

Revolution in Measurement

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ONE can scarcely pick up a modern periodical these days without reading about the revolution in living, education, motoring, or something of that kind. A fact, hardly recognized outside the engineering and surveying field and probably not too often recognized within these fields, is that during the past 25 years there has been a far-reaching revolution in the science of measurement. We cannot claim that this revolution came about because of photogrammetry nor can we assume that photogrammetry was born because of this revolution. It is certainly true that this revolution and the development of photogrammetry are very closely related.

An early aim of photogrammetrists was to eliminate or reduce ground control. Both money and time savings were the goal. In anticipation, bridges of astronomical length for both horizontal and vertical control were planned. Quadrangles, even counties, were to be bridged with a relatively small amount of field work. Unfortunately, came the dawn! It was discovered that for various reasons such as uncalibrated cameras, unflat film, emulsion creep, lens distortion (in both camera and plotter), and things of similar nature, bridging was not the panacea it had been believed. Now, 25 years later, there is more hope for the dreams of the pioneers in this field.

Improvement in systems, starting with the taking camera and film and continuing through the processing of diapositives, the plotting equipment, and the training of operators, has proved that it is possible to bridge profitably and accurately under some circumstances.

A new and startling development—electronics—has influenced photogrammetry tremendously. I doubt if the founders gave much consideration to the application of electronics. Currently, however, we have numerous measuring instruments of this family and many reports on their successful application to control problems.

Systems are under development which, almost without human aid, measure elevations, or compute earth volumes for our interstate highway systems. Also under development are electronic adaptations of photogrammetric plotting equipment which, with the merest touch of human guidance, record

data that when fed back through plotters may almost automatically produce topographic maps, relief models, or other presentations.

Applications of measurements in other fields have also been developed. Photogrammetry has proved its adaptability to the inventory of coal and pulp wood piles. It is being used in the measurement of subsidence areas, those caused both by natural forces and mining operations. An interesting innovation is the determination of flame shape and size in a high temperature furnace, certainly a spot where no chainman or rodman could venture. It will not be new to many that the shape and size of the human body is now the subject of photogrammetric measurements as it varies under different conditions. These applications, I claim, are a revolution in measurement. High speed cameras photograph the ground at frequent intervals from missiles and permit ballistic experts to determine the position and altitude of the carrier by resection from known ground points. Revolution? In Measurement? I think so!

A little research through earlier publications uncovers interesting facts about members—their then current thinking, equipment, and ideas. There were lengthy discussions on the exact specifications for aerial photography for the government, to the end that one flight would economically serve all purposes. Contrast this with the three and four times over coverage which is standard these days to provide for the several scales of maps to be compiled, or analysis to be performed.

In September 1934, the first copy of *NEWSNOTES* was published. Names of the members then leaders in the Society, should be of interest to our present membership. Of the seven on the first Executive Committee, two—Scott Reading and Marshall Wright, are still active in the Society; of the five members of the Publications Committee, we find Lee Eliel, Scott Reading, and Marshall Wright. The early Society had one activity we now lack, a Committee on Translations. Heinz Gruner was Chairman and responsible for German; Bill Medina was translating Spanish; volunteers were desired for both French and Italian. Other early committeemen were Russell Bean, Charley Davey, Dr. Gardner,

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Bennett Jones, Virgil Kauffman, Ashley McKinley, and Sid Park.

It is interesting to note that the men mentioned above were from the Army, Navy Hydrographic Office, Soil Conservation Service, Forest Service, Coast and Geodetic Survey and Geological Survey. There were several from industry and the universities.

As early as the first year of the Society's life, it was planned to affiliate with INTERNATIONAL SOCIETY OF PHOTOGRAMMETRY, and the first issue of NEWSNOTES tabulates the size of other National Societies. As of that time, without a count on the Finnish and Belgian societies, the total was only 1,100; approximately one-third of what our own Society is today.

We should remember that photogrammetry wasn't invented in the United States. In the second volume of NEWSNOTES there is a comprehensive discussion of the Stereoplanigraph by Leon Eliel. He closed his discussion by saying that, "... if this equipment were used by a Government Agency and operated at its maximum effectiveness, maps could be made to the existing standards in all but flat or densely timbered country, at not-to-exceed one-half of the present cost." In comments on this paper, W. N. Brown (recently deceased) was of the opinion that because so much of the United States was timber covered, and large areas lie in wide river valleys where the terrain is rolling and has only slight relief that, "It is probable," he said, "Only 50% of the area of the United States will be adapted to its (Stereoplanigraph) use."

Perhaps a forecast of today's speed was the article in June 1938 in which Lt. Col. Meyers of the Air Corps asked, "Can the human body keep pace with the airplane?" It seems that now, man is about to fall behind or out of this race, but we'll bet that automatic cameras will bring back pictures.

The first ANNUAL MEETING of the Society was held in the auditorium of the National Museum on April 22 and 23, 1935. It is noteworthy that even at that early date there was enough technical material available to fill four sessions. Seventy-two members were registered at this meeting and most of the meetings were attended by 100 or more. The Program Committee apparently suffered from an ailment which has continued to plague Program Committees. They apologized for the length of the program which did not permit time for much discussion.

In October 1935 a list of members included 353 names. A check against current membership shows that 71 of these are still in good

standing. Many have been Officers or Directors of the Society. Col. Blee, Bill Cude, Leon Eliel, Gerald FitzGerald, Virgil Kauffman, Ed Massie, Bill Medina, Sid Park, Scott Reading, Revere Sanders, George Whitmore, Louis Woodward, Marshall Wright and the writer all became Presidents.

The design for the emblem of the Society was approved in March 1936. It was submitted by Mr. Holtgreve and Past-President Bill Medina, both of the Navy Hydrographic Office. During the same year a National Library of Aerial Photographs was proposed. An extensive study was prepared by Scott Reading in which he listed the users of photographs, and particularly noted that those localities using aerial photographs had an increase in property on the tax rolls. This subject has been periodically reopened but has never received the favorable nod from Government which is required before activation. Our neighbor, Canada, has had a National Photographic Library for many years.

With Volume II of the NEWSNOTES a new publication policy was instituted. The format and reproduction was improved. Also, from once every month or so, the publication was established as a Quarterly. At the end of 1936, Volume II, No. 4, contained a Bibliography of Photogrammetry. Volume IV for 1938 was the first printed edition and the first appearance of the title "PHOTOGRAMMETRIC ENGINEERING."

The first recorded cooperation with our Canadian neighbors was in 1938 when A. C. T. Sheppard, President of the Canadian Institute of Surveying, delivered an address at our Fourth Annual Meeting.

It would not be appropriate to stop this flow of memories without a nod to the Photographic Interpretation group. They have made most of their progress since World War II, and now deal with everything—from agronomy to zones, geographic. Foresters were among the first to appreciate the possibility of qualitative measurements from aerial photos, and March of 1939 finds the JOURNAL carrying its first full-length article on this subject. It was "A Vegetation Inventory from Aerial Photographs" by G. F. Burks and R. C. Wilson. In the same issue Marshall Wright suggested applications to Astronomy, Radiography and Archaeology.

As recollection approaches the forty's, more and more of you will remember the changes and there is no need for this article to wander on. Let me close by saying that this revolution in measurement is one in which I have been happy to be a part.