

16 STADIA AND PLANE-TABLE SURVEYING

Therefore, the required difference in elevation between the ends of the sight is  $266.07 + 0.44 = 266.5$  ft. Ans.

EXAMPLES FOR PRACTICE

Solve each of the following examples by use of the stadia reduction table.

1. A sight is taken on a vertical rod with a transit having a stadia interval factor of 100 and a stadia constant of 0.75 foot. If the inclination of the line of sight to the horizontal is  $9^{\circ}21'$  and the distance intercepted on the rod between the stadia hairs is 4.28 feet, what are: (a) the horizontal distance from the transit to the rod, and (b) the difference in elevation between the ends of the sight?  
 Ans.  $\left\{ \begin{array}{l} (a) 417 \text{ ft.} \\ (b) 68.7 \text{ ft.} \end{array} \right.$
2. In an observation made with a transit for which the stadia interval factor is 101 and the stadia constant is 1 foot, the line of sight makes an angle of  $18^{\circ}14'$  with the horizontal and the interval intercepted on a vertical rod between the stadia hairs is 5.47 feet. Determine the horizontal distance from the transit to the rod. Ans. 499 ft.
3. For the conditions in the preceding example, what is the difference in elevation between the ends of the sight? Ans. 164.5 ft.

BEAMAN STADIA ARC

**16. Theory and Description of Stadia Arc.**—If the vertical circle or vertical arc of a transit is equipped with a device known as the Beaman stadia arc, the values of  $100 \sin^2 a$  and  $100 \times \frac{1}{2} \sin 2a$  can be read directly instead of the angle  $a$  that the line of sight makes with the horizontal. The time required to determine horizontal and vertical distances by stadia is thereby greatly reduced.

There are several forms of the Beaman stadia arc, but all are based on the same principles. Two common forms are illustrated in Fig. 4. The type shown in view (a) is intended for a transit with a complete vertical circle, and the type shown in view (b) is for use with a vertical arc. In either case, vertical angles can be read in the usual manner, if desired, by means of a scale that is graduated in degrees and half degrees and a vernier which is used with that scale to read minutes.

In view (a), the scale for reading vertical angles is along the outer edge of the vertical limb and the vernier is on a small

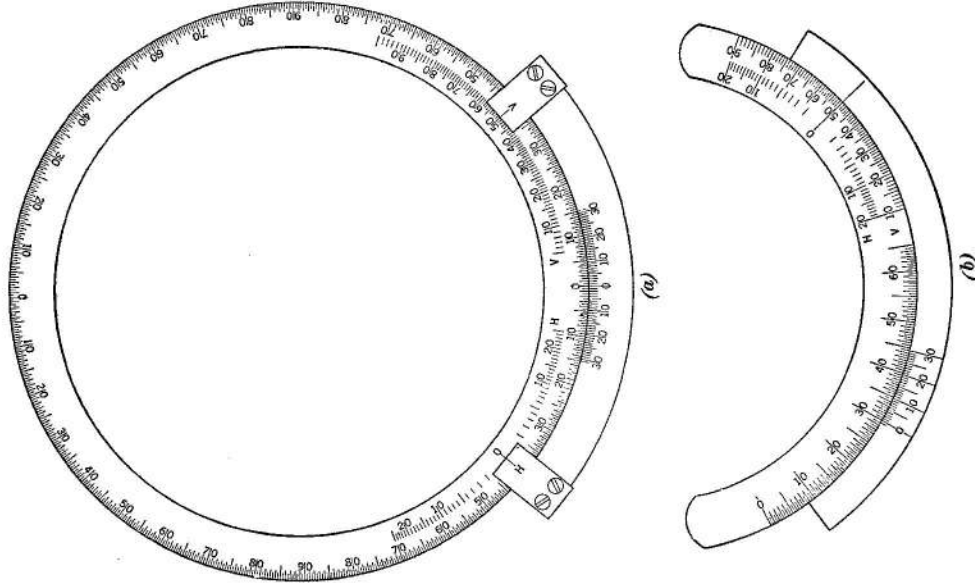


FIG. 4

plate that is fastened to one standard of the transit just below the vertical limb. The scales for determining stadia distances are added to the vertical limb inside the graduations for vertical angles. There are two stadia scales. One of these scales, which is marked  $H$ , is for corrections to horizontal distances; and the other scale, which is marked  $V$ , is for differences in