Constructing a Biltmore Stick

Biltmore stick – is a graduated stick used to estimate tree diameters when held at right angles to the axis of the stem and comparing the graduations cut by lines of sight tangential to either edge of the stem.

A Biltmore stick is a very simple tool that uses geometry to measure the diameter of a tree. Woodlot owners and forest consultants in the United States have used the Biltmore stick since the early 1900s as a fast and convenient way to estimate tree diameters.

Sticks can be purchased from a number of forestry equipment dealers (e.g., Bailey's, Canadian distributor) [1] or woodlot owners can easily construct their own. Here are instructions on how to construct and use a Biltmore stick.

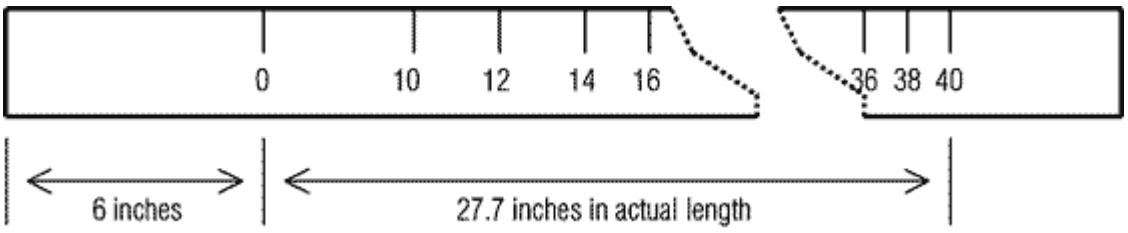
Making your own Biltmore stick.

By following these three simple steps you can make your own Biltmore stick (25-inch reach) to measure the diameters of trees in your woodlot.

Step 1. Take a strip of wood about 36 inches in length by 1 ½ inches wide (e.g., an old wooden yardstick or piece of lathing). Sand both sides of the wood strip smooth so that you can write on it.

Step 2. With a black felt pen mark a line indicating "0" approximately 5 to 6 inches from one end of the stick (refer to Figure 1). From this line measure 8.6 inches and mark a second point and record 10". Again, from the "0" mark measure 9.3 inches and mark a third point and record 11". Repeat this process according to the measurements provided for in Table 1. This will give you a stick that will measure tree diameters up to 40 inches.

Figure 1: This illustration shows the markings on a typical 25-inch reach Biltmore stick. Note: as the diameter increases the distance between the lines on your stick become smaller.



Step 3. Once you have marked all the necessary points on the stick it should be coated with a clear finish (e.g., polyurethane) to ensure the numbers will not rub when you take it into the woodlot.

Table 1: Biltmore stick measurements (for a 25-inch reach).			
Measurement on stick (in.)	Tree Diameter (inches)	Measurement on stick (in.)	Tree Diameter (inches)
8.6	10	19.4	26
9.3	11	20.0	27
10.1	12	20.6	28
10.8	13	21.2	29
11.5	14	21.8	30
12.2	15	22.4	31
12.9	16	23.0	32
13.6	17	23.6	33
14.2	18	24.2	34
14.9	19	24.8	35
15.6	20	25.4	36
16.2	21	26.0	37
16.9	22	26.5	38
17.5	23	27.1	39
18.1	24	27.7	40
18.8	25		

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How to use a Biltmore stick?

Here are a few tips on how to use a Biltmore stick (refer to Figure 2).

Stand squarely in front of the tree;
Hold the stick 25 inches from your eye, in a horizontal position against the trunk of the tree, 4.5 feet above ground level (referred to as diameter at breast height or dbh). Move the stick back and forth until the “0” mark matches up to the left edge of the tree; and

Without moving your head read the measurement that corresponds to the right edge of

the tree. This is the tree's diameter (dbh).

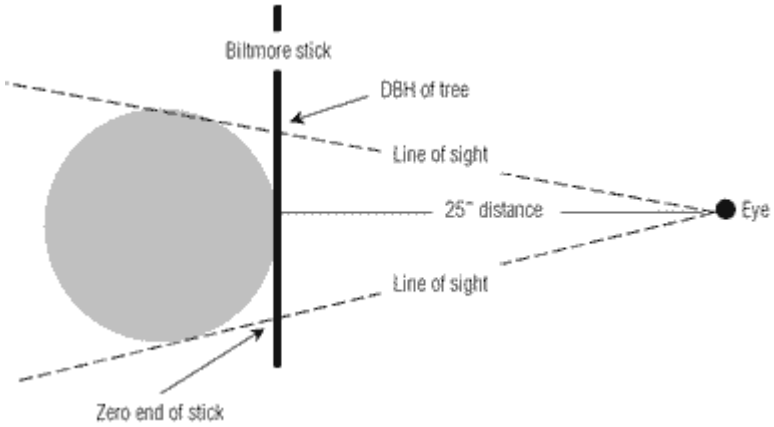

Figure 2:
Keeping the stick perpendicular and at the pre-set distance (25 inches) from your eye is essential in order to record an accurate measurement.

Because of the difficulties in maintaining the stick level (horizontally and vertically) and ensuring it is held exactly 25 inches from your eye, the measurements taken with a Biltmore stick should be only used to estimate tree diameters. Measurements for detailed inventory work (e.g., volume estimates for timber sales) should be collected using more accurate measuring tools such as callipers or a diameter tape.