**Scout Name:** _____ **Unit #:** _____ **Date:** _____

# RADIO

## Merit Badge Requirements

**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 the radio?

**3.** Do the following:
- **A.** Draw a chart of the electromagnetic spectrum covering 100 kilohertz (khz) to 1000 megahertz (Mhz).
- **B.** Label the 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, 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 who the FCC and the ITU are.

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

**5.** Explain to your counselor the safety precautions for working with radio gear, particularly direct current 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.) 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 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)** Explain handheld transceivers versus home "base" stations. Explain about mobile amateur radios and amateur radio repeaters.
- **B.** Broadcast radio
  - **1)** Prepare a program schedule for radio station "KBSA" of exactly on-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 fifteen 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, in the early morning, and the other in the early evening. Log the stations properly and locate them geographically on a globe. For several major foreign stations (BBC in Great Britain or HCJB in Ecuador, for example), list several frequency bands used by each.
  - **2)** 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.
  - **3)** 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.

**Scout Name:** _____ **Unit #:** _____ **Date:** _____

## Requirement 1

What is “radio”? _____

What are the differences between broadcast radio and hobby radio? _____

What are the differences between broadcasting and two-way communicating? _____

Explain broadcast radio and amateur radio call signs. _____

Why are “phonetics” used in radio? _____

Supply the correct word used to make spelling more clear.

| | | | | |
|---|---|---|---|---|
| A: *Alfa* | F: | K: | P: | U: |
| B: | G: | L: | Q: | V: |
| C: | H: | M: | R: | W: |
| D: | I: | N: | S: | X: |
| E: | J: | O: | T: | Y: |
| | | Z: | | |

**Scout Name:** _____ **Unit #:** _____ **Date:** _____

## Requirement 2

In the area below, sketch a diagram showing how radio waves travel both 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? _____

## Requirement 3

Use the following area to draw a chart of the electromagnetic spectrum covering 100 kilohertz (khz) to 1000 megahertz (Mhz). For help with this chart, look at the chart example provided in the Radio merit badge pamphlet.

On your chart above,

1) Label the **MF, HF, VHF, UHF**, and **Microwave** portions of the spectrum on your diagram.
2) Locate on your chart at least eight radio services such as AM and FM commercial broadcast, CB, television, amateur radio (at least four ham radio bands), and police.

**Scout Name:** _____ **Unit #:** _____ **Date:** _____

Why are some radio stations called "DX"? _____

Why are some radio stations called "local"? _____

What is the FCC and what does it do? _____

What is the ITU and what does it do? _____

## Requirement 4

*Explain how radio waves carry information. In your explanation include transceiver, transmitter, amplifier, and antenna.*
To satisfy this requirement, provide definitions of the following terms.

***Receiver:*** _____

***Transmitter:*** _____

***Transceiver:*** _____

***Amplifier:*** _____

***Antenna:*** _____

**Scout Name:** _____ **Unit #:** _____ **Date:** _____

## Requirement 5

*Working on radios can be dangerous—not only because they use electricity, but also because radio frequencies themselves can cause burns if you touch an antenna when someone is transmitting. DO NOT WORK ON ELECTRONIC EQUIPMENT YOURSELF until you have learned from someone more experienced.*

Explain the safety precautions for working with radio gear, particularly direct current and RF grounding.

**1.** _____

**2.** _____

**3.** _____

**4.** _____

**5.** _____

**6.** _____

**7.** _____

**8.** _____

**9.** _____

**10.** _____

## Requirement 6

Explain the difference between a block diagram and a schematic diagram. _____

In the area below draw a **block diagram** that includes a transceiver, amplifier, microphone, antenna, and feedline.

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

Use this area to draw eight different schematic symbols.

**Scout Name:** _____ **Unit #:** _____ **Date:** _____

Select three of the eight symbols that you drew, and explain what the represented parts do.

Symbol / Part: _____ What does it do? _____

Symbol / Part: _____ What does it do? _____

Symbol / Part: _____ What does it do? _____

Find three electrical components to match three of the symbols you provided. List the three you found.

_____ _____ _____

## Requirement 7

You can choose from three options for this requirement: ***Amateur Radio, Broadcast Radio***, and ***Shortwave listening***. Select one of the options and complete the requirements listed under that specific option.

### *Option A — Amateur Radio*

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

Carry on a 10-minute real or simulated ham radio contact using voice or Morse code. Use proper call signs, Q signals, and abbreviations. Give a short summary of your conversation and list some of the call signs, Q signals, and abbreviations that you used.

**Scout Name:** _____ **Unit #:** _____ **Date:** _____

Properly log the real (or simulated) ham radio contact, including the signal report.

Date: _____ Frequency: _____ Mode: _____ Power: _____

Station Worked: _____ Report Sent: _____ Report Received: _____

Time On: _____ Time Off: _____ Report Sent: _____

QTH: _____ Name: _____

Notes: _____

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

Signal or Term: _____ Meaning: _____

Signal or Term: _____ Meaning: _____

Signal or Term: _____ Meaning: _____

Signal or Term: _____ Meaning: _____

Signal or Term: _____ Meaning: _____

Explain some of the Technician Class license requirements and privileges. _____

Who gives amateur radio exams? _____

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

Tell why the FCC has an amateur radio service. _____

Explain handheld transceivers versus home "base" stations. _____

Explain about mobile amateur radios and amateur radio repeaters. _____

## Requirement 8

Visit a radio installation approved in advance by your counselor (for example, ham radio station, broadcast station, or public service communications center).

What radio installation did you visit and what kind was it? _____

What types of equipment did you see in use and how was it being used? _____

What types of licenses are required to operate and maintain the equipment that you saw? _____

Describe the purpose of the station. _____

Give a general summary of your visit to the station. _____