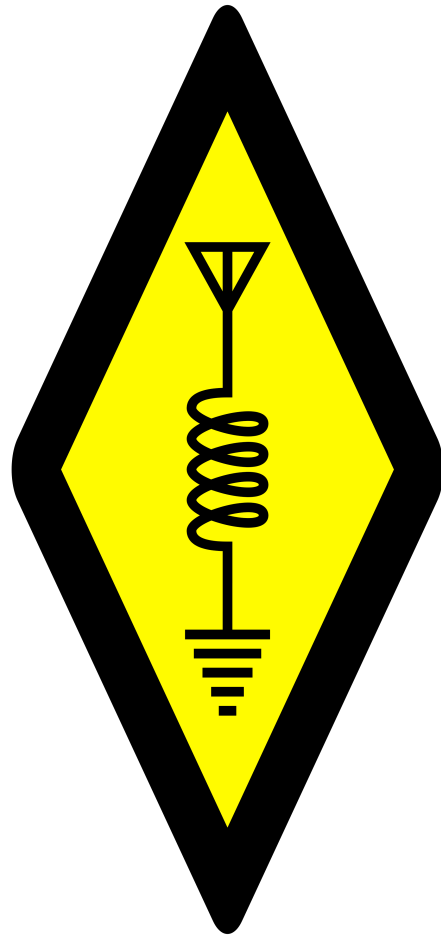


An Introduction to Amateur Radio



KF7ETX

**David Pruett
Portland, Oregon**

YouTube

USNERDOC

Follow my HAM radio adventures on YouTube!

Welcome to the exciting world of amateur radio!

Where do I start?

The first step is to study and get your operator's license. On February 23, 2007, the Federal Communications Commission (FCC) eliminated Morse Code testing. The Morse Code requirement was a major stumbling block for many interested in amateur radio. While no longer required for licensing, Morse Code or CW remains an interesting and effective mode of communication by many amateur radio operators.

New amateur radio operators typically enter the hobby by obtaining a Technician Class later advancing to the General Class or Extra Class. Volunteer Examiners (VEs) prepare and administer written examinations from published question pools publicly available. Helpful study guides, training courses and online resources are widely available.

• Technician Class (Element 2)

The privileges of a Technician Class operator license include operating an amateur station that may transmit on channels in any of 17 frequency bands above 50 MHz with up to 1,500 watts of power. Technician Class licensees also have privileges in four amateur service bands in the HF range. To pass the Technician Class examination, at least 26 questions from a 35 question written examination must be answered correctly.

• General Class (Element 3)

The General Class operator license authorizes privileges in all 27 amateur service bands. In addition to the above written examination, the requirement for a General Class operator license includes answering correctly at least 26 questions on a 35 question written examination.

• Extra Class (Element 4)

Operating privileges of an Extra Class operator license include additional spectrum in the HF bands. In addition to the two above written examinations, the requirement for an Amateur Extra Class operator license includes correctly answering at least 37 questions on a 50 question written examination.

Always check that you are studying the most current question pool for each element.

Practice Tests & Question Pool Resources

QRZ Practice Test Center	http://www.qrz.com/xtest2.html
QRZ Practice Test Center (large print)	http://www.qrz.com/xtestxl.html
eHAM Practice Exams	http://www.eham.net/exams/
HamExam Practice Exams & Flash Cards	http://hamexam.org/
ARRL - Test Question Pools	http://www.arrl.org/question-pools
ARRL - Find a Local License Exam	http://www.arrl.org/find-an-amateur-radio-license-exam-session
The HamWhisperer	http://www.hamwhisperer.com/

What can I do with a Ham License?

- Doorway to the world! Talk to people in foreign countries . . . DX'ing is a favorite activity of many hams.
- Talk to people both local & distant while driving to work or someone on those sleepless late nights!
- Public assistance by providing communications during emergencies, natural disasters, parades, bike races, marathons and other public events
- Help other people become hams . . . also called "Elmering"
- Hook your computer to your radio and communicate "computer-to-computer"
- Collect QSL cards. Collect cards from other hams, from all over the world
- Participate in radio contests or ARRL Field Day events
- Provide radio communication services to your local Civil Defense organization
 - ARES (Amateur Radio Emergency Service)
 - RACES (Radio Amateur Civil Emergency Service)
 - FEMA (Federal Emergency Management Agency)
- Aid members of the U.S. military by joining the Army, Air Force or Navy/Marine MARS (Military Affiliate Radio System)
- Participate in "Fox Hunts" or transmitter hunt games
- Receive weather satellites pictures
- Operate low power from remote locations
 - SOTA – Summits On The Air
- Build radios, antennas, direction-finding equipment
- Learn some electronics & radio theory
- Talk to astronauts in space!
- Use the moon to bounce signals to talk with people on Earth
- Experiment with Amateur TV (ATV), Slow-Scan TV (SSTV), or send still-frame pictures by facsimile
- Connect your ham radio to the public telephone system & call friends toll free . . . "auto-patching"
- Communicate through orbiting satellites.

Some Basic HAM Terminology

ELMER	Experienced HAM who teaches and nurtures the neophyte ham radio operator
DX	Hobby of tuning in and identifying distant radio stations
CW	Continuous Wave (morse code)
VHF	Very High Frequency
UHF	Ultra High Frequency
HF	High Frequency
73	Best Regards
CQ	Invitation for any operators listening on that frequency to respond
QSO	Contact
QSL	Acknowledge receipt
QTH	Station Location
QRP	Low Power

The Amateur Radio Bands

http://www.arrl.org/files/file/Hambands_color.pdf

US Amateur Radio Bands

US AMATEUR POWER LIMITS
At all times, transmitter power should be kept down to that necessary to carry out the desired communications. Power is rated in watts PEP output. Except where noted, the maximum power output is 1500 Watts.

Effective Date
May 6, 2008

Published by:
ARRL The national association for
AMATEUR RADIO™
www.arrl.org
225 Main Street, Newington, CT USA 06111-1494

160 Meters (1.8 MHz)
Avoid interference to radiolocation operations from 1.900 to 2.000 MHz

30 Meters (10.1 MHz)
Avoid interference to fixed services outside the US.

6 Meters (50 MHz)

80 Meters (3.5 MHz)

20 Meters (14 MHz)

2 Meters (144 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.

17 Meters (18 MHz)

1.25 Meters (222 MHz)

40 Meters (7 MHz)

Phone and image modes are permitted between 7.075 and 7.100 MHz for FCC licensed stations in ITU Regions 1 and 3 and by FCC licensed stations in ITU Region 2 West of 130 degrees West longitude or South of 20 degrees North latitude. See Sections 97.305(c) and 97.307(f)(11).
Novice and Technician licensees outside ITU Region 2 may use CW only between 7.025 and 7.075 MHz and between 7.100 and 7.125 MHz. 7.200 to 7.300 MHz is not available outside ITU Region 2. See Section 97.301(e). These exemptions do not apply to stations in the continental US.

15 Meters (21 MHz)

70 cm (420 MHz)*

12 Meters (24 MHz)

33 cm (902 MHz)*

23 cm (1240 MHz)*

10 Meters (28 MHz)

All licensees except Novices are authorized 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

Note: CW operation is permitted throughout all amateur bands except 60 meters. MCW is authorized above 50.1 MHz, except for 219-220 MHz. Test transmissions are authorized above 51 MHz, except for 219-220 MHz

- = RTTY and data
- = phone and image
- = CW only
- = SSB phone
- = USB phone only
- = Fixed digital message forwarding systems only

E = Amateur Extra
A = Advanced
G = General
T = Technician
N = Novice

See **ARRLWeb** at www.arrl.org for detailed band plans.

ARRL
We're At Your Service

ARRL Headquarters:
860-594-0200 (Fax 860-594-0259)
email: hq@arrl.org

Publication Orders:
www.arrl.org/shop
Toll-Free 1-888-277-5289 (860-594-0355)
email: orders@arrl.org

Membership/Circulation Desk:
www.arrl.org/membership
Toll-Free 1-888-277-5289 (860-594-0338)
email: membership@arrl.org

Getting Started in Amateur Radio:
Toll-Free 1-800-326-3942 (860-594-0355)
email: newham@arrl.org

Exams: 860-594-0300 email: veo@arrl.org

Copyright © ARRL 2007 rev. 4/21/2010

My First Station

A great place to start as a new HAM is with a 2 meter / 70 centimeter dual band hand held radio. This will get you active on the local repeaters and nets, as well as, the amateur satellites and the International Space Station. Additionally, 2m / 70cm are the bands used by local emergency radio services such as ARES, RACES and CERT Teams. These radios are small, compact and very portable. They used with a “rubber duck” antenna, a magnet mount antenna on your car or portable antenna with a coax feed line.

A handheld 5-watt handheld radio can be found used at very reasonable prices on eBay or the online QRZ Swap Meet. <http://forums.qrz.com/forumdisplay.php?f=3>

Ultimately you will be tempted to get a base station, upgrade your license and start making long distance contacts. A great resource for setting up your first station can be found at Ham Universe:

<http://www.hamuniverse.com/setuphamstation.html>

Station Identification

Whenever you transmit on an amateur radio, you are required to identify your transmissions by giving your amateur callsign. Below are some helpful tips:

- While common practice, you are NOT required to identify at the beginning of your transmission
- You are required to identify with your callsign at least every 10 minutes
- When you end your contact you are required to identify with your callsign
- While not required, it is common practice for each station to identify themselves and the station(s) they are in contact (exception: international third party traffic)

Time

Coordinated Universal Time (UTC) is the time standard used by amateur radio operators to avoid confusion related to time zones and daylight savings time. UTC uses 24-hour (military) time notation and is based on the local standard time on the 0° longitude meridian which runs through Greenwich, England. For example, midnight in Greenwich corresponds to 00:00 UTC and noon corresponds to 12:00 UTC.

For Mac and iPhone users there are some useful applications to consider:

- For the iPhone take a look at the HamClock App (99¢)
- For a Mac computer consider UTC Clock by Northern Software

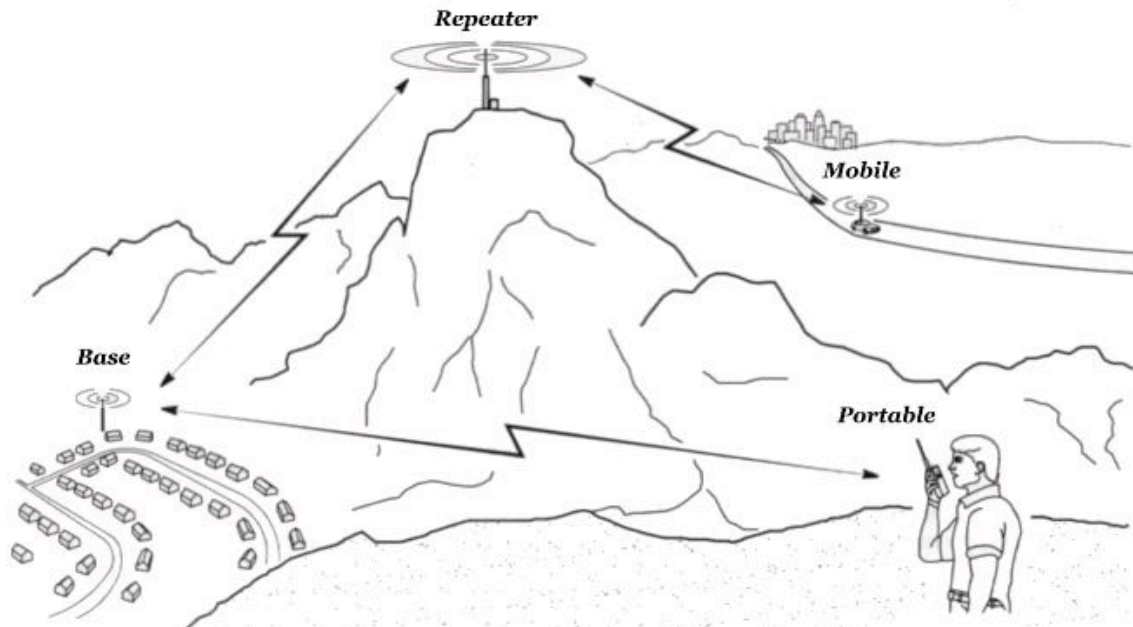
<http://www.northernsoftworks.com/utccklock.html>

UTC/GMT	EDT	EST/CDT	CST/MDT	MST/PDT	PST
0000	8 PM	7 PM	6 PM	5 PM	4 PM
0100	9 PM	8 PM	7 PM	6 PM	5 PM
0200	10 PM	9 PM	8 PM	7 PM	6 PM
0300	11 PM	10 PM	9 PM	8 PM	7 PM
0400	Midnight	11 PM	10 PM	9 PM	8 PM
0500	1 AM	Midnight	11 PM	10 PM	9 PM
0600	2 AM	1 AM	Midnight	11 PM	10 PM
0700	3 AM	2 AM	1 AM	Midnight	11 PM
0800	4 AM	3 AM	2 AM	1 AM	Midnight
0900	5 AM	4 AM	3 AM	2 AM	1 AM
1000	6 AM	5 AM	4 AM	3 AM	2 AM
1100	7 AM	6 AM	5 AM	4 AM	3 AM
1200	8 AM	7 AM	6 AM	5 AM	4 AM
1300	9 AM	8 AM	7 AM	6 AM	5 AM
1400	10 AM	9 AM	8 AM	7 AM	6 AM
1500	11 AM	10 AM	9 AM	8 AM	7 AM
1600	Noon	11 AM	10 AM	9 AM	8 AM
1700	1 PM	Noon	11 AM	10 AM	9 AM
1800	2 PM	1 PM	Noon	11 AM	10 AM
1900	3 PM	2 PM	1 PM	Noon	11 AM
2000	4 PM	3 PM	2 PM	1 PM	Noon
2100	5 PM	4 PM	3 PM	2 PM	1 PM
2200	6 PM	5 PM	4 PM	3 PM	2 PM
2300	7 PM	6 PM	5 PM	4 PM	3 PM

Antennas

What is a Repeater?

The purpose of a repeater is to allow its users a greater coverage area than that afforded by "simplex" or single channel operation. A repeater is generally located on the highest area in the locale or region to provide the best service to those who use it. Repeaters have separate input and output frequencies that are published in the ARRL Repeater Directory.



Amateur Radio on YouTube

Randy • K7AGE <http://www.youtube.com/user/K7AGE>

Wil • AI4QT <http://www.youtube.com/user/AI4QT>

John • W5CYF <http://www.youtube.com/user/johnrob281>

Steve • WGØAT <http://www.youtube.com/user/goathiker>
Steve's Blog <http://n0tu.blogspot.com/>

Andrew • K2FR <http://www.youtube.com/watch?v=NLgiaydnN3o>

Mark • M0SVT <http://www.youtube.com/user/markbeermonster>

David • KF7ETX <http://www.youtube.com/user/USNERDOC>

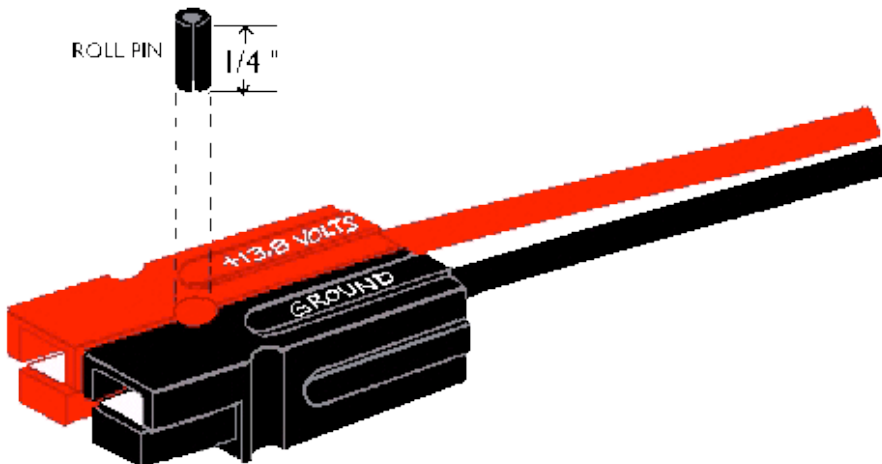
Anderson Powerpole® Connectors

RACES and ARES organizations, and most HAM radio operators, have now **standardized on the Anderson Powerpole® for DC power connections**. Start off in the right direction by adopting this power connection standard for your station. Anderson Powerpole® connectors offer the advantage of handling 15, 30 or 45 amps using the same connector (the contact must be matched to the current load). The connectors are genderless, meaning the supply and load connectors are the same. This reduces the number of parts required, however, just because Anderson Powerpole® connectors allow you to hook anything to anything, that does not mean that you can do so without thinking about the potential results! It is always necessary to know what you are connecting, what is a source and what is a load, and which sources should not be attached to other sources.

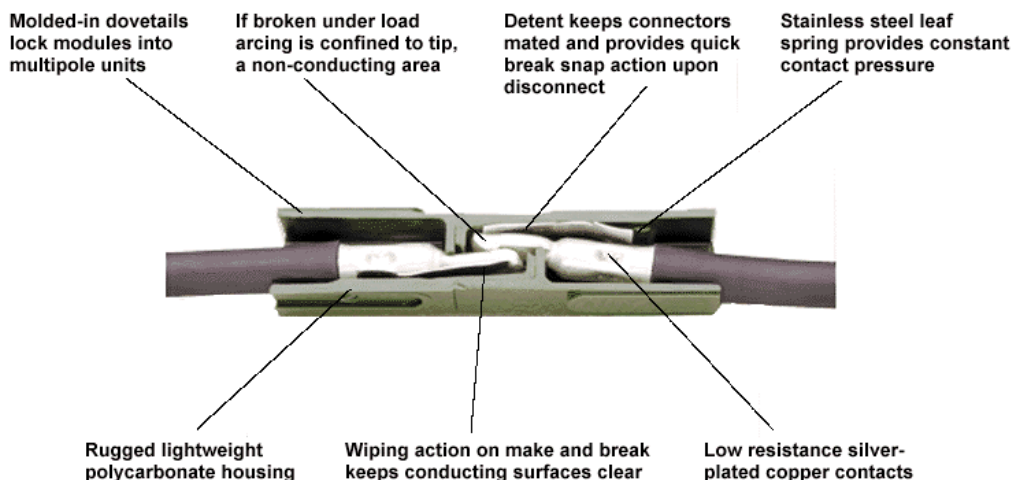
<http://www.andersonpower.com/>

<http://www.powerwerx.com/>

ASSEMBLY OF AN ANDERSON POWERPOLE® CONNECTOR



INTERIOR ANATOMY OF AN ANDERSON POWERPOLE® CONNECTOR



USEFUL RESOURCES FOR THE HAM RADIO OPERATOR

ORGANIZATIONS

ARRL	Amateur Radio Relay League	http://www.arrl.org/
ARES	Amateur Radio Emergency Services	http://www.ares.org/
RACES	Radio Amateur Civil Emergency Service	http://www.usraces.org/
CERT	Civilian Emergency Response Team	http://www.citizencorps.gov/cert/

AMATEUR RADIO MANUFACTURES / EQUIPMENT

Yaesu	http://www.yaesu.com/
iCOM	http://www.icomamerica.com/en/
Kenwood	http://www.kenwoodusa.com/Communications/Amateur_Radio/
Ten Tec	http://www.tentec.com/
Ham Radio Outlet	http://www.hamradio.com/
Amateur Electronics Supply	http://www.aesham.com/
PowerWerx	http://www.powerwerx.com/
Anderson Power Pole	http://www.andersonpower.com/products/singlepole-connectors.html
West Mountain Radio	http://www.westmountainradio.com/
LDG Electronics	http://www.ldgelectronics.com/
MFJ Industries	http://www.mfjenterprises.com/
W4RT Electronics	http://www.w4rt.com/
Nifty Mini-Manuals	http://www.niftyaccessories.com/
BuddiPole	http://www.buddipole.com/
S-9 Antennas	http://www.s9antennas.com/

INTERESTING & USEFUL AMATEUR RADIO LINKS

QRZ	http://www.qrz.com/
Gordon West W5YI – VEC	http://www.gordonwestradioschool.com/ http://www.w5yi-vec.org/
ARRL Question Pools Study Guides	http://www.arrl.org/question-pools http://www.hamradioinstructor.com/guides.html
Ham Universe	http://www.hamuniverse.com/setuphamstation.html
FCC Part 97	http://www.arrl.org/files/file/Part97_SinglePage.pdf
Summits On The Air	http://www.sota.org.uk/
ISSfanclum.com	http://www.issfanclub.com/
Great Grounding Primer Antenna Basics	http://www.hamuniverse.com/groundingbypolyphaser.pdf http://www.hamuniverse.com/basicantennas.pdf

iPhone & iPad Applications for the HAM Radio Operator

HamClock	Local and UTC time
MaidenHead	Get your LAT / LONG / GRID for contests & satellite communications
GoSatWatch	Satellite / International Space Station / Shuttle tracking
EchoLink	Access to ECHOLINK for validated Echolink users & licensed Amateurs
PocketPacket	APRS client for iPhone / iPad . . . receive, view & send packet data
PacketPAD	View packet transmissions on iPhone / iPad
Open APRS	APRS client for iPhone / iPad
QRZ	Look up HAM radio callsigns
Clinometer	Great for estimating angle above horizon for satellite communications

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

Adopted by the ARRL from the original version of "The Amateur's Code" written by Paul M. Segal, W9EEA in 1928

While no single document will ever be absolutely complete, I do hope this general primer is useful for those interested in getting involved with amateur radio operations. I am interested in correcting, updating and expanding this reference. Please email me with corrections, suggestions and updates!

Welcome to a fascinating hobby with many areas to explore.

See you on the airwaves!

73 – KF7ETX

David Pruett

Portland, Oregon

usnerdoc@mac.com

v1.0 – OCT 2010