There is another possible method of orienting photographs in the Multiscope. The photographs could be placed so that the optical axis of each photograph coincides with the vertical axis of eyepiece and mirrors. In this arrangement, each eye is over the exact center of the photograph being viewed, and the stereo image is seen by converging the eyes. No prisms are necessary to see both the map and the true stereo model.

The weakness of this arrangement is the limitation to plotting scale. The plot, if it is to be an orthogonal projection, will be at the scale: (interocular distance/air base distance) no matter how the principal distance is varied. The air base distance in any one particular run can have wide variations, depending the variation of overlap at one scale. Standard specifications allow overlaps ranging from 55 to 65%. This variation is evidence of changes in air base distance which will cause variations in plotting scale for adjacent pairs of photographs.

It may be that the designers of the Multiscope had certain purposes in mind that do not require original plotting or map making as such, but rather sketching or delineating special information on the framework of a base map already made. If this is the case, the instrument can fulfill these limited purposes, because accurate plotting is not neceesary.

COMMENTS ON THE MULTISCOPE

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IN PHOTOGRAMMETRIC ENGINEERING, Vol. XI, No. 3, of September 1945, a description is given of the "Multiscope." On page 173, it is stated that an "orthogonal plot" can be obtained when semi-transparent mirrors are used. Reference is made to Figure 2. This statement is true, but under certain conditions only; therefore, the conditions under which this "orthogonal plot" can be obtained might be investigated.

Supposing that there are two exactly vertical photographs with equal flying height (and equal focal length) these conditions are:

1. Virtual images of photographs must be parallel to virtual image (V.I.) of map.

2. Left (right) eye perpendicularly above principal point of V.I. of left (right) photograph, when "perpendicular" means with reference to V.I. of map.

3. Distances of left (right) eye to the principal point of V.I. of left (right) photograph must be equal.

With eye is meant exactly the center of the sphere of the eye which is the center of projection. If the above conditions, of which the third is more or less self explanatory, are fulfilled, then the distance of the principal points on the map is always equal to the distance of the eyes of the observer, therefore, the scale of the map is a fixed quantity, equal to (eye base/air base).

This eye base can be influenced by a system of mirrors or plane-parallel glass plates—but more simply by the use of two measuring marks instead of one, which is the well known principle of the so called "parallogram of Zeiss."

If the rotary prisms are used as stated in the above-mentioned article, or if the observer changes the position of his head, then the places of the virtual images change and the result is not orthogonal.