William A. Radlinski, President
American Society of Photogrammetry
Falls Church, Virginia 22046

Eleventh Congress of the International Society for Photogrammetry

The XI Congress of the International Society for Photogrammetry (ISP) was held in Lausanne, Switzerland, July 8–20, 1968. Over 1,300 registrants (including 400 wives) from over 75 countries participated in the well arranged activities under the very capable leadership of Dr. Hans Harry, President, ISP. The meetings and exhibits were held in the Palais de Beaulieu, especially built for expositions. The delegation from the United States was among the largest—nearly 150, including about 60 wives. The following report* covers the highlights of the Congress. The full proceedings will be recorded in Archives to be published later by the ISP.

The National Committee of Photogrammetrists, USSR, and the Mexican Society of Photogrammetry were accepted at this Congress, making the total membership of ISP equal to 51 nations.

Dr. Harry presented the Brock Gold Medal Award to Dr. Hellmut Schmid, nominated by the American Society of Photogrammetry for his work on the application of satellite photogrammetry to global geodesy.

General Assembly

Under the new Statutes, the General Assembly consists of an official delegate and two advisors from each member country. From the United States, they were ASP President W. A. Radlinski, Chief Delegate; and First Vice President F. J. Doyle, and General L. P. Jacobs, Executive Director, Advisors. The General Assembly is the ultimate authority in matters concerning the administration and financial management of the Society's affairs.

There were four meetings of the General Assembly. Among the more important decisions of this arm of the Society were the following:

- Approval of the new Statutes and Bylaws.
- Approval for membership in ISP of the National Committee of Photogrammetrists, USSR, and the Mexican Society of Photogrammetry. In addition, approval was given to accept the National Society of Topography and Cartography, Peru, when they submit the necessary papers.
- Election of the new officers of ISP for the next quadrennial (named under the section on Plenary Sessions).
- Assignment of the seven Technical Commissions for the next quadrennial. These are shown below with the names of the Presidents, as well as the U. S. Reporters, subsequently appointed:

Commission Presidents	*U.S. Reporters*
I U.S.A., Marvin B. Scher	J. R. Quick
II West Germany, Dr. H. Deker	C. E. Kowalczyk
III United Kingdom, Prof. E. H. Thompson	R. E. Altenhofen
IV Netherlands, Prof. A. van der Weele	C. J. Born

William A. Radlinski

* Contributors to this report were R. E. Altenhofen, Commercial Exhibits; J. M. Anderson, Commission VI; A. Anson, Plenary Sessions; C. J. Born, Commission III; L. P. Jacobs, Social Events; C. E. Kowalczyk, Commission II; E. M. Mikhail, Non-commercial Exhibits; C. E. Olson, Commission VII; J. R. Quick, Commission I; and M. S. Wright, Jr., Commission V.

V France, G. M. Carbonnell	H. M. Karara
VI Czechoslovakia, Prof. Pavel Gal	J. M. Anderson
VII East Germany, Dr. Arthur Reinholdt	C. E. Olson

- Appointment of Prof. A. van der Weele as the new editor of *Photogrammetria*, succeeding Prof. Schermerhorn.
- Selection of Canada as the site for the XII Congress in July 1972 with Sam G. Gamble as Director. In addition it was noted that the requests for the 1976 Congress were received from Finland, Bulgaria and Japan. The USA indicated that if the 1976 Congress is not assigned to Finland, it would want to be considered as the host country.
- Appointment of a Finance Committee consisting of Pas Clemente, Portugal; Odle, United Kingdom; and Moller, Sweden.
- Approval of a French proposal that the new Council study ways and means to effect the free exchange of maps and photographs among ISP nations.
- Approval of a resolution to FIG (International Federation of Surveyors) asking that they change their cycle of Congresses from 3 to 4 years, spaced two years away from the meetings of ISP. (FIG subsequently turned this down.)
- Appointment of a committee to prepare editorial improvements and versions of the new Statutes in three languages—French, M. Cruset; English, Gen. B. Brown; German, Prof. Krauss.
- Appointment of a committee to study the question of the archives and old files of ISP—Schermerhorn, Bachmann, Pas Clemente, and a member from the United Kingdom.
- Approved the unit of contribution for purposes of dues at 30 Swiss francs. Inasmuch as ASP is in category 8 with 48 units, our annual dues will be 1440 Swiss francs (about $350). This is a considerable reduction from the previous rate of about $1,000.

Plenary Sessions

The opening session of the XIth Congress, held on July 9 in the auditorium of the Palais de Beaulieu, was attended by approximately 1,000 members and guests from 70 nations. Welcoming speeches were made by M. Vuillman, Municipal Councillor, Vice-President of the Lausanne City Council; M. Pierre Graber, Cantonal Councillor, President of the Council of Vaud (state); and Dr. Nello Celio, Federal Councillor, Member of the Swiss Federal Government.

The keynote speech was delivered by Ing. Maurice Baussart of the French Photogrammetric Society. M. Baussart's lecture, "Modern Photogrammetry at the Service of Mankind," was a detailed account of the many ways photogrammetry can be employed to aid man in his day-to-day living. Dr. Harry then reported on the highlights of events that have taken place since the Xth Congress in Lisbon, 1964.

Dr. Hellmut H. Schmid (left) of U. S. ESSA Coast & Geodetic Survey received the Brock Gold Medal Award from Dr. Hans Harry, President of the International Society of Photogrammetry, for work on the application of satellite photogrammetry to global geodesy.

New members who were accepted in ISP in the interval between Congresses were:

Algeria—National Cartographic Institute, Ministry of Defense
Bulgaria—Scientific Technical Union of Geodesy, Photogrammetry Section
Cuba—Cuban Institute of Geodesy and Cartography
Libya—Ministry of Planning and Development, Survey & Mapping Department
Syria—Geographical Service of the Army
Thailand—Royal Thai Survey Department, Bangkok, Thailand.

The second Plenary Session on July 17 was attended by about 400 persons. ASP President W. A. Radlinski introduced Dr. Schmid, who gave a talk on satellite photogrammetry. ASP Vice President F. S. Doyle introduced Captain Lee R. Scherer, Director, Apollo Lunar Exploration Office, National Aeronautics and Space Administration, who made a presentation on "Photography and Photogrammetry in Space Activities." He also showed a color film, "Closeup of the Moon." This presentation was well received and stimulated numerous questions from the audience, answered by Vice President Doyle.

The third and final Plenary Session was held on July 19, attended by about 300 persons. Dr. Harry announced the new officers for 1968–1972 period:

President—Professor L. Solaini, Italy
Director of XIIth Congress—Sam G. Gamble, Canada (to be held in Ottawa, July 1972)
First Vice President—Professor W. K. Bachmann, Switzerland
Second Vice President, Secretary General, Treasurer—G. C. Tewinkel, U.S.A.; S. R. Halonen, Finland; L. Skladal, Czechoslovakia.

Subsequently, although Mr. Tewinkel re-

ceived the greatest number of votes for the elected offices, the following assignments were agreed to:

Second Vice President—Skladal
Secretary General—Tewinkel
Treasurer—Halonen

The resolutions of the seven Commissions were read and accepted without discussion. The session was ended with a short speech of acceptance by incoming President Solaini.

Technical Sessions

Commission I—Photography and Navigation (J. R. Quick)

At the opening session on July 10, R. W. Fish, United Kingdom, President, Commission I, presented his report on the activities within his Commission over the past four years. The program was carried out within four Working Groups, each concerned with a specific technical area. These were:

No.	*Title*	*Chairman*	*Country*
I	Image Quality	G. C. Brock	U.K.
II	Image Location	Prof. B. Hallert	Sweden
III	Photographic Materials	J. Cruset	France
IV	Navigation	Ir. F. L. Corten	Netherlands

Working Group I—One of the major conclusions reached by this group was that the Modulation Transfer Function (MTF) and the Optical Transfer Function (OTF) find their most natural application in the optical imaging components of the photo-optical system, i.e., camera and enlarger lenses, microscopes, etc. The OTF is a sensitive tool for measuring lens performance, potentially superior to photographic resolving power in precision and accuracy. However, its full value will not be realized without considerable improvement in the accuracy of present measuring devices. Supporting presented papers were given by Dr. L. R. Baker, U. K.; E. Welander, Sweden; P. Kowaliski, France; and P. Hanke, E. Germany.

Working Group II—Papers were given under two separate sessions with this group. The first, which concerned an inter-commission working group (B. Hallert, P. Kaasila, L. Ottoson and K. A. Ohlin), was highlighted by an invited paper "Quality Problems in Photogrammetry," in which the four authors bring out the concept of *weights* for application when different qualities of measurements in the same set are expected. Examples of *a priori* weights (those introduced before adjustment) due to physical circumstances are weights of image coordinates due to the fact that the photographic image is never in a mathematical plane. If such coordinates are measured orthogonally, the "out-of-flatness" values will differ from the center of the image in comparison with the edges. *A posteriori* weights (those determined from results of adjustment) are to be referred to the *quality of results* of adjustment procedures, and can be determined with the laws of error propagation.

The second session of Working Group II featured an invited paper by K. Torlegaw, Sweden, entitled "Geometrical Character-

All the meetings, exhibits, luncheons, and the banquet were held in the Palais de Beaulieu in Lausanne, Switzerland.

istics of Close-up Cameras." The author stated that calibration generally includes a determination of the radial distance of the camera. Reconstruction of the bundle of rays very often is done in such a way that the distance is eliminated. This may be done by the Porro-Koppe principle, by a correction in diapositive printing, by using correcting plate holders in the plotting machine, or by numerical correction in analytical photogrammetry. Doing this, it can be said that the radial distance is included in the definition of the interior orientation. Supporting presented papers were given by J. M. T. Clark, U. K.; A. Jaegle, France; Prof. J. Holsen, Norway; P. D. Carmen, Canada; and Dr. Desmond O'Connor (2 papers) and Abraham Anson, U.S.A.

Working Group III—Unfortunately, Chairman Cruset's invited paper, "Reflexions sur les Properties des Surfaces Sensibles" was cut short a few minutes after he began by a malfunction of the slide projector. Efforts to repair the projector failed, and the report was cancelled. Fortunately, there were excellent Presented Papers to fill the gap—one a *chalk talk* by Mme M. Marquet, France. Her subject was "Proprietes de l'Enregistrement par Holographic Intaressant la Qualite et la Mesure de l'Image." Other supporting papers included those of Dr. H. K. Meier, W. Germany; N. Gerencser, Hungary; V. Komarek, Czechoslovakia; and Abraham Anson, U.S.A.

Working Group IV—The invited paper, "Performance and Cost of Flight Functions," was given by Chairman Corten, ITC, Delft. The author concluded that to obtain good navigational results in all normal cases of aerial survey, a basic methodological knowledge is of greater importance than the use of more sophisticated instrumentation. Investment in know-how by means of education is an economic necessity, according to Corten. He mentioned the AN/USQ-28 Geodetic Mapping & Survey System, with its associated high cost and accuracy (no numbers were quoted as to accuracy, and the cost range was estimated between $500,000 to $2,000,000 "per integrated system"). Corten expressed doubts as to whether it is economically justified to apply the degree of sophistication embodied in the USQ-28. Whether it is possible to simplify the concepts and to reach the same goals with lower investment and operating cost is, in the author's opinion, a question which should be decided in the very near future. Supporting presented papers were given by G. Winkelmann, W. Germany; J. R. Quick, U.S.A. (2 papers); I. L. Gill, USSR; Dr. H. K. Meier, W. Germany; G. Borman, W. Germany; G. Voss, W. Germany; and P. D. Carman, Canada.

COMMISSION II—THEORY, METHODS & INSTRUMENTS OF RESTITUTION (C. E. Kowalczyk)

Commission II was allocated nineteen hours consisting of two sessions of three hours, five sessions of two hours and three sessions of one hour. Eight Invited Papers covered the subjects of quality problems in photogrammetry; standard tests for photogrammetric plotters; theory and methods; and new instruments. A total of sixty-two Presented Papers covered the field of Commission II.

The following is a general review on instrumental developments from 1964–1968. As there is no generally accepted classification system for the different types of photogrammetric instruments, the following review attempts to classify some of the newer developments into logical groupings. New techniques and equipment, however, are trending toward multi-purpose utilization and sometimes defy classification.

Analog Instruments

The Kern PG-3 is a mechanical precision plotter which can accommodate original size photography up to the size of 230×230 mm (9"×9") from all types of cameras with focal lengths between 84 and 220 mm. Electronic readout of model coordinates with output on typewriter, punch card or tape is available. It can also be used for aerial triangulation.

The *Wild A-10* can accommodate near-vertical, normal, wide and superwide angle and terrestrial photography. It has a focal length range of 86 to 308 mm for all picture formats up to 230 mm × 230 mm Earth curvature and refraction correction devices are also a part of the instrument. It is also suitable for aerial triangulation.

Planimat (Zeiss) is equipped with one-arm space rods and has a focal length range of 85 to 310 mm. This instrument can use the recording units derived from the stereoplanigraph for numerical evaluation. The Planimat can also be used as a control instrument for the Zeiss Orthoprojector.

The *RA/II (OMI)* is an instrument based upon the principle of mechanical projection. It can accommodate equally well wide-angle and super-wide-angle photography. Its particular characteristics and technical features make it very useful and adaptable to civil

engineering projects. The instrument belongs to the category which is normally referred to as second order and was designed primarily for medium-scale mapping. This is a new stereoplotter.

Spatial Simulator Type 900 (*S.F.O.M.*). This instrument can be used for plotting of single models and triangulation. Acceptable focal lengths range from 88 to 152 mm. The measuring and visual system are connected by electronic follower devices. This instrument can also control an orthophoto output.

The *Stereo-Trigomat* (Jenoptik). This instrument is based on use of mechanical projection computers connected to the observation system by servos. It has the capability of handling super-wide-angle photography and can be used to prepare orthophotos and dropped line charts.

The *Zeiss Oberkochen Projection Plotter DP-1* projector or stereoplotter can be used for medium and small scale mapping and map revision. It employs full size photographs. Focal length range is 50 to 120 mm.

Zeiss Jena Topocart is a topographic stereoplotting instrument for the production of medium- and small-scale maps from photographs with formats up to 23 cm×23 cm and calibrated focal lengths between 50 mm and 215 mm. It can be converted to orthophotomap production by connecting the differential rectifier.

Several other instruments have had major improvements in accuracy, focal range, associated equipment, etc., incorporated since their introduction. Worth noting are the Presa 225 (Sopelem), Stereo Cartograph V and Stereosimplex II/C (Galileo), Stereo Plotter PG2 (Kern) and the Stereometrograph (Jenoptik). Two developments utilizing chronological image separation for instruments of this class are the Stereo Image Alternator developed by the U. S. Geological Survey and the Doppelprojektor DPI by Zeiss.

Analytical Instruments

In recent years, instruments utilizing analog or digital computers to solve the many complex equations involved in the restitution of photography have become very important. These instruments provide the answer to the problem of precise mensuration for such applications as triangulation. One type of such an instrument is the AP/C (OMI/Bendix). This is an electronic digital computer which can, by means of program control, solve problems of orientation and mensuration quickly and accurately. An Orthoprinter can be used as an accessory instrument to enlarge its range of application. The new Zeiss Jena Stereodicomat is basically similar.

Automatic Systems

The combination of electronic correlator circuits, with electronic computers and electronic scanning devices has produced instruments capable of automatically recovering the orientation of the photography, making compilations of contour lines and profiles without operator assistance and automatic production of orthophotos and drop-line charts. Although there are still problems to overcome, these systems have advanced a long way toward completely automated production.

Stereomat (Wild/Raytheon). This system utilizes a Wild B8 Aviograph as a scanning bed. Relative orientation, altimetric measurement, orthophoto production are obtained by analog methods.

Wild/Raytheon Automatic A-2000 is a Stereomat integrated with an electronic computer.

AS-11 (Bendix). This instrument which is offered in several versions is essentially an analytical plotter in which a model is formed in a mathematical sense only. All computation and orthophoto production is performed under direction of the central processing unit. The ACAD and ATA3 have also been announced.

UNAMACE (Bunker-Ramo). This is another instrument in which the model is formed only in the mathematical sense. This system has successfully produced drop-line charts, orthophotos, color separations, etc., in a production situation.

The Itek-EC-5 Electronic Correlator can be integrated into a complete orthophoto system based on the Zeiss Planimat and the GZ-1 Orthophotoscope.

COMMISSION III—AERIAL TRIANGULATION (Carl J. Born)

This was the Commission for which ASP was responsible. The meetings were conducted by Mr. G. C. Tewinkel, President, and Mr. Marvin B. Scher, Secretary.

The technical sessions of Commission III opened on Wednesday morning with a paper by Prof. James Anderson. The paper was a summary of the results of tests conducted on the analytical triangulation of blocks of fictitious data. A lively discussion followed Professor Anderson's presentation. This session provided a precedent which was to be followed throughout the entire two weeks.

Part of the audience at the opening plenary session of the Eleventh Congress.

A report on the activities of OEEPE was given by Prof. M. Cunietti in which he concluded from the tests that, without a doubt, block adjustment yields an improvement in accuracy over the independent strip adjustments. Also in general the average planimetric error from all tests was 30 percent smaller than the error in heighting. Furthermore, there was no significant difference between the results of analytical and analogical triangulation.

The resolutions of the previous meeting in Lisbon established the themes for the sessions of Commission III. At each session, a digest of an invited paper was given by the author, which formed the basis for discussion. When time permitted, a few presented papers were also summarized by the authors. A summary of the Invited Papers follows:

Aerial Triangulation by E. H. Thompson. In this paper Professor Thompson gave a review of the status of aerial triangulation and emphasized the need for improving basic observations. In his opinion, instrumentation and computational methods are now better than the photographic. If increased accuracy is sought, it must come from improved resolution and stability of the photography.

Application of Photogrammetry to Three Dimensional Geodesy by H. Schmid. From his experience with the BC-4 geodetic satellite system, Dr. Schmid concludes that a world geodetic reference system with an accuracy approaching one part in one million is feasible.

Errors and Accuracy in Aerial Triangulation by F. Ackermann. Theoretical studies with fictitious data can provide useful results, but must be substantiated with empirical data; however, large quantities of empirical data are required to establish the error bounds ITC is initiating an international collection of empirical data from completed tests and mapping projects. They plan to evaluate the data and draw conclusions from it regarding the accuracies achievable with different control and photo configurations as well as adjustment procedures.

The Acquisition of Data in Aerial Triangulation by G. de Masson d'Autume. In his paper Monsieur Masson d'Autume discussed the taking of aerial photography, the instrumental procedures and the problem of transferring points in analytical methods.

Review of Strip and Block Adjustments During the Period 1964–1968 by G. H. Schut. Both the polynomial adjustment of strips and blocks and the simultaneous triangulation of all photographs remain in popular use. It was also brought out in discussion that combinations of both methods are sometimes employed in which the polynomial strip adjustment precedes the simultaneous block in an effort to eliminate systematic errors.

Techniques, Evaluation and Applications of Auxiliary Data in Aerial Triangulation by H. G. Jerie. Dr. Jerie advocated the increased use of auxiliary data, although admittedly there has been a reluctance to use it in the past. He stressed the use of auxiliary data in the adjustment phase rather than during instrumentation, since the photogrammetric relative orientation yields higher precision between successive photos, but the auxiliary data increases the overall accuracy of the strip.

COMMISSION IV—MAPPING FROM PHOTOGRAPHS

Unfortunately, the U. S. Reporter for Commission IV was unable to attend the

The stage at the opening plenary session of the Eleventh Congress where presided the ISP Council and dignitaries. The chairman is Prof. Dr. W. K. Bachmann, Secretary General of ISP.

Congress and there was no single coverage of the various sessions of this Commission. Their program can be best summarized by referring to the resolutions of Commission IV at the end of this report. The Invited Papers of the Commission were as follows:

International Controlled Photogrammetric Experiment by Sven G. Moller, Sweden.
Experimental Work in Urban Photogrammetry by B. Dubuisson, France.
Some Problems and Developments in the Small-scale Mapping Field by T. J. Blachut, Canada.
Mapping Accuracy—Standards and Criteria by V. Pichlik, Czechoslovakia.
Economical Considerations in Photogrammetric Surveying and Mapping-Planning by A. J. Brandenberger, Canada.
The Role of Resources Development Photogrammetry in the Integrated Activities in the Developing Countries by P. O. Fagerholm, Ceylon (Chairman ICWG IV/VII).

COMMISSION V—SPECIAL APPLICATIONS (M. S. Wright, Jr.)

Commission V held eight sessions during the Congress under the leadership of Professor T. Maruyasu, President, Mr. Nakano, and Mr. Oshima. Mr. Karara of the United States was very active throughout and chaired several of the sessions. The following Invited Papers were presented:

On the Precision of Stereometric Systems by H. M. Karara.
Short Range Photogrammetry of Objects in Motion by T. Maruyasu and T. Oshima.
L'historie et la situation presente des applications de la photogrammetrie a l'architecture by M. Carbonnell.
An Investigation of Real-Time Opto-Triangulation for the Impact Prediction of Rockets by J. St. Thomas (briefed by Marshall S. Wright, Jr.).

COMMISSION VI—EDUCATION, TERMINOLOGY AND BIBLIOGRAPHY (J. M. Anderson)

The opening session of Commission VI consisted of the President's report by Professor W. Sztompke, a report on education by H. A. Brouwer, and a talk by Professor Schermerhorn. The topic of primary interest was in Professor Schermerhorn's talk in which he called for broadening and liberalizing of engineering education at European universities (specifically engineering training for geodesists and photogrammetrists). A summary of other topics discussed follows:

Terminology. Discussion revolved around the progress of a group formed to develop a standard set of definitions and symbols for common photogrammetric terms. A report on such a list of terms was presented by East Germany. It was proposed that work continue on this project in the English and French languages and that the respective lists be published in *Photogrammetria.*

Planning for Photogrammetric Education. A paper on "Planning for Photogrammetric Education" was presented by Dr. Arthur Brandenberger. Discussions centered on attempts to predict the demand for professionally trained photogrammetrists so that adequate educational planning could be accomplished. A major point noted, was that the Commission VI working groups had no representatives from governmental agencies or industry. It was pointed out that lack of such representation on the Commission seriously hampers accurate evaluation of current and potential need for professionally and technically trained photogrammetrists.

Basic Sciences in Photogrammetry. A panel discussion on this subject was led by Professor Hallert. It was agreed that physics, mathematics, and computer sciences are necessary, but disagreement arose over inclusion of humanistic-social science courses in photogrammetric educational programs. In general, educators from the U.S.A., Canada and Russia favor inclusion of such courses while the majority of the Middle European educators believe that high school experience provides sufficient background in these areas for photogrammetric and geodetic engineers.

Photogrammetric Education in Different Coun-

tries. In general the emphasis on education in the U.S.A. is on broad, general training while European educators follow a curriculum which favors a more narrow, specialized type of training. It was interesting to note that education in photogrammetry in Russia allows inclusion of humanistic-social science courses which make up 15% of the total hours of course work taken or about the same proportion as in the United States.

Bibliography of Photogrammetry and Programs for Automatic Data Processing. A review of present bibliographies was presented. The major difficulties facing this group (ITC National Bibliography) are lack of subscribers and a limited number of contributors. It was urged that the presence of the bibliography be publicized and that various societies be encouraged to contribute.

Commission VII—Photo Interpretation (C. E. Olson)

Commission VII activities during the XI International Congress of Photogrammetry turned the spotlight on three areas of concern. The advent of new remote sensors, increased efforts at automating the PI process, and growing awareness of the need for more objective and positive confirmation of the results of past and present photo-interpretations were all discussed at length.

Wide gaps in knowledge of the capabilities of radar, microwave, and optical-mechanical scanning equipment were evident. W. A. Fischer's invited paper on remote sensing research in the United States stimulated considerable interest and helped to generate a Commission VII resolution calling for establishment of an Intercommission Working Group on Remote Sensing with Commissions I and VII cooperating.

The current status of automation in PI was well summarized by the invited paper prepared by A. DiPentima. The tremendous data acquisition rates provided by the newer remote sensors and the potentialities of orbiting spacecraft as remote sensor vehicles intensified interest in this area. However, many participants in Commission VII sessions seemed unusually concerned by their inability to cope with their own work and keep up with new developments, too. J. J. Palgren summarized the situation on a positive note when he commented: "It is a fact that we have tremendous quantities of material, but we don't know what to do with it. . . . We must learn to use our machines. . . . It took us 100 years to learn to use aerial photography . . . (and) . . . if we can learn to use automatic data processing equipment in 10 years, that's not bad."

The demand for more objective and positive confirmation of all photo-interpretations was called to the attention of Commission VII by several reports of failures of past methods to meet current problems, and by the contradiction of some past results by newer data. As photo-interpreters delve deeper into the cause and effect relationships in the terrain they interpret, they are finding a need for basic data not currently available. This need was first recognized in connection with non-photographic sensors, but the XI Congress illustrated how important such data can be in interpreting aerial photographs. It appears that the growing remote sensing field has more to contribute to photo-interpretation than simply new data acquisition tools.

Throughout the Congress a sense of confusion seemed to permeate the deliberations of Commission VII. Many photo-interpreters appeared to be groping for their place in a rapidly expanding field in which technical obsolescence looms just over the horizon. The resulting inability to identify with the new technology may have been a major factor contributing to the decline in attendance at Commission VII sessions when compared to attendance at the London and Lisbon Congresses.

In the four years leading up to the XII Congress in Ottawa, Commission VII activities will be directed by Dr. A. Reinholdt of East Germany. The interim meeting in 1970 is tentatively scheduled for Dresden in early September. In addition, a remote sensing seminar is being planned for the week before the Dresden meeting, and it is probable that the seminar will be held in Delft, Netherlands. Throughout the next four years, Commission VII will focus its attention on means of obtaining usable information from remote sensor imagery and will endeavor to shift applications of photo-interpretation methods into the appropriate discipline-oriented societies such as the International Geographical Union, Geological Society of America, and similar bodies.

Industrial Exhibits (R. E. Altenhofen)

The superb Swiss organization of the XI Congress was most materially evident in the layout of industrial exhibits at the Palais de Beaulieu. An exhibition catalog supplied registrants with a convenient reference enabling them to organize most beneficially their inspection tours which had to be sandwiched between meetings of the seven commissions, technical tours, and film showings.

The exhibition layout was a central axis of spaces occupied by the manufacturers of the

larger photogrammetric instruments bracketed by exhibits predominantly by the makers of auxiliary but nonetheless important equipment. Your reporter asks the reader to assume the role of an engineer visiting these exhibits who is in the market for photogrammetric or surveying instruments. His dilemma is multihorned, and he finds himself impaled thereon. Explanations by a multilingual exhibit attendant recalls the three descriptions applied to the girls in Lausanne—mini, maxi, moxie—describing, respectively, their skirts, beauty, and cranial content. So, too, does the attendant describe the claimed error of his plotter, its productivity, and his apparent knowledge.

The exhibitors quote grid model mean plate errors that range from 15 through 8 to 5 microns for the least to the most accurate analogical instruments. Unfortunately, mother earth confounds the photogrammetrist by never marking her surface with a perfect grid; therefore, the prudent purchaser will use these figures only to compare instruments and as standards for the performance tests proposed by Commission II.

Ultimate measuring accuracy characterizes the exhibited mono- and stereo-comparators. The elusive micron is pursued by all the manufacturers of plate measuring instruments. One claims not only to have caught it but also to have split it into ten parts. This capture takes place in a mono-comparator (Carl Zeiss, Jena) equipped with an optical spiral micrometer which produces readout to 0.1 microns. Dr. Hellmut Schmid remarked that one, while not actually splitting the micron, could benefit from a better treatment of micron roundoff error. This instrument could be called a comparator to compare comparators. It further permitted the viewer to observe laser-marked points produced by Transmark (Zeiss Jena). Perfectly round marks are burned in the emulsion by a laser beam which traverses the same optical path as the photoimage and measuring mark. Electronic readout from comparators may be buffered (Carl Zeiss, Oberkochen) for faster output by reading *on the fly*, or unbuffered (Kern, Carl Zeiss Jena) with a slight delay after setting while the circuitry generates the fine readings.

Semianalytical aerotriangulation by independent models, use of super-wide-angle photography, orthophoto production and electromagnetic distance measuring are four techniques which were very much in evidence at the industrial exhibition. The spreading use of independent models and super-wide-angle photos have caused diametrically opposite instrument design ranging from the smallest (Kern PG-2) to the largest (Wild A-10). Economy and results will soon determine which was the better decision. At least five companies exhibited orthophoto production instruments (Ottico Meccanica Italiano, Societe Francaise D'Optique et de Mecanique, Wild, Zeiss Oberkochen (2 types), and Zeiss Jena). These range from fully automatic to manually controlled. Sample orthophotos were acceptable. So much scientific talent and design skill is being concentrated on the problem of *orthophotoscopy* that before long we may witness production of a nearly *instant* orthophoto. Among the electromagnetic distance measuring instruments, the most interesting was the Distomat DI-10 (Wild) attachable to a theodolite and applying infrared ranging up to 1,000 meters with errors less than one centimeter.

Congratulations are due the Exhibition Committee for having arranged an outstanding industrial display. The stated objectives were fulfilled in an exemplary manner. The exhibitors could both be proud of their products and win recognition for their ingenuity, enterprise, and manufacturing skill.

Your reporter regrets unintentional omissions which were inevitable in a short report covering subject matter more fully explained in a 246 page exhibition catalog.

Non-Commercial Exhibits (E.M. Mikhail)

There were roughly 20 exhibits by national member societies. Emphasis in these was placed on the various means of applying photogrammetry and photointerpretation to solving multitudes of problems in their respective countries. One could not fail to note a certain trend in applications to close-range photogrammetry used in programs covering national monuments, archeology, architecture, and traffic investigations. Another aspect of these exhibits was the display of a diversity of methods for producing topographic maps, including the use of color photography and analytical photogrammetry Just as the method of triangulation by independent models (or semianalytical aerotriangulation) is gathering more interest in technical sessions, its use was also reflected in the exhibits.

There were also scientific exhibits by the technical commissions and research and teaching institutions in which some 15 organizations participated. Here, unlike the

A garden party at the Montreaux Palace Hotel was provided by Wild Heerbrugg Ltd. Montreaux is located on the north shore of Lake Geneva (Lac Léman) about 15 miles eastward from Lausanne, and readily accessible by boat, train and bus. A modern building contrasts with castles on the mountainside.

group in the preceding category, emphasis was on current fields of interest as well as possible future investigations. While there were displays by several universities and technical institutions, there was none from the United States. The ITC, which is now called the International Institute for Aerial Survey and Earth Sciences, displayed two training aids, the ITC Stereoscan and the ITC Stereotrainer. The other universities showed an outline of their courses and research activities. There was also an exhibit of books, both old and newly published, on photogrammetry and photointerpretation. The U. S. National Aeronautics and Space Administration displayed a large composite photograph of the Apollo Landing Zone as well as some striking color photographs of the earth taken from manned satellites.

While the extensive industrial displays with their many and attractive new instruments undoubtedly captured most of the attention, the non-commercial exhibits were of great value in informing the individual on current activities in the various countries.

The American Society of Photogrammetry had an exhibit booth where copies of its various publications were on display. A special brochure, "Photogrammetry in the United States of America," was distributed. ASP's booth was a popular meeting place for discussions and exchange of information.

EXCURSIONS AND TOURS (L. P. Jacobs)

Persons attending the Congress could choose from a wide variety of technical excursions and sightseeing tours. In addition, a series of interesting daytime events had been arranged for the ladies.

Technical excursions included trips by train to the Wild Heerbrugg Co. works in Heerbrugg, the Kern Co. at Aarau, the Federal Topographic Service at Bern, and the European Center of Nuclear Research at Geneva. Guided tours through the factories and installations were conducted at each location.

Tours featured a train trip to the Visp-Zermatt area at the foot of the famous Matterhorn peak, with the more adventurous continuing by cable car to about the 9,000-foot level. Other tours included visits to famous castles, centuries-old abbeys and monasteries, boat cruises on Lake Leman, and a trip through the Vallee de Joux along what is called the *Road of Wines*.

Tours of the cities of Lausanne, Bern, and Geneva were conducted for the ladies. Other interesting places visited by the distaff contingent were the La Sarraz-Romainmotier area and the Chateau de Gruyeres with a side trip to the world-famous cheese factory. Other areas were visited by boat along the shore of the beautiful Lake Leman with its background of snow-covered mountains.

The tours and excursions were unquestionably one of the highlights of the Congress. Thanks to the excellent planning of the Committee, it was possible to see much of Switzerland, make and enjoy new acquaintances, and get a firsthand look at new technical developments.

Resolutions

The resolutions of all of the technical commissions were not available when this report was prepared. Rather than delay the report, an incomplete listing is presented. Even these are not to be considered as the final wording. The official version of the resolutions will be published in a subsequent issue of *Photogrammetric Engineering*.

Commission I

1. Commission I should consider the image formation and image recording properties of Remote Sensing Systems. The Commission should cooperate with Commission VII in determining the parameters of these systems and the operating procedures which are relevant to Photographic Interpretation, for example, the time of day, the season, the direction of the flight line, overlap, polarization, sensitivity, image quality, possibility of stereoscopy, etc. . . .

2. Commission I has noted that optical transfer functions offer essential advantages for air-camera testing. As transfer functions are also useful when estimating the quality of the entire aerial photo system, Commission I recommends further work on the application of optical transfer functions for aerial cameras, and all imaging and recording systems used in photogrammetry. The standardization of methods, the calibration of instruments, and the establishment of tolerances for the measuring procedures should be particularly considered. The ultimate goal of this work should be the establishment of performance standards.

3. Commission I recommends that Appendix 5 of the Report of the Working Group on Image Quality should be added to the ISP "Recommended Procedures for Calibrating Photogrammetric Cameras and for Related Optical Tests." It should be published, preferably in *Photogrammetria*, and also distributed to National Societies and interested persons (See Amendment #1).

4. Commission I recommends that Resolution #4 from the Lisbon Congress (1964) should be noted, and applied in practice. The cited resolution is quoted below:

"Resolution 4—Accuracy of Photogrammetric Data—Photogrammetry and photo interpretation are founded upon the geometrical and photographic properties of the basic photographs and their copies. For the sound development of the two activities mentioned, it is therefore necessary that the basic geometrical and photographic qualities be kept under good control and be subject to detailed specifications and tolerances. In particular, the numerical data of geometrical properties of the image (interior orientation, image coordinates, etc. . .) and the photographic qualities (speed and gradation of the emulsion, color sensitivity, contrast transfer data, etc. . .) must be checked under real operational conditions, and tolerances must be established for the possible discrepancies."

"For such tolerances, it is necessary that the accuracy (in the real sense of the word) of basic measuring procedures be carefully determined from calibration procedures. Statistical methods should be used for the calculation of tolerances. Close cooperation with Commission II—Plotting, Theory and Instruments (U.S. Reporter, 1968–1972 is Chester E. Kowalczyk, 1504 Noyes Drive, Silver Spring, Maryland) in this particular problem is recommended. The terminology of basic concepts as treated in Commission VI should further be taken into account."

Commission II

1. In collaboration with the manufacturers and users of restitution instruments, including data recorders, the working group II-2 has set up guide lines for routine tests of these photogrammetry instruments. These tests have to be integral, complete, and reproducible; they should be performable with moderate means.

The guide lines are stipulated in an Invited Paper and respective comments are given in Presented Papers.

Commission II recommends the adoption of these guide lines as "*Provisional Standard Tests of I.S.P.*" and their investigation in practice.

2. It is recommended that Commission II consider the possibility of establishing a working group in the field of automated and analytical instrumentation.

3. Close liaison between photogrammetry instrument developers and manufacturers and the users of photogrammetry for engineering purposes is essential for improving the service and increasing the scope of use of photogrammetric instruments in engineering, including highway and related works. Consequently, it is recommended that consideration be given to establishing a suitable working group.

4. The theoretical research of photogrammetric methods and the instrumentation in connection with oceanographic surveys is of increasing importance and should therefore be stimulated.

5. The geometric theory of radargrammetry as a means for photogrammetric measurements should be further studied.

COMMISSION III

Commission III recognizes that there are many systems of aerial triangulation operational in the world today, but that there is still room for further improvement. Having this in mind the following resolutions are proposed:

1. That the themes of interest for the period 1968–72 be:
(a) data acquisition, (b) data processing, (c) accuracy studies, (d) data from airborne auxiliary equipment, (e) economics of aerial triangulation systems, and (f) satellite triangulation.

2. That the offer by the I.T.C., Delft, to collect and analyze the results of practical (production and experimental) aerial triangulations be accepted.

3. That the production organization be encouraged to calculate aerial triangulations by more than one method, and the results be communicated to the I.T.C. according to Resolution 2.

4. That research on the problem of point transfer be encouraged.

5. That research on, and the application of, data from airborne auxiliary equipment be encouraged.

6. That a working group be set up to continue studies based on simulated data.

COMMISSION IV

1. For stimulating the further development of photogrammetry in Highway Engineering, a Working Group, "Photogrammetry in Highway Engineering," should be established within Commission IV. The main subjects of the Working Group should be: Theory and Application of Digital Terrain Model and of Orthophotos in Highway Engineering. The existing intercommissional Working Group IV/V, Civil Engineering, should be dissolved.

2. The Intercommission Working Group IV/VII, Resources Development Photogrammetry, established in 1966 during the symposium in Prague, shall continue its activities, after its program has been reconsidered.

3. It is recommended that a study be made to determine the most effective methods of the simultaneous recording of all necessary quantitative and qualitative information during the production of plans and maps. In particular it is recommended that a study be made of the best current possibilities of combining graphical and numerical photogrammetry with orthophotos.

4. It is recommended to continue studies on the economic aspects of photogrammetric surveying and mapping and to establish a system to evaluate the economy of photogrammetric operations.

5. The parameters influencing the accuracy and cost of different photogrammetric subsystems should be studied, in order to establish the basic relations required for planning and designing of photogrammetric projects.

COMMISSION V

1. It is recommended that the activities within Commission V, during the period 1968–1972 should include the following items:

- Calibration of short-range photogrammetric systems.
- Stimulation of the development of equipment suitable for very short-range photogrammetry, including metric cameras with variable principal distance.
- Metrical aspects of non-conventional photography (holography, television imageries, X-ray imageries, etc.) in connection with photogrammetric principles.
- Analytical approach to special applications of photogrammetry.
- Four-dimensional (X, Y, Z, time) photogrammetry.

2. In order to promote and encourage the international cooperation and further development of the various fields of photogrammetry in cooperation with other commissions of ISP and other organizations on sciences and technology, Commission V strongly recommends the establishment of certain working groups composed of specialists of the various fields concerned.

3. In addition, Commission V supports the request of the International Council for Monuments and Sites (ICOMOS) for the establishment of a joint committee representing ISP and ICOMOS to further develop architectural photogrammetry.

COMMISSION VI (as abstracted from discussions)

It was resolved to form the following Working Groups:

1. *Education*. Continue studies of planning for photogrammetric education and analyze present status and future requirements and methods. It was recommended that representatives from Government agencies and industry be invited to collaborate on this working group.

2. *Terminology.* Establish international terminology and set of mathematical symbols as an important tool for the future of photogrammetry. Continue work on proposal as set forth in Warsaw.

3. *Bibliography.* Continue work on the ITC International Bibliography as before. Study adoption of a mechanized filing system for bibliography.

4. *History of Photogrammetry.* Record historical development of photogrammetry in different countries.

Articles for Next Month

J. R. Donaldson, The Lunar crater *Dawes*.
David M. Carneggie and *Jack N. Reppert*, Large-scale 70-mm. aerial color photos.
Edward A. Gill, The Pa Mong project.
Frank B. Silvestro, Multispectral photographic determination of reflectance.
Howard Jarmi and *Gerald Laughlin*, Phototype film transport.
Myron W. Lawrence, Earth crustal movements by precision analytics.
Leonard A. Forrest, Automatic orientation of the AS-11A.
David A. Sharpnack and *Garth Akin*, An algorithm for computing slope and aspect.
J. R. Jensen and *J. J. Steele*, Production mapping with computational photogrammetry.

Articles in Other Photogrammetric Journals

The Photogrammetric Record, Vol. VI, No. 32, October 1968

J. W. Norman, The air photograph requirements of geologists.
W. D. Rushworth and *W. P. Smith*, Mapping and demarcation of the Argentine-Chile frontier case.
J. M. T. Clark, Film flatness in survey cameras.
L. P. Adams, A semi-graphic method of adjustment of heights in a strip of aerial triangulation.
M. J. Miles, The theory of analytical solution of the stereogram.
E. H. Thompson, Corrections to x-parallaxes.
J. A. Eden, Discussion of a new fast working approach to analytical photogrammetry.

Journal of the Japan Society of Photogrammetry, Vol. 7, No. 3, 1968

S. Takahashi, K. Kimata, T. Tashiro, The Probability of occurrence of an avalanche.
C. Bojo, Snow avalanche analysis on aerial photographs.
K. Nishimura, H. Morito, Analytical picture control point survey for terrain photogrammetry.
Yukio Ozaki, Physical limitations of photogrammetry.
H. Fujimori, Some applications in photographic interpretation.