RSI

User's Manual

Military HF/SSB Manpack Transceiver

RI-8010

Contents

1. Installing and Preparing

1) Accessories and Assembling
a. Accessories
  - Remote Control Unit(RCU-02)
  - Handset(HS-2)
  - RS-232C Cable(CA-2)
  - Battery Charger(BCR-9000)
  - Rechargeable Battery Package 12V(BAT-12)
  - Manpack(BAG-01)
b. Options
  - 1.5m Whip Antenna(AT-1.5)
  - 15m Long Wire Antenna(AT-L15)
  - ACC Cable(CA-3)
  - Morse Key(MK-01)
  - Headset(HS-21)
c. Assembling of main accessories is as Fig.1.

Fig. 1. Assembling of main accessories

Remote Control Unit(RCU-02)	Handset(HS-2)	Headset(HS-21)	RS-232C Cable(CA-2)
Battery Package(BAT-12)	Whip Antenna(AT-1.5)	Manpack(BAG-01)	
Battery Recharger(BCR-9000)	Long Wire Antenna(AT-L15)	Morse Key(MK-02)	
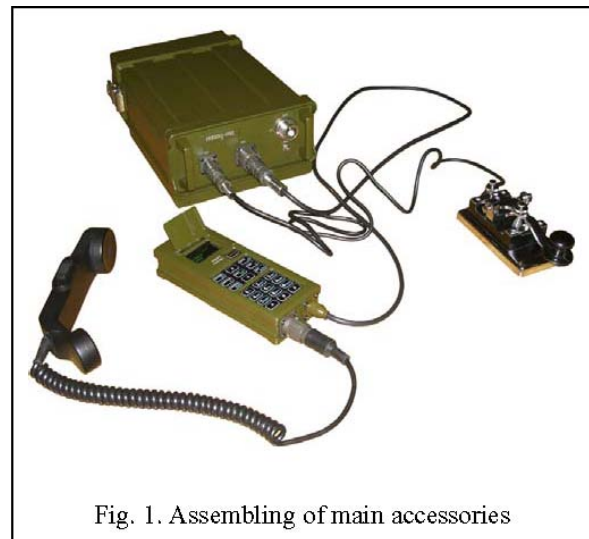
**Fig.2. Accessories and Options**

2) DC Power Supplying

RI-8010 must be supplied by DC power 12 voltage.
a. Power supplying by battery package(BAT-12)
   - Connects power plug and closes battery cover.
   - Sets cover latches.
b. Power supplying by external power
   - Connects to power plug, external power DC 12V.

Fig.3. Battery cover

3) Connecting of antenna.

a. Connecting whip antenna(AT-1.5).
   - Stand up the mainbody on working area or
bag(BAG-01) within the mainbody. .
   - Stretch out 1.5M whip antenna(AT-1.5) to make
on working status.
   - Insert 1.5M whip antenna(AT-1.5) to the
antenna socket of the mainbody(Fig.4).
   - Make sure that connecter of whip
antenna(AT-1.5) is fixed into socket exactly.
b. Connecting long wire antenna(AT-L15).
   - Stand up the mainbody on working area or
bag(BAG-01) within the mainbody. .
   - Install long wire antenna(AT-L15) on an appropriate
area.
   - Insert connector of long wire antenna(AT-L15) to
the antenna socket of the mainbody.
   - Make sure that connecter of long wire
antenna(AT-L15) is fixed into socket exactly.

Fig. 4. Assembling whip antenna
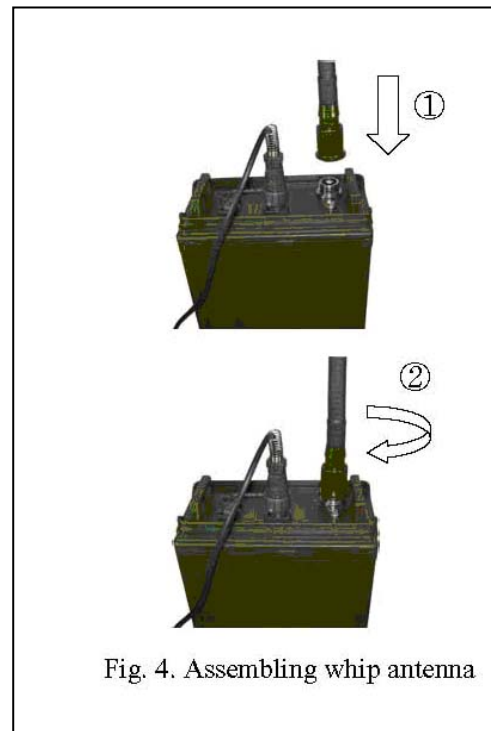
4) Connection of remote control unit(RCU-02)

- Insert the ACC cable of remote control
unit(RCU-02) into the ACC socket of the
mainbody.

5) Connection of Handset

- Insert the handset(HS-2) into handset socket of RCU-02.

2. Control Buttons and Sockets

1) Control Buttons of Remote Control Unit (RCU-02)

- [**CHANNEL/*ESC* **] **Button**

○ Moves to channel mode in main mode(clear mode).

○ Moves to main mode in any mode.

- **[HOP/MAIN/<] Button (move left)**

○ Moves to hopping mode in main mode.

○ Moves to main mode in hopping mode.

○ Moves cursor to left in edit mode.

- **[TUNE/>] Button (move right)**

○ Makes antenna to tune in selected frequency.

○ Moves cursor to right in edit mode.

- **[/\]([\/]) Button**

○ Increases(Decreases) value of selected item.

- **[FREQ/*BS*] Button**

○ Moves to frequency mode in main mode.

○ Makes backspace in edit mode.

- **[MSG/⇐] Button**

○ Moves to message mode in main mode.

○ Moves cursor to next line in edit mode.

○ Saves value of frequency in frequency mode.

- **[SET/*MODE*] Button**

○ Sets operating mode(USB,LSB,FM, CW, AM).

○ Moves to set mode for power, hopping, net number, local number, random number and communication mode.

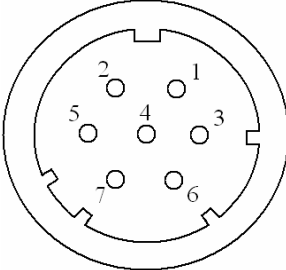- **[VOICE/DATA/*SEND*] Button**

○ Move to private voice mode(1200bps) in main mode.
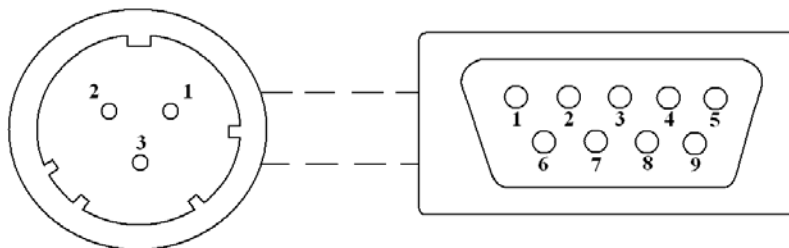
○ Send message in edit mode.

CHANNEL *ESC*	∧	FREQ *BS*
HOP/MAIN <	MSG ⇐	TUNE >
VOICE/DATA *SEND*	∨	SET *MODE*

2) Information of Sockets

Table 1. Handset Connector Information.

Connector	PIN #	NAME	DESCRIPTION
	1	GND	Connects to ground.
	2	Transmit	While pushing [PTT], transmit voice.
	3	Receive	Receive voice.
	4	-	-
	5	-	-
	6	PTT	PTT sign
	7	-	-

- Connector for RS-232C

corresponding pins :

① - ②
② - ③
③ - ⑤

3. Operation of Transceiver

1) Power on/off

- Push and release [**ON/OFF**] button to turn on transceiver.
  ○ Then display memorized frequency, channel and operating mode to screen(Fig.6).
  ○ Character "Rx" appears in upper-right of screen.
  ○ Now transceiver is in clear mode as first status.
- To turn off, Push and hold [**ON/OFF**] button while one second.

Fig. 6. Display

Fig. 7. Channel Setting

2) Setting of Various Values

- Setting of channel
This product have 100 channels.
Channel setting is as follows:

○ Push [**CHANNEL**] button when clear mode.

Then cursor blinks at position of channel

number on screen(Fig.7).

  ○ Push [∧] button or [∨] button to up/down channel number.

  ○ Push [*ESC*] button to set channel.

- frequency fine tuning and setting(Fig.8)

  ○ frequency fine tuning

    · Push [**FREQ**] button in main mode. Then cursor blinks at position of 10Hz unit.

    · Push [∧] button or [∨] button to up/down frequency.

    · Push [*ESC*] button to return to main mode.

  ○ frequency setting

    · First push [**FREQ**] button twice in main mode.

    · Use number keys to set frequency you want.

    · Push [⇐] button to keep the selected frequency.

    · Push [*ESC*] button to return to main mode.

- Setting of operating mode

  ○ Push [**SET**/*MODE*] button in main mode. Then cursor blinks at position of operating mode.

There are USB,LSB,FM, CW and AM modes.

  ○ Push [∧] button or [∨] button to select mode you want.

  ○ Push [*ESC*] button to return to main mode.

- Volume control

Push [∧] button or [∨] button to control volume of received signal.

- Setting of communication mode (M-MODE)

  ○ In main mode, push [**SET**] button twice and push [<]([>]) button until "M-MODE" appears.

  ○ Push [∧] button or [∨] button to select "MANUAL" or "AUTO" mode.

    If "AUTO" mode is set, RI-8010's transmitting channel can be changed between CH01~CH09

    automatically.

  ○ Push [*ESC*] button to return to main mode.

- Setting of power(POW)

  ○ In main mode, push [**SET**] button twice and push [<]([>]) button until "POWER" appears. Then

power setting menu is displayed.

  ○ Push [∧] button or [∨] button to change power by step 1W.

  ○ Push [*ESC*] button to return to main mode.

- Setting of hopping mode(HOP)

○ In main mode, push [**SET**] button twice and push [<]([>]) button until "HOP" appears. Then

hopping setting menu is displayed.

  ○ Push [∧] button or [∨] button to select "RANDOM", "ADAPTIVE" or "INTELLIG" mode.

  ○ Push [*ESC*] button to return to main mode.

- Setting of network number(NET)

  ○ In main mode, push [**SET**] button twice and push [<]([>]) button until "NET" appears.

  ○ Push [∧] button or [∨] button to select net number.

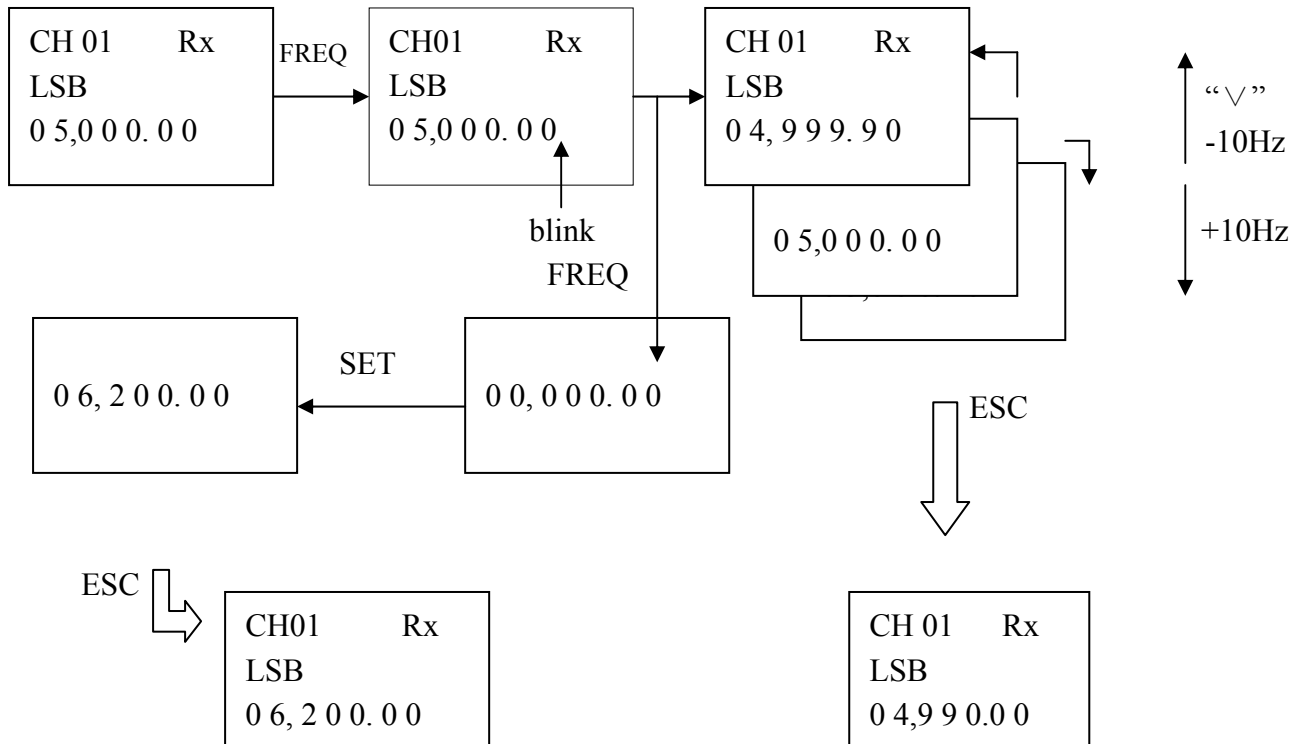 ○ Push [*ESC*] button to return to main mode.

Fig.8 Setting of frequency

- Setting of address(ADR)
  ○ In main mode, push [**SET**] button twice and push [<]([>]) button until "ADR" appears.
  ○ Push [∧] button or [∨] button to select address number.
  ○ Push [*ESC*] button to return to clear mode.
- Setting of Random
  ○ In main mode, push [**SET**] button twice and push [<]([>]) button until "RANDOM" appears.
  ○ Push number button to select random number. If want to stop random number change, please push [*ESC*] button. Then original random number will be return.
  ○ After input random number, push [⟸] button to keep the random number.
  ○ Push [*ESC*] button to return to clear mode.
- Frequency tuning
You can use frequency tuning function to maximize transmitting power.
When you are in clear mode, Push [**TUNE**] button, then the transmitter is tuned automatically to the frequency.

4. Communication

There are Public Voice(Clear Mode), Private Voice(Encrypt Mode), Send Message, Frequency Hopping, Network and Data communication.

Note: Before communication, you must confirm that your address(ADR) have been set and key agreement have been taken with opposite, excepting Public Voice mode. Refer to *Setting address(ADR)* in *3.2) Setting of Various Values* and *4.6) Key Agreement.*

1) Public Voice Communication(Clear Mode)

When status setting is finished, you can make public voice communication.
Push PTT button of Handset(HS-2) to transmit. Then "Tx" appears on screen. Release PTT button to return to receive. Then "Rx" appears on screen.
If you want to change working frequency, use fine tune or frequency setting function to change it.

2) Private Voice Communication(Encrypt Mode)

  ○ Push button [**VOICE/DATA**] in clear mode to have private voice communication of 1200bps.
  ○ Double click button [**VOICE/DATA**] in clear mode to have private voice communication of 600bps.
Then "Speech" is displayed on screen.
You can take private voice communication.
If you want to escape to clear mode, push [*ESC*] button once more.

3) Message Communication

You can take message sending in private mode.
  ○ Push [⬅] button to edit messages. Then cursor appears on upper-left of screen.
You can edit message using editor.
  ○ Editing finished, push [*SEND*] button to send message.
Then "ID*number*" and "Message Tx"appears on upper side of screen. *number* is current ID(1~8 or N).
If no response from other side, "Resp no" appears on screen and transmitting and receiving repeat until there would be response.
In receiving response, "Message Rx" appears on screen.
If message receiving is ok, the message appears on screen of each other.
To return to message receiving mode, push [*ESC*] button.
To escape to clear mode in message receiving mode, push [*ESC*] button.
  ○ Editing finished, double-click [*SEND*] button to send message in spread spectrum mode.
Then "Spread Tx" appears on upper side of screen.
  Note: For receiving of spread spectrum mode, User must push button [*] to display FUNC menu, and push button [8](PSK Rx) to enter to spread receiving mode.

In receiving response, "Spread Rx" appears on screen.
If message receiving is ok, the message appears on screen of each other.

4) Frequency Hopping

There are random(RANDOM), adaptive(ADAPTIVE) and intelligent(INTELLIG) modes.
You can select a mode wanted of them. Refer to *Setting of the hopping mode(HOP)* in *3.2) Setting of Various Values.*

○ When you are in clear mode, push [**HOP**] button to move frequency hopping mode.
Then "HopReady Tx" appears on screen.
Send side and receive side repeat transmit and receive until synchronization is ok.
Received, "HopReady Rx" appears on screen.
○ If synchronization between receive side and transmit side is ok, "HOP" appears upper of screen and move clear mode.
○ To make private voice communication or send message, repeat section 2) or 3).
○ Push [*ESC*] button to escape to clear mode in private voice communication.
If you push [*ESC*] button in message edit mode, You will be in message receive mode.
Then you can push [*ESC*] button to escape to clear mode.
○ In clear mode Push [**HOP**] button to stop hopping.

5) Network Communication

Network Communication is a way communicating between only members in a group.
A group is a set of members who have same net number and same random number.
You must know net number and random number of the group to become a member of the group. Saying, Network Communication(Group Communication) is a mode communicating between members who has the same net number(NET) and random number(RANDOM) each other.

To process net communication:
○ Sets random number(RANDOM). Refer to *3.2) Setting of Various Values.*
○ Sets net number(NET).
○ Sets current ID to "N".
○ Process a communication.

6) AutoScan Function

In AutoScan Mode the transceiver scans automatically from Channel 00 to Channel 99. This means that when the caller and the called differ in Channel, the called side's Channel will be set to the caller side's one automatically. AutoScan Function requires that the caller and the called should be the same frequency and mode from Channel 00 to 99.

To process AutoScan mode:
- ○ In Clear mode Push button [*] to enter Function Setting mode.
- ○ Push button [4]. Then "AutoScan" will be appeared in display.
 When signal received, the transceiver will stop scanning and response to the calling. The mode will be set automatically to the calling mode(message or voice).
- ○ Push button [ESC] to escape.

7) AutoCall Function

In AutoCall Mode the transceiver transmits automatically from Channel 00 to Channel 99. This means that when the caller and the called differ in Channel, the caller side's Channel will be set to the called side's one automatically. AutoCall Function requires that the caller and the called should be the same frequency and mode from Channel 00 to 99.

To process AutoCall mode:
- ○ In Clear mode Push button [*] to enter Function Setting mode.
- ○ Push button [5]. Then "AutoCall" will be appeared in display.
 When response signal received, the transceiver will stop transmitting and move to Clear mode. Then "Ok" will be appeared in display.

8) ALE Call Function

In ALE Call mode the transceiver selects automatically frequency in ALE List and transmits. ALE Call Function requires that the caller and the called maybe not the same frequency and mode from Channel 00 to 99.

To process ALE Call mode:
- ○ In Clear mode Push button [*] to enter Function Setting mode.
- ○ Push button [6]. Then "ALE Call" will be appeared in display.
 When response signal received, the transceiver will stop transmitting and move to Clear mode. Then "Ok" will be appeared in display.

9) Key Agreement

Transmission Encryption Key(TEK) can be agreed any time and the key is stored with current ID.

a) How to exchange TEK
Assume *A* and *B* are going to have key agreement.
- Push button [*] to display FUNC menu.
- *B* push button [**1**] to wait for *A*'s call. Then "ID*number*" and "Pub Key" appears on upper side of screen. *number* is current ID(1~8).

- A starts key agreement by pressing button [**2**]. Then "ID*number*" and "Pub Key" appears on upper side of screen. *number* is current ID(1~8).
- OK is appeared on the display of ***B*** and also ***A***. Then the key agreement is finished successfully.
- The new TEK is stored with current ID. You may see what current ID is.
b) How to set current ID
Transmission Encryption Keys of 8 can be stored with IDs of 8.
In clear mode to press button [*] and then button [**3**] will be show current ID to you.
To change current ID, press button [∧] or [∨] till ID that you want is seen.
c) Buttons for Key Management
Button [*] – displays FUNC menu to operate Key Management.
Button [**1**] – waits for call for key agreement.
Button [**2**] – starts key agreement.
Button [**3**] – views or sets current ID.
Note:
    * During key exchanging, you must not touch any key.
    If Key Agreement is not finished successfully, you must re-take the procedure.
    * Because ID N is for network communication, you should not set current ID to N in key agreement.

10) Data Communication by Computer

It follows to communicate data by computer:
    ○ Connects between the device and RS-232C port of computer by the provided RS-232C cable(CA-2).
    ○ Powers on the device.
    ○ Push button [*] to display FUNC menu.
    ○ Push button [∨] to select data communication mode.
    ○ Push button [9]. Then "PC comm" appears in display.
    ○ Starts up program SHIELD installed in computer and makes communication you want by the program.(Refer to SHIELD You 's Manual.)
While data communicating, "Rx" appears in display during receiving and "Tx" appears during transmitting. If no response, "Resp No" appears.

5. How to Use Editor Button

In the state of message edit, You can edit with English/Symbols and Number.

1) English and Symbol entry mode

- Push [*BS*] button to switch to the English/Symbol entry mode from clear mode.
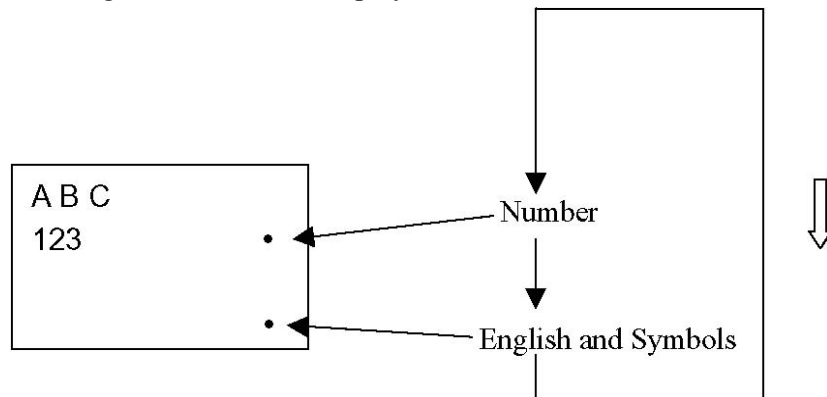Then dot appears at the right bottom in the display.

Fig.9. Entry Mode switch

- Push corresponding button continuously until the letter you wanted appears.

To entry the letters in the same button, wait 0.5 sec until cursor moves the next position

after the first letter appears and repeat previous operation for second, third, fourth letters.

For example, to entry "AB", wait 0.5 sec after "A" appears with pushing " ABC" button and cursor

moves next position, then push [ABC] button to entry " B".

(*) All English letters are fixed within 0.5 sec after appeared or with pushing other

buttons before less than 0.5 sec.

- Push [*] button to switch between large letter and small one.

- Push [#] button to make the space.

- 15 symbols are arranged in the [1] button, push continuously this until appears the symbol you wanted.

Symbol is fixed within 0.5 sec. Symbols arranged in "1" button are shown below. ! " # $ % & ' ( ) * + , -. /

- Symbols are also arranged in the English letter button with English letters.

When edit symbols, push corresponding button continuously until symbol you wanted appears. Selected symbol is fixed within 0.5sec.

2) Number entry mode

- Push [*MODE*] button momentarily to switch to the number entry mode from English/Symbols mode. Then dot appears at the right center in the display.

- Push corresponding number button to entry the number you wanted.

- To process the space function, push [#] button .

6. Specifications

General

Frequency range	1.6~60MHz
Preset channel numbers	100
Operating modes	USB, LSB, CW, AM, FM
	Simplex/Half-duplex
	Frequency Hopping(ECCM)
	ALE, Encrypted voice
	Channel scanning
	Data/Message
Frequency stability	±0.5ppm
Channel spacing	100Hz
Antenna tuning	automatic(internal)
Silent tuning	45
Tuning time	1~2.5s
Supply voltage	DC 9~14V

Supply current

Receive standyby	0.3A(at 9.6V)
max.audio	0.45A(at 9.6V)
Transmit max	3.0A(at 13.8V)
Antenna connector	50 Ω
Handset connector	FQ14-7Z

Size and weight

No battery	208 x 84 x 310mm,3.5Kg
With battery	208 x 84 x 310mm,5.1Kg

Receiver

Sensitivity

SSB/CW	0.16 uV (at 10dB S/N)
AM	2 uV (10dB S/N)
FM	0.25uV (12dB SINAD)
Selectivity	more than 2.1KHz/-6dB
	More than 4.5KHz/-60dB
Image rejection	more than 70dB
Phone	600 Ω(1000Hz)

Transmitter

Power output

SSB, CW, FM	0.1 ~ 10W
AM	0.1 ~ 4W

Modulation

SSB	balanced
AM	low level
FM	variable reactance
Carrier suppression	more than 40 dB
Unwanted sideband	more than 50 dB
Audio response	200 ~4000Hz
Microphone	150Ω(1000Hz)

Data and Digital Voice Encryption

Real-time encryption	AES (Rijndael OFB)
Key length	256 bit
Key agreement	Elliptic Curve 320 bit
TEK storage	8
Voice bit rate	2400/1200/600 bps
Modem	Coded PSK(serial tone), MSK
Data mode	simplex: FEC2, Half-duplex: FEC2-ARQ
Data rate	75 ~ 2400bps

Frequency Hopping

Hop rate	10, 20 hop/s
Hop range	0.3~3MHz
Sync. time	Max. 15s
Sync channels	8

Environmental

Operating temperature	-40°C ~ +60°C
Storage temperature	-40°C ~ +80°C
Environmental rating	immersion, shock, temperature

Specifications are subject to change without prior notice