

Arc Fault Circuit Interrupters

Increasing electrical fire safety:

There is a new type of circuit breaker that promises to reduce the number of electrical fires in homes. Some new homes already have a few installed. The 'arc fault circuit interrupter' or 'AFCI' is reported to detect sparking in the electrical system and can shut the affected circuit down before it causes a fire. Since this device is quite new, the jury is still out as to whether it is saving lives and property. In the mean time, here is what it's all about.

The National Fire Incident Reporting System (NFIRS) estimates that fire damage, caused by electrical distribution equipment, cost \$680,000,000 in 1998.

According to the Consumer Product and Safety Commission (CPSC) wiring problems are associated with 40,000 home fires and 1,400 injuries including the loss of 350 lives each year.

There are two ways a household electric circuit can cause a fire, one is overloading the circuit, the other is sparking. Standard circuit breakers or fuses are quite good at protecting a circuit if it is overloaded but they may not trip if there is a problem in the circuit that causes intermittent sparking.

For example in *Diagram 1*: if you hammer a nail into the wall to hang a picture and it pierces an electrical cable, you could sever a wire or create an intermittent short. The result is intermittent sparking that may not trip the circuit breaker but could easily cause a fire. The sophisticated electronics inside the AFCI is designed to detect just this kind of problem.

In *Diagram 2*: a piece of furniture is pushed up tight to the wall and is pushing on a lamp cord. The cord is forced into a tight bending radius next to the plug. This could eventually damage the cord. Sparking, and ultimately a fire, could result.

Here are a few other electrical hazards that could cause sparking:

- A frayed extension cord running under a carpet or pinched in a door jamb.
- Old and cracked insulation on electrical wires and cables
- Loose electrical connections

What's the difference between an AFCI and a GFCI?

A GFCI is a ground fault circuit interrupter. It protects people from getting serious electrical shocks. You will typically find them installed where the risk from electrical shock is high like in bathrooms (see Bulldog® Info Series on GFCIs). In short, GFCIs protect people from serious electric shock and AFCIs protect homes from electrical fires caused by sparks. There may ultimately be a device that does both.

What do they look like and where will they be installed?

An AFCI is a special circuit breaker that fits into the electrical panel in place of a standard circuit breaker. It looks like a GFCI circuit breaker except that the AFCI has a blue test button and the GFCI has an orange test button.

The requirement for AFCIs is creeping into local electrical jurisdictions. In 2002 it became a requirement of the National Electrical Code that bedroom electrical outlets and their branch circuits be protected by AFCIs. What this means is, you will see AFCIs in new homes in areas that have adopted the 2002 electrical code. Even in these areas, they are only required for bedroom outlets.

Does this mean they can't be install in existing homes or that they can only be used for bedroom outlets? No. They can be installed in any home with a modern circuit breaker panel. Before you ask your electrician to replace all of your breakers with AFCIs here are a few things you should know:

- They are still quite expensive, about \$40 to \$60 dollars per breaker. For a typical panel, this could cost \$1,500 not including labor.
- AFCI breakers may not be available for an old panel.

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The high cost of AFCI breakers is one reason why they are only required for bedroom receptacles right now. The idea is to introduce the device to the public, monitor the reaction and the gauge whether they are functioning as expected. In time, AFCIs will become less expensive.

Can it make an old electrical system safer?

Old wiring has likely endured many years of modifications and abuse. You would expect that old wiring is more likely to spark than new wiring. In particular, knob and tube wiring has had lots of attention from the insurance industry. It would seem that the AFCI is the ideal retrofit for older wiring. Unfortunately the AFCI has not been tested under these conditions. Certifying laboratories and electrical authorities cannot assure the public they will perform as expected for old wiring. In theory they should work.

Not quite electrical Nirvana:

It will take several more years before the statistics are in. In the mean time we can assume that AFCIs will reduce the chances of electrical spark induced fires. By how much, nobody knows. The intention of electrical authorities is that ultimately every breaker in your electrical panel is either an AFCI or a GFCI or a device that is both. People would be protected from serious electric shock and homes would be protected from electrical fires. We are still several years, and a few growing pains, away.

Bulldog® advocates safety in the home and would encourage anyone that feels they would benefit from AFCIs to consult an electrician for an opinion. We would like to make one thing clear. We do not believe AFCIs are an excuse to live with an unsafe electrical system. AFCIs are not a quick fix for dangerous wiring. Improper or unsafe wiring conditions should be dealt with promptly by a qualified electrician.

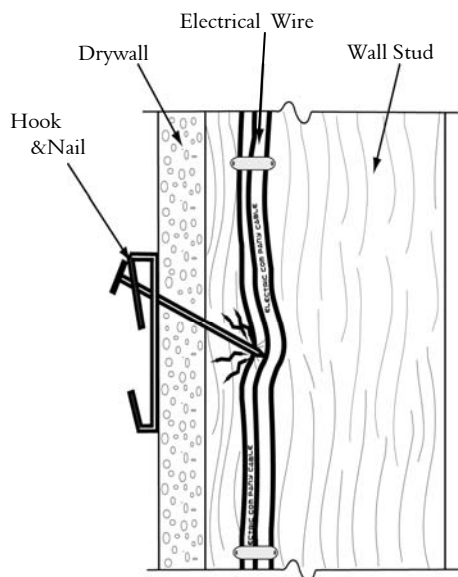


Diagram 1
Nail in Electrical Wire

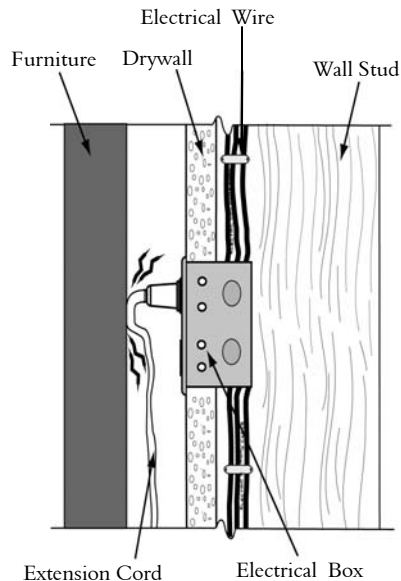
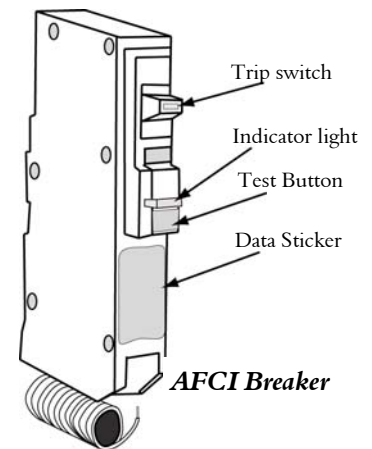


Diagram 2
Furniture Against Cord



AFCI's have a test button on them and should be tested monthly. Press and hold the test button, the AFCI should trip. To Re-set the AFCI, switch the breaker to the off position and then switch to the on position.