Electrical Risks, Safety and Solutions for Older Homes

Presented by:
Brian Cook

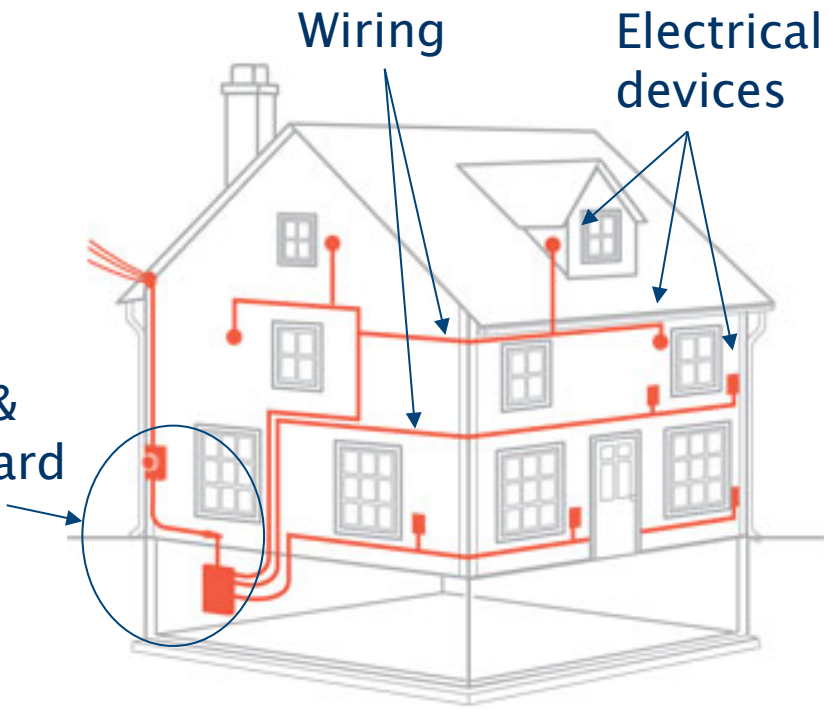
PowerCheck Electrical Safety Services

www.powercheck.ca

Electrical System Components

Three components to your electrical system:

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

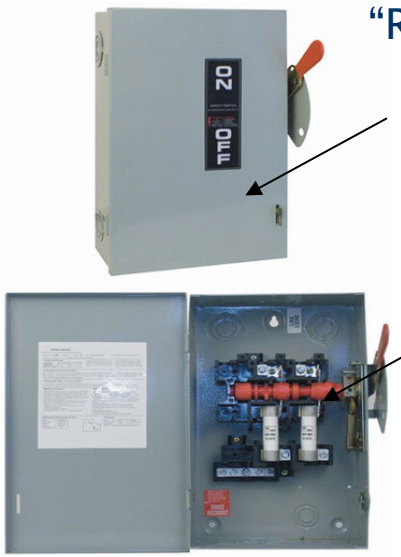


Service grounding often broken

- Copper water pipe repairs with "**PEX**", often found:
  - Disconnecting the service grounding, or
  - Water-pipe bonding

Service size: 100 amps?

- Often misdiagnosed as 100 amp, when in fact it is 60.

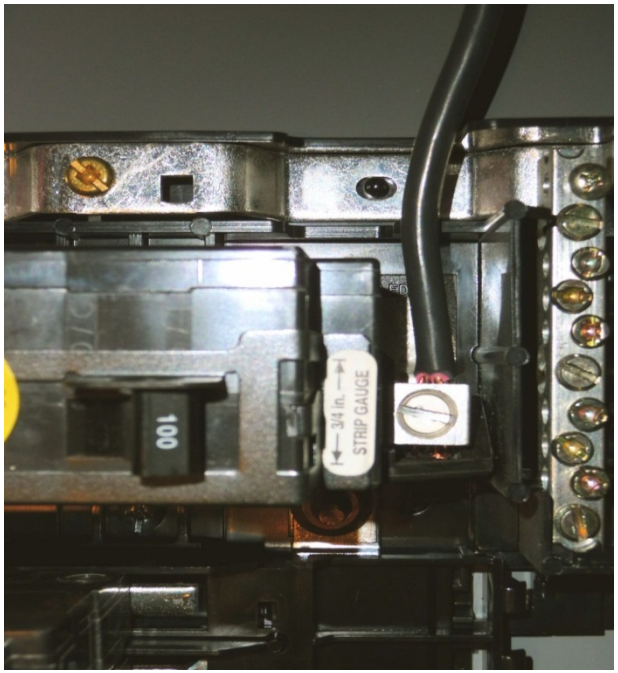


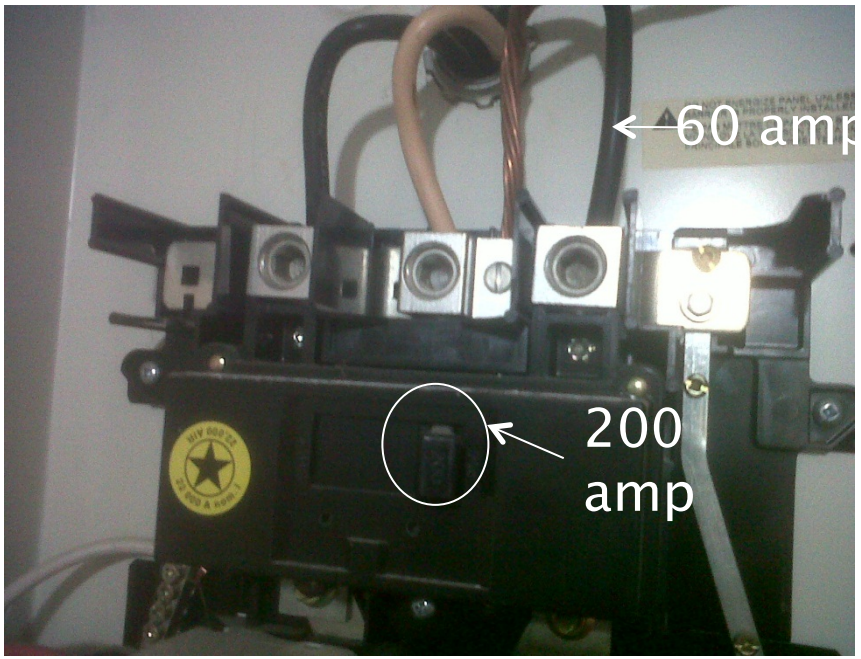
"Rated for 100 amps"

60-amp fuses, 60-amp service

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

Hazardous handyman upgrades!





Commonly found: 100 or 200 amp breakers on 60 amp services

Oversized circuit breakers

15 amp circuit breaker

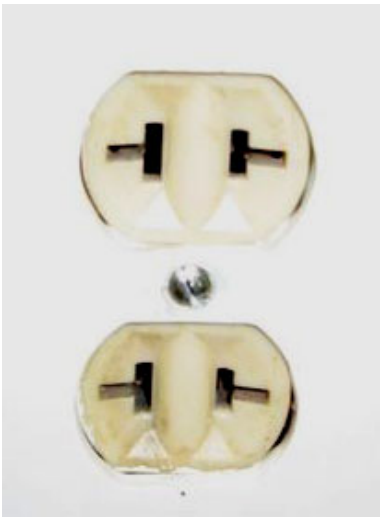
30 amp circuit breaker

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

Pre-1950 wiring: Knob-and-tube

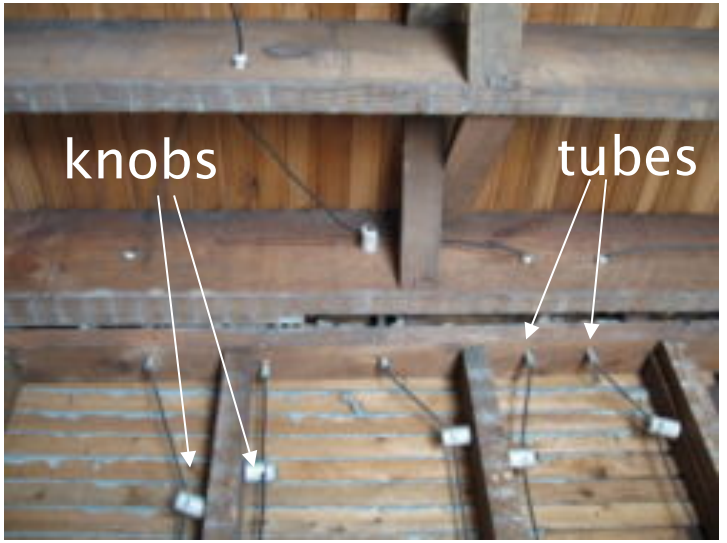
- **Knob-and-tube. The *standard* in homes before 1950.**
- **Knob-&-tube: Still present in *most* pre-1950 homes today.**



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

Knob and tube: Qualities

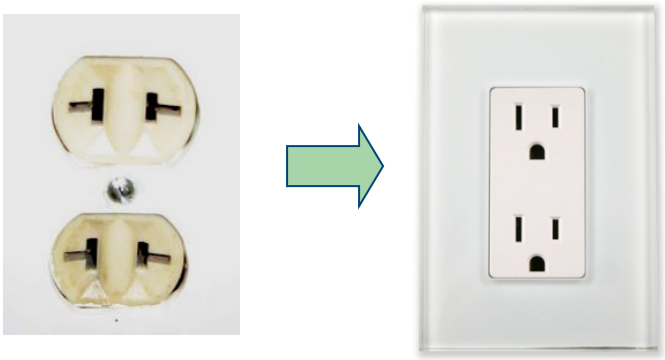
- **A well designed system:**
  - Heavy gauge conductors
  - Soldered connections
  - Spaced greater than 6" apart
- **Work *seldom* done by non-professionals**



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

Knob and tube: Hazards

- In nearly every house we have seen, the original outlets have been changed for modern 3-prong
- No ground protection
- Hazardous? YES!!



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

Solutions

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

   or

2. **If the wiring checks out fine:** GFCIs provide fabulous ground protection: **$20 each**

A SAFE SOLUTION!

GFCI receptacle provides excellent ground protection.

Findings

In 99% of homes built pre-1950:

- **Knob and tube wiring is present**
- **Knob-and-tube wiring is in fine condition**
- **Original 2-prong outlets now modern 3-prong**

Cost to get safe: Less than **$500**

1950s: Knob & tube in a jacket

- A modern cable: called NMD1
- Identical concerns as knob-&-tube
- Requires GFCIs for ground protection

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

1960s: NMD3 “With ground”

- **Grounding of receptacles became code: 1962**
- **Insulation still not suitable for high-temperature lighting**

New cable of the 1960s **“NMD3 with ground”**.

1970s: NMD7, modern wiring

- Now suitable for recessed lighting.

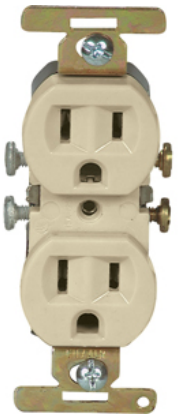
  However…

- **Now the handyman wiring abounds!!**
  - Due to the rapid rise in basement suites, kitchen renos & powering of garages
  - Encouraged by self-help books and easy access of electrical supplies.

Along with modern cables comes "**Do-it-yourselfers**".

Aluminum: 1965 – 1975

- A cost-effective solution due to the high price of copper during Vietnam War
- Installed in the *vast majority* of homes during that period
- Often not identified



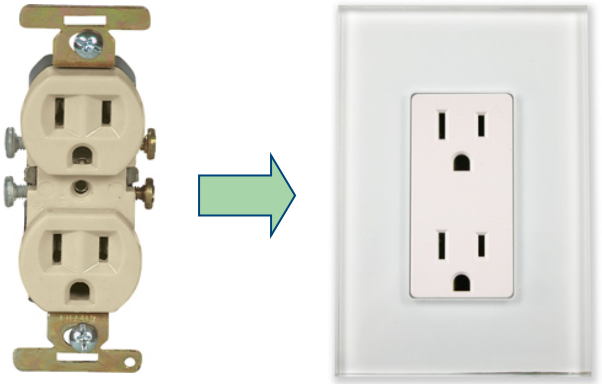
An aluminum-rated receptacle for use with aluminum wiring.

Fire hazard

- Original system fine!

  However

- Original outlets & switches swapped for modern outlets & switches **not rated for aluminum**



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

Solution

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

   or

2. **Copper pigtailing, with APPROVED wire connectors Typical cost: $1000 – $1500**

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

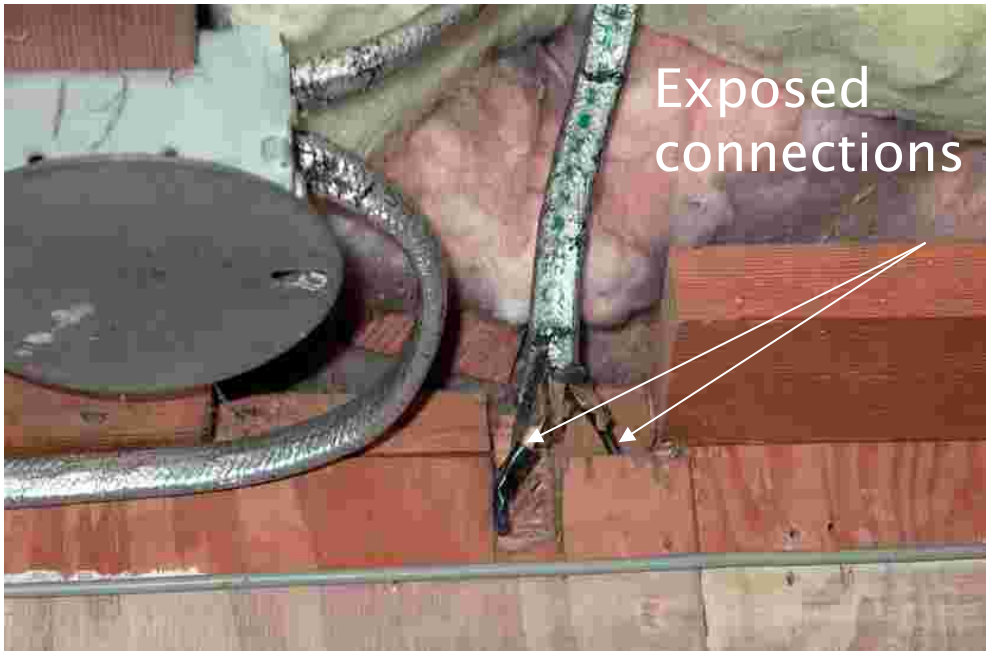
Hazardous add-ons: Abundant in older houses!

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

Hazardous add-ons create Real fire hazards!

Examples: Exposed electrical connections

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

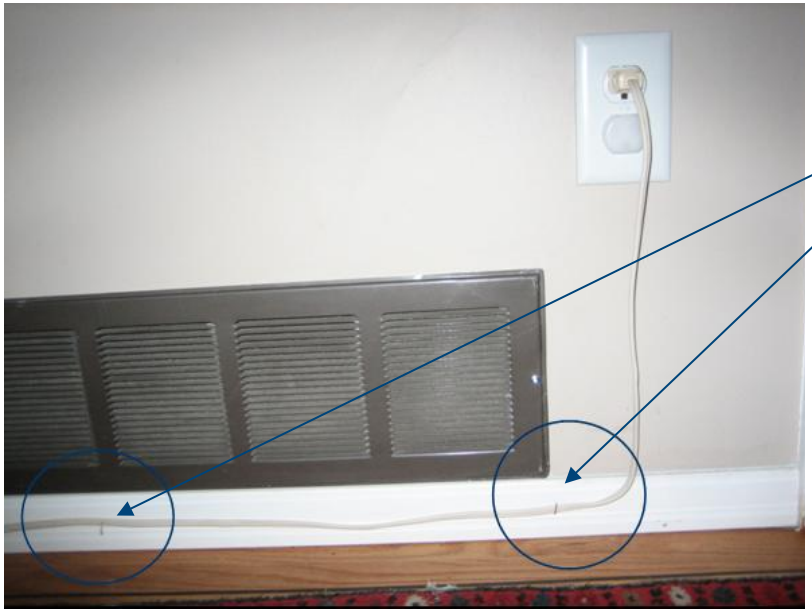


No junction box behind lampholder

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

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.



Equipment not grounded

Grounding is the safety net that protects the house in the event of a spark.

So commonly found to be missing!

"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).

Best indicator for level of risk

- Age of home!!
- If house has an illegal suite
- If any handyman renovations have taken place