PLOTTING THE FOREST MAP FROM VERTICAL AIR PHOTOGRAPHS

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THE RADIAL intersection method of plotting vertical air photographs is described in a number of publications, among which may be mentioned the following:

The Use of Air Photographs for Mapping, Topographical Survey Bulletin No. 62, 1932, obtainable from Legal Surveys and Map Service, Department of Mines and Resources, 105 George Street, Ottawa, Ontario.

Plotting Vertical Air Photographs by Radial Intersection, by W. Hall, 1939, published by the British Columbia Forest Service, Victoria, B.C. This comprises a revision and enlargement of a treatise prepared by G. S. Andrews in 1936.

Air Photography Applied to Surveying, by C. A. Hart, 1940, published by Longmans, Green and Co., London—New York—Toronto.

Surveying from Air Photographs, by Lieut. J. S. A. Salt, 1933, published by His Majesty's Stationery Office, London, England. (This book may not now be available from the publisher). Surveying from Air Photographs, by Capt. M. Hotine, 1931, Constable and Co., Ltd., London, England, might be secured alternatively.

In applying the radial intersection method to the compilation of maps desired for use in logging operations, the forest engineering staffs of timber owning companies will be guided by their own special requirements.

In the case of such maps as the National Topographic Series of Map Sheets, the Topographical Survey Division, Department of Mines and Resources, must, of course, determine the boundaries of the map sheet by means of ground surveys. Usually, however, the exact geographical setting of a map intended for use in woods operations is of minor importance. Thus it sometimes happens that a map wanted for forestry purposes may be proceeded with as soon as the photographs become available, instead of being delayed pending the extension of ground control.

On the other hand, the forest operating map must include considerable detail relating to forest types, roads, streams and slopes, and must have a comparatively high degree of accuracy, such as is not demanded in the usual small-scale map sheets as published. Local accuracy and careful distribution of error are important in the forest operating map. Consequently, it is usually necessary to re-plot the photographs, regardless of the fact that they have already been used in the compilation of the published map sheet, or at least to fill in further details. Sometimes it may be advisable to provide additional control by running traverses of lakes, streams and roads, as well as to make use of whatever control may be provided from timber cruising and running the job boundaries.

A special map¹ is being reproduced herewith to demonstrate some of the methods that may be employed by the forest engineer. In the absence of adequate ground control, no published map sheets were available for the region included in this map. The existing control, which consisted of seven geodetic

1. Compiled by R. D. Loomis, Dominion Forest Service, Ottawa.

points and limited coastal surveys (see legend) was sufficient for the compilation of a base for forest inventory data.

The time required to construct this map was reduced very greatly by a simplified procedure by which only about one-third of the photographs were plotted by the radial intersection method. The remaining photographs, which were numerous because the lines were flown with unusually large overlap, were used to fill in the gaps between radial intersection strips. These gaps were bridged at intervals by selecting photographs from one or more parallel flights and laying them out as a temporary mosaic. Then tie points were chosen (see legend) and joined by lines to provide orientation in plotting. The remaining blanks were filled in from single photographs. The photo control points as plotted on the map indicate the position of the photographs that have been used for radial intersection purposes, but the location of the other photographs is not shown by the map. In employing this simplified procedure it is necessary to keep constantly in mind existing circumstances in respect to the degree of control and the extent of scale variations in the photographs. In many cases the radial intersection method should be used throughout the whole area of the map. In the case of this special map, however, the general flatness of the tract and the control provided by the numerous straight roads favoured the employment of the simplified procedure.

Azimuth lines and offsets (see legend) were drawn on both the radial line strip and the map to facilitate the plotting of the photo-control points at the scale of the map, which was done by means of proportional dividers. Alternatively, a graphical method similar to that shown in the above-mentioned book by Salt, pp. 95 and 96, could have been employed. (See also Hart, p. 191). A pantograph would also have served.

Further saving of time was effected by means of the duoscope, which was used to transfer all the linear detail directly from the photograph to the map. In bridging the gaps between the radial intersection strips, the distance between control points was measured on the temporary mosaic, and the duoscope mirrors were set in the proper position to provide the required reduction of scale. The simultaneous view of photo and map afforded by the duoscope not only shortened the process of transfer but also aided greatly in adjusting the photographs to their control points or to stronger detail already plotted. The duoscope was adjustable instantaneously for fine changes of scale, permitted ease of manipulation of the photographs, and was freely movable on the map.

The Dominion Forest Service, Lands, Parks and Forests Branch, Department of Mines and Resources, will furnish on request, further explanations to those engaged in the compilation of forest maps from air photographs, or will indicate where the desired information can be secured.