Cruising Timber for Loggers
October 2, 2007 Brainerd & October 4, 2007 Nerstrand

Pacing

- **Pacing**: to calculate pace
  - **A pace is two steps, i.e.: right foot to right foot, NOT one step**
  - Walk a known distance 3 times – 66 feet = 1 chain. Walk normally – do NOT speed up or slow down
  - After each of the three trips count your pace, write number here:

_____ Paces/chain (66')

_____ Paces/chain (66')

_____ Paces/chain (66')

_____ / 3 = _____
(Total paces/chain) / (# of times paced the chain) = **average # of paces/chain**

OPTIONAL

_____ Paces/100 feet

_____ Paces/100 feet

_____ Paces/100 feet

_____ / 3 = _____
(Total paces/100') / (# of times paced 100 feet) = **average # of paces/100 feet**

Basic Types of Field Compasses

- GPS unit
    - Pros: can add waypoints (i.e. cruising data points), can upload maps and download your route, etc.
    - Cons: expensive, requires batteries which can have trouble working in extreme cold, can have trouble getting satellites under full canopy, particularly a conifer canopy. If they stop working without warning you may be stuck in the woods, in the middle of nowhere without a reliable compass – safety concern (or keep a back-up traditional compass for emergencies)
- Compass without mirror
    - pros: usually cheap, sold at K-mart, etc.
    - cons: MUST be looking down at compass while trying to site to your next point. Can't site and look down at the same time., must set declination, which may change from time to time and certainly with longitude

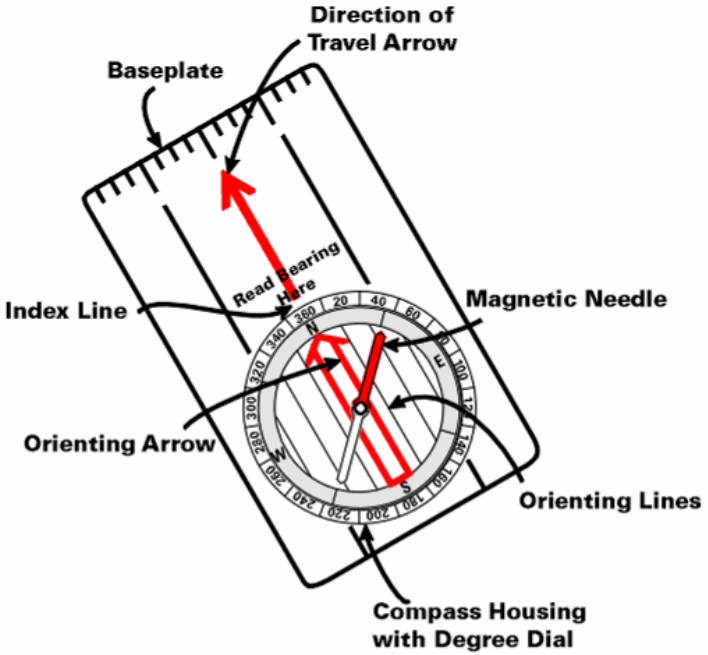
- Compute your declination at: http://www.ngdc.noaa.gov/seg/geomag/jsp/Declination.jsp

Compass information from, "OA Guide to Map & Compass – Part 2" part of The Backpacker's Field Manual by Rick Curtis published by Random House 1998
http://www.princeton.edu/~oa/manual/mapcompass.shtml

Using a Compass

The compass consists of a magnetized metal needle that floats on a pivot point. The needle orients to the magnetic field lines of the earth. The basic orienteering compass is composed of the following parts: (See Figure 6.6)

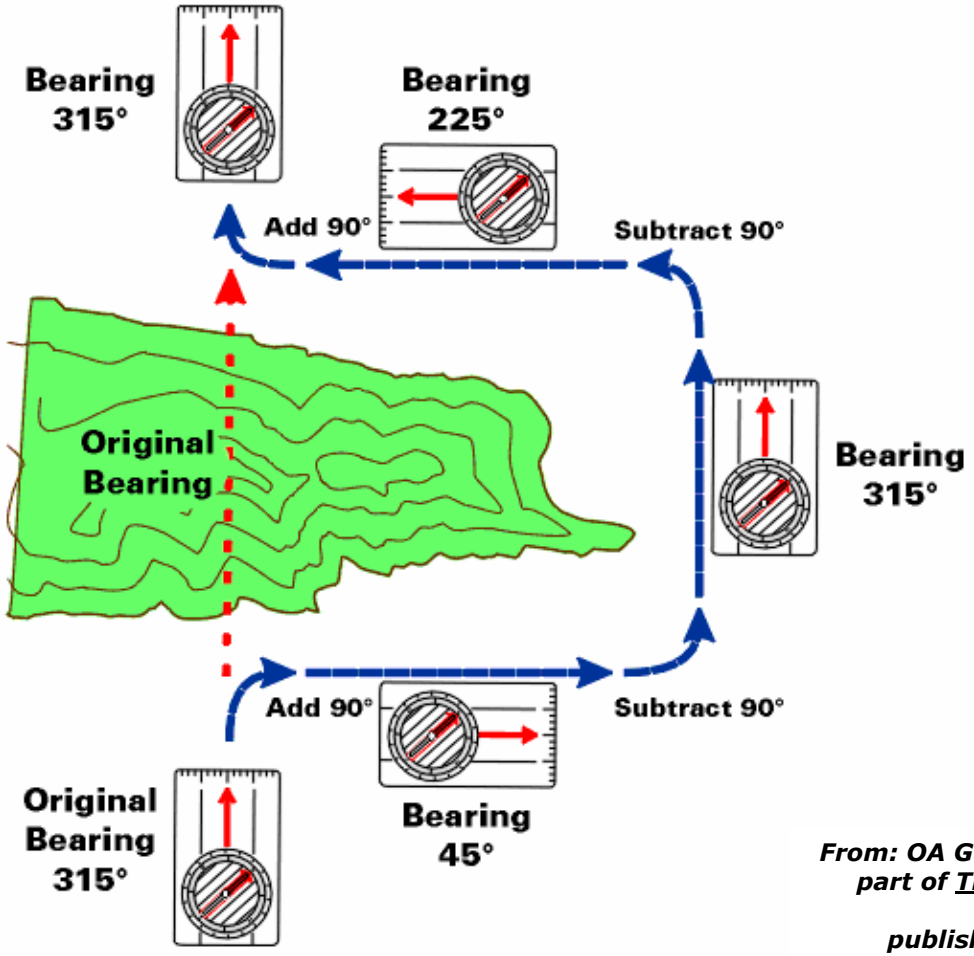
- Base plate
- Straight edge and ruler
- Direction of travel arrow
- Compass housing with 360 degree markings
- North label
- Index line
- Orienting arrow
- Magnetic needle (north end is red)



From: OA Guide to Map & Compass - Part 2, part of <u>The Backpacker's Field Manual</u> by Rick Curtis published by Random House 1998

Traversing Obstacles with a Compass

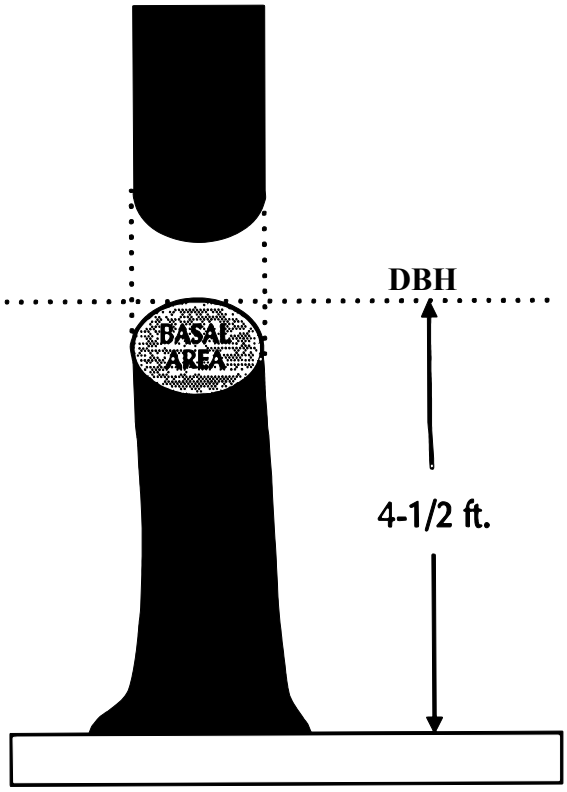
- **Walking Around Obstacles** - When you reach an obstacle, the best method for maintaining your course is to hike a rectangle around the object (see Figure 6.14).
  - Set a new bearing 90 degrees from your original heading and walk that until you have cleared the obstacle along that axis. For example, if you original bearing was 30 degrees, hike a new bearing of 120 degrees. While walking, maintain a count of paces or otherwise track the distance traveled.
  - Go back onto your original bearing, parallel to you original course until you clear the obstacle along that axis.
  - Set a bearing 90 degrees back to your original bearing (in this case 300 degrees) and walk the same number of paces.
  - Now turn back to your original bearing. You will be along your original line of travel.

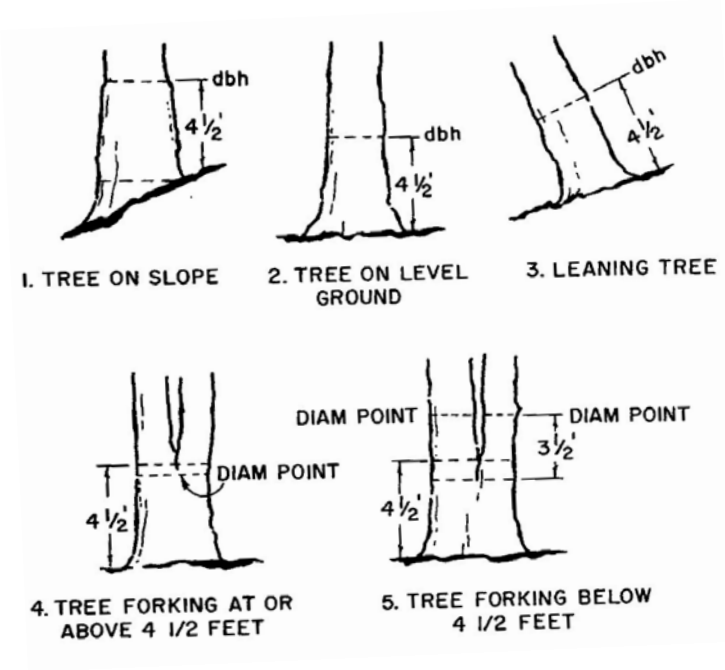


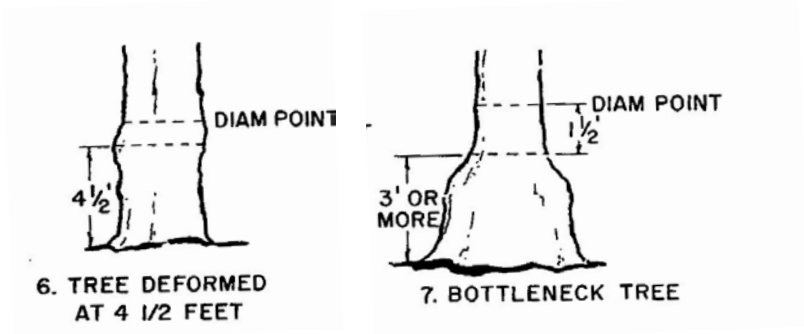
From: OA Guide to Map & Compass - Part 3, part of The Backpacker's Field Manual by Rick Curtis published by Random House 1998

Measuring Tree Diameter

- **DBH** – Diameter at Breast Height
  - Tools to measure DBH
    - **Biltmore stick**: Calibrate for a given reach, crude graduations
    - **D-tape**: light, compact, acceptable accuracy for most purposes
    - **Tree caliper**: High accuracy, multiple measurements for irregularities

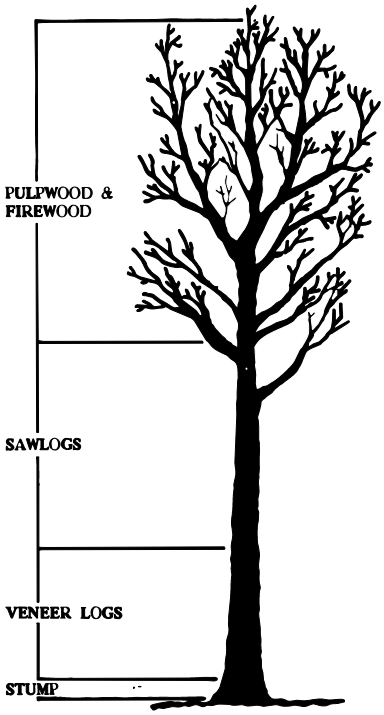


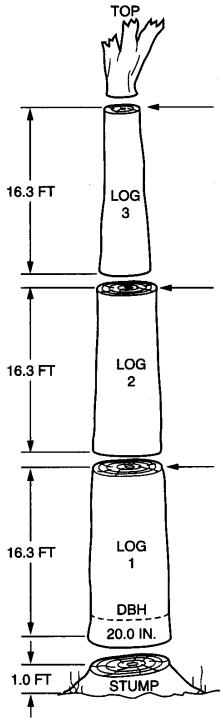


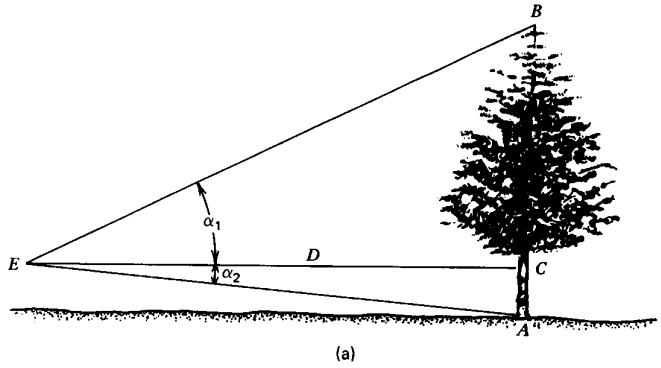


Measuring tree height

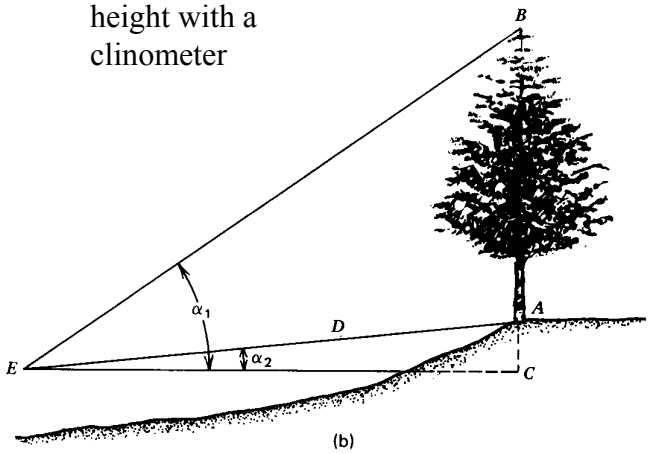
- **Measuring tree height**: total tree height versus merchantable tree height
  - **Total Tree Height**: ground to tip of tree, stand a know distance – generally 66 feet (1 chain), if tree is leaning must compensate
  - **Merchantable Height**: stump height to minimum top diameter, units generally in logs or sticks (or bolts)
  - **Tools to measure tree height**:
    - **Cruiser's stick (Biltmore stick)**: coarse scale, merchantable length, calibrated to read from either 66' or 99'
    - **Clinometer**: measure two angles, combine angles, calibrated from either 66' or percent

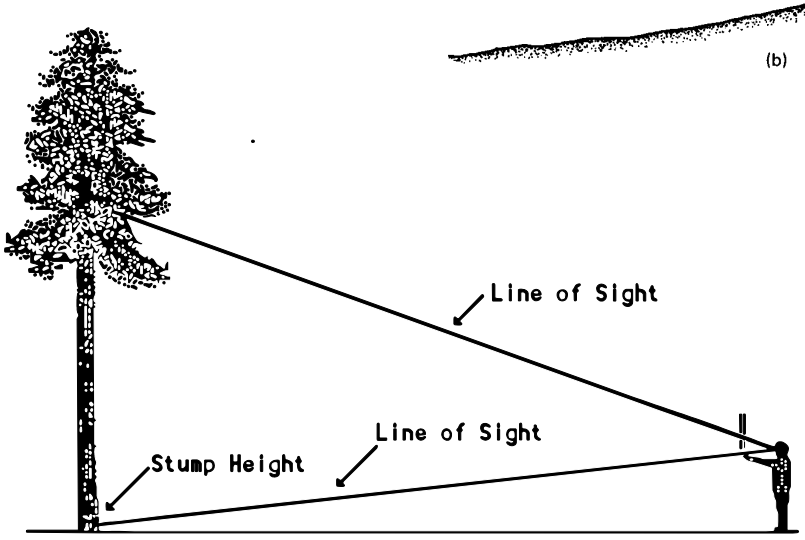






Measuring tree height with a clinometer





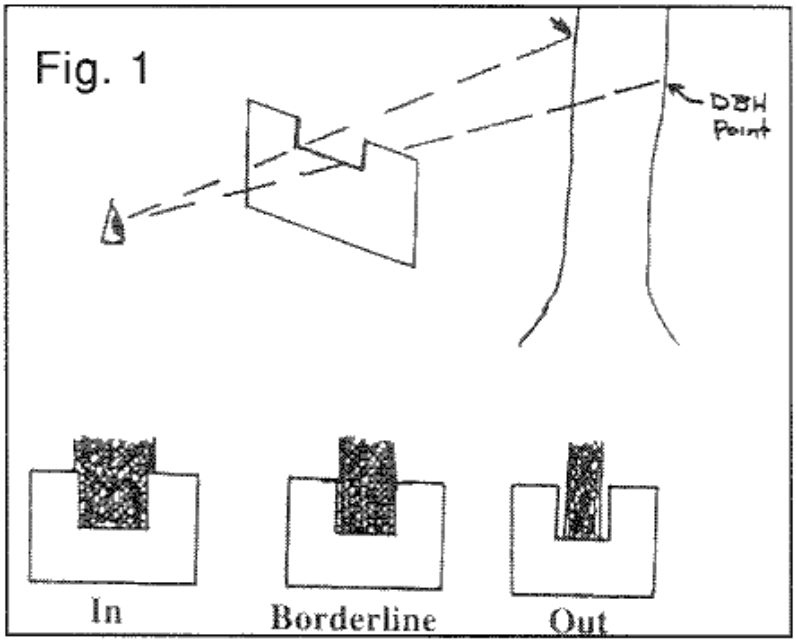
Timber Cruise Preparation

- A good timber cruise starts with some good office work.
    - Determine the area to be cruised
    - Determine access, vehicle, on foot, etc.
    - Determine stand area, possibly using Arial photo, plat book, drive-by, dot grid, etc
    - Determine cruise plot density: distance between plots & distance between plot lines, i.e. 3 chains x 3 chains, 3 chains x 4 chains, etc
    - Identify major landscape obstacles, lakes, streams, hills, interstates, etc
    - Identify starting point & ending point: cruise lines should run **perpendicular** to major obstacles
    - *Good planning will make for more efficient field time – it is worth the extra few minutes in the office!*

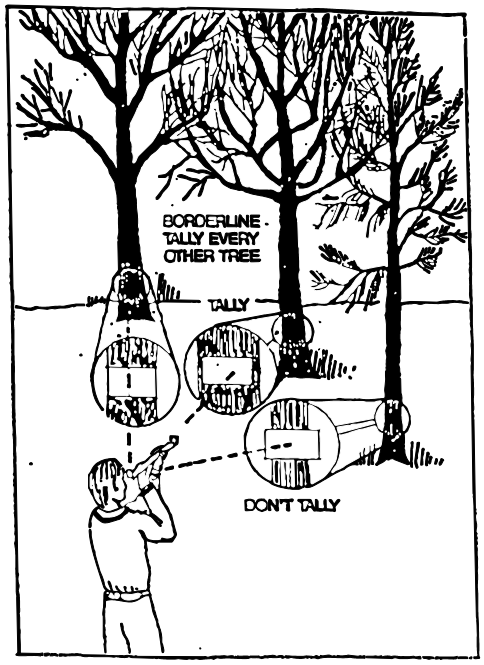
- Arial photos available on-line include the MN DNR site http://www.dnr.state.mn.us/airphotos/index.html Cost on MN DNR site: $10.00 photo, $0.65 tax, shipping?
    - MLEP has an "Accessing Aerial Photos, Topographic Maps and Other Timber Harvest and road Planning Tools" class that goes into more detail about accessing and using aerial photos, ect.
    - **BE CAREFUL ABOUT PRINTING AIRIAL PHOTOS AND ONSCREEN PHOTOS BECAUSE THE SCALE CAN BE MISREPRESENTED!**
    -
- To decide how many plots to use in a stand this formula may help:
  1 plot per acre on 30 acres or less.
  Stands with more than 30 acres: 24 plots plus 1 per 5 acres. **Example: 37 acres, 24 + (37/5) = 31.5 or 32 plots**.
  This formula should give you accuracy between 10%-20%.
  Roughly 3 chains by 3 chains to 4 chains by 4 chain spacing.

Plot measurements

- **Fixed radius plot**: measure all trees within a fixed radius either 1/10 (37.246' radius) or 1/20 (26.337' radius), measure radius using a tape measure or pacing
- **Variable radius plot**: use an angle gauge or prism, 10 factor most common here - multiply by 10 to get stems/acre (a thumb can be used for a prism, but it changes accuracy)

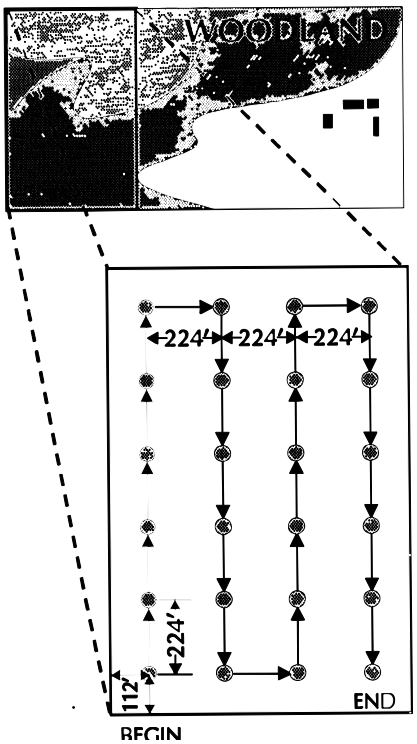


Picture from: www.ont-woodlot-assoc.org/sw_timbercruisept1.html



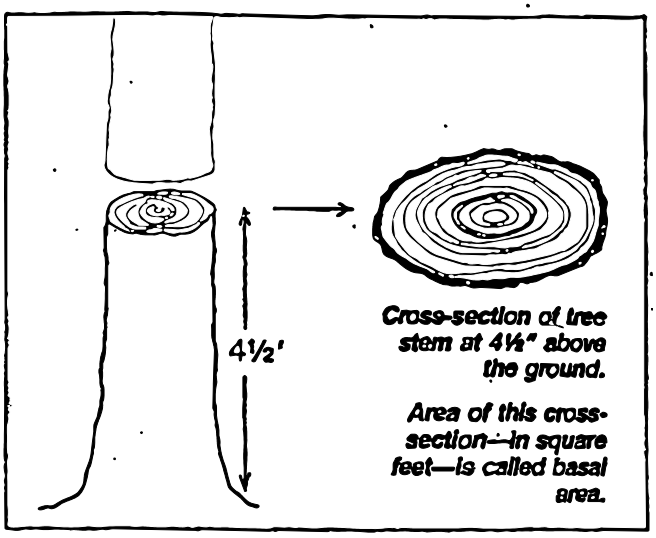
Cruising Timber

- Identify what species, products, etc you want to measure
- Calculate the number of plots needed and plot size for the level of accuracy needed
- "Map" cruising transects using forest management plan map or aerial photo before heading to the woods



Basal Area

The area in square feet of area if the stump was cut at DBH (4.5') and measured for every tree in your plot. This term is used to judge if a stand should be thinned and if so to what density. The easiest way to measure basil area with a 10 factor prism is to **count EVERY** (not just ever merchantable) tree that is "in" and multiply by 10 (the factor of the prism) this is the basal area of that stand. So if there are 12 "in" trees regardless of size then the basal area is 120.



Where to buy tools:

- Forestry Suppliers: 800-647-5368 or http://www.forestry-suppliers.com/
- Ben Meadows Company: 800-241-6401 http://www.benmeadows.com/?CID=7KD010BENHP