

Photogrammetric Pioneers

Aero Service Corporation

The Early Years—1919-1940

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AERO SERVICE CORPORATION

AERO SERVICE CORPORATION was founded in June 1919, in Philadelphia, and is the oldest flying corporation in the world. It was incorporated in the State of Delaware, and the original charter granted a wide range of aeronautical activities to Aero Service. They included design, manufacture, aircraft sales, operation of aircraft for transportation, flight instructions, aerial advertising, and aerial photography.

Aero was involved in all of these activities, including the use of aircraft to obtain aerial photographs of the city of Philadelphia and surrounding areas. These photographs were oblique views, made with a hand-held, glass-plate camera of 20-inch focal length, pointed over the plane's cockpit cowling. The aircraft was one of the famous "Fokkers" of World War I. Flight operations were from a field on Island Road and Elmwood Avenue, near what is now the Philadelphia International Airport. Offices and processing laboratories were located at 1612 Chancellor Street, in center city (Figure 1). The aerial views were well received and were used by newspapers, magazines, industrial plants, city planners, and many others.

In 1924, Virgil Kauffman joined Aero Service and was responsible for sales and aerial photography. Kauffman had served in World War I with the U. S. Army Engineers and was assigned to the Army Air Corps to pilot photographic missions. This experience eminently qualified him for the tasks he faced at Aero. He directed the efforts of Aero Service toward the application of aerial photography to the needs of the technical, commercial, and social segments of the community. This transition from pictorial oblique to vertical mapping photography was a natural but technically complicated step. Aero made this change successfully; at first, by simply mounting the oblique camera vertically over a port-hole in the deck of the aircraft. Later, an Eastman Kodak 12-inch camera, 7- by 9-inch format, with a magazine of 75-foot film capacity was used in a Curtiss JN 24D aircraft.

In 1928, Aero Service completed an aerial survey for the Philadelphia Regional Planning Commission, covering 4,000 square miles. Atlas sheets were compiled by mosaicking the vertical photography.

In 1932, Aero undertook, independently, the photography of the state of New Jersey, marking the first time that one of the United States was com-

pletely covered. Mosaic maps were compiled from this photography and reproduced in quadrangle format, conforming to the existing topographic maps of the state.

In 1934, the Tennessee Valley Authority was faced with a requirement for developing the potential resources of the 43,000 square miles of the Tennessee River Watershed. Topographic map coverage at scales of 1:62,500 and 1:125,000 was sparse, and the engineers required reconnaissance maps as quickly as possible. The answer was found in photographic coverage with the Bagley T-3A five-lens camera, manufactured by the Fairchild Camera Corporation. Aero Service was awarded a contract to produce the aerial photography and to compile mosaics of the entire Valley area. Aero assigned two "Fairchild 71" aircraft, each equipped with a T-3A camera (Figure 2). A photographic planning and processing laboratory was established at Chattanooga, in proximity to the job. All flight layout, film processing, printing, mosaicking, copying, and reproduction were accomplished at this plant. The 5-lens camera exposed a central vertical, and four oblique negatives simultaneously, each negative 5½- by 5½-inch in size. The side oblique views (43° from the vertical) were transformed in a special printer to near-verticals. The resulting assembly of prints was in the shape of a "Maltese Cross." The central vertical prints were mosaicked by means of a radial line strip, using the best available map for control purposes. The side-looking transformed prints of alternate exposures were mosaicked to the center strip. Each mosaic board covered 7½ minutes of longitude and 15 minutes of latitude, at a scale of 1:20,000.

In 1935 most vertical mapping cameras were of a 7- by 9-inch format, requiring a 12-inch focal length lens to cover the negative size. These cameras had focal plant shutters, which meant that the photography was not suitable for photogrammetric mapping. (The earlier Brock glass plate camera was a precision mapping camera.) Aero Service developed a design for a 9- by 9-inch negative camera, using a Goerz 8¼-inch focal length lens, with a between-the-lens shutter. Precisely-positioned fiducial marks were also a feature of this new camera design. It was first used in 1936, to photograph three areas in the Tennessee Valley, for joint use of the U. S. Geological Survey and the TVA. When the Bausch and



FIG. 1. Aero Service photolab, 1931, at Aero's original location, 1612 Chancellor Street, Philadelphia. Note the temperature control unit (obviously a coal stove) in the lower right corner.

Lomb "Metrogon" lenses became available, Aero built cameras with the B&L 6- and 5.2-inch focal-length lenses.

In 1937, Aero Service joined with Fairchild Aerial

Surveys, another pioneering company, to photograph the entire state of Virginia. The scale of the coverage was 1:20,000. Each county area was photographed and indexed as a unit. The photography fulfilled many needs of governmental and private interests.

During 1938, Aero Service acquired the equipment and the patents of the old Brock and Weymouth Company, of Philadelphia, which had developed the Brock Method for photogrammetric mapping. Aero re-activated this unique American mapping process and soon had it in productive operation. One of the first projects was the mapping of the Manleyville quadrangle in the Tennessee Valley, for the U. S. Geological Survey. The Brock glass plate camera was used. The topographic map was produced with ten-foot and five-foot intermediate contours. Field control and color separation printing were accomplished by the TVA. Intensive field checks again proved the accuracy of the Brock process. (A comparison of this 1939 survey with a 1973 edition further substantiated the accuracy standards).

Aero further utilized the Brock equipment from 1940 on for the compilation of both large-scale and small-scale mapping for the Federal government. Large-scale maps, with a 2-foot contour interval, were used for engineering design of industrial plants required in the national defense program of the time. Small-scale maps with 10- or 20-foot contours were a part of the program of the government in updating the topographic maps of the Eastern coastal states.

During the late 1930's, the needs of many Federal governmental agencies were such that these agen-



FIG. 2. Pilot, Clarke Smith; photographer, unknown; camera, Eastman Folmer; aircraft, Fairchild "71."

cies looked to the private aerial survey companies to meet those needs. The U.S. Geological Survey, the U.S. Corps of Engineers, the Soil Conservation Service, the Agricultural Adjustment Administration, and others required aerial photography for specific purposes and scales. Aero met those varied requirements with aircraft, cameras, qualified flight crews, and laboratory personnel. For the large requirements of the AAA, a processing lab was established at Omaha, Nebraska, in 1938. This operation, in close proximity to the principal areas, permitted rapid checking of photo flights, which assured maximum utilization of suitable photographic weather. Necessary reflights were expedited.

In 1938, Aero compiled precise photo-mosaics of 11,000 square miles of Utah for the Soil Conservation Service. Aero photographed the project areas, identified existing control by field and office rectification, extended this control by radial line triangulation, and rectified the photos to fit the control

net. The rectification was accomplished with a precision rectifying camera designed and built by Aero.

Through the years, Aero included in its staff a cadre of mechanical and optical engineers who designed and built equipment for the company's aircraft, its photo laboratories, and its photogrammetric department. Chemists evaluated all phases of the photographic processes to assure maximum quality control. Personnel, highly qualified in respective branches of the company's operations, assured clients of the best in services and products. Much of this reflected the management abilities of Virgil Kauffman, longtime company President, and his immediate staff.

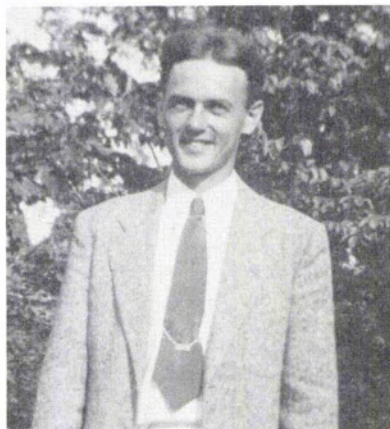
Since the early 1940's, Aero Service has greatly expanded its activities and extended its operations to all parts of the world. It is continuing its operations as a division of the Litton Company and affiliated with Western Geophysical Co., in Houston, Texas.



George F. Brenna was with the Los Angeles County Flood Control in 1934.



Clarence E. Bridges. In this photo, taken about 1936, about the time he joined ASP. He worked for the Army Corp of Engineers.



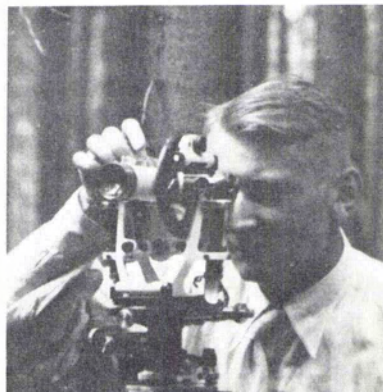
Harold R. Brooks. "At this time I was an engineer with the Bell Telephone Co."



Paul E. Bruns. "I was almost 20 years old when the Society was born and this picture was taken with my mother Erna on the streets of Berlin, Germany. Mother had been born in Karlsbad, Austria in 1894 and we were on the way there."



Joseph P. Burns working as an instrumentman on highway surveys in northern New York in 1938.



R. Burkhardt as beginner of photogrammetry, measuring control points in the Fir Mountains in Bavaria, Germany, in the summer of 1935.



H. G. Chickering in 1935, surveying for map control on the coast of Washington State for Fort Columbia Quad. 29th Engineer Topo. Br. from Fort Stevens, Oregon.



Walter ("Nobby") Clark, in 1934.



Clifford J. Crandall, a Happy Farm Boy.



Robert N. Colwell (the guy in the right). This photo was taken on June 16, 1934 in Turlock, California while he and his two brothers (ages 12 and 17 years) were enroute from Southern California to Idaho to spend the summer working on their grandpa's apple orchard.

Excerpt from diary, Wednesday, June 13, 1934: The wind blew all night. We slept good. Left camp at 6:30. Had a stiff wind plus sticky tar and gravel road to fight most of the day. Had mild and nut bread for dinner. Bert got pretty tired. Rested for 45 minutes in Fresno Park. Camped on San Joaquin River 10 miles north of Fresno. Had spuds, corned beef and tea for supper. Went swimming in river after dark. Bills: 2 qts. milk 20¢; 2 cans soup 20¢; 1 can corned beef 18¢; fruit 10¢. Total 68¢.



Ira Current as a technician—outside the Anso Phototechnical Laboratory.



Jack Davidson (at transit) doing 3rd-order triangulation of Seymour canal, Admiralty Is., Alaska, July, 1934.



Jean Cruset. Second Lieutenant at the Artillery High School, Fontainebleau, France. 1934.