

## PHOTOGRAPHY\*

Recording what the "eyes of the Fleet" see is vital task of aerial photographer

*By Lieutenant Commander Robert S. Quackenbush, Jr.*

**A**ERIAL photography in the present war has assumed proportions that were unheard of a few years ago. Photography in all its branches has achieved perfection in the United States that has not been surpassed by any other country in the world. Its use has become so universal and so diversified that it enters practically every phase of our daily life.

Very early in the present European conflict, the medium of photography, formerly confined to the fields of journalism, advertising and entertainment, was quickly recognized as an indispensable war implement.

It has been revealed by authoritative sources that all belligerents are using aerial photography in every type of operation. Pilots and camera men, trained for their highly technical task of reconnaissance photography, make daily trips for a film record of seaports, airdromes, industrial cities, railroad terminals and other military objectives.

Skilled interpreters examine minutely every detail of these photographs. The results achieved by this film translation are remarkable. Interpretations evaluate activities of shipping, building schedules of ships and concentrations of aircraft. The production of certain manufacturing centers may be calculated, troop and supply movement predicted and camouflage broken down. The result is, the possessor of the photographs knows nearly as much as the enemy.

It is conceivable that our Fleet units and aircraft may be required to operate in areas where existing maps are inaccurate, incomplete and unsuited for planning purposes. Into this category fall many of the Pacific islands, the north-eastern area of North America, including Newfoundland and Greenland, and much of the coastal areas of Alaska and the Aleutian Islands. The same absence of adequate maps exists for most of the Bahamas, much of the Caribbean area and a large percentage of both the Atlantic and Pacific coastal areas of Mexico, Central and South America and outlying island areas.

It would appear from this that the Navy must know how to photograph these areas and compile maps and map statistics from the photographs. The organization required for this technical work is extensive, composed of highly trained officers and men, whose field of activity is wide and diversified.

Military cartography entails all the details of map making, correction, revision and map statistics. The aircraft camera also enters the field of military intelligence, recording camouflage displacement and detection, location and selection of targets. For operational information, details are recorded on damage assessment of bombing and shell fire, deployment of enemy facilities, identification of ships and convoys.

In addition to military work, the camera of the Navy photographer covers all fields of both still and motion pictures. Records are made of all tests and experimental work. New designs of equipment are photographed for detailed study. Fleet maneuvers and target practice for both surface ships and aircraft are only some of the routine assignments. In addition, aerial surveys for other departments of the Government and motion picture training films for all bu-

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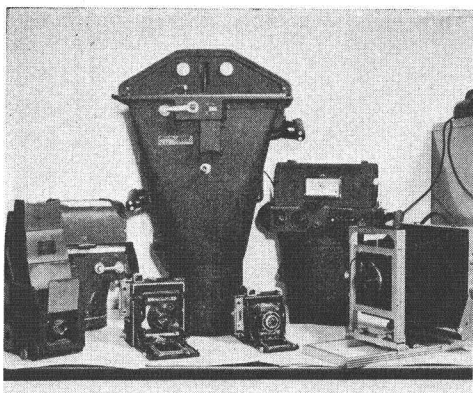
A photography class at Navy school emphasizes use of aerial camera in all phases of tactical flying.

reus of the Navy department are made. For example, during the period of 1936 to 1939, Naval photographers photographed for the hydrographic office, over various sections of the Western Hemisphere, 14,000 linear miles with single lens mapping cameras and 4,700 miles with multiple lens mapping cameras; 34,000 square miles were covered with single lens cameras and 44,000 square miles with multiple lens cameras. During the present year the Galapagos Islands, the entire western coast of Ecuador and several thousand miles in Central America have also been photographed for the hydrographic office.

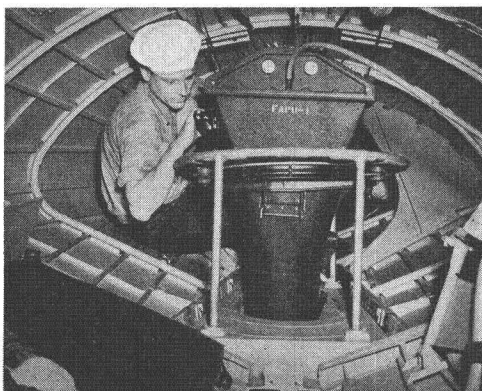
Official photography within the Naval aviation organization had its inception at Pensacola, Fla., in 1914. The principal work at that time consisted of making a photographic record of plane tests, instrument installations and similar routine work. Cameras used were comparable to those used by newspaper photographers.

This type of work gradually increased in volume. In March 1916, however, a new activity was introduced. Aerial photographs were requested of old Fort Morgan prior to its use as a target for experimental firing practice by the *U.S.S. New York* and *U.S.S. Arkansas*. Good photographs were secured on this mission by using a Graflex camera with an adaptation of cigar box pieces around the bellows which protected it from wind blasts. The results of this flight indicated that a special handheld aerial camera was necessary. The result was the production of the first handheld aerial camera to be manufactured in the United States.

This camera was successfully tested in December 1916. From that time on, aerial photography was added to the ever increasing volume of ground photography. By 1917 the volume of work had increased to such an extent that a photographic section was established. The official photographer at Pensacola was selected to organize this section. The value and necessity of photography as a function of the Navy became more and more apparent as the work load increased and additional reliance was placed upon its results. A school was established at Miami, Fla., and many of its graduates were sent to U. S. Naval air stations abroad during the World War.



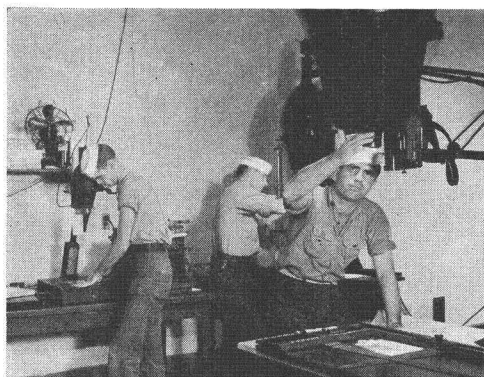
The Naval aviation photographer's range of equipment runs from the small newspaper camera to the giant aerial mapper.



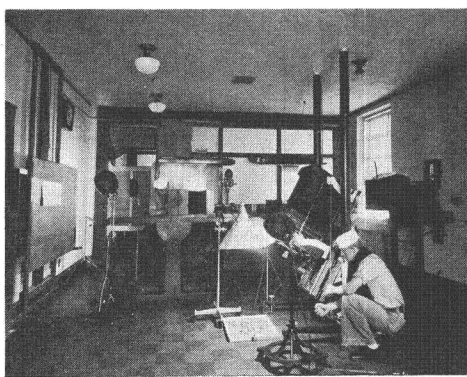
Fairchild mapping camera installation in PBY-5. Action is automatic. Swivel holder compensates for movement.

After the Armistice, practically all the photographic personnel returned to civilian life and the section was reorganized with the school located at Anacostia, D. C. This school was later transferred to the Naval Air Station, Pensacola, in 1921 in order that more flying facilities would be available for photographic training. This has continued to be the location of this school.

With the exception of a few isolated cases, the Bureau of Aeronautics administers all Naval photographic activities. The central office for this administration is in the Bureau of Aeronautics. The officer-in-charge is a Naval aviator with wide photographic experience. He is assisted by other Naval aviators with similar experience and other Naval officers and technicians, whose experience and background in the motion picture industry fit them for this work. Here policies are determined, funds provided, personnel procured, allowances determined and materials and equipment furnished to the many photographic laboratories and units in the Fleet. Modern, up-to-date laboratories are maintained at all Naval air stations, in all aircraft carriers, all aircraft tenders, each battleship and each



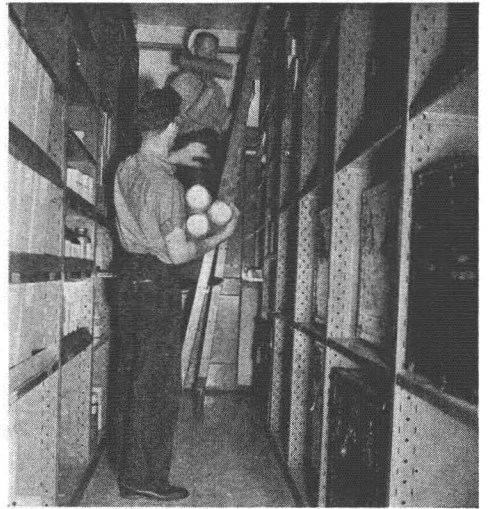
Printing department at Norfolk Naval Air Station. Aerial photographs now have important role in tactical operations.



Photographing parts from aircraft for closer examination or record purposes. This is customary when accidents occur.



Roll film from an aerial camera is developed and on the drying racks a few minutes after the plane returns to its base.

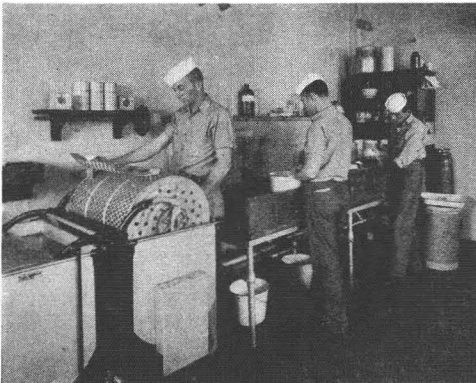


Camera storage room at Norfolk laboratory holds fortune in lens equipment. Darkroom chemicals occupy bins at left.

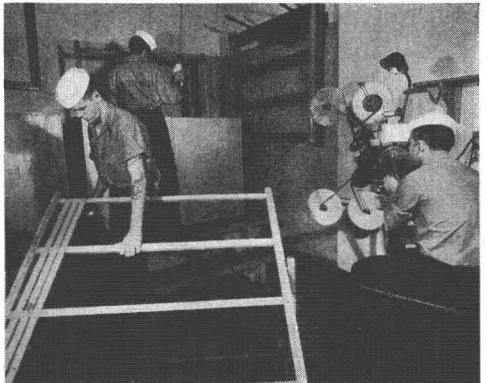
new cruiser. In addition to these laboratories, there are special shore establishments such as the Naval Academy, Naval Proving Grounds, Dahlgren, Va. and the Naval Torpedo Training Station, Newport, R. I., equipped with photographic laboratories.

Mobile photographic reconnaissance units, mobile utility squadrons and units of the Fleet Marine Force are provided with elaborate photographic units. Each laboratory is in the charge of an officer who is a graduate of the Naval School of Photography. The size and scope of each laboratory is, of course, dependent upon its local requirements and military usefulness.

The aerial cameras used by the Naval photographer vary in size and focal



Production line principle is applied in finishing room as prints follow steady course through developers and baths.



Motion pictures are used to record events and tests important to Naval aviation. These men are processing movie films.

lengths, but in general may be used for either vertical or oblique photography. The standard aerial camera used by the Navy and the Marine Corps is a product of many years of research, study and improvement. It is known as the F-56, designed by the Navy. This camera is electrically operated and contains a between-the-lens shutter of speeds up to 1/300th of a second and is furnished in focal lengths of 5¼", 8¼", 20" and 40". It uses roll film up to 225 exposures, 7" by 7" negative size. Aperture openings vary from F.4 in the 8¼" to F.8 in the 40". It is possible to take photographs as rapidly as one every second with these cameras.

In addition to the standard cameras, other cameras of Army design are also utilized. These are the standard night with a focal length of 13½" known as the K-19 and a K-18 which produces a 9" by 18" negative with 24" focal length and the T3A camera which is the multiple five lens camera of 6" focal length. Other focal lengths used are 7½", 10", and 12".

The most recent product in handheld cameras was developed by the Navy through the facilities of the Fairchild Aviation Corporation and is known as the F-48 handheld aerial camera. This camera is light in weight (approximately seven pounds) has roll film between-the-lens shutter with speeds up to 1/500th of a second, 4" by 5" negative. It has the very desirable feature of being practically foolproof. Anyone who can read or write, aim and sight the camera, can operate it. For use with these cameras, the standard automatic roll developing outfits are furnished to each laboratory.

In addition to the normal oblique and vertical photography, these cameras are used in conjunction with portable flight laboratories which may be carried in any two seater or larger airplane in use in the Navy. With these laboratories it is possible to develop and print film in flight and with the use of special containers, drop the finished print aboard any ship desired.

The Navy is also well equipped with motion picture cameras. As early as 1922 the possible utilization of slow-motion pictures was realized. Even in those days things moved too fast for the human eye to record what was happening in the primitive arresting gear installed on the *U.S.S. Langley*, the Navy's first aircraft carrier. Fortunately the slow-motion camera was available to record the number one landing on the *U.S.S. Langley*, a crowning achievement for a determined group of pioneers and now considered a historical milestone in the development of Naval aviation.

Commencing with this early date, the slow-motion camera has been present for every operation on all carriers. Practically every analysis of failures during carrier operations has been made possible by slow-motion pictures. It is safe to say that the precision now attained in the U. S. Navy carrier work could not have reached the highly efficient stage it now enjoys without benefit of these pictures.

The photographers who operate these complicated motion picture cameras have become so proficient in diagnosing the qualities of an aircraft landing that it has become an axiom in carrier operations that if a pilot, in making his approach to a landing, sees the motion picture operator start grinding out film, he had better prepare for a crash landing.

In addition to the standard commercial high speed 35 mm. motion picture cameras, Naval photographers effectively use various types of 16 mm. motion picture cameras. These cameras are employed primarily for recording tests and experiments and for providing public relations and the press with photographs. In addition, with the wide expansion that is taking place in the Navy, photographers are making all types of motion picture training films.

Laboratory equipment and ground cameras used are the most modern and up-to-date available. In each laboratory there will be found the standard speed graphic, the Graflex, view cameras, copy cameras and all the standard contact printers and enlargers. In addition to this normal laboratory equipment, there are many special pieces not found in the average laboratory.

Four service photographic schools are maintained through the co-operation of the Bureau of Navigation. One for basic photography, one for advanced color, one for slide film and the other for photo interpretation.

In addition to the above, the March of Time and the Fairchild Aviation Corporation conduct schools for Naval personnel at no cost to the Government. The March of Time's school is a six-months' course in motion picture work and the present class consists of 20 Navy enlisted men. The Fairchild school is a six-weeks' course in camera repair. The numbers attending this school vary with the availability of personnel.

Personnel for the School of Basic Photography are selected from enlisted men and officers of the regular and reserve Navy. They are sent to the photographic school at Pensacola for a period of four months, studying all phases of basic, ground and aerial photography.

The School of Color Photography is also maintained at the Naval Air Station, Pensacola, and consists of a three-months' course in all phases of this subject. The principles of color photography are taught, utilizing this information by practice with Kodachrome and Dufay film, three-shot color and one-shot color, employing several methods of making prints. Candidates to this school are selected from outstanding photographers within the Fleet.

The Slide Film School is maintained in the Navy Department at Washington, D. C. Candidates attending this school are taught all the necessary rules for making slide films. This, too, is a three-months' course. Candidates to this school are selected from the outstanding photographers graduating from the basic course.

It is essential that the Navy have competent personnel, trained in the interpretation and uses of aerial photography. When procured, this personnel is assigned to force commanders, flight commanders, beach reconnaissance units, Marine Corps units and other major units where the making of aerial photographs is possible.

Every nation at war in Europe employs aerial photographs to the fullest extent in connection with tactical decisions. In many cases these decisions are based exclusively on information obtained from the aerial photographs.

Realizing that the U. S. Navy must be prepared, not only to make similar aerial photographs but to use them intelligently, effectively, thoroughly and to a greater advantage than any potential enemy, a school for the interpretation of aerial photographs has been established at the Naval Air Station, Anacostia, D. C.

With so much stress placed on the importance of aerial photographs, the question may naturally arise, "How are they taken?" During peacetime oblique photographs are made from the average two-seater or multi-place airplane, either open cockpit or cabin design. Vertical photographs are taken from airplanes incorporating especially designed openings in the bottom of the fuselage. Photographers operating the cameras may obtain any desired scale by the proper selection of focal lengths and altitudes flown. However, in the present war, the element of altitude selection is not usually optional. Antiaircraft fire is too accurate and effective to permit low-altitude flying for photographic purposes. Fighter aircraft are too fast and too deadly to permit higher altitude photography by

slow-moving photographic planes. These factors have caused a radical change in photographic reconnaissance. Multiple cameras are now installed, both for vertical and oblique photography, in fast moving fighter aircraft which are stripped of everything except gasoline and cameras and can outfly any other plane in the air. The pilot is the photographer. Exposures desired are pre-set on the ground and the pilot, by remote control takes the exposures with modern electrically operated cameras. Altitudes flown are generally 25,000 to 35,000 feet. Sounds fantastic doesn't it?—but this is modern warfare and photography is not only keeping pace, but in some cases is miles ahead.

The increasing widespread war uses of photography by foreign nations has not passed unnoticed by the Navy Department. Provision is being made for obtaining aerial photographs under all anticipated and probable conditions by providing adequate plane and material equipment.

An accelerated training program is providing expert, competent, trained personnel. An expanded organization has provided facilities for the efficient interpretation and use of all phases of ground and aerial photography in order to gain full advantage from this new weapon, without which no modern war can be prosecuted to a full and successful conclusion.

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