

RADIO

Prepared By:

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Target Groups:

All Scouts

Time Allotted:

50 minutes block

Pre-Requisites:

None

Materials Required:

Radios, any additional instructional material you want, (TV, Morse Code, Charts).

Instructional Goal:

Scouts will leave camp with a basic understanding how to operate an armature radio, and terminology and skills associated with it.

Monday

Requirements:

1. Radio Safety. Explain the safety precautions for working with radio gear including:
 - a. grounding for direct and alternating current circuits, power outlets, antennas, and lightning.
 - b. Preventing and treating electrical burns
 - c. Preventing lithium-ion battery fires in cellphones and other devices

6. Radio Regulation. Discuss the following with your counselor:
 - a) What the Federal Communications Commission (FCC) does and how it is different from the International Telecommunication Union (ITU).
 - b) How radio station call signs are used in broadcast radio and amateur radio.
 - c) How the phonetic alphabet is used to communicate clearly.

Activity:

Phonetic Alphabet Telephone - Have scouts line up, give the starting scout an easy word and have them say the letters to that word in the phonetic alphabet through the line. (Example: Corn - Charlie, Oscar, Romeo, November)

Rocket Man - (Hangman) Play word or phrase guessing game, where they must use phonetic alphabet to guess letters, if letters are wrong draw parts of a person until they are strapped to a rocket and lose.

Tuesday

Requirements:

2. Radio Fundamentals. Do the following:

a) Do the Following:

- i) Draw a chart of the electromagnetic spectrum covering 300 kilohertz (kHz) to 3,000 Megahertz (MHz).
- ii) Label the MF, HF, VHF, UHF, and microwave portions of the spectrum on your diagram.
- iii) Locate on your chart at least eight radio services, such as AM and FM commercial broadcasting, citizen band (CB), Television, Amateur Radio (at least four amateur radio bands), Public service (police and fire), cellular, Wi-Fi, and Bluetooth.

b) Discuss the following topics with your counselor:

- i) The Definition of radio
- ii) The differences between broadcast radio and two-way radio
- iii) the differences between commercial broadcast radio and hobby radio.

3. How Radio Waves Travel. Do the following:

- a) Sketch a diagram showing how different radio wavelengths can travel locally or around the world.
- b) Explain how the radio stations WWV and WWVH can be used to help determine what you can expect to hear when you listen to a shortwave radio.
- c) Explain the difference between a distant (DX) and a local station.

Activity:

Continue to Draw charts and make a guessing game from the microwave portions, etc.

Wednesday

Requirements:

4. Information by Radio. Discuss the following with your counselor:

- a) How radio waves carry information using continuous wave (CW) Morse Code transmission, amplitude modulation (AM), frequency modulation (FM), single sideband (SSB) transmission, and frequency hopping.
- b) How digitized radio standards including Bluetooth, Wi-Fi, and 5G can offer more reliable data transmission and reception than analog standards.
- c) How the effective range varies for different methods of information encoding.
- d) How the maximum data rate from a Wi-Fi radio system compares to a hard-wired or fiber-optic system.

5. Radio Hardware and Services. Do the following:

- a) Explain the differences between a block diagram and a schematic diagram.
- b) Draw a block diagram for a radio station that shows a microphone, speaker, transceiver, transmitter, receiver, amplifier, feedline, and antenna and discuss the function of these components.
- c) List consumer devices and services that use analog or digital radiocommunications.
- d) Explain how NOAA Weather Radio (NWR) can alert you to danger.
- e) Explain how RFID works and what are some of its uses in everyday life.

Activity:

Cup Telephone Relay Race - Make teams of 3, Give each team a Phrase, they are then told to race another team where one person must make a cup telephone that stretches a certain distance to the other teammates where one hears the phrase and the other writes it down, that person then must run that written phrase to the instructor, first to do so wins.

Thursday

Requirements:

7. Cell Phones. Do the following:

- (a) Explain how cellular systems differ from broadcast and hobby radio.
- (b) Explain what Airplane Mode is and why it is important.
- (c) Explain how cell phones keep the correct time and show locations and elevations.
- (d) Explain the benefits and limitations of cell phones in emergencies.
- (e) Explain wireless charging for cell phones and other devices.

9. Careers. Do ONE of the following.

- (a) Explore careers related to radio. Research one career to learn about the training and education needed, costs, job prospects, salary, job duties, and advancement. With permission of your parent or guardian, your research methods may include an internet or library search, an interview with a professional in the field, or a visit to a location where people in this career work or train. Discuss your findings and career interest with your counselor.
- (b) Explore how you could use radio knowledge and skills to develop a hobby or to serve as a volunteer. If possible, with permission of your parent or guardian, interview a radio hobbyist or volunteer. Research training and licensing needed, expenses, and organizations that promote or support your objectives. Discuss with your counselor what short-term and long-term goals you might have if you pursue this.

Activity:

Visit Headquarters, talk to the office manager about the broadcasting system we use on camp, how it functions, and why it's important.

Friday**Requirements:**

8. Amateur and Professional Radio. Do ONE of the following options:

Option A—Amateur Radio. Do ALL of the following:

- (1) Tell why the FCC has an amateur radio service. Describe activities that amateur radio operators can do on the air, once they have earned an amateur radio license.
- (2) Explain differences between the Technician, General, and Extra Class license requirements and privileges. Explain who administers amateur radio exams.
- (3) Explain at least five Q signals or amateur radio terms.
- (4) Explain how you would make an emergency call on voice or Morsecode.
- (5) Explain the differences between handheld, mobile, and base station transceivers and their uses.

Explain the use of amateur radio repeaters.

- (6) Using proper call signs, Q signals, and abbreviations, carry on a 10-minute real or simulated amateur radio contact using voice, Morse code, or digital mode. Properly log the real or simulated amateur radio contact, and record the signal report.

Note: Licensed amateur radio operators may substitute five QSL cards as evidence of contacts with five amateur radio operators.

8. Option E—Family Radio Service (FRS) & General Mobile Radio Service (GMRS) Walkie Talkies.

Do ALL of the following:

- (1) Explain what the Family Radio Service (FRS) and General Mobile Radio Service (GMRS) are and how they are different from each other, from other commercial two-way radios, and from Citizens Band (CB) & Amateur Radio (HAM).
- (2) Explain each of the following for using a FRS radio or GMRS walkie talkie:
 - (a) Is any type of license needed to use these radios? If so: what kind?
 - (b) what radio frequencies are used and how is information encoded?
 - (c) how much power can be used when transmitting?
 - (d) what type of antenna can be used?
 - (e) what is the effective range and what limits it?
 - (f) what are common everyday uses for these radios?
 - (g) how can these radios be useful in an emergency?

(3) Use the FRS radios or GMRS walkie talkies with family, friends, or Scouts on a hike, at an event, or in a team game. Discuss what you learned with your counselor.

Activity:

Split scouts into teams of 3, have one writing down the message that is going to be sent for the simulated radio contact, have one transmit one way, and the other transmit the other way.