ductor has nothing to do with the operation of GFCIs.

The GFCI senses an imbalance of current between the "hot" and "neutral conductor." The GFCI really does not care about the current draw (amps) passing through, as long as it is within the designed limits of the device. Rather, it is monitoring the current difference in milliamperes between the hot and neutral. A milliamp is .001 or 1/1000th of an ampere. If this difference is at 5 milliamperes, plus or minus 1 milliampere, the device "trips out," breaking the circuit.

A hand-held hair dryer that is rated at 1,400 watts, 120 volts, will have a current draw of approximately 11.6 amperes, or 11,600 milliamperes. An industrial 3/8-inch electric drill will have a current draw of between 4 and 6 amperes, or 4,000 to 6,000 milliamps.

While electricity performs many tasks for us and makes our lives more enjoyable, it is basically lazy. The lazy part is that it will seek the path of least resistance to a grounding source. The resistance in a copper wire used as the grounding conductor is very low and will allow current to flow rather freely. In the event of an electrical fault in equipment that has a grounding conductor, the current will flow to ground on the conductor.

Effects of Electricity

The adult body has about 500 Ohms of resistance. If a person's body were to become the path to ground, the body would become a high impedance ground path. There is not enough current flowing through the body to trip an overcurrent device (a fuse or circuit breaker; the GFCI is not an overcurrent device.)

In order for an overcurrent device to trip, the current draw (amps) must exceed the rating of the device. For example, a circuit breaker rated at 20 amperes will not trip open until the current exceeds the 20 amperes. Using Ohm's Law, on a 120 volt circuit with 500 Ohms of resistance, the current level would be 240 milliamperes, or about 1/4th of an ampere. Even though this seems like a small amount of current, it is quite deadly when passing through the body.

Shock in the range of 6 to 30 milliamps can be very painful, and the person in contact cannot let go of the circuit. At around 50 milliamps respiratory arrest is possible, with severe muscular contractions. Ventricular fibrillation starts around 67 milliamperes of current. This is when the heart basically starts fluttering and is not pumping blood through the system. If not stabilized, death is a real possibility.

So you can see that if the GFCI is functioning properly the current level will never reach the danger point—because it trips at 5 milliamperes.

Testing GFCIs

UL 1943 is the standard for testing GFCIs. Each manufacturer must ensure that its product meets this standard. Included in the listing and labeling for GFCIs are instructions that they be tested monthly.

Both the National Electrical Code and OSHA's electrical standards require that equipment shall be used and installed in accordance with any instruction included in the listing and labeling. The purpose of this is to ensure as much as possible that the device is functioning properly.

The test is a very simple procedure where one can press the test button on the device to ensure that it does trip, breaking the circuit. This test button creates a difference of 5 milliamperes between the hot and neutral through a resister built in the device. There are GFCI testers in the mar-