Amateur radio communication has been around for more than 130 years. Learning to communicate using radio waves is fascinating, and the community of amateur radio operators is friendly and welcoming. This fun, interactive hobby can last a lifetime.

Amateur radio operators use radio frequency to transmit voice, text, image, and data communications. A radio wave is generated by a transmitter and picked up by a receiver. This system allows the average citizen to communicate across the club, community, country, or world. About three million amateur radio operators across the world use this skill daily. The United States has more than 700,000 licensed operators, so there are plenty of folks who are willing to listen!

Radio waves were discovered in 1888 by Heinrich Rudolf Hertz. Communicating with radio waves evolved and by the beginning of the 1900s, the system we use today was developed. A measurement of a sound wave frequency, or hertz, is named after him.

Amateur radio operators are also called “hams.” Hams typically use the amateur radio bands to communicate during an emergency, train others about radio operation, communicate with other hams, and test equipment. Amateur radio operation is a subgroup of commercial radio and is non-commercial. That’s great because you won’t hear any advertisements while you’re on the air.

Ham operators are frequently involved in transmitting information during local and national disasters. Natural disaster organizations such as the Federal Emergency Management Agency (FEMA), American Red Cross, and Salvation Army provide reliable communications during these times. Ham operators can quickly spread information to those who need it. For example, let’s say a region is affected by a hurricane. Traditional communication lines are down, and people cannot communicate as they regularly do.
The FM radio band has a consistent signal strength. This band also uses a higher frequency range and a bigger bandwidth than AM radio. Because of this, it transmits more information and sounds clearer than the AM band. Before 1990, individuals who wanted an amateur radio license needed to know Morse code. Many amateur radio operators know Morse code, but it is not a requirement anymore. Morse code is a series of short and long taps of sound (called dots and dashes) and silence using an electric wire. This method was used to send messages before it was possible to transmit human speech. Each letter and number had its own series of dots, dashes, or both.

Amateur radio operators have call signs, similar to a license plate on a car. Call signs have letters and numbers. Each operator’s call sign has a prefix. The prefix consists of either a one-letter (K, N, or W) or two-letter prefix (AA-AL, KA-KZ, NA-NZ, WA-WZ). A number in the middle (0–9) represents a geographic location. Then, a one-, two-, or three-letter suffix follows. Many operators put their call signs on their cars.

In the past, many amateur radio operators had very tall antennas in their yard or on their house. Now, most connect over the internet and do not need antennas. Some operators have small antennas for their cars so they can connect while traveling. If there is a power outage, most operators have backup generators, battery-operated equipment, or solar panels to charge both the generator and batteries.

Amateur radio is an extremely popular hobby. The United States has over 2,000 amateur radio clubs. Amateur radio is constantly changing and evolving. Operators are looking for ways to incorporate coding, apps, and drones into amateur radio operation.
AREAS OF INTEREST AND THINGS TO DO

Every self-determined 4-H project has various areas of interest. Each area offers specific things members can address during their project adventures. Using the 4-H 365 Self-Determined Project Guide, identify at least three areas of interest with at least three activities per area to explore. Take your ideas from the list below or make up your own.

History
- Research how communication has changed over the centuries by reading “A Brief History of Communication” at localhistories.org/communications.html. Make a timeline chart to share with your club.
- Explain the different situations of ham operators during World I and World War II. Start your research at hamradioprep.com/history-of-ham-radio. Write a summary of each situation.
- Study how women contributed to amateur radio at themarysue.com/female-ham-radio-operators. Create a poster showing the impacts they made.
- Explore how amateur radio has helped in various emergencies at arrl.org/amateur-radio-emergency-communication. Share what you learn with club members or friends in another group.

Licenses
- Explore the three types of licenses at arrl.org/ham-radio-licenses. Explain their differences to your project helper.
- Successfully complete one of the license tests—Technician, General, or Amateur Extra. The Technician license is the entry-level license. Make a copy of your license and keep it with this project.
- Explore the rules and regulations for operating amateur radios at arrl.org/fcc-rules-and-regulations. Bookmark this site so you can refer to it easily.
- A record of your contacts is not required by the FCC, but you might find it useful anyway. Find out more about keeping a log at arrl.org/keeping-a-log and create one of your own.
- Learn about call signs and what each letter and number means. If you could create a vanity call sign, what would yours be? Find out if it is available at arrl.org/advanced-call-sign-search.

Equipment
- Prepare a list of items needed to communicate over amateur radio. Include the basics and accessories, and the price of each item.
- Visit dummies.com/programming/ham-radio/how-to-operate-a-ham-radio-in-an-emergency and become familiar with handling an emergency using amateur radio. Print the list of the steps and keep it handy.
- Make a poster of the various abbreviations and common terms used in Ham Radio culture. Check out this glossary at arrl.org/ham-radio-glossary.
- Explore the different safety hazards associated with radio transmissions. Make a list of five hazards and how to prevent or avoid them. Start your research at arrl.org/safety.
- Amateur radio operators sometimes use diagrams to show how their components are connected. A standardized symbol represents each item. Review these electronic schematic symbols at radioing.com/hamstart/symbols.html. Print this page so you can refer to them as needed.
Career Development

- Participate and volunteer in a local ham radio event with a parent or other trusted adult. Start by searching online for a “ham radio event near me.”

- Give a demonstration on various radio communications at a club or county event. For example, show how to communicate with other 4-H members across the United States or around the world, or show how to help those in a natural disaster.

- Interview or shadow a local ham radio operator. Keep track of what you learn and share your findings with your project helper. Be sure to send a thank-you note after your visit.

- Explore three careers that use amateur radio skills at arrl.org/careers-and-amateur-radio. Record in a journal what you like about each one, what kind of post-high school education is needed (trade, college, or something else), and which courses to take in school now to help you reach this goal.

- Connect and communicate over amateur radio with another 4-H member or other group member in a different county or state. Log the date, time, who you spoke with, and a summary of what was discussed.

RESOURCES

“22 Things You Can Do with Amateur Radio: Technology That’s as Cool as You Want to Make It,” arrl.org/shop/files/pdfs/Youth%20Flyer.pdf

This ARRL video gives a short but thorough overview of amateur radio:youtu.be/wDn-6SDxyD4

SOURCES

The National Association for Amateur Radio, arrl.org

Federal Communications Commission, fcc.gov

ohio4h.org/selfdetermined