Annual Report of Local Sections Committee

W. E. HARMAN, JR.,
Chairman

The principal activity of the Local Sections Committee was the preparation and transmittal for approval to the membership of the recommendations adopted at last year's meeting of the Local Sections. The proposal was to enlarge the boundaries, jurisdiction, and responsibility of each section. The primary purpose was to permit more of the members to take an active participation in the affairs of the Society through the Local Sections. Each member was asked to vote yes or no to the following statement:

"I consider the idea of revising and changing Article VI of the By-Laws to offer more advantages than disadvantages to the Local Regions and would like to see it executed on a three year trial basis. Should a majority of the members respond affirmatively to these recommendations, I am willing to consider the amendment to the ASP By-Laws as outlined and indicate my vote in the space provided."

The vote was affirmative, 768 to 66, for the resolution. This proposal has been the basis for much activity during the past few years as a result of a suggestion by Mr. G. D. Whitmore, implemented by Messrs. Kowalzyk and Smart, past chairmen of the Local Sections Committee.

The annual meeting of the Local Sections Committee held this annual meeting was concerned primarily with clarifying some of the problems as to jurisdiction of the regions and methods of administering the proposal. All sections of the proposal were carefully reviewed and we think an agreement was reached on all points. A copy of the suggested changes will be sent to all Local Sections for approval. The principal deletion was a proposal for a paid secretary in each region, the feeling being that the time was not yet right to justify this type of paid service.

As to the number of sections, we have gained one and lost one. The Rochester section has apparently dissolved as we were unable to get in touch with any of the members or officers. We are happy to announce that, through the efforts of Professor Cook, Loyola University, Los Angeles, California, a new section has been founded in San Bernardino, California, and accepted by the Board of Directors at the meeting on March 3. It will begin activities when areas of jurisdiction are settled with the Los Angeles area.

At this time, I would like to express my thanks to those members of the Local Sections who so wholeheartedly cooperated in the work of the Committee.

Research Committee Report

FREDERICK J. DOYLE,
Chairman

Preliminary

The Research Committee for 1956 consisted of: William A. Radlinski, Everett M. Rhodes, Deputy Chairman, and Frederick J. Doyle, Chairman.

At the end of the year the Research Committee sent a letter to various government and commercial mapping organizations, educational institutions and research associations requesting specific information about their research activities during the preceding year. The response was gratifying and indicated that considerable research is being carried on in all phases of the photogrammetric problem. Unfortunately, some research is still restricted from publication for national defense and commercial reasons. However, the amount of this unpublished research seems to have decreased in the last several years. The information contained in this report is extracted from the replies received to this circular letter.

A. Photography

1. The fundamental lens formulas have been subjected to electronic analysis by the Bausch and Lomb Optical Company. The purpose is to obtain the best combination of simple components, ease of construction, and performance characteristics. This has resulted in the application of aspheric surfaces in projection systems, condensers, and distortion compensating devices. The Bausch and Lomb Planigon lens produced in the focal lengths of 6 inches and $1\frac{1}{2}$ inches now has an aspheric front surface to reduce the distortion to nominal zero.
2. An outstanding development of the year was the introduction of the new Wild Super Aviogon lens and the RC-9 camera in which it is mounted. The Super Aviogon has a focal length of $3\frac{1}{2}$ inches and a format of 9×9 inches, thus providing an angular field of 120°. In spite of this wide-angular coverage the resolving power is extremely high and the illumination is excellent from the center to the edges of the picture. The maximum radial distortion is 10 microns.
3. Chicago Aerial Industries reports improvements in the Sonne continuous strip photography. This photography is now available in two formats, the standard $9\frac{1}{2}$ inch wide strip and the new 70 mm. wide strip. Improved servo control of the film transport and stabilized mounts for the camera now produce photography of exceptional quality and good metrical characteristics (See Figure 1). The State of Wisconsin is now using strip photography for the determination of cross sections for highway construction.

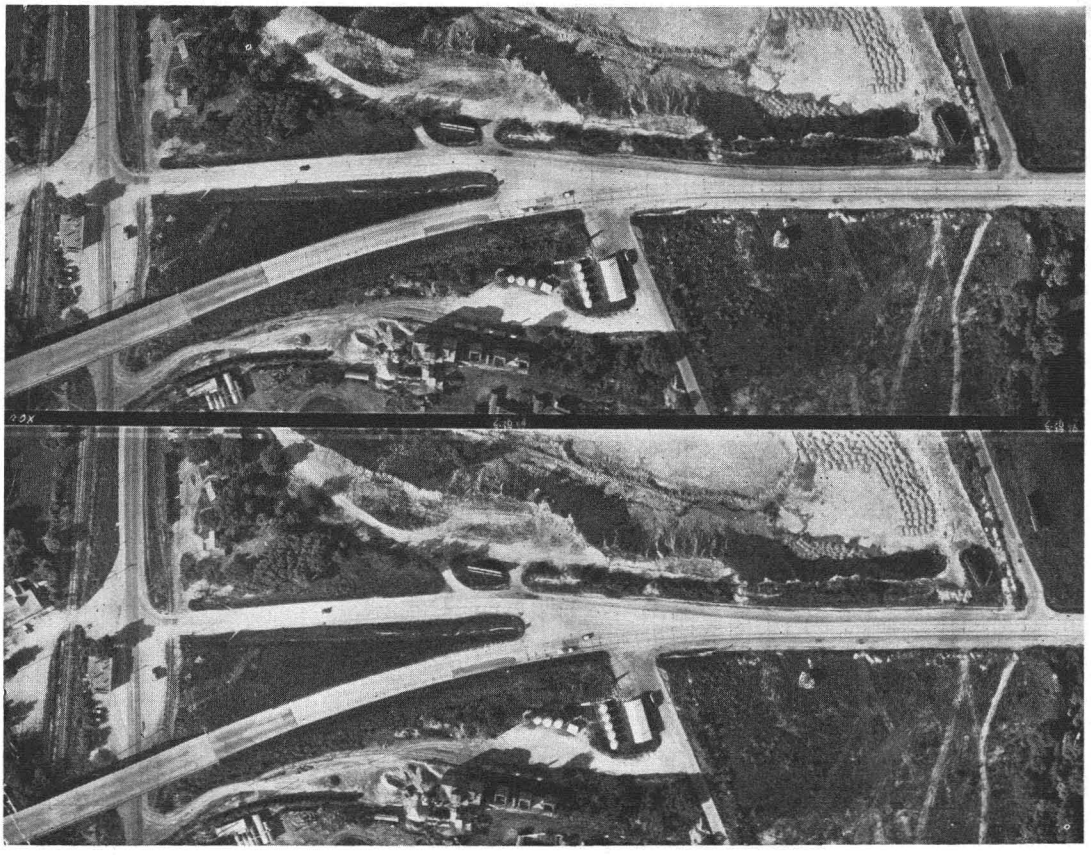

Fig. 1. Example of Sonne Strip Photography. The resolution and detail obtainable with this type of photography is apparent in this sample. Photograph courtesy of Chicago Aerial Industries, Inc.

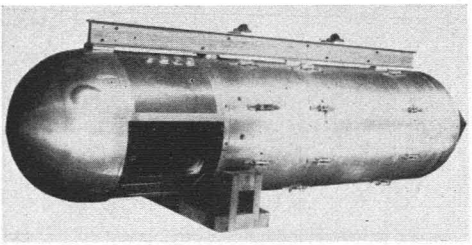

FIG. 2. The E-2 Panoramic Camera. The camera is designed for mounting underneath the aircraft. By means of a rotating lens and mirror system it exposes a single strip extending from horizon to horizon. Photograph courtesy of Wright Air Development Center.

4. The E2 Panoramic Camera for aerial reconnaissance has been designed and fabricated by the Vectron Corporation for Wright Aerial Development Center (See Figure 2). The camera is designed to give a horizon-to-horizon scan in order to replace the multi-camera installations presently used to provide wide-angle photographic coverage. For this reason the camera will be installed under the fuselage of the aircraft, and consequently is enclosed in a streamline airfoil 31 inches in diameter and approximately 12 feet long. The optical system consists of a front mirror, a lens, a rear mirror, and a cylindrical film drum upon whose inside surface the film is held during exposure. The two mirrors are mounted at 45° to the optical axis of the lens which is parallel to the longitudinal axis of the aircraft. Panoramic scan is achieved by rotating the two mirrors and the lens, as a unit, about the optical axis of the lens. Complete stabilization is provided in the camera to eliminate image motion due to pitch, roll and yaw of the aircraft during flight. Steadying is applied to only the forward area of the camera and not to the film supply and take-up portions.
5. Another development of the Wright Aerial Development Center is a mercury arc lamp of high intensity for night photography by reconnaissance aircraft. The new source provides a narrow directed beam of light that sweeps along the ground beneath the plane. It is used in conjunction with strip photography. To observers on the ground the light resembles a blueish star instead of the blinding flash which was given off by the older type magnesium bombs. Figure 3 compares strip photography made with daylight with a similar photograph made with the new light source.
6. A miniature camera calibrator has been developed for the Navy by Photogrammetry, Incorporated. This unit will provide calibration data for cameras of focal lengths between 35 mm. and 300 mm.
7. Aeroflex Laboratories reports improvements on stabilized and image motion compensating camera mounts. The Gyro stabilized mount Type ART-15 maintains the optical axis of the stabilized camera to the apparent vertical to within ± 30 minutes for 90 per cent of the exposures and to $\pm 1°$ for the remaining 10 per cent, when utilizing information provided by two pendulums mounted on the inner gimbal. The mount materially reduces loss of picture resolution due to the motion of the rigid airframe by means of the rate gyro servo loop.

   Verticality control is no longer limited by the sensitivity of the gyros but by the flight characteristics. It is apparent that a major breakthrough is required in order to meet the verticality requirements of the industry. Aeroflex has conducted extensive theoretical investigations on a new system which is expected to give verticality within ± 3 minutes. This new system should be operational within the year 1957.

   The new ARW-3A image motion compensating mount is an improvement on the older models of this same mount. An error analysis has been conducted to determine the residual uncompensated image motion resulting from the several different techniques of image motion compensation.
8. Extensive research and development has been devoted to the problem of obtaining the best possible information from the aerial negative after it has been exposed. One of the most interesting developments is the photo processor EH-15 developed by Houston Fearless of Los Angeles in cooperation with Eastman Kodak and the Aerial Reconnaissance Laboratory at Wright Air Development Center. This amazing machine utilizes a new type of aerial

FIG. 3. Example of Night Photography Obtained with Strip Camera. The lower photograph illustrates normal daytime photography with the Strip Camera. The upper photograph shows the same area photographed at night using the high intensity mercury lamp which illuminates a very narrow strip directly underneath the aircraft. Photograph courtesy of Wright Air Development Center.

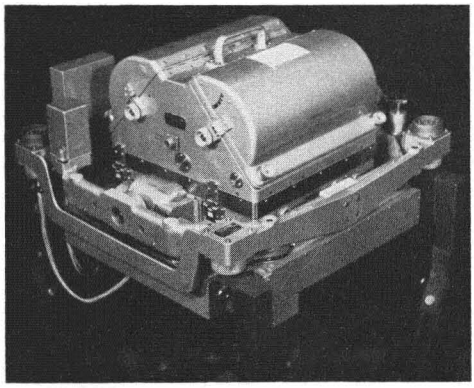

FIG. 4. Gyro Stabilized Mount—Type ART-15. This mount holds the camera axis within ± thirty minutes of the vertical for ninety per cent of the exposures and within ±1° for the remaining 10 per cent. Photograph courtesy of Aeroflex Laboratories, Inc.

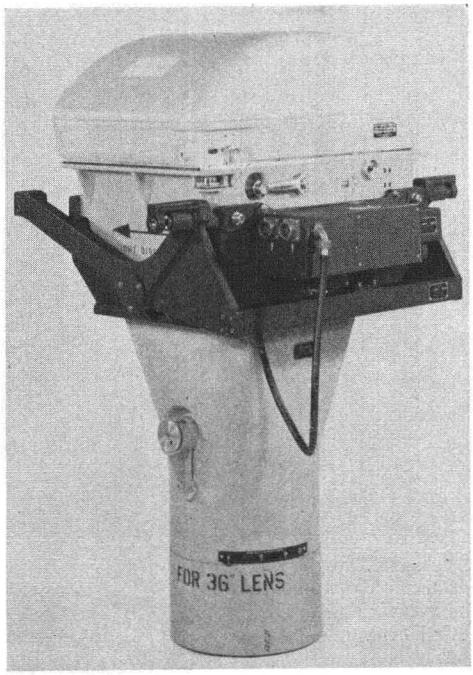

FIG. 5. Type ARW-3A Image Motion Compensating Mount. Photograph courtesy of Aeroflex Laboratories, Inc.

camera film developed by Eastman Kodak and processes negatives at the rate of seven per minute. After an initial partial development the film passes into a scanner section where an automatic evaluater analyzes the unfixed picture with an infrared beam and a photomultiplier unit to determine the minimum density of the picture. It then computes the amount of additional development necessary to bring the density up to a predetermined minimum. This information is fed into a programmer which assigns one of 396 rotating cams to each negative. The cam controls the treatment of the negative as it moves through the remaining variable development section. Development is not by the familiar immersion method but by sprays in individual bays, each bay the size of a negative and isolated from adjacent bays and negatives by rubber squeegees. The cam causes developer or water to be sprayed on the film as it passes each additional bay. The processor uses an automatic system for the replenishment of developer, fix, and short stop solutions, pumping them from tanks as required into and out of the processor. In the last stage of the machine the film reverses its direction of travel and as it passes back through the machine it is dried by hot air blowers. It is then re-spooled at the end of the same end of the machine from which it started. Figure 6 illustrates the new machine.

9. The Log Etronics principle has found increasing acceptance with photogrammetrists and several new units have been completed within the last year. The contact Printer CP-10 is for 10 inch by 10 inch format pictures which are scanned by a $\frac{1}{2}''$ diameter spot to provide both automatic dodging and automatic exposure control. The Contact Printer CP-210 also for $10''\times10''$ format has a $\frac{1}{8}''$ diameter scanning spot with manual control for localized dodging within much smaller areas of the picture. The Contact Printer CP-18 accommodates $14''\times18''$ photographs with a $\frac{1}{2}''$ diameter scanning spot. Preliminary work has been started on a continuous contact printer for $9\frac{1}{2}''$, $5''$, and 70 mm. film for the Navy. This unit will have a film transport speed of three feet to one hundred feet per minute. Also preliminary experiments with white cathode ray tubes have been conducted to determine the feasibility of using variable contrast papers in conjunction with filters for controlling detail contrast.

Log Etronics Incorporated have cooperated with Bausch and Lomb in the design and construction of a diaposi-

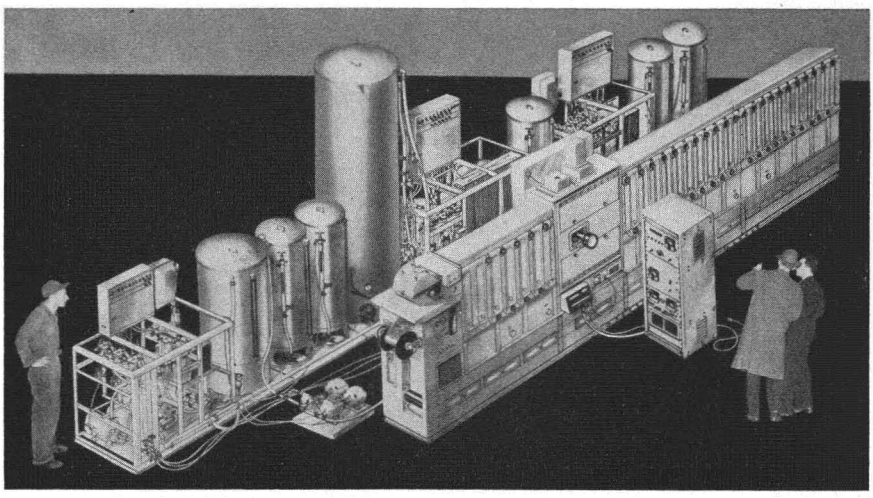

FIG. 6. The FH-15 Photo Processor. Aerial roll film is fed into the unit from the left. Each frame is electronically examined and then given the best possible development after which the film is air dried and is respooled at the left end of the machine. Photograph courtesy of Wright Air Development Center.

tive printer. The unit consists of a control attachment to an existing optical system for photographic reproduction. The console includes all controls and circuits for driving a cathode ray tube and a pair of photo tubes which are housed at the end of six foot cables. The console has been adapted for use with reduction printers which make diapositives for Multiplex, Balplex, ER-55; or one to one printers, for making optically corrected Kelsh plates. These units are now undergoing tests at the U. S. Geological Survey, Engineer Research and Development Laboratories, and the Hydrographic Office. Figure 7 illustrates the unit in use with a Multiplex diapositive printer.

Log Etronics has also produced the ER-5 enlarger for negatives from 35 mm. to 5″×5″. With interchangeable lenses this unit will produce prints up to 16×20 inches. The scanning spot is $\frac{1}{8}$″ inch in diameter for 4″×5″ negatives and is optically reduced for smaller sizes. Two photo tubes provide automatic dodging and automatic exposure control.

10. The U. S. Geological Survey has installed a new system for precise control of the geometric characteristics of diapositives. The system includes control of the temperature and humidity of the film, the measurement of key film dimensions prior to printing, flatness of plates, and precise reduction ratio.

    The Engineer Research and Development Laboratories have also been working on the problem of diapositive preparation. A reduction printer has been designed for making Multiplex diapositives from either metrogon or distortion free photography. This unit uses an aspheric corrector plate to replace the normal pressure plate.

11. The new Wild U-3 diapositive printer utilizes the same base with three different heads for producing diapositives

FIG. 7. Log Etronic Console Diapositive Printer. This unit is adaptable to any type of diapositive printer for Multiplex, ER-55, or Kelsh type diapositives. Photograph courtesy of United States Navy Hydrographic Office.

at one-to-one for Kelsh or first-order plotters, or at 55 mm. principal distance, or for Multiplex. Provision is made for distortion correction by means of pressure plates at the negative stage.

B. Instruments and Plotting

1. CONTROL EXTENSION:

a. Annotable addition to instruments for control extension is the new Wild RT-1 radial triangulator, which was demonstrated for the first time at the International Congress in Stockholm. The instrument is designed to provide data for a system of analytical radial triangulation.

b. The U. S. Geological Survey has developed and tested an integrated system using the Twinplex with ER-55 projectors and stereotemplets for transverse low-oblique photography for the extension of horizontal and vertical control. A separate study was also undertaken to investigate stereotemplet equipment, the templet material, slot cutters and studs. The procedures developed are now being applied to an extensive project in Northern Alaska.

c. The Engineer Research and Development Laboratories have been conducting extensive tests on control extension with convergent photography using the stereopontometer.

d. The Hydrographic Office is developing procedures for compiling maps from aerial photography with unusual format sizes, focal lengths, and camera orientations. Investigations to develop operational procedures for photo control extension with this type of photography are continuing. The procedures involve the use of mathematical and graphical techniques.

For Multiplex stereotriangulation in areas of great relief the Hydrographic Office has developed a motorized tracing table. The motor is geared to the table in the same way as the Veeder Counter (see Figure 8). Current for the motor is supplied from the regular tracing-table power source. Two micro switches mounted on the left hand side of the tracing-table base provide a means of control.

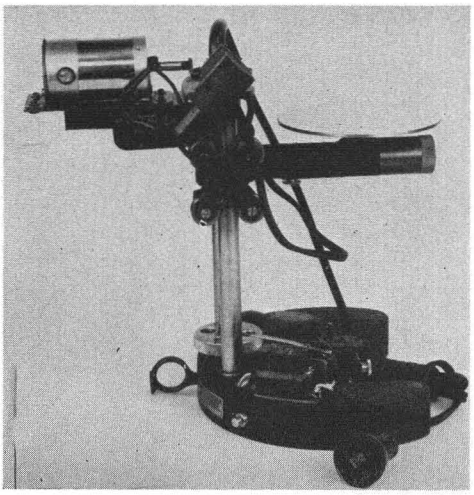

FIG. 8. Motorized Multiplex Table. A small motor driving the crown gear takes power from the regular tracing table source and is controlled by two switches at the left hand side of the table base. Photograph courtesy of United States Navy Hydrographic Office.

The Hydrographic Office has also developed the mathematical techniques for the adjustment of Stereoplanigraph triangulations on their recently acquired Datatron data processing system.

2. PLOTTING OF STEREO MODELS:

a. The Engineer Research and Development Laboratories have developed a modified Kelsh Plotter. This unit will provide BY and BZ motions and will be adaptable to both vertical and convergent photography. The new instrument is illustrated in Figure 9.

b. The Department of Mines and Technical Surveys in Canada reports tests of the new Gamble Plotter produced by PSC Applied Research Limited. Production records for almost one year of operation indicate that the output is approximately sixteen per cent greater than with conventional Multiplex. The operators report better topographic representation, ease of manipulation and eye comfort.

c. The U. S. Geological Survey has undertaken to adapt their ER-55 projectors for stereocompilation of trimetrogon obliques. Improvements have also been made in the design

and calibration techniques for the variable ratio pantograph.

d. Two new plotting instruments introduced at the International Congress meeting in Stockholm are the Wild A-9 Plotter and the Poivillier Stereophot. The A-9 is designed for plotting the photography made with the Super Aviogon lens. It utilizes diapositives reduced to one-half size. The optical and mechanical systems are a combination of those used in the A-7 and the A-8.

   The Poivillier Stereophot is considered to be a third-order plotting instrument. The mechanical reconstruction of the model by space rods is separated completely from the optical viewing system.

e. The Ohio Highway Department has developed a small device to facilitate the reorientation of plates in the Kelsh Plotter (see Figure 10). This consists of two level bubbles, one fixed and the other movable by means of a micrometer, which are mounted on a plate. The plate is superimposed on the diapositive after orientation has been accomplished and oriented so that the fixed bubble indicates the strike line. The movable bubble is then adjusted by means of the micrometer to indicate the dip. A segment of the strike line is etched on the plate and its graphical azimuth and length are recorded on the manuscript.

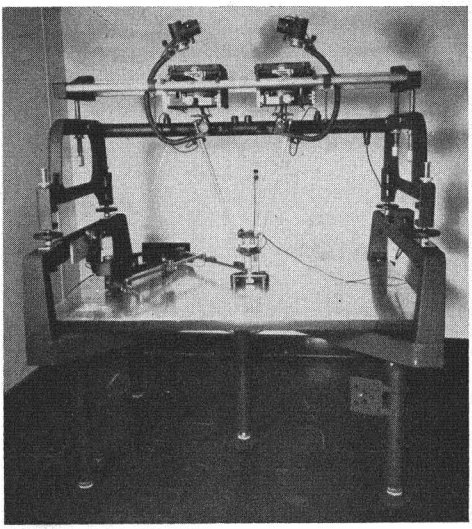

FIG. 9. The Modified Kelsh Plotter. The instrument provides BY and BZ motions for each projector and is adaptable to either vertical or convergent photography. Photograph courtesy of Engineer Research and Development Laboratories.

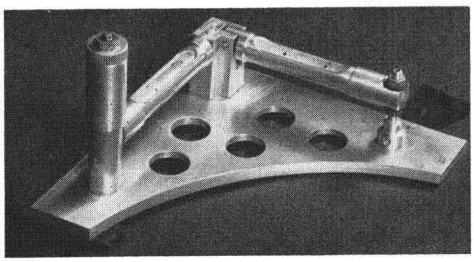

FIG. 10. Strike and Dip Indicator for Diapositive Plates. Photograph courtesy of Ohio Highway Department.

3. RECTIFICATION AND ENLARGING:

a. A new automatic rectifier has been produced by the Kargl Company.

b. The Wild VG-1 Enlarger was also introduced at the International Congress in Stockholm. This instrument uses the new Reprogon projection lens and provides a range of magnification from 0.75 to 7.0.

c. Both Engineer Research and Development Laboratories and the U. S. Geological Survey have produced transforming printers for rapid production of nominally rectified 20° obliques. A later model of the Geological Survey printer will include electronic scanning. The Engineer Research and Development Laboratories instrument manufactured by the Kargl Company is illustrated in Figure 11.

d. Kargl Company has also produced for Engineer Research and Development Laboratories a rectifier for 6″ focal length, 9″×9″ format; and 12″ or 24″ focal length, 9″×18″ format photography. The instrument will remove 10° of tilt for 6″ photography, 20° for 12″, and 30° for 24″ photos. The magnification at the isoline is 0.75 to 1.5. The instrument is suitable for van mounting (see Figure 12).

e. The U. S. Geological Survey has been studying operational procedures for the Orthophotoscope which is now in regular use. The performance characteristics of this instru-

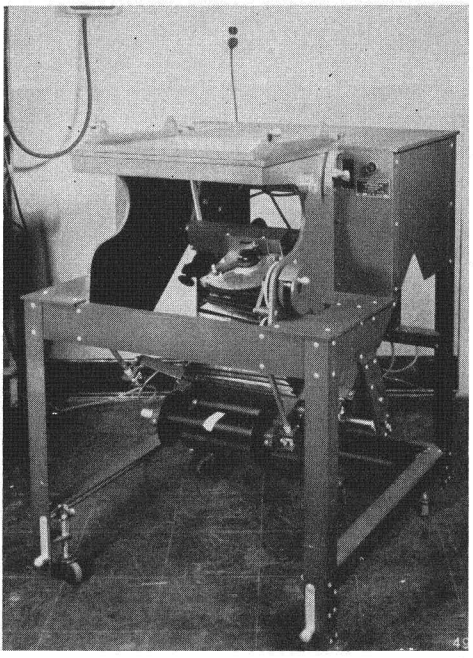

FIG. 11. Transforming Printer for nominal rectification of 20° obliques. Photograph courtesy of Engineer Research and Development Laboratories.

ment are being studied prior to the design of a new model.

f. The Aeronautical Chart and Information Center has been making extensive studies of techniques for the multistage rectification of trimetrogon obliques using the Bausch and Lomb autofocus rectifier.

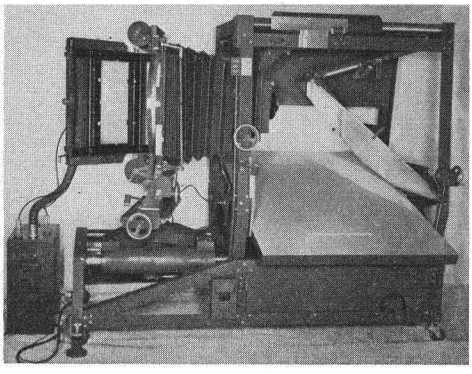

FIG. 12. Horizontal Rectifier for 9″×9″ and 9″×18″ Photography. Photograph courtesy of Engineer Research and Development Laboratories.

C. PHOTO INTERPRETATION

1. The U. S. Geological Survey has conducted a project designed to evaluate the applicability of photo interpretation techniques to the geological mapping of selected areas in the United States. Black and white photography at scales of 1:20,000 and 1:60,000 and color photography at 1:20,000 are being used in this evaluation.

   The Geological Survey has also constructed several small pieces of apparatus to aid the photo interpreter in extracting quantitative information from the photographs. A profile plotter for sketching terrain profiles from Multiplex type stereoscopic models was developed. A tilting platen with angle measuring device for Multiplex type tracing table was produced for use in determining angles of slope of terrain. Also the stereo slope comparator was developed for determining the angles of slope in stereoscopic models from paper prints.
2. Bausch and Lomb Optical Company, under contract to the U. S. Bureau of Aeronautics, has designed and constructed a new portable multiple magnification stereoscope for examination of paper prints . This new stereoscope is illustrated in Figure 13.
3. Under contract with the U. S. Air Force, Bausch and Lomb has developed a new desk type stereoviewer for 9″×9″ and 9″×18″ aerial photographs on uncut rolls of paper (see Figure 14).
4. A new stereoscope for viewing transformed 20° obliques is under development by the Engineer Research and Development Laboratories. The stereo-

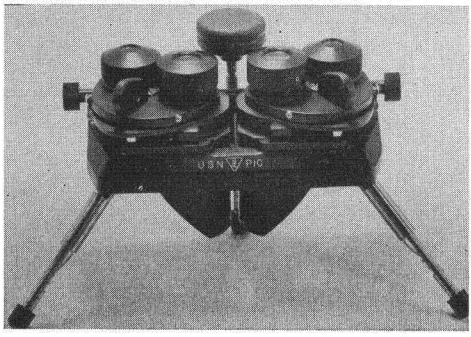

FIG. 13. Multiple Magnification Stereoscope. Photograph courtesy of Bausch and Lomb Optical Company.

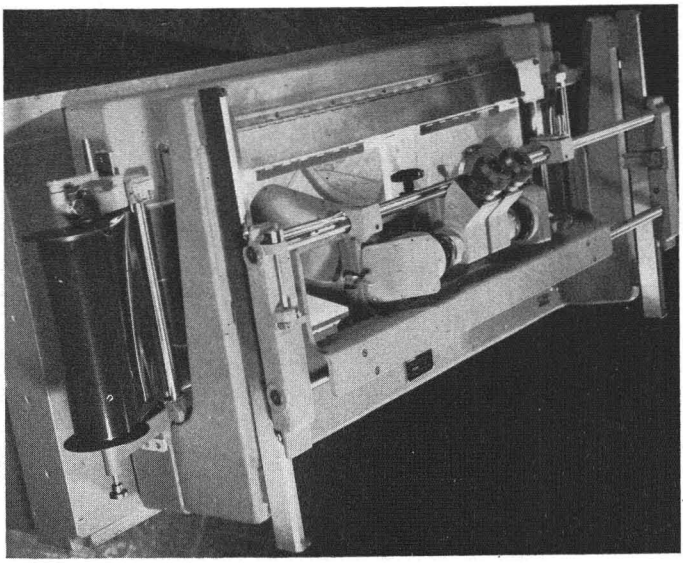

FIG. 14. Stereoviewer for 9″×9″ and 9″×18″ Uncut Film and Contact Prints. Photograph courtesy of Bausch and Lomb Optical Company.

scope will cover a field of 10″×12″ and will permit scanning of the entire model without movement of the operator's head or the photograph. The instrument will provide both two-times and four-times magnification.

5. The Hydrographic Office has designed and constructed a self-contained illumination system for the Abrams 2X-4X Stereoscope (see Figure 15). The illumination is provided by two 3 volt flashlight bulbs with reflectors. Power is supplied by two flashlight batteries and a pressure switch has been installed beneath the headrest. The unit is particularly convenient for operators of projection type instruments.

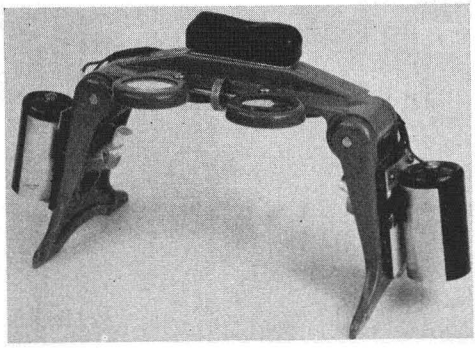

FIG. 15. Illumination System for Abrams Stereoscope. The self-contained lighting system is controlled by a pressure switch mounted underneath the headrest. Photograph courtesy of United States Navy Hydrographic Office.

6. The Intermountain Forest and Range Experiment Station of the U. S. Department of Agriculture has been particularly active in research on the application of photo interpretation techniques to forestry problems. A new parallax wedge for use in mountainous areas, photoscale, protractors, slope scales, dot sampling shields, and other inexpensive devices to be used on contact prints have been developed. These have been supplemented by the preparation of aerial volume tables, sample stereograms for improving recognition, and publications on training problems and aids to instruct personnel.

D. THEORETICAL INVESTIGATIONS

1. The National Bureau of Standards is continuing its program of developing improved methods for image evaluation. Dr. F. W. Washer has also conducted a study of the causes of error in camera calibration techniques. One paper on this subject has already been published in the September 1956 issue of PHOTOGRAMMETRIC ENGINEERING and further papers will follow.*

* The second paper in the series is in the March 1957 issue and the third will be in the June 1957 issue.—*Editor*

2. The U. S. Geological Survey has resumed a previous study of the effects of curvature and refraction in photogrammetric mapping in order to obtain more complete data.
3. The Engineer Research and Development Laboratories completed an investigation on distortion tolerance requirements for "distortion free" lenses. It was discovered by both theoretical and actual tests, that radial distortions should not exceed 10 microns for a lens to be treated as distortion-free in first-order plotting instruments. The Engineering Research and Development Laboratories are also investigating the accuracies of various methods and equipment for determining radial distortion in aerial camera lenses.

   The effect of various factors on stereoscopic perception is being determined by laboratory tests. All tests are primarily designed to determine differences in stereo acuity with the types of viewing systems found in the present stereoplotting instruments. Information on the effect of such variables as intensity and color illumination will also be derived for use in designing future instruments.
4. Of considerable interest is the large amount of research time being devoted to the problems of analytical methods of aerial triangulation. Investigations in this field are under way at the U. S. Geological Survey. The Engineer Research and Development Laboratories, the Aeronautical Chart and Information Center, Cornell, California and Ohio State Universities. No doubt this re-awakening of interest in analytical solutions is due to the wider availability and acceptance of electronic computing machines within the profession.

   Production application of analytical aerial triangulation is still delayed by the lack of adequate coordinate measuring equipment. However, Bausch and Lomb, Wild, and Zeiss are in the process of designing stereocomparators, and other organizations have expressed interest in developing further instrumentation for analytical photogrammetry.

   The Engineer Research and Development Laboratories have undertaken to evaluate various possible analytical aerial triangulation systems, and have completed investigations on the effect of various errors on analytical methods.
5. The Engineer Research and Development Laboratories have devoted considerable attention to the application of electronic principles and instrumentation to photogrammetric mapping. This research effort has resulted in the development of a laboratory model for an automatic contouring instrument. Other contract studies with Paul Rosenberg Associates have developed the preliminary concepts for systems of automatic map compilation. Some of this research has already been reported in papers before the American Society.

   Another research study conducted by the Engineer Research and Development Laboratories is an evaluation of high-precision Shoran (Hiran) mapping procedures for controlled photography in areas which lack geodetic control.

   Another research effort is devoted to the development of techniques for map compilation from radar presentations. An instrument has been developed and tested which automatically corrects the radar presentation for slant range, aircraft motion, non-linearity of electronic sweep, lens distortion of recording camera, and curvature of scope face.

E. Non-Topographic Applications

1. Some of the most interesting aspects of non-topographical metrical photography are being developed at the Guided Missile Test Range in Florida. Unfortunately, these developments are still classified and cannot be released at this time.
2. The Hydrographic Office is conducting a preliminary investigation to determine the feasibility of using electronic light amplifiers in conjunction with cameras for use in underwater photography. Images that cannot be normally photographed may be amplified sufficiently to permit proper exposure. Such an application might eliminate the hiatus between what the eye can see and what the camera can record.
3. One of the most interesting developments of the year has been sponsored by the Ohio Department of Highways. Highway department engineers, working together with Battelle Memorial Institute, the IBM Corporation, and the Ohio State University have developed a system for computing earth work volumes directly from measure-

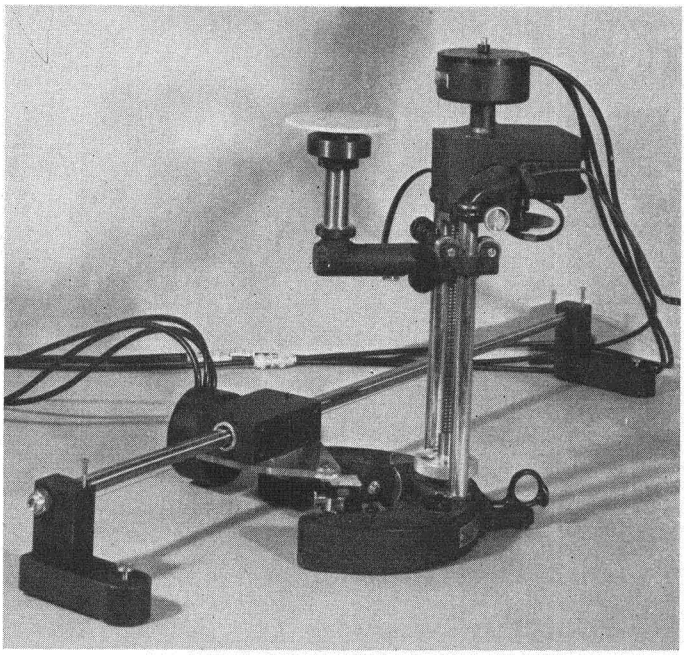

FIG. 16. Cross Sectioning Device for Kelsh Plotter. The device is oriented perpendicular to the highway location center line. Off-set and elevation readings are taken off electronically for eventual punching on IBM cards. Photograph courtesy of Ohio Highway Department.

ments made in the stereomodel of the Kelsh Plotter. An attachment to the tracing table (see Figure 16) measures in the stereomodel the horizontal distance from the location center line to points on a cross section, as well as the vertical height of such points. Off-set and elevation pulses from this device are fed to a console type digitizer which activates an IBM model 526 printing summary punch. The operator key punches the identification data on each card. These cards together with cards punched with the horizontal and vertical alignment and the proposed design section are then given to the IBM model 650 Computer. The computer has been programmed to develop the design templets and to calculate the earth work quantities. The entire equipment for the Kelsh Plotter is illustrated in Figure 17. The department also has under contract development a piece of equipment that will convert the templet design computed by the 650 and punched into cards into plotted cross sections for examination by the design engineers. It is expected that when completed this system will greatly reduce the time and effort between the photography and the final highway design.

F. CONCLUSIONS

It is apparent that every phase of the photogrammetric problem is under investigation with the aim of getting the most information on to the photograph and getting the most information off of the photograph, with a minimum expenditure of time, equipment, and personnel. The percentage of total time, funds and personnel devoted to research and development has been the subject of a separate investigation by Mr. Radlinski and will be reported upon by him. A certain amount of duplication and overlapping of effort has been indicated in the reports which were received. However, such overlapping is not considered wasteful since it generally results in an exchange of information and a cross-pollenization of ideas.

It is obvious that by far the major proportion of research and development effort is being devoted to modification and improvement of existing techniques and equipment. This concentration of effort is doubtless dictated by the current problems. The committee feels strongly that the profession and the science of photo-

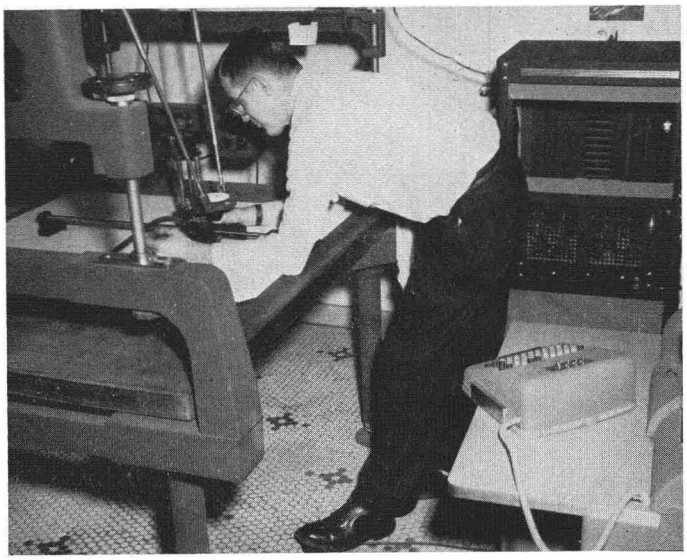

FIG. 17. Electronic Recording of Cross Sections. Center line off-set and elevation readings from the plotting table are transmitted electronically through a demodulator to the digitizing console in the upper right. The readings are then fed to the IBM Summary Punch and punched on cards together with the identification which the operator records by means of the key punch. Photograph courtesy of Ohio Highway Department.

grammetry would receive greater long-range benefit if more research were devoted to entirely new concepts; in particular, the application of electronics to mapping seems to hold the greatest promise for the future. Automatic contouring from aerial photographs is only the initial step. Already radar presentations of terrain data are reaching an astonishing level of resolution, and it will only be a matter of time until their metrical properties can be handled as adequately as those of the aerial photographs. Indeed it is entirely conceivable that within the lifetime of most photogrammetrists the conventional aerial photograph will be superseded as the primary means of acquiring terrain data, and our beautiful stereoplotters will be replaced by electronic black boxes full of undreamed of components. The time delay between aerial flight and printed map may become a matter of minutes instead of months.

Report of Photographic Interpretation Committee

CHARLES COLEMAN, JR.,
Chairman,
EARL J. ROGERS,
Deputy Chairman

INTRODUCTION

The efforts of the committee for the year were spread over a variety of activities. Much time and effort was spent in coordinating the activities of Commission VII (on photographic interpretation) of the International Society, the direction of which was a U. S. responsibility. Other parts of the committee program included internal reorganization to meet the growing needs of the PI field, the drafting of a formal statement of committee duties and responsibilities, the initiation of a roster of U. S. photographic interpreters, and the