

## ADVANCES IN THE DEVELOPMENT OF ANALYTICAL STEREOPLOTTERS

Morris L. McKenzie  
USA  
Chairman, Working Group II/1  
Commission II  
August 1992

### Abstract

In addition to disseminating information on analytical instruments through newsletters and technical meetings, Working Group II/1 has updated four reports comprising a packet for those planning to procure an analytical instrument. During the 4-year tenure of the Working Group there was a continuing trend toward output of digital data for input to Geographic Information Systems. The most significant development in photogrammetry was the emergence of digital photogrammetry and the softcopy workstation.

**Key words:** Analytical instruments, analytical stereoplotters, softcopy workstations, digital imagery, procurements, testing, specifications

International Society for Photogrammetry and Remote Sensing Working Group II/1, Analytical Instruments, supports activities of both users and manufacturers of analytical instruments by providing users up-to-date information on analytical instruments and guidance in procurements, and by keeping manufacturers abreast of user needs and feedback. Worldwide membership comprises representatives of users, manufacturers and universities.

Working Group functions are accomplished through newsletters, technical meetings, workshops and special publications. The 1988-92 Working Group issued 13 newsletters, held three technical meetings jointly with Working Group II/5, and held seven business meetings. A workshop on analytical instruments was planned for Torino, Italy, but these plans had to be canceled at a time too far into the Working Group term to organize a workshop at another location.

Each of the three joint technical meetings were 1-day affairs held at the facilities of the National Ocean Services in Rockville, Maryland, and hosted by Dr. Atef Elassal, Chairman of Working Group II/5, Integrated Photogrammetric Systems. These meetings were informal exchanges of information on photogrammetric/GIS activities.

Previous Working Groups II/1 have prepared four documents to assist users in procuring analytical instruments, and one of the projects of each new Working Group is updating these documents. During our 1988-92 tenure, task groups updated three of the four documents, the fourth being current. Any of these reports are available to those planning procurements of analytical instruments. They are:

- "Analytical Instrument Manufacturers," a table of manufacturers and their instruments to let the user know the analytical instruments on the market,
- "Analytical Stereoplotter Evaluation Guide," to help the user select the best-suited instrument from a list of candidates,
- "Standards and Specifications for Analytical Instruments," to assist the user in preparing a procurement contract,
- "Testing Packet for Analytical Instruments," for testing an instrument before and after procurement.

During our 1988-92 tenure, we experienced the acceleration of many exciting developments already underway. There was a continuing trend to replace instruments having hardcopy output with instruments having digital output and mass storage devices. More and more organizations implemented GIS's to support data bases and to provide hardcopy requirements offline from the digital data. The need for plotting online with stereoplotters decreased, and needs for digital-data storage devices increased. Storage device requirements passed from megabyte to gigabyte capacities, and interfacing with Geographic Information Systems (GIS) became an important consideration in both hardware and software procurements.

To edit and manipulate this huge volume of data, both online and offline workstations became a vital component of analytical instruments. The importance of compatibility and interfacing between instruments and between software packages continued to increase.

Most important, during the 4-year period, instruments were developed that promise to be the most revolutionary step forward since Dr. U. Helava developed an operational analytical stereoplotter in the late 1950's. This giant advance was the emergence of the softcopy photogrammetric workstation in which digitized imagery is used instead of hard-copy film, glass plates, and stable-base prints in forming stereomodels. Stereomodels so formed are displayed on high-resolution screens and viewed stereoscopically by various means, which include mirror trains, anaglyphic glasses, and polarized viewing. Some workstations use full-screen viewing and some use split-screen displays in which the left and right overlapping imagery is viewed, respectively, with the left and right eye.

Several of these instruments appeared on the market as personal-computer workstations with many off-the-shelf components at very reasonable prices, and some were developed as specially-designed workstations. These softcopy workstations with scanners vary in sophistication and price from \$30,000- to \$200,000-configurations. The DVP introduced by DVP Photogrammetric Systems, Quebec, Canada, and the DMS of R-Wel, Inc., Athens, Georgia, were the vanguards in the lower price range with 400- to 600-bpi scanners. Intergraph introduced the photogrammetric workstation in the upper price range with a scanner that records at a density of 800 bpi.

With the development of higher-resolution scanners, faster image-handling capabilities, and higher-resolution screens, softcopy photogrammetric workstations promise to rival conventional analytical stereoplotters in accuracy and image resolution. This area is being given attention and the future seems bright.

On the bleak side, the period 1988-92 has seen many of the high-quality workhorse analytical stereoplotters disappear, some fading from existence, some being incorporated by other manufacturers, and some being replaced by other versions designed for easier manufacture. We have seen high quality workmanship in manufacture and design being replaced by software to compensate for inherent errors and to allow lowering of prices in a competitive market.

Working Group II/1, Analytical Instruments, at one time was known as Working Group II/1, Analytical Plotters, but the 1980-84 Working Group under Mr. Lawrence W. Fritz took up the effort for a more definitive name for the instrument, an effort initiated by the US Department of Defense in the 1960's with the naming of the AS-11 series of analytical stereoplotters. Fritz recommended that the designation "analytical plotter" be replaced by "analytical stereoplotter," to distinguish the stereoplotter from other types of analytical instruments. In 1980, the name of Fritz's Working Group II/1 was changed from "Analytical Plotters" to "Analytical and Hybrid Instruments."

In 1984, it was decided that the Working Group II/1 domain should encompass all computer-controlled instruments for both photogrammetry and remote sensing, so the name was changed again, this time to Working Group II/1, Analytical Instruments. The present Working Group recognizes that the new instruments of softcopy photogrammetry promoted by Intercommission Working Group II/III are in its area of interest and now proposes a new and more inclusive name for the 1992-96 Working Group II/1. The new name proposed is Working Group II/1, "Image Exploitation Systems." Whatever the name, Working Group II/1 has an exciting 1992-96 tenure in the offing.

#### References:

- Case, J. B., 1982, The digital stereo comparator /compiler, *International Archives of Photogrammetry*, Vol. 24, Part 2.
- Dowman Ian, J., Ebner, H., Leberl, F., 1992, Design issues of softcopy photogrammetric workstations, *Photogrammetric Engineering and Remote Sensing*, Vol. 58, No. 1.
- Dowman, I. J., Ebner, H., Heipke, C., 1992, Overview of European developments in digital photogrammetric workstations, *Photogrammetric Engineering and Remote Sensing*, Vol. 58, No. 1.
- Nolette, C., Gagnon, P.A., Agnard, J. P., 1992, The DVP: Design, operation, and performance, *Photogrammetric Engineering and Remote Sensing*, Vol. 58, No. 1.
- Welch, R. A., 1989, Desktop mapping with personal computers, *Photogrammetric Engineering and Remote Sensing*, Vol 55, No. 11
- 1990, 3-D Terrain modeling for GIS applications, *GIS World*, Vol 3, No. 5.
- 1990, Geocoding and stereo display of tropical forest multisensor data-sets, *Photogrammetric Engineering and Remote Sensing*, Vol 56, No. 10.