Radio Merit Badge History

1922 Wireless Merit Badge

Requirements

To obtain a merit badge for Wireless, a scout must:

1. Be able to receive and send correctly not less than ten words a minute.
2. Know the correct form for sending a message.
3. Be able to tell in own words the principal laws regarding radio communication.
4. Know at least ten of the radiogram abbreviations. (Q signals)
5. (a) Be able to name two types of detectors and explain how they work. (b) Name five minerals used in detectors in the order of their sensitiveness.
6. Draw a diagram of a simple transmitting set, showing how the following instruments are connected: dynamo or storage battery (source of power), transformer, condenser, spark, gap, helix, key. Explain the function of each.
7. Draw a simple diagram showing how to connect the following instruments; tuning coil or loose coupler, detector, fixed or variable condensers, phones and ground. Tell the use of the above apparatus.
8. Draw a diagram of three different types of aerials and tell their advantages or faults.
9. (a) Know how properly ground a radio set and know what precautions to take during a thunder shower. (b) Demonstrate how to rescue a person in contact with a live wire, and have a knowledge of the method of resuscitation of a person insensible from shock.
10. Write a brief essay on development of wireless telegraphy.

1927 Radio Merit Badge

Requirements:

To obtain a merit badge for RADIO, a Scout must:

1. Receive and send correctly not less than 10 words per minute.
2. (a) Explain how to get in communication with another station. (b) Explain how to send a message in proper form.
3. Tell in own words the principal laws and regulations regarding radio communication.
4. Demonstrate at least ten of the radiogram abbreviations (Q signals).
5. (a) Explain the purpose of a detector and adjust a crystal detector, using a buzzer to test its adjustment. (b) Name two minerals used in crystal detectors.
6. Draw from memory, using correct symbols, a hook---up diagram of a complete vacuum tube transmitting apparatus, including generator or batteries, vacuum tube, condenser, tuning helix, key, antenna, ground, and the necessary protective devices. Describe each part of the apparatus and explain

its function. Explain how to use a wave meter in connection with this transmitting apparatus to secure the proper wave length of radiation.

7. Draw from memory, using correct symbols, a hook---up diagram of a complete receiving apparatus using a vacuum tube detector, including antenna, two circuit tuner, detector, fixed and variable condensers, resistors, batteries, phones and ground. Describe each part of the apparatus and explain its functions.
8. Describe a vacuum tube and explain its three principal uses, namely, as detector, amplifier, and oscillator.
9. Explain the difference between continuous wave, modulated or interrupted continuous wave, and spark signals. Explain how each kind of signal is produced and how each kind is received.
10. Construct with your own hands a practical working receiving set, and demonstrate its operation for receiving signals from a station 25 miles or more away.
11. Explain how to install an antenna, how to connect it to the sending and receiving set, how to ground it properly and how to protect it against lightning. State the Underwiter's laws for safeguarding radio apparatus.

Note. – The holding of a first grade amateur license and a regular or special amateur license will exempt the holder from examination on counts 1, 2, 3, and 4. Both the operator's license and the station license must be presented before the local Court of Honor and shown to be in force at the time the badge is awarded.

1930 Radio Merit Badge

Requirements

To obtain a Merit Badge for Radio, a Scout must:

1. Receive and send correctly a message of not less than five words per minute.
2. (a) explain how and what he would transmit in order to establish communication with another station. (b) Make up a sample radiogram including the body of the message.
3. Tell what the United States Radio Laws state about wave length, power, operating hours and kinds of apparatus for amateur radio stations; whether a license is necessary for all such stations, whether the operator needs a license; how one knows what calls to use at an amateur station.
4. Write down 10 of the most important "Q" signals and give the meaning of each.
5. Draw from memory, using correct symbols, the circuit diagram for a low power, short wave transmitting set. Describe each part of the apparatus and explain briefly its purpose. Explain how to use a wave meter in connection with this transmitting apparatus to obtain radiation on the proper wave length.
6. Draw from memory, using correct symbols, a wiring diagram of a complete receiving set, using a vacuum tube detector, and one stage audio frequency

amplifier showing all essential apparatus and including antenna and telephones. Describe each part of the apparatus and explain briefly its purpose.

7. Explain the difference between continuous waves and modulate or interrupted continuous waves.
8. Construct with his own hands a practical working receiving set and demonstrate its operations for receiving signals from a station 25 or more miles away.
9. Submit satisfactory evidence that he has located and repaired a fault in a receiving set.
10. Explain how to install an antenna, how to connect it for use on a sending and receiving set, how to ground it properly and how to protect it against lightning and power wires.

Note. – The holding of a first grade amateur license and a regular or special amateur license will exempt the holder from examination on counts 1, 2, 3, and 4. Both the operator's license and the station license must be presented before the local Court of Honor and shown to be in force at the time the badge is awarded.

1940 Radio Merit Badge

Requirements

To obtain a Merit Badge for Radio, a Scout must:

1. Receive and send correctly a straight text at not less than five words (25 letters) per minute.
2. Know what, if any, licenses are required by Federal Law for the operation of: (a) a receiving station: (b) a transmitting station.
3. Know at least five of the most frequently used "Q" signals. Explain the meaning of each.
4. (a) Draw a wiring diagram of a complete receiving set for use on short wave with vacuum tube detector and one stage amplifier. Use correct symbols and show all essential apparatus, including antenna and telephones. Describe each detail of apparatus and explain briefly the use of each. (b) Using the above diagram, explain how this receiving set could be made to operate also as a miniature transmitter.
5. Construct a working receiving set and demonstrate its operations by receiving signals from at least ten different stations.
6. Explain how to install an antenna for use in receiving equipment and how to ground it properly and protect it against lightning and power wires.

Note: The holding of an amateur operator's license and a regular amateur station license will exempt the holder from examination on all requirements above except 4. (a) and (b) and 5. Such license must be in force at the time the Badge is awarded.

1965 Radio Merit Badge

Requirements

1.Learn the safety precautions necessary in the building, repairing and testing of radio equipment, and in the erection of transmitting and receiving antennas.

2. Do the following:

(a) Demonstrate correct soldering techniques suitable for the wiring of radio equipment.

(b) Show how to avoid heat damage to transistors and other small parts during soldering.

(c) Explain why rosin---core solder is used rather than acid---core solder in the building of equipment.

3. Do the following:

(a) Draw 10 schematic symbols commonly used in diagrams of radio receivers, radio transmitters, or audio---frequency equipment.

(b) Explain in general terms what each of the parts represented by schematic symbols does.

4. Using the knowledge gained from the first three questions, build from individually purchased parts or fram a kit at lease one piece of radio equipment using a vacuum tube, transistor, or diode (including selenium, germanium, or silicon rectifiers). Demonstrate the equipment for the counselor to show that the wiring is safe, correctly soldered, and reasonably neat. (Acceptable equipment includes a portable radio, short---wave receiver, amateur transmitter, hi---fi amplifier, AC---DC multimeter, vacuum tube voltmeter, FM tuner, short---wave converter, tube or transistor code--- practice set, and similar apparatus. Because they are usually too simple, crystal radios, buzzer---type code sets, and continuity testers would not be considered acceptable.)

5. Demonstrate your ability to send and receive the Morse code by ear for at least 1 minute at a rate of at least five words (25 letters) per minute without any errors. (Holders of unexpired amateur licenses of any class, issued by the Federal Communications Commission, are exempt from this requirement.)

6. Do the following:

(a) Name and explain five of the common "Q" signals and five common abbreviations used by radio operators.

(b) Explain how amateur radio operators prepare to handle emergency messages during floods, hurricanes, forest fires, blizzards, or similar disasters.

7. Investigate job opportunities in radio. Discuss these with your counselor. Tell what job, if any, would interest you and what training is available in preparing for it.

1982-1983 Radio Merit Badge

Requirements

1. Learn the safety precautions for working with radio gear.
2. Do the following:
    (a) Show correct way to solder radio wiring.
    (b) Show how to stop heat damage during soldering.
    (c) Explain why rosin-core solder is used.
3. Do the following:
    (a) Draw 10 schematic symbols often used in radio diagrams.
    (b) Explain what each of the parts represented by the symbols does.
4. Build from parts or from a kit at least one piece of radio gear using a vacuum tube, transistor, or diode. (include selenium, germanium, or silicon rectifiers.) Show that the wiring is safe, correctly soldered, and neat. (Crystal radios, buzzer---type code sets, and continuity testers are not acceptable.)
5. Show you can send and receive the Morse code by ear for at least 1 minute at a rate of at least five words (25 letters) per minute without any mistakes. (Holders of unexpired amateur licenses of any class are exempt.)
6. Do the following:

(a) Name and explain five "Q" signals. Give five abbreviations used by radio operators.

(b) Explain how amateur radio operators prepare to handle emergency messages during disasters.

7. Check out jobs in radio. Talk about these with your counselor. Tell what job might interest you. Tell what training you need to prepare for it.

In 1984 receiving Morse Code at 5 words per minute was dropped and three options were established: amateur radio, broadcast radio, and shortwave listening.

1984 – 1985 Radio Merit Badge

Requirements

1. Explain what radio is and how radio waves carry information. Include in your explanation: frequency, wavelength, transmitter, microphone, receiver, antenna, amplifier, oscillator, modulation, detection, mixer, and heterodyne.
2. Sketch a diagram showing how radio waves travel locally and around the world and how the sun affects radio wave propagation.
3. Do the following:

(a) Draw a chart of the electromagnetic spectrum covering 100 kHz to 1000 MHz.

(b) Label the LF, MF, HF, VHF, UHF, SHF, and microwave sections.

(c) Locate on your chart at least eight services such as AM and FM commercial broadcast, CB, television, amateur radio (at least four bands), and police.

(d) Discuss why the frequencies used are well suited to the services you've marked and why the ITU and FCC regulate the use of the radio spectrum.

4. Learn the safety precautions for working with radio gear, particularly DC and rf grounding.

5. Build from parts or a kit at least one piece of radio equipment using transistors, diodes, or vacuum tubes (crystal sets, buzzer---type code sets, and continuity testers are not acceptable). Do the following:

(a) Demonstrate correct soldering and unsoldering techniques on radio equipment and how to prevent heat damage while soldering.

(b) Draw 10 schematic symbols often used in radio diagrams and explain what each of the represented parts do.

(c) Explain how basic test equipment (ohmmeter, voltmeter, ammeter, and oscilloscope) could be used to test your circuit.

6. Do 0NE of the following (a, b, or c):

(a) Amateur radio

(1) Carry on a real or simulated radio contact of at least 10 minutes using Morse code from memory; use proper prosigns, Q signals, and abbreviations. (Licensed ham operators may substitute five OSL cards as evidence of cw contacts with amateurs in at least three different call districts.)

(2) Listen to and properly log at least 10 ham contacts; send signal reports.

(3) Explain at least eight Q signals or terms you hear while listening.

(4) Discuss Amateur Novice Class license requirements and privileges.

(b) Broadcast radio

(1) Prepare a program schedule for radio station "KBSA" of exactly one---half hour, including music, news, commercials, and proper station identification. Record your program on audiotape using proper techniques.

(2) Listen to and properly log 15 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 4---hour periods, one 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 or Radio Moscow, for example) list several frequency bands used by each.
(3) Explain the differences in signal strength from one period to the next.
(4) Discuss the purpose of and careers in shortwave communications.

7. Visit a radio installation approved in advance by your counselor (ham shack, broadcast station, or public service communication center, for example). Discuss what types of equipment you saw in use, how it was used, what types of license are needed to operate and maintain the equipment, and the purpose of the station.

2008 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 a 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 OR b OR c):
    a. Amateur radio
        i. Describe some of the activities that amateur radio operators can do on the air, once they have earned an amateur radio license.
        ii. 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.
        iii. Explain at least five Q signals or amateur radio terms you hear while listening.
        iv. Explain some of the Technician Class license requirements and privileges. Explain who gives amateur radio exams.
        v. Explain how you would make an emergency call on voice or Morse code. Tell why the FCC has an amateur radio service.
        vi. Explain handheld transceivers versus home "base" stations. Explain about mobile amateur radios and amateur radio repeaters.
    b. Broadcast radio
        i. Prepare a program schedule for radio station "KBSA" of exactly one---half hour, including music, news, commercials, and proper station identification. Record your program on audio tape using proper techniques.
        ii. Listen to and properly log 15 broadcast stations; determine for five of these their transmitting power and general areas served.
        iii. Explain at least eight terms used in commercial broadcasting such as segue, cut, and fade.
        iv. Discuss the educational and licensing requirements and career opportunities in broadcast radio.
    c. Shortwave listening
        i. Listen across several shortwave bands for two four---hour periods, one in the early morning, the other in the early evening. Log the stations properly and locate them geographically on a globe.
        ii. For several major foreign stations (BBC in Great Britain or HCJB in Ecuador, for example), list several frequency bands used by each.
        iii. 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.

iv. Discuss the purpose of and careers in shortwave communications.
v. 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 are required to operate and maintain the equipment, and the purpose of the station.

In 2017 Amateur Radio Direction Finding was added as an option. Several requirements were adjusted and updated.

2017 Radio Merit Badge

1. Explain what radio is. Then discuss the following:
   (a) The differences between broadcast radio and hobby radio
   (b) The differences between broadcasting and two-way communications
   (c) Radio station call signs and how they are used in broadcast radio and amateur radio
   (d) The phonetic alphabet and how it is used to communicate clearly
2. Do the following:
   (a) Sketch a diagram showing how radio waves travel locally and 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.
   (d) Discuss what the Federal Communications Commission (FCC) does and how
   it is different from the International Telecommunication Union.
3. Do the following:
   (a) Draw a chart of the electromagnetic spectrum covering 300 kilohertz (kHz)
   to 3000 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. Include in your explanation: transceiver, transmitter, receiver, amplifier, and antenna.
5. 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 includes a transceiver, amplifier, microphone, antenna, and feed line.
   (c) Discuss how information is sent when using amplitude modulation (AM),

frequency modulation (FM), continuous wave (CW) Morse Code transmission, single sideband (SSB) transmission, and digital transmission.

(d) Explain how NOAA Weather Radio (NWR) can alert you to danger.

(e) Explain how cellular telephones work. Identify their benefits and limitations
in an emergency.

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

7. Visit a radio installation (an amateur radio station, broadcast station, or public service 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.

8. Find out about three career opportunities in radio. Pick one and find out the education, training, and experience required for this profession. Discuss this with your counselor, and explain why this profession might interest you.

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

(a) Amateur Radio

(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 Morse code.

(5) Explain the differences between handheld transceivers and home "base" transceivers. Explain the uses of mobile amateur radio transceivers and 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. (Licensed amateur radio operators may substitute five QSL cards as evidence of contacts with five amateur radio operators. Properly log the real or simulated ham radio contact, and record the signal report.)

(b) Radio Broadcasting

(1) Discuss with your counselor FCC broadcast regulations. Include power
levels, frequencies, and the regulations for low-power stations.

(2) Prepare a program schedule for radio station "KBSA" of exactly one half hour, including music, news, commercials, and proper station identification. Record your program on audiotape or in a digital audio format, using proper techniques.

(3) Listen to and properly log 15 broadcast stations. Determine the program format and target audience for five of these stations.

(4) Explain to your counselor at least eight terms used in commercial broadcasting, such as segue, cut, fade, continuity, remote, Emergency Alert System, network, cue, dead air, PSA, and play list.

(5) Discuss with your counselor alternative radio platforms such as internet streaming, satellite radio, and podcasts.

(c) Shortwave and Medium-Wave 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 map, globe, or web-based mapping service.

(2) Listen to several medium-wave stations for two one-hour periods, one period during daylight hours and one period at night. Log the stations properly and locate them on a map, globe, or web-based mapping service.

(3) Compare your daytime and nighttime shortwave logs; note the frequencies on which your selected stations were loudest during each session. Explain differences in the signal strength from one period to the next.

(4) Compare your medium-wave broadcast station logs and explain why some distant stations are heard at your location only during the night.

(5) Demonstrate listening to a radio broadcast using a smartphone/cell phone. Include international broadcasts in your demonstration.

(d) Amateur Radio Direction Finding

(1) Describe amateur radio direction finding and explain why direction finding is important as both an activity and in competition.

(2) Describe what frequencies and equipment are used for ARDF or fox hunting.

(3) Build a simple directional antenna for either of the two frequencies used in ARDF.

(4) Participate in a simple fox hunt using your antenna along with a provided receiver.

(5) Using your receiver, show on a map how you located the “fox.”