

Lesson Plan:
Brett Wuth

Communications

Scope:

This lesson plan covers the material of SAR Alberta's Telecommunications Training Standard.

Objectives:

At the conclusion of this lesson the participants:

1. will meet the requirements of the SARA Telecommunications Training Standard

Time Plan:

Total Time: ?? minutes

Start	Material
00:00 3 min	<ul style="list-style-type: none">• Introduce topic title• Introduce Instructor• Present Objectives
00:03 4 min	<ul style="list-style-type: none">• Why is communications important in SAR?<ul style="list-style-type: none">• The biggest problem you will ever experience in a SAR situation is lack of communication.• Critiques: "The first problem is always communications"• Why professionalism, why standards?<ul style="list-style-type: none">• communicating clearly with other groups• expectations of other groups (RCMP)• working efficiently• competence
00:07 4 min	<ul style="list-style-type: none">• What communications methods have you seen used in SAR?<ul style="list-style-type: none">• commercial radios• HAM radios• FRS• cell phone• sat phone• SPOT• voice• hand signals• mirrors• Discuss value of each
00:11 3 min	<ul style="list-style-type: none">• Basic Radio Theory<ul style="list-style-type: none">• all the wireless electronic communications methods are using radio waves• radio waves are electromagnetic radiation, same as light, longer wavelength

Start	Material
00:14 8 min	<ul style="list-style-type: none"> • Wavelength / Frequency <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • VHF: 30 - 300 MHz: 10 m to 1 m • UHF: 300MHz - 3 GHz: 1 m to 10 cm • Longer wavelengths bend around hills easier • Shorter frequencies can carry more information, packed closer together • Some frequencies bounce off the high atmosphere easier • Simplex: Transmit and receive on same frequency <ul style="list-style-type: none"> • one at a time • Duplex: Transmit and receive on different frequencies <ul style="list-style-type: none"> • simultaneously • typically using tower: repeater channels, cell phones
00:22 3 min	<ul style="list-style-type: none"> • Power <ul style="list-style-type: none"> • Power is measured in Watts (W) • The more power the further the signal can be received <ul style="list-style-type: none"> • Generally: double the distance, 4 times the power • advantages to less power? <ul style="list-style-type: none"> • Neighbours can share the same frequency • Batteries last longer • Typical: 0.5 W FRS, 2 W GMRS, 3 W commercial handheld, 30 W commercial mobile, base station
00:25 2 min	<ul style="list-style-type: none"> • Polarity <ul style="list-style-type: none"> • compare with polarized glasses • different types of antennas transmit and receive with different polar orientations • keep antennas upright
00:27 3 min	<ul style="list-style-type: none"> • Signal Encoding <ul style="list-style-type: none"> • AM: Amplitude Modulation • FM: Frequency Modulation <ul style="list-style-type: none"> • more resistant to static interference • Generally: established by band, fixed in radio

Start	Material
00:30 4 min	<ul style="list-style-type: none"> • Squelch <ul style="list-style-type: none"> • radio waves always present, but is it a real transmission? • Electromagnetic noise, interference • suppress speaker based on signal strength • squelch button: remove squelch • CTSS: Continuous Tone Squelch System <ul style="list-style-type: none"> • very low frequency tone added to transmission, if not present, suppress speaker • tone is so low can't be heard by human ear (maybe elephant, whale!) • FRS sub-channels • 2 sub-channels of same channel can't be use at same time
00:34 1 min	<ul style="list-style-type: none"> • “Channel” <ul style="list-style-type: none"> • Combination of Frequency, Polarity, Encoding, and Squelch to transmit and receive on • Listed on our radios so other agencies can program theirs to our channel
00:35 1 min	<ul style="list-style-type: none"> • Anatomy of radio <ul style="list-style-type: none"> • power source • microphone • transceiver / modulator • antenna • demodulator / receiver • squelch / speaker
00:36 3 min	<ul style="list-style-type: none"> • Types of radios <ul style="list-style-type: none"> • <i>show pictures</i> • handheld • mobile • base • repeater
00:39 1 min	<ul style="list-style-type: none"> • Connectors & Mobile Antennas <ul style="list-style-type: none"> • <i>show pictures</i>

Start	Material
00:40 8 min	<ul style="list-style-type: none"> • Use of radios <ul style="list-style-type: none"> • Battery Replacement • Using the controls <ul style="list-style-type: none"> • power, volume • channel selector • squelch • transmit (PTT) • external mic • Posture of the user <ul style="list-style-type: none"> • Keep the antenna vertical and fully extended. • Distance from outside noise when sending. • Keep the mic about 2 to 3 inches away from the mouth at 45 degrees. • normal speech levels • Hold the mic button down momentarily (1 sec) before and after you speak. • Mobile Radio setup and use • Base Radio setup and use • Equipment and channels we have access to <ul style="list-style-type: none"> • Channel 1 – Emergency Services repeater • Channel 2 – Emergency Services talk-around (Simplex) • Channel 9 - Tac 9 (RCMP) – Simplex
00:48 2 min	<ul style="list-style-type: none"> • Communication Protocols <ul style="list-style-type: none"> • 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.
00:50 1 min	<ul style="list-style-type: none"> • Professional expectations: <ul style="list-style-type: none"> • 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.

Start	Material
00:51 2 min	<ul style="list-style-type: none"> • Standard Words and Phrases • used internationally <ul style="list-style-type: none"> • pronunciations are tuned to world-wide speakers • vocabulary comes from both English and French • ITU Alphabet <ul style="list-style-type: none"> • letters all sound the same when spoken, clipped • say “Alpha”, write “A”
	A Alpha (AL fah)
	B Bravo (BRAH voh)
	C Charlie (CHAR lee *or* SHAR lee)
	D Delta (DELL tah)
	E Echo (ECK oh)
	F Foxtrot (FOKS trot)
	G Golf (GOLF)
	H Hotel (hoh TELL)
	I India (IN dee ah)
	J Juliett (JEW lee ETT) (NOTE SPELLING: 2 T's)
	K Kilo (KEY loh)
	L Lima (LEE mah)
	M Mike (MIKE)
	N November (no VEM ber)
	O Oscar (OSS car)
	P Papa (pah PAH) (NOTE STRESS IS ON THE 2ND SYLLABLE)
	Q Quebec (keh BECK)
	R Romeo (ROW me oh)
	S Sierra (see AIR rah)
	T Tango (TANG go)
	U Uniform (YOU nee form)
	V Victor (VIK tor)
	W Whiskey (WISS key)
	X X-ray (ECKS ray)
	Y Yankee (YANG kee)
	Z Zulu (ZOO loo)

Start	Material
00:53 2 min	<ul style="list-style-type: none"> • Numbers <ul style="list-style-type: none"> • 3-Tree • 4-Fower • 5-Fife • 9-Niner • Hundred • TOUsand • Decimal
00:55 12 min	<ul style="list-style-type: none"> • Calling procedures <ul style="list-style-type: none"> • Treat like all your job is, is to pass on written messages. Think telegraph. • Call Signs • Format: (Dest Call Sign)x3, THIS IS (Source Call Sign)x3, (message) OVER (or OUT) • 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 • Stand By • Go Ahead • Correction / I Say Again / Say Again • Read Back / Message is / That Is Correct • Words Twice • Shortening the format
01:07 6 min	<ul style="list-style-type: none"> • Call Signs <ul style="list-style-type: none"> • "All Stations" • "Control" - Network Control • SARA Standard: <ul style="list-style-type: none"> • 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
01:13 2 min	<ul style="list-style-type: none"> • Specialized messages: answers <ul style="list-style-type: none"> • Affirmative / Negative • Wilco - Will Comply (after receiving directive/request).

Start	Material
01:15 2 min	<ul style="list-style-type: none"> Specialized messages: time <ul style="list-style-type: none"> Use the 24 hr clock to tell time. Hundred Zulu – UTC (GMT) aviation
01:17 2 min	<ul style="list-style-type: none"> Specialized messages: radio check How Do You Read? Strength / Clarity <ul style="list-style-type: none"> 1 - (unreadable) 2 - (breaking up) 3 - (readable with difficulty) 4 - (readable) 5 - (perfectly readable) 5 x 5, “loud and clear”
01:19 5 min	<ul style="list-style-type: none"> Specialized messages: emergencies MAYDAY / PAN PAN / SECURITY
01:24 7 min	<ul style="list-style-type: none"> General messages <ul style="list-style-type: none"> use of plain language <ul style="list-style-type: none"> not “10 code”: 10-4 exceptions: <ul style="list-style-type: none"> SARA standard: 10-62 means turn radio off or move away from group. (RCMP) Death or injury relayed in code or special word by mgmt., instructions. Pincher SAR's codes
	<ul style="list-style-type: none"> Examples
2 min	<ul style="list-style-type: none"> Communications Traffic Logging <ul style="list-style-type: none"> SARA Standard: log must be kept ICS-309 form
3 min	<ul style="list-style-type: none"> Canadian law <ul style="list-style-type: none"> must identify yourself profane language false distress <ul style="list-style-type: none"> e.g. tests that seem real privacy
	<ul style="list-style-type: none"> Hands On use of radios <ul style="list-style-type: none"> Calling other stations Passing traffic Multiple Radio use simulation

Aids:

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Frequently Asked Questions

- How do external cell phone boosters work? See http://en.wikipedia.org/wiki/Cellular_repeater

Feedback:

- 2010-10-06 Wuth presentation to PCSAR. Projector did not work. Ran out of time for exercise.

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- Earlier lesson plans
 - Jake Waiboer, Chris Jorgensen

Reference Material:

- [1] SAR Alberta Telecommunications operations and training standards
http://saralberta.dnsalias.org:8080/mediawiki/index.php/Telecommunications_Standard

Notes:

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