STRENGTH OF FIGURE

The *strength of figure* is a factor considered in establishing a triangulation system to maintain the computations within a desired degree of precision. It plays an important role in deciding the layout of a triangulation system.The expression given by the U.S. Coast and Geodetic Survey for evaluation of strength of figure is

$$L^2 = \frac{4}{3} d^2 R$$

where L^2 = the square of the probable error that would occur in the sixth place of the logarithm of any side,

d = the probable error of an observed direction in seconds of arc,

R = a term which represents the shape of a figure

$$= \frac{D-C}{D} \sum \left(\delta_A^2 + \delta_A \delta_B + \delta_B^2 \right) \qquad ..$$

D = the number of directions observed excluding the known side of the figure,

$\delta_A, \delta_B, \delta_C$ = the difference in the sixth place of logarithm of the sine of the distance angles A, B, C, etc., respectively,

$C = (n' - S' + 1) + (n - 2S + 3)$

n' = the total number of sides including the known side of the figure,

n = the total number of sides observed in both directions including the known side,

S' = the number of stations occupied, and

S = the total number of stations.

DISTANCE OF VISIBLE HORIZON

If there is no obstruction due to intervening ground between two stations A and B, the distance D of *visible horizon* as shown in I   from a station A of known elevation h above mean sea level, is calculated from the following expression:

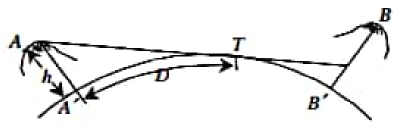
$$h = \frac{D^2}{2R}(1 - 2m)$$

where h = the elevation of the station above mean sea level,

D = the distance of visible horizon,

R = the mean earth's radius ($\simeq$6373 km), and

m = the mean coefficient of refraction (taken as 0.07 for sights over land, 0.08 for sights over sea).



For the sights over land

$$h = 0.6735\ D^2 \text{ metres}$$

where D is in kilometers.

The expression given by Eqs. (6.4) or (6.5), is used to determine the intervisibility between two triangulation stations.

PHASE OF A SIGNAL

When cylindrical opaque signals are used they require a correction in the observed horizontal angles due to an error known as the *phase*. When sunlight falls on a cylindrical opaque signal it is partly illuminated, and the remaining part being in shadow as shown in Fig becomes invisible to the observer. While making the observations the observations may be made on the bright portion (Fig.) or the bright line (Fig . Since the observations are not being made on the centre of the signal, an error due to incorrect bisection is introduced in the measured horizontal angles at O.

Observations Made on Bright Portion (

When the observations are made on the two extremities A and B of the bright portion AB then the phase correction β is given by the following expression:

$$\beta = \frac{206265}{D} r \cos^2(\theta / 2) \text{ seconds}$$

where θ = the angle between the sun and the line OP,

D = the distance OP, and

r = the radius of the cylindrical signal.

Observations Made on Bright Line (

In the case of the observations made on the bright line at C, the phase correction is computed from the following expression:

$$\beta = \frac{20625}{D} r \cos(\theta / 2) \text{ seconds}$$

While applying the correction, the directions of the phase correction and the observed stations with respect to the line OP must be noted carefully.