



# Scout Fair 2002 - Radio Merit Badge



This is only a PARTIAL merit badge. You will do some of the requirements here today, and then take this package home to finish the merit badge. You **MUST** complete steps 1 and 2 at the Scout Fair today to use this workbook.

## Step 1: Do this at the Scout Fair today. Show your work by filling in the blanks:

First, let's learn a little about radio. This is requirement #1:

- Radio** is \_\_\_\_\_
  - **Broadcast:** \_\_\_-way. Commercial (example: \_\_\_\_\_) or not (example: \_\_\_\_\_).
  - **Hobby:** For \_\_\_\_\_
  - **Two-way:** Both \_\_\_\_\_ and \_\_\_\_\_ messages
- Call signs** \_\_\_\_\_ the station and are \_\_\_\_\_ by law.
  - \_\_\_\_\_ callsigns include KSWB, WGN
  - \_\_\_\_\_ callsigns include KF6AVG, KQ6UK, AA6J, WB6BSA
  - U.S. begins with W, K, N, or A. XE is Mexico, VE is Canada.
- Phonetics:** \_\_\_\_\_ used for \_\_\_\_\_ to make \_\_\_\_\_ more \_\_\_\_\_.  
Alfa, Bravo, Charlie, Delta, Echo, Foxtrot, Golf, Hotel, India, Juliett, Kilo, Lima, Mike, November, Oscar, Papa, Quebec, Romeo, Sierra, Tango, Uniform, Victor, Whiskey, X-ray, Yankee, Zulu.

**Part of requirement #6d says to "Find three electrical components to match to three of these symbols."** We don't have time to finish all of requirement #6 today, but there is a box of spare parts were you can find three parts. Please leave these after you've identified them so the next Scout can do this too.

**In a few minutes, you'll have a chance to talk on a ham radio. Before you do, you should know a little about what hams do. This is requirement #7:**

- What can you do with a license?**
  - C \_\_\_ tests     • J \_\_\_
  - D \_ - QSL cards     • S \_\_\_\_\_ at special events
  - C \_\_\_\_\_ communications     • P \_\_\_\_\_ radio via computer
  - D \_\_\_\_\_ communications (Viejas \_\_\_\_, Northridge \_\_\_\_\_)
- We'll skip step #2 for a few minutes. Continue with #3 right below:*
- Q signals:**

QRM - _____, <u>m</u> an-made	QRN - _____, <u>n</u> atural noise
QRP - _____ p _____ (<5 watts)	QRS - <u>S</u> _____ Morse code speed
QRT - Q _____ t _____ - off the air	QSB - Signal is _____
QSL - Acknowledge receipt (c _____)	QSO - _____
QSY - C _____ frequency	QTH - L _____ (think <u>H</u> ome)

**•Terms:**

Log - Record of QSOs	CW - _____ (Continuous Wave)
DX - Distant (foreign stations)	CQ - _____ ("seek you")
OM - O _____ M _____ (male operator)	YL - Y _____ L _____ (female operator)
Rig - R _____	Shack - _____
HI - _____	73, 88 - _____, _____ and _____
- Technician license:** 35 question test, no code - gives full \_\_\_\_\_ & \_\_\_\_\_ use.  
**•Tests** are given by V \_\_\_\_\_ E \_\_\_\_\_ s (see merit badge counselor)

5.
  - Emergency use:** Speak clearly and give complete information, including location. Remember the person you are talking to may be in another state or country!
  - According to FCC, **Amateur radio exists** for (1) volunteer \_\_\_\_\_, (2) \_\_\_\_\_, (3) \_\_\_\_\_ skills, (4) self-\_\_\_\_\_, and (5) \_\_\_\_\_ goodwill.
6.
  - Handheld radios (HT):** \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, but not much \_\_\_\_\_.
  - Base radios:** More \_\_\_\_\_, better quality \_\_\_\_\_.
  - Mobile radios:** More \_\_\_\_\_, HT antenna doesn't work well inside car.
  - Repeaters:** Located on \_\_\_\_\_ points (\_\_\_\_\_ Mountain, Sharp Hospital) to automatically \_\_\_\_\_ signals.

All done? Good job! Now go visit the radio station and listen quietly while waiting your turn for a radio contact.

**Step 2: After you've filled in the spaces above and talked on the radio, have a counselor in the booth sign off a partial on your blue card.**

You have finished requirements #1, 7, and 8.

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**NOW GO HAVE FUN AT THE SCOUT FAIR. YOU CAN DO THE REST AT HOME LATER!**

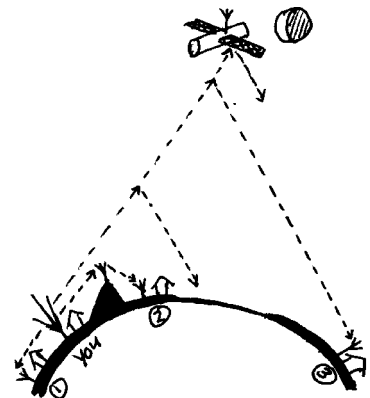
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**Step 3: Take this workbook home and finish the rest of the requirements. Again, show your work on this handout. For help, you can use either the Radio Merit Badge book or (easier) go on the Internet to [www.qsl.net/aa6j/radiomb](http://www.qsl.net/aa6j/radiomb) .**

You CAN do this here if you want, but there's a whole lot more going on here today, so you probably want to go. Show your work. Sometimes you'll have to draw something on a blank piece of paper.

1. Done at Scout Fair.
2. **Sketch a diagram showing how radio waves travel locally and around the world.** Draw this on a blank piece of paper. The following might help you:

- i.
  - Line-of-sight where the antennas can "see" each other. (You to #\_\_)
  - If a hill is in the way, a repeater can relay the signal over it. (You to #\_\_)
  - High frequency radio bounces off the ionosphere long distances (You to #\_\_) ("Skip")
  - Signals can also be relayed by \_\_\_\_\_ or even \_\_\_\_\_ bounce or meteor trails.
- ii. WWV in Colorado and WWVH in Hawaii broadcast the \_\_\_\_\_ on several frequencies.



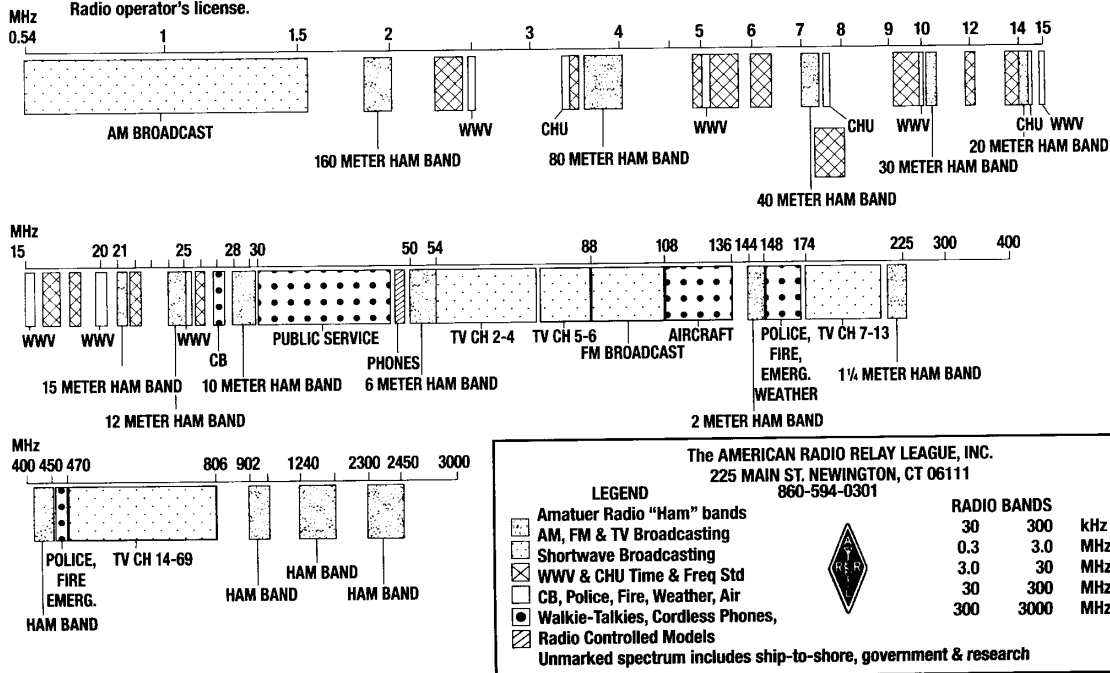
3. **Do the following on a blank piece of paper. You can use the chart on the next page for help:**

- a. Draw a chart of the electromagnetic spectrum covering 100 kilohertz (kHz) to 1,000 megahertz (MHz).
- b. Label the LF, 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 ham radio bands), and police.



### RADIO FREQUENCY SPECTRUM CHART

Since the early part of this century radio amateurs have had bands of frequencies throughout the usable radio spectrum. Some bands work well for long-range communications in the daytime, others provide worldwide communications at night. By choosing the best frequency band for a given time of day, radio amateurs, or "hams," can usually direct their signals to any part of the globe. Contact the American Radio Relay League for detailed information about the ARRL study guides for obtaining an Amateur Radio operator's license.



#### d. Discuss why some radio stations are called DX and others are called local.

**DX:** \_\_\_\_\_ (not \_\_\_\_\_, usually means out of the \_\_\_\_\_).

**Local:** \_\_\_\_\_, therefore more common usually.

**Explain what the FCC and the ITU are.**

**FCC:** F \_\_\_\_\_ C \_\_\_\_\_ C \_\_\_\_\_, sets rules in \_\_\_\_\_.

**ITU:** I \_\_\_\_\_ T \_\_\_\_\_ U \_\_\_\_\_ - Sets band plans \_\_\_\_\_.

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

i. **Transceiver:** \_\_\_\_\_ and \_\_\_\_\_ in one box

ii. **Transmitter:** \_\_\_\_\_ radio signals

iii. **Amplifier:** Makes signals \_\_\_\_\_

iv. **Antenna:** \_\_\_\_\_. Whips, wires, beams, etc. A few inches to 100's of feet long.

#### 5. Learn the safety precautions for working with radio gear, particularly direct current and RF grounding.

i. Electrical shock - Turn off power before working on any equipment.

ii. Radio RF radiation - Keep the equipment cases closed when operating.

iii. Radio RF burn - Keep antennas out of reach.

iv. Make sure antennas can't touch power lines.

v. Falling hazards on towers and roofs.

#### 6. Do the following:

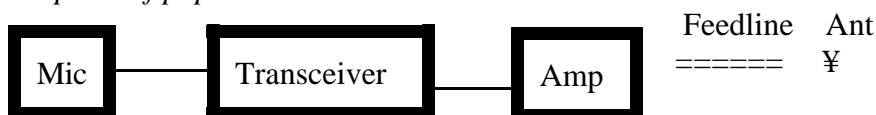
##### a. Explain the differences between a block diagram and a schematic diagram.

Block diagram: Shows \_\_\_\_\_ of radio station.

Schematic diagram: Shows how electrical \_\_\_\_\_ works.

##### b. Draw a block diagram that includes a transceiver, amplifier, microphone, antenna, and feedline.

Do this on a blank piece of paper.





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

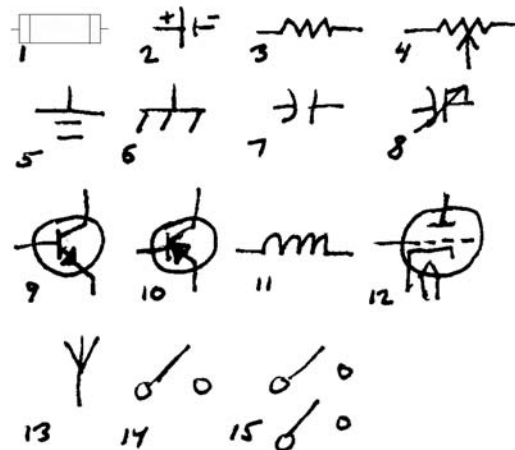
Open circuit: No current flows - No electrical contact - Light switch \_\_\_\_\_

Closed circuit: Current flows correctly - Light switch \_\_\_\_\_

Short circuit: Current flows to ground - Lamp cord \_\_\_\_\_ - Can cause fire

d. Draw eight schematic symbols. Explain what three of the represented parts do. At Scout Fair you found three of these electrical components to match to three of these symbols.

- |                  |                     |
|------------------|---------------------|
| 1 Fuse           | 2 Battery           |
| 3 Resistor       | 4 Variable resistor |
| 5 Earth ground   | 6 Chassis ground    |
| 7 Capacitor      | 8 Variable cap      |
| 9 NPN transistor | 10 PNP transistor   |
| 11 Coil          | 12 Tube             |
| 13 Antenna       | 14 Switch SPST      |
| 15 DPDT          |                     |



7. and 8. Done at Scout Fair.

### Step 4: When you've done all the requirements, sign your name here to say you did the work.

Name (print): \_\_\_\_\_

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

City, State, Zip Code: \_\_\_\_\_

E-mail address: \_\_\_\_\_@\_\_\_\_\_

(If some of your work does not complete the requirements, we can e-mail you and maybe help you finish the merit badge easier. We will not telephone you.)

I did all the work on this workbook. I may have had help, but I did it.

Don't sign until you're finished.

Sign your name here: \_\_\_\_\_

### Step 5: Make an appointment with a Radio Merit Badge counselor. Don't forget to bring your BLUE CARD with the partial signed off and ALL your work.

**Counselors** (phone numbers have been removed from this web version for privacy):

El Cajon, 92021, Leslie Morierisset, WB6AYD  
 El Cajon, 92021, Douglas Wescott, KF6QXU  
 Escondido, 92026, Jerry Bransford, KC6TAY  
 La Mesa, 91941, Rob Mai, KB2TYR  
 Poway, 92064, Scott Roleson, KC7CJ  
 Poway, 92064, Clarence Schmidt, KC6MKV  
 San Diego, 92111, Dick Warren, K6OBS  
 San Diego, 92114, Roger Coppock, N9EPY

San Diego, 92117, Robert Shoemaker, KG6EJW  
 San Diego, 92124, Kenneth Rogers, KR1KR  
 San Diego, 92129, Jack Goldberg, W6JZ  
 San Diego, 92139, Craig Davis, KM6AW  
 San Marcos, 92069, Bill Jeffrey, AA6J  
 Scripps Ranch, 92131, Loren Mitchell, K6BK