



# Radio Scouting



Below you will find some information that will help you explore the amateur radio world.

Links to places to study for tests:

[www.hamtestonline.com](http://www.hamtestonline.com)

[www.qrz.com](http://www.qrz.com)

[www.w5yi.com](http://www.w5yi.com)

[www.hamuniversity.com](http://www.hamuniversity.com)

[www.arrl.org](http://www.arrl.org)

Places to purchase a radio:

[www.hamradio.com](http://www.hamradio.com)

[www.maintradingcompany.com/](http://www.maintradingcompany.com/)

[www.hamcity.com](http://www.hamcity.com)

[www.universal-radio.com](http://www.universal-radio.com)

[www.aesham.com](http://www.aesham.com)

[www.gigaparts.com](http://www.gigaparts.com)

Types of radios:

Many new licensees start with a handheld radio which can range in price from \$100 single band 2 meter to \$400 dual or triband 144/440/220. There are also mobile radios that can be used in you car on your house. These range from a \$150 single band 2 meter to \$800 for a dual band 144/440.

There are several different ways amateur radio is used in the community. These are just a few of them: public service events (bike rides, runs, parades), storm spotting, public utility outages, emergency communications for disasters, and the most important - having fun and making new friends.

Visit [www.arrl.org](http://www.arrl.org) to find an Amateur Radio Club in your area.

# Fox Hunting

Radio direction finding (RDF) (also known as DF'ing or Fox Hunting) is locating the source of a radio transmission or other signal.

Everyday practical uses of RDF: 1) find stolen cars (lojack) 2) locate black boxes when an airplane crashes 3) track animals outfitted with radio collars 4) find interference whether it is intentional, an issue with a stuck transmitter or other items not working correctly and emitting spurious noise 5) **FOR FUN**



Types of Hunts: There are different ways to conduct a fox hunt. 1) Fixed, a person would hide in a given area and others would drive to find them. 2) On foot, a transmitter would be hidden and hunters would walk to find it like we are doing. 3) Mobile, the transmitter would move at a given interval making it harder to track down and find it.

Equipment used: You will need a radio, some sort of antenna. There are several different types of antennas that can be used for RDF, Yagi, loop, Doppler are a few. You can also use an attenuator. An attenuator is a special piece of equipment that is used to make a signal weaker, so the closer you are the stronger the signal.

How to: There are several techniques that can be used to help you find the "Fox". 1) Body shielding, use your body to block a signal and rotate around until you cannot hear it, the signal will be behind you. 2) You can remove your antenna, the closer you are to the transmitter the stronger the signal. 3) The same will apply for tuning off frequency (the closer you are to the transmitter the stronger the signal) by that it is meant that if the transmitter is on 147.580 you will listen on 147.570, 147.575, 147.585 or 147.590. 4) You can also use the 3<sup>rd</sup> harmonic frequency. A harmonic of a particular fundamental frequency, is a frequency that is an integer multiple of the first one. The 3<sup>rd</sup> harmonic frequency of 147.580 is 442.740. 5) Take at least 3 signal readings from different locations to help triangulate the signal and draw a line on a map from where you are in the direction of the signal. The point where the three or more lines intersect should be about the area where the "fox" is located.

Safety: Safety is very important. While hunting, watch for cars and other people.

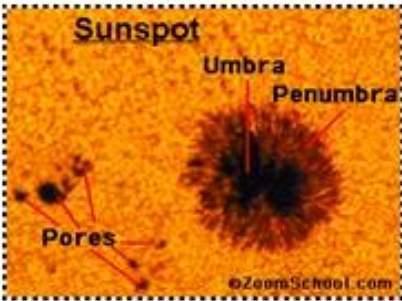
If you find the FOX, please do not pick it up, as to let others to try to find it. Let the staff member know you found it.



[www.tiny.cc/bsa](http://www.tiny.cc/bsa)



# Space Weather and Amateur Radio



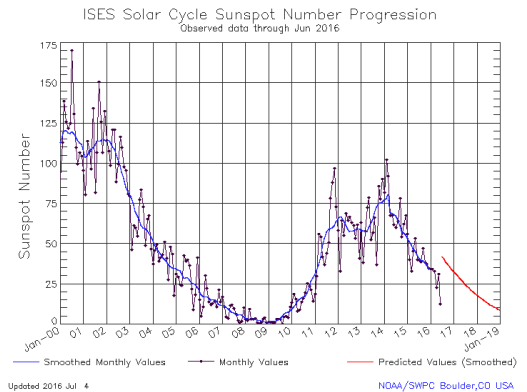
**Photosphere** – Visible disk of the Sun. Normal temperature of 5600 degrees Kelvin.

**Sunspots** – Areas of magnetic disturbance on the surface of the sun. They appear darker than the surrounding area as they are cooler. Sunspots produce Ultraviolet radiation.

**Sunspot Cycle** – The numbers of sunspots at any given time can change, but overall there is an approximate 11

year cycle of few sunspots to many sunspots back to few sunspots. We are currently in the middle of what is known as Cycle 24.

**Sunspot Number** – A standardized means of determining how many Sunspots are visible on the surface of the Sun. Each group of spots counts 10 and each individual spot in the group counts as 1.

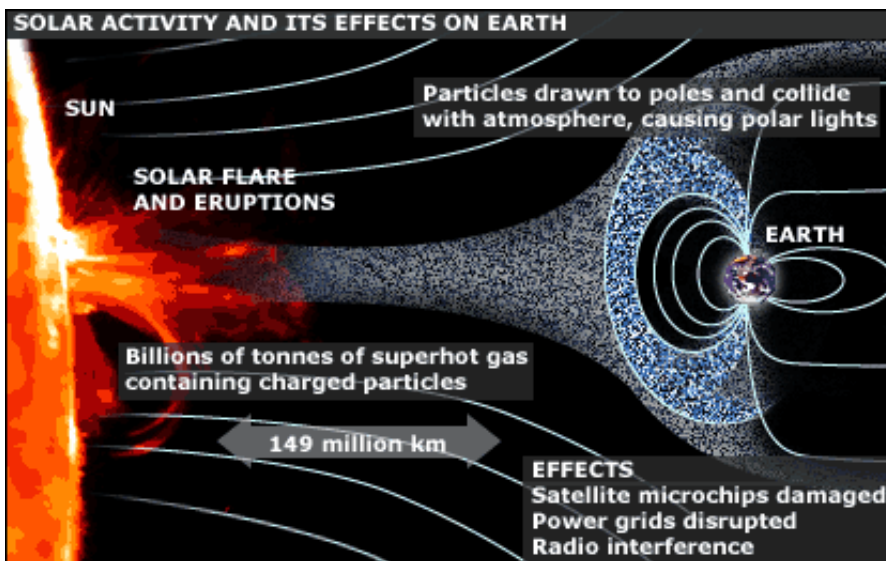


**Solar Flux** – A measure of the Ultraviolet radiation coming off the Sun on a given day. The more sunspots, the more UV.

**Solar Flares** – Violent discharges of energy emanating from the surface of the Sun. Usually associated with Sunspots but not always. Strong emitters of X-Ray Radiation.

**Solar Wind** – A consistent yet variable flow of solar matter and charged particles moving outward from the Sun.

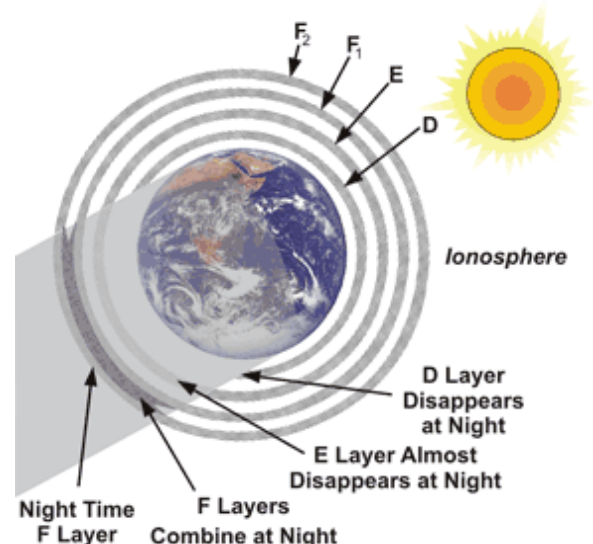
**Coronal Mass Ejection (CME)** – Explosive release of solar matter and charged particles into the Interplanetary magnetic field. While



the visible light, X-Rays and UV radiation come at the speed of light, the matter pushed outward by the CME may take several days.

**Magnetic Field** – The Earth is a magnet and the magnetic field that surrounds it acts as a protection from the harsh radiation environment of the sun. The Earth's magnetic field is affected by the Sun's light, solar wind and magnetic field. A and K indexes describe how unsettled our magnetic field is at the moment.

**Ionosphere** – Thinnest layers of the upper atmosphere ranging from 60 to 300 miles up. Sunlight, Ultraviolet and X-Ray radiation bombard Oxygen and Nitrogen atoms and knock electrons free. These charged particles form reflective "Clouds" that can aid in the long distance radio communications. The Ionosphere also helps protect us from Ultraviolet and X-Ray radiation.

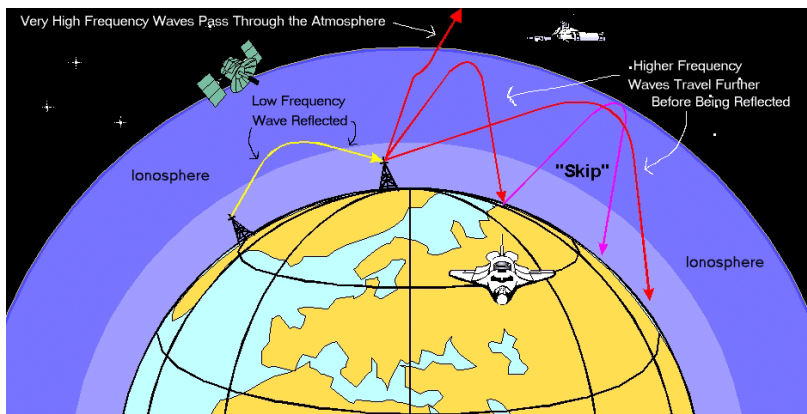




**Aurora Borealis (Northern/Southern Lights)** – Earth’s magnetic field captures charged particles from the Sun and draws them near the magnetic poles. These particles react with the atoms of the upper atmosphere causing them to rise to a higher state of energy. When they drop back down, they emit a burst of light. An Aurora looks like sheets of light in the northern sky. They are rarely seen south of 45 degrees latitude

The Earth’s magnetic field blocks and protects us from most of the harmful radiation produced by the Sun, but the Solar wind, material from CME’s and Solar Flares put pressure on the Magnetosphere. Our magnetic field can catch some of this solar material and channel it into the atmosphere near the North and South Poles and produce what we may know of as the Northern Lights.

The UV and X-Ray radiation from the Sun energizes atoms in the very thin upper atmosphere and knocks electrons loose from these atoms and produces a cloud of free electrons which can either absorb or reflect radio waves, depending on frequency and time of day. On the dark side of the earth, where there is no sun, these electrons join back with atoms that are missing an electron and the reflectivity of the Ionosphere goes way down.



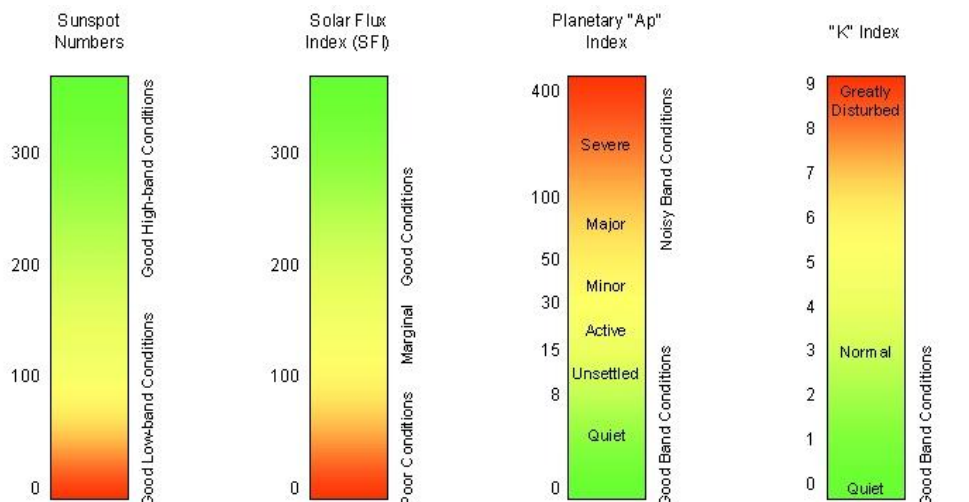
Ham Radio Operators use the reflections and refractions caused by the Ionosphere to communicate over hundreds and even thousands of miles. The Earth itself can reflect signals back up to the Ionosphere. If conditions are just right, a signal can bounce all the way around the globe. When this happens you can hear a faint echo of about 1/7<sup>th</sup> of a second.

**Space Weather Measurements.** The higher the **Solar Flux** and **Sunspot number** the better it is for long distance HF radio propagation. The higher the **K** and **A** indexes are, the more unsettled the Earth’s magnetic field is and the poorer the conditions for HF radio propagation.

To learn more about how the sun interacts with our earth and can both aid and hinder radio communications, visit;

[http://en.wikipedia.org/wiki/Radio\\_propagation](http://en.wikipedia.org/wiki/Radio_propagation) or;

<http://www.radio-electronics.com/info/propagation/ionospheric/ionosphere.php>



The number of sunspots is a measure of magnetic activity on the sun's surface, which roughly correlates to the ionization of the ionosphere. More is better.

Solar Flux Index (SF1) is a gauge of solar particles and magnetic fields (solar wind) reaching Earth's atmosphere. Higher numbers are better.

The A index (linear scale) is published daily, and is made up of the eight K indices over 24 hours. The Planetary A index is the average over several locations on Earth.

The planetary Kp is the mean standardized K-index from 13 geomagnetic observatories between 44° and 80° northern or southern geomagnetic latitude (quasi-log scale).

For an interesting site that provides lots of information, images and links describing the state of Space weather right now, go to <http://www.solarham.net/>

# AMATEUR RADIO OPERATOR'S GUIDE to JOTA

Jamboree-on-the-Air (JOTA) is an annual event in which about 500,000 Scouts and Guides all over the world contact each other by means of amateur radio. Scouting experiences are exchanged and ideas are shared, thus contributing to the world of Scouting. JOTA is a worldwide event. JOTA is held the third full weekend in October. Units may operate for 48 hours or any part thereof, from Saturday 00.00 until Sunday 24.00 local time. It is for members of the World Organization of the Scout Movement (WOSM), and also for members of the World Association of Girl Guides and Girl Scouts (WAGGGS).



## Amateur Radio Phonetics

<u>A</u> lpha	<u>J</u> uliett	<u>S</u> ierra
<u>B</u> ravo	<u>K</u> ilo	<u>T</u> ango
<u>C</u> harlie	<u>L</u> ima	<u>U</u> niform
<u>D</u> elta	<u>M</u> ike	<u>V</u> ictor
<u>E</u> cho	<u>N</u> ovember	<u>W</u> hiskey
<u>F</u> oxtrot	<u>O</u> scar	<u>X</u> -ray
<u>G</u> olf	<u>P</u> apa	<u>Y</u> ankee
<u>H</u> otel	<u>Q</u> uebec	<u>Z</u> ulu
<u>I</u> ndia	<u>R</u> omeo	

### Example:

*My name is Bill. Spelled Bravo India Lima Lima*

### Signal Report

#### Readability

- 1-Unreadable
- 2-Barely readable
- 3-Readable with difficulty
- 4-Readable with little effort
- 5-Perfectly readable

#### Signal Strength

- 1-Barely Perceptible
- 2-Very weak
- 3-Weak
- 4-Fair
- 5-Fairly good
- 6-Good
- 7-Moderately strong
- 8-Strong
- 9-Extremely strong

### Example:

*Your Signal Report is 5 by 9*

### Some special Signals you may hear:

- QRM** Man made interference  
**QRN** Natural interference (Static)  
**QRP** Low power  
**QRZ** Who is calling me?  
**QSB** Your signals are fading  
**QSL** 1. Acknowledge receipt  
 2. A contact card  
**QTH** Location  
**73** Best wishes  
**YL** Young Lady  
**OM** Old Man

## How to make a voice contact.

### Invitation to another station:

(CQ means CALLING):

*CQ Jamboree*

*CQ Jamboree*

*CQ Jamboree*

*This is K2BSA*

*This is Kilo 2 Bravo Sierra Alpha*

*Kilo 2 Bravo Sierra Alpha*

*standing by*

**Contact is made:** When another station responds, it is important to first correctly understand and write down the call sign. This will take some effort when its signal is hard to understand. When the other station finishes respond with:

*(their call sign) this is K2BSA.*

*Your signal report is 5 by 9.*

*My name is (say your first name)*

*Spelled (spell your name phonetically)*

*We are a Scout Troop station*

*Our QTH is Irving Texas*

*How Copy?*

**OVER.**

Write down names, signal reports, QTH, etc. Talk normally.

### The exchanges typically include:

- Name
- Location (QTH)
- Scout Rank
- Hobbies
- Age

Practice how you would answer questions in these areas and, also, questions you would like to ask. Say "OVER" each time you are finished talking.

**MOST IMPORTANT... HAVE FUN!**

### Third-party operation:

Even though you do not have an Amateur Radio license, you may participate in communication between two Amateur Radio stations as a third-party. The operation of the station you are using must remain under the direct supervision and control of a licensed operator. In general, this means you may do whatever this operator is licensed to do as long as he/she is right beside you. This does not apply to communication with stations outside of United States territory. In that case, unless there is an established agreement between the two governments, third-party communication is not allowed. A list of countries with which we have agreements can be found at <[http://www.arrl.org/FandES/field/regulations/io/3rd party.html](http://www.arrl.org/FandES/field/regulations/io/3rd%20party.html)>. If a station from a country not on the list attempts to contact you, the licensed operator will have to take over.

### Amateur operators are polite:

We use real first names and try to speak in plain English. There is a bit of ham radio jargon such as QTH and QSL, but you will quickly pick up some of it. Amateurs take pride in good operating procedures and in their call signs. We want you to have fun and enjoy your experience on shortwave radio. However, rude or arrogant on-the-air behavior will not be tolerated. Most of our radio contacts will be made by selecting a frequency, determining that it is not in use, and then inviting stations to call us. Once on a frequency, we will use it for as long as possible, inviting new stations to contact us. You will have a bit of a selling job here. Many stations will hear us. Not all will answer us. To increase the number of responses, it is important that you speak slowly and pronounce your words carefully. Let other stations know that we are operating from a scout camp. (Amateurs like to do favors for other amateurs.)

### The Amateur's Code

#### **The Radio Amateur is:**

**CONSIDERATE...** never knowingly operates in such a way as to lessen the pleasure of others.

**LOYAL...** offers loyalty, encouragement and support to other amateurs, local clubs and the American Radio Relay League, through which Amateur Radio in the United States is represented nationally and internationally.

**PROGRESSIVE...** with knowledge abreast of science, a well-built and efficient station and operation above reproach.

**FRIENDLY...** slow and patient operating when requested; friendly advice and counsel to the beginner; kindly assistance, cooperation and consideration for the interests of others. These are the hallmarks of the amateur spirit.

**BALANCED...** radio is an avocation, never interfering with duties owed to family, job, school, or community.

**PATRIOTIC...** station and skill always ready for service to country and community.

### WORLD SCOUT FREQUENCIES

<b>BAND</b>	<b>SSB (phone)</b>	<b>CW (Morse)</b>
80 Meters	3.740/3.940 MHz	3.590 MHz
40 Meters	7.270 MHz	7.030 MHz
20 Meters	14.290 MHz	14.070 MHz
17 Meters	18.140 MHz	18.080 MHz
15 Meters	21.360 MHz	21.140 MHz
12 Meters	24.960 MHz	24.910 MHz
10 Meters	28.390 MHz	28.190 MHz

### **The Morse Code Characters (How They Sound)**



### Letters and Numbers

<b>A: di-dah</b>	<b>S: di-di-dit</b>
<b>B: da-di-di-dit</b>	<b>T: dah</b>
<b>C: da-di-da-dit</b>	<b>U: di-di-dah</b>
<b>D: da-di-dit</b>	<b>V: di-di-di-dah</b>
<b>E: dit</b>	<b>W: di-da-dah</b>
<b>F: di-di-da-dit</b>	<b>X: da-di-di-dah</b>
<b>G: da-da-dit</b>	<b>Y: da-di-da-dah</b>
<b>H: di-di-di-dit</b>	<b>Z: da-da-di-dit</b>
<b>I: di-dit</b>	<b>1: di-da-da-da-dah</b>
<b>J: di-da-da-dah</b>	<b>2: di-di-da-da-dah</b>
<b>K: da-di-dah</b>	<b>3: di-di-di-da-dah</b>
<b>L: di-da-di-dit</b>	<b>4: di-di-di-di-dah</b>
<b>M: da-dah</b>	<b>5: di-di-di-di-dit</b>
<b>N: da-dit</b>	<b>6: da-di-di-di-dit</b>
<b>O: da-da-dah</b>	<b>7: da-da-di-di-dit</b>
<b>P: di-da-da-dit</b>	<b>8: da-da-da-di-dit</b>
<b>Q: da-da-di-dah</b>	<b>9: da-da-da-da-dit</b>
<b>R: di-da-dit</b>	<b>0: da-da-da-da-dah</b>

### Punctuation and Prosigns

<b>/ (slash):</b>	<b>da-di-di-da-dit</b>
<b>, (comma):</b>	<b>da-da-di-di-da-dah</b>
<b>. (period):</b>	<b>di-da-di-da-di-dah</b>
<b>? (qs. mk):</b>	<b>di-di-da-da-di-dit</b>
<b>BT (pause):</b>	<b>da-di-di-di-dah</b>
<b>AR (end of msg):</b>	<b>di-da-di-da-dit</b>
<b>SK (end of contact):</b>	<b>di-di-di-da-di-dah</b>

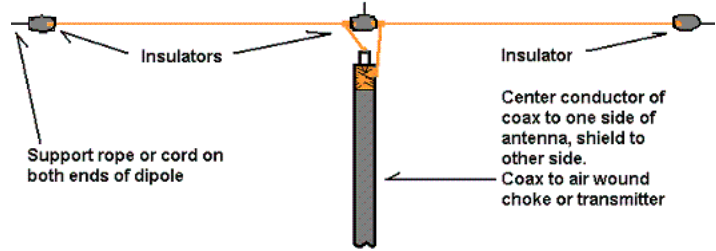


## Scout Questions



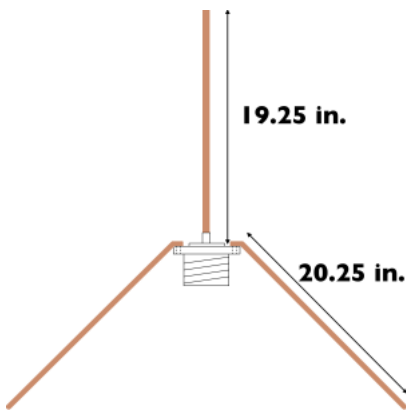
1. What is your favorite thing to do in scouts
2. What rank are you
3. What is your troop/pack
4. How long have you been a scout
5. Are you going to try to get your Eagle
6. Why did you join the scouts
7. What city do you live in
8. What state / country were you born in
9. What have you learned in merit badge class
10. What is the last merit badge you earned
11. What did you have to do to earn it
12. What was the first merit badge you earned
13. How many merit badges have you earned
14. What is the next merit badge are you going to try to earn
15. What is your favorite thing in school
16. Who is your favorite teacher
17. What grade are you in
18. What is your favorite car
19. What is your favorite pet
20. What is your favorite food
21. What is your favorite drink
22. What do you like to do for fun/hobby
23. What are you going to do for the summer / what did you do for the summer
24. Do you know anyone that is a ham radio operator
25. How many scouts are in the merit badge class
26. Did you go to the National Scout Jamboree or have you ever been to one
27. Have you lived in any other states
28. Have you lived in another country
29. Have you visited another country
30. What to you what to do when you graduate from high school / college
31. What is your favorite sport
32. What is your favorite team
33. What kind of music do you listen to
34. Who is your favorite band/singer
35. What is your favorite movie
36. Who is your favorite actor/actress
37. What is your favorite video game
38. What is your favorite TV show
39. Do you play sports What sport
40. Do you have brothers or sisters
41. What is your least favorite thing in school
42. Why are you taking radio merit badge
43. What camps have you been to
44. What is your favorite color
45. How many scouts in your troop/pack

# AMATEUR RADIO DOESN'T HAVE TO COST AN ARM AND A LEG!



Wire antenna for 20-6 meters \$29.95 plus coax cable or build your own dipole with 12 gauge wire, cut up plastic milk jugs for insulators and some old coax soldered to the wires.

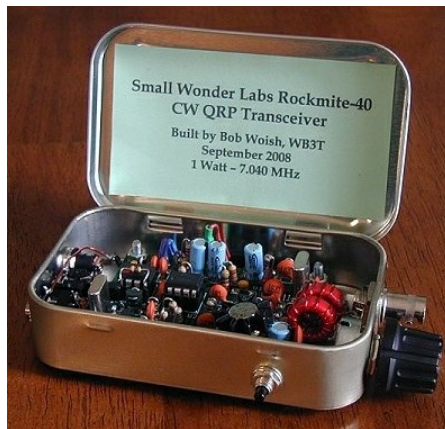
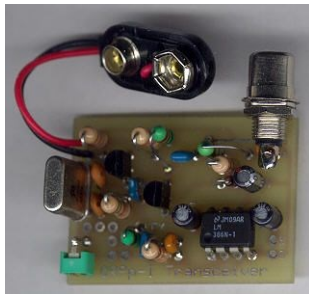
N4UJW



Build a simple "Ground Plane" antenna for 144 or 440 Mhz. out of coat hangers. Total cost of less than \$5 plus a length 50 ohm coax and connectors.



There are many kit designs out there which can make for great fun and learning. There is also the pride of putting something you put together yourself on the air.



These days there are many options for inexpensive VHF/UHF hand-held transceivers, You can easily find them new or used for under \$100.



From Ham Radio flea markets, estate sales or from EBay, purchase good used gear for mobile or base operations. Even this vintage Yaesu FT101 below left, for \$250 is a great starter HF radio. Many of them are still heard on the air sounding excellent.



If your are curious about seeing how easy it is to earn your license and get into Amateur Radio, Just ask any of the Hams present for more information.



## Phonetic Alphabet and Morse Code

Character	Morse Code (CW)	Phonic	Pronunciation
A	• –	Alpha	Al-fah
B	– •••	Bravo	Brah-voh
C	– • – •	Charlie	Char-lee
D	– ••	Delta	Dell-tha
E	•	Echo	Eck-oh
F	•• – •	Foxtrot	Foks-trot
G	– – •	Gulf	Golf
H	••••	Hotel	Hoh-tel
I	••	India	In-dee-ah
J	• – – –	Juliet	Jew-lee-ett
K	– • –	Kilo	Key-loh
L	• – ••	Lima	Lee-mah
M	– –	Mike	Mike
N	– •	November	No-vem-ber
O	– – –	Oscar	Oss-cah
P	• – – •	Papa	Pah-pah
Q	– – • –	Quebec	Keh-beck
R	• – •	Romeo	Row-me-oh
S	•••	Sierra	See-air-rah
T	–	Tango	Tang-go
U	•• –	Uniform	You-nee-form
V	••• –	Victor	Vik-tah
W	• – –	Wiskey	Wiss-key
X	– •• –	X-Ray	Ecks-ray
Y	– • – –	Yankee	Yang-key
Z	– – ••	Zulu	Zoo-loo
1	• – – – –	One	Wun
2	•• – – –	Two	Too
3	••• – –	Three	Tree
4	•••• –	Four	Fow-er
5	•••••	Five	Fife
6	– ••••	Six	Six
7	– – •••	Seven	Sev-en
8	– – – ••	Eight	Ait
9	– – – – •	Nine	Nin-er
0	– – – – –	Zero	Zee-ro

# RST

## Readability

- 1 Unreadable
- 2 Barely readable, occasional words distinguishable
- 3 Readable with considerable difficulty
- 4 Readable with practically no difficulty
- 5 Perfectly readable.

## Signal Strength

- 1 Faint signal, barely perceptible.
- 2 Very weak signals
- 3 Weak signals
- 4 Fair signals
- 5 Fairly good signals
- 6 Good signals
- 7 Moderately strong signals
- 8 Strong signals
- 9 Extremely strong signals

## Tone

- 1 Sixty cycle a.c. or less, very rough and broad
- 2 Very rough a.c., very harsh and broad
- 3 Rough a.c. tone, rectified but not filtered
- 4 Rough note, some trace of filtering
- 5 Filtered rectified a.c. but strongly ripple-modulated
- 6 Filtered tone, definite trace of ripple modulation
- 7 Near pure tone, trace of ripple modulation
- 8 Near perfect tone, slight trace of modulation
- 9 Perfect tone, no trace of ripple or modulation of any kind

## Common Q Signals

Signal	Question	Answer, Advice or Order
<b>QRG</b>	Will you indicate my exact frequency in kilocycles?	Your frequency is ... kc.
<b>QRH</b>	Does my frequency vary?	Your frequency varies.
<b>QRI</b>	How is the tone of my transmission?	The tone of your transmission is ... 1. Good. 2. Variable. 3. Bad.
<b>QRJ</b>	Are you receiving me badly? Are my signals weak?	I cannot receive you. Your signals are too weak.
<b>QRK</b>	What is the legibility of my signals (1 to 5)?	The legibility of your signals is ... (1 to 5).
<b>QRL *</b>	Are you busy?	I am busy (or busy with....). Please do not interfere.
<b>QRM *</b>	Are you being interfered with?	I am being interfered with.
<b>QRN *</b>	Are you troubled by static?	I am troubled by static.
<b>QRO *</b>	Must I increase power?	Increase power.
<b>QRP *</b>	Must I decrease power?	Decrease power.
<b>QRQ *</b>	Must I send faster?	Send faster ... (words per min.).
<b>QRS *</b>	Must I send more slowly?	Transmit more slowly ... (w.p.m.).
<b>QRT *</b>	Must I stop transmission?	Stop transmission.
<b>QRU *</b>	Have you anything for me?	I have nothing for you.
<b>QRV *</b>	Are you ready?	I am ready.
<b>QRW</b>	Must I advise ... that you are calling him on ... kc?	Please advise ... that I am calling him on ... kc.
<b>QRX *</b>	When will you call again?	I will call you again at ... hours (on ... kc.).
<b>QRZ *</b>	By whom am I being called?	You are being called by ...
<b>QSA</b>	What is the strength of my signals (1 to 5)?	The strength of your signals is ... (1 to 5).
<b>QSB *</b>	Does the strength of my signals vary?	The strength of your signals varies.
<b>QSD</b>	Is my keying correct? Are my signals distinct?	Your keying is incorrect; your signals are bad.
<b>QSG</b>	Must I transmit ... telegrams (or one telegram) at a time?	Transmit ... telegrams (or one telegram) at a time.
<b>QSK *</b>	Shall I continue the transmission of all my traffic?	necessary.
<b>QSL *</b>	Can you acknowledge receipt?	I am acknowledging receipt.

<b>QSM</b>	Shall I repeat the last telegram I sent you?	Repeat the last telegram you sent me.
<b>QSO *</b>	Can you communicate with ... directly (or through...)?	I can communicate with ... direct (or through...).
<b>QSP</b>	Will you relay to ...?	I will relay to ... free of charge.
<b>QSV</b>	Shall I send a series of VVV....?	Send a series of VVV.
<b>QSX</b>	Will you listen for ... (call sign) on ... kcs?	I am listening for ... on ... kcs.
<b>QSY *</b>	wave?	Change to ... kc. without changing type of wave.
<b>QSZ</b>	Shall I send each word or group twice?	Send each word or group twice.
<b>QTA</b>	Shall I cancel nr ... as if it had not been sent?	Cancel nr ... as if it had not been sent.
<b>QTB</b>	Do you agree with my word count?	I do not agree with your word count; I shall repeat the first letter of each word and the first figure of each number.
<b>QTC</b>	How many telegrams have you to send?	I have ... telegrams for you or for ....
<b>QTH *</b>	What is your position (location)?	My position (location) is ....
<b>QTR</b>	What is the exact time?	The exact time is ....
<b>QST *</b>		General call preceeding a message address to all amateurs and A.R.R.L. Members. This is in effect "CQ ARRL".
<b>QRRR</b>		Official A.R.R.L. "land SOS." A distress call for emergency use only.

**Presented in the table below are some common Q-Codes used by radio amateurs.**

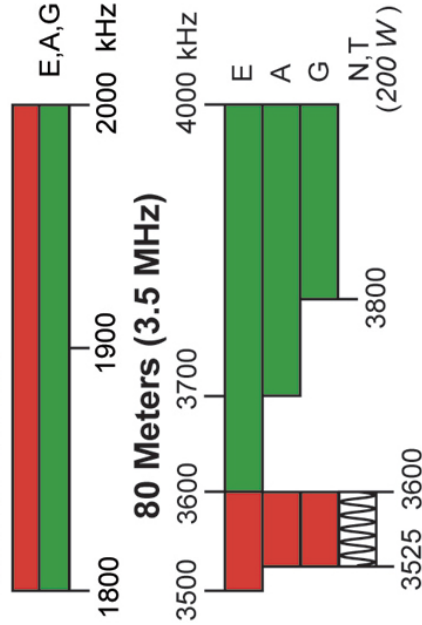
**These codes were found on the inside cover of a 1965 ARRL Amateur Radio Station Log Book.**

**Q Codes marked with an " \* " are the most commonly used today.**

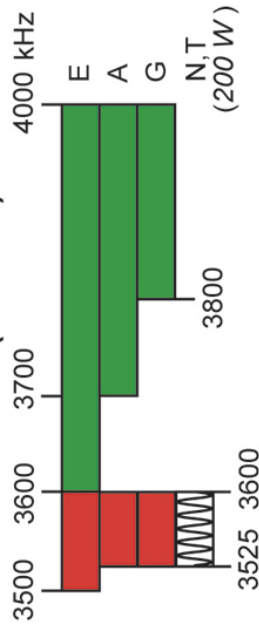
**A question is indicated by the use of the interrogation sign, " ? ", after the Q signal.**

### 160 Meters (1.8 MHz)

Avoid interference to radiolocation operations from 1900 to 2000 kHz



### 80 Meters (3.5 MHz)



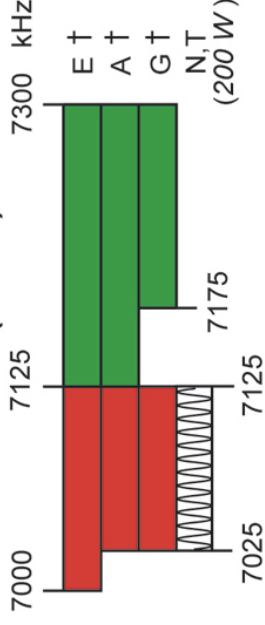
### 60 Meters (5.3 MHz) USB only

2.8 kHz



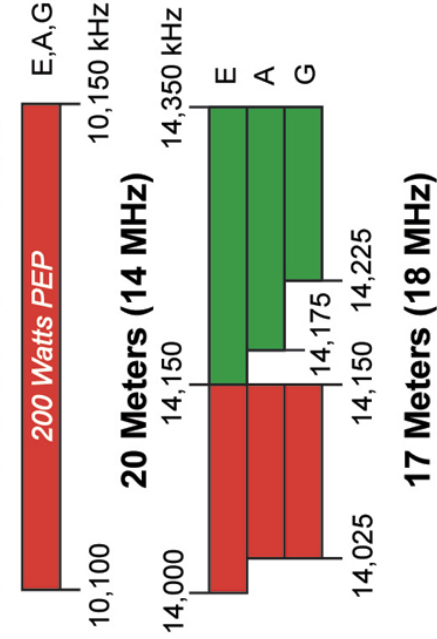
General, Advanced, and Amateur Extra licensees may use the following five channels on a secondary basis with a maximum effective radiated power of 50 W PEP relative to a half wave dipole. Only upper sideband suppressed carrier voice transmissions may be used. The frequencies are 5330.5, 5346.5, 5366.5, 5371.5 and 5403.5 kHz. The occupied bandwidth is limited to 2.8 kHz centered on 5332, 5348, 5368, 5373, and 5405 kHz respectively.

### 40 Meters (7 MHz)

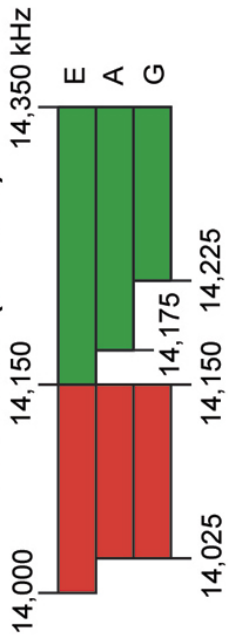


### 30 Meters (10.1 MHz)

Avoid interference to fixed services outside the US.



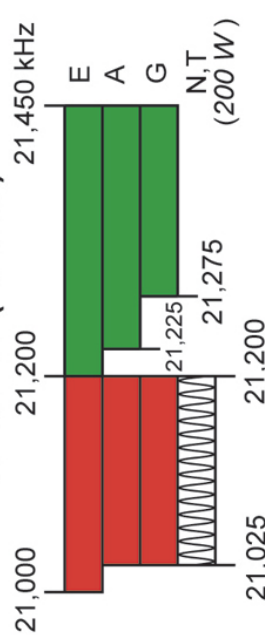
### 20 Meters (14 MHz)



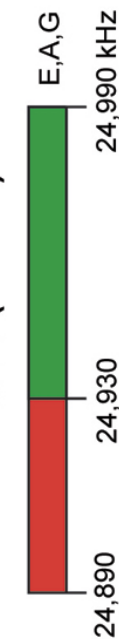
### 17 Meters (18 MHz)



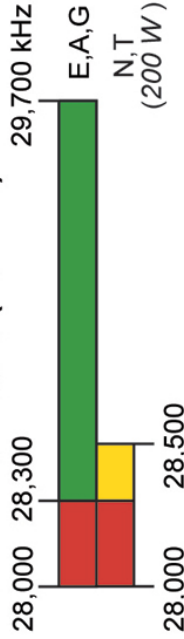
### 15 Meters (21 MHz)



### 12 Meters (24 MHz)



### 10 Meters (28 MHz)



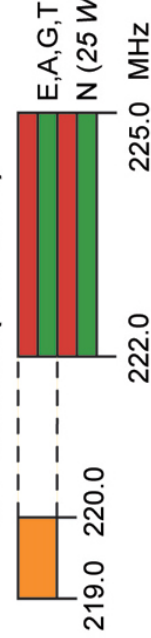
### 6 Meters (50 MHz)



### 2 Meters (144 MHz)



### 1.25 Meters (222 MHz)



\* Geographical and power restrictions may apply to all bands above 420 MHz. See *The ARRL Operating Manual* for information about your area.

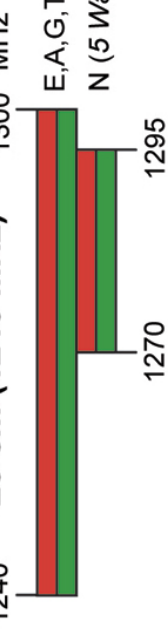
### 70 cm (420 MHz) \*



### 33 cm (902 MHz) \*



### 23 cm (1240 MHz) \*



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

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

**Key:** █ = RTTY and data █ = phone and image █ = CW █ = SSB phone █ = USB phone █ = Fixed digital message

## Scout Frequencies

Here's detailed information on frequencies suggested as Scout amateur radio frequencies. These were initially suggested by the World Organization of the Scout Movement and their Jamboree on the Air organizer. As with all amateur radio frequencies they are a shared resource. If someone else is already on that frequency, move up or down to find a clear frequency for calling.

- All frequencies are shown as megahertz.
- Primary HF recommendations are for General Class licensees. Technicians may take advantage of 10 meters and VHF/UHF for voice communications.
- After contact is made on a Calling Channel or frequency, move to another channel or frequency for your QSO.
- Experiment with modes prior to JOTA or Radio Scouting demo. 'Murphy's Law' prevails!
- Use web search tools to find lots of helpful information about any of the modes commonly used for JOTA and Radio Scouting.
- WOSM (World Organization of the Scouting Movement) calling frequencies are shown to indicate center of international activity.

## HF SSB Voice

Band	WOSM Calling Frequencies	Suggested Band Segment for US Stations	Notes
80 m	3.940 & 3.690(1)	3.920 – 3.940 3.670 – 3.690 (1)	(1) Extra segment
40 m	7.190 & 7.090 (2)	7.180 – 7.200 7.270 – 7.290	(2) 7.090 not available in Region 2
20 m	14.290	14.270 – 14.290 14.320 – 14.340	
17 m	18.140	18.140 – 18.150	
15 m	21.360	21.360 – 21.400	
12 m	24.960	24.960 – 24.980	
10 m	28.390 (3)	28.350 – 28.400 (3)	(3) Includes Novices & Techs
6 m	50.160	50.160 – 50.200	

## 2 Meter FM Simplex

147.450, 147.480, 147.510, 147.540\* \* Use 147.540 as Calling Channel. Always listen first to avoid interfering with another QSO or auxiliary or control link. Avoid 146.520, the National FM Simplex Calling Frequency, as well as 146.550, which is commonly used by mobiles and RVerS.

## 70 CM FM Simplex

446.000\*, 445.950, 446.050, 446.100, 446.150 \* Use 446.000 as Calling Channel. Always listen first to avoid interfering with another QSO or auxiliary or control link.

## UTC Time Conversion Chart

UTC	EDT/AST	CDT/EST	MDT/CST	PDT/MST	PST
0000*	2000	1900	1800	1700	1600
0100	2100	2000	1900	1800	1700
0200	2200	2100	2000	1900	1800
0300	2300	2200	2100	2000	1900
0400	0000*	2300	2200	2100	2000
0500	0100	0000*	2300	2200	2100
0600	0200	0100	0000*	2300	2200
0700	0300	0200	0100	0000*	2300
0800	0400	0300	0200	0100	0000*
0900	0500	0400	0300	0200	0100
1000	0600	0500	0400	0300	0200
1100	0700	0600	0500	0400	0300
1200	0800	0700	0600	0500	0400
1300	0900	0800	0700	0600	0500
1400	1000	0900	0800	0700	0600
1500	1100	1000	0900	0800	0700
1600	1200	1100	1000	0900	0800
1700	1300	1200	1100	1000	0900
1800	1400	1300	1200	1100	1000
1900	1500	1400	1300	1200	1100
2000	1600	1500	1400	1300	1200
2100	1700	1600	1500	1400	1300
2200	1800	1700	1600	1500	1400
2300	1900	1800	1700	1600	1500
2400*	2000	1900	1800	1700	1600

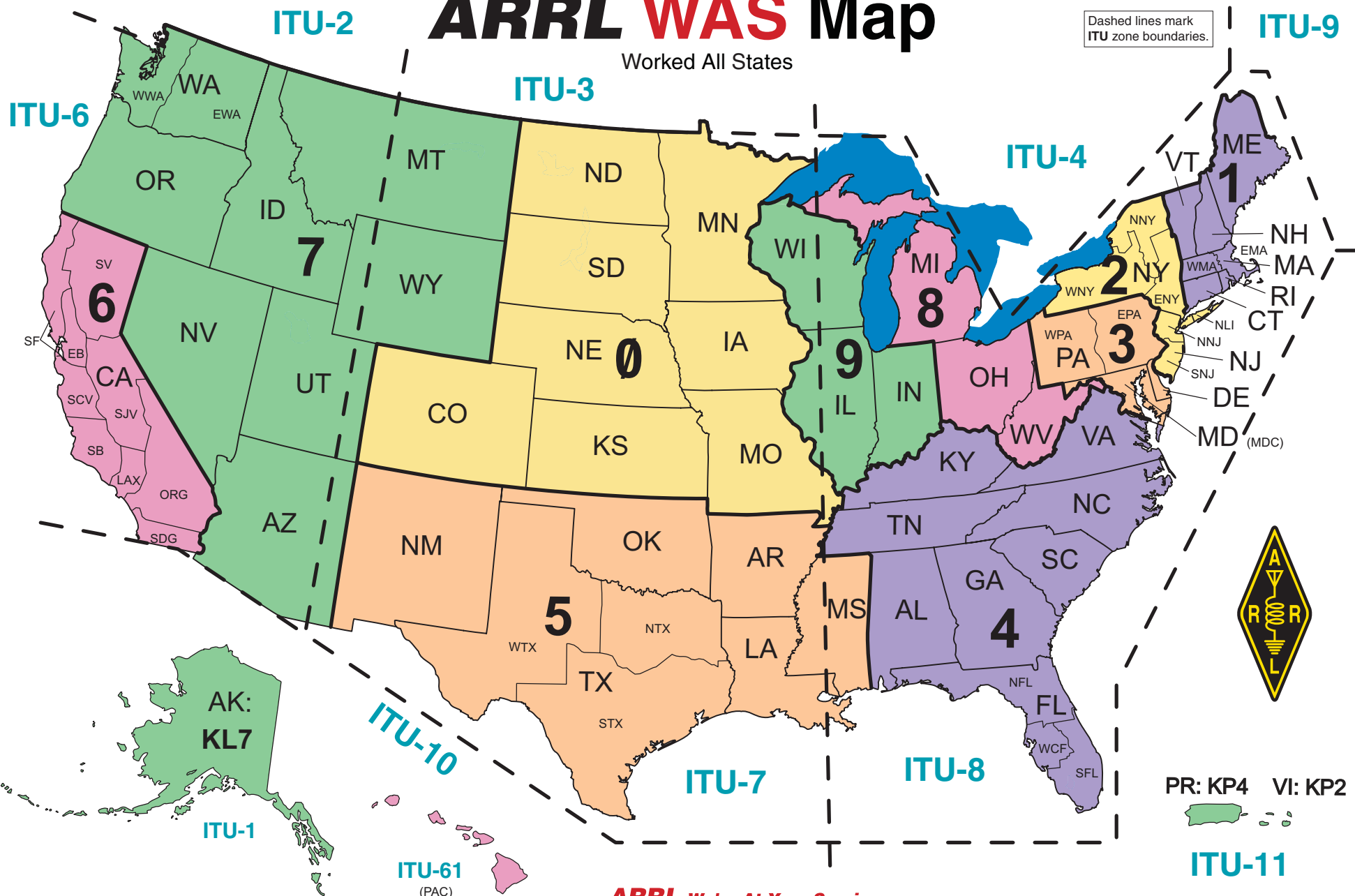
Universal Coordinated Time (UTC) is the time at the zero or reference meridian. Time changes one hour with each of 15 degrees in longitude. The five time zones in the US Proper and Canada roughly follow these lines.

\* 0000 and 2400 are interchangeable. (2400 is associated with the day of the day ending, 0000 with the day just starting.)

# ARRL WAS Map

Worked All States

Dashed lines mark ITU zone boundaries.



## ARRL The national association for AMATEUR RADIO

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ITU-61 (PAC)  
HI and Pacific: KH6

### ARRL We're At Your Service

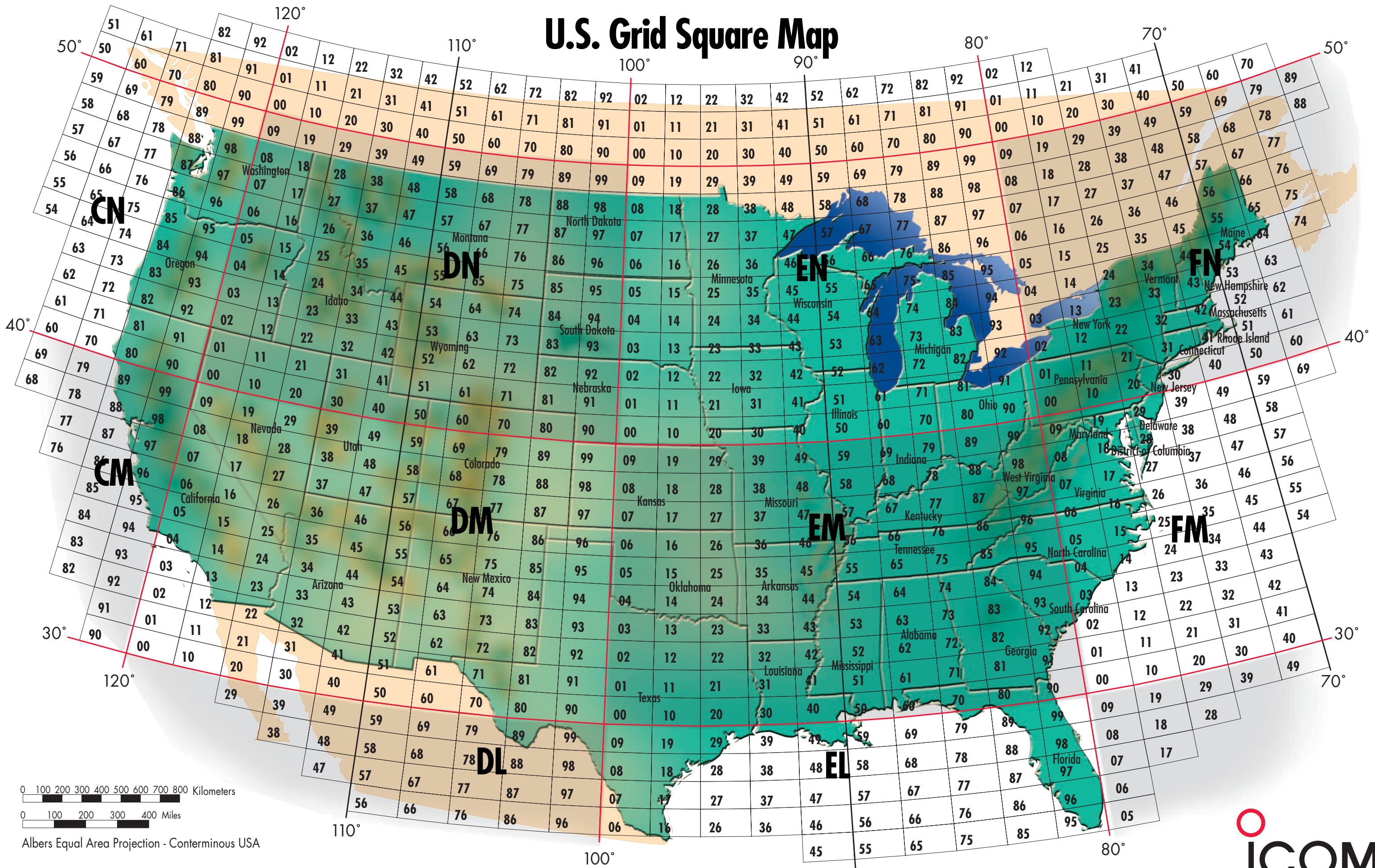
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 860-594-0300  
 www.arrl.org/

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 orders@arrl.org  
 membership@arrl.org  
 newham@arrl.org  
 vec@arrl.org



# U.S. Grid Square Map



0 100 200 300 400 500 600 700 800 Kilometers

0 100 200 300 400 Miles

Albers Equal Area Projection - Conterminous USA

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## Major VHF/UHF Contests

Mid January, Full Weekend  
ARRL VHF Sweepstakes

Early March, Full Weekend  
ARRL International DX Contest Phone

Early April, Spring Sprint—144 MHz

Early April, Spring Sprint—222 MHz

Early April, Spring Sprint—432 MHz

Early May, Spring Sprint—50 MHz

Mid May, Full Weekend  
CQ National Fox Hunting Weekend

Early June, Full Weekend  
ARRL VHF QSO Party

Mid June, Full Weekend,  
SMIRK 6 meter QSO Party

Mid/Late June, Full Weekend  
ARRL Field Day

Mid July,  
CQ World Wide VHF Contest

Mid July, Full Weekend  
IARU HF World Championships

Early August, Full Weekend  
ARRL UHF Contest

Mid September, Full Weekend  
ARRL September VHF QSO Party

Courtesy: **CQ Magazine & ARRL**

## ICOM Grid Square Tips:

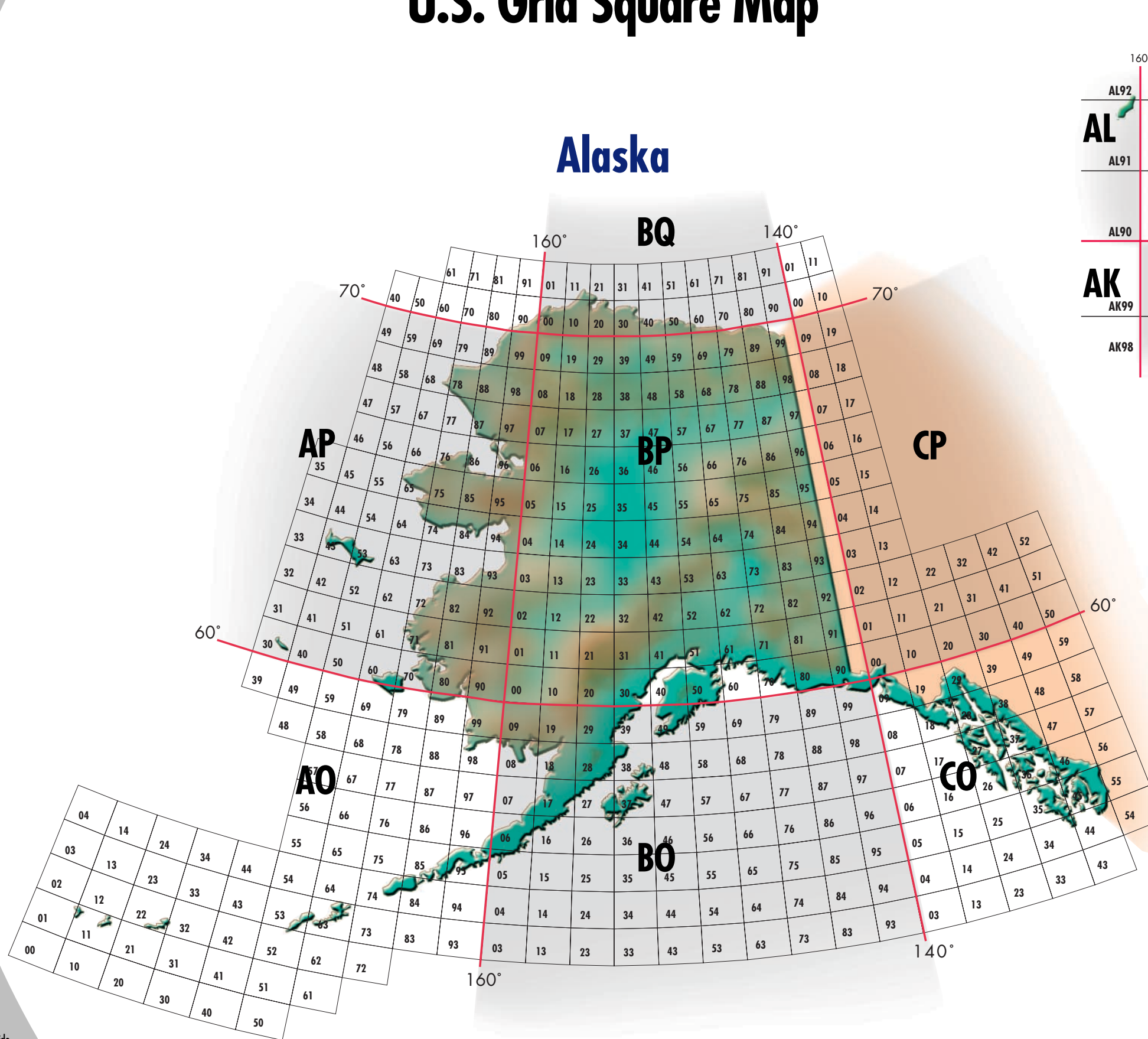
1. Say your grid square location when operating on VHF & UHF bands.
2. Many portable GPS receivers can read out Maidenhead\* grid squares automatically.
3. Say your grid square letters phonetically.  
Example: for grid 13 in region DM say "delta, mike, one, three" on air.
4. Give your general location along with your grid square.
5. Have fun on VHF & UHF!

\*An instrument of the Maidenhead Locator System (named after the town outside London where it was first conceived by a meeting of European VHF managers in 1980), a grid square measures 1° latitude by 2° longitude and measures approximately 70 x 100 miles in the continental US. A grid square is indicated by two letters (the field) and two numbers (the square).. "

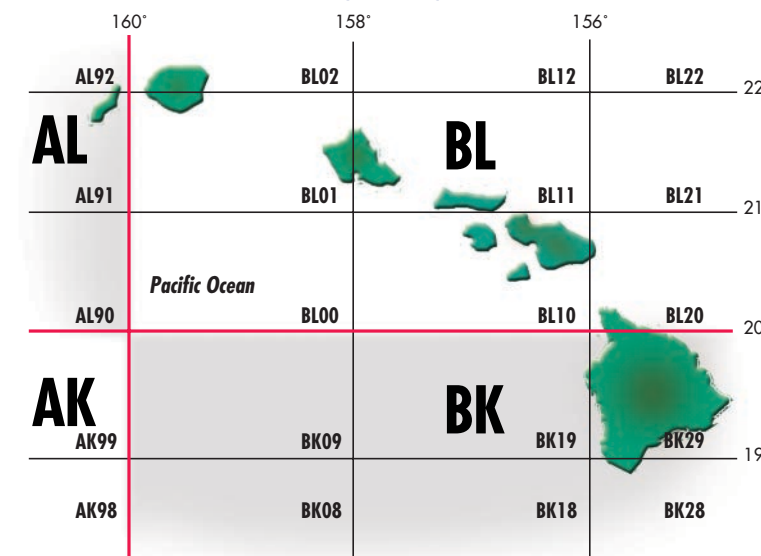
From ARRL source: <http://www.arrl.org/locate/gridinfo.html>

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# U.S. Grid Square Map



## Hawaii\*\*



0 10 20 30 40 50 60 70 80 Kilometers  
0 100 200 300 400 Miles

Albers Equal Area Projection - Alaska

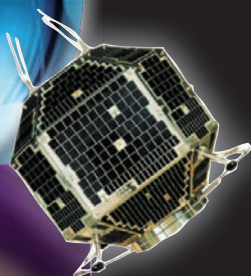
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\*\*All maps except Hawaii use an Albers Equal Area Projection. The map of Hawaii is based on the grid square map information from ARRL.

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# 22 THINGS YOU CAN DO WITH AMATEUR RADIO:

TECHNOLOGY THAT'S AS COOL AS YOU WANT TO MAKE IT



## EXPAND YOUR WORLD

1. Talk around the world without the Internet or cell phones. Use your own "Internet" when the "other one" is down.
2. Send your voice, text and pictures to unusual places, both near and far.
3. Create your own network of ham radio friends and send instant text messages without cell phones.
4. Meet awesome people from all over the U.S. and around the world, on-the-air and in person at ham radio events.

## EXPLORE AMATEUR RADIO

5. Talk through satellites or with astronauts on board the International Space Station.
6. Send messages in code—learn Morse code.
7. Be a signal sleuth, "Fox" hunt for hidden radio signals, and with GPS—GeoFox!
8. Investigate the many new combined radio-Internet communication techniques.
9. Try a new sport—Radiosport: Compete-on-the-air for awards and fun!
10. Send a message around the world using less electricity than a nightlight.

## PUT RADIO TO WORK

11. Become a weather spotter and help your community prepare for weather events.
12. Use Amateur Radio to control models, robots, or even drones.
13. Support recovery efforts in emergencies.
14. Earn badges and patches through Scouting programs and participate in worldwide radio events.



(Continued from front)

- 15. Use your radio for community service! Provide communications for a bike race or a marathon.
- 16. Track your friends, pets, or wildlife using your ham radio.
- 17. Take ham radio along when you go hiking or camping. You'll never be out of contact with ham radio!
- 18. Collect weather and flight data by releasing and tracking a high-altitude balloon.
- 19. Learn how radio is used to explore space.

## GO BEYOND THE MENU: CREATE TECHNOLOGY

- 20. Do it yourself, build and test your own gear.
- 21. Experiment with new software applications for radio, or create your own.
- 22. Learn the radio science that powers cell phones, Bluetooth and all of the hottest wireless technologies.

## FIND OUT WHAT OTHER YOUNG HAMS ARE UP TO AT: [WWW.ARRL.ORG/YOUTH](http://WWW.ARRL.ORG/YOUTH)

There are over 700,000 Amateur Radio (otherwise known as "ham") operators in the United States and 3 million worldwide. To get your Amateur Radio License you'll need to take a 35-question, multiple choice exam. **Anyone—of any age—can be on-the-air as an Amateur Radio operator!**

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