adi Communications

# AT-48




# USER MANUAL

# THANK YOU!

We are grateful that you chose adi for your land mobile radio applications. We believe this introduces innovative DSP digital signal processing technology easy-to-use transceiver will provide dependable and reliable communication to personal operating at peak efficiency.

adi transceivers incorporate the latest in advanced technology. As a result, we feel strongly that you will be pleased with the quality and features of this product!

# SAFETY INFORMATION FOR USER

adi transceiver is excellently designed with advanced technology. Please observe the following precautions to perform your obligation, prevent personal injury and ensure the safety of transceiver usage.

1. Keep the transceiver and accessories away from children.
2. Please do not try to open or modify the transceiver without permission, non-professionals process may also cause damage.
3. Please use assorted battery and charger to avoid damage.
4. Please use assorted antenna to ensure the communication distance.
5. Please do not expose the transceiver to long period of direct sunlight, nor place it close to heat appliances.
6. Please do not put the transceiver in excessively dusty or humid areas.
7. Do not use harsh chemicals, cleaning solvents to clean the transceiver.
8. Do not transmit without antenna.
9. When using this transceiver, we recommend transmitting for 1 minute then receiving for 4 minutes. Continuous transmitting for long time or working in high power will heat the back of the transceiver. Do not place the transceiver's hot back close to any surface of plastic.
10. If any abnormal odor or smoke detected coming from the transceiver, turn off the power and take off the battery pack and its case. Then contact local adi dealers.

ATTENTION:
All tips above apply to accessories of your adi transceiver. If any device can not work normally, please contact local adi dealers.
If you use any accessories made by other companies, adi Company does not guarantee the operability and safety of the transceiver.

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## ◦ UNPACKING

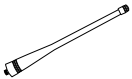
Carefully unpack the transceiver. We recommend you to identify the items listed in the following table before discarding the packing material. If any items are missing or have been damaged during shipment, please contact dealers immediately.

### Supplied Accessories

| Item | Quantity |
|---|---|
| Antenna | 1 |
| Li-ion Battery Pack | 1 |
| Battery Charger | 1 |
| Belt Clip | 1 |
| Instruction Manual | 1 |

## ○ STANDARD ACCESSORIES/OPTIONAL ACCESSORIES

### Standard Accessories


Antenna


Li-ion Battery Pack


Charger


Belt Clip


AC Adaptor


Instruction Manual

* Note: For frequency of antenna, please refer to label indicated in the bottom of the antenna.

### Optional Accessories


USB Programming Cable


Programming Software AT-48


Earpiece


Battery Pack for Car charger

## ◦ BATTERY INFORMATION

### Charging Operation

The battery pack is not charged at the factory; please charge it before use.
Charging the battery pack for the first time after purchase or extended storage (more than 2 moths) may not bring the battery pack to its normal operating capacity. After fully charging/ discharging cycle for two or three times, the operating capacity will reach its best performance. The battery pack life is over when its operating time decreases even though it is fully and correctly charged. Replace the battery pack.

### Charger Applied

Please use the specific charger appointed by our company. Other models may cause explosion and personal injury. After installing the battery pack, if the radio displays low battery with red flashing lamp or voice prompt, please charge the battery.

### NOTES

- ▼Do not shorten the battery terminals or throw the battery into fire. Never attempt to remove the casing from the battery pack. We show no responsibility on any results caused by modifying freely without permission of our factory.
- ▼The ambient temperature should be between 5℃ and 40℃ while charging is in progress. Charging outside this range may not fully charge the battery.
- ▼Always switch OFF the transceiver equipped with a battery pack before charging. Otherwise, it will interfere with correct charging.
- ▼To avoid interfering the charging, please do not cut off the power or take out the battery during charging.

## ○ BATTERY INFORMATION

▼Do not recharge the battery pack if it is already fully charged. This may shorten the life of the battery pack or damage the battery pack.

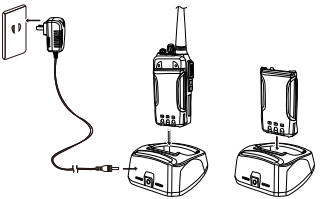
▼Do not charge the battery or transceiver if it is damp. Dry it before charging to avoid danger.

WARNING:

When keys, ornamental chain or other electric metals contact with the battery terminal, the battery may cause damage or hurt bodies. If the battery terminal short circuit it will generate a lot of heat. Take care when carrying and using the battery. Remember to put the battery or radio into insulated Container. Do not put it into metal container.

## How to Charge

1. Plug the charger into AC outlet . The indicator light shows in Green and Red light twinkles.
2. Plug the Li-ion battery or transceiver with Li-ion battery into the charger.
   A: Make sure that the battery terminals are in contact with charging terminals well.
   B: In the process of charging, the indicator turns to Red.
3. When the battery is fully charged, the indicator turns to green.



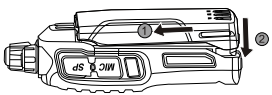
Charging Transceiver  Charging Battery

NOTE: It takes approximately 4 hours to fully charge the battery. The actual charging time depends on the capacity battery. Don't over-charge the battery as it will shorten the battery life and reduce its performance.

## Installing / Removing the Battery

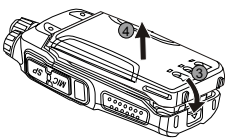
### Installing the Battery

1. Match the two grooves of the battery pack with the corresponding guides on the back of the transceiver, and then push it.
2. Press the button of battery , the latch in button of transceiver locks will release. After hearing a "click" sound ,the battery has been locked.




### Removing the Battery

According to "▼" to push the battery lock to remove the battery.



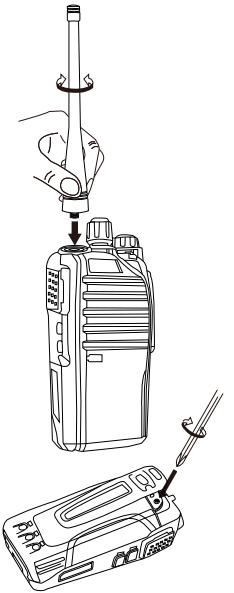
## Installing / Removing the Antenna

■ Installing the Antenna:

Screw the antenna into the connector on the top of the transceiver by holding the antenna at its base and turning it clockwise until secured.

■ Removing the Antenna:

Turn the antenna counterclockwise to remove it.



## Installing / Removing the Belt Clip

■ Installing the Belt Clip:

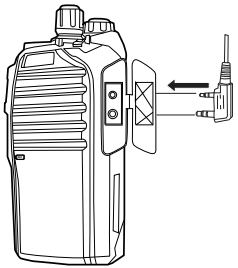
Place the belt clip to the grooves on the back of the transceiver, and then screw it clockwise.

■ Removing the Belt Clip:

Turn the screws counterclockwise to remove the belt clip.

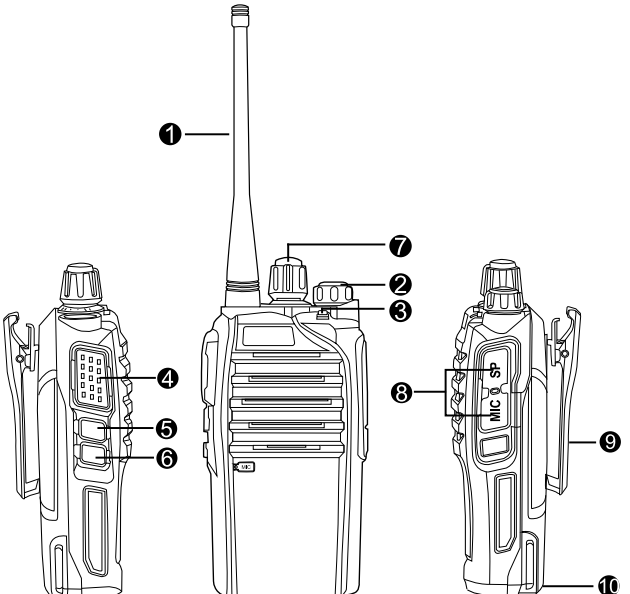
## Installing the Additional Speaker/ Microphone (Optional)

Unveil the MIC-SP jack cover and then insert the Speaker/Microphone plug into MIC-SP jack.



Note:
The transceiver is not completely waterproof while using the Speaker/Microphone.

## ◦ GETTING ACQUAINTED



## ◦ GETTING ACQUAINTED

❶ **Antenna**

❷ **POWER / VOLUME Switch:**

Turn clockwise to switch on the transceiver, and turn counterclockwise till hearing “Click” to switch off thetransceiver. After switching on the transceiver, turn clockwise to increase the volume and counterclockwise to decrease the volume.

❸ **Indicator light**

❹ **PTT Key**

When you are making a call, please press and hold this key to speak into the microphone. Release the key to receive.

❺ **PF1 Key**

It can realize different functions by programming.

❻ **PF2 Key**

It can realize different functions by programming.

❼ **Channel Selector Knob**

Turn the selector knob to select desired channel. Turn clockwise to increase channel, counterclockwise to decrease channel.

❽ **Additional Microphone / Speaker Jack ` Reading / Writing frequency Jack**

❾ **Belt Clip**

❿ **Battery Lock**

## Indicator Status and Beep

| | |
|---|---|
| Warning on low voltage | The red light twinkles, and the transceiver emits a low voltage beep at intervals of 30 seconds. |
| Transmitting | Lighten the red light. |
| Receiving | Lighten the green light. |
| Scan | Green light twinkles every second. |
| Reading/Writing Frequency | Reading Frequency: Red light twinkles<br>Writing Frequency: Green light twinkles |
| DTMF Successfully Decoded | Voice prompt or vibration(vibration function is option). |
| Key Operation | Voices "DU" into any function, "DU DU" or beep voice prompt to exit any function. |

## [PF1] & [PF2] Key Default

| | |
|---|---|
| Press [PF1] | Battery Capacity Enquiry |
| Press [PF2] | Squelch off |
| Press [PF1] 1 second | Monitor |
| Press [PF2] 1 second | Power Switch |
| Press [PF1] 3 seconds | On/Off VOX Function |

# ○ AUXILIARY FUNCTIONS

**Users can setup the key [PF1] and [PF2] to be one of the optional functions as follows :**

- ·Squelch off
- ·Monitor
- ·Current Channel Power Enquiry
- ·Scan
- ·Frequency Reverse
- ·Talk Around
- ·Battery Capacity Enquiry
- ·Call 1
- ·Call 2
- ·TX Power Switch
- ·Emergency Alarm

For better information on this part, please refer to the "Advanced Operation" instruction.

## ◦ BASIC OPERATIONS

### Switch on / off Transceiver

**Switch on Transceiver:** Under power-off state, turn POWER / VOLUME clockwise till hearing "**Click**" to switch on the transceiver. The transceiver will announce "**Power on**" when power-on and announce the current channel.

**Switch off Transceiver:** Under power-off state, turn POWER / VOLUME counterclockwise till hearing "**Click**" to switch off the transceiver.

### Adjusting Volume

Under power-on state, turn POWER / VOLUME switch to adjust the volume. Turn clockwise to increase the volume, and counterclockwise to decrease the volume.

NOTE: You can press the programmed key of squelch off [PF1] / [PF2] to monitor the background noise and meanwhile turn POWER / VOLUME to adjust the volume. Under the communicating state, you can adjust volume as per your need more accurately.

### Channels Selection

Under the standby conditions, turn channel selector knob to choose the desired channel, and the transceiver will announce the adjusted channel. Turn clockwise to increase the channel, counterclockwise to decrease the channel.

NOTE: The transceiver will emit a voice prompt when current channel is blank.

## ◦ BASIC OPERATIONS

### Receiving

You can hear the transmitting party's calling when the channel you are operating is called and the LED light turns green.

NOTE:
You may not receive the calling if you set a high squelch off level of the transceiver.
If current channel has been programmed with signaling, you can only hear the call from a same signaling, other calls can not be heard.

### Transmitting

Before transmitting, make sure that the channel you want to use is not in busy state through monitoring for a while by pressing the programmed Squelch off [**PF1**] / [**PF2**] key. Under these conditions, press the [**PTT**] key and speak into microphone. Please keep around 2.5-5cm distance between microphone and your lip. And please speak in normal tone to make the receiver obtain best tone quality.

Note: Press PTT, Red LED lighting means transmitting. Release PTT to receive signal.

## ◦ ADVANCED OPERATIONS

### Squelch Off

Pressing the programmed key of Squelch off [PF1]/[PF2], the squelch circuit is not mute and at present you can hear the background noise. Press this key again, the squelch circuit becomes mute. By using this function you can monitor the weaker signal which is hard to receive.

### Monitor

Pressing the programmed key of Monitor [PF1]/[PF2], the transceiver emits "DU" beep and then comes into the monitor state. Under these conditions, transceiver will ignore CTCSS/DCS decode and monitor signal of the other party as long as receiving the matched carrier wave. Press this key again, transceiver emits "Du Du" beep and exits the monitor state.

### Current Channel Power Enquiry

Under the standby conditions, press the programmed key of Current Channel Power Enquiry PF1 / PF2, transceiver announces the current channel power state.

### Scan

Scan function can be used in monitoring every channel of current group.
Under the standby conditions, press the programmed key of "Scan" [PF1] /[PF2], transceiver emits "DU" beep and comes into scan state. It scans channels in scan list one by one, and the Green light flashes once per second. When one channel receives a matching signal, the green light lighten and the transceiver temporarily stays in this channel till the signal disappears. Press the scan key again, transceiver emits "Du Du", exits scan and switches the working channel to returned channel which is programmed by users in advance (Please refer to return channel in the programming software).

## Frequency Reverse

Under standby conditions, press the programmed key of Frequency Reverse [PF1]/[PF2], transceiver emits "DU" beep and then comes into frequency reverse state. After that, the current channel RX frequency will be switch to TX frequency, and the CTCSS or DCS signal which has been setup will be also switched. Press this key again, the transceiver exits reverse function with "Du Du".

## Talk Around

Under the standby conditions, press the programmed key of Talk Around [PF1]/[PF2], transceiver emits "**DU**" and then the current channel comes into Talk Around state. Under these conditions, transceiver will transmit by receiving frequency. Also, the setting code (CTCSS / DCS) will interchange encoding signal as decoding signal.
Press this key again, transceiver emits "**DU DU**" and exits the Talk Around state.

NOTE: Under the talk around state, the transceiver can not communicate with other transceivers through repeaters.

## Battery Capacity Enquiry

Under the standby conditions, press the programmed key of "Battery Capacity Enquiry" [PF1]/[PF2], transceiver announce current battery capacity. There are 10 grades in total. Grade 10th means full battery capacity.
When the battery state is grade 1th (6.1V), the LED lights red. The transceiver will voice prompt users to charge timely and also enter automatically the state of no transmission.

## ◦ ADVANCED OPERATIONS

### Power Switch

Under the standby conditions, press the programmed key of "Power Switch" [PF1]/[PF2], transceiver change the current channel power and announces.

### Call 1/Call 2

Under the standby conditions, press the programmed key of "Call 1/Call 2" [PF1]/[PF2] to transmit the prestored and selected DTMF signaling.

### Emergency Alarm Function

Under the standby conditions, press the programmed key of "Emergency Alarm" [PF1]/[PF2] , transceiver emits "DU" to start the Emergency Alarm Function. Once this function is enabled, the transceiver will voice alarm beep, start transmitting and send the alarm beep to companions or systems. Restart the power supply to exit the emergency alarm function.

NOTE: This function is related to alarm lock, need to enable this function via programming software.

### ON/OFF VOX

When turn on this function, it's not necessary to press the PTT, through the appropriate voice can star emission.

In standby, press and hold PF1 more than 3 seconds, the transceiver will send a prompt voice and turn on VOX function. Repeat the above operation or restart will turn off the VOX function..

NOTE: VOX needs to be programmed under... valid status firstly otherwise, the above operation is invalid.

## CTCSS / DCS Encode and Decode

When this function is enabled, the transceiver can receive only the matched signaling. However, the transceivers with or without matched CTCSS/DCS can both hear your call.

## Optional Signaling (DTMF)

Users can enable or disable the Optional Signaling in every channel by programming software. This Signaling function is similar to CTCSS/DCS which embodies functions as Selective Call, Group Call, All Call, PTT ID, Remotely stun,kill and Waken.

1. **PTT ID:** If current channel is edited with PTT ID, the transceiver will send transmitting ID when pressing or releasing PTT key.
2. You can set group call wildcard for each group by programming software. (DTMF character A. B.C.D.*** or "#").

The caller can call different groups by sending different group call codes. When the receiving party receives a valid ID code, one or all of the characters would be replaced by wildcard characters and the receiving part can realize all calls, group call or selective call. It is much easy and flexible to realize all calls, group call and etc by group call code.

**For example:**
**Group code :"C"**

| | Radio A | Radio B | Radio C | Radio D |
|---|---|---|---|---|
| ID code of the receiving party is | 123 | 223 | 235 | 355. |

If the calling party uses "**C23**" to call, Radio A and Radio B will receive the call.
If the calling party uses"**CC5**" to call, Radio C and Radio D will receive the call.
If the calling party uses "**CCC**" to call, All Radios would receive the call..

This transceiver is set with 16 groups of DTMF code,user can program and use them flexibly.

## Signaling Relations Setup

User can set relations between CTCSS/DCS signal and DTMF signal by programming software.
**AND:** Only when a matching CTCSS/DCS signal and a DTMF signal are received, calling of other party can be heard.
**OR:** As long as a matching CTCSS/DCS signal or a DTMF signal is received, calling of the other party can be heard.

## Wide / Narrow Band Setup

On the basis of national conditions, users can set channel spacing as 25K (wide band), and 12.5K (narrow band) to communicate on the transceiver by programming software.
This transceiver can realize 25k ( wide band) or 12.5K ( narrow band) etc. communication mode.

## Accession to Scan List

Via programming software, users can choose whether add current channel into scan list or not. If current channel is not in the scan list, the transceiver will skip this channel.

## Busy Channel Lockout

When BCL function is enabled, you can not transmit in busy channel. BCL prevents you from interfering with other parties who is using the same frequency point that you select. Under this condition, if you press the [PTT] to transmit, the transceiver will emit beep prompt and return to receiving mode.

Users can set Busy Channel Lockout mode by programming software.

1. **Repeater:** Repeat lockout, transmitting is inhibited when current channel receives a matched carrier but with different CTCSS/DCS.
2. **Carrier wave:** Carrier busy lockout, transmitting is inhibited when current channel receives a matched carrier wave.
3. **Close**: BCL disabled, you can do transmission under whatever receiving state.

## Time-out Timer

The purpose of the Time-out Timer is to prevent any caller from using a channel for an extender period of time. If you continuously transmit for a period of time that exceeds the programmed time set in advance, the transceiver will stop transmitting with voice prompt.
Users can set TOT timer by programming software.

## Time-Out Timer Pre-Alarm

The Time-Out Timer Pre-Alarm is to alarm users that overtime transmission is going to happen.
Users can program desired TOT Pre-Alarm time by programming software.

## ◦ ADVANCED OPERATIONS

### Voice Prompt

This function is to identify the radio input operation ,operator error or a fault condition prompts. There are Chinese report or English report. Users can program desired beep by programming software.

### Battery Save Setup

When this function is enabled, the transceiver can efficiently reduce battery consumption. The transceiver will automatically switch on Battery Save Function when not receiving and signal or making any operations. But when the transceiver receives a matching signal or make operation it will automatically exits this function.
There are three modes 1:4, 1:8, 1:16 for option, user can set it by programming software.

### Priority Scan Setup

There are two priority-channel settings of this transceiver, "fixed" and "selected".Users can set the desired priority scan, under scanning and without signaling, it will scan every channel and scan priority channel at a time. When the non-priority channel receives signal, it will test priority channel according to flyback time "A" and flyback time "B" setup by users.

### Return to Appointed Channel

During scan process, press PTT key to transmit or stop scanning, then the transceiver will return to appointed channel. This transceiver is setup with different ways to return to appointed channel. Users can choose the desired way by programming software.

## ◦ ADVANCED OPERATIONS

### Expand Frequency

Users can set the expand frequency via programming software, the range of expand frequency is 400~520MHz.

### Eliminating Tail without signaling

When transceiver without CTCSS/DCS, choose this option and write into transceiver to eliminate tail voice.

NOTE: The receiver and transmitter must choose this function so that it can eliminate the end voice effective

### Resume Factory Default

Once transceiver works abnormally for wrong operations or wrong programming, users can start this function to resume all functions and channels as Factory Default.
Under power off state, press [PTT] and [PF1] key same time to switch on transceiver. Holding the two keys till hear " click" beep to release the two keys, the transceiver will resume factory default.

### Maintaining and Cleaning

Cover the jack with its opercula when the transceiver is not in use. After long-time use of the transceiver, keys, control buttons and housing would become dirty. Then, neutral detergent (no corrosive chemical agent) and wet cloth can be used to clean them.

## ○ PROGRAMMING SOFTWARE LNSTALLING & STARTING (TAKES WINDOWS XP AS AN EXAMPLE)

1. Double-click “AT_48_Setup.EXE”, and then install the software as per computer instructions.
2. Click "START" menu, select and click "USB TO COM PORT" in the "AT_48" program from "ALL PROGRAM".
3. Connect the optional USB cable to the USB port in PC device and connect the transceiver with the other end of cable.
4. Double click "AT_48" setup short-cut icon or click "START" menu to choose AT_48 entry in the AT_48 program from "ALL PROGRAMS" menu .
5. As per computer command, choose serial port "COM Port" firstly , then click OK to start programming software.

**TIPS:**

In one individual computer, users need to choose different COM Port number when USB cable is connected with different USB port.

To program frequency, power on the transceiver firstly. Do not power on/off the transceiver when it is connected with computer. Otherwise, the transceiver can not read or write frequency well.

NOTE: The programming software of this transceiver has identifying system. Therefore, when you start programming software at the first time, you should connect the transceiver and then you can run the software, otherwise the software cannot be run.

# ○ TECHNICAL SPECIFICATIONS

| General | |
|---|---|
| Frequency Range | VHF:136~174MHz<br>UHF: 400~520MHz |
| Channel Capacity | 16 channels |
| Channel Spacing | 25KHz (Wide Band)<br>12.5KHz (Narrow Band) |
| Phase-locked Step | 5KHz, 6.25KHz |
| Operating Voltage | 7.4V DC |
| Battery Life | More than 12 Hours (1500mAh), by 5-5-90 work cycle |
| Frequency Stability | ±2.5ppm |
| Operating Temperature | -20℃~ +55℃ |
| Size | 127×60×35mm (with battery pack) |
| Weight | 219 g (with battery pack, antenna) |

| Receiving Part | | |
|---|---|---|
| | Wide band | Narrow band |
| Sensitivity(12dB SINAD) | ≤0.25μV | ≤0.3μV |
| Adjacent Channel Selectivity | ≥60dB | ≥60dB |
| Intermodulation | ≥60dB | ≥60dB |
| Spurious Rejection | ≥80dB | ≥80dB |
| Audio Response | 6dB/per interval | 6dB/per interval |
| Hum & Noise | ≥50dB | ⩾45dB |
| Audio Distortion | ≤5% | |
| Audio Power Output | 500mW/10% | |

| Transmitting Part | | |
|---|---|---|
| | Wide band | Narrow band |
| Power Output | 5W/1W | |
| Modulation | 16KΦF3E | 11KΦF3E |
| Adjacent Channel Power | ≥60dB | ≥60dB |
| Hum & Noise | ≥45dB | ≥40dB |
| Spurious Emission | ≤-36dB | ≤-36dB |
| Audio Response | 6dB/per interval | 6dB/per interval |
| Audio Distortion | ≤5% | |

## ◦ TROUBLE SHOOTING GUIDE

| Problem | Corrective Action |
|---|---|
| No Power | A. The battery pack may be exhausting. Recharge or replace the battery pack.<br>B. The battery pack may not be installed correctly. Remove the battery pack and install it again.<br>C. The power switch is broken; send it to local dealers to repair.<br>D. Battery touch is broken; send it to local dealers to repair. |
| Battery power dies shortly after correctly charging. | The battery pack life is finished. Replace the battery pack with a new one. |
| Transceiver cannot scan | The channels are not in scan list. (Professionals set it.) |
| All band noisy after programmed or green light always lightens | Turn on squelch when programmed. Non-professionals are advised not to adjust this function. |
| No sound after using microphone for a while | Earphone jack is broken. (Please contact with local dealers to repair it.) |
| Communication distance becomes short, and it is low sensitivity | A. Check whether the antenna is in good condition and the antenna base do not come adrift.<br>B. Users select wrong frequency type which is not in accord with this transceiver when programming.<br>C. Whether it has set in low power output. (Please contact with local dealers to repair it.) |

## ◦ TROUBLE SHOOTING GUIDE

| | |
|---|---|
| Cannot talk to or hear other members in your group | A. Different frequency or channel, please change it.<br>B. Different CTCSS / DCS please reset it.<br>C. Out of communication range. |
| Can not power on or frequent power-off | Check whether the battery touch is out of sharp or broken. |
| The receiver gets low or intermittent voice from the caller | Check weather the MIC is stoppage. (Otherwise, please contact with local dealers to repair it.) |
| Unstable communication with loud background noise | Out of communication range or obstruct by tall buildings or in basement and so on. |
| Loudspeaker become lower or with “ka ka” sound after using a certain time | Check whether the loudspeaker net is broken. Iron powder or sundries is in the loudspeaker. (Please contact with local dealers to repair it.) |
| Receive voice from the other party but can not transmit | Check [PTT] key. (Please contact with local dealers to repair it.) |
| Receiving Indicator (green light) lightens but no sound | A. Low volume, please turn on clockwise.<br>B. Loudspeaker is broken. (Please contact with local dealers to repair it.)<br>C. Earphone jack is broken. (Please contact with local dealers to repair it.)<br>D. Volume switch is broken. (Please contact with local dealers to repair it.) |

## ◦ ATTACHED CHART

### CTCSS Frequency Chart

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 67.0 | 12 | 97.4 | 23 | 141.3 | 34 | 179.9 | 45 | 225.7 |
| 2 | 69.3 | 13 | 100.0 | 24 | 146.2 | 35 | 183.5 | 46 | 229.1 |
| 3 | 71.9 | 14 | 103.5 | 25 | 151.4 | 36 | 186.2 | 47 | 233.6 |
| 4 | 74.4 | 15 | 107.2 | 26 | 156.7 | 37 | 189.9 | 48 | 241.8 |
| 5 | 77.0 | 16 | 110.9 | 27 | 159.8 | 38 | 192.8 | 49 | 250.3 |
| 6 | 79.7 | 17 | 114.8 | 28 | 162.2 | 39 | 196.6 | 50 | 254.1 |
| 7 | 82.5 | 18 | 118.8 | 29 | 165.5 | 40 | 199.5 | | |
| 8 | 85.4 | 19 | 123.0 | 30 | 167.9 | 41 | 203.5 | | |
| 9 | 88.5 | 20 | 127.3 | 31 | 171.3 | 42 | 206.5 | | |
| 10 | 91.5 | 21 | 131.8 | 32 | 173.8 | 43 | 210.7 | | |
| 11 | 94.8 | 22 | 136.5 | 33 | 177.3 | 44 | 218.1 | | |

## DCS Chart

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 017 | 18 | 073 | 35 | 165 | 52 | 261 | 69 | 356 | 86 | 464 | 103 | 632 |
| 2 | 023 | 19 | 074 | 36 | 172 | 53 | 263 | 70 | 364 | 87 | 465 | 104 | 645 |
| 3 | 025 | 20 | 114 | 37 | 174 | 54 | 265 | 71 | 365 | 88 | 466 | 105 | 654 |
| 4 | 026 | 21 | 115 | 38 | 205 | 55 | 266 | 72 | 371 | 89 | 503 | 106 | 662 |
| 5 | 031 | 22 | 116 | 39 | 212 | 56 | 271 | 73 | 411 | 90 | 506 | 107 | 664 |
| 6 | 032 | 23 | 122 | 40 | 217 | 57 | 274 | 74 | 412 | 91 | 516 | 108 | 703 |
| 7 | 036 | 24 | 125 | 41 | 223 | 58 | 305 | 75 | 413 | 92 | 523 | 109 | 712 |
| 8 | 043 | 25 | 131 | 42 | 225 | 59 | 306 | 76 | 423 | 93 | 526 | 110 | 723 |
| 9 | 047 | 26 | 132 | 43 | 226 | 60 | 311 | 77 | 425 | 94 | 532 | 111 | 731 |
| 10 | 050 | 27 | 134 | 44 | 243 | 61 | 315 | 78 | 431 | 95 | 534 | 112 | 732 |
| 11 | 051 | 28 | 135 | 45 | 244 | 62 | 325 | 79 | 432 | 96 | 546 | 113 | 734 |
| 12 | 053 | 29 | 143 | 46 | 245 | 63 | 331 | 80 | 445 | 97 | 565 | 114 | 743 |
| 13 | 054 | 30 | 145 | 47 | 246 | 64 | 332 | 81 | 446 | 98 | 606 | 115 | 754 |
| 14 | 055 | 31 | 152 | 48 | 251 | 65 | 343 | 82 | 452 | 99 | 612 | 116 | 765 |
| 15 | 065 | 32 | 155 | 49 | 252 | 66 | 345 | 83 | 454 | 100 | 624 | | |
| 16 | 071 | 33 | 156 | 50 | 254 | 67 | 346 | 84 | 455 | 101 | 627 | | |
| 17 | 072 | 34 | 162 | 51 | 255 | 68 | 351 | 85 | 462 | 102 | 631 | | |

**NOTE:** 1. "N" stands for positive code. "I" stands for inverted code. 232 groups of DCS in total.

2. Overstriking marks are non-standard DCS.

adi Communications