Chapter 5
Felling and Cutting Trees

Felling (cutting down a tree) is probably the most difficult and dangerous part of the logger's job. The required skills and judgment cannot be attained by reading a few pages in a handbook. On-the-job training provides actual experience for the logger. This chapter provides the basic principles of felling.

5-1. Direction of Fall. Before starting felling operations, you must carefully decide where the tree should be dropped. Experienced loggers should make this determination because inexperienced loggers may not be as careful, resulting in injury to themselves and others. When felling trees, it is always dangerous to fell a tree into another one if either has dead branches. The branches are likely to snap off and fly through the air, These flying limbs are called *widow makers* (Figure 5-l). When beginning the felling process, look up, spot, and be aware of falling or flying limbs, or have another person spot for you. When the tree begins its fall, a cutter should pay attention to a safe exit zone. Cutters should avoid power and telephone lines.

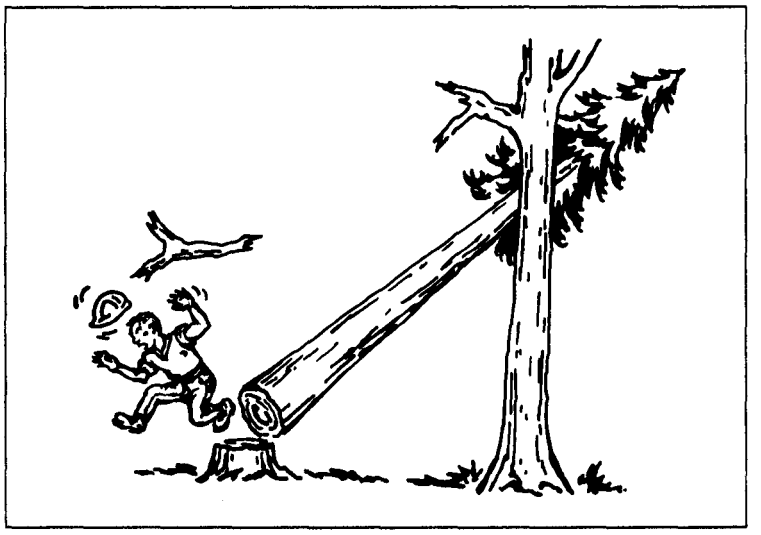

Figure 5-1. Widow maker

a. *Well-Balanced Trees.* If a tree is not leaning more than 5 degrees from the vertical, has about the same number of limbs all around, and is not being pushed by a strong breeze, you should be able to drop it in just about any direction. You do this by proper location and sequence of cuts and by judicious use of timing and wedges.

b. *Inclined Trees.* Trees with greater inclines call for stronger measures. You can push over small trees, but larger ones present more serious problems. Felling in a direction opposite the lean may call for the use of a jack or a *pull-by* cable. Using the jack or pull-by cable reduces the tension and will allow you to make a safer cut. Using all the available tools ensures the direction of the fall.

c. *Steep Upslope.* If possible, do not fell a tree straight up a steep slope. As the tree strikes the ground, it may bounce back over the stump or to either side. Since tree action is impossible to predict, the faller will have difficulty finding a safe place to watch the tree's fall. If the tree falls at a 45 degree angle on either side of an uphill slope, the faller can seek safety on the uphill side of the stump with less risk. Any other angle fall could be risky to the faller.

d. *Steep Downslope.* Trees felled straight down a steep slope are apt to be shattered by the fall, particularly if the ground is rough. Avoid felling a tree across a large rock, a stump, or a log. Such obstructions are likely to break the stem and cause much waste of good timber.

5-2. Directional Felling. Although not always possible, especially with larger timber, directional felling is more desirable to expedite the skidding job and to reduce logging damage to the trees left for future growth and reproduction. Directional felling works best in pole-sized stands being thinned and in improvement cutting.

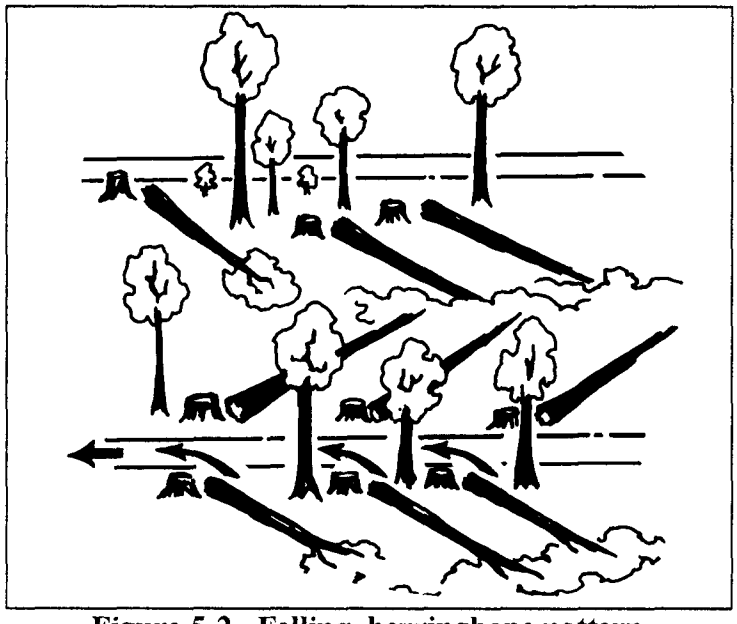

Figure 5-2. Felling, herringbone pattern

After felling, lay the trees down in a herringbone pattern so that they can be pulled out and away butt first onto the skid road (Figure 5-2). When you have to complete limbing on site, the above pattern leaves the majority of the limbs and tops away from the road and you will not have to handle the logs as often. In a full-tree logging operation, using the herringbone pattern works best.

In operations where you limb the cut stems where they drop, lay the stems down in the opposite direction so you can pull them out top first (Figure 5-3). The tops are smaller, making it possible to bring in a bigger load behind the skidder. On clear-cutting or row-thinning operations, this method reduces felled trees from lodging. Fallers should avoid leaving criss-crossed stems, which makes a skidding operation more difficult.

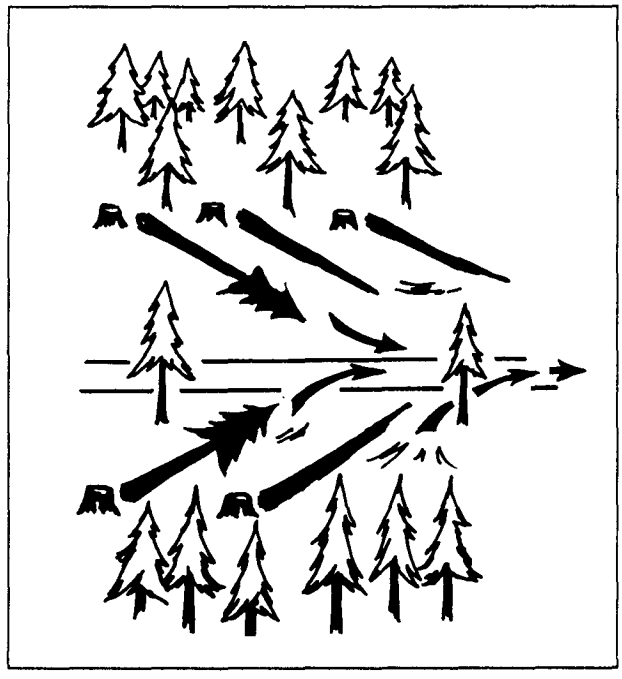

Figure 5-3. Felling, tops toward the road

5-3. Cutting Trees.

a. *Clearing Work Space.* Once you determine the fall direction, you should clear a working space around the tree's butt and prepare an escape path. Accidents could occur during an operation, and a clear working space could prevent tripping and falling.

b. *Brushing Out.* Clip off small brush close to the ground (Figure 5-4). Pulling on

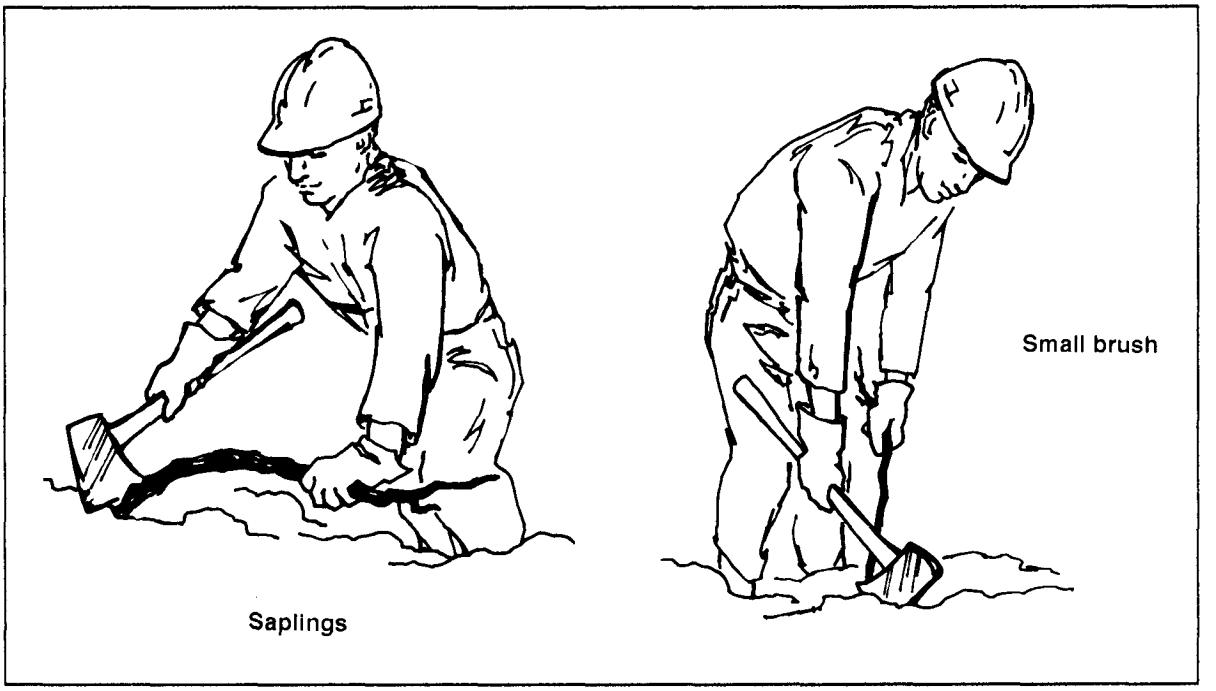

Figure 5-4. Clearing away small brush and saplings

the brush provides the necessary resistance to a slicing cut. Cut larger brush and small trees, and remove low-hanging limbs in this manner.

c. *Making The Undercut (Notching).* Undercutting provides a fulcrum and a hinge point on which to tip the tree off its stump in the desired direction. Make the undercut on the side toward which the tree is to fall. For saw timber, the stump should not be over 12 inches above the ground on the uphill side of the tree. Lower is better. High stumps waste timber and hinder skidding. On skid roads, stumps should just about be flush with the ground. At times you may have to leave a high stump because of rocks or some other obstruction that makes a low stump impossible. Use a chain saw when making all undercuts. Make undercuts deep enough to penetrate one-fourth of the diameter of the butt. For leaning trees, make the undercuts much deeper. The traditional undercut has a horizontal base and a top sloping down to it at about a 45 degree angle. Making an undercut requires experience to make the two cuts come out even and not pass each other. Careful undercutting is essential to control the direction of fall. Using a chain saw, fallers determined that they can easily make the undercut upside down with the sloping side coming up from below. This is called a Humboldt undercut (Figure 5-5). The cut makes a more nearly square end on the butt log.

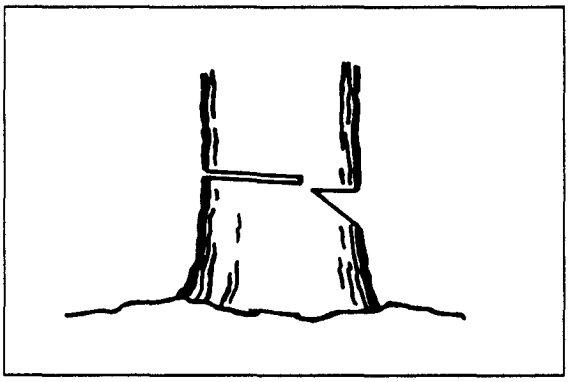

Figure 5-5. The Humboldt undercut

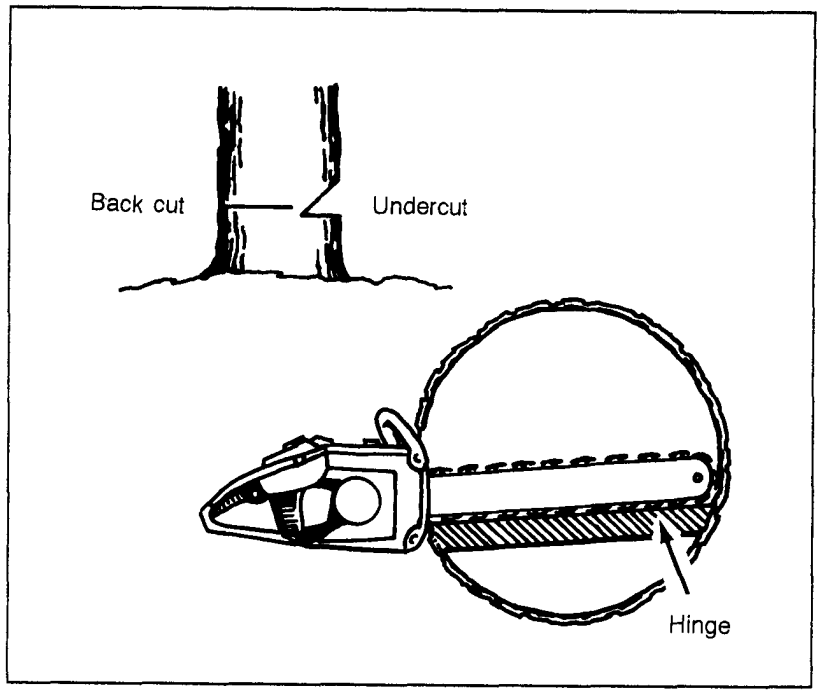

Figure 5-6. Back cut

d. *Making the Back Cut.* Make the back cut about 1 inch higher than the horizontal part of the undercut. Keep the back cut parallel with the back of the undercut, and do not let it penetrate closer than 2 inches (Figure 5-6). The back cut provides the hinge that guides the direction in which the tree falls. If the tree does not start to fall when you reach this point, start a wedge at the center of the back; remove the saw from the cut; pound home the wedge to start the tree tipping.

Often, you will encounter a tree with a diameter larger than the length of the chain-saw bar. Usually, making two cuts from opposite sides will suffice. For even larger trees, make a sequence of three cuts (Figure 5-7) to bring down the tree. First, make a semicircular cut in the middle of the back of the tree. Then, cut out the fins on both sides, ending up at the back of the hinge parallel to the undercut.

5-4. Leaning Trees. Most trees should be felled in the direction of the lean. However, when a tree leans from the desired direction of fall, you can change this direction a little by *holding a corner*. To do this, make the back cut closer to the undercut on the side toward the lean, and retain a little more wood in the hinge cm the side away from it (Figure 5-8). By holding a corner, you can help tip the tree to an upright position so it will fall in the desired direction.

When felling a tree in the direction in which it leans, the tree is apt to start falling before you complete the back cut. When this happens, the tree butt could split some distance up from the stump, leaving a *barber chair* (Figure 5-9). The splitting reduces the value of the butt log and may throw the butt of the tree around in unpredictable directions. This is extremely dangerous. To reduce the possibility of this happening, *saw off the corners* before the completing the back cut (Figure 5-10, page 5-6). Make angling cuts through the sapwood, on both sides, to the undercut. Another method you can use to reduce the splitting is to fasten a log chain around the tree's base and tighten the chain by driving in a few wedges (Figure 5-10, page 5-6).

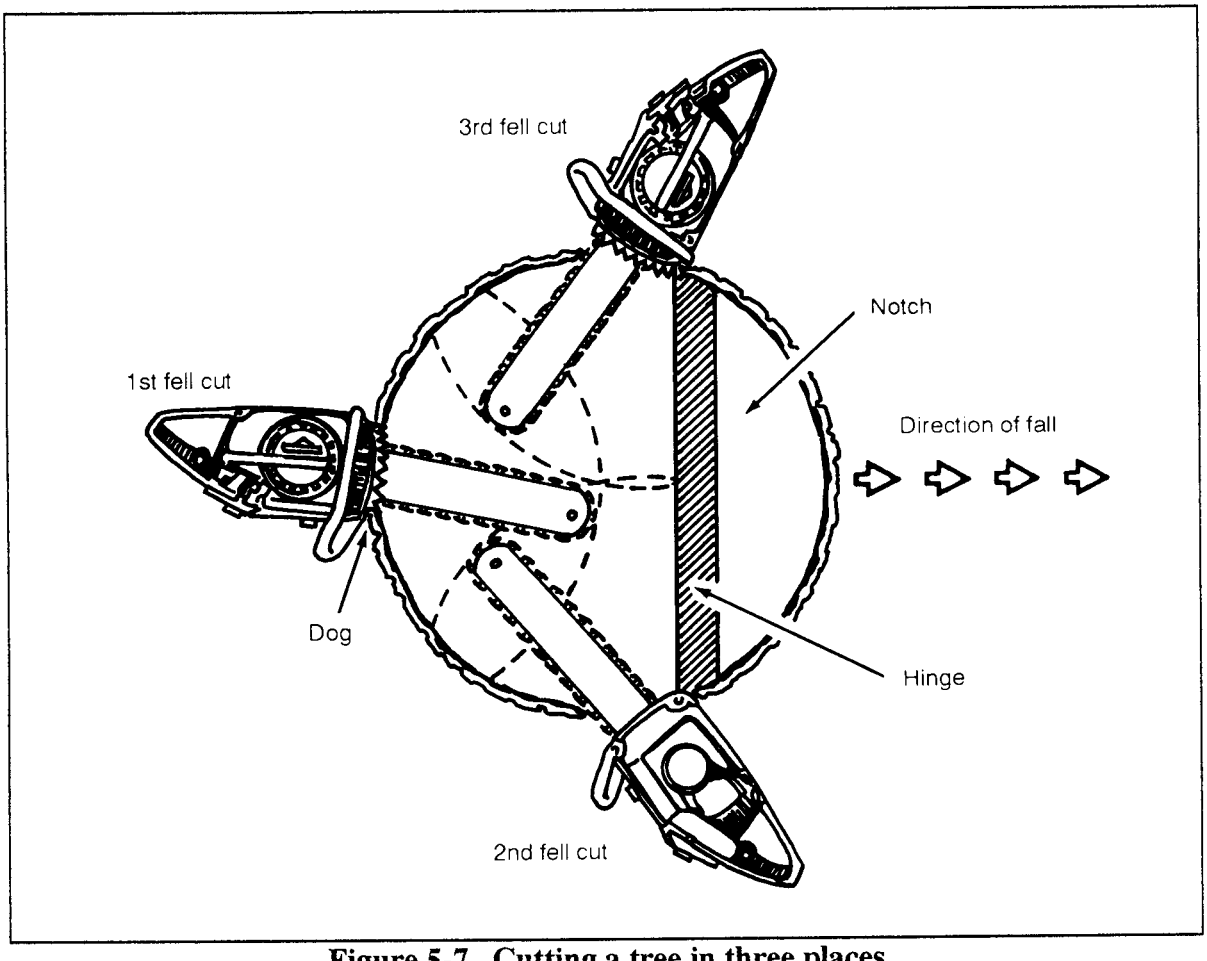

Figure 5-7. Cutting a tree in three places

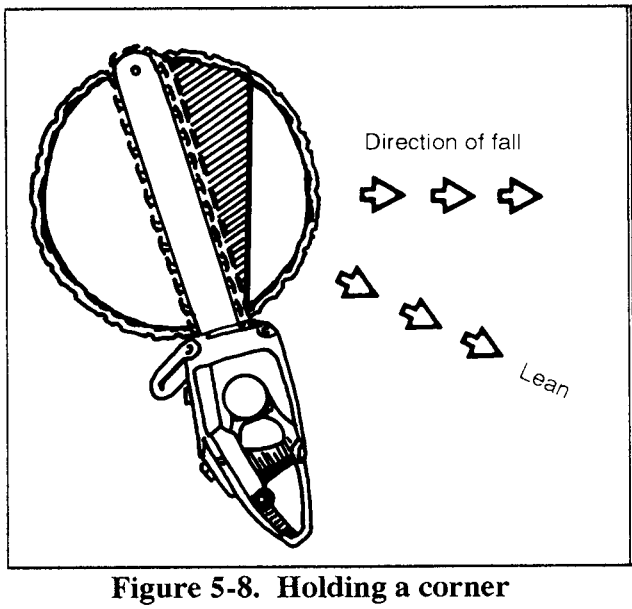

Figure 5-8. Holding a corner

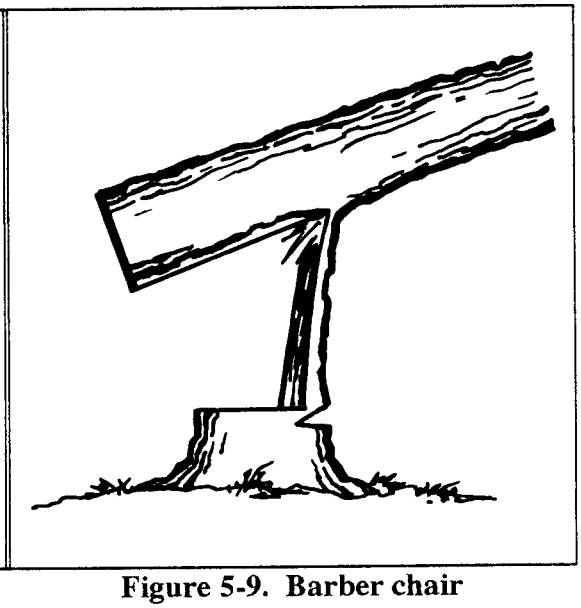

Figure 5-9. Barber chair

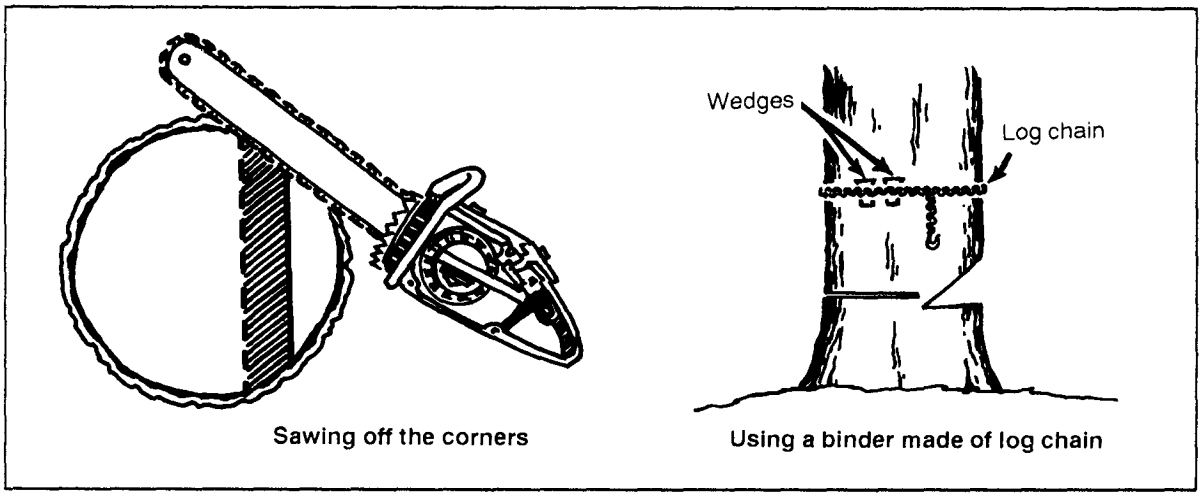

Figure 5-10. Methods to prevent splitting

Two new techniques have been developed for bringing down heavy leaners in the direction of their lean, without splitting. Both depend on the special cutting abilities of chain saws.

- Method One. Make an undercut, either the traditional or the Humboldt type. Instead of starting the back cut from the rear of the tree, start it with a boring cut several inches in from the back side. Continue the cut forward, leaving just the hinge to the rear of the undercut, and then go backward, leaving only two or three inches uncut at the rear. Pull out the saw and slice away the uncut fibers to allow the tree to fall (Figure 5-11, A).

WARNING
The plunge (boring) cut can be dangerous. Be very careful because chain-saw kickback can occur during the Initial cut.

- Method Two. Make a straight cut into the tree from the side toward which it will fall, about two-thirds through the trunk (Figure 5-11, B). Drive wedges in behind the saw when you feel the tree starting to pinch. After making the cut, remove the saw and complete the cut from the backside. Stay alert in anticipating the tree's fall; be ready to get out of the way. Tree-butt kickbacks are common with this method.

You can choose from several methods when you have to tip a heavy leaning tree in a direction other than the one in which it would normally fall. The most common method is to attach a cable high on the stem. A skidder, tractor, or hand-operated *come along* exerts pull on the chain. A second method is to use a jack that has been developed for use on the backside of such trees. The third and easiest method is to use a truck or house-moving jack that you insert in a square backed notch in the back of the tree (Figure 5-12).

5-5. Rotten Trees. Rotten butted trees present a special problem, and most serious accidents in felling result from trying to fell rotten butted trees. It is difficult to anticipate the time or direction of their fall. If possible, make felling cuts high enough to avoid the worst of the rot

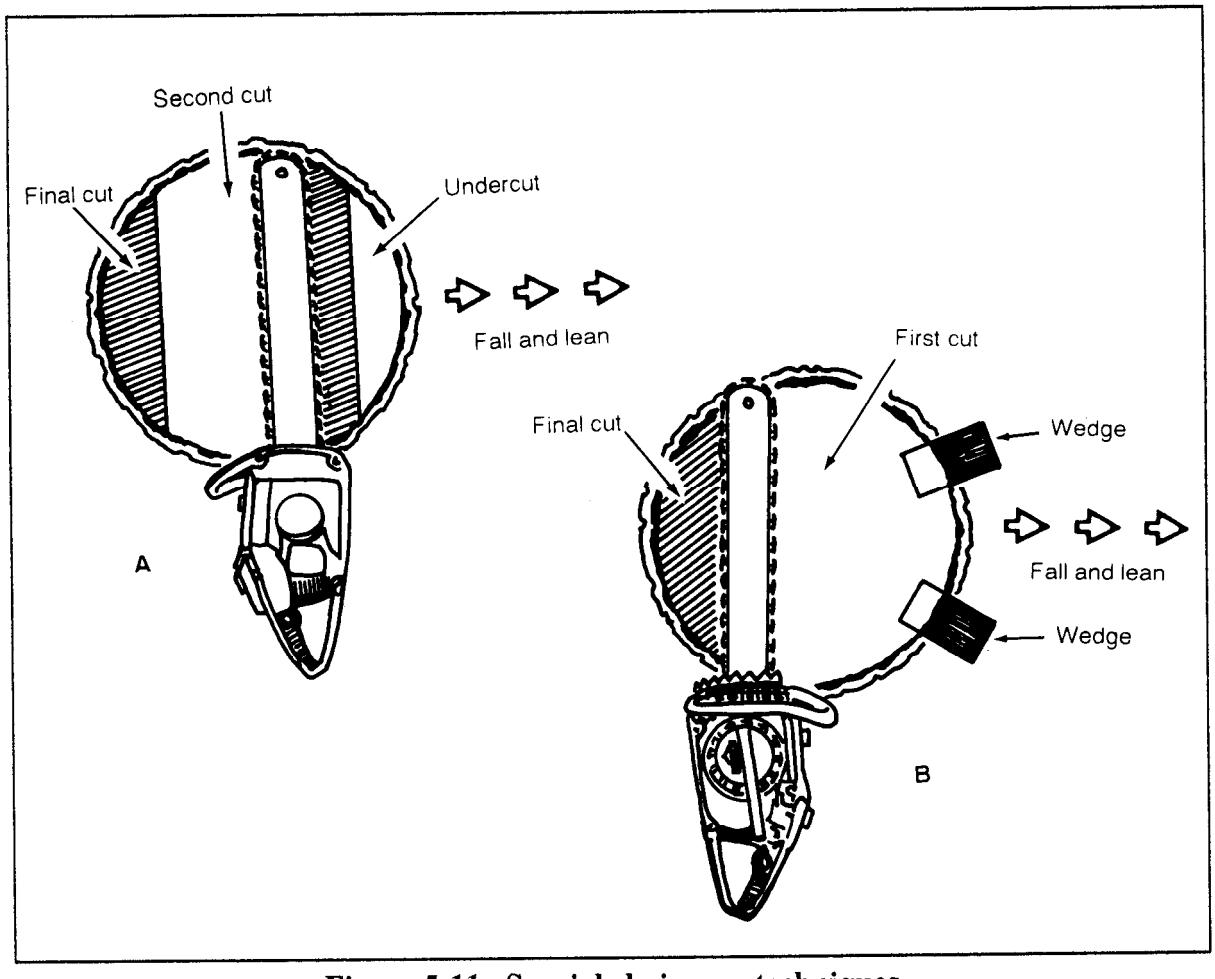

Figure 5-11. Special chain-saw techniques

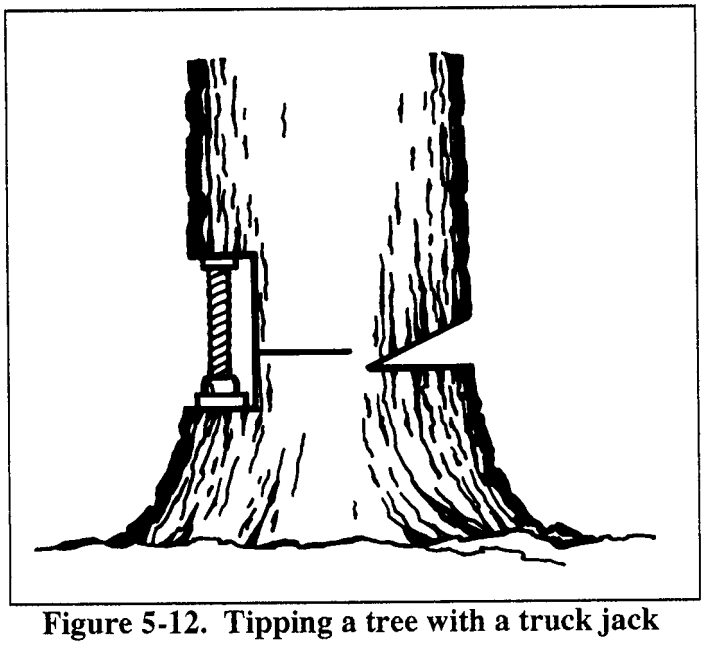

Figure 5-12. Tipping a tree with a truck jack

(Figure 5-13, page 5-8). Doing so results in safer felling. Also, you save time by not having to saw rotten wood off the butt, When the rot goes up too high, you may be able to saw around the rot with cornering cuts similar to those used for leaning trees (Figure 5-14, page 5-8). Remain extremely alert when felling a rotten tree.

5-6. Lodged Trees. Any tree faller can lodge a cut tree into a standing one. A sturdy limb on the tree being felled or the tree in its way may fail to bend as expected, or the cut tree may fall or twist a little out of line. More experienced felling crews will lodge fewer trees. Dislodging may be easy

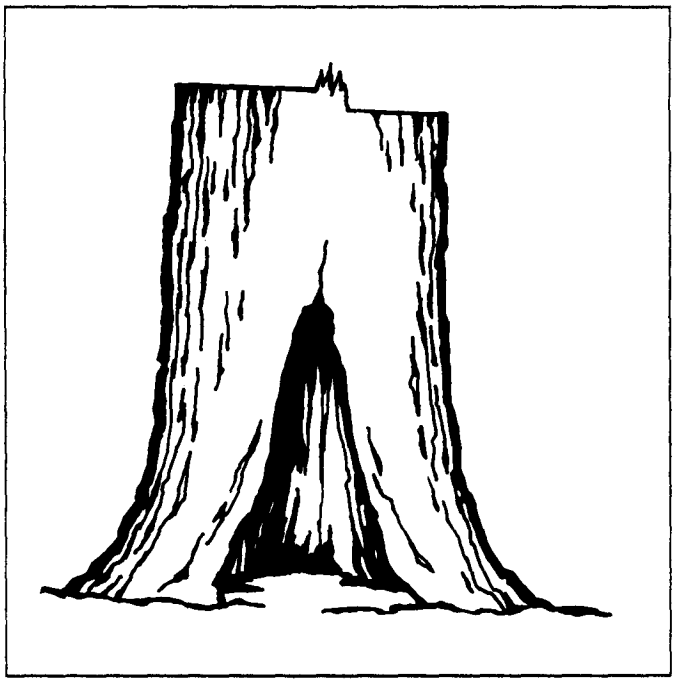

Figure 5-13. Cutting high to avoid rot

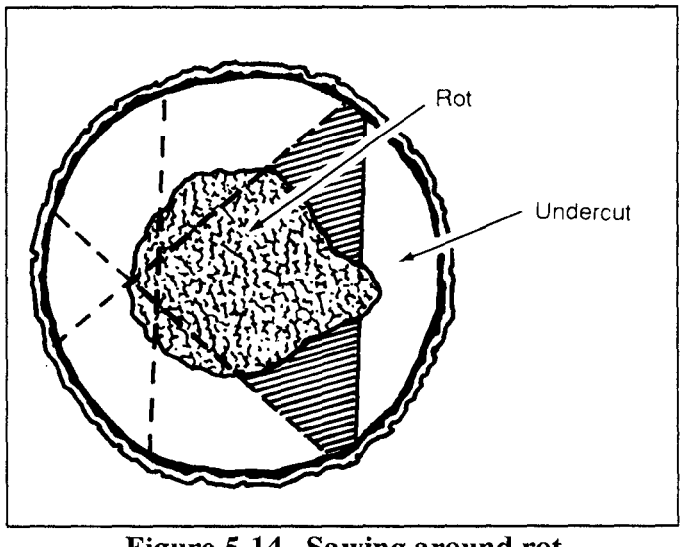

Figure 5-14. Sawing around rot

and safe or difficult and dangerous, depending on conditions. Cutters must be able to diagnose how firmly a tree is lodged and what method to use to get the tree down.

If the tree is lightly lodged, cutting it loose from its stump and prying the butt off to the ground may cause the tree to dislodge and fall. If only the ends of the limbs are caught, pushing or twisting the tree may dislodge it. Avoid climbing on the lodged tree and jumping up and down to dislodge it.

The safest and most practical way to free a lodged tree is to back the logging tractor to within a safe distance from the lodged tree, attach the winch cable around the butt, and pull the tree down. The most dangerous way to remove a lodged tree is to cut the tree in which it is lodged. Judging stresses and the direction of fall for either tree is not possible.