

# Chain Saw Safety

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## Introduction

This fact sheet gives the basic safety precautions for reducing common woodcutting hazards while using a chain saw. The chain saw (Figure 1) is one of the most efficient and productive portable power tools used in the industry, yet it can also be one of the most dangerous tools. Operating a chain saw is hazardous. According to the Center for Disease Control and Prevention, each year approximately 36,000 people are treated in hospital emergency departments for injuries from using chain saws. Unexpectedly, one analysis of chain saw accidents revealed that 70 percent of those injured had more than one year's experience. A number of serious injuries occur to Arkansans each year which could be prevented by

following fairly simple precautions. The potential risk of injury increases after storms and other natural disasters when chain saws are widely used to remove fallen or partially fallen trees and tree branches.

The Occupational Safety and Health Administration (OSHA) reported that 243 workers died in 2012 while engaging in tree-trimming and clearing activities. There are four leading causes of trimming and clearing fatalities: (1) struck-by incidents in which workers are hit by falling trees, limbs or motorized equipment; (2) caught-in incidents, which often involve workers becoming caught in wood chippers; (3) falls from elevations such as trees, lifts or ladders; and (4) electrocution due to contact with overhead power lines.

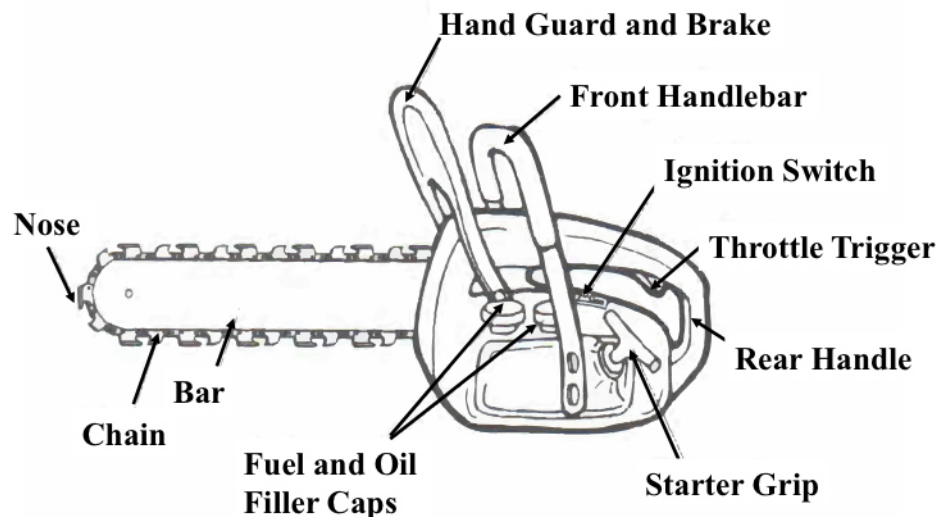


Figure 1. Illustration Showing Chain Saw Parts.

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If you learn how to operate a chain saw properly and maintain it in good working condition, you can avoid injury as well as be more productive. A skilled worker quickly reduces a large tree to manageable pieces. Inexperienced chain saw operators can gain some of these skills with training and using safe, efficient cutting practices. Even seasoned woodcutters should revise techniques that are hazardous. To avoid injuries, possibly even death, practice safe woodcutting while clearing, thinning, cutting firewood or cleaning up downed trees. Be sure to have on personal protective equipment (PPE) before starting and while working with chain saws.

## Personal Protective Equipment (PPE)

Personal protective equipment is designed to prevent or minimize the severity of injuries to loggers and other workers using chain saws. PPE must be inspected prior to use on each work shift to ensure it is in serviceable condition. The following PPE must be used when working with chain saws:

- **Hard hat** to protect your head from falling limbs or branches. The best helmets have a face guard.
- **Ear muffs or ear plugs** to protect ears from permanent injury. Noise from some gasoline-powered chain saws can exceed 100 decibels.
- **Safety glasses or goggles** to protect the eyes and to prevent injury from flying wood chips. Wear these during wood splitting also to preserve your eyesight.
- **Heavy work boots or shoes with high tops and steel toes** to protect your feet.
- **Lightweight abrasion-resistant gloves** to protect hands from abrasions and cuts.
- **Flexible, trim-fitting clothing free of ragged edges** to prevent cloth from being caught by the saw. Loose clothing might snag on limbs or get caught in the saw. Woodcutter's chaps are recommended to give leg protection during a mishap.

## Before Starting a Chain Saw

You should be well prepared before using a chain saw.

- Read and understand the operator's manual and other manufacturer publications to learn how to operate the saw before you use it.
- Observe an experienced operator in action.
- Use a saw for a period of time with supervision.

- Wear all PPE before starting the saw.
- Make sure that your saw is in good operating condition.
- Keep the chain properly sharpened and make sure that the lubrication reservoir is full.
- Maintain proper chain tension as defined in the manual. Remember with use, chain tension may decrease.
- Check controls and all bolts and handles to ensure they are functioning properly.
- Follow manufacturer's recommendations for service and maintenance.

**Choose the proper size chain saw and bar length to match the job.**

## Fueling the Chain Saw

Good fire safety practices are necessary when refueling the chain saw. Follow these tips while fueling the chain saw:

- Use approved containers for transporting fuel to the saw (see Figure 2).



Figure 2. Fueling the Chain Saw.

- Shut off the chain saw before fueling. Never attempt to fuel a running or hot saw.
- Refuel the saw in an open area after it has been cooled.
- Dispense fuel at least 20 feet away from any sources of ignition.
- Use a funnel or a flexible hose when pouring fuel into the saw to prevent spills.

- Wipe the saw dry of any spilled fuel before cranking it.
- Never smoke during fueling of the saw.

## Starting the Saw

In addition to knowing the owner's manual recommendations for starting the chain saw, you should be sure to follow these tips:

- Start the saw on the ground or on another firm support. Drop starting is never recommended.
- Get a good footing. Place your foot in the handle to restrain the saw if designed with this intention.
- Start the saw at least 10 feet from the fueling area, with the chain's brake engaged.
- Place the saw on a clear, firm, flat surface as close to the work area as possible.
- Never start the saw on your knee; too many experienced woodsmen have slipped and cut their legs.

**Operate, adjust and maintain the saw according to manufacturer's instructions.**

## While Running the Saw

Follow the tips below while running the saw:

- Keep hands on the handles and maintain secure footing while operating the chain saw.
- Clear the area of obstacles that might interfere with cutting the tree or using the retreat path.
- Do not cut directly overhead.
- Shut off or release throttle prior to retreating.
- Shut off or engage the chain brake whenever the saw is carried more than 50 feet, or across hazardous terrain.
- Be prepared for kickback; use saws that reduce kickback danger (chain brakes, low kickback chains, guide bars, etc.).

## General Instructions

- Choose the proper size of chain saw to match the job and include safety features such as a chain brake, front and rear hand guards, stop switch, chain catcher and a spark arrester.
- Avoid contact with power lines until the lines are verified as being de-energized.
- Always cut at waist level or below to ensure that you maintain secure control over the chain saw.
- Bystanders or coworkers should remain at least two tree lengths (at least 150 feet) away from anyone felling a tree and at least 30 feet from anyone operating a chain saw to remove limbs or cut a fallen tree.
- If injury occurs, apply direct pressure over site(s) of heavy bleeding; this act may save lives.
- Clear away dirt, debris, small tree limbs and rocks from the saw's chain path. Look for nails, spikes or other metal in the tree before cutting.
- Be careful that the trunk or tree limbs will not bind against the saw.
- Watch for branches under tension as they may spring out when cut.
- Identify the maximum point of tension on the spring-pole.

**Take extra care in cutting "spring poles": trees or branches that have gotten bent, twisted, hung up on or caught under another object during a high wind.**

- Slowly shave the underside of the tree rather than cut through to allow the tree or branch to release tension slowly.

## Felling, Limbing, Bucking Trees and Splitting Wood

Felling, limbing and bucking trees are hazardous tasks if not done carefully. Felling involves cutting a standing tree and dropping it in the place you want it. Limbing is the removal of the branches from either standing or downed trees. Bucking is the process of cutting a downed tree into appropriate lengths.

## Felling the Tree

Plan a safe approach to cutting the tree. Size up the tree. Note the wind direction and the way the tree is leaning. If the tree is leaning, try to fell the tree in that direction when the wind is not blowing against it. If you are inexperienced, try to fell only trees that will fall in a predictable, safe direction. Examine trees for loose, dead limbs before felling. Loose limbs that fall onto the tree cutter are a common cause of serious injuries and fatalities. Either remove the limb first or fell the tree from a position where the limb could not strike you if it was dislodged.

Clear a safe work area around the base of the tree. Remove limbs, underbrush and other obstructions. Be sure to have several open pathways away from the tree for an escape route when the tree begins to fall (see Figure 3).

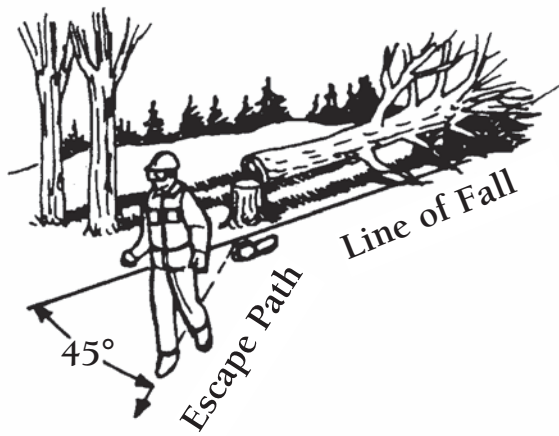


Figure 3. The Escape Path.

Be sure that clearance in the intended direction is adequate for the tree to fall completely to the ground. A lodged tree is very dangerous. Experienced loggers are often killed by trees that hang up or snag in adjacent trees. A tree springing back from the weight of a falling tree can whip a broken limb toward the cutter with tremendous speed.

After determining the direction of fall and clearing escape routes, cut the tree as follows:

- Make one cut through trees less than 8 inches in diameter.
- On larger trees, notch (undercut) at least one third of the trunk diameter on the fall side of the trunk as shown in Figure 4. Make the lower cut of the notch first to prevent the loose wedge of wood from pinching or bending the chain. The recommended angle of the notch varies from 45 to 90 degrees. With 45-degree notches the bottom cut is horizontal. For 70- to 90-degree notches, the bottom cut is sloped upward into the tree.

- Make a felling or back cut on the opposite side of the trunk one to two inches above and parallel to the horizontal cut in the notch. The tree should begin to lean when your cut approaches the inner face of the notch. Leave a narrow uncut portion to serve as a hinge for controlling the fall of the tree.

**Be sure that bystanders are at a safe distance from cutting activities.**

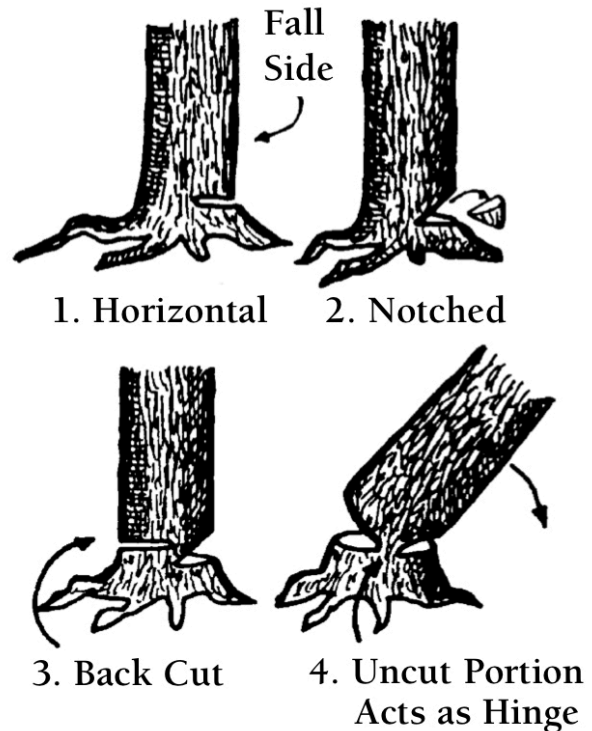


Figure 4. Steps in Cutting a Tree.

If the saw begins to bind in a closing cut, you may have misjudged it. At the very first indication of binding, remove the saw. If it is too late to remove the saw, do not struggle with it. Shut off the engine and plan a way to remove the saw using wedges. Wedges are the most dependable way of controlling the direction a tree falls. Using two wedges rather than one is best. Two wedges allow better control and ensure a forward fall of the tree.

## Limbing the Tree

The next job is to remove the limbs. Be alert for flexible limbs that wedge and whip a chain saw, and avoid cluttered work areas. Serious injuries may occur during the limbing operation. Some safety tips are:

- Begin limbing at the base of the trunk. The first limbs cut should be those on top of the trunk. Cut these as far up the top side of the

trunk as possible before removing those resting on the ground.

- Stand on the opposite side of the trunk from the limb being cut. The trunk provides a barrier between you and the saw and helps protect from accidental contact with the chain.
- Do not hold a running saw with one hand and clear limbs with the other. Shut off the saw and put it down until limbs have been cleared.
- Cutting branches resting on the ground may be necessary to clear the area as you work. Be aware that the tree may settle or roll as a new branch is cut. The likelihood of this occurring increases as more branches are removed. Be alert for any trunk movement and be ready to move away quickly if necessary.
- If the tree or the branch is suddenly released, it may strike the person cutting it, or a bystander, with enough force to cause serious injury or death. Even a seemingly small tree or branch (2 inches in diameter, for example) may pose a hazard when it is released from tension.

## Bucking the Logs

Bucking is cutting the trunk of the felled tree into desired lengths. The greatest hazards while bucking a tree are unexpected log roll and saw kickback. Here are a few safety tips:

- Always be sure of your footing. By keeping yourself in a well-balanced position at all times, you can react to unexpected log movement.
- Raise and chock the trunk when possible to prevent rolling. Work on the uphill side of the log. Since a log rolls downhill, working on the uphill side provides the greater safety.
- Bucking procedures differ depending on how you support the log as shown in Figure 5. When the log is flat on the ground, cut it from top, then roll it over and cut it through from the opposite side. When the log is supported on one end, cut one-third of the diameter from the underside to avoid pinching and splintering, then cut the remaining two-thirds of the diameter from the top. On a log supported at both ends, make the first cut through the top one-third of the diameter. The remaining wood is then cut upward from the bottom.

## A. Flat Log on the Ground

1. Cut from top
2. Roll log over
3. Cut the opposite side



## B. Log is Supported on One End

1. Cut 1/3 diameter
2. Cut 2/3 diameter



## C. Log is Supported on Both Ends

1. Cut 1/3 diameter from top
2. Cut 2/3 diameter upward



Figure 5. Various Tree Bucking Methods.

When cutting firewood lengths, several methods can be used. One way is to make cuts about three-fourths of the way through for each length of firewood. By not cutting completely through, several lengths stay together and the log remains rigid. After all cuts are made from one side, roll the log over and complete cuts. Avoid sawing into the ground, which dulls the chain and shortens its useful life.

## Splitting Wood

Even though a chain saw is not commonly used for splitting wood, the topic is included in this section to emphasize the need to also wear all PPE for your safety while performing this activity. Splitting wood is a skill that improves with experience. Having the proper tools makes the job easier. Tools used to split firewood include a splitting ax, a sledgehammer, a splitting maul and wedges. The quickest way to split small, easy-to-split pieces is with an ax. However, an ax can get stuck in larger pieces. A splitting maul makes the job easier. A splitting maul is a combination of an ax and a maul, with a wedge on one side

and a hammer on the other. Use the wedge side just as you would an ax. The broader wedge keeps the blade from jamming as easily in wood. The hammer side can be used to pound the occasional wedge. You may need a sledgehammer and wedges for larger pieces that are very hard to split. A powered log splitter is often used instead of axes and splitting mauls to reduce labor.

## Employee Training

Employers involved in tree removal/logging are required to assure that their employees are able to safely perform their assigned tasks. When loggers are trained to work safely, they should be able to anticipate and avoid injury from the job-related hazards they may encounter. Training requirements include:

- Specific work procedures, practices and requirements of the worksite, including the recognition, prevention and control of general safety and health hazards.
- Requirements of the OSHA Logging standard, Bloodborne Pathogens standard, first aid, and CPR training.
- How to safely perform assigned work tasks, including the specific hazards associated with each task and the measures and work practices which will be used to control those hazards.
- How to safely use, operate and maintain tools, machines and vehicles which the employee will be required to utilize in completing the assigned requirements.

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