CURRENT EUROPEAN PHOTOGRAMMETRY*

O. S. Reading, U. S. Coast and Geodetic Survey and President of International Society for Photogrammetry

I WISH that each one of you might have attended the Sixth Congress of Photogrammetry in the Netherlands and have made the tour of some of the European photogrammetric organizations that I was able to make last fall. I feel sure you would have picked up a great deal of inspiration and some ideas useful in your work, as well as enjoying the cordial hospitality of our colleagues in Europe.

One of the most pleasing features of the Congress and tours was the cordial willingness of the photogrammetrists to impart all the information they could about their work. It is true that this often takes the form of arguments to prove their methods or instruments to be the best possible. Rationalizations as to why methods reported to be superior in other organizations or countries cannot be adopted are never lacking. They are just as expert in Europe in supplying such rationalizations as we are in this country. And yet from congress to congress, one can note that modifications have been made to incorporate as many as possible of these advantages in each organization's own procedures or instruments. In short, a very real exchange of helpful information, a sort of cross-fertilization of ideas, takes place.

As to important features of European photogrammetry discussed at the Congress, there were several that will repay watching or studying. As we are behind schedule on our program, I shall be very brief in referring to these. However, I shall be glad to answer questions afterwards, orally or by correspondence, or to refer questions to the European authorities best qualified to answer them.

Among the papers most worthy of attention is one by M. Cruset of the French Institut Geographique Nationale on their methods for controlling the quality of their lenses, including measurements of unsymmetrical distortion, and for matching the air camera lenses with those of the plotting apparatus. A special goniometer with a precision of five milligrads has been developed for measuring distortion and focal length. The procedure employs a graticule in the focal plane and furnishes a ready means of measuring unsymmetrical distortion. Possibly because of such measurements, the French have adopted a one-piece mount for their lens elements in which all the elements are mounted in a single block, in order to retain the precise centering set by the manufacturer. A slot in this block permits insertion or removal of the shutter without affecting the lens. American photogrammetrists have been suffering for a long time from unsymmetrical distortion of our lenses without actually trying to do much about it. It is very gratifying to learn that Mr. Sharp of Bausch and Lomb has taken up the study in this country. We American photogrammetrists should give all practicable endorsement to this research and compare our results with those obtained by the leading photogrammetrists in Europe.

I suppose many of us have toyed with the idea of a curved focal plane to correct for lens distortion but felt it too uncertain to try. Professor Tham of Sweden is actually trying it. He had a special vacuum plate made to fit the 30×30 cm. Zeiss camera and to correct Topogon lens distortion on exhibit at the Congress. Preliminary tests in the laboratory indicated that the vacuum satisfactorily sucked the film down against the spider web-like grooves of the curved focal plane plate. There had not been time to make air tests; the results

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will be awaited with interest by all of us. If the idea works for distortion, it may serve also to help on resolution and curvature of field. Curvature of field corrections would not require the strict tolerances as to position corrections that distortion correction demands.

There were several interesting discussions on photography. Mr. Corten of the Netherlands had measured the oscillations of aircraft and vibrations of different camera installations. The vibrations varied in different airplanes and camera stations, an indication that, if a simple inexpensive apparatus were available, it might be worthwhile to measure the vibrations and oscillations of each new camera installation. The Dutch tests came up with the same answer as the Harvard research, namely that pending improved stabilization and perhaps moving film in the future, the best results with present mounts are obtained with exposure as short as possible.

There were many studies of air triangulation. M. Poivilliers reported a test of 50 models with results satisfactory for 1/50,000 scale work; by his special procedures and equipment using glass plates, he hopes to be able to span 100 models.

M. Wiser of Belgium reported that corrections based on the indications of a statoscope doubled the precision obtained in tests in which it was not used.

Tests by the Instituto Geographico Militare of Italy indicated a difference in precision of about 6 to 9 ratio in favor of glass plates over film.

Mr. Van der Weele of the Netherlands made an exhaustive study of the sources of error in the stereoplanigraph which will be of interest to all those who operate such instruments. Prof. Roelofs made some extensive probability experiments by drawing lots and came up with the answer that it would be impracticable to separate the systematic from the accidental errors when using plotting instruments solely by analyzing the magnitudes of the discrepancies themselves.

Dr. Vining Meinez reported that where an extensive gravity survey exists or can be made, very good values of deflection of the plumb line can be computed from the gravity data. However, the discussion brought out that so many gravity observations are required that, for isolated astronomical control stations, the procedure would be impracticable to use solely to obtain corrections to the vertical.

The proposal of the Netherlands Society presented by Professor Schermerhorn to revive the publication of *Photogrammetria* received general endorsement. About 500 subscribers at $4.00 per year will be necessary for success. As there are about 350 subscribers to PHOTOGRAMMETRIC ENGINEERING in addition to the 1,600 members of the American Society, this does not look too hopeless. The revival of *Photogrammetria* will furnish by far the most certain and efficient means of keeping informed on the valuable items of progress in European Photogrammetry. I am sure of this from bitter experience in trying to get adequate translations of papers in foreign languages on photogrammetry within a reasonable time. I hope that this revival may be realized during the coming year.

The visits I was able to make to the various photogrammetric organizations were also very interesting and enjoyable. Always I received a most cordial welcome and ready answers to all my questions.

As most of you have heard, England has a program of 1/1,250 scale surveys of all her developed areas underway. Most of this work is being done by the conventional transit and tape traverse method tied into a dense network of triangulation. A super-accurate radial line plot on two diameter enlargements on topo base film is being used to get positions of detail points in congested areas

where the traffic is so dense as to make traversing very difficult. The English have set a tolerance of two tenths of a millimeter on their surveys. They think they cannot afford plotting machines accurate enough to meet these tolerances, or at least cannot afford to wait for them to be made. Most photogrammetrists, at least those outside Britain, think they will learn differently. The interchangeable tripod head outfit has proven a notable improvement in the efficiency of traversing. Notable, also, is their system of plotting the surveys on very accurately machined squares of anodized aluminum. The control is plotted rapidly and with high accuracy by a special machine set with microscopes. Four of these squares cover 1 sq. km. on the 1/1,250 scale and their edges form grid lines. The four squares are held by suction disks on a special field plotting board; by shifting two of the squares one can work continuously in any direction. The advantages for continuous revision seem quite marked.

In Belgium photogrammetry has come in to its own. It is used for all scales from 1/1,000 to 1/20,000. I saw some beautiful 1/500 scale enlargements also used in connection with public works surveys. The Public Works Department intends mapping all their developed areas during the next ten years on scales of 1/5,000 or larger. The Military Geographic Institute expects to complete a new 1/20,000 scale topographic map of all Belgium, also within ten years. The Public Works Department uses mostly Wild equipment. The Military Geographic Institute has eight Poivilliers (French) machines to accomplish its program.

The Institut Geographique Nationale in France has some 40 odd Poivilliers plotters busy on very finely detailed 1/20,000 scale maps of all of France and 1/50,000 scale maps of the French African Colonies. Plates are used for France and film for the 1/50,000 colonial surveys.

The Italians are again resuming their large scale cadastral topographic surveys by photogrammetric means, mostly by contract with photogrammetric organizations. Scales are generally 1/1,000, 1/2,000 or 1/4,000. The Italians had a very alert delegation at the Congress with many ingenious instruments on display, notably the Santoni plotters and cameras including a solar camera. Nistri has a servo motor-driven multiplex tracing table and coordinatograph. The Officine Galileo had a number of easily read surveying instruments of ingenious design on display also.

The Swiss are busy with a combined cadastral and topographic survey of all the developed areas of Switzerland on scales ranging from 1/250 to 1/10,000 with most of the maps on 1/1,000 or 1/2,000. Photogrammetric methods are showing marked economies on the 1/1,000 or smaller scales. The Swiss have a very democratic arrangement whereby these surveys are made on a negotiated piece-work price basis by contract with registered surveyors.

The Europeans have many ingenious, exquisitely designed instruments, beautiful photographs and finely detailed maps. But the most inspiring thing about European photogrammetry is the enthusiasm of the men who are doing the work. They all have very challenging programs of mapping ahead and are confident of the efficiency and value of the methods they are using. They are undertaking a tremendous number of large scale detailed maps, well suited to the reconstruction and future development of their countries. These maps are based on geodetic control and show property lines as well as detailed topographic information. Mr. Schmidheini, the managing director of the Wild Company, told me that he has orders for all the A5 plotters that can be filled until 1952. This is a striking index of the expansion that has occurred in photogrammetry.

It is evident from European photogrammetry that there is a very great field

of usefulness in large scale photogrammetric surveying. The advantages and value of such large scale surveys are only just beginning to be appreciated in the United States. It is notable that the best mapped countries in Europe are the very ones that are spending the largest sums, relatively, in still better, larger scale surveys with definite provision for keeping revisions current. It is clearly evident that the better the maps, the easier it is to sell them. This is profoundly encouraging to photogrammetrists for we have in our science the most economical and efficient means of making the better maps.

OBSERVATIONS ON AN AROUND-THE-WORLD TRIP*

Talbert Abrams, President, Abrams Aerial Survey Corp.

SINCE I have just finished a trip around the world, I have been asked to give you some briefs on what happens when you make such a trip, what you do, what it means to you in the future and what it means to you people here.

Individual people here could go on a trip around the world, and would see quite different things from what I would see; almost anybody in any other kind of work, if on a similar trip, would see an entirely different group of things.

If a tourist, and on a trip around the world, you would pretty much see the spas and the beaches and the sights of interest which everybody talks about. I did not get to see all of those; I sent my wife on those expeditions. She brought back a story of where all the beautiful points of interest are, and if you want to talk about any of them, I think I will be able to talk about them just as well as if I had gone there.

What I was mainly interested in was the mapping activities and the places where this kind of work is going on. I wanted to see the factories; the armies and navies of the different countries, and what they were all doing. Then I wanted to take the whole thing and bunch it together, when I got home, and try to make a little five-year plan of our own, which we might be able to work out. I also desired to take the same information and pass it on to our friends in industry and business and government, wherever they might be, so that they also could gain by it.

I did that as best I could. Yesterday Capt. Reading pretty much covered Europe as far as photogrammetric work goes. He gave you a very good story. However, he saw it from the governmental angle and what was being done in government agencies, what they were doing in commercial companies, and how the government might be able to use it.

I saw it in quite a different way. I saw the socialization of Europe, England, and the Far East, and that is a story which is of importance to all you people.

If you were an educator and went around the world, or even if you were a student, you would try to figure out how there could be some sort of universal language so that you could better understand and learn. If a financier, you would think in terms of one universal currency which could be used by everybody; you would see the black market in money and start wondering where it all led to. If in aviation, you would see all of the bad weather, all of the good weather, all the airports we have built and paid for around the world; and you would see how they are being used by other people.

In our particular line of work, I was mainly interested in factories where

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