The Hamster Handbook

Table of Contents

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 when 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, sideband

EchoLink

EchoLink is voice + text messaging (depending on how you connect). The idea is to extend the reach by connecting "nodes" across the internet. You access a local node, squirt across the inet and finish the last mile from the radio at the far-end node.

[EchoLink] | *images/EchoLink.gif*

EchoLink node 598882 NY7S-R is West Valley Amateur Radio Club node.

EchoLink node N2QOJ-R runs Central Arizona Youth Net on Sundays at 5pm.

K7UGS Karen likes and uses EchoLink. I see Karen is operating EchoLink on a Samsung Galaxy S9 from Oregon! Apparently there is EchoLink for Android!

The EchoLink website says it does not run on Mac but they recommend EchoHam from the app store.

I was able to install EchoLink software on a Win11 VM, connect a USB microphone (it didn't like my bluetooth microphone) and bluetooth speakers and listened in on the Central Arizona Youth Net that meets Sunday nights (N2QOJ-R).

- Net Control is Landon AI7HE.
- Promoter/sponsor appears to be Joe Sammarino N2QOJ.

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.

Packet

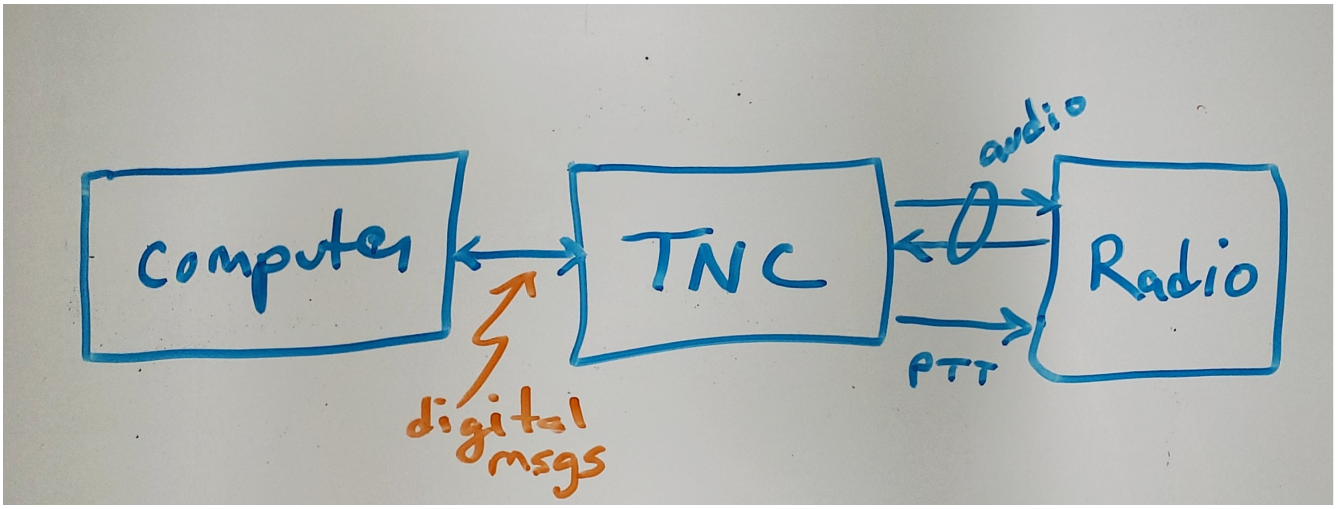
How does "packet" relate to APRS or WinLink? Or is "packet" some separate thingy?

> "Since the late 1990s, most AX.25 usage has shifted to a different one-to-many communication paradigm with the Automatic Packet Reporting System (APRS)".
>
> — wikipedia

Check out YouTube for Denver Radio Club "DRC Packet Radio Class 01". Circa 1992 but it has the details and the history. Excellent.

TNC - Terminal Node Controller

The TNC shows up in many of the digital packet solutions. A TNC is like a modem in that it talks analog (tones) to the radio and digital messages to the computer. The protocol appears to (often? always?) be AX.25.



There are lots of dead solutions out there. Mobilinkd appears to be one of the few hardware solutions still going. Direwolf is a software solution (multiple platforms) that leverages the considerable processing power in todays computers plugs the audio cards.

Apparently packets work pretty well on VHF but on HF the noise and contention is often a problem, so some people are experimenting with packets not using AX.25.

"Using FLdigi For APRS Over Non-AX.25 Modes", Stephen H. Smith

FLdigi is similar to Direwolf in that it is software, but it is not operating on AX.25. It does, however, leverage the soundcard on your computer as a DSP to construct and decode the tones.

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 - Automatic Packet Reporting System

Don't make the mistake of calling it 'Automatic Position Reporting System' or Bob will get annoyed.

digipeater, iGate, microsat, aprsdroid

https://aprs.fi

SMSGTE is a way to bridge APRS messaging and SMS (cell phone texting).

JS8CALL

Julian OH8STN likes JS8CALL for actual comms during emergencies. Works well with low power. Appears to be point-to-point rather than email.

APRS Messanger is obsolete. The developer recommends using 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/

WoAD is a WinLink client that runs on Android. This looks promising.

> ... 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.

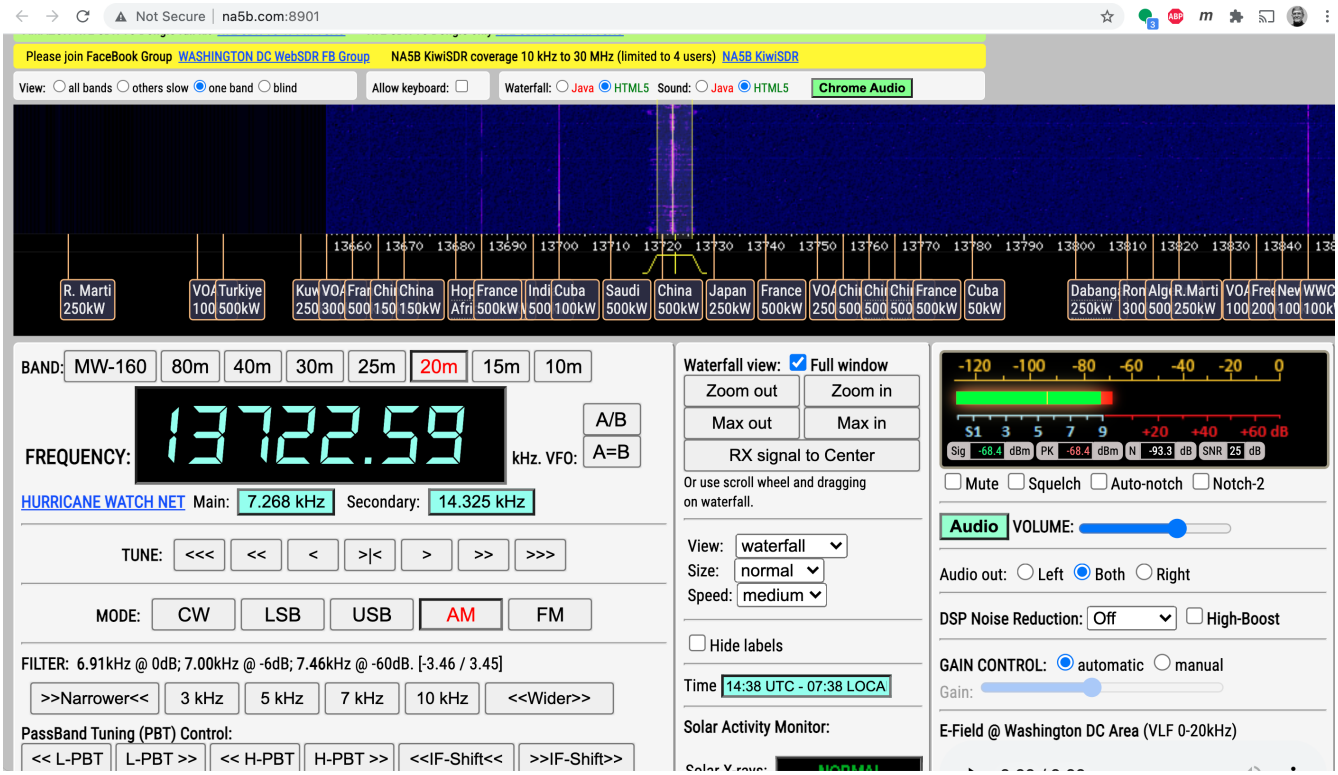
Mobile Antennas

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

Physical wiring and cable construction

operating APRSdroid - what can you do with it?

Project #2 - EchoLink on the Cheap

See the section on EchoLink. Install on a PC. Join the Sunday night net using your computer (or android).

Project #3 - WinLink on Android

See the section on WinLink and replicate it by sending email over winlink on Tera HT (using the cable from project #1 above).

1. can you receive email?
2. can you send/receive from e.g. gmail??
3. can you replicate this with mobile radio in your truck?

How does the choice of SSID affect this? What would a sane policy for using SSID with WinLink be?

Project #4 - Listen to the International Space Station

Even with a handheld, if you know the frequency and when to expect them, you can always listen in.

https://spotthestation.nasa.gov/sightings/view.cfm?country=United_States&region=Arizona&city=Phoenix#.YQBMBRNKg-Q

Project #5 - See How Far You Can Whisper

Using something like WSTJ-X and the WSPR protocol, you can experiment to see how far you can actually go on a few watts (or less!). Multi-platform, multiband, cool mapping tool to see your results.

WSPR

Project #6 - Send A Text Message From Your Radio

Try using SMSGTE to connect (bi-directionally!) your APRS-enabled radio with SMS.

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

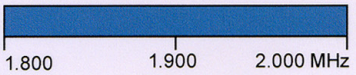
1 W EIRP maximum

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**

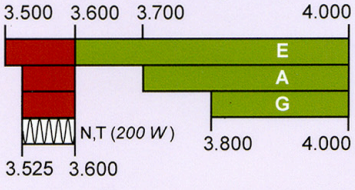
160 Meters (1.8 MHz) E,A,G



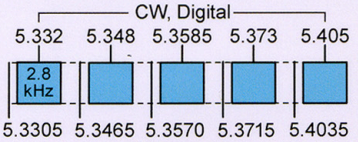
Amateurs wishing to operate on **2200 or 630 meters** must first register with the Utilities Technology Council online at **https://utc.org/plc-database-amateur-notification-process/.** You need only register once for each band.

HF – High Frequency bands

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

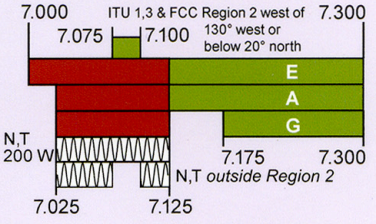


60 Meters (5.3 MHz) E, A, G (100 W)



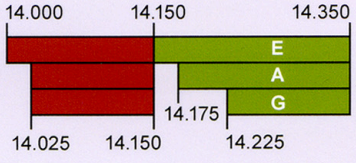
Gen, Adv, and Extra licensees may operate on a secondary basis with a maximum ERP of 100 W maximum.

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

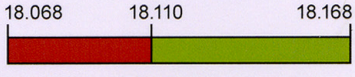


30 Meters (10.1 MHz) E,A,G

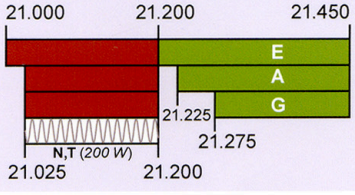
20 Meters (14 MHz) E,A,G



17 Meters (18 MHz) E,A,G

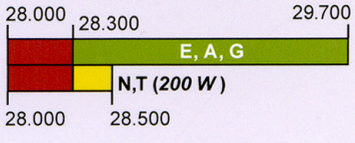


15 Meters (21 MHz) E,A,G,T,N



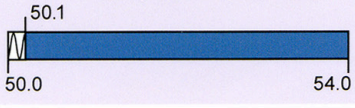
12 Meters (24 MHz) E,A,G

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

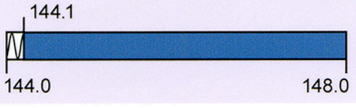


VHF – Very High Frequency bands

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



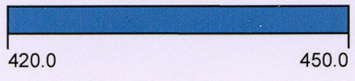
2 Meters (144 MHz) E,A,G,T



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

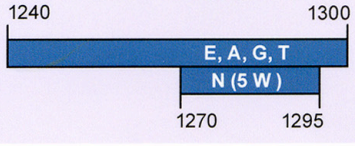
UHF – Ultra High Frequency bands

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.

OTAbands **rev. 1-22-20**

International Call Sign Directory

Call Sign Series	Allocated To
AAA-ALZ	United States of America
AMA-AOZ	Spain
APA-ASZ	Pakistan (Islamic Republic of)
ATA-AWZ	India (Republic of)
AXA-AXZ	Australia
AYA-AZZ	Argentine Republic
A2A-A2Z	Botswana (Republic of)
A3A-A3Z	Tonga (Kingdom of)
A4A-A4Z	Oman (Sultanate of)
A5A-A5Z	Bhutan (Kingdom of)
A6A-A6Z	United Arab Emirates
A7A-A7Z	Qatar (State of)
A8A-A8Z	Liberia (Republic of)
A9A-A9Z	Bahrain (State of)
BAA-BZZ	China (People’s Republic of) (see carve-out for Taiwan below)
BM-BQ, BU-BX	Taiwan
CAA-CEZ	Chile
CFA-CKZ	Canada
CLA-CMZ	Cuba
CNA-CNZ	Morocco (Kingdom of)
COA-COZ	Cuba
CPA-CPZ	Bolivia (Republic of)
CQA-CUZ	Portugal
CVA-CXZ	Uruguay (Eastern Republic of)
CYA-CZZ	Canada
C2A-C2Z	Nauru (Republic of)
C3A-C3Z	Andorra (Principality of)
C4A-C4Z	Cyprus (Republic of)
C5A-C5Z	Gambia (Republic of the)
C6A-C6Z	Bahamas (Commonwealth of the)
* C7A-C7Z	World Meteorological Organization

C8A-C9Z	Mozambique (Republic of)
DAA-DRZ	Germany (Federal Republic of)
DSA-DTZ	Korea (Republic of)
DUA-DZZ	Philippines (Republic of the)
D2A-D3Z	Angola (Republic of)
D4A-D4Z	Cape Verde (Republic of)
D5A-D5Z	Liberia (Republic of)
D6A-D6Z	Comoros (Islamic Federal Republic of the)
D7A-D9Z	Korea (Republic of)
EAA-EHZ	Spain
EIA-EJZ	Ireland
EKA-EKZ	Armenia (Republic of)
ELA-ELZ	Liberia (Republic of)
EMA-EOZ	Ukraine
EPA-EQZ	Iran (Islamic Republic of)
ERA-ERZ	Moldova (Republic of)
ESA-ESZ	Estonia (Republic of)
ETA-ETZ	Ethiopia (Federal Democratic Republic of)
EUA-EWZ	Belarus (Republic of)
EXA-EXZ	Kyrgyz Republic
EYA-EYZ	Tajikistan (Republic of)
EZA-EZZ	Turkmenistan
E2A-E2Z	Thailand
E3A-E3Z	Eritrea
** E4A-E4Z	Palestinian Authority
E5A-E5Z	New Zealand - Cook Islands (WRC-07)
E6A-E6Z	New Zealand - Niue
E7A-E7Z	Bosnia and Herzegovina (Republic of) (WRC-07)
FAA-FZZ	France
GAA-GZZ	United Kingdom of Great Britain and Northern Ireland
HAA-HAZ	Hungary (Republic of)
HBA-HBZ	Switzerland (Confederation of)
HCA-HDZ	Ecuador
HEA-HEZ	Switzerland (Confederation of)

HFA-HFZ	Poland (Republic of)
HGA-HGZ	Hungary (Republic of)
HHA-HHZ	Haiti (Republic of)
HIA-HIZ	Dominican Republic
HJA-HKZ	Colombia (Republic of)
HLA-HLZ	Korea (Republic of)
HMA-HMZ	Democratic People’s Republic of Korea
HNA-HNZ	Iraq (Republic of)
HOA-HPZ	Panama (Republic of)
HQA-HRZ	Honduras (Republic of)
HSA-HSZ	Thailand
HTA-HTZ	Nicaragua
HUA-HUZ	El Salvador (Republic of)
HVA-HVZ	Vatican City State
HWA-HYZ	France
HZA-HZZ	Saudi Arabia (Kingdom of)
H2A-H2Z	Cyprus (Republic of)
H3A-H3Z	Panama (Republic of)
H4A-H4Z	Solomon Islands
H6A-H7Z	Nicaragua
H8A-H9Z	Panama (Republic of)
IAA-IZZ	Italy
JAA-JSZ	Japan
JTA-JVZ	Mongolia
JWA-JXZ	Norway
JYA-JYZ	Jordan (Hashemite Kingdom of)
JZA-JZZ	Indonesia (Republic of)
J2A-J2Z	Djibouti (Republic of)
J3A-J3Z	Grenada
J4A-J4Z	Greece
J5A-J5Z	Guinea-Bissau (Republic of)
J6A-J6Z	Saint Lucia
J7A-J7Z	Dominica (Commonwealth of)
J8A-J8Z	Saint Vincent and the Grenadines

KAA-KZZ	United States of America
LAA-LNZ	Norway
LOA-LWZ	Argentine Republic
LXA-LXZ	Luxembourg
LYA-LYZ	Lithuania (Republic of)
LZA-LZZ	Bulgaria (Republic of)
L2A-L9Z	Argentine Republic
MAA-MZZ	United Kingdom of Great Britain and Northern Ireland
NAA-NZZ	United States of America
OAA-OCZ	Peru
ODA-ODZ	Lebanon
OEA-OEZ	Austria
OFA-OJZ	Finland
OKA-OLZ	Czech Republic
OMA-OMZ	Slovak Republic
ONA-OTZ	Belgium
OUA-OZZ	Denmark
PAA-PIZ	Netherlands (Kingdom of the)
PJA-PJZ	Netherlands (Kingdom of the) - Netherlands Caribbean
PKA-POZ	Indonesia (Republic of)
PPA-PYZ	Brazil (Federative Republic of)
PZA-PZZ	Suriname (Republic of)
P2A-P2Z	Papua New Guinea
P3A-P3Z	Cyprus (Republic of)
P4A-P4Z	Netherlands (Kingdom of the) - Aruba
P5A-P9Z	Democratic People’s Republic of Korea
RAA-RZZ	Russian Federation
SAA-SMZ	Sweden
SNA-SRZ	Poland (Republic of)
SSA-SSM	Egypt (Arab Republic of)
SSN-STZ	Sudan (Republic of the)
SUA-SUZ	Egypt (Arab Republic of)
SVA-SZZ	Greece

S2A-S3Z	Bangladesh (People’s Republic of)
S5A-S5Z	Slovenia (Republic of)
S6A-S6Z	Singapore (Republic of)
S7A-S7Z	Seychelles (Republic of)
S8A-S8Z	South Africa (Republic of)
S9A-S9Z	Sao Tome and Principe (Democratic Republic of)
TAA-TCZ	Turkey
TDA-TDZ	Guatemala (Republic of)
TEA-TEZ	Costa Rica
TFA-TFZ	Iceland
TGA-TGZ	Guatemala (Republic of)
THA-THZ	France
TIA-TIZ	Costa Rica
TJA-TJZ	Cameroon (Republic of)
TKA-TKZ	France
TLA-TLZ	Central African Republic
TMA-TMZ	France
TNA-TNZ	Congo (Republic of the)
TOA-TQZ	France
TRA-TRZ	Gabonese Republic
TSA-TSZ	Tunisia
TTA-TTZ	Chad (Republic of)
TUA-TUZ	Côte d’Ivoire (Republic of)
TVA-TXZ	France
TYA-TYZ	Benin (Republic of)
TZA-TZZ	Mali (Republic of)
T2A-T2Z	Tuvalu
T3A-T3Z	Kiribati (Republic of)
T4A-T4Z	Cuba
T5A-T5Z	Somali Democratic Republic
T6A-T6Z	Afghanistan (Islamic State of)
T7A-T7Z	San Marino (Republic of)
T8A-T8Z	Palau (Republic of)
UAA-UIZ	Russian Federation

UJA-UMZ	Uzbekistan (Republic of)
UNA-UQZ	Kazakhstan (Republic of)
URA-UZZ	Ukraine
VAA-VGZ	Canada
VHA-VNZ	Australia
VOA-VOZ	Canada
VPA-VQZ	United Kingdom of Great Britain and Northern Ireland
VRA-VRZ	China (People’s Republic of) - Hong Kong
VSA-VSZ	United Kingdom of Great Britain and Northern Ireland
VTA-VWZ	India (Republic of)
VXA-VYZ	Canada
VZA-VZZ	Australia
V2A-V2Z	Antigua and Barbuda
V3A-V3Z	Belize
V4A-V4Z	Saint Kitts and Nevis
V5A-V5Z	Namibia (Republic of)
V6A-V6Z	Micronesia (Federated States of)
V7A-V7Z	Marshall Islands (Republic of the)
V8A-V8Z	Brunei Darussalam
WAA-WZZ	United States of America
XAA-XIZ	Mexico
XJA-XOZ	Canada
XPA-XPZ	Denmark
XQA-XRZ	Chile
XSA-XSZ	China (People’s Republic of)
XTA-XTZ	Burkina Faso
XUA-XUZ	Cambodia (Kingdom of)
XVA-XVZ	Viet Nam (Socialist Republic of)
XWA-XWZ	Lao People’s Democratic Republic
XXA-XXZ	China (People’s Republic of) - Macao (WRC-07)
XYA-XZZ	Myanmar (Union of)
YAA-YAZ	Afghanistan (Islamic State of)
YBA-YHZ	Indonesia (Republic of)

YIA-YIZ	Iraq (Republic of)
YJA-YJZ	Vanuatu (Republic of)
YKA-YKZ	Syrian Arab Republic
YLA-YLZ	Latvia (Republic of)
YMA-YMZ	Turkey
YNA-YNZ	Nicaragua
YOA-YRZ	Romania
YSA-YSZ	El Salvador (Republic of)
YTA-YUZ	Serbia (Republic of) (WRC-07)
YVA-YYZ	Venezuela (Republic of)
Y2A-Y9Z	Germany (Federal Republic of)
ZAA-ZAZ	Albania (Republic of)
ZBA-ZJZ	United Kingdom of Great Britain and Northern Ireland
ZKA-ZMZ	New Zealand
ZNA-ZOZ	United Kingdom of Great Britain and Northern Ireland
ZPA-ZPZ	Paraguay (Republic of)
ZQA-ZQZ	United Kingdom of Great Britain and Northern Ireland
ZRA-ZUZ	South Africa (Republic of)
ZVA-ZZZ	Brazil (Federative Republic of)
Z2A-Z2Z	Zimbabwe (Republic of)
Z3A-Z3Z	North Macedonia (Republic of)
Z6A-Z6Z	Kosovo (Republic of)
Z8A-Z8Z	South Sudan (Republic of)
2AA-2ZZ	United Kingdom of Great Britain and Northern Ireland
3AA-3AZ	Monaco (Principality of)
3BA-3BZ	Mauritius (Republic of)
3CA-3CZ	Equatorial Guinea (Republic of)
3DA-3DM	Kingdom of Eswatini
3DN-3DZ	Fiji (Republic of)
3EA-3FZ	Panama (Republic of)
3GA-3GZ	Chile

3HA-3UZ	China (People’s Republic of)
3VA-3VZ	Tunisia
3WA-3WZ	Viet Nam (Socialist Republic of)
3XA-3XZ	Guinea (Republic of)
3YA-3YZ	Norway
3ZA-3ZZ	Poland (Republic of)
4AA-4CZ	Mexico
4DA-4IZ	Philippines (Republic of the)
4JA-4KZ	Azerbaijani Republic
4LA-4LZ	Georgia (Republic of)
4MA-4MZ	Venezuela (Republic of)
4OA-4OZ	Montenegro (Republic of) (WRC-07)
4PA-4SZ	Sri Lanka (Democratic Socialist Republic of)
4TA-4TZ	Peru
* 4UA-4UZ	United Nations
4VA-4VZ	Haiti (Republic of)
4WA-4WZ	Democratic Republic of Timor-Leste (WRC-03)
4XA-4XZ	Israel (State of)
* 4YA-4YZ	International Civil Aviation Organization
4ZA-4ZZ	Israel (State of)
5AA-5AZ	Libya (Socialist People’s Libyan Arab Jamahiriya)
5BA-5BZ	Cyprus (Republic of)
5CA-5GZ	Morocco (Kingdom of)
5HA-5IZ	Tanzania (United Republic of)
5JA-5KZ	Colombia (Republic of)
5LA-5MZ	Liberia (Republic of)
5NA-5OZ	Nigeria (Federal Republic of)
5PA-5QZ	Denmark
5RA-5SZ	Madagascar (Republic of)
5TA-5TZ	Mauritania (Islamic Republic of)
5UA-5UZ	Niger (Republic of the)
5VA-5VZ	Togolese Republic
5WA-5WZ	Samoa (Independent State of)
5XA-5XZ	Uganda (Republic of)

5YA-5ZZ	Kenya (Republic of)
6AA-6BZ	Egypt (Arab Republic of)
6CA-6CZ	Syrian Arab Republic
6DA-6JZ	Mexico
6KA-6NZ	Korea (Republic of)
6OA-6OZ	Somali Democratic Republic
6PA-6SZ	Pakistan (Islamic Republic of)
6TA-6UZ	Sudan (Republic of the)
6VA-6WZ	Senegal (Republic of)
6XA-6XZ	Madagascar (Republic of)
6YA-6YZ	Jamaica
6ZA-6ZZ	Liberia (Republic of)
7AA-7IZ	Indonesia (Republic of)
7JA-7NZ	Japan
7OA-7OZ	Yemen (Republic of)
7PA-7PZ	Lesotho (Kingdom of)
7QA-7QZ	Malawi
7RA-7RZ	Algeria (People’s Democratic Republic of)
7SA-7SZ	Sweden
7TA-7YZ	Algeria (People’s Democratic Republic of)
7ZA-7ZZ	Saudi Arabia (Kingdom of)
8AA-8IZ	Indonesia (Republic of)
8JA-8NZ	Japan
8OA-8OZ	Botswana (Republic of)
8PA-8PZ	Barbados
8QA-8QZ	Maldives (Republic of)
8RA-8RZ	Guyana
8SA-8SZ	Sweden
8TA-8YZ	India (Republic of)
8ZA-8ZZ	Saudi Arabia (Kingdom of)
9AA-9AZ	Croatia (Republic of)
9BA-9DZ	Iran (Islamic Republic of)
9EA-9FZ	Ethiopia (Federal Democratic Republic of)
9GA-9GZ	Ghana

9HA-9HZ	Malta
9IA-9JZ	Zambia (Republic of)
9KA-9KZ	Kuwait (State of)
9LA-9LZ	Sierra Leone
9MA-9MZ	Malaysia
9NA-9NZ	Nepal
9OA-9TZ	Democratic Republic of the Congo
9UA-9UZ	Burundi (Republic of)
9VA-9VZ	Singapore (Republic of)
9WA-9WZ	Malaysia
9XA-9XZ	Rwandese Republic
9YA-9ZZ	Trinidad and Tobago

http://www.arrl.org/international-call-sign-series

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. Direwolf - software TNC - https://packet-radio.net/direwolf. See also github.
4. EchoLink - https://secure.echolink.org/. RF to internet to RF, so you can connect to hams around the world. Even better: your PC to internet to RF, so you can connect without even having a radio!
5. JS8CALL - http://js8call.com/
6. Mobilinkd - hardware TNC - https://www.mobilinkd.com
7. MMANA-GAL - antenna analysis software, https://hamsoft.ca/pages/mmana-gal.php
8. WSJT-X - a collection of weak-signal protocols; multiplatform - https://physics.princeton.edu//pulsar/K1JT/wsjtx.html

Log Book

STATION CALLSIGN: _____

HF Log Sheet

PAGE____ OF_____.

DATE	UTC		FREQ	MODE	POWER	CALLSIGN	QTH	RST		COMMENTS	
	ON	OFF						SENT	RCVD		
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HF Log Sheet

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DATE	UTC		FREQ	MODE	POWER	CALLSIGN	QTH	RST		COMMENTS	
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