitor / TS model,SIZE A,1uF ± 20%,16V,lead-free	3	C199, C200, C225
187	112-102106-R02	Chip Ta capacitor / TS model,SIZE A,10uF ± 20%,10V,lead-free	4	C197, C203, C210, C237
188	112-102156-R01	Chip Ta capacitor / TS model,SIZE A,15uF ± 20%,6.3V,lead-free	3	C191, C198, C208
189	112-172107-R02	Chip Ta capacitor / TS model,SIZE C,100uF ± 20%,10V,lead-free	1	C254
190	113-010100-R01	Chip trimming capacitor / TZV2Z100A110,3~10p+100,lead-free	1	C180
191	114-06E330-R01	Chip wire inductor / C1608CB-33NJ,green,porcelain core33NH ± 5%,0603,lead-free	1	L30
192	114-06E560-R01	Chip wire inductor / C1608CB-68NJ,porcelain core68nH ± 5%,0603,lead-free	1	L13
193	114-06E680-R01	Chip inductor / MLG1608BR10J,100nH ± 5%,0603,lead-free	1	L53
194	114-06G101-R03	Chip inductor / MLF1608A1R0K,1uH ± 5%,0603,lead-free	2	L27, L36
195	114-06G102-R01	Chip inductor / MLG1608B12NJ,12nH ± 5%,0603,lead-free	1	L21

196	114-06G120-R01	Chip stacked inductor / LGHK1608R22J-T,220nH±5%,0603,lead-free	1	L31
197	114-06G221-R02	Chip inductor / MLG1608B27NJ,27nH±5%,0603,lead-free	1	L18
198	114-06G270-R01	Chip inductor / MLF1608A3R3K,3.3uH±5%,0603,lead-free	3	L12, L32, L33
199	114-06G332-R01	Chip inductor / MLG1608B47NJ,47nH±5%,0603,lead-free	1	L28
200	114-06G470-R01	Chip inductor / MLG1608B6N8DT,6.8nH±0.5nH,0603,lead-free	1	L35
201	114-06G6R8-R01	Chip inductor / FSLM2520-100J,10uH±5%,1008,lead-free	1	L23
202	114-08E103-R01	Chip inductor / FSLM2520-R82K,820nH±10%,1008,lead-free	1	L45
203	114-08E821-R01	Chip wire inductor / LQN21AR22J,220nH±5%,0805,lead-free	2	L55, L56
204	114-10E221-R01	Chip air-cored coil / 0.4*1.5*3TL,negative,high pin, lead-free	1	L26
205	115-1R53R0-R04	Chip air-cored coil / 0.4*1.5*4TL,negative,high pin,lead-free	10	L1, L2, L3, L4, L5, L6, L7, L8, L9, L10
206	115-1R54R0-R04	Chip air-cored coil / 0.5*1.5*5T,positive,high pin,,lead-free	2	L14, L15
207	115-1R55R0-R01	Chip air-cored coil / 0.4*1.5*8TL,negative,high pin,lead-free	1	L24
208	115-1R58R0-R02	Chip bead / EMI,FILTER, SMT,BLM11A221S,0603,lead-free	1	L25
209	117-000000-R04	Chip bead / EMI,FILTER, SMT,BLM21P300S,0805,lead-free	11	L19,L20,L41,L44,L46,L47,L48,L60,L61,L66,R242
210	117-000000-R05	MIC / B6027AP402-65,lead-free	5	L37, L38, L39, L43, L58
211	121-200000-R01	Chip transistor / 13MHz±2.5PPm	1	MIC1
212	122-113M00-001	Chip crystal resonator / CSTCR7M30G53-R0,7.3M,lead-free	1	X4
213	122-17M300-R01	Plug-in crystal oscillator / 49.5MHz±10PPM,UM-1,lead-free	1	X2
214	122-249M50-R01	3.5mm MIC socket / SP/MIC,ST-212,lead-free	1	X3
215	124-050000-R04	2.5mm earphone socket / SP/MIC,EJ-2507-CCPA,lead-free	1	J2
216	124-050000-R05	PT3208 PVC MIC spacer / transparent PVC,0.5MM thick	1	J1
217	201-003208-029	PT558 speaker contact spring/ carbon spring wire φ 0.25,gilt	1	
218	203-000558-004	378 crystal oscillator spacer/dobouble-faced adhesive sponge,5*5	2	
219	204-000378-001	PT558 potentionmeter spacer / PVC transparent,self-adhesive,	1	
220	204-000558-R04	0.35THK,lead-free	2	
221	603-0W558A-R01	Voice recording IC / W588A080,fixed,lead-free	1	IC15

**Appendix 5 Accessory List**

Item	Model	Specification	Accessory Figure
Battery	KB-58A	7.4V 1200mAh Li-Ion	
Hand Strap	8AJD-20K		
Earphone	KME-201		
	KME-202		
Charger	KBC-58L	7-hour standard charger	
Adapter	KTC-58C1	DC OUT 15V 400mA	
Antenna	KA-3U057		
	KA-2U046		





101-04200U-R02  
 PT4200U-081229







Figur4 PT558 Schematic Circuit Pane Diagram

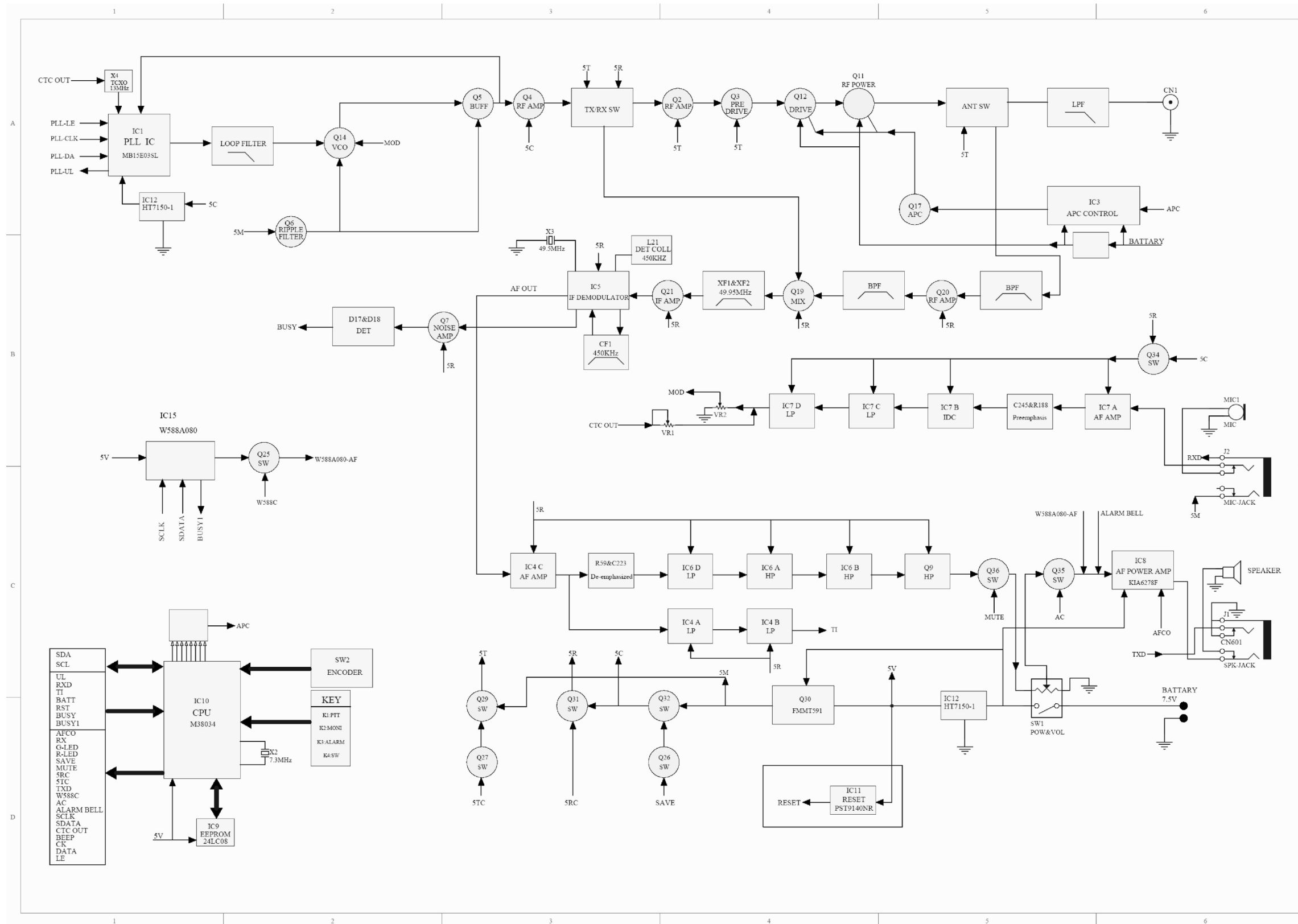


Figure 5 KBC-58L Schematic Circuit Diagram

