Air Service and the Corps of Engineers

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WHEN the National Defense Act of 1920 became a law it seemed that we were willing to profit by our recent experience and that a safe and sane military policy had been finally adopted by the United States, something which we had never had during all of the previous 144 years of our national existence. Very shortly thereafter, there began to loom obstacles in the way of actually putting this policy into effect and more and more have been thrown in the way ever since.

The Problem of Training

The War Department plans in time of emergency to create certain field armies, and to bring them into being at different dates. It is manifest that if this plan is to be carried out, all of the component parts of these armies should be brought to the proper state of efficiency simultaneously. This is impossible unless the corresponding parts of the regular army are so proportioned that they can expand and train at a sufficiently rapid rate. For example, it takes, let us say, nine months to train aircraft pilots. If an entire field army is to be effective, and all of its branches ready in any period less than nine months, it is evident that the entire air component of this army must be trained, or at least partially trained, in advance.

At present, the Air Service quota of the 125,000 army is only 8,764 men and the authorized officer strength is 1,061. In addition to the Air Service components of the garrisons in the Philippines, Hawaii, and Panama and to the training centers which it must maintain, this number permits in the United States only one pursuit, one attack, and one bombardment group and the observation squadrons in each corps area, all at greatly reduced strength. For example, according to tables of organization the pursuit group should consist of 101 officers and 735 men; as a matter of fact, it is possible to have in this group only 15 officers and 600 men. This single illustration indicates how difficult it is to do the needed training of the regular Air Service personnel alone, to say nothing of that which should, according to the scheme of things be given to the National Guard and to the Organized Reserve.

Records Established by Air Service

Though seriously handicapped by lack of personnel and by the limited funds made available by Congress, the Air Service feels that it has developed materially since the World War ended. Every effort has been, and is being, made to improve the types of aircraft with which the Service must be equipped. We now hold all records for altitude; endurance, that is, longest sustained flight or the longest non-stop flight of an airplane; and for speed around an enclosed course and over a straight-away. This means that, technically, we are at least abreast of any other country. The tests which resulted in the achievement of these records were undertaken not for the mere purpose of surpassing previous performances, but in the natural course of improving the aircraft in which we have to fly. Speed is an essential characteristic of suitable pursuit or combat planes. This was proven beyond doubt in the World War. Speed combined with maneuverability are the two characteristics which are of the greatest importance. Our bombing planes must be capable of carrying great weights and we are now assembling the largest plane which has been constructed in this country. This has a wing spread of 126 feet, weighs about 30,000 pounds, is powered with six Liberty motors of 400 horsepower each, and can lift no less than 20,000 pounds. It could easily carry a 5-ton bomb in addition to its crew and fuel.

The Automatic Pilot

The Air Service has developed what, for want of a better name, we call the automatic pilot, an apparatus which can be installed in any plane, and which enables the plane to take off, to fly at a predetermined height in a predetermined direction without being guided or directed by human agency. This can be used to send pilotless planes on bombing missions or, installed in a plane, it will greatly relieve a pilot of the flying strain. Radio control can be adapted to this automatic pilot so that from the ground or from a following plane the one thus equipped can be...
THE POSSIBILITIES OF AERIAL MAPPING AND RECONNAISSANCE

Tiptonville and Reelfoot Lake, Tennessee, from 3,000 Feet

Mount Washington, White Mountains, Vermont
maneuvered in the air. In fact, it is not too violent a flight of the imagination to conceive of a number of such pilotless radio-controlled planes being directed like a flock of birds by a single pilot in a plane some miles away or from a ground station.

Development of Helicopter

For many years aeronautical engineers and designers have been trying to solve the problem of vertical flight; that is, to design and build a machine which could rise vertically, hover in the air, move from place to place at the will of the operator, and descend straight to the ground. Most of these helicopters which have been tried have failed because they lacked stability. It was easy enough to secure the necessary lift to raise the machine from the ground, but once in the air, it would have no stability and most of them merely toppled to earth again. The Air Service has now designed and built a helicopter which does seem to possess a high degree of stability, which has been flown successfully and, although it is but a first attempt and will have to be modified materially, the principle seems to be sound and its development promises to be a marked step in advance.

Lighter-Than-Air Craft

Much work is being done in the development of lighter-than-air craft, airships or dirigibles, and it is proposed to inflate them with helium gas, which will render them practically immune from hostile fire. They will be used for long-distance reconnaissance, for the transport of personnel and matériel, and particularly for carrying airplanes. Experiments have proceeded far enough to show that it is perfectly feasible for an airplane to light on such an airship while both are in flight, to detach itself at will, and then proceed under its own power. The airplane flies up underneath the airship and attaches itself to a ring or other device by means of a hook arrangement, leaving the airplane suspended below the airship’s keel.

Tactics of Aerial Warfare

We have been doing something, but not as much as we should, to develop the tactics of aerial warfare. When the World War started the air men knew little of what they could or should do and the commanding generals of the ground troops knew even less. The pilots acted almost on their own initiative and their work was entirely individual. Formation flying, a number of aircraft acting together under the control of a leader, or commander, was a development of the latter part of the World War. It had become evident that "in numbers there is strength" applied to the Air Service as well as to other branches of the army. This is stressed in all of our studies of aerial tactics and in all maneuvers now being practiced.

Mission in Future Wars

As the Air Service sees its mission in the next war this will be divided into two major parts. On the one hand it will act as an auxiliary, aiding ground troops by reconnaissance over the theater of operations, noting visually the movements of enemy troops, his attempted concentrations, the location of his depots, and salient features along his lines of communication. It will likewise photograph the terrain and thus secure information which can be interpreted at leisure and which will prove invaluable. The observers will note the fire of our own artillery, adjust it, regulate it, and greatly increase its efficiency. In an advance or an attack upon a position, the Air Service will assist ground troops by actually machine-gunning and bombing the enemy or, in case of a retreat, it can greatly retard the pursuing troops. In addition, what may more properly be called the air force may be given missions of its own. This component will consist of pursuit, bombardment, and attack aviation, the mission of the first element being to clear the air of enemy aircraft in order to permit the slower and heavier bombardment and attack machines to work with comparative freedom. Such a force should be in readiness to strike the day war is declared. It takes time to assemble a ground army, to supply and to equip it, to prepare it for the field. Assuming that our air force is adequate to prevent the enemy’s from interfering seriously with our own concentrations, while, at the same time, it can effectively hamper his mobilization, it is at least
conceivable that he would be unable to assemble his forces and to oppose effective resistance to our own army, whose concentration he has been powerless to prevent.

General Duval, the Chief of the French Air Service during the World War, has said that the air force, highly developed, would attack the enemy's ground troops, particularly in the areas back of the front line, or that it may even ignore his army, and by a campaign of terror carried on against the enemy population far behind the lines, it may have so great effect as to bring the enemy to terms, but that in any event the decision will be reached in the air and the victors in the air will dictate peace on the ground.

So great was the outcry caused by the use of aircraft against centers of population, the horror inspired by the destruction wrought by air bombs and by the number of so-called noncombatants who were killed, that an effort is being made at present to formulate a code of rules to govern aerial warfare and to limit the legitimate targets against which air bombs may be directed. This is prompted by a desire to get away from frightfulness and to humanize warfare. The object is, of course, laudable, but we may venture to doubt whether it is practicable to attain it. It is a well-known fact that when a nation or a man is fighting, back to the wall, there is the tendency to disregard all rules, to ignore them, and to urge the old excuse that the end justifies the means. For example, there is already an agreement among certain nations that noxious gases will not be used in warfare. Nevertheless, there is the decided feeling among many military men that such an agreement will not stand the strain of actual warfare and that we may expect gas to be used against us when we fight again and that we must be prepared accordingly.

**Bombing a Hostile Fleet**

The bombing experiments carried out something over a year ago indicated very clearly the role which the Air Service will play in coast defense. It has been demonstrated beyond a doubt that air bombs can be dropped with sufficient accuracy and that they are sufficiently powerful to put out of commission or to sink any naval vessel which up to the present time has been designed or built. While it is true that the vessels thus attacked offered no resistance, that the aircraft operated freely and were not exposed to hostile fire, all experience leads us to believe that naval vessels cannot bring to bear any anti-aircraft fire which we need greatly dread. Even if such fire should prove more deally than we now think, it certainly will not be effective at night when the aircraft can use parachute flares lighting up large sea areas, while they themselves remain above the source of light, absolutely invisible. As a matter of fact, the only defense with which a fleet can successfully oppose an attack from the air is by means of its own air force which accompanies it. We should have an air force of our own sufficiently superior to any which could be brought with the hostile fleet so that in case of an attack upon our coasts we can dominate the air and destroy the fleet at our leisure.

With such an adequate air force properly equipped and properly trained we can regard ourselves as safe from any attack from the sea and we can insure ourselves against the landing of a hostile expedition on our shores.

**Peace Time Work of the Air Service**

The above is a brief exposition of the role which the Air Service will play in future wars. In time of peace, in addition to its training activities, the Air Service has endeavored to assist the Post Office Department in carrying the air mail by furnishing equipment and the Department of Agriculture by carrying on fire patrols over extensive forest areas in the west and northwest and in the campaign against plant diseases and the ravages of insects which destroy growing crops and trees.

**Cooperation with the Engineers**

In time of war the Air Service, by visual reconnaissance and photographing the terrain, can assist the Engineers materially in the selection of sites to be fortified, their preparations for the attack upon positions strongly held, or in preparing for an advance. In time of peace, the Air Service is photographing for the Engineers important harbors and their port facilities. It also aids the Engineers by photographing extensive areas in connection with river improvement projects or surveys for power sites and the like. Major Bagley, of the Engineers, has invented and is perfecting an excellent camera for use in aerial mapping and, working in close collaboration with the Air Service, is engaged in perfecting the methods which will make these aerial photographs of greater and greater use in the preparation of topographical maps.

![Barling Bomber, of 136 Feet Spread, Powered with Six 400 H. P. Motors](image-url)