MOONRAKER

# ORION

## MOBILE VHF/UHF TRANSCEIVER

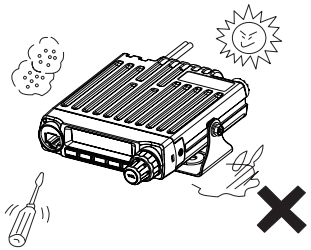



**Instruction Manual**

## Precautions

Please observe the following precautions to prevent fire, personal injury, or transceiver damage:

- Do not attempt to configure your transceiver while driving, it is dangerous.
- This transceiver is designed for a 12V and 24V DC power supply.
- Do not place the transceiver in excessively dusty, humid or wet areas, nor unstable surfaces.
- Please keep it away from interferential devices (such as TV, generator etc.)
- Do not expose the transceiver to long periods of direct sunlight nor place it close to heating appliances.
- If an abnormal odor or smoke is detected coming from the transceiver, turn OFF the power immediately. Contact local service station or your dealer.
- Do not transmit with high output power for extended periods; the transceiver may over heat.



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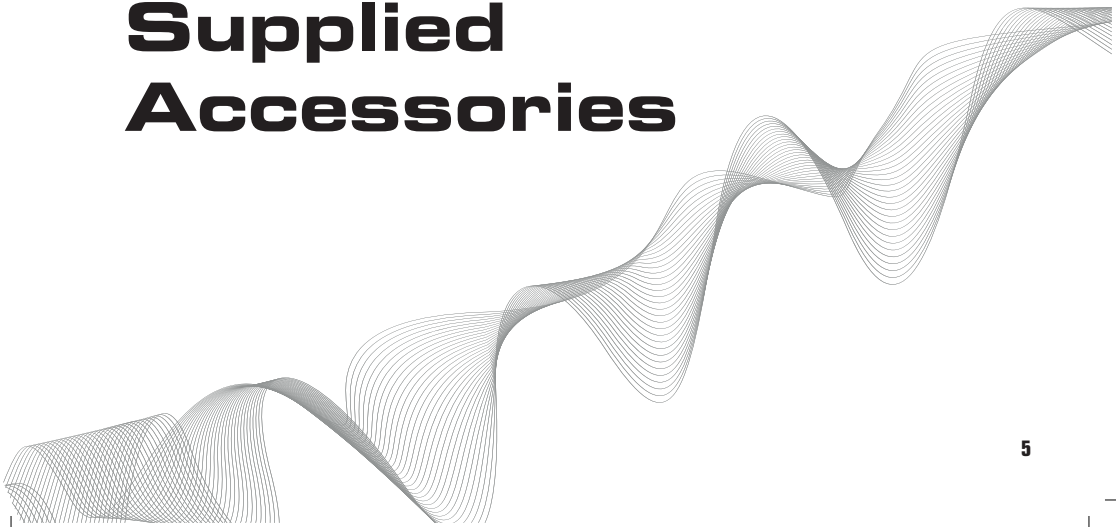
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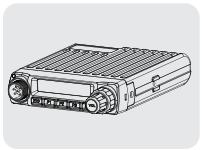
# Supplied Accessories



# Supplied Accessories/Optional Accessories

## Supplied Accessories

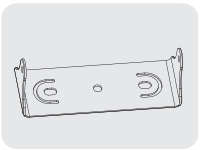
After carefully unpacking the transceiver, identify the items listed in the table below. We suggest you keep the box and packaging.



radio body *1



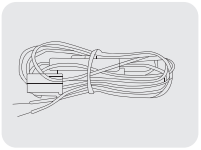
Microphone*1



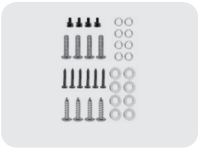
Panel bracket *1



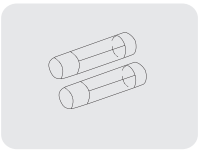
Microphone bracket*1



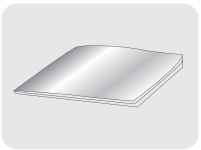
Power Cable*1



Hardware



Fuse*2



User's Manual*1

# Installation

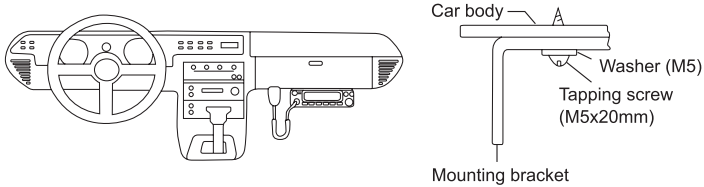


## Initial Installation

**Mobile installation**

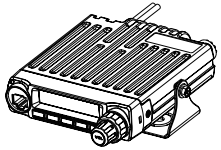
To install the transceiver, select a safe, convenient location inside your vehicle that minimizes danger to your passengers and yourself while the vehicle is in motion.Consider installing the unit at an appropriate position so that knees or legs will not strike it during sudden braking of your vehicle.Try to pick a well ventilated location that is shielded from direct sunlight.

1.Install the mounting bracket in the vehicle using the supplied self-tapping screws(4pcs) and flat washers(4pcs).

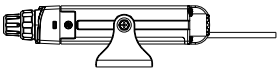



2.Position the transceiver, then insert and tighten the supplied hexagon SEMS screws.

■ Double check that all screws are tightened to prevent vehicle vibration from loosening the bracket or transceiver.



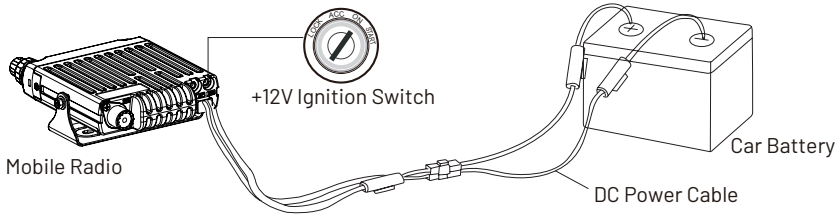
■ Determine the appropriate angle of the transceiver, using the screw hole positions on the side of the mounting bracket.



DC Power Cable Connection
NOTE: Locate the power input connector as close to the transceiver as possible.

**Mobile Operation**

This transceiver is designed for a 12V and 24V DC power supply.

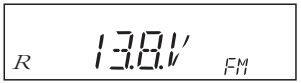


1.Route the DC power cable supplied with the transceiver directly to the vehicle's battery terminals using the shortest path from the transceiver.

■ We recommend you do not use the cigarette lighter socket as some cigarette lighter sockets introduce an unacceptable voltage drop.

■ The entire length of the cable must be dressed so it is isolated from heat,moisture,and the engine secondary (high voltage) ignition system/cables.2. After installing cable, in order to avoid the risk of damp, please use heat-resistant tap to tie together with fuse box. Don't forget to reinforce whole cable.

The transceiver will return to its normal operation when the power is switched ON or repeat above operation.



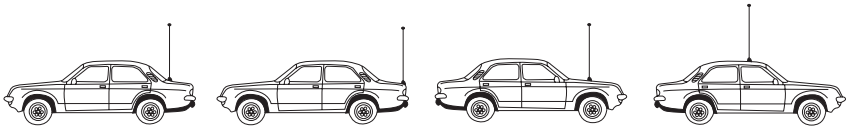
## Antenna Connection

Before operating, install an efficient, well-tuned antenna. The success of your installation will depend largely on the type of antenna and its correct installation.The transceiver cangive excellent results if the antenna system and its installation are given careful attention.Use a 50Ω impedance antenna and low Hoss coaxial feed-line that has a characteristic impedance of 50Ω, to match the transceiver input impedance.Coupling the antenna to the transceiver via feed-lines having an impedance other than 50*reduces the efficiency of the antenna system and can cause interference to nearby broadcast television receivers, radio receivers, and other electronic equipment.

NOTE: Transmitting without first connecting an antenna or other matched load may damage the transceiver. Always connect the antenna to the transceiver before transmitting.

All fixed stations should be equipped with a lightning arrester to reduce the risk of fire, electric shock, and transceiver damage.

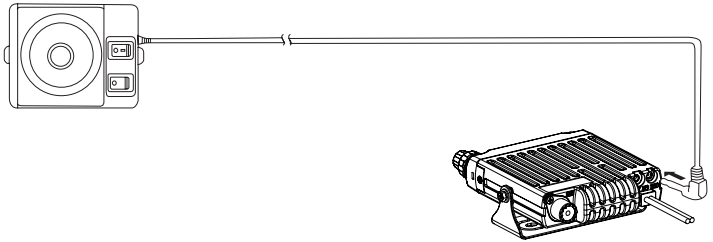
The possible locations of antenna on a car are shown as following:



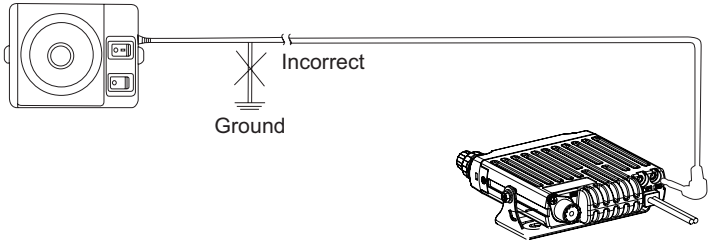
## Accessories Connections

**External Speaker**

■ If you plan to use an external speaker,choose a speaker with an impedance of 8Ω.The external speaker jack accepts a 3.5 mm(1/8")mono (2-conductor)plug.

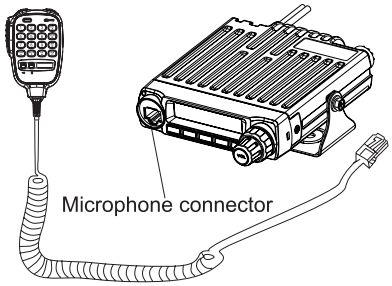


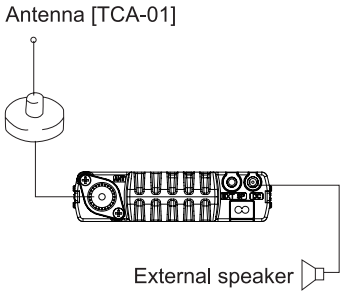
NOTE: External speaker adopt double port BTL, please care about the connecting way.The speaker cannot connect with the ground, otherwise the speaker will be fault.The wrong connecting way as the following picture.



## Microphone

■ For voice communications, connect a microphone equipped with an 8-pin modular plug into the modular socket on the front of the main unit. Press firmy on the plug until the locking tab clicks. Attach the supplied microphone hanger in an appropriate location using the screws included in the screw set.



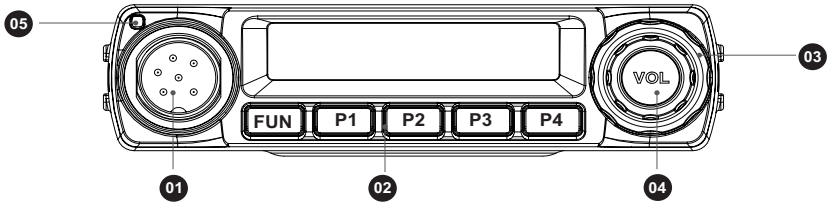
## Functions & Features

- Supports 12/24V voltage
- Dual band,dual wait,dual standby,dual watch
- Speaker gain
- Mic Gain
- Auto power off
- DOT-MATRIXLCD Display
- 200 channels
- FM radio for 32 channels storage
- Wide/Middle/Narrow bandwidth select
- High/Middle/Low power select
- Talk permit tone
- Roger tone
- Sub band tone
- Remote stun/kill/activate
- TOT
- ANI
- PTT ID
- DTMF encoding and decoding
- 2 Tone/5 Tone encoding and decoding
- Scrambler
- CTCSS/DCS
- Programmable keys
- Backlight brightness setting

# Getting Acquainted



## Front Panel Buttons' Definitions



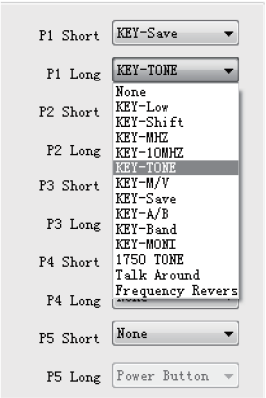

| *NO.* | *Key* | *Function* |
|---|---|---|
| 01 | Mic connector/DATA | Microphone connection port/PC programming data port |
| 02 | FUN,PI,P2,P3,P4 key | Long press Fun key to enter menu/Fun+P5:Enter menu<br>Default setting as below:<br>FUN+P1: FM RADIO<br>Fun+*: Main/Sub channel switch<br>Fun+P2: Lock<br>Fun+P3: CTCSS/DCS setting<br>Fun+#:Emergency call |
| 03 | Turnning Control | a.Rotate this knob can choose the VFO frequency,Channel number, Tone value, Scan direction.<br>b.When operating band is MR model or channel mode,press [Turnning Control] can switch the channel. |

| NO. | Key | Function |
|---|---|---|
| 04 | P5 | P5-- volume knob<br>Long press P5 to power on the radio |
| 05 | Indicator light | Red Light during transmit<br>Green light during receive |

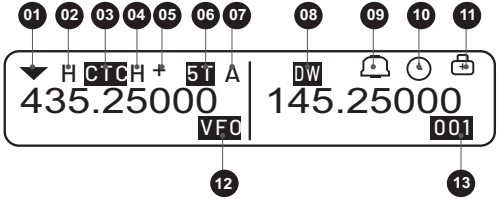
P1-P5 short and long press setting you can do it by software as you requirement.

Software-Basic---Radioset

Choice as below:

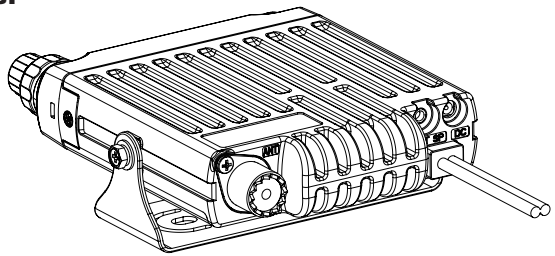


## Display



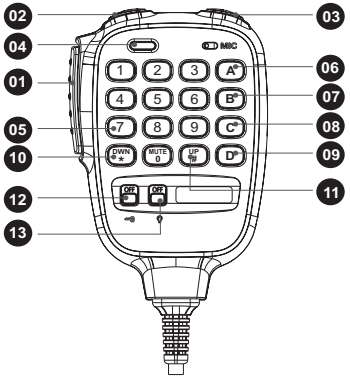

| *No.* | *Icon* | *Function* |
|---|---|---|
| 01 | ▼ | Home screen |
| 02 | H,M,L | High power output/Middle power output/Low power output |
| 03 | CTC,DCS | CTCSS /DCS encode or decode |
| 04 | N,M,W | Narrow bandwidth/Middle bandwidth/Wide bandwidth |
| 05 | +, - | Positive direction of offset/Negative direction of offset |
| 06 | 2T,5T,DT | Signaling |
| 07 | A | AM mode |
| 08 | DW | Dual wait |
| 09 | 🔔 | Beep |
| 10 | 🕒 | Auto Power-off |
| 11 | 🔒 | Lock the keypad |
| 12 | VFO | Frequency mode |
| 13 | 001 | Channel mode |

## Rear Panel




| *No.* | *Description* | *Function* |
|---|---|---|
| 01 | Ant | Connection to 50Ω Antenna |
| 02 | EXT SP | Terminal for optional external speaker |
| 03 | EXT DC | DC power cable connection |

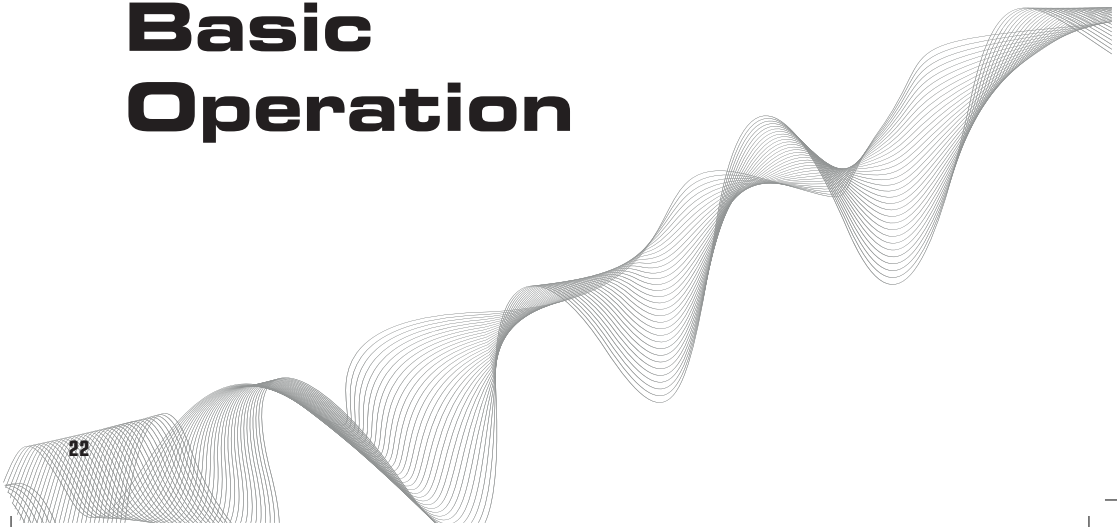
## Microphone




| *No.* | *Icon* | *Function* |
|---|---|---|
| 01 | PTT | Press the key to transmit |
| 02 | Down | Decrease setting value |
| 03 | Up | Increase setting value |
| 04 | Indicator light | Indicator light will red during transmit and green during receive. |
| 05 | Number key | Input channel number or DTMF dial out etc |
| 06 | A | VFO mode and MR mode |
| 07 | B | Long press B---transmit |
| 08 | C | Under VFO mode,long press C to enter one key frequency copy |

| *No.* | *Icon* | *Function* |
|---|---|---|
| 09 | D | Short press D--Fun menu<br>Long press D---Radio menu |
| 10 | * | Lock/Unlock |
| 11 | # | Long press # ---FM Radio |
| 12 | Key lock | Key lock on or off |
| 13 | Keypad light | Keypad light on or off |

# Basic Operation



## Basic Operations

**Power on/off**

Long press the P5 

button to switch the radio ON.

- The power on message momentarily appears on the display.
- If the transceiver power on password has been activated,you must first enter your password before you can operate the transceiver.

Long press P5 button again to switch the radio OFF.

**Adjusting the volume**

Rotate P5 (volume knob) clockwise to increase the volume and counterclockwise to decrease the volume.

**Switch between VFO and channel Mode**

In standby, press microphone “A” key, the indicates will display current channel in channel mode.
Repeat above operation to switch between Frequency(VFO) mode and channel mode.

**Adjusting Frequency/channel**

Under Frequency(VFO) mode, you can change the current frequency to the desired one through [Turnning Control];Turn clockwise to increase frequency, turn counterclockwise to decrease.Or you can do it by “Down” or “Up” key at microphone.

In frequency mode, you can rotate the knob and change the standby frequency in steps.This product has 8 step sizes for users selecting:2.5K,5K,6.25K,10K,12.5K,25K,50K,100K.

You can also press the number keys to enter the waiting frequency you need to switch in sequence. For example, switch to 455.125MHz and press 【4】, 【5】, 【5】, 【1】, 【2】, 【5】.
In the channel mode,you can change the current channel to the desired one through [Turnning Control] or microphone “up” and “down”.
You can also press the number keys to enter the channel number you need to switch sequentially. For example, switch to CH001 and press 【0】, 【0】, 【1】; Switch to CH128 and press 【1】, 【2】, 【8】. When you want to switch to a channel between CH030-CH099, you can also directly enter the last two digits of the channel number; If switching to CH034, connect to 【3】 and 【4】; Switch to CH099 and press 【9】 or 【9】.

**Receiving**

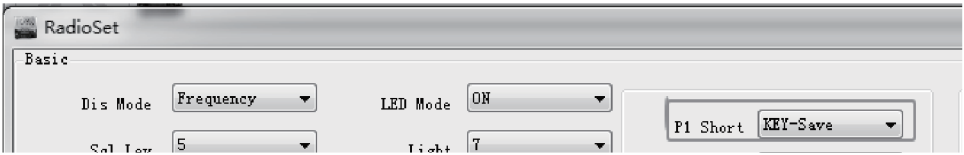
When the channel you are operating is called,the screen will show R and S meter appears on display.The indicator light show green at receiving status.

**Transmitting**

Press PTT and hold on and speak to the microphone to transmit,the screen will show T _ _ appears on display.The indicator light show red at transmit status.

**Channel store or delete**

Preset the key-save function by software.For example set this function at P1 Short.




1. Under frequency mode(VFO),turn [Turnning Control] to select the desired frequency or input frequency by Mic's number keys.
2. Select the desired CTCSS/DCS signaling in the menu 23-25th.
3. Short press P1 to enter storage or delete mode,the channel number of screen will flashing.
4. Turn [Turnning Control] to select the desired channel number to store or input directly by microphone.
5. Press Fun key or P5 to store current channel.Press P2 to delete the current channel.
6. Press P4 to exist.

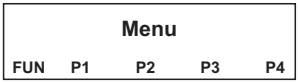
**VFO offset setting**

Under VFO mode, enter Menu 22 to set magnitude of the repeater shift, enter menu 26 to set the shift direction, synthesizer Steps can be changed through menu item 27.
For example, if your frequency now is 445.0500MHz, would like to set a frequency 444.4500MHz as transmit frequency, steps as below:

1. Under VFO mode, enter Menu 22 to set the offset at 0.6MHz,press F to confirm.
2. Enter menu 26 to set shift direction at "-",press [Fun] to confirm.
3. Press PTT button will show transmit frequency at 444.4500MHz.

## Operation of the composite key

Press Fun to enter below page:




Then press the key below to achieve default function.

**1.Press the "FUN+*" to switch home screen and sub screen.**

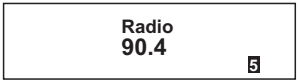
▼ at where, which screen is home screen

**2.FM radio function(FUN+P1)**

**1)** On/off radio receiver

Under standby mode, press [FUN+P1 ] or directly long press [#] at microphone to open FM radio function , LCD

display "90.4M", then press [FUN+P1 ] again, radios receiver is off



**2)** Mode selection
Under FM radio mode, press [A ] to switch between FM memory mode and FM frequency mode (this function is unavailable when there is not FM memory channel).
**3)** Frequency selecting
Under FM frequency mode, input the digits directly by keypad or press the [Turning Control] to choose the desire frequency.
Under FM memory,press the [Turning Control] to choose the desire channel.
**4)** FM radio storage
Under FM frequency mode,press [P1] which you set key-save function, the channel number for storage blinks at the right of the screen.Press [Turning Control] select the desired channel number. Press[FUN] key to confirm and then back to the receiving mode.
**5)** FM radio channel delete:
Under FM frequency mode, press [P1] which you set key-save function, the channel number for storage blinks at the right of the screen.Press [Turning Control] select the desired channel number. Press[P2] key to delete the channel.

**Keypad lock setting(FUN+P2)**
Under standby mode, press [* ] for 2 S to lock to unlock the keypad.“  ” will be displayed at the top of LCD when keypad is locked.
And you can Enter Menu 32 [LOCK MD] to set Keypad lock method:ALL/PTT/KEY/K+S lock.

**DCS/CTCSS setting(FUN+P3)**

This function is used to receive and transmit CTCSS/DCS frequency. (The current channel should be have CTCSS/DCS)

1. Press the [Fun] key during standby to enter the menu operation interface and select menu 23
2. Press the [Fun] key to confirm and enter the settings mode.
   Press the P1 key to switch the signaling type (OFF->DCS).
4. Select the DCS/CTCSS you need.
5. When selecting signaling as DCS, press the P2 key to choose the DCS direction.
6. Press [Fun] to confirm after completing the settings.

Set the receive tone coder and transmit tone coder in the same manner as the above operation.

**Frequency copy**

At VFO mode, Long press “C” at microphone to open one key frequency copy function, the screen will show:Auto Scan.

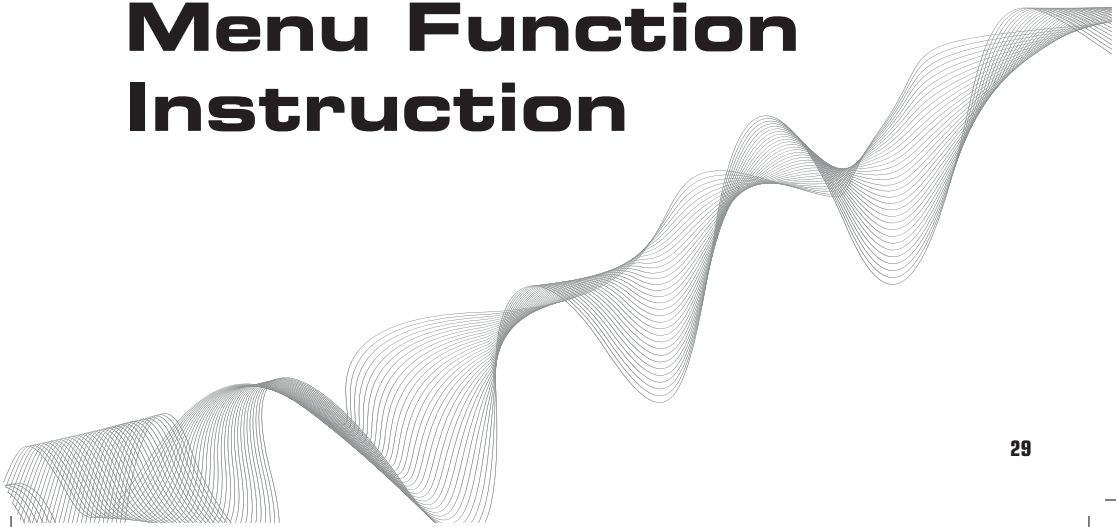
Using the other radio to transmit,the frequency will copy to your mobile radio.

Support different brand radio copy.

**Emergency Alert(F+#)**

Under standby mode, press [FUN ] to enter menu setting. LCD display “MENU”, then press [#]to turn on emergency alert function,radio will transmit emergency ring,until you press PTT, it will exit.

# Menu Function Instruction



# Menu Function Instruction

1.There are three ways to enter menu:
- Long press “Fun” key to enter menu
-”Fun” + P5 power on channel
- Long press “D” key at microphone to enter menu

2.Rotating the [Turnning Control] to choose the desire menu or using microphone “UP” or “Down” to choose or directly input the desire menu by microphone number key.
3.Press “Fun” key to enter and set the current menu.
4.Press [Turnning Control] to select desire value of current menu .
5.Press “Fun” key to save selected value.
6.Repeat the steps of 2-5 can set more value.

| *No.* | *Display* | *Setting values* | *Description* |
|---|---|---|---|
| 01 | Scan | ON | Scan |
| 02 | STE | Frequency/120/180/240/OFF | End Tone Eliminator |
| 03 | TX.SEL | Main CH/Last CH | TX Channel |
| 04 | POW | HIG/MID/LOW | High/Middle/Low TX Power |
| 05 | SQL | 0-9 Level | Squelch Level Setting |
| 06 | D.WATT | ON/OFF | Dual Wait/Standby |
| 07 | LED | ON/5S/10S/15S/20S/25S/30S/OFF | LED Display Mode |
| 08 | LIGHT | 1-7 | Back Light Setting |
| 09 | BEEP | ON/OFF | Keypad Beeper Setting |
| 10 | DT CH | 1-16 | Preset Channel Setting |
| 11 | TOT | OFF/30/60/90/120/150/180/210/240/270 | Time-out-Timer |

| *No.* | *Display* | *Setting values* | *Description* |
|---|---|---|---|
| 12 | BCLO | OFF/SUB/Carrier | Busy Channel Lock-out |
| 13 | Signal | OFF/DTMF/2 Tone/5 Tone | Signal Select |
| 14 | Roger BP | ON/OFF | Transmit Over Beeper |
| 16 | Code | ON/OFF | Power on Password |
| 17 | SCAN | TO/CO/SE | Scan Mode |
| 18 | AUTO LK | ON/OFF | Auto Keypad Lock |
| 19 | Pow off | OFF/30 minute/60 minute/120 minute | Auto Power Off |
| 20 | OPNSET | DC/Char/MEG/OFF | Power-on Display |
| 21 | DC VOLT | / | DC Voltage |
| 22A | OFF SET | 0.000-99.995MHZ | Repeater Shift(Under VFO Mode) |
| 22B | DIS.NM | ON/OFF | Power-on Display |
| 23 | C-CDC | OFF/67.0/D023N | TX/RX Tone Coder |
| 24 | R-CDC | OFF/67.0/D023N | RX Tone Coder |
| 25 | T-CDC | OFF/67.0/D023N | TX Tone Coder |
| 26 | S-D | OFF/+/- | Shift Direction |
| 27 | STEP | 2.5K/5K/6.25K/10K/12.5K/25K/50K/100K | VFO Step |
| 28 | N/W | WIDE/MIDD/NARR | Bandwidth Select |
| 29 | SEEK | 67 | CTCSS Scanning |
| 30 | SEEK | D023N | DCS Scanning |
| 31 | SCR.NO | OFF/1-8 | Voice Scramble |
| 32 | LOCK MD | ALL/PTT/KEY/K+S | Lock Mode |
| 33 | DIS MD | FRE/CH/MR | Work Mode Setting |
| 34 | FM Moni | ON/OFF | FM Radio |
| 35 | CH.NAME | | Display Channel name |

| *No.* | *Display* | *Setting values* | *Description* |
|---|---|---|---|
| 36 | MIC LEV | 1-8 | Microphone Sensitive Level |
| 37 | RX.LIGHT | ALW.ON/CODE.ON/OFF | Receiving Light |
| 38 | TalkPrmt | ON/OFF | Talk Permit |
| 39 | Ch Alert | ON/OFF | Receive Alert |
| 40 | Spk Gain | Normal/1-7 | Speaker Gain |
| 41 | Reset | ALL/VFO/FULL | Reset Function |
| 42 | Ver: | MUC/T | Radio Version |

# Signalings



# Signalings

Press the [PTT] and [UP] key at microphone to achieve remote kill/stun/active.

## DTMF

When the signal of the channel selects the DTMF, press PTT and at the same time press 【UP】key at microphone, the current channel will automatically check if the DTMF signaling is received and decoding it. And achieve a corresponding function according to the received code.

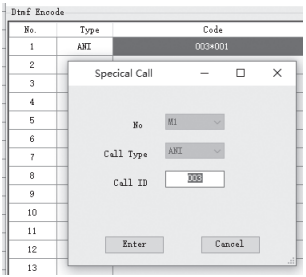
The function including: ANI display, remote stun/waken/kill.

ANI Display:

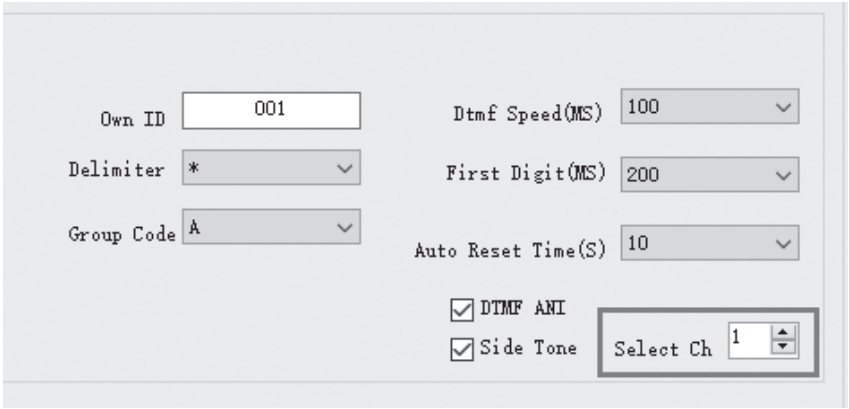
1.DTMF Encode type choose ANI:




2.Input the called ID, eg, your radio ID is 001, the called radio ID is 003



3.Select channel NO.




4.Choose DTMF signal

| No. | Rx Fre | Tx Fre | Decode | Encode | Scramble | Power | B_Lock | Step | Wide | Signal |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 445.02500 | 445.02500 | OFF | OFF | OFF | Hig | OFF | 12.5K | Wide | DTMF |

5.Press PTT and side key【UP】key at the microphone at the same time to achieve the ANI display function.

## Remote stun, remote kill function

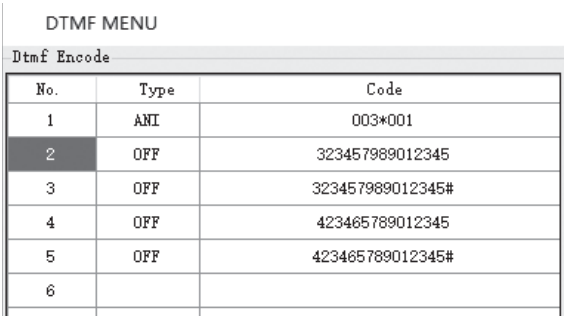
Stun code: when the radio receives the corresponding DTMF code, the radio will be remote stunned and disabled transmit.

Kill code: when the radio receives the corresponding DTMF code, the radio will be remote killed and disabled receive and transmit.

Waken code: release the state of stun/kill.

Select Ch: the default channel when the DTMF is calling.

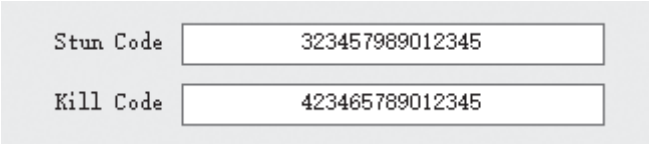
1.DTMF Encode type choose OFF, user can input the desired DTMF code directly.


DTMF MENU

Dtmf Encode

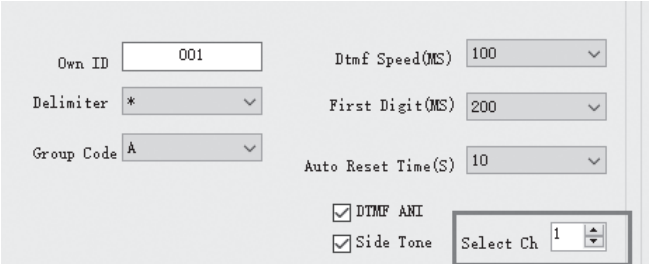
| No. | Type | Code |
|---|---|---|
| 1 | ANI | 003*001 |
| 2 | OFF | 323457989012345 |
| 3 | OFF | 3234579890123 45# |
| 4 | OFF | 423465789012345 |
| 5 | OFF | 4234657890123 45# |
| 6 | | |

2.In transmitting ,input the remote kill/stun code for the radio which you want to remote kill/stun.




3.DTMF Encode:
Remote receive code :"remote stun code + #" to waken radio which at stun state
Remote receive code:"remote kill code + #" to waken radio which at kill state

4.Select channel



Like above setting,
Channel 1: ANI display,
Channel 2: remote stun code
Channel 3: remote waken from stun state
Channel 4: remote kill code
Channel 5: remote waken from kill state

5.Signal choose DTMF

| No. | Rx Fre | Tx Fre | Decode | Encode | Scramble | Power | B_Lock | Step | Wide | Signal |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 445.02500 | 445.02500 | OFF | OFF | OFF | Hig | OFF | 12.5K | Wide | DTMF |

6.Remote kill/waken/stun operation.

After setting like above, if you would like to achieve Radio A kill Radio B, there are two way to achieve:

One: At programming software DTMF setting choose Ch 4.

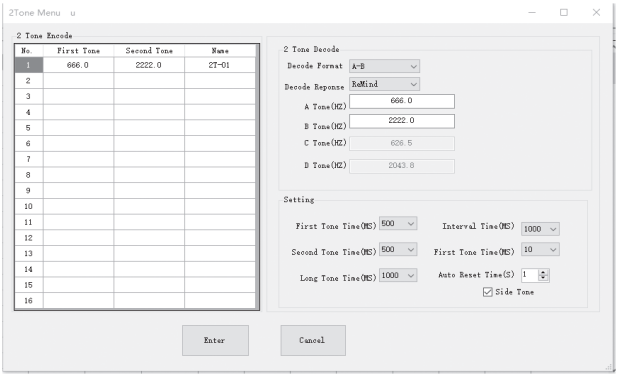
Then press the PTT and【UP】key at microphone to achieve remote radio B.

Two: At radio, choose Menu 10th—DT CH—Channel number choose 4.

Then press the PTT and【UP】key at microphone to achieve remote radio B.

Similar operation for remote stun/waken.

# 2 TONE Operation




2 Tone encode

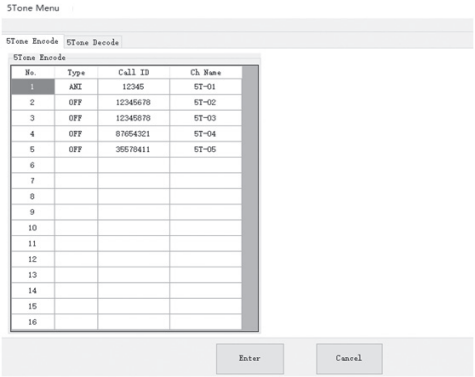
Input: the frequency of first tone and second tone

Note: the frequency between of the first tone and second tone should not too similar to avoid the decoding is wrong.

2 Tone decode

Decode Format: the combination of decode, for example: A-B, you should make sure the frequency of first tone is A, and second tone is B. Other combination is similar.

# 5 Tone Operation




5 Tone encode
The write way is same with the DTMF.

5 Tone decode
Function: The function will be achieved when the radio receives the corresponding code.
Select: Turn on squelch
Stun/kill: same with DTMF
Wake: release the state of stun/kill

## Specification

| | | |
|---|---|---|
| **General** | Frequency range | 136-174 &400-480MHz |
| | Channels | 200 |
| | Frequency stability | ±1ppm |
| | Working temperature | -30 ~ + 60 |
| | Operating voltage | 13.8V DC |
| | Size (HxWxD) | 145x108x21.5mm |
| | Weight | 422g |
| **Receiver** | Receiver sensibility | 0.2μV @ 12dB SINAD |
| | Adjacent channel selectivity | ≤-60dB@12.5KHz |
| | Intermodulation | ≥60dB /≥65dB |
| | Spurious rejection | ≥70dB |
| | Audio response | +1～-3dB |
| | Audio distortion | <5% |
| | Audio power | 3W |
| | FM Hum and Noise | ≥45dB@25KHz /≥40dB @12.5KHz |
| **Transmitter** | RF output power | UHF ≥ 20W / VHF ＞20W , 140-160MHz up to 25W |
| | Transmit current | ≤4.5A |
| | Standby current | 0.2A |
| | FM modulation | 11kΦF3E / 16kΦF3E |
| | Modulation distortion | <5% |
| | FM Hum and Noise | ≥45dB@25KHz /≥40dB@12.5KHz |
| | Adjacent channel power | ≤-60dB@12.5KHz |
| | Audio response | +1～-3dB |




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