Remote Sensing Brief

A Practical Field Stereo Viewer for 230-mm Color Transparencies

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Natural resource managers often find it necessary to view color aerial photographs in the field as well as in the office, particularly when training photo-interpreters, setting interpretation standards, and verifying the results of interpretation. Ideally, the photos should be viewed stereoscopically, with good illumination and in a comfortable working position. Positive reversal transparencies have the best resolution of the generally available color products and are also usually the least expensive. Standard light sources can be used for office viewing; however, it is much more difficult to provide the necessary transmitted light for viewing transparencies in the field.

Several general approaches to this problem have been reported. Wear (1960) developed a portable light table powered by batteries. A simple lens stereoscope was used and the overlapping portions of the stereopair were accommodated in a slot in the illuminated surface. Later developments (e.g., Parker 1971) which incorporated transistorized circuitry to convert the D.C. output of the batteries to the 110 or 240 volt A.C. used to drive low-wattage fluorescent mini-tubes resulted in some reduction of weight; however, in the authors' experience versions made for 230- by 230-mm photos are too bulky for convenient field use.

Considerable use has been made of ambient light as a source of illumination. Interpretation of individual transparencies can be made against the light from the sky (Wear and Lauterback, 1955), but the working position is neither convenient nor comfortable. Further, this method provides only a monoscopic view. A stereo viewer for 230- by 230-mm transparencies illuminated by skylight was described by Klein and Lory (1981). To be effective the entire viewer has to be held in a near-perpendicular position and thus is not comfortable to use.

An alternative approach, reported by Myers and van der Duys (1975), involved the attachment of a white-painted reflecting board beneath the viewing surface. They claimed it was effective under most field conditions. Klein and Lory (1981) also used this principle in the two other field viewers they described, one for 70-mm film and the other for panoramic imagery obtained from U2 aircraft.

A most useful feature of Klein and Lory's 230- by 230-mm viewer is the provision of slots at the outer edges of the viewing surface to accommodate the portions of the transparencies not required for viewing with a lens stereoscope. The total width of the viewer is thus reduced to about 250 mm.

In field use it is desirable to have the stereoscope attached firmly to the viewer to enable it to be carried from point to point in a ready-to-use position. This feature also allows the interpreter to hold the viewer in one hand and have the other free for annotation. The viewers described by Myers and van der Duys (1975), Craig and Myers (1981), and Klein and Lory (1981) all exhibit this feature, although to accommodate the full depth of the overlap of 230- by 230-mm transparencies, Klein and Lory chose to attach the stereoscope to a sliding carriage which in turn was attached to the viewer.

A field exercise was conducted in 1980 in the tall *Eucalyptus* regrowth forests in southern Tasmania using 230- by 230-mm large-scale color transparencies to establish ground truth as part of a study on detecting crown dieback (Myers *et al.*, 1984). Field conditions which included heavy undergrowth, steep terrain, and many large logs on the ground, some up to 3 metres in diameter, made movement through the forest very difficult. A lightweight viewer was built for the purpose which allowed viewing of the entire stereo overlap of the 230- by 230-mm transparencies. The design embodied the best features of the previously reported devices and incorporated

- a split viewing surface with side slots to accommodate the excess portions of the transparencies;
- a hinged reflector;

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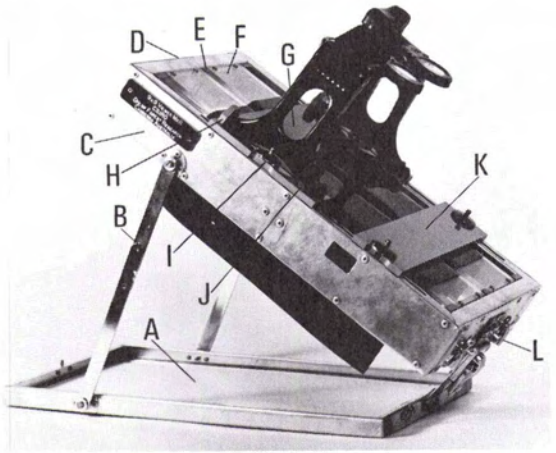

FIG. 1. Field stereo viewer with transparencies and stereoscope attached. *A*–reflector, *B*–stay, *C*–frame, *D*–carrying handle, *E*–film slit, *F*–U-section, *G*–stereoscope carriage, *H*–fixed stirrup, *I*–knurled nut, *J*–rubber stirrup, *K*–film retainer, *L*–hinge.

- a firmly attached 2x lens stereoscope, the position of which is readily adjustable;
- light weight;
- compact dimensions;
- a comfortable viewing position;
- ease of assembly and disassembly for carrying; and
- strong construction.

The viewer is shown in Figure 1. Two film supports each 325-mm long and 75-mm wide with a U-shaped cross section 75-mm deep were made from clear plexiglass 6-mm thick. These were set in a rectangular frame of aluminum sheet such that there were 7.5-mm gaps at the outside edges and between the sections to accommodate the portions of the transparencies not required for viewing. The frame supports a plastic stereoscope carriage which also holds the transparencies flat on the viewing surface. The carriage can be moved over the face of the viewer to allow scanning of the entire stereo overlap. Also attached to the frame is a plastic film retainer which assists in keeping the film flat. Like the stereoscope carriage, its position can be altered. Hinged to the frame is a matte white reflecting board (sand-blasted melamine plastic sheet) retained by folding stays. The hinge, when open, extends so that the reflecting board is clear of any protruding portions of the transparencies.

The device is held by the frame, and the viewing position is varied to maximize the amount of light reflected by the hinged board. The viewing position can be varied to avoid reflections from the surface of the transparencies and to suit the comfort of the user. In fact, comfortable viewing is possible in a range of positions; the lines of sight through the stereoscope may vary from vertically downwards through to nearly horizontal.

The matte white reflector on the viewer provides illumination at a color temperature of about 5500°K at the viewing surface whether illuminated by direct sunlight, diffuse skylight, or dappled light under a forest canopy. This approximates the color temperature (5000°K) recommended by the American National Standards Institute (1969) for viewing color transparencies.

The viewer can be carried conveniently by its carrying handle with the stereoscope attached and a stereopair in position. The hinged reflector can be folded flat onto the underside of the frame for movement through the forest, or, for transport over longer distances, the stereoscope can be removed easily and the folded viewer fitted into a small backpack. The overall dimensions when folded are 250 by 250 by 90 mm. Complete with stereoscope, the viewer weighs 2.5 kg.

The viewer has proved to be effective and comfortable to use. Illumination was adequate even in mid-winter in the tall forest, but low ambient light levels associated with very low cloud and rain showers did prove limiting. The viewer is strong, though improvements could be made to strengthen the reflector hinge.

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