Electrical Basics

Electricity enters your home through overhead or underground wires, where it passes through a meter before entering the main service panel (also called a fuse box or circuit-breaker panel). The meter measures how much electricity you use. At the main service panel, the electricity is divided into branch circuits, each of which is protected by a fuse or circuit breaker. Power travels in a closed loop through the circuit's hot wires to outlets or fixtures and returns to the service panel via neutral wires, unless it is interrupted by an open switch or short circuit. The fuses or breakers protect these circuits from overloading (drawing more power than the wires can handle).

Electrical Terms

Current flow is measured in amperes, or amps. The amp rating is marked on many appliances. Electrical suppliers have charts showing the amp rating for various American wire gauge (AWG) sizes. The rating for your house's circuits will be marked on the circuit breaker or fuse—generally 15 or 20 amps for most room circuits and 30 or 50 amps for heavy-duty circuits, such as those serving a kitchen range, a clothes dryer, or a water heater.

Voltage measures the force of electrical pressure that keeps the current flowing through the wires. Products are marked with a voltage capacity, usually 120 or 240 volts. You can't hook up a product designed to operate at 120 volts to a 240-volt electrical outlet—it will burn out. The shape of the receptacle will prevent you from inserting the wrong type of plug.

Wattage equals volts multiplied by amps. The wattage rating of a circuit is the amount of power the circuit can deliver safely, determined by the current-carrying capacity of the wires. Wattage also indicates the amount of power that a fixture or appliance needs to work properly. Appliances with large motors, such as air conditioners, should not exceed 50% of a circuit's capacity because of start-up overcurrent—motors need more current to start than they do to run. Large appliances often need their own circuits.

Grounding

Electricity always seeks to return to a point of zero voltage (the ground) along the easiest path open to it. If you touch an electric fence, electricity will flow from the fence through your body to the ground—the electrical path is then "grounded" through you. A short circuit in wiring is a similar situation. Electrical current is able to leave the closed loop of the circuit—because, for example, a hot wire is off its terminal and touches the metal box of a light fixture, which is now charged—and return to the source by some other means. If the system is properly grounded, this short would be a fault to ground, and pose no hazard. If it's improperly grounded, and you touch the wiring path—and it could be something as innocuous as the metal pull cord on that light fixture—the electricity will seek to ground itself through your body.

To guard against this, your house's electrical system has grounding wires, which give the electricity a permanent alternative path for its return to the source. Each receptacle and fixture has its own grounding wires that return electricity to the main panel—the third, grounding plug of most appliances extends this protection to them. The entire system is also grounded to your cold-water pipes or (if you have plastic plumbing) to a grounding rod buried underground next to your foundation—or to both.