Electrical Risks, Safety and Solutions for Older Homes

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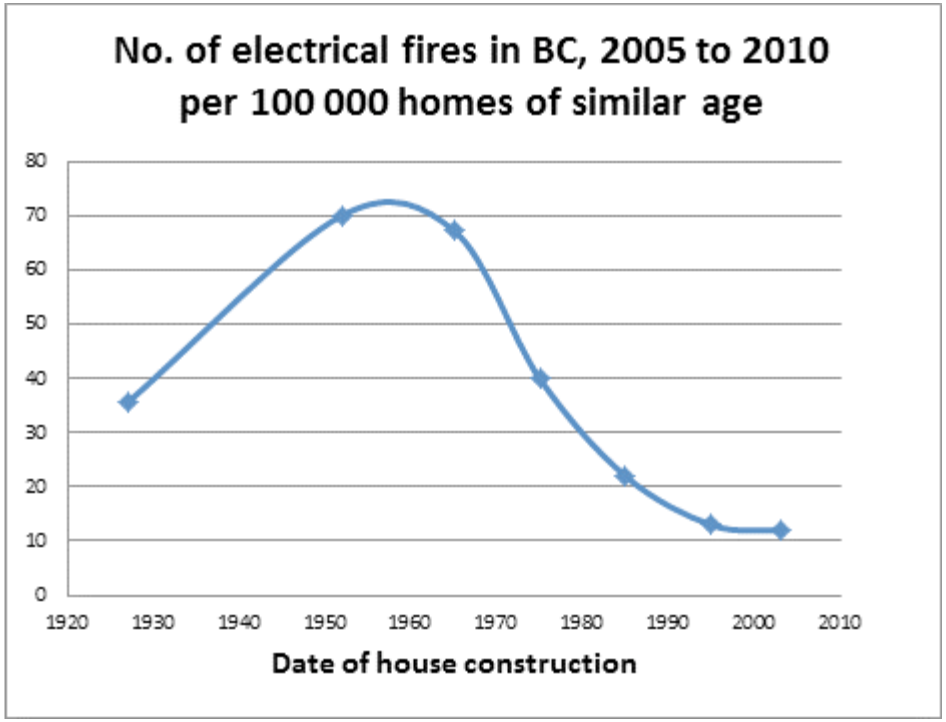
www.powercheck.ca

BC Fire Statistics

- Reported fires per year
  - Reported fires: 4500–6000
  - Fire fatalities: 18–32
- Electrical fires:
  - 186 (5 year average)
  - Represents about 10% of residential fires
- In about 40% of reported fires the cause of fire is unknown. Electrical may have been the cause.

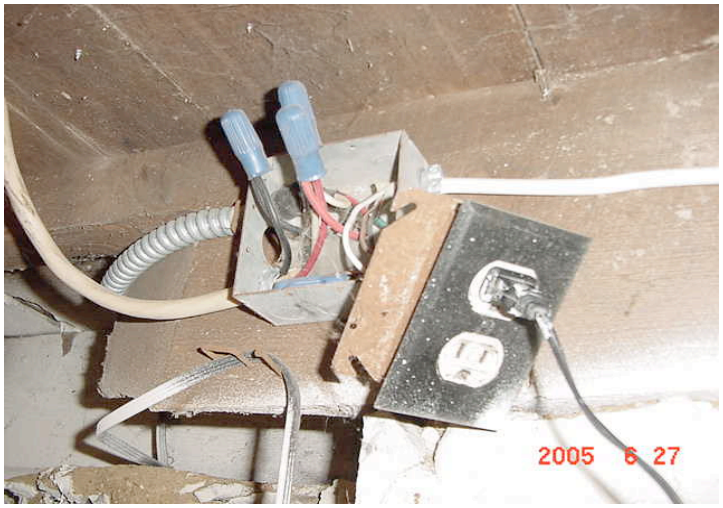
Old house: Higher probability of fire



In 25%, house construction date unknown. Data source: BC OFC

What is causing the electrical fires?

- **Original wiring**
  - Important to check, sometimes faulty
  - Not the leading cause of fire
- **Handyman tinkering**
  - Accounts for the vast majority of electrical fires.
  - Probability of handyman tinkering present increases with age of home
  - **Old houses often found rampant with “Hazardous handyman add-ons”!**

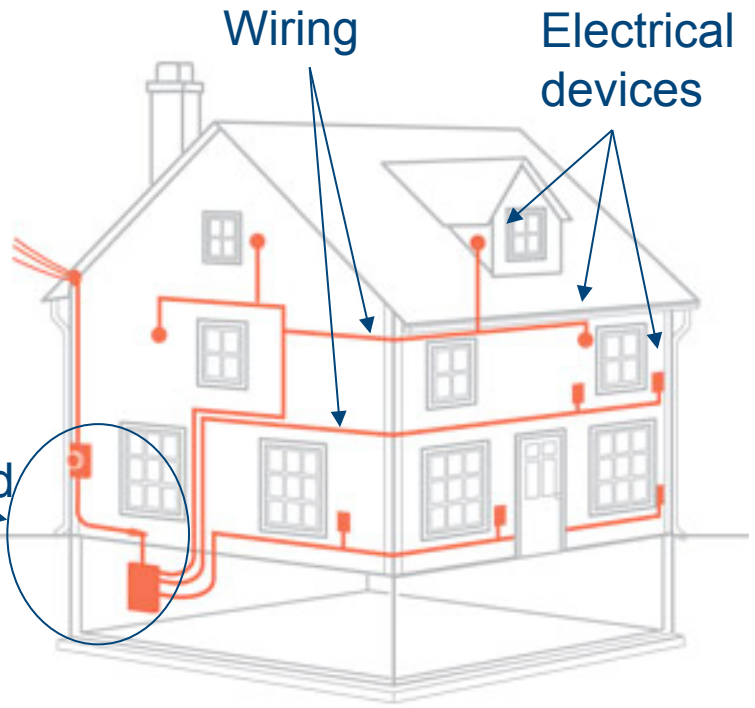


Hazardous add-ons are common in older houses. These dangerous additions put the house at high risk of electrical fire.

Electrical System Components

Three components to your electrical system:

1. **Service & Panelboard**
2. **Wiring**
3. **Electrical devices**
   (switches, receptacles, lights)



Service size: 100 amps or 60?

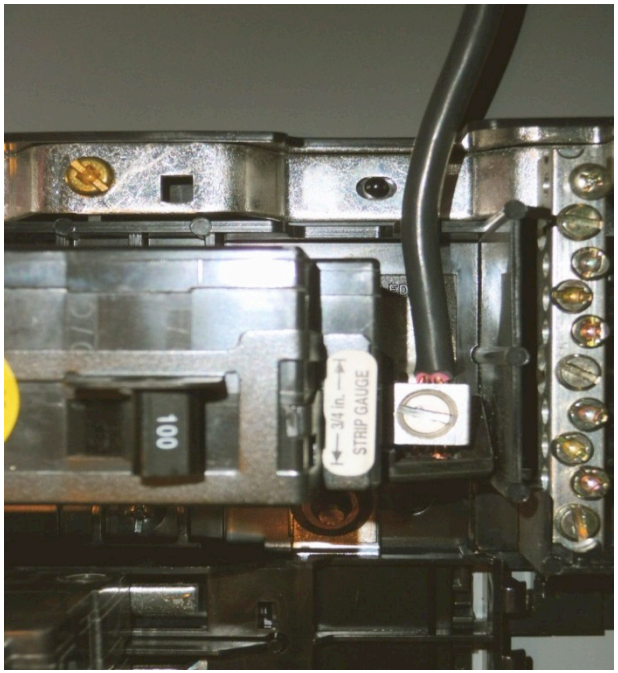
- Until the1970s, 60 amp service was the norm in single-family homes
- **If there has been no additional circuits: Original 60 amp service is still acceptable and safe today**
- 60-amp service is often not recognized.

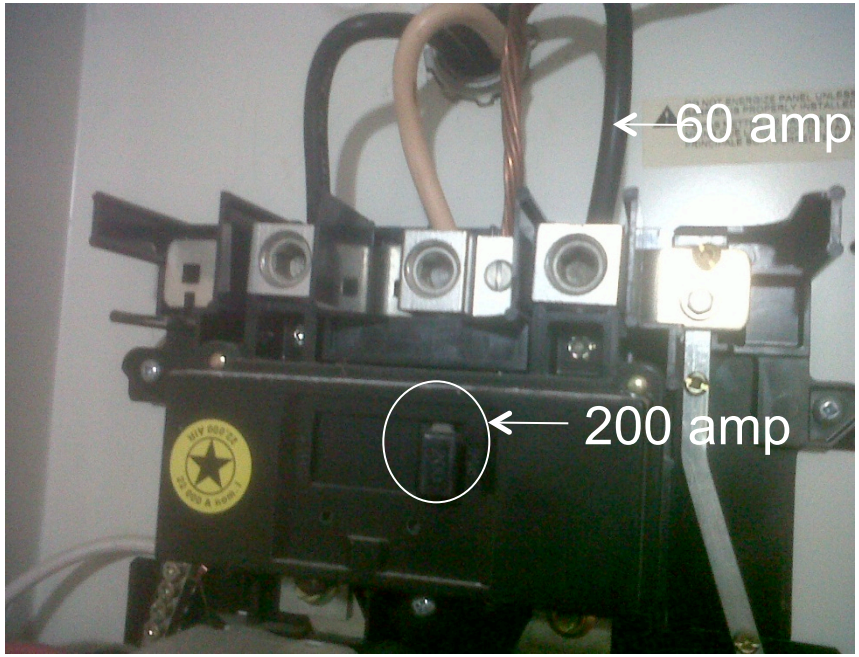
"Rated for 100 amps"

60-amp fuses, 60-amp service

Enclosure is rated for 100 amps but inside box is 60 amp service

Main circuit breaker can present incorrect service size





These illegal upgrades present what appears to be 100 & 200 amp services, but in fact both are very hazardous 60 amp services (Note the wire size: 60 amps).

Common hazard in panelboards: Overrated circuit breakers

15 amp circuit breaker

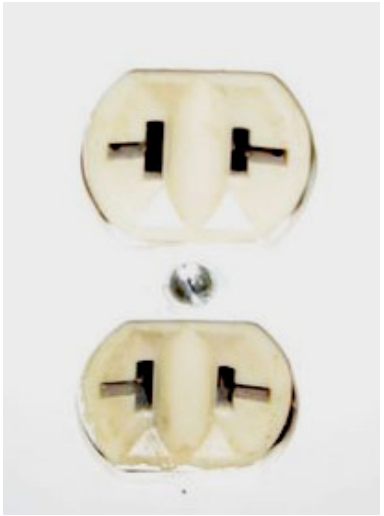
30 amp circuit breaker

Overrated circuit breakers can result in over-heated conductors

The circuit breaker provides the protection of the wires from overcurrent. If the circuit breaker is oversized, it won't trip when needed

Wiring before 1950

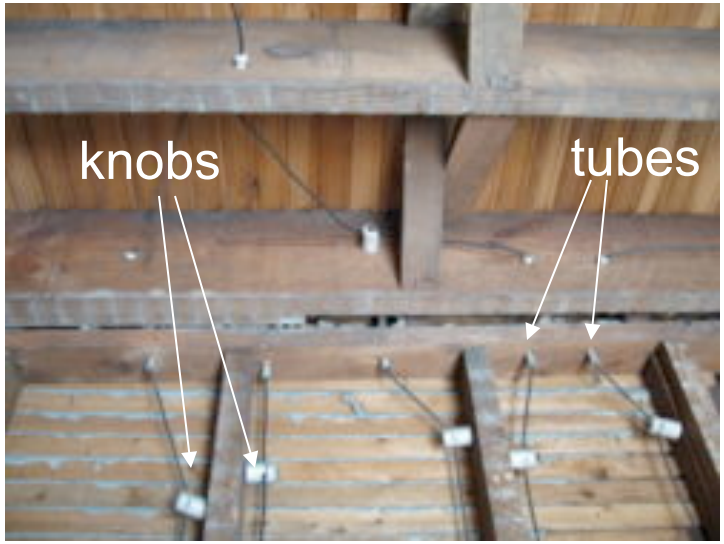
- **Knob-and-tube.**
  The *standard* in homes before 1950.
- **If outlets have been changed, and basement enclosed, knob-&-tube often not identified.**
- **Knob-&-tube: Still present in *most* pre-1950 homes today.**



Original two-prong, ungrounded receptacle. Prior to 1950 this would have been fed by knob-and-tube conductors

Knob and tube: Qualities

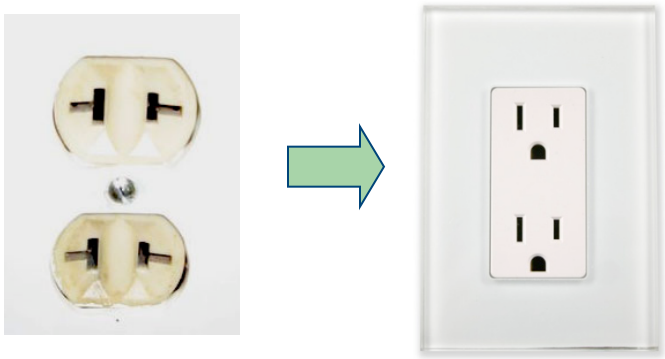
- **A well designed system:**
  - Heavy gauge conductors
  - Spaced well apart
  - Soldered connections
- **Work *seldom* done by non-professionals**



Knob and tube wiring runs along the studs and through the joists of older homes.

Knob and tube: Hazards

- No ground protection
- Not suitable for high-temperature lighting
- Handyman add-ons



Original 2-prong outlet swapped for modern 3-prong, falsely presenting receptacle is grounded.

Knob and tube: Solutions

1. **Rewire: $20,000 +**

   or

2. **The wiring usually checks out fine:** Therefore GFCIs provide excellent ground protection**: $20 each**

AN EXCELLENT & SAFE SOLUTION!

GFCI receptacle provides excellent ground protection.

Knob and tube findings

In 99% of homes:

- **Knob and tube wiring is still in homes today**
  – Usually not visible due to new panel and finished basement.
- **Knob-and-tube wiring is in excellent condition**
  – No need for expensive replacement, but:
- **Original 2-prong outlets now modern 3-prong**
  – Falsely presenting outlets are grounded, thus rated **"High Risk"**

Cost to eliminate fire risk of knob-&-tube: Less than **$500**

RESULT: SAFE AND HAPPY HOMEOWNERS!

Wiring of the 1950s

- Ungrounded wiring continued through the 1950s.
- Same concerns as knob-&-tube
- Requires GFCIs for ground protection

Ungrounded 2-prong receptacle fed by “modern” cable, NMD1

Wiring of the 1960s

- **Grounding of receptacles: 1962**
- **New cable introduced with ground**
- **Insulation still not suitable for high-temperature lighting**

New cable of the 1960s **"NMD3 with ground"**.

Wiring of the 1970s

- Modern electrical cable introduced, suitable for recessed lighting.
- **Hazardous wiring abounds!!:**
  - Due to the rapid rise in basement suites, kitchen renos & powering of garages: Unauthorized electrical work thrives.
  - This is encouraged with the proliferation of self-help books and easy access of electrical supplies.

Modern cables: NMD7 & NMD90
But along with it comes “do-it-yourselfers”.

The Aluminum Years: 1966–1974

- Aluminum wiring: A cost-effective solution due to the high price of copper 1966–1974
- Installed in the *vast majority* of homes during that period
- Still present today in nearly all of these homes

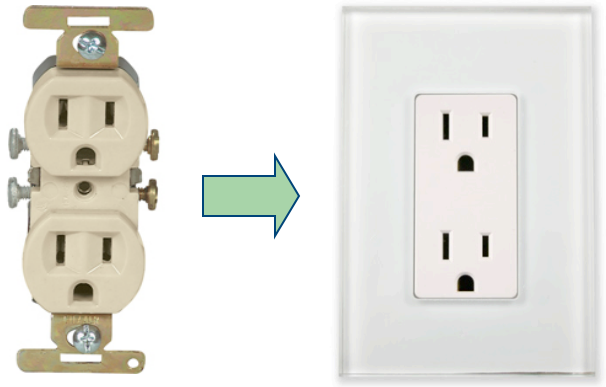
An aluminum-rated receptacle for use with aluminum wiring.

The Aluminum wiring fire hazard

- Original system fine

  however

- Original outlets and switches swapped for modern outlets and switches not rated for aluminum



Original aluminum-rated outlets are commonly found swapped for modern, non-aluminum-rated outlets.

The Aluminum wiring solution

1. **Rewire: $20,000 +**

   or

2. **Approved copper pigtailing** (or aluminum rated devices) **Typical cost: $1000 - $1500**

   NOTE: “Approved” means with the correct wire connectors

Aluminum-wiring pigtailing with incorrect wire connectors; commonly found.

Hazardous add-ons Abundant in older houses!

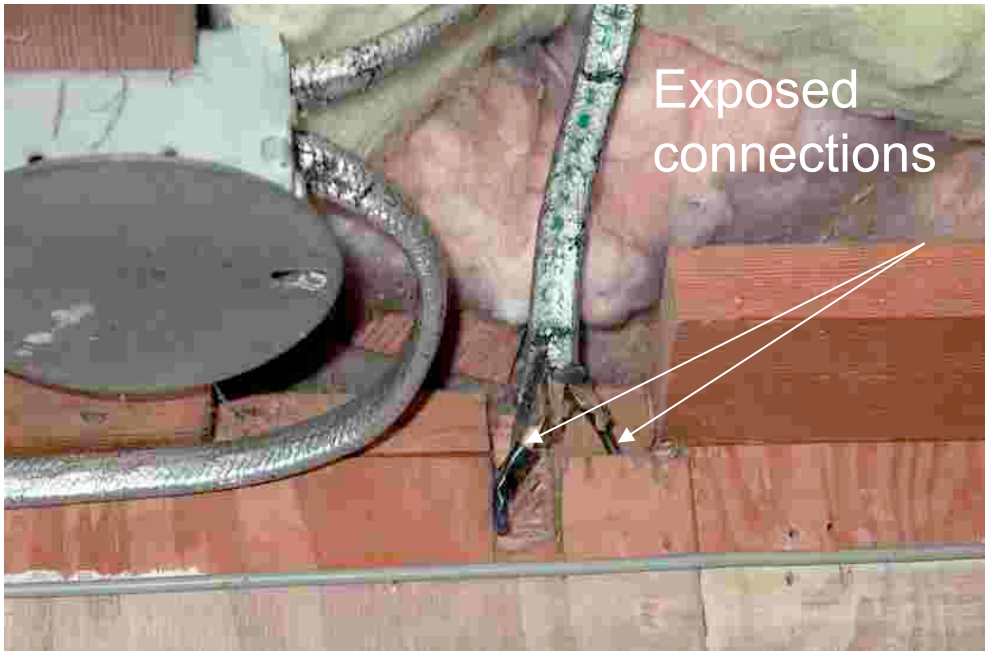
- Undersized cables
- Incorrect cables
- Ungrounded cables
- Oversized circuit breakers
- Bad electrical connections
- “Mouse holes”
- BX cables incorrectly installed

- **All these deficiencies create Real fire hazards!**

Hazardous add-ons
Exposed electrical connections

If connections become at all loose they will arc, easily igniting surrounding wall material.

Common



Hazardous add-ons
No junction box behind lampholder

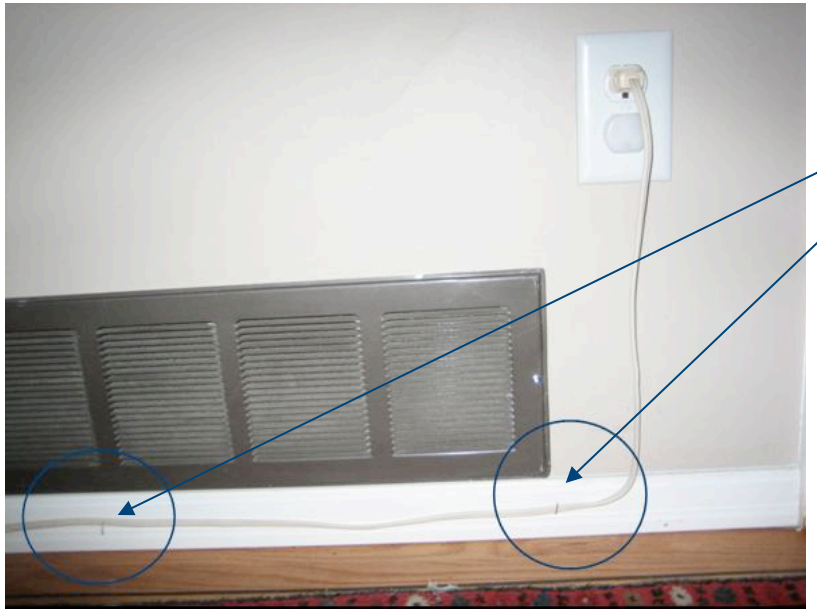
If connections become at all loose they will arc, easily igniting surrounding ceiling material.

Common

Hazardous add-ons
Extension cords stapled to walls

Staples put pressure on cord. Over time the cord insulation breaks down. The staple then creates a direct short across the wires, which can easily result in fire.

Common



Hazardous add-ons
Baseboard heaters incorrectly installed

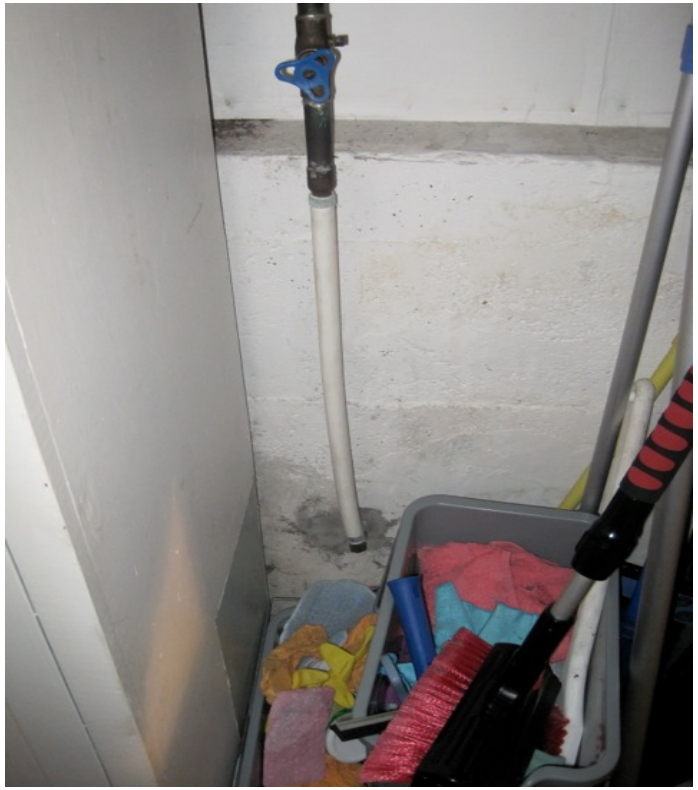
Incorrect installation can easily result in electrical fires.

"Seven firefighters said the fire began about 1 a.m. near an electric baseboard heater. Three children died, ages 6, 2 and 14 months" (Cleveland News, Dec 5, 2007).

Inadvertent actions can create fire hazards

- Copper water pipe repairs with "**PEX**" can disconnect the grounding
- Old **hot-water-tank cable,** live and dangling; often near the gas line.

- **These deficiencies create Real fire hazards!**



Summary

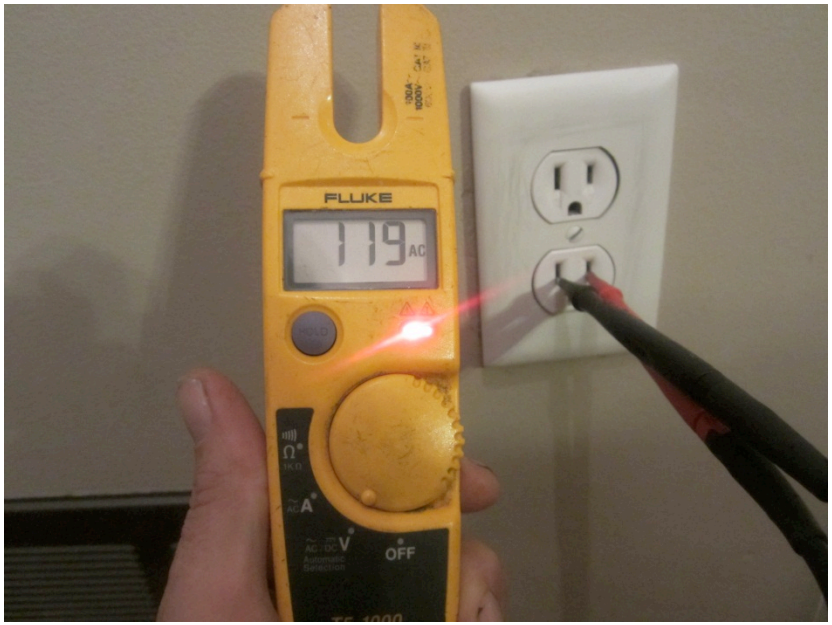
- Electrical fire hazards in most homes built before 1975.
- Though deterioration of older wiring is occasionally found, the vast majority of fire hazards are due to handyman tinkering.

A solution for safety: An electrical examination

An electrical examination finds out what needs to be done to make house safe!

The PowerCheck examination

- Comprehensive
- Conducted by master electrician (FSR in BC)
- Third party examination only



The result

- Safe houses
- Happy homeowners

Over 4000 clients have had their electrical system examined by PowerCheck. Nearly all have said, "***It was the best thing that we have ever done***".