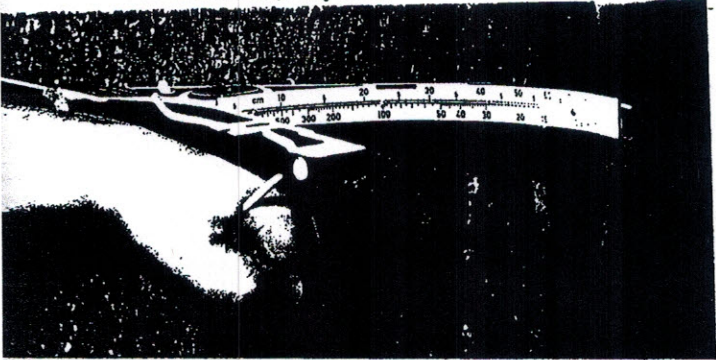
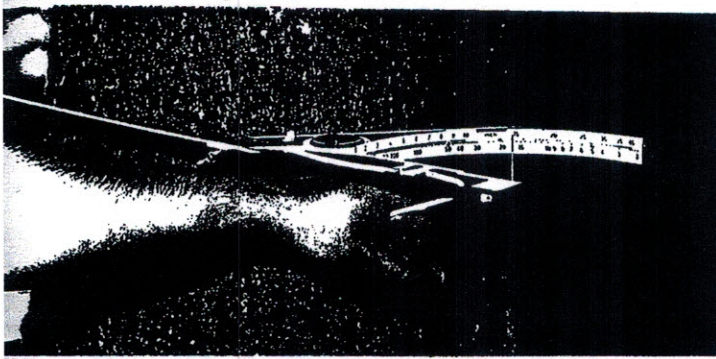


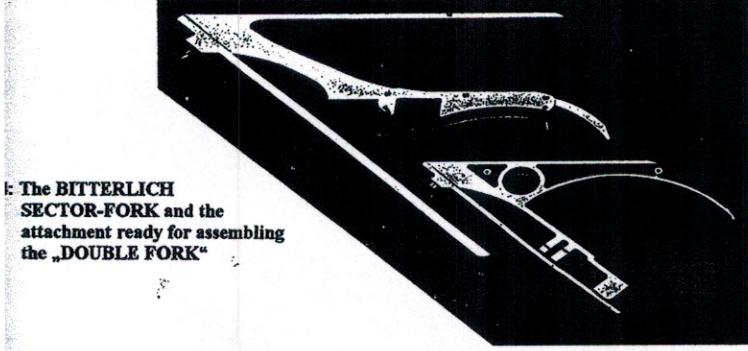
a: BITTERLICH SECTOR-FORK, ready to use.



b: The SECTOR-FORK is put into position using the left hand.



c: The sighting pin is lined up with the right side of the stem to read the value of the diameter.



d: The BITTERLICH SECTOR-FORK and the attachment ready for assembling the „DOUBLE FORK“

# BITTERLICH SECTOR-FORK

For the measurement of tree diameters up to 80 inches

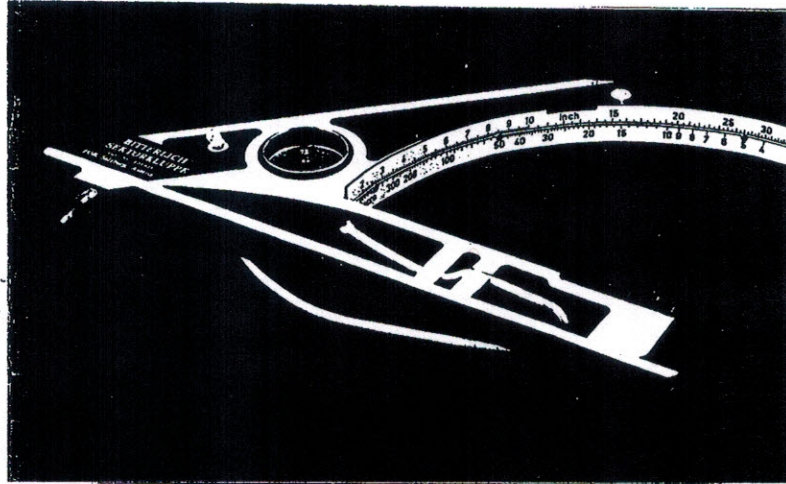


Fig. 1: BITTERLICH SECTOR-FORK, made of stable and weatherproof plastic (in folded position).



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## Introduction

The BITTERLICH SECTOR-FORK is a further improvement of an instrument developed in 1952. This earlier instrument was developed to measure the Diameter Breast Height (DBH) of trees during forest inventory work.

Any concern that calipers are more accurate than this instrument can be addressed both theoretically and practically.

- Practically:

because it is possible to quickly get an average of two or three measurements for trees which are not round in cross-section.

- Theoretically:

because, when trees are selected by the Relaskop, the volume per unit area can be very exactly determined using only approximate diameters. Great precision in determining DBH with either calipers or diameter tapes is a luxury for most inventory work with a possible exception for the measurement of permanent sample plots or for scientific studies. This is particularly the case when you consider the inevitable biases of other relevant factors, such as bark thickness, volume tables or tree form factors (mostly available from regional averages). Given the uncertainties of these assumptions, the measurement of standing trees is not materially improved when DBH is measured with great precision, for example by the use of computerized calipers.

## The Instrument

The BITTERLICH SECTOR-FORK reads the DBH by sighting only one edge of the tree, based on known distances and the angle (sector) between the sides. The instrument is made of plastic, which is dimensionally stable and weatherproof (see Fig.1, in folded position) and it is very light (4 oz.). It can be fastened on the back of the hand, leaving that hand free for use with a notebook or field computer.



In Fig.2 the BITTERLICH SECTOR-FORK is shown with the sector arm unfolded and the sighting pin in upright position. The sighting pin is placed from the storage position into the working position by pulling and turning the knob.

**Attention: whenever you are moving around, please stow the sighting pin in the horizontal position!**

The SECTOR-FORK is held against the tree stem at the appropriate height. The angle made by the folding sector arm and the front of the instrument will place it automatically into the correct position against the tree. The sighting pin is lined up with the right side of the stem to measure the tree.

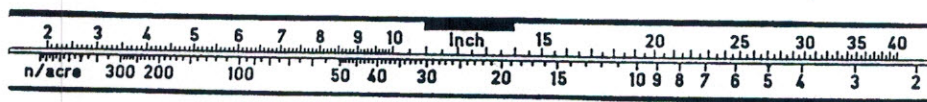


Fig. 3: The two part scale, giving DBH and number of trees per acre.

There are two scales, shown in Fig.3. The upper scale gives diameter in inches in the range from 2 to 40 inches. The lower scale shows the number of trees per acre corresponding to that diameter when using a Relaskop scale of BAF 20 ft<sup>2</sup>/acre. If you use half this BAF (10), the number of trees must also be divided by 2.

## **The Measurement Process**

The BITTERLICH SECTOR-FORK must be positioned against the tree so that the sighting pin is parallel with the right side of the tree (this is particularly important for leaning trees). The DBH is read directly under the sighting pin on the upper scale. Irregular or non-circular trees should be measured at different points around the DBH line, and an average diameter determined. With just a practice, taking such a set of measurements is fast and easy. In most forest inventory work only one measurement per tree is necessary, because the large number of trees averages any small variability in diameter.

### **The BITTERLICH SECTOR-FORK as a Complement to the Relaskop**

Silvicultural practices in forests with uneven ages and multiple species are often limited to small specific areas. The usual form of forest inventory is not designed for decisions within these small areas. To monitor or design a local treatment plan, an obvious method is to determine the basal area per acre removed (or remaining) for each species. This is conveniently done with the Spiegel-Relaskop using a BAF of 20 or 10 and requires only the counting of trees. Since the basal area alone does not indicate the number of trees by diameter, the additional measurement of DBH on these counted trees is necessary. The light, easy to use and fast BITTERLICH SECTOR-FORK is a very suitable tool for this diameter measurement.

As the DBH of each tree is determined from the upper scale, the number of trees per hectare reads directly from the lower scale (assuming a BAF 20, see Fig.3). In this way the diameter distribution by species can be quickly determined for both cut and remaining trees.

## The "DOUBLE FORK" to Measure Large Diameter Trees

The BITTERLICH SECTOR-FORK (from Fig.1) is positioned between the metal support of the DOUBLE FORK and fixed at bore holes 1 and 2 by bolts and butterfly nuts (see Fig. 4). When using the DOUBLE FORK the readings on the upper scale (diameter) must be doubled, and the lower scale (number of trees) must be divided by 4.

The DOUBLE FORK measures diameters up to 80 inches and the weight of the combined instruments is less than 1 lb.

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