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What You Should Know About Safe Chainsaw Operation

Michigan State University Extension Service

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# What you should know about safe chain saw operation

## INTRODUCTION

Chain saw operators need to know how to:

- match the saw to the job.
- evaluate working conditions.
- perform basic cuts.
- work within the limitations of the saw.
- avoid "kickback."
- identify dangerous problem trees.
- do basic routine saw maintenance.
- dress with proper clothing for the job.
- use safe operating techniques (starting, cutting position, refueling, clean work area).
- "size up" a tree.
- "fell a tree" (cut it down).
- "limb" (remove limbs from a trunk).
- make trunk cuts.
- identify if a chain is sharp.

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Drawings courtesy of Deere and Company.

A CHAIN SAW should match the task you want it to do. That is a basic principle of chain saw safety.

The best source of knowledge about the size of chain saw required is an experienced, knowledgeable dealer. To choose the proper saw, it is necessary to know the amount and type of cutting that will be required. Large chain saws, weighing over 15 pounds with long bars are best used for professional, heavy cutting of large wood and in felling operations. Saws of a medium size generally having a total weight of 10 to 15 pounds, with cutting bars over 12 inches in length up to 18 inches, are good for light cutting, bucking and limbing. Small, lightweight saws, usually weighing less than 10 pounds with cutting bar lengths of 12 or 10 inches, are best suited for cutting small trees and pruning. If too small a saw is continually used for tough jobs, the operator will tend to over-exert. Similarly, use of a heavy saw for light work may result in excessive fatigue. Under these conditions, accidents can occur.

Several factors affect the safe operation of a chain saw—the weather, the work, the saw, and the operator.

Let's consider these individually.

## The Weather

Wind can create very serious hazards when cutting down trees. Sudden gusts may cause a tree to fall in an unexpected direction. Avoid cutting large trees on windy days, or use these days for "limbing" (removing the limbs from the trunk) or bucking (cutting the trunk into desired lengths). Good footing is a must when using the chain saw; so rain, snow and ice are definite hazards. Wear proper protective clothing and work slowly and carefully.

## The Work

Inexperienced operators should not start by "felling" (cutting down) trees. Make trial cuts to become accustomed to a chain saw's cutting and handling characteristics. Cut small logs supported off the ground so that chain will not strike the ground. Let the chain do the cutting. Extra pressure does not need to be applied. Don't try to cut trees with a diameter greater than the length of the chain saw guide bar (Figure 1). This requires special techniques, and



the operator could be seriously injured if the saw made a "kickback"—jumping backward as the chain at the top of the guide bar is snagged.

Certain trees are dangerous. Lumberjacks use some of the following expressions to identify problem trees:

- **Widowmaker** is a tree with broken or dead limbs or a dead tree "hung up" in another tree. A limb doesn't have to be very big or high in a tree to be capable of causing serious injury if it falls on a person.
- **Spring pole** is a sapling that is bent and held under tension by another tree. If the spring pole is cut or the other tree is removed from it, the sapling can snap up with a tremendous force and seriously injure anyone nearby.
- **Schoolmarm** is a tree with a prominent fork in the trunk, making it difficult to predict which way it will fall.

### The Saw

The noise and vibration of a chain saw can cause hearing loss, fatigue and swelling of the hands, which is commonly known as white fingers disease. Buy a saw with minimum vibration (some saws are equipped with anti-vibration mounts) and good vibration-absorbing grips. Proper maintenance is also essential. This includes sharp teeth, correct chain tension, proper lubrication and a well-tuned engine.

Most routine maintenance can be accomplished by following the owner's manual recommendations. Unless the operator is mechanically inclined, it is probably better to consult the

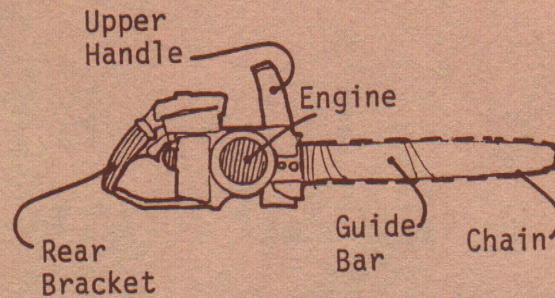


Figure 1—Basic parts of a chain saw.

saw dealer when serious mechanical problems arise.

Every owner should have a good tool kit to help assure continued operation of his saw (Figure 2). The kit should contain:

- a few extra labeled cans or a plastic bottle (with attached pouring nozzle) of chain oil.
- wrenches to fit all nuts and lugs on the saw.
- screwdriver.
- round file and guide for touching up the chain.
- flat file and depth gauge to file the depth guides.
- small brush (½ inch) to clean away sawdust and wood chips from around gas cap and cooling fins.
- extra sparkplug.
- owner's manual (wrapped in a plastic bag).
- cleaning rags.

If you are going to do a lot of cutting, take along an extra chain as a spare. Alternating

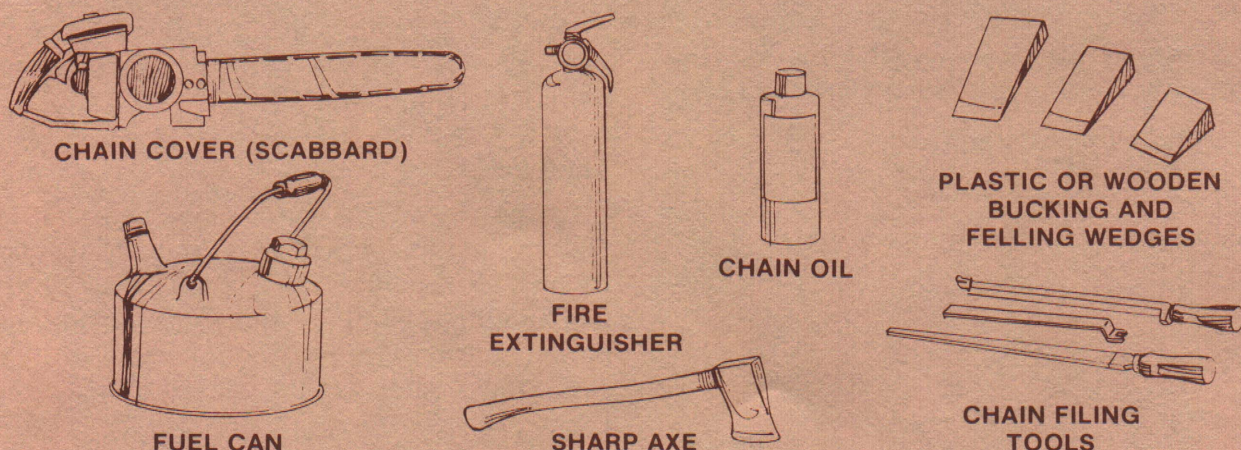


Figure 2—Use proper equipment to help you do the job safely.



chains every day will greatly prolong the life of the sprocket upon which they run.

### The Operator

Felling and cutting timber is hard work. Operators should be in good physical condition, able to withstand heavy work periods. Persons who become exhausted easily may be potential accident victims. Don't hesitate to take frequent rest breaks. A prerequisite to any cutting operation is proper clothing for the operator (Figure 3). Wear warm, comfortable, trim-fitting clothing that allows easy movement, light nonslip gloves and good gripping boots or shoes. Protective leggings or chaps and shoes with steel toes will provide additional safety to the operator. Safety goggles or eye glasses with safety lens help prevent possible eye injury from flying wood chips or sticks. A good safety hardhat may prevent serious head injury from falling branches or limbs.

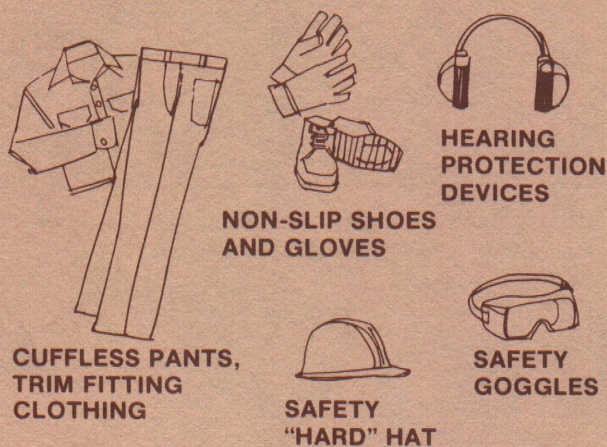


Figure 3—Use protective equipment when operating a chain saw.

Ear plugs or acoustic muffs are essential because of the saw's high noise level. If ears ring for an extended time after the saw is used, hearing damage may have occurred.

### OPERATING TECHNIQUES

#### Mixing Fuel

Mix fuel according to instructions in the owner's manual. Store and transport fuel in a properly labeled, heavy-gauge (26 gauge or heavier) metal gasoline container. The chain



Figure 4—Refuel on bare ground to reduce the fire hazard.

and bar must be kept well lubricated when cutting. Make certain the oiler device (manual or automatic) is functioning, as the oiler is a safety device as well as a means of reducing bar wear.

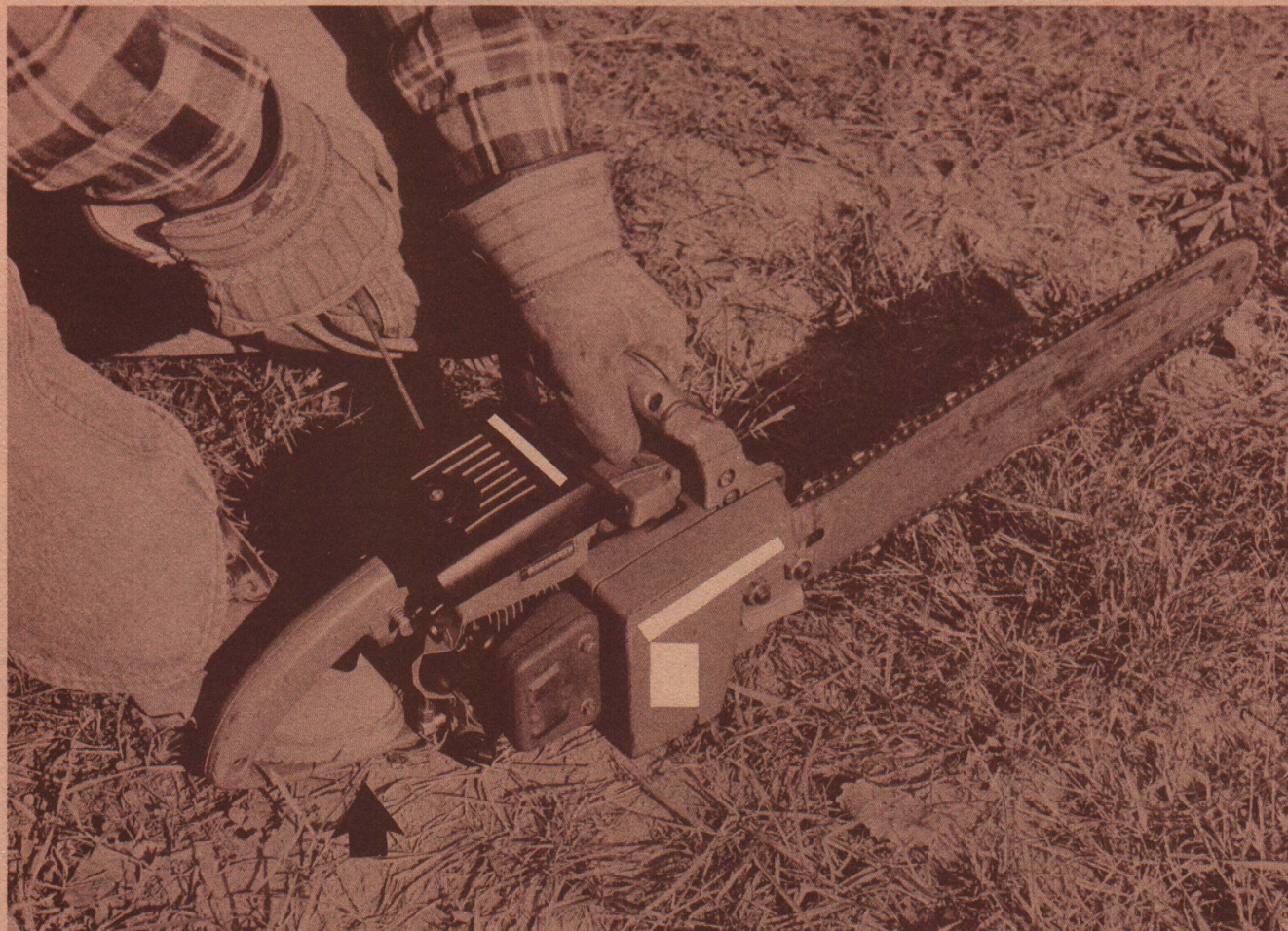
#### Refueling

When refueling the engine, use a funnel or flexible nozzle to avoid spillage on the engine. If fuel is spilled, thoroughly clean the engine before starting. Refuel the engine with the saw on the ground and in an area cleared of combustible materials (Figure 4). Under no circumstances should you smoke while refueling. Before starting the engine, check the oiler, air filter, sprocket and cooling fins for possible blockage. Check and, if necessary, adjust the tension in the chain. Consult the owner's manual for the proper distance the chain should be from the bottom of the bar. In addition, check that all bolts, nuts and screws are tight, as these often become loose during operation.

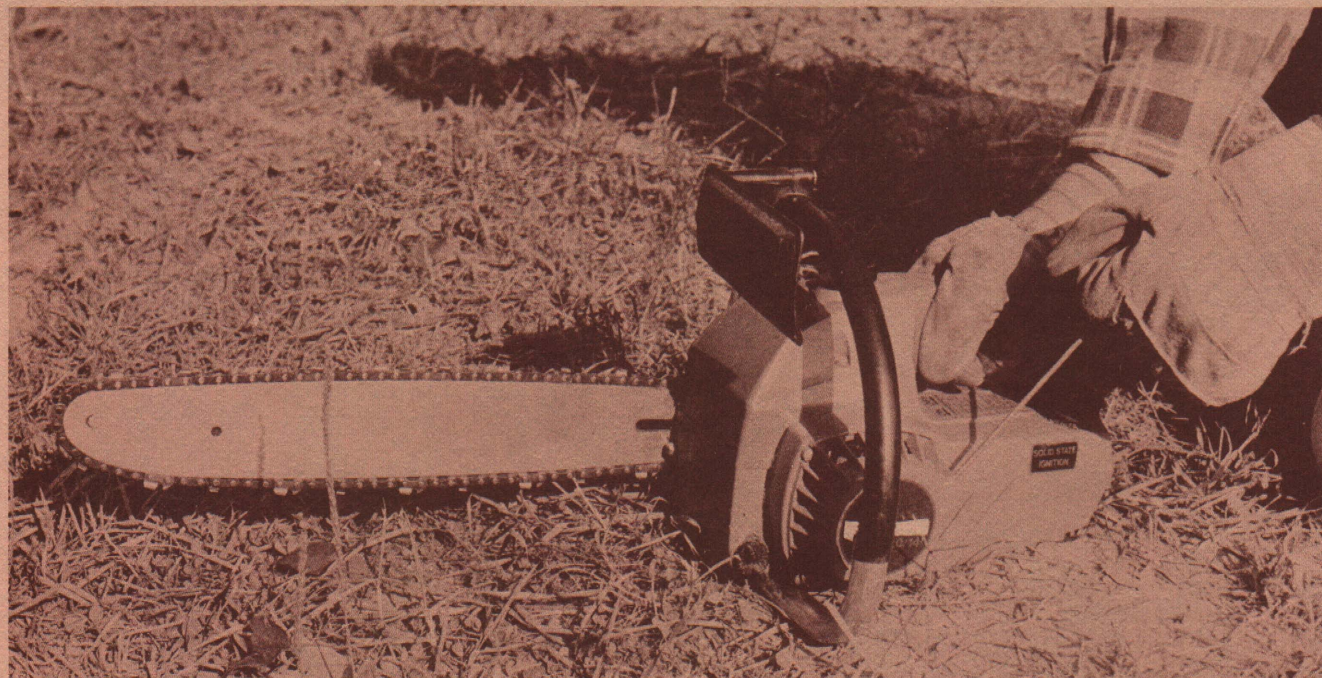
#### Starting the Engine

Start engine with the saw on the ground, one foot placed in the bracket to the rear of the unit (Figure 5). Grip the handle at the top of the saw with the thumb wrapped under the handle and pull the starter rope with the other hand after starting controls have been properly set. Smaller saws may not have a foot bracket, so make certain the saw is held firmly on the ground. Never allow another person to assist in starting. If either person slips or lets go, someone may be injured.





**Figure 5-A—When starting a medium or large chain saw, make sure that one foot (arrow) is firmly placed in the handle. Grasp the saw handle firmly with one hand, making sure the starter rope is pulled firmly straight backward.**



**Figure 5-B—Hold small chain saws firmly on the ground with one hand when starting. Pull the starter rope straight back with a firm short pull. Do not jerk. This could cause the saw to turn sideways, especially on a wet or slippery surface.**



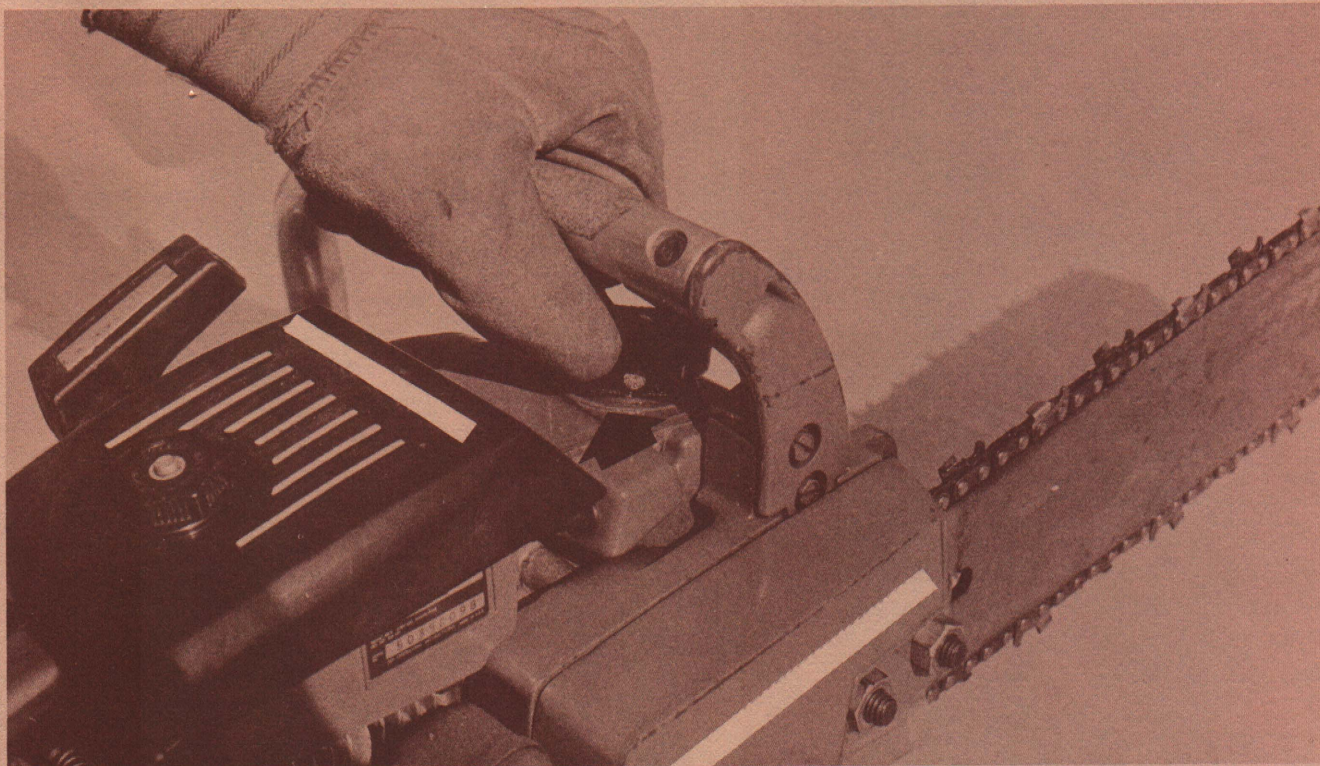


Figure 6—Keep your thumb (arrow) wrapped around the bottom side of the chain saw handle at all times. This will prevent your hand from possibly slipping onto the blade during operation.

### Making a Cut

When making a saw cut, be sure your thumb is wrapped under the bar atop the saw, not laid alongside the index finger on the bar (Figure 6). This will prevent the hand from slipping into the chain.

While cutting, hold the saw close to the body to provide maximum control. Do not work with arms extended. Keep knees flexed and one foot

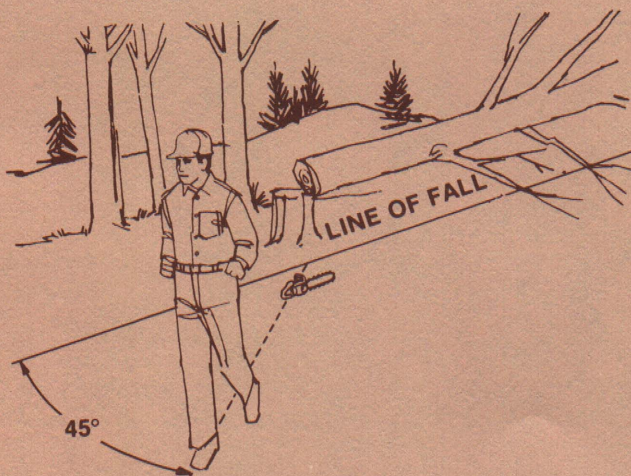


Figure 7—Plan a safe retreat before felling a tree.

comfortably behind the other to provide a firm footing with maximum balance.

Before “felling” (cutting down) a tree, size it up carefully. Note the distribution of the larger branches and wind direction to determine how the tree is apt to fall. Allow no one else within two tree lengths of a person felling a tree.

Be sure the work area around the tree is cleared of underbrush or obstacles that could be tripped over. Clear an escape path 45 degrees opposite the direction the tree will fall (Figure 7). Examine the tree for loose or dead limbs before felling. If they appear to be a hazard, remove them first.

When changing locations, carry the chain with the blade to the rear and with the hot muffler away from the body. Never carry a chain saw on your shoulder or with the chain in motion. If you are moving any distance, or if you let the saw down, stop the engine.

Make certain the chain stops rotating around the bar when the throttle control trigger is released.

When cutting on steep slopes the chain saw operator should always stand on the uphill side to prevent being struck by rolling logs.



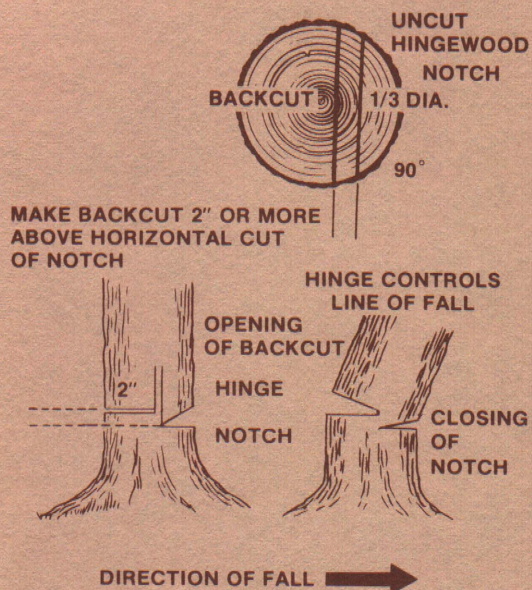


Figure 8—Notch and felling cuts must be made correctly to make the tree fall in the desired direction.

### Felling

- Cut through trees less than 4 to 5 inches thick with one cut.
- On larger trees, make a notch on the side of the tree on which it is expected to fall. It should have a depth approximately one-third the diameter of the tree (Figure 8).
- Make the felling or back cut at least two inches higher than the horizontal notch cut. Keep the felling cut parallel with the horizontal notch cut. Cut it so wood fibers are left to act as a hinge, keeping the tree from

twisting and falling in the wrong direction or making a kickback on the stump.

- Keep the guide bar in the middle of the cut (horizontal) so the cutters returning in the top groove don't recut. Guide the saw into the tree—don't force it. The rate of feed will depend on the size and type of timber being cut.
- Remove the saw from the cut, and shut it off before the tree falls. Do not cut through the hinge because this may cause the tree to fall in any direction, possibly on the retreating operator. Move away from the tree at a 45-degree angle through the retreat lane that has been thoroughly cleared.

**Note:** See page 12 for listing of factors to consider when felling a tree.

### Limbing

After the tree is on the ground, take a look at each limb before making the cut to be sure that cutting the limb off will not bind the guide bar or cause the trunk to roll toward the operator.

Do not face the limb squarely. Stand at approximately a 45-degree angle so that if the saw slips or completes the cut sooner than expected, the chain will not strike your leg.

Avoid sawing with the point of the guide bar (nose sawing). This greatly increases the chances of chain saw kickback (Figure 9). Kickback can occur if the chain suddenly hits a solid object or takes too large a cut. This can

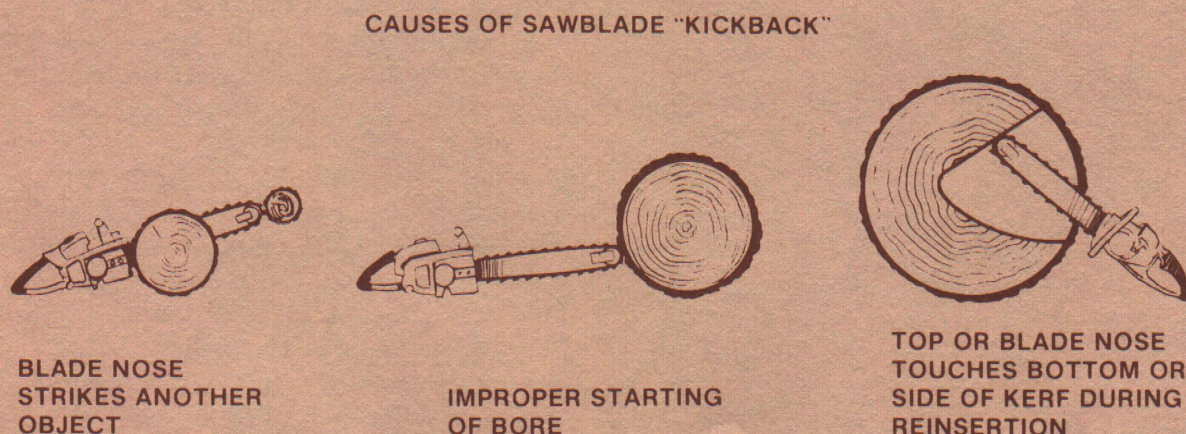


Figure 9—Avoid situations which can cause kickback.





**Figure 10—Whenever possible, keep the tree trunk or similar barrier between yourself and the saw blade. This precaution may prevent an accident, should the saw strike an object that causes it to jump or suddenly slip.**

force the saw backward and may result in a serious accident.

Kickback can be prevented by:

- holding the saw firmly with both hands
- gripping the top handle with the thumb around it
- using a saw equipped with a chain-brake or kickback guard
- watching for twigs that can snag the chain
- not pinching the bar while in the log cut
- sawing with the lower part of the bar, close to the bumper, not on the top near the nose
- maintaining high saw speed when entering or leaving a cut in the wood
- keeping the chain saw chain sharp
- not reaching above shoulder height to cut.

The chain is too close to your face in this position.

Many newer models of chain saws are equipped with a safety tip, a chain brake or a special chain, all of which are anti kickback features.

Ask the dealer to explain how these help reduce kickback. Look for anti kickback features on any new or used saw you are considering to buy.

Never make cuts with the saw between the legs or straddle the limb to be cut. Always be aware of the direction the chain will go if it breaks, and keep people clear of this area. Stand on the opposite side of the trunk from the limb you are cutting. This gives the legs additional protection (Figure 10).

While limbing or cutting the trunk (bucking), make sure the chain does not hit the ground. An operator can cut 40 trees and not do the damage to the chain that striking the ground one time can do.

### **Bucking**

**If the trunk is supported along its entire length, make cuts from the top (called overbuck) one-third the diameter of the log deep, the length of the trunk. When this is completed, roll**



it over and make the final cuts. This prevents pinching the guide bar and chain (Figure 11-A).

**If the log is supported on one end,** make the first cut (underbuck) one-third the diameter, then complete from topside by overbucking the upper two-thirds to meet the underbuck (Figure 11-B).

**When the log is supported from both ends,** cut one-third the diameter from the top (overbuck), then complete the cut by cutting upward from the underside (underbuck) to meet the first cut (Figure 11-C).

Whenever the saw is being operated, keep people well out of the cutting area. If a person is assisting by removing limbs, be aware of their position and activity at all times.

When cutting large diameter logs, operate the saw with the throttle about three-quarters open. Overpowering the saw will waste fuel and create unnecessary wear. Underpowering will not push enough air through the cooling fins and may cause engine overheating.

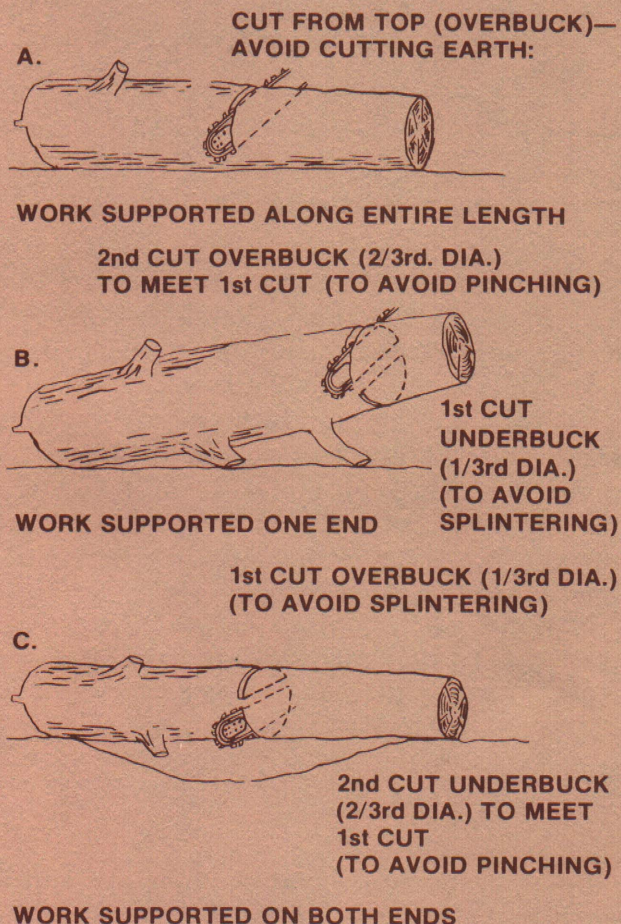


Figure 11—Use these bucking procedures for safety.

## SPECIAL SITUATIONS

### Cutting at Heights

Using a ladder to remove limbs from trees is very hazardous. Don't carry a chain saw up and down a ladder with the engine running. Use a rope to hoist the chain saw, engine not running, up into the tree. You will need a very stable position on the ladder to start the chain saw without losing your balance. When cutting, always keep a firm grip on the chain saw with both hands. Don't let it "fall" through the cut or it may strike your legs or other objects. Overhead cutting is extremely tiring and dangerous.

### Using Wedges

When binding occurs, use wedges. However, stop the chain so there is no danger of driving a wedge into the moving chain. Use only wooden, aluminum or plastic wedges. Do not use steel or iron wedges, as they may do considerable damage to the chain if struck. Also, be alert to the fact that if the chain should strike the wedge, it will probably hurtle it out of the tree with enough force to inflict considerable injury. Position yourself and helpers accordingly.

On windy days, for leaning trees or where trees must fall in a specific direction, wedges are essential. Two wedges are usually used. When the final cut is up to the proper depth for felling the tree, remove the saw. Shut the chain saw off and move it back to a safe position. Then tap the wedges with a sledge or mallet to fell the tree.

If the chain cuts a wide groove or the cut shows fine powder instead of wood chips, it needs sharpening (Figure 12). If the saw tends to cut a circular path instead of a straight line through the log, the guide bar track, along which the chain runs, is worn on one side or the chain may be improperly sharpened. Unless the owner has the proper equipment to correct the problem, take the chain and guide bar to the dealer for filing and regrooving.

When the cutting is completed, shut off the saw—do not move out of the immediate cutting area with the saw running. If you're not going to use the saw for a while, place a chain cover over the guide bar to prevent the chain from snagging or becoming damaged by other objects.



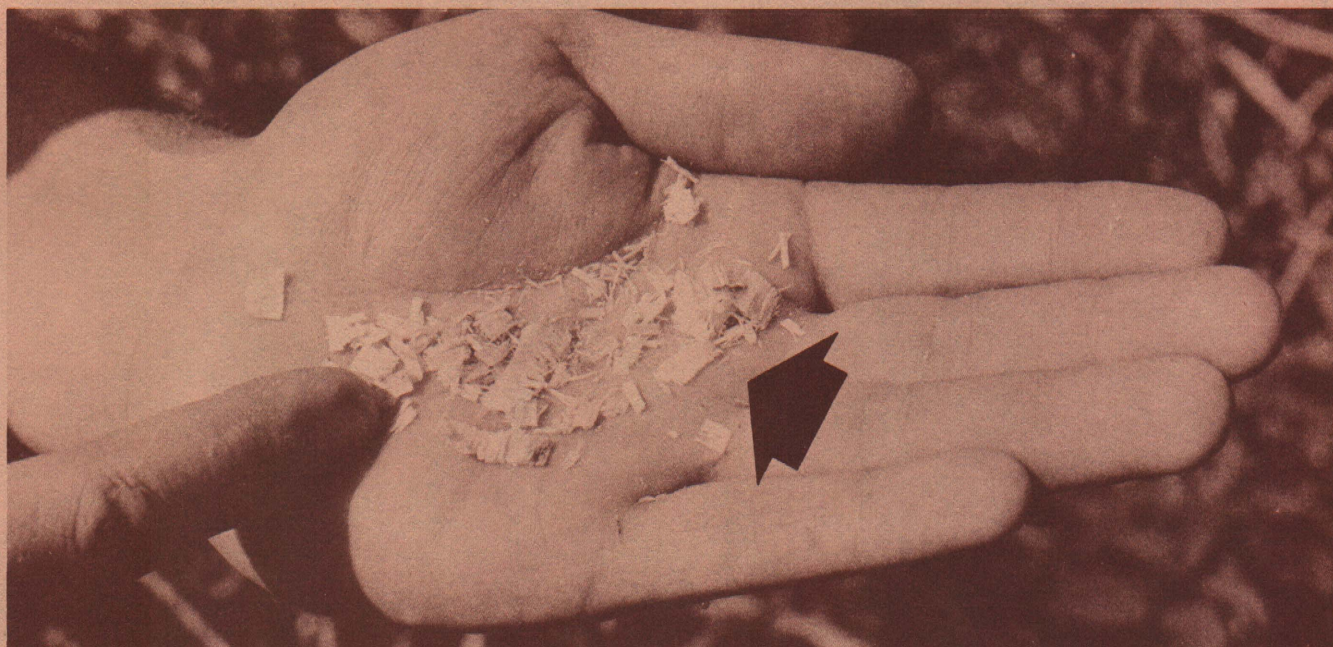


Figure 12—Chainsaw wood chips tell you a lot. They should be about the size of the chain teeth (arrow). If they are small or powdery, get the chain sharpened!

#### When Buying a Chain Saw, Consider These Safety Features

1. **Anti-kickback device**—most newer saws have this important safety feature.
2. **Vibration and noise characteristics**—look for noise and vibration reduction features on new and used saws. (See Extension Bulletin E-1268 for noise ratings on electric and gas powered chain saws.)
3. **Throttle interlock**—prevents accidental throttle advance. Also a high engine idle latch allows operator to start engine while holding the saw firmly on the ground.
4. **A well-balanced chain saw sized for the job**—the correct bar length and engine size (power) will reduce operator fatigue.

**A special note to remind you about youth and hazardous occupations.** The Hazardous Occupations Order forbids youth under 16 years of age to operate a chain saw on trees or timber having a butt diameter of more than six inches. This includes felling, bucking, skidding, loading, or unloading logs or poles. The only exception is a youth working on a farm owned or operated by the youth's parent or legal guardian.

**Remember**—the most important safety factor in a chain saw cutting operation is the operator.

#### Gasohol and Small Engines —Do Not Mix?—

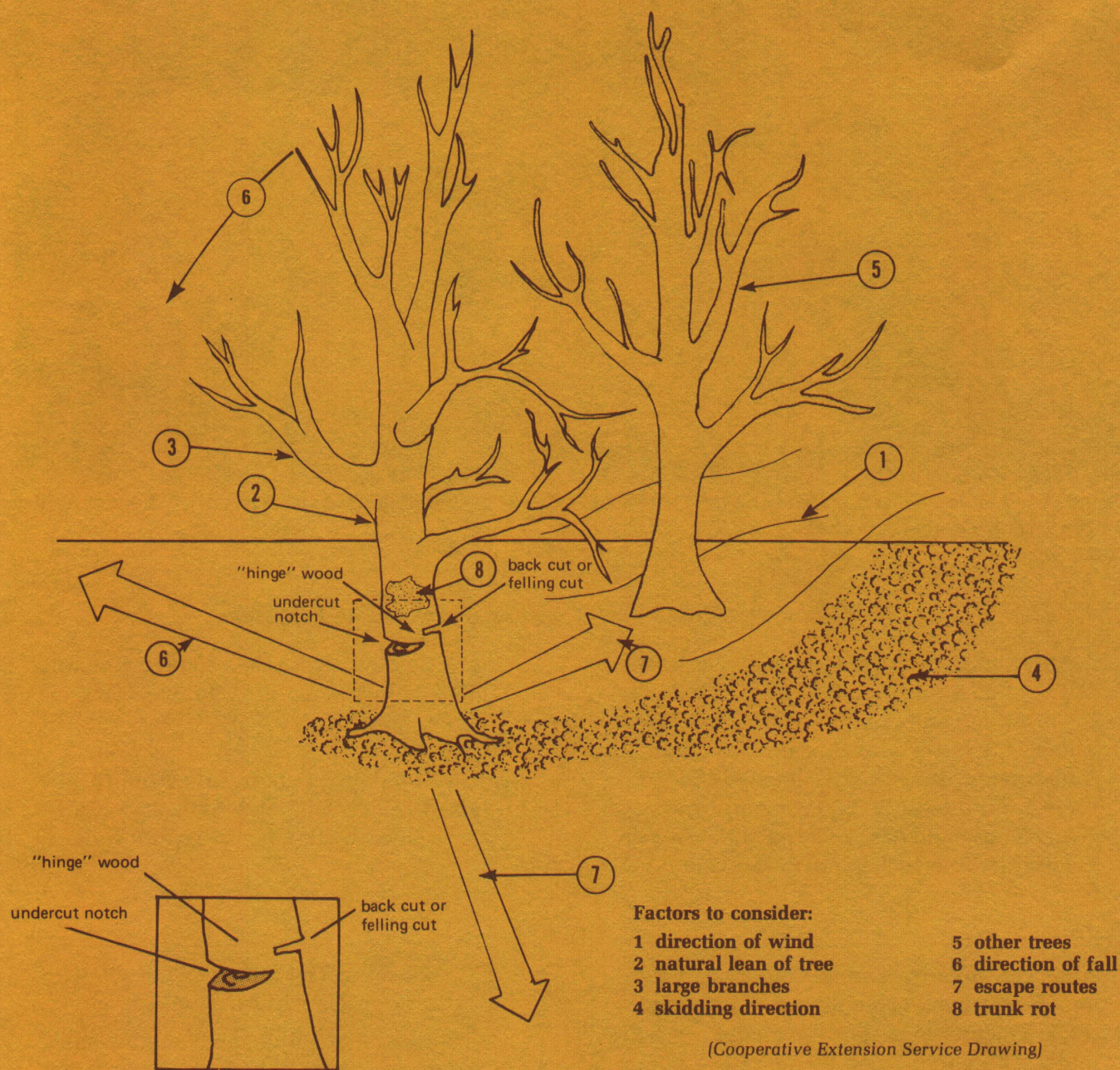
According to a major small engine manufacturer, **using gasohol as a fuel source for small engines is not currently recommended** due to possible damage to certain gaskets, seals, hoses and packings. Also, overall engine life was reported to be severely decreased.

Be sure to check with an authorized dealer or contact the manufacturer of your particular brand of small engine concerning the advisability of using "gasohol", as a gasoline substitute.

Source: Tecumseh Research Laboratory, Ann Arbor, Michigan



Accurate tree felling is possible if these factors are observed and the felling cuts are made correctly.



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