The Hamster Handbook

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Overview

Notes made by a ham newbie as he muddled his way through the learning curve.

Scenarios

1. just chatting ("rag chew")
2. automatic position reporting (see APRS)
3. operating remotely - QRM, solar powered
4. operating remotely - canyons and other obstacles
5. disaster assistance - reconnecting to a net, operating in a net, operating the net

Morse Code

For completeness, Morse code (CW) is included. It requires you to learn Morse, however. From many perspectives, CW is optimal - low bandwidth, low power, it can get through whenm voice cannot, and the kit to start operating is probably the least expensive — assuming you can get past the 'learn Morse' part.

Morse code used to be called Continuous Wave (CW).

Voice

AM, FM, side band

Digital Modes

It appears that digital is where a lot of the experimentation is happening. While CW & voice are well understood and pretty stable, digital provides a ton of opportunities to play with protocols, error checking & correction, TDMA, data+voice and a ton of other things.

I'm attracted to digital modes because it appears it may be possible to get a message through with a low power transmitter when voice wouldn't cut it.

Digital Voice

Who would have thought there would be competition in digital voice? I see DMR on the European models, and that appears to be TDMA (duplexing two channels in one 12.5 kHz band). As a standard, all vendors can mfgr this, and several do.

I see C4FM WIRES-X on Yaesu radios. C4FM appears to refer to the digital voice, and WIRES-X appears to refer to linking across the internet.

AKA System Fusion? Circa 2014? Great audio quality. Can mux voice & data.

other reflectors (repeaters?) that work with C4FM:

1. FCS
2. YSF?

ICOM likes D-STAR. Japan Amateur Radio League, circa 2001. Oldest digital format.

Internet is the weak link, and many of these look to be proprietary.

ALE - Automatic Link Establishment

Problem: after a disaster how to hams reconnect with each other?

Solution: ALE is a set of fixed frequencies and a protocol for scanning those frequencies to find and reconnect hams to each other.

APRS -

digipeater, iGate, microsat, aprsdroid

https://aprs.fi

JS8CALL

???

RTTY

Radio **T**ele**TY**pe - pretty vintage stuff, but still being used, apparently.

Tutorial for beginners and MMTTY software (MSWin only, alas) available at https://hamsoft.ca/pages/mmtty.php

1. AFSK - ?

"LSB is the convention for AFSK"

WinLink

WinLink - global radio email - https://www.winlink.org/

> ... there is even a setting in Winlink Packet for the D710.
>
> All you need is USB-K5G cable either from RT Systems https://www.rtsystemsinc.com/TM-D710-programming-software-and-USB-cable-s/1882.htm or Amazon https://smile.amazon.com/Valley-Enterprises-Programming-TM-D710A-TM-D710E/dp/B072QDHT11 (Valley Enterprises version is not compatible with RT Systems, but works really well for programming the radio with Kenwood software and accessing the TNC)
>
> You plug the USB side into the PC. Plug the 8 pin accessory plug in the back of the head unit of the D710 labeled COM (NOT in the main body, that is the programming port). Start a Winlink Packet or Packet P2P session. Pick the D710 from the dropdown menu. Pick the correct Serial Port for your USB cable. Change the Maximum frames to 2. Click OK. Pick a frequency and you are off to the races.
>
> Good forums for these questions are https://groups.google.com/forum/#!forum/winlink-programs-group https://groups.google.com/forum/#!forum/winlink_for_emcomm
>
> 73, Oliver K6OLI
>
> — https://www.arednmesh.org/content/kenwood-tm-d710g-and-winlink

https://www.arednmesh.org/content/kenwood-tm-d710g-and-winlink

Antennas

Antenna Design

If you want to analyze an antenna design, AFAIK the only free software left for this is https://www.qsl.net/4nec2/ It has a very steep learning curve, but it could be useful. (extra credit: is the fractal antenna in White Collar really an antenna? What properties do you get from the fractal shape?)

MMANA-GAL appears to be free antenna analysis software. MSWin only, sadly.

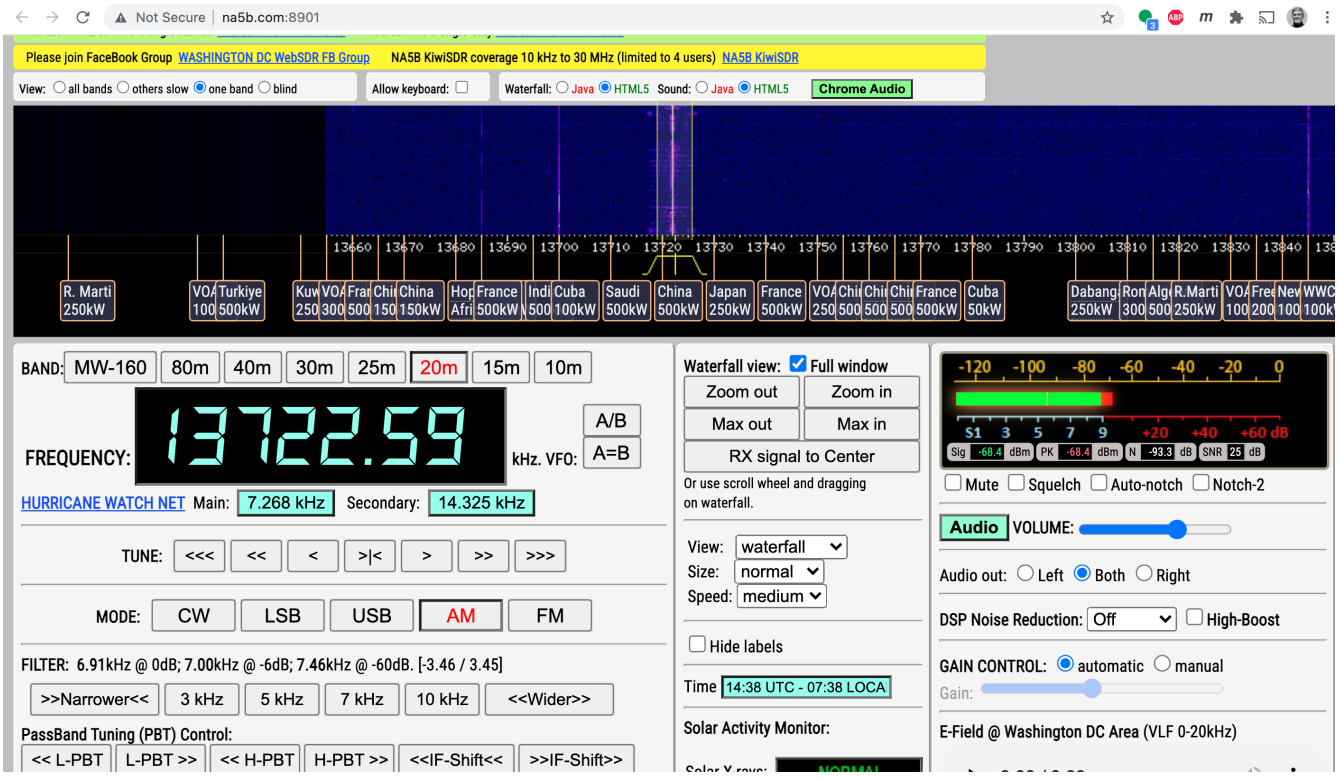
Mobile Antennas

If you can stomach it, the NMO mount looks the best, as it's a permanent mount on your roof. Originally bought Browning BR-1015-UHF from Amazon ($24) but what I received has the chrome plating flaking off and the fit & finish are poor.

Considering swapping for Larsen NMOK mount, which is *reputed* to be of better quality.

Coolest Website Ever

Imagine being able to operate a ham radio (receive only) from your browser. Practice dialing in signals and understanding the bands. Thanks to Software Defined Radio [SDR] and some generous people, you can!



There is a list of other operating locations here: http://websdr.org/

SDR is pretty magical, in that dozens of people can operate simultaneously.

Projects

Project #1 - APRS on the Cheap

Minimal materials to get experience with APRS. Proposed solution: APRSdriod running on cell phone, connected to a dual band Handy Talkie (HT).

SITE for APRSdroid and where you can download it free

Phyical wiring and cable construction

operating APRSdroid - what can you do with it?

Project #2 - WinLink on Kenwood TM-D710GA

Kenwood TM-D710GA

See the section on WinLink and replicate it by sending email over winlink on that radio.

1. can you receive email?
2. can you send/receive from e.g. gmail??

Reference Materials

Phonetic Alphabet

A	Alfa/Alpha	AL FAH
B	Bravo	BRAH VOH
C	Charlie	CHAR 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

K	Kilo	KEY LOH
L	Lima	LEE MAH
M	Mike	MIKE
N	November	NO VEMBER
O	Oscar	OSS CAH
P	Papa	PAH PAH
Q	Quebec	KEH BECK
R	Romeo	ROW ME OH
S	Sierra	SEE AIRRAH
T	Tango	TANG OH
U	Uniform	YOU NEE FORM
V	Victor	VIK TAH
W	Whiskey	WISS KEY
X	X-ray	ECKS RAY
Y	Yankee	YANG KEY
Z	Zulu	ZOO LOO

Q-Codes

Q-signals are a system of radio shorthand as old as wireless and developed from even older telegraphy codes. Q-signals are a set of abbreviations for common information that save time and allow communication between operators who don't speak a common language. Modern ham radio uses them extensively. The table below lists the most common Q-signals used by hams. While Q-signals were developed for use by Morse operators, their use is common on phone, as well. You will often hear, "QRZed?" as someone asks "Who is calling me?" or "I'm getting a little QRM" from an operator receiving some interference or "Let's QSY to 146.55" as two operators change from a repeater frequency to a nearby simplex communications frequency.

QRG	Your exact frequency (or that of) is __*kHz. Will you tell me my exact frequency (or that of _*)?
QRL	I am busy (or I am busy with ___). Are you busy? Usually used to see if a frequency is busy.
QRM	Your transmission is being interfered with ___ (1. Nil; 2. Slightly; 3. Moderately; 4. Severely; 5. Extremely.) Is my transmission being interfered with?
QRN	I am troubled by static ___. (1 to 5 as under QRM.) Are you troubled by static?
QRO	Increase power. Shall I increase power?

QRP	Decrease power. Shall I decrease power?
QRQ	Send faster (_____wpm). Shall I send faster?
QRS	Send more slowly (_____wpm). Shall I send more slowly?
QRT	Stop sending. Shall I stop sending?
QRU	I have nothing for you. Have you anything for me?
QRV	I am ready. Are you ready?
QRX	I will call you again at _*hours (on* _kHz). When will you call me again? Minutes are usually implied rather than hours.
QRZ	You are being called by _ *(on* ____kHz). Who is calling me?
QSB	Your signals are fading. Are my signals fading?
QSK	I can hear you between signals; break in on my transmission. Can you hear me between your signals and if so can I break in on your transmission?
QSL	I am acknowledging receipt. Can you acknowledge receipt (of a message or transmission)?
QSO	I can communicate with _ *direct (or relay through _). Can you communicate with* ___ direct or by relay?
QSP	I will relay to . Will you relay to ?
QST	General call preceding a message addressed to all amateurs and ARRL members. This is in effect “CQ ARRL.”
QSX	I am listening to on _*kHz. Will you listen to on* _kHz?
QSY	Change to transmission on another frequency (or on _*kHz). Shall I change to transmission on another frequency (or on* _kHz)?
QTC	I have _*messages for you (or for* _). How many messages have you to send?
QTH	My location is ___. What is your location?
QTR	The time is ___. What is the correct time?

REF: ARRL

Band Chart

On the Air
arrl.org/ota

US Amateur Radio Bands

Operator license classes: **E** = Amateur Extra **A** = Advanced **G** = General **T** = Technician **N** = Novice
CW operation is permitted throughout all amateur bands. Except as noted, all frequencies are in megahertz (MHz).

= RTTY, data, phone, image = USB phone, RTTY, data and CW = RTTY and data = phone and image
= SSB phone = CW only

LF – Low Frequency band

2200 Meters (135 kHz) E,A,G

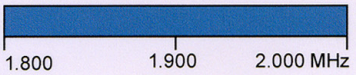
1 W EIRP maximum

MF – Medium Frequency bands

630 Meters (472 kHz) E,A,G

5 W EIRP max, except in Alaska within 496 miles of Russia where the limit is **1 W EIRP**

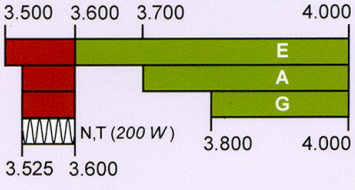
160 Meters (1.8 MHz) E,A,G



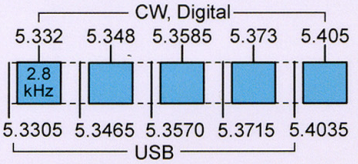
Amateurs wishing to operate on **2200 or 630 meters** must first register with the Utilities Technology Council online at **https://utc.org/plc-database-amateur-notification-process/.** You need only register once for each band.

HF – High Frequency bands

80 Meters (3.5 MHz) E,A,G,T,N

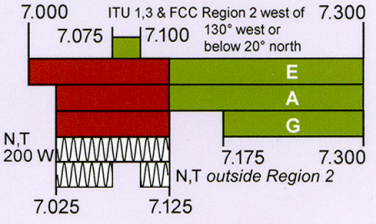


60 Meters (5.3 MHz) E, A, G (100 W)

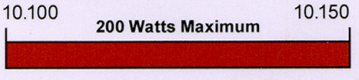


Gen, Adv, and Extra licensees may operate on a secondary basis with a maximum ERP of 100 W maximum.

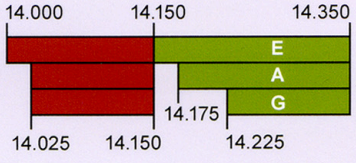
40 Meters (7 MHz) E,A,G,T,N



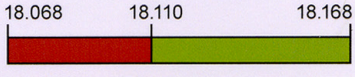
30 Meters (10.1 MHz) E,A,G



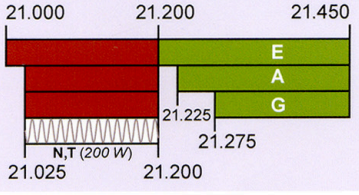
20 Meters (14 MHz) E,A,G



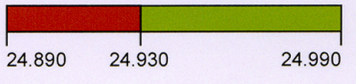
17 Meters (18 MHz) E,A,G



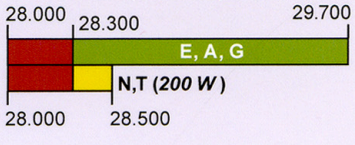
15 Meters (21 MHz) E,A,G,T,N



12 Meters (24 MHz) E,A,G

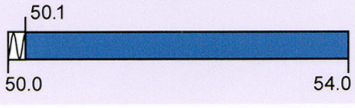


10 Meters (28 MHz) E,A,G,T,N

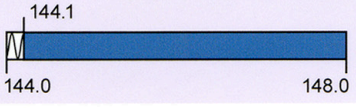


VHF – Very High Frequency bands

6 Meters (50 MHz) E,A,G,T



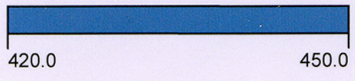
2 Meters (144 MHz) E,A,G,T



1.25 Meters (222 MHz) E,A,G,T,N

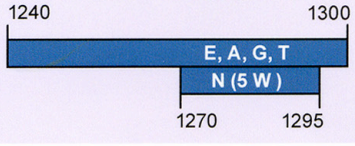
UHF – Ultra High Frequency bands

70 cm (420 MHz) E,A,G,T



33 cm (902 MHz) E,A,G,T

23 cm (1240 MHz) E,A,G,T,N



SHF&EHF – Super and Extremely High Frequency bands

All licensees except Novices are authorized all modes on the following frequencies:

2300-2310 MHz	3300-3500 MHz	10.0-10.5 GHz	47.0-47.2 GHz	122.25-123.0 GHz	241-250 GHz
2390-2450 MHz	5650-5925 MHz	24.0-24.25 GHz	76.0-81.0 GHz	134-141 GHz	All above 275 GHz

See www.arrl.org/band-plan for detailed band plans.

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References

1. ARRL - American Radio Relay League. arrl.org
2. 4NEC2 - "NEC based antenna modeler and optimizer by Arie Voors", https://www.qsl.net/4nec2/
3. MMANA-GAL - antenna analysis software, https://hamsoft.ca/pages/mmana-gal.php