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Two Way Radio Protocols

Purpose and Scope:

This document is about the use of portable radios during training scenarios, expanded for use on scouting activities and the use of two way radios in general. This procedure will also provide examples of clear, concise and accepted terminology to be used with these radios, as well as provide a system to identify those using these radios.

Responsibilities:

It is the responsibility of all persons who operate two way radios to have read manufacturers recommendations, be familiar with and utilise these minimum procedures.

In any two-way radio system, it is absolutely essential that each person using the system recognise that many people must also use the same frequencies (channels). Therefore, it is necessary to practice the policy of **“Listen before You Talk”**.

Radio transmissions are not private conversations. Everything that is transmitted on the base and portable radios might be heard by other persons monitoring the channel. Therefore, use discretion in transmitting any message

Channel Selection

- Assign a Primary channel number
- Assign a Secondary channel.

Radio Unit Identification

A radio identification protocol should be established, depending on the activity this may be personal identification, team roll, check point location or a combination of all three

- David Batt, checkpoint Lugnaquilla Summit”
- David Batt, sweep team now approaching Lugnaquilla Summit

Note the use of surname as they can often be two persons with the same Christian name



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- Clean battery contacts by using a pencil eraser to remove oils and residue from the battery connectors in humid conditions.
- To avoid rapid discharge of the battery:
 - Keep the volume below MAX
 - Limit the duration of your transmissions
 - Keep the battery as warm as possible
- **Warning:** Most batteries are Nickel Cadmium or Nickel Metal Hydride. These batteries fail abruptly when they reach the end of their charge.

Protocol

Communication between Two Way Radio Units is expected to follow this specific protocol:

1. Two-way radio antennas will give best performance if placed in a vertical position
2. Turn towards the person who is to receive your signal so that your body does not absorb most of the radio energy from the antenna.
3. **“Listen Before You Talk”**. No transmission is begun without listening for clear air.
 - Two-way radios are not “full-duplex” like a telephone. Because only one person can talk at a time, it is more important to **LISTEN** on two-way radio than to talk!
4. All radios idle in the receive mode. So do not speak immediately when you press the **PTT (Push to Talk)** button, but wait a second or two until you are transmitting. Likewise do not release the **PTT** button until you have finished speaking
 - If you speak as soon as you “key up” the radio “clips” the first syllable of your first word, making it harder to understand.
5. A basic insight into the physics of these radios is that shouting into them will **NOT** improve your range and intelligibility. **NEVER SHOUT** – increasing your voice level will only cause distortion of your voice by the microphone.
 - The volume control affects only the volume of the speaker and not the sensitivity of the mic.
6. Louder, faster, or higher pitched speech is counter-productive to intelligibility. It doesn't help to talk louder on the radio in a noisy environment, even though it may seem natural.
 - Understand that it in general it is *consonants* and not vowels that carry meaning; you will lose no points or intelligibility by over-stressing consonants.
 - The only way is to shield the microphone from the wind, point it away from the source of noise, or wait until the noise passes.
 - Remember that a simple message such “Go” maybe heard as “No” so try to use unambiguous phrases that will reproduce without ambiguity especially in an emergency.
7. Before transmitting, ensure that you are not interrupting someone else's communications. Refrain from **“walking on”** or interfering with other transmission by Listen first before you talk!
8. **Microphone:** The most important factor in your outgoing transmission quality is the relative position of your mouth to the radio's built-in microphone. Know where it is (not



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always the obvious choice) and speak directly into it at a distance of about 1 inch. Speak at a moderate pace, neither too slow nor too fast and avoid slurring your words.

- Speak **ACROSS** the microphone rather than into it because plosive sounds reduce intelligibility.
 - In colder weather, speak at a slightly sharper angle to the unit so that condensation does not freeze on the small microphone.
9. Basic “radio etiquette” establishes contact first and makes sure that you have the other person’s attention before you just babble away. If you hear someone calling you, acknowledge his or her call by saying, “**GO AHEAD, OVER**”. This lets the caller know that you heard them, and that you are ready to listen.
 10. It’s always best to speak in short simple phrases on the radio and toss the conversation back and forth like a tennis ball with the word “**OVER**”.
 11. Identify Yourself. Transmissions begin with Caller identification number. (Example: Unit Three /Team Leader / Lugnaquilla summit or perhaps your name)
 12. The Unit transmitting will direct the radio transmission to the receiving unit by Identification Example: Unit three to unit ten)
 13. The receiving unit will acknowledge the transmission. (Example: Unit ten. Go ahead unit three)
 14. The transmitting unit will state when the communication is received or complete. (Example: Copy Unit three)
 15. Limit conversation to specific details. Avoid personal comments. Never talk back. Never show anger. Anyone with a radio or, more likely, a scanner can listen in. Prudence suggests keeping things decorous and avoiding sensitive items.
 16. Utilise the **10 code** terminology and the **phonetic alphabet** when appropriate to convey your messages.

Emergency Radio Procedures

Announce “emergency emergency emergency”

Speaking clearly slowly and in plain language identify yourself Give as many details of the emergency including the exact location

Dos and Don’ts:

Do’s:

1. Be brief and to the point. Do not confuse your radio with an open mic at a comedy club.
2. Listen before you begin your transmission, and always wait a second or two before you speak after keying the push-to-talk button.
3. Indicate your location; your audience needs to know where you are:
4. Acknowledge the receipt of all messages directed to you regardless of how trivial.
 - The word “**OVER**” leaves no doubt about whose turn it is to talk and avoids any confusion which results in two people speaking at once and nobody hearing anybody. When your business is finished, the person who started the conversation should end it by saying his name and the word “**OUT**”, which leaves



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no doubt that contact has ended.

- 5. Always release the push-to-talk (PTT) button whenever you stop talking. If you forget and keep it pushed down when trying to think of something to say, the radio continues to transmit a carrier, making your battery run down faster and making for “dead air” so that nobody else can speak or be heard.

Don'ts:

- 1. Turn your squelch too high – you may wonder why everyone is so quiet because the receiver will not open up. It takes a stronger signal to overcome squelch too loud on the receiver unit to receive.
- 2. Turn up the volume to the max. This will drain the battery and cause distortion. Furthermore, it has no effect on outgoing transmission whatsoever.
- 3. Talk too much. Only speak when absolutely necessary. Safety information must take priority.
- 4. Never Use “Over and Out” simultaneously.
- 5. Never Swear. Use common sense on an open radio channel.
- 6. Never get the radio wet. Use plastic over the radio.
- 7. Never make negative comments about anyone or the quality of work you see. You will regret it.

<u>RADIO PHASE</u>	<u>INSTEAD OF</u>	<u>MEANING</u>
NEGATIVE	Nope	No
THAT IS CORRECT	Yup	Yes, Confirm
AFFIRMATIVE	Yup	Yes, Confirm
ROGER	Yup	Yes, Confirm
ACKNOWLEDGE	Eh?	Confirm that you understand my message
SAY AGAIN	Hunh?	Repeat last message
GO AHEAD	Yeah, what?	Listening, proceed with your message
CORRECTION	Oops....	I made a mistake, correct version is
DO YOU READ	Are ya there?	Called you once or more, reply please
STAND-BY	Wait a sec....	Busy, please pause for a moment
WILCO	Okey Dokey...	Message understood, will comply
OUT	My message ended, no reply expected
OVER	Huh, Eh	Message completed, reply expected
CHECK	Got it	Understood
CONFIRM	Is that right eh?	My version is..... Is that correct?



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Phonetic Alpha list:

A- APLHA	B- BRAVO	C- CHARLIE	D- DELTA
E- ECHO	F- FOXTROT	G- GOLF	H- HOTEL
I- INDIA	J- JULIET	K- KILO	L- LIMA
M- MIKE	N- NOVEMBER	O- OSCAR	P- PAPA
Q- QUEBEC	R- ROMEO	S- SIERRA	T- TANGO
U- UNIFORM	V- VICTOR	W- WHISKEY	X- X-RAY
Y- YANKEE	Z- ZULU		

10 Codes

10 Codes, properly known as ten signals, are code words used to represent common phrases in voice communication.

10 Codes provide effective and efficient way of communication

- Less traffic time on radio
- Safety, keeps communication between personnel clear and concise,

10 codes can be used in conjunction with others to ask questions or make statements. For example 10-3, 10-9, at 10-7 (Translation- stop transmitting - say again - out of service). See the following:

Ten Signals

- 10-1 Signal Weak
- 10-2 Signal Good
- 10-3 Stop Transmitting
- 10-4 Affirmative (OK)
- 10-5 Relay (To)
- 10-6 Busy
- 10-7 Out of Service
- 10-8 In Service
- 10-9 Say Again (Repeat)
- 10-10 Negative



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Protecting Equipment

During Storage

Any delicate equipment that is just left in a box that gets moved around is likely to incur some damage even if only cosmetic. As radios are expensive and delicate pieces of equipment it is recommended that that are stored in a protective case ideally with foam inserts to stop unnecessary movement as pictured below



During Use

Avoid dropping or throwing the radios

Try and keep the radio dry, this can be one with specialist covers but can be done simply with a good zip lock bag

One option often used is to keep the radio inside a water proof cover / coat pocket and just use an extension mic / speaker unit. Some of these can be shower proof but a zip lock bag with an elastic band around the cable makes a very good alternative

Remember if the speaker and mic are covered it will affect the sound quality of the transmission.



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Additional Information

Scouting Ireland VHF Radio Frequency 165.0875 MHz (Used by Sionnach Team)

MPC Frequency on PMR 446 (UHF) Chanel 5 Sub Channel 3

To programme a UHF radio that is not automatically set up for PMR Channels this setting is 446.05625 MHz VHF (Channel) at a tone frequency of 74.4 Hertz

Full Details Below

PMR Frequencies Channel Frequency in MHz

Channel Number	Frequency
1	446.00625 MHz
2	446.01875 MHz
3	446.03125 MHz
4	446.04375 MHz
5	446.05625 MHz
6	446.06875 MHz
7	446.08125 MHz
8	446.09375 MHz

PMR Radio CTCSS Frequency List

Sub Channel	Tone Frequency (Hz)	Sub Channel	Tone Frequency (Hz)
1	67.0Hz	20	131.8 Hz
2	71.9 Hz	21	136.5 Hz
3	74.4 Hz	22	141.3 Hz
4	77.0 Hz	23	146.2 Hz
5	79.7 Hz	24	151.4 Hz
6	82.5 Hz	25	156.7 Hz
7	85.4 Hz	26	162.2 Hz
8	88.5 Hz	27	167.9 Hz
9	91.5 Hz	28	173.8 Hz
10	94.8 Hz	29	179.9 Hz
11	97.4 Hz	30	186.2 Hz
12	100.0 Hz	31	192.8 Hz
13	103.5 Hz	32	203.5 Hz
14	107.2 Hz	33	210.7 Hz
15	110.9 Hz	34	218.1 Hz
16	114.8 Hz	35	225.7 Hz
17	118.8 Hz	36	233.6 Hz
18	123.0 Hz	37	241.8 Hz
19	127.3 Hz	38	250.3 Hz



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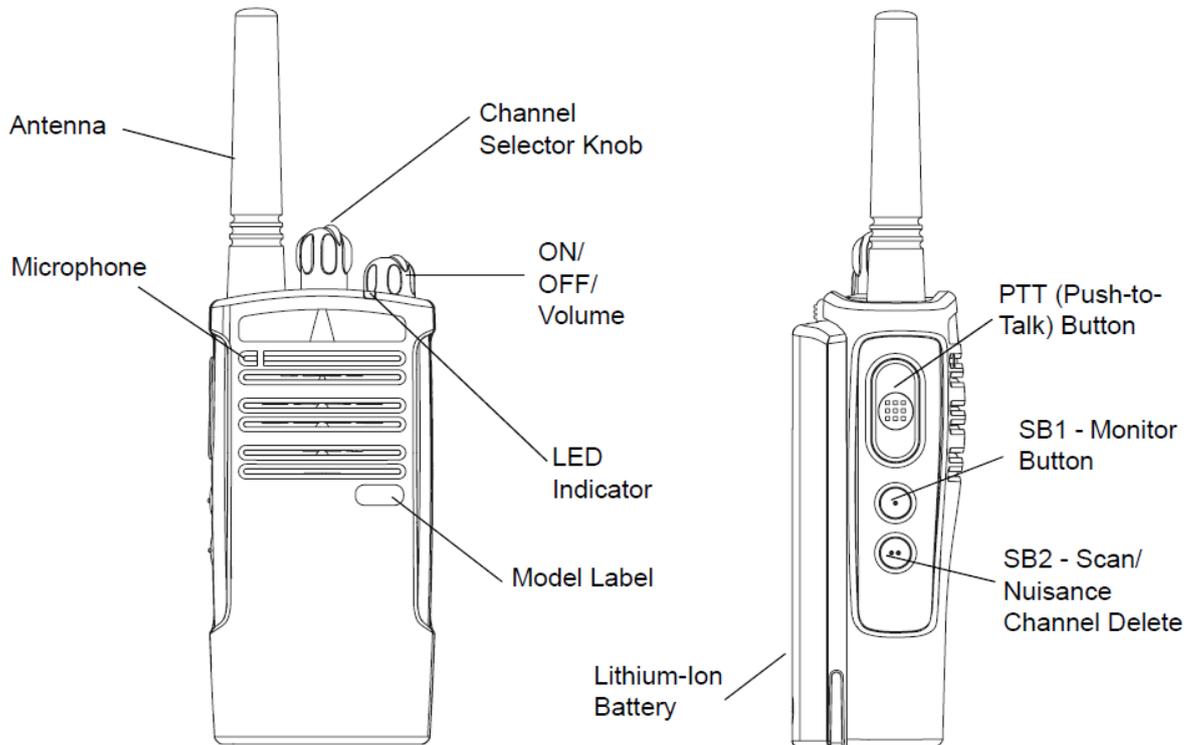
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Radios Used in Training

Motorola Xtni

RADIO OVERVIEW

PARTS OF THE RADIO





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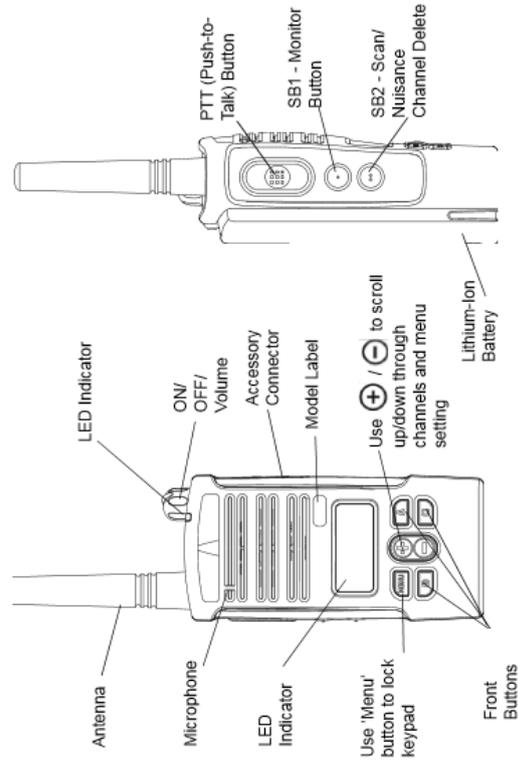
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Motorola XtniD

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RADIO OVERVIEW

PARTS OF THE RADIO



RADIO OVERVIEW



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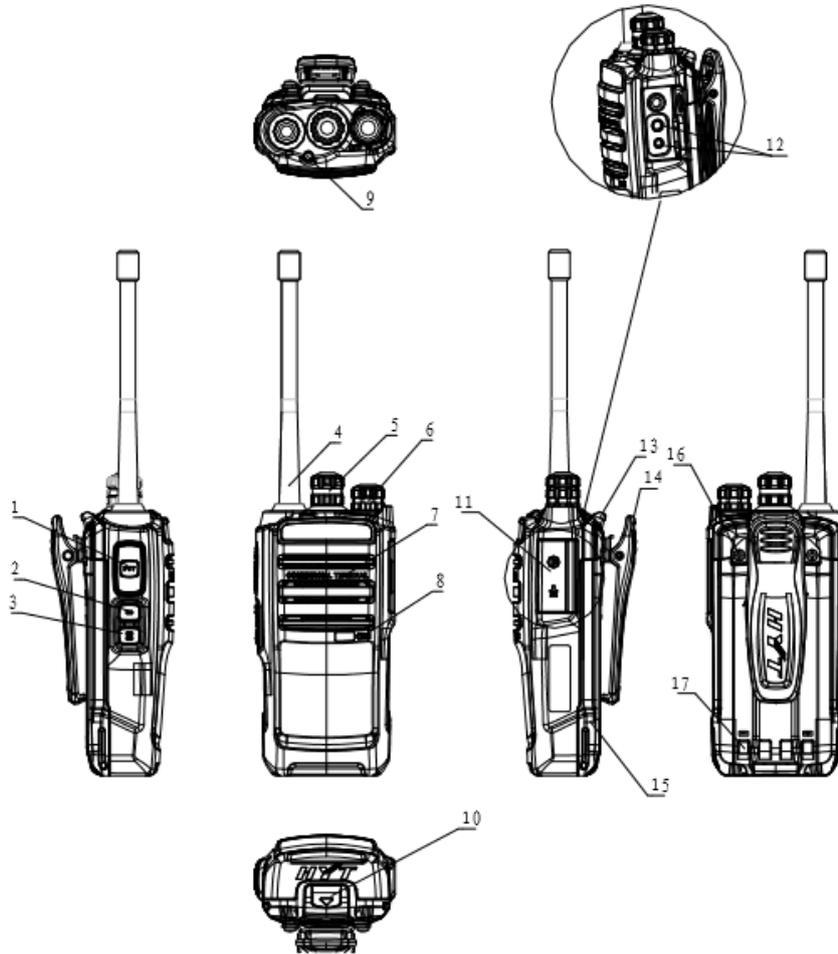
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HYT

TC-446S Owner's Manual

Product Overview

Product Controls



No.	Part Name	No.	Part Name
①	PTT Key	⑩	Battery Latch
②	SK1 (programmable)	⑪	Accessory Jack Cover
③	SK2 (programmable)	⑫	Accessory Jack



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TC-446S Owner's Manual

④	Antenna	⑬	Strap Hole
⑤	Channel Selector Knob	⑭	Belt Clip
⑥	Radio On-Off/Volume Control Knob	⑮	Battery
⑦	Speaker	⑯	Screw of Belt Clip
⑧	Microphone	⑰	Charging Piece
⑨	LED Indicator		

Programmable Keys

For enhanced convenience, you may request your dealer to program the keys **SK1** and **SK2** as shortcut to the functions listed below:

No.	Shortcut Key	Function
1	Monitor	To adjust the condition for incoming signal match.
2	Monitor Momentary	
3	Squelch Off	To always unmute speaker no matter whether carrier is present or not.
4	Squelch Off Momentary	
5	Scan	To listen to communication activities on other channels.
6	VOX	To make the radio transmit automatically when you speak.
7	Battery Strength Indicator	To indicate the charge remaining in the battery.
8	Channel Lock	To lock the current channel.



Note: Long and short press of the key can be assigned with different functions by your dealer.