

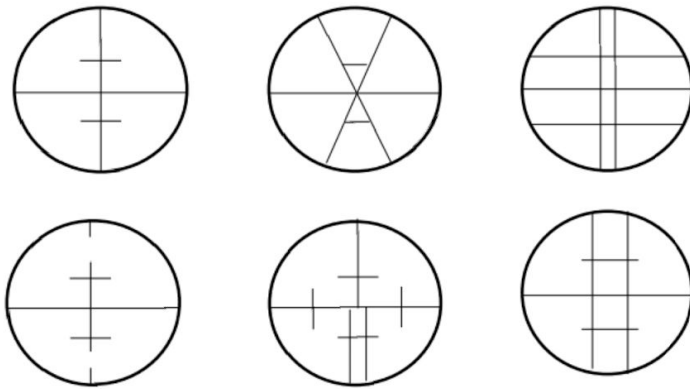
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Tacheometric survey..

Tachometry is a method of measuring both horizontal distance and vertical elevation of a point in the distance, without the use of sophisticated technology, such as electronic distance measurement (EDM) or satellite transmissions.

It means we can measure distance and vertical distance with the help of tachometer.

Tachometer is an instrument which is basically a theodolite fitted with analytic lens and stadia



diaphragm .

Analytic lens is a special lens which makes additive constant zero. These constants are discussed later.

Fixed hair method

◦ This is a method of finding the distance and elevation of staff from the theodolite (Tachometer). It means diaphragm hairs are fixed in this method not moveable .

Different formulas are used in finding distance for different cases.

Moveable hair method

In this method diaphragm hairs are moveable with the help of some microscopic screw .it means distance between them is already known.

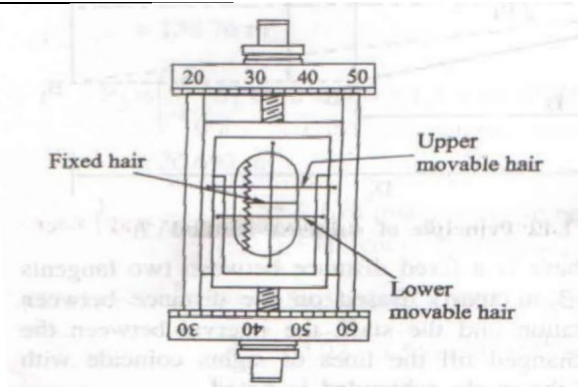
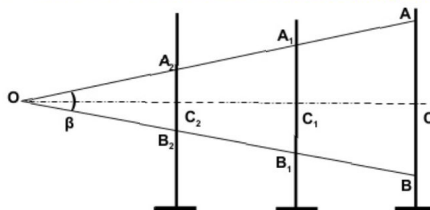


Fig. A special type diaphragm of a moving hair theodolite

PRINCIPLE OF STADIA METHOD

The stadia method is based on the principle that the ratio of the perpendicular to the base is constant in similar isosceles triangles.



In figure, let two rays OA and OB be equally inclined to central ray OC. Let A_2B_2 , A_1B_1 and AB be the staff intercepts. Evidently,

$$\frac{OC_2}{A_2B_2} = \frac{OC_1}{A_1B_1} = \frac{OC}{AB}$$

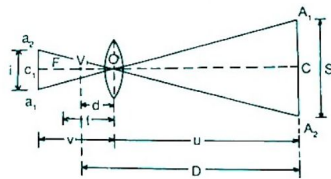
$$= \text{constant } k = \frac{1}{2} \cot \frac{\beta}{2}$$

This constant k entirely depends upon the magnitude of the angle β .

In this diagram point A represent upper hair reading , point B shows lower hair reading .. And difference of both reading known as staff intercept small s .

#Techometric constants (K and C)

K is multiplying constant and D is additive constant .
Theory of stadia Tacheometry



- A_1, A_2, C = readings on staff cut by three hairs
- a_1, a_2, C = bottom, top and central hairs of diaphragm
- $a_1 a_2 = i$ = length of image
- $A_1 A_2 = S$ = staff intercept
- F = focus
- V = vertical axis of instrument
- f = focal length of object glass
- d = distance between optical centre and vertical axis of instrument
- u = distance between optical centre and staff
- v = distance between optical centre and image

Now by using property of similar triangle and equation of lens.

$\triangle aOb$ and $\triangle AOB$ are similar,

$$\therefore \frac{i}{S} = \frac{v}{u}$$

$$v = \frac{iu}{S} \quad \dots(i)$$

Also from the properties of a lens,

$$\frac{1}{v} + \frac{1}{u} = \frac{1}{f} \quad \dots(ii)$$

Substituting the value of v from (i) in (ii),

$$\frac{1}{\frac{iu}{S}} + \frac{1}{u} = \frac{1}{f}$$

$$\frac{S}{iu} + \frac{1}{u} = \frac{1}{f}$$

or
$$\frac{S}{iu} + \frac{1}{u} = \frac{1}{f}$$

or
$$u = \left(\frac{S}{i} + 1 \right) f$$

$$= \frac{S}{i} f + f$$

But $D = u + d$

$$\therefore D = \frac{S}{i} f + f + d$$

$$= \frac{f}{i} S + (f+d) \quad \dots \dots \dots (\text{Eqn. 10.1})$$

The quantities $\frac{f}{i}$ and $(f+d)$ are called the constant of the instrument, their values being supplied by its manufacturer.

This f/i is multiplying constant K and $(f+d)$ is additive constant C .

This is the equation of distance we use for finding distance and heights of various objects .

