The invariability in length of this base has been checked many times within the limits of 1/1,000,000th. It has been proposed to link it to the international metric standard by the VAISÄLÄ method of interference of light (See *Hydrographic Review*, Vol. VIII, N⁰ 1, p. 230).

On the ground, 24-metre ranges are marked out by wooden pickets, 10 to 15 cm. in diameter and 2.40 metres in length, which are planted in the earth until only 70 cm. emerge. A gudgeon marked by a cross is screwed onto each picket. The mean errors of base-measurements in 1932 vary between 0.26 and 0.34 mm.

P. V.

ISTRUZIONI PER LA COMPENSAZIONE DELLE TRIANGOLAZIONI DI ORDINE TOPOGRAFICO

(INSTRUCTIONS FOR COMPENSATING TRIANGULATIONS OF A TOPOGRAPHICAL ORDER)

by

PROFESSOR G. FORNI

Publication N⁰ I. I. 3092 of the Hydrographic Institute of the Royal Italian Navy, Genoa, 1935 - 63 pp., 6 fig.

The length of the sides of coastal triangulations used in hydrographic surveying is generally between 5 and 20 kilometres — a value which is not exceeded except in very rare cases where it is a question, for instance, of connecting islands to the mainland. Measurements relating to this kind of triangulation must be made with a certain degree of accuracy. At the Hydrographic Institute of the Royal Italian Navy it is usual to measure the departure bases and also, when required, a control base at least 1,000 m. in length using 24 m. invar wires ; and to measure the angles of the triangles with at least six repetitions by the Troughton & Simms theodolite giving the approximation of a second.

Passing on to the computations, the first problem to be solved to obtain this degree of accuracy is that of the compensation, always a delicate operation, even for a triangulation of limited extent, when it is proposed to adopt the method of GAUSS for geodetic triangulations based on the method of least squares.

The chief aim of Professor G. FORNI's manual, recently published by the Hydrographic Institute of the Royal Italian Navy, is to serve as a guide to the computers of this Service for the compensation problems most commonly met with in coastal surveys, by comparing the results of three methods of compensation which correspond to different degrees of accuracy. The manual also deals with the subject of rigorous compensation in such a way as to explain the general considerations on the principles of the compensation.

Articles on this subject appeared in *Hydrographic Review*, Vol. VIII N⁰ 2 of November 1931, and Vol. IX N⁰ 2, November 1932, and for this reason only an analytical summary of the new Italian publication is given below :

I. *The rigorous compensation of the quadrilateral*, p. 16 of the manual, gives the same results as those arrived at in *Hydrographic Review*, Vol. IX N⁰ 2, pp. 53-54. The latter possess the advantage of deriving from general formulae the application of which is sufficient without restating and resolving the equations anew.

II. *The semi-rigorous compensation of the quadrilateral*, p. 23 of the manual, gives the same results as those given by the formulae shown in the above quoted number of the *Review*, p. 54 - Remark I.

III. *The summary compensation of the quadrilateral*, p. 29 of the manual, is the method developed in *Hydrographic Review*, Vol. VIII N⁰ 2, p. 217 (Publication H. D. 295 of the Hydrographic Department).

IV. *The rigorous compensation of the polygon with central station*, p. 32 of the manual, shows the same results as those given in *Hydrographic Review*, Vol. IX N⁰ 2, pp. 50-51.

V. *The semi-rigorous compensation of the polygon*, p. 38 of the manual, involves the arbitrary assumption $\alpha_p = o$ (notation used in *Hydrographic Review*, Vol. IX N⁰ 2, p. 50) ; consequently the corrections β_p and γ_p are simplified thus :

$$\beta_p = -\gamma_p = \frac{\cot c_p + \cot b_p}{\Sigma (\cot c + \cot b)^2} \xi$$

VI. *The summary compensation of the polygon*, p. 46 of the manual, is that given in Publication H D. 295, reproduced in *Hydrographic Review*, Vol. VIII N⁰ 2, p. 211.

VII. *The semi-rigorous compensation of a quadrilateral in which one triangle has already been compensated*, p. 49 of the manual, involves the same preliminary corrections to angles as in *Hy rographic Review*, Vol. IX N⁰ 2, p. 54, following, however, a much more complicated method. Dablas of angles A and C are introduced and consequently angles which have alreadv been compensated, which makes the comparison of results difficult. Therefore the process is slightly different.

VIII. *The semi-rigorous compensation of a polygon a triangle of which has already been compensated*, p 56 of the manual, may be immediately deduced from case N⁰ V.

P. V.