Scouting America

Radio Merit Badge Workbook

SCOUTMASTER BUCKY

Scouts participating in a Scoutmaster Bucky merit badge opportunity, whether online or in person, should consider using the Radio merit badge pamphlet for discovery and knowledge, along with the class preparation pages for clarifications, insights, and expectations.

https://scoutmasterbucky.com/merit-badges/radio/radio-pamphlet.pdf

https://scoutmasterbucky.com/merit-badges/radio/radio-cpp.pdf

REQUIREMENT 7 REQUIRES COUNSELOR APPROVAL.

REQUIREMENT 1:	Explain what radio is.

Notes:

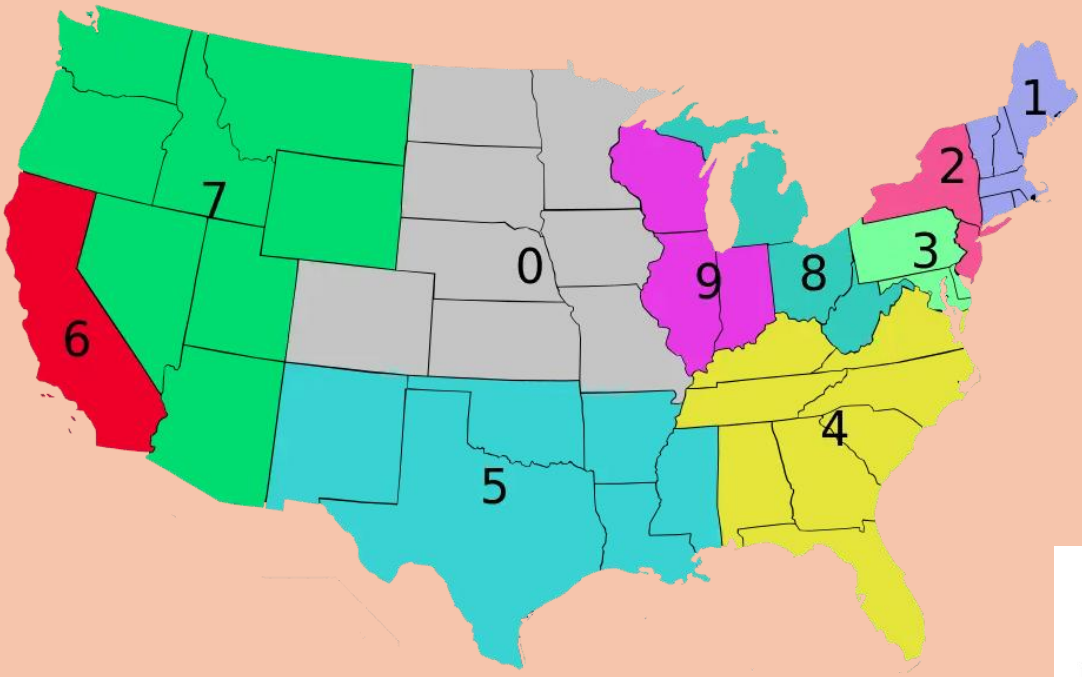
REQUIREMENT 1a:	Discuss the differences between broadcast radio and hobby radio.

Notes:

REQUIREMENT 1b:	Discuss the differences between broadcasting and two-way communications.

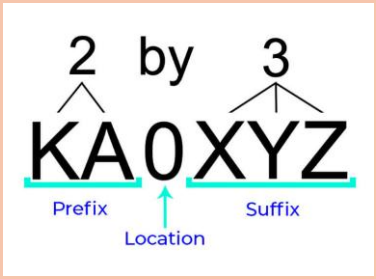
Notes:

REQUIREMENT 1c: Discuss radio station call signs and how they are used in broadcast radio and amateur radio.



A ham radio call sign is a unique identifier that is assigned to an amateur radio operator. It is used to identify the operator and their location, and is typically a combination of letters and numbers.

Call signs begin with K, followed by a second letter and a number that indicates what call sign area you're in. This is called the call sign prefix. After the prefix is a single number. The single number indicates the area.



The area code is followed by three letters called the suffix. They are assigned sequentially from the pool. These call signs are called "2-by-3," or "2×3," call signs because two letters precede the number, and three letters follow the number. As shown in Figure x below, KA0XYZ is an example of a 2-by-3 callsign

Notes:

REQUIREMENT 1d: Discus the phonetic alphabet and how it is used to communicate clearly.

Poor atmospheric conditions with HF communications, weak signal strength, interference from other stations or emitters, and other environmental factors can degrade the quality of received audio. Even in good conditions many words and alphabetic characters sound similar. The letters B, C, D, E, G, P, T, V, and Z offer salient examples of similar sounding letters whose differentiation depends strictly upon the beginning phoneme that is commonly comprised of quite high audio frequency components that may not clearly survive the modulation-demodulation process.

Using a standard phonetic alphabet works very well to improve communications. A phonetic alphabet consists of a word to represent each letter of the alphabet. For instance, 'A' is represented by the word 'Alpha.' Since words contain more phonemes than letter names, and frequently even multiple syllables, there is redundant audio information transmitted that helps the receiving operator more easily identify or distinguish the letter.

The International Telecommunications Union (ITU) adopted a standard phonetic alphabet in 1959 based upon the preceding phonetic alphabet of the International Civil Aviation Organization (ICAO). These standard phonetics changed and evolved into the adopted standard over the course of a few years following World War II, ensuring their acceptability and uniqueness among international languages.

It is a good idea with international contacts to utilize the ITU standard phonetics rather than alternative phonetics. The international standard phonetic terms are recognizable as such around the world, and they are less likely to be confused for other words or meanings than non-standard phonetics.

The standard ITU phonetic alphabet is depicted here. Particularly in noisy single sideband (SSB) phone mode conditions, operators will use phonetics regularly for station identification, for relating operator name, and location

A – Alpha	J – Juliet	S – Sierra
B – Bravo	K – Kilo	T – Tango
C – Charlie	L – Lima	U – Uniform
D – Delta	M – Mike	V – Victor
E – Echo	N – November	W – Whiskey
F – Foxtrot	O – Oscar	X – X-Ray
G – Golf	P – Papa	Y – Yankee
H – Hotel	Q – Quebec	Z – Zulu
I – India	R – Romeo	

The International Telecommunications Union
Standard Phonetic Alphabet

Notes:

REQUIREMENT 2a:	Sketch a diagram showing how radio waves travel locally and around the world.

Notes:

REQUIREMENT 2b:	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.

Notes:

REQUIREMENT 2c:	Explain the difference between a distant (DX) and a local station.

Notes:

REQUIREMENT 2d:	Discuss what the Federal Communications Commission (FCC) does and how it is different from the International Telecommunication Union.

Notes:

REQUIREMENT 3a:	Draw a chart of the electromagnetic spectrum covering 300 kilohertz (kHz) to 3,000 Megahertz (MHz).
REQUIREMENT 3b:	Label the MF, HF, VHF, UHF, and microwave portions of the spectrum on your diagram.
REQUIREMENT 3c:	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).

Notes:

REQUIREMENT 4:	Explain how radio waves carry information.
Notes:	

REQUIREMENT 4:	Explain: transceiver, transmitter, receiver, amplifier, and antenna.
Transceiver:	
Transmitter:	
Receiver:	
Amplifier:	
Antenna:	

REQUIREMENT 5a:	Explain the differences between a block diagram and a schematic diagram.
Notes:	

REQUIREMENT 5b:	Draw a block diagram for a radio station that includes a transceiver, amplifier, microphone, antenna, and feed line.
Notes:	

REQUIREMENT 5c:	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.

Amplitude Modulation (AM):

Frequency Modulation (FM):

Continuous Wave (CW) Morse Code Transmission:

Single Sideband (SSB) Transmission:

Digital Transmission:

REQUIREMENT 5d:	Explain how NOAA Weather Radio (NWR) can alert you to danger.
Notes:	

REQUIREMENT 5e:	Explain how cellular telephones work.
Notes:	

REQUIREMENT 5e:	Identify the benefits and limitations in an emergency for cellular telephones.
Notes:	

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

Notes:

Grounding for Direct Current Circuits:

Power Outlets:

Antenna Systems:

REQUIREMENT 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.

Radio Installation and Location to Visit:

COUNSELOR APPROVAL: IS REQUIRED.

Counselor's Name _____ Phone or Email _____

Counselor's Signature _____ Date _____ ☐ *approved*

Equipment you saw in use:

Type of licenses required to operate and maintain:

Purpose of the station:

REQUIREMENT 8:	Find out about three career opportunities in radio.
Career Opportunity #1:	
Career Opportunity #2:	
Career Opportunity #3:	
REQUIREMENT 8:	Pick one and find out the education, training, and experience required for this profession. Discuss this with your counselor.
Selected Career Opportunity:	
Education Requirements:	
Training Requirements:	
Experience Requirements:	
REQUIREMENT 8:	Explain why this profession might interest you.
Notes:	

COMPLETE ONE OF THE FOLLOWING OPTIONS FOR REQUIREMENT 9

PLEASE NOTE THAT EACH OPTION FOR REQUIREMENT 9 IN THE RADIO MERIT BADGE IS A SEPARATE SUPPLEMENTAL WORKBOOK SECTION

Choose the option you want to do for completing Requirement 9 and download that section for inclusion with the main section of the Scoutmaster Bucky Radio Merit Badge Workbook.

AMATEUR RADIO OPTION

RADIO BROADCASTING OPTION

SHORTWAVE AND MEDIUM-WAVE LISTENING OPTION

AMATEUR RADIO DIRECTION FINDING OPTION