



Module 6

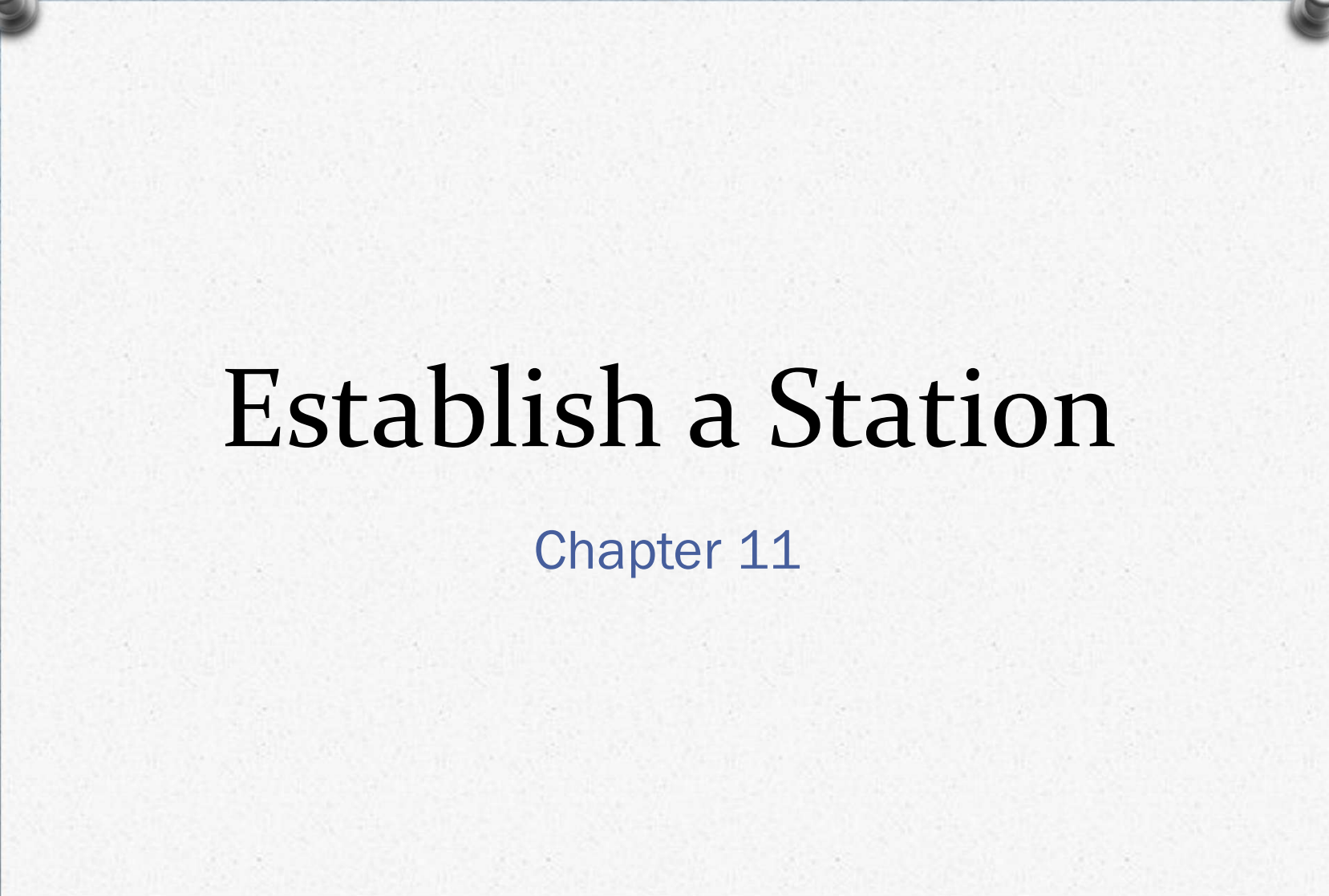
Establishing a Station and Routine
Operation

References

- *Canadian Amateur Radio Basic Qualification Study Guide (8th Edition)*, Chapters 11 and 12.

Outline

- o Establishing a Station
 - o equipment, location
 - o VHF and UHF
 - o Solid state v. tubes
 - o ATU
 - o CW and calibration
 - o Modes
 - o Microphones and speakers
- o Routine Operation
 - o Q Codes, Phonetics
 - o VHF and UHF and HF
 - o CW
 - o Modes
 - o QSLs
 - o Emergencies



Establish a Station

Chapter 11

Preamble

- o “With great power comes great responsibility”
- o Modes of interest?
- o General experimentation?
- o Specialization later?
- o Specialization may vary from time to time...
- o Station equipment may vary according to interests

Obtaining Equipment

- o Basic Qualification restrictions
 - o commercially built transmitters and amps
 - o may assemble professionally designed kits
- o Dealers
 - o carry new and used equipment – serviced
- o Second hand
 - o cheaper but may have been modified
- o Guidance
 - o other HAMs
 - o www.eham.com reviews

Obtaining Equipment

- o USA
 - o brokerage fees, GST, customs etc.
- o Chinese EBay specials
 - o really cheap
 - o may not be anything wrong with equipment
 - o importation issues
 - o particularly certification by IC or FCC
 - o may be breaking the law by importation
 - o open bands – IC view
- o Military surplus
- o Government or Industry surplus

Station Location

- o Radio room to a closet or desktop
- o access to 120 VAC/15A outlet
- o means of getting lines to antennas
- o safe place to mount antennas
- o proper station ground

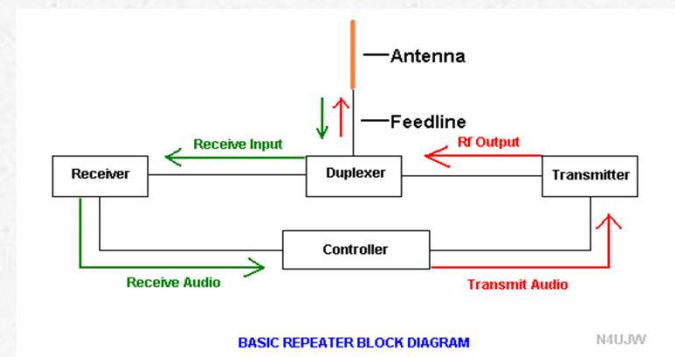
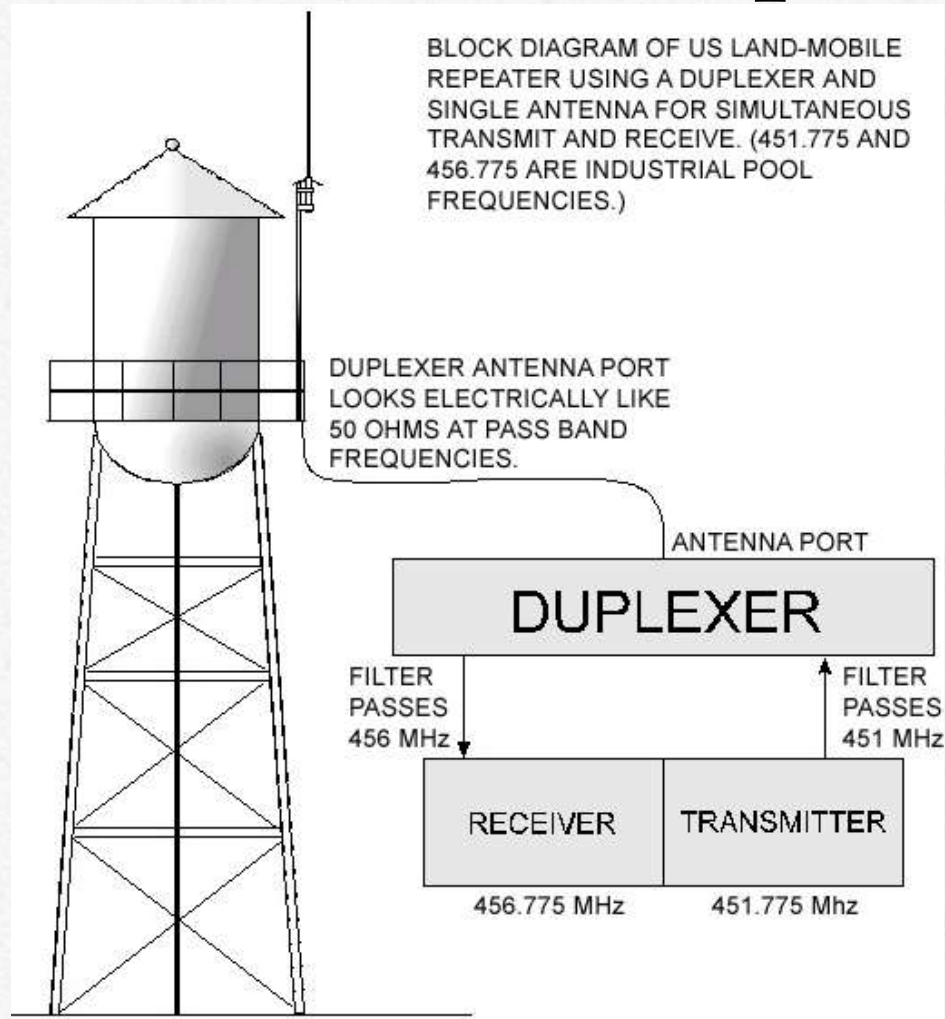
VHF and UHF Stations

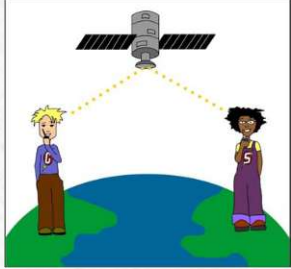
- o Basic qualification
- o Components
 - o transceiver w. microphone and MANUAL
 - o power supply
 - o coax transmission line to antenna
- o deviation of FM transmitter
 - o under – sounds thin
 - o over – sounds unnecessarily loud
 - o can move microphone to adjust
 - o without Advanced Qualification cannot modify transmitter

VHF and UHF

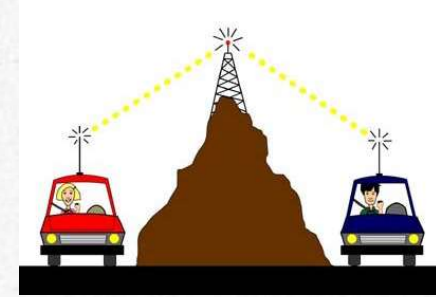
- ◊ Power supply or batter (risks)
- ◊ Mobile installations
- ◊ Handheld
- ◊ Exposure to RF
- ◊ Multimode (if to go beyond FM – SSB, CW)
- ◊ Repeater Operation

Repeater





Repeater

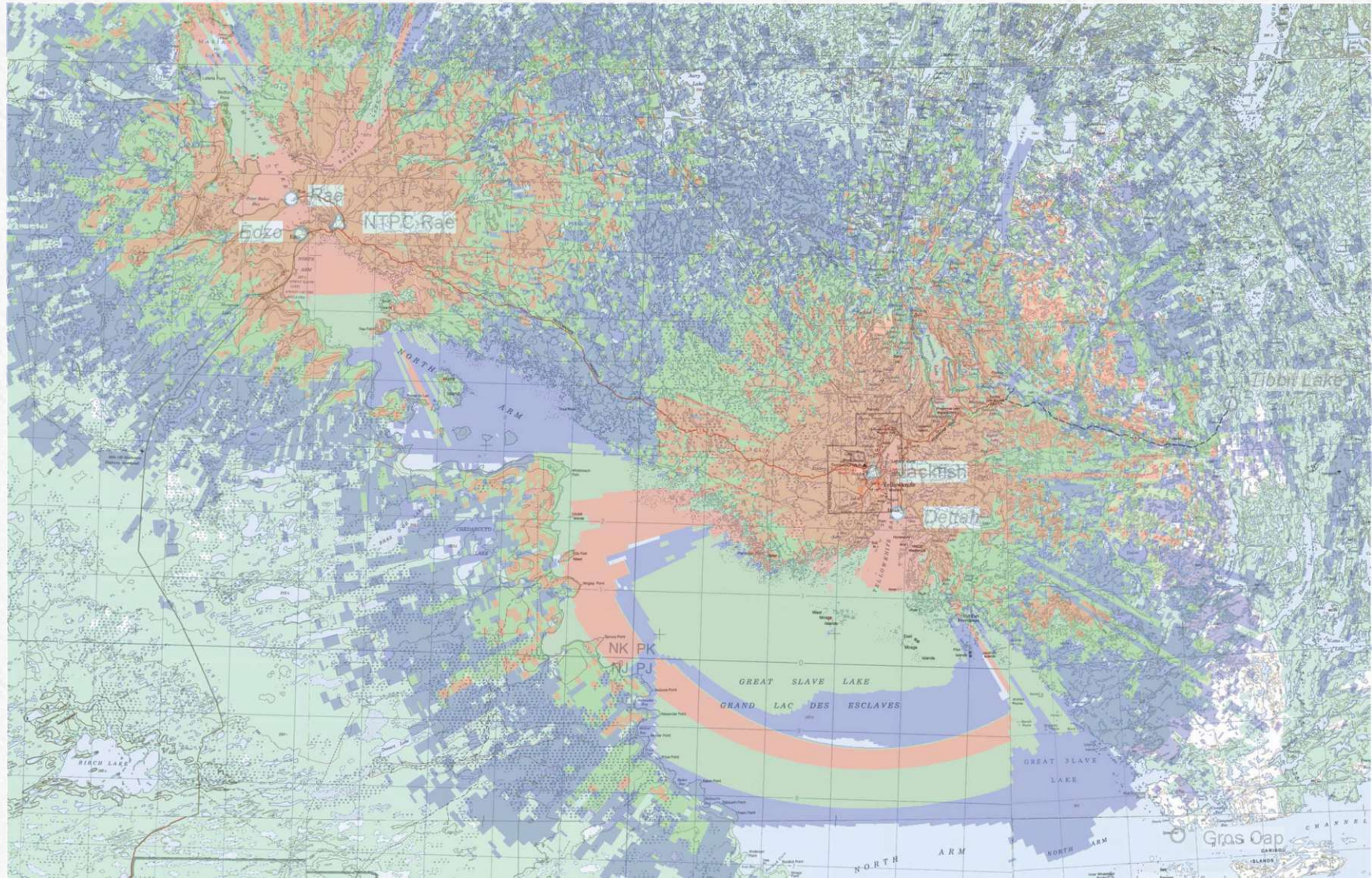


- o Simplex
 - o repeater picks up signal and retransmits it on same frequency
 - o direct communications
- o Duplex (Half Duplex Operation)
 - o you Xmt on 146.340 MHz and Rx 146.940 MHz
 - o Repeater Xmt on 146.940 MHz and Rx 146.340 MHz
 - o distant station Xmt on 146.340 MHz and Rx 146.940 MHz
 - o -600kHz offset
 - o VE8YK/R
- o Full Duplex Operation
 - o Telephone – can speak and listen at same time

Repeaters

- o Frequency Coordination
 - o RAC
 - o Regional frequency coordination councils etc.
- o Require an Advanced Qualification to
 - o sponsor a repeater
 - o sponsor a club repeater <- good reason to join a club
 - o do the modifications
 - o remote operation
- o Require a Basic Qualification to use a repeater...
- o In many places in Canada/US etc. – sometimes locked with tones and sometimes not (open)

VE8YK/R & VE8RAE/R



VHF and UHF

- o always use minimum power necessary
 - o legal requirement
 - o batteries
 - o consider antenna
- o Note NWT distracted driving laws
 - o *Restricted Electronic Devices Regulations (R-100-2011)*

Restricted Electronic Devices Regulations (NT)

- o 2. A driver who is a member of a class of users listed in Schedule B is, subject to the conditions set out in that Schedule, permitted to use a restricted electronic device.
- o From Schedule B - CLASS OF USERS PERMITTED TO USE RESTRICTED ELECTRONIC DEVICES UNDER CERTAIN CONDITIONS

6.	Persons who use any transceiver	May be used on any road as long as the transceiver is mounted to the motor vehicle and the user is lawfully authorized to use the transceiver (for all services including commercial services, the General Radio Service (GRS), General Mobile Radio Service (GMRS) and amateur radio service).
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Handhelds

- o microphone and speaker output
- o programming interface
- o ease of use of menu system
- o battery capacity/extra battery/charger
- o external power port (highly recommended)
 - o portable battery packs
- o type of antenna/antenna port
- o manual (often downloadable)
- o 5W FM only



Multimode

- to use CW or SSB you will need a multimode radio
- crucial for satellite operations
- CW will also need a key or paddles – iambic keyer



Microphones

- ◊ Diaphragm or Capacitor Plates (condensor)
- ◊ Coil
- ◊ PTT – “Push to Talk”
- ◊ VOX

HF Station - Basics

- o Design considerations
 - o Size, space
 - o Antenna and transmission line
 - o Grounding
 - o Weather
 - o Power
 - o EMI/RFI

HF Station

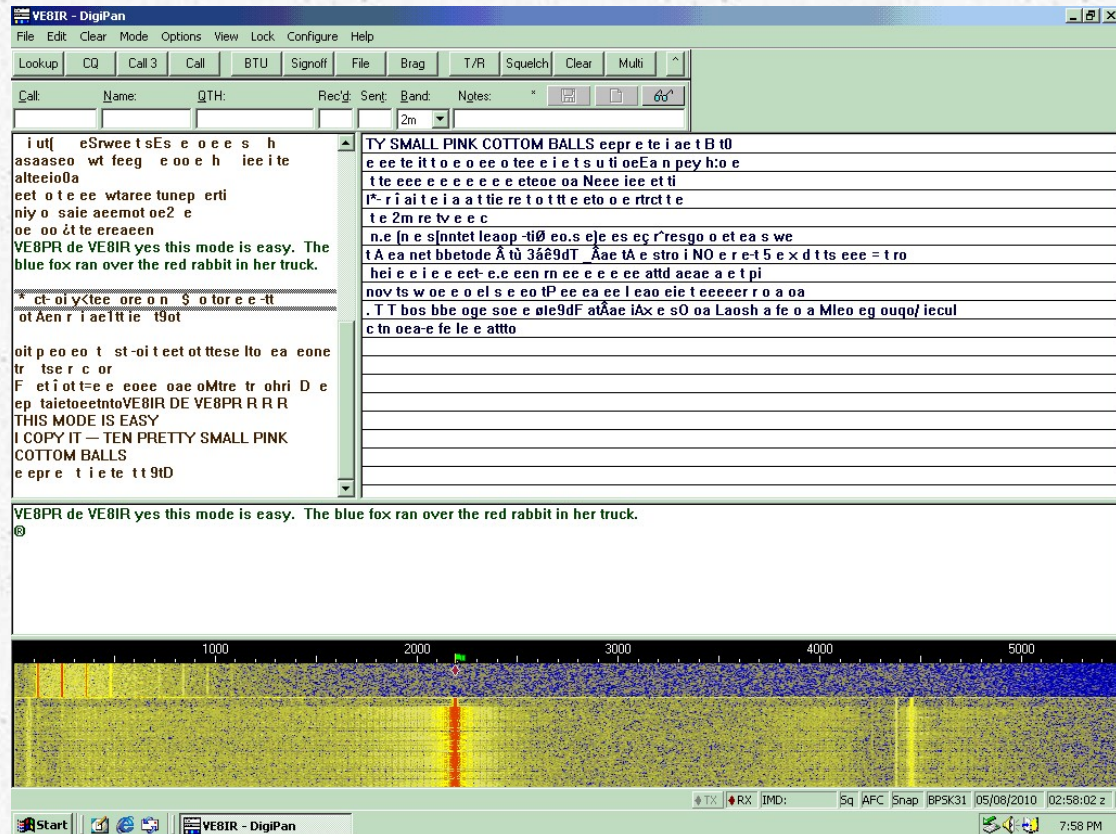
o Fig. 11-3 (page 11-9)

- o Transceiver
- o Linear amplifier
- o Low pass filter
- o SWR bridge/meter
- o Antenna switch
- o Dummy load
- o Antenna Tuner
- o Antenna (VHF)
- o Antenna (HF)

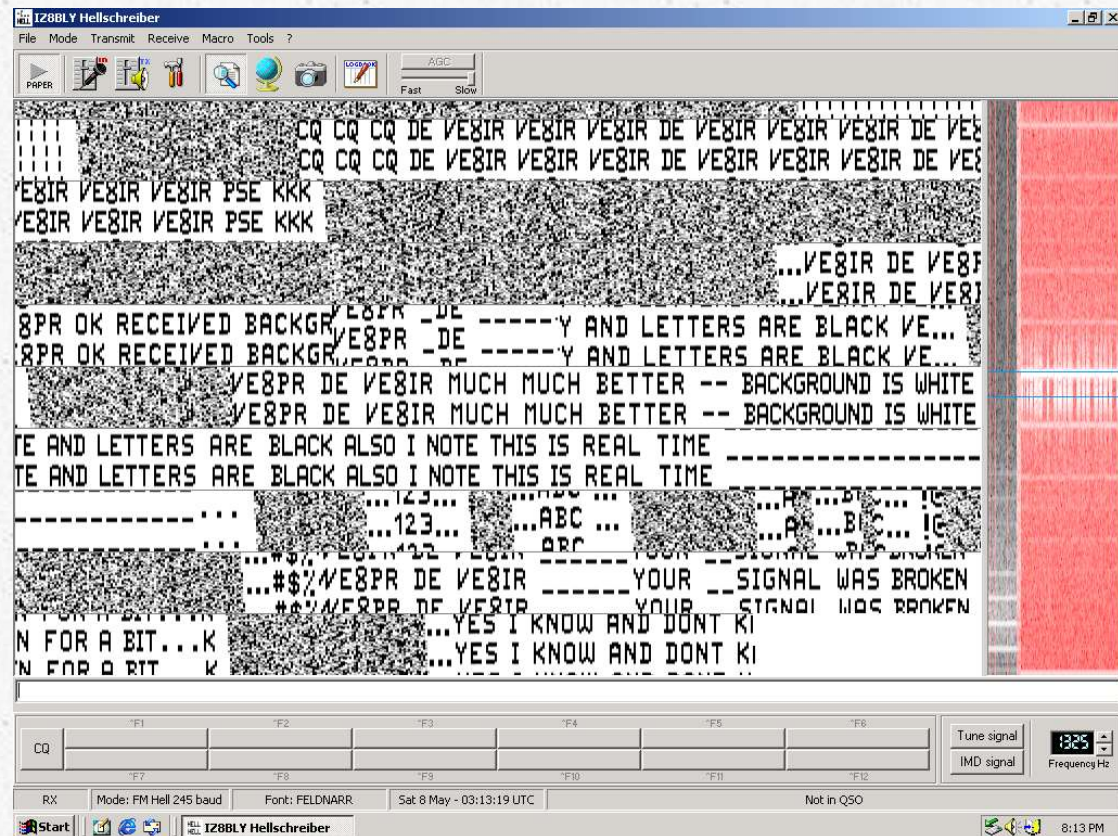
HF Station

- o Operating manuals
 - o very important these are on hand
 - o check frequency before tuning up
 - o QRL? “This is VE8YK - Is the frequency in use?”
 - o Tune into dummy load with minimum power output – calibrate – then tune with min power into antenna
 - o ATUs
 - o Check frequency against CHU or WWV

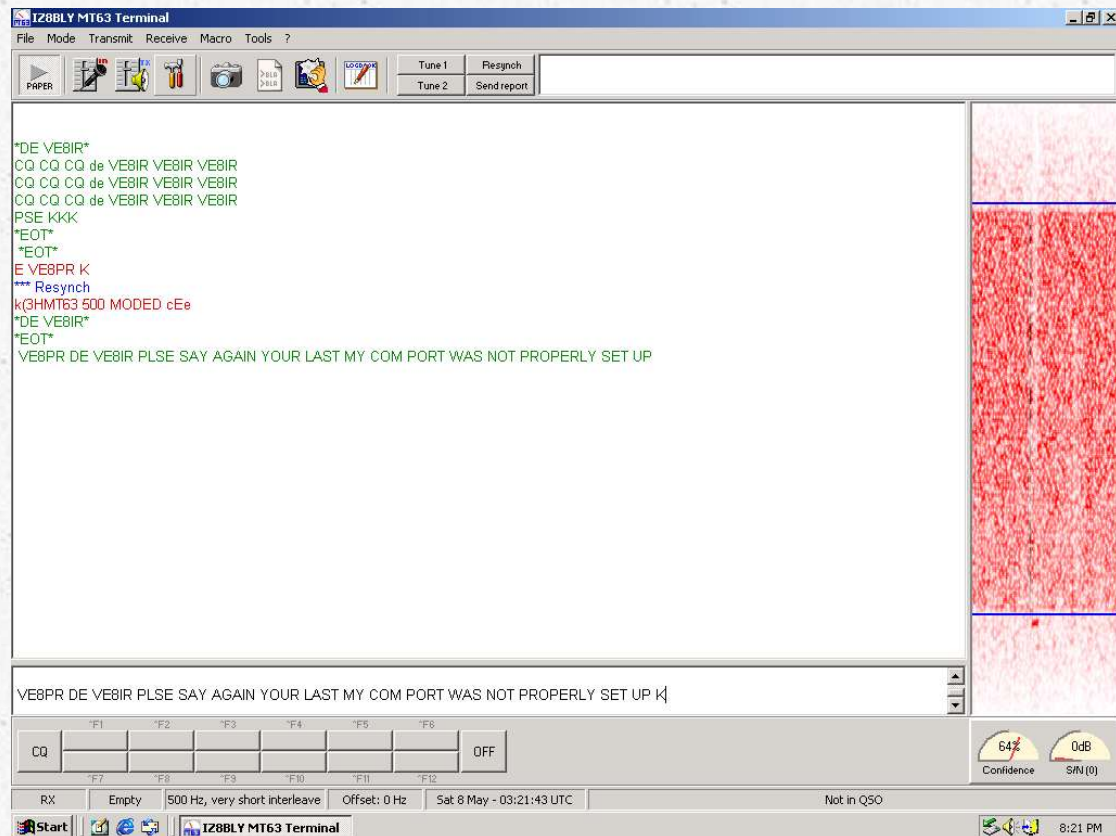
Digital Modes PSK



Digital Modes - Hellschreiber



Digital Modes - MFSK



Digital Modes - SSTV



Digital Modes

- ◊ PSK, MFSK, Olivia, SSTV, RTTY, Packet, AMTOR etc.
- ◊ Input/Output (IO)
- ◊ Computer
- ◊ Modem or soundcard
- ◊ Transceiver
- ◊ Antenna

Transducers, Microphones and Loudspeakers

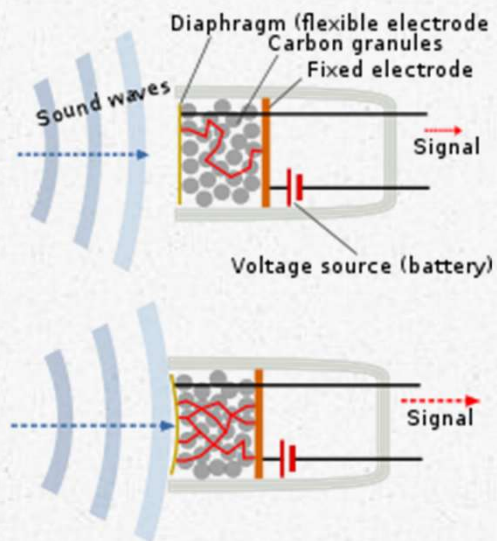
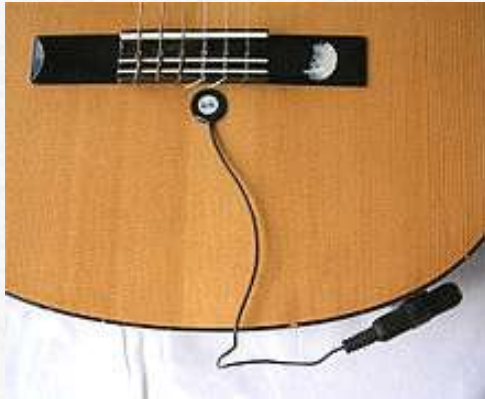
○ Microphone

- converts sound energy into electrical energy
- 20 Hz to 20 kHz (narrower for older persons)
- Sensitivity – defines sound energy to produce a certain voltage output from the microphone
- Directional qualities – sensitivity varies depending on direction from which sound approaches microphone
- Impedance – match microphone impedance to Xmtr for max efficiency

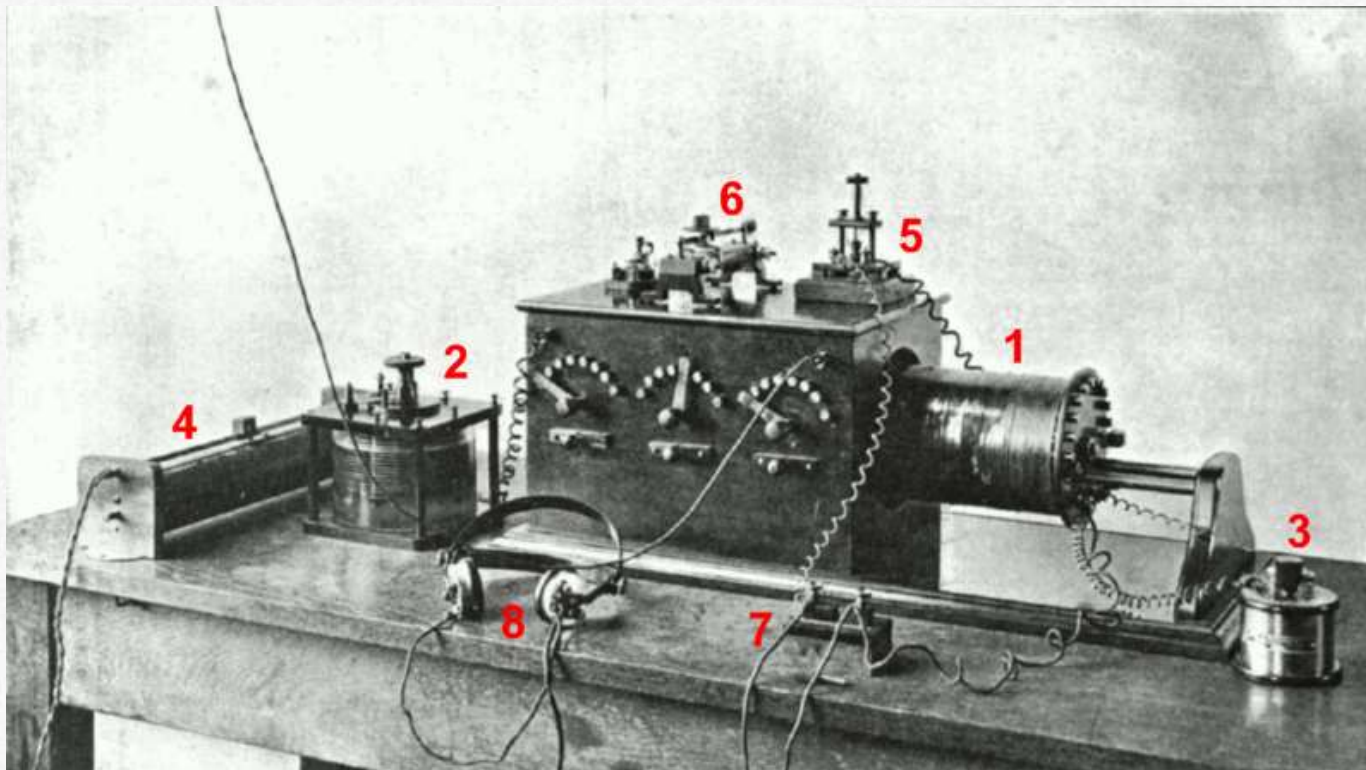
Types of Microphones

- **Crystal** – piece of crystal – Rochelle's salt – crystal is deformed by waves – piezoelectric effect – rare today - diaphragm
- **Dynamic** – diaphragm - electric current generated by moving a conductor through a magnetic field
- **Condenser or Electrostatic** – capacitor microphone – diaphragm – moves and alters capacitance
- **Carbon** – used to be common in most telephones – small container with carbon granules and two electrodes – diaphragm moves and compresses granules changing resistance – rare today

Microphones

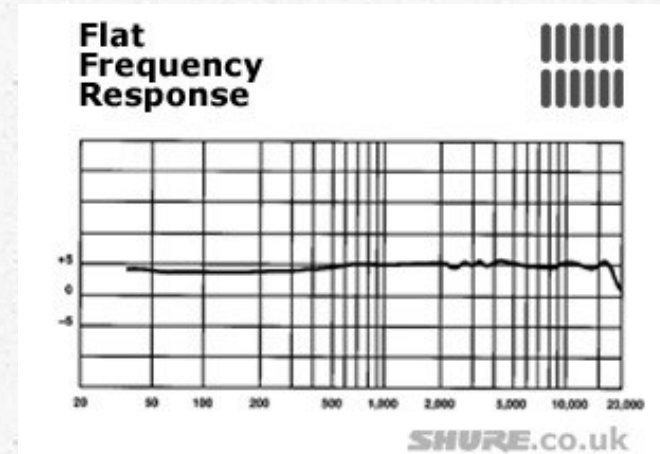


LW Listening Station 1914



Loudspeakers

- Frequency response – should be stable over entire audio spectrum
- Impedance – match device to rest of equipment to get max power transfer
- Power rating – 100 W through a speaker rated for a max of 5 W will damage it



System Impedance Calculator

[2 Series](#) | [2 Parallel](#) | [3 Series](#) | [3 Parallel](#) | [4 Series](#) | [4 Parallel](#)
[2 Parallel & 1 Series](#) | [2 Series & 1 Parallel](#) | [2 Series & 2 Parallel](#)

Amp Power: Watts

Amplifier

Speaker A: Ω

Speaker B: Ω

Total Impedance = 8 Ω
Speaker A Power = 100 Watts
Speaker B Power = 100 Watts



Routine Operation of a HAM Station

Chapter 12

Q-Codes

- The Q code is a standardized collection of three-letter message encodings, also known as a brevity code, all of which start with the letter "Q", initially developed for commercial radiotelegraph communication, and later adopted by other radio services, especially amateur radio.
- Although Q codes were created when radio used Morse code exclusively, they continued to be employed after the introduction of voice transmissions. To avoid confusion, transmitter call signs are restricted; while an embedded three-letter Q sequence may occur (for instance when requested by an amateur radio station dedicated to low-power operation), no country is ever issued an ITU prefix starting with "Q".
- The codes in the range QAA–QNZ are reserved for aeronautical use; QOA–QQZ for maritime use and QRA–QUZ for all services.

Code	Question	Answer or Statement
QRA	What is the name (or call sign) of your station?	The name (or call sign) of my station is ...
QRG	Will you tell me my exact frequency (or that of ...)?	Your exact frequency (or that of ...) is ... kHz (or MHz).
QRH	Does my frequency vary?	Your frequency varies.
QRI	How is the tone of my transmission?	The tone of your transmission is (1. Good; 2. Variable; 3. Bad)
QRJ	How many voice contacts do you want to make?	I want to make ... voice contacts.
QRK	What is the readability of my signals (or those of ...)?	The readability of your signals (or those of ...) is ... (1 to 5).
QRL	Are you busy?	I am busy. (or I am busy with ...) Please do not interfere.
QRM	Do you have interference?	I have interference.
QRN	Are you troubled by static?	I am troubled by static.

QRO	Shall I increase power?	Increase power.
QRP	Shall I decrease power?	Decrease power.
QRQ	Shall I send faster?	Send faster (... wpm)
QRS	Shall I send more slowly?	Send more slowly (... wpm)
QRT	Shall I stop sending?	Stop sending.
QRU	Have you anything for me?	I have nothing for you.
QRV	Are you ready?	I am ready.
QRW	Shall I inform ... that you are calling him on ... kHz (or MHz)?	Please inform ... that I am calling him on ... kHz (or MHz).
QRX	When will you call me again?	I will call you again at ... (hours) on ... kHz (or MHz)
QRZ	Who is calling me?	You are being called by ... on ... kHz (or MHz)
QSA	What is the strength of my signals (or those of ...)?	The strength of your signals (or those of ...) is ... (1 to 5).
QSB	Are my signals fading?	Your signals are fading.
QSD	Is my keying defective?	Your keying is defective.
QSG	Shall I send ... telegrams (messages) at a time?	Send ... telegrams (messages) at a time.

QSN	Did you hear me (or ... (call sign)) on .. kHz (or MHz)?	I did hear you (or ... (call sign)) on ... kHz (or MHz).
QSO	Can you communicate with ... direct or by relay?	I can communicate with ... direct (or by relay through ...).
QSP	Will you relay a message to ...?	I will relay a message to
QSR	Do you want me to repeat my call?	Please repeat your call; I did not hear you.
QSS	What working frequency will you use?	I will use the working frequency ... kHz (or MHz).
QST	-	Here is a broadcast message to all amateurs.
QSU	Shall I send or reply on this frequency (or on ... kHz (or MHz))?	Send or reply on this frequency (or on ... kHz (or MHz)).
QSW	Will you send on this frequency (or on ... kHz (or MHz))?	I am going to send on this frequency (or on ... kHz (or MHz)).
QSX	Will you listen to ... (call sign(s) on ... kHz (or MHz))?	I am listening to ... (call sign(s) on ... kHz (or MHz))
QSY	Shall I change to transmission on another frequency?	Change to transmission on another frequency (or on ... kHz (or MHz)).
QSZ	Shall I send each word or group more than once?	Send each word or group twice (or ... times).
QTA	Shall I cancel telegram (message) No. ... as if it had not been sent?	Cancel telegram (message) No. ... as if it had not been sent.
QTC	How many telegrams (messages) have you to send?	I have ... telegrams (messages) for you (or for ...).
QTH	What is your position in latitude and longitude (or according to any other indication)?	My position is ... latitude...longitude

QTR	What is the correct time?	The correct time is ... hours
QTU	At what times are you operating?	I am operating from ... to ... hours.
QTX	Will you keep your station open for further communication with me until further notice (or until ... hours)?	I will keep my station open for further communication with you until further notice (or until ... hours).
QUA	Have you news of ... (call sign)?	Here is news of ... (call sign).
QUC	What is the number (or other indication) of the last message you received from me (or from ... (call sign))?	The number (or other indication) of the last message I received from you (or from ... (call sign)) is ...
QUD	Have you received the urgency signal sent by ... (call sign of mobile station)?	I have received the urgency signal sent by ... (call sign of mobile station) at ... hours.
QUE	Can you speak in ... (language), - with interpreter if necessary; if so, on what frequencies?	I can speak in ... (language) on ... kHz (or MHz).
QUF	Have you received the distress signal sent by ... (call sign of mobile station)?	I have received the distress signal sent by ... (call sign of mobile station) at ... hours.

Phonetic Alphabet

The Radiotelephony Spelling Alphabet

Letter to be Identified	Identifying Word	Representation of Pronunciation in English*
A	Alfa	<u>AL</u> FAH
B	Bravo	<u>BRAH</u> VOH
C	Charlie	<u>CHAR</u> LEE (or <u>SHAR</u> LEE)
D	Delta	<u>DELL</u> TAH
E	Echo	<u>ECK</u> OH
F	Foxtrot	<u>FOKS</u> TROT
G	Golf	GOLF
H	Hotel	HOH <u>TELL</u>
I	India	<u>IN</u> DEE AH
J	Juliett	<u>JEW</u> LEE ETT
K	Kilo	<u>KEY</u> LOH
L	Lima	<u>LEE</u> MAH
M	Mike	MIKE
N	November	NO <u>VEM</u> BER
O	Oscar	<u>OSS</u> CAH
P	Papa	<u>PAH</u> PAH
Q	Quebec	KEH <u>BECK</u>
R	Romeo	<u>ROW</u> ME OH
S	Sierra	<u>SEE</u> AIRRAH
T	Tango	<u>TANG</u> GO
U	Uniform	<u>YOU</u> NEE FORM (or <u>OO</u> NEE FORM)
V	Victor	<u>VIK</u> TAH
W	Whiskey	<u>WISS</u> KEY
X	X-ray	<u>ECKS</u> RAY
Y	Yankee	<u>YANG</u> KEY
Z	Zulu	<u>ZOO</u> LOO

* The syllables to be emphasized are underlined.

- o ICAO and ITU standard
- o Also NATO standard
- o There are older forms around
 - o RN, Western Front, RAF, USA pre-1956
 - o e.g. Sugar for Sierra
 - o Papa – Pudding, Pip, Peter/Prep, Peter
- o Viet Cong – VC – Victor Charlie – “Charlie”

Phonetic Digits

<u>0</u>	Zero (FAA) Nadazero (ITU, IMO)	ZE-RO (ICAO), ZE RO or ZEE-RO (FAA) NAH-DAH-ZAY-ROH (ITU, IMO)
<u>1</u>	One (FAA) Unaone (ITU, IMO)	WUN (ICAO, FAA) OO-NAH-WUN (ITU, IMO)
<u>2</u>	Two (FAA) Bissotwo (ITU, IMO)	TOO (ICAO, FAA) BEES-SOH-TOO (ITU, IMO)
<u>3</u>	Three (FAA) Terrathree (ITU, IMO)	TREE (ICAO, FAA) TAY-RAH-TREE (ITU, IMO)
<u>4</u>	Four (FAA) Kartefour (ITU, IMO)	FOW-ER (ICAO), FOW ER (FAA) KAR-TAY-FOWER (ITU, IMO)
<u>5</u>	Five (FAA) Pantafive (ITU, IMO)	FIFE (ICAO, FAA) PAN-TAH-FIVE (ITU, IMO)
<u>6</u>	Six (FAA) Soxisix (ITU, IMO)	SIX (ICAO, FAA) SOK-SEE-SIX (ITU, IMO)
<u>7</u>	Seven (FAA) Setteseven (ITU, IMO)	SEV-EN (ICAO), SEV EN (FAA) SAY-TAY-SEVEN (ITU, IMO)
<u>8</u>	Eight (FAA) Oktoeight (ITU, IMO)	AIT (ICAO, FAA) OK-TOH-AIT (ITU, IMO)
<u>9</u>	Niner (FAA) Nine or niner (ICAO) Novenine (ITU, IMO)	NIN-ER (ICAO), NIN ER (FAA) NO-VAY-NINER (ITU, IMO)
100	Hundred (ICAO)	HUN-dred (ICAO)
<u>1000</u>	Thousand (ICAO)	TOU-SAND (ICAO)
. (decimal point)	Point (FAA) Decimal (ITU, ICAO)	DAY-SEE-MAL (ITU) (ICAO)
. (full stop)	Stop (ITU)	STOP (ITU)

Stop

- o To Mr. Charlie Chaplin, Sennet Studios, Hollywood, California. Congrats stop. Have found only person in world less funny than you stop. Name Baldrick stop. Signed E. Blackadder stop. ... P.S.: please, please, please stop.
- o Twice nightly filming of my films in trenches: excellent idea stop. But must insist that E. Blackadder be projectionist stop. P.S. Don't let him ever... stop.

Channelized VHF/UHF Operation

- o FM Voice procedure a bit different than on HF
- o Use of repeaters
 - o time-out timer
 - o don't interrupt someone (why?)
 - o use "break" only in emergencies
 - o if someone having trouble do not cut them off (could be faulty equipment or panic)
 - o do not kerchunk without identification
 - o avoid the Royal "we"
 - o don't over use Q codes
 - o do not give out personal information over the air

Radio Operating

- o Do not swear or use profanity (it is illegal)
- o Do not broadcast music or programming or commercial notices (these are illegal)
 - o not only is it illegal it puts you into the realm of a pirate radio operator
 - o bane of the amateur radio service
 - o but who listens to SSB broadcasting?
- o Use simplex over repeater where possible
- o pause for squelch tail
- o identify callsign every 30 mins and at start and finish of the QSO (why?)

Voice Procedure

- o Roger
- o Say Again
- o How Copy?
- o Break
- o Q-Codes
- o Double
- o autopatches

IRLP

- o The Internet Radio Linking Project, also called IRLP, is a project that links amateur radio stations around the world by using Voice over IP (VoIP). Each gateway consists of a dedicated computer running custom software that is connected to both a radio and the Internet. This arrangement forms what is known as an IRLP Node. Since all end users communicate using a radio as opposed to using a computer directly, IRLP has adopted the motto "*Keeping the Radio in Amateur Radio*".
- o Yellowknife link currently not operational

HF Operations

- o Band plans
- o Enunciate slowly and clearly
 - o distortions
 - o non-English speakers
 - o English speakers with accents
- o CW
 - o DX
 - o simplest mode; narrow band; low power; low equipment requirement
 - o slow speed
 - o try to avoid using a computer

CW Operations

- ◊ QRL?
- ◊ CQ CQ de VE8YK VE8YK K
- ◊ VE8YK de VE9RCN VE9RCN KN
- ◊ VE9RCN de VE8YK GE OM UR RST 599 599
IN YELLOWKNIFE, NT BT WX COLD AND
SNOWY BT TU ET 73 BT VERCN DE VE8YK
SK

Prowords

- AS
- AR
- BK
- CQ
- DE
- K
- KN
- SK
- SASE
- LOL
- HR
- 73
- 88

- AFSK
- AGN
- ANT
- ARS
- BT
- CPY
- CW
- DX
- OM
- GE
- XYL

RST

Readability (R)	Strength (S)	Tone (T)
1 – unreadable	1 – faint	1- rough, hissing
2 – barely readable	2 – very weak	2 – rough, AC note
3 – difficult	3 – weak	3 – low pitched AC
4 – minor difficulty	4 – fair	4 – slightly musical, hum
5 – easily readable	5 – fairly good	5 – musical some hum
	6 – good	6 – modulated, tone
	7 – fairly strong	7 – modulated, whistle
	8 – strong	8 – near DC, smooth ripple
	9 – very strong	9 – purest DC

Warning

- Remember the rules in Module 1 about passing of third party traffic

Digital Modes

- o digital
 - o on or off/true or false/+5V or -5V
 - o 1 or 0/mark or space
- o rate of signaling is the baud (signalling changes per second) e.g. 2400 Bd is a transmission rate of 2400 symbols per second
 - o Book says 2400 Bd is 9600 bits/s (bps) but surely that depends on the no. of bits in a symbol
 - it assumes a symbol is 4 bits long (a byte is 8 bits)
 - o If so then 2400 Bd is 300 bps

Digital Modes

- o RTTY
- o Packet (TNC)
 - o packet node network
 - o AX.25 protocol
- o APRS
- o AMTOR and PACTOR
- o PSK 31
- o THROB
- o MFSK
- o MT63
- o FSK 441, JT65 etc.
- o ATV and FSTV (70 cm and up)

QSLing

- o Canada not DX in NA
- o RAC Bureau
- o Post Cards
- o IRCs or cash
- o VE8- is rare
- o Logging



CANADA
VE8YK

Y.A.A.R.S.
VE8YK

Yellowknife Amateur Radio Society
P.O. Box 752 STN Main
Yellowknife, Northwest Territories
Canada X1A 1N4

QSL ☐ PSE
☐ TNX

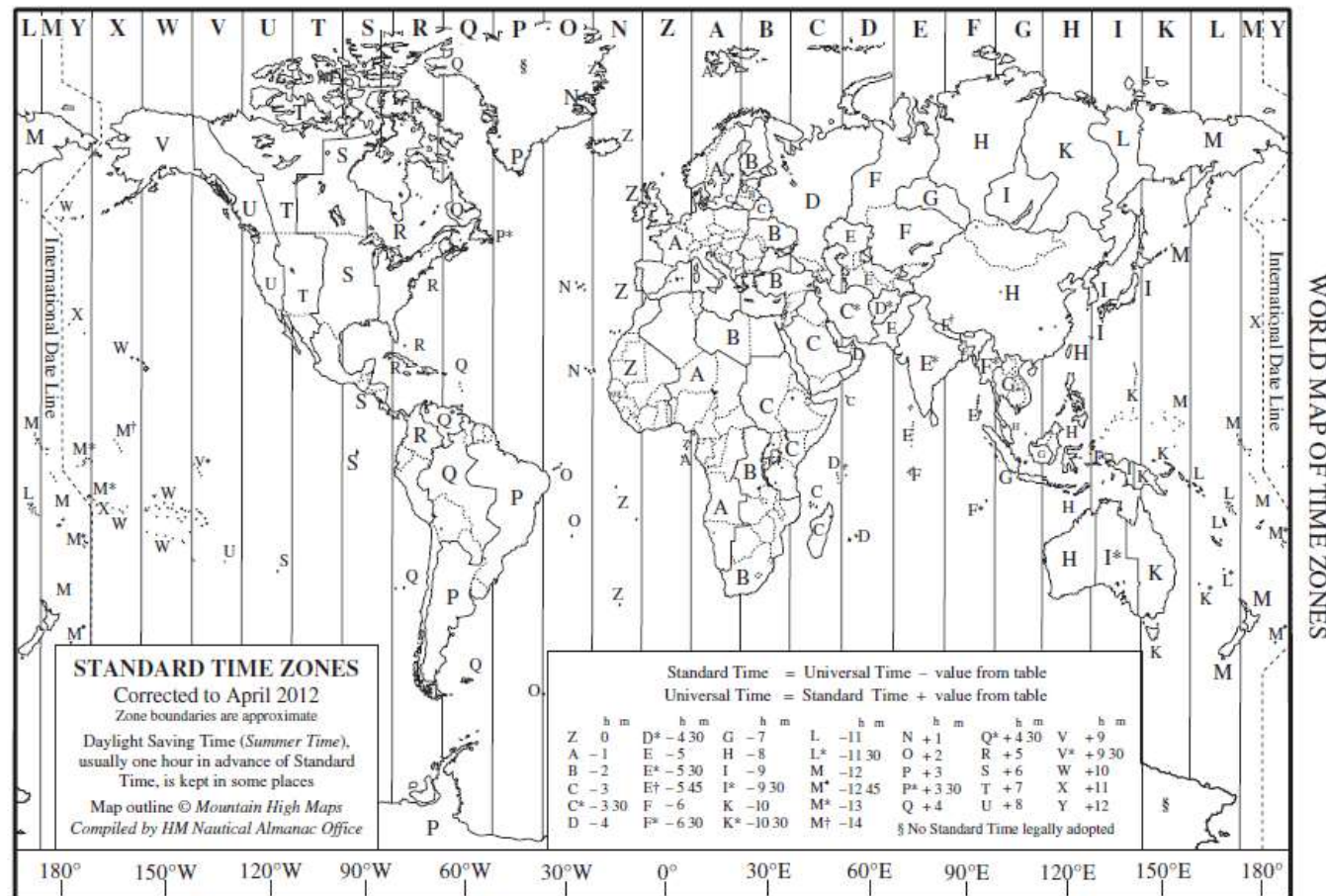
62° 28' N 114° 27' W CQ Zone 1 ITU Zone 2 DP22sl www.ykars.ca

Confirming QSO With	Day	Month	Year	UTC	MHz	2 x Way	RST

Licence Plates



UTC

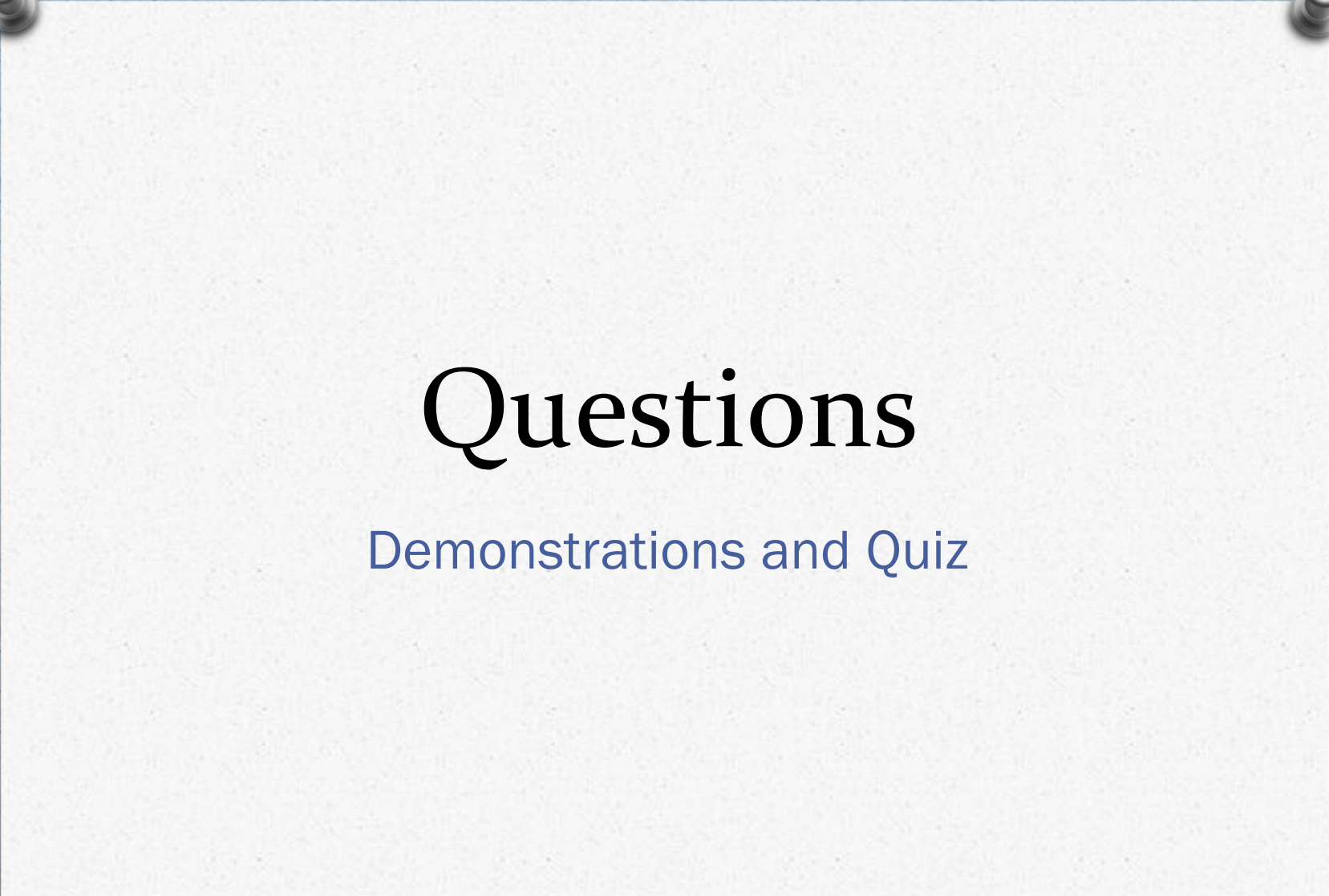


Emergency Operation

- o Distress – MAYDAY, SOS or NC (nautical) – imminent loss of life or property
 - o do not reply
 - o write down what you can including time, date, message, frequency etc.
 - o contact authorities immediately (RCMP)
- o Urgency – PAN PAN – safety of persons threatened but not immediate
- o Security – used as a warning in maritime about aids to navigation and weather (secur-it- tay)
- o Break Break – on repeaters

Emergencies

- **MAYDAY MAYDAY MAYDAY** This is sailing vessel **Deep Six** again sailing vessel **Deep Six** I say again sailing vessel **Deep Six Whisky Xray Tango seven five niner one** Five miles northeast of Saboni Point, Delaware River. Taking on water rapidly and sinking. 35 foot sloop white hull, light blue cabintop. Five people aboard. No life raft. No survival suits. Requesting immediate assistance. **OVER**
- **PON PON PON PON PON PON** This is motor vessel **No Way KILO VICTOR ALPHA four eight niner two**. Ten miles west of Smith Point. 30 foot Hunter Marine light grey hull. Two people onboard. Engine flooded from controlled hull leak. Drifting toward shore. Estimate two to three hours before hit surf line. **OVER**
- **ECURITE SECURITE SECURITE** This is kayak **Mariner Express** Two hundred yards North North East of Red Buoy 66 in the Chester River. All traffic this area be advised a group of nine kayaks is crossing the channel in heavy fog. **OVER.**



Questions

Demonstrations and Quiz