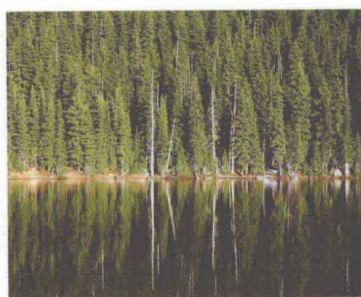




# TERMINOLOGY OF FOREST ENGINEERING AND TIMBER HARVESTING

Lihai Wang Yaoxiang Li



Science Press  
Beijing

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Responsible Editors: Haiguang Wang

## Foreword

We endeavored to make the book suitable for use as a tool for students majored in Forest Engineering, Forestry, and people who working with forestry related industries.

With the reduction of forest resources and the increasing cost and complexity of forest operations, there is an ever-growing need for standardization of forest engineering terminology. The objective of this publication is to provide a glossary of definitions for a broad group of terms used in forestry and in forest engineering, with an emphasis on timber harvesting. This list of terms and definitions should result in better communication among people involved in forest engineering.

The text also offers some new, yet important, features. Some pictures were added to the text to help the reader understand the glossaries.

The book could also use as a tool for graduate studies or upper level industry practitioners in Forest Engineering. It contains a wealth of definitions, graphs and figures to help understand what timber harvesting is all about.

We would like to thank the funding support from Chinese National Bilingual Course Demonstration Project. We also want to express our grateful thanks to all of these individuals that have contributed in our efforts to write this textbook that captures the essence of what we believe.

Lihai Wang, Yaoxiang Li

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# A

## **A-frame**

A structure made of two independent columns fastened together at the top and separated by a reasonable width at the bottom to stabilize the unit from tipping sideways.

## **abney level**

Hand-held clinometer used to measure slope in percent.

## **aboveground biomass**

Aboveground portion of a tree, excluding the root system.

## **acceptable growing stock (AGS)**

Any potential crop tree to be retained and managed to meet the landowner's objectives. UVA guidelines (for sawlog production) describe AGS as trees of commercial species which have the potential to produce one 12-foot log or two non-contiguous 8-foot logs.

## **access**

Means of gaining entry to timber on a tract or logging chance.

## **accumulating shear**

Shear head on a feller-buncher that is capable of accumulating and holding two or more cut stems. Accumulating shear felling head can accumulate 2 to 4 trees. It works best for smaller-diameter trees in selective harvesting (Fig. 1).

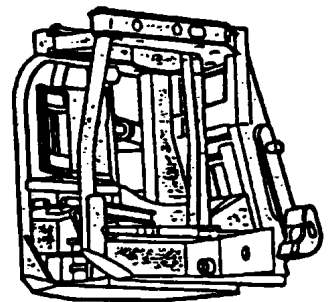


Fig. 1 Accumulating shear

## **acre**

A standard unit of area measure. One acre equals: 43,560 square feet, 4,840 square yards, 10 square chains.

## **active falling area**

The area within two tree-length radius of where a feller or a mechanized falling

machine is operating.

### **active repair time**

See **machine time**, **mechanical delay time**, **scheduled operating time**, **delay time**.

### **actual productive time**

See **machine time**, **productive time**.

### **admiralty shackle**

Heavy shackle at the tail tree that connects the skyline to the stub line (guyline extension).

### **adverse grade**

In highway transport, uphill haul that requires truck to use lower gears; gradient that slopes upward in the direction of loaded log truck travel.

### **aerial logging**

A logging system which fully suspends the logs such as done by helicopters or balloons. Not to be confused with cable systems which use cables and supports.

In the past, there were two legitimate forms of true aerial logging extant in the world: balloon logging and helicopter logging. Today, however, helicopter logging is the only aerial logging system in production.

Balloon logging was in production from about the second half of the 1960s through the 1970s. Two companies only were significant loggers by this method and both were based in the Pacific Northwest. However, the economics of the system, the decrease in USDA Forest Service timber sale volumes (about the only significant user of the system), and the increasing versatility and high production rates being achieved by helicopters, doomed this system. However, from a historical viewpoint, balloon logging needs to be remembered.

Shown below is a schematic of a typical balloon setup (Fig. 2). This rigging is called an inverted skyline setup. Note that the balloon provides lift while the skyline “sucks down” the balloon and keeps it under control.

### **aerial photogrammetry**

Interpreting information from aerial photographs.

### **afforestation**

Establishment of forest crops by artificial methods, such as planting or sowing on land where trees have never grown.

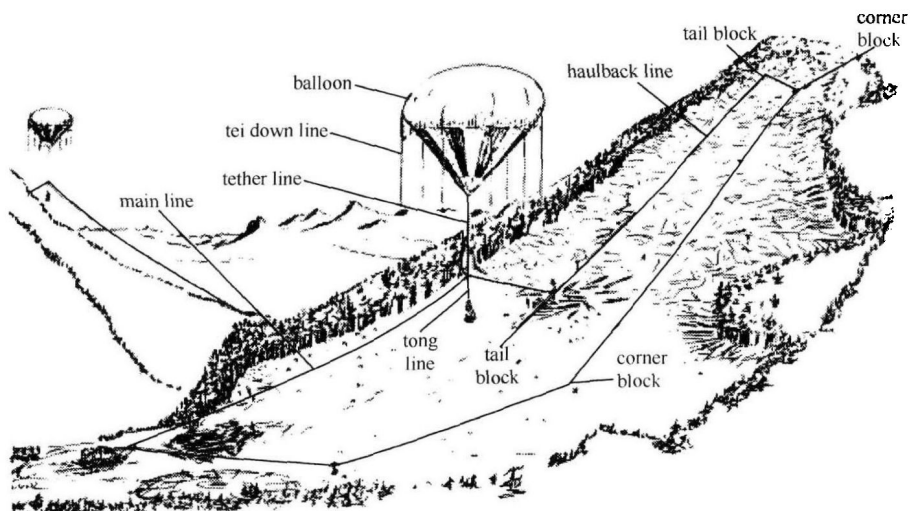


Fig. 2 Schematic of a typical balloon logging setup

### age

(a) Mean age of the trees comprising a forest, crop, or stand. In forests, the mean age of dominant (and sometimes codominant) trees is taken. The plantation age is generally taken from the year the plantation was begun, without adding the age of the nursery stock. (b) Of a tree; the time elapsed since the germination of the seed, or the budding of the sprout or cutting from which the tree developed.

### age class

One of the intervals, commonly 10 or 20 years, into which the age range of tree crops is divided for classification or use. Also pertains to the trees included in such an interval. For example, trees ranging in age from 21 to 40 years fall into a 30-year age class; 30 designate the midpoint of the 20-year interval from 21 to 40 years.

### air-dried

Lumber or other wood products that have been either dried by exposure to natural atmospheric conditions outdoors or in an unheated shed or dried to equilibrium with the surrounding atmosphere. Moisture content of air-dried mod fiber depends on relative humidity, temperature, and length of drying period. Also referred to as air seasoned.



**all-aged**

Forest or stand maintaining trees of almost all age classes up to and including trees of harvestable age.

**alligator**

See **crotch**.

**all live tree**

See **tree classes**.

**allowable cut**

Volume of timber that may be harvested during a given period to maintain sustained production.

**allowable-cut effect**

Allocation of anticipated future forest timber yields to the present allowable cut; this is employed to increase current harvest levels (especially when constrained by even flow) by spreading anticipated future growth over all the years in the rotation.

**amenity value**

Environmental or landscape benefit of trees rather than their commercial value as a timber crop.

**anchor**

A stump or wooden, concrete, or metal device secured in the earth to hold a line securely. Also see **deadman**.

The most anchor used in the woods is a sound stump of adequate size to serve the purpose (Fig. 3). It is often notched so that the tag guyline will not slip off during use. Where not adequate stumps are available, other items can be used, such as a deadman.

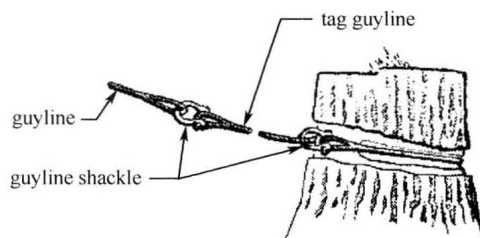


Fig. 3 Illustration of anchor

**anchor cable**

Line used to tie down a yarder to prevent tipping on a heavy pull.

**anchor line**

A line to be used to tie down a yarder to prevent tipping. Also see **guyline**.

Anchor or guylines are required to maintain stability on yarders. Here is an example of a grapple equipped swing yarder landing logs in the chute. The cable setup shown here is a running skyline.

The guyline tailholds must be changed as the yarder moves and kept in line with the yarding lines (Fig. 4). Swing yarders such as this require only 2 guy lines and these are in proper lead to the skyline position.

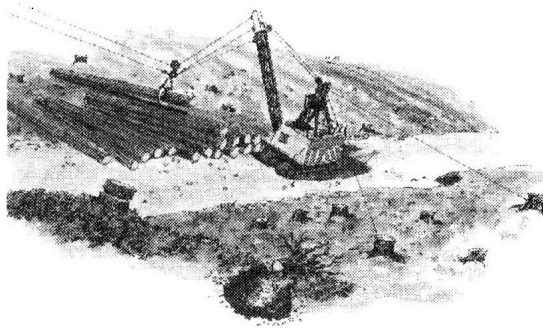


Fig. 4 Illustration of guylines

**anchor log**

Wooden, concrete, or metal bar buried in the earth to hold a guy rope, Also called a deadman.

**angledozer**

Heavy steel blade mounted across the front of a crawler tractor. The blade can be raised and lowered, and each end can be advanced and retracted to place the blade at various angles, making it possible to push dirt to either side.

**annual allowable harvest**

Quantity of timber scheduled to be removed from a particular management unit in 1 year.

**annual growth**

Average annual increase in the biomass of growing-stock trees of a specified area.

**annual ring**

The sleeve of wood put on each growing season over the previous year's wood and under the bark on both stem and branches. Consists of spring wood and summer wood, the latter usually darker and thereby showing up as a ring in cross section. See **spring wood** and **summer wood**.

**an operation**

Any place where logging or log related activities are taking place.

**anvil**

Fixed steel block that provides support and resistance for the cutting blade of a single-action tree shear. The hydraulically operated cutting blade slices through the tree towards the anvil. Also known as a bed plate. See **portable chipper terms**.

**apprised price**

Price of a particular timber sale based on the estimate of the timber actual market value. The minimum acceptable price on a sale.

**approved**

Approved by the appropriate authority or testing laboratory.

**arboriculture**

Management of individual trees or groups of trees primarily for their amenity value.

**arch**

A framework through which a winch line from a skidder passes over and is used to suspend the leading ends of logs being dragged (skidded).

**arched skidding**

Skidding logs with an arch to raise the front of the logs off the ground; as opposed to **ground skidding**.

**arching**

Skidding logs or trees using a mounted or trailing arch.

**area regulation**

Method of controlling the annual or periodic acreage harvested from a forest, despite fluctuations in fiber-yield volumes. Leads to a managed forest.

**area salvage**

Timber sales in which the USDA Forest Service sells dead timber within a given area. Usually covers more than one operating season and require the operator to return annually to remove any dead timber present.

**articulated**

With reference to a vehicle, hinged at the center for turning, as with a wheeled skidder.

**artificial regeneration**

Renewal of the forest by planting or direct seeding; establishing a new stand of trees by planting seeds or seedlings by hand or machine.

**aspect**

Compass direction to which a slope faces. Also called exposure.

**assortment**

The breakdown of a stand of timber into different products. Estimated using stand assortment tables, and based on the average dbh of the stand and the minimum top diameter required for the products being considered.

**average yarding distance (AYD)**

Often abbreviated as AYD, the total yarding distance for all turns for a particular logging setting or unit divided by the total number of turns. Usually expressed as slope distance, unless otherwise stated.

AYD and EYD (external yarding distance) are in slope distance. For ground based skidding, to account for slope and circuit of skid, it is usual to multiply map distance by 1.2 to estimate actual distance across the ground surface. For cable units, use the actual pathway slope to obtain the conversion from map distance to slope distance (Fig. 5).

The AYD location for any unit is analogous to the center of mass of the timber on the unit. An assumption can be made that all MBF (one thousand board feet) on the cutting unit is hauled from this point and, hence, simplified cost and production computation estimates are possible.

**authorized person**

A person approved or assigned by the employer to perform a specific type of duty(s) or to be at a specific location at a certain time(s).

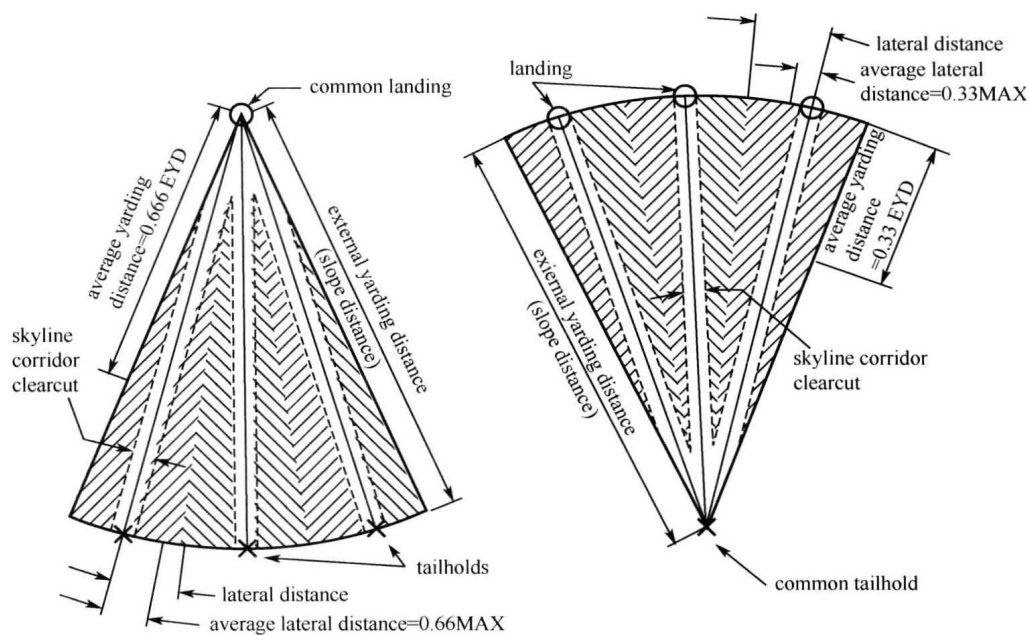
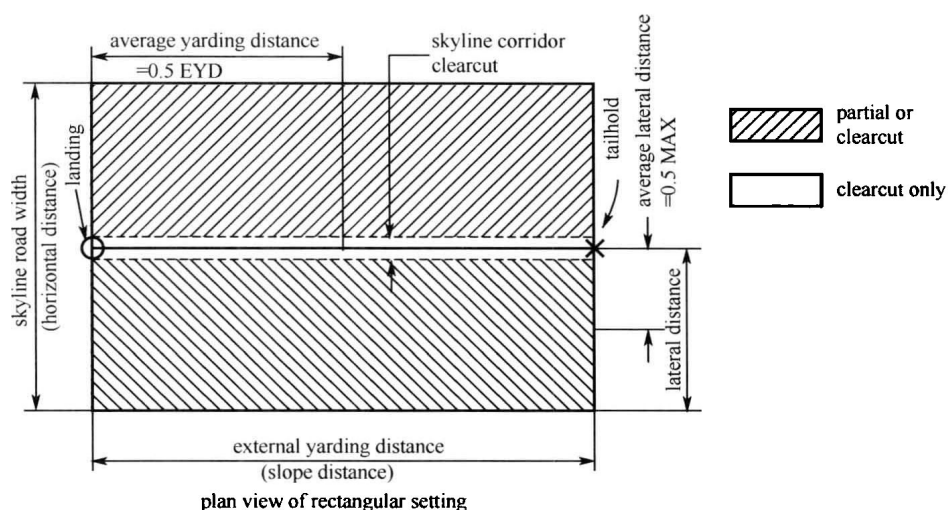


Fig. 5 Plan view of pan-shaped settings

## axe

A part of the faller's safety equipment which serves many pounding and chopping functions. Can also be used to plumb the lean of a tree and gauge the height of the tree.

## B

### backcut

The last of the three cuts required to fall a tree, made on the side opposite the intended direction of fall, after the undercut. Located on the opposite side of the tree from the face and minimally 1 inch above the horizontal cut of the face (Fig. 6A). The 1 inch is referred to as stump shot and prevents the tree from kicking back over the stump toward the faller. The backcut must never be continued to a point at which no holding wood remains. Variations of backcutting are discussed in: face-boring backcut, side-boring backcut, and side-notching backcut (Fig. 6B). Also called felling cut.

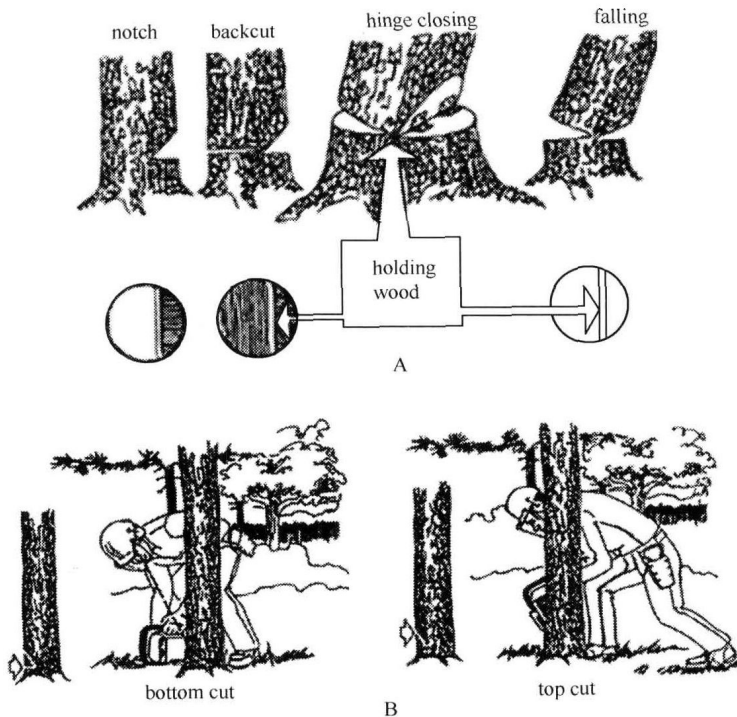


Fig. 6 Illustration of tree cutting  
A. Cutting sequence; B. Bottom cut and top cut

**backfire**

Blaze set in front of an advancing forest fire in an effort to check the wildfire by cutting off its fuel supply.

**back guy**

The guy line(s) behind the spar, opposite the lead of the main line or skyline in a cable logging setup. Usually applies to standing towers, rather than to swing towers.

**back lean**

See **side lean**.

**back line**

Boundary line marked by blazed or painted trees indicating the cutting area.

**back spar**

See **tail spar**.

**ballhooter**

Person who rolls or slides logs down a hillside.

**ballistic nylon**

A nylon fabric of high tensile properties designed to provide protection from lacerations.

**bank**

Logs cut or skidded above the required daily production and held in reserve.

**bar**

That part of the chain saw upon which the cutting chain travels. Long, thin projection of the chain saw upon which the saw chain travels. Improper use of the bar results in kickbacks and saw cuts. It is the extreme top and bottom of the bar's nose that is sensitive. Also called blade.

**bark**

Protective layer on the outside of stems and branches, consisting of living cork cells on the inside and dead cells on the outside.

**barber-chair**

Vertical split of a tree during the falling procedure. Generally a result of improper facing and/ or backcutting. Characterized by a portion of the fallen tree

being left on the stump. Results in a stump which looks like a high-backed chair. Very dangerous to the faller.

The splitting and whipping upwards of the splitting butt of the tree can result in serious injury or death to the faller. A Barberchair can result from several causes. They are: (a) Lack of a proper undercut, usually too shallow from top edge to bottom edge of the undercut, (b) Heavy lean of pressure on the tree, (c) Failing to sidecut or side bore heavy leaners, (d) Leaving a Dutchman in the undercut, and (e) Natural splits and deformities in the tree.

### **bardon hook**

Hook used with wire rope slings for gripping trees or logs to be skidded.

### **bare-root seedling**

Tree seedling grown in a nursery bed. When large enough for transplanting, the seedling is lifted from the nursery bed, and the dirt is removed from the roots before packaging.

### **bark beetle**

Small, cylindrical beetle of the family Scolytidea, the adult of which bores into and beneath the bark of various trees for the purpose of egg laying.

### **barker**

Machine used to remove bark from pulpwood.

### **barking drum**

Large drum in which logs or billets are tumbled by mechanical rotation, the bark being removed by abrasive action.

### **barking iron**

Tool with a narrow-shaped, curved blade used in removing bark by hand. Also called a spud.

### **bark residue**

Refers to the bark removed from a log and also to portions of wood and foreign matter such as sand, grit, or stones that may be imbedded in the bark.

### **barrel**

Liquid measure, equivalent to 42 U. S. gallons.

### **barrier**

A fence, wall or railing to prevent passage or approach.



**basal area**

Cross sectional area of a tree, in square feet, measured at breast height. Used as a method of measuring the volume of timber in a given stand.

**basal area factor**

Number of units of basal area per acre (or per hectare) represented by each tree.

**base of tree**

That portion of a natural tree not more than three feet above ground level.

**bearing strength**

Amount of weight that a soil or subgrade can safely support.

**bearing tree**

Tree marked to identify the nearby location of a survey corner. Also known as a witness tree.

**beaver-tailing**

Burying the whole bar of a chainsaw into the log or tree while cutting.

**bed**

The intended position in which a tree will be felled. In old-growth redwood timber, a bed is created by a bulldozer from piled up earth and slash so as to cushion the fall of these brittle giants.

**bedding**

Raised mound on which seedlings are planted. Site preparation method used most extensively in the southeastern United States.

**bed plate**

See **anvil**.

**bell**

A type of choker hook that slides on the choker wire between the two knobs.

**belly**

A sag in any line.

**bench mark**

Survey reference point, used to signify a starting point.