

2-6 Types of Lamps

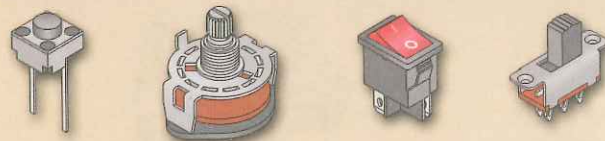
The lamps in Snap Circuits are **incandescent** type, the same as the larger lamps in your home. The bulbs contain a special high-resistance wire, called the **filament**. When an electric current passes through it the wire gets so hot that it glows. Heat is also produced, and the glass bulb prevents the filament from reacting with oxygen in the air and burning. When the voltage rating of an incandescent bulb is exceeded, the filament gets so hot it burns out. Filaments are usually made of tungsten, since ordinary copper would melt.

The **fluorescent** light bulbs that come in white 4 ft. tubes are the standard room lights for offices and schools. They pass electric current through a gas, usually neon. This gas emits light as the electricity

passes through it, similar to how a tungsten wire does. Although larger and more expensive than ordinary incandescent lamps, they are more efficient at converting electricity into light.

The difference in heat produced between incandescent and fluorescent light bulbs might surprise you. Find a fluorescent bulb and feel the heat coming off it; you won't feel much. Find an incandescent lamp **THAT HAS BEEN OFF FOR A WHILE** and turn it on. Feel the heat it produces; it soon becomes too hot to touch. Only about 5% of the electricity used by incandescent bulbs is converted into light. Without the more efficient fluorescent bulbs, our society of office buildings might have been much different.

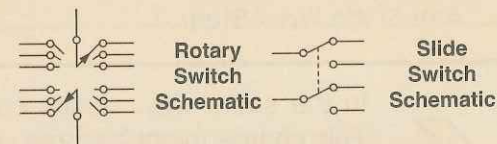
2-7 Types of Switches



Push Button Rotary Rocker Slide

The slide and press switches included in snap circuits are simple switches, more complex types are also available. Switches come in almost every shape and size imaginable. There are membrane, rocker, rotary, DIP, locking, and non-locking types just to name a few.

Very often, a single switch is used to make many different connections. The combinations of connections for a switch are indicated in the symbol for it. Here are some examples:



2-8 Electricians

There are many different ways of using electricity, so there are many types of people who work directly with it. The main categories are electricians and engineers/technicians. Although many people think of these as being the same career, they are actually very different. They attend different schools, use different tools, and work in different places.

Electricians are the people who install electrical wiring into homes and businesses. Electricians deliver the electricity to your home to be used. It takes a lot more electricity to operate everything in a building than to operate a computer or radio, so safety is very important and the equipment they use can handle high levels of voltage and current. Buildings are not easy to re-wire, so the wiring must be reliable and safe for many years.

Electricians are trained in union and trade schools. Local government licenses them because buildings must be wired as per strict local building codes to be sure they will be safe even after many years.

Electrical/electronics engineers and technicians design and develop products that will use the electricity that electricians have brought to them. Voltages and currents are much lower and safer, but circuits can be much more complex (like computers) and technologies change quickly. Electronic products are mass-produced in factories, unlike building wiring which must be installed in the building. Engineers are trained in colleges and technicians are trained in trade schools. Government does not regulate them but products must meet industry safety standards.

Summary

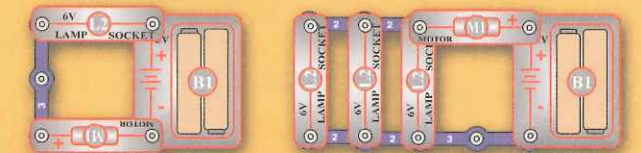
Summary of Chapter 2:

1. An electric current flowing in a wire has a magnetic field.
2. A generator uses mechanical motion to create electricity and a motor uses electricity to create mechanical motion.
3. A fuse is a special wire that breaks when an excessively high current flows through it, used for safety.
4. Electrical outlets are 120V, and can supply enough current to kill people.
5. Static electricity can cause clothes to stick together. Lightning occurs when static electricity in clouds discharges into the ground.
6. Only a small amount of the electricity used by light bulbs is converted into light, the rest becomes heat.

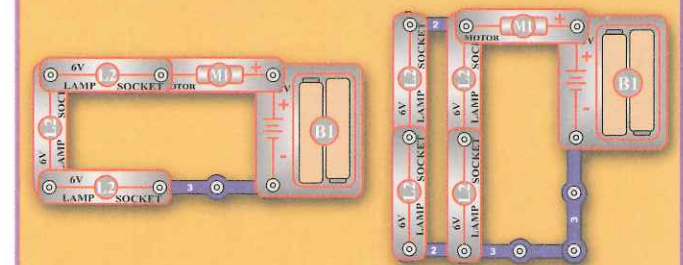
Quiz

Chapter 2 Practice Problems

1. Fuses are needed for all of the following reasons except:
 - A. They improve circuit performance.
 - B. To prevent an electrical problem from starting a fire.
 - C. To limit the current in a circuit.
 - D. People don't always use products correctly.
2. All of the following are caused by static electricity except:
 - A. Lightning
 - B. Erratic noises interrupting music on your AM radio.
 - C. Clothes sticking together in the dryer.
 - D. Blackouts
3. Which circuit will spin the fan the fastest? Which will spin fan the slowest?

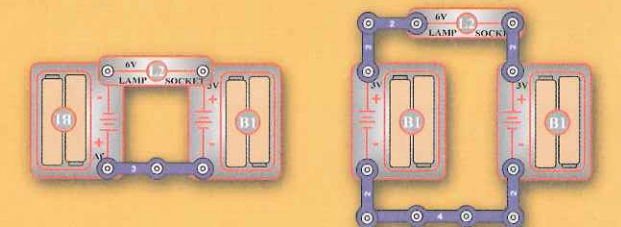


A B

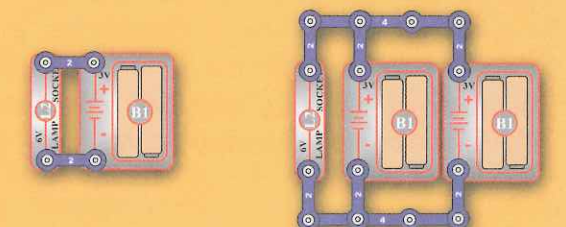


C D

4. Which circuit will make the lamp the brightest?



A B



C D

Answers: 1. A, 2. D, 3. B/C, 4. A