THE FUTURE OF PHOTOGRAMMETRY*

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IF I had your ideas as to the future of photogrammetry I am confident that a large majority of those present at this meeting, especially those engaged in commercial photogrammetry, would be thinking only of the volume of work that will be available to our profession in the near or distant future.

When I first started to consider this subject, my mind followed that line. However, after some thought I began to see that in the past the concern about volume wf work had completely been taken care of by the improvement in our techniques, methods and equipment. I therefore assume that there is no reason to believe that this will not occur again in the future.

Following this line of reasoning, it is apparent that the entire future of photogrammetry is dependent upon our ability to develop more new techniques, methods and equipment and to continue to sell the public on our progress and capabilities. We, in photogrammetry, know the extent of our progress in the past twenty years and have done a reasonably good job of acquainting the general public as well as the engineering profession with those capabilities. It behooves each of us not only to assist in developing methods and equipment for use in our profession, but to lend every effort to publicizing our products and capabilities.

It is quite evident that even with our past progress we have only scratched the surface of the possibilities in the use of photogrammetry. It is most certainly true that with our high educational standards and high degree of mechanical aptitude, we should expand our research and development program. Europe is still far ahead of us in developing new techniques and instruments. Of course this is partially caused by our higher standard of living and the resulting high cost of this type of program, but this alone can not account for our lagging instead of leading. Each of us is somewhat responsible for this condition as we do not seem to disseminate our ideas and developments to any great extent. The medical profession is a good example of what we could do in this line. It promulgates its smallest developments and its newest techniques through the American Medical Association and its seminars. We fail to follow this practice to a similar extent and leave this task to the men in the government service. Worse yet, we in private practice avoid writing papers for our meetings and publications.

I urge each of you who have never taken part in a program like that at this meeting, to sit down and write a paper on some new technique or device you have developed or have in mind. For example, if you write a paper concerning a very simple idea, this might be developed by others later on and thereby prove advantageous to the entire profession.

It is the opinion at Abrams Aerial Survey Corporation that the use of first-order instruments in this country will have a very rapid growth in the next few years. The constant demand for mapping of larger scale and smaller contour intervals, especially in connection with industrial operations and highway construction, is requiring the use of more accurate photogrammetric plotting instruments. The development and use of new lenses, more precise equipment, and new techniques are making evident the weaknesses of some of our laboratory equipment and supplies. Developing better and more accurate mediums and supplies is going to be a must in the future of photogrammetry. Our photographic film base is a good example of one primary supply that needs development. The only way we can get these products developed is to insist on the suppliers finding new materials and furnishing the producers with our requirements and our ideas as to possible solutions of their problems.

Each of you can remember, a few years back, that the engineering profession rated photogrammetry as a reconnaissance tool and would use it only for that purpose. Now, we in photogrammetry have produced a sufficiently accurate product and

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have advertised that product to such an extent that the majority of the engineering profession accepts our work as a basis for much of its final design.

The future of our profession is closely related to civil and other engineering groups. We should continue to concentrate on convincing these organizations that we can supply them with a more satisfactory product at less cost and in considerably less time than they could do the job, through using field methods. Each of us should make every possible effort and at all times, to acquaint the engineering profession with the capabilities of photogrammetry. We, however, should be extremely cautious in making claims for any accuracy of our product that cannot be demonstrated. At all times we should be very careful that we produce a product that is completely within the promised accuracies. We should never be guilty of furnishing a marginal or doubtful product even though we may be able to produce it for less money.

At this meeting Bausch & Lomb Optical Company is displaying the first commercial version of a low oblique plotter. This was developed through the efforts of Mr. Bean and the U. S. Geological Survey. We at Abrams feel that the low oblique technique has an extremely bright future in the program for large-scale, small-contour-interval mapping. We have felt that for this program this type of operation would greatly influence the product as well as the cost. In order that we may be a part of the development of this program, we have ordered, from Galileo Santoni Corporation, a first-order plotting instrument, the Stereosimplex Model III, built especially to take the 20 degree oblique photography. We believe that in the very near future it will be possible to produce 2 foot contour maps from photography taken at altitudes of 5,000 to 6,000 feet above terrain, using first-order instruments in connection with the above-mentioned technique. To change the present Stereosimplex Model III to a convergent plotter, we found that it would be necessary to do considerable redesign. This work is now in progress and we hope for delivery of the first instrument of this type by December of this year. At that time, we will conduct tests in connection with the operation of this instrument, and will make public the results at the earliest possible date. We feel that this development, in a very small way, will be our contribution to the future of photogrammetry for the present time.

Up to this point, my remarks have dealt primarily with commercial operations on large-scale, small-contour-interval mapping. I feel that this field is one which we can develop and give us a real future in photogrammetry. However, it must not be forgotten that this phase of our work is only one step in a much larger field. There are many companies in the United States today whose operations include only a small amount of this type of product. They specialize in small-scale, large-contour-interval mapping, primarily for government agencies. In this field we feel that, even as related to the previously mentioned field, possibilities exist for the development of new and much needed techniques and equipment.

An example is the 1:250,000 scale mapping program which was entered into by the Army Map Service several years ago and in which the majority of those present participated to some extent. This was a program of enormous size. The development of this type of mapping had to be very rapid and accomplished with the tools and techniques available at that time. You are aware of the situation relative to aircraft available for this type of mapping, when this program was instituted. You are also cognizant of the difficulties encountered using existing aircraft for this type of work. Those were the conditions a few years ago. They now are different. Undoubtedly a program similar to the earlier one could now be accomplished throughout the world in a much more satisfactory manner and more easily with our present jet aircraft, new cameras, and first-order instruments.

As you know, the extension of horizontal and vertical control in connection with this program has been the most expensive step in the operation. We believe that this can be overcome by using the Galileo Santoni Solar Periscope Triangulation System. Briefly, this system permits establishing horizontal and vertical control from vertical or trimetrigon aerial photographs, by using a sun camera which takes an exposure at the same time as the terrain photography is exposed. In 1951 tests were

run on this equipment in Italy and it was found that the error could be held to a mean of approximately 45-feet horizontally and vertically, using the equipment then available. While this accuracy would not be sufficient for some vertical operations, the results show that this equipment could have been used in the 1:250,000 program where only 200 foot contours were required. We believe that if this equipment had been used, a more accurate and economical product would have resulted in many instances. There is now being conducted in Europe, additional tests with the improved version of the 1951 equipment. The results will be made public at the International Meeting next June and it is our opinion that many of you will be amazed by the results of these experiments as regards accuracy.

There is being carried on in this country, at the present time, tests of the use of radar photography in connection with contour mapping. These experiments have not yet progressed to a completely satisfactory operational stage. However, we feel certain that in the future radar photography will be utilized in doing a considerable amount of certain types of mapping. I hope to live and work until this becomes a reality as I certainly should like to avoid having to call the weather bureau to find out whether the day will be satisfactory for photographic operations.

Of course many new techniques are being developed which are related in some way to our field. The future of photogrammetry is tied very closely to electronics in many ways and will be greatly affected by the development of new electronic devices. All engaged in this work should give full consideration to the possibilities of electronics in connection with our profession.

In conclusion I ask each of you to keep in mind at all times that the future of photogrammetry is in your hands. Photogrammetry will have a successful future if the general public and the users of our products have confidence in our ability and integrity.

INTEGRATED PHOTO RECONNAISSANCE SYSTEM FOR HIGH PERFORMANCE AIRCRAFT*

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ABSTRACT

Results of a research and development program conducted by Fairchild Camera and Instrument Corporation and directed toward evolving a photo reconnaissance system of advanced capability are presented. Emphasis has been placed on analyses of alternate approaches with final selection guided by technological factors inherent in new high performance aircraft design.

RECENTLY, Fairchild Camera and Instrument Corporation has been engaged in the development of a complete, integrated airborne photo reconnaissance system applicable to advanced high performance aircraft. As a primary capability this system was to provide military reconnaissance of large areas from high altitude, recording major detail with supplementary coverage of selected smaller areas in fine detail. As a secondary capability, in the event weather conditions precluded reconnaissance from high altitude, the system was to provide coverage of relatively small areas in fine detail from low altitude.

Before any design was attempted a careful analysis was made giving consideration to mission requirements, airframe problems and characteristics, capabilities of existing equipment and the improvement which is feasible within a reasonable time period.

Major objectives included reduction of size, weight and power consumption to a very minimum, attainment of maximum information recording ability and maximum potential reliability.

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