ONEGA-2 MULTIPURPOSE RECORDING SYSTEM

Yuriy I. Kuchinskiy, Victor K. Fomin
Central Research Institute of Geodesy,
Air Survey and Cartography (TsNIIGAiK)
Onezhskaja 26, Moscow 125413
USSR
Commission II

ABSTRACT

Onega-2 computer-aided recording system is intended for collecting, checking, editing and processing photogrammetric data. It can be used in aerial triangulation and digital mapping. Stereo- or monocomparators, analogue stereoplotters and digitizer equipped with linear or circular transducers may be employed as peripherals. Onega-2 is based on SM 1803.07 computer, its software includes application and system program packages. The packages comprise translators, data acquisition and editing programs and programs to check measurements in the course of strip and block adjustment. The data checked and corrected by ES-series computer are used for final block adjustment. Employment of Onega-2 system provides for increase in labour productivity, decrease in cost, reduction in labour expenditure and production cycle.

Onega-2 Soviet-made computer-aided recording system is intended for recording and preprocessing of measuring data from stereoplotting instruments and digitizers.

Onega-2 system consists of:
- SM 1803.07 eight-bit microcomputer;
- operator's console with interface;
- transducer with interface;
- transcribing device with interface to transfer information from floppy disks to magnetic tape;
- OS 1800 operating system compatible with CP/M;
- technological software.

The microcomputer comprises: a central processor, two floppy disk storages, an alphanumeric display with keyboard and printer. The capacity of working memory is 64K, and the capacity of external memory is 512K.

The operator's console is intended for man-machine interaction. An operator uses the console to specify modes of recording and formats of information being recorded, to input information in the form of different characters and symbols used in digital mapping and aerial triangulation.

The transducer interface is used to convert measuring information from circular or linear raster photoelectric transducers of a photogrammetric instrument into digital form and to input the information to microcomputer.

To transcribe the information recorded in Onega-2 system onto magnetic tape, ES 9002M (ES 9004M) magnetic tape data preparation device can be connected to microcomputer of this system via a special interface.

The technological software is written in Fortran and Assembler languages. It is controlled by OS 1800 operating system and includes the following programs:
- to record measuring data onto magnetic tape;
- to edit the acquired information;
- to transcribe the corrected data arrays onto magnetic tape;
- to generate a digital model from the results of measurements in aerial photographs;
- to analyse accuracy of measuring system of photogrammetric instruments connected to Onega-2 system.

Depending on the type of an operation performed, the recording of measuring data can be carried out in statistic or dynamic mode using the following formats: NXYPQ, NXYZ, NXY, XYZ, XY, where N is number of a point.

Recording in dynamic mode can be made by increments of coordinates ΔX, ΔY, ΔZ or distance ΔS.

The following programs were developed for analytical photogrammetric bridging from data of measurements with stereocomparator:
- acquisition of measuring data with stereocomparator (SB) and their recording on floppy disks;
- editing (RIF) of information collected by SB program;
- generation and checking of a single model (DM);
- construction of a free strip photogrammetric net and checking of tie-points (CN);
- absolute orientation of a free photogrammetric net and checking of field and photogrammetric measurements of control points (GO);
- elimination of network deformation by polynomials using control points;
- transcription of information from floppy disks to magnetic tape at any stage of data acquisition (recording, single model, free or oriented net, etc).

Generation of a digital model from measurements by stereocomparator is made by means of a set of programs: SB, RIF, TM, DTM, GOD, etc.

Computation of space coordinates from corrected results of measurements is made in batch (TM) or dialog (DTM) mode. Absolute orientation in a specified system of terrain coordinates is carried out by means of GOD program (a combination of horizontal/vertical control points, vertical control points and horizontal control points is used).

A similar set of programs is prepared to generate digital models from measuring data obtained with an analog stereoplotter. A data file in this case is organized so that OS 1800 (CP/M) system programs, i.e. text editor program (ED) and command processor (TYPE, ERA, etc commands) can be used.

The data recording program (SBC) is used to record data of measurements output from a STs-1 type (Soviet-made) analog instrument. This program ensures preparation of a combined file which includes symbolic (service) and digital (metric) information.

An operator has opportunities to control data acquisition pro-

cess by editing service information, suspending recording mode to change increments of recording, etc. These opportunities ensure increase in productivity in the process of information collection from aerial photographs and decrease in volume of metric information recorded.

After the data of measurements are processed by SM 1803.07 computer, digital models can be used in engineering calculations (areas, volumes, etc) or in relief modelling. When it is necessary, the information about digital terrain models can be transcribed onto magnetic tape and then processed by general-purpose ES or SM-type computers.

Production experience of Onega-2 employment for aerial triangulation shows that labour productivity increases from 40% to 80% and cash and labour expenditure decreases. Production cycle can be shortened to 1.7 of its previous value.

Rational employment of Onega-2 makes it possible to pay off money spent for the system in 1.2 years.