Telecommunications

Pincher Creek SAR

Why?

- Why is communications important in SAR?
- Why professionalism?
- Why standards?

Why?

- The biggest problem you will ever experience in a SAR situation is lack of communication.
- Critiques: "The first problem is always communications"
- communicating clearly with other groups
- expectations of other groups (RCMP)
- working efficiently

Methods of Communication

- What communications methods have you seen used in SAR?

Radio Theory

- all the wireless electronic communications methods are using radio waves
- radio waves are electromagnetic radiation, same as light, longer wavelength

Radio Theory

- Wavelength / Frequency
  - All radio transmissions have a wavelength
  - The speed of radio is the same: 3×10^8 m/s (speed of light)
  - The number of waves received at a spot per second changes with the wavelength. Shorter wavelength, higher frequency.
  - Bands:
    - VHF: 30 - 300 MHz: 10 m to 1 m
    - UHF: 300MHz - 3 GHz: 1 m to 10 cm

Radio Theory

- Longer wavelengths bend around hills easier
- Shorter frequencies can carry more information, packed closer together
- Some frequencies bounce off the high atmosphere easier

Radio Theory

- Simplex: Transmit and receive on same frequency
  - one at a time
- Duplex: Transmit and receive on different frequencies
  - simultaneously
  - typically using tower: repeater channels, cell phones

Radio Theory

- Power
  - Power is measured in Watts (W)
  - The more power the further the signal can be received
    - Generally: double the distance, 4 times the power
  - advantages to less power?
- Typical: 0.5 W FRS, 2 W GMRS, 3 W commercial handheld, 30 W commercial mobile, base station

Radio Theory

- Polarity
  - different types of antennas transmit and receive with different polar orientations
  - keep antennas upright

Radio Theory

- Signal Encoding
  - AM: Amplitude Modulation
  - FM: Frequency Modulation
    - more resistant to static interference
  - Generally: established by band, fixed in radio

Radio Theory

- Squelch
  - radio waves always present
    - Electromagnetic noise, interference
  - suppress speaker based on signal strength
  - squelch button
  - CTSS: Continuous Tone Squelch System
    - very low frequency tone added to transmission, if not present, suppress speaker
    - FRS sub-channels

Radio Theory

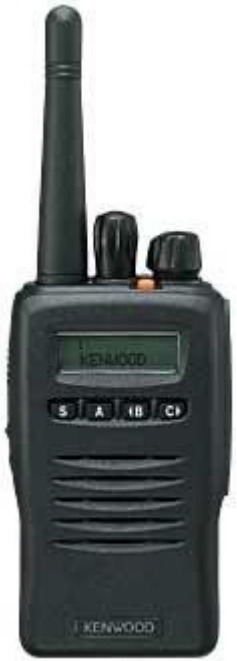
- "Channel"
  - Combination of Frequency, Polarity, Encoding, and Squelch to transmit and receive on

Radio Anatomy

- power source
- microphone
- transceiver / modulator
- antenna
- demodulator / receiver
- squelch / speaker

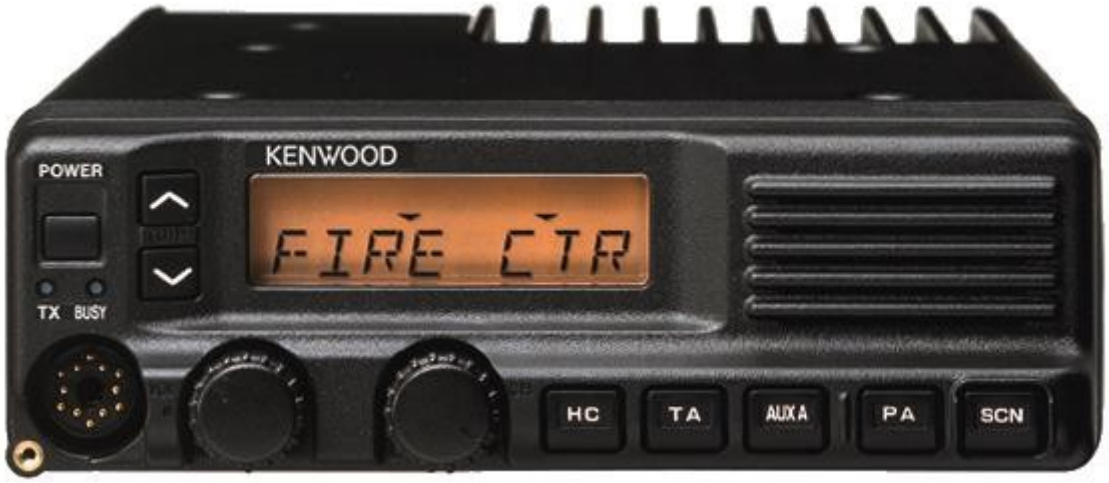
Types of Radios

- Hand held



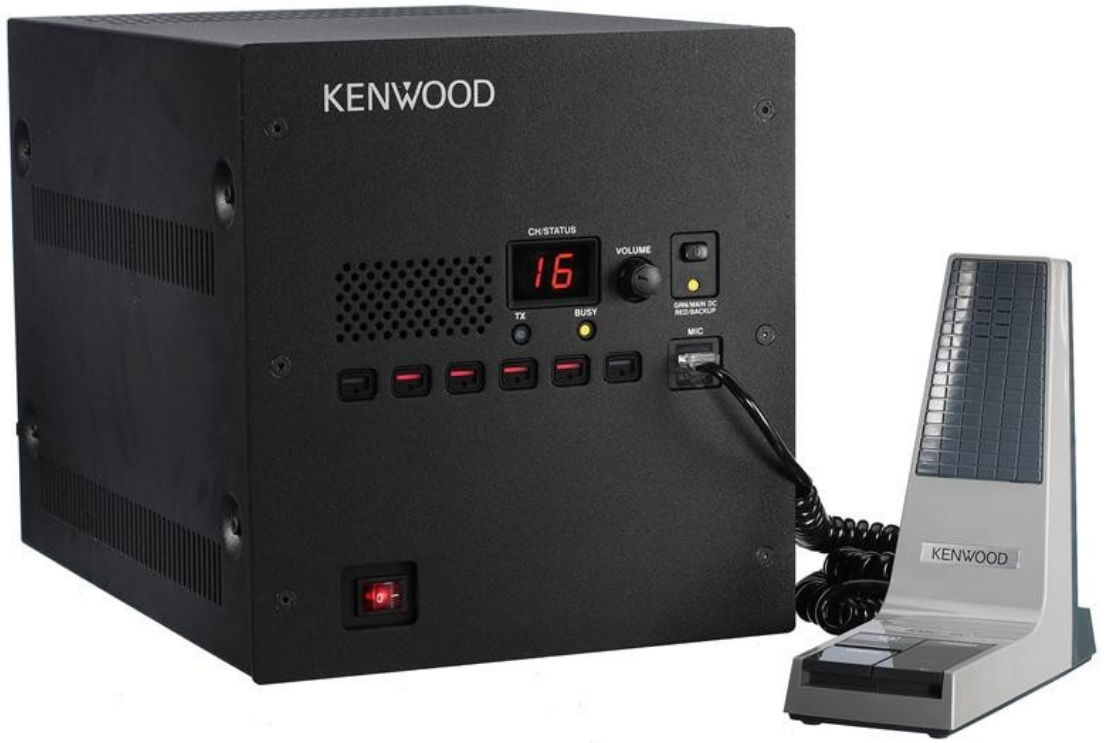
Types of Radios

- Mobile



Types of Radios

- Base Station

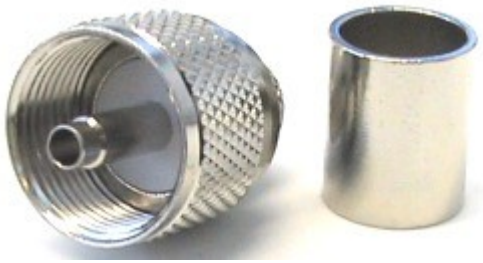


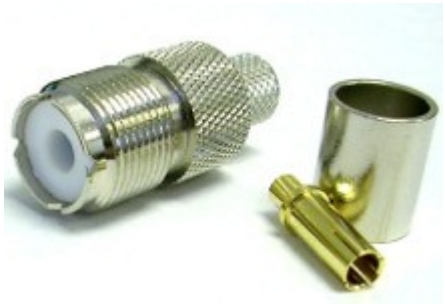
Types of Radios

- Repeater

Connectors

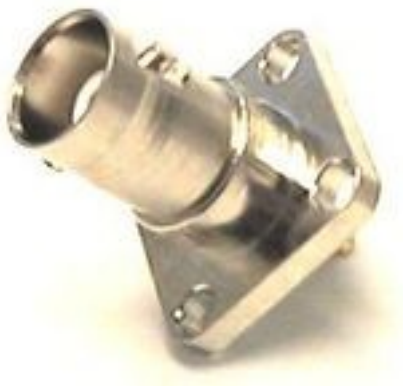
- PL259 or UHF connector





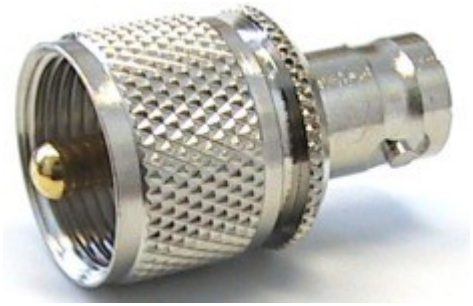
Connectors

- BNC connector



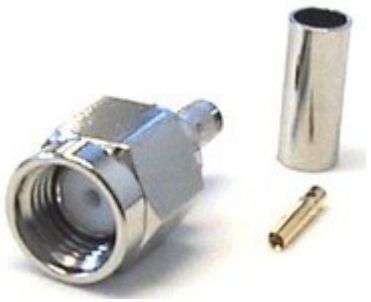
Connectors

- UHF to BNC



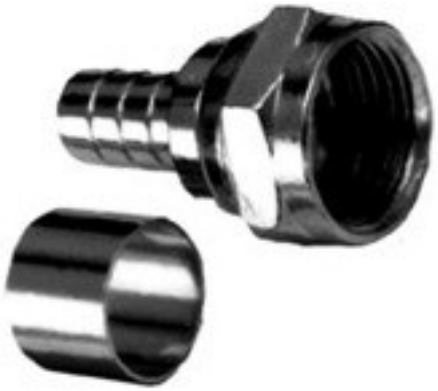
Connectors

- SMA Connector



Connectors

- F to TV



Use of Radios

- Handhelds
  - Battery Replacement
  - Using the controls
  - Posture of the user

Use of Radios

- Mobile Radio setup and use
- Base Radio setup and use

Use of Radios

- Equipment and channels we have access to
  - Channel 1 – Emergency Services repeater
  - Channel 2 – Emergency Services talk-around (Simplex)
  - Channel 9 - Tac 9 (RCMP) – Simplex

Protocols

- Communication Protocols
  - set by laws of physics
  - set by international treaties
  - set by Canadian law
  - set by SARA standard
  - set by professional expectations
- Physics: Do not cut into a message being sent. Listen before you send.

Protocols

- Professional expectations:
  - Sound professional. Absolutely everyone is listening.
  - Make sure your information is clear, concise and short. Think before you speak, not during.
  - Speak slow and clear.
  - Use simple words.

Protocols

- Standard Words and Phrases
- used internationally
  - pronunciations are tuned to world-wide speakers
  - vocabulary comes from both English and French
  - ITU Alphabet

Protocols

- Numbers
  - 3-Tree
  - 4-Fower
  - 5-Fife
  - 9-Niner
  - Hundred
  - TOUsand
  - Decimal

Protocols

- Calling procedures
  - Treat like all your job is, is to pass on written messages. Think telegraph.
  - Call Signs
  - Format: (Dest Call Sign), THIS IS (Source Call Sign), (message) OVER (or OUT)

Protocols

- This Is ...
- Over - I have finished talking and I am listening for your reply. Short for "Over to you."
- Out or Clear - I have finished talking to you and do not expect a reply. Channel available for other use.
- Roger - Information received.
- Copy - I understand what you just said (after receiving information).
- Acknowledge - confirm you've received

Protocols

- Stand By
- Go Ahead
- Correction / I Say Again / Say Again
- Read Back / Message is / That Is Correct
- Words Twice

Protocols

- Shortening the format
- (Dest Call Sign)x3, THIS IS (Source Call Sign)x3, (message) OVER (or OUT)

Call Signs

- All Stations
- Net Control, “Control”

Call Signs

- SARA Standard:
  - A - Prefix assigned to Medical Teams
  - B - Prefix assigned to specialized resources, not just boats - boats, ATVs, Bikes, Horses
  - D - Prefix assigned to Dog Teams
  - H - Prefix assigned to Helicopter units or the aircrafts call sign may be used e.g.. C-GAHM
  - S - Prefix assigned to Search teams
  - T - Prefix assigned to Tracking teams

Protocols

- Specialized messages: answers
  - Affirmative / Negative
  - Wilco - Will Comply (after receiving directive/request).

Protocols

- Specialized messages: time
  - Use the 24 hr clock to tell time.
  - Hundred
  - Zulu – UTC (GMT) aviation

Protocols

- Specialized messages: radio check
- How Do You Read?
- Strength / Clarity
  - 1 - (unreadable)
  - 2 - (breaking up)
  - 3 - (readable with difficulty)
  - 4 - (readable)
  - 5 - (perfectly readable)
  - 5 x 5, “loud and clear”

Protocols

- Specialized messages: emergencies
- MAYDAY / PAN PAN / SECURITY

Protocols

- General messages
  - use of plain language
    - not “10 code”: 10-4
  - exceptions:
    - SARA standard: Code: 1062 means turn radio off or move away from group.
    - Death or injury relayed in code or special word by mgmt., instructions.
    - Pincher SAR's 5 codes

Example

- contact, basic message

- TEAM ALPHA, THIS IS BASE, OVER
- BASE, THIS IS TEAM ALPHA, GO AHEAD, OVER
- TEAM ALPHA, ... OVER
- BASE, ROGER OUT

- PROCEED TO UTM 915026 AND SWEEP TRAIL TO BOULTON CREEK

Example

- BASE, THIS TEAM BRAVO, HOW DO YOU READ?, OVER
- TEAM BRAVO, THIS IS BASE, READING YOUR STRENGTH 4, CLARITY 3, OVER
- (THIS IS) TEAM BRAVO, OUT.

Example

- ALL STATIONS, THIS IS SAR BASE, PINCHER CREEK SAR WILL BE CONDUCTING RADIO TRAINING ON THIS CHANNEL UNTIL 2200 HOURS. OUT

Example

- ALL SAR TEAMS, THIS IS BASE, RETURN TO BASE. TEAM ALPHA ACKNOWLEDGE OVER
- (THIS IS) TEAM ALPHA ROGER (OVER)
- TEAM BRAVO, ACKNOWLEDGE (OVER)
- (THIS IS) TEAM BRAVO WILCO OVER
- TEAM CHARLIE, ACKNOWLEDGE (OVER)
- (THIS IS) TEAM CHARLIE WILCO (OVER)
- (THIS IS) SAR BASE. OUT.

Example

- TEAM ALPHA, THIS IS BASE, OVER
- BASE, GO AHEAD
- TEAM ALPHA PLEASE RELAY FOLLOWING MESSAGE TO TEAM BRAVO PROCEED 1 MILE EAST ON HIGHWAY 507 OVER
- THIS IS ALPHA, WILCO, OUT.

Example (cont.)

- TEAM BRAVO, THIS IS ALPHA OVER
- TEAM ALPHA, GO AHEAD
- MESSAGE FROM BASE READS: PROCEED 1 MILE EAST ON HIGHWAY 507 OVER
- TEAM ALPHA, ROGER. OUT.

Logging

- ICS-309 form
- PCSAR Doc-51

Canadian Law

- must identify yourself
- profane language
- false distress
  - e.g. tests that seem real
- privacy

Acknowledgments

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Questions?

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  - Download from pcsar.webhop.org
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