



# Radio

## Merit Badge Workbook

This workbook can help you but you still need to read the merit badge pamphlet.

The work space provided for each requirement should be used by the Scout to make notes for discussing the item with his counselor, not for providing the full and complete answers. Each Scout must do each requirement.

No one may add or subtract from the official requirements found in **Boy Scout Requirements** (Pub. 33216 – SKU 34765).

The requirements were last issued or revised in 2009 • This workbook was updated in March 2012.

Scout's Name: \_\_\_\_\_ Unit: \_\_\_\_\_

Counselor's Name: \_\_\_\_\_ Counselor's Phone No.: \_\_\_\_\_

<http://www.USScouts.Org> • <http://www.MeritBadge.Org>

Please submit errors, omissions, comments or suggestions about improving this workbook to: [Workbooks@USScouts.org](mailto:Workbooks@USScouts.org)

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1. Explain what radio is. Then discuss the following: \_\_\_\_\_

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\_\_\_\_\_

a. The differences between broadcast radio and hobby radio. \_\_\_\_\_

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\_\_\_\_\_

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\_\_\_\_\_

b. The differences between broadcasting and two-way communications. \_\_\_\_\_

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\_\_\_\_\_

c. Radio call signs and how they are used in broadcast radio and amateur radio. \_\_\_\_\_

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\_\_\_\_\_

\_\_\_\_\_

d. The phonetic alphabet and how it is used to communicate clearly. \_\_\_\_\_

\_\_\_\_\_

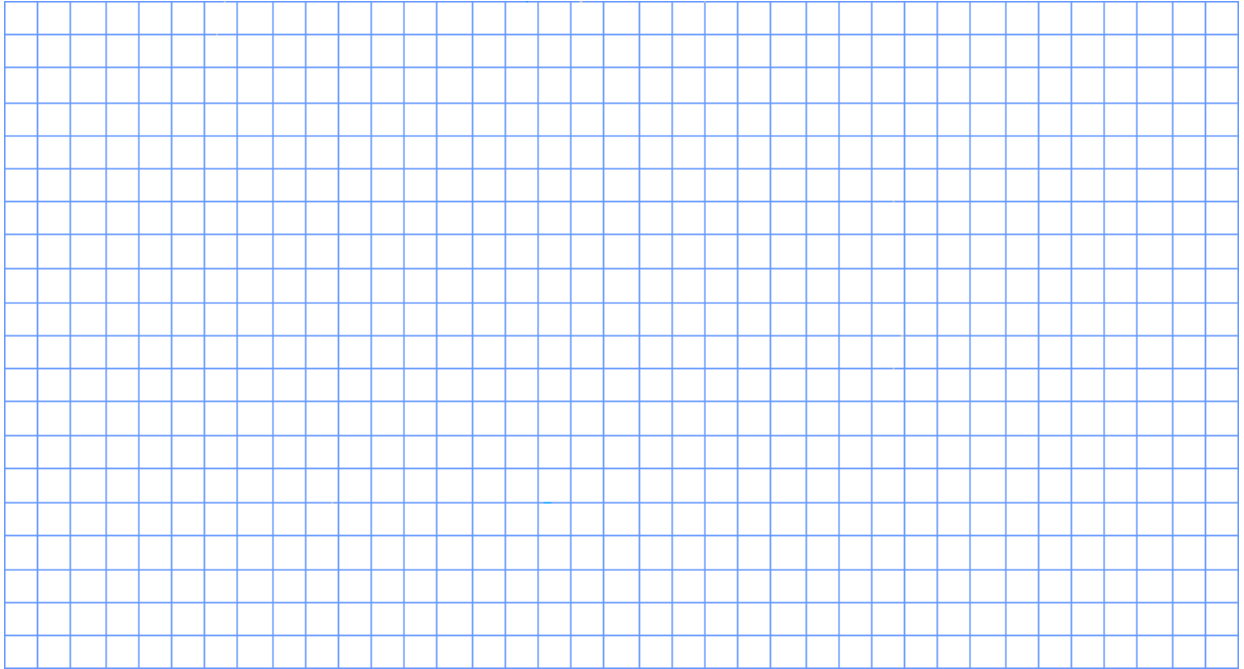
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\_\_\_\_\_

2. Do the following:

a. Sketch a diagram showing how radio waves travel locally and around the world.



Explain how the broadcast radio stations, WWV and WWVH can be used to help determine what you will hear when you listen to a shortwave radio? \_\_\_\_\_

\_\_\_\_\_

b. Explain the difference between a DX and a local station. \_\_\_\_\_

\_\_\_\_\_

Discuss what the Federal Communication Commission (FCC) does and how it is different from the International Telecommunication Union.

FCC: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

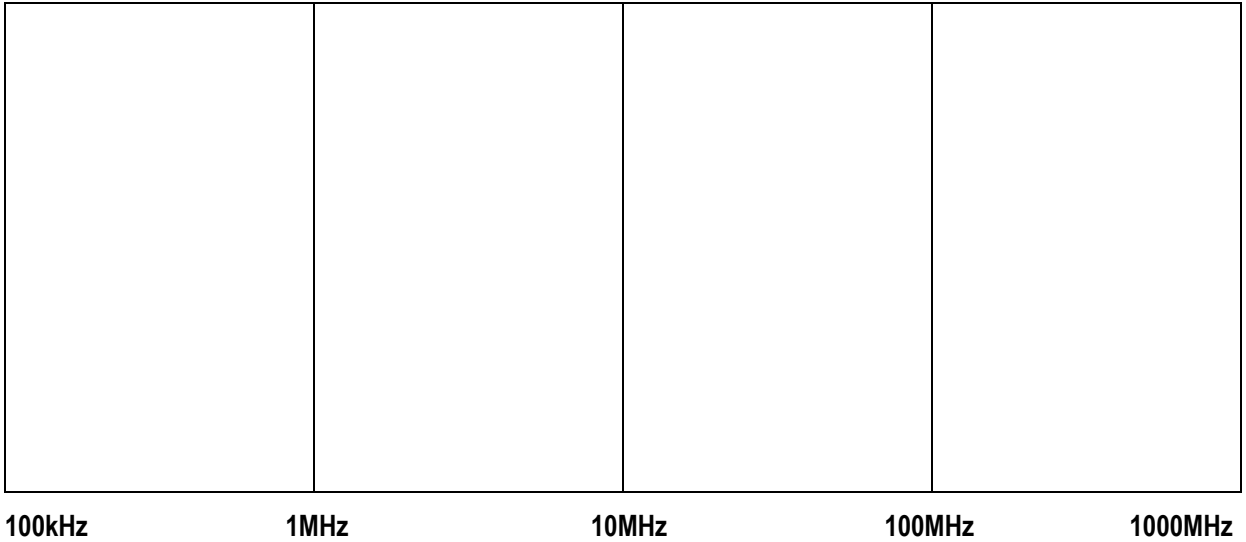
International Telecommunication Union: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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, citizens band (CB), television, amateur radio (at least four amateur radio bands), and public service (police and fire).



4. Explain how radio waves carry information. \_\_\_\_\_

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Include in your explanation: transceiver, transmitter, amplifier, and antenna.

Transceiver: \_\_\_\_\_

Transmitter: \_\_\_\_\_

Amplifier: \_\_\_\_\_

Antenna: \_\_\_\_\_

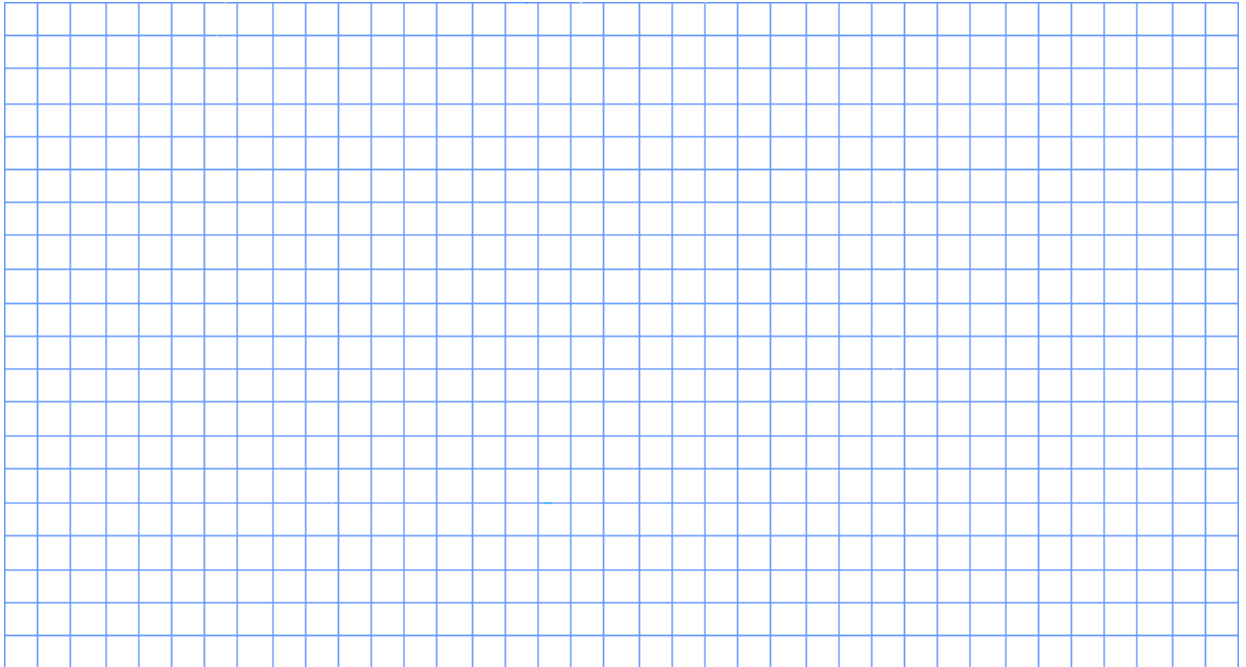
5. Do the following:

- a. Explain the differences between a block diagram and a schematic diagram.

Block diagram: \_\_\_\_\_

Schematic diagram: \_\_\_\_\_

- b. Draw a block diagram for a radio station that includes a transceiver, amplifier, microphone, antenna, and feed line.



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

Open circuit: \_\_\_\_\_

\_\_\_\_\_

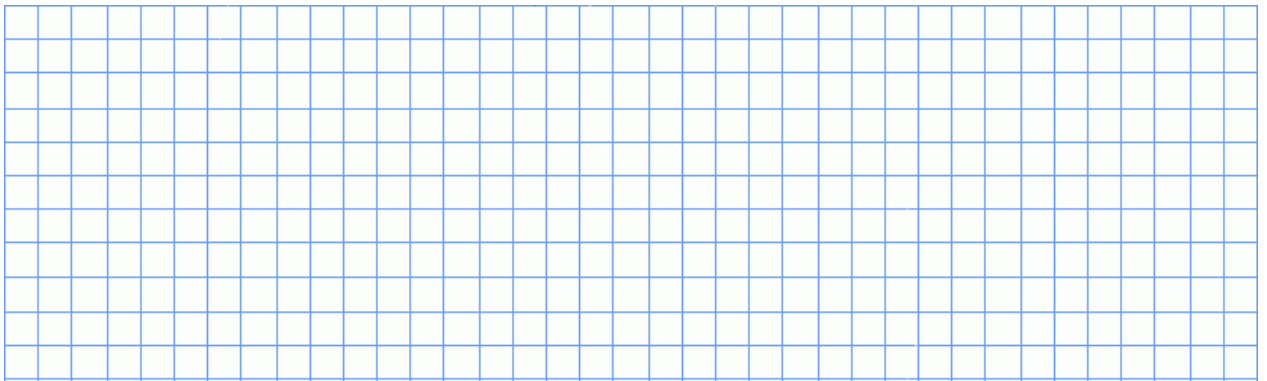
Closed circuit: \_\_\_\_\_

\_\_\_\_\_

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.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- 6. Explain the safety precautions for working with radio gear, including the concept of grounding for direct current circuits, power outlets, and antenna systems.

General safety precautions: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Grounding for direct current circuits: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Grounding for Power outlets: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Grounding for antenna systems: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

- 7.  Visit a radio installation (an amateur radio station, broadcast station, or public communications center, for example) approved in advance by your counselor.

Discuss what types of equipment you saw in use, how it was used, what types of licenses are required to operate and maintain the equipment, and the purpose of the station.

Equipment: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Licenses: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Purpose: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_

8. Find out about three career opportunities in radio.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Pick one and find out the education, training, and experience required for this profession. \_\_\_\_\_

Career: \_\_\_\_\_

Education: \_\_\_\_\_

Training: \_\_\_\_\_  
\_\_\_\_\_

Experience: \_\_\_\_\_

Discuss this with your counselor, and explain why this profession might interest you. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

a. **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.

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_
- 4. \_\_\_\_\_
- 5. \_\_\_\_\_

4. Explain some of the differences between the Technician, General, and Extra Class license requirements and privileges.

Technician: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

General: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Extra Class: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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. \_\_\_\_\_

Transceivers: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Repeaters: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



3. Explain at least eight terms used in commercial broadcasting, such as segue, cut, fade, continuity, remote, Emergency Alert System, network, cue, dead air, PSA, and playlist.

Segue: \_\_\_\_\_  
\_\_\_\_\_

Cut: \_\_\_\_\_  
\_\_\_\_\_

Fade: \_\_\_\_\_  
\_\_\_\_\_

Continuity: \_\_\_\_\_  
\_\_\_\_\_

Remote: \_\_\_\_\_  
\_\_\_\_\_

Emergency Alert System: \_\_\_\_\_  
\_\_\_\_\_

Network: \_\_\_\_\_  
\_\_\_\_\_

Cue: \_\_\_\_\_  
\_\_\_\_\_

Dead Air: \_\_\_\_\_  
\_\_\_\_\_

PSA: \_\_\_\_\_  
\_\_\_\_\_

Playlist: \_\_\_\_\_  
\_\_\_\_\_

c. **SHORTWAVE LISTENING**

1. Listen across several shortwave bands for four one-hour periods - at least one period during daylight hours and at least one period at night. Log the stations properly and locate them geographically on a globe.

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

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3. Compare your daytime and nighttime logs; note the frequencies on which your selected stations were loudest during each session. \_\_\_\_\_

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Explain the differences in the signal strength from one period to the next. \_\_\_\_\_

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**Requirement resources can be found here:**  
[http://www.meritbadge.org/wiki/index.php/Radio#Requirement\\_resources](http://www.meritbadge.org/wiki/index.php/Radio#Requirement_resources)

## Important excerpts from the [‘Guide To Advancement’](#), No. 33088:

Effective January 1, 2012, the *‘Guide to Advancement’* (which replaced the publication *‘Advancement Committee Policies and Procedures’*) is now the *official* Boy Scouts of America source on advancement policies and procedures.

- **[ Inside front cover, and 5.0.1.4 ] — Unauthorized Changes to Advancement Program**  
***No council, committee, district, unit, or individual has the authority to add to, or subtract from, advancement requirements.***  
(There are limited exceptions relating only to youth members with disabilities. For details see section 10, “Advancement for Members With Special Needs”.)
- **[ Inside front cover, and 7.0.1.1 ] — The [‘Guide to Safe Scouting’](#) Applies**  
Policies and procedures outlined in the *‘Guide to Safe Scouting’*, No. 34416, apply to all BSA activities, including those related to advancement and Eagle Scout service projects. [Note: Always reference the online version, which is updated quarterly.]
- **[ 7.0.3.1 ] — The Buddy System and Certifying Completion**  
Youth members must not meet one-on-one with adults. Sessions with counselors must take place where others can view the interaction, or the Scout must have a buddy: a friend, parent, guardian, brother, sister, or other relative—or better yet, another Scout working on the same badge—along with him attending the session. When the Scout meets with the counselor, he should bring any required projects. If these cannot be transported, he should present evidence, such as photographs or adult certification. His unit leader, for example, might state that a satisfactory bridge or tower has been built for the Pioneering merit badge, or that meals were prepared for Cooking. If there are questions that requirements were met, a counselor may confirm with adults involved. Once satisfied, the counselor signs the blue card using the date upon which the Scout completed the requirements, or in the case of partials, initials the individual requirements passed.
- **[ 7.0.3.2 ] — Group Instruction**  
It is acceptable—and sometimes desirable—for merit badges to be taught in group settings. This often occurs at camp and merit badge midways or similar events. Interactive group discussions can support learning. The method can also be attractive to “guest experts” assisting registered and approved counselors. Slide shows, skits, demonstrations, panels, and various other techniques can also be employed, but as any teacher can attest, not everyone will learn all the material.  
  
There must be attention to each individual’s projects and his fulfillment of *all* requirements. We must know that every Scout—actually and *personally*—completed them. If, for example, a requirement uses words like “show,” “demonstrate,” or “discuss,” then every Scout must do that. It is unacceptable to award badges on the basis of sitting in classrooms *watching* demonstrations, or remaining silent during discussions. Because of the importance of individual attention in the merit badge plan, group instruction should be limited to those scenarios where the benefits are compelling.
- **[ 7.0.3.3 ] — Partial Completions**  
Scouts need not pass all requirements with one counselor. The Application for Merit Badge has a place to record what has been finished—a “partial.” In the center section on the reverse of the blue card, the counselor initials for each requirement passed. In the case of a partial completion, he or she does not retain the counselor’s portion of the card. A subsequent counselor may choose not to accept partial work, but this should be rare. A Scout, if he believes he is being treated unfairly, may work with his Scoutmaster to find another counselor. An example for the use of a signed partial would be to take it to camp as proof of prerequisites. Partials have no expiration except the 18th birthday.