## PROPAGATION OF RADIO WAVES

**Objectives**

- Help prepare the scout to fulfill the following merit badge requirements:

  - 2.a.      Sketch a diagram showing how radio waves travel locally and around the world.
  - 2.b.      How do broadcast stations WWV and WWVH help determine what you will hear when you listen to the radio?
  - 4.a.      Explain how radio waves carry information.
  - 4.b.      Include in your explanation:  Transceiver, transmitter, amplifier and antenna.
  - 7.a.6.*c.* Explain the uses of amateur radio repeaters.

**Reference Materials**

- Handouts:  Radio Wave Propagation.
            WWV and WWVH Broadcast Stations.
            <span style="font-size:smaller">Depending on order scout takes classes, they may already have this.</span>
            Sending Information with Radio Waves
- Merit badge pamphlet pages:  12-15 and 39.
- Icom band chart.
- URFMS repeater map.
- Cell phone (or FRS radio or GPS unit).
- 8.5 X 11 blank paper for scouts to use.

**Suggested Activities**

- Quickly go over the handouts.
- Discuss wave length vs antenna length – use cell phone and CB and station antennas as examples.
- Ask and discuss the following questions:

  - Why are FM radio stations only heard locally while AM radio stations are heard at long distances?  Refer to frequency chart to see that FM stations broadcast above 50 MHz so they are limited to line of sight while AM stations are about 1 MHz and will thus bounce off the ionosphere.
  - Why do you hear different AM radio stations at night than you do in the day?  Refer to frequency chart and propagation handout and discuss how the ionosphere changes at night.

**Verifying Scouts Have Met the Merit Badge Requirements**

- Meet with each scout individually so they can present to you the information required to fulfill each of the above merit badge requirements.
- Sign the scout's record sheet in the spaces provided to indicate scout has fulfilled those requirements.
- If the scout is not able to meet any requirement, have them review the handout and referenced pages in the merit badge pamphlet and come back later to complete the requirement.  Provide additional one-on-one mentoring if needed.