



School Fox Hunting Activity ... Outdoors Exercise with Wireless Technology

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Radio Direction Finding (RDF) or Fox Hunting is a popular spring and summer activity for many schools. It combines the fun of ham radio and wireless technology with outdoor activity and competition. Fox hunting has some very important uses besides just being a fun activity. RDF is used in search and rescue operations, tracking wildlife for nature studies, locating weather balloons and scientific instruments, and finding interfering transmitters. As far as learning objectives, fox hunting includes map reading, orienteering, triangulation, group problem solving and cooperation, as well as radio wave propagation and equipment operation. Your fox hunting activities can be informal or formal. Believe it or not, there are very specific rules and regulations (35 pages in fact) that cover fox hunting competitions. So if you want to go the competitive route, a review of the rules and regulations would be in order.



You will need a receiver, receiver interface that the students will use to locate the foxes and of course the foxes (transmitters) to do fox hunting. In fox hunting competitions, up to five foxes are employed. The teacher hides the foxes before the activity in the activity area. The teacher then activates the foxes to begin the activity and the students use the fox hunting receiver and interface to find a direction from their current location to the target fox. Students make appropriate annotations on their maps and take note of local terrain features to help keep orientation. Once they have their first "cut" the students move to another location and await for the next transmission from the fox. Students can triangulate the location of the fox with a minimum of two "cuts" and move in to find it. The more "cuts" the students have, the more accurately they can locate and find the fox. The winning team that finds the fox first.

Fox hunting receiver interface. The ARRL Handbook has an excellent section on fox hunting and RDF. The chapter also includes a good fox receiver interface that is relatively easy to construct. Check the index for The Simple Seeker. I made a little modification to the circuit that is detailed in the Handbook to improve the operation of the direction-finding needle. The circuit diagram for the added operational amplifier is attached as a [PDF file](#).



Fox transmitter controllers. The foxes can be standard hand held radios using the appropriate frequency. I use two-meter HTs set to low power. The radios are easily hidden and provide adequate (but not too strong) signals for the activity. I developed a microcontroller circuit that is used to control each fox remotely. This note will not go into the specifics of the circuit but will give a brief overview. If the reader wants more details they can contact the Education

Services Department at ARRL, etp@arrl.org (The circuit diagram for the fox controller is [available here](#))

The fox controllers are microcontrollers that monitor the HTs receiver channel for specific DTMF tones to begin transmissions. The microcontrollers are programmed to respond to the key "A" to turn on all foxes, "0" (zero) to turn off all foxes, or the fox number (1 through 5) to toggle individual foxes.

Once turned on, the fox controller waits for the appropriate one minute time period of a five-minute span to begin transmitting. Foxes 1 through 5 transmit sequentially for one minute each. At the start of the assigned minute, the controller turns on the fox HT via the PTT line and sends the fox's identification in Morse code (the ID code is MOE, MOI ... MO5, the fox number is the number of dits in the last character). At the end of the assigned one-minute transmission period, the controller sends the control operator's callsign in Morse code and puts the HT into receive mode. The next fox in the "den" then begins its transmission period. The sequence begins again at the end of the five-minute span. The foxes will continue to transmit until the "0" or toggle DTMF tone is received.

Fox hunting can be a fun and meaningful learning activity for your class that combines the technology of wireless with the outdoors and team competition. The activity will take some preparation, so begin now and be ready when the snow goes away and the kids start getting spring fever.

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