

Electrical Safety Illustrated



That Old House, This New Update



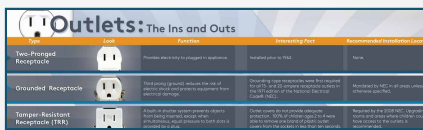
THAT OLD HOUSE, THIS NEW UPDATE

Dedicated exclusively to promoting electrical safety, the **Electrical Safety Foundation International** (ESFI) engages in public education campaigns throughout the year to prevent electrical fires, injuries, and fatalities in the home, school and workplace. Each May ESFI commemorates **National Electrical Safety Month** (NESM) to raise awareness about critical electrical safety topics. The 2015 campaign theme, "**That Old House, This New Update**," informs readers about common hazards posed by America's aging housing stock and features a variety of updates that can improve a home's functionality, efficiency and safety, regardless of its age.

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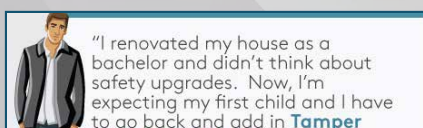
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Evolution of the American Home

Homes built today are dramatically different than they were 40 years ago. Not only are they larger, but they have more amenities that can severely stress your electrical system. The Electrical Safety Foundation International recommends all homes over 40 years old undergo an electrical inspection to ensure your home's electrical system can handle modern demands.

In 1973, 17% of U.S. homes had central A/C and 30% contained window units. Today about 65% of homes have central A/C and another 21% have window units.



The residential energy sector accounted for 25% of the total energy consumption in 2010, yet remained the least energy efficient largely due to the use of incandescent lamps.



Over half of U.S. homes (51%) have two or more bathrooms compared to just 19% in 1973.

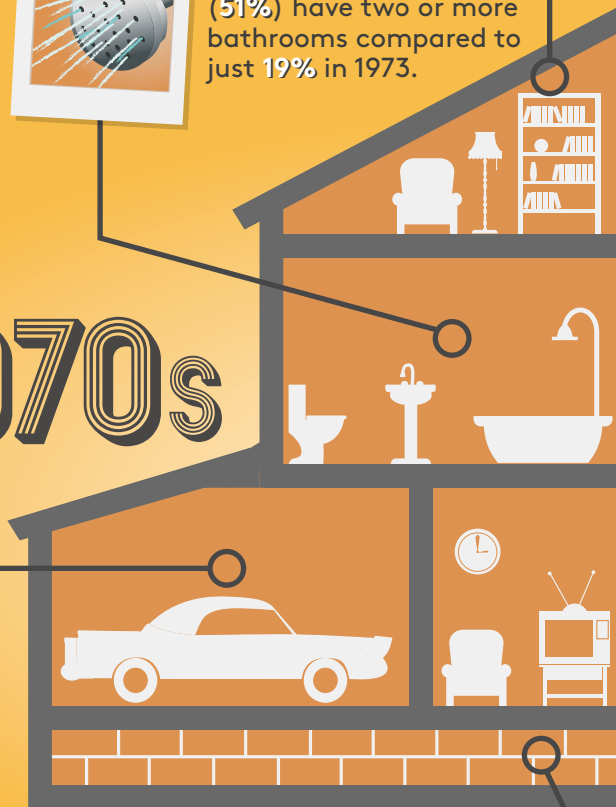


The median square footage of single-family homes built between 2005-2009 is 2,200. The median in the 1970s or earlier was 1,700 ft².



1970s

2010s



In 1973 48% of new homes had garages for 2 or more cars compared to 80% in 2008.



54% of homes in the U.S. had 3 or more TVs in 2009.



More than four in ten (44%) of the nation's housing stock was built before 1970.



A 2009 study found 26% of homes had a second refrigerator and that number is growing 1% per year.





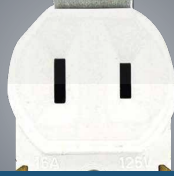
Outlets: The Ins and Outs

Type

Look

Function

▶ **Two-Pronged Receptacle**



Provides electricity to plugged in appliance.

▶ **Grounded Receptacle**



Third prong (ground) reduces the risk of electric shock and protects equipment from electrical damage.

▶ **Tamper-Resistant Receptacle (TRR)**



A built-in shutter system prevents objects from being inserted, except when simultaneous, equal pressure to both slots is provided by a plug.

▶ **Arc Fault Circuit Interrupter (AFCI) Receptacle**



Reduces the risk of fire, by interrupting power when an arc fault occurs anywhere in the circuit, including within items plugged into it.

▶ **Ground Fault Circuit Interrupter (GFCI) Receptacle**



Prevents shock by quickly shutting off power to the circuit if the electricity flowing into the circuit differs from that returning, indicating a leakage current.

▶ **Surge Suppression Receptacle**



Protects sensitive electronic equipment from transient surges.

▶ **USB Receptacle**



Provides a permanent Universal Serial Bus (USB) connection source.



Often used interchangeably, a "receptacle" is the "female" counterpart to a plug that provides access to electricity while an "outlet" can be any access point to wiring, such as light fixtures or receptacles.

Interesting Fact	Recommended Installation Locations	Average Cost Per Unit
Installed prior to 1962.	None.	Upgrade recommended.
Grounding-type receptacles were first required for all 15- and 20-ampere receptacle outlets in the 1971 edition of the National Electrical Code® (NEC).	Mandated by NEC in all areas unless otherwise specified.	\$0.70
Outlet covers do not provide adequate protection. 100% of children ages 2 to 4 were able to remove one brand of plastic outlet covers from the sockets in less than ten seconds.	Required by the 2008 NEC. Upgrading rooms and areas where children could have access to the outlets is recommended.	\$1.20
The CPSC estimates more than 50% of electrical fires that occur every year could be prevented by AFCIs.	Provides protection from arc faults beyond branch circuit wiring extending to appliances and cords using the receptacle.	\$25
GFCIs shut off electric power in the event of a ground fault within as little as 1/40 of a second.	Installed in areas where water and electricity are in close proximity, such as bathrooms, garages, kitchens, laundry areas, and any receptacles located outdoors.	\$12
National Electrical Manufacturers Association (NEMA) estimates that 60-80% of surges are created within the building, such as when large appliances, like air conditioners, turn on and off.	Not required by the NEC, though often installed in rooms containing costly devices such as computers, TVs or refrigerators.	\$20
Over 10 billion electrical devices in use today charge via a USB cable.	Offers a permanent adaption for devices requiring a USB terminal for power or charging as needed for convenience. Not required by the NEC.	\$20



Out with the old: All outlet installation should be performed by a qualified electrician.



Some receptacles may combine more than one technology such as AFCI+TRR, GFCI+TRR, or USB+GFCI.

Old Aluminum Wiring Foils Safety

Copper is the preferred and predominate metal used in electrical wiring. However, due to a surge in copper prices between the late 1960s and the mid-1970s, many homes instead used aluminum wire throughout residential distribution systems. Years later, reports of fires began to reveal hazardous conditions caused by the use of aluminum wiring.

Many receptacles and switches manufactured during this time were not intended for use with aluminum wire. This incompatible equipment, combined with poor installation practices, resulted in loose or deteriorating electrical connections, which pose a potential fire hazard. A national survey conducted by Franklin Research Institute for the U.S. Consumer Product Safety Commission showed that homes built before 1972, and wired with aluminum, are 55 times more likely to have one or more wire connections at outlets reach “Fire Hazard Conditions” than homes wired with copper.

According to the CPSC, an estimated 2 million homes were built or remodeled between the late 1960’s



and mid-1970’s to include aluminum wiring. If you are unsure whether your home is among them, look at the printed or embossed markings on the outer jacket of the electric cables, which are visible in unfinished basements, attics, or garages. Cable with aluminum conductors will be marked on the sheath with “Al” or “Aluminum” along its length. If you are unable to determine the type of wiring, contact a qualified electrician to investigate.

There are a variety of options to help mitigate the risk of fire caused by aluminum wiring. To understand your home’s unique risks and needs, a qualified electrician should conduct an inspection. Together you can explore solutions to accommodate your budget, ranging from complete replacement with copper wiring to permanent repairs at the connections. This is not a do-it-yourself project and all modifications to installed wiring should be performed and inspected in compliance with local regulations.

IS YOUR HOME AT RISK?



- Is your home **40 years old or older**?
- In the last 10 years, has your home undergone a **renovation or added a major new appliance**, such as a refrigerator or air conditioner?
- Are you the **new owner of a previously owned home**?

If any of the above are true, ESFI recommends you have an electrical inspection conducted by a qualified electrician or electrical inspector to ensure your home’s safety.



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www.youtube.com/user/esfidotorg

FUSE & BREAKER BREAKDOWN

FUSE	STANDARD BREAKER	BRANCH/FEEDER TYPE AFCI BREAKER	COMBINATION TYPE AFCI BREAKER	GFCI BREAKER
<p>55+</p>  <p>Commonly found in homes built over 55 years ago.</p>	<p>Began appearing in homes built in the 1960s</p> 	<p>FIRST-GENERATION</p> <p>AFCI protection required by the 1999 NEC®.</p> 	<p>The 2005 NEC® phased out Branch/Feeder AFCIs as of January 1, 2008 for new construction and remodels. Today, MOST circuits should have AFCI protection.</p>	<p>The first GFCI circuit breaker was introduced around 1968, and the first receptacle type in 1972.</p> 
<p>BASIC fire prevention.</p> 	<p>BASIC fire prevention.</p> 	<p>MODERATE fire prevention.</p> 	<p>ENHANCED fire prevention.</p> 	<p>Prevents SHOCKS.</p> 
<p>Uses a filament that melts when overloaded.</p> 	<p>Trips when electrical current exceeds levels determined by the breaker's ratings.</p> 	<p>Trips when a parallel arc between the hot and neutral conductors is detected.</p> 	<p>Provides same protection as Branch/Feeder AFCIs AND detects lower level series arcing in both branch circuits and power supply cord.</p> 	<p>Trips when an unwanted path occurs between an electrical current and a grounded element. Recommended on circuits that could come in contact with water.</p> 
<p>Average Cost \$6</p>	<p>Average Cost \$5</p>	<p>Average Cost \$25</p>	<p>Average Cost \$35</p>	<p>Average Cost \$35</p>
<p>Must replace with fuse of the same rating if blown.</p> 	<p>Can be reset and reused after tripping.</p>  			
<p>Use of an oversized fuse, i.e. a 30 amp fuse in a 20 amp circuit, is a dangerous FIRE HAZARD.</p> 	<p>FREQUENT trips of a breaker indicate a problem and should be inspected by a qualified electrician.</p> 	<p>Parallel arcs are commonly caused by damaged or melted insulation on fixed wiring.</p>	<p>"Combination" does NOT mean an AFCI + GFCI.</p> <p>Combination = protection from parallel & series arcing.</p>	<p>AFCI & GFCI technologies can co-exist, which together, provide the most complete protection on a circuit.</p>

 **Label** your panels so you can quickly turn off and **restore electricity** when necessary.

 All electrical distribution systems should have an **electrical inspection** conducted if the home is older than **40 years** or has had a major addition, renovation or large appliance added.

 AFCI and GFCI breakers should be tested monthly. Visit www.esfi.org to learn how.

Switch to Safety



If your lighting control points are characterized by any of the above, have your home's electrical system inspected by a qualified electrician as soon as possible.



Cracked, broken or missing cover plates should be replaced immediately to prevent accidental contact with wiring.



Switches and lighting equipment should bear the mark of a nationally recognized testing laboratory such as UL, Intertek, or CSA.



Dimmers

- Save energy and reduce utility costs
- Extend bulb life
- Adjust light levels to meet range of preferences
- LEDs and CFLs need to be dimmer compatible



Timers

- Provide added security while away from home
- Improve safety for entrance after dark
- Countdown timers prevent leaving lights on accidentally



Remote Control/Smart Panels

- Offer convenient management from phone or remote control
- Some models save preset preference profiles
- Have ability to save energy and reduce utility costs
- Some models allow for remote management from anywhere providing security and peace of mind



Motion Sensors

- Allow for hands-free convenience
- May save energy and reduce utility costs
- Added security when installed outside

⚡ If you want to switch up your lighting controls, contact a **qualified electrician** to make sure that the option you desire is compatible with your home. And remember, all light switches should be **installed by a professional**.

HVAC Maintenance: Get Your Ducts in a Row

HVAC = Heating, Ventilation and Air Conditioning

Don't Get Burned

WARNING SIGNS OF POTENTIAL PROBLEMS

Take note if your **ENERGY BILL** goes up without increased use.



Clunking, knocking or other sounds.

The air in the home is too **humid** or too **dry**.

Certain areas of the home are **HOTTER** OR **COOLER** than others.



HVAC breaker keeps tripping.

If your furnace is more than

15

years old...

If your air conditioner is more than

10

years old...

IT MAY BE TIME FOR A REPLACEMENT

Keep Your Cool

UPKEEP AND MAINTENANCE



Make sure all **FUEL-BURNING** heating equipment is vented to the outside without **OBSTRUCTION**.

Replace the HVAC air filter at least every **90 DAYS**.



Keep intake and output vents clean and **CLEAR OF DEBRIS AND DUST**.



Have your heating and air conditioning systems **INSPECTED** by a qualified service professional at least **ONCE A YEAR** to make sure they are running at optimal efficiency and to diagnose any potential problems.

Some heating appliances may produce carbon monoxide (**CO**), a **POISONOUS GAS** that is tasteless, colorless, and odorless. Protect your home with CO alarms and **TEST** them **MONTHLY** to ensure they are working properly.



All repairs should be performed by a certified **HVAC technician**.





HVAC systems use the most **household energy**.



Visit www.esfi.org for tips on how to use portable heaters and air conditioning units safely.

Watt Bulb Works Best for Your Home?

President George W. Bush signed the **Energy Independence and Security Act** of 2007, requiring all light bulbs use nearly **30% less energy** by 2014.

	Average Price	\$1.25	\$3.50	\$8.00
	Lifespan (@ 3 hrs/day)	Less than 1 year	Approx. 9 years	At least 22 years
	Average Annual Energy Cost	\$3.50 - \$4.80	\$1.20	\$1.00
	Lumens per Watt	13 to 14	55 to 70	60 to 100
	Incandescent Bulbs	Compact Fluorescent (CFL) Bulbs	Light-Emitting Diode (LED) Bulb	
	Electricity runs through a wire filament , heating the filament until it glows and creates light.	Visible light results when UV light, created when electricity is driven through a tube containing argon and mercury , reacts with the coating on the tube.	Electricity passes through semiconductor material , illuminating the semiconductor devices called light-emitting diodes.	
	Produce heat and light in every direction.	75% less heat than incandescent bulbs.	Uses diodes, not heat, to produce light.	
	Loses up to 50% of the light before it even exits a fixture.	= 75% more energy savings.	85% more energy savings as compared to incandescent bulbs.	
	Contains no hazardous materials .	Because CFLs contain mercury (about 4 mg, which is less than 1% found in old thermometers), they require proper disposal.	Contains no hazardous materials .	
	More efficient bulbs could save consumers \$6 billion in 2015 alone.	Visit Earth911.com for tips on how to properly clean up a broken bulb or recycle intact bulbs.	Some localities recycle used LEDs.	
				

Wattage: The amount of electricity consumed by a light source.

Lumens: The amount of light that a light source produces.

Only use bulbs **labeled** for use in enclosed fixtures to prevent **dangerous heat buildup**.

Install bulbs with **extended lifespans** in hard-to-reach locations to **limit the number of times** you have to climb a ladder, move furniture, or otherwise engage in potentially dangerous activities.

Surge and Protect

Power Surges and How to Protect Yourself

The Issue

WHAT IS A "POWER SURGE"?

A power surge, or transient voltage, is a **sudden and unwanted increase in voltage that can damage, degrade or destroy** the sensitive electronic equipment in your home or business.



CAUSES

The National Electrical Manufacturers Association (NEMA) estimates that **60-80% of surges are created within a facility**, such as when large appliances, like air conditioners, turn on and off. Surges can also originate from the **electric utility company during power grid switching**. Lastly, the most powerful surges can be caused by **lightning**.



IMPACT

A spike in voltage can be **harmful to electrical devices** in your home if the increase is above the device's intended operating voltage. This excess voltage can cause an arc of electrical current resulting in **heat that damages** the electrical components. Repeated small-scale surges may slowly **damage your electronic equipment** and **shorten the life** of appliances and electronics involved.



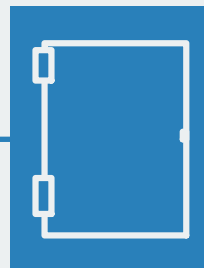
The Solutions

POINT-OF-USE SURGE PROTECTION DEVICES



Protect only the items that are **directly plugged into the device** from most electrical surges. It does not suppress or arrest a surge but **diverts the surge to ground**. Use point-of-use surge protectors that have an indicating light and/or audible alarm that alert when it needs replacement.

SERVICE ENTRANCE SURGE PROTECTION DEVICES



Mounted in or on your main electrical panel or at the base of the electric meter, this device provides **protection for your entire electrical system**.

This device covers components that cannot be connected to a point-of-use device, such as outlets and light switches.

REMINDERS

- ! No surge protection device can handle a **direct lightning strike**. The best surge protection is to **unplug devices from the wall** if you suspect a surge might be coming.
- ! Power strips **do NOT provide surge protection**. Be sure you are relying on the appropriate device for protection.
- ! Power strips and surge suppressors **don't provide more power to a location**, only more access to the same limited capacity of the circuit into which it is connected.

Electrical Safety: Think Outside the Home

Electrical hazards are not only present indoors, but can also occur outside. Follow this guide to help prevent common outdoor electrical hazards.

POWER LINES

Before planting trees near a power line, conduct research or speak with a professional to ensure there's enough space for it to grow. If you suspect that a tree is too close to power lines, report it to your local utility.

Always keep yourself and equipment at least **10 Ft.** away from power lines. Electricity can jump to nearby objects!

Power lines are also underground. Call **811** before you dig.

OUTDOOR OUTLETS

Have **Ground Fault Circuit Interrupters (GFCIs)** installed, which automatically cut power when a plugged in item comes in contact with water or begins to "leak" electricity.



Install **weatherproof** boxes or covers on outdoor outlets.

GENERATORS

Between 1999 and 2012, **79%** of the 931 **carbon monoxide (CO) fatalities** were associated with generators.



24% of CO fatalities involving generators occurred when used inside an attached **garage or shed.**



Make sure your home is properly equipped with carbon monoxide alarms and **test them monthly.**



When in use, position generators outside and **away from doors, windows and vents.**

Do not plug generators directly into a home outlet without a transfer switch to **prevent backfeed** which could harm utility line workers making repairs.

Make sure your generator is **properly grounded.**

EXTENSION CORDS

Extension cords provide a **temporary solution** and should not be used long-term or permanently.



Never use an indoor extension cord outdoors. Outdoor cords will be labeled **"For Outdoor Use"** and are often orange.



Never attempt to extend the length of an extension cord by connecting it to another extension cord.



Be sure the **amperage rating** for the extension cord is higher than amperage of the electrical product being used.



Only use extension cords that have the mark of a **nationally recognized testing laboratory** such as UL, Intertek or CSA.



ADDITIONAL TIPS

Store fuel in **approved containers** and away from any **potential heat sources**, like a furnace, space heater, or even direct sunlight.



When storing electrical products in your garage, **use containers** to prevent exposure to water or damage caused by animals.



Have an electrician **inspect** your swimming pool, spa or hot tub to ensure it complies with applicable local codes, such as the **National Electrical Code®**.





"I wish my stovetop wasn't located in my kitchen's island. It's the social gathering place whenever I entertain and really makes cooking more difficult. It's also the first place my kids put the mail and other papers, which could be a **fire hazard** if the top is still hot from cooking."

- Julie M., Clifton, VA



"I renovated my house as a bachelor and didn't think about safety upgrades. Now, I'm expecting my first child and I have to go back and add in **Tamper Resistant Outlets**. I wish I had thought ahead."

- Dean B., Washington, D.C.

"As I get older, my **night vision** is getting worse. I need more outdoor lighting on the walkways and porch so I don't trip. It would also illuminate the keyholes better."

- Elliot C., Tampa, FL



"Before we bought it, we only walked through our home during the day when it was full of light. Now we realize there are **not enough lighting fixtures** nor enough outlets to accommodate the number of floor lamps we need."

- Nicole S., Long Beach, CA



"My wife LOVES the look of **vaulted ceilings** and had to have it in our new house. But she's not the one who has to **climb the ladder** to clean the fan or change light bulbs. The older I get, the more unsettled I feel on a ladder and I've come to really hate those ceilings."

- Will K., Fort Wayne, IN



"I wish I had **outdoor outlets** on every side of the house so I didn't have to use extension cords so often, especially during the holidays."

- Alexander M., Portland, OR



"I tried to cut corners when I had my **HVAC** installed and didn't do due diligence when finding a **reputable contractor**. For what I saved on installation, I have spent nearly double in repairs over the course of two years. My advice is to read reviews and if you come across someone who charges significantly less, there is probably a reason why."

- Meagan H., Omaha NE



"I wanted to hang all my framed photos along the hallway of my house. But an **electrician** friend of mine warned me that each nail runs the risk of hitting a wire and creating a fire hazard. He recommended installing **AFCIs** to protect against that possibility. I would never have even thought about that hidden danger, but now I have peace of mind."

- Nathan D., Denver, CO

