

HYDROGRAFISCH OPNEMEN

(HYDROGRAPHIC SURVEYS.)

Published by the Hydrographic Service of the Netherlands.

(17 x 24 cm., 152 pp. + 54 figures, 31 plates - Algemeene Landsdrukkerij, 's-Gravenhage, 1938).

The Hydrographic Section of the Ministry for Defense has just published (in 1938) a new edition completely revised and brought up to date of the work entitled: *Hydrografisch Opnemen*.

A previous treatise bearing the same title and drawn up by Captain J. L. H. LUYMES, was brought out in 1921 (see *Hydrographic Review*, Vol. III No 2, July 1926, p. 229).

The new Manual which has just appeared has been entirely revised and modernized and is illustrated by numerous drawings and photographs. In the Introduction is a definition of Hydrography. In this connection the Manual has adopted definition No 3 given on p. 11 of the *Hydrographic Review*, Vol. XI No 1, of May 1934, in the article which treats of the definitions of the words "Hydrographer" and "Hydrography".

The present Manual is designed to serve as a guide, and to give information on surveying operations. It describes all of the methods which in the course of years have proven suitable and lasting.

The volume is divided into three principal sub-divisions:— Triangulation and the erection of signals; sounding; plotting.

In the chapter containing the general remarks it is stated that the Manual treats of the various hydrographic operations in the field as they are conducted in the Netherlands and its colonies. In the Netherlands the hydrographic work consists principally in the control of the channels and the estuaries and their variations under the influence of the tidal currents. One single surveying vessel named the *Hydrograaf* is in service, which is equipped with a motor surveying launch fitted with an echo sounder. The surveying vessel is in service during the six months of summer only, and its crew consists of a permanent civilian personnel in charge of a naval officer. The Pilot Service and the *Rijkswaterstaat* also carry out numerous local surveys.

In the Netherlands East Indies the more extensive work has been carried out on a modern basis only since the last years of the past century, and the complete systematic survey of the entire Archipelago was finished in 1930 except for the southern coast of New Guinea. The control surveys, comprising the systematic search for dangerous reefs in the vicinity of the principal shipping lanes are carried out by three surveying vessels, belonging either to the Dutch Navy (H. M. *Snellius* and *Tydeman*), or, partly, to the Colonial Navy (SS. *Eridanus*, *Hydrograaf*, *Orion*.)

For the Netherlands West Indies, without employing a surveying ship in the true sense of the word, the charts and Sailing Directions are compiled in the Netherlands from data furnished by the station ships with the aid of the local personnel.

The first chapter in the Manual deals with the measurement of the base-line: either by means of the graduated tape, chain or stadia; by means of the theodolite employing a base-rod; by means of masthead angles or by means of a range-finder; or by taut wire; measurements deduced from the field sheets of a neighbouring triangulation already completed, or derivation from astronomical positions. In the case of each of these methods examples are given of operations effected by the Dutch surveying vessels.

The second chapter deals with the triangulation and the determination of position. It is stated at the beginning that, for the Netherlands, since the year 1930 the co-ordinates of all the principal points are centralized by the *Bijhoudingsdienst der Rijksdriehoeksmeting*, a branch of the Cadastre, for which the data are given on the stereographic projection.

In the Indies the *Topografische Dienst* of Batavia centralizes the data for the Archipelago, the topographical charts of which are on the polyhedral projection.

The Manual then enumerates, without going into the detail of the calculations for precision, the different methods of triangulation. For the detail the reader is referred to the works: *Kaartprojecties beschouwd uit een hydrografisch oogpunt* and *De methode der kleinste kwadraten en hare toepassing bij de hydrografische triangulatie* (See: *Hydrographic Review*, Vol II No 1, November 1924, p 165, and *Hydrographic Review*, Vol I No 2, May 1924, p 190). The different methods

of triangulation enumerated are as follows:— 1.— Triangulation by fixed triangles for which all the positions of the vertices are calculated. For the reduction of the calculation, reference is made to the various tables supplied in the work: *Hydrografische Tafels* 1938; 2.— Triangulation with the vessel at sea as the vertex of a triangle. Various examples are given, taken from the survey of the East Indies. Other methods are mentioned:— intersection; azimuth and distance; SNELLIUS method; angle combined with an astronomical azimuth observation; astronomical determination of latitude and astronomical azimuth observation. The Manual then describes the various processes for the determination of the vertices of the triangles. Reference is made to the radio-acoustic methods and the use of the radio-sono buoy.

Chapter III treats of the different methods of sounding. First is mentioned the general configuration of the area to be sounded, and the working plan for the sounding launches, the preparation of the boat sheets and the smooth sounding sheet; careful examination of the doubtful areas, search for dangers reported and the location of banks. This chapter also gives a description of the various sounding apparatus: the rod, the lead-line, the fish-lead, the DOUGLAS-SCHAFFER deep sounding machine, the KELVIN machine and the LUCAS machine. However, since 1936 all soundings made by the Netherlands have been carried out with echo sounding apparatus. In this connection the *Willebrord Snellius* expedition in 1929-1930 carried out interesting experiments for the exact determination of the velocity of sound in water.

These determinations have been described in Vol. II edited by F. PINKE giving the report on the Expedition by N. V. KEMINK and which may be obtained from E. J. BRILL at Leiden. The *Willebrord Snellius* was fitted with an "Atlas Werke" (Bremen) sounding apparatus similar to the American *Fathometer*. The Manual further describes in general terms several of the sounding machines, particularly the British type of Henry HUGHES & SON (Type MS XIV, 1937) for shoal water.

A large part of the chapter is devoted to wire drag operations, which since the year 1933 have been maintained as part of the routine operations in the Netherlands East Indies. The Manual describes in detail the dragging operations developed from the American system such as the methods of manœuvring based on the data given in Special Publication N° 118 of the U. S. Coast and Geodetic Survey 1925. The Netherlands Manual gives three plates to illustrate this subject as well as some remarkable photographs.

The same chapter contains a few remarks on the determinations of the topographical contours along the coast and the various special features which are necessary for the compilation of the views of the coast, and the use of aerial photography. Then there is treated the question of instruments and material needed in the field for the soundings. In this connection the author gives a short theory of the sextant and theodolite errors and a description of the day-book and records relating to the observations and reports to be submitted to the Hydrographic Office.

The fourth chapter is devoted to plotting and sketching on the sheets: Preparation of the field sheets and drawing of the co-ordinates; use of the scale rule and graduation of the perpendiculars for the solution of the SNELLIUS problem; use of the ordinary protractor and the station pointer. Although the special paper manufactured by the Dutch firm of van GELDER offers a good isotropic surface from the point of view of dilatation compared with other paper rolled by machine, it is recommended to surveyors who desire to have field sheets which will not shrink to glue the paper to plates of aluminum or zinc.

The soundings are referred for a given region to the same datum (vlak van gemiddeld laag-laagwaterspring), which in turn is referred to the zero of the general datum adopted for the Netherlands by the *Rijkswaterstaat*; the *Normal Amsterdamsch Peil* (NAP), a designation introduced in 1875, a detailed history of which is given in N° 39 (1934) of the journal *De Ingenieur*. Interesting extracts from this article are given on page 120 of the Manual.

The Manual also gives for the coast of the Netherlands, where the tides are well known, a general chart showing the various reference planes of reduction referred to the NAP.

Chapter IV closes with a general description of the plotting of the smooth sheets on which the contour lines of equal depth are simply indicated, their final position being determined later on by the Central Hydrographic Office. Several practical hints are given with regard to the compilation of the Sailing Directions and for the control of the locality once the compilation has been finished.

Several hints are given in Chapter V with regard to methods of current measurements: by means of the log, ORION type; by measurement with the JACOBSEN or ORT current meters; or the recording current meters of the WOLLASTON, RAUSCHELBACH, PETERSSON and EKMAN types.

The Manual closes with two appendices: the first giving the description of the *de Vries* recording tide gauge, constructed by the instrument-maker H. M. SMIT at Bilthoven.

Appendix II gives a short history of the hydrographic work accomplished in the Archipelago of the Netherlands East Indies, by Admiral J. M. PHAFF.

There is also a chronological list of the various vessels which have been engaged in surveying operations in the Archipelago from 1822 to 1937, prepared by Captain J. L. H. LUYMES.

The Manual ends with a few plates illustrating, among others, the various Netherlands surveying vessels.

H. B.

CARTOGRAPHY

by

CHARLES H. DEETZ.

(Special Publication N° 205 of the U. S. Coast and Geodetic Survey).

(15 × 23 cm., 83 pp. 29 figures : Government Printing Offices, Washington, D. C., 1936. Price 60 c.).

The purpose of this publication is to supply in outline form the underlying principles of constructive cartography, while tracing briefly the attempts made through the ages to depict on paper accurate geographic information which leads to a better understanding of the terrain and the sea, their history, their characteristics and phenomena. The publication also summarises what are now considered the best methods of securing and utilising map data, and studies in a general way maps and charts and methods of constructing and printing them. Part of a previous Special Publication of the Coast and Geodetic Survey (N° 66) which deals with the rules and practice relating to the construction of nautical charts as followed in the Division of Charts of the Survey, has been embodied in the present publication.

The new manual, however, deals rather with cartography in general, It is meant to serve the compiler in the application of his technical knowledge and skill, being mainly an attempt to co-ordinate available cartographic information; it should also serve those who by their operations in the field produce the material from which maps and charts are constructed; it points out the conditions and restrictions under which map-producing organisations are functioning.

Chapter I is introduced by a brief historical account of the most ancient cartography known and of that pertaining to the more recent period of MERCATOR and ORTELIVS, followed by a summary of present day chart- and map-making methods and instruments.

Chapter II reviews the different types of charts and the purposes for which they are published, classifying them according to the main study which they are meant to serve:- Geology, Geodesy, Littoral and Continental Shelf, Oceanography, Aeronautical Charts, Weather Maps, Navigational Charts.

In the third chapter:- *Compilation of Material*, the selection of the different elements which enter into the construction of a chart is considered. Mention is made of original surveys, control points, datum planes for elevations and for soundings; selection and checking of cartographic material; projection and framework; project and specifications to insure a scheme of uniformity; construction of a projection; selection of scale of paper; methods of reduction. Some interesting remarks concerning reproduction and photo-aluminography, hereafter given in full, terminate this chapter.

Chapter IV is devoted to the study of cartographic projections: without entering into details of the mathematical formulæ and developments attached to the kind and properties of the different projections, the manual sets out in a general way the advantages of the various systems of cartographic projection, also the distortions which they carry with them, having in view the solution of the construction problems met with in cartography: facility of construction and the rapid plotting or scaling of geographical positions as, for instance, in the case of the MERCATOR projection or of the polyconic system, for which general tables have been calculated for the spheroid; definition of conformality: equivalence; representation of Great Circles or lines of shortest distance as straight lines; true bearings; true distances and azimuths. A study of the usual projections follows:- polyconic projections, the LAMBERT conformal conic projection, MERCATOR's transverse projection. The author then passes on to a study of the grid system and the establishment of rectangular co-ordinates the complete system of which is becoming more and more extensively used in the United States. Chapter IV concludes by a few general remarks