# Electrical Risks, Safety and Solutions for Older Homes

Presented by:
Brian Cook

**PowerCheck Electrical Safety Services**

www.powercheck.ca

# Welcome!

Today we are going to talk about electrical systems in a home, and the hazards associated with improper or “handyman” work!

# Agenda

- Background: Higher risk in older homes
- Three components of an electrical system
- Value of an electrical inspection

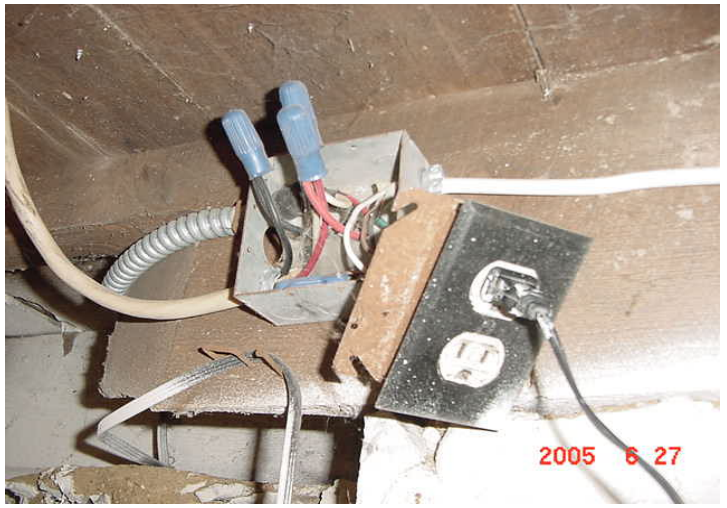
# Older buildings: Higher risk!!

- About 200 electrical fires per year reported in BC
- As buildings age the risk of fire increases.
- "*The frequency of fires in residential electrical systems was disproportionately high in homes more than 40 years old*" (CPSC, 1987).

With an electrical check up by a qualified person, electrical fires will be prevented.

# What is causing electrical fires?

- **Handyman tinkering**
  - accounts for the vast majority of electrical fires.
  - is often found rampant in older homes.
  - tends to accumulate over the years resulting in older homes being particularly at risk.
- **Did you know:** the only person allowed to do an electrical installation in your home is a **licensed electrical contractor**

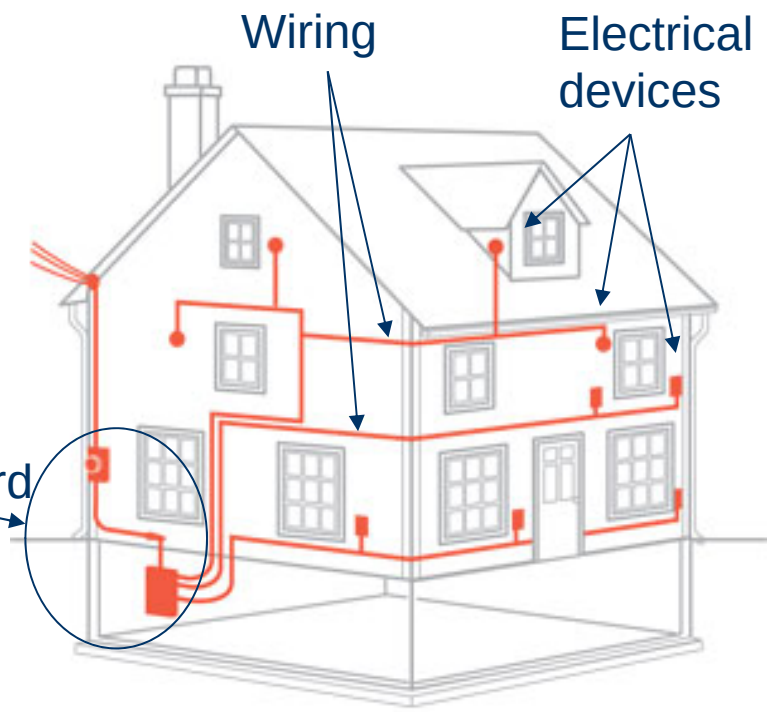



ALL TOO COMMON. These types of hazards are commonly found, independent of knob-and-tube replacement or service upgrade.

# Electrical System Components

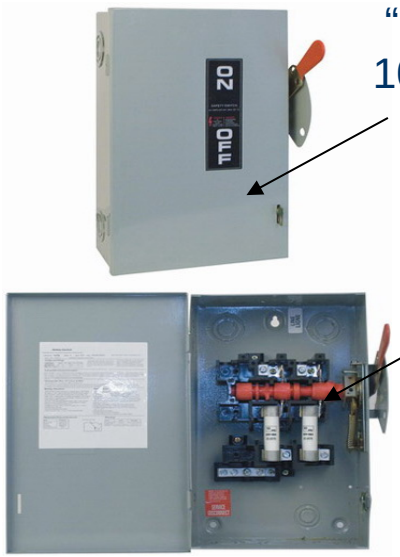
Three components to your electrical system:

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



# Service: 60-amp

- Until the1970s nearly all homes had 60-amp service.
- Many homeowners do not know their home has 60-amp service.
- Today, a minimum of 100-amp electrical service is recommended.
- Ask an expert for correct service size and acceptability. Homeowners should not try to determine this on their own!




"Rated for 100 amps"

60-amp fuses, 60-amp service

Old service boxes often have the wording "***Rated for 100 amps***". This refers to the box rating, not service size.

# Common hazard in panelboard: An over-rated circuit breaker…

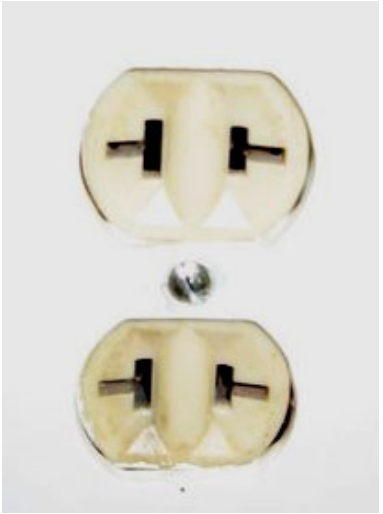

**15-amp** circuit breaker


**30-amp** circuit breaker

# …can create over-heated conductors

# Knob and tube Wiring: pre-1950

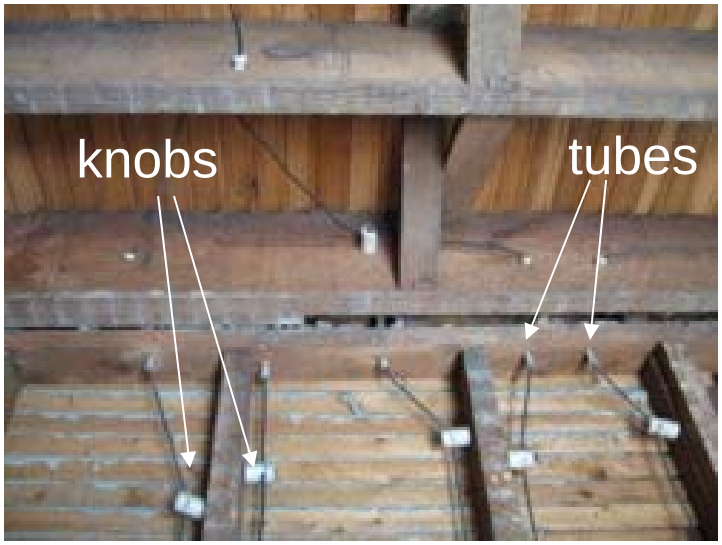
- **Installed in nearly all homes built before 1950.**
- **Still present in *most* pre-1950 homes today.**
- **Designed for “two-prong” receptacles.**



Two-prong receptacle

# Knob and tube: Qualities

- **Identification:**
  - Two single conductors
  - Supported by porcelain knobs and tubes
- **A well designed system:**
  - Heavy gauge conductors
  - Spaced well apart
  - All connections soldered
- **Work *seldom* done by non-professionals**

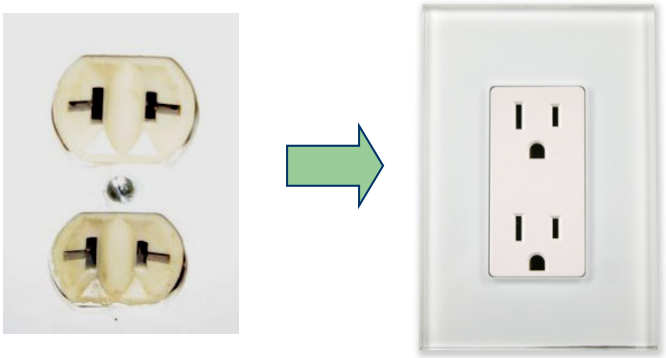



Behind the walls, knob-and-tube wiring provides power for lights and receptacles throughout an older homes.

# Knob and tube: Hazards

- Original 2-prong outlets swapped for modern 3-prong:
  **Hazard: NO GROUND PROTECTION**
- Original lighting exchanged for recessed lighting (pot lamps)
  **Hazard: INSULATION BREAKS DOWN**
- Due to limited number of outlets:
  **Hazard: DANGEROUS ADD-ONS**

**ALL FIRE HAZARDS!**



In nearly all older homes, the original 2-prong outlets have been found swapped for modern 3-prong without the proper wiring, which falsely presents that the home has been rewired & outlets grounded.

# Knob and tube: Solutions

1. **Rewire: $20,000**
   or
2. **Have wiring checked by an electrical specialist:**

   Vast majority of homes:
   Old wiring = Excellent condition!

   Therefore, GFCIs can provide the necessary ground protection**:**
   **$20 each**

**AN EXCELLENT SOLUTION!**

GFCI receptacle provides excellent ground protection. It disconnects the power if leakage to ground exceeds 5 mA.

# Knob and tube: Findings

**In 99% of homes built pre-1950:**

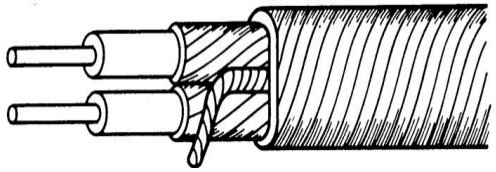
- **Knob and tube wiring is still live today**
  - Usually not visible due to new panel and finished basement.
- **Knob-and-tube wiring is in excellent condition**
  - No need for expensive replacement, but:
- **Original 2-prong outlets found swapped for modern 3-prong**
  - Falsely presenting that the homes have been rewired and outlets grounded.

Cost to correctly bring these homes to LOW RISK: less than **$500**

**RESULT: SAFE AND HAPPY HOMEOWNERS!**

# Wiring of the 1950s

- NEW cable and new method of wiring introduced 1950.
- Eliminated the need for knobs and tubes.
- **Fire hazards remain**
  - No ground protection
  - Not for recessed lighting
  - Due to limited number of outlets: Dangerous add-ons still rampant



Introduced in 1950 a new “twin cable”, called “NMD1”. Still for 2-prong outlets. It had cable temperature rating of 60 degrees. Not suitable for recessed lighting.

# Wiring of the 1960s

- NEW cable introduced in the 1960s provides ground protection.
- Modern grounded outlets become the standard.
- **Fire hazards remain:**
  - Cable not suitable for recessed lighting
  - Due to limited number of outlets: Dangerous add-ons still rampant

Introduced in the late 1950s: “NMD3”. Same characteristics as NMD1 but provided ground protection: Still not suitable for recessed lighting.

# Wiring of the 1970s through to today

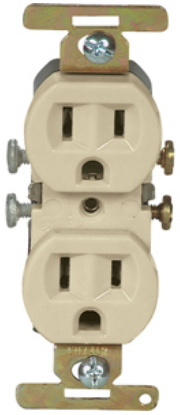
- NEW cables rated with higher insulation temperature become the standard.
- Suitable for recessed lighting.
- **Fire hazards remain:**
  - Dangerous add-ons

Due to the rapid rise in basement suites, kitchen renos and powering of garages: Unauthorized electrical work continues to thrive. This is encouraged with the proliferation of self-help guide books and easy access of electrical supplies.

Modern wiring, NMD7 & NMD90 become the standard, but along with it comes “do-it-yourselfers”.

# Aluminum wiring: 1968 – 1974

- In *vast majority* of homes built 1968 – 1974.
- Still present today in *most* homes built 1968 – 1974.
- Designed as a cost-effective solution due to the high price of copper during these years.



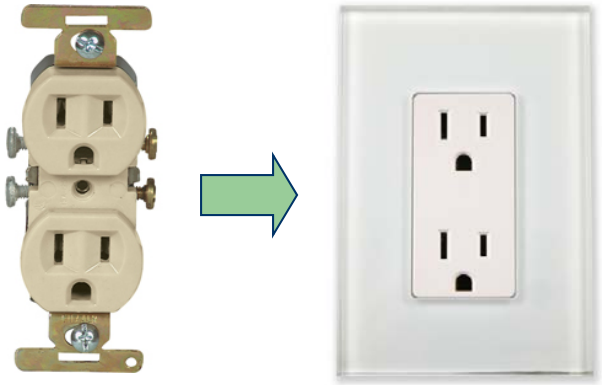
An aluminum-rated receptacle was required with the installation of aluminum wire.

# Aluminum wiring: Hazards

**Aluminum wiring can be fine, but 2 concerns:**

- Original aluminum-rated outlets do get loose in time
  **HAZARD: LOOSE CONNECTIONS**
- Original aluminum-rated outlets swapped for modern, non-aluminum-rated outlets
  **HAZARD: CORRODED CONNECTIONS**

  **ALL FIRE HAZARDS!**



Original aluminum-rated outlets are commonly found swapped for modern, non-aluminum-rated outlets: Creates corroded connections.

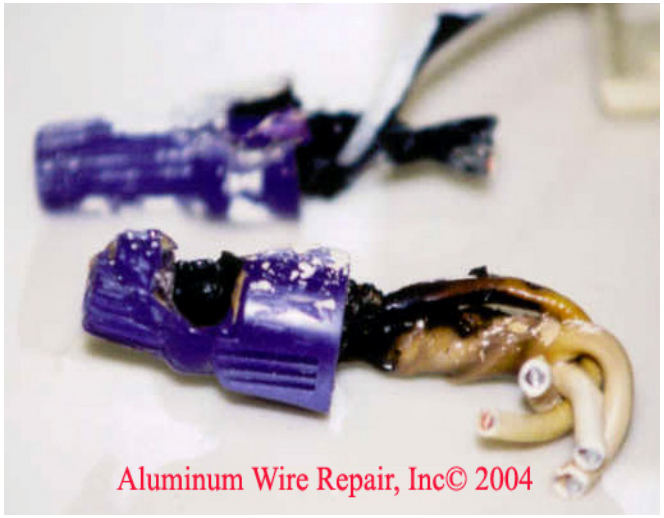
# Aluminum wiring: Solutions

1. **Rewire: $20,000**
   or
2. **Have wiring checked by an electrical specialist:**

   Vast majority of homes:
   Aluminum wiring = Not in good condition!
3. **Regular maintenance:**

   Many authorities recommend regular maintenance every 15 years.

   Typical cost: ~$1000




*"If home [with aluminum wiring] has not been checked since new, it is high time overdue"* (NFPA).

# Electrical Assessments

- Let’s look at some actual examples where a PowerCheck ***Home Electrical Safety Assessment*** identified and subsequently prevented an electrical fire.

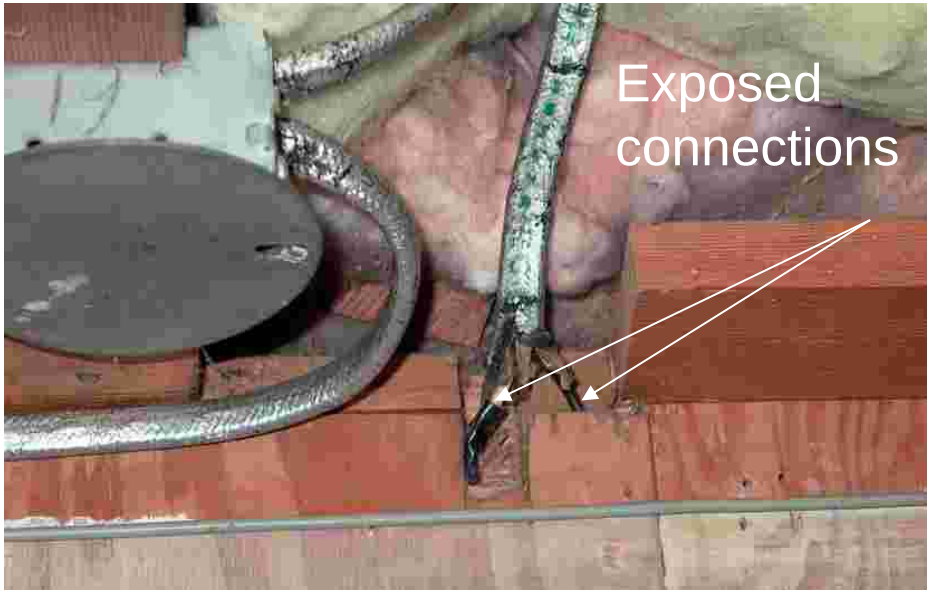
# Sometimes found: No fuses!!

Here client has replaced main fuses with metal bars, eliminating over-current protection, creating a fire hazard condition.

This exact scene was found by PowerCheck in an older home in Vancouver earlier this year. **Home was sent to us because of knob-and-tube wiring**.

# Exposed electrical connections

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




This scene was found in a older home in New Westminster by PowerCheck last year. **Home was sent to us because of knob-and-tube wiring**.

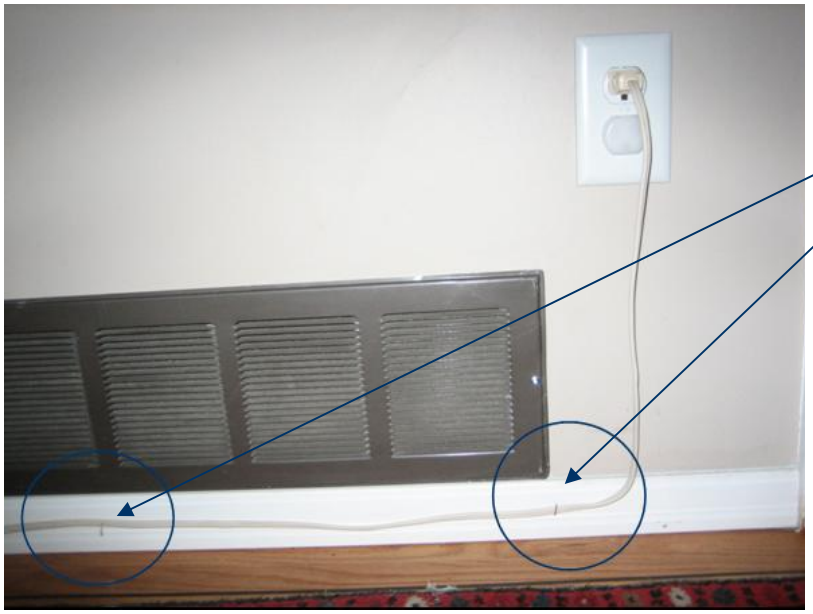
# No junction box behind electrical device

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

Commonly found in older homes where electrical wiring was done by home-owner or unqualified person. **Home was sent to us because of knob-and-tube wiring.**

# 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.




Commonly found: This scene was found in a older home in Vancouver by PowerCheck this year. **Home was sent to us because of knob-and-tube wiring.**

# Not enough homes are checked: Baseboard heater in dangerous location

Individuals installing electrical equipment without being thoroughly knowledgeable on the electrical code, 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).

# A PowerCheck Home Electrical Safety Assessment

- Key points to an assessment that works for you:
  - Conducted by qualified person
  - Comprehensive examination
  - Third party examination only

PowerCheck
Electrical Safety Services

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| Safety Report Number: |
|---|
| Conducted by: |
| Phone number: |

**Electrical Safety Report – Residential**

Client name: _____ Phone: _____

Assessment address: _____ Mailing address if different: _____

Secondary suite present: ☐ yes ☐ no Age of house: ☐ pre-1950 ☐ 1950-59 ☐ 1960-69 ☐ 1970-79 ☐ 1980-89 ☐ 1990-99 ☐ 2000-present

**CLIENT AGREEMENT**

In consideration of the provision of an electrical safety survey (the "Survey") by Powercheck Electrical Safety Services Inc. ("Powercheck"), over the Assessed Address as set out above (the "Premises"), the Client agrees as follows:

a) Client agrees that if Powercheck advises of any imminent electrical dangers as a result of the Survey, pursuant to the BC Safety Standards Act, the Client will, at his own expense, immediately have corrective actions taken by a licensed electrical contractor.
b) Client will make the Premises available for an unobstructed survey by PowerCheck for a period of up to 90 minutes, as required by PowerCheck to perform the Survey.
c) Client acknowledges and agrees that in order to obtain a lower risk rating than the one identified by Powercheck, the required corrective actions must be completed by a licensed electrical contractor.
d) Client acknowledges that this Survey report is an assessment of the items listed on the Electrical Safety Report only and that there may be additional risks not identified by the Survey. Powercheck does not provide any representations or warranties, express or implied, other than as specifically set out herein. The Survey is an electrical safety survey only and not a rewiring or repair to the electrical system. Any alterations to the electrical system following this Survey will invalidate the Survey report. Client acknowledges and agrees that while Powercheck has made every effort to ensure the accuracy of information provided in the Survey report, some information may be unavailable or incorrect as a result of incorrect or missing information found on or in the electrical system of the Premises and Powercheck cannot be responsible for errors or omissions as a result of such misinformation. No attempt has been made by Powercheck to verify the information provided by manufacturers of components of the electrical system.
e) Client acknowledges that neither PowerCheck, its employees, agents, or its representatives are liable to the Client or any third party for any loss, injury or damage, direct or indirect, arising from deficiencies in the electrical system or this Survey Report.
f) Client acknowledges that the sole purpose of this Survey report is to remove electrical impediments to the Client obtaining house insurance over the Premises. Insurance companies may have other criteria that may prohibit the Client from obtaining house insurance over the Premises

Client: _____ Date: _____

**RECEIPT**

| | |
|---|---|
| ☐ Regular Service | $325.00 |
| ☐ Rush Service | $500.00 |
| Service Charge: | |
| Transportation Fee: | |
| Subtotal: | |
| GST (5%): | |
| **Total:** | |

Received

**ELECTRICAL SAFETY ASSESSMENT**

**In the opinion of Powercheck -- concerning the risk of accidental fire at the Premises as a result of the electrical system -- our assessment is:**

☐ Extreme risk ☐ High risk ☐ Medium risk ☐ Low risk

NOTE: See page 4 for Description of Risk Ratings PowerCheck Agent Date

**CONFIRMATION OF WORK COMPLETION FOR MEDIUM RISK**

☐ **All the required work (Section B) has been completed**

Electrical Contractor: _____ EC License Number: _____

Telephone number: _____ Signature: _____ Date: _____

**If the required work has been completed and signed-off by a licensed electrical contractor then house is rated at MEDIUM RISK.**

**CONFIRMATION OF WORK COMPLETION FOR LOW RISK**

☐ **All the required work (Section C) has been completed or no work (Section C) has been identified**

Electrical Contractor: _____ EC License Number: _____

Telephone number: _____ Signature: _____ Date: _____

**If the required work has been completed and signed-off by a licensed electrical contractor then house is rated at LOW RISK.**

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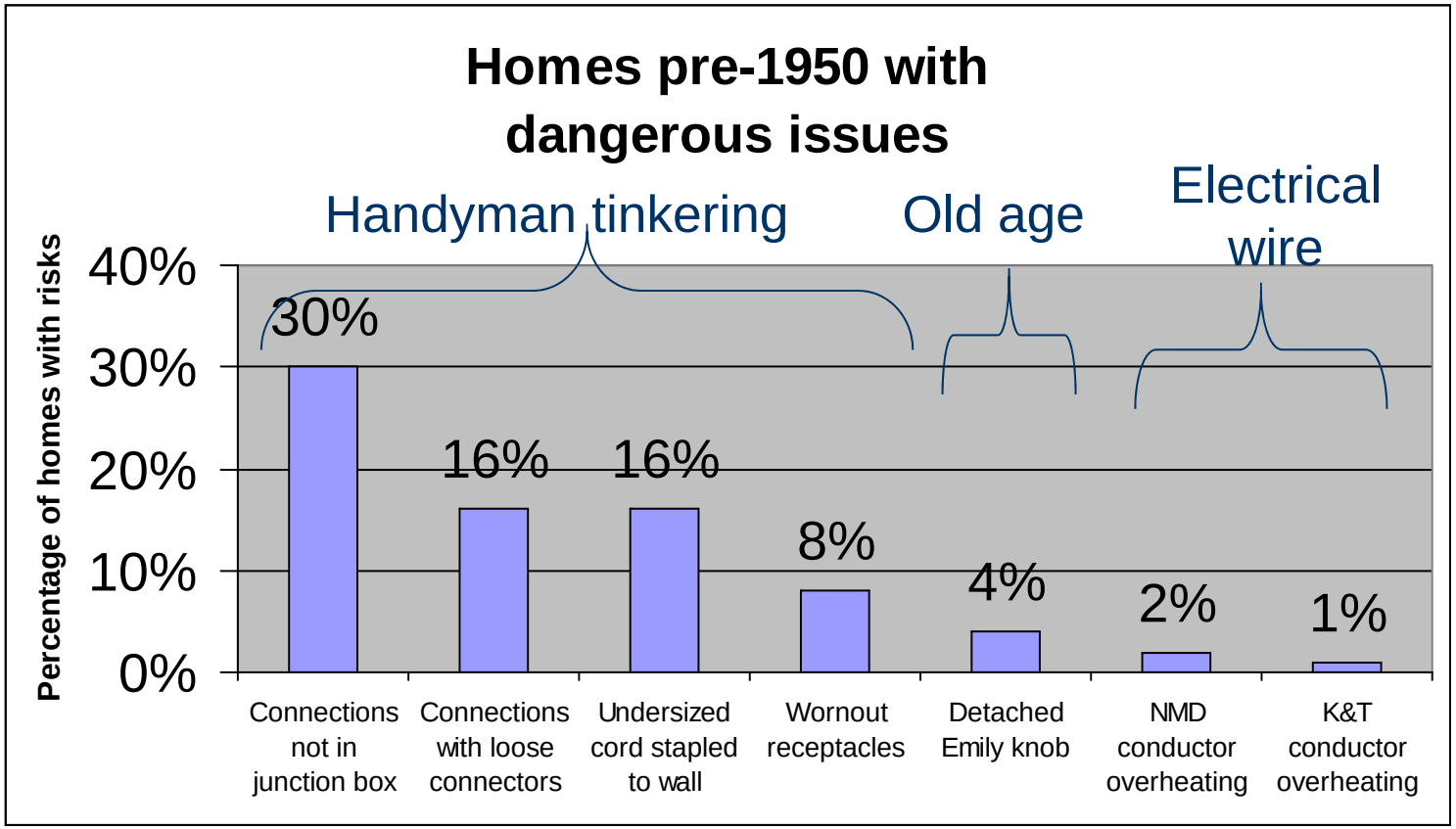
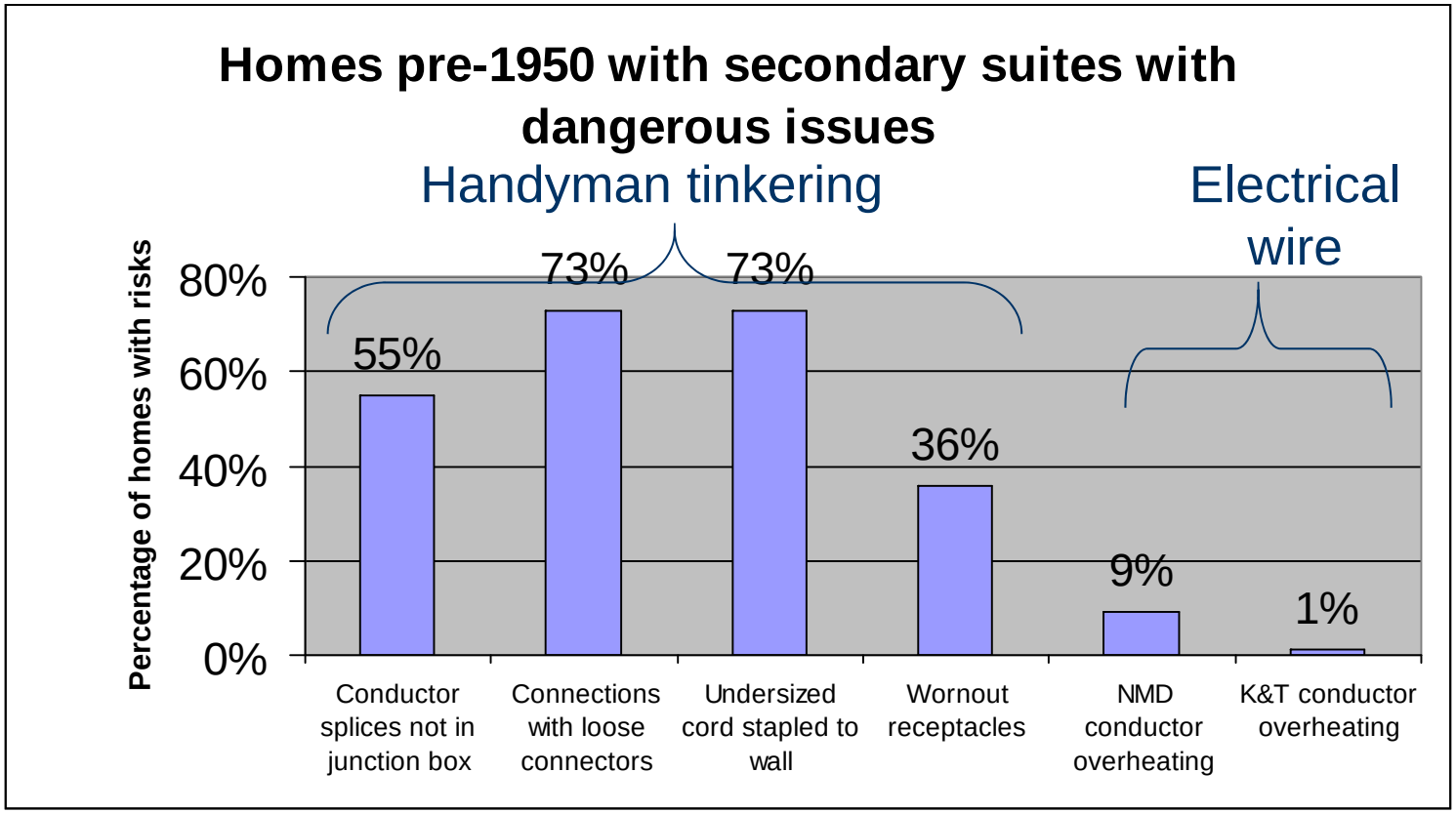
# Summary of PowerCheck findings

- **Most homes built pre-1975 have had Fire Hazard Conditions present**
  - **99%** of fire hazards due to handyman tinkering
  - Once the fire hazards are correctly identified, the cost to eliminate these fire hazards in 99% of homes has been expected to be less than $1000  (a day or less with an electrical contractor)
  - With an accurate assessment  by a master electrician, that is impartial in his findings, the homeowner can take correct steps to get safe at the minimum cost.

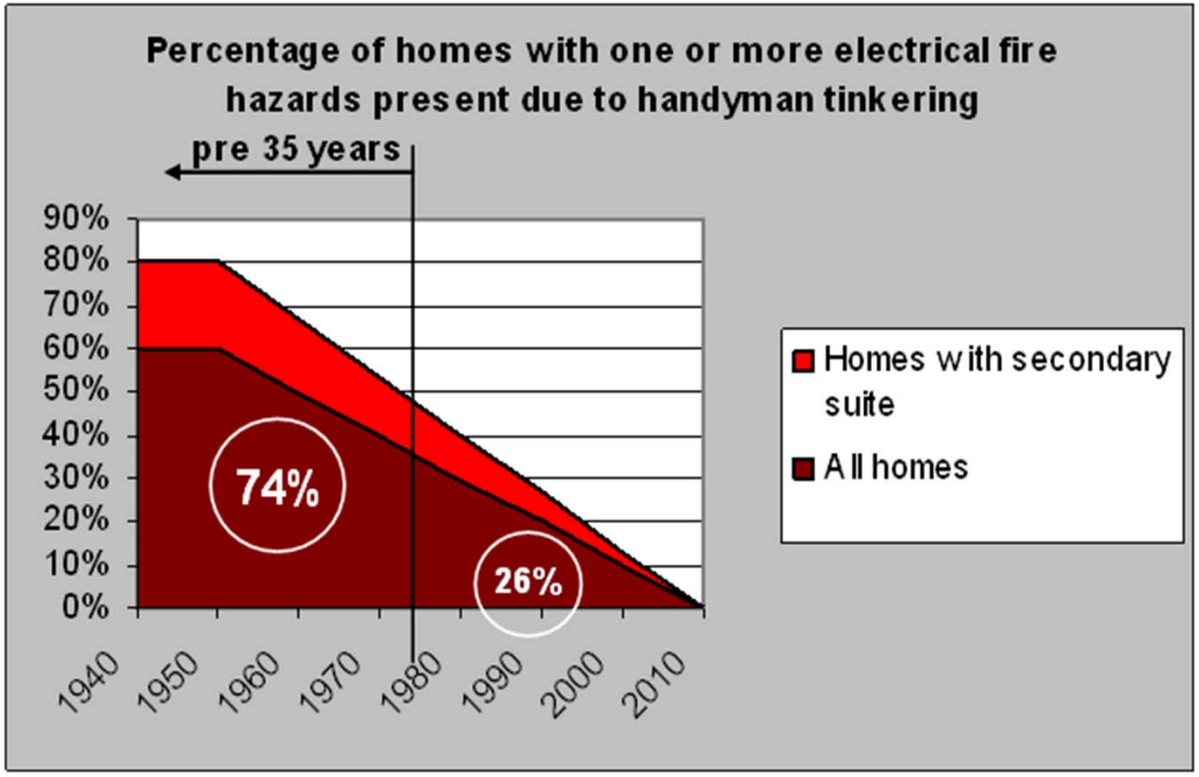
# Specific breakdown of risks
## Homes in general, pre-1950



# Homes with secondary suite, pre-1950



# Probability of risk increases with age




If all homes greater than 35 years were checked, we would catch **74% of homes** with electrical fire hazards.

# Our Goal is Your Safety

- Most home owners are cautious to have their homes checked.
- PowerCheck wants to work with you to ensure your home is **safe**!
- PowerCheck is an independent third party, and you may find your insurance premiums reduce after an Home Electrical Safety Assessment.
- **Over 1000 clients have had their electrical assessed by PowerCheck. Nearly all have said, "*It was the best thing that we have ever done*".**

**A HAPPY HOMEOWNER WITH A SAFE HOUSE**