Contents

Introduction

Manual Scope

This manual is intended for use by experienced technicians familiar with similar types of communication equipment. It contains all service information required for the equipment and is current as of the publication date.

Safety Information

The following safety precautions shall always be observed during operation, service and repair of this equipment.

- This equipment shall be serviced by qualified technicians only.
- Do not modify the radio for any reason.
- Use only HYT supplied or approved antenna.
- Gain of antenna must not exceed 3dBi for VHF or 5.5dBi for UHF.
- Mobile antenna Installation: Install the mobile antenna at least 82cm (32 inches) away from your body, in accordance with the requirements of the antenna manufacturer/supplier.
- Transmit only when people inside and outside the vehicle are at least the minimum distance away from a properly installed, externally mounted antenna.
- Mobile antenna substitution: Don’t substitute HYT supplied or approved antenna, or excessive radio frequency radiation will result. Please contact your dealer or the manufacturer for further instructions.
- Please make sure there’s no stress on the antenna joint during transportation or installation.
- To avoid electromagnetic interference and/or compatibility conflicts, turn off your radio in any area where posted notices instruct you to do so. Hospital or health facilities may be using equipment that is sensitive to external RF energy.
- For vehicles with an air bag, do not place a radio in the area over an air bag or in the air bag deployment area.
- Turn off your radio prior to entering any area with explosive and flammable materials.
- Do not expose the radio to direct sunlight over a long time, nor place it close to heating source.

■ Operation Guidelines

For vehicles equipped with electronic anti-skid braking systems, electronic ignition systems or electronic fuel injection systems, interferences may occur during radio transmission. If the foregoing electronic equipments are installed on your vehicle, please contact your dealer for further assistance to make sure that radio transmission will not interfere with these equipments.

For radio installation in vehicles fueled by LP gas with LP gas container within interior of the vehicles, the following precautions are recommended for personal safety.

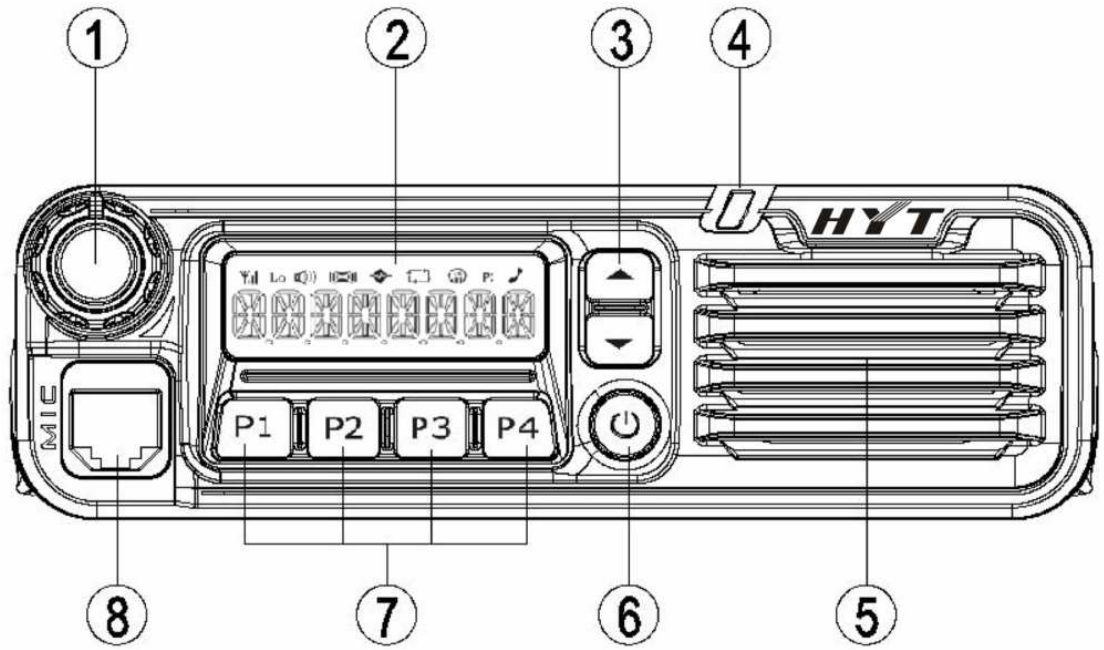
1. Any space containing radio equipment shall be isolated by a seal from the space in which the LP gas container and its fittings are located.
2. Remote (outside) fitting connections shall be used.
3. Good ventilation is required for the container space.

■ Installation Guidelines

- Vehicle installation: The antenna can be mounted at the center of a vehicle metal roof or trunk lid if the minimum safe distance is observed.
- Do not mount the mobile radio overhead or on a sidewall unless you take special precautions.
- If the mobile radio is not properly installed, road shock could bump the radio loose, and the falling radio could, in some circumstances, cause serious injury to the driver or a passenger. In case of vehicle accidents, even when properly installed, the radio could break loose and become a dangerous projectile.

Radio Overview

Front Panel View



① Volume Control Knob

Turn the Volume Control Knob clockwise to increase the volume, or counter-clockwise to decrease the volume.

② LCD

Please refer to the “LCD Display” section for details.

③ Programmable Functions Keys (**[▲]** / **[▼]**)

The **[▲]** / **[▼]** keys are programmable with auxiliary functions by your dealer. Please refer to the “Programmable Functions Keys” section.

④ LED Indicator

⑤ Speaker

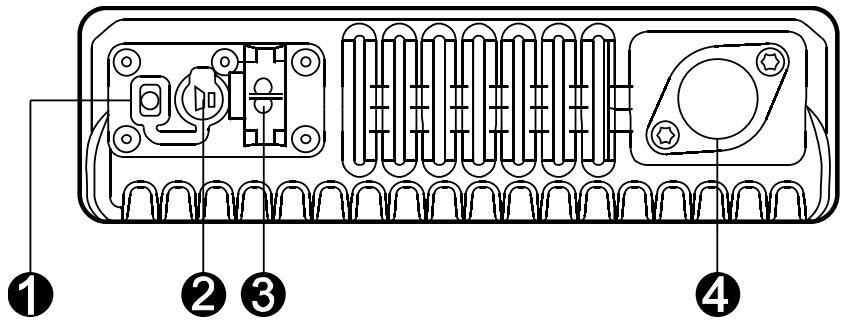
⑥ Power Switch

⑦ Programmable Functions Keys (**[P1]/[P2]/[P3]/[P4]**)

The **[P1]/[P2]/[P3]/[P4]** keys are programmable with auxiliary functions by your dealer. Please refer to the “Programmable Functions Keys” section.

⑧ Mic Jack

Rear Panel View



① 15-Pin Connector (for external expansion)

② External Speaker Jack

Used to connect the external speaker (for the 3.5mm plug only).

Note: Please refer to “Test Cable for Speaker Output” in “Tuning Description” for details.

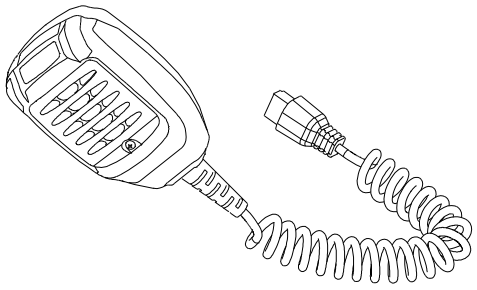
③ Power Inlet

Used to connect the HYT -authorized DC power cable for input of 13.6V DC power.

④ Antenna Connector

Used to connect the external connector.

Microphone



■ LED Indicator

Indicator	Description
Solidly glows red	The radio is transmitting signals.
Solidly glows green	The radio is receiving signals.
Flashes orange	The radio has received encoding squelch, select calls or 2-tone calls.

■ Programmable Function Keys

The **P1**-**PF4** and ▲/▼ keys can be programmed with auxiliary functions below:

1. Off
2. CH Up
3. Channel Down
4. Zone Up
5. Zone Down
6. MONI A
7. MONI B
8. MONI C
9. MONI D
10. Display Frequency
11. Display Mode Switch
12. User Selectable Tone
13. Sel 2-Tone
14. TX Power
15. Scan
16. Add/Del
17. Reverse frequency
18. TalkAround
19. Selectable Squelch Level
20. Home Channel
21. Public Address
22. Scrambler
23. Compander
24. Emergency Call
25. HDC Encode
26. Lone Worker
27. Whisper

28. Short Message

29. Rent Time Inquiry

30. AUX A

31. AUX B

■ LCD Display

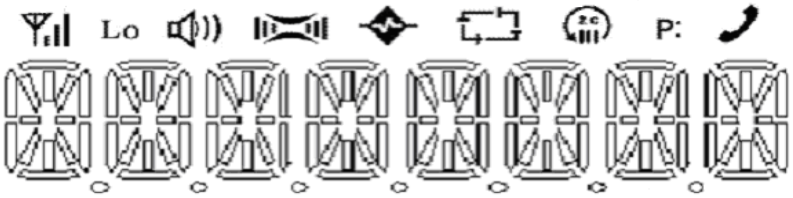


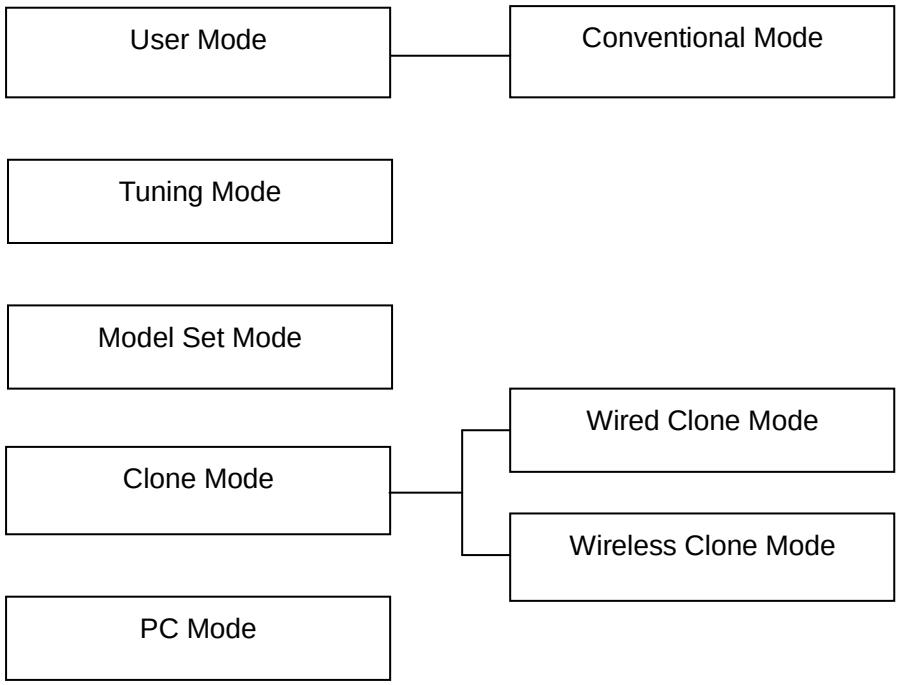
Figure 1 LCD panel

Indicator	Description
	Displays CH number/name, zone number/name, DTMF number, frequency, menu and options, etc.
Lo	Indicates low power output.
	Press the **Monitor** key: 1. The  icon is displayed when CTCSS/CDCSS and 2-Tone decoding is off. 2. The  icon is displayed when the speaker is unmuted.
	Appears when the radio begins to scan
	Appears when the radio is transmitting a selected call.
	C indicates that the current channel is in the scan list. Z indicates multi zone scan.
	Appears when the Scrambler feature is enabled.
	Appears when the Compandor feature is enabled.
	Appears when the current channel is already in use.

	Indicates the current channel is the priority channel. **P•** indicates priority channel 1, **P.** indicates priority channel 2, **P:** indicates priority channels 1 and 2.

Software Specification

Frame of Radio Modes



■ Keypad Entry for Mode Startup

Mode	Display	Operation	Remarks
User Mode	Welcome Screen and then CH number	The radio enters User Mode upon power-on.	Conventional Mode
Panel Tuning Mode	TXHIGH	Power the radio on while holding down **P1**.	
Model Set Mode	DESTINA0	Power the radio on while holding down **P2**.	
Clone Mode	CLONE	Power the radio on while holding down **P3**.	
Firmware Version Display Mode	Firmware Version VX.XX.XX	Power the radio on while holding down **P4**.	
PC Mode	PROGRAM	Connect the mobile radio to PC via the programming cable, and then send commands via PC.	

User Mode

Power on the radio and you will enter this conventional mode.

Panel Tuning Mode

You can perform tuning in the following steps:

1) Power on the radio while holding down **P1** to enter the tuning mode.

2) Use ▲/▼ to select the tuning item, and press **P4** to enter.

3) After you enter the sub-item by pressing **P4**, use ▲/▼ to adjust the parameter, and press **P4** to save and enter the next sub-item; or press **P1** to return to the previous menu without saving the settings.

Tuning items and display (***: 1-256): Please go to *Tuning Description---Panel Tuning Mode---Tuning items and Display* for details.

Model Set Mode

You can go with operations in this mode as follows:

1) Power on the radio while holding down **P2** to enter the Model Set mode. At this time, the LCD displays "DESTINA.*", where "*" represents the model number.

2) Use ▲/▼ to select the model number 0-5.

3) Press **P4** to confirm your selected model number. The LED glows orange and the LCD displays "WAIT". After reset, the radio enters User mode.

Note:

1. Once a new model is set by pressing **P4**, the previously stored channel information (such as frequency, CTCSS/CDCSS and functions assigned to each channel) will be cleared, and some functions will also be changed. Therefore, do not perform this operation unless it's very necessary (e.g. when EEPROM is replaced).

Clone Mode

Data can be transferred from radio to radio either by wired cloning or wireless cloning. Operation methods are given in the following paragraphs.

Wired Clone Mode

1) Power on the source radio while holding down **P3**. The radio displays "CLONE" and enters Clone mode or enters User Mode if Clone Mode is set OFF by your dealer.

2) Press **P3** to switch between Dealer Clone Mode and Factory Clone Mode, with "DEACLONE" and "FACCLONE" displayed respectively. The radio restores its original display mode in 5 seconds. Dealer Clone Mode is the default mode in which tuning data and embedded messages will not be

cloned. However, in Factory Clone Mode, all data will be cloned.

3) Connect two radios using a clone cable, and then turn on the target radio.

4) Press **P4** on the source radio to start cloning. LED on the source radio glows red, and it begins to transmit data to the target radio. During the cloning process, LCD of the target radio displays "PROGRAM" and its LED glows green. Upon completion of cloning, LCD of the source radio displays "END". And the target radio automatically enters User Mode after receiving all data.

5) Press **P4** on the source radio to return to Clone Mode, and "CLONE" is displayed. Repeat the above steps for further wired cloning.

Wireless Clone Mode

1) Power on the source radio while holding down **P3**. The radio displays "CLONE" and enters Clone mode or enters User Mode if Clone Mode is set OFF by your dealer.

2) Press **P1** to enter Wireless Clone Mode. The LCD displays "WIRELESS" for about two seconds, and then displays its channel frequency (wireless cloning is performed at this frequency). Press **P1** again to return to Clone Mode, or press ▼ to switch the channel for wireless cloning.

3) Press **P3** to switch between Dealer Clone Mode and Factory Clone Mode, with "DEACLONE" and "FACCLONE" displayed respectively. The radio restores its original display mode in 5 seconds. Dealer Clone Mode is the default mode in which tuning data and embedded messages will not be cloned. However, in Factory Clone Mode, all data will be cloned.

4) For the target radio, repeat the above steps 1) and 2), and set its cloning frequency the same as that of the source radio. Place the target radio close to the source radio, and press **P4** of the source radio to start cloning.

5) The source radio is transmitting data to the target radio. During data transmission, the source radio displays the percentage of the transmitted data, with red LED glowing. During data receiving, the target radio displays the percentage of the received data and a "BUSY" icon, with orange LED glowing.

6) Upon completing of data transmission, LCD of the source radio displays "END" and the LED flashes red. Press **P1** to read the cloning frequency and repeat the above steps to continue. The target radio enters User Mode automatically after receiving all data.

Note: Clone Mode can be enabled or disabled by your dealer. You can perform cloning only when such mode is enabled by your dealer.

Firmware Version Display Mode

Power on the radio while holding down **P4**. The LCD displays the firmware version accordingly. Release **P4** to enter User Mode automatically.

PC Mode

Connect the mobile radio to a PC using a programming cable. Data can be transmitted to the mobile radio and saved in the EEPROM.

You can configure the parameters and tune the mobile radio via the programming software.

1） Once PC starts to transfer data to the mobile radio, “PROGRAMM” will be displayed on the LCD. When the data is written to the mobile radio, the LED glows green; and when the data is read from the mobile radio, the LED glows red. The mobile radio will reset automatically when programming is completed.

2） The following items can be set via programming software:

- TX High Power
- TX Low Power
- Maximum Frequency Deviation
- CDCSS Balance
- CTCSS Deviation (67.0Hz)
- CTCSS Deviation (151.4Hz)
- CTCSS Deviation (254.1Hz)
- CDCSS Deviation
- DTMF Deviation
- MSK Deviation
- Single Tone Deviation
- RX Sensitivity
- Squelch ON Level (9)
- Squelch ON Level (3)
- Squelch OFF Level (9)
- Squelch OFF Level (3)

■ Key Assignment

Your dealer may assign one of the following functions to the programmable key (**P1/ P2/ P3/ P4/ ▲/ ▼**).

See the table below for reference.

Key Assignment				
No.	**Function Key**	**Settings**	**Display**	**Remarks**
1	**P1-P4** & ▲/▼	Off		No function
		CH Up	CH Information	Channel up
		CH Down	CH Information	Channel down
		Zone Up	Zone Information	Zone up
		Zone Down	Zone Information	Zone down
		MONI A	MoniA Icon	Monitor A: Monitor Unmute – Momentary
		MONI B	MoniB Icon	Monitor B: Monitor Unmute – Toggle
		MONI C (default)	MoniC Icon	Monitor C: Carrier Unmute – Momentary
		MONI D	MoniD Icon	Monitor D: Carrier Unmute – Toggle
		Display Frequency	CH Frequency	Displays the channel frequency
		Display Mode Switch	Mode Information	Displays the channel number, channel label, zone number, zone label and channel frequency.
		User Selectable Tone	UST Information	Tone 01-32 (CTCSS/CDCSS)
		Sel 2-Tone	2-Tone Information	Selects 2-Tone encode
		TX Power	Power Icon	Displays when the TX power is low
		Scan	SCAN and Icon	Scan
		Add/Delete	CH Information	Adds or deletes scan channel in non-scan status
				Temporarily deletes nuisance channel
		Reverse	RE and CH Number	Reverse frequency
		Talk Around	TA and CH Number	Talk Around
		SEL SQL	SQL Level	Selects squelch level
		Home CH	HOME and CH Number	Home Channel
		Public Address	PA	Public Address
		Scrambler	Scrambler Icon	Scrambler
		Compander	Compander Icon	Compander
		Emergency Call	Emergency	Emergency Call
		HDC Encode	HDC Menu	HDC call
		Lone Worker	LONE ON/OFF	Lone Worker
		Whisper	WHISP ON/OFF	Whisper

		Short Message	Message Menu	Short Message
		Remaining Rental Time Inquiry	Remaining Time	Inquires about the remaining rental time
		AUX A	AUX A	AUX A
		AUX B	AUX B	AUX B
2	HOOK/ MONI	Hook Check		This option should be selected when palm microphone is used.
		Monitor		This option should be selected when desktop microphone is used.
3	Selector Knob	Selector Knob		For controlling the volume as well as selecting the channel and zone

Circuit Description

Frequency Configuration

The receiver utilizes double conversion superheterodyne. The first IF is 49.95MHz and the second IF is 450KHz. The first local oscillator signal is supplied by the PLL circuit, while the second local oscillator signal (49.5MHz) is generated from the frequenc MHz The PLL circuit generates the frequencies required for transmission. See Fig.1.

Frequency Range VHF: 136MHz-174MHz

UHF: 400MHz-470MHz;

Receiver Circuit

The receiver section configuration is shown as Fig. 1.

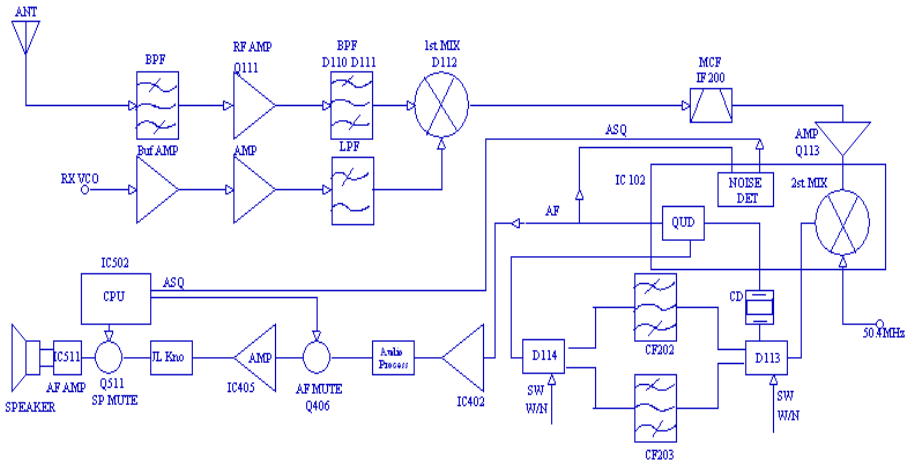


Fig. 1 Receiver Circuit

2.1 RF AMP BPF

The circuit consists of front-stage BPF, RF amplifier (Q111) and final-stage BPF (D110 and D111). The

bandpass frequency range varies with the radio models. The BPF is used to eliminate unwanted signals and let only wanted signals go to the mixer.

2.2 First Mixer Circuit

The signal output from RF AMP&BPF is mixed with the first LO signal from the PLL circuit at the mixer (D112) to generate a 49.95MHz first IF signal. Then the first IF signal will feed through a crystal filter (IF200) to further remove spurious signals.

2.3 IF Amplifier Circuit

After amplified at Q113, the first IF signal enters IC102 (TA31136FN), where it is mixed with the second LO signal (50.4MHz) to generate a 450KHz second IF signal. Then the second IF signal feeds through a pair of ceramic filters (N: CF202; W: CF203) where unwanted signals are removed. Finally the signal goes to the frequency discriminating circuit of IC102 to output audio signal from Pin 9.

2.4 Audio Amplifier Circuit

The audio signal from IC102 is amplified and filtered at IC402, and then amplified again at IC401 (the received signaling is separated and sent to CPU for decoding). Then the signal passes through Q406 (AF MUTE), and enters IC405 for further amplification. After the volume is controlled at K301 on the control panel, and SP MUTE is controlled at Q511, the signal feeds into IC511 to output audio signal to drive the speaker.

2.5 Squelch Control Circuit

One flow of the audio signals from IC102 feeds into IC102 (from Pin8) for amplification, filtering and rectification, and then a SQL level is derived. Then the SQL level is sent to CPU (IC502) for comparison with the reference level to generate a level which controls AFMUTE and SP MUTE. The level controls Q406 and Q511 to open or close the audio channel.

Transmitter Circuit

The transmitter circuit is composed of MIC circuit, modulation circuit, RF driver, final-stage power amplifier circuit and APC circuit.

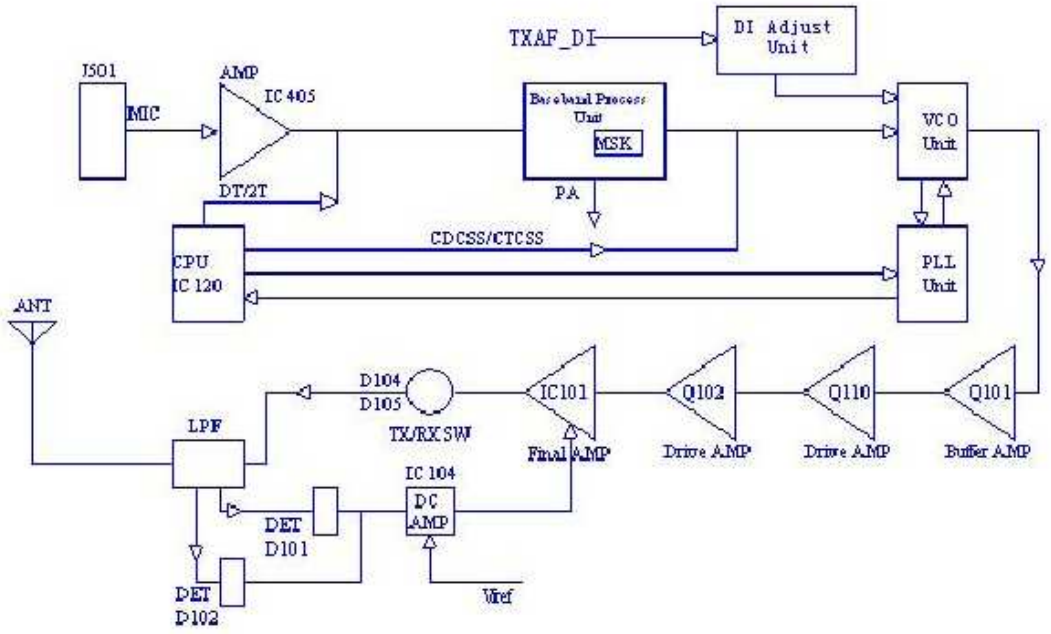


Fig. 2 Transmitter Circuit

3.1 MIC and Modulation Circuit

The audio signal from MIC is amplified at IC405, and further amplified, pre-emphasized and encoded at IC 401. It is added with signaling before going to VCO for modulation.

The DI modulation circuit is composed of IC407 and peripheral circuits (see the figure above). The signal goes to the DI modulation circuit via the TXAF_DI port, and then goes to the VCO unit. The signal amplitude can be adjusted manually via VR802, allowing accurate modulation of DI without any distortion. This circuit can serve as input or output port for GPS and encryption, promoting the radio functions to be further expanded.

3.2 RF Driver and Final-stage PA Circuit

TX-RF signal output from Q703 in the VCO circuit is amplified at Q101, driver PA Q110 and Q109, and final-stage PA IC101. The signal passes through LPF and goes to the antenna for transmission.

3.3 APC Circuit

The circuit is used to keep output power at a constant preset value. In this circuit, D101 and D102 convert the signal from detector into DC voltage, which is then compared with the reference voltage from CPU in IC104 to output a DC voltage. The DC voltage controls gate electrode of IC101, so as to control the output power.

■ 4. PLL Circuit

PLL circuit supplies frequency to receive the first LO signal and TX signal. The circuit consists of TX

frequency oscillator (Q701), RX frequency oscillator (Q702), buffer amplifier (Q703), RF amplifier (Q102), PLL IC (IC801), LPF and TX/RX VCO switch (Q704/Q706).

In TX mode, IC502 provides the frequency data to and activates PLL IC. Meanwhile, Q704 is turned on to activate TX VCO. The output signal is amplified by Q703 and Q102. Then PLL IC divides the signal into 2.5KHz, 5KHz or 6.25KHz. And phase of it is compared with that of reference frequencies 2.5KHz , 5KHz or 6.25KHz from the 16.8MHz crystal oscillator. The crystal oscillator has operating frequency of 16.8MHz and frequency stability of 2.5ppm. The frequency control voltage output from the phase comparator passes through LPF (Q802 and Q803), and then is sent to TX VCO. In the meantime, TX modulation signal is passed to TX VCO for frequency modulation.

The working principle of RX mode is similar to that of TX mode.

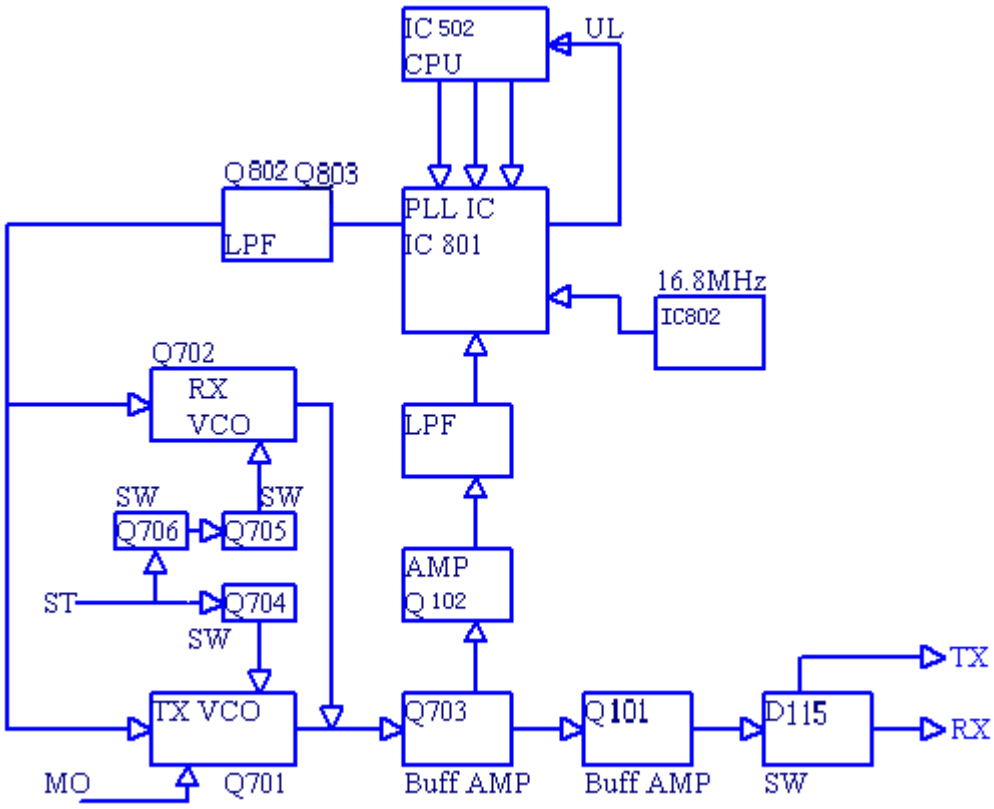


Fig. 3 PLL Circuit

■ 5. Control Circuit

The circuit comprises CPU circuit, reset circuit and power control circuit.

5.1 CPU

IC120 (CPU) operates at 9.8304MHz, and controls EEPROM (IC501), RX circuit, TX circuit, control circuit and display circuit, as well as data transmission with peripheral equipment.

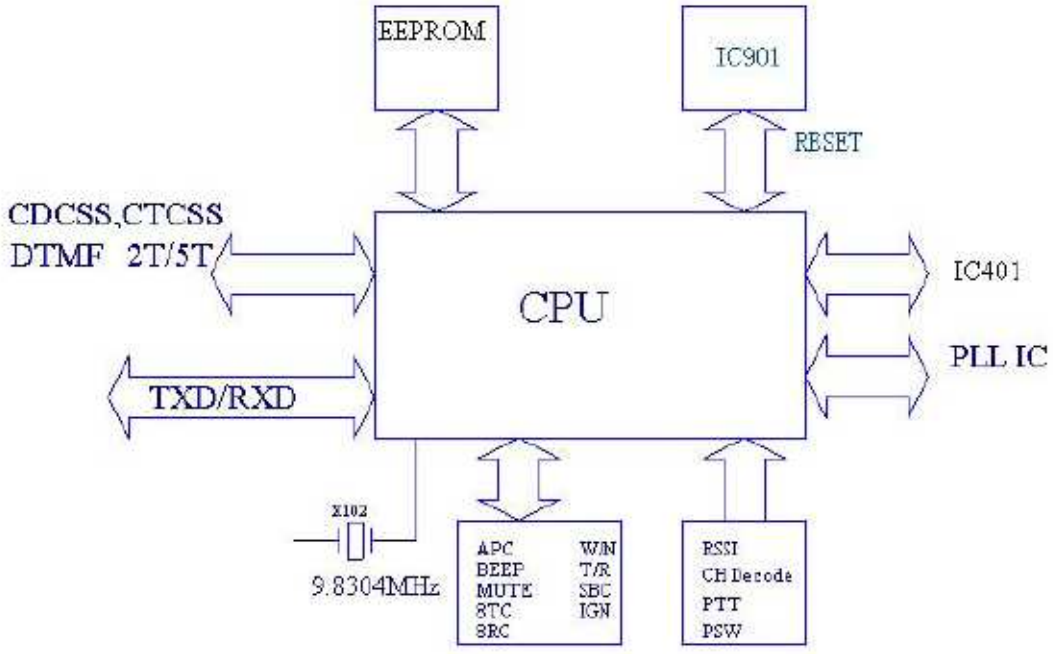


Fig. 4 Control Circuit

5.2 Reset Circuit

The reset circuit consists of a reset IC (CN813LESA) and peripheral circuits. When a breakdown occurs due to change of external voltage, the CPU would automatically reboot your radio through the reset IC (IC901).

5.3 Power Control Circuit

Power supply of the radio is derived from +B. D515 and D516 are diodes for over-voltage protection. The power can be switched on or off via software (see the figure below):

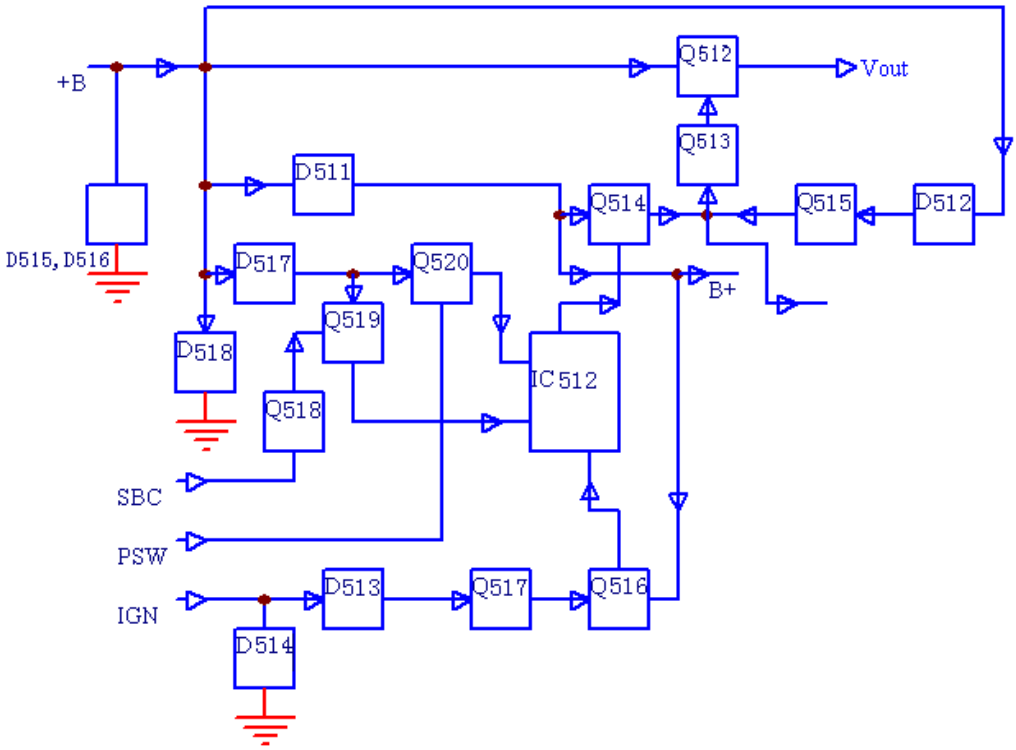
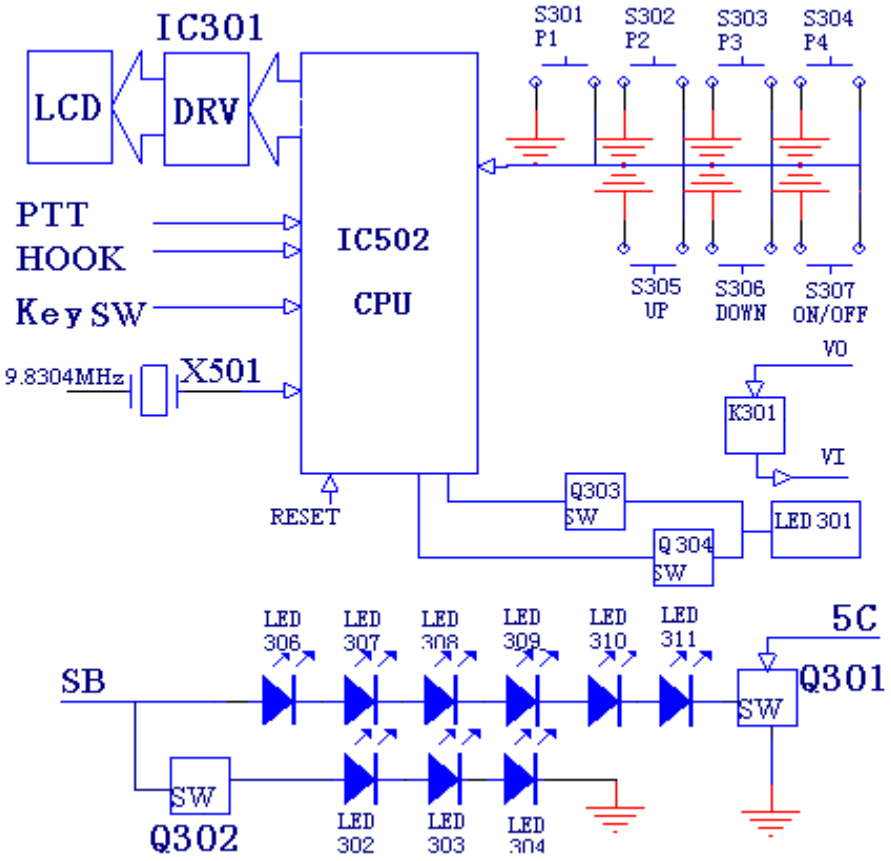


Fig. 5 Power Supply Circuit

Vout supplies power for IC601, IC602 and IC803, which generate 8V, 5V and 3.3V voltage respectively to supply the whole circuit.

6. Display Circuit

Display circuit comprises CPU (IC502), LCD, LED and other components. Application can be operated manually through programmable keys **P1**-**P4** as well as ▲ and ▼. Channel information is displayed on the 14-segment display.



Semiconductor Data

1. Positive voltage regulator: TA7805F (Power Unit IC602), TA7808S (Power Unit IC601)
2. EEPROM: CAT24C256WI 256K CATALYST (CPU Unit IC501)

2-1. Pin Function

Pin Function

Pin No.	Name	I/O	Function
1～3	A0～A2	I	Address input
4	GND		Ground
5	SDA	I/O	Serial data input/output
6	SCL	I	Serial clock input
7	Write Protect		Write protect
8	VCC		+5V

3. Audio processor: AK2346 (AFPwr Unit IC404)

Pin Function

Pin No.	Pin Name	I/O	Function
1	AGNDIN	I	Analog ground input
2	AGND	O	Analog ground output
3	TXIN	I	TX audio signal input
4	TXINO	O	TXA1 feedback output
5	LIMLV	I	Limit level tuning
6	EXTLIMIN	I	External signal input for pre-limiter
7	MOD	O	Modulated TX signal output
8	VSS		Ground
9	TCLK	O	Clock output pin for MSK transmission data
10	TDATA	I	MSK transmission data input Data are latched synchronizing with the TCLK rising edge.
11	DI/O	I/O	Serial data input and output Input for register setting data and output for MSK receiving data
12	RDF/FC	O	Rx flag, frame detection signal output pin
13	SCLK	I	Clock input
14	DIR	I	Serial data input
15	XOUT	I	Crystal oscillator input pin
16	XIN	I/O	Crystal oscillator input/output pin
17	VDD		Positive power supply pin
18	EXPOUT	O	Signal output (after audio processing)
19	RXAFIN	I	RX audio input pin
20	RXAF	O	RX audio output pin
21	RXLPFO	O	Rx LPF output pin
22	RXINO	O	RXA1 feedback output pin
23	RXIN	I	Demodulated signal input pin
24	TEST	I	Test register control input pin

4. Audio Power Amplifier: TDA7297D(AFPwr Unit IC511)

Pin Function

Pin No.	Name	I/O	Function
1	PW GND		Power ground 1
2	OUT1+	O	Output 1+
3	N.C		
4	N.C		.
5	OUT1-	O	Output 1-
6	VCC	I	Supply voltage
7	IN1	I	Input 1

8	MUT	I	Operating Switch
9	STAND-BY	I	Operating Switch
10	PW GND		Power ground 2
11	PW GND		Power ground 3
12	N.C		
13	SGND		Signal ground
14	IN2	I	Input 2
15	VCC	I	Supply voltage
16	OUT2-	O	Output 2-
17	N.C		.
18	N.C		
19	OUT2+	O	Output 2+
20	PW GND		Power ground

5. LCD driver: PCF8576DH (Display Unit IC501)

Pin No.	Pin Name	I/O	Function
1	NC		
2~7	S34~S39	O	LCD output
8~9	NC		
10	SDA	I/O	I^2C bus serial data input/output
11	SCL	O	I^2C bus clock output
12	NC		
13	NC		
14	V_{DD}		Power Supply
15	OSC	I	Internal quartz crystal oscillator enable input
16~18	A0~A2	I	Address line
19	SA0	I	I^2C bus slave address (bit 0)
20	Vss		Ground
21	V_{LCD}		5C power supply
22~24	NC		
25~28	BP0~BP3	O	LCD bottom board output
29~32	S0~S4	O	LCD output
33	NC		
34~47	S5~S18	O	LCD output
48	NC		
49, 50	S19, S20	O	LCD output
51~64	S21~S34	O	LCD output

5. Amplifier: TA75W558FU (AFPr Unit IC404), TC75W51FU (AFPr Unit IC402, AFPr Unit IC405, AFPr Unit IC403), TA75S01F (RF Unit IC1037), TA75W01FU (RF Unit IC404).
6. IF detector: TA31136FN (RF Unit IC102).

7. Dual D-type trigger: TC4013BF (AFPwr Unit IC512).
8. RF PLL frequency synthesizer: MB15A02 (PLL Unit IC801).
9. Reset IC: CN813LESA (Reset Unit IC901)
10. CPU: SCM M3062LFGPGP (CPU Unit IC502)

Pin Function

Pin No.	Port	Pin Name	I/O	Function
1	P94/DA1	APC	O	Modulation sensitivity output
2	P93/DA0	DTMF	O	DTMF/2-Tone/5-Tone/BEEP output
3	P92/TB2in	2TN/5TN	I	2-Tone/5-Tone decoded pulse input
4	P91	AFDIO	I/O	AK2346 data input/output
5	P90	AFSCLK	O	AK2346 Clock output
6	BYTE	BYTE	I	+5V (5C)
7	CNVSS	CNVSS	I	Ground (via 0 resistance)
8	P87	PA	O	MIC PA switch control H: PA
9	P86	HMBL	O	Palm MIC backlight control
10	RESET	RESET	I	Reset
11	XOUT	XOUT	O	Clock output
12	VSS	VSS	I	Ground
13	XIN	XIN	I	Clock input
14	VCC	VCC	I	+5V
15	P85/NMI	NMI	I	NMI
16	P84/INT2	AFRDF	I	MSK RX detect for baseband chip
17	P83/INT1	DTMFSTD		Not used (left open)
18	P82/INT0	AUX1	I/O	AUX 1
19	P81/TA4in	SBC		Power switch control H: Off L: On
20	P80/TA4out	CTC_OUT	O	CDCSS balance output
21	P77/TA3in	SPMUTE	O	SP Mute control H: Mute
22	P76/TA3out	CTC_PLL	O	CTCSS/CDCSS modulation output
23	P75/TA2in	EMICC	O	External MIC control H: External MIC
24	P74/TA2out	AFTDATA	O	MSK serial data output of baseband chip
25	P73/TA1in	AFTCLK	I	MSK clock input of baseband chip
26	P72/TA1out	AFDIR	O	Baseband chip control
27	P71/RXD2	RXD2		Not used
28	P70/TXD2	TXD2		Not used
29	P67/TXD1	TXD1	O	Serial data output L: PTT On
30	P66/RXD1	RXD1	I	Palm MIC HOOK input/serial data input L: On
31	P65	AUX4	I/O	AUX 4
32	P64	AUX5	I/O	AUX 5
33	P63	TXD2	O	Acc comm0 (serial data output)
34	P62	RXD2	I	Acc comm0 (serial data input)
35	P61	MICDAT	O	Palm MIC key code output

36	P60	AUX2	I/O	AUX 2
37	P57	RDY	I	Pulled Up
38	P56	NC		Not used (left open)
39	P55	HOLD		Not used (left open) (used for downloading)
40	P54	NC		Not used (left open)
41	P53	NC		Not used (left open)
42	P52	RD	O	External expansion for reading signal (not used)
43	P51	NC		Not used (left open)
44	P50	WR	O	External expansion for writing signal (not used)
45	P47	HNC	O	Horn alert control H: On (not used)
46	P46	SHIFT	O	Clock frequency shift H: On
47	P45	W/N	O	Wideband/Narrowband switch H: Wideband
48	P44	CS0		Not used (left open)
49	P43	MicMute	O	MIC Mute H: Mute
50	P42	KEYBL	O	Keypad backlight control
51	P41	UP/LED4	O	UP/LED4
52	P40	LED6	O	LED6
53	P37	LCDCI/LED3	I/O	LCD Driver CI PIN/LED3
54	P36	DOWN/LED5	O	DOWN/LED5
55	P35	LCDCL/LED2	O	LCD Driver CL PIN/LED2
56	P34	LCDBL/LED0	O	LCD Driver BL PIN/LED0
57	P33	LED7	O	LED7
58	P32	LCDCE/LED1	O	LCD Driver CE PIN/LED1
59	P31	RLED	O	Red indicator
60	VCC	VCC	I	+5V
61	P30	GLED	O	Green indicator
62	VSS	VSS	I	Ground
63~66	A7~A4	A7~A4		Not used (left open)
67	P23	PLLDAT	O	PLL data output
68	P22	PLLCLK	O	PLL clock output
69	P21	SLED	O	Scan status indicator
70	P20	PLED	O	High/Low power indicator
71	P17	8RC	O	8R power supply control H: RX
72	P16	8TC	O	8T power supply control H: TX
73	P15	RX	O	TX/RX VCO switch L: RX
74	P14	EEPDAT	I/O	EEPROM data input/output
75	P13	EEPCLK	O	EEPROM clock output
76	P12	PLLUL	I	PLL unlock detect L: Unlock
77	P11	PLLSTB	O	PLL strobe output L: Lock
78	P10	AFMUTE	O	RX audio mute H: Mute
79	P07	/IGN	I	Ignition sensor input H: Off L: On
80	P06	PWR	I	Power On/Off key L: On

81	P05	TYPE	I	selection input
82	P04	NC		Not used (left open)
83	P03	P4	I	P4 key input L: On (external resistor pulled up)
84	P02	P3	I	P3 key input L: On (external resistor pulled up)
85	P01	P2	I	P2 key input L: On (external resistor pulled up)
86	P00	P1	I	P1 key input L: On (external resistor pulled up)
87	AN7			Not used (left open)
88	AN6			Not used (left open)
89	AN5			Reserved for DTMF decoding
90	AN4			Reserved for DTMF decoding
91	AN3	Temp	I	Temperature data input
92	AN2	RSSI	I	RSSI input
93	AN1	SQL	I	SQL analog input
94	AVss	AVss		Ground
95	AN0	TI	I	CTCSS/CDCSS signal input
96	VREF	VREF	I	Reference voltage input
97	AVCC	AVCC	I	+5V
98	P97/Sin4	AUX3	I/O	AUX 3
99	P96/Sout4	AUX6	I/O	AUX 6
100	P95/Clk4	APCO	O	Audio PA control

Component Description

1. TX-RX Unit

Ref. No.	Part Name	Type	Description
IC101	IC	Power module	Power module
IC501	IC	AT2408N12.5S	EROM
IC401	IC	AK2346	Audio processor
IC404	IC	TA75W558FU	Dual operational amplifier
IC403	IC	TC75W51FU	Dual operational amplifier
IC803	IC	XC62FP3302P	Positive voltage regulator
IC602	IC	TA7805F	Positive voltage regulator
IC103	IC	TA75S01F	Single operational amplifier
IC104	IC	TA75W01FU	Dual operational amplifier
IC102	IC	TA31136FN	IF detector
IC502	IC	M30624FCPGP#U5C	CPU
IC121	IC	BU4066BCFV	Quad analog switch
IC122	IC	LC73872M	DTMF Receiver
IC125	IC	M62364FP	D/A converter with buffer amplifier
IC126	IC	TDA8561Q	Power amplifier
IC127	IC	TC4013BF	Dual D-type trigger
IC301	IC	PCF8576DH	LCD driver
IC901	IC	CN813LESA	Reset IC

Parts List 1

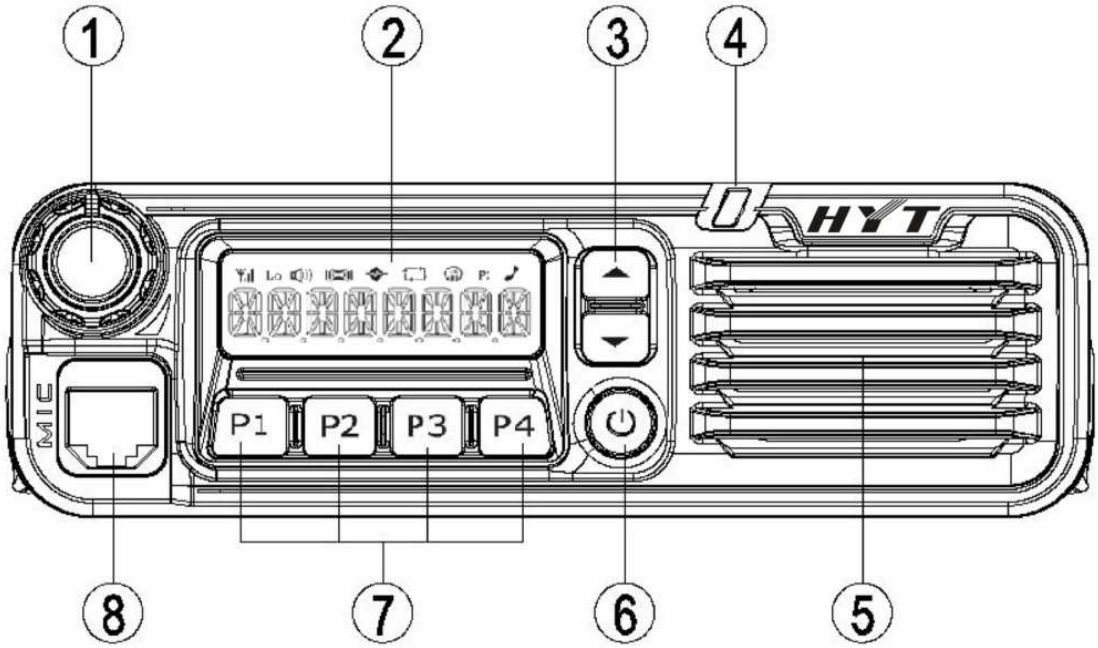
VHF Parts List 1 (Main Board Unit)

VHF/UHF Parts List 1 (Display Unit)

Tuning Description

Key Functions

1. Front Panel



① Volume Control Knob

② LCD Display

③ Programmable Function Keys ▲/▼

④ LED Indicator

⑤ Speaker

⑥ Power Switch

⑦ Programmable function keys **P1/P2/P3/P4**

⑧ Microphone Jack

2. Panel Testing Mode

■ 2. Panel Tuning Mode

2-1 Basic Operations in Panel Tuning Mode

The transceiver is tuned in this mode. For details on mode selection, see “Software Specifications -> Keypad Entry for Mode Startup”.

2-2 Enter Panel Tuning Mode

1) Power on the radio while holding down **P1** to enter the tuning mode, and the LED would flash red twice.

As for the tuning items, all the frequencies and signaling, other than the maximum frequency deviation and sensitivity, return to the values valid for the test frequency channels and test signaling channels before entering the panel tuning mode.

No.	Tuning Item
1	TX High Power
2	TX Low Power
3	Maximum Frequency Deviation
4	CDCSS Balance
5	CTCSS Deviation (67.0Hz)
6	CTCSS Deviation (151.4Hz)
7	CTCSS Deviation (254.1Hz)
8	CDCSS Deviation
9	DTMF Deviation
10	MSK Deviation
11	Single Tone Deviation
12	RX Sensitivity
13	Squelch ON Level (9)
14	Squelch ON Level (3)
15	Squelch OFF Level (9)
16	Squelch OFF Level (3)

Note: The tuning items are displayed on the LCD as described in Section “2-3”.

2-3 Tuning Items and Display

Tuning Items and Display (＊＊＊: 1-256)

Tuning Item	Tuning Item Display	Wideband/ Narrowband	Frequency	Sub-item Display	Description
Tx Power	TXHIGH	High Power W	Center	_C ***	No signaling
			Low	_L ***	No signaling
			High	_H ***	No signaling

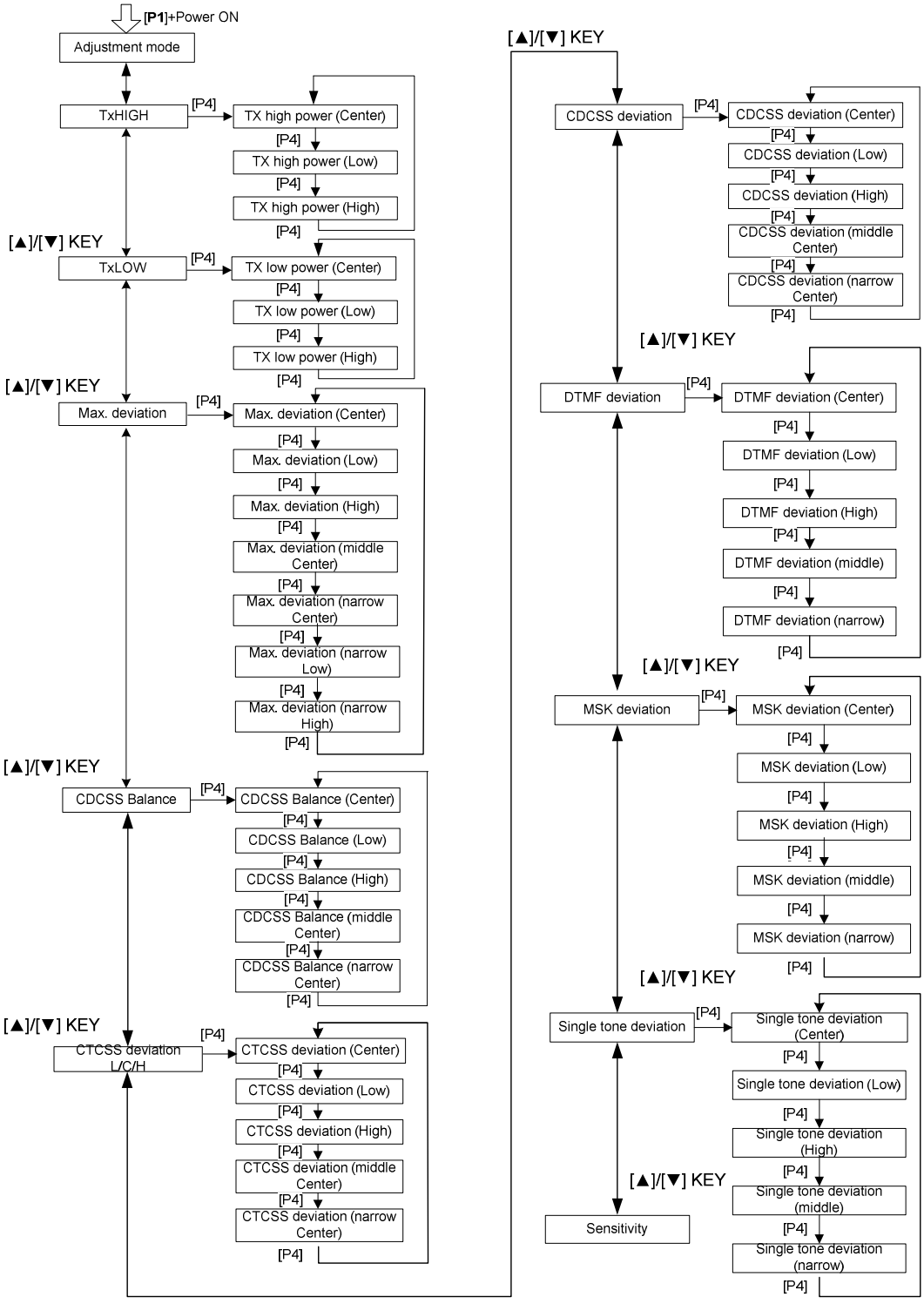
	TXLOW	Low Power W	Center	_C ***	No signaling
			Low	_L ***	No signaling
			High	_H ***	No signaling
Maximum Frequency Deviation	MAXDEV	W	Center	_C ***	No signaling
			Low	_L ***	No signaling
			High	_H ***	No signaling
		M	Center	M_C ***	No signaling
		N	Center	N_C ***	No signaling
			Low	N_L ***	No signaling
			High	N_H ***	No signaling
CDCSS Balance	CDCSSBAL	W	Center	_C ***	100Hz square wave
			Low	_L ***	100Hz square wave
			High	_H ***	100Hz square wave
		M	Center	M_C ***	100Hz square wave
		N	Center	N_C ***	100Hz square wave
CTCSS Deviation	CTCL_DEV	W	Center	_C ***	CTCSS: 67.0Hz
			Low	_L ***	CTCSS: 67.0Hz
			High	_H ***	CTCSS: 67.0Hz
		M	Center	M_C ***	CTCSS: 67.0Hz
		N	Center	N_C ***	CTCSS: 67.0Hz
	CTCC_DEV	W	Center	_C ***	CTCSS: 151.4Hz
			Low	_L ***	CTCSS: 151.4Hz
			High	_H ***	CTCSS: 151.4Hz
		M	Center	M_C ***	CTCSS: 151.4Hz
		N	Center	N_C ***	CTCSS: 151.4Hz
	CTCH_DEV	W	Center	_C ***	CTCSS: 254.1Hz
			Low	_L ***	CTCSS: 254.1Hz
			High	_H ***	CTCSS: 254.1Hz
		M	Center	M_C ***	CTCSS: 254.1Hz
		N	Center	N_C ***	CTCSS: 254.1Hz
CDCSS Deviation	CDCSS_DEV	W	Center	_C ***	CDCSS: 023N
			Low	_L ***	CDCSS: 023N
			High	_H ***	CDCSS: 023N
		M	Center	M_C ***	CDCSS: 023N
		N	Center	N_C ***	CDCSS: 023N
DTMF Deviation	DTMFDEV	W	Center	_C ***	DTMF: 9
			Low	_L ***	DTMF: 9
			High	_H ***	DTMF: 9
		M	Center	M_C ***	DTMF: 9
		N	Center	N_C ***	DTMF: 9

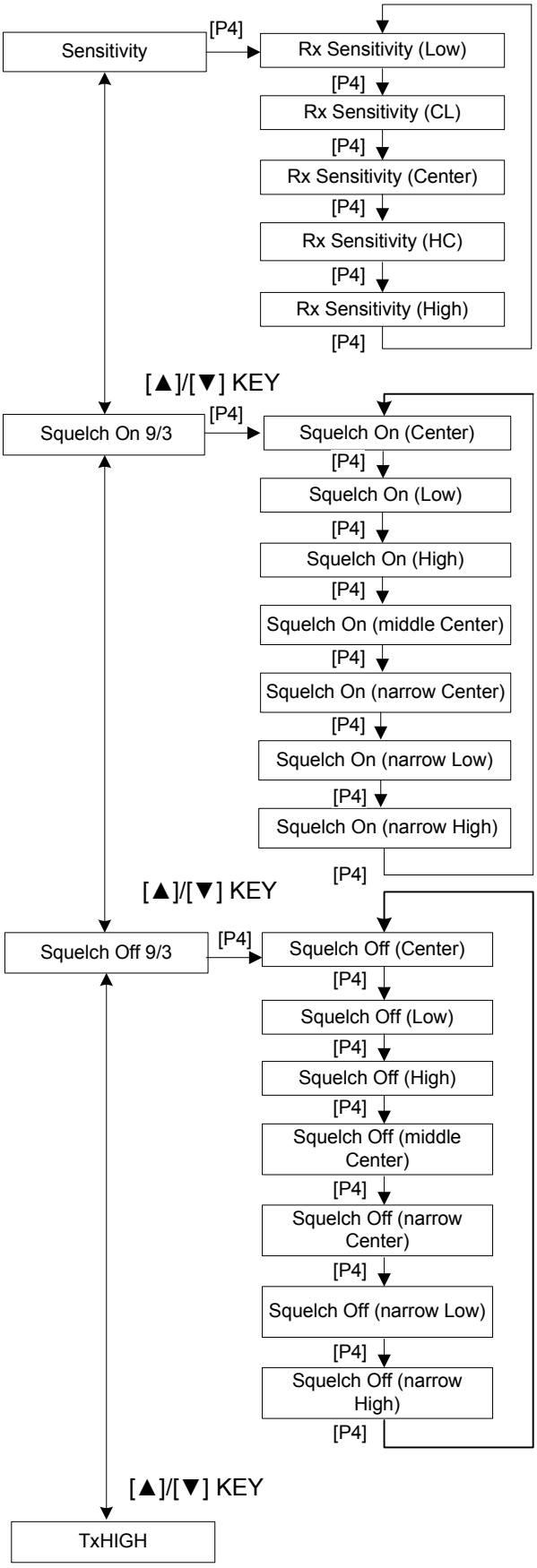
MSK Deviation	MSKDEV	W	Center	_C ***	0XAAA…
			Low	_L ***	0XAAA…
			High	_H ***	0XAAA…
		M	Center	M_C ***	0XAAA…
		N	Center	N_C ***	0XAAA…
Single Tone Deviation	TONEDEV	W	Center	_C ***	1KHz
			Low	_L ***	1KHz
			High	_H ***	1KHz
		M	Center	M_C ***	1KHz
		N	Center	N_C ***	1KHz
RX Sensitivity	SENSITVI	-	Low	_L ***	No signaling, SQL off
		-	Low-center	_LC ***	No signaling, SQL off
		-	Center	_C ***	No signaling, SQL off
		-	High-center	_CH ***	No signaling, SQL off
		-	High	_H ***	No signaling, SQL off
Squelch On Level	OPENSQL9	SQL 9 W	Center	_C ***	No signaling
			Low	_L ***	No signaling
			High	_H ***	No signaling
		SQL 9 M	Center	M_C ***	No signaling
		SQL 9 N	Center	N_C ***	No signaling
			Low	N_L ***	No signaling
			High	N_H ***	No signaling
	OPENSQL3	SQL 3 W	Center	_C ***	No signaling
			Low	_L ***	No signaling
			High	_H ***	No signaling
		SQL 3 M	Center	M_C ***	No signaling
		SQL 3 N	Center	N_C ***	No signaling
			Low	N_L ***	No signaling
			High	N_H ***	No signaling
Squelch Off Level	CLOSSQL9	SQL 9 W	Center	_C ***	No signaling
			Low	_L ***	No signaling
			High	_H ***	No signaling
		SQL 9 M	Center	M_C ***	No signaling
		SQL 9 N	Center	N_C ***	No signaling
			Low	N_L ***	No signaling
			High	N_H ***	No signaling
	CLOSSQL3	SQL 3 W	Center	_C ***	No signaling
			Low	_L ***	No signaling
			High	_H ***	No signaling
		SQL 3 M	Center	M_C ***	No signaling
		SQL 3 N	Center	N_C ***	No signaling

			Low	N_L ***	No signaling
			High	N_H ***	No signaling

2-4 Flow Chart

You can perform tuning in the following steps:

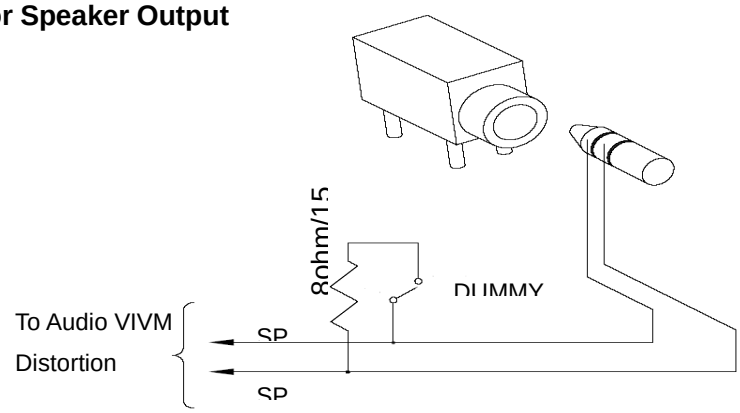



Sensitivity
[P4]
Rx Sensitivity (Low)
[P4]
Rx Sensitivity (CL)
[P4]
Rx Sensitivity (Center)
[P4]
Rx Sensitivity (HC)
[P4]
Rx Sensitivity (High)
[P4]
[▲]/[▼] KEY
Squelch On 9/3
[P4]
Squelch On (Center)
[P4]
Squelch On (Low)
[P4]
Squelch On (High)
[P4]
Squelch On (middle Center)
[P4]
Squelch On (narrow Center)
[P4]
Squelch On (narrow Low)
[P4]
Squelch On (narrow High)
[P4]
[▲]/[▼] KEY
Squelch Off 9/3
[P4]
Squelch Off (Center)
[P4]
Squelch Off (Low)
[P4]
Squelch Off (High)
[P4]
Squelch Off (middle Center)
[P4]
Squelch Off (narrow Center)
[P4]
Squelch Off (narrow Low)
[P4]
Squelch Off (narrow High)
[P4]
[▲]/[▼] KEY
TxHIGH

■ 3. Instruments for Tuning

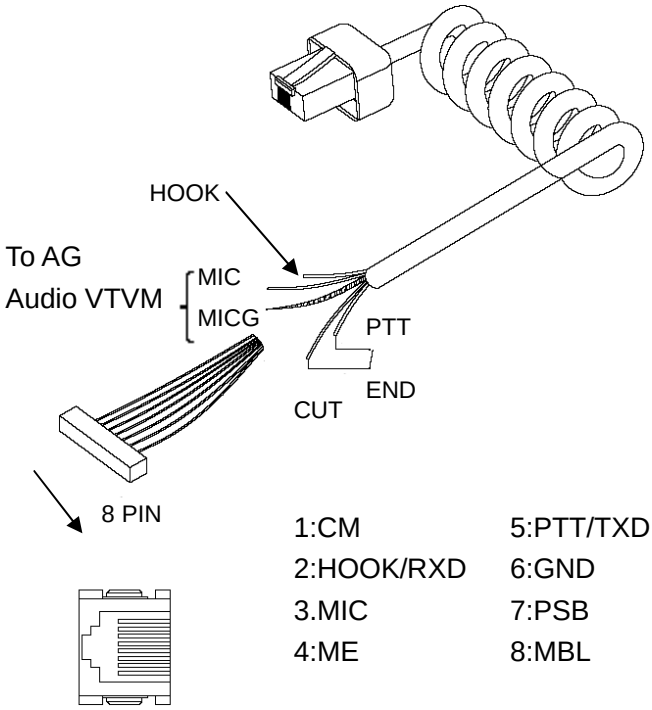
Instrument	Method	Specifications
Standard Signal Generator (SSG)	Frequency Range Modulation Method Power Output	VHF: 136-174 MHz; UHF: 400-470 MHz Frequency modulation and external modulation 0.1uV and above
Power Meter	Input Impedance Frequency Range Measurement Capability	50Ω VHF: 136-174 MHz; UHF: 400-470 MHz About 50W/45W (high power)/5W (low power)
Tuning Meter	Frequency Range	VHF: 136-174 MHz; UHF: 400-470 MHz
Digital Voltmeter (DVM)	Measuring Range Accuracy	1 to 20V DC High input impedance for minimum circuit load
Oscilloscope		DC to 30MHz AC
High Sensitivity Frequency Counter	Frequency Range Frequency Stability	10Hz to 600MHz 0.2ppm or less
Ammeter		13A or more
AF Vacuum Tube Voltmeter (AF VTVM)	Frequency Range Voltage Range	50Hz to 10kHz 3mV to 3V
Audio Generator (AG)	Frequency Range Power Output	50Hz to 5kHz 0 to 1V
Distortion Meter	Measurement Capability Input Level	3% or less (1KHz) 50mV to 10Vrms
4Ω Dummy Load		About 4Ω, 20W
Regulated Power Supply		13.6V, about 20A (adjustable within 9~20V) Applicable when an antenna is used.

3-1 Test Cable for Speaker Output



3-2 Test Cable for Microphone Input

The following test cable is recommended:



■ 4. Tuning Instructions

The mobile radio can be tuned manually or through PC programming software. For information on manual tuning, see “Software Specifications -> Panel Tuning Mode”.

Instruments:

Communication Test Set	1 set
Spectrum Analyzer	1 set
20A/30V Power Supply	1 set
Digital Voltmeter	1 set
Power Meter	1 set
Signal Cable (with dummy load)	1 set

Method and Procedure:

1) Downloading

- Connect the mobile radio with PC via programming cable; and turn the radio on.
- Click “Download” on software interface.
- Click “Exit” when download is completed.
- Turn the radio off and remove the programming cable.

2) Initialization

It’s necessary to set the frequency and initialize the mobile radio before tuning, because there is no required information in EEPROM when the radio is delivered from the factory.

- Turn on the power while holding down **P2**, and press **P4** after the LCD displays “DESTINA + initialized value” (Refer to “Model No.” in the Frequency Table).
- Initialization is done when the red LED on the front panel goes out.

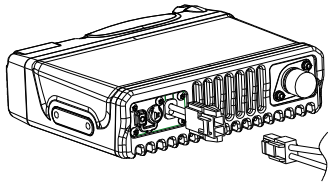
3) Tuning

Some items can be tuned in conventional mode and the others in manual tuning mode.

- Turn on the power to enter conventional mode by default.
- Turn the radio off and restart it by holding down **P1**; then the radio will enter manual tuning mode. The tuning items are displayed on the LCD.
- Frequency Table

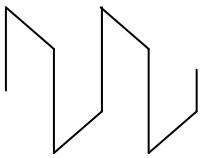
Model No.	RX/TX	1 (C)	2 (L)	3 (H)	4	5	6	7	8
0	RX(MHz)	155.15	136.15	173.85	145.55	164.50	155.00	155.20	155.40
(V)	TX(MHz)	155.00	136.00	174.00	145.50	164.50	155.00	155.20	155.40
1	RX(MHz)	435.15	400.15	469.85	417.55	452.50	435.00	435.20	435.40
(U1)	TX(MHz)	435.00	400.00	470.00	417.50	452.50	435.00	435.20	435.40

VCO Tuning

Item	Condition	Measurement		Tuning		Specification/ Remarks
		Test Instrument	Terminal	Part	Method	
1. Power Supply	13.6V DC	 Note: 1. This radio can be installed in negative ground electrical systems only. Reverse polarity will cause the cable fuse to blow. Check the vehicle ground polarity before installation. 2. If DC power is to be controlled by the vehicle ignition switch, a switch relay should be used to switch the positive power lead. The vehicle ignition switch then controls DC to the relay coil.				
2. VCO Lock Voltage (TX)	1. CH: TX HI	Digital Voltmeter	CV	TC701	6.1V±0.1V	U1
					6.0V±0.1V	V
	2. CH: TX LO				Check	＞1.0V
3. VCO Lock Voltage (RX)	1. CH: RX HI	Digital Voltmeter	CV	TC702	6.0V±0.1V	U1
						V
	2. CH: RX LO				Check	＞1.0V

Transmitter Tuning

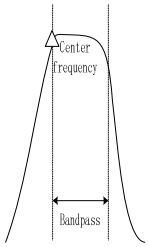
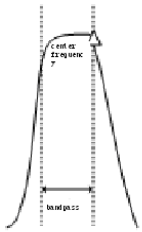
Item	Condition	Measurement		Tuning		Specification/ Remarks
		Test Instrument	Terminal	Part	Method	
4. TX Frequency	Switch to CH_4 (Do not enter any tuning item).	Communication Test Set	ANT	Adjust VR801.	Adjust Channel frequency.	Error <50Hz
5. TX Power	Each channel corresponds to a specific TX frequency. Enter the item “TXHIGH” and “TXLOW” in turn, and press **P4** to enter “_C”,	Communication Test Set Ammeter	ANT	Adjust software settings; press **P4** to save and enter the next item. Note: VR101 is required to be	High Power: PO=50W（V） PO=45W（U） I≤13A	Check high power
					Low Power: PO=5±0.5W I≤5.0A	Check low power

	"_L" or "_H" to tune the high or low power.			tuned for VHF high power (not required for UHF).		
6. Maximum Frequency Deviation	Each channel corresponds to a specific TX frequency. Enter the tuning item "MAXDEV" to adjust among "_C", "_L", "_H", "M_C", "N_C", "N_L" and "N_H".	Radio Communication Test Set FILTER: 0.05-15KHz AF:1KHz 75mV	ANT MIC Jack	Adjust software settings; press **P4** to save and enter the next item.	Check deviation at CH L/C/H: 4.0±0.2KHz (W)	"_C", "_L" and "_H" for wideband
					Check deviation at CH L/C/H: 3.2±0.2KHz (M)	"M_C" for mediumband
					Check deviation at CH L/C/H: 2.0.0±0.2KHz (N)	"N_C"," N_L" and "N_H" for narrowband
7. Modulation Sensitivity	Each channel corresponds to a specific TX frequency.	Communication Test Set Filter: 0.05-15KHz AF: 1KHz 7.5mV	ANT MIC Jack		Check deviation: 2.7KHz-3.4KHz (W) 2.2KHz-2.7KHz (M) 1.3KHz-1.7KHz (N)	Check
8. Modulation Distortion					≤5%	
9. CDCSS Balance	Each channel corresponds to a specific TX frequency. Enter the tuning item "CDCSSBAL", and press **P4** to adjust among "_C", "_L", "_H", "M_C" and "N_C".	Communication Test Set Filter <20Hz-300Hz AF: OFF	ANT	Use **▲/▼** to adjust software settings; press **P4** to save and enter the next item.		"_C", "_L" and "_H" indicate the widebands respectively of center, low and high frequencies ; "M_C" indicates the mediumband of center frequency (20K); "N_C" indicates the narrowband of center frequency (12.5K).

10. CTCSS Deviation	Each channel corresponds to a specific TX frequency. Enter tuning items “CTCL_DEV”,”CTCC_DEV” and “CTCH_DEV” (to tune the CTCSS at 67Hz/151.4Hz/254.1Hz). Press **P4** to adjust among “_C”, “_L”, “_H”, “M_C” and “N_C”.	Communication Test Set Filter <20Hz-300Hz AF: OFF	ANT	Use ▲/▼ to adjust software settings; press **P4** to save and enter the next item.	Adjust the deviation to 0.75KHz±0.15KHz (W) 0.60KHz±0.15KHz (M) 0.37KHz±0.15KHz (N)	“_C”, “_L” and “_H” indicate the widebands of each frequency; “M_C” indicates the medium band; “N_C” indicates the narrowband of center frequency.
11. CDCSS Deviation	Each channel corresponds to a specific TX frequency. Enter tuning item “CDCSS_DEV”, and press **P4** to adjust among “_C”, “_L”, “_H”, “M_C” and “N_C”.	Communication Test Set Filter <20Hz-300Hz AF: OFF	ANT	Use ▲/▼ to adjust software settings; press **P4** to save and enter the next item.	Adjust the deviation to 0.75KHz±0.15KHz (W) 0.60KHz±0.15KHz (M) 0.37KHz±0.15KHz (N)	“_C”, “_L” and “_H” indicate the widebands of each frequency; “M_C” indicates mediumband; “N_C” indicates the narrowband of center frequency.
12. DTMF Deviation	Each channel corresponds to a specific TX frequency. Enter tuning item “DTMFDEV”, and press **P4** to adjust among “_C”, “_L”, “_H”, “M_C” and “N_C”.	Communication Test Set Filter 300Hz--3KHz AF: OFF	ANT	Use ▲/▼ to adjust software settings; press **P4** to save and enter the next item.	3.0KHz±0.2KHz (W) 2.4KHz±0.2KHz (M) 1.5KHz±0.2KHz (N)	“_C”, “_L” and “_H” indicate the widebands of each frequency; “M_C” indicates the medium band; “N_C” indicates the narrowband of center frequency.
13. MSK Deviation	Each channel corresponds to a specific TX frequency. Enter tuning item “MSKDEV”, and press **P4** to adjust among “_C”, “_L”, “_H”, “M_C” and “N_C”.	Communication Test Set Filter 300Hz--3KHz AF: OFF	ANT	Use ▲/▼ to adjust software settings; press **P4** to save and enter the next item.	3.0KHz±0.2KHz (W) 2.4KHz±0.2KHz (M) 1.5KHz±0.2KHz (N)	“_C”, “_L” and “_H” indicate the widebands of each frequency; “M_C” indicates the medium band; “N_C” indicates the narrowband of center frequency.

14. Single Tone Deviation	Each channel corresponds to a specific TX frequency. Enter tuning item "TONEDEV", and press **P4** to adjust among "_C", "_L", "_H", "M_C" and "N_C".	Communication Test Set Filter 300Hz--3KHz AF: OFF	ANT	Use ▲/▼ to adjust software settings; press **P4** to save and enter the next item.	Adjust the deviation to 3.0KHz±0.2KHz (W) 2.4KHz±0.2KHz (M) 1.5KHz±0.2KHz (N)	"_C", "_L" and "_H" indicate the widebands of each frequency; "M_C" indicates the medium band; "N_C" indicates the narrowband of center frequency.
15. TX S/N	Each channel corresponds to a specific TX frequency.	Communication Test Set Filter 0.3-3KHz AF: 1KHz 7.5Mv DEV: 3KHz	ANT	Check	S/N≥45 (W) S/N≥40 (N)	

Receiver Tuning

Item	Condition	Measurement		Tuning		Specification / Remarks
		Test Instrument	Terminal	Part	Method	
16. RF Bandpass Filter	Each channel corresponds to a specific RX frequency. Enter tuning item "SENSITVI", and press **P4** to adjust among "_L", "_LC", "_C", "_CH" and "_H".	Scanner	ANT	Use ▲/▼ to adjust manually, and then press **P4** to save and enter the next item.	Adjust the gain to the maximum value; the corresponding frequencies of VHF and UHF are respectively at the rightmost and leftmost of the bandpass waveform. Press **P4** to save.	UHF waveform  VHF waveform 
17. Maximum Volume:	Freq: RX Center; go to CH_1 (C), which corresponds to a specific frequency.	Communication Test Set SSG output: -47dBm MOD: 1KHz DEV: ±3KHz (W) ±1.5KHz (N) Filter: 0.3-3.0KHz	ANT SP Jack	K301		Check the maximum volume: 4.4V-5.2V

18. Sensitivity	1. Test mode CH: RX Center; manually switch to CH_1 (C). 2. Test mode CH: RX LO; manually switch to CH_2 (L). 3. Test mode CH: RX HI; manually switch to CH_3 (H).	Communication Test Set SSG output: -118dBm MOD: 1KHz DEV: ±3KHz (W) ±2.4KHz (M) ±1.5KHz (N) FILTER: 0.3-3.0KHz	ANT SP Jack	Switch between wideband and narrowband (turn power on while holding down **P1** to enter Channel Set Mode).	Adjust K301 to provide rated volume output.	SINAD: 12dB or above
19. Squelch On	Enter tuning items “OPENSQL9” and “OPENSQL3” in turn, and then press **P4** to adjust among “_C”, “_L”, “_H”, “M_C”, “N_C”, “N_L” and “N_H”.	Communication Test Set SSG output: -120dBm (Level 3) SSG output: -114dBm (Level 9)	ANT SP Jack	Adjust software settings	Press **P3** and **P4** to save (no need to adjust software settings at Level 3 and Level 9).	Press **P3** and **P4** in turn for the CPU to read and write squelch level. (Note: Do not press **P4** until the LED glows green after **P3** is pressed.)
20. Squelch Off	Enter tuning items “CLOSESQL9” and “CLOSESQL3” in turn, and then press **P4** to adjust	Communication Test Set SSG output: -122dBm (Level 3)			Press **P3** and **P4** to save (no need to adjust software settings at Level 3	Press **P3** and **P4** in turn for the CPU to read and write

	among “_C”, “_L”, “_H”, “M_C”, “N_C”, “N_L” and “N_H”.	SSG output: -116dBm (Level 9)			and Level 9).	squelch level. (Note: Do not press **P4** until the LED glows green after **P3** is pressed.)
21. Distortion	Test mode CH: RX Center	Communication Test Set SSG output: -60dBm	ANT SP Jack	Filter: 0.3-3.0KHz	Check	DIS≤5%
22. S/N						S/N≥47 (W) S/N≥42 (N)

Note: The radio must be covered with aluminum chassis during adjustment of sensitivity, TX power, signaling waveform, frequency deviation and RX squelch; the RF power meter must be connected to the antenna connector during transmission; and the SINAD meter with a 16ohm load must be connected to the external speaker jack.

Terminal Function

1. Display Unit

Pin No.	Name	Description
J301 (To MIC Jack)		
1	CM	Serial data input for keypad MIC
2	HOOK/RXD	Hook signal/serial data input
3	MIC	MIC signal input
4	ME	MIC ground
5	PTT/TXD	PTT signal input/ Serial data output
6	GND	Ground
7	PSB	Power output upon power switch (13.6V±15%).
8	MBL	MIC backlight control signal output H: On, L: Off.
J303 (To Display Unit)		
1	VCC	+5V
2	BS	Power output upon power switch (13.6V±15%)
3	VCC	+5V
4	BS	Power output upon power switch (13.6V±15%)
5	NC	
6	MICDAT	Serial data input for keypad MIC
7	NC	
8	ME	MIC ground

9	MIC	MIC signal output
10	GND	Ground
11	VO	Audio input after tuned by K301
12	PSW	Power switch control signal output
13	RXD2	Serial data output
14	TXD2	Serial data output
15	VI	Audio output after tuned by K301
16	TYPE	Model select
17	P4	P4 signal output
18	P3	P3 signal output
19	P2	P2 signal output
20	P1	P1 signal output
21	SLED	Scan indicator
22	PLED	Low power indicator
23	RLED	TX indicator control
24	GLED	RX indicator control
25	LED1	Channel display control
26	LED7	Channel display control
27	LED0	Channel display control
28	LED2	Channel display control
29	LED5	Channel display control
30	LED3	Channel display control
31	LED6	Channel display control
32	LED4	Channel display control

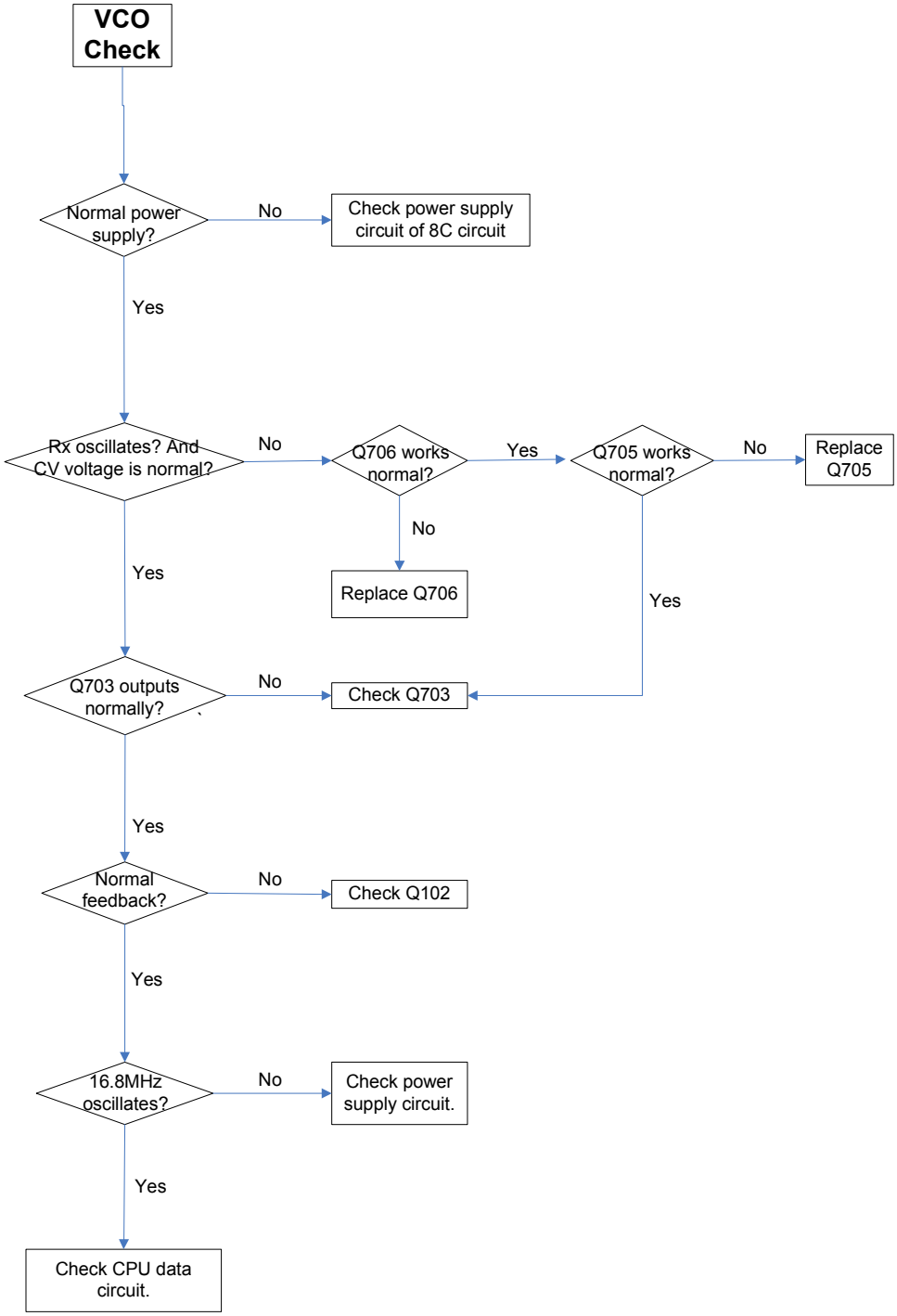
2. Tx-Rx Unit

Pin No.	Name	Description
J501 (To Display Unit)		
1	VCC	+5V
2	BS	Power output upon power switch (13.6V±15%)
3	VCC	+5V
4	BS	Power output upon power switch (13.6V±15%)
5	NC	NC
6	MICDAT	Serial data input for keypad MIC
7	NC	NC
8	ME	MIC ground
9	MIC	MIC signal input
10	GND	Ground
11	VO	Audio output after tuned by K301
12	PSW	Power switch control signal output
13	RXD2	Serial data output
14	TXD2	Serial data input
15	VI	Audio input after tuned by K301

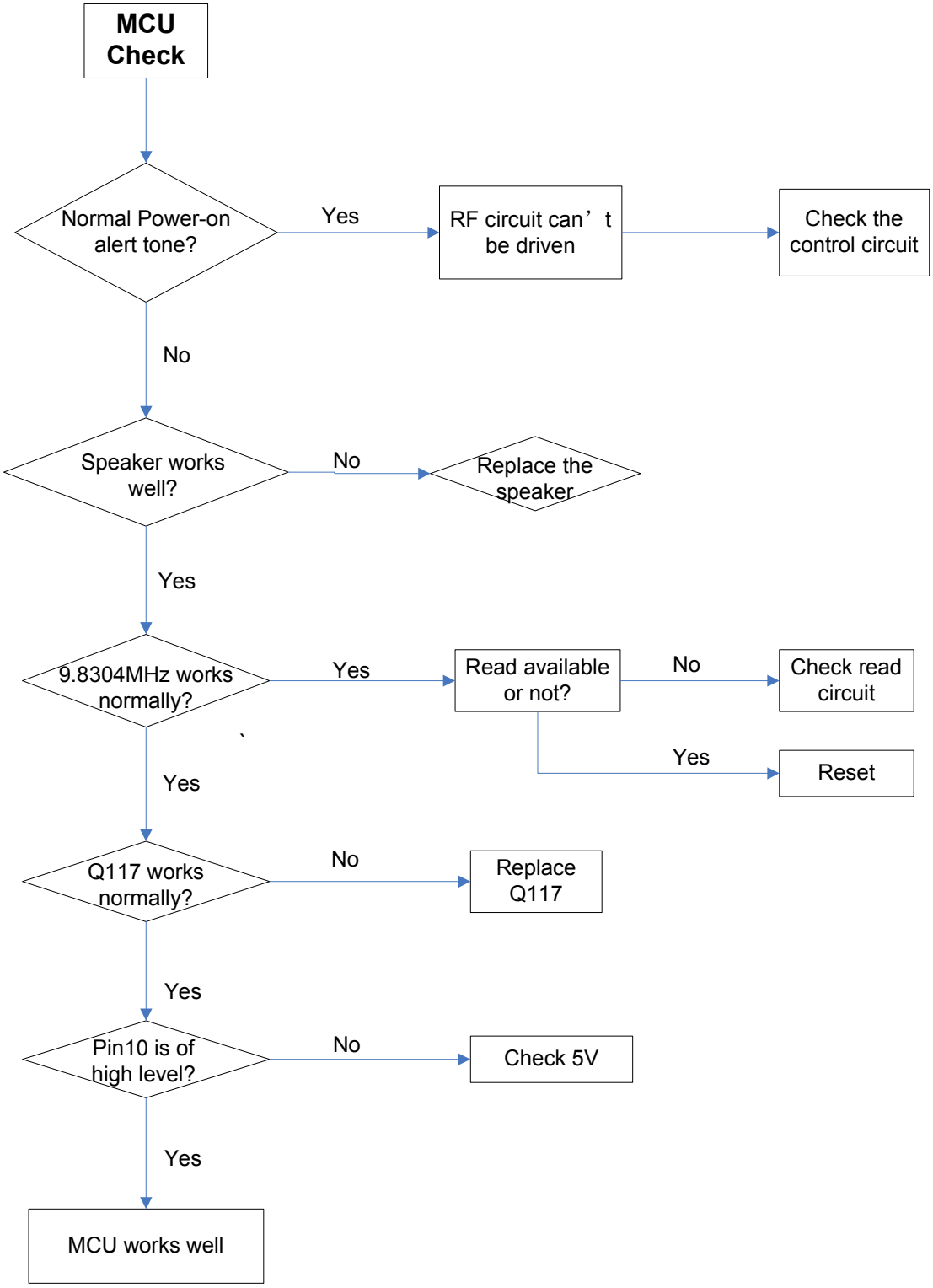
16	TYPE	Model select
17	P4	P4 signal output
18	P3	P3 signal output
19	P2	P2 signal output
20	P1	P1 signal output
21	SLED	Scan indicator
22	PLED	Low power indicator
23	RLED	TX indicator control
24	GLED	RX indicator control
25	LED1	Channel display control
26	LED7	Channel display control
27	LED0	Channel display control
28	LED2	Channel display control
29	LED5	Channel display control
30	LED3	Channel display control
31	LED6	Channel display control
32	LED4	Channel display control
J504 (To Speaker)		
1	SP1	BTL Input for external speaker
2	SP2	BTL Input for external speaker
J503 of new version mobile radio (to Repeater)		
1	TXD2	Transmit and read
2	RXD2	Write
3	MIC2	External MIC input
4	ME	External MIC ground
5	AF_O	RX audio output (300-3KHz, de-emphasized) (default)
	DI	Digital signal modulation input (optional)
6	PA1	SPEAKER1 signal output (optional)
	RSSI	RSSI detect (default)
7	PA2	SPEAKER2 signal output (optional)
	PCO	RF power control (default)
8	AUX1	Functions to be expanded (for AUX1 to AUX4):
9	AUX2	1. External PTT; 2. Data Transmission PTT; 3.Speaker Mute; 4.External Monitor;
10	AUX3	5. ▲ Key; 6. ▼ Key; 7. External Hook; 8. Emergency Call; 9. MIC Mute; 10. RX
11	AUX4	Carrier; 11. RX Audio; 12. Digital Modulation Input
12	DET	RX audio output, AK2346 (default)
	TI	Filtered CTCSS/CDCSS output (optional)
13	E	Ground
14	SB	13.6V power (default)
	5C	5V power, maximum current is 1A (optional)
15	IGN	Ignition sensor input

VCO

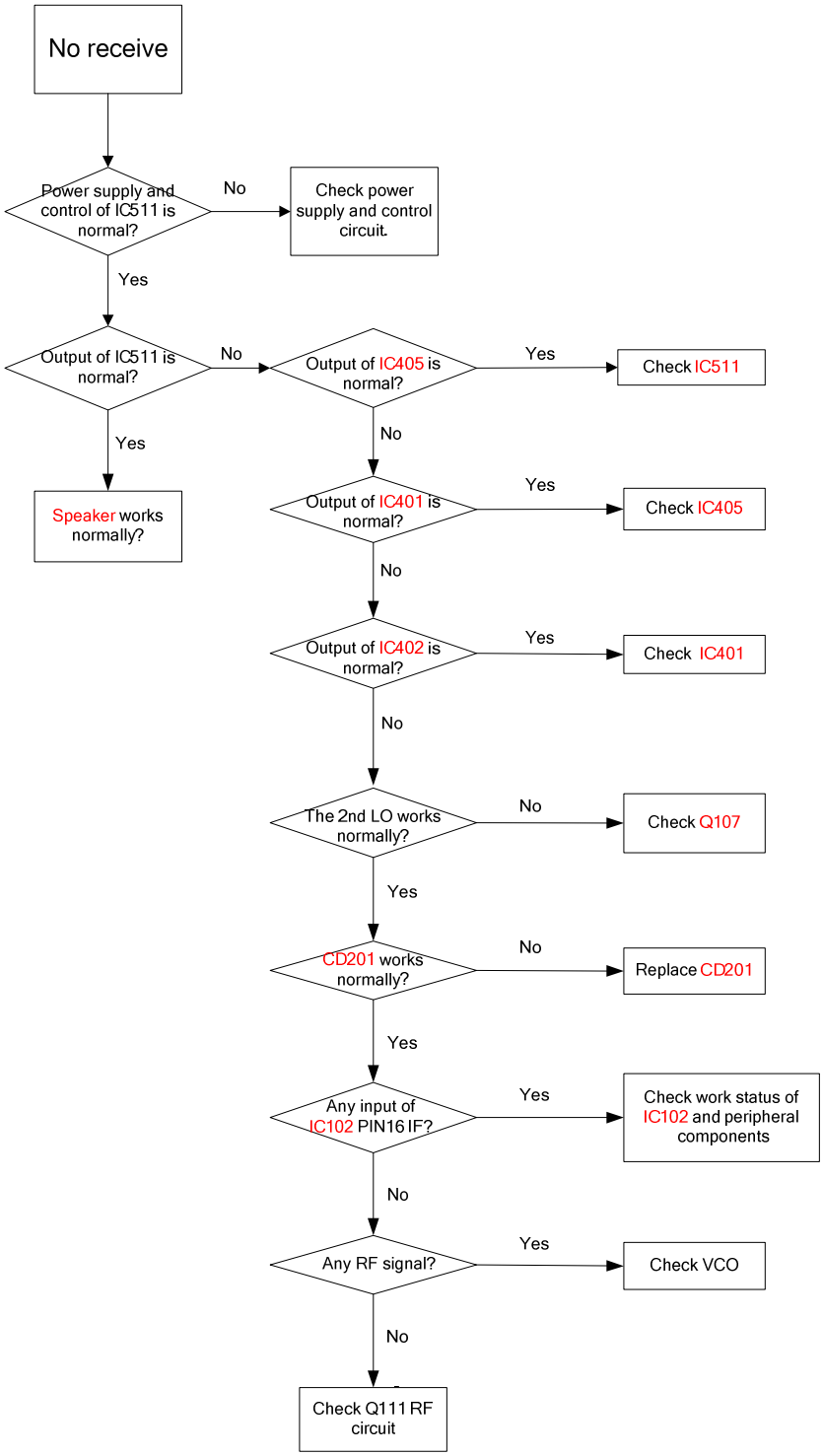
Troubleshooting Flow Chart



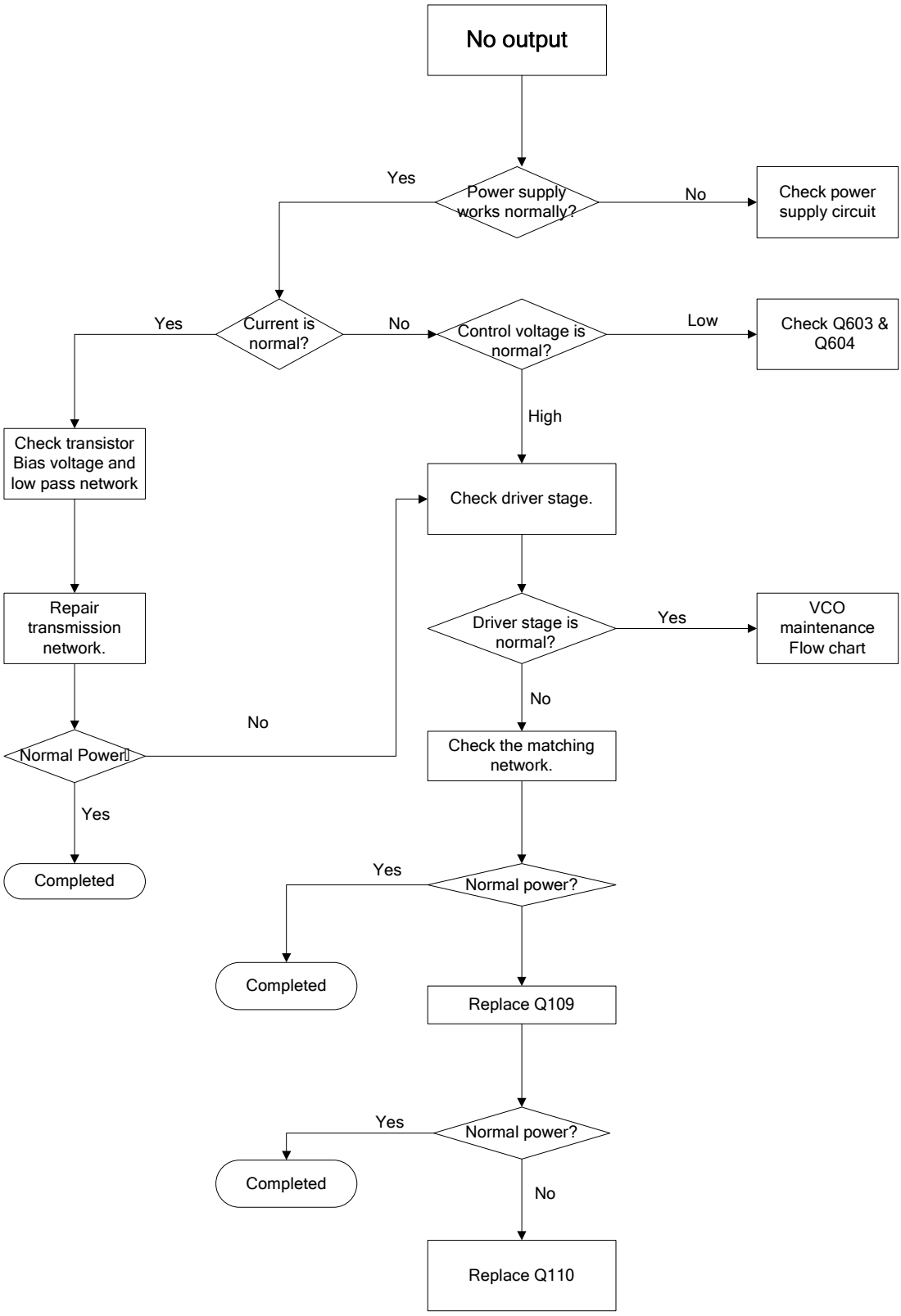
MCU


MCU Check
Normal Power-on alert tone?
Yes
RF circuit can’ t be driven
Check the control circuit
No
Speaker works well?
No
Replace the speaker
Yes
9.8304MHz works normally?
Yes
Read available or not?
No
Check read circuit
Yes
Reset
Yes
Q117 works normally?
No
Replace Q117
Yes
Pin10 is of high level?
No
Check 5V
Yes
MCU works well

Receive Circuit



Transmit Circuit



PCB View

PCB View (Main Board Unit)

PCB View (Main Board Unit)

VHF/UHF PCB View (Display Unit)

Block Diagram

Schematic Diagram

VHF Schematic Diagram

UHF Schematic Diagram

Specifications

General		
Frequency Range		VHF: 136-174MHz UHF: 400-470MHz
Channel Capacity		128
Channel Spacing		25KHz/20KHz/12.5KHz
Operating Voltage		13.6V±15%
Current Drain	Standby	0.2A
	Receive	≤2A
	Transmit	≤13A (High power); ≤5A (Low power)
Operating Temperature		-30℃~+60℃
Dimensions (H×W×D)		125×152×43mm
Weight		1.23 kg
Frequency Stability		±2.5ppm
Receiver		
Reference Sensitivity		0.28μV/0.33μv/0.35μV
Selectivity		75dB/70dB/65dB
Intermodulation		70dB/70dB/70dB
Spurious Response Rejection		70dB
Rated Audio Power Output (Internal)		Rated: 3W (@16Ω 3% distortion), Max.: 6W(@16Ω 5% distortion)
Rated Audio Power Output (External)		Rated: 10W (@8Ω 3% distortion), Max.: 12W(@8Ω 5% distortion)

Transmitter	
RF Power Output	V：50W/5W U：45W/5W
Spurious and Harmonics	-36dBm<1GHz -30dBm>1GHz
Modulation Limiting	5KHz/4KHz/2.5KHz
FM Noise	≥45dB(25KHz/20KHz)/40dB(12.5KHz)
Audio Distortion	<3%

All Specifications are tested according to TIA/EIA-603, and subject to change without notice due to continuous development.

HYT endeavors to achieve the accuracy and completeness of this manual, but no warranty of accuracy or reliability is given. All the specifications and designs are subject to change without notice due to continuous technology development. Changes which may occur after publication are highlighted by Revision History contained in Service Manual.