



Figure 19.1 Automated external defibrillator unit (AED) (credit: U.S. Defense Department photo/Tech. Sgt. Suzanne M. Day)

Chapter Outline

- 19.1 Electric Potential Energy: Potential Difference
- 19.2 Electric Potential in a Uniform Electric Field
- 19.3 Electrical Potential Due to a Point Charge
- 19.4 Equipotential Lines
- 19.5 Capacitors and Dielectrics
- 19.6 Capacitors in Series and Parallel
- 19.7 Energy Stored in Capacitors

Introduction to Electric Potential and Electric Energy

In Electric Charge and Electric Field, we just scratched the surface (or at least rubbed it) of electrical phenomena. Two of the most familiar aspects of electricity are its energy and *voltage*. We know, for example, that great amounts of electrical energy can be stored in batteries, are transmitted cross-country through power lines, and may jump from clouds to explode the sap of trees. In

a similar manner, at molecular levels, *ions* cross cell membranes and transfer information. We also know about voltages associated with electricity. Batteries are typically a few volts, the outlets in your home produce 120 volts, and power lines can be as high as hundreds of thousands of volts. But energy and voltage are not the same thing. A motorcycle battery, for example, is small and would not be very successful in replacing the much larger car battery, yet each has the same voltage. In this chapter, we shall examine the relationship between voltage and electrical energy and begin to explore some of the many applications of electricity.

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