WHY NOT BETTER INSTRUMENTS FOR MAP FLYING?

by

Robert G. Wemple, Jr.

It has been mentioned before in these news notes that the skill of a photographic pilot, or mapping pilot, can be likened unto a brick layer, in that a little practice makes perfect. The article I refer to was most interesting from the procedure of operation standpoint but, for the actual flying which the title would imply, it leads one to believe that photographic flying is even more simple than flying itself. Naturally I resented the opening statement. How appalled it made me feel to think that I have been wasting my time and risking my neck by not sticking to my brick laying--perhaps I have?

It reminded me of a certain manufacturer of an aircraft of unconventional design who listened to the words of the highly paid intelligentsia of his organization and spent hundreds of thousands of dollars in advertising the erroneous belief that his machine could be flown by any pilot after a few moments of verbal instruction. It is true that this was accomplished in a few instances, but, to bring out my point, the manufacturer and his group of advisers overlooked and did not appreciate the inherent flying ability of these men. Consequently, it cost them much in advertising erroneously and a great deal more in the loss of prestige after about 95 percent of the ships manufactured and sold were cracked up.

There is little doubt in my mind that the various aerial survey companies throughout the country have spent more than they realize on the inability of "any good pilot" to fly accurately enough for mapping. When a man is asked to fly a series of imaginary lines on the earth's surface, thirty or more miles long, with a deviation from his course of no more than 1200 to 1700 feet, in a machine that can rotate around three different axes separately or simultaneously, it is a matter of deep concentration and developed skill on the part of the individual rather than just a few hours of practice. Consequently we have the fact that, at certain times, the BEST mapping pilots are incapable of doing the job set down before them.

Rather than complacently standing by with the thought that the pilot will do better next time if they give him a good bawling out for pulling his lines apart or having excess bow in one, I feel that the operator should consider more seriously the problems confronting their pilots. Assist them by supplying all the instruments they want and help them to develop instruments they think might help.

It is true that the flying in map work is merely incidental to the completed product and for that reason the development in this line of endeavor has been in all the other phases and the pilots have been left to rely upon their own resources to comply with the increased stringency of the specifications brought on by the other developments. There is entirely too much guess work in map flying and until the error of the human element can be removed, or further removed, and map flying becomes as mechanically accurate as blind flying, there is little chance of any pilot consistently staying within the present specifications.

It must be admitted that there are plenty of instruments still to be developed before a pilot can accurately and consistently do perfect work. At the present time we have so few instruments that aid the pilot in his work that they can be counted on one hand. And, even now, without these few, it would be impossible for the best mapping pilot in the world to fly a job according to the existing specifications.

Think of all the development that has been carried forward on other instruments in order to produce accurate work and then compare it in every way with what the

pilot has to work with and the progress in that line. Did you ever hear a pilot say he had a real airplane for mapping or that he had a perfect set of instruments? Of course not. Because there is no such thing in existence. However, there are few pilots doing this work that do not have splendid ideas on what they want and need.

With so few days out of the year to fly it seems logical that more thought should be given to the assistance of getting more work out of these days.

It is my hope that this article will bring out many helpful ideas and stimulate further discussion on this subject. If it is so desired by any members of our organization I would be more than pleased to correspond personally with them on it.

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THE ORIENTATION OF OBLIQUE AERIAL PICTURES

by

Lage Wernstedt, U. S. Forest Service

By the method described in this article, aerial oblique pictures may be oriented precisely through a procedure which might possibly appeal to the aerial map maker as possessing the indispensable quality of simplicity.

The procedure involves the use of a photogoniometer. Pictures corresponding to any ordinary focal length from 5" up can be used directly in this instrument and the total cost of the complete outfit, as used for making contour maps, aside from the transit employed is not over $200 and probably less if made in quantity. (Figure 1)

It is believed that the method might be useful in covering an area with control, both vertical and horizontal, where vertical aerial pictures are principally used for making the map.

A contour map worked up by methods similar to plane table methods involving resection and computation of altitude of the air stations and intersection and computation of the elevation of salient topographic points with subsequent sketching in of contours from the pictures is appended, and serves to show the possibilities of small scale topographic mapping by this method at least in mountainous country. Most of the work is graphical. All computations involved are trivial ones and are quickly performed on a slide rule.

Procedure of Orientation

A knowledge of the approximate altitude of the air station at the time of exposure, although not necessary, will save time. Therefore the altimeter reading is used as a preliminary.

It is necessary to have vertical and horizontal ground control available, but the control points do not need to be spaced closer than 15 to 20 miles or one point per 150 to 300 square miles where a wide angle lens is used or where two or more cameras are employed.

A typical map was made from 2-camera simultaneous exposures, the cameras, two K5[S] both being mounted in a casting at right angles to each other and constituting in effect a two lens camera.

A 5 or 6 lens camera designed for obliques and exposing the entire horizon on the same film could easily be designed and would reduce the work materially. With a single camera covering 40° of horizontal angle 9 exposures are necessary to cover the entire horizon. With two cameras at least 5 exposures are needed. With a lens covering 70°, 5 and 3 exposures respectively would accomplish the same result, while with a 5 or 6 lens camera a complete panorama could be made in one exposure. This means that the number of air stations that it is necessary to resect and the work necessary to do this would be reduced very materially.

To get back to the subject. If some sort of base map is available on which the triangulation points are shown, a rough location by eye is made of the camera station by simply inspecting the picture before us and lining up various map features using a plastacele ruler to define the center line of the picture on the map. This furnishes one line. The other picture belonging to the pair provides