

LONDON AMATEUR RADIO CLUB

2017 Basic License Course

427 Wing

Chapters 11 & 12

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VE3CTS

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11.2 OBTAINING EQUIPMENT

Dealers: Radio World, Durham Radio, ComWest, GPS Central

Radio club swap meets, flea markets

Internet – KWARC (<http://www.kwarc.org/swapshop/>)

Word of mouth

Radio Amateurs of Canada

Need to be licensed to purchase a transmitter

Out of Canada – can get expensive – guarantee ???

Old HF may only have 5 bands instead of 8 (more)

V/UHF may require xtals, no pl, dtmf, old unreplaceable battery packs

11.3 STATION LOCATION

- Access to power
- Way to get your transmission line (coax) to your antenna
- Location for your antenna
- Station grounding
- Work space for rig, computer, telephone, internet etc.
- Not to interfere with or by others.

11.4 VHF & UHF

- HT – probably where you will start
- Dual band, 50 mW to 5 W, battery life, external antenna, power supply, PA, charging and deep cycle. NiCad, Li-ion
- Base/mobile rig – can be used at home or in vehicle
- Under the dash, radio in trunk with remote control head, speaker, microphone up front – either case direct wire from battery.
- All band HF, cw, ssb, analogue, digital

- VHF 2 metre FM (144 – 148 MHz)
- UHF 70 centimetre FM (442 – 450 MHz)
- Simplex, ½ duplex, full duplex
- Repeater, offset, (+/- 600kHz; 5 MHz)
- CTCSS, PL, Channel Guard, Digital Coded Squelch
- WNYSORC
- Antenna suggestions, band openings
- Distracted driving

- Why is it a good idea to have a way to operate your amateur station without using commercial AC power lines?
- 1) So you will comply with rules
- 2) So you may operate in contests where AC power is not allowed
- **3) So you may provide communications in an emergency**
- 4) So you may use your station while mobile

11.5 HF STATION – THE BASICS

- High Frequency 135.7 kHz to 29.7 MHz
- 2200 metres to 10 metres
- <http://wp.rac.ca/rac-0-30-mhz-band-plan/>
- Many points to consider before setting up station
- QRP – low power transmitter < 10 watts
- Mobile HF
- Distracted driving
- Disable radio / microphone if left unattended

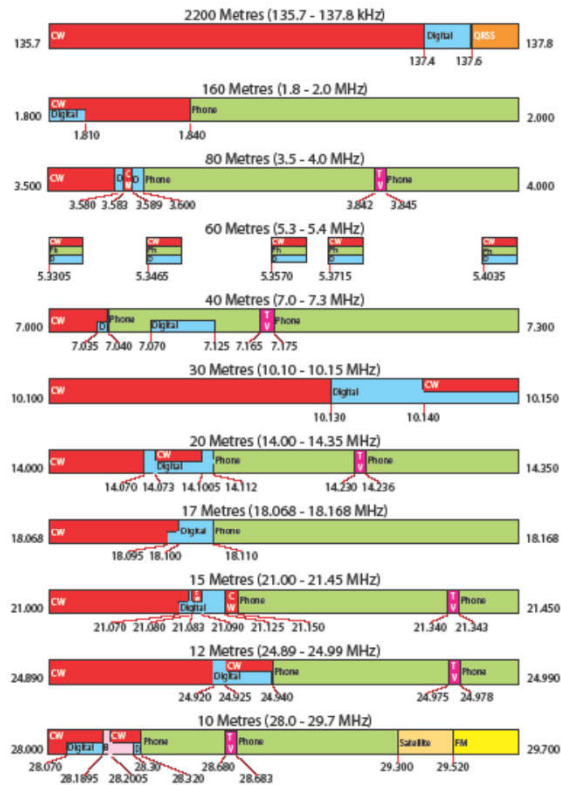


Canadian 0 - 30MHz Band Plan

Effective Date:
December 1, 2015

1. This is a simplified version of the official RAC Band Plan. Not all permissible modes/activities are represented.
2. LSB is used on 160, 80 and 40m. USB is used on all other bands that permit SSB, including 60m.
3. Consult various online resources for detailed information on what digital modes are used.
4. Maximum bandwidth permitted on 2200m is 100 Hz. Maximum power is 1 Watt ERP.
5. Refer to the IC and RAC websites for full details before operating on the new 60m channels.
6. Remember not to allow your signal to spill over into adjoining band segments when operating close to the edges. During major weekend contests activity in certain modes can spill over into other segments. Operators should avoid NCDF beacons on 14.100, 18.110, 21.150, 24.930 and 28.200 MHz.
7. This graphic is a living document and will be reviewed and updated periodically to reflect changes in the band plans and operating habits.

www.rac.ca



| Key | | | | | |
|-----|--------|--|-----------|--|---------|
| | CW | | FM | | SSTV |
| | CWQRSS | | Beacons | | Digital |
| | Phone | | Satellite | | |

11.6 WHAT GOES WHERE

- Low pass filter – eliminate spurious emissions from transmitters operating below 30 MHz (2nd & 3rd harmonics)
- SWR bridge – indicates match between transmitter & antenna. First warning of problem if meter jumps around
- Antenna Switch – convenient way of selecting different antennas, dummy load etc.
- Antenna Tuner – a device connect between a transceiver and its antenna to improve power transfer by matching impedance of the radio to the antenna and feed line.
- Dummy load – replaces the antenna to operate a transmitter without putting a signal on the air during testing.



Low Pass Filter
Model YA-1
52 ohm 1.8-30 MHz
1.5 kw Continuous Power
5 kw Peak Power
BENCHER, INC.

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**MFJ QRP SWR
WATTMETER**

MFJ

FWD/SET

REF/SWR

SWR/POWER

5W

**MODEL
MFJ-813**



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INDUCTANCE

CAPACITANCE

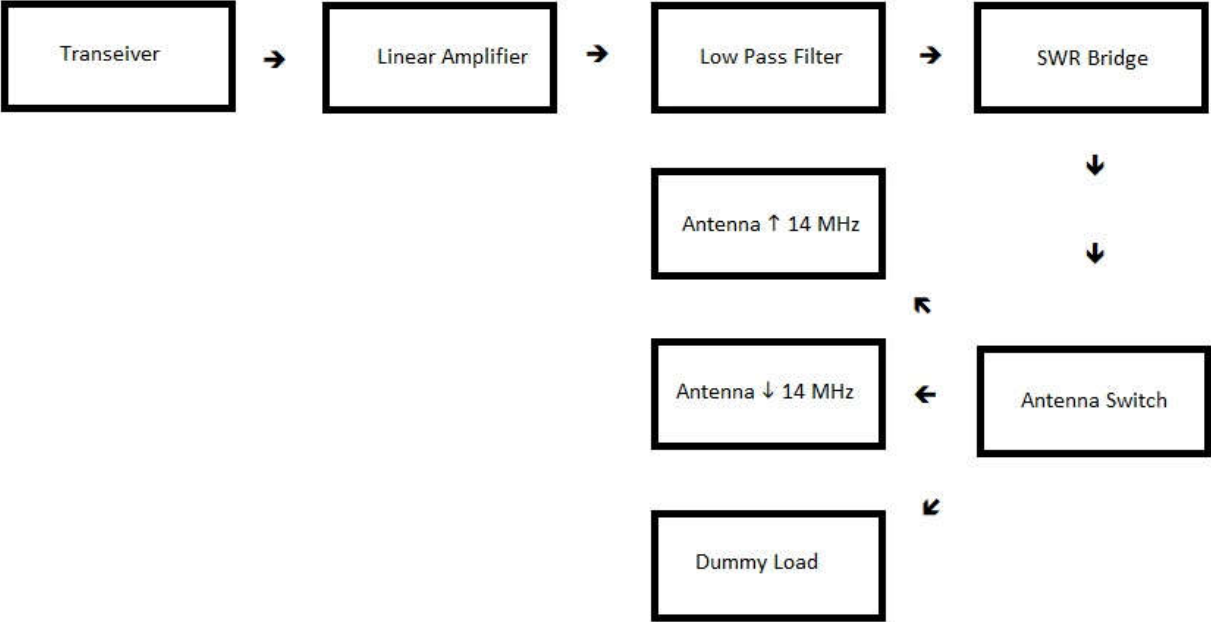


MFJ ANTENNA TUNER
Model MFJ-16010

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- Which component in an HF station is the most useful for determining the effectiveness of the antenna system?
 - **1) SWR bridge** 2) Antenna switch 3) Linear amplifier 4) Dummy load
- A low pass filter in an HF station is most effective when connected:
 - 1) as close as possible to the antenna 2) as close as possible to the antenna tuner output 3) as close as possible to the linear amplifier input **4) as close as possible to the linear amplifier output**
- In designing an HF station, which component would you use to reduce the effects of harmonic radiation? .
 - 1) Dummy load **2) Low pass filter** 3) Antenna switch 4) SWR bridge
- What kind of SWR reading may mean poor electrical contact between parts of an antenna system?
 - 1) A negative reading 2) No reading at all **3) A jumpy reading** 4) A very low reading

- What does a very high SWR reading mean?
 - 1) The transmitter is putting out more power than normal, showing that it is about to go bad **2) The antenna is the wrong length, or there may be an open or shorted connection somewhere in the transmission line** 3) There is a large amount of solar radiation, which means very poor radio conditions 4) The signals coming from the antenna are unusually strong, which means very good radio conditions
- Of the components in an HF station, which component would be used to match impedances between the transceiver and antenna?
 - **1) Antenna tuner** 2) Antenna switch 3) Dummy load 4) SWR bridge
- In an HF station, the antenna tuner is usually used for matching the transceiver with:
 - **1) most antennas when operating below 14 MHz** 2) most antennas when operating above 14 MHz 3) mono-band Yagi type antennas 4) tri-b and Yagi antennas

- In an HF Station, the antenna tuner is commonly used:
 - 1) with most antennas when operating above 14 MHz 2) to tune into dummy loads 3) to tune low pass filters 4) **with most antennas when operating below 14 MHz**
- What device might allow use of an antenna on a band it was not designed for?
 - **1) An antenna tuner** 2) An SWR meter 3) A low pass filter 4) A high pass filter
- What does an antenna matching unit do?
 - **1) It matches a transceiver to a mismatched antenna system** 2) It helps a receiver automatically tune in stations that are far away 3) It switches an antenna system to a transmitter when sending, and to a receiver when listening 4) It switches a transceiver between different kinds of antennas connected to one transmission line

- What would you use to connect a coaxial cable of 50 ohms impedance to an antenna of 35 ohms impedance?
 - 1) An SWR meter **2) An impedance-matching device** 3) A low pass filter 4) A terminating resistor
- What is one way to shorten transmitter tune-up time on the air to cut down on interference?
 - 1) Use a random wire antenna 2) Tune up on 40 metres first, then switch to the desired band 3) Use twin lead instead of coaxial cable transmission lines **4) Tune the transmitter into a dummy load**
- How can on-the-air interference be minimized during a lengthy transmitter testing or loading-up procedure?
 - 1) Choose an unoccupied frequency 2) Use a non-resonant antenna 3) Use a resonant antenna that requires no loading-up procedure **4) Use a dummy load**

- Why would you use a dummy antenna?
 - 1) To give comparative signal reports **2) To allow antenna tuning without causing interference** 3) It is faster to tune 4) To reduce output power
- Why might a dummy antenna get warm when in use?
 - 1) Because it absorbs static electricity 2) Because it stores radio waves **3) Because it changes RF energy into heat** 4) Because it stores electric current



- 11-7 OPERATING THE EQUIPMENT

- Read the manual
- Spend time listening
- Ask questions or ask for help
- Listen before you transmit – 15 Metres Canada to Florida
- Identify your station
- What is the circuit called which causes a transmitter to automatically transmit when an operator speaks into its microphone?
 - 1) VXO
 - 2) VCO
 - 3) VFO
 - **4) VOX**

- 11.8 USING XCVR WITH SOLID STATE FINALS

- Transistor are less forgivable than tubes.
- Tune and load up rig according to manual.
- Poor antenna match will reduce power and can damage finals
- Improper settings can cause interference and splatter.
- How should the microphone gain control be adjusted on a single-sideband phone transmitter?
 - **1) For slight movement of the ALC meter on modulation peaks**
 - 2) For full deflection of the ALC meter on modulation peaks
 - 3) For 100% frequency deviation on modulation peaks
 - 4) For a dip in plate current

11.9 USING TRANSMITTERS WITH TUBE FINALS

- Tube final amplifiers are more tolerant to maladjustments or high SWR (3:1)
- Final power amplifier will provide years of service
- Becoming hard to obtain = ↑ \$\$\$

- 11.10 USING YOUR ANTENNA TUNER

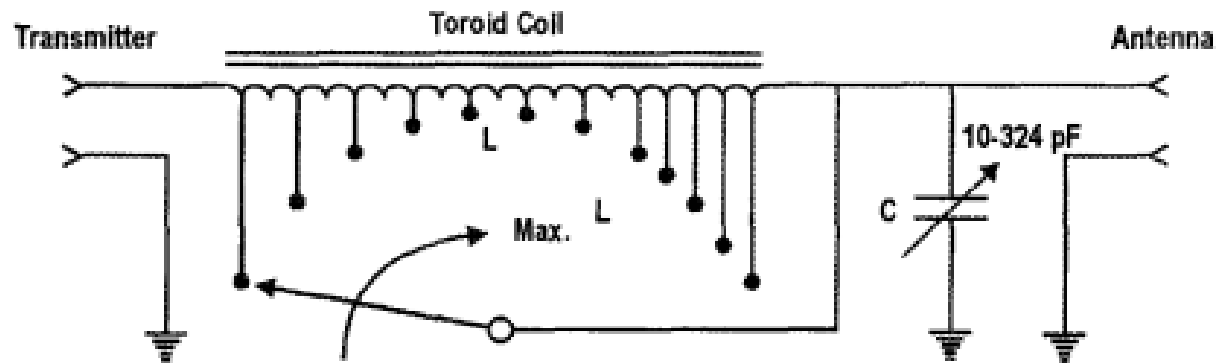
- Many modern HF transceivers have built in tuners
- Use little transmit power while tuning (prevent arcing on capacitor plates)
- Rotate inductance (L) for maximum noise from receiver
- Apply power to give adequate reading on SWR meter
- Adjust (L) for drop in SWR
- Adjust capacitance (F) for minimum SWR
- If minimum SWR is not achieved adjust (L) +/- and start over
- If position of the controls change over time check your antenna system to see if wire has stretched etc.



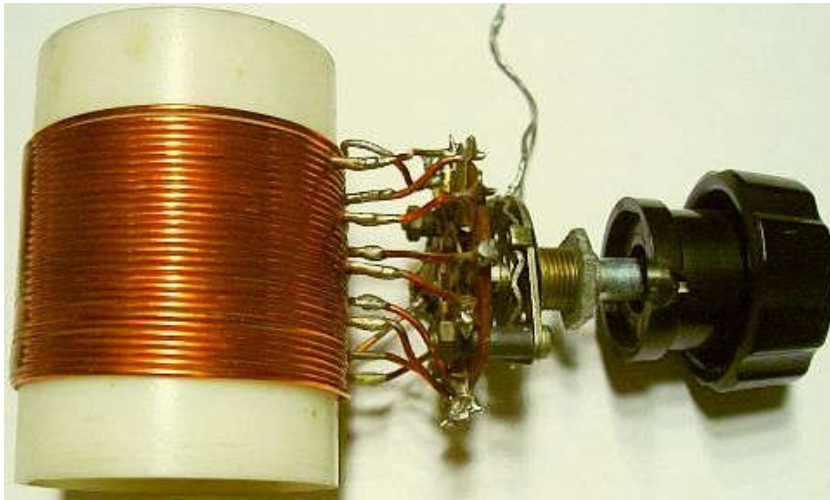
Connect the MFJ-16010 as shown

Figure A

CIRCUIT DIAGRAM

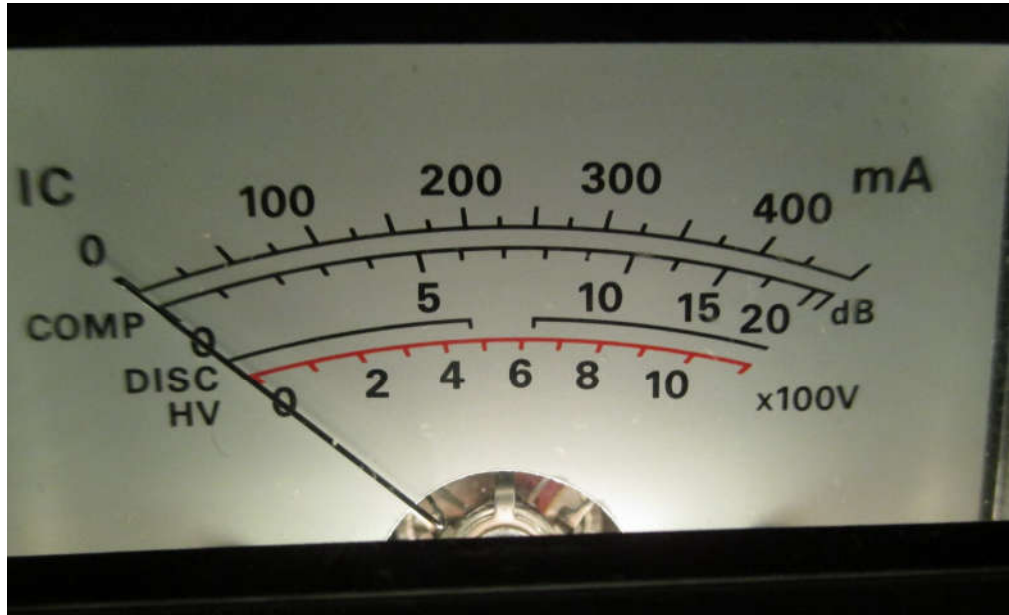


MFJ-16010



11.11 MONITORING PERFORMANCE

- Most modern transceivers have multifunction meters allowing you to read: 'S'units; ALC; current; voltage; power output; compression and discriminator
- Power input can be determined multiplying PA current by PA voltage in tube rigs or collector current and collector voltage in solid state rigs
- You can also use stand alone watt meter or combined with VSWR
- No system is 100% efficient – 1/3 dissipated as heat.



11.12 FREQUENCY DETERMINATION

- Important to know your exact transmitter frequency (so you comply with the bands allotted to Amateurs)
- Modern transceivers have stable frequency synthesizers and can be compared to standard time signals
- CHU Ottawa: 3.33 / 7.85 / 14.67 MHz
- WWV(H) Fort Collins CO; Kauai HI: 2.5 / 5 / 10 / 15 / 20 MHz
- Some older rigs have 100 kHz marker

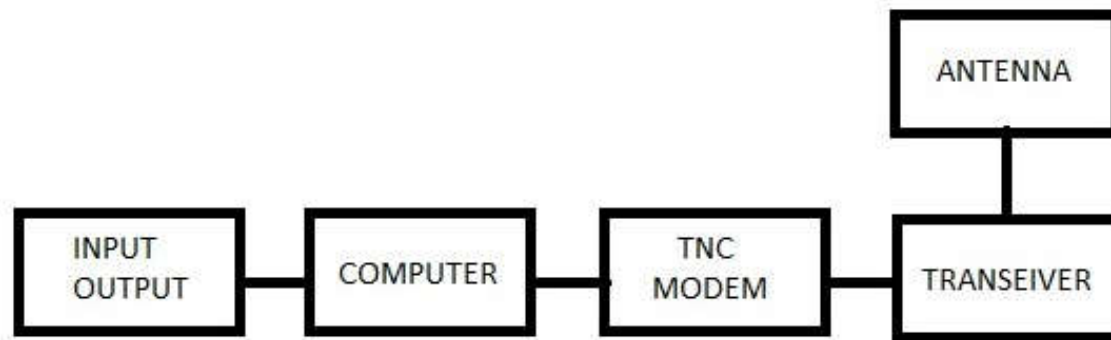
11.13 OPERATING CW (continuous wave)

- Turns transmitter carrier on and off with a switch called a 'key'
- Automatic keyer times the **dits** and **dahs** so they are at the right ratio
- Computer programs to send and receive CW – interface with *xcvr*
- Interactive web sites to learn Morse code
- W1AW code practice at variable speeds on air or on the web
- <http://www.arrl.org/code-practice-files>
- <http://www.arrl.org/w1aw-operating-schedule>
- Don't send faster than you can receive



11.14 OPERATING DIGITAL MODES

- In an *AX.25 packet-radio* operation, what equipment connects to a terminal-node controller?
 - 1) A transceiver and a modem
 - 2) A DTMF keypad, a monitor and a transceiver
 - 3) A DTMF microphone, a monitor and a transceiver
 - **4) A transceiver, a computer and possibly a GPS system**



- RTTY (Radio Teletype)

- is the original keyboard to keyboard mode, based on the 5-bit Baudot code, began with mechanical Teletypes as mentioned above. It is still a popular communications mode, but now uses PCs for coding and decoding, using 170 Hz frequency shift keying at a 45.45 baud rate -- 60 words per minute.



- PSK-31 (Phase Shift Keying 31 bit rate)

- is a computer-sound card-generated radioteletype mode, used to conduct real-time keyboard-to-keyboard communications



- JT65-HF (Joe Taylor -65 tones)

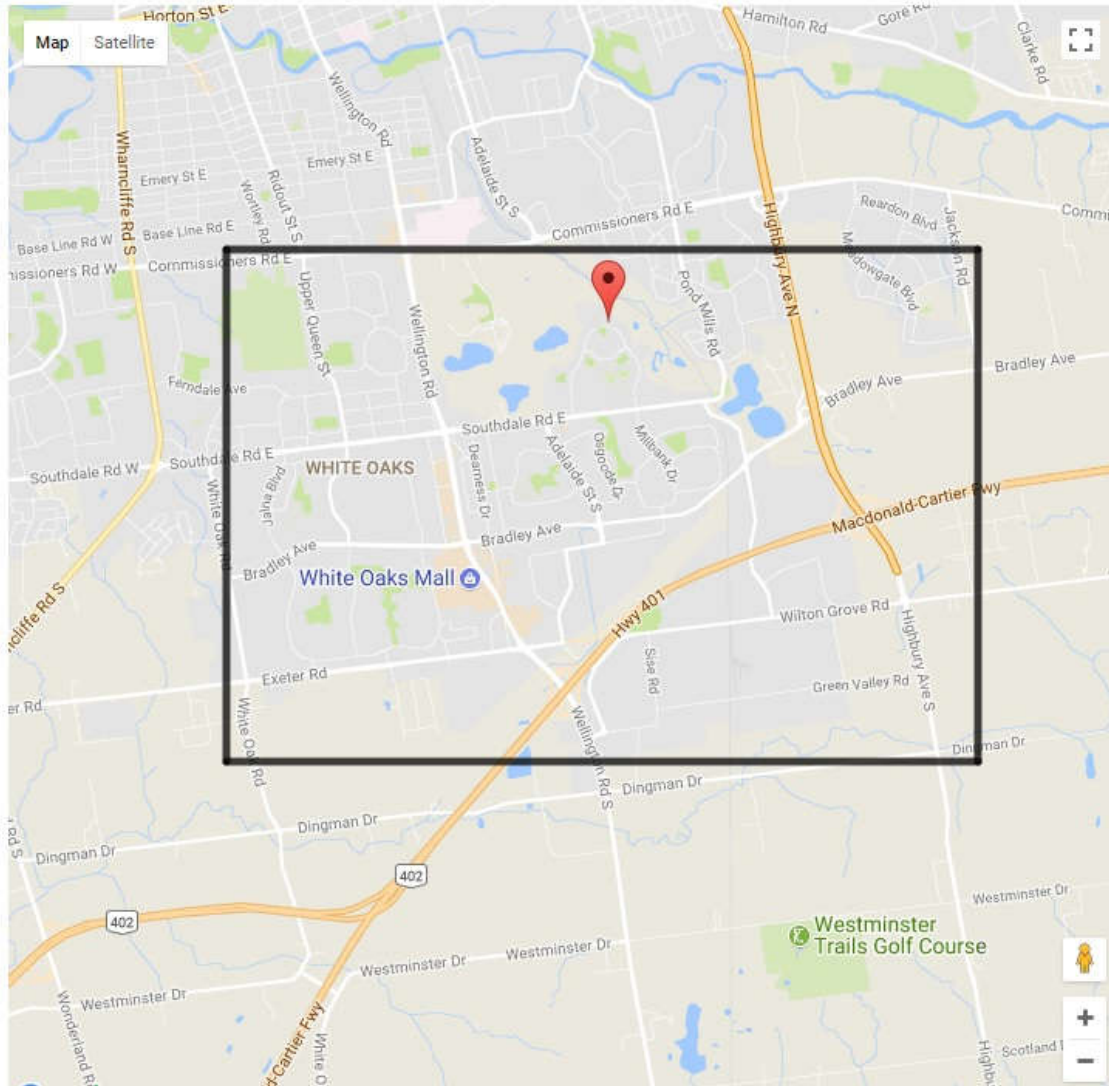
- is an extremely efficient weak-signal mode – possible to decode signals you simply cannot hear in audio



- WSPR (Weak Signal Propagation Reporter)

- Low power transmission
- Transmissions carry a station's callsign, [Maidenhead grid locator](#), and transmitter power

Grid: **EN92jw** (QRZ: EN92jx)



11.15 TRANSDUCERS: MICROPHONES AND LOUDSPEAKERS

- Frequency response
 - Best suited for communication - 300 – 3000 hz
- Sensitivity
 - How well a microphone can capture the range of audio
- Directional qualities
 - For communications – do not want background noise
 - Noise cancelling microphones / headsets
- Impedance
 - Match to xcvr's requirements
 - High/low measured in ohms
- Crystal, dynamic, condenser/electrostatic, carbon

12.2 Q-CODES

- Mainly used for CW, but sneak into everyday voice comms
- 10% of exam questions – easy marks
- “?” changes the statement
- dadadidadah

- QSB - fading
- QRM - man made interference
- QRN - static - natural
- QSY - change frequency
- QRX - standby, I will call you
- QRZ - who is calling
- QRU - standby - monitoring
- QRT - stop transmitting
- QSL - acknowledge receipt
- QTH – location
- QRL – is the frequency busy
- ORS – send slower

12.3 PHONETIC ALPHABET

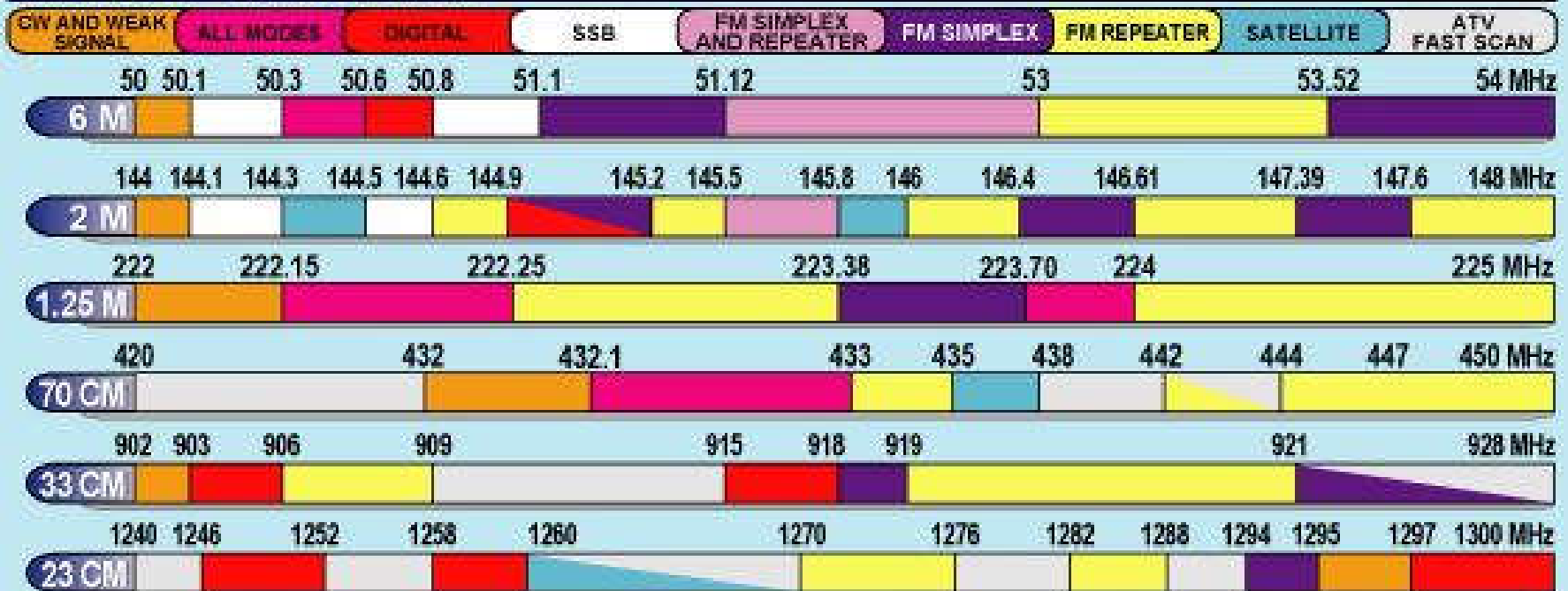
- Standard international phonetic alphabet
 - Just spell unusual items
 - Call sign
 - City if unknown and important
 - Similar sounding letters
- If string of numbers – warn recipient saying figures or numbers

- Common Exam questions for the phonetics for these letters:
 - A - alpha
 - B - bravo
 - D - delta
 - E - echo
 - G - golf
 - I - India
 - L - Lima
 - P - papa
 - R - Romeo

12.4 CHANNELIZED VHF/UHF OPERATION

- CW, AM, SSB, Digital (packet, Dstar, Mototurbo, Fusion and others)
- Most operation is FM 144-148; 442-449 MHz
 - FM - Capture effect
 - Difference AM – FM distance – weak signal
- Simplex - transmit / receive on same frequency
- ½ duplex
 - xmit on one frequency; receive on another (repeater)
- Full duplex – same as above, but you can talk and receive at the same time Just like a telephone.
- Check band plan so as to not interfere with other modes

VHF/UHF BAND PLAN



VHF/UHF SPECIAL FREQUENCY TABLE

| | 6M | 2M | 1.25M | 70CM | 33CM | 23CM |
|--------------------------|--------------------------------|-----------|-----------|-----------|---------|-----------|
| DX WINDOW | 50.0-51.1 | | | | | |
| NATIONAL CALLING SSB | 50.125 | 144.2 | 222.1 | 432.1 | 902.1 | 1296.1 |
| NATIONAL CALLING FM | 52.525 | 146.52 | 223.5 | 448.0 | | 1294.5 |
| RADIO REMOTE CONTROL SSB | 50.8-51.53.12,3,4,5,6,7,8 | | | | | |
| DIGITAL REPEATER | 51.12-51.18,51.62-51.68 | 144.1-148 | 222.1-225 | 432.1-433 | 902-928 | 1240-1300 |
| INDIVIDUAL FM SIMPLEX | 52.02,52.04,52.525,52.54, 53.0 | | | | | |

12.5.1 OPERATING ON REPEATERS

- Repeaters
 - Automatically retransmits signal from other stations
 - Increase range of portable & mobile stations
 - Keep HF frequencies available for long range contacts
- Frequency modulation (+/- 5 kHz)
- ½ duplex – transmit and receive different frequencies
 - Offset 600 kHz VHF – 2 metres
 - Minus below 147.000 / plus 147.00 and above
 - Offset 5 MHz UHF – 70 cm – always plus

TONE SQUELCH

- Squelch
- CTCSS (continuous tone-coded squelch system) PL, CG, tone
 - Sub-audible tone
 - 50 settings - 67.0 to 254.1 Hz (southwest Ontario 114.8)
 - Encode
 - Decode
- DCS (digital-coded-squelch)
 - adds a 134.4 [bps](#) (sub-audible) bitstream to the transmitted audio
- Courtesy tone
- Repeater tail (hang time)
- Repeater timeout timer

More operating on repeaters

- Leave space for someone to break in
- Normally just say your call sign (full call sign)
 - Phonetics only require occasionally
- If urgent 'break' and your call sign – with emergency traffic
- If in a QSO invite others, or ask if there any other traffic
- Use suitable power to reach repeater
- Hold HT (handie talkie) upright (20 to 30 dB loss)
- No cq cq cq, 10 codes or CB slang
- Band openings (encode only)
- Identify at beginning and end of QSO and every 30 minutes

FM SIMPLEX OPERATION

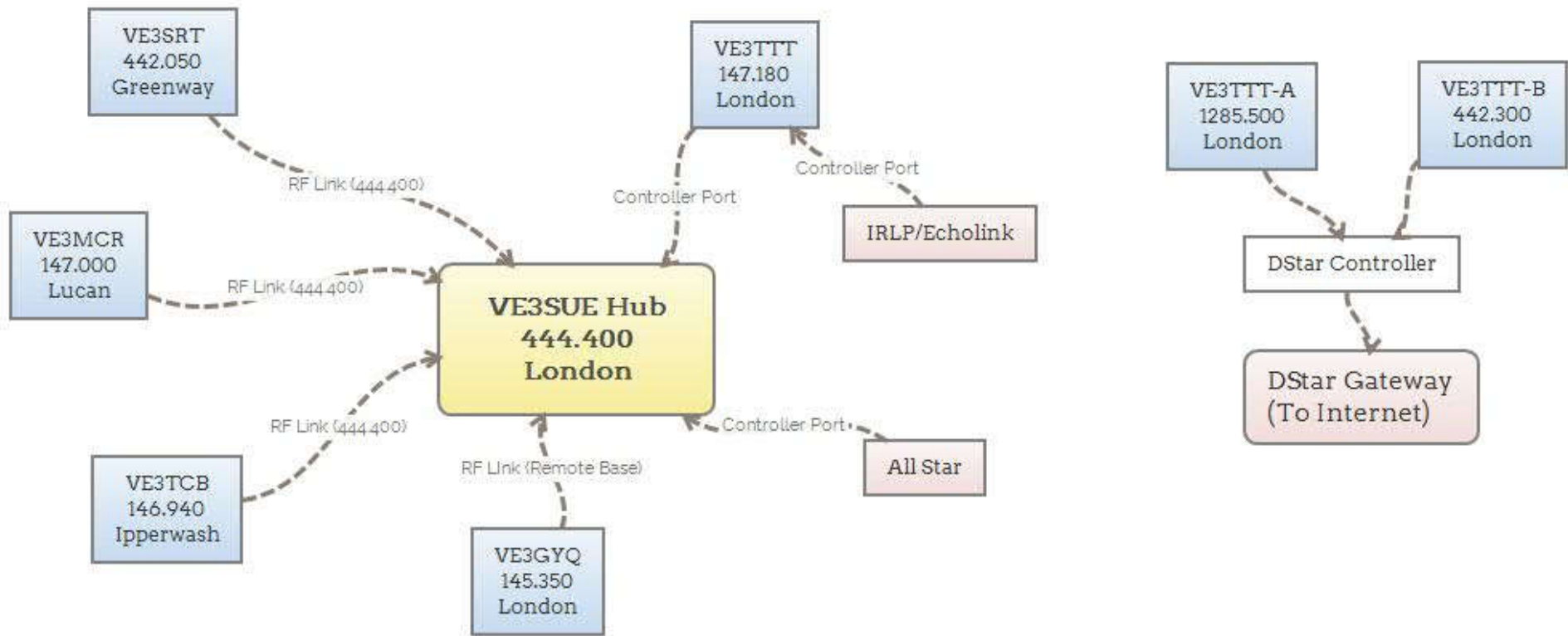
- Operator to operator
- Can be used if repeater is busy /don't want to tie up the frequency
- If you hear the station on the input of the repeater you can work simplex
- VHF will go farther, but UHF will work into building etc.
- Simplex FM frequencies
 - 146.400 – 146.580
 - 146.520 national calling frequency
 - 147.420 – 147.570
 - 446.000 – 446.175
 - 446.000 – national calling frequency

OTHER MISCELLANEOUS STUFF

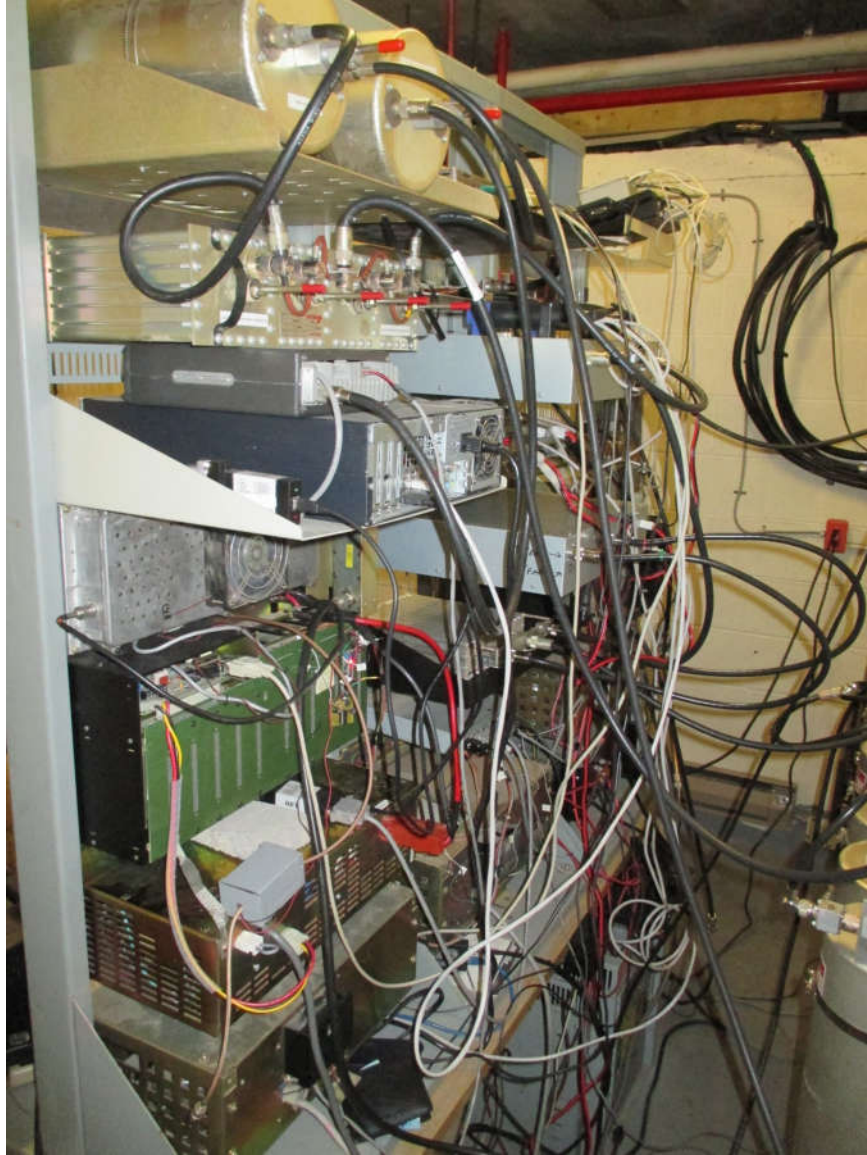
- Linking repeaters
 - Terrestrial links
- Voice over IP
 - IRLP (Internet Radio Linking Project)
 - Echolink
 - Allstar
- Repeaters with remote base
- Apps available for smart phones
- WNYSORC
- License requirements – repeater licensee
 - Basic and advanced amateur for same band
 - Basic amateur for cross band

Time for an advertisement

- SORT (Southern Ontario Repeater Team Inc.)
 - VE3TTT 147.180 + London
 - VE3SUE 444.400 + London – Hub repeater
 - VE3GYQ 145.350 + London – Remote base
 - VE3MCR 147.000 + Lucan
 - VE3SRT 442.050 + Grandbend / Pinery
 - VE3TCB 146.940 – Ipperwash
 - VE3ISR 147.360 + Dutton (owner VE3CGN – Scott Carter)
 - VE3TTT 442.030 + London (Dstar)
 - VE3TTT 1285.500 + London (Dstar)
- IRLP node 2400
- Echolink node 10741
- Allstar node 2416













12.6 CW OPERATION

- Slower speed CW can be found at
 - 3.675 – 3.725
 - 7.100 – 7.150
 - 21.100 – 21.200
 - 28.100 – 28.300
- Listen before you xmit. Send QRL and listen for response. (Twice ?)
- To make a general call for anyone to answer, send
 - CQ CQ CQ DE VA3DAE VA3DAE VA3DAE
- I answer:
 - VA3DAE DE VE3CTS VE3CTS VE3CTS

- You answer and the contact begins:
 - VE3CTS DE VA3DAE - -
 - TNX CALL OM - -
 - RST 599 IN QTH LONDON
 - NAME DOUG - - HW CPI?
 - VE3CTS DE VA3DAE K (OR KN)
- And the call goes on ... you can tell him he is your 1st contact, RST, QTH, name etc.

| Readability | | Strength | | Tone | |
|-------------|------------------|----------|---------------|------|--------------------------|
| 1 | unreadable | 1 | faint | 1 | extremely rough, hissing |
| 2 | barely readable | 2 | very weak | 2 | very rough, ac note |
| 3 | difficult | 3 | weak | 3 | low pitched ac |
| 4 | minor difficulty | 4 | fair | 4 | slight musical ac hum |
| 5 | easy readable | 5 | fairly good | 5 | modulated some ac hum |
| | | 6 | good | 6 | modulated musical tone |
| | | 7 | fairly strong | 7 | modulated slight whistle |
| | | 8 | strong | 8 | near dc smooth ripple |
| | | 9 | very strong | 9 | purest dc note |

12.7 PHONE OPERATION HF BANDS

- Lower sideband - 160, 80, 40
- Upper sideband – 20, 15, 10
- Listen before you xmit – ask if frequency is in use - over
- ID every ½ hour – beginning and end
- I spell – warn phonetics coming – don't wear it out
- Don't rag chew on DX freqs
 - 3.775 – 3.800
 - 7.075 – 7.100
 - 14.175 – 14.225
- Readability Strength (no Tone)
- No Q signals – Zed instead of Zee
- Speak clearly, slowly if contact's 1st language is English

GETTING THE CONTACT

- Call the same way you would on CW
 - ***CQ CQ CQ THIS IS VA3DAE VA3DAE VA3DAE OVER***
- Don't interrupt a QSO just to get a specific contact – wait to end
- Understand how contests work before participating
- Canada and USA are not DX

12.8 DIGITAL MODES – THE BASICS

- Advantages
 - Narrow band width
 - Works well with interference
 - Automatic error correction
 - Requires less transmit power
- Digital transmissions use signals called ***mark and space*** to transmit the states 1 and 0

RTTY – RADIO TELETYPE

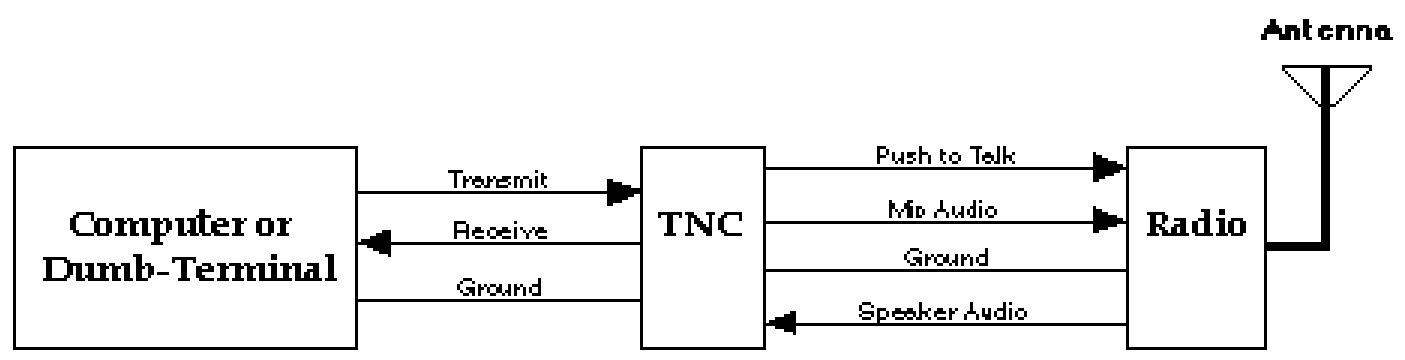
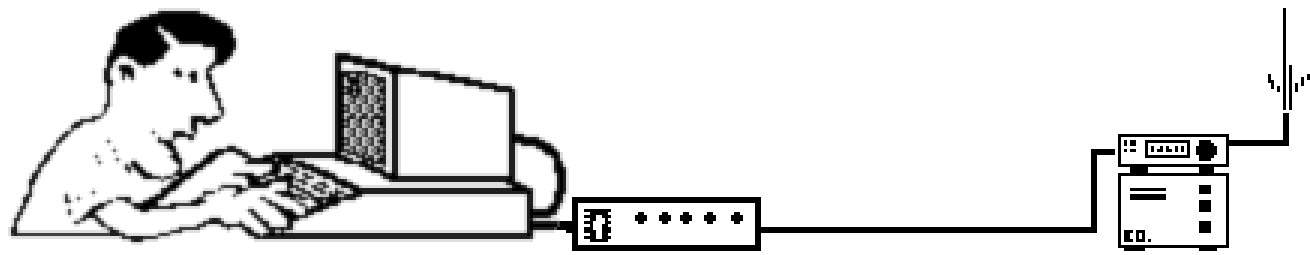
- Became popular when surplus Teletype machine became available
- Uses **Baudot** code which predates ASCII used by packet radio
 - Bits known as mark (1) and space (2)
- Transmission is via shifted carrier
 - Mark frequency is shifted 170 Hz to signal space
- When selecting a RTTY transmitting frequency you should stay a minimum **250 to 500 Hz** from a contact in progress



PACKET RADIO

- Computer to computer via radio
- Message forwarding system using **AX-25** protocol
- use 144.390 locally, 220 backhaul, HF and now the internet
- Data goes in bundles called a packets, with synchronization, recipient and control information for error checking
- When 2 stations are linked they are in a **connected** mode which ensures no errors
- You can display all packets from other stations by using the **monitoring** mode
- A **digipeater** received packets stores them temporarily and retransmits
- Send data a long distance via a **packet node network**

Figure 1 - Packet Radio Station



Serial Connection
Basic connection only
requires pins 2,3,7 (DB-25)

Radio Connection
Basic connection only
requires speaker and mic plugs



APRS
(AUTOMATIC POSITION REPORTING SYSTEM)

www.aprs.fi

- is system for digital communications of information of immediate value in the local area
- Data can include object (GPS) coordinates, weather station telemetry, text messages, announcements, queries
- APRS data can be displayed on a map, which can show stations, objects, tracks of moving objects, weather stations, search and rescue data, and direction finding data.
- Newer amateur radio equipment has APRS built in along with GPS
- Experimental amateur radio balloon launches use aprs to track the flight path

- AMTOR

- (Amateur Teleprinting Over Radio)



- Not as popular as it used to be

- Has two modes

- **Mode A** – is used for one on one *communications after a contact has been* established and not for general calls. You would not call CQ using this mode.

- Mode B – is used for CQ and net operations where there are a number of receiving stations

- PSK31 has pretty well taken over

OTHER DIGITAL MODES

- PSK31
- THROB
- MFSK 16
- MT 13
- Hellschreiber

- Modes specifically for VHF/UHF
 - FSK441
 - JT6M
 - JT65
 - EME Echo

AMATEUR TELEVISION

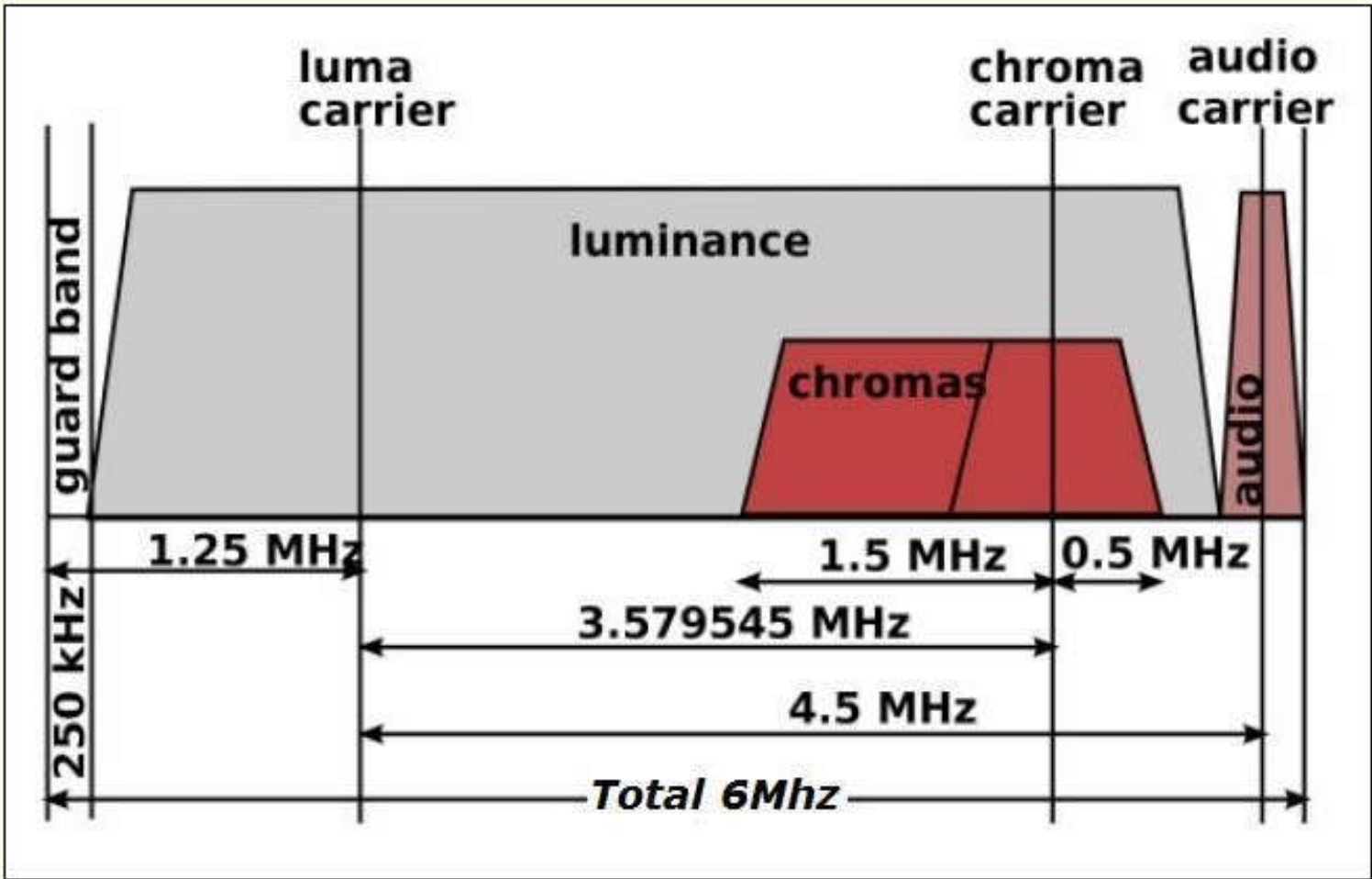


- SSTV (slow scan tv)
- Band width few kHz – same a phone mode so can be used on HF
- Takes about 8 seconds to send picture (NASA moon landing '69)
- Tone varies with picture information so it is a analogue mode
- Digital tv is now available to use on HF

FAST SCAN TV (ATV)

Amateur TV

- ATV bandwidth is 5 MHz and ***restricted to UHF and above***
- Best to use low loss hard-line coax
- Canada band plan 438 to 444 MHz
- Video carrier frequency 439.250 MHz
- Audio to VHF simplex
- Repeater output 442 to 445 !!!
- Cross band repeater



12.11 QSL'ing

- Card of uniform size with:
 - ***Written proof of communication between to amateurs***
 - ***Call sign*** of both stations
 - ***Time*** (UTC) and ***date*** of contact
 - ***Frequency*** or ***band***
 - ***Mode***
 - ***Power***
 - Signal report – RS(T)
- RAC members can send cards via Outgoing QSL Bureau



The Hashemite Kingdom of Jordan



JY1



*Confirming with Measure The Contact with
Thomas Strang*

Warm Regards and Best 73"

Hussein I.



AMATEUR RADIO STATION JY1

CONFIRMS CONTACT WITH :

| RADIO | DATE | GMT | MC | RST | 2 WAY |
|-------|----------|------|----------------|-----|-----------|
| G4DY0 | 4 Mar 79 | 1902 | 14 21 28 | 59 | CW SSB |

73

OP. HUSSEIN I
P.O. BOX 1055
AMMAN
JORDAN

PSE QSL TNX *Drew*

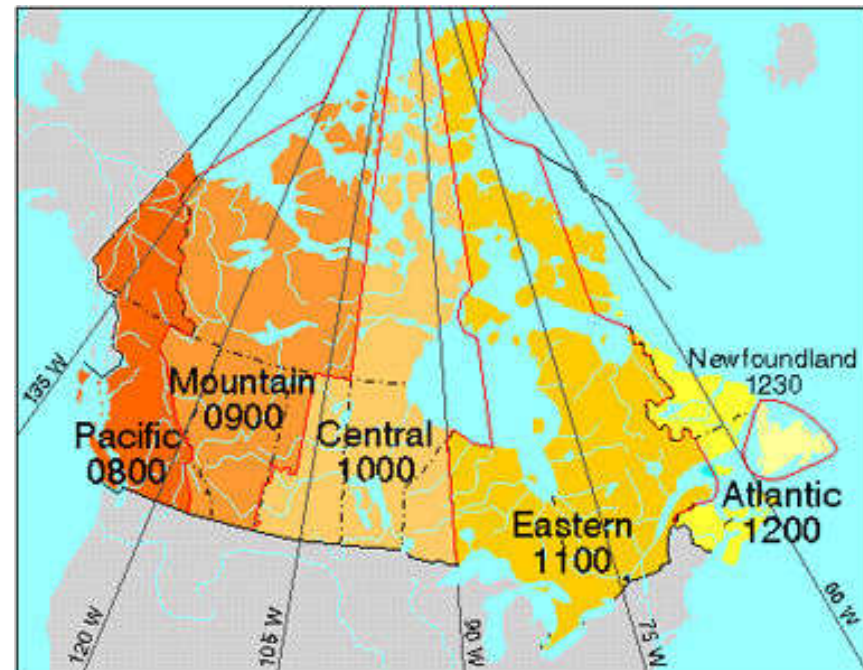
Hussein I.

12.12 LOGGING

- ***Keeping a log book for amateur radio contacts is NOT required in Canada***
- If you decide to keep a log – do it consistently to have any meaning
- Should contain the same information that is used on a QSL card along with the other operator's name and location
- Also becomes handy if there is interference problem, to confirm if you were transmitting

12.13 UTC/GMT

- Universal Time Coordinated
- Greenwich Mean Time (Greenwich UK - 51.4826° N, 0.0077° W)
- Does not change with standard/daylight time
- Six time zones in Canada
 - PST + 8
 - MST + 7
 - CST + 6
 - EST + 5
 - AST + 4
 - NFLD + 3½
 - Remember to subtract 1 hour for daylight savings time
 - CHU, WWV(B), GPS, Cell, Time server



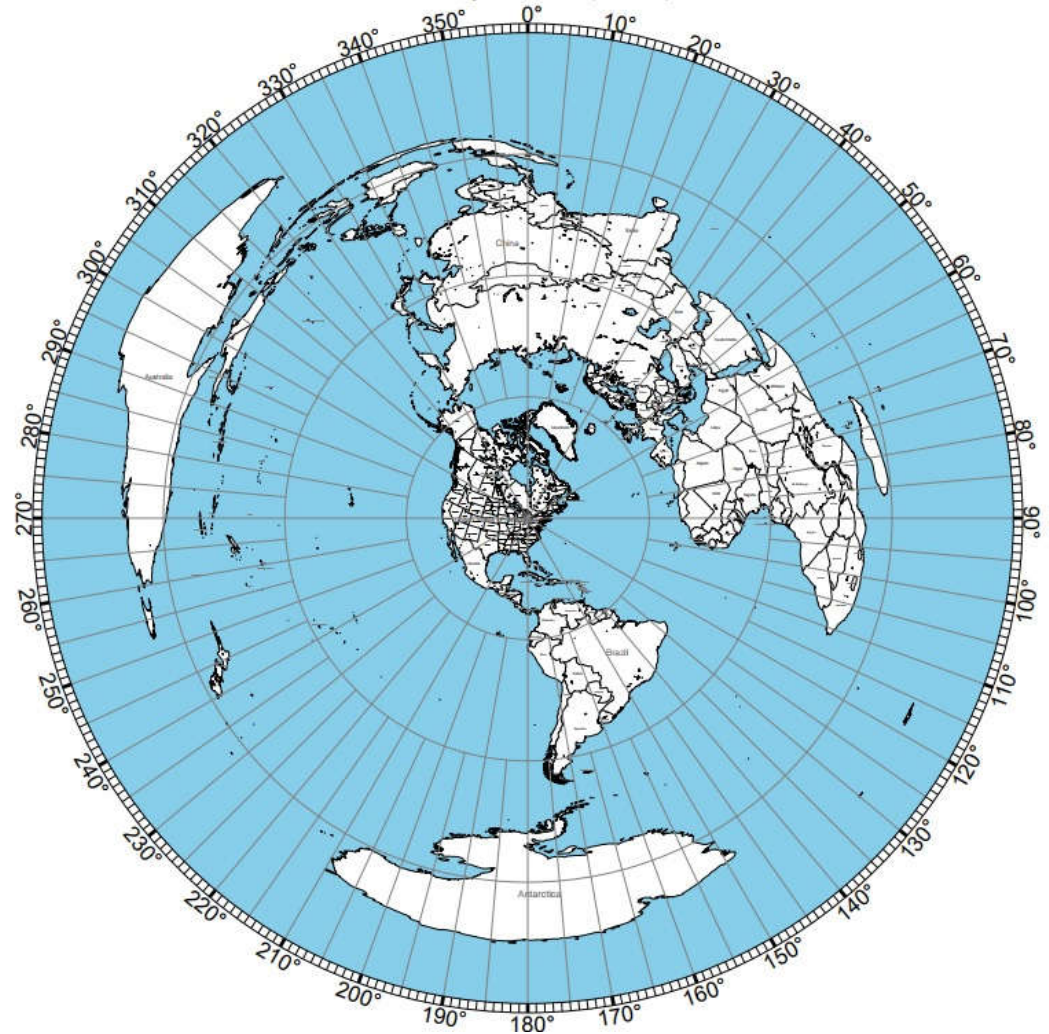
12.14 MAPS - Azimuthal

- ***Is a map centered on a particular location used to determine the shortest or longest path between points on the earth's surface.***
- Long/short path are 180° apart
- This map shows compass bearing from your station to any place on earth for antenna pointing

Azimuthal Map

Center: 43°1'58"N 81°9'36"W

Courtesy of Tom (NS6T)



12.15 NETS – (short for network)

- Nets operate more or less formally depending on their purpose and organization.
- May organize and operate in collaboration for a common purpose, such as to pass along emergency messages in time of disaster.
- Controlled by a “Net Control Station”
- Traffic nets – relay formal written message
- DX nets - help amateur radio operators make contact with stations in distant locations or regions where amateur radio operators are scarce
- Club or Topic nets - Special interest clubs or non-club groups often organize nets to enable discussions on a particular topic.

What to do if you are the 'Net Control Station'

- If you are the net control station of a daily HF net, what should you do if the frequency on which you normally meet is in use just before the net begins?
 - **Call and ask the occupants to relinquish the frequency for the scheduled net, but if they are not agreeable conduct the net on a frequency 3 to 5 kHz away from the regular net frequency**
- If a net is about to begin on a frequency which you and another station are using, what should you do?
 - **As a courtesy to the net, move to a different frequency**

Some more miscellaneous tidbits

- If propagation changes during your contact or you notice other activity or increasing interference on the same frequency, what should you do?
 - **Move your contact to another frequency**
- When selecting a single-sideband phone transmitting frequency, what minimum frequency separation from a contact in progress should you allow (between suppressed carriers) to minimize interference?
 - **Approximately 3 kHz**

12.16 COMMUNICATIONS IN TIMES OF EMERGENCY

- Order of priority for distress messages
 - Distress
 - Highest level – threat of grave and immediate danger, requesting immediate assistance
 - On voice: MAYDAY MAYDAY MAYDAY
 - (it's illegal to knowingly transmit fraudulent distress signal)
 - On cw: SOS SOS SOS
 - Urgency
 - Next level – situation where safety of person, vehicle, airplane, vessel, residence is threatened
 - On voice: PAN-PAN PAN-PAN PAN-PAN
 - Security
 - Lowest level – primarily for warnings for maritime navigational aids and weather warnings
 - On voice: SECURITY SECURITY SECURITY (pronounced secur-it-tay)
- On repeaters request is less formal – station needing assistance might say 'BREAK BREAK BREAK' this is (station's call sign). Those using the repeater should suspend their contact and respond to station breaking in and determine what assistance should be provided.

SK

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