A SIMPLE METHOD FOR CONTROLLING AN AERIAL MOSAIC

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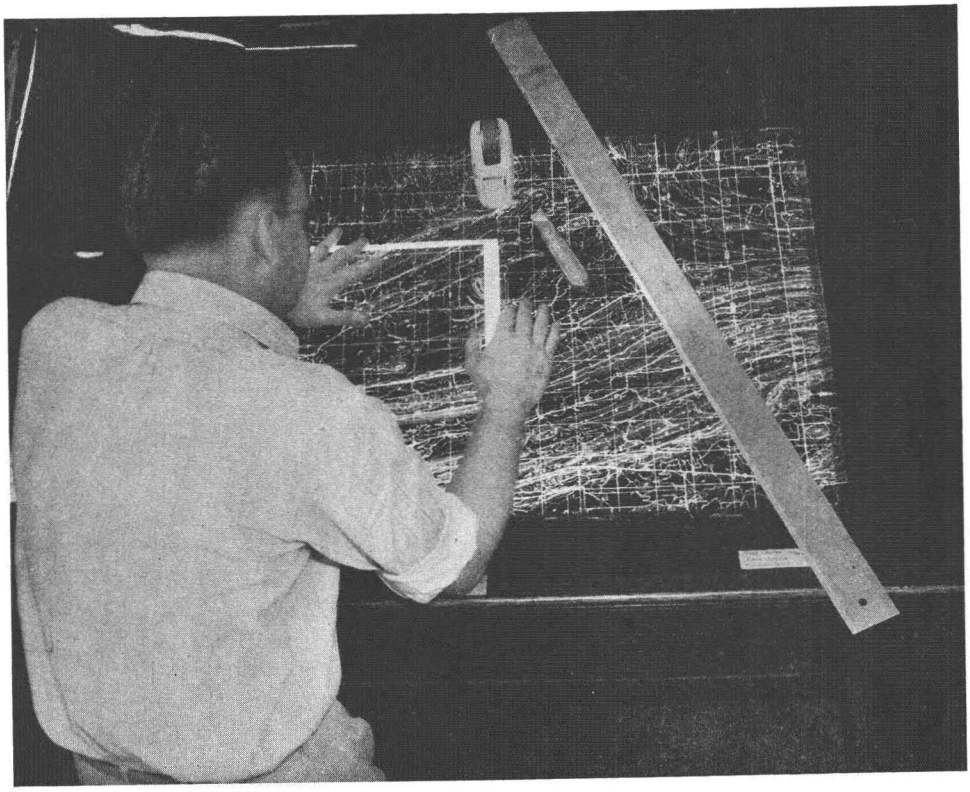
THE Little Rock Engineer District recently prepared an accurate controlled mosaic of an encampment and troop training area in conjunction with a multiplex plotted map. The mosaic was not needed as urgently as the map and methods were designed whereby the map planimetry could be used for controlling the mosaic laydown. The method, because of its simplicity, will probably

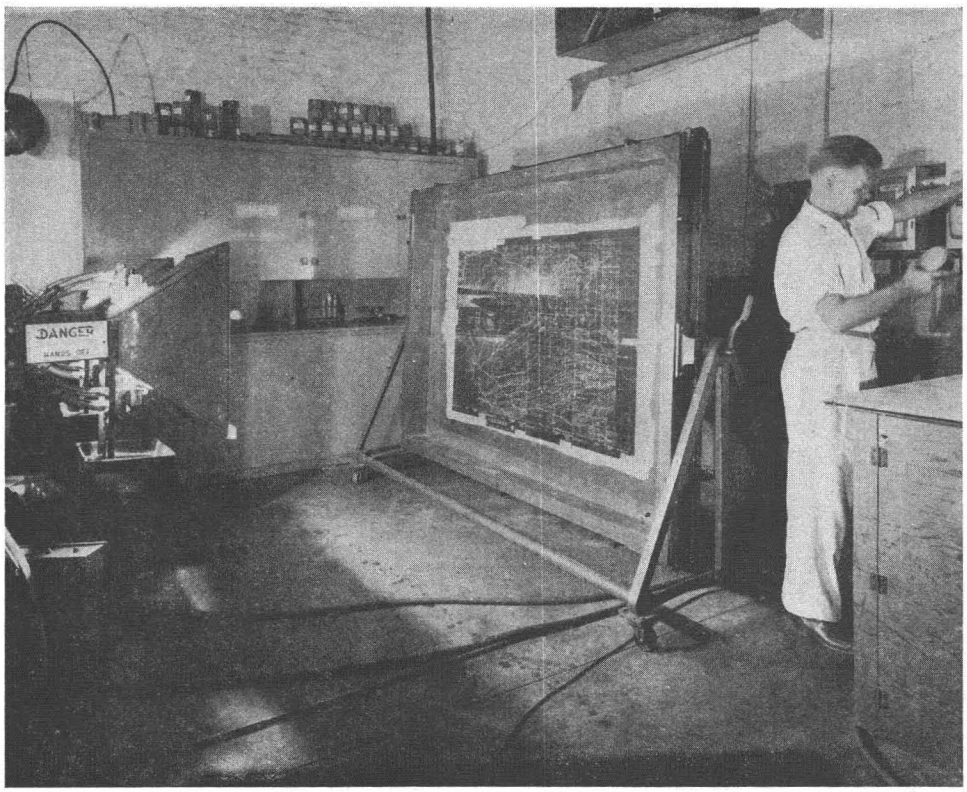


SPLICING AND JOINING FILM NEGATIVES FOR THE MOSAIC COVERAGE

be of interest to photogrammetric engineers who have tried to lay a controlled mosaic without rectified photographs. It can best be appreciated when applicable to mosaics of an area consisting of irregular terrain.

For our particular problem, the map and the mosaic were to be approximately the same scale, or 1:20,000; the map being exactly 1:20,000 and the aerial photographs as flown approximately 1:19,200. The map and the mosaic were to have a common military grid. Knowing that the mosaic would probably be frequently compared with the map, in which differences would be outstanding, it was imperative in the interest of our department to prepare an accurate mosaic. Our reproduction unit at that time had no rectifying photograph printer so the problem became more difficult.

For controlling the mosaic, we were limited to the basic horizontal field control established in preparing the map and the map itself. The base horizontal field control was inadequate for the laying of unrectified prints since there were differences of elevation as great as 300 feet in more than one of the flight lines. Our first thoughts were to scale by coordinates numerous identifiable features from the map and plot these points to the mosaic board as photographic ties. Since this would have been an expensive process, it was decided that experiments should be made to try to photograph the map to the mosaic board. All

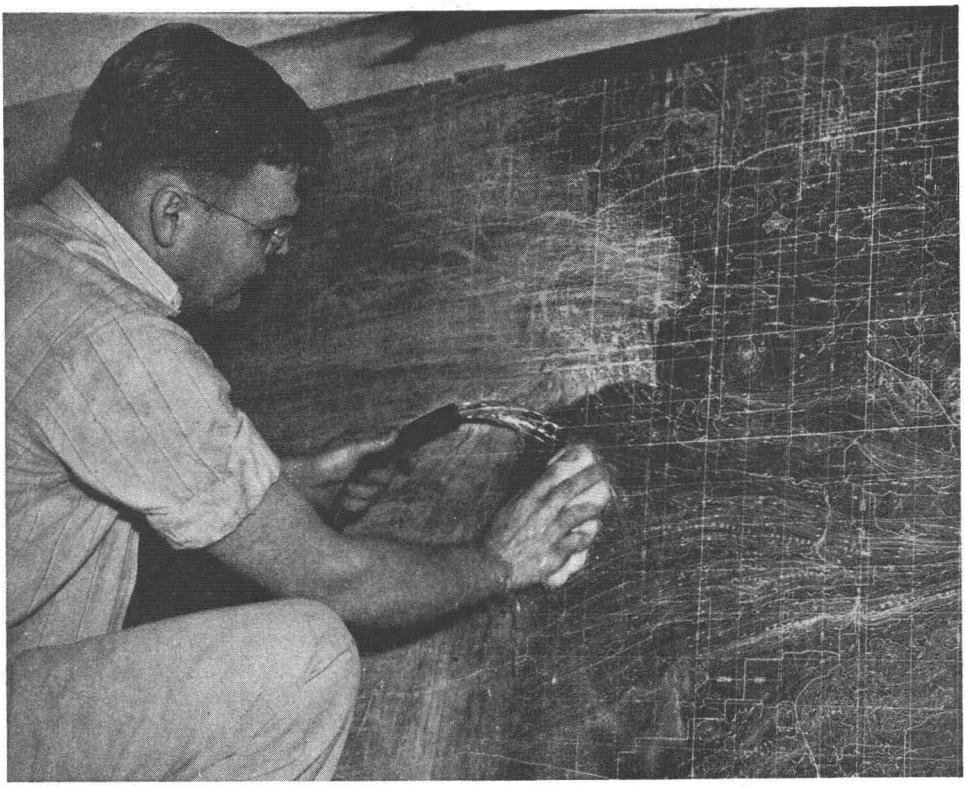


FILM TAPED IN PLACE ON MOSAIC BOARD AND EXPOSED IN VACUUM FRAME

identifiable planimetric features on the map could then be used if a photographic solution could be found that would develop into a good image on the mosaic board. Several solutions were tried and satisfactory processes were found for both a dark and light board.

To obtain a black image, the following process was devised. The mosaic board was sanded until the glaze was removed and water was flowed over its surface to cover it with an even film. Regular multilith "Senseve" was filtered through cotton and poured onto the white board which was tilted at a slight angle. When the surface was covered completely the board was held vertical and dried. When the emulsion was dry, film negatives of the multiplex map were spliced and taped in place and exposed in a vacuum frame. After exposure the board was coated with "Platinx" developing ink and placed under running water to wash with cotton. The image appeared on the board in waterproof black lines. This process corresponds to the method of preparing multilith plates.

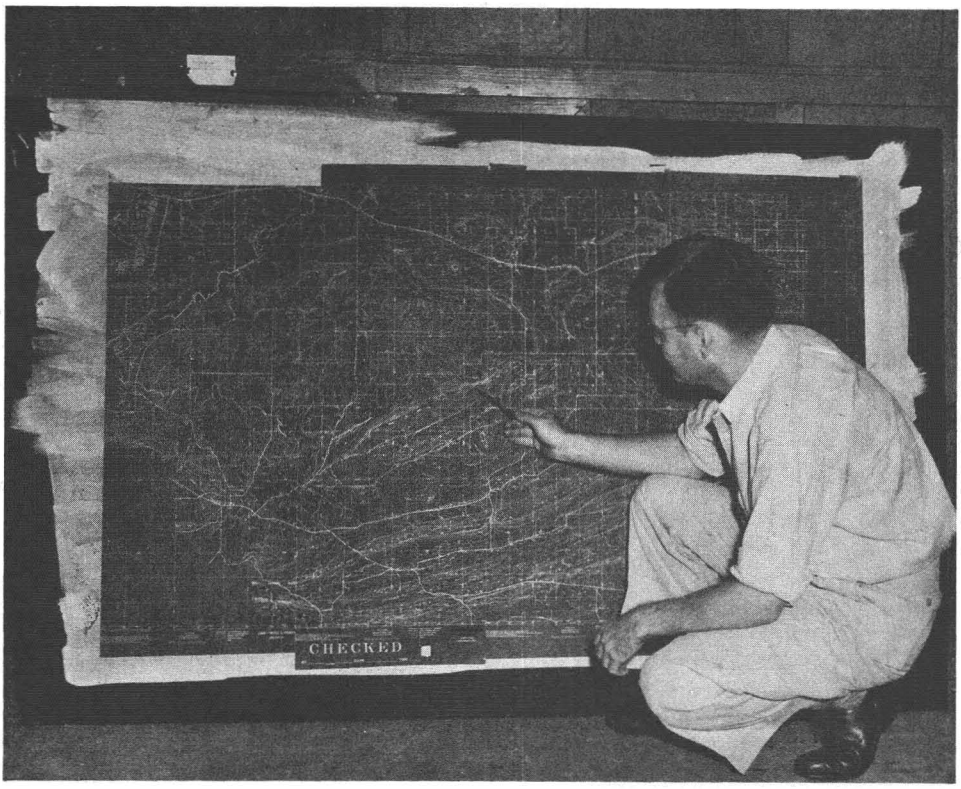
To obtain a white image, "Bon Ami" was mixed with the "Senseve" and stirred slowly to avoid bubbles. The powder was added until the mixture became a thin paste. This mixture was applied to the dry sanded board with a soft brush and the paste dried with the blower. When the board became dry, the negatives were taped in place, the board exposed and developed by running water over the board. The board cannot be rubbed with cotton at this stage or the image will erase. If the exposure is correct the background will wash out and give a complete image in white lines which is fairly durable. The image will



DEVELOPING MOSAIC BOARD

become durable when the board is covered with glue, especially if the glue is allowed to dry.

To describe the procedure in detail, the following methods were pursued. First, a rough mosaic laydown was made to compute the approximate mean actual scale of the aerial photographs. This was found by measuring the distance between horizontal control points along the flight lines, across flight lines, and diagonal to flight lines, dividing the known distance by the scaled distance and taking a mean of the computed scales. For this particular area, the mean photograph scale was found to be 1:19,200. The grid layout at the scale of 1:19,200 was then made for the mosaic on the sanded side of 3/16-inch pressboard timber, or the mosaic base board. A corresponding area for each of the 11 mapped sheets was also outlined on the board at the scale of 1:19,200. Film negatives were made of the 11 finished mapped sheets to the scale of 1:19,200 and spliced within their respective markings on the mosaic board to which the photographic



FULLY DEVELOPED MOSAIC BOARD INDICATING THE ROAD NETWORKS, STREAMS, BUILDINGS, ETC., THAT MAY BE USED AS CONTROL

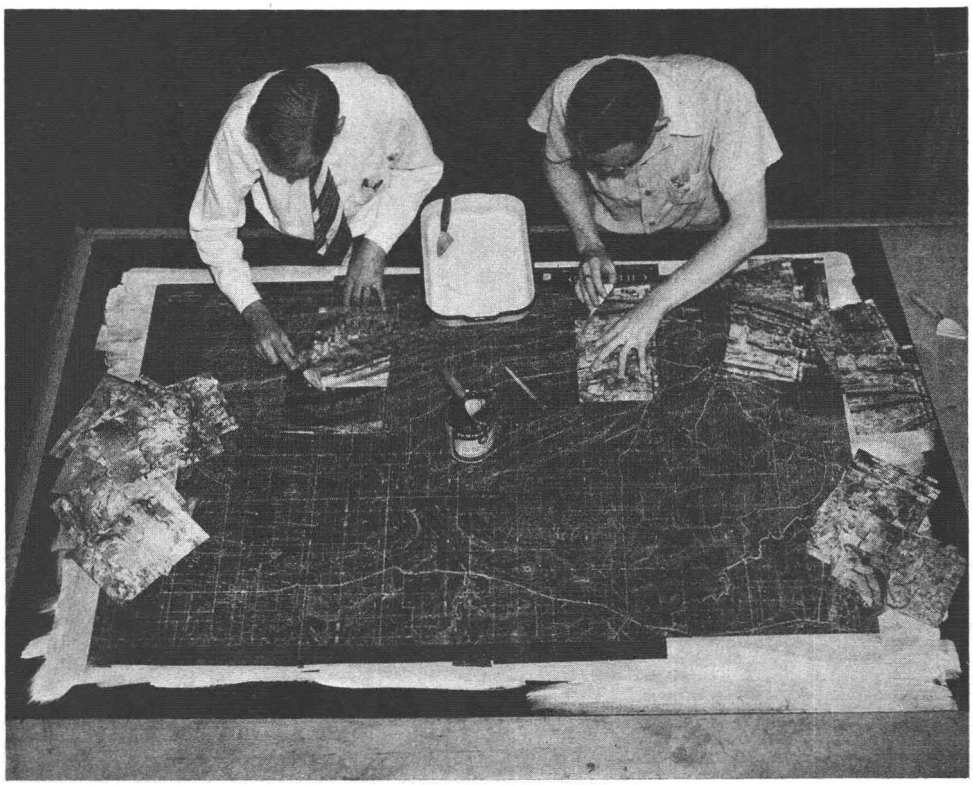
solution had been added. The image was then exposed and developed as described for the black image. This procedure complete, the mosaic board was coated with glue and it was a very simple matter to lay the photographs to the board using any number of roads, timber lines, houses, streams, etc., as controlling features in the laydown.

The following advantages were found in using the method:

1. Temporary laydowns are eliminated for adjustment between control.
2. The mosaic may be laid much faster.
3. Several employees can work on the same mosaic board.
4. Less reponsible employees may be used, or very little experience in mosaic laying is necessary.
5. Rectifying of photographs is not necessary although desirable.
6. Elimination of the plotting of horizontal control points on the mosaic board.
7. Resulting mosaic more accurate and consistent throughout.
8. No great problem in matching edges of adjacent boards where more than one board is necessary in preparing mosaics of large areas.

The disadvantages of the method would be as follows:

1. The map must be prepared before the mosaic is initiated.
2. Access to a large precision camera and vacuum frame is necessary.
3. Lack, in some instances, of planimetric detail such as would be experienced in large forests or desert areas.



LAYING MOSAIC TO THE CONTROLLING FEATURES

4. Instances where the map would not be required in conjunction with the mosaic.

The Little Rock Engineer District will have a frequent need for the described process since many different engineering features are studied after a general area map is prepared. Some of these features are clearing outlines of reservoir pools, land acquisition of all types, right-of-ways, large airport studies, special construction projects, or any general engineering planning involving a rather large area.

There seems to be a varied conception of what constitutes a controlled mosaic but it is believed that this method should be one of the best methods for preparing that type of mosaic. With the rapid growth of multiplex mapping in which accurate planimetry is so easily accessible, it is believed that the method can have distinct advantages over older practices in mosaic construction. Fairly accurate county maps, land plats, quadrangles, or city layouts could also serve as base control for less accurate maps. The method, because of its simplicity, may have been practiced before but it is believed that it is not generally known.