TRANSIT. OBSERVATIONS IN GEODETIC ASTRONOMY

by

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(Review).

Hydrographic Engineer A. GOUGENHEIM published in the " Bulletin Géodésique N° 58 of 1938 " an interesting study " *on a rational graphic representation of transit observations by transit telescope* ". Taking up the question again in a more general way under the title: *Transit observations in Geodetic astronomy,* he describes the principle of these observations together with a new method of reduction which may be affected by means of a graph based on the employment of position lines.

He shows that each condition equation represents a position line supplied by observation and which may be replaced by a straight line situated in a plane and orientation $T + \frac{\pi}{2}$.

T. is the diedre angle whose line of intersection is the rotation axis of the instrument and whose faces contain respectively the vertical of the station and the direction of the body observed. In the absence of errors, these straight lines should envelop a circumference. The graphic solution will be obtained by determining its center, the coordinates of which are the new unknown x, y, and the radius the unknown z.

Value z makes it possible to obtain the radius of the small circle of the celestial sphere on which transits are observed; values x and y cannot give the error on the vertical of the observation place, but may allow to infer the time and latitude, if the rotation axis of the instrument is vertical, that is if the equal altitude method is used, or the time and azimuth, if the rotation axis is perpendicular to the meridian, or the latitude alone, if the instrument has its axis in the meridian.

The three quantities: time, latitude and azimuth might even be determined theoretically if the instrument could be made to revolve round an extra vertical axis, so as to set it in different azimuths, provided it is fitted with a sensitive level capable of recording the variations of the telescope rotation axis inclination.

But, practical consideration have led to the adoption of only two types of instruments; one for equal altitudes and one for transits. The latter, consisting of a telescope perpendicular to a horizontal rotation axis must include a vertical rotation axis allowing to set it in any vertical.

This study of position astronomy methods, based on the notion of position lines, affords a new and very useful means of reviewing the various observation instruments and processes, and, if need be, of suggesting new methods for obviating certain defects in the instruments; it is of very great interest to all those who may be called upon to carry out astronomic operations in the field.

P. V.