



**MSRE Home Inspection Services, LLC**

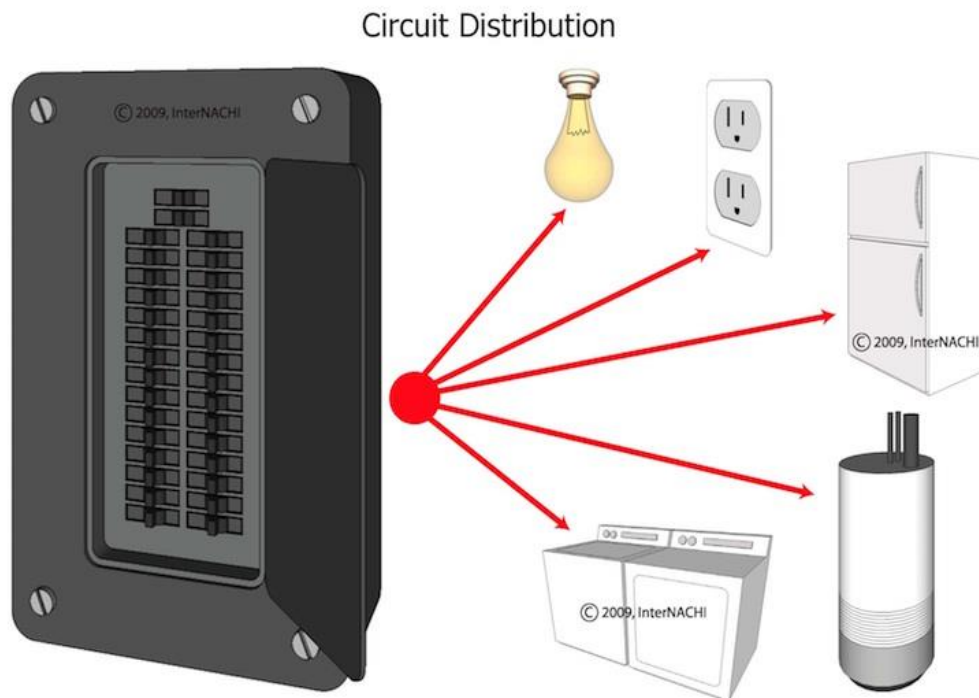
**(216) 403-4511**

## **Electricity 101: Understanding the Service Panel**

by Fran J. Donegan of [The Home Depot](http://www.thohome.com)

Many homeowners who are unfamiliar with construction and wiring are timid when it comes to electrical work. It makes perfect sense to have a healthy respect for electricity—it can be dangerous if you don't understand it.

To give you confidence and a little knowledge to help you discuss electrical problems with an electrician, let's explore how the service panel (or panel box) controls your home's electrical system.



### **The Service Panel**

After passing through the electric meter, the local electrical utility provides electricity to your house through the service panel (also called the distribution center). The panel, which is usually located in a garage, basement or utility room, distributes electricity through individual circuits that run throughout your house.

The service panel in most homes contains circuit breakers, which look like little switches. Older homes may contain fuses, but they serve the same purpose as circuit breakers—to stop the flow of electricity when there is a problem.

As a homeowner, you need access to the panel for three tasks:

- to shut off power to the whole house if needed (you do this by switching off the large breaker);
- to reset a circuit breaker that trips; and
- to turn off power to individual circuits when you are doing electrical work somewhere in the house.

You can also add new circuits to the panel box if there is room, but this is usually a job for a licensed electrician.

### **Why Do Circuit Breakers Trip?**

If you plug too many appliances into a circuit, the system senses that they require more power than the circuit can accommodate and the circuit breaker trips, shutting off power completely. It's a safety measure designed to protect the wiring in the circuit, as too great a demand can cause the wires to overheat.

Each circuit has a limit of how much power it can handle. You will find that limit printed on each breaker. The number represents the ampere, or amps, which measure the rate or quantity of electrical flow. The number printed on the main breaker is the upper limit your house's service can accommodate.

For example, a 15-amp circuit is a light-duty circuit that may power something like living room and bedroom lights and electrical outlets, and there are usually several outlets on one circuit. A 30- or 50-amp circuit is for appliances that use a lot of energy, such as an electric clothes dryer or an electric range. These kinds of appliances are usually the only thing hooked up to the circuit—called a dedicated circuit—and their wiring will have a larger diameter.

### **Stopping Circuit Breakers from Tripping**

Reducing demand on the circuit is the best way to prevent breakers from tripping. Appliances list their energy demands on an identification label on the unit. Most services experience tripping when juggling power demands. For example, if the breaker trips when you use the microwave and the toaster oven at the same time, you will have to move one of those appliances to another circuit. However, if a circuit trips frequently, contact an electrician because there may be a problem in the wiring or a short circuit.

Reset a breaker in the service panel by first pushing it to the "OFF" position and then pushing it back to the "ON" position. Fuses in older panels can't be reset but must be replaced. Always replace a fuse with another of the same amperage. Don't be tempted to install a higher-amp fuse because wiring size corresponds to amps. Wiring that is too small for the new fuse could overheat.

### **Types of Circuit Breakers**

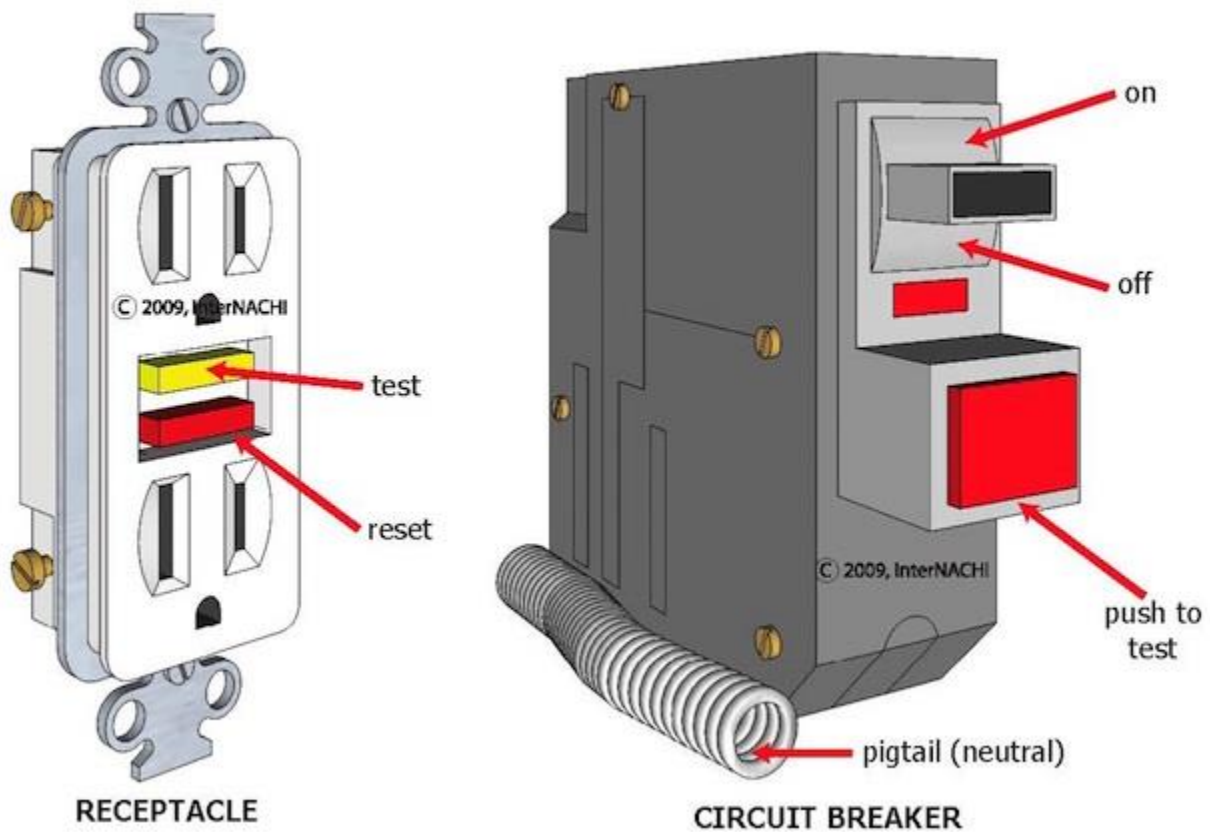
Your home is connected to the electric utility by three wires. Two of the wires are charged with a nominal 120 volts each, and the third wire is neutral. Volts or voltage is the force with which electricity flows. Each of the two "hot" wires is attached to the power bus in the service panel. You can't see the power bus because the panel box should have an inside cover that allows only the circuit breaker switches to be accessible inside the door or cover. As the name implies, the power bus energizes the circuits with either 120 or 240 volts.

The way the circuit is used determines the amount of voltage needed. A 15-amp circuit requires one hot wire or 120 volts. This type of circuit breaker is called a single-pole breaker. An electric range on a 50-amp circuit may need 240 volts, so it has two hot wires. This type of breaker is called a double-pole breaker.

**Other circuit breakers include:**

- **ground-fault circuit interrupters (GFCIs).** These breakers can sense the slightest imbalance in the flow of electrical current when a hot wire touches a ground, such as the metal cabinet of an appliance. Any type of abnormal current flow is called a fault. GFCI breakers trip much more quickly than standard breakers. GFCI protection is required by the National Electrical Code (NEC) in wet areas, such as kitchens and bathrooms, as well as in attached garages. GFCI outlets—the outlets with the "Test" and "Reset" buttons on them—offer the same protection.

### Ground Fault Circuit Interrupters



- **arc-fault circuit interrupters (AFCIs).** A disconnected hot wire can produce a small arc of electrical current. AFCIs are designed to shut down the circuit before the arc can cause a fire.

Don't be alarmed if your panel box does not contain GFCI breakers. GFCI electrical outlets provide the same protection. The use of AFCI breakers is relatively new, and not every municipality includes their use in local codes. If you are concerned about arc faults, consult a licensed electrician.

### Map the Circuits

Make sure that the inside of the panel door has a legend that clearly indicates which rooms and/or appliances are powered by which breakers. Many service panels' legends are missing, illegible or inaccurate. Make sure that yours is up to date. Work with a helper and methodically go through the house testing the circuits. Don't

assume that all of the outlets in a room are on one circuit. Kitchen lighting and outlets, for example, should be serviced by two circuits. A simple rule of thumb is to check all electrical outlets.

### **Be Responsible and Safe!**

Unless a breaker trips or you want to shut off power to do some electrical work, there's no need to deal with your service panel. But it's important to know where it's located and to keep the area around it clear so that it's accessible in an emergency. It's also a good idea to store a working flashlight nearby in the event of a power outage.

If the door to your home's electrical service panel has scorch marks, that could indicate dangerous arcing. If it's rusted, there may be a hidden water leak. It's best to call a licensed electrician to investigate such issues further.

If your home's electrical service uses fuses, be sure to keep compatible replacements available.

And never insert any metal object (such as a screwdriver) into the panel or attempt to remove the dead front or cover behind the breakers. One wrong move could prove fatal.

Do NOT attempt to perform electrical work yourself if you lack the proper experience and training.

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*Fran Donegan provides advice on a plethora of home improvement topics, including the residential electrical service. To see a selection of distribution and load centers for the home, visit [The Home Depot](#) online.*



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