



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, on 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.

Requirement 1

Explain what radio is: _____

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: _____

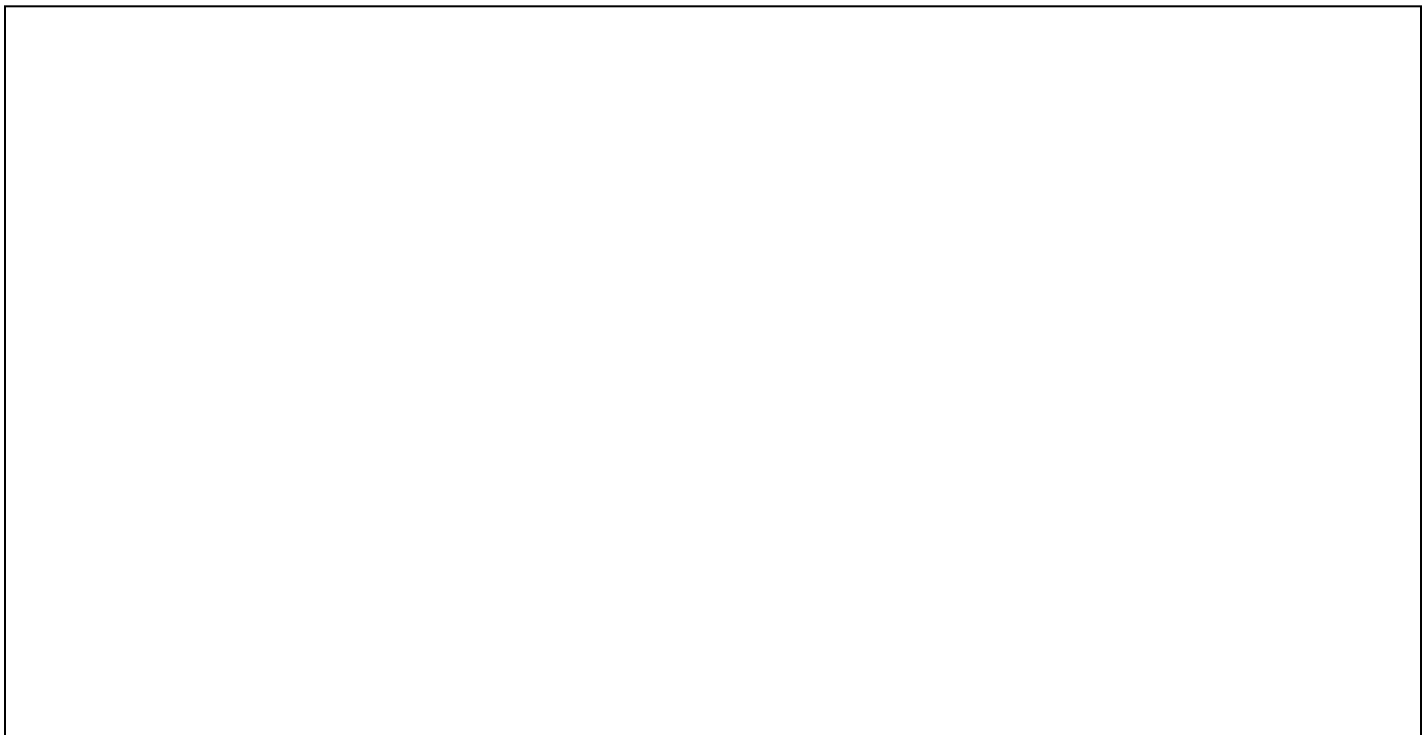
Why are phonetics used? _____

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 - | | |

Requirement 2

Use the area below to sketch a diagram showing how radio waves travel locally and around the world.




Scout Name: _____ Unit #: _____ Date: _____

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.



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

___ 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.

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 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. PLEASE 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: _____

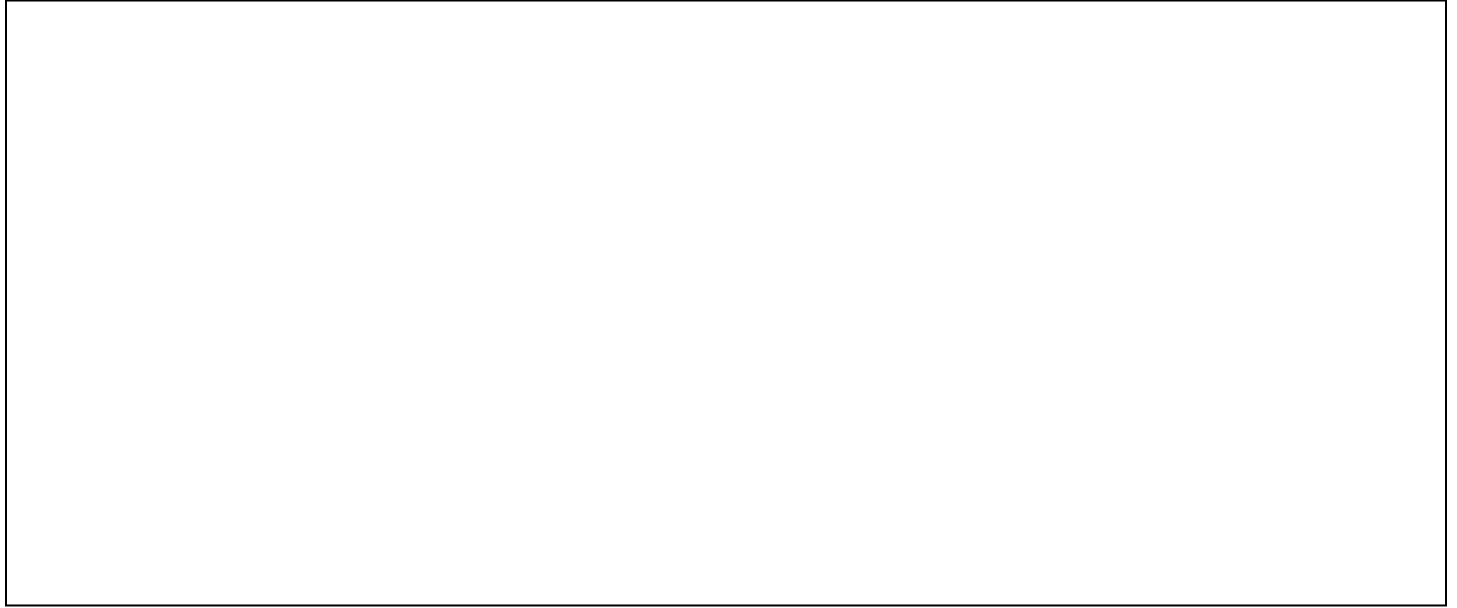
Here are some other safety precautions you will want to be mindful of:

- Electrical shock can hurt or kill you. Make sure the power is disconnected before working.
- Even with the power off, some parts inside the radio can hold a dangerous charge. If you don't know for sure what you are doing, get help.
- Radio Frequency (RF) can burn you badly. Keep antennas out of reach of people and animals.
- RF radiation can be unhealthy. Don't use a radio when it is not completely assembled. The case keeps the RF radiation in.
- Make sure the antennas can't touch any power lines or you could be electrocuted when using the radio.
- Lightning can hit your antenna and travel down your lines to the radio. Make sure your antenna and radio are grounded to a good earth ground.
- Be careful working on towers and roofs so you don't fall or hurt someone on the ground

Requirement 6

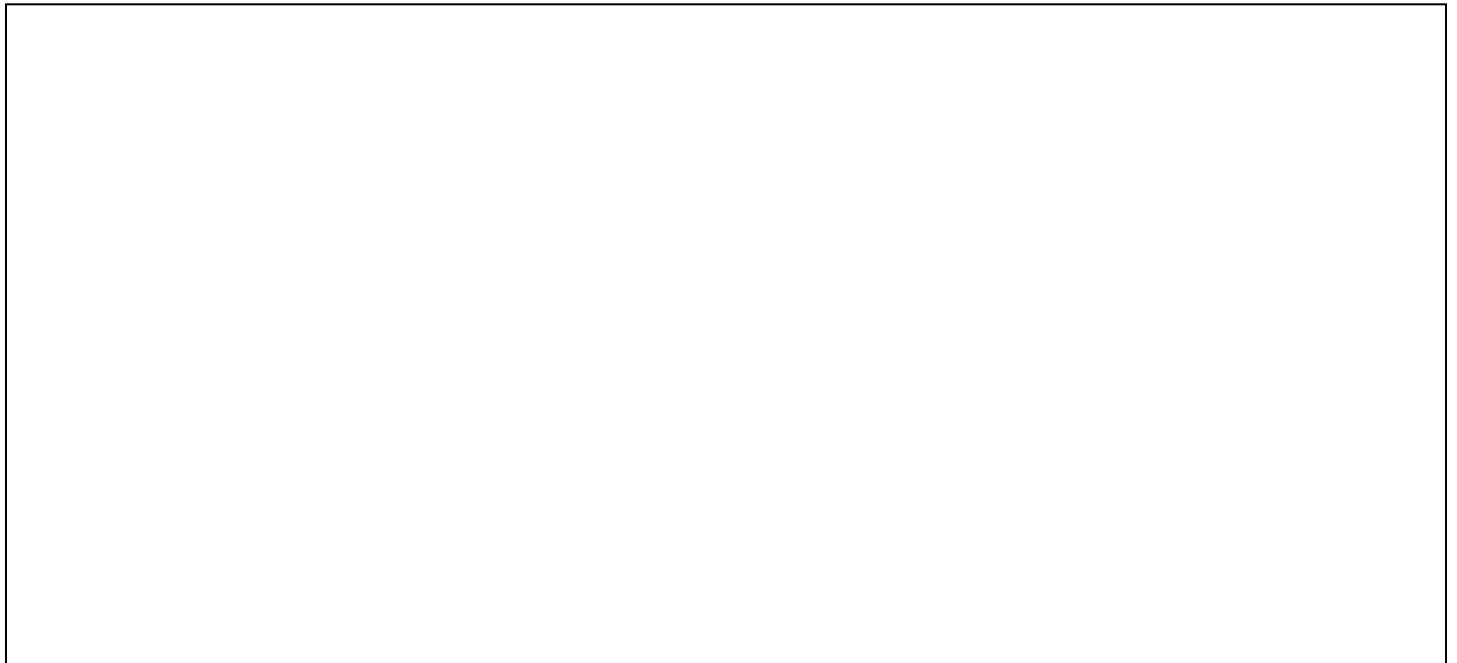
Explain the difference between a block diagram and a schematic diagram: _____

In the area below to 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 schematic symbols.



Scout Name: _____ Unit #: _____ Date: _____

Select three of the ten 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 to three of the symbols you provided. List the three you found:

Requirement 7

You have been given three options to select from for this requirement; Amateur Radio, Broadcast Radio, and Shortwave listening. Select one of the options and complete the requirements listed under that specific option.

If you selected *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 and record the signal report:

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

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

Time Off: _____ Radio Signal Report: _____ 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? _____

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: _____

If you selected **Option B - Broadcast Radio**:

Prepare a program schedule for radio station "KBSA" of exactly one-half hour, including music, news, commercials, and proper station identification. You can use the area below to help you schedule, minute-by-minute, your half-hour radio program or you can create your own layout and attach it to this worksheet. Show your schedule to your counselor before recording it.

To use this graph, let each line represent one minute. Use shading to help identify items lasting longer than one minute. See the example below for ideas.

| Minute | Item Description |
|--------|--|
| 1 | Station Identification - "KBSA" |
| 2 | Commercial - Local Auto Dealer Inventory Blow-Out Sale |
| 3 | |
| 4 | Local Weather - Stormy Jones gives live forecast for this week |
| 5 | Spotlight News Story - Local Boy Scout Troop Participates in Jamboree On The Air |
| 6 | |

KBSA - Program Schedule

| Minute | Item Description & Detail |
|--------|---------------------------|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
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| 30 | |

___ Record your program on audio tape using proper techniques. Turn your recording in to your counselor for review.

Scout Name: _____ Unit #: _____ Date: _____

Listen to and log fifteen broadcast stations. Use the area below to log each station. For five of the stations on the list, determine the transmitting power and general areas served. Use the first five records below to log these stations.

Frequency: _____ **Date:** _____ **Time:** _____ **Station ID:** _____ **Location:** _____

Emission Mode: _____ **Signal Quality:** _____ **Notes:** _____

***Transmitting Power:** _____ **General Areas Served:** _____

Frequency: _____ **Date:** _____ **Time:** _____ **Station ID:** _____ **Location:** _____

Emission Mode: _____ **Signal Quality:** _____ **Notes:** _____

***Transmitting Power:** _____ **General Areas Served:** _____

Frequency: _____ **Date:** _____ **Time:** _____ **Station ID:** _____ **Location:** _____

Emission Mode: _____ **Signal Quality:** _____ **Notes:** _____

***Transmitting Power:** _____ **General Areas Served:** _____

Frequency: _____ **Date:** _____ **Time:** _____ **Station ID:** _____ **Location:** _____

Emission Mode: _____ **Signal Quality:** _____ **Notes:** _____

***Transmitting Power:** _____ **General Areas Served:** _____

Frequency: _____ **Date:** _____ **Time:** _____ **Station ID:** _____ **Location:** _____

Emission Mode: _____ **Signal Quality:** _____ **Notes:** _____

***Transmitting Power:** _____ **General Areas Served:** _____

Frequency: _____ **Date:** _____ **Time:** _____ **Station ID:** _____ **Location:** _____

Emission Mode: _____ **Signal Quality:** _____ **Notes:** _____

Scout Name: _____ Unit #: _____ Date: _____

Frequency: _____ Date: _____ Time: _____ Station ID: _____ Location: _____

Emission Mode: _____ Signal Quality: _____ Notes: _____

Frequency: _____ Date: _____ Time: _____ Station ID: _____ Location: _____

Emission Mode: _____ Signal Quality: _____ Notes: _____

Frequency: _____ Date: _____ Time: _____ Station ID: _____ Location: _____

Emission Mode: _____ Signal Quality: _____ Notes: _____

Frequency: _____ Date: _____ Time: _____ Station ID: _____ Location: _____

Emission Mode: _____ Signal Quality: _____ Notes: _____

Frequency: _____ Date: _____ Time: _____ Station ID: _____ Location: _____

Emission Mode: _____ Signal Quality: _____ Notes: _____

Frequency: _____ Date: _____ Time: _____ Station ID: _____ Location: _____

Emission Mode: _____ Signal Quality: _____ Notes: _____

Frequency: _____ Date: _____ Time: _____ Station ID: _____ Location: _____

Emission Mode: _____ Signal Quality: _____ Notes: _____

Frequency: _____ Date: _____ Time: _____ Station ID: _____ Location: _____

Emission Mode: _____ Signal Quality: _____ Notes: _____

Frequency: _____ Date: _____ Time: _____ Station ID: _____ Location: _____

Emission Mode: _____ Signal Quality: _____ Notes: _____

Scout Name: _____ Unit #: _____ Date: _____

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

Term: _____ Definition: _____

Term: _____ Definition: _____

Term: _____ Definition: _____

Term: _____ Definition: _____

Term: _____ Definition: _____

Term: _____ Definition: _____

Term: _____ Definition: _____

Term: _____ Definition: _____

What are some of the educational requirements for broadcast radio? _____

What are some of the licensing requirements for broadcast radio? _____

Discuss some of the career opportunities in broadcast radio: _____

Scout Name: _____ Unit #: _____ Date: _____

If you selected **Option C - Shortwave Listening**:

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

Early Morning - 4 Hours

Frequency: _____ Date: _____ Time: _____ Station ID: _____ Location: _____

Emission Mode: _____ Signal Quality: _____ Notes: _____

Transmitting Power: _____ General Areas Served: _____

Early Evening - 4 Hours

Frequency: _____ Date: _____ Time: _____ Station ID: _____ Location: _____

Emission Mode: _____ Signal Quality: _____ Notes: _____

Transmitting Power: _____ General Areas Served: _____

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

Foreign Station: _____ Frequency Bands Used: _____

Foreign Station: _____ Frequency Bands Used: _____

Foreign Station: _____ Frequency Bands Used: _____

Foreign Station: _____ Frequency Bands Used: _____

Foreign Station: _____ Frequency Bands Used: _____

Foreign Station: _____ Frequency Bands Used: _____

Foreign Station: _____ Frequency Bands Used: _____

Compare your morning and evening logs, noting the frequencies on which your signal strength from one period to the next. Explain what you found: _____

What is the purpose of shortwave communications? _____

List some of the careers in shortwave communications? _____

Requirement 8

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

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: _____
