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Electrical Safety— Ground Fault Circuit Interrupters

Fred M. Crawford, Department of Agricultural Engineering
College of Agriculture

A ground fault circuit interrupter keeps you from getting shocked when you use a defective electrical appliance. It interrupts the flow of current, limiting the magnitude and time of flow to harmless levels.

According to the National Electrical Code, all residences must have ground fault circuit interrupters for all 120 volt, 15 and 20 ampere receptacle outlets installed in bathrooms, garages, and outdoors where there is direct grade level access. The Code further states that ground fault protection may be provided for other circuits to protect against shock.

A current of 60/1000 ampere can be fatal if it flows through a person for one second. A current of $\frac{1}{3}$ ampere can kill a person if it flows for $\frac{1}{3}$ second. In either case, this is much less than the 15 or 20 amperes required to "blow" a fuse or trip a circuit breaker. A current of 8/1000 ampere sometimes exceeds the "let go" threshold of some individuals.

A ground fault circuit interrupter (Figure 1) will interrupt flow of 5/1000 ampere in 25/1000 second. This restricts the amperage and time so an individual will not be harmed.

A normal household circuit has two conductors. One is neutral and should have white insulation. The other is the "hot" wire with black insulation. If the hot wire insulation fails and the wire touches the metal case of a toaster or other ungrounded appliance, the case becomes electrically "hot." Anyone touching the case (Figure 2) while also touching a grounded object such as a faucet may get a severe shock.

In addition to shock protection for residential circuits as mentioned above, the NEC also specifies ground fault interrupters for receptacles and lighting fixtures around swimming pools and for all electrical equipment used with storable swimming pools.

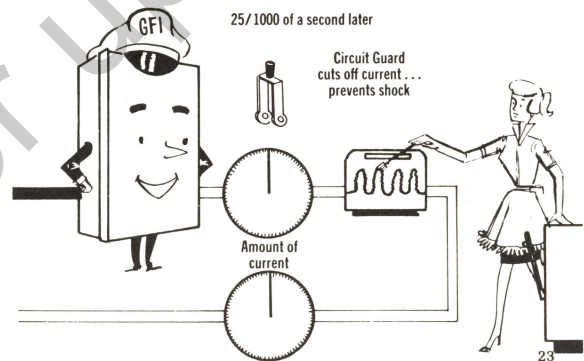


Figure 1. A ground fault interrupter will interrupt the flow of current within 25/1000 of a second when trouble occurs.

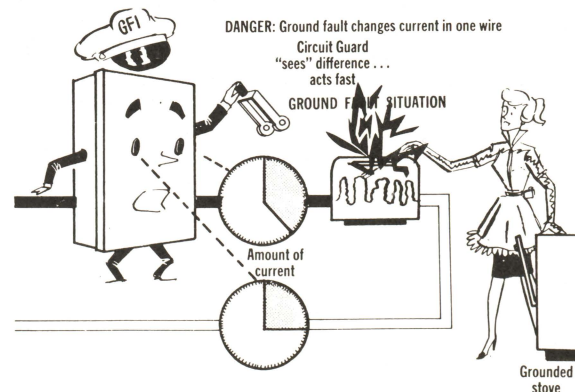


Figure 2. If the wiring of a toaster or other appliance is defective, anyone touching it and a grounded object will be in a position to conduct current through his body to the ground.

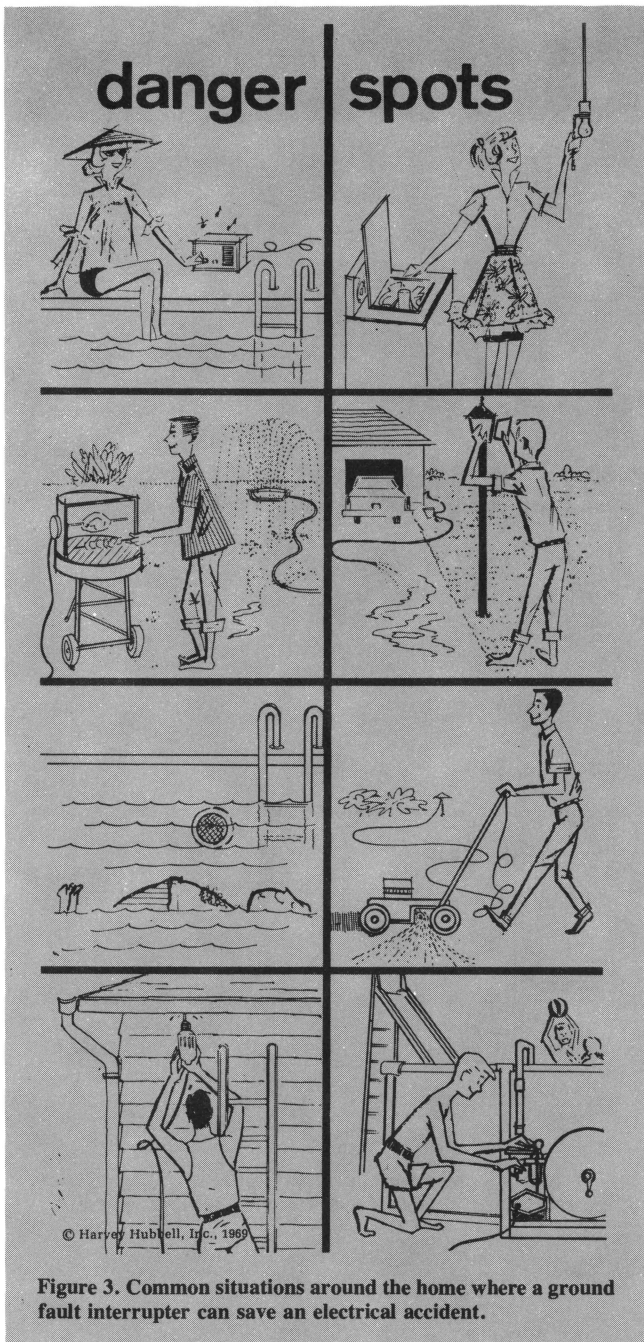


Figure 3. Common situations around the home where a ground fault interrupter can save an electrical accident.

Acknowledgment

Figure 5 is courtesy of Square D Company, and Figures 1, 2, 3, 4, 6 and 7 are courtesy of Harvey Hubbell, Inc.

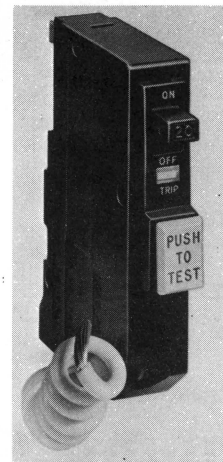


Figure 4. A circuit breaker type of ground fault interrupter fits in space normally occupied by a circuit breaker.



Figure 5. Plug-In ground fault interrupter plugs into regular home receptacle, offering protection from equipment connected through it

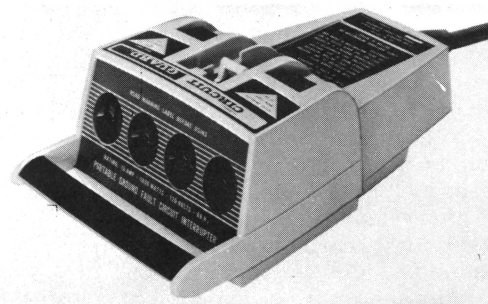


Figure 6. Portable ground fault interrupter may be plugged into outlet and equipment connected to it.