



PT8000

SERVICE MANUAL

VHF/UHF MOBILE RADIO



DANGEROUS!!

Do not connect AC power or the DC power that exceeds the specified input value with any connector or terminals of the radio. Otherwise it will cause fire or electric shock.

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 tightly burning on skin.

It's better to avoid putting it in rain or snow, or any other liquid to ensure its life and performance.

STATEMENT!


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Chapter 1 Introduction

1.1 Introduction

This manual applies to the service and maintenance of PT8000 series of FM mobile radio, and is designed for the engineers and professional technicians that have been trained by our company. In this manual you can find all the information of product service. Kirisun reserves the rights to modify the product construction and specification without notice in order to enhance product performance and quality. You can also log on our website www.kirisun.com to download the latest service manual or contact your local dealer or us.

Read this manual before repair the product.

1.2 Service Precautions

Safety

Avoid skin contacting with the antenna connector and PCB.

Do not reverse the power polarities.

If signal input is bigger than 20dBm (100mW) it may cause damage to the radio.

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. Contact the damaged antenna will cause lightly burning on the skin.

Repair 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.

Change Components

All the components use 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 the following forms if you want to apply for any components from Kirisun.

Component Application

Radio Model	Component	No.	Model/ Specifications	Material Serial No.	Quantity
PT-8000 (2)	ChipFET	Q 3	RD01MUS1	105-RD01MU-R01	1
PT-8000 (2)	Triode Chip	Q49	2SC5108 (Y)	104-SC5108-R01	1

1.3 Service

All the Kirisun products are subject to the service warranty.

After-sales service will be provided, and the length of warranty is stated by Kirisun. The radio and its accessories are all in the warranty. However, in one of the following cases, charge free service will be 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 damage such as mechanical damage, burning or water leaking.

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

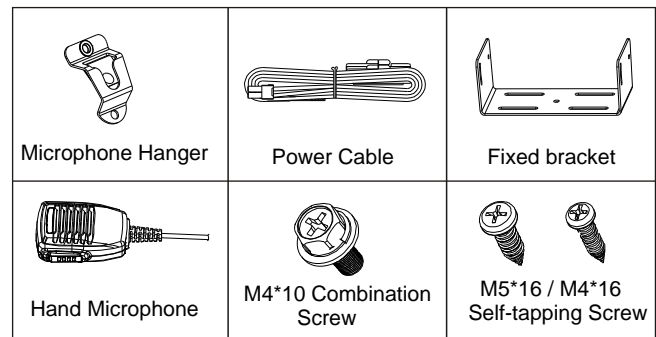
After the warranty expires, lifetime service is still available. And we also provide service components to service stations and service staff.

Installation Condition

1. Unpack

Please check the host in the package and the supplied accessories in the following table before using. Any articles are found lost or damaged, please contact the distributor without delay.

Accessories	Quantity
Fixed bracket	1
Power Cable	1
Hand Microphone	1
Microphone Hanger	1
M4*10 Combination Screw	4
M4*16 Self-tapping Screw	2
M5*16 Self-tapping Screw	4
Instruction Manual	1



2. Licenses

Rules require that the radio installation point (mobile station or base station) needs permission license. The license carrier guarantees that the RF power, frequency and frequency deviation comply with the license requirements. The radio assembling or operation must be conducted by the license-authorized technicians.

3. Installation Preparation

3.1 Description

Every radio has been adjusted and checked before the shipment. Before installation it's better to check if the radio transmitting or receiving is normal to make sure its proper operation.

3.2 Test

Connect all the cables and accessories to test the radio. Transmitter frequency, deviation, and power output should be checked, as should receiver sensitivity, squelch operation, and audio output. Signalling operation should be verified.

4. Installation Steps

4.1 Introduction

Check the car and decide how and where to install the radio antenna and accessories. Allocate the cable in a proper place to avoid pressing or squeezing it. And pay attention to the heat scattering of the radio equipments.

4.2 Antenna

The most ideal place for antenna is the center of an open and flat conduction region. It usually at the center of the car top or at the top of the luggage cabinet. Stick the ground wire at the top of the luggage cabinet and the car outer shell and make sure to connect the luggage cabinet with the ground.

4.3 Connection of Power Cable

* First of all, please check whether there is a hole for the power cable on the insulating board. If no, please bore the board with the suitable drill bit and fix a rubber grommet on it.

* Afterwards, please have the cable pass through the insulating board and lead from the car into the car engine. Connect the re conductor to the positive terminal of the accumulator and the black conductor to the negative terminal.

* At last, ring the remained conductor and fix it.

Note: Please maintain the sufficient relaxation of the power cable to make it convenient to dismantle the radio in the state of power connection.

4.4 Radio Installing

Warning: For passengers' safety, please fix the radio firmly on the fixed bracket so that the radio will not be loosened in case of collision.

* The fixed bracket is taken as an example. Draw the position and drill a hole on the instrument panel first, and then install the fixed bracket with 4 M5*16 self-tapping screws. (Note: please fix the radio at the position convenient for operation and control, and leave an enough space for fixation and connection of the cable.)

* Slide the radio into the fixed bracket and fix it with 4 M4*10 combination screws (plus plain washer and spring washer). (Different combinations of fixing holes are selectable to adjust the radio to the proper height and visual angle.)

* Connect the antenna and the power cable to the radio.

* Install the microphone hanger at the position easy to use, with 2 M4*16 self-tapping screws. (The microphone and its cable should be fixed at the position not affecting safe driving.)

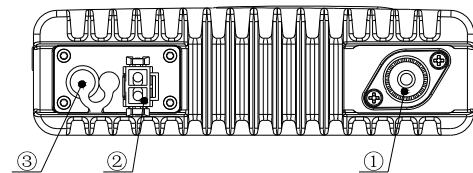
* Connect the microphone to the microphone jack on the front panel of the radio and put it on the hanger.

Note: When replacing the protective tube for the power cable, please use the one of the same specification without fail. It is not allowed to change it into the tube of higher capacity.

4.5 If you do not intend to use the external speaker, fit the supplied speaker-jack cap to stop dust and sand getting in.

Display	Description
SCAN indicator	Scan indication: on when scan is enabled.
LOW indicator	Power level indication: on when in low power.
	Indicates the current channel in normal use, ranging from 1-8.
	Indicates the current squelch level when squelch selection is enabled, ranging from 0.-9.
	Displays "b" when Public Address is enabled.
	Displays "-" when the radio has no channel.
	Displays "u" when the radio is in the remote stun status.
	Displays "h" when the radio is in the remote kill status.
	Displays "P" when the radio enters the PC Programming Mode.
	Displays "t" when the radio enters the PC Adjustment Mode.
Displays "C" when the radio enters the Wired Clone Mode.	

2.3 Rear Panel



- ① Antenna Interface
- ② Power Interface
- ③ External Speaker Interface

Chapter 2 Radio Overview

2.1 Description of External View

① power button

Press this button for a long time (more than 1.5 seconds) to switch the radio on/off.

② LED indicator

The red indicator will light while transmitting; the green indicator will light when it receives the carrier.

③ button (programmable button)

④ Display screen

For details, see Display .

⑤ Volume Control knob

To be used to adjust volume.

⑥ Microphone/Programming Interface

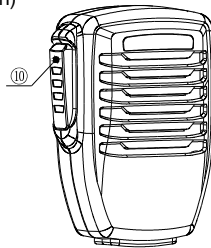
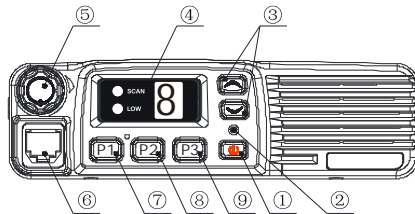
⑦ P1button (programmable button)

⑧ P2 button (programmable button)

⑨ P3button (programmable button)

⑩ PTT button (on the hand microphone)

Press the PTT button first, and then speak to the microphone to transmit the voice to the other. Loosen to receive.



2.2 Display Screen



Chapter 3 Circuit Principles

3.1 Frequency Structure

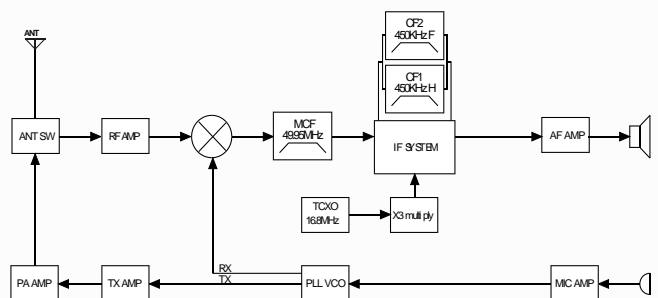


Figure 3.1 Frequency Chart

The receiver adopts quadric mixing mode. The first IF is 49.95MHz, and the second IF is 450kHz.

The first local oscillation signal of the receiver is produced by frequency synthesizer and the second local oscillation signal is produced by X1 THG. The signal of transmitter is produced by frequency synthesizer.

The reference frequency of frequency synthesizer is produced by TCXO.

3.2 Principles of Receiver (RX)

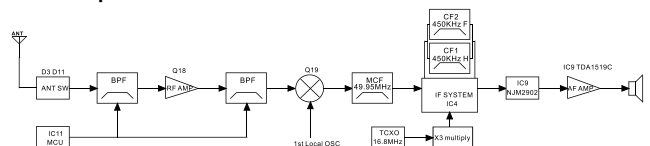


Figure 3.2 Schematic Diagram for Receiver

Front End of Receiver

Signals from the antenna are filtered by BPF which consists of two-LC via RX/TX switch (D3, D11). After being filtered out the useless out-of-band signals, the signals are amplified by LNA consisting of Q18 and external components.

Signals from LNA are filtered again by BPF which consists of three-LC before entering the 1st mixer (Q19).

AGC Circuit

It consists of Q16 and peripheral circuit. AGC will work to reduce the gain of Q18 only when the input signal is oversize.

1st mixer

The first IF (49.95MHz) signal is produced after mixing of the receiving signal from LNA and the 1st local oscillation signal from frequency synthesizer.

IF Circuit

The first IF signal is filtered out adjacent channel and other useless signals by crystal filter (XF1).

The first IF signal from crystal filter is amplified by the first IF amplifier (Q20) before processing of IC in IF (IC6, TA31136).

IF IC consists of the 1st mixer, IF amplifier, limiter, frequency discriminator, noise amplifier, audio low pass filter.

Signals (16.8MHz) from X1 are amplified by Q11 and peripheral circuit and then generate the second local oscillator (50.4MHz). The second IF signals (450kHz) are generated after signals mixing of the second local oscillation (50.4MHz) and the first IF (49.95MHz) in IC6. Audio signals are demodulated and outputted by IC6 after the second IF signals are amplified and limited in IC6 and then filtered by ceramic filter (CF1 or CF2 450kHz).

The second IF filter selective circuit consists of CF1, CF2, D20, D21 and peripheral circuit. When vehicle station is set on broadband, CF2 is connected and CF1 is cut off; when it is narrowband, CF1 is connected and CF2 is cut off.

Squelch Circuit

Signals demodulated by IC6 are amplified by noise amplifier of IC6 and then amplified further by Q21. After that, the signals are demodulated by D25, and then the generated DC level enters squelch circuit controlled by MCU. The voltage is in inverse proportion to the input signals.

3.3 Principles of Transmitter (TX)

Transmitter Power Amplifier

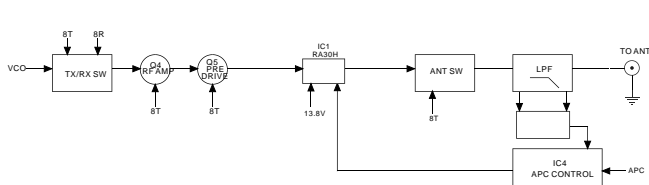


Figure 3.3 Schematic Diagram for Power Amplifier and Antenna Switch

The modulated RF signals from VCO are amplified by Q1, Q2, Q4 and Q5 before the power amplification in IC1. IC1 Output Power: 25W Gate bias of IC1 is controlled by APC circuit, so the output power of transmitter can be controlled conveniently by changing the gate bias voltage.

APC (Automatic Power Control) Circuit

The output power of RF power amplifier is detected and converted into DC level by RF detector diode (D9, D10). The DC level is then compared with signals from MCU and amplified in IC4 before power output control in IC1 gate.

The voltage detected by detector diode will increase with oversized output power of transmitter. When the output voltage of IC4 decreases, the bias

voltage of IC1 will decrease, finally the output power of transmitter will decrease or vice versa. Thus, the output power of transmitter will keep stable under any different working condition.

MCU can set the power by changing the voltage input to IC4.

3.4 Principles of Frequency Synthesizer

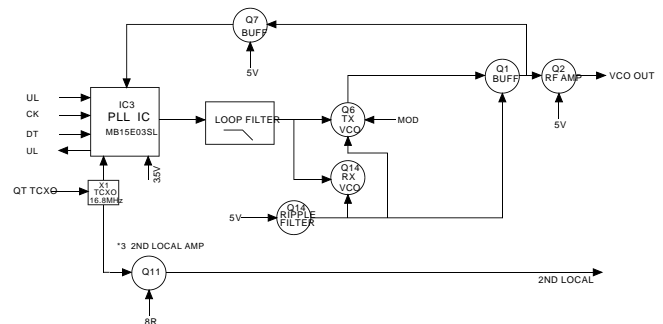


Figure 3.4 Schematic Diagram for Frequency Synthesizer

The PT8000 adopts PLL frequency synthesizer.

Frequency synthesizer consists of reference oscillator, voltage controlled oscillator (VCO), programmable frequency divider (PFD), phase comparator and low pass filter (LPF).

Transmitting VCO Unit consists of Q6, D1, D4, D5 and D6, etc. D8 is the modulation circuit of transmitting VCO.

Receiving VCO Unit consists of Q12, D14, D16, D17 and D18, etc.

IC3 (MB15E03SL) is PLL integrated circuit and contains programmable parametric frequency divider (PPFD), programmable frequency divider (PFD), phase comparator and charge pump, etc.

Low pass filter consists of R54, C113 and so on.

Reference frequency is provided by X1 (TCXO, 16.8MHz).

Reference frequency of TCXO (Temperature-controlled Crystal Oscillator) is divided by PPFD in IC3 to produce reference frequency of 5kHz or 6.25kHz (controlled by MCU based on the set channel frequency).

The oscillation frequency of VCO is compared with reference frequency to produce error signal after divided by PFD in IC3. The error signal is filtered by low pass filter before changing the VCO frequency to the set value in VCO (it is locking).

Lock lost detection: When PLL is out of lock, IC3 pin14 will output low level signal to MCU, and then MCU prohibit transmitter from transmitting with a warning tone.

3.5 Audio Processing Circuit:

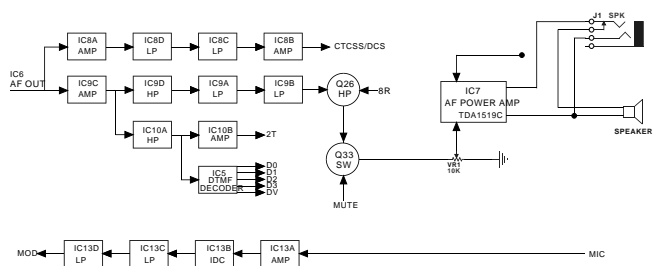


Figure 3.5 Schematic Diagram for Audio Processing Circuit

MIC Signal Processing:

Voice signals from MIC are amplified in IC13A (IC13A composes the AGC circuit with D32 and Q32 to increase the dynamic range of the circuit), and then sent to IDC circuit composed by IC13B after the pre-emphasis of C322 and R267. The limited signals are switched broad/narrowband in Q30 and then filtered signals over 3000Hz in the two-level low pass circuit composed by IC13C and D. Then the filtered signals are modulated to transmitting VCO by D8 after frequency offset adjustment in VR2.

Receiving Audio Signal Processing:

Audio signals from IC6 are classified into two groups. One group is amplified and filtered in low pass circuit composed by IC8 (for audio signal), then the relatively purified CTCSS/DCS signals are sent to MCU for processing; the other group is amplified by IC9C in IC9 (Q29 is gain switch circuit used for the volume switch of broad/narrowband), after that, one group is shaped to better square signal in two-tone shaping circuit composed by IC10, and then sent to MCU for two-tone signal test; the other group is filtered CTCSS signals in high pass circuit composed by IC6 D and then sent to the de-emphasis circuit composed by R173 and C245, after that, the signals, through the two-level low pass circuit (composed by IC9A and D) and high pass circuit (composed by Q26), are amplified to make the speaker work in IC7 after volume adjustment by the volume switch.

Speaker Impedance: 16ohm

Caution: Neither end of the speaker can be grounded!

Emergency alarm tone has no volume limitation.

3.6 Power Supply:

The station use 13.8V battery, while transmitter amplifier circuit (IC1) and receiver audio amplifier (IC7) use battery directly for power supply.

IC17: 5V LDO, micro-power voltage stabilizer. Supply power for units such as MCU, IF processing and frequency synthesizer.

IC16: 8V LDO, micro-power voltage stabilizer.

Q38: 8T switch (controlled by MCU)

8T: supply power for the front end of transmitter

Q40: 8R switch (controlled by MCU)

8R: supply power for the RF amplification and mixing units of receiver.

3.7 MCU Unit:

MCU Unit controls the operation of every unit to realize all functions of the PT8000.

Communication with external PC

State data access

Control PLL for the generation, receiving and transmitting of local oscillation frequency

Access to the current channel state

Control LED status indicator

Control power supplied condition of every unit

Detect action of every function key

Produce CTCSS signal

Produce DCS signal

Produce power controlled signal

Finish CTCSS decoding

Finish DCS decoding

Squelch detection and control

Control voice prompt content

Memory (E2PROM, AT24C08)

Channel data, CTCSS/DCS data and other function setting data and parameter adjustment data.

CTCSS/DCS signal coding and decoding:

CTCSS/DCS signals from MCU (pin12 output, PWM wave) are sent to VCO and TCXO for modulation after the balance adjustment by VR1.

CTCSS/DCS signals from receiver are sent to MCU for decoding, and then MCU test if there are CTCSS/DCS signals with the same setting of the station to decide whether open the speaker or not.

CTCSS

CTCSS (continuous tone control squelch system, hereinafter referred to as CTCSS), is a kind of squelch control system with modulation on carrier and continuous sub-audio signals as pilot tone. If CTCSS function is set, the call is available only at the same CTCSS frequency of both receiving and transmitting parties to avoid the disturbance of other signals.

The station has 39 groups of standard CTCSS frequency for your selection, such as Table1.

CTCSS signals produced by MCU (PWM waveform) are sent to VCO for modulation after filtered the HF components over 300Hz in low pass filter composed by RC.

Table 3.1 CTCSS Frequency Table

No.	Frequency [Hz]	No.	Frequency [Hz]	No.	Frequency [Hz]	No.	Frequency [Hz]
1	67.0	11	94.8	21	131.8	31	186.2
2	69.3	12	97.4	22	136.5	32	192.8
3	71.9	13	100.0	23	141.3	33	203.5
4	74.4	14	103.5	24	146.2	34	210.7
5	77.0	15	107.2	25	151.4	35	218.1
6	79.7	16	110.9	26	156.7	36	225.7
7	82.5	17	114.8	27	162.2	37	233.6
8	85.4	18	118.8	28	167.9	38	241.8
9	88.5	19	123.0	29	173.8	39	250.3
10	91.5	20	127.3	30	179.9		

DCS signaling:

DCS (Digital code squelch), is a kind of continuous digital code modulated on carrier with voice signal and used for squelch control. If DCS function is set, the speaker is available only when receiving the same DCS code to avoid the disturbance of useless signals.

The station has 83 kinds of standard codes including positive and inverse code for your selection, such as Table 2.

DCS signals produced by MCU (PWM waveform) are sent to VCO and TCXO for modulation (the HF components of DCS signals are modulated by VCO, while the LF components by TCXO) after filtered the HF components over 300Hz in low pass filter composed by RC.

CTCSS/DCS signals from receiver are sent to MCU for decoding, and then MCU test if there are DCS codes with the same setting of the station to decide whether open the speaker or not.

Table 3.2 DCS Coding Schedule

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	

3.8 Description of Semiconductor Devices

MCU Description

Table 3.3 Port Description of Microprocessor (R5F212A8)

NO.	Port name	Pin Name	I/O	Function
1	IGN	P33	I	Reserved
2	EXT-ALARM	P34	I	External Alarm Input
3	MODE		I	Connect resistor of 4.7K with VCC
4	SCL	P43	O	EEPROM Clock Line
5	SDA	P44	I/O	EEPROM Data Line
6	RST		I	Reset Input
7	XOUT		O	Oscillator
8	VSS		-	Grounding
9	XIN		I	Oscillator (7.3MHz)

NO.	Port name	Pin Name	I/O	Function
10	VCC		-	CPU Power 5V Input
11	SHIFT	P54	O	Clock Beat Frequency Shift H: On
12	TO0	P53	O(PWM)	QT/DQT Output
13	TO1	P52	O(PWM)	QT/DQT Output
14	DEV1	P51	O	Max Frequency Compensation
15	DEV2	P50	O	(four frequency band)
16	SCNLED	P27	O	Scanning Indicator Light H: on
17	LOWLED	P26	O	Low-power Indicator Light H : on
18	GLED	P25	O	Receiving Green Indicator Light H: on
19	RLED	P24	O	Transmitting Red Indicator Light H: on
20	UL	P23	I	PLL Lock Detection Pin H: Locking L: Out of Lock
21	CK	P22	O	PLL Clock Output
22	LE	P21	O	PLL IC Enable Pin H: Locking
23	DT	P20	O	PLL Data Output
24	DTMFD0	P17	I	DTMF Detection Input
25	DTMFD1	P16	I	DTMF Detection Input
26	DTMFD2	P15	I	DTMF Detection Input
27	DTMFD3	P14	I	DTMF Detection Input
28	DTMFDV	P86	I	DTMF Decoding Effective Input
29	RX	P85	O	TX/RX VCO Selection H: TX, L: RX
30	MICDAT	P84	I	Preservation: Digital Keyboard Microphone Data Input
31	T2IN	P83	I(TRFI)	Reserved: 2TONE Detection Output
32	HOOK	P82	I	Hang Signal Input, Connect R0ohm with RXD
33	LEDC	P81	O	LED Display Control H: Effective
34	DATA	P80	O	LED Display Control Data
35	CLK	P60	O	LED Display Control Clock
36	INT	P45	I	Power Detection Input
37	TXD	P66	O	RS-232C Output
38	RXD	P67	I	RS-232C Input
39	BLC	P65	O	Reserved
40	8TC	P64	O	Transmitting PowerControl H: on
41	8RC	P63	O	Receiving Power Control H: on
42	APC/TV	P31	O(PWM)	TX: Automatic Power Control Output RX: BPF Tuning Output
43	SBC	P30	O	Main Power Switch Control H: on
44	TXGSW	P36	O	Transmitting Gate Control L: Transmitting
45	PA	P32	O	PA Control H: PA
46	AF_MUTE	P13	O	Mute Control L:AF Mute
47	MIC_MUTE	P12	O	Mute Control H: Mic Mute
48	AFCO	P11	O	Audio Power Amplification Control L: Power Amplification
49	TI	P10	I(A/D8)	QT/DQT Signal Input
50	RSSI	P00	I(A/D7)	Signal Strength Input
51	BUSY	P01	I(A/D6)	Busy Signal Input
52	TEMP	P02	I(A/D5)	Power Amplification Temperature Protection Input
53	KEY2	P03	I(A/D4)	Keyboard Entry
54	KEY1	P04	I(A/D3)	Keyboard Entry
55	PTT	P62	I	Press [PTT] to input, Connect R0 ohm with TXD

NO.	Port name	Pin Name	I/O	Function
56	NC			Connect Pull-down Resistor with VSS
57	NC			Connect Pull-down Resistor with VSS
58	VCCN	P06	O(D/A0)	Frequency Voltage Regulation Output VCCN
59	AVSS		-	Connect with VSS
60	DTMF	P07	O(D/A1)	D/A Output: DTMF/BEEP Output
61	VREF		-	Connect with AVCC
62	AVCC		-	CPU Power 5V Input
63	MAXAF	P37	O	Alarm Max Volume Control Switch H: Controlled by Volume Switch L: Max Volume at Emergency Alarm
64	WNTC	P35	O	Broad/narrowband Control H: Broad L: Narrow

3.4 Functional description of semiconductor device

Item	Model	Function Description
IC5	HT9172	DTMF Decoder Chip
IC12	PST9140NR	MCU Reset Circuit
IC13	NJM2902V	MIC Amplification, Limitation, Filtering
IC3	MB15E03SL	Frequency Synthesizer
IC4	NJM2904	APC, Voltage Comparison, Driving
IC6	TA31136	Receiver 2nd Local Oscillation, 2nd IF Amplification, Limitation, Demodulation, Noise Amplification
IC9	NJM2902	Receiver demodulated signal Amplification, Filtering
IC8	NJM2902	Receiver CTCSS Signal Amplification, Filtering
IC11	R5F212A8	MCU
IC15	AT24C08	E2PROM, Channel Frequency Data Storage, Function Setting Parameter, Debug Mode Parameter
IC7	TDA1519C	Audio Frequency Power Amplification
IC11	RA30H	Transmitter Final Power Amplification
IC17	NJM78L05	5V Voltage Regulation Input
IC16	TA7808S	8V Voltage Regulation Input
Q9	DTC144EE	APC Control Switch
Q12	2SK508NV	Receiving VCO Oscillation Circuit
Q14	2SC4617	VCO Power Filters
Q11	2SC5108	Receiving 2nd Local Oscillation Frequency Multiplier Circuit
Q16	2SK1829	Receiving High Power Amplification Gains Control Switch
Q18	3SK318	Receiver High Power Amplification
Q19	3SK318	First Level Mixer
Q1	2SC5108	VCO Buffer Amplifier
Q20	2SC5108	1st IF Amplifier
Q21	2SC4617	Receiver Noise Amplifier
Q22	DTC144EE	Broad/narrowband Noise Switch
Q23	DTA144EE	Receiving Broad/narrowband Frequency Switch
Q29	DTA144EE	Receiving Broad/narrowband Switch
Q30	2SK1824	Transmitting Broad/narrowband Switch
Q27	DTC144EE	Beat Frequency Control Switch
Q33	2SK1824	Receiving Audio Mute Switch
Q45	2SK1824	Receiver Audio Output Switch, Disconnection on Emergency
Q28	DTC144EE	Audio Power Amplification Control Switch
Q35	DTA144EE	MIC Power Switch of Amplification Unit
Q40	KTA1298	8R Switch
Q1	2SC5108	VCO Buffer Amplifier
Q38	KTA1298	8T Switch
Q32	2SC4919	MIC AGC Control Switch
Q4	2SC3357	Transmitter 1st Amplification
Q5	2SC3357	Transmitter 2nd Amplification
Q46	2SK1824	Receiver Audio Output Switch, Connection on

Item	Model	Function Description
		Emergency
Q6	2SK508NV	Transmitting VCO Oscillation Circuit
Q3	2SC4116	Transmitting VCO Control Switch
Q7	2SC5108	VCO Buffer Amplifier
Q13	2SC4116	Receiving VCO Control Switch

Table 3.5 Functional description of Diode

Item	Model	Function Description
D3、D11	L709CE	Transmitter antenna switch diode
D12	MA2S111	Lock Lost Detection Diode
D14、D16、D17、D18	HVC376	Receiving VCO Oscillation Varactor Diode
D16	HVC376	Receiving VCO Oscillation Varactor Diode
D17	HVC376	Receiving VCO Oscillation Varactor Diode
D18	HVC376	Receiving VCO Oscillation Varactor Diode
D7	HZU5ALL	APC Output Voltage-limiting Diode
D2、D19	HSC277	VCO Output Switch
D20、D21	DAN222	Receiving 2nd IF Filter Broad/narrowband Switch
D8	HVC376	Transmitting VCO Oscillation Varactor Diode
D23	HVC355B	Receiving BPF Varactor Diode
D25	MA742	Noise Demodulation
D27、D28、D26、D30、D29	HVC376B 1SS372	Receiving BPF Varactor Diode
D32	HVC376	MIC AGC Detection Diode
D1、D4、D5、D6	1SV278	Transmitting VCO Oscillation Varactor Diode
D8		Transmitting VCO Modulation Diode

Table 3.6: Characteristic of XF1 crystal filter

Item	Rated Value
Nominal center frequency	49.95MHz
Transmission band width	±7.5khz or higher, but within 3db
40dbstop band width	±20.0khz or lower
Ripple	1.0db or lower
Insertion loss	3.0db or lower
Ensure attenuation	80db or higher, but between f0-910khz
Terminal impedance	330 Ω

Table 3.7 Performance and characteristic of CF1 LTWC450H

Item	Rated Value
Nominal center frequency	450kHz
6db band width	±3.0khz or higher
50db band width	±9.5khz or lower
Ripple	2.0db or lower, but between f0±4kHz
Insertion loss	6.0db or lower
Ensure attenuation	47.0db or higher, but between f0±100kHz
Terminal impedance	1.5k Ω

Table 3.8 Performance and characteristic of CF1 LTWC450F

Item	Rated Value
Nominal center frequency	450kHz
6db band width	±6.0khz or higher
50db band width	±12.5khz or lower
Ripple	2.0db or lower, but between f0±4kHz
Insertion loss	6.0db or lower
Ensure attenuation	47.0db or higher, but between f0±100kHz
Terminal impedance	1.5k Ω

Chapter 4 Mode Introduction

Mode combinations

Mode	Function	Howto access
User Mode	For normal use	Power on
PC Mode	Data Programming mode	Reading and writing frequency data and other functions Receive instructions from the PC
	Test Mode	Used to tune the radio using the PC. Receive instructions from the PC
	Firmware Programming Mode	Upgrades the software when new features are added Press button P3 for over 2 seconds and connect the power at the same time; Receive instructions from the computer
Wired Clone mode	Used to transfer programming data from one radio to another.	Press button P1 for over 2 seconds and connect the power at the same time.

User Mode:

You can enter User Mode (conventional communication mode) by turning on the power switch. Users in the mode can use the defined function of the vehicle station.

Data programming mode:

Before leaving the factory, the radio has been set in factory. However, due to different requirements of users, functional parameters of the radio like working frequency, channels, CTCSS/DCS and auto scanning, etc. Should be reset. Therefore, the company has specially designed a set of Chinese/English programming software KSP8000 with friendly interface, convenient operation and visualized display for setting functional parameters of the radio.

Steps for setting the functional parameters of the radio by PC are as follows:

A. Install KSP8000 on the PC.

B. As shown in the figure below, connect the radio and the serial port of the PC with the special programming cable KSPL-05

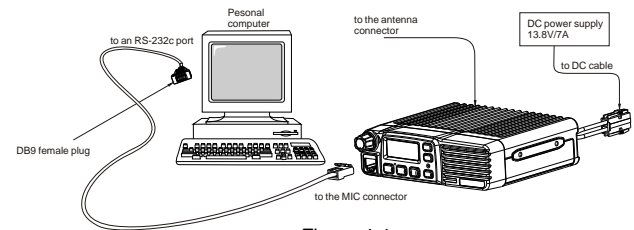


Figure 4-1

C. Turn on the power of the PC.

D. Turn on the power of the radio.

E. Click on KSP8000 to perform the program and run KSP8000.

F. In the main menu of KSP8000, click on [Read] to read the parameters of the radio into the PC; click on [Write] to write the parameters set in the PC into the radio.

G. With the KSP8000 Programming Software, you can set the following parameters according to the requirements of customers:

The station information:

Model of vehicle station (model/ frequency range), serial number, embedded information, MCU version and hardware version, etc

The station parameters:

(1) Programmable buttons: (P1, P2, P3, and) can be set to long/short button and the long button time can be defined)

(2) Miscellaneous settings

- ①. Cable copy mode allowed
- ②. TOT transmitting time limitation
- ③. TOT transmitting time limitation reset

- ④. Pre-tips for TOT transmitting time limitation
- ⑤. Re-key time of TOT transmitting overtime
- ⑥. Squelch level option
- ⑦. Warning tone
- ⑧. Frequency reading code
- ⑨. Frequency writing code

(3) Scanning settings

Scanning option, priority channel selection, back-channel selection, transmitting pause time, scanning detention time and fly-back period

(4) Emergency alarm settings

Channel parameters:

- (1) Channel receiving frequency and transmitting frequency. (stepping frequency: 2.5KHz / 5KHz / 6.25KHz)
- (2) Channel receiving signaling and transmitting signaling
 - ① none
 - ② sub-audio frequency CTCSS (60~260Hz @ 0.1Hz step)
 - ③ CTCSS digital DCS(-777 ~ 777 @ octal number)
- (3) Busy channel lock option
- (4) Clock beat frequency shift selection
- (5) Channel spacing selection 25KHz/12.5KHz(Wide/Narrow)
- (6) Scanning adding/deletion selection
- (7) Channel high/low power selection
- (8) CTCSS rhyme flip & phase shift selection
- (9) Code selection of CALL1 and CALL2
- (10) Code selection of PTT ID on-line code and off-line code

DTMF setting:

DTMF encoding template
 DTMF encoding sequence (group 1~12)
 DTMF decoding sequence (group 1~4)
 Decoding response

Please refer to the "Help" document of KSP8000 for details.

Caution:

1. Before editing for the first time, the data should be read from the vehicle station and properly backed up.
2. If the edited data cannot work normally after being written into the vehicle station, please open the backup data and rewrite them.
3. "Model Information" is the important information of the vehicle station and should not be altered.

Test Mode

According to Figure 4-1, connect the vehicle station and the serial port of the computer with the special programming cable.

Warning: Before entering the Test Mode, please first connect a high-frequency load of 50 ohm to the antenna port of the vehicle station or connect the vehicle station to a comprehensive tester.

With the KSP8000 Programming Software, you can enter the adjustment status in Computer Test Mode to adjust the following parameters of the vehicle station:

1. Frequency stability
2. Transmitting five frequency points of high power
3. Transmitting five frequency points of low power
4. Level- 9 broadband of squelch level opens five frequency points
5. Level- 9 broadband of squelch level closes five frequency points
6. Level- 9 narrowband of squelch level opens five frequency points
7. Level- 9 narrowband of squelch level closes five frequency points
8. Level- 1 broadband of squelch level opens five frequency points
9. Level- 1 broadband of squelch level closes five frequency points
10. Level- 1 narrowband of squelch level opens five frequency points
11. Level- 1 narrowband of squelch level closes five frequency points
12. Five frequency points of broadband QT(67Hz) frequency offset
13. IF points of narrowband QT(67Hz) frequency offset
14. Five frequency points of broadband QT(151.4Hz) frequency offset
15. IF points of narrowband QT(151.4Hz) frequency offset
16. Five frequency points of broadband QT (254.1Hz) frequency offset

- IF points of narrowband QT(254.1Hz) frequency offset
- Five frequency points of broadband DQT frequency offset
- IF points of narrowband DQT frequency offset
- Receiving five frequency points of sensitivity tuning voltage
- IF points of broadband/narrowband DTMF frequency offset

Firmware Programming Mode

The vehicle station is equipped with FLASH ROM internally, when new features are announced, it can be upgraded.

1. Press P3 for over 2 seconds and connect the power at the same time. Enter Firmware Programming Mode when orange indicator is on.
2. Run computer programming software KMU.
3. Connect the vehicle station and the computer with the programming cable.
4. Select the com port to load firmware upgrade file and then click on "E.P" for downloading.
5. Turn off the power to quit after the communication is successful.
6. Just repeat steps 1-5 if you want to program another vehicle station.

Cable Copy Mode

The vehicle station will not exit automatically after entering cable copy mode if the cable copy function is set. But the user need to turn on the power again if return the user mode.

The operation steps are as follows:

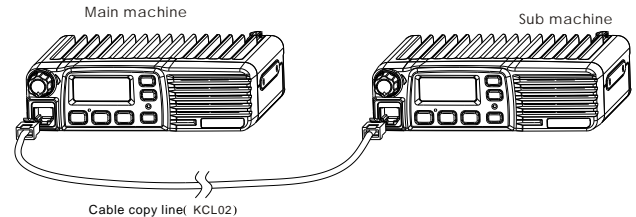


Figure 4-2

1. Press [P1] and connect the power at the same time for entering copy mode when it "C" appears. Please enter user mode if copy mode is prohibited.
2. Connect sub-machine with cable copy line (KCL02) and turn on the power of sub-machine.
3. Press [P2] of Host for copy with the red indicator on, thus the data can be copied from Host to sub-machine. The sub-machine shows "P" with green indicator on when receiving the data. The red indicator of Host is off after copy, while sub-machine reset automatically after receiving all data.
4. You may continue the copy of step 3.

Notes: You may turn on or prohibit cable copy mode by PC Programming Software. The vehicle station can not enter cable copy mode once the cable copy function is prohibited.

Chapter 5 Maintenance, Assembly and Disassembly

The station is a kind of sophisticated communication equipment with small and fine mechanical structure. You should assemble and disassemble it carefully during the maintenance process. The Instruction for assembly and disassembly are as follows:

1.Exploded view of the station

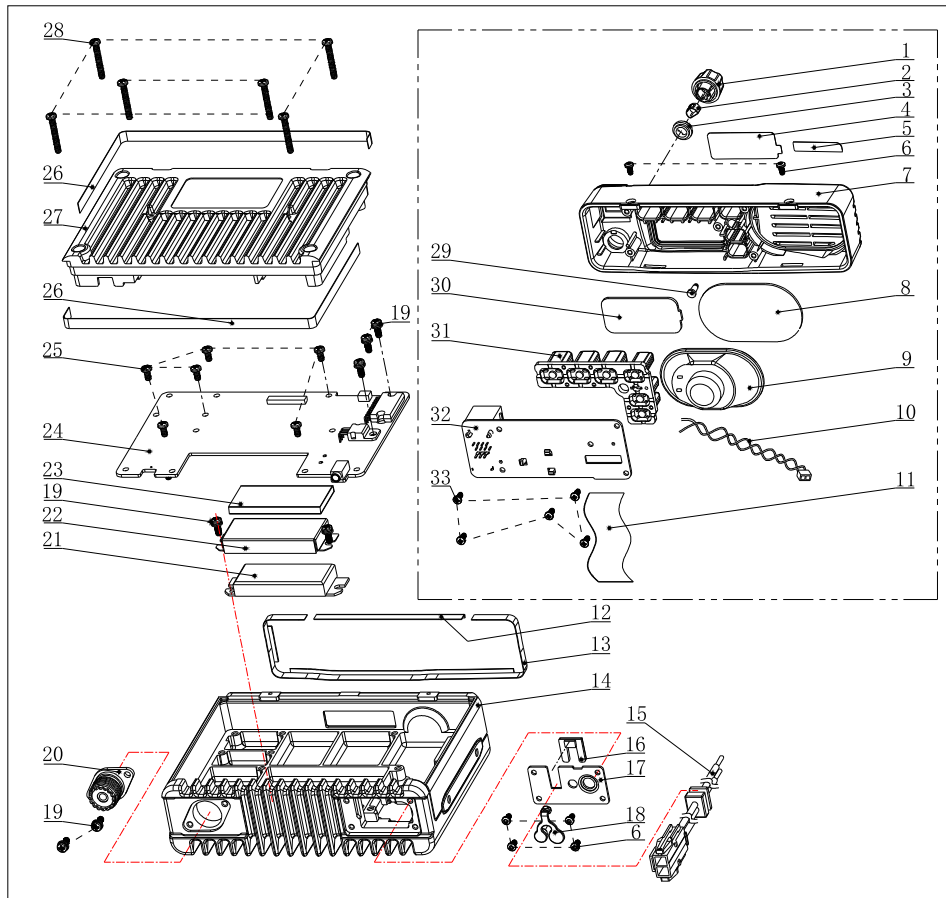


Figure 5-1

ITEM	PARTNUMBER	DESCRIPTION	QTY.
1	201-008000-R02	KNOB VOLUME	1
2	203-006800-R26	SPRING PLATE	1
3	203-007200-R08	NUT VOLUME KNOB	1
4	204-006800-R01	LABEL LCD LENS	1
5		LABEL LOGO	1
6	301-25050J-R01	SCREW M2.5*5	6
7	201-008000-R01	CASE FRONT	1
8	204-008000-R01	NET DUSTPROOF SPEAKER	1
9	121-100000-R19	SPEAKER	1
10	120-400000-R04	LINE SPEAKER	1
11	120-400000-R05	LINE 0.5*34P*110mm	1
12	204-008000-R02	STRIP DUSTPROOF C	1
13	204-008000-R03	STRIP DUSTPROOF B	1
14	203-008000-R02	CASE TOP AL	1
15	120-100000-R15	CABLE POWER	1
16	201-008000-R06	FASTENER POWER CABLE	1
17	203-008000-R03	PLATE METAL	1
18	202-008200-R02	PLUG RUBBER SPEAKER HOLE	1
19	303-30100G-R01	SCREW M3*10 WITH SPRING PLATE	
20	203-008200-R03	ANTENNA BASE	
21	102-304452-R01	MODULE POWER	1
22	203-008200-R05	SHIELD POWER MOUDLE	1
23	203-008200-R09	CUSHION SHIELD	1
24		PCB ASSEMBIY MAIN	1
25	301-30060G-R01	SCREW M3*6	8

ITEM	PARTNUMBER	DESCRIPTION	QTY.
26	204-008000-R04	STRIP DUSTPROOFA	2
27	203-008000-R01	CASE BOTTOMAL	1
28	301-30250D-R01	SCREW M3*25	6
29	201-008000-R04	LENS LED	1
30	201-008000-R03	LENS LCD WINDOW	1
31	202-008000-R01	KEY RUBBER	1
32		PCB ASSEMBLY CONTROL	1
33	302-26060D-R01	SCREW M2.6*6	5

2. Instruction for disassembly of the station for maintenance

1) RF-PCB Disassembly

- ① Release the 6 screws (M3x25) for the upper and lower covers and open the aluminum alloy lower cover (see the figure below).

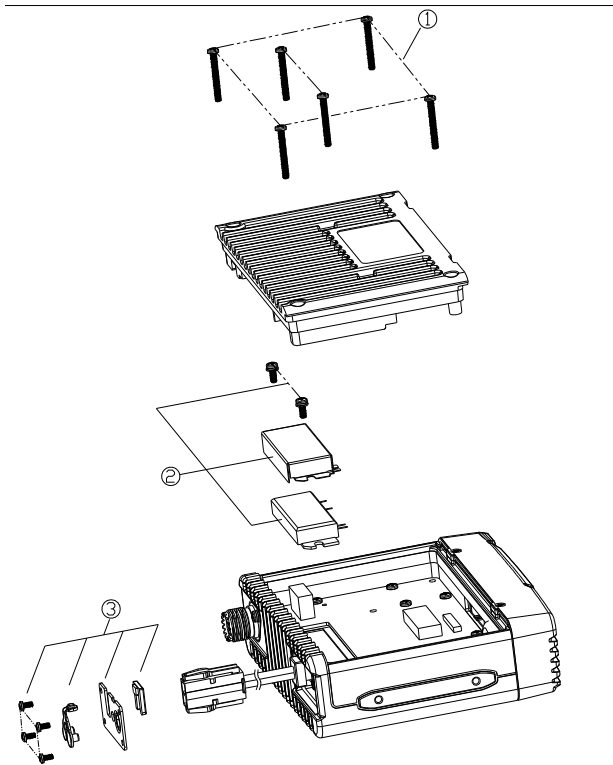


Figure 5-2

- ②. Remove the power module shield and unsolder the welding leg of power amplification module from PCB with the electric iron (see the figure above).
- ③. Release the 4 screws (M2.5x5) of the baffle and remove the metal baffle, plastic buckle and horn hole plug (see the right figure above).
- ④. Unplug the flat cable and horn cable, unsolder the antenna head from RF-PCB with the electric iron, release the screws and then carefully remove the RF-PCB from the aluminum alloy upper cover (see the figure below).

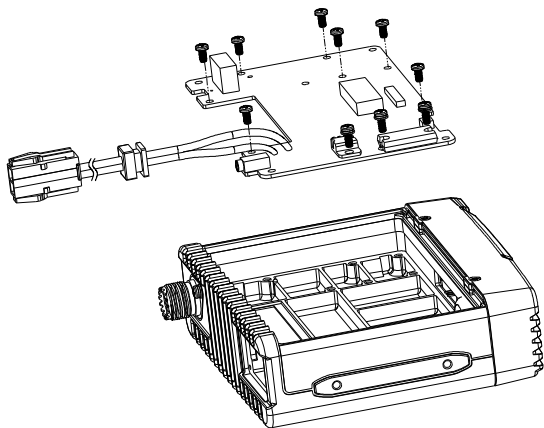


Figure 5-3

2) Instruction for disassembly of KEY-PCB

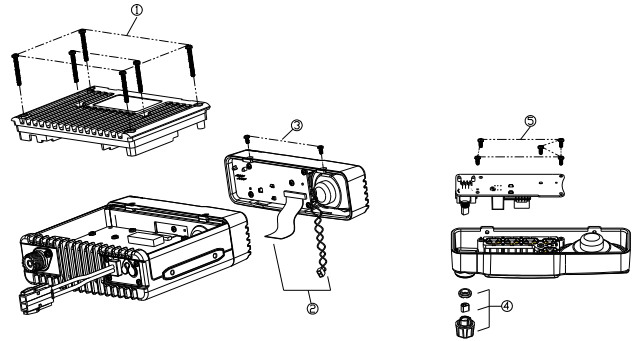


Figure 5-4

- ①. Release the 6 screws (M3x25) for the upper and lower covers and open the aluminum alloy lower cover (see the figure above).
 - ②. Unplug the flat cable and horn cable.
 - ③. Release the 2 screws (M2.5x5) for the panel to separate the panel from the station.
 - ④. Unplug the volume knob and then remove the knob circlip and the switch nub.
 - ⑤. Release the 5 fixing screws (M2.6x6) for KEY-PCB to take out the KEY-PCB from the plastic panel (see the figure above).
- After the disassembly above, you can carry out corresponding reparation and debugging according to the actual malfunction.

Chapter 6 Overall Debugging

Please ensure good grounding of all equipment before testing/debugging! Please ensure the correct connection of antenna output with the corresponding equipment or load before testing/debugging. Transmitter output must connect with standard signal source/ frequency meter/ frequency deviator/frequency spectrograph by RF Power Attenuator. Please ensure no transmitting operation when testing the receiver. Please ensure the good antistatic measures for human body and equipment during the debugging /testing/repairation process.

6.1 Equipment and software for repair

It is necessary to list the equipment and software in the following table to repair and test this product.

Table 6.1 For repair and test: equipment and software

NO.	Name	Parameter requirements
1	Computer	Above P2, compatible IBM PC, WINDOWS 98/ME/2000/XPOperating System
2	Programming software	KSP8000
3	Programming cable	KSPL-05
4	Dubbing cable	KCL-02
5	DC regulator	Output voltage:13.8V, output electric current: ≥20A
6	RF power meter	Test range: 0.5--50W Frequency range: 100MHz500MHz Resistance: 50Ω SWR ≤1.2
7	Frequency meter	Frequency range: 0.1600MHz Frequency accuracy: higher than ±1 × 10 ⁻⁶ Sensitivity: higher than 100mV
8	Frequency deviator	Frequency range: DC600MHz Test range: 0--±5kHz
9	DMM	Input resistance: above 10MΩ/V DC, capable of measuring voltage, electric current and resistance.
10	Audio signal generator	Frequency range:2---3000Hz Output level: 1---500mV

NO.	Name	Parameter requirements
11	RF power attenuator	Decrement: 40db or 50db Receive power : higher than 50W
12	Standard signal source	Frequency range:10MHz---1000MHz Output level:0.1uV~32mV (-127dBm~-17dBm)
13	Oscillograph	Frequency range: DC~20MHz Test range: 10mV~20V
14	Audio Frequency voltmeter	Test range: 10mV~10V

Recommend how to use: item 6, 7, 8, 10, 11 and 12 which listed in the table can be substituted by integrated tester Hp8920.

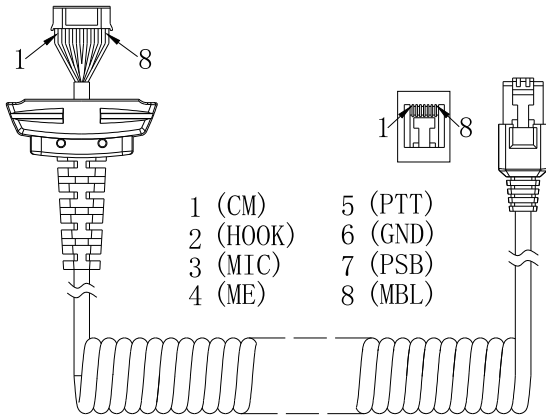


Figure 6.1 External microphone Interface Definition

6.2 Debugging

6.2.1 VCO Adjustment

- a. Adjust channel to high frequency point (see Table 6.2)
- b. In the receiving state, test voltage of PD by DMM and adjust fine-tuning capacitor C122 to get PD voltage of 3.5V ±0.1V
- c. In the transmitting state, test voltage of PD by DMM and adjust fine-tuning capacitor C39 to get PD voltage of 3.5V ±0.1V
- d. Adjust channel to low frequency point (see Table 6.2)
- e. In the receiving state, test voltage of PD by DMM (>0.6V)
- f. In the transmitting state, test voltage of PD by DMM (>0.6V)

Table 6.2 High/ Intermediate/ Low Frequency Point of All Models

	Low Frequency	PointIntermediate Frequency Point	High Frequency Point
PT8000(2)	400.125MHz	425.125MHz	449.975MHz
PT8000(3)	438.125MHz	464.125MHz	489.975MHz

6.2.2 Transmitting frequency offset adjustment (HP8920 is set to TX state and filter is at 50Hz~ 15kHz) :

- a. Input audio signal of 60mV, 1000Hz at MIC jack of vehicle station.
- b. Adjust channel to low frequency point (see Table 6.2)
- c. Press PTT to adjust VR2 and set frequency offset to 4.2kHz
- d. Observe frequency offset of other channels (>3.5kHz)

6.2.3 PLL frequency calibration (HP8920 is set to TX state)

Enter “Frequency Stability” in “Computer Test Mode” to achieve the rated transmitting frequency by adjusting the number from 0 to 255 (Error<100Hz).

6.2.4 Transmitting frequency adjustment (HP8920 is set to TX state)

- a. Enter “Transmitting High Power” in “Computer Test Mode” to adjust the five frequency points including min., low, intermediate, high and max points respectively and set transmitting power to 22W by adjusting the number from 0 to 255.
- b. Enter “Transmitting Low Power” in “Computer Test Mode” to adjust the five frequency points including min., low, intermediate, high and

max points respectively and set transmitting power to 5W by adjusting the number from 0 to 255.

6.2.5 Smooth regulation for DCS waveform (HP8920 is set to TX state and filter is at 20Hz~300Hz)

Enter “DCS frequency offset” in “Computer Test Mode” to adjust VR1 close to square wave.

6.2.6 DCS frequency offset (HP8920 is set to TX state and filter is at 20Hz~300Hz)

a. Enter “DCS frequency offset” in “Computer Test Mode” and select “Broadband” to set the frequency offset to 0.75 kHz by adjusting the number from 0 to 255 and the five frequency points including min., low, intermediate, high and max points.

b. Enter “DCS frequency offset” in “Computer Test Mode” and select “Narrowband” to set the frequency offset to 0.35 kHz by adjusting the number from 0 to 255.

6.2.7 (QT67) frequency offset (HP8920 is set to TX state and filter is at 20Hz~300Hz)

a. Enter “(QT67) frequency offset” in “Computer Test Mode” and select “Broadband” to set the frequency offset to 0.75 kHz by adjusting the number from 0 to 255 and the five frequency points including min., low, intermediate, high and max points.

b. Enter “(QT67) frequency offset” in “Computer Test Mode” and select “Narrowband” to set the frequency offset to 0.35 kHz by adjusting the number from 0 to 255.

6.2.8 (QT254) frequency offset (HP8920 is set to TX state and filter is at 20Hz~300Hz)

a. Enter “(QT254) frequency offset” in “Computer Test Mode” and select “Broadband” to set the frequency offset to 0.75 kHz by adjusting the number from 0 to 255 and the five frequency points including min., low, intermediate, high and max points.

b. Enter “(QT254) frequency offset” in “Computer Test Mode” and select “Narrowband” to set the frequency offset to 0.35 kHz by adjusting the number from 0 to 255.

6.2.9 Receiving Sensitivity (HP8920 is set to RX)

Enter “Receiving Sensitivity” in “Computer Test Mode” to adjust the five frequency points including max, high, intermediate, low and min. points and the number from 0 to 255 for setting max sensitivity of all points.

6.3.0 Receiver Squelch setting (HP8920 is set to RX)

a. Enter “SQL9 open” in “Computer Test Mode” (input the frequency of adjusted frequency point, transmitting signal with amplitude of -115dBm, audio frequency of 1kHz and frequency offset of 3kHz in antenna interface of vehicle station) and click “Broadband” to adjust the five frequency points including min., low, intermediate, high and max points.

b. Enter “SQL9 open” in “Computer Test Mode” (input the frequency of adjusted frequency point, transmitting signal with amplitude of -115dBm, audio frequency of 1kHz and frequency offset of 1.5kHz in antenna interface of vehicle station) and click “Narrowband” to adjust the five frequency points including min., low, intermediate, high and max points.

c. Enter “SQL9 close” in “Computer Test Mode” (input the frequency of adjusted frequency point, transmitting signal with amplitude of -116dBm, audio frequency of 1kHz and frequency offset of 3kHz in antenna interface of vehicle station) and click “Broadband” to adjust the five frequency points including min., low, intermediate, high and max points.

d. Enter “SQL9 close” in “Computer Test Mode” (input the frequency of adjusted frequency point, transmitting signal with amplitude of -116dBm, audio frequency of 1kHz and frequency offset of 1.5kHz in antenna interface of vehicle station) and click “Narrowband” to adjust the five frequency points including min., low, intermediate, high and max points.

e. Enter “SQL1 close” in “Computer Test Mode” (input the frequency of adjusted frequency point, transmitting signal with amplitude of -122dBm, audio frequency of 1kHz and frequency offset of 3kHz in antenna interface of vehicle station) and click “Broadband” to adjust the five frequency points including min., low, intermediate, high and max points.

f. Enter “SQL1 open” in “Computer Test Mode” (input the frequency

of adjusted frequency point, transmitting signal with amplitude of -122dBm, audio frequency of 1kHz and frequency offset of 1.5kHz in antenna interface of vehicle station) and click “Narrowband” to adjust the five frequency points including min., low, intermediate, high and max points.
 g. Enter “SQL1 close” in “Computer Test Mode” (input the frequency of adjusted frequency point, transmitting signal with amplitude of -123dBm, audio frequency of 1kHz and frequency offset of 3kHz in antenna interface of vehicle station) and click “Broadband” to adjust the five frequency points including min., low, intermediate, high and max points.
 h. Enter “SQL1 close” in “Computer Test Mode” (input the frequency of adjusted frequency point, transmitting signal with amplitude of -123dBm, audio frequency of 1kHz and frequency offset of 1.5kHz in antenna interface of vehicle station) and click “Narrowband” to adjust

the five frequency points including min., low, intermediate, high and max points.
 6.3.1 DTMF frequency offset (HP8920 is set to TX state and filter is at 50Hz ~15 kHz)
 a. Enter “DTMF frequency offset” in “Computer Test Mode” and select “Narrowband” to set frequency offset to 3.5 kHz by adjusting the five frequency points including min., low, intermediate, high and max points and the number from 0 to 255.
 b. Enter “DTMF frequency offset” in “Computer Test Mode” and select “Narrowband” to set frequency offset to 1.7 kHz by adjusting the number from 0 to 255.

6.3.2 Adjusting explanation

Please refer Table3, 4 and 5 for the debugging of the parts above

Table 6.3 Voltage controlled oscillator

Item	Test condition	Instrumentation	Test point	Correcting member	Requirement	Remarks
Setting	Supply voltage battery terminal:13.8V	DMM	PD			
Locking voltage	CH: Receiving high frequency point			C122	3.5V±0.1V	Adjustment
	CH: Receiving low frequency point				>0.6V	Observation
	CH: Transmitting high frequency point				3.5V±0.1V	Adjustment
	CH: Transmitting low frequency point			C39	>0.6V	Observation

Table 6.4 Receiving part

Item	Test condition	Instrumentation	Test point	Correcting member	Requirement	Remarks
BPF		Spectrum Analyzer / Integrated Tester	Before Mixing	Test mode	Smooth Wave.	User's adjustment not recommended!
Audio Power	Test frequency: Intermediate Frequency Point Antenna Interface Input: RF OUT: -47dBm(1μ V) MOD: 1kHz DEV: ± 3.0kHz/± 1.5kHz Audio load: 16 Ω	therefore signal generator Oscillograph Audio frequency voltmeter	Speaker Interface	Test mode	(Volume knob clockwise to the end) Audio Power>4W	
Sensitivity	CH: Low Frequency Point CH: Intermediate Frequency Point CH: High Frequency Point therefore OUT: -119dBm(0.25μ V) MOD: 1kHz DEV: ± 3.0kHz/± 1.5kHz	distortion tester /Integrated tester		Test mode	SINAD: 12dB or higher	
Squelch	CH: Receiving Center Frequency Point			Test mode	Normal squelch opening after adjustment	
	Level-9 RF OUT output:-114dBm				Normal squelch opening after adjustment	
	Level-1 RF OUT output:-121dBm				Normal squelch opening after adjustment	

Table 6.5 Transmitting part

Item	Test condition	Instrumentation	Test point	correcting member	requirement	remarks
RF rate		Frequency Counter / Integrated Tester		Test mode	Within $\pm 100\text{Hz}$	
DCS waveform (balance)		Oscilloscope / Integrated Tester	Antenna	VR1	Nearly flat waveform Square wave	
Power		Power Tester / Integrated Tester Ammeter		Test Mode	Adjust to 22W/5W	
Max Modulation Frequency Deviation	CH: Transmitting Low Frequency Point AG: 1kHz/60mV	Frequency deviator/Integration Tester		VR2	Adjust to $\pm 4.2\text{kHz}/2.1\text{kHz}$	$\pm 200\text{Hz}$
DTMF DEV		Frequency deviator/Integration Tester		Test Mode	Adjust to $\pm 3.5\text{kHz}/1.7\text{kHz}$	
CTCSS DEV	CTCSS: 67Hz	Frequency deviator/Integration Tester		Test Mode	Adjust to $\pm 0.75\text{kHz}/0.35\text{kHz}$	
CTCSS DEV	CTCSS: 254.1Hz	Frequency deviator/Integration Tester		Test Mode	Adjust to $\pm 0.75\text{kHz}/0.35\text{kHz}$	$\pm 50\text{Hz}$
DCS DEV	DCS: 023N	Frequency deviator/Integration Tester		Test Mode	Adjust to $\pm 0.75\text{kHz}/0.35\text{kHz}$	

Chapter 7 Main Technical Indexes

Chapter 8 Trouble Shooting Guide

7.1 General Indexes

Model	PT8000
Frequency	(1) (136 ~ 174) MHz(2) (400 ~ 450) MHz (3) (438 ~ 490) MHz(5) (350 ~ 400) MHz
Modulation	16K ϕ F3E/11K ϕ F3E
Number of channels	8
Channel separation	25 kHz/12.5kHz
IF	1st IF: 49.95MHz 2nd IF: 450kHz
Working voltage	13.8V Negative Earth
Working temperature	-25 $^{\circ}\text{C}$ ~ +55 $^{\circ}\text{C}$
Antenna Impedance	50 Ω
Microphone Impedance	2.2k Ω
Dimension	
Weight	

7.2 Receiving part

Usable Sensitivity (12dB SINAD)	$\leq -118\text{dBm}$
Squelch-on sensitivity	$\leq -121\text{dBm}$ @ Level-1 Squelch
Receiver residue output	$W \leq -45\text{dB}/N \leq -40\text{dB}$
Modulation receiving bandwidth	$W \pm 7\text{kHz}/N \pm 3.5\text{kHz}$
Adjacent channel selectivity	$W \geq 70\text{dB}/N \geq 60\text{dB}$
Intermodulation immunity	$\geq 65\text{dB}$
Spurious response immunity	$\geq 70\text{dB}$
Audio Output Power	4W, Balance @ Distortion $\leq 5\%$, 16 Ω
Receiving consumption current	$\leq 1\text{A}$
Standby current	$\leq 100\text{mA}$

7.3 Transmitting part

Transmitting Power	20W/5W @ 13.8V DC
Frequency Stability	$\leq \pm 2.5\text{ppm}$
Max Modulation Frequency Deviation	$\pm 5\text{kHz}/\pm 2.5\text{kHz}$
Modulation Distortion (300~3000Hz)	$\leq 3\%$
Adjacent-channel Transmitting Power	$W \geq 70\text{dB}/N \geq 60\text{dB}$
Spurious Emissions	$\geq 70\text{dB}$
Residual FM	$W \leq -45\text{dB}/N \leq -40\text{dB}$
Transmitting Consumption Current	$\leq 7\text{A}$ @ 13.8V DC

No.	Problem	Solution
1	Power on Failure	A. The power cable is not connected with the accumulator or the host reliably. Please connect the power cable reliably. B. The protective tube of power cable is burnt out. Please change it. C. The power button is of poor contact. Please change the silica gel button or PCB button. D. The rechargeable battery is out of power. Please recharge or change a new one. E. CPU is broken, Please change the IC.
2	Phase lock loop unlocked (Beeping)	A. Channel frequency beyond the range, reset channel data. B. The crystal X1 of phase lock loop is broken. Please change it. C. The oscillator tube is broken. Please change it. D. The IC3 of phase lock loop is broken. Please change IC.
3	No talkback	A. The frequency is not right. Please reselect the channel of the same frequency. B. The CTCSS/DCS code is not the same. Please reset it. C. It is out of the effective communication range.
4	No receiving signal	A. The antenna is not in good contact. Please fasten the antenna head. B. The high-frequency amplifying tube Q18 is broken. Please change it. C. The squelch level is set to high Please reset the squelch level. D. The mixed tube Q19 is broken. Please change it. E. The FM IC6 is broken. Please change IC.
5	The red transmission Indicator lights but no sound is heard.	A. Power module IC1 damaged, no power output, please change the module. B. MIC damaged, please change it.
6	The green receiving indicator lights but no sound is heard.	A. The speaker is broken. Please change it. B. The audio power amplifier IC7 is broken. Please change IC.

Appendix 1 Abbreviations

AMP	amplify, amplifier	MCU	micro control unit
ANT	antenna	MIC	microphone
APC	automatic power control	MOD	modulation
BPF	band passfilter	MONI	monitor
CTCSS	continuous tone control squelch system	PLL	phase lock loop
DCS	Digital codesquelch	PTT	push-to-talk
DEMODO	demodulation	RX	接收机
E2PROM	E2PROM	SPK	speaker
HPF	high pass filter	TCXO	temperature control X' oscillator
IDC	instantaneous deviation control	TX	发射机
IF	intermediate frequency	UL	un-lock
LED	Light-Emitting Diode	VCO	voltage control oscillator
LNA	low noise amplifier		
LPF	low pass filter		

Appendix 2 Mainboard Bom(438-490MHz)

NO.	Material Serial No.	Name/Spec.	Installation Positon
1	101-08000U-R03	PT8000PCB / PT8000U-080403.PCB,ROHS	
2	102-0R8C2A-R01	MCU / R8C/2A,R5F212A8SNFP,PLQP-64,ROHS	IC11
3	102-304452-R01	Power module / RA30H4452M, ROHS	IC1
4	102-9140NR-R01	MOS IC / PST9140NR,ROHS	IC12
5	102-A1519C-R01	MOS IC / TDA1519C,SIL9,ROHS	IC7
6	102-A31136-R01	MOS IC / TA31136FN,SSOP,ROHS	IC6
7	102-AT2408-R01	MOS IC / AT24C08AN-SU27,ROHS	IC15
8	102-B15E03-R01	MOS IC / MB15E03SL,PLL,16-PIN,SSOP,ROHS	IC3
9	102-FP3502-R01	MOS IC / XC62FP3502PR,SOT-89,ROHS	IC2
10	102-HT9172-R01	MOS IC / HT9172,SOP,ROHS	IC5
11	102-M2902V-R01	MOS IC / NJM2902V,OP-AMP,ROHS	IC8, IC9, IC13
12	102-M2904V-R01	MOS IC / NJM2904V,OP-AMP,ROHS	IC4
13	102-M78L05-R01	MOS IC / NJM78L05UA, ROHS	IC17
14	102-TA7808-R01	MOS IC / TA7808S,TO-220,ROHS	IC16
15	103-0DA221-R01	Chip diode / DA221(ROHM),ROHS	D13
16	103-0MA742-R01	Chip diode / MA742(PANASONIC),ROHS	D9, D10, D25
17	103-1SS372-R01	Chip diode / 1SS372(TOSHIBA),ROHS	D32
18	103-1SV278-R01	Chip variable capacitor diode/ 1SV278,ROHS	D8
19	103-A2S111-R01	Chip diode / 0603,MA2S111(PANASONIC),ROHS	D12, D15, D22
20	103-AP1250-R01	Chip diode / MA4P1250-1072T,ROHS	D3, D11
21	103-DAN222-R01	Chip diode / DAN222,(ROHM),ROHS	D20, D21, D33
22	103-HSC277-R01	Chip diode / HSC277(HITACHI),ROHS	D2, D19
23	103-HVC355-R02	Chip variable capacitor diode/ 0603,HVC355B(HITACHI),ROHS	D23
24	103-HVC376-R01	Chip variable capacitor diode/ HVC376B,ROHS	D1, D4, D5, D6, D14, D16, D17, D18, D26, D27, D28, D29, D30
25	103-HZU5AL-R01	Chip diode / HZU5ALL(HITACHI),ROHS	D7
26	103-SM3MA1-R01	Chip diode / DSM3MA1,ROHS	D34
27	104-A144EE-R01	Chip capacitor / DTA144EE(ROHM),ROHS	Q15, Q23, Q29, Q35, Q36
28	104-C144EE-R01	Chip capacitor / DTC144EE(ROHM),ROHS	Q9, Q10, Q17, Q22, Q24, Q25, Q28, Q37, Q42, Q43, Q44, Q47
29	104-MT717T-R01	Chip capacitor / FMMT717TA,ROHS	Q39
30	104-SC3357-R01	Chip capacitor / 2SC3357, ROHS	Q4, Q5
31	104-SC4116-R01	Chip capacitor / 2SC4116-GR, ROHS	Q3, Q13
32	104-SC4617-R01	Chip capacitor / 2SC4617(S)(ROHM),ROHS	Q14, Q21, Q26, Q31
33	104-SC4919-R01	Chip capacitor / 2SC4919,MUTING,CIRCUIT(SANYO),ROHS	Q32
34	104-SC5108-R01	Chip capacitor / 2SC5108Y(TOSHIBA),ROHS	Q1, Q2, Q7, Q11, Q20
35	104-TA1298-R01	Chip capacitor / KTA1298(Y),ROHS	Q38, Q40
36	105-2SK508-R01	FET / 2SK508NV(K52),ROHS	Q6, Q12
37	105-3SK318-R01	FET / 3SK318,ROHS	Q18, Q19
38	105-SK1824-R01	FET / 2SK1824,ROHS	Q30, Q33, Q34, Q45, Q46
39	105-SK1829-R01	FET / 2SK1829,ROHS	Q16

40	108-450C24-R02	450kHz Phase Frequency Detector / JTBM450CX24,ROHS	CD1
41	108-CF450F-R01	Plug-in porcelain filter / LTM450FW, 450kHz \pm 7kHz,ROHS	Cf2
42	108-CF450H-R01	Plug-in porcelain filter / LTM450HT, 450kHz \pm 3kHz,ROHS	Cf1
43	108-XF4995-R01	Plug-in IF filter / 49.95MHz \pm 7.5KHz, U-5*2,ROHS	Xf1, XF2
44	109-040000-R01	Chip resistor / 0402,0R \pm 5%,ROHS	C134, C135, C162, C289, R66, R72, R145, R149, R172, R186, R196, R197, R222, R223, R229, R238, R242, R252, R257, R268, R282, R287
45	109-040100-R01	Chip resistor / 0402,10R \pm 5%,ROHS	R2, R3, R71, R82, R84, R219
46	109-040101-R01	Chip resistor / 0402,100R \pm 5%,ROHS	R21, R26, R101, R121, R247
47	109-040102-R01	Chip resistor / 0402,1K \pm 5%,ROHS	R9, R48, R70, R78, R83, R136, R188, R194, R201, R206, R231, R235, R254, R266, R270, R292
48	109-040103-R01	Chip resistor / 0402,10K \pm 5%,ROHS	R10, R12, R13, R15, R20, R24, R35, R62, R65, R68, R74, R79, R81, R112, R174, R210, R228, R233, R237, R280, R283, R284, R285
49	109-040104-R01	Chip resistor / 0402,100K \pm 5%,ROHS	R40, R52, R53, R60, R64, R67, R80, R92, R117, R123, R199, R208, R225, R236, R239, R248, R269, R273
50	109-040105-R01	Chip resistor / 0402,1M \pm 5%,ROHS	R128, R130, R131, R132, R133, R137, R139, R147, R192, R277
51	109-040122-R01	Chip resistor / 0402,1.2K \pm 5%,ROHS	R152, R267
52	109-040123-R01	Chip resistor / 0402,12K \pm 5%,ROHS	R88, R245
53	109-040124-R01	Chip resistor / 0402,120K \pm 5%,ROHS	R150, R175
54	109-040151-R01	Chip resistor / 0402,150R \pm 5%,ROHS	R63, R111
55	109-040153-R01	Chip resistor / 0402,15K \pm 5%,ROHS	R49, R50, R56, R155, R162, R272
56	109-040154-R01	Chip resistor / 0402,150K \pm 5%,ROHS	R6, R11, R27, R140, R216
57	109-040183-R01	Chip resistor / 0402,18K \pm 5%,ROHS	R198, R207, R217, R259
58	109-040184-R01	Chip resistor / 0402,180K \pm 1%,ROHS	R169, R170, R221
59	109-040184-R02	Chip resistor / 0402,180K \pm 5%,ROHS	R93, R143
60	109-040204-R01	Chip resistor / 0402,200K \pm 5%,ROHS	R69
61	109-040220-R01	Chip resistor / 0402,22R \pm 5%,ROHS	R33, R37, R103
62	109-040221-R01	Chip resistor / 0402,220R \pm 5%,ROHS	R115
63	109-040223-R01	Chip resistor / 0402,22K \pm 5%,ROHS	R85, R86, R106, R109, R110, R153, R171, R215
64	109-040224-R01	Chip resistor / 0402,220K \pm 5%,ROHS	R183, R213
65	109-040241-R01	Chip resistor / 0402,240R \pm 5%,ROHS	R61
66	109-040272-R01	Chip resistor / 0402,2.7K \pm 5%,ROHS	R1, R57, R148
67	109-040273-R01	Chip resistor / 0402,27K \pm 5%,ROHS	R59, R161, R177, R205
68	109-040274-R01	Chip resistor / 0402,270K \pm 5%,ROHS	R42, R141, R164
69	109-040331-R01	Chip resistor / 0402,330R \pm 5%,ROHS	R14, R43
70	109-040332-R01	Chip resistor / 0402,3.3K \pm 5%,ROHS	R124, R142, R146, R159, R173
71	109-040333-R01	Chip resistor / 0402,33K \pm 5%,ROHS	R151, R156, R157, R185, R249
72	109-040334-R01	Chip resistor / 0402,330K \pm 5%,ROHS	R73, R108, R134, R230
73	109-040363-R01	Chip resistor / 0402,36K \pm 5%,ROHS	R98
74	109-040392-R01	Chip resistor / 0402,3.9K \pm 5%,ROHS	R271, R279
75	109-040393-R01	Chip resistor / 0402,39K \pm 5%,ROHS	R278
76	109-040394-R01	Chip resistor / 0402,390K \pm 5%,ROHS	R202, R220
77	109-040433-R01	Chip resistor / 0402,43K \pm 5%,ROHS	R160, R163
78	109-040471-R01	Chip resistor / 0402,470R \pm 5%,ROHS	R100
79	109-040472-R01	Chip resistor / 0402,4.7K \pm 5%,ROHS	R5, R16, R39, R76, R77, R91, R179, R187, R191, R195, R288, R289, R290
80	109-040473-R01	Chip resistor / 0402,47K \pm 5%,ROHS	R75, R89, R105, R126, R127, R129, R293, R294
81	109-040474-R01	Chip resistor / 0402,470K \pm 5%,ROHS	R96, R165, R204
82	109-040560-R01	Chip resistor / 0402,56R \pm 5%,ROHS	R135
83	109-040561-R01	Chip resistor / 0402,560R \pm 5%,ROHS	R51, R54, R55
84	109-040562-R01	Chip resistor / 0402,5.6K \pm 5%,ROHS	R178, R184, R193, R212, R241, R260
85	109-040563-R01	Chip resistor / 0402,56K \pm 5%,ROHS	R97, R125, R232, R258, R263, R275
86	109-040564-R01	Chip resistor / 0402,560K \pm 5%,ROHS	R99, R243
87	109-040682-R01	Chip resistor / 0402,6.8K \pm 5%,ROHS	R94, R95, R113, R114, R244
88	109-040683-R01	Chip resistor / 0402,68K \pm 5%,ROHS	R118, R264, R274
89	109-040684-R01	Chip resistor / 0402,680K \pm 5%,ROHS	R209
90	109-040821-R01	Chip resistor / 0402,820R \pm 5%,ROHS	R255
91	109-040824-R01	Chip resistor / 0402,820K \pm 5%,ROHS	R224

92	109-040913-R01	Chip resistor / 0402,91K \pm 5%,ROHS	R190
93	109-060000-R01	Chip resistor / 0603,0R \pm 5%,ROHS	L52, L62
94	109-060100-R01	Chip resistor / 0603,10R \pm 5%,ROHS	R29, R30
95	109-060102-R01	Chip resistor / 0603,1K \pm 5%,ROHS	R18, R19
96	109-060121-R01	Chip resistor / 0603,120R \pm 5%,ROHS	R41
97	109-060151-R01	Chip resistor / 0603,150R \pm 5%,ROHS	R4
98	109-060221-R01	Chip resistor / 0603,220R \pm 5%,ROHS	R45
99	109-060271-R01	Chip resistor / 0603,270R \pm 5%,ROHS	R44
100	109-060272-R01	Chip resistor / 0603,2.7K \pm 5%,ROHS	R34
101	109-060274-R01	Chip resistor / 0603,270K \pm 5%,ROHS	R36
102	109-060471-R01	Chip resistor / 0603,470R \pm 5%,ROHS	R32
103	109-0605R6-R01	Chip resistor / 0603,5.6R \pm 5%,ROHS	R8
104	109-060681-R01	Chip resistor / 0603,680R \pm 5%,ROHS	R58
105	109-060821-R01	Chip resistor / 0603,820R \pm 5%,ROHS	R22, R23
106	109-070000-R01	Chip resistor / 0805,0R \pm 5%,ROHS	L29
107	109-070220-001	Chip resistor / 0805,22R \pm 5%	L30
108	109-070470-001	Chip resistor / 0805,47R \pm 5%,停用	L31
109	109-100221-R01	Chip resistor / 1206,220R \pm 5%,ROHS	R46, R47
110	110-110473-R01	Chip trimming resistor / MVR22HXBRN473, 47K \pm 25%,B Linear,ROHS	VR2
111	110-110683-R01	Chip trimming resistor / MVR22HXBRN683, 68K \pm 25%,B Linear,ROHS	Vr1
112	111-010000-R01	Plug-in voltage-dependent resistor / 10D220, ROHS	R281
113	111-030000-R01	Chip Fuse / 433003,3A/32V,1206(429003), ROHS	F1
114	112-043100-R01	Chip capacitor / 0402,10P \pm 0.5P,50V,C0G,ROHS	C7, C53, C80, C138, C139, C307
115	112-043101-R01	Chip capacitor / 0402,100P \pm 5%,50V,C0G,ROHS	C36, C37, C81, C90, C91, C99, C103, C105, C108, C112, C114, C115, C349, C350, C351, C352, C353, C354, C356, C359, C360, C361, C362, C363
116	112-043102-R01	Chip capacitor / 0402,1000P \pm 10%,50V,X7R,ROHS	C58, C167, C170, C171, C188, C189, C195, C196, C206, C212, C214, C221, C231, C266, C311, C321, C370
117	112-043103-R01	Chip capacitor / 0402,0.01uF \pm 10%,50V,X7R,ROHS	C33, C102, C121, C133, C145, C153, C191, C242, C256, C284, C297, C330, C333
118	112-043104-002	Chip capacitor / 0402,0.1uF \pm 10%,10V,X5R,停用	C173
119	112-043104-R02	Chip capacitor / 0402,0.1uF \pm 10%,10V,X5R,ROHS	C17, C83, C144, C172, C183, C184, C186, C187, C210, C211, C213, C235, C253, C259, C261, C268, C270, C271, C295, C300, C308, C319, C325, C329, C334, C337, C338
120	112-043105-R01	Chip capacitor / 0402,1uF \pm 10%,6.3V,X5R,ROHS	C56, C120, C267, C278, C280, C291, C298, C303, C304, C312, C323, C335, C336
121	112-043110-R01	Chip capacitor / 0402,11P \pm 5%,50V,C0G,ROHS	C197
122	112-043120-R01	Chip capacitor / 0402,12P \pm 5%,50V,C0G,ROHS	C2, C16, C106, C118, C194
123	112-043123-R01	Chip capacitor / 0402,0.012uF \pm 10%,50V,X7R,ROHS	C249, C252, C258, C263, C273
124	112-043150-R01	Chip capacitor / 0402,15P \pm 5%,50V,C0G,ROHS	C13, C190, C198
125	112-043180-R01	Chip capacitor / 0402,18P \pm 5%,50V,C0G,ROHS	C204
126	112-043182-R01	Chip capacitor / 0402,1800P \pm 10%,50V,X7R,ROHS	C217
127	112-0431R0-R01	Chip capacitor / 0402,1P \pm 0.25P,50V,C0G,ROHS	C69, C70, C175
128	112-0431R5-R01	Chip capacitor / 0402,1.5P \pm 0.25P,50V,C0G,ROHS	C203
129	112-043220-R01	Chip capacitor / 0402,22P \pm 5%,50V,C0G,ROHS	C27, C28, C82, C97, C98, C168, C272, C281
130	112-043221-R01	Chip capacitor / 0402,220P \pm 5%,50V,C0G,ROHS	C282
131	112-043222-R01	Chip capacitor / 0402,2200P \pm 10%,50V,X7R,ROHS	C248, C262
132	112-043223-R01	Chip capacitor / 0402,0.022uF \pm 10%,50V,X7R,ROHS	C158, C238, C239, C322
133	112-0432R0-R01	Chip capacitor / 0402,2P \pm 0.25P,50V,C0G,ROHS	C60, C161, C177
134	112-0432R5-R01	Chip capacitor / 0402,2.4P/2.5P \pm 0.1P,50V,C0G,ROHS	C200
135	112-043330-R01	Chip capacitor / 0402,33P \pm 5%,50V,C0G,ROHS	C6, C130, C147, C232
136	112-043331-R01	Chip capacitor / 0402,330P \pm 10%,50V,X7R,ROHS	C140
137	112-043333-R01	Chip capacitor / 0402,0.033uF \pm 10%,16V,X7R,ROHS	C125, C154, C156, C257, C276
138	112-043390-R01	Chip capacitor / 0402,39P \pm 5%,50V,C0G,ROHS	C225, C229
139	112-043392-R01	Chip capacitor / 0402,3900P \pm 10%,50V,X7R,ROHS	C301, C314
140	112-043393-R01	Chip capacitor / 0402,0.039uF \pm 10%,50V,X7R,ROHS	C288
141	112-0433R0-R01	Chip capacitor / 0402,3P \pm 0.25P,50V,C0G,ROHS	C35, C124, C275
142	112-043470-R01	Chip capacitor / 0402,47P \pm 5%,50V,C0G,ROHS	C129, C255

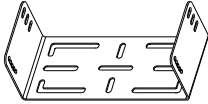
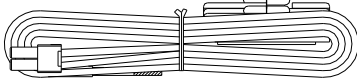
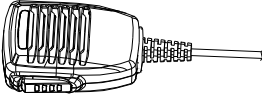




143	112-043471-R01	Chip capacitor / 0402,470P ± 10%,50V,X7R,ROHS	C3, C9, C11, C12, C19, C20, C21, C38, C47, C49, C50, C51, C52, C54, C55, C57, C59, C68, C71, C87, C88, C89, C92, C95, C110, C116, C119, C123, C128, C136, C142, C143, C148, C151, C157, C160, C169, C174, C178, C185, C207, C215, C218, C220, C222, C223, C247, C274, C279, C283, C285, C293, C296, C305, C309, C310, C315, C317, C326, C328, C332, C339, C340, C342, C343, C348, C369
144	112-043473-R01	Chip capacitor / 0402,0.047uF ± 10%,16V,X7R,ROHS	C245, C294, C306
145	112-0434R0-R01	Chip capacitor / 0402,4P ± 0.25P,50V,C0G,ROHS	C100, C107, C126
146	112-0435R0-R01	Chip capacitor / 0402,5P ± 0.25P,50V,C0G,ROHS	C72, C73, C166, C205
147	112-043681-R01	Chip capacitor / 0402,680P ± 10%,16V,X7R,ROHS	C132
148	112-043683-R01	Chip capacitor / 0402,0.068uF ± 10%,16V,X7R,ROHS	C155, C244, C320
149	112-043683-R02	Chip capacitor / 0402,0.068uF ± 10%,10V,X7R,ROHS	C357, C358
150	112-043820-R01	Chip capacitor / 0402,82P ± 5%,50V,C0G,ROHS	C234
151	112-043821-R01	Chip capacitor / 0402,820P ± 10%,16V,X7R,ROHS	C324
152	112-0438R0-R01	Chip capacitor / 0402,8P ± 0.5P,50V,C0G,ROHS	C192
153	112-0439R0-R01	Chip capacitor / 0402,9P ± 0.5P,50V,C0G,ROHS	C93
154	112-043R50-R01	Chip capacitor / 0402,0.5P ± 0.1P,50V,C0G,ROHS	C48, C62, C65
155	112-063102-R01	Chip capacitor / 0603,1000P ± 10%,50V,X7R,ROHS	C26
156	112-063104-R01	Chip capacitor / 0603,0.1uF ± 10%,50V,X7R,ROHS	C96
157	112-0631R0-R01	Chip capacitor / 0603,1P ± 0.25P,50V,C0G,ROHS	C4, C5, C176
158	112-0632R0-R01	Chip capacitor / 0603,2P ± 0.25P,50V,C0G,ROHS	C40
159	112-063333-R01	Chip capacitor / 0603,0.033uF ± 10%,16V,X7R,ROHS	C18
160	112-063471-R01	Chip capacitor / 0603,470P ± 10%,50V,X7R,ROHS	C22, C23, C24, C25, C64, C67, C77, C78, C79, C84, C85, C86, C101, R7
161	112-0634R0-R01	Chip capacitor / 0603,4P ± 0.25P,50V,C0G,ROHS	C30, C32, D24
162	112-0635R0-R01	Chip capacitor / 0603,5P ± 0.25P,50V,C0G,ROHS	C10, C34
163	112-0636R0-R01	Chip capacitor / 0603,6P ± 0.5P,50V,C0G,ROHS	C31
164	112-063R50-R01	Chip capacitor / 0603,0.5P ± 0.1P,50V,C0G,ROHS	C41, C111
165	112-072105-R01	Chip Ta capacitor ,SIZE P,1uF ± 20%,10V,ROHS	C290
166	112-072106-R01	Chip Ta capacitor ,SIZE P,10uF ± 20%,6.3V,ROHS	C327
167	112-072225-R01	Chip Ta capacitor ,SIZE P,2.2uF ± 20%,10V,ROHS	C233, C237, C313
168	112-072475-R01	Chip Ta capacitor ,SIZE P,4.7uF ± 20%,10V,ROHS	C1, C8, C42, C131, C159, C216, C226, C246, C286, C345, C346
169	112-073334-R01	Chip capacitor / 0805,0.33uF+80%--20%,10V,Y5V,ROHS	C181
170	112-102104-R01	Chip Ta capacitor ,SIZE A,0.1uF ± 20%,35V,ROHS	C109, C113
171	112-102105-R01	Chip Ta capacitor ,SIZE A,1uF ± 20%,16V,ROHS	C117
172	112-102156-R01	Chip Ta capacitor ,SIZE A,15uF ± 20%,6.3V,ROHS	C137, C149
173	112-103102-R01	Chip capacitor / 1206,1000P ± 10%,50V,X7R,ROHS	C29
174	112-103106-R01	Chip capacitor / 1206,10uF+80%--20%,16V,Y5V,ROHS	C265
175	112-103120-R01	Chip capacitor / 1206,12P ± 5%,50V,C0G,ROHS	C45
176	112-103140-R01	Chip capacitor / 1206,14P ± 5%,50V,C0G,ROHS	C94
177	112-1031R0-R01	Chip capacitor / 1206,1P ± 0.25P,50V,C0G,ROHS	C43
178	112-1032R0-R01	Chip capacitor / 1206,2P ± 0.25P,50V,C0G,ROHS	C15
179	112-1034R0-R01	Chip capacitor / 1206,4P ± 5%,50V,C0G,ROHS	C61
180	112-191477-R01	Plug-in electrolytic capacitor / Φ 10*16,470UF25V,± 20%, ROHS	C331
181	112-201476-R02	Chip electrolytic capacitor / Φ 6.3*5.3,47U25V,± 20%,ROHS	C66, C74, C341, C344
182	113-010100-R01	Chip trimming capacitor / TZV2Z100A110,3~10p+100,ROHS	C39, C122
183	114-06E180-R01	Chip inductor / C1608CB-18NJ,陶瓷芯18nH ± 5%,0603,ROHS	L20, L45
184	114-06E560-R01	Chip inductor / C1608CB-56NJ,陶瓷芯56nH ± 5%,0603,ROHS	L36
185	114-06E680-R01	Chip inductor / C1608CB-68NJ,陶瓷芯68nH ± 5%,0603,ROHS	L47, L53
186	114-06G102-R01	Chip inductor / MLF1608A1R0K,1uH ± 5%,0603,ROHS	L48
187	114-06G120-R01	Chip inductor / MLG1608B12NJT,12nH ± 5%,0603,ROHS	L14, L15
188	114-06G180-R01	Chip inductor / MLG1608B18NJT,18nH ± 5%,0603,ROHS	L13
189	114-06G181-R01	Chip inductor/ LGHK1608R18J-T,180nH ± 5%,0603,ROHS	L2
190	114-06G220-R01	Chip inductor / MLG1608B22NJT,22nH ± 5%,0603,ROHS	L7, L8
191	114-06G221-R02	Chip inductor/ LGHK1608R22J-T,220nH ± 5%,0603,ROHS	L12, L21, L27, L44
192	114-06G332-R01	Chip inductor / MLF1608A3R3K,3.3uH ± 5%,0603,ROHS	L5, L37

193	114-06G471-R01	Chip inductor / MLF1608DR47K,470nH±10%,0603,ROHS	L41
194	114-06G561-R01	Chip inductor / MLF1608DR56K,560nH±10%,0603,ROHS	L42
195	114-06G820-R01	Chip inductor / MLG1608B82N,82nH±5%,0603,ROHS	L34, L38
196	114-08E103-R01	Chip inductor / FSLM2520-100J,10uH±5%,1008,ROHS	L40
197	114-08E331-R01	Chip inductor / FSLM2520-R33K,330nH±10%,1008,ROHS	L49
198	114-08E821-R01	Chip inductor / FSLM2520-R82K,820nH±10%,1008,ROHS	L50
199	114-10D170-R01	Chip inductor/ LQW31HN17NJ03L,17nH,1206,MURATA,ROHS	L3
200	114-10D330-R01	Chip inductor/ LQW31HN33NJ03L,33nH,1206,MURATA,ROHS	L35
201	115-1R23R0-R01	Chip air-cored coil / 0.4*1.2*3TR,ROHS	L51, L54, L55, L56, L57, L58
202	115-2R02R0-R01	Chip air-cored coil / 1.4*2.0*2TR,ROHS	L9, L10, L11, L28
203	115-3R0110-R01	Chip air-cored coil / 0.9*3.0*11TR,ROHS	L19
204	115-3R06R0-R02	Chip air-cored coil / 0.9*3.0*6TR,ROHS	L18
205	117-000000-R05	Chip bead / EMI,FILTER, SMT,BLM21P300S,0805,ROHS	L64, L72, L73
206	117-000000-R07	Chip bead / EMI,FILTER, SMT,BLM41P600SPT,1206,ROHS	L25, L26
207	117-000000-R08	Chip bead / EMI,FILTER, SMT,BLM11A601S,0603,ROHS	L1, L4, L23, L24, L32, L33, L39, L59, L60, L61, L65, L66, L67, L68, L69, L70, L74, L75, L76, L77
208	119-060104-R01	Temperature Chip resistor / NTH5G16P42B104K07TH,100K,0603,ROHS	R90, R138
209	122-116M80-R02	Chip crystal resonator / TVCGDCSANF,16.8MHz±2.5PPm, ROHS	X1
210	122-13M580-R01	Chip crystal resonator / ZTACC3.58MG,ROHS	X2
211	122-17M300-R01	Chip crystal resonator / CSTCR7M30G53-R0,7.3M,ROHS	X3
212	124-020000-R08	FFC/FPC Connector / 08 6210 034 340 800,34PIN,P=0.5mm,ROHS	CN4
213	124-050000-R14	3.5mm Plug-in Speaker-Mic socket / MOTOROLA接口,ROHS	J1
214	124-090000-R01	2PIN Plug-in Speaker socket / WCPW20-02,ROHS	Cn2

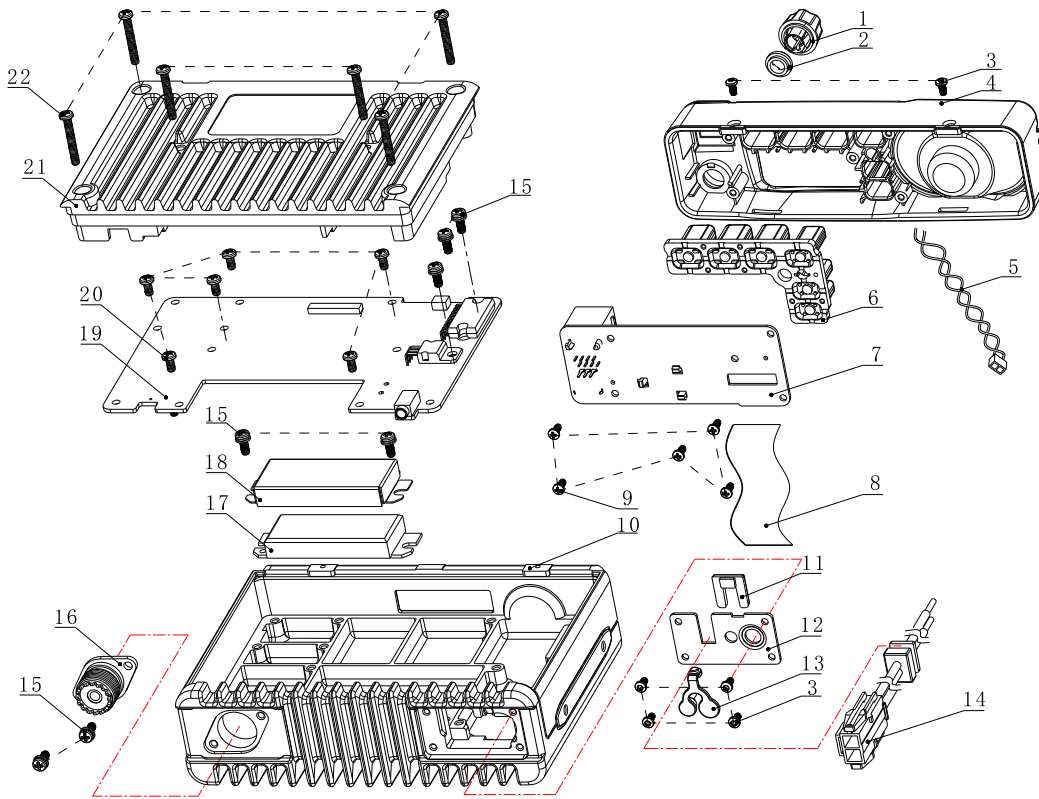
Appendix 3 Structured Part List

Number	P/N	NAME	QTY.
1	120-100000-R38B	cable power	1
2	120-400000-R04	wire speaker	1
3	120-400000-R05	cable 34pin	1
4	121-100000-R19	speaker	1
5	201-008000-R01A	case front	1
6	201-008000-R02A	knob volume	1
7	201-008000-R03A	lens display	1
8	201-008000-R04A	lens led	1
9	201-008000-R05A	bracket display	1
10	201-008000-R06A	SR power cable	1
11	202-008000-R01B	key rubber	1
12	202-008200-R02A	plug speaker hole	1
13	203-006800-R26	spring plate volume knob	1
14	203-007200-R08	nut volume knob	1
15	203-008000-R01A	case top Al	1
16	203-008000-R02A	case bottom Al	1
17	203-008000-R03A	plate metal of cable power	1
18	203-008000-R05A	metal dome rubber key	1
19	203-008200-R03A	base antenna	1
20	203-008200-R05A	shield cover power module	1
21	204-006800-R01	lable display lens	1
22	204-008000-R01A	dustproof net speaker	1
23	204-008000-R02A	dustproof up case front	1
24	204-008000-R03A	dustproof down case front	1
25	204-008000-R04A	dustproof case top and bottom	2
26	204-008200-R09A	plate grounding with power module	1
27	301-25050J-R01	screw m2.5*5	6
28	301-30060G-R01	screw m3*6	7
29	301-30250D-R01	screw m3*25	6
30	302-26060D-R01	screw m2.6*6	5
31	303-30100G-R01	screw m3*10	7

Appendix 4 Appendix

Name	Type	Specification	Accessories
Bracket			
Powercable			
Hand Microphone (MIC)	KME215		
Microphone Hanger			
Combination Screw		M4.0*10.0	
Self-tapping Screw		M5.0*16.0	
Self-tapping Screw		M4.0*16.0	

Appendix 5 PT8000 SPARE MECHANICAL PART BOM



ITEM	PART NUMBER	DESCRIPTION	QTY
1	604-080000-R02	SUBASSEMBLY VOLUME KNOB	1
2	203-007200-R08	NUT VOLUME KNOB	1
3	301-25050J-R01	SCREW M2.5*5	6
4	604-080000-R01	SUBASSEMBLY FRONT CASE	1
5	120-400000-R14	LINE SPEAKER	1
6	202-008000-R01B	KEY RUBBER	1
7	604-080000-R05	SUBASSEMBLY PCB CONTROL	1
8	120-400000-R15	CABLE 0.5*34P*110mm	1
9	301-26060D-R01	SCREW M2.6*6	5
10	604-080000-R03	SUBASSEMBLY CASE TOP AL	1
11	201-008000-R06A	FASTENER POWER CABLE	1
12	203-008000-R03A	METAL PLATE	1

ITEM	PART NUMBER	DESCRIPTION	QTY
13	202-008200-R02A	PLUG SPEAKER HOLE	1
14	120-100000-R15	CABLE POWER	1
15	301-30100G-R01	SCREW M3*10 WITH SPRING PLATE	7
16	203-008200-R03	ANTENNA BASE	1
17	102-304452-R01	POWER MODULE	1
18	203-008200-R05A	SHIELD POWER MOUDLE	1
19	204-008200-R10A	CUSHION ELECTRIC	1
20		PCB MAIN ELEC. PARTS	1
21	301-30060G-R01	SCREW M3*6	8
22	604-080000-R04	SUBASSEMBLY CASE BOTTOMAL	1
23	301-30250D-R01	SCREW M3*25	6

PT8000 SUBASSEMBLY CASE FRONT (604-080000-R01) BOM

ITEM	PART NUMBER	DESCRIPTION	QTY
1	201-008000-R01A	CASE FRONT	1
2	204-008000-R01A	NET DUSTPROOF SPEAKER	1
3	121-100000-R21	SPEAKER	1
4	201-008000-R04A	LENS LED	1

ITEM	PART NUMBER	DESCRIPTION	QTY
5	201-008000-R03A	LENS WINDOW	1
6	204-006800-R01	LABLE LCD	1
7		LABLE LOGO	1

PT8000 SUBASSEMBLY VOLUME KNOB (604-080000-R02) BOM

ITEM	PART NUMBER	DESCRIPTION	QTY
1	201-008000-R02A	KNOB VOLUME	1
2	203-006800-R26	SPRING PLATE	1

PT8000 SUBASSEMBLY CASE TOPAL (604-080000-R03) BOM

ITEM	PART NUMBER	DESCRIPTION	QTY
1	203-008000-R02A	CASE TOPAL	1
2	204-008000-R03A	STRIP DUSTPROOF B	1
3	204-008000-R02A	STRIP DUSTPROOF C	1

PT8000 SUBASSEMBLY CASE BOTTOMAL (604-080000-R04) BOM

ITEM	PART NUMBER	DESCRIPTION	QTY
1	203-008000-R01A	CASE BOTTOMAL	1
2	204-008000-R04A	STRIP DUSTPROOF A	2

PT8000 SUBASSEMBLY PCB CONTROL (604-080000-R05) BOM

ITEM	PART NUMBER	DESCRIPTION	QTY
1		PCB CONTROL ELEC. PART	1
2	203-008000-R05A	METAL DOME	1

Figure 1 PT8000 Schematic Circuit Diagram

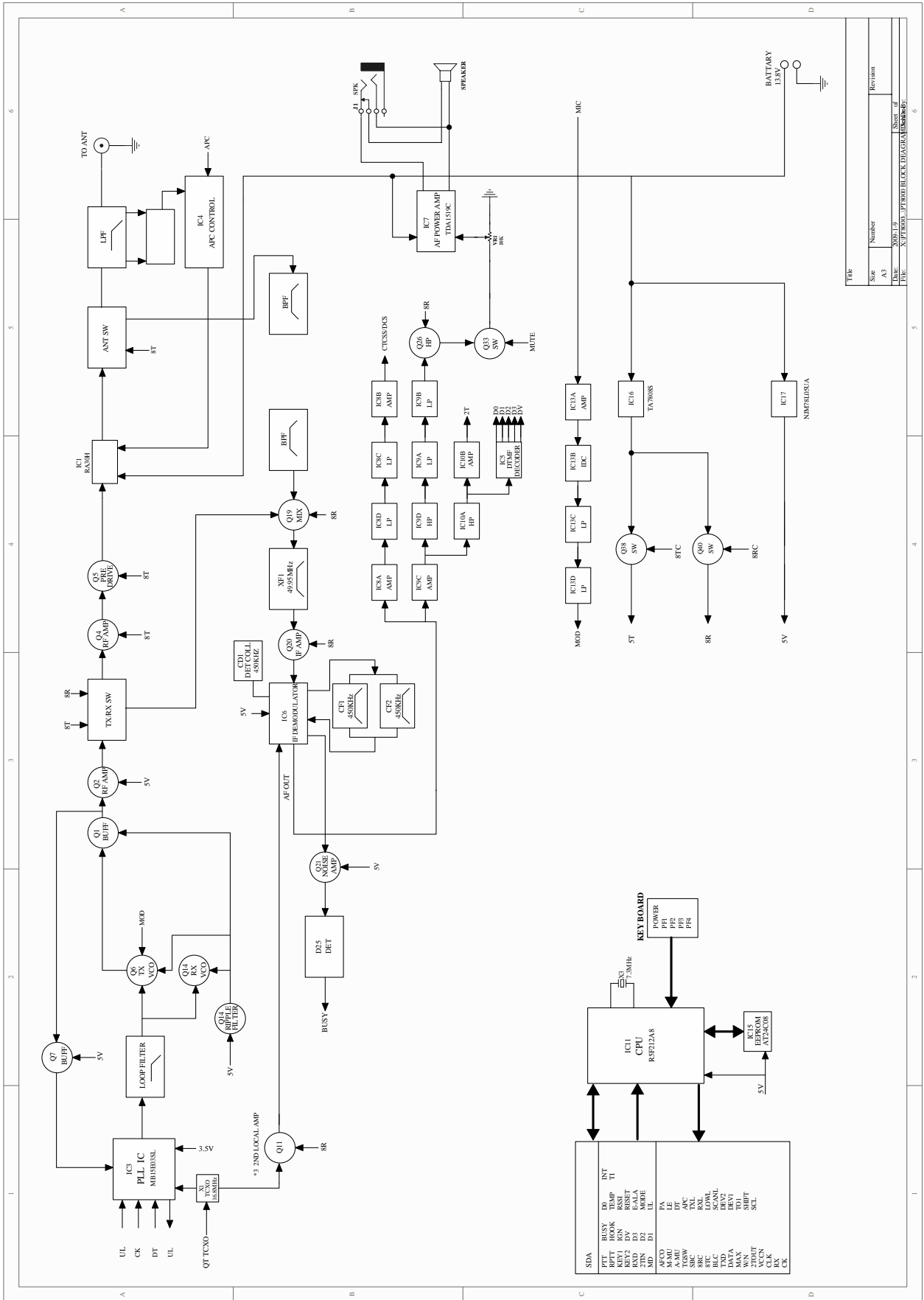
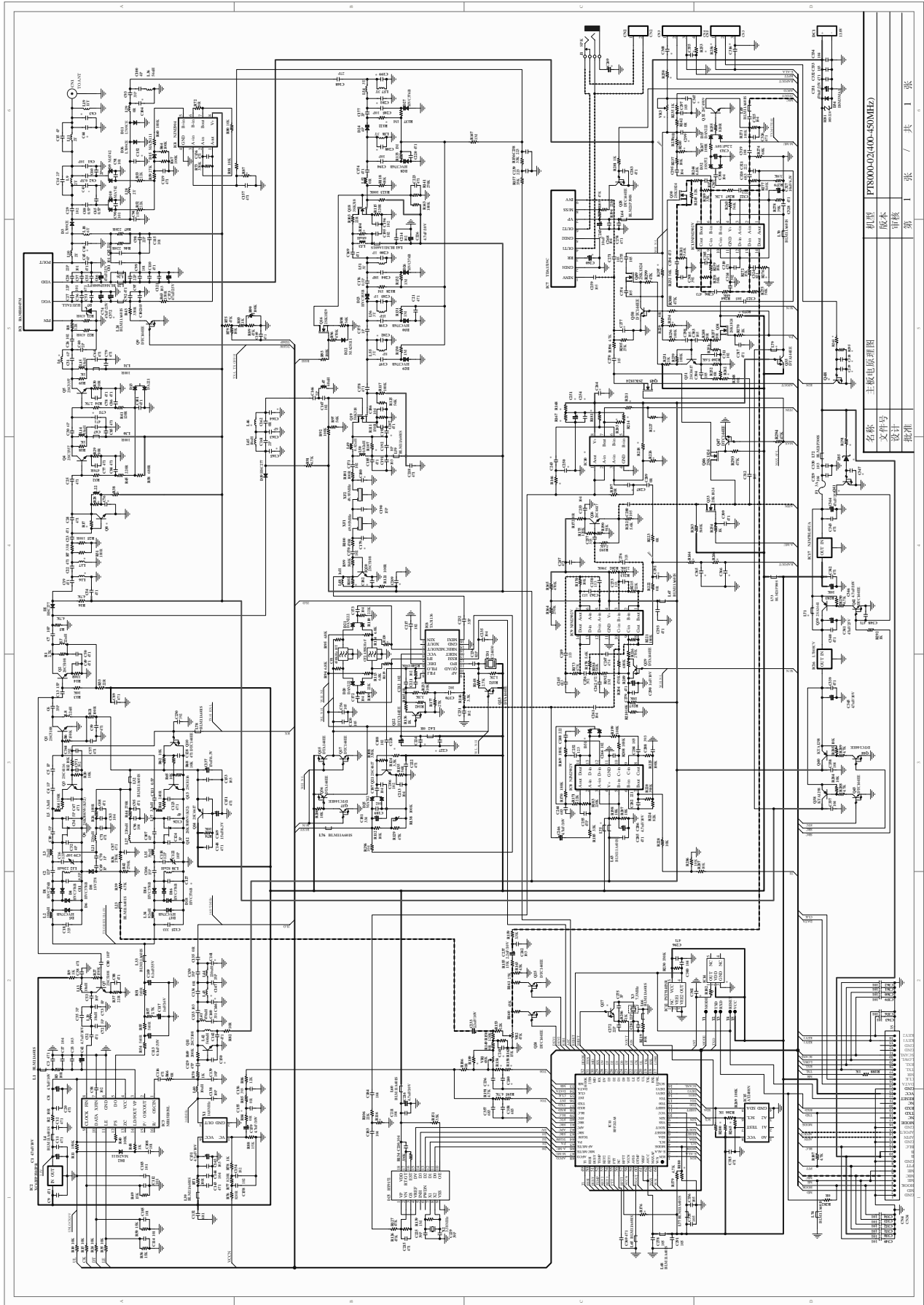
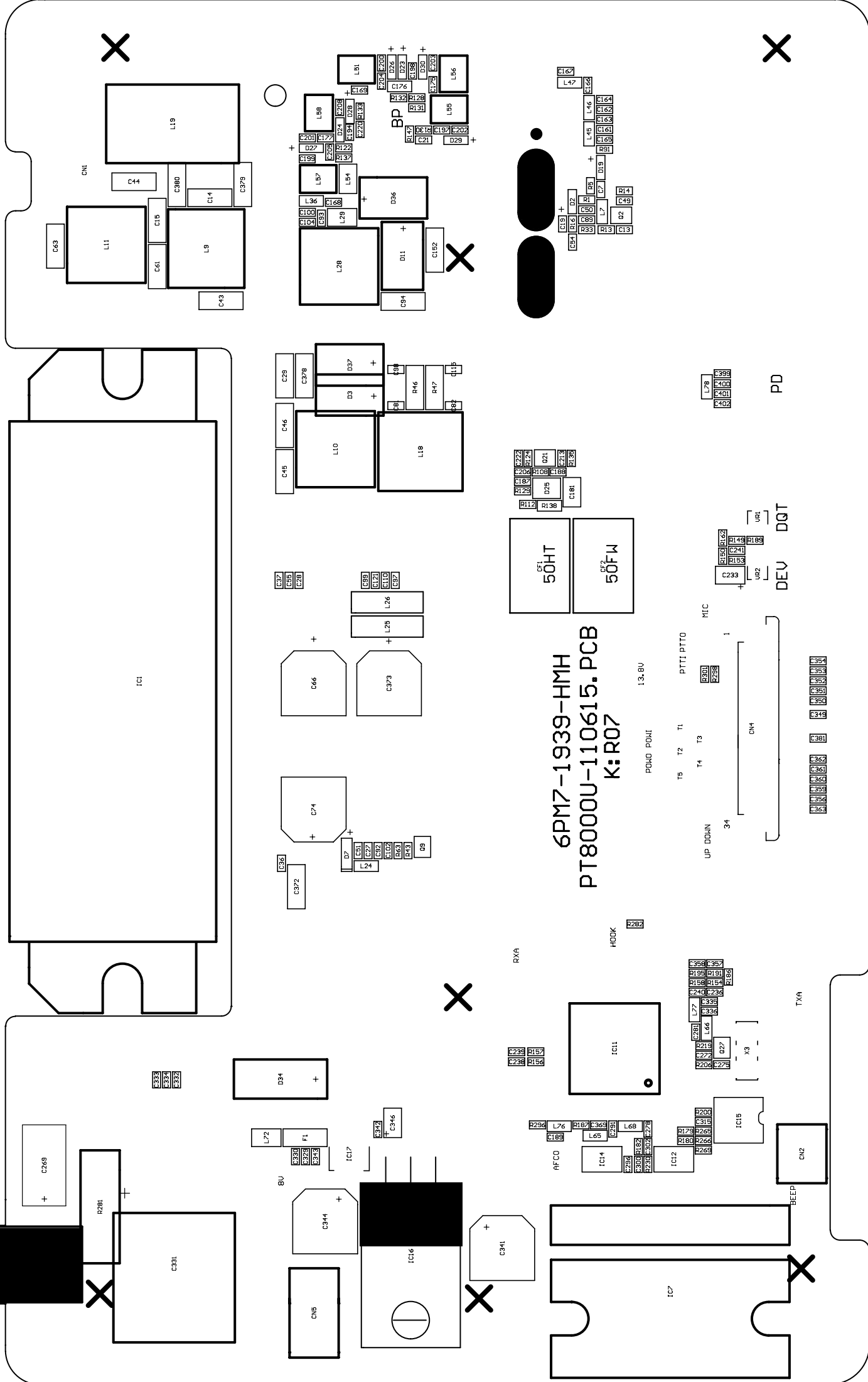


Table	
Site	Revision
A3	
Sheet of 6	
DWC - SUPPLY BLOCK DESIGN LIBRARY	

Figure 2 PT8000 Main Board Schematic Circuit Diagram



名称	主板电路原理图
文件号	PT8000-02(400-450MHz)
设计	张
审核	张
批准	张
张数	共 1 张



6PM7-1939-HMH
 PT8000U-110615. PCB
 K:R07

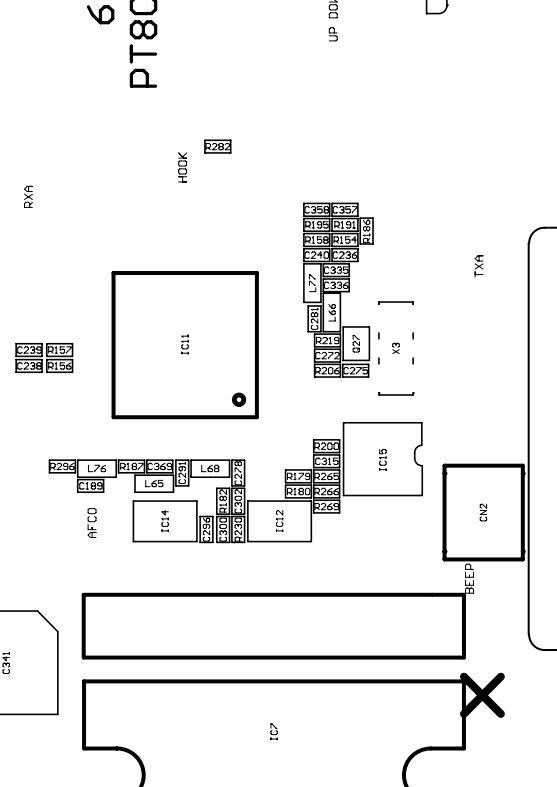
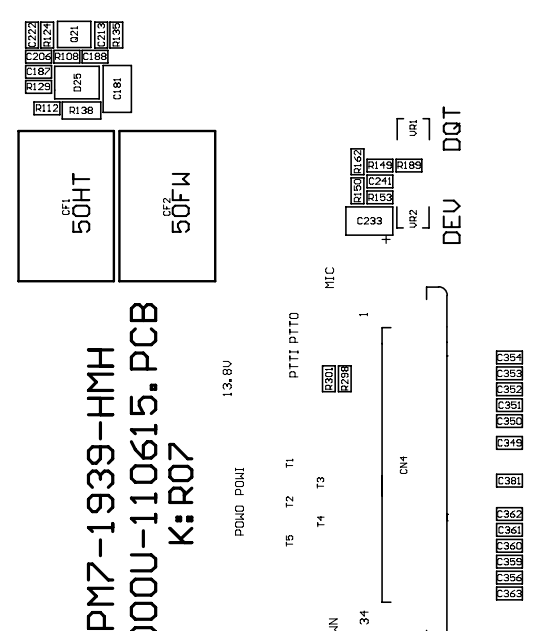
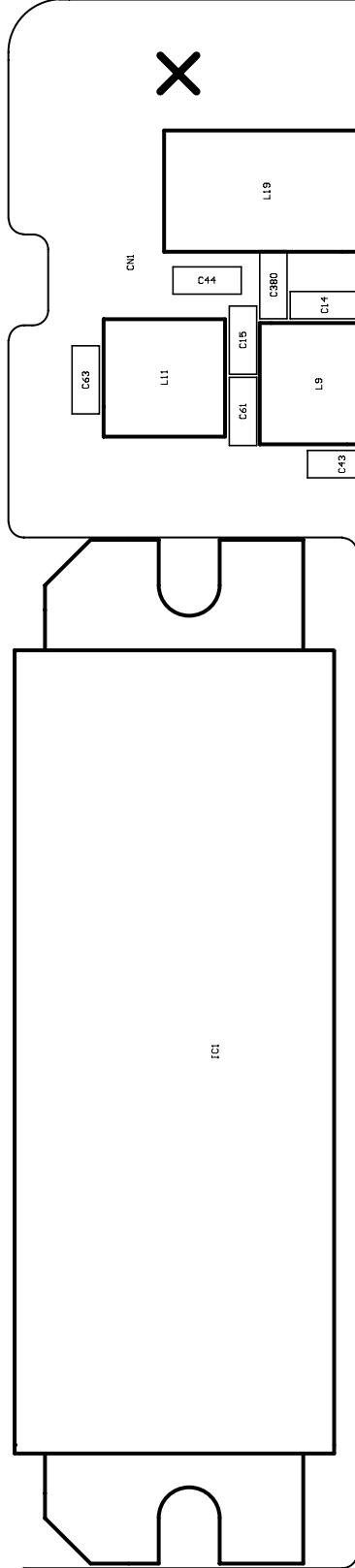
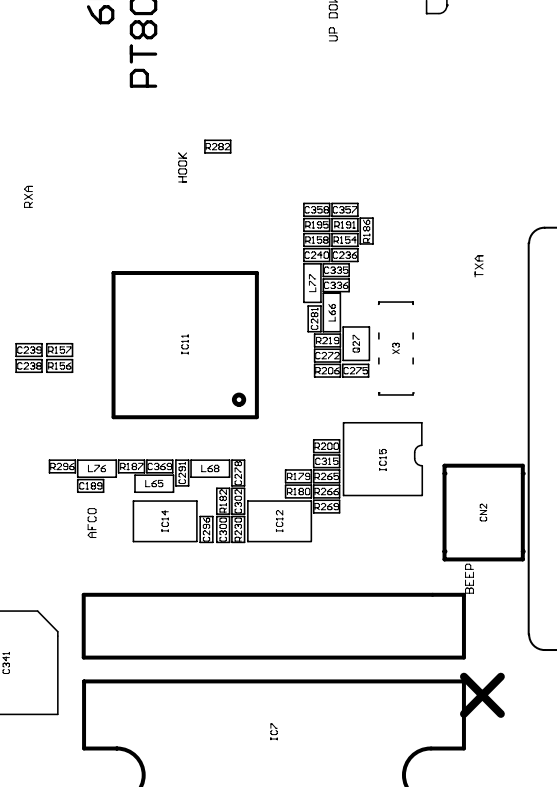
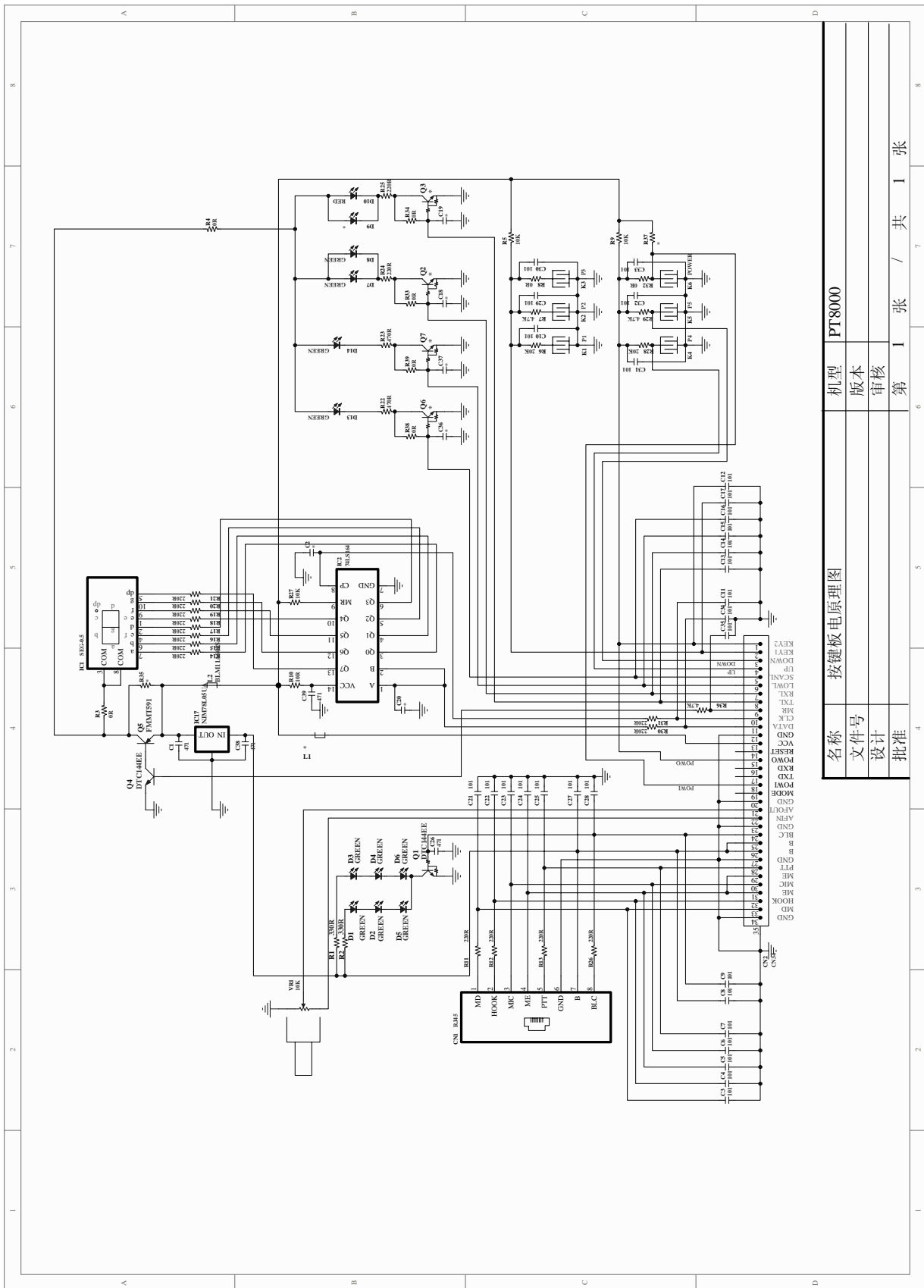


Figure 5 PT8000 Keyboard Schematic Diagram



名称	按键板电原理图
文件号	PT8000
设计	版本
批准	审核
	第 1 张 / 共 1 张

Figure 6 PT8000 Top Keyboard Position Mark Diagram

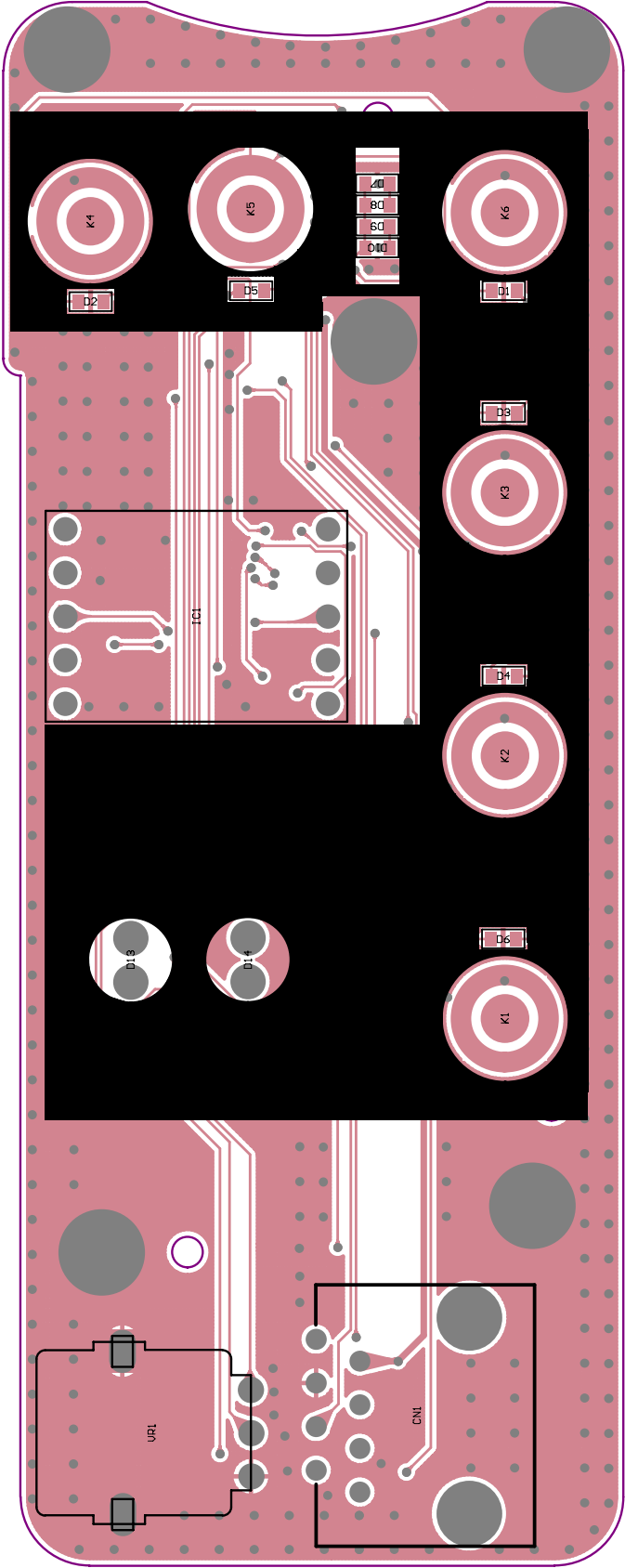


Figure 7 PT8000 Bottom Keyboard Position Mark Diagram

