PHOTOGRAMMETRIC TEST FIELDS

Prof. Dr. R.S.Halonen
Technical University of Helsinki
Institute of Photogrammetry

Several test fields have been constructed for the calibration of cameras actual flight conditions. These are, however quite expensive, especially if the control points are measured by geodetic field methods. The use of test fields is also expensive as the calibration of a camera necessarily involves an actual flight, which can be expensive merely due to reasons of location. For these reasons it generally suffices to calibrate cameras under laboratory conditions. The distortion values that are given by manufacturers of cameras are evidently also determined under laboratory conditions.

Though it is quite evident that calibration values that are fully equivalent to ones measured on the field can scarcely be obtained in laboratories, the magnitude of the discrepancies between the measurements has never exactly been determined nor has the practical significance been evaluated - indeed it may be of merely academic interest. This state of affairs is probably explained by the fact that test field specialists do not build collimators, and such people that do rarely have the use of a test field. To throw some light on these problems the initiative has been taken in Finland - which is duly acknowledged a new neutral country - to build both, and to essay to determine to what real extent test fields are necessary.

It is self-evident that if a camera is to be calibrated under actual flight conditions then this task must be performed under these conditions. This means that each flight altitude should have its own test field. This is hardly possible and thus the conditions should be determined for extreme circumstances, i.e. for maximum and minimum flight altitudes.

As a curiosity, it can be mentioned that the determination of the coordinates of one of the fields was with analytic photogrammetry. Actually the camera that was used for the purpose is scheduled for calibration on this same field. The idea came from the field of geodesy in which it is well known that even

an uncalibrated levelling instrument can give correct readings by arranging measurements in such a way that the errors compensate each other. This is also possible in photogrammetry. In practice this means a homogeneous test field with 60 % overlap in two directions and with the points situated on the common area of nine photographs. A group of points, placed in this way, is independent of all errors that are determined as a function of the radius and thus by choosing a suitable flight altitude the required accuracy for the points can be determined. The scale will be larger than the actual calibration scale, with which one photograph covers the whole field, and the determination of the coordinates of the points is accomplished by analytic photogrammetric methods, as mentioned above. Though the actual scale is not all necessary for the calibration itself the minimum required amount of geodetic measurements for the determination if the scale were taken.

Two test fields of the above mentioned type have been prepared. The one for the calibration of cameras intended for use in the preparation of 1:500 - 1:2000 scale maps the other for so-called high altitude flights at approximately 7500 m and at a scale of 1:50000.

The results of the photographing of the test flights will be compared to those of laboratory measurements (see the paper by Mr Hakkarainen) and the accuracy of the latter calibration values will be determined as will also the need of additional test fields.

The measurement results of the test fields will be further described in the first number of this Journal to appears in 1970.