Guide to the Tree and Log Scale Stick

No. 59750
Doyle Tree & Log Scale Stick
No. 59760
Scribner Tree & Log Scale Stick
No. 59770
Int’l. 1/4˝ Tree & Log Scale Stick

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Tree and Log Scale Sticks have many uses including diameter measurements for dbh, determining merchantable tree height, finding volumes for standing trees (FC 78), and finding volumes for bucked logs. Knowing how to properly perform these measurements is imperative for accurate readings. The following pages offer in-depth instructions and informative descriptions concerning how to use the Doyle, Scribner, and International 1/4˝ Tree and Log Scale Sticks.

Comparison of Doyle, Scribner & International 1/4˝ Tree & Log Scales Sticks

Basics of the Tree and Log Scale Stick
This straight hardwood stick is graduated for direct readings of diameter. Tree diameter is taken at 4-1/’ above the ground, which is more commonly known as diameter breast height or dbh. Since the stick was derived from the principle of similar triangles, it is necessary to hold it horizontally against the tree at breast height, usually at a distance of 5˝ from the eye. To account for the perspective view, the diameter graduations become increasingly smaller as the tree diameters increase. Because of these smaller graduations, the accuracy of the diameter reading for larger trees decreases. However, the diameter of small trees can be read to the nearest full inch.

The stick should not be used for highly accurate measurements, since it is difficult to keep the correct distance from eye to tree. While it is useful for cruising work, a more accurate and reliable measurement of individual trees can be obtained with tree calipers or diameter tapes. Refer to the Forestry Suppliers catalog for a complete listing.

Tree and Log Scale Sticks are available in three scales: Doyle, Scribner and International 1/4˝ scales. It is recommended that you use a scale common to your area, especially if you are using the measurements as a basis for selling timber. To determine which is commonly used in your area, contact your local county Forester or a saw mill.

Doyle Tree & Log Scale Stick
Based on the algebraic equation:
\[ \text{bd ft} = \frac{(D-4)^2}{4} \frac{L}{4} \]

D represents the log diameter in inches and L represents the log length in feet. The Doyle Scale has a slab allowance of 4” and a saw kerf of 5/16”, or 25%.

Figure 1

Scribner Tree & Log Scale Stick
The Scribner Scale is based on diagrams of 1” boards drawn to scale within different sized cylinders (Figure 1). The saw kerf is
assumed to be 1/4". However, the minimum board width allowed is not clear but may have been 4" for some log diameters. All volume outside scaling cylinders projected from small ends of logs is ignored, since no taper allowance was included.

**International 1/4˝ Tree & Log Scale Stick**

The International Scale is derived from the mathematical formula:

$$0.905 \times (0.71 - D)$$

Volumes for 16´ log lengths require an easier formula:

$$0.8 \times (D - 1)$$

This is the only commonly used scale that allows for log taper. The fixed taper allowance is 1/2 per 4` log length. Scale values for a 16´ log are obtained by adding board-foot volumes of four 4` cylinders, each 1/2" larger in diameter than the previous log. Rational deductions for slabbing saw kerf are also included.

The International 1/4˝ Log and Tree Scale Stick has a 1/4˝ saw kerf plus a 1/16˝ allowance for board shrinkage, providing a total deduction of 5/16˝. Slabs are deducted in the form of a hypothetical plank .1” thick with a width equal to the log diameter. All logs are considered to have been cut into boards 1” thick.

**To Measure Tree Diameter**

With the side of the tree and log scale stick marked *Tree Scale Stick* facing you, hold the stick perpendicular to the tree 5˝ from your eye and 4-1/´ from the ground. Place the left edge of the stick on the left edge of the tree and without moving your head (turn your eyes only) read the number from the row marked *Diameter of Tree in Inches* which corresponds with the right edge of the tree. This number is the diameter of the tree. Diameter may be measured from 10˝ to 40˝ in 1˝ increments (Figure 2).

**To Measure Tree Height**

With the side of stick marked *Merritt Hypsometer* facing you, stand 66´ from the tree, holding the stick parallel to the tree trunk with the stick 25’ from your eye and the bottom of the stick corresponding to the point where the tree trunk would be severed when harvested. Read the stick upward to the top where the tree would be topped. This number represents the number of 16’ logs in the tree (Figure 3).

**To Determine Volume Once a Tree is Felled & Cut**

To determine the board foot volume of the log after the tree has been felled and cut into log segments, first determine the length of the log. The stick can be used with 8’, 10’, 12’, 14’, 16’, or 18’ logs. These are clearly identified in a column on the Log Scale Stick side of the stick. Next the diameter of the log must be determined. Align the left edge of the stick with the left edge of the log at the desired starting point of measurement inside the bark. Since not all logs are perfectly round, a log may be measured at a narrow point or averaged from measuring a narrow point and a wide point.

Read the number which corresponds to the right edge of the log from the row marked *Diameter of Log at Small End*. Once the log length and diameter have been obtained, the intersection between the row marked *Diameter of Log at Small End* and the column marked for appropriate length of the log is the volume of this log. For example, a log 19” in diameter which is 16’ long has a volume of 225 board feet (Figure 5).

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* Examples use measurements based on the Doyle Tree & Log Scale Stick. Scribner and International work the same but yield different volumes.