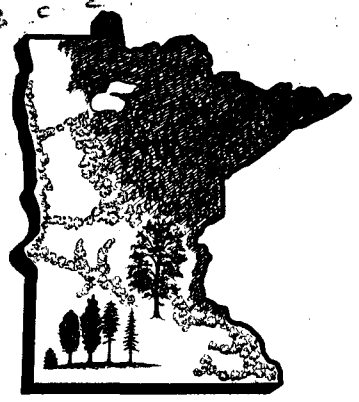
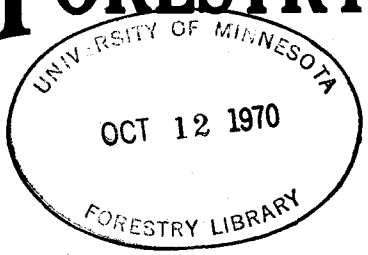


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SOME RULES-OF-THUMB FOR OBTAINING THE VOLUME OF SMALL LOGS AND PULPWOOD

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Foresters frequently have need for rapid but reasonably accurate methods for making quick estimates of the volume of small logs and pulpwood sticks when log rules or product-volume tables are not available. The following rules-of-thumb were devised to partially satisfy this need.

LOG RULE

Basis: Many scale diagrams of the small end of logs and the basic collar formula for log rules.

Conditions: $\frac{1}{4}$ -inch kerf; width of narrowest merchantable board 4 inches; odd and even widths utilized.

Formula: Board-foot volume of 1-inch lumber equals: $\frac{(d-1)^2}{10} \times \frac{\text{Log length in feet}}{2}$, where "d" is the average scaling diameter in inches.

Example: Volume of 16-inch, 16-foot log is $\frac{(16-1)^2}{10} \times \frac{16}{2} = \frac{225}{10} \times 8 = 180$ bd. ft.

Comparison with locally-used log rules:

Log scaling diameter (Inches)	International $\frac{1}{4}$ -inch	Scribner Decimal C	Minnesota* Standard	Rule-of-thumb formula
Volume of 8-foot logs - Board feet				
6	10	5	9	10
8	15	10	16	120
10	30	30	25	32
12	45	40	40	48
14	65	60	57	68
16	85	80	80	90

*Same as original Scribner.

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Comparison with mill tally:

Log scaling diameter (Inches)	Mill tally - - - Board feet - - -	Formula volume	Over- or under-run Percent	No. logs
7- 8	694	682	+1.8	38
9-10	1446	1480	-2.4	53
11-12	474	464	+2.2	11
Total	<u>2614</u>	<u>2626</u>	<u>-0.5</u>	<u>102</u>

Use in timber estimating: This rule-of-thumb may be used for rough timber estimating as follows:

- Count the number of trees per plot or stand.
- Estimate the average number of logs per tree.
- Multiply (a) x (b) to obtain the total number of logs.
- Estimate the scaling diameter of the average log.
- Compute the volume of the average log by formula.
- Compute the gross volume per plot or stand by multiplying (c) x (e).

RULE FOR CUBIC AND CORD VOLUME OF SMALL 100-INCH BOLTS

Cubic-foot volume:

Formula: Cubic-foot volume = $\frac{0.1 d^2}{2}$ - (0.1 of first term), where "d" is the middle diameter of the stick in inches.

Example: Cubic volume of 10-inch, 100-inch long bolt is:

$$\left[\frac{0.1(10)^2}{2} - 0.1 \left(\frac{0.1(10)^2}{2} \right) \right] = 5 - 0.1 \times 5 = 4.50 \text{ cubic feet.}$$

Comparison with Huber's Formula for 100-inch bolts:

Middle diameter of bolt* (Inches)	Volume		Error Per cent
	Huber's Formula**	Rule-of-thumb formula***	
	Cubic feet		
4	0.72	0.72	0
6	1.63	1.62	-0.6
8	2.91	2.88	-1.0
10	4.54	4.50	-0.9

* Either inside or outside bark.

** Huber's Formula: Volume in cubic feet = basal area in square feet at the middle of the bolt x length of bolt in feet.

*** To improve the estimate, add 1 per cent to the grand total volume for all bolts.

Cord volume: If 90 cubic feet is assumed for the volume of wood in a standard cord, the formula is much simpler as follows:

Formula: Volume in standard cords equal: one-half of $\frac{d^2}{1000}$,

where "d" is the average middle diameter of the bolt in inches.

Example: Volume in standard cords of a 10-inch, 100-inch long bolt is one-half of $\frac{(10)^2}{1000}$ or $\frac{0.1}{2} = .05$ cords.

Use in timber estimating: Follow the same procedure as given under "Log Rule," substituting 100-inch bolts for logs and using middle rather than small-end diameters.