Remote Sensing Brief

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Modifications to Interpretoskop Optics for Stereo Viewing of 70 mm Aerial Photography

A dual periscope mirror arrangement is used to move the inter-frame conjugate centers inward sufficiently for stereo viewing.

Increasing use is being made in the Division of Land Resources Management of large-scale 70 mm format aerial photography, acquired using Vinten and Hasselblad cameras, for inventory and monitoring of a wide range of resources and environmental parameters. Other groups outside the Division are applying, or are considering applying, 70 mm aerial photography for mapping and monitoring. If the photography is to be analyzed in roll form, there are a limited number of stereoscopes which allow stereo viewing of the film. Generally, the geometry of the stereoscope optics requires the image frame centers to be more than 70 mm apart. For 70 mm aerial photography with 60 percent overlap, the conjugate centers vary between 50 and 55 mm, depending on the interframe spacing on the strip film, and the film must be cut into individual frames if no modification to the stereoscope optics is done. Frequently, dual viewing is advantageous, improving interpretation of difficult areas, and zoom capability can facilitate the identification of small plants.

We use a Zeiss-Jena Interpretoskop for routine mapping from black-and-white, color, and color infrared aerial photography.

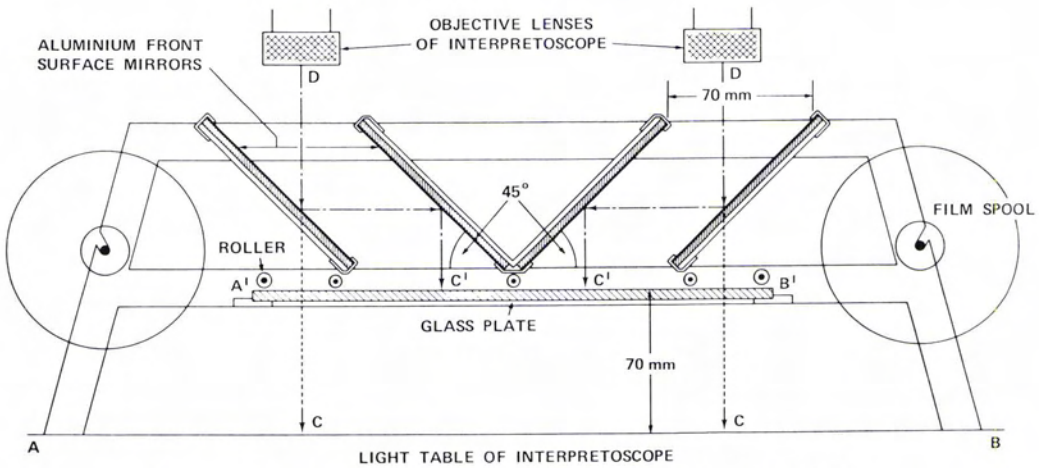

Fig. 1. Schematic diagram showing modifications to the Interpretoskop.

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The Interpretoskop is an extremely versatile stereoscope, with dual viewing, the ability to independently zoom and rotate the image planes, and parallax motion in the X direction over the range 90 to 310 mm, and in the Y direction to ± 65 mm. To allow stereo viewing of 70 mm aerial photography in positive transparency roll form, a simple "dual periscope" mirror arrangement was constructed to offset the optical path in the film web (X) direction.

A schematic diagram of the system is presented in Figure 1. Four front surfaced mirrors of dimensions 75 by 110 mm are mounted in two pairs of two, 70 mm apart at 45° to the film plane AB of the Interpretoskop. The mirrors deflect the optical path from the frame center into the objective lenses CD, to the position C'D. By deflecting the optical path in this manner, the distance from the objective lens to the film plane of the Interpretoskop is increased by 70 mm. To compensate for this, the film plane is raised 70 mm to position A'B' by means of a glass plate. Nylon rollers are used to hold the film flat on the glass plate. Slots are machined into the ends of the frame to hold the 70 mm film spools. The frame is constructed to allow maximum accessibility to the film surface for annotation.

The attachment has been tested on 70 mm photography at a variety of scales and for different terrain types and vegetation types. No distortion or loss of focus could be observed over the full zoom range of the Interpretoskop. Variations in inter-frame center distances from rotations due to aircraft yaw, and offsets in cross track direction due to aircraft roll, could be compensated for adequately with the Interpretoskop controls.

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