Backpack Tactical Multi-Function

Radio Station

TBR-119

User manual 1.0

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Catelogue

Generation

PMR-119 is a multi-purpose vehicle/backpack tactical multi-function radio station with all the functions of traditional tactical backpack radio station. Mode support: SSB, CW, AM, FM, DMR. The radio station is equipped with fully automatic Antenna tuner and can use various tactical and static antennas. The protection capability reaches IP67 and military aviation plug is adopted. The system includes a backpack station, a vehicle-mounted dock and a base station dock. When working in a vehicle-mounted or base station mode, the output RF power is short wave 20W or 100W (100W power amplifier is optional) PEP and UV20W. It can also be used as a relay.

Based on the new generation SDR software radio technology platform, it can meet the needs of most users and provide digital upgrade options for military and security users: digital voice, digital encryption, frequency hopping and other high-end functions. Meanwhile, 4G module, Bluetooth module, GPS positioning module, electronic compass module and barometer (altitude meter) module are built in. Can be optional satellite communication modules: iridium module, maritime satellite module.

Application

emergency communication

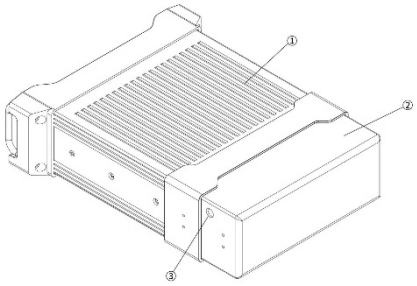
Remote spectrum monitoring sensing

Radio direction finding

Amateur radio

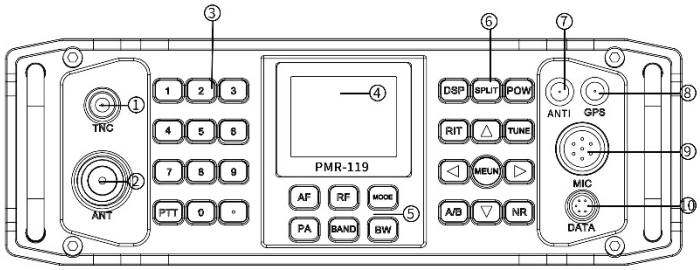
Panel control and operation

Radio Station View



①Radio Station. ② Battery. ③Charging interface.

Front panel



①80～520MHz Antenna interface.
②1～80MHz Antenna interface.
③keyboard.
④ LCD.
⑤keyboard.
⑥keyboard.
⑦Reserved interface.
⑧GPS Antenna.
⑨Hand microphone interface.
⑩USB interface

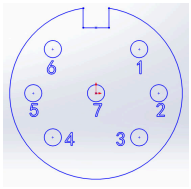
Note: in 80 ~ 520 MHZ antenna 1, DMR and DFM mode for sending and receiving antenna interface.Frequency in 80 ~ 520 MHZ model for SSB, the CW, AM, WFM, (NFM), RTTY interface for TX.Antenna interface 2 in 100 KHZ ~ 80 MHZ frequency, mode for SSB, the CW, AM, WFM, (NFM), RTTY for incoming and outgoing interfaces.Antenna receiving frequency range of 2 to 100 KHZ to 2000 MHZ.For radio inside two rf amplifier, share the different frequency band signal amplification.So in 80 ~ 520 MHZ SSB, the CW, AM, WFM, (NFM), RTTY modulation mode, the antenna interface 1 as launch interface, 2 as receiving antenna interface interface, need to pick up two antennas at the same time.

Rear panel

①Battery interface

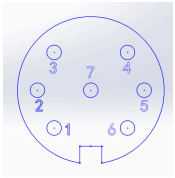
Interface definitions

MIC interface definitions



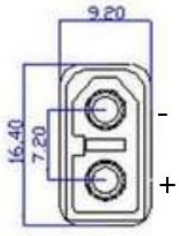
1：GND。
2：MIC。
3：PTT。
4：AT OUT。
5:+5V OUT。
6：RS232_TX。
7：RS232_RX。

USB interface definitions

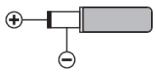


1：GND。
2：FS_DM。
3：FS_DP。
4：HS_DP。
5: HS_DM。
6：+5V OUT。
7：+5V IN。

Battery interface



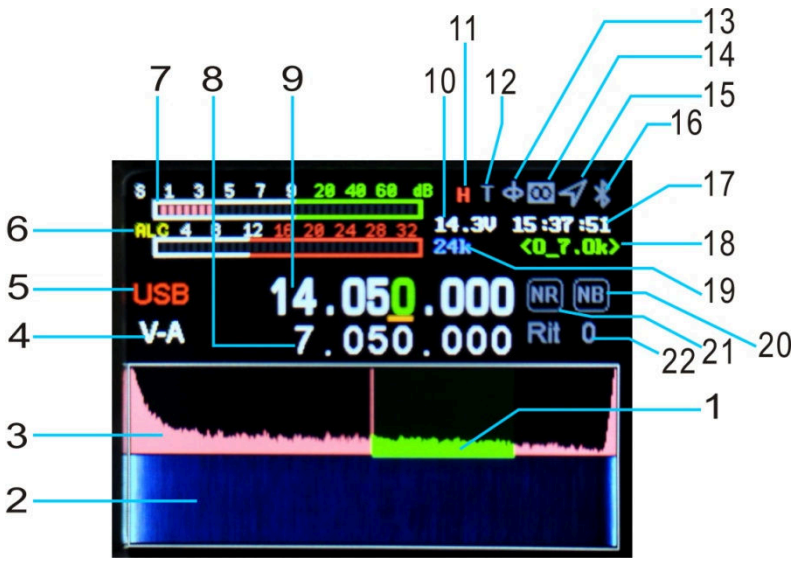
Charging interface



Key function

Key	Short press	Long press
Power supply	Switching VSWR, ALC, MIC audio indication	Power on / off
BAND	Band selection	CW settings
SPLIT	Different frequency on, different frequency off	Sub tone settings
AF	Volume, MIC gain, MIC audio widening, bass, treble	Frequency mode and channel mode switching
RF	RF gain, IF gain, AGC, SQL, ATT	USB data output format selection
R/X	RIT receiving frequency offset, xit transmitting frequency offset	Transceiver frequency offset switch
MODE	Mode setting	USB / LSB, NFM / WFM, CWR / CWL switching
TUNE	Turn on / off AH	Tuning start / stop
A/B	A frequency or B frequency	A = B frequency
NR	NB or NR selection	Show only spectrum, show only waterfall chart, show spectrum and waterfall chart at the same time, and turn off spectrum
DSP	NR, NB, PEAK threshold setting	Close NR or NB
PA	Power adjustment	High and low power switching L / h
BW	Digital filter selection	Spectrum bandwidth setting, spectrum reference level setting and spectrum refresh rate setting
.	*	5W turn on CW long tone transmission for debugging antenna standing wave
Direction key left	Left selection or impairment operation	*
Direction key right	Right selection or addition operation	*
Direction key up	Upper selection	Fast frequency addition
Direction key down	Next selection	Fast frequency reduction
MENU	Confirm	Application interface, return

SDR main screen

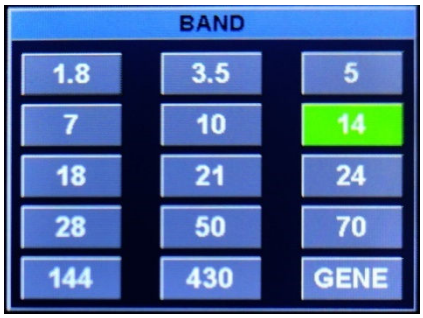


1. Digital filter
2. Waterfall diagram
3. Spectrum
4.Section A / B indication
5. Mode display
6. SWR, AUD, ALC instrument
7. S meter (transmission time to power meter)
8. Different frequency transmission frequency
9.Main frequency display (different frequency reception frequency)
10.Voltage display
11. The high power of the radio station is H, the low power is L
12. AH enable display
13. Electronic compass
14. LORA display
15. GPS display
16. Bluetooth display
17. Time indication
18.Digital filter bandwidth
19.Spectrum bandwidth
20&21. NR,NB indication
22.RIT/XIT frequency offset

Radio operation

Band selection operation

Short press the band key to pop up the frequency band selection interface, press the direction key to select the frequency band, and press the menu key to confirm.



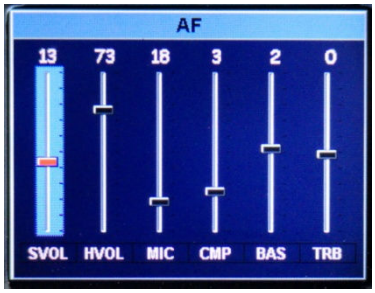
Different frequency operation

Short press [SPLI] to display the different frequency, then press to close the different frequency, press the left and right direction keys to select the frequency bit, and press the up and down direction keys to add and subtract the frequency. The upper row is the receiving frequency and the lower row is the transmitting frequency. Press the [A / B] key for switching.

AF audio frequency setting

Short press the [AF] key to enter the AF interface, select the setting item with the left and right direction keys, and press the up and down keys to set the value.

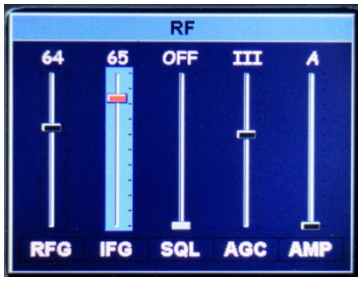
SVOL：volume.
HVOL：panel headphone volume.
MIC：MIC gain.
CMP：MIC companding ratio.
BAS：bass.
TRB：treble.



Note: when you **receive the display is receiving time of bass and treble, TX time shows the time of bass and treble The setting of the bass and treble will affect the sound quality TX time.**

RF setting

Short press the [RF] key to enter the RF parameter setting interface. Select the setting item with the left and right direction keys, and press the up and down keys to set the value.



RFG： RF gain.
IFG： IF gain.
AGC: automatic gain adjustment speed (0:OFF AGC).
SQL: squelch level (FM mode).
AMP： front LNA amplification (A:OFF LNA B:ON LNA).

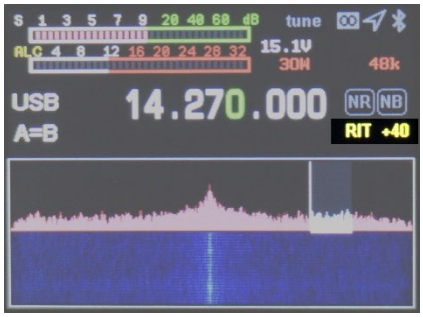
USB sound card data output format setting

Long press the [RF] key to enter the USB sound card data output format selection interface, and press the up and down keys to select the output mode. Press and hold again to exit.

USB： selected in digital modes such as FT8/HRD/N1MM/LOG32/RTTY
SDR： selected when using CNSDR software

Transceiver frequency offset setting

Long press [R / X] to open the transceiver frequency offset setting interface, and then long press to exit. Short press to select the received frequency offset RIT, Short press again to set the transmission frequency offset XIT. Set the frequency offset with the left and right direction keys. Frequency offset frequency = key display value * 20Hz.



0Transceiver mode setting

Short press the [MODE] key to select the mode

Short press the [mode] key to select the mode.
In FM mode: press and hold to select NFM / WFM.
In SSB mode: press and hold to select USB / LSB.
In CW mode: press and hold to select CWL / CWR
Short press to cycle AM, FM, USB (LSB), CW, RTTY and DMR successively

Antenna tuner operation

1. Short press the [power] key to switch to SWR standing wave instrument.

2. Long press the [TUNE] key, TBR-119 will automatically enter the tuning mode, and the machine will make a short click sound. The T word on the screen interface turns green. If you want to exit the tuning state halfway, long press [TUNE] again, the tuning failure T word is gray, and the success is green. In the green state, short press [TUNE] to turn off the sky tune.

3. Long press [.] TBR-119 to directly enter 5W CW long tone transmission. With the local standing wave, you can directly observe the antenna standing wave SWR value to facilitate the adjustment of your antenna feeder system. Short press [.] again to exit.

A/B frequency operation

Short press the [A / B] key to switch A / B frequency, long press A frequency = B frequency.

NR/NB noise suppression setting

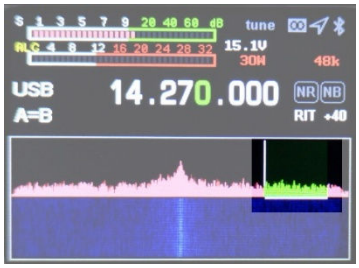
Short press the [NR] key to start, and short press to switch NR / Nb. Generally, NR is used.
Short press the [BW] key to turn on the digital filter (green display), adjust the left and right direction keys and turn down the bandwidth to 4.8k. At this time, NR works. Press and hold the [DSP] key to close NR / NB.

Spectrum and waterfall display setting

Long press the [NR] key to select switching display → waterfall diagram → spectrum diagram → waterfall diagram and spectrum diagram are displayed at the same time → waterfall diagram and spectrum diagram are closed.

Spectrum parameter display setting

Long press the [BW] key to set the spectrum bandwidth, reference level and refresh rate; The direction up and down keys can select the setting item, and the direction left and right keys can set the value.
SPAN: spectrum bandwidth.
REF: spectrum reference level.
SPEED: spectrum ref resh rate.

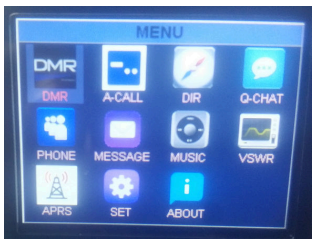


Digital filter operation

Short press the [BW] key to select the digital filter (as shown in the figure below, green is selected), and press the left and right keys to select the filter bandwidth; Short press the [BW] key to exit the filter bandwidth adjustment (at this time, the green part becomes white).

Application menu operation

Long press the [MENU] key to enter the menu interface, long press the [MENU] key to exit the menu interface, press the left, right, up and down keys to select application, and short press the [MENU] key to select application.



1. DMR setting.

Used to set the DMR baseband parameters must be set in the main screen for DMR mode can be set DMR parameters.Key selected items, the or so key Settings.Or short call digital keyboard input value according to the MENU.

CALL_TYPE:group,single,all.

SLOT:SLOT 1，SLOT 2.

TX_CC:call color code.

RX_CC：RX color code.

CALL_ID：CALL_ID.

OMN_ID: OMN_ID.

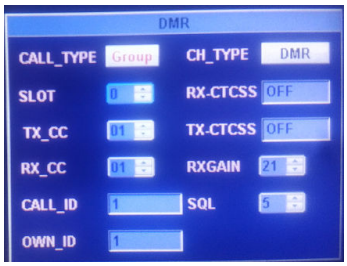
CH_TYPE：Channel type, optional DMR digital voice communication and DFM analog voice communications, DFM FM communication for simulation, compatible with the traditional analog interphone, when using analog FM voice communications suggest using DFM mode.

RX_CTCSS: RX_CTCSS.

TX_CTCSS: TX_CTCSS.

RX_GANI: RX_GANI.

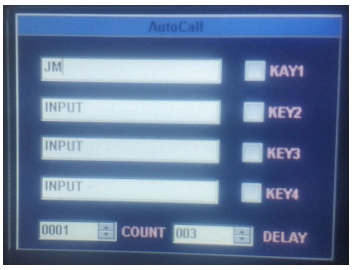
SQL：SQL.



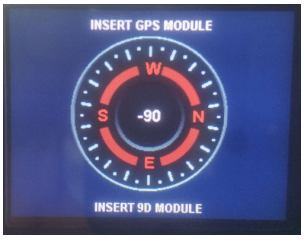
2. A-CALL automatic call setting.

The content of automatic call setting is used for CW automatic call and RTTY automatic call at the same time.

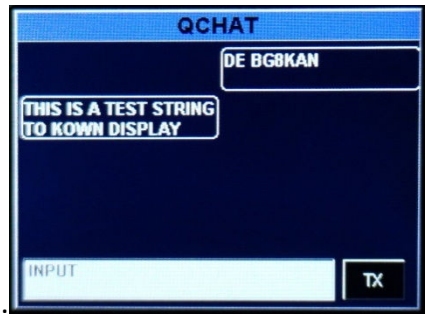
2.1. KEY1 ~ KEY: automatic call content, select the input item with up and down keys, and short press [MENU] to select. Please use the radio numeric keypad or USB keyboard for input. Refer to Appendix 1 for input method.
2.2. COUNT the number of consecutive calls, select the input item with the up and down keys, and adjust the number with the left and right keys.
2.3. DELAY automatic call interval, in seconds. Press the up and down keys to select the input item, and press the left and right keys to adjust the interval time.



3. GPS and electronic compass operation DIR .
Enter the menu to directly display the UTC time, longitude and latitude, speed, direction, altitude, etc. received by the GPS module.



4. Q-CHAT(RTTY)
After receiving the short message, display it directly, press the keyboard to enter the information, and click TX to transmit the information



5. Telephone function * PHONE (temporarily unavailable)

6. SMS * MESSAGE (temporarily unavailable)

7. Music player * MUSIC.

Mobile search station, Bluetooth connection and play audio with mobile music player.

8. VSWR standing wave scanning (long press MENU to exit)

8.1. Select BABD Marker START with the left and right direction keys, and short press the MENU key for confirmation.

8.2. BAND select scan band.

8.3. After selecting Marker, press the left and right direction keys to view the frequency standing wave value of the band.

8.4.START start scanning antenna standing wave

Note:SWR scanning function only supports 2 antenna interface.

9. APRs (unavailable)

10. Set * SET

10-0 KEY-LED keyboard backlight on / off

10-1 OUT-BAND-EN OFF lock band pool data

10-2 TX-EN transmitting switch (it needs to be on to transmit after the new machine is activated)

10-3 KEY-VOLUME keyboard key volume

10-4 BACKLIGHT LCD brightness

10-5 LED_ BRIGHNESS adjustment of transceiver indicator light

10-6 HOUR time setting: hour

10-7 MINUTE time setting: minute

10-8 SECOND time setting: second

10-9 FAN-EN-TEMP fan temperature control

10-10 FAN-AUTO automatic temperature control

10-11 VSWR-THRESHOLD standing wave protection threshold off does not limit the size of standing wave

10-12 VSWR-TUNER AH standing wave cut-off threshold, which means that the AH stops adjusting SWR to less than this number

10-13 TOT-TIMER limited launch time

10-14 AUTO-SLEEP backlight turns off automatically

10-15 VOX_ EN USB port data voice control on / off

10-16 VOX_ Threshold value of voice control for threshold USB port data

10-17 EX_ SQL full mode squelch on / off

10-18 DBM_ EN signal DBM display on / off

10-19 FW-VERSION version number

11.ABOUT

11-1 CALLING calling input (displayed on the start screen)

Calling input operation method: refer to Appendix 1 input method.

11-2 MODEL machine model

11-3 SN machine serial number

11-4 HW hardware version number

11-5 SW software version number

Receive advanced operation

TBR-119 power on status is the receiving status. In order to get a better listening experience, you need to follow me to understand the advanced operation of the machine.
1. Select the desired frequency mode, for example: 14.270MHz \ USB.

2. Short press [AF] key to call up Vol volume adjustment; Press the up and down direction keys to adjust the volume, adjust the appropriate volume, and short press the [AF] key again to save and exit.

3. Short press the [RF] key to call up the RF parameter setting interface. Select the setting item with the left and right direction keys, press the up and down keys to set the value, and then short press the [RF] key again to save and exit.

3-1. RFG: RF gain.

3-2. IFG: if gain.
Through the combination of RFG and IFG, the receiver achieves the highest sensitivity and the lowest noise volume; Usually, if you want to hear a very weak signal, you need to raise these two parameters, but the noise also increases; Achieving a balanced state requires careful adjustment. Usually, the IF gain can be higher than the RF gain.

3-3. Amp front stage power amplifier, divided into A / B section

3-4. MIC gain. If this gain is turned on too high, it will greatly increase the pickup sensitivity and cause mic overload. It shows that when the radio station presses the hand microphone, the transmission power comes out and there is noise. Therefore, it is just right to press hand microphone and the radio station will come out without power in SSB.

4. Long press the [BW] key to set the spectrum bandwidth, reference level and refresh rate; Press the up and down keys to select the setting item, press the left and right keys to set the value, and long press the [BW] key again to exit. Other signals within the bandwidth can be seen through the spectrum display.

4-1. Span: spectrum bandwidth, 1.5k, 3k, 6K, 12K, 24K and 48K respectively
4-2. Ref: spectrum reference level.
4-3. Speed: spectrum refresh rate.

5. Spectrum and waterfall display settings
Long press the NR key to select the display of waterfall diagram, long press to select the display of spectrum diagram, and long press the tile diagram and waterfall diagram to display at the same time.

6. Digital filter operation, TBR-119 provides powerful digital filters.
Short press BW key to select digital filter. After selecting to turn on digital filter, the original white horizontal line on the spectrum is displayed in green; Press the left and right buttons to select the filter bandwidth, and then short press the BW button again to determine the filter bandwidth and exit.

Different band widths can effectively avoid interference signals to achieve excellent listening effect.

7. NR / NB noise suppression setting, usually this option should be combined with digital filter to achieve excellent results.

7-1. Short press the [NR] key to start, and short press to switch NR / NB. Press and hold [DSP] key to close NR / Nb. Short press [DSP] to set NR / NB / peak threshold value, press up and down keys to select NR / NB / peak setting item, press left and right keys to set value, and then short press [DSP] again to exit.

7-2. Find the required signal and turn on NR. generally, the effect of NR is more obvious, and then turn on the digital filter to the maximum bandwidth according to the operation of ⑥; Then slightly reduce the bandwidth of the digital filter. When it is adjusted to 4.8k, you will find that the noise will be greatly suppressed; At this time, the combination of RFG and IFG can also be adjusted to achieve the optimal reception effect.

Through the above settings, you have mastered the advanced receiving settings of TBR-119. Now, let TBR-119 swim in the ocean of radio waves with you.

- **Turn on and turn off TBR-119**

1. To turn on the walkie talkie, just press and hold the power button for one second.

2. To turn off the walkie talkie, just press the power button for one second.
3. TBR-119 has power-off data saving function. For example, if you operate power-off on 7.050MHz LSB, you will directly restore the state before power-off without going through the power switch after power-on again. This function is helpful to select remote control operation.

- **Band selection**

1. The frequency range of TBR-119 is very wide. Short press [BAND] to call up the frequency band menu

2. Short press the direction key to select, and short press [MENU] to confirm the frequency band.

- **Frequency selection**

1. Short press the left and right direction keys to select the position of the cursor, short press the up direction key to adjust the required frequency, and long press the up and down direction keys to quickly select the required frequency.

2. Enter the desired frequency directly from the numeric keypad.
For example, if you want to input 14.270MHz, press 014270000 or 14.270000

respectively on the numeric keypad, and then press the menu key [MENU] to confirm.

- **Mode selection**

1. TBR-119 supports FT8, LSB, USB, CW, FM and RTTY in the whole section. Short press the [MODE] key to select, long press the [MODE] key for LSB and USB, and long press the [mode] key for CW and CWR. Long press [MODE] to switch between WFM and NFM.

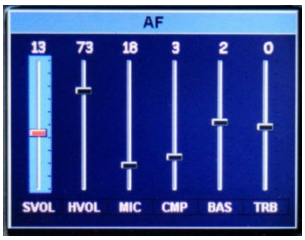
- **Transmission Power output selection**

1. Short press [PA] to enter the transmission power adjustment, and press the up and down direction keys to adjust the value.

2. Long press [PA] to quickly select 5W and 20W sections, and the power of each section can be fine adjusted by up and down direction keys.

- **Receive volume, MIC gain**

1. Short press the [AF] key to enter the AF interface, select the setting item with the left and right direction keys, and press the up and down keys to set the value.



SVOL: volume； HVOL： Front headphone volume

MIC： MIC gain

CMP:MIC companding ratio

BAS: bass

TRB： treble

- Hand microphone

1. When a wired hand microphone is selected, it is directly inserted into the mic port of the front panel.

2. When the wired hand microphone is connected to the radio station, the mic gain cannot be adjusted too much; Under SSB, if the wired hand microphone PTT is pressed, if the radio power meter has an output, the hand microphone gain is too large. It needs to be reduced to no power output when the hand microphone is pressed under quiet conditions.

Simple setup is complete, and you can now communicate happily. Generally, LSB mode is used below 7Mh, USB mode is used above 14mhz, and FM mode is used above 28MHz.

DIGI MODE communication

1. Press [MODE] key, select FT8 mode, connect the computer with USB cable, open FT8 software, select CAT protocol device as FT-817, audio device as TBR-119, and other parameters are default.

SSB communication

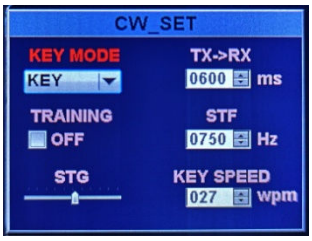
1. Press the [mode] key to select one of the SSB (LSB or USB) modes. If you are operating in 7MHz or below frequency band, please select LSB mode. If you are operating in the frequency band of 14MHz or above, please select USB mode.

2. Short press the [power] key to switch the display of ALC, SWR and AUD instruments on the screen.

3. Press the PTT button on the microphone to speak to the microphone with normal voice, and observe the display of ALC instrument at the same time. When the microphone inputs the actual voice level, the corresponding amplitude will be displayed on the ALC table. Release the PPT key to return to receiving mode.

4. If the ALC table displays too high or too low, you can reset the gain value of the microphone as follows: long press the [AF] key for one second to enter the selection mode, select the MIC item in the left and right directions, press the up direction key to set the value, and long press the [AF] key again to exit. Speak to the microphone until the ALC indicates when your voice peaks

CW communication



When using hand keys, automatic keys, semi-automatic keys, external electronic keying unit or computer-generated keyboard equipment, please operate as follows:

1. Insert your 3.5mm (three-phase or two-phase) plug into the key jack on the rear panel.

2. Short press [MODE] to select a CW mode (CW or CWR); "CW" mode uses the carrier input on the USB side, while CWR (reverse) mode uses the input on the LSB side.

3. Long press [BAND] key to enter CW setting. The up and down direction keys on the keyboard select options, and the left and right direction keys adjust the settings in the options.

3-1. KEY MODE selection contents of left and right direction keys : manual key and automatic key

3-2. KEY SPEED automatic key code rate. The larger the value, the faster the speed

3-3. TX-RX CW transmit and receive conversion time. The greater the value, the greater the delay.

3-4. STF CW sidetone audio.

3-5. STG CW sidetone volume.

3-6. TRAINING practice mode, launch is not enabled.

3-7. DECODE CW, RTTY decoding display switch.

3-7. THRESHOLD CW decoding threshold.

4. CW automatic call, long press the [MENU] key to enter the menu, select a-call with the direction key, short press the [MENU] key to select A-CALL, and use the numeric keypad or USB keyboard to input the automatic call content. Press and hold the [MENU] key continuously to exit the main interface, set the key mode to the manual KEY mode, and press and hold the corresponding 5 items of input on the numeric keypad 1 ~ 5.

FM communication

TBR-119 supports full segment FM mode transmission and reception, and is usually used for FM communication above 28MHz in short wave communication; 29.6HMz is called the magic band by the HAM community. It will be opened for a short time in the summer of a year. It is a very challenging communication.

1. Short press the [MODE] key to find the FM mode, and long press the [mode] key to switch between WFM mode and NFM mode.

2. TBR-119 includes UV segment FM. You can communicate with ordinary walkie talkie or go to local relay station.

3. Short press the [RF] key, press the left and right direction keys to select SQL and mute options, and press the up and down direction keys to set the mute level.

Relay operation

1. Set the required frequency. For example, the relay station parameters (downlink 145.670MHz, uplink 144.130MHz, uplink and downlink analog mute 88.5) are set as follows:

1-1. Press SPLI to display different frequencies, and then press turn off different frequencies. The frequency in the upper row is the receiving frequency, that is, the relay downlink; Press the left and right direction keys to select the frequency bit, press the up and down direction keys to add or subtract the frequency, or enter directly from the numeric keypad: 14567000; The frequency in the lower row is displayed as the transmission frequency, that is, the relay uplink frequency; You need to press the A / B key to switch to the upper row, directly enter 14413000 on the keyboard, and then press the A / B key to switch to the lower row.

1-2. Mute setting mode: long press [SPLIT], press the up and down keys to select the setting items, and press the left and right keys to select the parameters.

T-CTSS emit sub tone

R-CTSS receive sub tone

L-Voice preamble frequency

L-Time preamble duration

AM communication

1. Press [MODE] to select AM mode and set the required frequency
2. The input RF power in AM mode is 5W

Data communication RTTY

The "RTTY" working mode of TBR-119 is realized on the basis of LSB carrier according to the long-term use of amateur radio. If you want to use USB carrier for "RTTY" operation, you need to set the user. Please refer to the following introduction.

1. Computer RTTY operation:

1-1. Connect your computer with TBR-119 through USB.

1-2. Long press the RF key to enter the USB sound card data output format selection interface, and press the up and down keys to select the output mode. Press and hold again to exit.

1-3. Short press [mode] to select RTTY mode.

Select [USB] digital mode.

1-4. At this time, you can search on the frequency. If there is RTTY signal, the relevant computer software can decode it.

2. Radio independent RTTY communication:

2-1. Short press [MODE] to select RTTY mode.

2-2. Long press the [BAND] key to start the decode display.

2-3. Connect the USB keyboard to the HUSB port, press the tab key on the keyboard to launch, enter characters on the keyboard to launch, and press the tab key to stop launching.

3. RTTY automatic call.

Short press [mode] to select RTTY mode. Long press the [MENU] key to enter the

menu, select a-call with the direction key, short press the [MENU] key to select A-CALL, and use the numeric keypad or USB keyboard to input the automatic call content. Press and hold the [MENU] key continuously to exit the main interface, and press and hold the numeric keypad 1 ~ 5 to input 5 items.

Custom digital mode

TBR-119 cooperates with the mobile APP software HAM-BOX to realize a user-defined digital communication mode, which needs to be set by both sides of the communication.

1. Open the mobile phone Bluetooth, search TBR-119 and connect it.

2. Open the mobile APP software HAM-BOX and set the relevant communication mode (both sides need to be the same). Then use the mobile phone to send text, pictures, coordinates, etc

The software is provided separately with the TBR-119 instructions, which can be accessed under the QQ group.

Channel storage

1. Long press AF to enter channel mode

2. Long press the left and right direction keys to make the number (channel number) next to CH turn red, short press menu to turn green, and press the up and down direction keys to operate the channel mode when the channel number is green.

3. In the channel mode, press the up and down direction keys to save the channel (or the existing channel is overwritten again). At this time, there is the word RENAME. Long press the right direction key, RENAME turns red, and short press MENU to display the channel name input box.

3-1. Input method: at present, it only supports the input of letters and numbers, and the Chinese input is post production.

3-2. Long press the number 1 key to switch the input of uppercase letters, lowercase letters, numbers and symbols, and short press the mode delete key.

3-3. Under the symbol ,.?, press the decimal point on the left keyboard, briefly press once, and continuously press twice. Press continuously for a short time, and the characters are [,.?!:; '"() < > [] {} $% @ * + - = ~]. Remember to press continuously. If you press wrong, click mode to delete the last input.

3-4. In the alphabetic state, the number key 2 is short pressed once as A, short

pressed twice as B, and three times as C, which is the same in lowercase.

2=ABC 3=DEF 4=GHI 5=JKL 6=MNO 7=PQRS 8=TUV 9=WXYZ

3-5. In the digital state, the corresponding numbers are corresponding respectively. After input, press menu to confirm. At this time, adjust the frequency, mode and other corresponding parameters on the interface, and shut down and store them automatically.

4. Enter the next group of channels and repeat the above operation.

CAT control

TBR-119 compatible with CAT protocol:

The TBR-119 has a CAT system, so you can control the walkie talkie with a personal computer. Multiple control operations can be completed automatically by clicking with the mouse. It also supports the control of third-party software packages (such as radio log software for competition), so that TBR-119 can be used for communication without (additional) operators. The CAT protocol is compatible with FT-817, so the ft-817 radio model is selected during CAT control. Usually, the computer only needs to determine the corresponding COM port number, stop bit and baud rate do not need to be set.

CAT control uses a TYPE-C USB cable to connect to the computer, and the serial port driver is only applicable to windows 10 system. The USB cable integrates the sound card function at the same time, and only one USB is needed to realize CAT control and data transmission. Because there are too many kinds of computers, operating systems and application software, Guohe electronics does not develop the control software of the system. However, TBR-119 widely supports various third-party control software packages.

TBR-119 cat protocol:

TBR-119 supports independent self owned protocols. All protocols have open interfaces, can be developed freely, and can provide technical support. See Appendix 2 for the agreement

Instructions for firmware upgrade v1.2

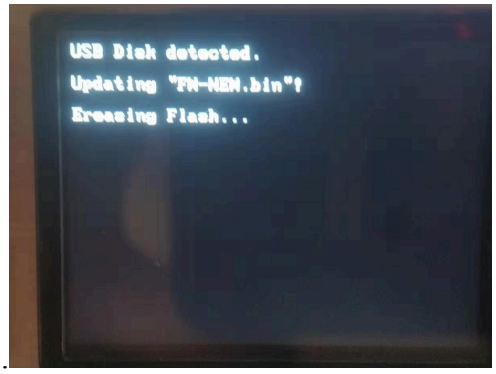
Description:

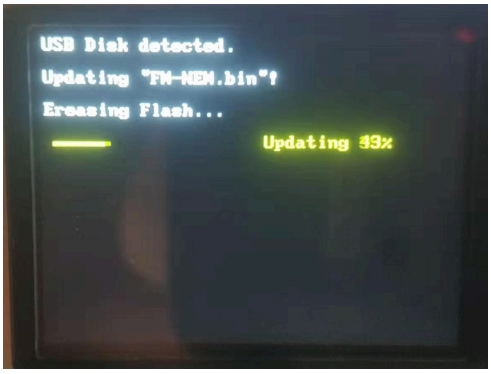
Update the radio station application.

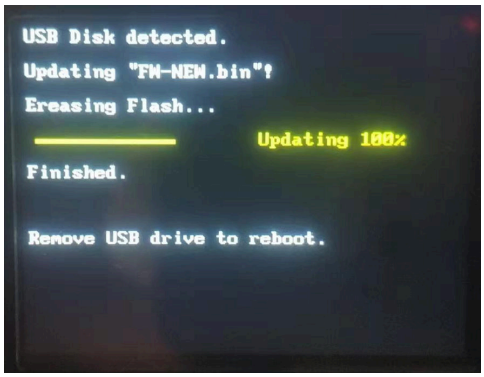
Insert the USB flash disk storing the application fw-new.bin into the husb(Need to tieline) port of the radio station, and briefly press the power key. The bootloader of the radio station will automatically recognize the application of the USB flash disk and update it automatically. The radio screen will prompt the update progress. When updating 100%, remove USB drive to reboot is displayed, the update is completed automatically. Unplug the USB flash disk and long press the power key to start up, and then you can automatically enter the main interface of the radio station. If the update fails, the station screen will prompt error code and failure information. Check whether the USB flash disk capacity or fw-new.bin file name is correct, or copy fw-new.bin to the USB flash disk after replacing the USB flash disk to update the application again.

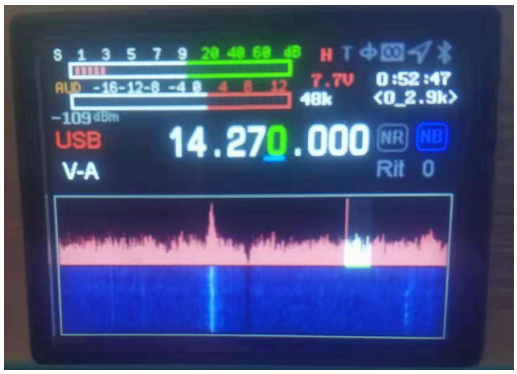
Notes:

1.After the update is completed, the USB flash disk cannot be inserted again, otherwise the application will be updated again









Appendix 1：Input method

1. Radio keyboard input method

Key	Short press	Long press
MODE	Delete key	*
.	Symbol input	*
0	Blank key	*
1	*	Subtitle case, number and symbol switching
2	ABC	
3	DEF	
4	GHI	
5	JKL	
6	MNO	
7	PQRS	
8	TUV	
9	WXYZ	

2. USB keyboard input method

Key	Short press	Key value of corresponding radio station
F1	Power control	PA
F2	Band selection	BAND
F3	Filter bandwidth selection	BW short press
F4	RF parameter setting	RF-RFG
F5	RF parameter setting	RF-IFG
F6	Mode selection	MODE
F7	Spectrum setting	BW long press
F8	Audio parameter setting	AF
F9	Select confirm and return	Menu short press
F10	Select confirm and return	Menu long press
ENTER	Select confirm	Menu short press
TAB	RTTY transceiver control	PTT in RTTY mode
ALT+ F1	Automatic call content 1	Long press the number key 1
ALT+ F2	Automatic call content 2	Long press the number key 2
ALT+ F3	Automatic call content 3	Long press the number key 3
ALT+ F4	Automatic call content 4	Long press the number key 4
ALT+ F5	Automatic call content 5	Long press the number key 5
Direction key up	Add or up selectin	Direction key down
Direction key down	Minus or down selection	Direction key up

Direction key left	Minus or left selection	Direction key left
Direction key right	Add or right selection	Direction key right
Others not listed	Comply with keyboard definition rules	

Appendix 2：TBR-119 control protocol

TBR-119 control protocol V1.5

1. Data communication is transmitted through TBR-119 built-in sound card, and data can be transmitted, read and written through sound card. When the radio station is set to USB mode, it transmits modulation data, and when the radio station is set to SDR mode, it transmits IQ data.

2. The control protocol data can be controlled through Bluetooth SPP, BLE, RS232 and USB interfaces, and the protocol follows the serial port standard.

Note：BLE

V1.0 hardware

Service UUID: 0000FFF0-0000-1000-8000-00805F9B34FB

Write feature：0000FFF2-0000-1000-8000-00805F9B34FB

Notify feature：0000FFF1-0000-1000-8000-00805F9B34FB

V2.0 hardware

UUID list

Service UUID：FFE0

Feature UUID：FFE1 （For serial port transparent transmission, property notify, write）

Feature UUID：FFE2 （For audio Bluetooth or SD card music playback control, property Write）

Protocol format：

0XA5	0XA5	0XA5	0XA5	Packet length	Command type	DATA	CRC HIGH	CRC LOW

Packet head: use four 0XA 5 as packet head respectively.

0XA5	0XA5	0XA5	0XA5

A byte indicates the byte length from the next byte of packet length to the end of the packet.

Command type: see the protocol

DATA: see the agreement.

Verification: CRC verification method is adopted, from packet length to the previous byte of CRC high byte. See Appendix I for the algorithm.

1. PTT command， used to control the PTT of the radio station, press and release.

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	07	PTT	CRC HIGH	CRC LOW

PTT:0X00, press PTT. 0X01， PTT release。

Radio station reply：

0XA5	0XA5	0XA5	0XA5	Packet length	07	PTT	CRC HIGH	CRC LOW

2. Frequency setting command, for setting radio station frequency。

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	09	VFOA frequency	VFOB frequency	CRC HIGH	CRC LOW

Frequency: maximum decimal 2000000000, four byte length.

Radio station reply：

0XA5	0XA5	0XA5	0XA5	Packet length	09	VFOA frequency	VFOB frequency	CRC HIGH	CRC LOW

3. Mode setting command， for setting radio station mode.

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X0A	VFOA mode	VFOB mode	CRC HIGH	CRC LOW

mode:

0：USB
1：LSB
2：CWR
3：CWL
4：AM
5：WFM
6：NFM
7: DIGI
8: PKT

Radio station reply：

0XA5	0XA5	0XA5	0XA5	Packet length	0X0A	mode	CRC HIGH	CRC LOW

4. Spectrum data

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X39	CRC HIGH	CRC LOW

Radio station sending：

0X7e	0X7e	0X7e	0X7e	Spectrum data

V1.0 hardware

Spectrum data: packet length 256 bytes, no packet head, no verification.

V2.0 hardware

Spectrum data: packet length80 bytes, no packet head, no verification.
Spectrum diagram:
The size represents the Y-axis height and the position represents the X-position drawing.
Waterfall diagram:
The size represents the colour (blue + current value), and the position represents the x position drawing.

5. Status synchronization command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X0B		CRC HIGH	CRC LOW

Radio station reply：

0XA5		0XA5	0XA5	0XA5	Packet length	0X0B	Transceiver status	VFOA mode	VFOB mode	VFOA frequency	VFOB frequency	A/B	NR/NB
RXT	XIT	Filter bandwidth	Spectrum band width	Voltage	UTC time		Status bar status	S table / PO table value		SWR/AUD/ALC		CRC HIGH	CRC LOW

Transceiver status: one byte
0: receive status
1: launch status
VFOA mode: one byte
0：USB
1：LSB
2：CWR
3：CWL
4：AM
5：WFM
6：NFM
7： DIGI
8： PKT
VFOB mode: one byte
0：USB
1：LSB
2：CWR
3：CWL
4：AM
5：WFM
6：NFM
7： DIGI

8: PKT
VFOA frequency: the maximum value is decimal 2000000000, four byte length.
VFOB frequency: the maximum value is decimal 2000000000, four byte length.
A/B: one byte
0:A frequency
1：B frequency
NR/NB：
0: NR/NB off
1：NR on
2：NB on
RIT: one byte
0~120
XIT: one byte
0~120
Filter bandwidth: one byte
0 ~ 50 (see attached table for filter corresponding to serial number)
Spectrum bandwidth： one byte
0：48K
1: 24K
2: 12K
3:6K
4:3K
5:1.5K
Voltage： one byte
Decimal value / 10.
UTC time: three bytes
Hour：0~24
Minute:0~60
Secord:0~60
Status bar： one byte
Bit0:1 Bluetooth connection succeeded 0 Bluetooth disconnection
Bit1:1 GPS module online 0 GPS module disconnected
Bit2: 1 LORA module online 0 LORA module disconnected
Bit3: 1 electronic compass module online 0 electronic compass module disconnected
Bit4:1 AH on 0 AH off
Bit5: 1 high power 0 low power

Table S/ table Po value: one byte
S table when receiving: 0 ~ 34 (S table when BIT7 is 0)
Po table for launch: 0 ~ 34 (PO table when BIT7 is 1)
SWR/AUD/ALC： one byte
SWR: 0 ~ 34 (SWR table when BIT7 and BIT6 are 00)
ADU: 0 ~ 34 (ALC table when BIT7 and BIT6 are 01)
ALC: 0 ~ 34 (ADU table when BIT7 and BIT6 are 10)

6. Shutdown command, turn off the radio station

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X0C	0	CRC HIGH	CRC LOW

0：power off

1：power on

AF 菜单：

7. Speaker volume adjustment command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X0D	Volume	CRC HIGH	CRC LOW

Volume：0~30

8. Earphone volume adjustment command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X0E	Earphone volume	CRC HIGH	CRC LOW

Earphone volume：0~80

9. MIC gain adjustment command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X0F	MIC gain	CRC HIGH	CRC LOW

MIC gain：0~100

10. Voice compansion ratio adjustment command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X10	Compansion ratio	CRC HIGH	CRC LOW

Compansion ratio：0~14

11. Bass EQ adjustment command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X11	Bass EQ	CRC HIGH	CRC LOW

Bass EQ：0~40

12. Treble EQ adjustment command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X12	Treble EQ	CRC HIGH	CRC LOW

Bass EQ：0~40

RF menu：

13. RF gain（RFG）adjustment command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X13	RF gain	CRC HIGH	CRC LOW

RF gain： 0~100

14. IF gain (RFG) adjustment command.

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X14	IF gain	CRC HIGH	CRC LOW

IF gain： 0~80

15. Noise suppression (SQL) adjustment command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X15	Noise suppression	CRC HIGH	CRC LOW

Noise suppression： 0~20

16. Automatic gain control（AGC）command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X16	Automatic gain	CRC HIGH	CRC LOW

Automatic gain： 0~5

17. Preamplifier (AMP) command.

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X17	Preamplifier	CRC HIGH	CRC LOW

Preamplifier： 0： AMPA 1:AMPB

18. Filter（filter） command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X18	Filter	CRC HIGH	CRC LOW

Filter：

FM mode

1-<7.2k>	2-<10.0k>	3-<12.0k>

CW/SSB mode

4-<250_550>	5-<250_575>	6-<300_600>	7-<325_625>	8-<350_650>
9-<375_675>	10-<400_700>	11-<425_725>	12-<450_750>	13-<475_775>
14-<275_775>	15-<325_825>	16-<375_875>	16-<375_875>	17-<425_925>
18-<475_975>	19-<0_1.4k>	20-<370_1.7k>	21-<0_1.6k>	21-<0_1.6k>
23-<500_2.3k>	24-<600_2.4K>	25-<700_2.5k>	26-<800_2.6k>	26-<800_2.6k>

28-<0_1.8k>	29-<0_2.1k>	30-<500_2.6k>	31-<600_2.9k>	31-<600_2.9k>
33-<800_3.1k>	34-<900_3.2k>	35-<0_2.3k>	36-<0_2.5k>	

SSB mode

37-<650_3.2k>	37-<650_3.2k>	39-<700_3.4k>	40-<0_2.9k>	41-<800_3.7K>
42-<0_3.2k>	43-<900_4.1k>	44-<0_3.4k>	45-<900_4.3k>	46-<0_3.6k>
47-<1.0k_4.6k>	48-<0_3.8K>	49-<1.1k_4.9k>	50-<0_4.0k>	51-<0_4.2k>
52-<0_4.4K>	53-<0_4.6k>	54-<0_4.8k>	55-<0_5.0k>	56<0_5.5k>
57-<0_6.0k>	58-<0_6.5k>	59-<0_7.0k>	60-<0_7.5k>	61-<0_8.0k>
62-<0_8.5k>	63-<0_9.0k>	64-<0_9.5k>	65-<0_10.0k>	

AM mode

66-<1.4k>	67-<1.6k>	68-<1.8k>	69-<2.0k>	70-<2.3k>
71-<2.5k>	72-<2.7k>	73-<2.8k>	74-<3.2k>	75-<3.4k>
76-<3.6k>	77-<3.8k>	78-<4.0k>	79-<4.2k>	80-<4.4k>
81-<4.6k>	82-<4.8k>	83-<5.0k>	84-<6.0k>	85-<7.5K>
86-<10.0k>				

Filters: 0x01 – 0x55, 85 filters in total, classified according to mode. 4-36 are filters that can be used in CW mode and SSB mode.

19. NR command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X19	NR	CRC HIGH	CRC LOW

NR: 0:NR off 1:NR on

20. NB command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X1A	NB	CRC HIGH	CRC LOW

NR: 0:NB off 1:NB on

21. AB frequency command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X1B	AB	CRC HIGH	CRC LOW

AB: 0:A frequency 1:B frequency 2： A=B frequency

22. Different frequency command。

APP sending

0XA5	0XA5	0XA5	0XA5	Packet length	0X1C	SPLIT	CRC HIGH	CRC LOW

SPLIT: 0:Different frequency off 1:Different frequency on

23. Band selection command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X1D	Band	CRC HIGH	CRC LOW

Band:

1.8	3．5	5	7	10	14	18
21	24	28	50	144	430	

24. NR threshold setting command

APP sending

0XA5	0XA5	0XA5	0XA5	Packet length	0X1E	NR threshold	CRC HIGH	CRC LOW

NR threshold: 1~200

25. NB threshold setting command。

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X1F	NR threshold	CRC HIGH	CRC LOW

NR threshold: 0~15

26. PEAK threshold setting command。

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X20	NR threshold	CRC HIGH	CRC LOW

NR threshold: 0~20

27. AH setting command。

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X21	AH	CRC HIGH	CRC LOW

AH: 0:AH off 1：AH on 2：Start tuning

28. Spectrum bandwidth command。

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X22	SPAN	CRC HIGH	CRC LOW

SPAN: 0~5

29. Spectrum reference level command。

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X23	REF	CRC HIGH	CRC LOW

REF: 1~20

30. Spectrum refresh rate command。

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X24	SPEED	CRC HIGH	CRC LOW

SPEED: 1~30

31. Spectrum display mode command。

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X25	Spectrum display mode	CRC HIGH	CRC LOW

Spectrum display mode: 0: spectrum and waterfall are displayed at the same time 1: only spectrum 2: only waterfall 3: spectrum and waterfall diagram are closed

32. Simulate subsonic

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X26	Launch subsonic	Receive subsonic	Leading tone	CRC HIGH	CRC LOW

Launch subsonic：

0	67.0	69.3	71.9	74.4	77.0	79.7
82.5	85.4	88.5	91.5	94.8	97.4	100.0
103.5	107.2	110.9	114.8	118.8	123.0	127.3
131.8	136.5	141.3	146.2	150.0	151.4	156.7
159.8	162.2	165.5	167.9	171.3	173.8	177.3
179.9	183.5	186.2	189.9	192.8	196.6	199.5
203.5	206.5	210.7	213.8	218.1	221.3	225.7
229.1	233.6	237.1	241.8	245.5	250.3	254.1

Receive subsonic：

0	67.0	69.3	71.9	74.4	77.0	79.7
82.5	85.4	88.5	91.5	94.8	97.4	100.0
103.5	107.2	110.9	114.8	118.8	123.0	127.3
131.8	136.5	141.3	146.2	150.0	151.4	156.7
159.8	162.2	165.5	167.9	171.3	173.8	177.3
179.9	183.5	186.2	189.9	192.8	196.6	199.5
203.5	206.5	210.7	213.8	218.1	221.3	225.7
229.1	233.6	237.1	241.8	245.5	250.3	254.1

Leading tone：

0	1750	2135	

33. Equipment type recognition command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X27	Equipment type	CRC HIGH	CRC LOW

Radio station reply：

0XA5	0XA5	0XA5	0XA5	Packet length	0X27	Equipment type	CRC HIGH	CRC LOW

Equipment type: 0： TBR-119

34. Transmit power level setting command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X28	Power level	CRC HIGH	CRC LOW

Power level：0~100

Radio station reply：

0XA5	0XA5	0XA5	0XA5	Packet length	0X28	Power level	CRC HIGH	CRC LOW

35. Receive frequency offset setting command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X29	RIT	CRC HIGH	CRC LOW

RIT：0~120

Radio station reply：

0XA5	0XA5	0XA5	0XA5	Packet length	0X29	RIT	CRC HIGH	CRC LOW

36. Transmit frequency offset setting command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X2A	XIT	CRC HIGH	CRC LOW

RIT：0~120

Radio station reply：

0XA5	0XA5	0XA5	0XA5	Packet length	0X2A	XIT	CRC HIGH	CRC LOW

37. Preamble emission duration setting command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X2B	L-TIME	CRC HIGH	CRC LOW

L-TIME：50 - 300

Radio station reply：

0XA5	0XA5	0XA5	0XA5	Packet length	0X2B	L-TIME	CRC HIGH	CRC LOW

38. High and low power level setting command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X2C	Power level	CRC HIGH	CRC LOW

Power level：

0：low power

1：high power

Radio station reply：

0XA5	0XA5	0XA5	0XA5	Packet length	0X2C	L-TIME	CRC HIGH	CRC LOW

39. Synchronous command of standing wave meter, S meter, ALC meter and transmit power meter (control end polling).

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X2D	CRC HIGH	CRC LOW

Radio station sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X2D	Transmit power / S Meter	SWR/AUD/ALC	CRC HIGH	CRC LOW

Table S: 0 ~ 34 (table s when BIT7 is 0)

Transmit power: 0 ~ 34 (PO table when BIT7 is 1)

SWR/AUD/ALC： one byte

SWR: 0 ~ 34 (SWR table when BIT7 and BIT6 are 00)

ADU: 0 ~ 34 (ALC table when BIT7 and BIT6 are 01)

ALC: 0 ~ 34 (ADU table when BIT7 and BIT6 are 10)

40. Parameter synchronization command (timing polling for synchronization).

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X2E	Data packet	CRC HIGH	CRC LOW

Radio station sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X2E	SVOL	HVOL	MIC	CMP	BAS	TRB	RFG	IFG

SQL	AGC	AMP	NR	NB	PEAK	SPAN	REF	SPEED	T-CTSS	R-CTSS

L-VOICE	L-TIME	KEY_MODE	TX_RX	TRANING	STF	STG	KEY_SPEED

DECODE	THRESHOLD	Data formant	CRC HIGH	CRC LOW

41. Key type setting command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X2F	Key type	CRC HIGH	CRC LOW

Key type： 0:AUTO-L 1:AUTO-R 2： KEY

Radio station sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X2F	Key type	CRC HIGH	CRC LOW

42. Side tone volume setting command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X30	Sidetone volume	CRC HIGH	CRC LOW

Sidetone volume：0~15 steps 1

Radio station sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X30	Sidetone volume	CRC HIGH	CRC LOW

43. Sidetone frequency setting command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X31	Sidetone frequency	CRC HIGH	CRC LOW

Sidetone volume：40~20 steps 2

Radio station sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X31	Sidetone frequency	CRC HIGH	CRC LOW

After radio station receives, it needs to be multiplied by 10

44. Transceiver conversion time setting command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X32	Conversion time	CRC HIGH	CRC LOW

Sidetone volume：0~50 steps 1

Radio station sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X32	Conversion time	CRC HIGH	CRC LOW

After radio station receives, it needs to be multiplied by 40

45. USB data format setting command。

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X33	Data format	CRC HIGH	CRC LOW

Data format：0：Audio frequency 1：IQ

Radio station sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X33	Data format	CRC HIGH	CRC LOW

46. CW training mode setting command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X34	TRAINING	CRC HIGH	CRC LOW

Training mode：0：off 1： on

Radio station sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X34	TRAINING	CRC HIGH	CRC LOW

47. CW automatic key speed setting command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X35	KEY_SPEED	CRC HIGH	CRC LOW

Automatic key speed：5~48 steps 1

Radio station sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X35	KEY_SPEED	CRC HIGH	CRC LOW

48. CW decoding setting command

APP sending:

0XA5	0XA5	0XA5	0XA5	Packet length	0X36	DECODE	CRC HIGH	CRC LOW

Decoding switch：0：off 1：on

Radio station sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X36	DECODE	CRC HIGH	CRC LOW

49. CW decoding threshold setting command

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X37	THERSHOLD	CRC HIGH	CRC LOW

CW decoding threshold：1~50 steps 1

Radio station sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X37	THERSHOLD	CRC HIGH	CRC LOW

50. MESH data transmission communication（LORA、2FSK、4FSK）。

APP sending：

0XA5	0XA5	0XA5	0XA5	Packet length	0X38	Data packet	C	CRC LOW

Data packet：

0x7e	0x7e	Source address	Destination address	MESH hops	Total number of packet	Packet number	Data	Destination address	

Source address: 2 bytes

Destination address: 2 bytes

MESH hops: 1 byte

Total number of packet: 1 byte

Packet No.: 1 byte

Data: fixed 225 bytes

Appendix 2-1

10. CRC verification algorithm result verification

```
//*****************************************************
//**Function name: CRC16Check
//**Input: buf the data to be verified;
//**            len length of data to be verified
//**Output: verification value
//**Function Description: CRC16 cyclic redundancy check

//**Note: the verification mode is CRC16 / CCITT-FALSE. Note the variable
type
//*****************************************************/
unsigned int CRC16Check(unsigned char *buf, unsigned char len)
{
    unsigned char    i, j;
    unsigned int uncrcReg = 0xFFFF;
    unsigned int uncur;
    for (i = 0; i < len; i++)
    {
        uncur = buf[i] << 8;
        for (j = 0; j < 8; j++)
        {
            if ((int)(uncrcReg ^ uncur) < 0)
            {
                uncrcReg = (uncrcReg << 1) ^ 0x1021;
            }
            else
            {
                 uncrcReg <<= 1;
            }
            uncur <<= 1;
        }
    }
    return uncrcReg;
}
```

Change notification:

1.Exchange the content data of the 5th agreement

Original data format:

ALC: 0 ~ 34 (when BIT7 and BIT6 are 01, it is the ALC table)

ADU: 0 ~ 34 (ADU table when BIT7 and BIT6 are 10)

After change:

ADU: 0 ~ 34 (ALC table when BIT7 and BIT6 are 01)

ALC: 0 ~ 34 (ADU table when BIT7 and BIT6 are 10)

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