chains can be restricted to those areas described as partially stocked.

The fully stocked types are sampled at random only for species composition and age.

The same random sampling is carried out on those areas classified as not stocked, in order to determine the possible presence of small seedlings.

This survey method will provide all the necessary forest inventory data and not just the number of trees per acre. And the costs are substantially lower.

A rough calculation might illustrate this point. Assume that a logged-over area of about 10,000 acres or 16 square miles has to be surveyed.

With ground methods a crew of 2 men has to run 8 line miles per square mile, or a total of 128 miles (8×16). At the rate of 2 miles per day, which represents a fair average, the crew will need 64 working days for examination strips. Add an additional 6 days for travel etc. and the field work will be completed after 70 days. If the work is carried out by a service organization, the costs per crew-day can be assumed as approximately $55.00. Board and lodging of field crew might average $10.00 per day. The field work cost would then total approximately $4,500.00. If a suitable 20 chains map exists the office compilation might amount to one half of the field time which is 35 crew days or approximately $1,900.00. Thus, the total costs of this survey by ground methods would be approximately $6,500.00 or 65 cents per acre.

Using the previously outlined survey method based on *air photography* the costs would be as follows:

Dual photography, 6″ and 12″ with photo-scales of 40 and 20 chains respectively at 3 cents per acre..	$ 300.00
Planimetric mapping at 20 chains scale at 3.0 cents per acre.....	300.00
Photo interpretation of 12″ photos with 10 acres minimum type size at 6 cents per acre.....	600.00
	$1,200.00
Field examination. Will average one third of field time of ground methods or 23 crew days @ $55.00 plus $10.00 for B/L..	1,500.00
Transfer of types to map at 2 cents per acre.....	200.00
Office compilation. Same time as field work. 23 crew days @ $55.00.....	1,300.00
	$4,200.00

The total cost of this air survey method would be approximately $4,200.00 or 42 cents per acre, or roughly one third less than the ground survey costs.

These costs will, of course, vary to some extent in different locations. The basic fact will remain, however, and that is that photogrammetric methods in reforestation surveys will provide considerably more information for less money.

*Photo Holder for Stereoscopic Viewing**

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THE photo holder herein described is a device used by the author for rapidly orienting stereoscopic pairs of vertical aerial photographs under a mirror or prism stereoscope. It is of simple construction, and when properly used in viewing stereoscopic pairs of photographs, it will prevent eye strain that may otherwise develop with mis-oriented pairs of photographs.

The holder (Figure 1) consists of two units joined together by a sliding-arm assembly. A photo-holding plate is attached to each unit and can be rotated. Each plate (see Figure 1) has four corner cleats and three centering cleats for holding the photograph in place. The three centering cleats are so located that when they are aligned with three of the fiducial marks on the photograph, the principal point of the photograph is over the axis of rotation.

A small spring-loaded self-winding reel such as is used to hold a measuring tape, is

* Publication authorized by the Director, U. S. Geological Survey.

attached to the far edge (see Figure 1) of the right-hand unit. It holds a black thread which can be stretched over both photo-holding plates and secured by a small hook to an eyelet at the far edge of the left-hand unit. Since each anchor point of the thread is on the long axis of the photo holder, the thread passes over the axis of rotation positioned over the axes of rotation, the plates need only be rotated accordingly to align the conjugate points with the simulated flight-line thread. The photographs are now properly oriented, and with a suitable adjustment of the sliding arm for proper separation, are ready for stereoscope study. Adjustments of separation

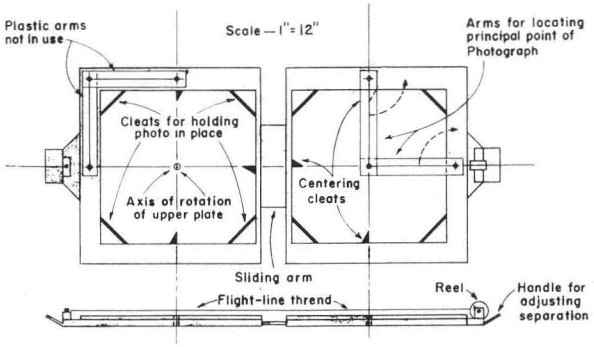

FIG. 1

of the photo-holding plates. This thread is used to simulate the flight path of the aircraft. The spring-loaded reel keeps the thread taut when in use, and stores it when not in use.

After a photograph is properly positioned on the photo-holding plate, the principal point is physically located by use of the two plastic arms secured by grommets to the frame of the photo-holding plate, and which can be swung over the photograph. A line is scribed on the long axis of each arm. The two arms are so secured to the plate that when positioned over the photograph and at right angles to each other, the intersection of the two scribed lines falls over the axis of rotation, and if the photographs are properly positioned, over the principal point. Coincident pin holes in each arm at this point of intersection enable the operator to identify the point by use of a point picker. This is done for both photographs. The conjugate principal points are then sterescopically identified. Since the principal points are already can be made by use of the two tabs, one at each end of the photo holder.

Approximate orientation.—As previously discussed, if the photographs are properly positioned, the principal point of each is over its respective axis of rotation and is in alignment with the flight-line thread. By rotating one plate, the principal point can be visually identified by its fixed position in reference to the center of rotation and the flight-line thread. The conjugate center is then visually identified on the other photograph, and the plate is rotated until this point is in alignment with the flight-line thread. This adjustment is made for both conjugate principal points. The photographs are now approximately oriented and ready for stereoscopic viewing.

The photo holder described in this paper was designed for use under stereoscopes that accommodate image separations of 7 to 10 inches. The photo-holding plates and sliding-arm assembly were cut from rigid cardboard. Such parts made of masonite, plywood or metal would be more suitable.