

National Report of the Hungarian Geodetic and Cartographic Society to the XIVth Congress of the
I S P

The geodetic, photogrammetric and cartographic professional activities in Hungary are coordinated and held together by the Geodetic and Cartographic Society, within which there is an independent Photogrammetric Section. Later holds the photogrammetrist together and makes possible to exchange the experiences, to discuss professional questions, to contact other professional groups for the sake of propagating its results and to widen its applications. There are other Commissions in the Society /namely photointerpretation, monument-photogrammetry, environmental protection/, which are coordinated by the Section Photogrammetry.

Hungary was one of the founders of the ISP. The legal predecessor of the Section Photogrammetry was the Hungarian Photogrammetric Society; we commemorated this year its 50th anniversary. We do our best to take part in the work of the ISP, according to our traditions and relative to our possibilities. We are represented through correspondants in every Commission of the ISP. The activity of our correspondants follows naturally also our possibilities. So we are less active in Comm. II, than in Comm. IV in solving their tasks.

Since 1976 /Congress XIII in Helsinki/ the national photogrammetric activities are characterised as follows.

The published results of the former Congress and their possibilities to establish them in Hungary were discussed on a conference, lasting a whole day.

Our Society was represented on the following symposia in 1978:

| | | | | |
|-----------|----|----------------|---|---------|
| Comm. III | 12 | participant/s/ | | |
| VI | 1 | " | 1 | lecture |
| VII | 3 | " | 1 | " |
| V | - | " | 4 | " |

We couldn't participate on the symposia of Comm.I and IV, because of the great geographic distances.

In 1978, with the assistance of the Wild Co., we organised a conference, getting acquainted with their newest instruments and the System OR-1 /120 hungarian participants/. In october 1979 we organised an international conference on modern photogrammetric methods of large-scale mapping /42 participants from 12 countries, plus 120 domestic/.

Between the two Congresses of ISP, there were 69 lectures held in photogrammetry in our Society.

In the reported period, the professional activity and our results are shown in the sequence of the Commissions.

Comm. I.

Determination of MTF on basis of terrain-edges, with the "Schnellphotometer" of Zeiss-Jena and our digital registration

unit: the experiments are continued, they are encouraging, but our results aren't mature yet for publication; more experiments are to be made. In this theme, we participated in an research work of Comm. I, for which the test-material was provided by our finnish colleagues.

This period is characterized by the introduction of colour diapositives and negatives /Kodak/ in our large-scale jobs /occasionally in mapping, aerotriangulation and photointerpretation/.

We make extensive experimentation with the helicopter type Ka-26 for special engineering-photogrammetric tasks. About these works we present a separate report.

Comm.II.

Related to our possibilities we may attribute as result the development of two prototypes of a registration equipment. One is connected to a stereocomparator type 1818 of Zeiss, the other /FAB/ is to be connected to any analogue and analytic instrument, which has precise measuring spindles. In developing, we took into consideration the needs of the automatic mapping, the specifications of which were obtained by a research-work of this theme. We present a separate report about it.

Comm.III.

The practical introduction and broad spreading of the Anblock-method falls also on this period. The method of independent models was also introduces at the end of 1979. Both methods may utilize as inputs all the measured data of both the analogue and analytic systems. Besides these methods, we use the adjustment by polynomials /depending on the task to be solved/.

The accuracy of aerotriangulation amounts to

$$m_{xy} = \pm 5-10 \mu\text{m} \quad \text{and} \quad m_h = \pm 0,07-0,18 \text{ H}\%$$

We got usefull help in introducing the methods of Anblock and independent models from the Finnish State Geodetic Survey. In addition, we made experiments with very large blocks, concerning the error-accumulation of aerotriangulation and in the theoretic correction of these errors. We present a separate report of these themes to the Congress.

We participated also in the activities of WG III/2, about which we give our report, too.

Comm.IV.

In the reported period, Hungary has increased her different photogrammetric applications in large-scale and topographic mapping. Table 1. shows the hungarian photogrammetric instruments /pieces/ and their avarage utilization-rate /%, years 1976-1979/.

Table 1.

| Type | pieces | utilization-rate |
|--------------------|--------|------------------|
| WILD A-7 | 2 | 94,0 % |
| WILD A-8 | 7 | 92,0 |
| Stereometrograph | 7 | 74,0 |
| Topocart-Orthophot | 2 | 70,0 |
| Zeiss C-5 | 1 | 60,0 |
| Stecometer | 1 | 72,0 |
| SEG I | 2 | 90,0 |
| SEG V | 3 | 95,0 |
| WILD E-4 | 1 | 90,0 |
| Orion III/S | 2 | 82,0 |

total sum 28

Table 2.demonstrates the application-rate of photogrammetry in geodetic and mapping activities and methods /mono, stereo/.

Table 2.

| Type of job | appli- cation rate | share of methods | |
|--|--------------------------|------------------|----------|
| | | mono % | stereo % |
| top.survey 1:10 000 | 100 | 60 | 40 |
| top.revision 1:10 000 | 100 | 60 | 40 |
| nat.large-scale base-mapping 1:1000, 1:2000, 1:4000 | 80 | 20 | 60 |
| revision of large-scale cadastral maps 1:2880, 1:2000 aso. | 60 | 30 | 30 |
| special mapping /for planning/ | 40 | 5 | 35 |

Till the end of 1979 in Hungary, the large-scale mapping of non-residential areas is made 72% with revision, 20% with survey; this work will be finished in 1980.

The large-scale mapping of residential areas is finished 55% with survey and 27% with revision; it is still in progress.

From 1976 on, new large-scale mapping occurs in the uniform national mapping system.

Characteristics of photogrammetric methods used in Hungary

For large-scale surveys, one uses always a new photographing mission and its photomaterial. Photography is made by cameras RC 10, RC 8 and RC 5 of Wild, generally

| | | | |
|-----------------|-----------------|--------|---------------|
| 1:4500 -1:6000 | photo-scale for | 1:1000 | mapping-scale |
| 1:8000 -1:12000 | " | 1:2000 | " |
| 1:16000-1:20000 | " | 1:4000 | " |

Either for mono-system /rectification/, or for stereo-system /plotting/, the determination of photo-control points is made by spatial aerotriangulation.

Geodetic determination of controlpoints is needed very rarely, because in Hungary, the density of geodetic points is 1 point/2 km² /in cities 2 points/km²/, in the framework of the triangulation 4th order of relative accuracy 1/50 000.

We use aerotriangulation not only for photo-control works, but also for the determination of survey-points /traverses/ of boundary-lines in cities and villages and of residential fracture-lines. Later are stabilised and signalized points on the terrain. Their horizontal accuracy equals the accuracy of the aerotriangulation /see there/. We determine such points in quantity of 10000 yearly.

The relative accordance of the blocks /parcels/, plots and buildings is secured by terrestrial completing measurements.

Stereo-plotting is carried out in the large-scale mapping of hilly and mountainous areas by pricking of the points and without preliminary classification on the terrain.

We chose following technologies in stereomapping of cities /and residential areas/ in scales 1:1000 and 1:2000:

- 1/ Analogue instruments: numerical plotting of parcel-boundary lines, mapping of details by pricking and local completing survey.
- 2/ Method of encircling of blocks: traditional measuring of the break-points related to the base-points, determined by aerotriangulation. After calculating the results of the survey in computer, the points are plotted by an automatic coordinatograph onto the base-plate of the stereo-plotting. More details are mapped with method Nr 1.
- 3/ Combined method: one measures photogrammetrically the basic survey-points, sometimes /in complex cities, building staggered/ the minor, numerical base-points /identifiable on ground and picture/ within the blocks, too. Detail-points are determined by traditional geodetic methods /orthogonal, polar/.

The most general method became Nr 2/, the reasons of which are the following:

- the national base-maps in Hungary must fulfill the needs of the cadastre, so the identifiable break-points of property-lines should have an accuracy of 0,3 mm. This may be reached only by a lot of supplementary survey /when carried out without delimitation and signalisation/;
- the mapping of public utilities /underground lines/ is carried out on the basis of the block-boundaries.

Experiments for developing the technology

We want to make more effective our large-scale mapping and the updating of maps. Therefore we are developing following photogrammetric methods:

- 1/ Digital photogrammetric plotting, as the most economic source of the geodetic-mapping data-base /automatic mapping/.

2/ Orthophoto-mapping.

The development of these two systems is delayed by financial factors and by the lack of a conception on the whole national databank-system.

Topographic mapping

As one can see from Table 2., this job is performed 100% by photogrammetric methods. According to the physical relationship of Hungary, we use every method /combined, differential and universal photography/. In last years, the orthophotomaps are becoming more-and-more general.

Revision of maps by photogrammetric methods

In both mapping tasks /large-scale and topographic/, revision is simplified by fast and economic technologies; their base is our photo-archive, with points signalized for control in former surveys and pictures on dimensionally stable material. Determination of control-points on the terrain is wholly eliminated by the identification of older, signalized points onto the new picture.

We need more photo-control for the detailed plotting in larger scales; they are determined in all cases by densification in the model or by spatial aerotriangulation. One may carry out the stereo-plotting at once, or the rectification. Points and lines unchanged or changed are unambiguously fixed before the field-work /reambulation/. Later can be minimized thatway.

Comm.V.

The industrial utilisation of photogrammetry in Hungary is significantly advanced, mostly in measuring of deformations, surveying of industrial sites. Experiments are carried out in making of public-utility maps by photogrammetry. We must mention, that the monument-photogrammetry is applied effectively for making reconstruction-plans in the Commission of Monument Supervision. There are significant results also in the introduction of biostereometry. Experiments are carried out with orthophotos in architecture.

We participate in the works of CIPA, the results of which is a common swedish-hungarian publication of architecture - photogrammetry.

About these themes, we present more papers to the Congress.

Comm.VI.

1/ Education

We participated on the symposium /1979/ in Cracow, we held a report with the tittle: "The role of photogrammetry in the training of geometers."

The national report of Hungary in Helsinki has given a detailed account on the situation of photogrammetric education. Therefore we mention only the following:

There are 3 levels of education of geometers in Hungary: secondary school /professional/, engineering-highschool and Technical University. Their study-period is 4, 3 and

5 years, resp. Photogrammetry is instructed in appropriate levels in all types. Table 3. shows some data on this education /yearly 30-32 weeks/.

Table 3.

| | <u>lecture</u> | <u>exercise</u> | <u>head/year</u> |
|------------------|----------------|-----------------|------------------|
| secondary school | | 7 | 150 |
| eng.highschool | 10 | 12 | 50 |
| university | 10 | 10 | 30 |

2/ History of photogrammetry

We reported and demonstrated the "History of hungarian Photogrammetry" already at the Congress of Lissabon. This material was completed with newer informations and sent to prof. Blachut /february 1979/.

3/ Terminology

We studied the introduced sketch; our comments were sent to colleague Pietschner to Dresden; they were presented also at the symposium in Cracow.

4/ Bibliography

The hungarian photogrammetric bibliography was sent in november 1979 to colleague Linsenbarth /Warsow/.

5/ Economics

As we mentioned earlier, we organized a conference /october 1979/ on large-scale photogrammetric mapping, where we dealt with economic questions, too.

6/ Photogrammetric periodicals

We dont agree with prof. Hothmer in this subject /presented in Helsinki/; this "international periodical" will have many financial and organisatory problems. Besides these, it will not make national publications superfluous /in terms of maintenance and many-sided orientation/. If such national publications survive, then they give rise to buy them, mostly in countries with same fundamentals, for getting experiences and knowing results of other nations. The number of publications to be ordered would not decrease, it would even increase. The financial burden and the ordering-sphere wouldn't change significantly. We assist the development of the publication of ISP "Photogrammetria" /Amsterdam/.

Comm.VII.

The Commission Photointerpretation of the Hungarian Society organized some conferences. The themes of these were mostly the interpretation of cosmic pictures /images/. The tematic order was as follows: recent crustal movement, forestry, geophysics, hydrology, instrumentation, protection of the environment, survey of natural resources and natural landscape,

automatic interpretation, archeology, program for the biosphere.

Some of these reports /papers/ have presented not only international, but the hungarian results, too:

- a/ A photographic system of 4 Hasselblad cameras, projected and manufactured by the Hydrographic Service. This multi-spectral system is used for reconnaissance and registration of dirty waters. The apparatus is used by other institutions, too.
- b/ Forestry interpretation is already an organic part of management of woods; in practice, it is used for the operating-plans of woods yearly 140 000 ha in size.
- c/ Regional analysis of forested lands; the experts of hungarian Forest Service worked out a method, which uses 2 channels of cosmic images, making a color-composition of them.

For automatic interpretation of cosmic images, there is an instrument-family under development; its results are so far encouraging.