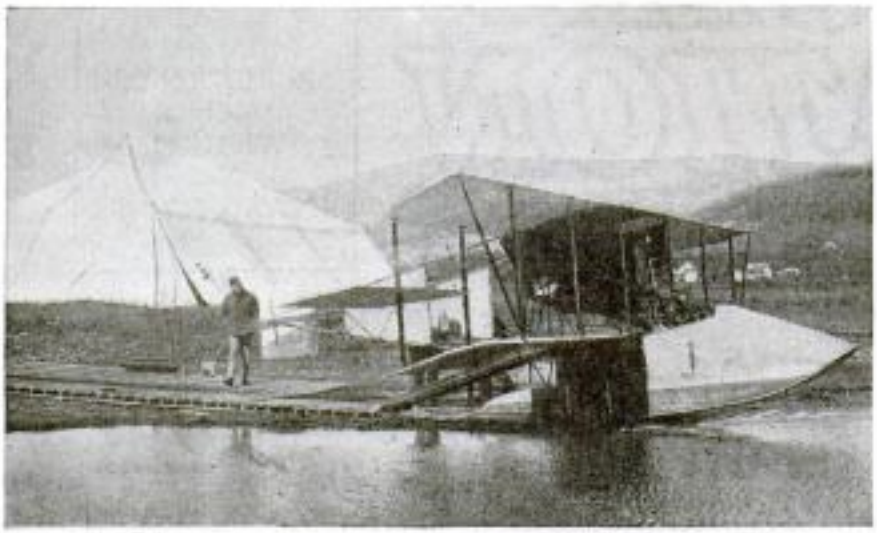
The Inside History of



The Navy "flat-boat" A-2, the first amphibian and the forerunner of the NC boats. An experimental type developed by Curtiss at Hammondsport in 1913. Lieut. Ballinger in the background.

by

"STONEWALL JACKSON"

Aeronautical Engineer and co-worker with Curtiss at the early Hammondsport plant.

IN THIS era of perfectly appointed airports, up-to-date factories, expensive laboratories, elaborate college courses in aeronautics and well organized and lavishly equipped flying schools, it might prove interesting and even instructive to glance back across a long vista of years at the beginning of things.

In those days, the pursuit of aviation, equalling the pursuit of happiness in the uncertainty of its results, was still regarded by the public at large as a spectacular and oft-times thrilling variety of dare-deviltry for the ultimate benefit of hospitals.

Nevertheless, in spite of the admittedly precarious combination of the laws of gravity with experimental contrivances intended to defy the said laws piloted by blithely optimistic votaries of the art of flying, a considerable remnant of those gladsome harbingers of the aerial dawn managed to survive the ordeal and still continue to abide in this vale of tears and depression. Most of them bear the proud title of "Early Birds." And they were birds, indeed, all of a feather, and strenuously intent on catching the worms of pre-war days with many a splintering crash and groans of contentment.

Although a goodly number of those old-timers were actuated by an adventurous spirit which urged them to get away from a humdrum existence, in which attempt some of them succeeded to perfection and with amazing finality, quite a few others proved to be by no means devoid of brains, common sense and such knowledge of the flying game as was at that time available. This is a fact somewhat at variance with the conception cherished by the present day super-sophisticated aeronautical generation, but none the less true, for all that.

Some could even lay claim to that peculiar trend of mind, which for lack of better name, may be termed "originality." Originality, as everybody knows, is a mental condition which prevents the sufferer from doing anything twice in the same way. In other words, they would try anything once and very often get away with it.

Those early experimenters lacked the modern text-books in which are set forth the mathematized results of the very science they were so valiantly trying to originate and establish. And yet those surviving few possess a priceless advantage over the younger generation in that they personally experienced and struggled through that painful phase of growth and development which, carefully nursed along by a handful of daring spirits from very small beginnings, was soon to acquire noble proportions.

It is an inestimable advantage to have at one's disposal numerous hand books, reports, graphs, and classified information, pertaining to the minutest details of construction, to design and build an airplane these days. It is likewise a great boon to have the use of smooth-rolled fields extending almost as far as the eye can reach, concrete runways, parachutes, instruments, weather reports and triple-licensed airmen available at a moment's notice to test the plane after meticulous inspection by qualified experts.

And yet, when all is said and done, this ponderous array of science and organization is mainly concerned with the exploitation of planes, which in their essential features differ but slightly from those built twenty years ago. The old-timer who, by personal contact and through personal observation, has followed the progress made from the initial period of inception and struggle for recognition is forced to the conclusion that not only was the foundation laid and the way for subsequent development paved in those remote years of pioneering, but also that the most important and fundamental problems of development were likewise solved during that short period.

And in spite of his endeavor to maintain an impartial attitude, it appears to him that the work that has been done since, represents with but a very few notable exceptions, mostly a process of

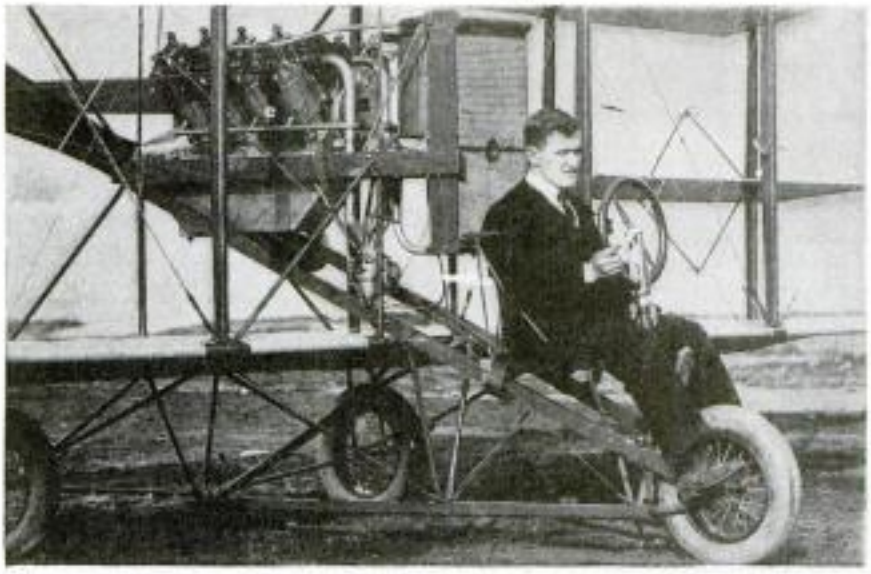
The first flying boat was invented and developed at the Hammondsport plant by Curtiss in 1911. Note that this first boat has no "step" in the hull. The step was a later development that made take-off easier.

Curtiss at Hammondsport

HERE is an intensely interesting story of early days at the Curtiss Hammondsport plant—at the time when revolutionary improvements were made over night.

The author, who drew his nickname from his famous crackup at the stonewall boundary of the old Curtiss field, participated in this early development work and recalls interesting incidents occurring in 1911, 1912 *and* 1913.

The title of this story might have been, "There is Nothing New Under the Sun," for on these early ships we see many items that many believe to be modern.



Here we have Lincoln Beachey, the peer of all stunt pilots, trying out the first of the famous "OX" series of Curtiss engines. Note the so-called "floating aileron" at the right. Beachey subsequently performed the first loop made in America with this machine in 1913.

refining and elaboration of already established designs.

In order to gain a clear idea of the manner in which progress was achieved in those early pre-war days, the reader is invited, in spirit, to make a pilgrimage to the charming village of Hammondsport in the up-lands of New York State, the erstwhile home of the Curtiss Aeroplane Company and the birthplace of its founder and moving spirit—Glenn H. Curtiss.

Nestling under the steep wooded hills which flank Pleasant Valley, broadened out to a sloping plain terminating at the southern extremity of the narrow Lake Keuka, the village lies snugly enseconced among the foliage of splendid trees and breathes a spirit of rural contentment. To the casual visitor it would seem the last place in the world to suggest a glorious past as an early center of aeronautical activity; nor would it appeal to the present-day airman as a likely location for an aviation school, since he would search in vain for the broad level meadows and unobstructed vistas usually associated with flying fields.

From the upper end of the main street he will be directed down a gently descending highway lined with tall trees to an open space called Kingsley field and he will be informed that this was the arena of action where many famous flyers of former years received their initial training.

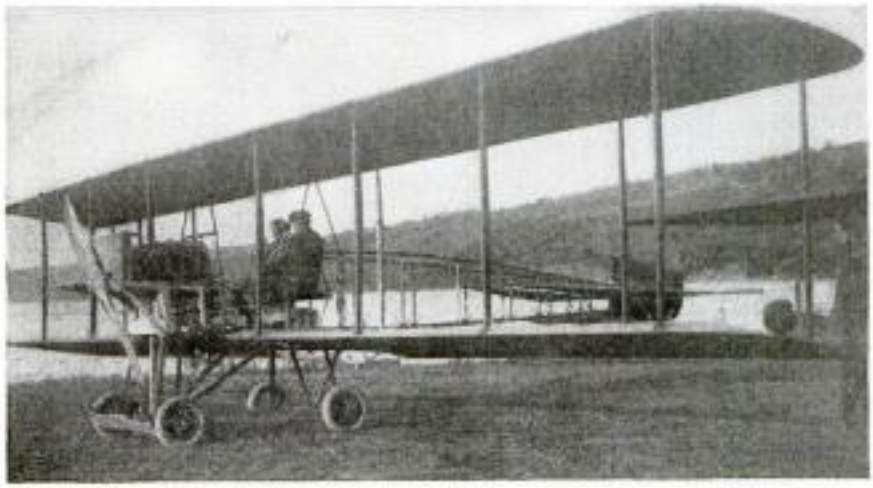
Standing at the hither end of the field, he sees a breast-high stone wall with trees and telephone poles lining the road immediately beyond it. In front of him, stretching away for three-quarters of a mile to the water's edge is a fairly level expanse of ground to the right, this ground slopes up and is mostly given over to vineyards and gardens which are bordered by another stone wall and road at right angles to the first ones with a similar array of trees and telephone poles.

Beyond this road, the hills rise abruptly to a height of several hundred feet. To the left of his point of observation the field is rough and uneven, and merges into the marshy grounds bordering on the inlet creek which meanders down the valley to the lake. Near the lake shore he will discern some frame sheds of simple construction, open at the front and serving as hangars for the well-known Curtiss Airplanes of the period. A runway and turntable for the hydro-airplanes complete the equipment of this primitive airport.

The actual space available for taking off and landing then was about three-tenths of a mile in length and at the most some two or three hundred feet in width. A tall and solitary elm tree graces the landscape between the serviceable part of the field and the creek, evidently placed there by nature with intentional disregard for the spacious requirements of the novice engaged in practising the art of making a turn on a low powered training machine having a ceiling of about fifty feet.

Whatever else the embryo flyer might do or omit to do, if he wanted to make a complete circle, he simply had to dodge that elm tree. Keep clear of the stonewall and the encumbrances beyond it, avoid settling down in the marshy grounds around the creek, give the vineyards at the opposite side a wide berth and refrain, as much as humanly possible, from over-shooting the mark and landing in the lake.

Considering that the machines of those days were not exactly fast climbers and that their reserve power was very small, the matter of getting out of the field required a good deal of judgment and practice in addition to a sound knowledge of the topographical features of the grounds. Mishaps would occur, of course, and disabled machines had to be dragged back to the hangars on numerous occasions, the



Well, well! Here we have the first Curtiss tractor plane all dolled up with a four-wheel landing gear. They didn't have time to cover the fuselage with fabric. Date: 1913.

would-be aviators, however, usually escaping with a few scratches and a lowered self-esteem.

The art of taking off and landing was drilled into the aspirants for aerial honors by the instructors under the ever-watchful eye of Glenn Curtiss; beginners were started out soloing right off the bat in low powered machines, with engines throttled down, to practice straight runs and hops and to familiarize themselves with the controls. A drag brake was supplied to stop the machine before it hit the stone wall. If the brake did not work, or was applied too late, the run would be checked by a rope stretched a few yards along in front of the wall; and if the rope proved powerless, the stone wall, as a last resort, would stop the machine very effectively.

Usually, one crash like this was sufficient to teach the pupil to use better judgment in the future. Landings in the lake were not so harrowing, but still attended by enough excitement and discomfort to carry their point.

If practice on the land machines was beset with many obstacles, the same could not be said for the hydros, for surely a more perfect place than the calm expanse of Lake Keuka could hardly be found elsewhere, and this more than made up for the deficiencies of the field. It is therefore not surprising that the hydro-airplane originated in Hammondsport, which also witnessed the conception and development of the flying boat by its inventor Glenn H. Curtiss.

It is fair to presume that aviators of the present era, accustomed to the commodious seating arrangement and the protection offered by fuselage, windshield or cabin, would feel particularly uncomfortable if they had to ride in an old-time Curtiss pusher machine, perched as he would be in front of the radiator on a little canvas covered frame fastened to the diagonal members of the chassis without a trace of a shock-absorber. And in addition one front wheel equally bereft, that precious front wheel that should never be bumped in landing if a series of disquieting kangaroo-hops were to be avoided.

A group taken at Hammondsport in 1913. LEFT TO RIGHT: Lansing Callan, Henry Keckler, Lieut. Goodier, Lieut. McLeary, David McCullough, Haldemann Figelmessy, J. D. Van Vliet (author of this article), "Oliver," Adams, Glenn H. Curtiss, Lieut. Parks, Lou Cranite, Lincoln Beachey, Doc Wildman.

Those were the days of the good old Curtiss control with foot-throttle and aileron-shoulder-yoke, an arrangement which developed a sense of balance in the student impossible to attain with the now universally employed stick control and foot bar.

Disturbances in the lateral balance of the machine were corrected by the aviator leaning over toward the high wing; which was a natural enough movement to make. When banking on a turn however, he was supposed to sit tight which was rather contrary to his instinct of self-preservation, and furthermore he was expected to help the banking along a bit by leaning over toward the low wing, but *not too much*, lest a side-slip should put an end to his evolutions.

The Curtiss Hammondsport flying field in 1913. This is the first aerial photo made in the United States from an airplane.

The hydro was provided with a dual control, instructor and pupil sitting cosily side by side, an ideal arrangement which enabled the instructor to watch the pupil closely, and to bump him or kick his shins if he neglected to ease up on the throttle while attempting a landing. This may seem a harsh procedure, but sometimes it was necessary and saved the day for both.

Amusing contrivances, no doubt, when viewed through the mist of time, deserving perhaps the pitying smile of these latter day tractor-trained pilots. And yet we thought a great deal of those machines in the old days, and for some reason, we still do. One who had learned to handle those machines aright and could take off and land in the restricted, obstacle-beset area above described, was well qualified to meet any emergency.

Those who had the privilege of witnessing expert flyers like Curtiss or Beachey pushing those early machines through their paces, could not but marvel at their wonderful performance, and realized that much could be accomplished with primitive appliances if handled by thoroughly competent men. And in those days the business of flying was 99 per cent man; the aviator having to rely entirely on his own caution and good judgment, which qualities were the keys to a successful performance. To go easy and be cautious, was the admonition constantly tendered to over-ambitious novices by the naturally cautious Glenn Curtiss.

And thus we love to remember him, straight and spare of frame, somewhat

The complete personnel of the Curtiss factories in 1913. Among this group of workers are many who later became famous in the aeronautic industry.

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Hammondsport

(Continued from page 78)

dour and pre-occupied of countenance, going about quietly, with his keen gray eyes unobstrusively taking the measure of a crew of pupils who could do much to make or mar the reputation of the Curtiss School by either following or disregarding his instructions. Somewhat evasive of point-blank questions, and rather averse to committing himself on any point, he knew in his own mind that what was deemed satisfactory today, would be improved upon and work better tomorrow. Was there ever an inventor who could leave well enough alone? "So why make a statement now that might be called in question a short week hence?"

Glenn Hammond Curtiss was born at Hammondsport in 1878. Ever interested in things mechanical, he contrived by dint of much experimenting and improving, to build a first-rate little motorcycle with which he leaped into prominence in 1906 by winning the motorcycle record for speed at Ormond Beach, Fla. He made a mile in 26 2/5 seconds, which resulted in the erection of a motorcycle factory which throve and expanded as the demand for his product increased. Then followed the association with Dr. Alexander Graham Bell of telephone fame, who in those days was concentrating his attention on man-carrying kites which took the shape of the many celled gliders familiar to all students of the subject. In 1907 came into being the Aerial Experiment Association of which Glenn Curtiss was a director.

Having ideas of his own on the subject, he experimented with biplane gliders, in the meantime working out a satisfactorily functioning neat little aeroplane engine, and in 1908 the famous "June bug" was evolved, the first of a series of Curtiss aeroplanes, the end of which is not yet in sight. The June Bug won him the Scientific American cup. The June Bug design, by effecting various improvements, was transformed into the well-known Curtiss Pusher biplane equipped with a 35 H.P. four-cylinder Curtiss Motor and with this machine he won the cup at the Rheims International Meet in 1909.

The efficacy of the Curtiss Biplane was now generally recognized and the reputation of the machine and its originator was further cemented by the famous Albany to New York flight in 1910, by which Curtiss won the $10,000 New York World prize, the distance of 143 miles being covered at an average speed of 49.5 miles per hour.

The Curtiss Aeroplane Company was now fairly launched and the aeroplane factory back on the hill among the vineyards had to be enlarged to fill the orders that were fast coming in. Many young men were attracted by the opportunities offered by the Curtiss Exhibition Co., a flying school was established at Hammondsport as well as on North Island, San Diego, Calif., and in both places, many famous flyers were being developed, not the least of whom was Lincoln Beachey, soon to be world-renowned.

Engine development went on apace, a sixty H.P. engine was soon produced, to make room in its turn for the 90 H.P. Curtiss O. and its immediate descendants the Curtiss OX series, which were extensively used during the war on the Curtiss' J. N. training machines and others. With the advent of this comparatively speaking, high powered engine the development of the hydro-airplane was greatly accelerated since a hydroplane needs more power to take off than does a land machine.

The experiments leading to the invention of the Curtiss Standard Hydro-airplane were extremely interesting. The idea probably germinated during the Albany-New York flight over the broad Hudson River, on which memorable trip Curtiss carried a light canvas boat strapped to the bottom skid of the plane. As he stated afterward "The river looked extremely deep."

This precautionary arrangement evidently suggested the idea of a float of some kind which was to form an integral part of the machine and would take the place of the landing gear. A short time afterwards, experiments along those lines were commenced at Hammondsport, the first floats used being a pair of canoes which however proved to be unsatisfactory. When tipping the plane up in order to take off, the rear part of the canoe would be forced down and fill up with water which had to be bailed out to prevent them from being swamped, so the next step was the addition of an oilcloth cover.

Another trouble then developed, namely the suctional action on the rounded bottoms of the boats, whereby the machine was prevented from leaving the water. The canoes were accordingly discarded and a flat-bottom box-like pontoon was substituted.

Modifications were essayed, such as placing the engine in the hull and driving two propellers by means of a chain transmission; in another experimental construction the pontoon was provided with wheels.

This arrangement is especially noteworthy inasmuch as it constituted the Curtiss hydro, the first amphibian plane ever built. These experiments, however, were only of a preliminary nature and intended as a basis for future development and research. The Curtiss hydro-airplane was a great success and the machine became immensely popular. For school purposes it certainly had no equal, and in spite of its seemingly light construction it was able to withstand an immense amount of buffetting. During the summer seasons the school hydro would make as many as 40 trips a day, each trip covering about 10 miles and consisting mostly of landings and take-offs which Curtiss deemed the most essential part of the training.

It was evident, however, that Curtiss was not satisfied with the hydro which in rough weather provided but scant protection, if any at all, from spray and waves, so the next logical development was the Flying Boat, which is one of the outstanding achievements in Aviation. The first Flying Boat was

built and flown in 1911 on Lake Keuka. It comprised, a set of wings carried by a hull with a continuous bottom which took the place of the hydro-pontoon, the controls and the occupants being contained within the hull, while the tail surfaces were carried by the after part of the hull. This design needs no further description since everybody is familiar with it; it has persisted since the day of its inception and differed only in matters of detail from the flying boats now in use.

Since some difficulty was experienced in getting off the water, the next and most notable improvement in order was the introduction of the break in the bottom, the "step" as it is termed, whereby the detrimental suctional action of the rear part of the hull was eliminated, the suction being still further diminished by apertures in the bottom back of the step which communicated with the air on the top of the hull. The machine was thereby able to rock on the step prior to taking off without suctional interference of the after part of the hull.

Thus in the short space of one year, the flying boat was invented and practically perfected. The flying boat as it is used today is in all essential features a replica of the boats built by Glenn H. Curtiss in 1912. A further innovation was introduced in 1913 when the pusher type flying boat was converted into a tractor type, which necessitated the removal of the front cowl and the shifting of the cockpit to a position aft underneath the motor, thus foreshadowing the still remote advent of the Dornier boat.

Other experimental work was being carried on at the same time. The land machines were coming in for a thorough overhauling; the first experimental tractor was constructed and flown, which was followed by the now well-known type of tractor hydro-airplane. A monoplane flying boat was also constructed which turned out very successfully. New wing curves were evolved and tested in actual flight, new fabrics were employed and tested, and a series of interesting experiments were made with different kinds of wing dopes which were fast replacing the rubber coatings used on the older machines.

Engineering was awarded its share of attention and methods of stress analysis were devised which succeeded the original rule of thumb ways supplemented by experience and horse sense. In spite of those archaic methods, no structural failures of any kind ever occurred on any of the Curtiss machines, the construction in accordance with Curtiss' doctrine of caution, initially rather tending to over-strength than otherwise, and being then gradually reduced to conform with the requirements of lightness.

EDITOR'S NOTE. *This is the first article by "Stonewall Jackson" treating of early days at Hammondsport, N. Y. A second article will follow in an early issue which will be even more instructive.*