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MARITIME AVIATION.

By Jean Ravennes.

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NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS
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MARITIME AVIATION.*

By Jean Ravennes.

The formidable organization of military aeronautics, disorganized by reductions in the personnel, is passing through a crisis. There has, as yet, hardly been time to study the problems left unsolved at the time of the armistice.

On the other hand, it was in the Navy, where there was no well-organized air service during the war, that a group of able engineers and officers, while studying special problems in maritime aviation, made discoveries of interest to both army and navy. Years of experience brought them to a realization of the almost utter impossibility of building seaplanes capable of meeting the conditions of speed, lightness, maneuverability and strength required in modern warfare and the consequent necessity of using landplanes over the sea, as well as over the land.

Disdaining (perhaps wrongly) the float seaplanes, which the Germans were able to utilize to better advantage than we, our Navy, built only boat seaplanes during the war. This gave us the F.B.A. with the pusher propeller (a monstrous mistake) which, in air combats over water, offered the Germans as easy prey as the Farman airplanes did over the trenches. Handicapped by the weight and head resistance of their hulls, these boat seaplanes were extremely cumbersome and seldom satisfactory.

The studies of maritime aviation have therefore covered the following principal points: employment of landplanes in maritime

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aerial warfare; their adaptation to the peculiar requirements of the Navy; and the establishment of a method of aerial pursuit and bombardment, likewise adapted to military aviation over land.

All these investigations are nearly completed. It is impossible to describe them, without naming the officer who was their promoter and indefatigable worker. This officer is Paul Teste, a naval lieutenant and war hero, an officer of the "Legion d'Honneur" at 27 years, an excellent scientist and a fearless experimenter.

It is worth while to take a glance first at the present organization of maritime aviation, which comprises two reserve centers (Brest and Bizerte) and four training schools in commission:

Cherbourg, a training school employing Latham 1000 HP (3 or 4 engines) seaplanes, which have proven fairly satisfactory;

Hourtin (lake 80 km. from Bordeaux), school for seaplane observers, who are all petty officers;

Berre, school for seaplane pilots (F.B.A. seaplanes with 130 HP Clerget engines). All pilot students receive their first training on seaplanes. This method, acknowledged to be unsatisfactory, is only employed because the Navy has no field large enough for training on landplanes. The results are mediocre (only about ten pilot candidates every three months);

Saint Raphael, the most important maritime aviation training school, comprising:

1. A finishing school for seaplane pilots from Berre. This school employs F.B.A. seaplanes, with 200 HP Hispano-Suiza

engines, and G.L. (Georges Levy) seaplanes with 300 HP Renault engines.

2. A landplane training school for commissioned seaplane pilots and a training school for pursuit flying with landplanes. These schools employ Sopwith airplanes with 130 HP Clerget engines for the dual control and for commissioned pilots; H.D.3, 200 HP Spads (old float seaplanes, on which guns were formerly mounted, transformed into landplanes) and HD1 (Hanriot airplanes with 130 HP Clerget engines). All the commissioned seaplane pilots take their examinations here for their licenses to fly landplanes.

The pursuit methods in maritime aviation are governed by two important principles:

a) Elimination of the single-seater and the adoption of the two-seater which has no dead angle for its rear fire and which, with a competent gunner, does not require an "ace" for its pilot, but only a skillful "chauffer".

b) Elimination of individual pursuit methods which, though they enable gifted individuals to distinguish themselves, are not suited to men of average ability, who are thus made an easy prey for the enemy. Such methods are, moreover, contrary to war discipline, which is indispensable in battle. The present trend is toward having a squadron commander lead his airplanes into battle in the same order and with the same discipline as an infantry section. For this purpose, Lieutenant Teste devised squadrons composed of nine airplanes in three triangles of three airplanes each. Each triangle is inseparable and flies as a unit. The air-

planes composing it fly at a distance of 10 to 20 meters apart. When the squadron is formed, the three triangles have the same arrangement as the individual airplanes in each triangle. The triangles and the squadron thus form veritable herissons, leaving no dead angles in their field of fire. By progressive training of the pilot, first alone, then in triangle and then in squadron, Lieutenant Teste succeeded in having the squadrons execute the most difficult acrobatic performances without accident and, since the airplanes remained in close formation during the maneuvers, he was even able to command them by gestures, like the leader of a ground platoon.

3. The "C.E.P.A." (Commission d'Etudes Pratiques de l'Aviation), whose task was to study all technical problems. Since the Paris technical section of aeronautics has no naval airdrome, all new seaplanes are tested at Saint Raphael. They are all triple-engine seaplanes of 1000 HP (Nieuport, Georges Levy and Latham), which have given fairly good results, but are still far from being fitted for use on the high seas.

The C.E.P.A. studies many problems which concern only the Navy, particularly the launching of torpedoes. While awaiting the torpedo airplanes which have not yet left the shops, the commission is using for this study a 700 HP seaplane, with two hulls and two engines, a veritable monster which flies poorly, but which has enabled considerable progress toward the solution of the problem. The torpedo used is of the newest type and weighs 800 kg. When dropped from an altitude of less than ten meters, the straightness

of its path in the water is assured.

The C.E.P.A. has also experimented much with "amphibians" (G.L. and F.B.A., with skis; Hanriot, whose floats are air bags which the pilot inflates just before alighting on the water), but its means are so greatly reduced that these experiments have been suspended. It also studies airplane observation problems, fire control of battleships by radiotelephony, mounting of guns on airplanes and dropping bombs from high altitudes. In the latter exercise, the same principles are observed as in pursuit exercises. There are to be no more individual bombardments, where each one fires at will and where only aces succeed. Here again the squadron consists of three triangles of three airplanes each. The squadron commander transmits to the triangles the coordinates of the target. The first triangle flies over it and drops its bombs, which, for example, fall beyond the target. The second triangle, immediately following it, adjusts its fire accordingly and transmits its correction to the third triangle. Let us suppose that the latter's bombs fall short. The target is then bracketed for the third triangle. The triangles, passing in a circle above the target, can thus reduce their errors, like artillery gunners on the ground, until they hit the target. By this method, for bombarding at 1500 meters altitude, the probable error has been reduced to ten meters.

The C.E.P.A. also serves as an advisory board to the general staff on all questions, even of a military nature, relating to aviation, although this was not originally included in its duties.

4. Lastly, the "Aviation d'Escadre" (our only naval "escadre," which is in the Mediterranean) has a temporary camp at Saint Raphael. It is placed directly under the orders of the vice-admiral commander-in-chief of the "escadre" and is composed entirely of landplanes. It consists of one Salmson observation squadron (escadrille), one Hanriot pursuit squadron and a few airplanes for experimental purposes. All the pilots are licensed pursuit pilots.

The "aviation d'escadre," being the only airplane organization of the navy, makes all the investigations which it is impossible for seaplanes to undertake. It occupies a preponderant position, because of the superiority of airplanes over seaplanes from the military point of view. It has devised a method for airplanes to take off from and alight on ships.

a) Taking off.- At the end of the war, when the defects of seaplanes every day increased the precariousness of their service, Lieutenant Teste attempted to take off from a platform on a turret of a battleship. This poorly prepared experiment only resulted in a terrible fall on the forward deck of the ship. The method has since been improved. We have, as yet, no airplane carrier, but a platform 15 meters long by 6 meters wide has been mounted on the cruiser Bapaume and pilots are now being trained to take off from it. Naturally, it is possible to take off only when the ship is going ahead under full steam, so that its speed will be added to that of the airplane, which does not have a long

enough run to acquire otherwise a sufficient speed to lift itself. It is secured on the platform with its tail up and is not released until its engine has attained full speed.

b) Alighting.- The English, who also used airplanes over the sea during the war, did not hesitate to let them alight on the water near ships and be lost, while saving only the pilot with his information. Alighting on a ship presents many difficulties. We know that an airplane runs a long distance on the ground, that the pilot loses lateral control and that the airplane is liable to turn to the right or left. Moreover, any accurate landing becomes impossible in a storm. It is consequently necessary to find some way to brake and steer an airplane from the moment it touches the deck of a ship. In this again Lieutenant Teste was successful. He first perfected his method on land on a concrete platform, though not without terrible accidents which would have discouraged most men. He then installed a platform on the Bearn, a battleship which remained unfinished during the war and which was to be transformed into an airplane carrier.

On the deck of the Bearn, to the right and to the left of the platform, there are placed two rows of sand bags. In each row, the sand bags are connected by slack longitudinal cords. Lastly, the two rows are connected transversely by several cords slightly elevated above the platform. As the airplane arrives, the pilot, with the aid of a sighting line, steers toward a mark placed a few meters above the deck of the vessel. As he passes over the

stern, he stops his engine and releases a hook under the fuselage of his airplane. The hook catches one of the transverse cords and, successively stretching all the sections of the longitudinal cords, drags all the sand bags and comes to a stop in a few meters. The hook is attached to the airplane by means of a strap encircling the fuselage. It should pull in such a way as not to tilt the airplane either forward or backward. Experiments have shown that the strap should pass slightly back of the center of gravity of the airplane.

Forty-five satisfactory landings have been made on the Bearn by 16 different pilots, some of whom were novices, without the least mishap. The swiftest airplanes at the close of the war (Salmson Z 9 and Hanriot H D 3) have often landed on it, always stopping less than 90 meters from the stern. No foreign navy has attained like results.

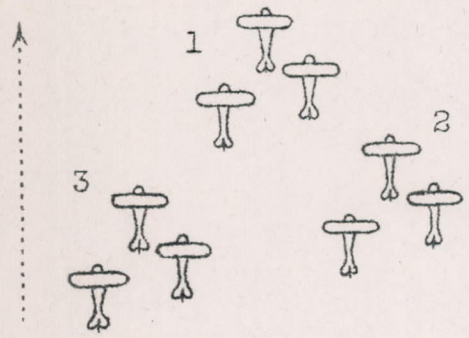
Such is the work of the "Aviation d'Escadre," which also does a large share of the experimenting with fire control by radio-telephony and the bombardment of ships from high altitudes. These investigations have been so thorough that the general staff can already foresee the possibilities of aviation and the transformations entailed in the construction of large units.

We cannot conclude without recalling that all these tasks have been successfully accomplished in spite of shortness of funds and personnel, there being only one mechanic for two or three airplanes.

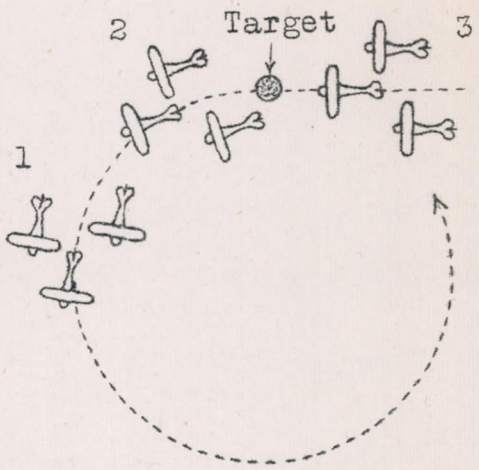
Both officers and men are giving proof of their zeal, but if we are to profit by the new discoveries, the personnel of the maritime air service must be recruited.

There are now no applications to enter the service, either as officers or men, doubtless due to the fact that no pecuniary advantages are offered them, nor chance of advancement. Nevertheless, the splendid work done by a few merits the support of the nation, both in men and money.

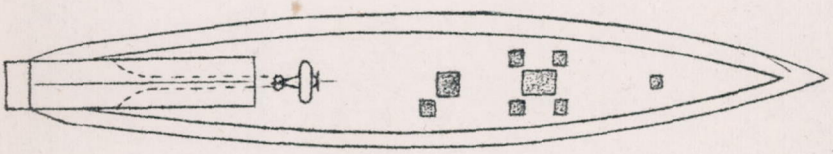
Translated by the National Advisory Committee for Aeronautics.



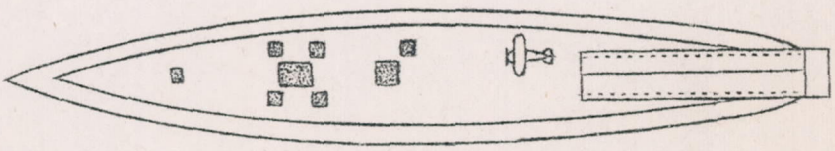
Formation of pursuit squadron.



Formation of bombing squadron at the target.

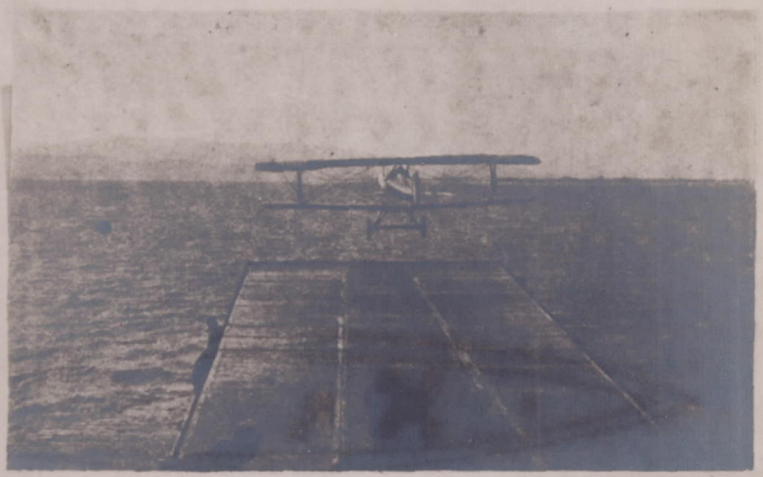


The airplane dragging sacks, originally arranged along both sides of the boat, which act as a brake.



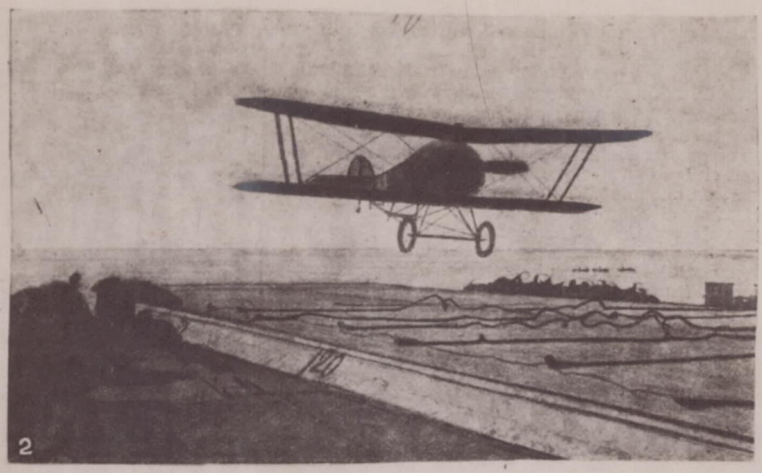
The airplane arrested.
The sacks have been replaced at both right and left and the boat is ready to receive another airplane.

An 80 H.P. Nieuport taking off from the Bapaume which is going at 18 knots.



Platform on the Bapaume.

Arrival of airplane with engine at lowest speed.



Pilot has stopped engine and released hook under fuselage.

Hook has caught a transverse cord and is dragging the sand bags, which brake and slow down the airplane.