Requirement 9

Do ONE of the following, (a OR b OR c):

a.  AMATEUR RADIO  b.  BROADCAST RADIO  c.  SHORTWAVE LISTENING

9a. AMATEUR RADIO

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

2. Using proper call signs, Q signals, and abbreviations, carry on a 10 minute real or simulated radio contact using voice, Morse Code, or digital mode. (Licensed amateur radio operators may substitute five QSL cards as evidence of contacts with amateur radio operators from at least three different call districts.) Properly log the real or simulated ham radio contact and record the signal report.

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

4. Explain some of the differences between the Technician, General, and Extra Class license requirements and privileges. Explain who administers amateur radio exams.

5. Explain how you would make an emergency call on voice or Morse code.

6. Explain the differences between handheld transceivers and home "base" transceivers. Explain the uses of mobile amateur radio transceivers and amateur radio repeaters.

9.a.1 Amateur radio is also called ham radio. Specific frequencies are set aside by the FCC for amateur radio use, meaning that these frequencies cannot be used for commercial radio purposes like broadcast radio, cell phones services, or other money-making activities. Amateur radio is a fun hobby and a public service for communities where amateur radio may be used to aid firefighters and police during times of emergency.

The FCC established the Amateur Radio Service for:

- **International goodwill:** With some amateur radio frequencies you can talk around the world to people in other countries.
- **Experimentation and Electronics Expertise:** The amateur radio service encourages the home-building of equipment such as antennas and radio circuits, as well as experimentation with new modes of radio communications.
- **Volunteer Service:** Community communications support and emergency preparation. As a scout, you can earn your amateur radio license and Be Prepared to serve your community with radio communication skills!
- **Communications Expertise:** Amateur radio builds communications skills, both technical and social.
Amateur radio operators, or *hams*, do many fun and important things, including:

**Radio Contests:** Ham radio operators compete with one another to make the most radio contacts in a specific time period. [See a video about one type of radio contest!](#)

**Space Contacts:** Hams can make contact with the International Space Station and talk to amateur radio licensed astronauts! Hams can also communicate with other earthbound hams by having signals relayed by satellites in orbit around the earth! These links tell you more about amateur radio and space contacts!

- [Amateur Radio on the International Space Station](#)
- [ISS Fan Club](#)
- [Amateur Radio Satellites (AMSAT)](#)

**Portable Communications:** Many hams enjoy taking their radio station away from home, perhaps to a mountaintop or on a backpacking trip, to communicate from the backcountry and to be prepared in case of an accident to get help. [Link to troop 6 summer camp video; link to WGØAT YouTube videos](#)

**Skywarn:** Hams report on severe weather observations to the National Weather Service: [Skywarn Site](#)

**Hidden Transmitter Hunting:** Some hams like to play a game with radio, seeking a hidden transmitter with direction finding equipment. This popular radiosport is called foxhunting, and some hams combine it with the popular geocache activity! [Read about scouts competing in a hidden transmitter hunt!](#) (PDF File download)

**DX Contacts:** Hams communicate “DX” or distant out of country radio communications and exchange QSL cards as a record of the contacts. Hams seek awards, such as for contacting 100 different countries and other accomplishments on the air.

**Public Service:** Hams serve their community with communications for parades and other community events, and by volunteering in special radio organizations that help fire, police, or other emergency response agencies during times of emergency or disaster. [RACES Organization](#) [ARES Volunteers](#)

**Jamboree On The Air (JOTA):** Scouting organizations worldwide participate in JOTA each year on the third weekend of October. Scouts and hams team up to communicate with one another over the airwaves around the world. [JOTA Web Site](#)

*You can learn more about the fun things amateur radio operators do in the HamRadioSchool.com Technician License Course book Chapter 3!*  

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9.a.2. Using proper call signs, Q signals, and abbreviations, carry on a 10 minute real or simulated radio contact using voice, Morse Code, or digital mode. (Licensed amateur radio operators may substitute five QSL cards as evidence of contacts with amateur radio operators from at least three different call districts.) Properly log the real or simulated ham radio contact and record the signal report.

This requirement will be a blast! This is one reason why selecting option 9a Amateur Radio is so popular with scouts! Discuss with your counselor visiting an amateur radio operator station where you can make a radio contact with another amateur operator. You can talk on the air!
If your merit badge counselor is not familiar with local amateur radio stations, he may be able to request help from an amateur radio club in your area. You can search for an amateur radio organization in your area at this site: ARRL Find a Club. Just enter your zip code in the search box and click to get a listing of clubs in your area, then have your counselor contact the club with a request.

You may also be able to participate in the JOTA program to fulfill this requirement. Ask your local council about JOTA activities scheduled in your area. (See requirement 9.1.a)

For your on-air contact you should record the following information as a “logbook entry:”

- Date and Time
- Frequency
- Contact’s Call Sign, Name, & Location
- Signal Report Received (RST)
- Signal Report Given (RST)

Signal reports by phone (voice) modes are issued as “RS:” Readability (1 to 5) and Strength (1 to 9). The best signal report is “59.”

Signal reports by CW (Morse Code) mode are issued as “RST:” Readability (1 to 5), Strength (1 to 9), and Tone (1 to 9). The best signal report is “599.”

**NOTE:** If you are visiting an amateur radio station, be sure to review requirement 7 since you will be able to accomplish that requirement at the same time as this one!

You can learn more about call signs and Q signals in the HamRadioSchool.com Technician License Course book Chapter 2!

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

**Q signals** are three-letter shortcuts used on the air. Each Q signal has a specific meaning. Q signals were originally used with Morse Code transmissions to help reduce the amount of “dits and dahs” transmitted. Q signals are quick, easy, and efficient. They are often used by amateur radio operators with phone mode (voice) communications also.

Here are a few examples of Q signals, and you may reference a complete list here: <HRS Q-signal link>

QSO: An on air conversation
QSL: Acknowledge receipt
QTH: Location
QSY: Change of frequency
QRP: Low power; reduce power
QRN: Noise interference
QRM: Interference from another station (manmade interference)

See a thorough list of other common amateur radio terms from HamRadioSchool.com.
9.a.4. Explain some of the differences between the Technician, General, and Extra Class license requirements and privileges. Explain who administers amateur radio exams.

The 3 levels of amateur radio licenses are:

**Technician** – Entry level license requiring an examination on basic topics of rules, regulations, on-air procedures, and radio theory. The examination is 35 multiple choice questions selected randomly from a pool of almost 400 total questions. The Technician license allows transmitting on all UHF and VHF amateur frequencies and a small portion of the HF frequencies. The technician will be able to communicate locally and on repeaters, and also communicate long distances by ionosphere skip when conditions permit on the 10-meter and 6-meter bands. You can get your Technician license easily! (See below.)

**General** – Mid-level license requiring passing of Technician examination first and another 35-question examination on more advanced rules, procedures, and radio theory. Much of the radio theory focuses on the HF radio bands and long distance communications. The General license allows transmitting on most of the HF amateur bands in addition to all of the privileges earned with Technician. The General operator will be able to talk around the world using the ionosphere skip of the HF radio bands.

**Extra** – Highest level license requiring first passing of General examination and another 50-question examination from a question pool of about 700 questions on advanced radio theory, the various modes of operation, and other topics. Extra license holders may transmit on all portions of all amateur frequency bands.

All license examinations are administered by Volunteer Examiners, or VEs. VEs are sanctioned by the FCC to issue and evaluate amateur radio license examinations. At least three qualified VEs must be present for any examination. VEs are other licensed amateur radio operators who volunteer their time and services to the amateur radio community.

**GET YOUR LICENSE!** Once you have completed the radio merit badge, you have learned a lot of what is needed to earn your FCC Technician license! Don’t let that effort go to waste! Check out the [HamRadioSchool.com](http://HamRadioSchool.com) Technician training system. The book is easy to read, and the web site learning media has videos, sound files, pictures, quizzes and more that are organized for you right along with the book sections! And we have a fantastic mobile app for practicing questions and exams, and it also follows right along the book organization. It’s a great way to really learn about ham radio and get your Technician license! Check it out at: [HamRadioSchool.com](http://HamRadioSchool.com)

9.a.5. Explain how you would make an emergency call on voice or Morse code.

**Voice Mode Emergency:** With amateur radio, the most practical thing to do if you need to communicate on the air that you have an emergency situation is to simply say “Emergency!” You may want to say it three times in a row to get attention. Follow up with your call sign, your location, a brief description of the emergency, and the type of help needed. For example, “Emergency, emergency, emergency. WØCOL, hiking accident with injuries on Pikes Peak Barr Trail. Medical help is needed. Over.”

Wait for a reply from another amateur operator, answer questions, and provide more detailed information as necessary to receive the help you need. For instance, in our example above you may need to provide information about exactly where on the 13 mile trail you are located, such as an altitude position or latitude-longitude determined by a GPS receiver or a map.

The voice method above is fine for clear transmission modes, like FM repeaters, particularly in the United States. However, if the radio conditions are poor and the audio is noisy, such as with many single-sideband and HF bands, or if...
you are in another country where English is not the primary language, you may need to use the term “Mayday” instead of “Emergency.” If you hear someone transmitting “Mayday, mayday, mayday,” that is telling you that person has an emergency situation! Call them back and help in any way you can!

**Morse Code Emergency:** With Morse Code an emergency is indicated by transmitting “S O S.” This is a shortcut that means “save our ship” or “save our souls.” Again, follow the SOS transmission with your call sign, location, and what help is needed. The Morse Code transmission for SOS is:

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...    ---    …
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That sounds like “di di dit, dah dah dah, di di dit.”

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### 9.a.6. Explain the differences between handheld transceivers and home "base" transceivers. Explain the uses of mobile amateur radio transceivers and amateur radio repeaters.

**Handheld Transceiver:** The “HT” is a small, lightweight radio that fits into your hand. They are great for mobile or portable operations, such as walking around the neighborhood and transmitting across a small town, but they do not transmit with much power and they do not work well from inside a car. However, coupled with a repeater, a handheld transceiver can be very useful and communicate long distances! The HT is usually a voice mode, FM transceiver only.

![Handheld Transceiver: Yaesu FT-60R](image)

**Base Station Transceiver:** A base station is usually a permanently installed station in a home or building. These larger radios provide much more power and usually are connected to large external antennas. The base station may be able to communicate with several different modes, such as FM, AM, Single Sideband (SSB), CW (Morse Code), and digital methods. A base station may have many more features for helping to transmit and receive effectively.
Mobile Transceiver: A mobile station is usually installed in a car and can be operated as the car moves around. Usually in between the size of an HT and a base station, the mobile station will provide more power than the HT and it usually will have an antenna mounted outside the car cabin.

Repeater Station: A repeater station receives your signal and retransmits it on a different frequency, usually with higher power and from a higher antenna position. This lets other operators hear your signal much further away than with your transceiver alone! Repeaters are often located on high hills, mountains, or tall buildings so that their repeated signals travel great distances. Some repeaters are linked together in sets or systems, so that when one repeater in the system...
receives a call all of the other repeaters will retransmit that call. This can spread your signal across a very wide area! Other repeaters are linked over internet connection, allowing you to contact amateur operators in other countries around the world or in almost any state in the US! You can learn much more about these radio systems by earning your FCC Technician license with HamRadioSchool.com!  www.HamRadioSchool.com

A repeater station receives on one frequency and repeats the radio signal on a second frequency.

You can learn more about the different kinds of radios and about repeater stations in the HamRadioSchool.com Technician License Course book Chapter 1!

Learn more about amateur radio and getting your Technician license:

HamRadioSchool.com  Email the Author of this site

American Radio Relay League (ARRL): New to Ham Radio?