



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Jozefa S. McKiernan	Project Number J0825
Project Title So You Want to Build a Radio?	
Abstract Objectives/Goals The goal of my project was to learn as much as possible about radio receivers and transmitters and the components that make them up. Methods/Materials I studied several different aspects of radios: I studied how changing the resistance and capacitance of an oscillator circuit affected its output frequency; I studied the amplification of a signal using a transistor-based amplifier circuit; I studied how antenna length affects the reception of a crystal radio using a microammeter; I built an AM transmitter by combining a variable frequency oscillator circuit with a coil-and-capacitor tank circuit; and I built an FM transmitter and broadcast a signal to a commercially available receiver. To accomplish the above, I learned about capacitors, resistors, inductors, and equipment like ammeters and oscilloscopes. Results I found that the lower the resistance of the oscillator circuit, the higher-pitched the sound was and the greater the capacitance, the lower the frequency. The amplifier circuit considerably magnified the input signal. I found that the longer the antenna, the greater the amount of current. It seemed that some antenna lengths were not compatible with the wavelength. A longer transmitter antenna allowed the signal to be received farther away. The FM transmitter could transmit sounds but not voices at about 89.6 MHz. Conclusions/Discussion Radios fundamentally operate on resonance of electronic circuits. The resonant frequencies can be tuned using different values of resistance, capacitance, and inductance. I was able to tune radio transmitters and receivers using these principles. Receiver antenna length appeared to show wavelength dependence. Weak receiver output was amplified enough to drive an audio speaker.	
Summary Statement My project studies how radios work and how their components affect them.	
Help Received Grandfather answered questions and provided information and equipment; father answered questions, provided equipment, and edited report and abstract; mother typed report; Mr. Hall provided advice and information.	