ON A METHOD OF TRAVERSING

by

Dr. G. Poivilliers.

(Complete French text is given on page (414)-45-1 of the General Report).

Goal of the method:

1. to keep the systematic errors as constant as possible.
2. to reduce these errors and the accidental errors due to the imperfections of sight to a minimum.
3. to eliminate the influence of local deformations of the perspective bundles.
4. to reduce the time needed for the operations and to codify the operations in order to make them accessible for any operator.

Though the traversing calls, in a general way, for a high regularity in flying altitude, rectilinearity and cadence of shots, the method can be used even in the case of important local irregularities; moreover the method can be applied in the case of most accidented terrains.

The traversing can be fitted in between control points or not (antenna). The compensation that can be executed per strip or per block, is not included in the exposed method.

The constancy of the systematical errors is reached by keeping zero the base components by and bz and by blockading the component bx on a fixed value, the latter resulting in the necessity of displacing the common photograph of two successive models at every change of a model.

The three connection points ANB of a photograph with its neighbours are marked on this photograph by means of a gauge, they occupy therefore the same position in all models.

The stereoscopic models are formed utilizing exclusively the perspective rays corresponding to these points, following a method — treated in "The Determination and Correction of Accidental Local Deformations of Perspective Rays" — that permits the elimination of the influence of the local transversal deformations of the bundles.

The accidental errors of the formation of stereoscopic models are reduced by repeating the measurements of the transversal parallax. The connection is assured by:

1. stereoscopic measurement of the coordinates x, y and z of the points ANB,
2. measurement of the angles α and i of the marked points (monocularly),
3. measurement of the coordinates x', y' of the same points for a certain, fixed, value of z (monocularly).

Changing two adjacent models the angle i of point N (ordinate y being about zero) is conserved rigorously in the case of a stretched traversing; it is modified with a convenable quantity in the case of an important variation in the rectilinearity or in the altitude between two successive photographs.

The Stereotopographes Poivilliers SOM type B are particularly adapted for the application of this method, that asks for only one passage of each model. The calculation furnishes the data for the plotting of each model:

1. *Correction Δb_k of the base length:* (for the formulae: see the French text)
   z = mean z-distance of point N_k in the two models K-1, K
   Δz = difference of these two z-distances of point N_k (The models 1 and n are furnished with control points).
2. *Correction of the Y-tilt:* (y/z is constant for all models).
3. *Vertical base-component:* H_z and H_{n+1} are the altitudes of the air stations 2 and n+1.
4. *Altitude of air station K.*
5. *Horizontal base-component (swing):* ($\Delta x'$ = the difference of the abscisses x′ of the same point A or B in the two models).
6. *Coordinates of point N_k in the projector-system:* D_x, D_y, D_z = differences of the coordinates of the points N_{k-1} and N_k in model (k—1), corrected for the systematic errors and for the local deformations of the models.

The final compensation over the control points is executed with the help of the method of least squares.
In the antennae the terms, e, α, γ are calculated, supposing

$$\Delta b_1 - \Delta b_n = 0, \qquad H_{n+1} - H_z = 0, \text{ a.s.o.}$$

THE DETERMINATION AND CORRECTION OF ACCIDENTAL LOCAL DEFORMATIONS OF PERSPECTIVE RAYS

by

Dr. G. Poivilliers.

(Complete French text is given on page (414)-47-1 of the General Report).

The theory of the plotting is based on the hypothesis of the identity of the perspective rays of the photographic bundle with the bundle of lines through the air station to the groundpoints.

The traversing is based on the hypothesis of the presency of only two kinds of errors: errors with a systematic character descended from systematic deformations of the perspective bundles and errors with an accidental character descended from imperfections of sight to the points.

The hypotheses are not rigorous, sometimes local deformation in the perspective bundles are to be found, deformations descending from either deformations of the emulsion base or from deviation of light-rays that have passed zones of atmospheric turbulence.

These local deformations result in fractures that have been stated in the repartition of the errors after the compensation of the traversings.

The communication treats a method of discrimination of those perspective rays that are subject to such deviations; the errors resulting from these deviations are eliminated.

The deviations have two components: the first is the transversal component, that falsifies the transversal parallax and results in: 1. an error in the execution of the relative orientation of the two perspective bundles of a model, and 2. deformations in this stereoscopic model that propogate theirselves in all following models. The second, the lateral component, modifies the stereoscopic