

## ELECTRICAL 101

*Q; We have bought our first home, it is ten years old and I find the electrical panel frightening, it is not identified and the shut-offs are different numbers. These numbers add up to more than the main shut-off? Could you give an amateur a short lesson on home electricity, some terms and how it works?*

A: It is still surprising to me the number of electrical panels that I see that is either not marked or the identification is wrong. The electrical system in a modern home should not be frightening, respected is the way it should be understood. We are “addicted” to electricity today; our lives depend upon a safe and steady supply. Massive generators produce electricity, they create kilowatts of power. Voltage is the pressure that pushes the electrical supply thru the transmission lines to the lines throughout your home. Transformers located on the hydro pole or the big green box sitting beside the road in your subdivision break this power down for home use. Today’s systems have two black wires and a white neutral wire, each of the black wires contributes 120Volts to the home, and together they create 240 Volts. In a conventional plug, you have 120 Volts, which runs thru one of the black wires and returns thru the white or neutral wire. The electron flow is actually an alternating current that moves at 60 cycles per second. The amount of electricity drawn by the load is rated in amperage or amps as are commonly known. The actual amperage is determined by the shut-offs, which could be fuses or in the reader’s case, breakers. 15 Amps is the most common circuit size for general home wiring. This breaker also dictates what the wire size should be. A 15 Amp circuit for example would be wired with 14-gauge wire. Today all wiring also has a ground wire, this is done to protect the system in the case of a short in the system, and it takes the electricity to a safely grounded point. In a city home this ground wire is generally tied to the copper water supply coming into the home, usually before the water meter. In the country it is buried in the ground to a metal rod or plate. The code in Ontario today states a home must have a 100 Amp supply. Our reader is right, the breakers do add up to much more than 100 Amps. Years of experience and load testing have found that the average home uses less than 100 Amps, unless it is electrically heated. I remember a few years ago Ontario Hydro did a sampling of homes and they found at the peak period of 5-8:00 PM, a family of four used 68.8 amps. The reason a breaker panel has so many breakers is to safely supply different branch circuits to the home and also supply 240 power to your stove and dryer for example.

Our reader's electrical panel will likely contain a number of different sized breakers with numbers on them. A stove is generally wired to a 40-amp breaker. If your home has a cook-top and a wall oven, often they are 30 amp breakers. They will be wired separately if done correctly. The majority of dryers are 30 amps. If your home has air conditioning, it will likely be a 20-amp breaker or if the home is larger, it may be a 30 amp. At ten years of age, our reader should have larger breakers that are still only 15 amps. These are called splits and they are supposed to be designated to the kitchen plugs. Each duplex plug here has access to 15 amps on each plug. This allows high draw items like a toaster or a coffee maker to have its own 15-amp supply. I commonly see electric wall heaters in basements and they are commonly 240 Volt and wired with 12-gauge wire to a 20-amp breaker. I suggest our reader have an electrician review the panel and do a circuit chase to establish what breaker operates which plugs and lights. If you feel comfortable around an electrical panel you can do this yourself. Go to your local hardware store and buy a three prong three prong circuit tester, they are about 10-12 dollars. Pick a warm day, as this will take some time. Make sure any sensitive appliances or computers are shut down and then turn all the 15 amp breakers off. Now, one at a time turn one on and go thru the home and turn on your lights and check the wall plugs. Make a drawing of your home where the plugs are. The tester will light up when you have power at the plug, lights will respond to switches. These testers also will tell you if the ground is not working or the polarity is reversed. If you find any plugs with these conditions, call your electrician. Do it one breaker at a time and you will end up with a map of your home's branch circuit supply. Do not assume the kitchen plugs are designated, check them too. I often find these are doubled up or someone has cheated and added another circuit. Anytime you find an issue with your panel, this is work for a qualified electrician.

A home at this age should have plugs in the bathrooms and the exterior that are protected by Ground Fault Circuit Interrupters. These plugs are designed to detect any potentially wet conditions and will sense the current leak and shut the power off within 1/30<sup>th</sup> of a second. You should test these monthly. The plug will have two small push buttons, one marked test and the other reset. When you push the test button, the reset should trip. If it doesn't, time to replace these and this is also a job for your electrician. Treat electricity with respect and it will serve you well, if you are not sure though, have your electrician review any problems as electricity is not forgiving and can cause serious harm, there are no second chances.