AERIAL PHOTOGRAPHY

HARRY MCDERMITH

Urbana, Illinois

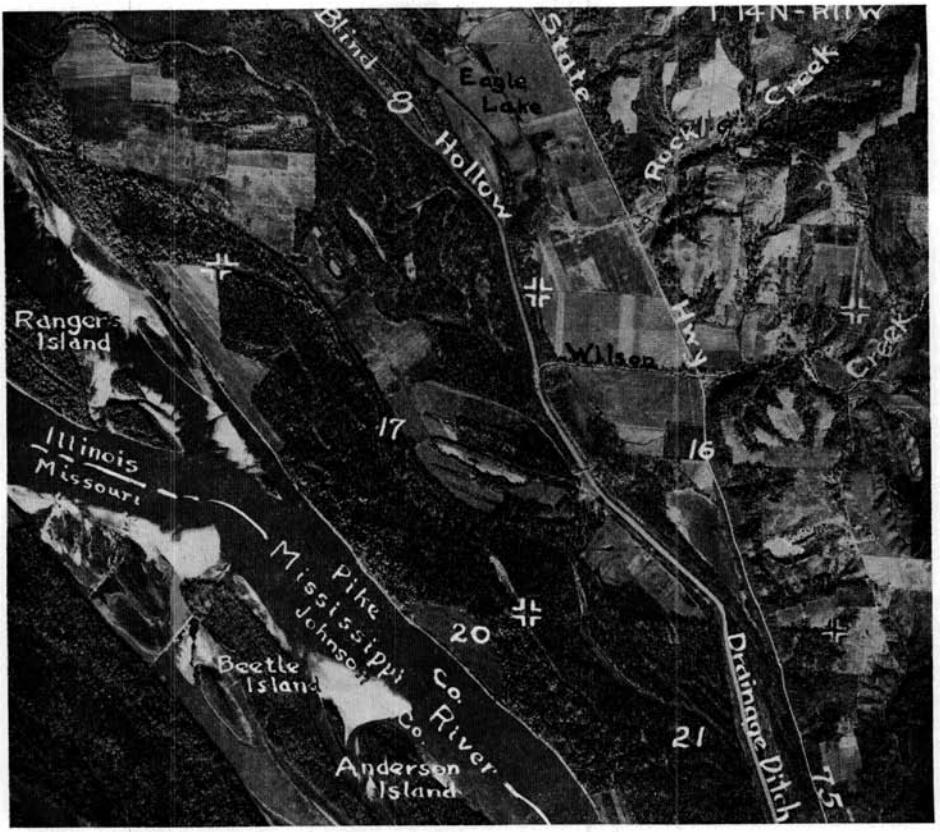
Photographing from the air on a large or commercial scale is a comparatively new industry. However, since the airplanes came into use, and especially since the start of the great World War, aerial photography has become very popular. The first photographs of this type date back to about 1865. With a few limited exceptions, this work previous to 1914 was done from kites, balloons and dirigibles. Kites and balloons were unsatisfactory in that they were at the mercy of the winds, making it impractical to carry out accurate and systematic photographic plans. The dirigible is quite satisfactory insofar as stability, room for operation and speed of motion is concerned; however, it is too expensive to operate. The airplane has now proven itself to be the most practical and economical of all air transports for aerial photographing.

Commercial and army airplanes are most commonly used in this work. The Fairchild "71", Lockheed, and the Cessna have been among those extensively used in this country. There has not been a plane constructed yet that possesses all the qualities desired in a photographing ship. However, an attempt has been made to construct such a plane by the Abrams Aircraft Corporation of Lansing, Michigan, in building what they call the "Explorer". This is a pusher type single motored monoplane with the cockpit enclosed with plexiglass or a similar material. The following features of special importance are included in this plane: wide radius of visibility, rapid climbing ability, high cruising speed, stability, and the camera is placed ahead of the motor.

Photographing from the air was carried on in a very limited scale until the beginning of the World War. Then when it was found that these photographs could be so effectively used in reconnaissance surveys over the enemy lines in determining the position, size and direction of motion of troops as well as in furnishing a fine planimetric map of the country, aerial photography took a big jump. By the end of the war the aerial mapping units in all government armies had been enlarged considerably. This revolutionized military operation completely. After the war activity in this field was carried on by the U. S. Geological Survey, the U. S. Coast and Geodetic Survey, and the U. S. Army Engineers on a rather small scale for mapping and planing work. In 1935 the Agricultural Adjustment Administration, under the U. S. Department of Agriculture, started a systematic and extensive plan of aerially photographing this country. The primary purpose was for the administration of the crop control program. This department has photographed approximately 2,000,000 square miles in this country at an estimated cost of $6,900,000 in the last ten years, of which 90 per cent has been performed since 1934. Aerial photographic operation under the AAA began in this State in 1936 when eleven counties were photographed. The original photography for the entire State was completed in the fall of 1939.

The photography by the AAA is performed with a single-lens, high-precision aerial photographing camera mounted in a vertical position. The pictures are taken at an altitude of 13,500 to 17,000 feet, with each picture overlapping the preceding one about 60 per cent, and those in adjacent flight strips 30 per cent. The size of the negatives are 7″ x 7″ and 7″ x 9″, covering respectively approximately 6 and 7 square miles, depending upon height of plane at time of exposure. At this height and using a camera having an 8¼″ focal length the scale of these negatives are 1:20,000, or approximately 1″ = 1,700 feet. Oblique and vertical photographs using a multiple lens camera have been used extensively in Canada, Alaska, and several European countries.

The bureaus of the various governmental departments that are making ex-



tensive use of aerial photographs are as follows: Department of the Interior—the U. S. Geological Survey, General Land Office, and Bureau of Biological Survey; Department of Commerce—U. S. Coast and Geodetic Survey; Navy Department—Hydrographic Office; War Department—Corps of Engineers; Federal Works Agency—Public Works Administration; Department of Agriculture—AAA, Forest Service, Soil Conservation Service, and Bureau of Plant Industry. Other federal agencies are Tennessee Valley Authority, Mississippi River Commission, International Boundary Commission, Lake Surveys, Post Office Department, National Park Service, Rural Electrification, and Department of Justice.

It is impossible in this paper to enumerate and elaborate on all the possible uses of aerial photographs; however, some of the more interesting uses are listed below: a. making of plans for auxiliary landing fields; b. studies for dam construction and reservoirs; c. drainage regulation and canal projects; d. planning and erecting communication lines; e. topographic and planimetric mapping; f. crop control and soil preservation; g. illustrations for tourists and passenger guidebooks; h. study of position and shape of natural boundary lines, mountain ranges, rivers, streams, and timber; i. studying and tracing bedrock outcrops, faults, limestone sinkholes, landslides, underground and surface water courses; j. mapping and studying of oil and coal field activities; k. military operation.

In conclusion, I wish to state that the principal concern of this paper is to bring to your attention the endless uses that can be made of airplane photographs in both private and governmental work.