

# 2010

## RADIO PROGRAM OVERVIEW & WORKBOOK



STUHR MUSEUM

MERIT BADGE UNIVERSITY

OVERLAND TRAILS COUNCIL

7/31/2010

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FEBRUARY 2010

Information in this booklet was accurate at the time of publishing.  
Boy Scouts Requirements 2010, Copyrighted Boy Scouts of America  
Program Overview & Workbook was reviewed by  
MBU Staff/Committee.

## RADIO PROGRAM OVERVIEW

**COUNSELOR:** tba

C/O: Overland Trails Council  
PO Box 1361  
Grand Island, NE 68802-1361

**LOCATION:** tba

**TRANSPORTATION:** Transportation is provided

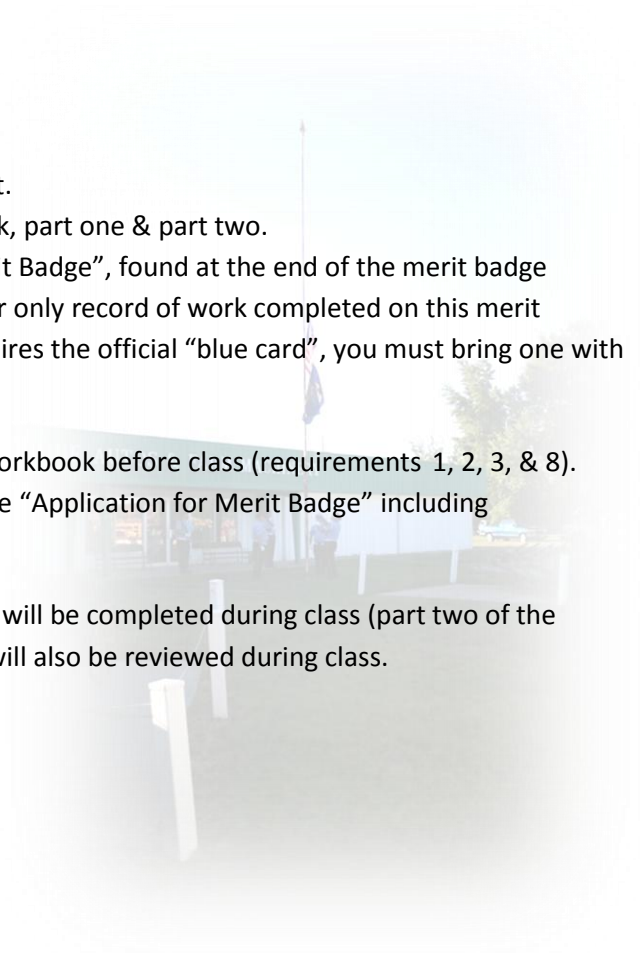
**ADDITIONAL COSTS:** None

**CLASS SIZE:** 10

**BRING TO CLASS:** Radio merit badge pamphlet.  
Radio merit badge workbook, part one & part two.  
Signed "Application for Merit Badge", found at the end of the merit badge workbook. (This will be your only record of work completed on this merit badge.) If your Council requires the official "blue card", you must bring one with you to class.

**PRE-REQUISITES:** Complete Part One of the workbook before class (requirements 1, 2, 3, & 8).  
Complete information on the "Application for Merit Badge" including Scoutmasters signature.

**CURRICULUM:** Requirements 4, 5, 6, 7, & 9 will be completed during class (part two of the workbook). Pre-requisites will also be reviewed during class.





PRE-REQUISITE REQUIREMENTS ARE PRINTED IN **RED ITALICS &**  
MUST BE COMPLETED BEFORE CLASS.

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. 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 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 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. 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) 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.
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):

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

**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 or in a digital audio format, using proper techniques.
- 2) Listen to and properly log 15 broadcast stations. Determine the program format and target audience for five of these stations.
- 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.

**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.
- 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 daytime and nighttime 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.

# RADIO WORKBOOK

## PART ONE, PRE-REQUISITIES



Name \_\_\_\_\_  
Unit # \_\_\_\_\_ District \_\_\_\_\_  
Council \_\_\_\_\_

**Part One of the workbook must be completed before class.**

**Bring the entire workbook (part one and part two) with you to class.**

**Also bring the "Application for Merit Badge" signed by your scoutmaster (included at the end of the workbook).**

<input type="checkbox"/> 1. Explain what radio is. Then discuss the following:
<i>Explain what radio is:</i>
_____
_____
_____
_____
<input type="checkbox"/> a) The differences between broadcast radio and hobby radio
<i>Differences between broadcast radio and hobby radio:</i>
_____
_____
_____
_____
<input type="checkbox"/> b) The differences between broadcasting and two-way communications
<i>Differences between broadcasting and two-way communications:</i>
_____
_____
_____
_____
<input type="checkbox"/> c) Radio station call signs and how they are used in broadcast radio and amateur radio
<i>Call signs and how they are used:</i>
_____
_____
_____
_____

**RADIO WORKBOOK, PART ONE, p.2**

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Name \_\_\_\_\_

1. continued

- d) The phonetic alphabet and how it is used to communicate clearly

*Phonetic alphabet and how it is used:*


- 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.

*Sketch a diagram showing how radio waves travel:*

--

*Explain how radio stations WWV and WWVH can be used to help determine what you will hear:*


Name \_\_\_\_\_

2. continued

- b) Explain the difference between a DX and a local station. Discuss what the Federal Communications Commission (FCC) does and how it is different from the International Telecommunication Union.

*Explain the difference between a DX and a local station:*


*Discuss what the FCC does:*


*How it is different from the International Telecommunication Union:*


Name \_\_\_\_\_

- 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).

*Draw a chart of the electromagnetic spectrum covering 100 kilohertz to 1000 megahertz:*



**RADIO WORKBOOK, PART ONE, p.5**

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Name \_\_\_\_\_

- 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.

*Career opportunities in radio:*

1.

2.

3.

*Pick one career:*

*Career:*

*Education:*

*Training:*

*Experience:*

*Why this profession interest's you:*




## RADIO WORKBOOK PART TWO, CLASS CURRICULUM

Name \_\_\_\_\_  
Unit # \_\_\_\_\_ District \_\_\_\_\_  
Council \_\_\_\_\_

**Part Two of the workbook will be completed during class.**

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

*Explain how radio waves carry information:*


5. Do the following:  
 a) Explain the differences between a block diagram and a schematic diagram.

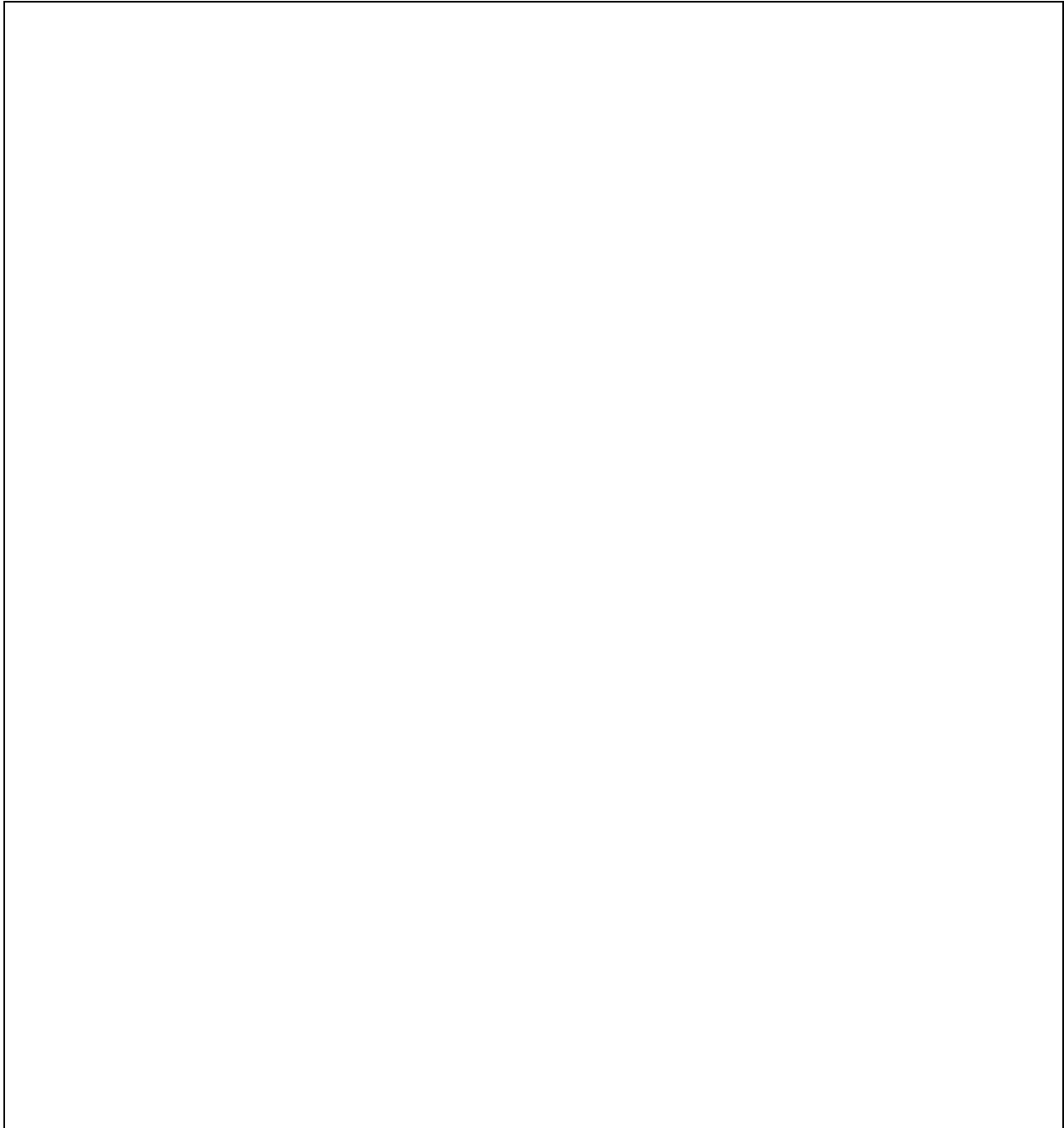
*Explain the differences between a block diagram and a schematic diagram:*


Name \_\_\_\_\_

5. continued

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

*Draw a block diagram for a radio station:*



Name \_\_\_\_\_

5. continued  
 c) Explain the differences between an open circuit, a closed circuit, and a short circuit.

*Explain the differences between an open circuit, closed circuit and 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.

*Schematic symbols:*

1	2	3	4
5	6	7	8

*Explain what three of the represented parts do:*


Name \_\_\_\_\_

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

*Explain the safety precautions:*


- 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.

*Location visited:*

--

*Discuss what types of equipment you saw and how it was used:*


*Types of licenses are required to operate and maintain the equipment:*


*The purpose of the station:*


Name \_\_\_\_\_

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

**AMATEUR RADIO**

**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.

*Tell why the FCC has an amateur radio service:*


*Describe some of the activities that amateur radio operators can do on the air:*


2) 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 amateur radio operators from at least three different call districts.) Properly log the real or simulated ham radio contact and record the signal report.

*Carry on a 10-minute real or simulated amateur radio contact:*


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

<i>Q-signal or term</i>	<i>Explain</i>

Name \_\_\_\_\_

a) Amateur Radio, continued

- 4) Explain some of the differences between the Technician, General, and Extra Class license requirements and privileges. Explain who administers amateur radio exams.

*Technician license requirements and privileges:*


*General license requirements and privileges:*


*Extra Class license requirements and privileges:*


*Explain who administer amateur radio exams:*


- 5) Explain how you would make an emergency call on voice or Morse code.

*Explain how you would make an emergency call:*


- 6) Explain the differences between handheld transceivers and home "base" transceivers. Explain the uses of mobile amateur radio transceivers and amateur radio repeaters.

*Differences between handheld transceivers and home "base" transceivers:*


*Explain the uses of mobile amateur transceivers and repeaters:*




Name \_\_\_\_\_

- b) Broadcast Radio, continued
- 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.

<b>Term</b>	<b>Explain</b>
<i>Segue</i>	
<i>Cut</i>	
<i>Fade</i>	
<i>Continuity</i>	
<i>Remote</i>	
<i>Emergency Alert System</i>	
<i>Network</i>	
<i>Cue</i>	
<i>Dead air</i>	
<i>PSA</i>	
<i>Playlist</i>	

Name \_\_\_\_\_

**OR**  
**SHORTWAVE RADIO**

**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.

*Listen across several shortwave bands for four one-hour periods:*


*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.

*List several frequency bands used by each:*


- 3) Compare your daytime and nighttime 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.

*Compare your daytime and nighttime logs:*


*Explain differences in the signal strength:*


# RADIO WORKBOOK

Notes



**APPLICATION FOR MERIT BADGE**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_

State: \_\_\_\_\_

Is a registered \_\_\_\_\_ Boy Scout,  
 \_\_\_\_\_ Varsity Scout,  
 \_\_\_\_\_ Venturer,

of \_\_\_\_\_ No. \_\_\_\_\_  
Troop, team, crew, ship

District: \_\_\_\_\_

Council: \_\_\_\_\_

**MERIT BADGE UNIVERISTY**

Merit Badge: **Radio**

Counselor: \_\_\_\_\_

Address: Overland Trails Council

PO Box 1361

2808 O'Flannagan

Grand Island, NE 68802-1361

Phone: 308-382-3717

email: mbuotc@yahoo.com

*and is qualified to begin working for this merit badge and has completed the following pre-requisite requirements:*

**SECTION A PRE-REQUISITE REQUIREMENTS**

Requirement No. and letter	Date of Approval	Counselor Initial	Requirement No. and letter	Date of Approval	Counselor Initial
1					
2					
3					
8					

*The applicant has personally appeared before me and demonstrated to my satisfaction that he has met all pre-requisites requirements for the above stated merit badge and is ready to attend his assigned MBU class.*

Signature of Unit Leader \_\_\_\_\_ Date \_\_\_\_\_

**SECTION B APPLICANTS RECORD**

Requirement No. and letter	Date of Approval	Counselor Initial	Requirement No. and letter	Date of Approval	Counselor Initial
4					
5					
6					
7					
9					

The applicant has personally appeared before me and demonstrated to my satisfaction that he has completed all requirements in **SECTION B** above for the

Merit Badge: **Radio**

Name of Counselor: \_\_\_\_\_

Signature of Counselor \_\_\_\_\_ Date \_\_\_\_\_

### SCOUT INSTRUCTIONS

- Complete your name, address, city, unit type & number, district, & council on the Application for Merit Badge.
- Your unit leader must sign the Application for Merit Badge before attending class.
- All other information is already printed on the Application for Merit Badge; please make sure all information is correct.
- The merit badge counselor is registered & approved for this merit badge and is on the MBU Counselor's List.
- Read the merit badge pamphlet.
- Attend the merit badge class.
- Always meet with your counselor along with a buddy (a Scout, friend, or parent)
- Have your merit badge worksheet with you when you attend class.
- **If the merit badge pre-requisites are not completed before class, you will not be able to complete the merit badge during this weekend event, you will have to follow up with your Unit's Advancement Chair when you return home**
- **PLEASE BE AWARE THAT SOME COUNSELORS WILL NOT ALLOW YOU TO ATTEND THEIR CLASS WITHOUT PRE-REQUISITES COMPLETED—CLASS CURRICULUM IS DEPENDENT ON PRE-REQUISITE WORK BEING COMPLETED!**

### COUNSELOR INSTRUCTIONS

- Never meet alone with a Scout.
- Verify all information & merit badge name on Application for Merit Badge is correct.
- Sign your name on the line at the bottom of **"SECTION B APPLICANTS RECORD"**.