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Using Electricity Safely

Cooperative Extension Service
South Dakota State University

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Service, Cooperative Extension, "Using Electricity Safely" (1970). *SDSU Extension Special Series*. 100. https://openprairie.sdstate.edu/extension_ss/100

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Using Electricity Safely

Cooperative Extension Service
U. S. Department of Agriculture
South Dakota State University, Brookings

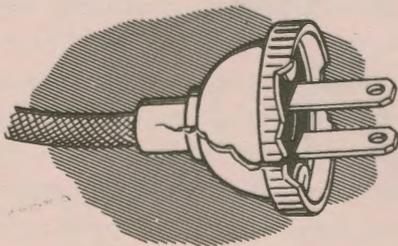
Two hazards that can result from misuse of electricity are **SHOCK** and **FIRE**. You can get an electric shock when electric current from a "live" or "hot" wire passes through you to what is called "ground." A "ground" can be anything that is connected to the earth and through which electricity can easily flow. For instance, if you are touching a water faucet and touch a live wire at the same time, you will receive a shock because the water faucet is a good electrical ground. Other good grounds include drain pipes, sinks, bathtubs, gas piping, damp concrete floors—almost anything made of metal that is touching the earth. An electrical appliance can shock you if a loose wire inside touches the metal case or enclosure.

Fire can result when you use too many appliances on an electric wire or cord or from a poor connection in a plug or appliance. Overloading causes overheating in a wire that is too small. If it gets too hot, the insulation can catch fire. A poor connection causes heat to be produced at the connection when current flows. The more current, the more heat is produced.

Keep in mind the above electric hazards to help you understand the reasons for the precautions listed below:

- Be sure that any wiring is done by a competent electrician. If parts of the wiring system become damaged or broken, an electrician should be called to make repairs. Broken electrical boxes, worn or broken wires or cables may have parts exposed that carry live electricity, causing a hazard to children and others. These defective appliances should be repaired.

Broken electrical wiring devices should be repaired.

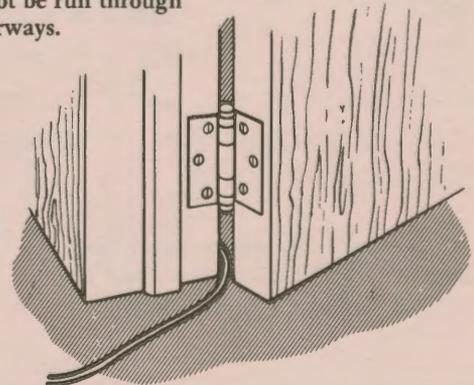


- Keep cords in good condition. Don't use any cord that becomes worn so that wires are exposed. Old cords with cracked insulation should be replaced. Do not run cords through doorways, windows, under rugs, hanging on nails, or wherever they may be easily damaged. A cord that has been bent sharply, such as one pinched in a door, may develop a hot spot at the point of bending because of broken strands of wire inside. Such a cord could start a fire.



A frayed or broken cord can start a fire.

Cords should not be run through doorways.



"Using Electricity Safely" was prepared by William H. Peterson, Agricultural Engineer, Cooperative Extension Service, South Dakota State University.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U. S. Department of Agriculture. Duane Acker, Director of Extension Service, South Dakota State University, Brookings. The South Dakota Cooperative Extension Service offers educational programs and materials to all people without regard to race, color, religion, sex, or national origin and is an Equal Opportunity Employer.

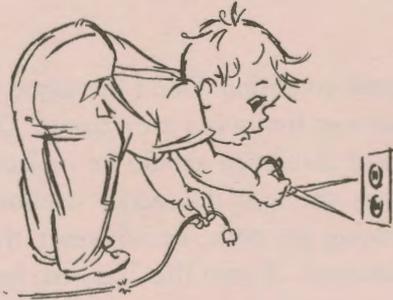
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- Do not let children chew on electric cords. A bad burn or shock, or both, can result. Do not let children poke anything into electrical outlets, sockets, switch boxes, or fuse boxes as this can cause a dangerous shock.



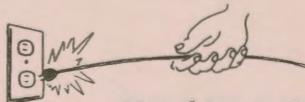
Uncovered electric outlets

Never touch an electrical appliance or switch while you are in the bathtub, or while touching a sink, water or gas pipe, or other grounded surface.



- When you disconnect an appliance, disconnect it at the wall outlet by pulling on the *plug*, not on the cord. This prevents breaking wires where they are attached inside the plug. If cords connect at the appliance, disconnect at the outlet first, then at the appliance. This avoids dangling, live cords that could be dangerous to children. Turn the appliance off before disconnecting to save wear on the plug from the arc that results when a load is disconnected.

Pull on the plug, not on the cord, when disconnecting an appliance.

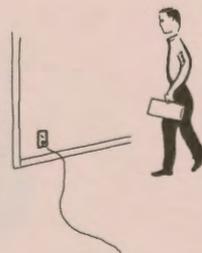


Not this way!!!



Bathtubs and switches

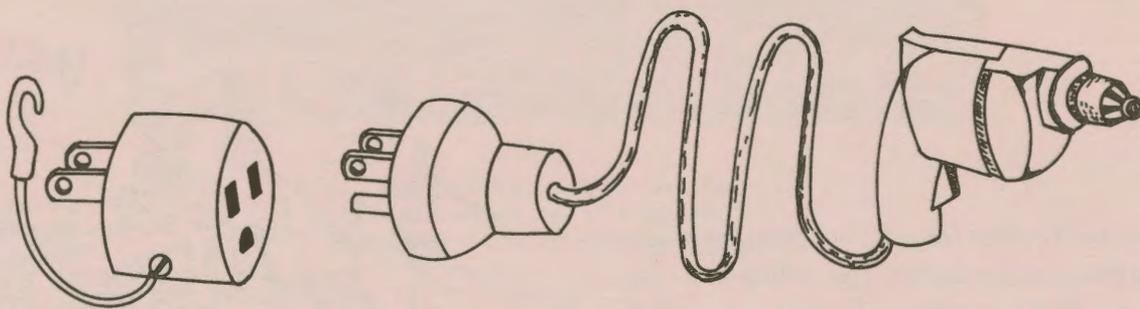
Do not run cords where people walk. Cords in such places become worn and people may trip over them.



- Do not use an electrical appliance when you touch a grounded surface, such as a faucet, water pipe, sink, or damp concrete floor, or outdoors. Never touch any electrical equipment while in the bathtub. Keep appliances away from bathtubs, sinks, stoves (gas or electric), and other grounded surfaces.

Ground appliances to prevent electric shocks

- If you need to use an appliance, such as electric drill, outdoors or in a basement, or near some other grounded surface, be sure that it is grounded with a three-prong plug in a three-prong receptacle (see drawing). With the third prong connection, a third wire will carry the current if the appliance is faulty. Without the third wire, a faulty appliance will cause the current to go through the person handling it. Electric washing machines, stoves, drills, power saws, and other items used near grounded surfaces should be grounded with the three-prong plug and three-wire connection. You must use a three-prong plug and receptacle or outlet because an adapter that permits plugging into a two-prong outlet does not provide the safety of the third wire.



An electric drill, equipped with a three-prong grounding type plug, is shown with an adapter for use in a two-prong

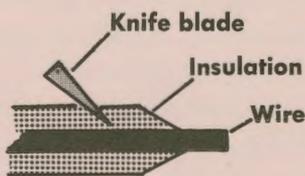
receptacle (left). The appliance is not grounded until the adapter wire is properly connected to a ground. Otherwise,

the operator in effect is installing himself as the conducting path which any stray current will take to ground.

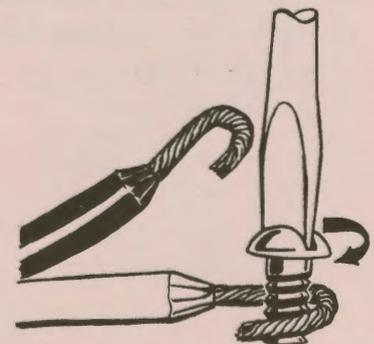
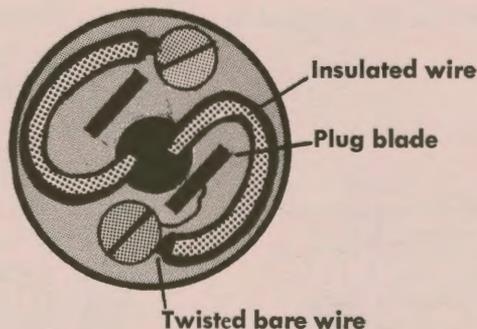
When removing insulation from wires, cut at a slant (as when sharpening a pencil) not straight into the wire. When fastening the wire ends under the screws bring them *around* the plug blade and under the screw, wrapping in a *clockwise* direction (the direction the screw tightens). But do not run the wire directly to the screw, as this puts strain on the individual

strands of wire and they will break, one at a time, as you use the plug.

Be sure wire strands are twisted together before putting them under the screw. A stray strand touching the other plug blade can give you a disturbing flash as you push in the plug. Replace the cover on the end of the plug. This prevents a short if the receptacle has a metal plate.



115-Volt Plug

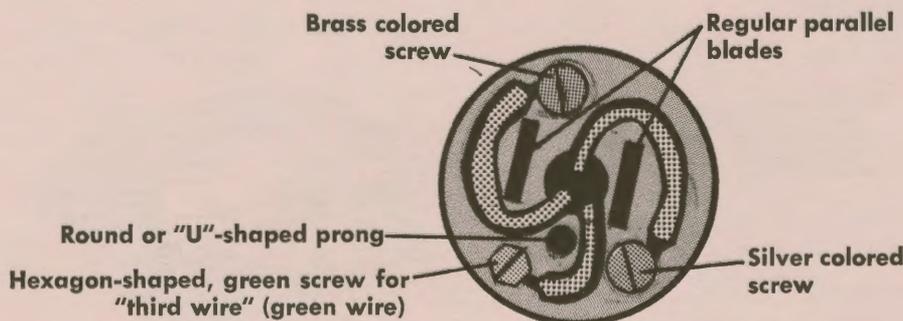


115-Volt Grounding Plug

You can install a grounding-type plug on an appliance cord. Just connect the two original wires (usually a black one and white one) to the two parallel blades in the regular manner. Then (if it is a two-wire cord) run a third wire from under the green hexagon-shaped screw to a good contact (such as under a bolt or screw) on the appliance. Scrape off any paint at the point where the wire touches the appliance so that you have a bright metal surface for

good electrical contact.

If you replace a three-prong plug, you must be sure that the wire with the green colored insulation is connected to the green colored screw in the plug. If wires are connected wrong, the appliance itself may be carrying the electrical charge and it could cause a dangerous shock. If you are not absolutely sure of the right way to make electrical connections, have it done by an appliance repairman.





FUSE BLOWS

HOT WIRE

SYSTEM GROUND

EQUIPMENT GROUNDING

This system is safe:
Let the green grounding conductor take the charge—not you!



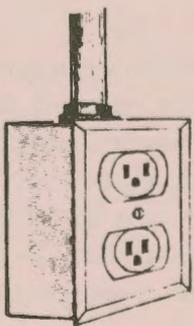
FUSE INTACT

HOT WIRE

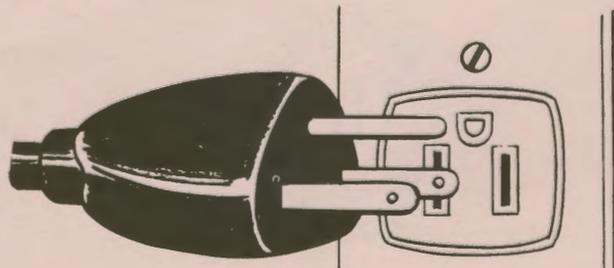
SYSTEM GROUND

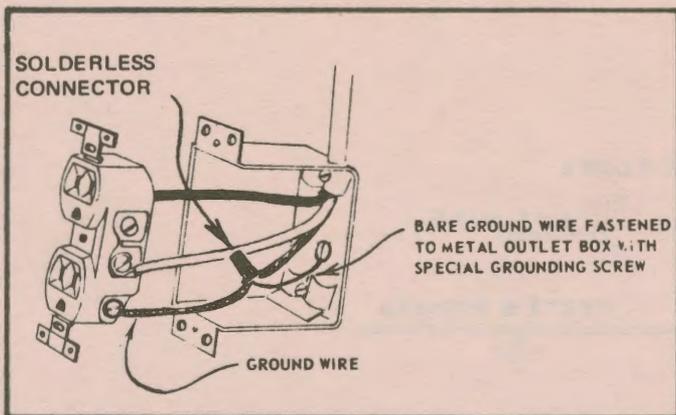
This system is dangerous:
Don't you act as a grounding conductor. Make sure equipment is grounded through the cord!

Three-prong plug and outlet



Grounding Conductor





The third-prong connection inside the receptacle box is connected to a separate grounding wire that runs back to the grounding connection at the main fuse-box. This carries the stray current if an appliance is faulty, and is properly grounded through the third prong.

- Be sure that children do not touch overhead wires outdoors. Some of these carry high voltage. Be sure children do not fly kites near electric wires. A damp string can carry electricity to the child.
- Before moving anything tall (such as a television antenna) check for overhead wires. Do not let anyone throw rocks, shoot at, or damage overhead wires or insulators. The wire could fall and cause a fatal shock to someone.
- If you ever get a shock from an electrical appliance, do not use it again until it has been repaired. The amount of shock you get depends on how well grounded you are, and the next shock may be much more serious.
- Buy only appliances that have the UL (Underwriters' Laboratories) label on them. The UL label means that this model of appliance has been tested and found to be safe if used as intended. Be sure that the UL label appears on the appliance itself, not just on the cord. A label on the cord only means that just the cord is approved.

The UL label means that the appliance should be safe to use as intended.



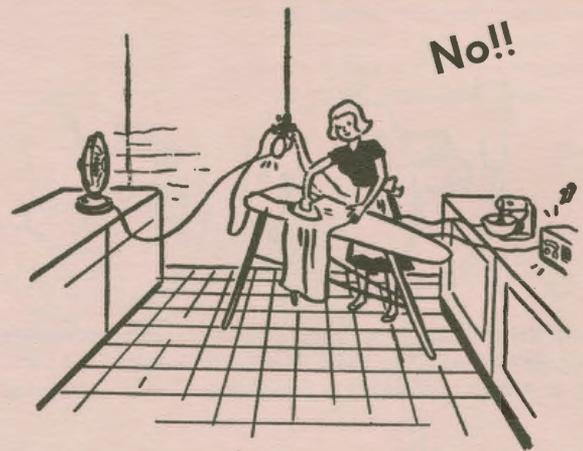
- Do not use brass-shell light sockets outside; use only plastic, porcelain or rubber sockets. Brass shells are meant for indoor use only.
- Be sure that electric cords have large enough wire in them to carry the intended load. You can tell the amount of load that an appliance takes by looking at the nameplate where it usually tells how many watts of power it uses. Electric cords in the larger sizes are usually labeled with the size marked on the cord. Ordinary lamp cord is usually No. 18. The *smaller* the size *number*, the *larger* the size *wire*. Here are the wattages that different size cords are meant to carry when operated on standard 115-volt power:

No. 18 lamp cord or round rubber	575 Watts
No. 16 lamp cord or round rubber	805 Watts
No. 14 cord or cable	1,725 Watts
No. 12 cord or cable	2,300 Watts

If a cord that you have been using feels warm, you know that it has been overloaded, and will have a shorter life because the heat causes the insulation to deteriorate much faster.

- Make sure that light bulbs do not touch anything that can burn. Bulbs can get hot enough to start a fire.
- If circuit breakers trip and have to be reset frequently (or fuses blow and have to be replaced) that means you are connecting more load than the circuit wires can carry safely. Either connect part of the load on a different circuit, or have an electrician install another circuit and receptacles. *Do not replace with a larger-rating circuit breaker or fuse.*

- Use only wall outlets for plug-in heating appliances such as iron, toaster, heater. The ceiling sockets are meant for lighting only, and screw-in receptacles should not be used.



- Always disconnect the power from an appliance before doing work on it. Unplug a lamp, for instance, before changing the bulb.
- Disconnect appliances when they are not in use. A toaster, for instance, if left plugged in, could shock a child that poked a knife or fork into it. (A refrigerator, of course, has to be left plugged in to perform its job).

