BelFone

www.belfone.com

BF-TD520

Commercial Portable Radio

Notice to the user

Government law prohibits the operation of unlicensed radio transmitters within the territories under government control.
Illegal operation is punishable by fine or imprisonment or both.

Acknowledgement!

Thank you for choosing BelFone series professional radio communication products!

Since 1989, BelFone has been dedicated to research and exploration in the field of radio communication technology throughout the decades, and has developed leading smart technology in the industry. Underpinned by research, development and design geared towards modern complicated and changeable communication environment, it is capable of tailoring specific communication solutions to your needs based on features of your industry. Superior products with outstanding performance may help you control the overall situation, while providing you with the best choice for smart scheduling and instructions communicating.

This operation manual is applicable to
BF-TD520 series

Warning!

◆In explosive atmospheres(inflammable gas, dust particles, powder-covered area, etc.),Please turn the power off.

Instructions before Use

Following the safety precautions below may prevent damage to this product and personal injuries. To avoid potential risks, please read these instructions carefully before using the product, and operate the product as instructed.

◆The recommended usage rate is 1 minute for TX and 4 minutes for RX, Continuously TX will let the radio rear surface will be in a high temperature state, When placing the radio, do not make the rear part touch the surface of objects with low melting point and low ignition point (such as plastic, etc.);

◆The radio shall be protected from long-time direct exposure to the sun, kept in a place away from high temperature, high humidity, high dustiness or water splashes, and put on a stable surface;

◆Where use of the radio is prohibited or use of intercommunication may cause interference or danger, the radio shall have its power turned off as required by relevant regulations;

◆Please avoid to use the radio while driving, which may be against the Traffic Rules;

◆If you find any fault of the product, please turn off the power immediately, and then contact the local distributor of BelFone; unless otherwise specified in this Manual, maintenance shall not be performed by any person other than a maintenance worker authorized by BelFone Company;

◆ If this product is needed for further development, please contact BelFone Company or BelFone's distributor;

◆Do maintain the product surface clean and dry; for cleaning, use a piece of soft cloth dipped with mild detergent or clear water (without water dripping) to wipe the product surface.

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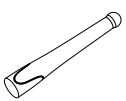
Unpacking and Device Inspection

Note: The following instructions regarding unpacking are only for BelFone's distributors, and service agencies or factories authorized by BelFone.
Be careful when taking the device out of the packing box. You'd better count the accessories against the following list before discarding the packaging. If you find any item is missing or damaged, please contact the local distributor of BelFone or directly contact BelFone Communication immediately.

Accessories supplied along the device

Items	Quantity
Antenna	1
Strap	1
Belt Clip	1
Charger	1
Li-ion Battery	1
Screws	1
User Manual	1
Warranty Card	1
Certificate	1

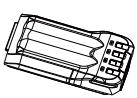
Antenna



Strap

Charger

Li-ion Battery



Belt Clip

Screws

Installation of Accessories

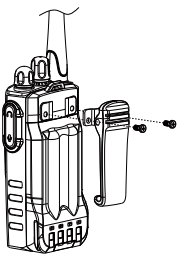
Installation/ removing the antenna

Hold the antenna base, screw it into the connector at the top of the radio until fasten.

Turn the antenna anti-clockwise to remove it.

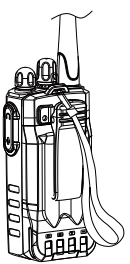
Installation/ removing the belt clip

Attach the belt clip using the two supplied3*7mm binding screws.



Attaching/ removing the strap

Thread the hand strap to the loop back of your two-way radio.

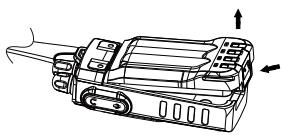


Attaching/Removing the Battery

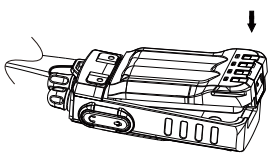
Warning!

- 1. Don't short-circuit the battery, which may cause damaged or catch fire;
- 2. Never to remove the case of the battery, prevent battery short circuit;
- 3. Battery is flammable and explosive, don't throw it into fire or don't use it in dangerous area, such as gas stations

Following the guide, insert the contact side of the battery first, gently pushes the battery into place until hear "click" and slide battery latch into lock position.



To remove the battery, please turn the power off, release latch to unlock the battery, and pull it away from the radio.



Note: Do not insert or remove the battery if the radio is on.

Battery Information

New battery shipped from the factory is not fully charged, so please charge it for 5 hours before initial use. After three full charge and discharge cycles, battery capacity and performance can reach the best condition. Please recharge/charge the battery in low power level.

Applicable Battery

To reduce the risk of injury, please only use the battery and charger specified by Belfone, other batteries may burst, causing bodily injury and property damage.

Battery Tips

1.Batteries charge best at room temperature within 5℃—40℃, or it'll lead to battery leakage and damage.
2.Prior to charging a battery with the radio, it is recommended to turn the radio off.
3.Avoid cut off the power supply or remove the battery during charging.
4.Please ensure that the battery is charged in a dry state before charging.
5.Please change the battery when working time is shorten than normal performance even if the battery is fully charged.

Extend Battery Life

1.The battery performance will be decreased under 0℃. Please prepare a spare battery in cold weather. A battery not work properly in a cold environment does not mean that it is damaged. Please keep the battery and reconfirm at room temperature.
2.The dust on the battery contact point may cause battery faulty, please cleaning it by a dry cloth before using.

Battery Storage

1.Fully charge the battery before long-term storage, to avoid battery damage due to over-discharge.
2.Recharge a battery after several months' storage, to avoid battery capacity reduction due to over-discharge.(NI-MH batteries:3 months, Li-Ion& Li-polymer batteries: 6 months)
3.Store your battery in a cool, dry place under room temperature, to reduce self-discharge.

Charging the battery

Use only the charger specified by the manufacturer, the charge indicator indicates the charging progress.

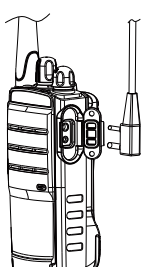
Charger Status	Charger Indicator
Standby(No-load)	Green
Battery is charging	Red
Battery is fully charged	Green

Charging Procedure:

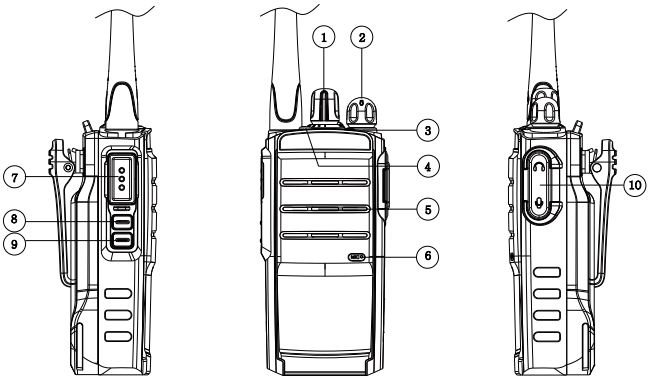
1.Plug the AC connector of the charger into the AC outlet socket, the charger indicator glows green;
2.Plug the battery or the radio with battery into the charger;
3.Making sure the battery plugs the charger, the charging process initiates when the charger indicator glows red;
4.The charger indicator glows green when the battery is fully charged, please remove the battery.
Note: While charging the temperature out of the limit, or battery has damaged, or battery is not connected, the LED indicator of charger will flash red and green.

Attaching the Speaker/ Microphone

Open the accessory port cover, then align the plug with the accessory port.



Get Familiar with the Device



①	Channel Selector Knob	⑥	Microphone(MIC)
②	Power &Volume Knob	⑦	PTT key
③	LED Indicator	⑧	Button 1
④	Orange Button	⑨	Button 2
⑤	Speaker	⑩	MIC-SP Jack

Basic Operation

Power on /off

Rotate the power &volume knob clockwise to turn the power on.

Rotate the power &volume knob anti-clockwise to turn the power off.

Adjusting the volume

After the radio is powered on, you can rotate the power &volume knob to adjust the volume level, rotate the knob clockwise to increase the volume, or rotate the knob anti-clockwise to decrease the volume.

Selecting a Channel

Turn the channel selector knob to select channel 1 to 16, rotate the knob clockwise to increase the channel number, or rotate the knob anti-clockwise to decrease the channel number, while enable all tone alert, switch channel will play the current channel number voice.

Note: If a channel is not programmed, LED indicator flash red and a prompt tone "no channel "sounds.

Switch a Zone

The radio can support up to 16 zones, and each zone include a maximum of 16 channels, that means the radio support up to 256 channels. You may select a desire zone by pressing [Zone] function button (if defined in the programming software) to switch the zone. While enable all tone alert, select zone will play the current zone number voice.

Dual Modes Switching

If current channel mode is D/A compatible, press preprogrammed [AD Switch] key to switch the channel mode. The current channel mode is digital compatible analog , press preprogrammed [AD Switch] key to switch to analog compatible digital mode; the current channel mode is analog compatible digital, press preprogrammed [AD Switch] key to switch to digital compatible analog mode.

Note: Analog/Digital Switch function only switching the channel mode temporarily, while you restart the radio or changing channel by the knob, the current channel will resume to default mode.

Call

Each digital channel you may initiate a private call, a group call or an all call; On analog compatible digital channel press PTT key, if is not within hang time to transmit analog call, within the hang time to call back; On digital compatible analog channel press PTT key, if is not within hang time to initiate a digital call, within hang time to call back. To transmit press and hold down the PTT key, LED indication glows red, speak into the microphone, hold the palm microphone approximately 3 to 4 centimeters away from your mouth.

1.)Group Call

To initiate a group call, the radio will add the group contact via the programming software. If you preset a group call contact for current digital channel, press PTT key to initiate a group call. Also allow set the one touch call key as group call feature, then to initiate a group call. Release PTT key to exit transmitting.

2.)Private Call

To initiate a private call, the radio will add the private contact via the programmable software. If you preset a private call contact for current digital channel, press PTT key to initiate a private call. Also allow set the one touch call key as private call feature, then to initiate a private call. Release PTT key to exit transmitting. If the feature “private call ACK” is enabled, to transmit a private call need to confirm whether target device is power on or activate on the current channel.

3.)All Call

If you preset an all call contact for current digital channel, press PTT key to initiate an all call, release PTT key to exit transmitting.

Receiving

While a call is received on current channel, LED indicator glows green. While a group or private call is received, you may press the PTT key within the preset time period to call back. On compatible channel, while receiving, the radio detect digital and analog signal (is must attach to CTCSS/CDCSS) simultaneously, if detected matching signal, within the preset time period to call back.

Call and receiving on analog Channel

On analog channel press and hold down the PTT key to transmit, LED indication glows red, speak into the microphone, and hold the palm microphone approximately 3 to 4 centimeters away from your mouth.

Button Configuration

Use the customer programming software to configure orange button, button1, button2 to pressing and holding-down operation.

Programmable buttons are including functions listed below:

1	Unassigned	The key is not assigned with any function
2	One Touch Call 1~6	To quick access a service as: group call, private call, private message, group message, and call alert.
3	Emergency on/off	Allow user to make an emergency call
4	Monitor	Enable monitor function.
5	Scan on/off	To enable or disable the scan function.
6	All alert tone on/off	To enable or disable all alert tones
7	Battery Indication	Quick to view battery capacity
8	Zone Toggle:	Quick access to [Zone Toggle]
9	AD Switch	To temporarily switch channel mode to AD or DA on digital analog compatible channel.
10	Power Switch	To switch High/Middle/Low Power quickly
11	Repeater/talk around	To enable or disable talk around quickly
12	Vox on/off:	To enable or disable VOX quickly
13	Nuisance Delete	To temporarily ignore unwanted channel activity
14	Permanent Monitor	To enable or disable permanent monitor function

Functions and Operations

Scan

Scan is useful for monitoring signals on the radio channels which is configured the scan list. While scanning, the radio checks for a signal on each channel and only stops on a channel if a signal is present. Press programmed [Scan on/off] key to begin scanning, while scanning on, a “scan on” sounds, LED indicator flash red. While scanning off, a “scan off” sounds

Auto Scan

If Auto Scan feature is enabled for a channel, the radio will automatically enter scan mode when it is switched to this channel. To stop scanning, press programmed [Scan On/Off] key or switch to other channels. If return to the channel will enter scan mode directly.

Monitor and Permanent Monitor

Monitor: On analog or digital channel, enable the Monitor feature to monitor current channel activities and receive weak signals. Press the programmed [Monitor] key to activate the monitor function, if a signal is detected, until the signal is no longer present the radio will exit monitor mode.

Permanent Monitor: Permanent monitor feature is the same as monitor, but long press the [Permanent Monitor] key to enter monitor mode, the radio will remain on monitor mode until long press it again to exit.

Message

On digital channel and digital mode compatible channel, you can send preset messages by programmed [one touch call] key.

One Touch Call

On digital channel and digital mode compatible channel, one touch call feature contains: to send messages or transmit to a group call contact, to send messages or send call alert and transmit to a private call contact.

Talk Around

When your repeater malfunctions, or when radio is out of repeater's range, you can continue to communicate in talk around mode. While enable talk around feature, by this time TX frequency is the same as to RX frequency. Press the programmed Repeater/Talk Around key to switch between repeater modes and talk around mode. Switch to talk around, a "talk around" sound; switch to repeater mode, a "repeater" sounds.

Note：**To enable this function, TX frequency should be different from RX frequency, and the channel will set as allow talk around on the programmable software.**

TX Power

You can switch power levels to Low, Middle or High. If you communicate with radio located at a distant place please select High power; if you communicate with radio located at a close place please select Low power to save battery. Press the programmed [Power Switch] key to switch between high power, middle power and low power. Switch to high power, a "high power" sounds; switch to middle power, a "middle power" sounds; switch to low power, a "low power" sounds.

Press programmed [Power Switch] key to switch power level or select power level via programmable software

Bandwidth

On analog mode, there are two types of bandwidth available, you can choose bandwidth as wide (25 KHz) or narrow (12.5 kHz) via programmable software.

Squelch Level

On analog mode and digital mode compatible channel, this feature allows you to adjust the squelch threshold for the radio to receive audio. You can set squelch level as 0~9. High level requires stronger signal for the radio to un-mute.

Emergency

The digital channel and digital analog compatible channel support the emergency alarm function. In case of an emergency you can enter emergency mode to ask for help. While current channel add emergency system, you may enable the feature. The emergency modes and emergency types are configured via the programming software. You can short press orange key to send emergency information or long press to exit the emergency mode.

Alone Worker

This function is useful for persons who work lonely and encounter an incident; you cannot press any keys or transmit audio within the preset period time. The radio will alarm automatically to ask help. Via the programmable software to enable the feature, and setting work alone response time, work alone warn time, work alone response operation.

Time Out Timer (TOT)

The purpose of TOT is to prevent any user occupy a channel for an extended period. If a channel is busy, the time will be shorter. If the preset time (default as 300s) expires, the radio will generate beep and terminate transmission automatically.

Voice Encryption

The voice encryption can encrypt your audio signals to guarantee the privacy of your communication, via the programmable software user can select encryption type as static or dynamic. If the encrypt feature is enabled, the transmitter and receiver will be set as the same encryption type and same voice encryption key, otherwise the receiver is mute.

Note: This feature is effective on digital channel, if enable voice encryption feature, the voice encryption key must be 10 characters, there are including letters and numbers.

VOX

If enable VOX feature you can enjoy hands-free communication, the radio will automatically begin transmitting when you speaking, and terminate transmitting when you stop talking with no need of PTT press. You may set VOX level as1~8 or disable (Off). When the environment too much noise, VOX level will be higher, when the environment is quiet, VOX level will be lower. If the VOX level is set as off via the programmable software, press programmed [VOX on/off] key can't enable VOX feature, if the VOX level is set as 1 to 8, press programmed VOX on/off key can enable or disable VOX feature.

Tone Alerts

Voice Indication

If enable voice indication feature, the radio will give tone indication for channel change, zone change, power level switch, scan feature enable or disable, VOX on or off, low battery alert, repeater mode or talk around mode switch and etc.

Channel Free Indication

On digital mode, if enable Channel Free Indication feature, the receiver gives a high-pitched tone indication while the transmitter release PTT key to stop transmitting.

Talk Permit Indication

There are four options are available for Talk Permit Indication feature: None (the radio does not give any tone indication for transmission on analog and digital channel), Analog (the radio gives tone indication for transmission on analog channel), Analog & Digital (the radio gives tone indication for transmission on analog and digital channel), Digital (the radio gives tone indication for transmission on digital channel).

Reject Stranger Call

On digital mode, if enable reject strange call feature, while the call ID not exist in the contacts list, it's unable to transmit or receive. When received group call or all call, the device ID of transmitter and group call ID or all call ID should preset on address list.

TX Permission

Digital Channel

This feature can restrict the channel if it is already in use you will be unable to transmit. There are three options available: always, color code free, channel free, if choose always, whenever press PTT key to transmit directly; If choose color code free, you will be unable to transmit on the channel if the color code is already in use; If choose channel free, you will be unable to transmit on the channel if it is already in use. If the channel is busy, press PTT key a low-pitched tone will sound.

Analog Channel

This feature can restrict the channel if it is already in use you will be unable to transmit. There are three options available: Off, Carrier, CTCSS/CDCSS, if choose off, whenever press PTT key to transmit directly; If choose carrier, you will be unable to transmit on the channel if the channel is being used by others; If choose CTCSS/CDCSS, you will be unable to transmit on the channel if it is already in use and the CTCSS/CDCSS code in use. If the channel is busy, press PTT key a low-pitched tone will sound.

Battery Saver

This feature allows an idler radio to automatically enter battery saver mode, the mode will extend battery service life, but response time may be delayed. You can set battery saver time ratio as: 1:1, 1:2, 1:3, 1:4, the time rate is smaller, the power saving more evidently.

Lowery Battery Alert

When your battery gets low, LED indicator glows red and with a warning tone: “Please Charge”, please replace the battery or charge the battery in time. The radio will turn off automatically while battery is too low.

CTCSS/CDCSS

On analog channel and digital analog compatible channel, you can set unique CTCSS/CDCSS to guarantee the privacy of your communication, on digital compatible analog or analog compatible digital channel there must have a CTCSS/CDCSS. If CTCSS/CDCSS has been set on the current channel, CTCSS/CDCSS match is required for the radio to receive an incoming signal. You can select a CTCSS/CDCSS from CTCSS frequency table or CDCSS code table, or input non-standard CTCSS/CDCSS manually.

- **Decode:** Only when receiver receives a call containing matching the decode, you can hear the call;
- **Encode:** Signal that you transmit will only be heard by parties whose CTCSS/CDCSS signaling matches your radios.

Note: **The radio approve of non-standard code, on analog mode, you can input non-standard code manually as you need.**

CTCSS Standard Frequency Table

CTCSS No.	Freq. [Hz]	CTCSS No.	Freq. [Hz]	CTCSS No.	Freq. [Hz]	CTCSS No.	Freq. [Hz]
1	67.0	11	94.8	21	131.8	31	186.2
2	69.3	12	97.4	22	136.5	32	192.8
3	71.9	13	100.0	23	141.3	33	203.5
4	74.4	14	103.5	24	146.2	34	210.7
5	77.0	15	107.2	25	151.4	35	218.1
6	79.7	16	110.9	26	156.7	36	225.7
7	82.5	17	114.8	27	162.2	37	233.6
8	85.4	18	118.8	28	167.9	38	241.8
9	88.5	19	123.0	29	173.8	39	250.3
10	91.5	20	127.3	30	179.9		

CDCSS Standard Code Table

NO	Normal	Inverted	NO	Normal	Inverted	NO	Normal	Inverted
1	D023N	D023I	29	D174N	D174I	57	D445N	D445I
2	D025N	D025I	30	D205N	D205I	58	D464N	D464I
3	D026N	D026I	31	D223N	D223I	59	D465N	D465I
4	D031N	D031I	32	D226N	D226I	60	D466N	D466I
5	D032N	D032I	33	D243N	D243I	61	D503N	D503I
6	D043N	D043I	34	D244N	D244I	62	D506N	D506I
7	D047N	D047I	35	D245N	D245I	63	D516N	D516I
8	D051N	D051I	36	D251N	D251I	64	D532N	D532I
9	D054N	D054I	37	D261N	D261I	65	D546N	D546I
10	D065N	D065I	38	D263N	D263I	66	D565N	D565I
11	D071N	D071I	39	D265N	D265I	67	D606N	D606I
12	D072N	D072I	40	D271N	D271I	68	D612N	D612I
13	D073N	D073I	41	D306N	D306I	69	D624N	D624I
14	D074N	D074I	42	D311N	D311I	70	D627N	D627I
15	D114N	D114I	43	D315N	D315I	71	D631N	D631I
16	D115N	D115I	44	D331N	D331I	72	D632N	D632I
17	D116N	D116I	45	D343N	D343I	73	D654N	D654I
18	D125N	D125I	46	D346N	D346I	74	D662N	D662I
19	D131N	D131I	47	D351N	D351I	75	D664N	D664I
20	D132N	D132I	48	D364N	D364I	76	D703N	D703I
21	D134N	D134I	49	D365N	D365I	77	D712N	D712I
22	D143N	D143I	50	D371N	D371I	78	D723N	D723I
23	D152N	D152I	51	D411N	D411I	79	D731N	D731I
24	D155N	D155I	52	D412N	D412I	80	D732N	D732I
25	D156N	D156I	53	D413N	D413I	81	D734N	D734I
26	D162N	D162I	54	D423N	D423I	82	D743N	D743I
27	D165N	D165I	55	D431N	D431I	83	D754N	D754I
28	D172N	D172I	56	D432N	D432I			

Specifications

General	
Optional Frequency Range	VHF:136-174 MHz UHF:350-400 MHz UHF:400-480 MHz UHF:450-520 MHz
Channel Capacity	256
Zones	16
Channel Spacing	12.5KHz/25KHz
Operating Voltage	DC 7.4V (±20%)
Battery Capacity	2000mAh
Battery Life（5/5/90）	Digital: 20 Hours; Analog: 15 Hours
Frequency Stability	±1.5ppm
Antenna Impedance	50Ω
Dimensions (L×W×H)	59（L）*41 (W) *117 (H)mm
Weight	271g (Including Battery)
Transmitter	
RF Output Power	High：5W；Middle：3W；Low：1W；
4FSK Modulation	12.5kHz Only data：7K60FXD 12.5kHz data and audio：7K60FXE
FM Modulation	12.5 kHz：8K50F3E； 25 kHz：16KΦF3E；
Modulation Limiting	+/- 2.5kHz @ 12.5kHz; +/- 5kHz @ 25kHz
FM Noise	-40dB
Conducted Emission	-36 dBm≤1GHz/-30 dBm≥1GHz
Adjacent Channel Power	≤-60dB
Audio Response	+1/-3 dB
Audio Distortion	3%
Digital Voice coder Type	AMBE

Receiver	
Digital Sensitivity	5% BER：0.25uV
Analog Sensitivity	0.25uV (12dB SINAD)
Intermodulation	65dB
Adjacent Channel Selectivity	60dB
Spurious Response Rejection	70dB
FM Noise	-40dB
Audio Response	+1/-3dB
Rated Audio output power	0.5W
Max Audio output power	1.2W
Audio Distortion	3% (Typical)
Conducted Spurious Emission	-36dBm
Environmental Specifications	
Working Temperature	-20℃—+60℃
Storage Temperature	-30℃—+85℃
Vibration & Shock	MIL-STD-810C/D/E/F/G Standard

Statement

To the best of our knowledge, this Manual has been prepared in an accurate and complete manner. For any doubt, please contact us timely for specific explanation. Considering the fast development of wireless communication technology, BelFone reserves the right to modify the product design and specification without any further notification. Your understanding in this respect will be much appreciated!

BelFone

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