

Building a Radio Without Batteries

Purpose: The objective of this activity is to allow students to build a crystal radio receiver that will receive local broadcast stations. In the process of building the receiver, the student will be able to identify the basic components of a radio receiver.

Overview: Early wireless technology had humble, yet very effective beginnings. Many early receivers were crystal receivers based on the oscillation of crystals to detect or convert the intelligence carried on radio waves into audio that people could listen to and enjoy. Many soldiers in World War Two entertained themselves and kept informed of the war's progress by making homemade crystal sets with broken razor blades that served as crystal detectors. Stories abound about tuning their crystal sets by moving the "cat's whisker" to just the right spot to tune in the desired station and crowding around the radio to capture the latest information (information about crystal radios can be found in the suggested background information). Though very much a novelty today, crystal receivers are very easy and fun to make, are inexpensive, and require no batteries to operate.



Time: One class period to instruct the students of the fundamental principles behind the crystal radio set. One class period for students to construct their own crystal sets.

Skills Required:

Listening
Collaboration
Manual dexterity

Materials and Tools:

Parts for the project are outlined on the accompanying Web site (parts may be available at your local Radio Shack store, check for availability):

- Cardboard circular container, such as an oatmeal container
- Diode 1N34 available from electronic supply outlets
- 100 feet of plastic coated wire
- 47K ohm resistor
- high impedance crystal set earplug
- solder and soldering iron

Preparation:

Download and review the construction procedures with the students. An already completed crystal set that the students can use as a model would be helpful in illustrating construction techniques.

Before class locate a good grounding location within the classroom or on the school grounds that the students can use when they operate their radios. A cold water pipe should provide a good ground connection. Ask the custodial staff for advice.

Pre-identify supports for the ends of the radio antennas such as trees, corners of buildings, etc. Ask the custodial staff for advice.

Background:

About crystal radios in general:

<http://www.midnightscience.com/>

About this crystal radio project:

<http://www.midnightscience.com/project.html>

What to do and how to do it:

Follow the construction steps in the Web information.

Data Analysis:

Have the students identify the components of their crystal radios in relation to the components of a wireless technology system as discussed in class.

Activity questions:

1. What happens to the operating of the radio when you disconnect the ground wire? Explain what you observe? What is the purpose of the radio ground?
2. Explain the process that you used to tune the radio. Did you hear more than one station at a time? Was one station stronger than the others? Why or why not?
3. What are some of the advantages of this radio? What are some of the disadvantages of this radio?
4. What would you improve on the radio and how would you do it?