A Scouter's Guide to Amateur Radio
California Inland Empire Council

Charles Kinnear – KD6RXY
WE4-45-04

Introduction

Amateur Radio and Scouting share a relationship that extends back almost to the birth of both movements. The BSA Scouting Handbook for Boys – 1911 edition included information on learning the Morse Code as well as directions at how to construct home built transmitter and receiver sets. (Until about 1972, knowledge of Morse Code was required for First Class Scout Rank.) While technology and requirements have changed, the complementary nature between amateur radio and scouting remains as strong today as it was in 1911.

By federal law and international treaties, Amateur Radio exists for five stated purposes:

a. Recognition and enhancement of the value of the amateur **service to the public** as a voluntary noncommercial communication service, particularly with respect to providing **emergency communications**.

b. Continuation and extension of the amateur's proven ability to contribute to the **advancement of the radio art.**

c. Encouragement and improvement of the amateur service through rules which provide for **advancing skills** in both the communication and technical phases of the art.

d. Expansion of the existing reservoir within the Amateur Radio Service **of trained operators, technicians and electronics experts**.

e. Continuation and extension of the amateur's unique ability to enhance **international goodwill.**

Part 97.1 FCC Rules

Service to the public; skills advancement; service during emergencies; training; and international goodwill. Don't these concepts sound a lot like values and aspects of the scouting program?

Experience has proven that amateur radio can be integrated into all levels of the scouting program successfully. Both as an educational tool as well as providing dependable communications for scouting activities and emergency service.

My intent is provide the non-ham scout leader a overview of amateur radio and to demonstrate the utility and possibilities of incorporating amateur radio in their unit's scouting program. I hope that you find the information in this guide useful.

73

Charles Kinnear, KD6RXY
WE4-45-04 - Bear

Table of Contents

A Radio Amateur is:

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

LOYAL.....
offering 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 beyond reproach.

FRIENDLY.....
with slow and patient operation when requested, friendly advice and counsel to the beginner, kindly assistance, co-operation 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.....
with station and skill always ready for service to country and community.

by Paul M. Segal, W9EEA (1928)

A Scout is a Radio Amateur is:

TRUSTWORTHY...
A Scout tells the truth. He keeps his promises. Honesty is part of his code of conduct. People can depend on him.

LOYAL...
A Scout is true to his family, Scout leaders, friends, school, and nation.

HELPFUL...
A Scout is concerned about other people. He does things willingly for others without pay or reward.

FRIENDLY...
A Scout is a friend to all. He is a brother to other Scouts. He seeks to understand others. He respects those with ideas and customs other than his own.

COURTEOUS...
A Scout is polite to everyone regardless of age or position. He knows good manners make it easier for people to get along together.

KIND...
A Scout understands there is strength in being gentle. He treats others as he wants to be treated. He does not hurt or kill harmless things without reason.

OBEDIENT...
A Scout follows the rules of his family, school, and troop. He obeys the laws of his community and country. If he thinks these rules and laws are unfair, he tries to have them changed in an orderly manner rather than disobey them.

CHEERFUL...
A Scout looks for the bright side of things. He cheerfully does tasks that come his way. He tries to make others happy.

THRIFTY...
A Scout works to pay his way and to help others. He saves for unforeseen needs. He protects and conserves natural resources. He carefully uses time and property.

BRAVE...
A Scout can face danger even if he is afraid. He has the courage to stand for what he thinks is right even if others laugh at or threaten him.

CLEAN...
A Scout keeps his body and mind fit and clean. He goes around with those who believe in living by these same ideals. He helps keep his home and community clean.

REVERENT...
A Scout is reverent toward God. He is faithful in his religious duties. He respects the beliefs of others.

"Be Prepared"

It's a beautiful day on the trail. Your troop is making good time and you haven't seen signs of modern civilization for the past couple of hours. The Senior Patrol Leader is doing his job remarkably well. The scouts are practicing Leave No Trace by staying on the trail and keeping noise to a minimum. As you continue to hike you can't help but reflect on how well your troop has progressed in the past years.

Just before starting a steep decent into a desolate canyon you notice the SPL and another scout kneeling alongside a hiker on the trail. As you approach the group, a scout runs up and informs you that the hiker is experiencing chest pain and believes he's having a heart attack. Pulling out your cell phone you realize that your phone doesn't have service. Neither does any of the other cell phones in your group.

As you consider sending a couple of scouts back along the trail with phones to search for a signal to call 9-1-1, your SPL reaches into his pack and pulls out his small amateur transceiver. Within a few moments he has established contact with another "ham" who notifies emergency services. Help arrives soon afterwards and the hiker is receives the definitive care required for his survival.

While having an amateur radio isn't a guarantee of 100% communications in the backcountry, it doesn't rely on "cell sites" or a wired infrastructure to remain operational. The history of reliability is one reason why ham radio is used by thousands of hikers, boaters and others as supplemental communications when they venture out away from civilization.

In the aftermath of the September 11, 2001 attacks on New York and the Pentagon, amateur radio operators distinguished themselves and their hobby by providing essential communications when the emergency service's communications systems were overloaded or failed. Today amateur radio operators train and equip themselves to provide communications during disasters, emergencies and public safety events. Like scouts, they are being prepared.

Amateur radio isn't limited to camping, hikes and other outdoor applications in scouting. It provides a medium that can connect many activities, and enhance the scouting experience for all participants.

Radio, electronics, communications, emergency preparedness and many other merit badges are all enhanced by amateur radio. Jamboree on the Air (JOTA) is a world wide scouting activity where scouts can talk to and share scouting fellowship with other scouts all over the world via amateur radio. Competitive on the air contests and "radio fox hunting" add to the fun.

Like Scouting, the possibilities of amateur radio are endless.

Wireless Communications

Radio communications utilizes the electromagnetic spectrum to exchange signals that when properly decoded carry information that we use to communicate. That is, a transmitter sends out electromagnetic waves carrying information that when received by a receiver tuned to the same frequency reveals that information.

The term "Wireless" has come back into current usage as our society embraces cellular telephones and similar technology to enhance our daily lives. However, these technologies in their basic form are not new to "hams". In fact, many of these "new" technologies that consumers and businesses are discovering were developed or refined by amateurs. Many engineers and developers of these products are themselves amateur radio operators. The amateur radio service provides the test bed or product incubator for many products that consumers are just embracing or have yet to gain commercial acceptance.

Some of the more common technologies used daily that were conceptualized, developed or enhanced by hams are:

Wireless telephone
Radio Pagers
Automatic Packet Reporting System (APRS) or commercially known as "Automatic Vehicle Locator (AVL) systems.
Slow Scan Television (You know your new "Camera Phone"? Hams have been sending photographs over the air for years!)
Wireless weather stations and other radio telemetry devices.
Satellite telephone communications.
Digital communication modes- Packet (SMS-text messaging), Radioteletype, TCP/IP, Voice over Internet, etc.

Scouts too have been involved with "Wireless Communications" since their inception. Baden-Powell's "Scouting for Boys", the original scout handbook written for youth which sparked the scouting movement, included a chapter entitled "Signaling". Included was the Morse code, semaphore flag and whistle signals. All convey information and are wireless. During his world tour / inspection of scouting units, Baden-Powell recollects in his book "Boy Scouts beyond the Seas" multiple demonstrations of "Wireless Telegraphy" by various scout units he was visiting and his enthusiasm for scouts to know this essential skill.

We continue the tradition of "Radio Scouting" by encouraging our scouts to participate in Jamboree on the Air, earn the communications, radio and electronics merit badges while learning to be productive citizens and to be prepared.

RADIO SERVICES

In the United States, the Federal Communications Commission (FCC) licenses and regulates radio operation. Commissioned by Congress and operating within international treaties, the FCC allocates radio spectrum and users into "services" which are generally related to the operations of the user. There are a number of radio services that scouting units can utilize in the delivery of their programs. Some are highly regulated and others less so. It is important to note that unlicensed or improper operation of a radio transmitter can subject the operator to significant federal civil and criminal penalties.

Citizens Band

The Citizens Band Radio Service consists of 40 pre-defined channels around 27MHz that allow citizens to communicate using Amplitude Modulation (AM) or Single Side Band (SSB) modes. This un-licensed (and seemingly un-regulated) radio service is limited to 4 watts output and is commonly used by truck drivers and others who desire inexpensive local radio communications. In the highly populated urbanized areas of Southern California CB radio is less useful than in rural areas with less population. It is unlawful to modify or otherwise enhance the performance of CB radios to extend range or enhance performance.

Family Radio Service

The Family Radio Service (FRS) is a relatively new, low power, radio service assigned frequencies near 460Mhz that allows low cost, unlicensed, short distance operations by persons of all ages. Using Frequency Modulation (FM) the voice quality is better than Citizen Band's AM mode but with less range. Many scouting units use FRS radios during hikes, summer camp and other outings and activities where the communications is limited to less than 1 mile per station. It is unlawful to modify or otherwise enhance the performance of FRS radios to extend range.

General Mobile Radio Service

Originally part of the Citizen's Radio Service, the GMRS retains the requirement for a license to operate. Legally only stations operating under the same license can communicate with each other, so many users belong to licensed clubs or organizations that allow members to communicate with each other and utilize repeaters to extend the range of their radios. The equipment is normally commercial quality, FM radios operating around 460Mhz similar to public safety and commercial radio equipment.

Multiple Use Radio Service / Business Radio Service

These services are similar in types of equipment and the FM mode they share. While the licensed Business Radio Service can utilize fixed stations, gain antennas and repeaters, the un-licensed MURS users are limited to low power, point to point communications. Many Scouting units have found the MURS an acceptable communications medium and its usage is found by both individual units as well as council operated summer camps.

The Business Radio Service is a communications medium that allows licensed users to use a specific frequency within a specific geographical area to conduct its business operations. Equipment cost ranges from moderately priced hand held radios costing from $100 up to high quality base station transceivers and repeaters costing thousands of dollars. Some users of this radio service contract with commercial providers to provide equipment and service. Many users have switched to common carriers like Nextel and other cellular providers that integrate wireless with wired communications technologies.

Cellular Telephone

In the past twenty years the cellular telephone system has revolutionized the world's telecommunication system. Many users have replaced their wired telephones with wireless, cellular phones which allow mobility and greater convenience. "Push to talk" functions with "talk groups" has further blurred the lines between cellular phones and conventional radios. This is one reason that many business and other users are switching from fixed, business band radio systems to Nextel and similar combination radio / telephone services.

It is important to note that cell phones always communicate with a cell site (or system) and not directly with the other phone. The phone handset connects with the closest cell site with relays the message via wire (landline) or microwave into the conventional telephone system. If the other station being called is

also a cell phone, the system control computer routes the call to the closet cell site to the receiving phone and connects the call.

In normal usage the technology of the cellular system is more than adequate to provide reliable communications. However there are limitations that should be known prior to relying on cellular communications as the sole communications medium.

Cell sites have a limit to the number of simultaneous connections. While this has been improved with the migration to digital phones, cell sites can become saturated during emergencies and other high use events and result in failure to connect or dropped calls. In the event of an earthquake or similar emergency that interrupts the wired telephone system, the cellular system could also be adversely affected.

Cell sites are also limited in geographic coverage. Handset design compromises power to conserve battery life, reduce radio interference and potential harmful health effects of radio frequency radiation. Fixed cell sites cost quite a bit of money and wireless providers situate the sites in locations that provide the greatest coverage for the greatest number of users. That is, the freeways have excellent coverage, while desolate; wilderness areas may have limited coverage if any at all.

Other services

Scouting units may have access to other radio services depending on activity. The Marine Radio Service has a number of frequencies assigned to facilitate the safe and efficient operation of vessels on our waterways. While some of these frequencies do not currently require a license for domestic usage, they are restricted to use by vessels and licensed shore stations only. It is a federal offence to use marine band radios for non-maritime use on shore without specific authorization by the FCC.

Amateur Radio

The Amateur Radio Service (HAM Radio) is a noncommercial, licensed & regulated two-way, radio service that allows licensed operators and stations a broad choice of operational modes and techniques.

Equipment ranges from home made radios and antennas to high quality, commercial grade equipment. Operators can chose to operate using CW (Morse code), FM voice, AM or Single Side Band voice, digital data or voice. HAMS can transmit video, still photos, fax, telemetry data, control remotely operated craft and communicate using line of sight, ionspheric "skip", repeaters, satellites or even bounce signals off of the moon! The only limitation is the operating privileges allowed by their license class and the equipment available.

By law, amateurs are not allowed to conduct business on behalf of themselves or others, broadcast (one-way transmission) or transmit music. They are further limited to transmitting international third party communications with only countries with which the United States has a third party amateur communications agreement.

Amateur radio is not limited to specific geographical areas or a specific frequency like the GMRS or Business Radio service. While CB radios are limited to 4 watts, MURS stations limited to 1 watt, amateur stations are limited to 1,500 watts thus enabling worldwide communications. Only in the amateur radio service are licensees permitted (and encouraged) to modify their equipment using good engineering principles, to improve its performance.

Scouting units can incorporate amateur radio at several levels. While a license is required to control an amateur station, it is not beyond the abilities of most scouts and scouters to obtain.

Scouts can use amateur radio to coordinate hikes and other outings. As well as providing safety related communications at camporees / jamborees and other functions. (It would not be proper to use it to provide camp operation communications, see business use prohibition.)

In many communities, Scouts and Venturers as part of the Amateur Radio Emergency Service, provide emergency communications during disasters, emergencies and other special events to their governmental and non-governmental emergency organizations (Red Cross / Salvation Army, etc.) using amateur radio.

Some of the common transmission modes found in amateur radio:

CW – Continuous Wave
This is the oldest radio operating mode and is still a reliable and popular form of communications for amateurs and some maritime users. "Wireless telegraphy" is conducted using the binary Morse Code and consists of simply turning the transmitter on and off using a switch or key. A favorite mode of low power operators, Scouts can achieve worldwide communications using this mode and relatively modest and field expedient antennas.

Single Side Band (SSB)
Single Side band is a voice mode that is normally utilized on the High Frequency (HF) bands. SSB occupies more frequency bandwidth than CW and some digital modes, but allows the operator to simply speak into the microphone. Worldwide communication using SSB is common but it is not as efficient in low power operation.

Frequency Modulation (FM) voice
FM provides high quality voice transmissions for relatively local communications. It is the most popular mode for repeater operations and most handheld radios are designed for this mode exclusively. It uses

much more bandwidth than CW or SSB, but the low noise and high sound quality make it the choice for most local operations.

When linked to a radio with telephone access, a FM radio can access the commercial telephone circuits to place telephone calls. Hams have been using radio phone patches both on FM and SSB for almost 50 years long before the advent of cell phones.

Radio Teletype (RTTY)
At one time, RTTY required the stations to be equipped with large, noisy teletype terminals that were interfaced with a transceiver radio. RTTY has been used by governments, press agencies and other organizations to provide reliable long distance text communications for years. Now, many users of this mode operate using simple and small computers equipped with a soundcard and RTTY emulation software.

PSK-31
Phase Shift Keying at 31 baud is a relatively new operating mode and is found mainly on the High Frequency Bands. It utilizes a computer and soundcard interface to provide digital communications using low power over long distances. A keyboard to keyboard mode, it does not support file transfers like some other modes.

Packet
Packet radio, using the AX-25 or TCP/IP protocols, allows for both keyboard to keyboard and file transfers using both FM and SSB via radio. Before the rise in popularity of the internet, amateurs maintained (and in some areas still do) packet radio bulletin board systems (BBS) to send and receive e-mail and files. Hams who live on sailboats, or travel extensively in RV's use packet radio to receive their e-mail via internet gateway stations. Many hams still maintain packet equipment for use in emergencies and disasters to support the Red Cross, Salvation Army and other relief agencies.

While this mode has declined in some amateur operations, it remains a reliable mode to send and receive text and data files and a similar version can be found in police cars and delivery vehicles providing data communications and vehicle locator service.

Amateur Television (ATV) or Fast Scan Television
ATV is a fun mode where a video camera is coupled to a transmitter. The operator can transmit the image real time to any cable ready television. ATV has found many fans in both the amateur and disaster response communities. Emergency Managers can dispatch their volunteer hams to perform damage assessment while monitoring the situation from the command post or emergency operations center. In Southern California we have a few, high level ATV repeaters that retransmit the signal over long distances enabling a stations to communicate via ATV over long distances.

Slow Scan Television (SSTV)
SSTV allows stations to transmit and receive still photo images over HF radio. A digital camera can be connected to a radio via either an interface or a computer and stored images can be sent and received long distances. Scouts can send photos of their campsite or other activity back home while still on the trail. This mode is now gaining popularity as wireless "camera phones" become popular. The difference is that SSTV via amateur radio is not dependent on a cell site or phone lines. In providing public service, SSTV images also serve public service agencies during emergencies as described in the ATV section.

IRLP / WIN-Link
Amateurs embrace technology and are always looking for ways to advance their activities and technologies. While the internet has caused the decline of some amateur radio modes, it has spawned others. One marriage between amateur radio and the internet is the IRLP or Internet Radio Linking Project.

IRLP uses gateway stations that are accessible to both amateur bands (normally FM) and a broadband internet connection. Using Voice over Internet Protocol (VoIP) the gateway station can connect with

another gateway station anywhere in the world. An amateur operator hiking in a Southern California forest equipped with a handheld radio can talk to another amateur walking on the beach in Australia.

APRS / Automated Position Reporting System

APRS was developed by amateur radio operator Bob Bruninga, WB4APR, at the US Naval Academy as a real-time local tactical communications system for rapidly exchanging digital data of immediate value to operations. This really took off when GPS became available and maps were integrated into the system for tactical situational awareness of everything in the net. This mode combines packet radio with GPS technology to automatically transmit and receive position coordinates and other data (weather data etc.) using amateur radio.

Now commercially deployed in Automatic Vehicle Locator systems and combined with cellular telephone (OnStar®), APRS's roots are firmly in amateur radio and continues to be a popular activity. Search & Rescue teams, scout units, relay races, etc. all can utilize APRS to track individual units / people for safety and other uses. There is even an internet link where non-hams can track participating APRS equipped stations over the net. www.findu.com For more information on APRS visit: www.ew.usna.edu/~bruninga/aprs.html

Map showing active APRS stations in the San Bernardino / Riverside area.

On the Air Activities

Entire books can and indeed have been written on all the activities that a licensed amateur can participate. Many of these would be of interest to scouts. However the most popular activities in the US for scouts and hams would be:

Jamboree on the Air (JOTA)
This annual event brings scouts from all over the world together via amateur radio bands. See the section on JOTA elsewhere in this guide for additional details.

Field Day
Amateur radio Field Day is an annual event sponsored by the American Radio Relay League (ARRL) where amateur radio stations are encouraged to operate in "primitive" or emergency conditions. While the operating locations could be quite comfortable by scout standards, they remove the amateur radio operator from their usual fixed radio station, connected to commercial power and his usual antenna system and have them operate in a field or emergency environment such as would be found after a major earthquake or similar disaster. Stations normally found in houses are moved to tents or RVs at public parks or similar locations. The amateur operators are then challenged to contact as many stations in as many locations possible using battery or other
emergency power while connected to portable or field expedient antennas. This event lasts almost 36 hours and attracts a fair percentage of the amateur operators. Many scout units establish and staff their own stations like they would be asked to do in an emergency.

Venturers from Crew 800 staff radios during Field day

Contesting / Special Event Stations
Various amateur radio organizations host on the air operating contests and special event stations where HAMS compete against each other or receive recognition for contacting a special event radio station. Contesting activities provide essential training and operating experience for radio operators in high volume traffic handling, operating under adverse conditions and generally hone operator skills.

Special event stations are found at Scout Jamborees, State Fairs, Route 66 Celebrations, etc. and extend the event's presence worldwide. Besides helping to publicize the events they allow HAMS around the world to participate by contacting the station. Operators gain experience in traffic handling (an essential emergency skill), field station setup and operation and public affairs.

Foxhunting DF / Radio Orienteering
Amateur radio direction finding (ARDF) also known as "fox hunting" or radio orienteering, combines amateur radio, orienteering and transmitter hunting in a challenging outdoor activity that can be confined to a camp ground, city park or even an entire state.

Participants in ARDF do not require licenses. The control operator of the hidden transmitter must be licensed for the mode and frequency utilized but the hunters do not since they operate in receive only mode. ARDF attracts participants from all ages and abilities from around the world. International competitions attract teams and individuals from all over the world.

Many scouting units enjoy "T-hunts" for both their outdoor aspect as well as learning the technology and science involved in finding hidden transmitters. Frequently Fall Camporees incorporate JOTA stations and t-hunt activities.

For more information see Joe Moell's web-site: www.homingin.com for more information.

Public Service Events for Scouts

Crew 800 Radio Operators in the San Bernardino Police Mobile Command Post during Baker to Vegas 2005

Many scouting units have applied their amateur radio skills and capabilities to serve their communities during times of emergency or during special events. Scouting HAMs have set up communications for parades, walk a thons, Red Cross shelters, and similar events.

An example is Venturing Crew 800 (Yucaipa, CA.) who supports the San Bernardino Police Department's running team by providing communications monitoring runners during the grueling Baker to Vegas cross country relay race. More information: www.crew800.org

Amateur Radio Stations and Equipment

Amateur radio stations can range from small relatively inexpensive cell phone size handheld radios to fixed stations with 100' antenna towers costing thousands of dollars and everything in between.

Most HAMS start with a small handheld transceiver (HT) in the 2 meter (145MHz) band. Ideal for campouts, hikes and emergencies most of these radios can be adapted to vehicular use by the addition of an external antenna and a power connector to the vehicle's battery. Extended range (beyond line of sight) communications is possible by utilizing one of the many amateur repeaters located on high buildings or mountaintops. While radios designed for other bands, as well as multiband radios (2m/440MHz, etc) are available, 2m remains the most popular band for both beginners and experienced HAMS alike.

Another popular type of station is the mobile (vehicle mount) radio. Connected to the vehicle's electrical system and connected to an outside antenna, these radios are capable to longer distance communications and can be readily adaptable to APRS and other popular modes. A mobile radio connected to a 12 volt power supply is a popular choice for a fixed or permanent station in a structure.

Field portable radios are a favorite of many backpackers and scouts. Frequently similar size to many handhelds they are designed (and often custom made) for field usage and battery power. When combined with field portable antenna systems (again frequently homemade / custom built) these stations allow worldwide operation from mountaintops and other remote locations.

For more information on this mode checkout www.arsqrp.com and www.hfpack.com

Base Stations

Permanent or base stations range from mobile radios with 12 volt power supplies and roof mounted antennas to large transceiver / amplifier combinations feeding their output to directional antennas mounted at the top of large towers. Combined with computer controlled logging equipment, tuners and related accessories these stations are capable of multi-band worldwide communications.

HAM stations can be found in private residences, schools, scout camps, military bases, museums, lighthouses, fire lookout towers, police / fire stations. Just about anywhere.

Obtaining an Amateur Radio License

In the United States, amateur radio licenses are issued by the Federal Communications Commission using the Volunteer Examiner program. Volunteer Examiners (VEs) consisting of teams of at least three licensed and specially qualified examiners conduct the examinations at minimal cost to the public and the government.

Currently there are three classes of amateur radio licenses in the United States:

Technician: The "Tech" license is now the entry level license for US amateurs. The exam consists of 35 multiple choice questions drawn from and approved question pool approved by the FCC covering essential topics such as: Electrical safety, basic electronics, basic radio theory, rules and regulations, Radio Frequency (RF) safety, operational techniques and frequency privileges of the technician class license.

The technician licensee has unlimited privileges using all modes above 30 MHz. Technician licensees in possession of proof of completion of the Element 1, 5 word per minute Morse code exam may operate on a limited number of frequencies using limited power in the HF bands.

General: The General class license grants all the privileges plus privileges in the HF bands except for a portion of some bands which are reserved for Extra class licensees. Currently there are two examinations in addition to the technician exam to receive the General license grant. Element 1 is a 5 word per minute examination and Element 3 is the General Class written exam. The written examination consists of additional electronics and radio theory, safety, radio wave propagation using HF bands, rules and regulations and frequency privileges of the general class license. In addition, general class licensees can serve on Volunteer Examiner teams conducting the Element 1 (Morse Code) and Element 2 (Technician) exams.

Extra - The Extra class license is the pinnacle of the amateur radio licenses in the US. It grants additional privileges in the HF bands that are reserved for Extra class use. The examination consists of 50 questions covering advanced radio and electronics theory, radio wave propagation and radio service rules and regulations.

There are a number of books, CD/DVD study materials and other educational media to learn the material required to pass the test. A good source to start is the American Radio Relay League's website: www.arrl.org

Gordon West, WB6NOA of Costa Mesa, California conducts weekend classes for scouts and others desiring amateur radio licenses and his students have a high rate of success in passing the exams. You can purchase his study books and materials at Radio Shack or on line at the www.w5yi.com web site. Information on his classes can be found on www.gordonwestradioschool.com

Morse Code

Morse Code is the universal language of radio and signaling. A digital, binary code consisting of long and short tones (or flashes when used with light) it allows communications in the harshest of conditions. By using pro-signs and Q-signals messages can be sent between stations regardless of language.

While no longer required to obtain a Technician class license, CW or continuous wave when used in radio, is very efficient in terms of power required and bandwidth. A favorite of low power (or QRP) operators the power of the signal is concentrated in a small portion of the band. (As of September 2005, the FCC is considering removing the requirement to be proficient in Morse Code for the General and Extra licenses.) Regardless of license requirements, Morse code aficionados will be heard in the parts of the bands restricted to digital communications.

Learning Morse code can be a fun activity for scouting units. By starting with a few (maybe 5) characters and adding additional letters to the mix each meeting, scouts can become proficient in Morse code in a couple of months. Games and other activities incorporating the code can be used to keep the activity fun and interesting. Having a "secret" language adds to the fun.

It is important to realize that Morse code is taught using sounds, not visualizing dots and dashes. In other words Morse code is heard not read! Attempting to learn code by referring to dots and dashes will limit the student's ability to increase code speed as they will attempt to visualize the dots and dashes prior to making the sound / letter association. There are a number of good tapes, CD's and computer programs to help you teach and learn Morse code.

Scouts can combine learning Morse code with electronics construction projects by building a Morse code sounder to practice sending and receiving. This project will meet one of the requirements in the electronics merit badge. (Audio circuit project, 4C)

For more information on learning Morse code, visit: http://www.arrl.org/FandES/ead/learncw/

Amateur Radio Ideas for Cub Scout Advancement
by Larry Wolfgang. WR1B 5/03

Rank	Requirement	Amateur Radio ideas
Tiger Cubs	4G	Visit an Amateur Radio station. Learn how people communicate by radio. Talk to an Amateur Radio operator at another station by Amateur Radio
Wolf	6a, b	Learn about an Amateur Radio operator's collection of QSL cards. Postcards received from other Amateur Radio operators after an over-the-radio conversation.
Wolf	10d	With Akela, visit an Amateur Radio station and listen to some Amateur Radio operators talking with each other. Listen to several short-wave broadcast stations during your visit.
Bear	8b	Visit an Amateur Radio station. With the operator, talk to other Amateur Radio operators and ask them if they were ever in Cub Scouts. Ask them what it was like to be a Cub Scout then.
Bear	17c	Visit an Amateur Radio station and listen to the operators talking about world news events. During "hurricane season" listen to the Hurricane Watch net. Or listen to a "traffic net" passing messages between Amateurs. Talk with the operator at your station about how Amateur Radio operators can help with emergency communications.
Webelos	Communicator 4	At an Amateur Radio station, learn about at least 6 different ways that Amateur Radio operators communicate with other stations. Ask the operator to demonstrate single sideband voice, FM voice, Morse code, radioteletype, packet radio, slow scan TV and any other methods they would like to show you.
Webelos	Communicator 5	With the help of an Amateur Radio operator, learn to send messages to your friends using Morse code.
Webelos	Communicator 7	Visit an Amateur Radio station and learn how Amateur Radio operators send and receive messages to other Amateurs.
Webelos	Communicator 10	Ask an Amateur Radio operator to show you how they can send and receive messages with other Amateurs using computers and packet radio or other methods.

Webelos	Communicator 11	Under adult supervision, search the Internet for information about Amateur Radio. Learn about some of the ways Amateurs use the Internet to exchange information and share ideas.
Webelos	Family Member 8	Talk with your family about the ways you could use radio communication to keep in contact with each other on family trips and outings. Compare low power Family Radio Service radios with Amateur Radio.

Requirements for the Radio Merit Badge

Revised by BSA January 2002

1. Explain what radio is. Include in your explanation: the differences between broadcast radio and hobby radio, and the differences between broadcasting and two-way communicating. Also discuss broadcast radio and amateur radio call signs and using phonetics.

2. Sketch a diagram showing how radio waves travel locally and around the world. How do the broadcast radio stations, WWV and WWVH, help determine what you will hear when you listen to a radio?

3. Do the following:

a. Draw a chart of the electromagnetic spectrum covering 100 kilohertz (kHz) to 1000 megahertz (Mhz).

b. Label the LF, MF, HF, VHF, UHF, and microwave portions of the spectrum on your diagram.

c. Locate on your chart at least eight radio services such as AM and FM commercial broadcast, citizens band (CB), television, amateur radio (at least four ham radio bands), and police.

d. Discuss why some radio stations are called DX and others are called local. Explain what the FCC and the ITU are.

4. Explain how radio waves carry information. Include in your explanation: transceiver, transmitter, amplifier, and antenna.

5. Learn the safety precautions for working with radio gear, particularly DC and RF grounding.

6. Do the following:

a. Explain the differences between a block diagram and a schematic diagram.

b. Draw a block diagram that includes a transceiver, amplifier, microphone, antenna, and feedline.

c. Explain the differences between an open circuit, a closed circuit, and a short circuit.

d. Draw eight schematic symbols. Explain what three of the represented parts do. Find three electrical components to match to three of these symbols.

7. Do ONE of the following (a, b, or c):

a. *Amateur Radio*

1. Describe some of the activities that amateur radio operators can do on the air, once they have earned an amateur radio license.

2. Carry on a 10-minute real or simulated ham radio contact using voice or Morse code; use proper call signs, Q signals, and abbreviations. (Licensed ham radio operators may substitute five QSL cards as evidence of contacts with amateur radio operators from at least three different call districts.)

3. Explain at least five Q signals or amateur radio terms you hear while listening.

4. Explain some of the Technician Class license requirements and privileges. Explain who gives amateur radio exams.

5. Explain how you would make an emergency call on voice or Morse code. Tell why the FCC has an amateur radio service.

6. Discuss handheld transceivers versus home "base" stations. Explain the uses of about mobile amateur radios and amateur radio repeaters.

b. *Broadcast Radio*

1. Prepare a program schedule for radio station "KBSA" of exactly one-half hour, including music, news, commercials, and proper station identification. Record your program on audio tape using proper techniques.

2. Listen to and properly log 15 broadcast stations; determine for five of these, their transmitting power and general areas served.

3. Explain at least eight terms used in commercial broadcasting such as segue, cut, and fade.

4. Discuss the educational and licensing requirements and career opportunities in broadcast radio.

c. *Shortwave Listening*

1. Listen across several shortwave bands for two four-hour periods, one in the early morning, and the other in the early evening. Log the stations properly and locate them geographically on a globe.

2. For several major foreign stations (BBC in Great Britain or HCJB in Ecuador, for example), list several frequency bands used by each.

3. Compare your morning and evening logs, noting the frequencies on which your selected stations were loudest during each session. Explain the differences in signal strength from one period to the next.

4. Discuss the purpose of and careers in shortwave communications.

8. Visit a radio installation approved in advance by your counselor (ham radio station, broadcast station, or public service communications center, for example). Discuss what types of equipment you saw in use, how it was used, what types of licenses required to operate and maintain the equipment, and the purpose of the station.

Requirements for the Electronics Merit Badge

1. Describe the safety precautions you must exercise when using, building, altering, or repairing electronic devices.
2. Do the following:
    a. Draw a simple schematic diagram. It must show resistors, capacitors, and transistors or integrated circuits, Use the correct symbols. Label all parts.
    b. Tell the purpose of each part.
3. Do the following:
    a. Show the right way to solder and desolder.
    b. Show how to avoid heat damage to electronic components.
    c. Tell about the function of a printed circuit board. Tell what precautions should be observed when soldering printed circuit boards.
4. Discuss each of the following with your merit badge counselor, and then choose ONE of the following and build a circuit to show the techniques used:
    a. Tell how you can use electronics for a control purpose, and then build a control device circuit.
    b. Tell about the basic principles of digital techniques, and then build a digital circuit. Show how to change three decimal numbers into binary numbers, and three binary numbers into decimal numbers.
    c. Tell about three audio applications of electronics, and then build an audio circuit.

    Show how to read the schematic diagram of the project you choose and, to the best of your ability, explain to your counselor how the circuit you built operates.

5. Do the following:
    a. Show how to solve a simple problem involving current, voltage, and resistance using Ohm's law.
    b. Tell about the need for and the use of test equipment in electronics. Name three types of test equipment. Tell how they operate.
6. Find out about three career opportunities in electronics that interest you. Discuss with and explain to your counselor what training and education are needed for each position.

BSA Advancement ID#: 44
Source: *Boy Scout Requirements,* #33215, revised 2004

What is Jamboree-on-the-Air (JOTA) ????

When Scouts want to meet young people from another country they usually think of attending a World Jamboree or another international gathering. But few people realize that each year about half-a-million Scouts and Guides "get together" over the airwaves for the annual Jamboree-on-the--Air (JOTA). Modern communication technology offers Scouts the exciting opportunity to make friends in other countries without even leaving home.....

The JOTA is an annual event in which Scouts and Guides all over the world speak to each other by means of amateur radio contacts. Scouting experiences are exchanged and ideas are shared, via the radio waves.

Since 1958 when the first jamboree-on-the-Air was held, thousands of Scouts and Guides have "met" each other through this event. Not only is it fun to talk to Scouts from other parts of the world but it provides also a chance to find out about other countries and about Scouting elsewhere. Many contacts made during the JOTA have resulted in pen pals and links between scout troops that have lasted for many years.

With no restrictions on age, on the number that can participate and at little or no expense, the JOTA provides an opportunity for Scouts and Guides to contact each other by amateur radio. The radio stations are operated by licensed amateur radio operators. Many Scouts and leaders hold licenses and have their own stations, but the majority participates in the JOTA through stations operated by local radio clubs and individual radio amateurs. Today some operators even use television or computer linked communications.

Date and duration of the event

The world--wide Jamboree-On-The-Air is organized to coincide with the third **full** weekend of October each year. The event starts at 00.00 hours local time on the Saturday and concludes 48 hours later at 24.00 hours local time on the Sunday. Each station can choose its own operating hours within this period

HB9S - World Scout Bureau – Geneva, Switzerland
K2BSA - Boy Scouts of America – Dallas, TX
JA1YSS - Boy Scouts of Nippon – Tokyo, Japan
PA6JAM - Scouting Nederland -- Netherlands
5Z4KSA - The Kenya Scouts Assoc. -- Kenya
VK1BP - Scout Assn. of Australia -- National Station
GB2GP - The Scout Assn. -- London, UK
XEIASM - Boy Scouts of Mexico
DUIBSP - Boy Scouts of Philippines
TF3JAM - Scouts of Iceland

Where Scouts are not allowed to speak over the air, the licensed operator will have to make the contacts. If the operator is not a scout or leader, he will need a special briefing on Scouting and your group. The operator should be able to talk about Scouting in your local area and be able to have friendly and informative exchanges on behalf of the Scouts present. The Scouts can help to brief the operator and tell him the sort of things they would like to find out from other Scouts.

Rules of the game
There are some basic rules that should be followed:

- All radio operators must operate their stations strictly in accordance with their national licensing regulations;
- Stations should call "CQ Jamboree" or answer scout stations calling to establish a contact;
- Any authorized frequency may be used. It is recommended that stations use the agreed World Scout Frequencies listed below. To avoid congestion, other frequencies closeby can be used as well.

World Scout Frequencies:

Band	SSB(phone)	CW(Morse)
80 m	3.740 & 3.940 MHz	3.590 MHz
40 m	7.090 MHz	7.030 MHz
20 m	14.290 MHz	14.070 MHz
17 m	18.140 MHz	18.080 MHz
15 m	21.360 MHz	21.140 MHz
12 m	24.960 MHz	24.910 MHz
10 m	28.390 MHz	28.190 MHz

- The JOTA is not a contest. The idea is not to contact as many stations as possible during the weekend.
- All participating groups are asked to send a report of their activities to their National JOTA Organizer (NJO) after the event.
- NJO's are requested to send a National JOTA Report to the World Scout Bureau, for inclusion in the World JOTA Report.

The world-wide JOTA is organized in October. However, there are other times when Scouts can meet on the air. Often a radio--scouting station will be organized in conjunction with a large camp or other international gathering of Scouts. Regular scout nets (a prearranged time and frequency when operators meet) are organized nationally or regionally. An updated list of these nets can always be found in the latest World JOTA Report.

HB9S
The World Scout Bureau operates its own amateur radio station, with the call sign HB9S. There is a permanent radio room in the office building of the Bureau in the centre of Geneva. The station is on the air regularly at scout nets. During the JOTA weekend, HB9S will operate most of the Saturday and Sunday, with short breaks during the night.

Transmitters will be on the air simultaneously on the 10/15/20 meter, 160/80/40 meter and 0.7/2 meter bands. The World JOTA Team is usually assisted by World Bureau staff and an international team of scout radio amateurs to operate HB9S.

Making a contact with HB9S takes some patience in practice. Many stations are calling at the same time. Please follow the instructions given by the operators and do not interfere with on-going contacts. The operators will do the best they can to make contact with scout stations world-wide and speak to Scouts in as many languages as possible.

The Phonetic Alphabet.

When using radio communications, words and call signs are liable to be misunderstood, because some words and letters sound similar. To overcome this a phonetic alphabet is used. The following is used by amateur radio operators.

A	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	HO 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 vem BER
O	OSCAR	OSS cah
P	PAPA	PAH pah
Q	QUEBEC	KWEE 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	WHISKEY	WISS key
X	X RAY	ECKS ray
Y	YANKEE	YANG key
Z	ZULU	ZOO loo

1	WUN
2	TOO
3	THUH ree
4	FO wer
5	FI viv
6	SIX
7	SEVEN
8	AIT
9	NINER
0	ZERO

Amateur Radio Emergency Operations

In the event of a disaster or other emergency, FCC licensed, amateur radio operators (HAMS) stand ready to assist government and other relief agencies with communication and other assistance using their technical skills and equipment for the benefit of others.

Field Day is an annual, nationwide event that encourages HAMS to operate from non-traditional locations, using field expedient equipment and antennas. The purpose of field day is to simulate emergency operating conditions and encourage emergency preparedness by amateurs and the community.

Many HAMS utilize their skills and equipment and serve both governmental and non-governmental organizations such as:

San Bernardino County Emergency Communications Service (RACES) – HAMS belonging to ECS, service the emergency communications requirements of the local governments in San Bernardino Operational Area. ECS is the RACES (Radio Amateur Civil Emergency Service) program administered by the San Bernardino County Fire Department's Office of Emergency Services. Many other jurisdictions have similar programs.

RACES, is a program which enrolls and trains HAMS to assist state and local governments with communications in the event of emergency. Nationally it sponsored by the Department of Homeland Security – Federal Emergency Management Agency with provides guidance and training to state and local government emergency management agencies, which administer the program. Locally it is administered by County and City Emergency Management (Civil Defense) Agencies.

Amateur Radio Emergency Service (ARES): Organized by the American Radio Relay League (ARRL), ARES provides communications support to governmental and non-governmental organizations. ARES has written agreements at the national level with the Red Cross, Salvation Army, FEMA and other disaster response organizations which provides the framework for amateur radio support of disaster response and recovery effort. ARES provides standardized training courses to HAMS to enhance their emergency preparedness and capabilities.

Salvation Army Team Emergency Network (SATERN): SATERN provides HAM emergency communications assistance to enhance Salvation Army emergency shelters and relief activities.

Red Cross: The Red Cross utilizes HAMS to communicate between chapters, shelters, damage assessment teams and other relief activities.

Department of Homeland Security - US Coast Guard: HAMS of the Coast Guard Auxiliary serve as radio operators at both ashore and afloat emergency operational activities. CG Auxiliary radio operators also serve as the backbone of the Federal Highway Administration Emergency Communications program.

Military Affiliate Radio Stations (MARS): Thousands of US Military Service members have been able to communicate "home" via radio "phone patches" established and maintained by HAMS volunteering through the MARS programs of the Army, Navy-Marine Corps, Air Force. MARS operators serve as the communication reserve of the Department of Defense both in peacetime and time of emergency.

National Weather Service – SKYWARN is comprised of HAMS who have been trained to identify and report potential hazardous weather conditions to the NWS. The NWS incorporates SKYWARN reports in it's weather advisories

Religious based organizations: Many religious based organizations utilize HAMS for communications support of disaster relief and other humanitarian missions.

Search & Rescue: Many (if not most), search and rescue teams have at one HAM providing communications support.

For additional information visit:
WWW.ARRL.ORG
WWW.SBCECS.ORG
WWW.ACS.OES.CA.GOV
WWW.FEMA.GOV
WWW.CGAUX.ORG
WWW.SATERN.ORG
WWW.NAVYMARS.ORG

Amateur Radio Clubs in the California Inland Empire Council Area

For an updated listing of all ARRL affiliated Amateur radio clubs visit:
http://www.arrl.org/FandES/field/club/clubsearch.phtml

Amateur radio clubs provide a wealth of experience, knowledge and support to the amateur community and scouting. Contact a couple of local clubs in your area for additional information and support.

LISTING OF AMATEUR RADIO CLUBS IN THE CALIFORNIA INLAND EMPIRE COUNCIL AREA:

Name: SAN GORGONIO PASS ARC
Specialties: General Interest, DX, Public Service/Emergency Comms, VHF/UHF
Call sign: KF6GDX
Services: Help for newcomers, Entry-level classes, Other
Address: POB 1333
BANNING, CA 92220
Contact: CHARLENE F NEITZEL, KQ6HG
Phone: (909) 849-4041 **(D)** (909) 849-4041 **(N)**
Web: http://www.qsl.net/kf6gdx
E-mail: kq6hg@aol.com

Name: BIG BEAR ARC
Specialties: General Interest, Repeater, Public Service/Emergency Comms
Call sign: K6BB
Services: Help for newcomers, Other
Address: POB 790
BIG BEAR LAKE, CA 92315
Contact: GLEN T LANGER, W6GTL
Phone: (714) 230-3555 **(D)** (714) 593-1560 **(N)**
Web: http://www.bbarc.org

Name: CREST REACT ARC
Specialties: General Interest, Repeater, Public Service/Emergency Comms, VHF/UHF
Call sign: KE6TZJ
Services: Help for newcomers, Entry-level classes, Higher-level classes, Other
Address: 22579 PIN TAIL DR
CANYON LAKE, CA 92587-7524
Contact: JERRY SCHNOCK, W6JFS
Phone: (909) 437-3979 **(D)** (951) 244-2636 MSG **(N)**
Web: http://www.CrestCom.org
E-mail: info@crestcom.org

Name: TRI-COUNTY ARA
Specialties: General Interest, Contest, DX, Repeater, Digital Modes, Public Service/Emergency Comms, VHF/UHF
Call sign: K6AGF
Services: Help for newcomers, Other
Address: TCARA
PO BOX 75
CLAREMONT, CA 91711-0075
Contact: W BRADLEY RACHIELLES, KC6NNV
Phone: (909) 985-8018 **(D)** (909) 985-8018 **(N)**
Web: http://www.tcara.org
E-mail: k6agf@arrl.net

Name: CORONA POLICE CSV TEAM
Specialties: Public Service/Emergency Comms
Call sign: W6CPD
Services: Help for newcomers, Entry-level classes, Other
Address: 849 W 6TH ST
CORONA, CA 92882-3238
Phone: (951) 736-2330 **(D)**

Name: CALNET SOUTH RPTR GROUP
Specialties: Repeater, Public Service/Emergency Comms, VHF/UHF
Services: Help for newcomers, Other
Address: 1025 PETER CHRISTIAN CIR
CORONA, CA 92881-8674
Contact: MARSHALL E OLDHAM, KE6PCV
Phone: (951) 735-9687 **(D)** (951) 735-9687 **(N)**
Web: http://www.cal-net.org
E-mail: info@cal-net.org

Name: AMATEUR TELEVISION NETWORK-CA CHAPTER
Specialties: Repeater, VHF/UHF
Services: Help for newcomers, Other
Address: PO BOX 1594
CRESTLINE, CA 92325-1594
Contact: MICHAEL V COLLIS, WA6SVT
Phone: (909) 338-6887 **(D)**
Web: http://www.atn-tv.org
E-mail: wa6svt@aol.com

Name: MILE HIGH RADIO CLUB
Specialties: General Interest, Contest, Repeater, Public Service/Emergency Comms, VHF/UHF
Services: Help for newcomers, Entry-level classes, Other
Address: PO BOX 1204
IDYLLWILD, CA 92549-1204
Contact: VIOLA B HALLACY, K6VBH
Phone: (909) 659-4765 **(D)**
E-mail: vhalc@tebone.net

Name: CORONA NORCO ARC
Specialties: General Interest
Call sign: W6PWT
Services: Help for newcomers, Entry-level classes, Other
Address: 1610 PACIFIC AVE
NORCO, CA 92860-2820
Contact: NORMAN A MUSSELMAN, KN6CV
Phone: (909) 279-4636 **(N)**
Web: http://www.qsl.net/w6pwt
E-mail: cpl2602@hotmail.com

Name: INLAND EMPIRE COUNCIL OF AR ORG (Club Council)
Call sign: W6IEC
Services: None
Address: PO BOX 6532
NORCO, CA 92589-8051
Contact: NORBERT W DEAN, AD6F
Web: http://www.qsl.net/iecaro/

Name: INLAND EMPIRE A R C
Specialties: General Interest, Contest, DX, Repeater, Public Service/Emergency Comms, VHF/UHF
Call sign: W6IER
Services: Help for newcomers, Entry-level classes, Other
Address: PO BOX 1433
ONTARIO, CA 91762-0433
Contact: ROBERT J OVERHOLSER, K6HA
Phone: (909) 355-0185 **(D)**
Web: http://www.qsl.net/w6ier

Name: DESERT RADIO AMATEUR TRANSMITTING SOCIET
Specialties: General Interest, Contest, DX, Public Service/Emergency Comms, VHF/UHF
Call sign: WD6RAT
Services: Help for newcomers, Entry-level classes, Higher-level classes, Other
Address: P.O. BOX 1167
PALM SPRINGS, CA 92263
Contact: GARY S BOSKOVICH, KD6QLT
Phone: (760) 328-9662 **(D)** (760) 328-9662 **(N)**
Web: http://www.thedesertrats.org
E-mail: gsbosko@msn.com

Name: RIVERSIDE COUNTY ARA
Specialties: General Interest, Contest, DX, Repeater, Digital Modes, Public Service/Emergency Comms, VHF/UHF
Call sign: W6TJ
Services: Help for newcomers, Entry-level classes, Higher-level classes, RFI help, Other
Address: P.O. BOX 1412
RIVERSIDE, CA 92502
Contact: CLAIR E CESSNA, K6LG
Phone: (951) 689-4580 **(D)** (951) 689-4580 **(N)**
Web: http://www.w6tj.com
E-mail: w6tj@arrl.net

Name: CITRUS BELT ARC **[SSC]**
Specialties: General Interest, Contest, DX, Repeater, Public Service/Emergency Comms, VHF/UHF
Call sign: W6JBT
Services: Help for newcomers, Entry-level classes, Higher-level classes, RFI help, Other
Address: PO BOX 3788
SAN BERNARDINO, CA 92413-3788
Contact: JEFFREY J RICHARDSON, W6JJR
Phone: (909) 863-0035 **(D)** (909) 863-0035 **(N)**
Web: http://www.qsl.net/w6jbt
E-mail: kd6nxd@msn.com

Name: LEE DE FOREST AMATEUR RADIO CLUB
Specialties: General Interest, Contest, Repeater, School/Youth, Public Service/Emergency Comms
Call sign: N7OD
Services: Help for newcomers, Other
Address: PO BOX 441
SAN JACINTO, CA 92581-0441
Contact: RONALD J BAKER SR, WA6AZN
Phone: (951) 658-8807 **(D)** (951) 658-8807 **(N)**
Web: http://www.homestead.com/LeeDeforest/

Name: SUN CITY ARC
Specialties: General Interest, Digital Modes, Public Service/Emergency Comms, VHF/UHF
Services: Help for newcomers, Other
Address: 26501 JAMESTOWN DR
SUN CITY, CA 92586-2540
Contact: BRUCE J OWENS, KG6FFM
Phone: (951) 301-4038 **(D)** (951) 301-4038 **(N)**
E-mail: IndyOldtimer@msn.com

Name: VICTOR VALLEY ARC
Specialties: General Interest, School/Youth, Public Service/Emergency Comms, VHF/UHF
Call sign: K6QWR
Services: Help for newcomers, Entry-level classes, Other
Address: PO BOX 869
VICTORVILLE, CA 92393-0869
Contact: VIRGINIA V HALL, KD6YLT
Phone: (760) 245-0123 **(D)** (760) 245-0123 **(N)**
Web: http://www.victorvalleyarc.com/
E-mail: kd6rdc@juno.com

Name: GOLDEN TRIANGLE ARC
Specialties: General Interest, Contest, Repeater, Public Service/Emergency Comms, VHF/UHF
Call sign: W6GTR
Services: Help for newcomers, Entry-level classes, Higher-level classes, Other
Address: PO BOX 1335
WILDOMAR, CA 92595-1335
Contact: CHARLES J NEUMANN, NU6E
Phone: (951) 926-4242 **(D)**
Web: http://www.qsl.net/gtarc

Name: YUCAIPA VALLEY ARC
Specialties: General Interest, Contest, DX, Repeater, Digital Modes, School/Youth, Public Service/Emergency Comms, VHF/UHF
Call sign: K6YRC
Services: Help for newcomers, Entry-level classes, Higher-level classes, Other
Address: 34428 YUCAIPA BLVD. E-188
YUCAIPA, CA 92399-4661
Contact: GLENN A MONTENERO, KJ6QB
Phone: (951) 377-6331 **(D)** (909) 795-4398 **(N)**
Web: http://www.yvarc.org
E-mail: president@yvarc.org

Name: MORONGO BASIN ARC
Specialties: General Interest, Contest, DX, Repeater, Digital Modes, Public Service/Emergency Comms, VHF/UHF
Call sign: W6BA
Services: Help for newcomers, RFI help, Other
Address: PO BOX 1995
YUCCA VALLEY, CA 92286-1995
Contact: GLENN E MILLER, N6GIW
Phone: (760) 364-3957 **(D)** (760) 364-3957 **(N)**
Web:
http://wwwmjoshuatreevillage.com/206.206.htm
E-mail: deacon733@msn.com


RADIO SCOUTING

RADIO
MERIT
BADGE

WHAT IS THE ARRL?

The ARRL is an organization that supports Amateur Radio operators from all over the world. We publish many Amateur Radio books and provide helpful services to our members. If you'd like more information about Amateur Radio and getting your ham license, just fill out the form below.

Cut apart along the dotted line.

Please send me:
(Check the ones you want.)

- Radio Merit Badge requirements
- More information about Amateur Radio
- Names of Amateur Radio instructors and clubs near me
- Details about study guides on getting my license
- More information about the ARRL

Send this to:

ARRL
225 Main St, Dept BSA
Newington, CT 06111
or call: **1-800-32-NEW HAM**
(800-326-3942)

8-2000-E6A

My name and address:

Name

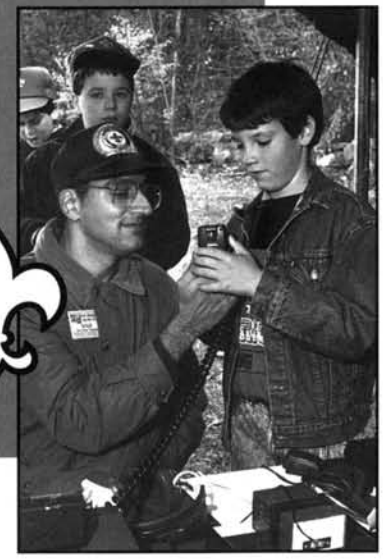
Street

Town State ZIP

( )
Phone Number

BOY SCOUTS OF AMERICA

SCOUTS



ON-THE-AIR

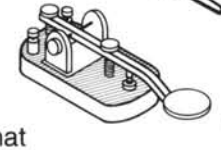
Earning Your Radio Merit Badge

Here is a new way you can communicate—an exciting way you and other Scouts can make new friends across town and around the world. Amateur Radio is an exciting hobby that brings people of all ages together, including many Scouts.

As a Scout, the skills you learn in Amateur Radio will help you earn the Radio Merit Badge. Some of the requirements can include:

- building your own radio
- learning Morse code
- making radio contact with other Amateur Radio operators.

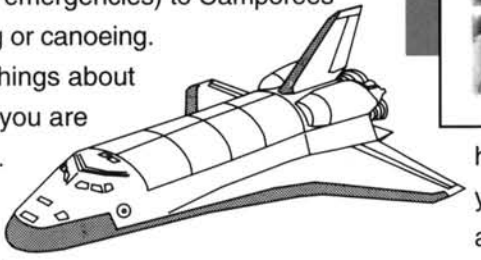
WHAT IS AMATEUR RADIO?



As an Amateur Radio operator (ham), you talk by two-way radio with other hams. Anyone can be a ham—no matter what age, sex or physical ability. Ham radio doesn't have to cost much. Your radio station can be held in your hand or take up a corner in your bedroom! You even get your choice of ways to communicate—voice, Morse code or by computer.

Scouting and Amateur Radio go hand in hand. "Jamboree-on-the-Air" (JOTA) is an official Scouting event held every October where hams and Scouts from all over the world talk to each other and have a great time! Hams also use their radios for search and rescue missions or for crowd control at Scout shows and parades. You may want to bring your radio for fun (or emergencies) to Camporees or while backpacking or canoeing.

You'll find many things about Amateur Radio that you are already familiar with. Just compare The Amateur's Code to your Scout Law.



Find Amateur Radio Clubs in your area:
http://www.arrl.org/field/club/clubsearch.phtml
BSA Web site: http://www.bsa.scouting.org/

SCOUT LAW

A Scout is. . .

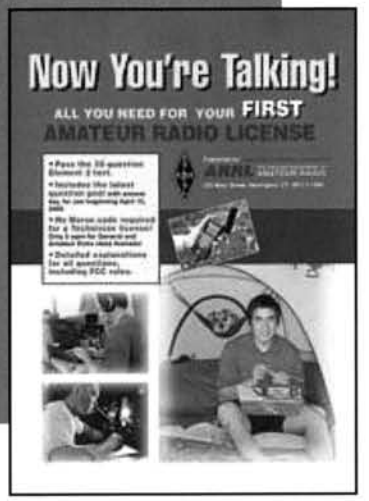
Trustworthy
Loyal
Helpful
Friendly
Courteous
Kind
Obedient
Cheerful
Thrifty
Brave
Clean
Reverent

THE AMATEUR'S CODE

Amateurs are. . .

Considerate
Loyal
Progressive
Friendly
Balanced
Patriotic

Over a dozen astronaut-hams have flown on the space shuttle and taken their radios along to talk to thousands of hams on earth. Hams talk to each other by bouncing their radio signals off the moon or relaying them through Amateur Radio satellites! Hams even link their radios to computers and send messages back and forth.



HOW DO I GET STARTED?

First, ask your Scoutmaster about earning your Radio Merit Badge. Once you have your badge you will have a real head start toward exciting ham radio activities. With a little more study, you can get your own Amateur Radio license and call sign.

Getting started is easy. All you need to do is spend some time with a beginner study guide.

Now You're Talking and Morse code practice tapes, produced by the American Radio Relay League (ARRL), contain all you need to know to pass the license exams. The exams are given by volunteer hams in your area. There is a license that doesn't even require a Morse code test! **Now You're Talking** teaches you basic electricity and rules for talking on the radio. If you like to study with a group, your local Amateur Radio club runs classes.

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).

For more Amateur Radio information, please contact:

_____

_____

_____

prepared by
Bill Wetherill - N2WG

Amateur Radio Phonetics

ALPHA	**J**ULIETT	**S**IERRA
BRAVO	**K**ILO	**T**ANGO
CHARLIE	**L**IMA	**U**NIFORM
DELTA	**M**IKE	**V**ICTOR
ECHO	**N**OVEMBER	**W**HISKEY
FOXTROT	**O**SCAR	**X**-RAY
GOLF	**P**APA	**Y**ANKEE
HOTEL	**Q**UEBEC	**Z**ULU
INDIA	**R**OMEO	

Example:
My name is Bill. Spelled Bravo India Lima Lima

Signal Report

Readability	**Signal Strength**
1-Unreadable	1-Barely perceptible
2-Barely readable	2-Very weak
3-Readable with difficulty	3-Weak
4-Readable with little effort	4-Fair
5-Perfectly readable	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
88	Hugs and kisses (just for fun)
YL	Young Lady
OM	Old Man

Example:
I'm having trouble copying you.
The ORM is bad.

How to make a voice contact.

Invitation to another station:
(CQ means CALLING):

CQ Jamboree
CQ Jamboree
CQ Jamboree
This is W1AW
This is WHISKEY 1 ALPHA WHISKEY
WHISKEY 1 ALPHA WHISKEY
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 W1AW.***
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 *(your city and state)*
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>. 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.

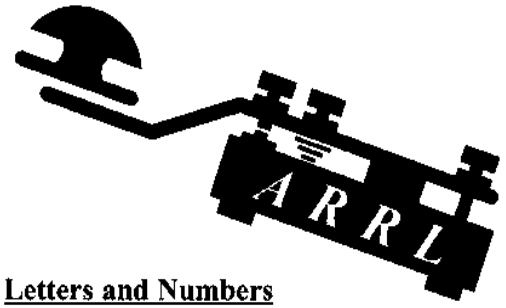
BALANCED... radio is an avocation, never interfering with duties owed to family, job, school, or community.

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

WORLD SCOUT FREQUENCIES

BAND	SSB (phone)	CW (Morse code)
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

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

Punctuation and Prosigns

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

Who is ARRL?

The American Radio Relay League, founded in 1914, is a non-profit organization that represents US hams in government and public relations matters. ARRL prints a monthly journal, *QST*, plus many ham radio books. ARRL provides services to its members, such as our Member's Only Web site, low-cost insurance for radio equipment, on-the-air operating awards, and support to volunteers who use ham radio to help in emergencies.

Who are Amateur Radio Operators or Hams?

The real fun for me is in talking daily to my friends back home and in other countries through our evening nets, in assisting youngsters to get their first Amateur Radio license, and in showing others how to make their own antennas. People become close through Amateur Radio. Strangers are no longer strangers. There are no borders or language barriers.

Dan Miller, K3UFG

Having been an Amateur Radio Operator since age 13, Amateur Radio has been a life changing hobby to me. I can't imagine what life would be like without my involvement in the hobby.

John Hennessee, N1KB

Whenever I travel around the country, on vacation or for business, I meet or talk with radio amateurs on the air. I am among friends wherever I go.

Steve Ewald, WV1X

With modest equipment, I am able to communicate with fellow amateurs around the world. Every time I do, I feel the same thrill Marconi must have felt when he made the first radio transmission around a century ago.

Brennan Price, N4QX

In my case, ham radio helped a shy woman in her 30s come out of her shell. I learned to mix with ease at club meetings. The radio helped me stay in contact with friends all around town. I learned the correct way to help using emergency communications. Nowadays, I have fun doing microwave and weak signal activities from scenic mountaintops in New England.

Mary Lau, N1VH

Please visit our Web site at:

http://www.arrl.org/hamradio.html

or call us Toll-Free: 1-800-32-NEWHAM

or contact your area Amateur Radio Club:

Local Radio Club:

Send to:

ARRL
225 Main Street
Newington, CT
06111-1494

Please send me:

- ❑ More information about Amateur Radio
- ❑ Names of Amateur Radio insructors and clubs near me.
- ❑ Details about obtaining study guides for getting my license.

Name _____

Street _____

City _____ State _____ ZIP _____

Phone Number _____

E-mail Address _____

New Horizons! New Horizons! New Horizons! New Horizons!

Bridging you to new HORIZONS

- **NEW FRIENDS**
- **NEW CHALLENGES**
- **NEW HORIZONS...**

...the promise of AMATEUR "HAM" RADIO

A large community of **Ham Operators** share common interests and have a means of **communicating** with each other. Join that community. **Have fun...learn...be useful in times of disaster.**

New Horizons! New Horizon
ew Horizons! New Horizons!

Join the worldwide community of Ham Radio enthusiasts who find fun and satisfaction in their rewarding hobby.

Want to be in The Future NOW?

Does the Space Program interest you? Ham Astronauts and Cosmonauts thrill thousands of hams on earth with a call from space!

Want to meet people in other countries (without having to travel there) and make new friends?

Amateur Radio Operators make hundreds of friends across town and around the world. You'll discover the culture and history of places you've only dreamed about. Amateur Radio is an exciting hobby where you meet new people of all ages and backgrounds and have a GREAT time!

Whether it be sharing experiences with a friend continents away....assisting your community in times of disaster...

Learning to become a Ham Radio Operator will bring you new and enjoyable activities and bridge you to New Horizons.

IF YOU ANSWERED "YES" TO ANY OF THE ABOVE QUESTIONS, WHY NOT BE A HAM RADIO OPERATOR!

Want to help people in times of Disaster?

When regular communication channels fail, hams swing into action, sometimes saving lives, and finding it very rewarding.

What is the latest in Amateur Radio Technology?

Today's technology allows hams to link computers to their radio equipment. You can send messages to, and receive messages from friends, or go to bulletin boards. The radio takes the place of the modem.
Another sophisticated aspect, ham satellites, allows you to relay your signal from continent to continent. Some stations communicate by bouncing signals off the moon and even off meteor trails!

How can I become a ham operator?

Study guides produced by ARRL contain all you need to know to pass your Amateur Radio license exam. Exams, given by volunteer hams in your area, cover basic electricity and on-the-air operating rules. Some Amateur Radio exams include a Morse code test, some do not. ARRL has Morse code-learning tapes, CDs and computer software for all levels of license exams. Getting your ham radio license is even easier when you use our fast-moving video courses. E-mail **pubsales@arrl.org** for full details. If you prefer not to study on your own, you may choose to enroll in a licensing course. Many Amateur radio clubs offer courses. Instructors enjoy teaching, and often only charge for the cost of a study guide. As with most hobbies, you have a multitude of choices about how much time and money you invest. You can contact another continent using the simplest radio set-up and antenna. Your radio station can occupy an entire room or can be held in your hand.

What is Amateur Radio?

As an Amateur Radio (ham) operator, you talk by two-way radio with other hams. Anyone can be a ham – no matter what age, sex, or physical ability. Ham radio doesn't have to cost much. Your radio station can be held in your hand or take up a corner in your bedroom. You even get your choice of ways to communicate – voice, Morse code or by computer.

About ARRL

The ARRL is an organization of Amateur Radio operators from all over the world. We publish many Amateur Radio books and we provide helpful services to our members. If you'd like more information about Amateur Radio, contact a local radio club or email ARRL at hq@arrl.org

Leap into amateur radio

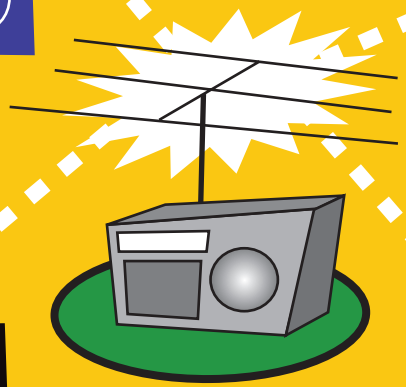
Leap into amateur radio

Leap Into Ham Radio!

Young people communicate in many ways--by cell phone, Internet, music, and even through sporting events and clothing styles. Here's another way you can communicate. You and your friends can make new friends across town and around the world. Young hams are active in Scouting, community radio clubs, and school radio clubs all over the US. Amateur Radio is an exciting hobby that lets you meet new people of all ages--and have a great time!

The Fun (and Serious) Sides of Amateur Radio

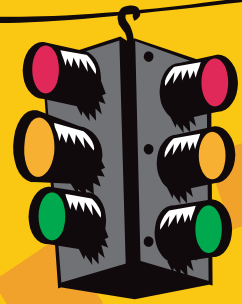
Hams do really neat things! Astronaut-hams have radios on the International Space Station to talk to thousands of hams on earth! Hams even relay their radio signals through Amateur Radio satellites! Ham friends can send and receive messages by attaching their radios to computers. Hams send messages when telephone poles are knocked down, but they also talk together just to enjoy themselves.



Microphone, Computer Keyboard and Telegraph Keys

Hams use microphones, telegraph keys, or computer keyboards as their "key" to open the door to talk to the world. Hams can use Morse code …a special language that they telegraph to other hams who decode it…but you don't have to learn it to get your basic ham radio license. The license is pretty easy to study for and earn, and once you do, you have a special identity…plus a call sign…that says, "I'm an Amateur Radio operator!"

Ready, Set,



GO!

Getting Started

Getting started is easy! All you need to do is spend time with a beginner study guide. ARRL produces guides that contain all you need to pass the entry level license tests. The tests, given by volunteer hams in your area, cover basic electricity and on-the-air radio rules. ARRL has Morse code-learning tapes and CDs. If you like to study with a group, your local Amateur Radio club runs classes. You can even study online, by visiting dozens of Amateur Radio study sites. The #1 site to visit for these resource links is http://www.arrl.org/hamradio.html