POINT IDENTIFICATION ON AIR PHOTOGRAPHS

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PERHAPS the most important requirement in any air survey is that the ground surveyed points used as a basis for controlling the photography should be correctly identified on the photographs. In the writer's experience, more difficulties and delays have been caused by misidentifications of these points in the field than perhaps by any other cause; yet very little has been written on this important subject, and generally recognized methods of point identification do not exist. In this article a system of point identification is described which the writer has used with success in certain types of country, and it is hoped that the article may lead to more contributions on the subject.

The system described herein cannot be used in every circumstance inasmuch as it depends on the presence of a very small pattern formed on the photograph by the texture of the ground. There are places where such patterns do not exist, such as on lawns or very smooth cultivated grassland, but these places are generally found in well developed areas where point identification is less difficult than in open, undeveloped country. The method is perhaps particularly suitable for work in desert areas which would seem at first sight to be featureless, but where these small patterns usually abound.

The system also depends on the pattern formed by the texture of the ground not having changed appreciably in the interval between the photography and the visit of the surveyor. This could only come about through rapid growth of the vegetation, and the application of the method is widened considerably if areas of rapid growing vegetation can be avoided, or if the interval, that has elapsed since photography, has occurred during the winter months when the vegetation growth is dormant. A small uniform growth is not objectionable as this merely accentuates the pattern.

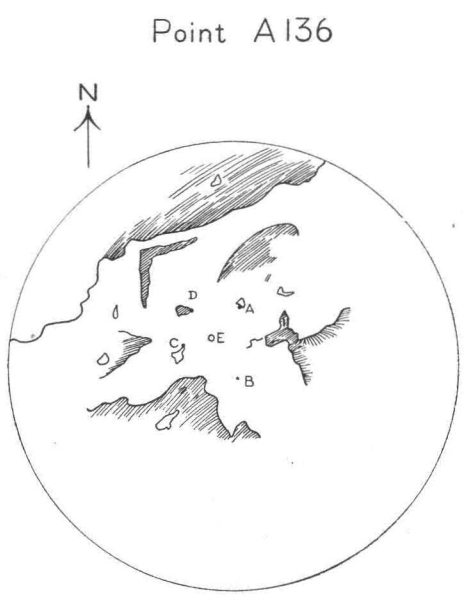
The method is as follows: The surveyor locates the approximate position in the usual manner, that is by walking from one clearly identifiable object to another, or by bearing and distance travelled.

On arriving at the approximate position of the trig point, or the place where he intends to establish such a point, he should then be in a position to say that the point lies somewhere in a very small area on the photograph. By careful cross reference between the photograph and the ground, he should be able to reduce the size of this area to say, a centimeter or $\frac{3}{4}$ centimeter circle on the photograph.

Having done this, he pencils the circle on one of the photographs, and sits down as comfortably as possible on the ground and examines the area in the circle stereoscopically using a small magnifying stereoscope.

Examination will disclose some kind of pattern in the area circled. There may be a few moderately large shapes visible with the naked eye, but in addition there will almost certainly be a number of small irregular shapes which are only clearly visible under the magnification. These are formed by large tufts of grass, rocks, patches of bare earth, scrub or similar irregularities.

The surveyor draws a circle in his note book as large as possible, and some ten or perhaps even twenty times larger than the circle on the photograph. He sketches the most prominent features of the pattern at a correspondingly large scale. He then selects some five or six points in the pattern, and using a glass scale, graduated in 1/5ths or 1/10ths of a millimeter, laid over the photograph, and examined under the magnification of the stereoscope, he measures



DISTANCE	MMS ON PHOTO	PACES ON GROUND
A - B	1·20	24
B - C	1·10	22
C - D	0·55	11
D - A	0·85	17
A - E	0·75	15
E - E	0·80	16
C - E	0·50	10
D - E	0·60	12

SIZE OF CIRCLE
ON PHOTOGRAPH

all possible distances between these five points. The distances measured will be very short and generally in the order of 1 or $1\frac{1}{2}$ millimeters. Knowing the approximate scale of the photographs, the distances are converted to paces on the ground and entered as such on his sketch. (See Figure.)

The surveyor now proceeds to search for the pattern on the ground; having found it, he checks to see that the pattern is the correct one, by pacing between the selected points.

If the Surveyor selects at least five points in his pattern, the chances are small that there are another five points of the same shape and disposition forming an identical pattern close by. The chance is so small that the contingency may be regarded as impossible, and he may conclude that he has identified the correct position with certainty.

When identifying an existing trig position and the trig is on a small cairn, the image of the actual cairn can generally be identified as it will feature in the pattern. If not, a photo point can be selected inside the pattern and can be positioned with relation to the trig by compass bearing and short measured distance.

The advantages claimed for the method are twofold: first, an identification by this means is beyond any possibility of error; and second, a record of the identification is available in the field book. In practice, it is advisable field practice to mark the point identified with a fine needle point on one of the photographs, but if the sketch is well made, it should be sufficiently readable to provide proof of correct office identification. It is thought that such sketches would be very valuable in giving to cartographers, a confidence in the points they use. This confidence is often lacking; and a single mistake can completely destroy confidence as it throws suspicion, not only on the point in error, but on other points in the neighborhood. For example, if one point in a group of three is

wrong, the cartographer is generally unable to tell at which point the mistake was made.

When the pattern is large and distinctive, the point may often be identified by immediate inspection, and the pattern check might seem a waste of time; but it is of no more waste of time than a cross check on a computation, and is valuable in that it eliminates possibility of error, however stupid.

In cases where the pattern is small and complicated, it may take as long as an hour's careful study and search to locate the pattern. It is, however, the only method I know which enables a point to be located in this type of background, and well repays the time spent. The general practice when a trig is located in this type of background is to choose a photo point some distance away, and to determine its position by bearing and distance from the trig. This normally takes longer than direct identification of the trig by the method described, and introduces additional possibilities of error.

It is hoped that the method described may be of interest to some surveyors, and that there may be some more contributions on this small but important aspect of air survey which may lead to the elimination of the "I think this is where it is" method.