

# THE CAMERA

TRADE MARK REGISTERED

A MONTHLY MAGAZINE DEVOTED TO THE ADVANCEMENT OF PHOTOGRAPHY

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## AMERICAN AERIAL PHOTOGRAPHY AT THE FRONT—MAJOR EDW. J. STEICHEN, A. S. A.

(Chief of Photographic Section, U. S. Air Service, A. E. F.)

THE consensus of expert opinion, as expressed at the various inter-Allied conferences on aerial photography, is that at least two-thirds of all military information is either obtained or verified by aerial photography.

Marshal Foch withheld his final decision, governing the operations immediately following the St. Mihiel offensive, until his staff had received and examined the aerial photographs which confirmed the nature and strength of the new line established by the victorious American troops. General Pershing has stated that the aerial photograph is the most reliable source of information available to the higher staff officers.

An infantry colonel referred to the aerial photographs he received during the Argonne offensive as the most vital assistance he had ever been given by the Air Service, and that the details of the action as worked out by his command from the study of these photographs had contributed in a large measure to the success of the action and had been an important factor in reducing casualties. A young lieutenant, in speaking of his experiences in action near Vaux, said that the only data he had there that was worth a "tinker's damn" came from three aerial photographs some one had "policed up" for him.

As another side to the question, it is but fair to note the following remark by a colonel of the infantry: "They sent me some of that stuff (referring to aerial photographs), but I couldn't make anything out of them." The answer in this case is obvious, for the value and meaning of aerial photography has been definitely and conclusively established, and the success with which aerial photographs can be exploited is measured by the natural and trained ability of those concerned with their study and interpretation. The aerial photograph is in itself harmless and valueless. It enters into the category of "instruments of war" when it has disclosed the information written on the surface of the print. The average vertical aerial photographic print is upon first acquaintance as uninteresting and unimpressive a picture as can be imagined. Without considerable experience and study it is more difficult to read than a map, for it badly represents nature from an angle we do not know.

The oblique aerial picture, especially when taken from a low altitude, is more readily comprehended, and sometimes striking pictorial effects are produced. The vertical photographs made by the day bombing squadrons occasionally present a spectacular and dramatic interest in addition to their value as a record of the bomb raid.

There has been a tendency to wrap the technique of aerial photography in a veil of secrecy and mystery. This attitude may have been useful in stimulating curiosity, but there comes a time when such a pose seriously interferes with the free development of a new process.

While aerial photographs can be made with a vest-pocket Kodak, it is obvious that where special conditions prevail new instruments and methods

must be created to meet these conditions. The work accomplished along these lines during the war stands as a remarkable scientific and mechanical achievement. This achievement, coupled with the courage, skill and endurance displayed in taking and producing the amazing quantity of photographs required, makes up a chapter that is second to none in the annals of photography.

A good aerial photograph compares favorably with the best technical landscape photographs. The latter can be leisurely made from a carefully chosen point of view, with a camera firmly set on a tripod, and with lens and exposure conditions offering a considerable latitude. The military aerial photograph is made with a heavy, cumbersome camera more or less successfully suspended in the fuselage of an airplane traveling through the air at a good hundred miles per hour. The fuselage receives all the vibrations of a powerful motor, whirring off more than a thousand revolutions a minute, as well as the thumps and bumps of air-pockets and exploding enemy anti-aircraft shells.

The ground photographer chooses his weather; the General Staff chooses the aerial photographer's weather. The weather conditions during both the Argonne and St. Mihiel operations were exceptionally poor. The most favorable days were crammed with photographic activity, and even days with barely enough light to produce the faintest trace of an image on the photographic plate had to be "photo days."

Most of the long distance photographic-reconnaissance missions were the work of the First Army Observation Group, to which was attached Photographic Section No. 2. I do not believe that there was a better or more efficient outfit for the producing of aerial photographs in any of the combatant armies. Throughout the entire period of operations the enemy never was able to carry on long-range reconnaissance with anything like the system or regularity which prevailed here.

The photographic missions went out on schedule, like an express train service. The "big price" was often paid, but from all available data the enemy more than "got his" in return, and also learned to know this group, not only as an observation unit, but as a formidable fighting machine. Their photographs were all made from an altitude of about 5,000 meters, and the quantity and quality of the work produced was remarkable.

Photographic reconnaissance is a most difficult and ungrateful part of aerial observation. It gets more recognition and credit from the enemy than any one else. Captured enemy documents indicate that their General Staff was very much worried about the Allied aerial observation, and particularly the planes with the all-recording camera soaring miles up in the air overhead.

The American photographs were practically all produced with 18 x 24 centimeter (about 7½ x 9 inches) cameras. This camera is a simple metal box fitted with a 20-inch lens and focal plane shutter; the plates are carried in magazines with a capacity of 12 plates. These cameras, and, as a matter of fact, 87 per cent. of all the photographic equipment and materials employed at the front, were purchased in France.

During a mission over the lines the operation of this camera took up all the attention of the observer. From the beginning of our experience, it was clear that an automatic camera was not only desirable, but would eventually become a necessity. All of the Allied armies had been working on a camera of this kind; numerous interesting experimental instruments had been evolved, but the production of a satisfactory apparatus was slow in materializing. Only during the last month of the war were we able to place 15 automatic cameras in operation over the lines.

These cameras were ingenious instruments invented by Lieutenant De Ram, and were built under his supervision in a small shop near Paris. The camera works entirely automatically; it can be set for any given interval of exposure and simply requires to be started when the airplane reaches the region to be photographed. It has a capacity for 50 exposures. In spite of the fact that this machine was new in principle and that these first cameras could scarcely have been considered final or complete, results were produced that were not only valuable in themselves, but pointed the way to new and hitherto impossible accomplishments in aerial photography. Unfortunately the camera could only be installed in the Salmson planes, as the U. S. D.H.-4 planes then in France were designed to carry the small cameras used in training and not the larger instruments in use at the front.



14th PHOTO SECTION, FIRST ARMY. PHOTO TAKEN AFTER ARMISTICE  
CAPT. A. W. STEVENS, CENTER OF GROUP

*Aerial cameras shown right to center.*

- 1.—120 cm. French type cameras, using 18 x 24 cm. plate.
- 2.—50 cm. French camera, 18 x 24 cm. plate. Standard camera in U. S. Air Service in France.
- 3.—26 cm. French hand-held camera, 13 x 18 cm., used in A. E. F. schools for training.
- 4.—50 cm. DeRam automatic camera. This camera was especially built for the Photo Section of the U. S. Air Service A. E. F. in a small shop near Paris. It functions automatically and rendered unusual service during the last month of the war. Capacity 50 plates (18 x 24 cm.)
- 5.—A captured German camera, 50 cm.; 24 x 30 cm. plates.

On one occasion two planes were sent out on a photographic mission ; one was equipped with a De Ram automatic and the other with a hand-operated camera. During the mission these two planes were attacked by seven enemy ships ; two of the enemy machines were brought down, the remaining five quit. The observer in each plane naturally made good use of their machine guns, but the plane with the automatic camera also continued ticking off pictures throughout the fight and they brought back a perfect reconnaissance without a single gap in the series.

The significance of this kind of a performance is even more important than the result, and with the prospect of soon receiving similar and possibly better automatic cameras that were being produced in America, there is no doubt that within a few months aerial photographic methods would have been completely changed. As it was, these few De Ram cameras were the first entirely automatic cameras successfully employed by any of the Allies over the lines.

The automatic camera is not only a logical factor in mechanical efficiency, but it eliminates an unnecessary risk of life.

This is exemplified by the photographic reconnaissance of the 99th Squadron, which came to be known in the Photographic Section as the "13th hour mission," the pictures having been made about 1 o'clock. The Intelligence Staff had made an urgent request for photographs of a certain part of the Hindenburg system. Weather conditions delayed this work for some time. Several attempts were made and finally one of the planes ran into a clear space over the prescribed area, but at the same time a group of enemy planes appeared.

Both pilot and observer realized the importance of getting these pictures, and the observer, deliberately disregarding danger, kept on operating his camera and completed the mission. The pilot, though slightly wounded, was able to get his riddled ship back home.



AIR PICTURE OF VERDUN. PHOTO SHOWN BY COURTESY OF ELLSWORTH GEIST. CUT FROM "THE AMERICAN PRINTER."

When the plane landed the observer was found dead, his body fallen forward against the camera. A bullet had gone clean through the camera and then through his heart, but orders had been complied with. The magazine containing the plates was intact, and when developed the "13th hour mission" produced one of the finest sets of photographs made in the A. E. F.

When the airplane returns from a photographic mission the real labor of the Photographic Section begins. The greatest speed compatible with photographic quality is desirable. The exposed plates are hurried to the laboratory, developed, washed and dried; then two proofs are run off from each plate. These are identified and located on the map and given a preliminary interpretation. Sometimes this interpretation reveals information that is promptly reported to headquarters over the telephone. These first prints from a mission were normally produced in from one to two hours.

In urgent cases, when chances could be taken with quality of results, this time was considerably shortened, the record being 24 finished prints, from the first 12 plates developed, delivered to the Branch Intelligence Officer in slightly less than half an hour after the plane had landed on the field. Spectacular stunts of this kind were not often required or encouraged. They were furthermore often impossible, due to so simple a reason as lack of transportation for the heavy plate magazines from the field to the laboratory when this happened to be located quite a distance away.

The real speed problem consisted in getting out the great mass of prints required from the negatives made each day. In this connection the American Photographic Service set a pace which was not equalled. The printing record goes by a small margin to Photographic Section 1. This section produced 17,000 prints in one day—16 actual working hours.

This would be an achievement if the work had been done in a perfectly equipped laboratory, but under the primitive conditions at the front and with all the water carried in buckets from a neighboring well, it is another one of the many examples indicating that the American Expeditionary Forces made good chiefly on the inherent ability of the American soldier.

The only laboratory facilities a Photographic Section was ever reasonably sure of was their photographic truck and trailer, which latter contained a tiny dark-room and drafting-room. The dark-room served admirably for plate development, and sometimes for making proofs; but something had to be found, stolen or imagined to serve as a printing laboratory, and a cowshed or a dug-out might be called into service for this purpose.

In July, during the Chateau-Thierry offensive, a Photographic Section had to resort to a tent for a work-room. Inside of one end of the tent a wooden framework was set up and this covered with tar paper and opaque curtains to make it light-tight. It was also just about as air-tight, but men worked steadily in shifts in this hotbox for six consecutive days and nights—and came out alive. The three prints referred to by the young lieutenant of Vaux came out of this "laboratory," and so did all the other American photographs that were used in the Chateau-Thierry operations.

The secrecy involved in the preparations of the Argonne offensive made new and unexpected demands on our photographic service.

Late one afternoon General Mitchell called for another Photographic Section. Within an hour's time the nucleus of a section was organized and equipped from such casual replacement personnel as was available in the vicinity of the first Air Depot. These men were all just fresh from the training schools, and without any previous experience in the field. They traveled all night and got installed in an outhouse of a brewery at Ligny-en-Barrois by daybreak, where they promptly set up shop and commenced work like old-timers.

At 10 o'clock of the same morning on reporting the arrival of the section to the General, and being questioned as to how long it would be before this section would be in shape to produce, I was able to report that 1,000 prints had already been delivered. These boys kept at it for five days and nights, without more than four hours' sleep out of any twenty-four and produced over 50,000 prints. They needed no urging or encouragement other than being told that the prints were wanted for their "buddies," who were about to go over the top on the biggest job yet.

Whereas photography over the lines was currently entrusted to observers, the best photographs, from a technical standpoint, were made by such photographic officers as were occasionally detailed to do the work.

Captain A. W. Stevens, while Commanding Officer, Photographic Section 6, volunteered to do several particularly difficult missions while in the region of Fismes. He mounted his camera on the machine gun tourelle and made the pictures from an altitude of but a few hundred meters. Numerous dangerous and troublesome machine gun nests were located on these pictures, which all previous photographs had failed to show.

His work, as well as the photographs taken by several of the other non-combatant photographic officers, present a conclusive argument that in all cases where special photographic requirements or conditions have to be met the trained and experienced photographer is a better man for the work than the regular aerial observer.

At the time of the armistice, the personnel of the Photographic Section, Air Service, in the A. E. F., numbered 55 officers and 1,111 soldiers. The efforts of these men individually, as units, and as the Photographic Section of the Air Service, have been a definite factor in fighting and winning of the war. The total production of photographs since July 1, 1918, was 1,300,000 prints.

While the laboratory photographic work is arduous and makes big demands on the endurance and health of men, it can scarcely be called hazardous, even though sections frequently continued turning out prints in their laboratory during the nights the enemy bombed the vicinity, and occasionally the work was pursued in spite of long-range shell fire.

Much of the equipment furnished was primitive and the materials avail-



VAUX (CHATEAU-THIERRY SECTOR). PHOTOGRAPHIC SECTION, AIR SERVICE A. E. F.



able became progressively worse. The influence of this factor of quality of materials can be measured by the fact that, when a few batches of the new panchromatic plate arrived from England, the quality of our photography was raised by at least 50 per cent., and this quality was further improved upon in the work done when American plates and paper finally arrived.

The practical experience gained by these photographic soldiers in learning to surmount all kinds of technical and material difficulties, coupled with the excellent photographic training they received at the specialized schools in America and in France, brings them back to America as an asset to American photography. They represent a new and specific value to the American photographic industry, if this industry will be shrewd enough to recognize their worth.

The future of aerial photography is naturally bound up with the future of the Air Service, and as a function of the Air Service is full of possibilities as a peace-time development. Not only will aerial photography render great assistance in mapping the United States, but it brings to the process of mapping, and by the simplest of means, a wealth of detailed information that would ordinarily be excluded and perhaps even impossible. Numerous Government agencies interested in mapping will participate abundantly in the advantages of aerial photography mapping, if the work is properly undertaken and on a sufficiently large scale.

The nature, quality and quantity of the timber in our forests can be accurately measured by making aerial photographs of these forests in the autumn. Each kind of tree assumes a characteristic color at this time of the year, and by the use of appropriate selective color screens and panchromatic plates these color tones can be separated, and subsequently the proportion of each tone measured. In this manner the quantity of each kind of timber in a given area can be readily estimated, and if necessary or desirable the individual trees could even be counted.

A recent experiment in locating, by aerial photography, areas infected by the boll weevil in Southern cotton fields is another example of the innumerable large and small possibilities which suggest themselves for the exploitation of this process for commercial and educational purposes.

After the signing of the armistice we made a series of aerial photographic mosaics and oblique photographs of all the important American Expeditionary Force, camps and construction activities for historical records.

About 10,000 ground photographs were also made in the areas covered by American military operations. These ground photographs effectively supplement and complete the records as represented by the aerial photographs made over the same territory during the period of hostilities.

These aerial photographs, which have rendered a signal service during the conduct of the war, are now an historical legacy to the nation, ready to serve future generations as an unequalled historical document of the great war. They represent neither opinions nor prejudice, but indisputable facts.—  
*United States Air Service.*