52081

Distr.
LIMITED

E/CN.14/CART/328
2 November 1972

Original: ENGLISH

UNITED NATIONS

ECONOMIC AND SOCIAL COUNCIL

ECONOMIC COMMISSION FOR AFRICA

Third Regional Cartographic Conference for Africa

Addis Ababa (Ethiopia) 30 October - 10 November 1972
Provisional agenda item 4

REPORT ON CARTOGRAPHIC ACTIVITIES IN ARAB REPUBLIC OF EGYPT

Report submitted by the Government of the Arab Republic of Egypt

GENERAL

This report deals primarily with types of maps and, secondly, with photogrammetric activities for compiling topographic and other maps, and thirdly, a general idea about Geodesy in Egypt and the reproduction techniques used.

Cartographic practice in Egypt is usually exercised by governmental services having well-organized surveying and mapping units. The map projection used in all survey maps in Egypt is the "Transverse Mercator" projection. Old maps were produced using "Helmert" spheroid 1906. Since 1959, we shifted over to the international spheroid "Hayford" 1910. The country is now adequately covered with maps in various scales.

Cadastral maps cover all the cultivated land and normally are compiled by ground survey methods at the scale 1:2500. General town maps are produced mainly at the scale 1:5000, some at the scale 1:2500.

Detailed town plans at the scale 1:500.

Topographic maps at the scale 1:25,000, 1:50,000 are produced normally by photogrammetric means using aerial triangulation. The basic map sheet is at the scale 1:50,000.

Most of the important areas of Egypt have been covered with maps at this scale.

All the cultivated areas are covered with maps at the scale 1:25,000.

The whole area of Egypt is covered with topographic maps at the scale 1:100,000 except most of the south-western desert area and small areas in the eastern desert. New maps at the scale 1:100,000 are generally compiled from maps at the scale 1:50,000.

The present revision cycle of our basic maps at the scale 1:50,000 is 20 years, although several maps on different scales for specific areas have been revised at shorter intervals depending upon the extent of changes. There are also series of maps at the scale 1:250,000 and 1:500,000. These maps are in turn used for the compilation of various geographical maps such as 1 / M international maps and charts and single maps covering the whole of Egypt such as railway maps, road maps, political maps, physical maps, etc. We also produce various survey maps as required for development projects such as those dealing with irrigation, road and railway construction, transmission lines, agriculture, mines, rural improvements, etc.

We now have some experience in producing plastic relief maps. Many relief maps in different scales have been produced fulfilling the purposes for which they have been made.

Extensive areas have been covered with controlled, uncontrolled and semi-controlled mosaics to meet specific needs of geomagnetic surveys, photo-interpretation studies, pre-investment surveys, etc.

PHOTOGRAMMETRY

Photogrammetric techniques were applied in 1954. Since that time, a good deal of progress has been achieved. We have switched over completely to photogrammetry for the production of small- and medium-scale maps. Cadastral maps are still being compiled by ground survey.

Many large-scale maps and diagrams have been compiled by photogrammetric means covering certain areas for the design of engineering projects and rural development studies.

The development of photogrammetry has led to complete changes in all types of survey planning. First order plotting instruments are used for large-scale surveys. For medium-scale plotting of details and contours, second order plotters are also used. The control points needed for each stereoscopic pair are normally provided by spatial aerial triangulation. In this respect, it is planned in the very near future to use modern distance measurement instruments as well as digital computers.

Plotting is normally done on stable material, i.e. correctostat paper.

Spatial aerial triangulation is normally carried out by the aeropolygon method on universal instruments as the Wild Autograph A7 or the Zeiss stereo-planigraph C8 and very recently by the independent model method on Wild Autograph A8 or Zeiss Jena stereometrograph.

Aerial triangulation in Egypt is usually carried out mainly for 1:25,000 and 1:50,000 scale maps. At present the adjustment of the machine co-ordinates obtained from spatial aerial triangulation is carried out by graphical strip

adjustment methods or by block adjustment using the ITC Jerie Analogue Computer. Numerical methods have also been attempted to a limited extent using the electronic desk computer system IME.

The graphical strip adjustment which is now widely used has already yielded good results acceptable for topographical mapping. The ITC Jerie analogue computer gives better accuracy.

The numerical method for strip adjustment is preferable when the control points are in arbitrary positions.

Mechanical radial triangulation by slotted templet method is extensively executed in areas having limited relief. This extension of planimetric control is mainly used for the rectification of photographs for the purpose of producing photo-mosaics or direct graphical plotting from photographs.

We hope to get the necessary instruments in the near future for preparing orthophotographs as we feel that such photographs will be of immense use for planning and for expediting map production in undulating terrain. This in due course, would perhaps lead to the development of the future map with aerial photographs for its background. In this respect, we prefer the "Orthophot B" in connexion with "Topocart B" produced by Carl Zeiss Jena or a Gigas-Orthoprojector.

Our present photogrammetric equipment mainly consists of the following instruments:

- Wild A_7
- Wild A_8
- Zeiss stereoplanigraph C_8
- Zeiss Jena stereometrograph
- M.S. II Kelsh plotter
- Multiplex Williamson and Zeiss Jena
- ITC Jerie Analogue Computer
- Radial secator
- SEG V rectifier

We have already received very recently Wild A_{10} and Wild B_{8s} but not yet installed.

Aerial photography is executed either by private foreign agencies or by the Egyptian air force. The country is almost covered with aerial photography in different types and scales ranging from 1:5000 for large-scale mapping up to 1:60,000 for desert areas.

We have not yet tried the use of camera orientation equipment although we are aware that such equipment would help reduce the ground control and also increase the accuracy for long strip triangulation especially in mountainous terrain.

We are in favour of the use of super-wide angle cameras as they would enable us to avoid high altitude flying for small-scale photography, thereby increasing the height accuracy. At present, however, we have SWA photography by Wild RC9 for a big area in the Western Desert. From this photography we have produced 1:25,000 scale maps for the New Valley area.

The following cameras are used for aerial photography:

- Wild RC_{5a}
- Wild RC_{8}
- Wild RC_{9}
- Fairchild
- Zeiss RMK

GEODESY

The Geodetic Triangulation of Egypt began in 1907 in order to fix fundamental control points on which could be based the cadastral survey of Egypt. It was decided from the beginning to attain the highest possible accuracy. The survey of the country was already under the control of second order triangulation, so that the need for speed of work was not a prime necessity. Latitude were observed by Talcott's method at every station as a matter of routine; longitudes by Transit method. Astronomical azimuths were also observed.

All bases in Egypt are measured by 24 metre Invar wires. These wires have always been standardized either just before or after the measurement of each base. The geodetic triangulation is carried out by means of a chain of quadrilaterals with all angles observed. In several cases the chain has been strengthened by interlinking the quadrilaterals.

The average length of side is from 40 to 50 kilometres, and as far as possible the sides have been kept about this length, except in the north-western desert the sides were shortened because the coast is comparatively flat. The maximum distance covered between bases has been set at 200 kilometres. The lengths of the bases are chosen to be as near as possible to 10 kilometres with a maximum length of about 12 kilometres and a minimum of 6 - 7 kilometres. The bases are linked into the main network by special base extension triangulation. Each section from base to base is computed and adjusted as a solid block by the method of least squares. The observations for latitude and longitude are used only to determine the deflection of the vertical at the stations concerned. When the geodetic triangulation in Egypt started there was only one fixed point at which longitude had been observed. This station was therefore taken as the fundamental starting point. For latitude, the mean discrepancy between the astronomical and trigonometrical latitudes of eight stations in the first section has been made zero. Special 3rd order triangulation nets were made to cover some desert and mountainous areas for the sake of quick production of 1:100,000 topographic maps. These nets were based on the geodetic net with some additional astronomical observations of Azimuth.

The first network of precise levelling in Egypt was carried out by the survey of Egypt in the years 1906 to 1912 in order to establish fundamental bench marks over the whole country. The datum adopted was the mean sea-level at Alexandria Harbour. Now, Egypt is covered with networks of closed short circuits in cultivated areas and long circuits along the main roads in desert and mountainous areas.

The altitudes of all geodetic stations are determined by vertical angle observations taken at every station. Wherever possible, junctions have been made to the first order bench marks.

REPRODUCTION

Plastic is now in use instead of drawing correctostat paper for scribing the basic colours and in preparing blue-prints, colour tints originals, and chemical proofs. Certain stick patterns are also in use to save time and to achieve more accuracy in preparing map originals. The photolettering machine has been introduced in preparing the Arabic names instead of hand-writing and has proved to be satisfactory. Some names and titles still have to be written by hand as the machine does not cover all the required types. Map grids and sheet-corners are plotted on thick aluminium foil paper to ensure accuracy and to be used as reference for checking the dimensions of the film positives prepared from colour originals. Film positives are prepared from all the sheets representing the different colours of a map and from which the coloured chemical proof and the aluminium press-plates are prepared. Annodized plates are used for halftone work and have proved to be very satisfactory especially when a big number of copies is needed.