PACIFIC SOUTHWEST
Forest and Range
Experiment Station

FOREST SERVICE
U.S.DEPARTMENT OF AGRICULTURE
P.O. BOX 245, BERKELEY, CALIFORNIA 94701

PROJECTION-VIEWER FOR MICROSCALE AERIAL PHOTOGRAPHY

Robert C. Aldrich James von Mosch Wallace Greentree

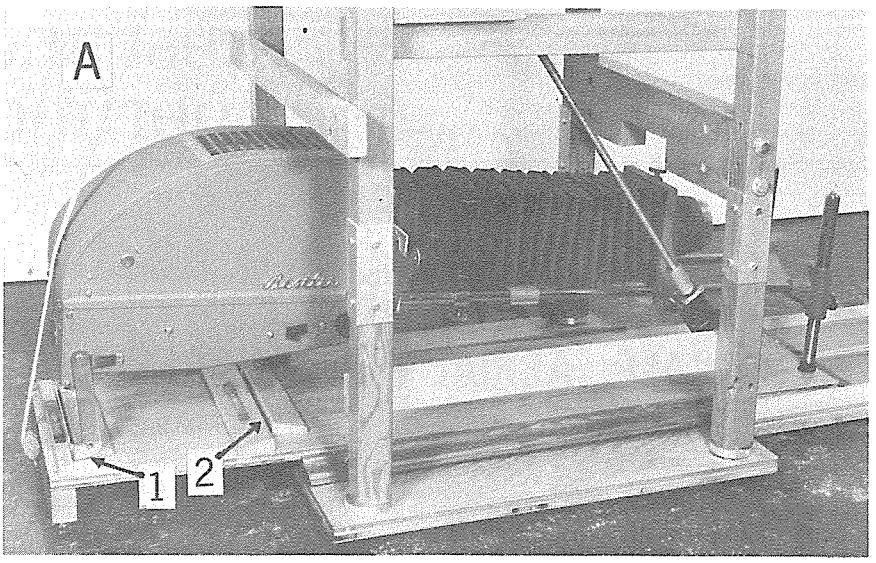
USDA Forest Service
Research Note PSW-277
1972

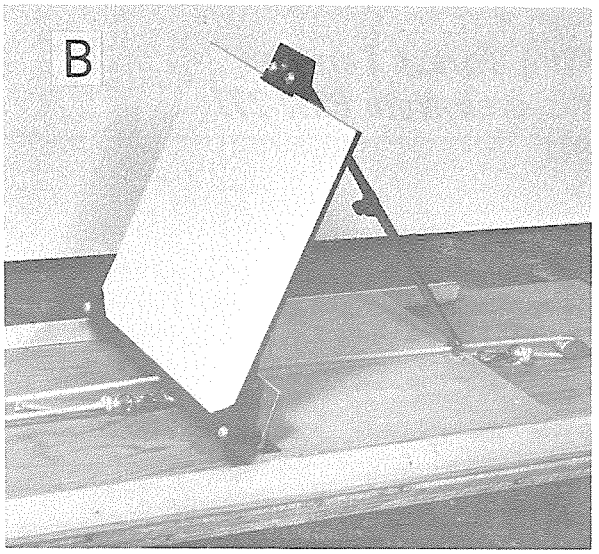
Abstract: A low-cost projection-viewer has been developed to enlarge portions of microscale aerial photographs. These pictures can be used for interpretation or mapping, or for comparison with existing photographs, maps, and overlays to monitor environmental changes. The projection-viewer can enlarge from 2.5 to 20 times, and can be calibrated so that maps may be drawn with a minimum of distortion.

Oxford: 587: U778.2.
Retrieval Terms: aerial photographs; forest surveys; photoprojectors.

A major stumbling block for users of remote sensing data who have limited budgets is the high cost of specialized photo interpretation and mapping instruments. We were faced with this problem in the interpretation and mapping of study areas on a forest inventory test site near Atlanta, Georgia. Specifically, we needed to enlarge photographs taken from high altitude and from space (1:120,000 to 1:2,400,000 scale) to compare them with ground surveys and larger-scale aerial photographs. To fill this need, we developed a projection-viewer that will enlarge microscale photographs and can be calibrated so that maps can be drawn with minimum distortion *(fig. 1)*. A Beseler Slide King,[1] with provisions for projecting 2- by 2-inch, 2-3/4- by 2-3/4-inch, and 3-1/4- by 4-inch slides, is used as the source *(fig. 1A)*. The projected image strikes a first-surface mirror *(fig. 1B)* that is adjustable for both reflection angle and position along a channeled wood base. The position of the mirror along the channel is changed by means of a pulley cord. By using the appropriate combination of mirror position and focal length lens (6 inches or 14 inches), a 2.5- to 20-time magnification of the imagery can be obtained on a 20- by 20-inch Polacoat screen *(fig. 1C)*. For example, when using a 6-inch focal length projection lens, portions of a 1:420,000-scale, 70-mm transparency can be enlarged to about 1:20,000 scale. Remote focusing of the projected images is done by twisting a knob *(fig. 1D)* that turns a geared arm attached to the projector focusing mechanism *(fig. 1E)*.

Although the projection-viewer is not a precision mapping instrument, it can be calibrated and maps drawn with a minimum of distortion. First, project a grid of squares (0.10-X by 0.10-inch) onto the viewing surface. Next, place a calibration grid constructed to the desired projection scale on the viewing surface.





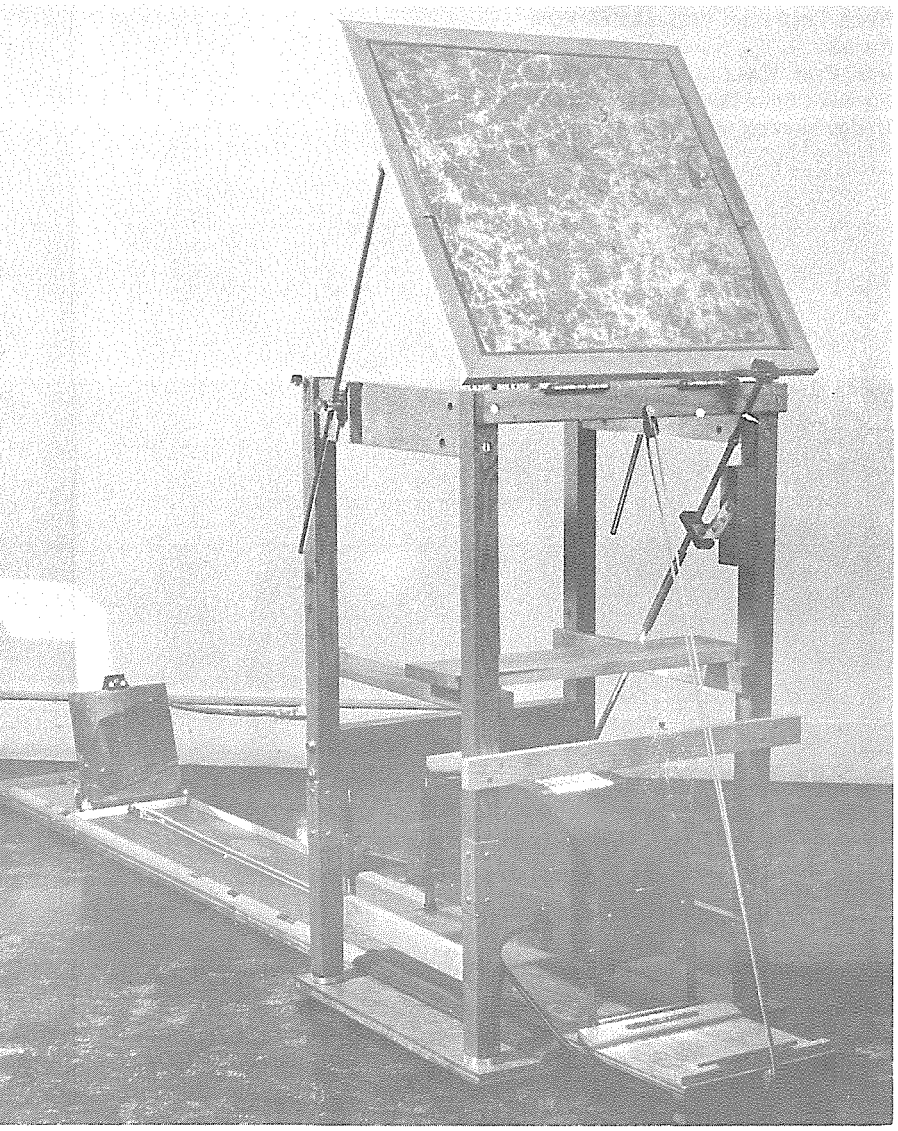
Adjust scale of the projected grid to equal the scale of the calibration grid *(fig. 1C)*. Then adjust leveling screws on the bottom of each leg of the viewing easel, and the angle of viewing surface, to remove distortion in the grid squares along all edges of the viewing surface. Finally, repeat the calibration procedure until most of the distortion has been removed. Once this has been accomplished, film transparencies in any of the three mount sizes mentioned can be projected within acceptable tolerances for interpretation, forest and range mapping, or for comparison with existing photographs, maps, and overlays to monitor environmental changes.

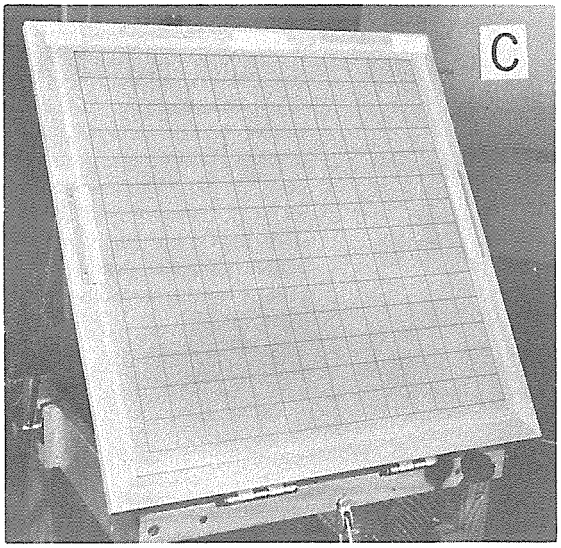
The construction cost of this instrument was about $130. It includes labor, construction materials, and the Polacoat viewing screen, but does not include the projector, mirror, and focusing lever. The Beseler projector was available. The mirror, focusing lever, and gears were extracted from obsolete surplus equipment. More detailed information is available upon request to the Director, Pacific Southwest Forest and Range Experiment Station, P.O. Box 245, Berkeley, California 94701.

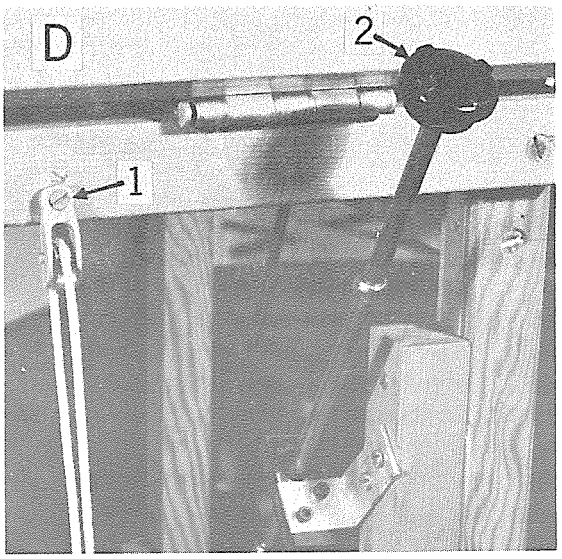
NOTE

[1]Trade names and commercial enterprises or products are mentioned solely for necessary information. No endoresment by the U.S. Department of Agriculture is implied.

The projection-viewer shows a 1:420,000-scale infrared color transparency enlarged to 1:32,000 for land-use mapping.







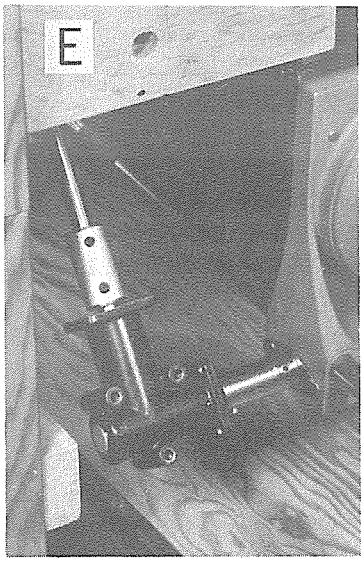


Figure 1—The projector-viewer is made up of five major functional sections. **A**, the Beseler Slide King projector mounted on its wooden stand (has two positions for projection: 14-inch focal length lens to enlarge 2.5 to 8 times, and a 6-inch focal length lens to enlarge to 8 to 20 times). **B**, an adjustable (8- by 9-inch) first-surface mirror. **C**, 20- X 20-inch Polacoat viewing screen with calibration grid shown. **D**, a photo scaling adjustment—the pulley for adjusting mirror position, and the projector focusing knob. **E**, the right-angle geared connection between the focusing arm and the projector.

The Authors

ROBERT C. ALDRICH is studying problems in remote sensing of the forest environment, with headquarters in Berkeley, Calif. He joined the Forest Service in 1948, after earning bachelor's (1944) and master's degrees (1948) in forestry at New York State College of Forestry, Syracuse. He has been a member of the Station staff since 1965. JAMES VON MOSCH, formerly with the Station's remote sensing research unit, is now with the Collins Pine Company, Chester, Calif. WALLACE GREENTREE earned a forestry degree (1961) at Humboldt State College. He joined the remote sensing research unit in 1967, after working with forestry consulting firms.

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*U.S. GOVERNMENT PRINTING OFFICE: 1972-794-421-3722