The San Diego Aviator Factory

Preliminary Training of Our Flying Men at a Leading School

By Edward C. Crossman

NOT many moons ago our short-sighted Uncle Sam maintained, on the spit of land in San Diego Bay known as North Island, a somewhat aviation school. It was known to the dear people chiefly by the occasional squibs in the press announcing that some unhappy victim of Congressional parsimony had made a much faster descent from the blue empyrean than is contemplated in present airplane construction. It was known to professional flying men as the harbor for various antiquated craft of the same class among airships as the famous "Santa Maria" of Christopher Columbo is among watercraft. It was this school that saw depart, over the blue mountains to the east, the worst lost pair of aviators that ever aviated—the two army gentlemen who set sail for Calixico in the Imperial Valley over the mountains and who finally wound up more than a hundred miles beyond, in Mexico, in the most desolate, least inhabited and most dangerous region adjoining the border of these United States.

So it came about that the aviation school at North Island didn't wear any impressive reputation on the Pacific Coast and the name may even now arouse entirely erroneous ideas in the minds of those reading of it and its work. The island and its name still remain, but all else is changed. From a one-horse, purely experimental and mostly forgotten branch of our army's posts and schools, North Island at San Diego has been suddenly metamorphosed, in this sixth month of the first year of war, into one of the greatest training schools in the world for aviators. Not that the graduate of this school is fit without more ado to take on Guynemeyer or the Teuton flier with two-score French scalps to his belt. North Island is merely the second step along the road toward the "Ace" stage of aviation. Other schools take the junior military aviator and introduce him to the upside down and the loop-the-loop, and the whirling leaf and other stunts that serve to undo Hans and Fritz in the air.

North Island, however, situated in the best possible climatic location in these United States, grinds out junior aviators as steadily as a big plant grinds out munitions. Practically devoid of high winds, blessed by little more than ten inches of rain per year and that

SOME eight months ago Mr. Crossman submitted this article to us. At that time it told of the latest developments at the San Diego flying field. For obvious reasons the publication of this information has been withheld until now, and the article is presented in its original form.—THE EDITOR.

falling within sixty to ninety days during the winter, the San Diego climate sees the fliers starting morning after morning at the magic hour of six-thirty, while the bulletins from the eastern schools growl dispiritedly about rain or snow, or blizzards, or high winds and muddy fields. The school finishes off the raw material supplied by the theoretical school up at Berkeley, converting these novices into men who can do any ordinary sort of flying, who understand gas engines as thoroughly as any man can understand the moody, tricky and inconsistent beasts, and who are ready to learn the gentle art of the aerial gymnastics that cause the fretful hair to rise on the scalp at the mere reading of the accounts thereof.

Now, instead of the solitary, uncertain, wobbling, unreliable machine that used to circle around the fields across the bay from San Diego, the sky is full of pale yellow dragon flies, while the roar of the great eight-cylinder motors reaches over to the business district. Nearly two-score of the planes circle the fields in solemn procession during flying time in the early morning, while often there sails over the city itself the straw-colored, translucent plane of the more advanced student, and the staccato song of his motors floats down from his mile elevation.

The island is so-called because it is a promontory. San Diego Bay is formed by the curving highlands of Point Loma on one side, and by the long, low sand-spit of Coronado and North Island on the other. The latter forms the northwest termination of this 10-mile spit.

Said spit, running from the mainland some ten miles to the south, is but a few hundred yards wide for much

of its length. At its northern end it widens to several miles, and this is the beautiful little suburb of Coronado. Then it narrows down again, pinching out beyond the hotel to a mere strip of sand across which the water floods with the right combination of high tide and high wind. Beyond this little neck, it again widens to make North Island, several miles each way, and forming one side of the entrance to San Diego Bay—of which Point Loma is the other. It is but a scant mile from the city of San Diego and is surrounded by water on every side save the little neck mentioned that links it with Coronado. One side is washed by the placid waters of San Diego Bay, another by the harbor entrance, and a third by the more boisterous waters of the open Pacific, with only the highland of Point Loma reaching out in its curve to stop the long roll of the open sea.

The San Diego climate is without doubt the most even and the mildest of any city in the United States, having a mean of 60, a low temperature in winter of 54, and a high one in summer of 68. There are few cloudy days and little rain, while high winds are mostly absent. As a combination of ideal climate and location, the North Island Aviation School is more nearly ideal than any other such institution in the world.

In this Uncle Sam agrees. Already there have been drawn tentative plans—blue prints of which hang on the walls of the office of the school—for the only joint aviation school in this country for the army and navy. Some four million dollars are to be expended in the buildings and the improvements. The army is to have the sea side of the island, the navy the bay side, where the waters are ironed out and so adapted to the navy hydroplanes. Each branch is to have its own hangars and shops and offices. Work is expected to start on the army buildings about November 1st. The plans include specifications for handsome quarters for the officers of the school along the mission style—which is not used for more than three out of four buildings in California—with hospital, barracks for the enlisted men and non-coms and others for the cadets attending the school, with the usual buildings of the army post, and in addition with machine shops and wood-working shops,

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Correspondence

The editors are not responsible for statements made in the correspondence column. Anonymous communications cannot be considered, but the names of correspondents will be withheld when so desired.

The Nose Spin

To the Editor of the SCIENTIFIC AMERICAN:

Investigations into the numerous airplane accidents of late reveal that by far a larger part of these accidents are the result of the machine going into a nose spin, or as the average press reporter would have it, a nose dive. The nose dive itself is not necessarily dangerous. I have seen this executed time and again by even the less experienced flyers with no hint of danger and it is extremely doubtful if this spectacular stunt has been responsible for a single accident unless some part of the machine was at fault. The nose spin, however, is extremely dangerous and is almost certain of disastrous results. It is practically the same as in the nose dive except that instead of the machine diving straight to earth as in the nose dive, the planes revolve about the axis of the propeller horizontally like the arms of a machine governor. In this position the controls are useless, in fact they only tend to increase the rotary motion of the planes.

While the death rate among flyers is gratifyingly small considering the number of comparatively inexperienced men involved, it is doubtless the desire of the officials in charge to reduce these accidents to the smallest figure possible, and scientific research and discussion of the subject will no doubt, in due course of time, bring about the results desired.

In solving the problem of the nose spin it will, of course, be necessary first to determine the exact cause, before attempting to apply a remedy. In my opinion it is unquestionably due to the machine going into a nose dive under full power and the propeller torque causing the planes to rotate horizontally about the propeller shaft.

This theory is substantiated by the fact that the direction of the planes' rotation is always opposite to that of the rotation of the propeller. Another fact which would

bear out this theory is, that a pilot can voluntarily execute the nose dive successfully, but when a machine suddenly goes into a nose dive unexpectedly it is reasonable to suppose that the spin has already begun before the pilot has had time to switch off his motor. Once this spinning motion of the planes is started there is little that the pilot can do to save himself.

Assuming that the above theory is correct it would seem that a solution of the problem would be to equip each machine with an automatic device for short-circuiting the motor when a certain forward angle of the machine is assumed, or to provide a reversing mechanism for the propeller shaft or the propeller pitch, with which the pilot could set up a reaction to the spinning motion once he found himself in that dangerous predicament.

GEO. W. WILLIAMS.

Temple, Texas.

Papers for Bagdad

To the Editor of the SCIENTIFIC AMERICAN:

Since the occupation of Bagdad and Mesopotamia by the British army, and the opening up of communications with the outside world via Bassorah, the local merchants are beginning to look about to make connections in order to replenish their depleted stocks of merchandise. The local British authorities are also taking an active interest in developing the country and have a number of projects in hand for introducing more modern methods of farming and irrigation.

With a view of bringing to the attention of the persons concerned the advantages of the American market I desire to open a reading room in the Consulate and would be glad to have your publication on file. The Consulate is not able to purchase the papers, however, and I wonder whether some of your readers would not send us their copies after reading them. The address is simply, "American Consulate, Bagdad, via Bombay, India."

Oscar S. Heizer,
American Consul.
Bagdad.

A New Lifting Force for Airplanes

To the Editor of the SCIENTIFIC AMERICAN:

Regarding the additional lifting force for airplanes mentioned in the article by Mr. Hering in the SCIENTIFIC AMERICAN of March 9th, this is no doubt appreciable, due

to the fact that the air stream, by its friction on the surrounding air carries a considerable portion of that air with it and the rush of air to fill the partial vacuum thus created, causes air currents from all sides towards the axis of the propeller stream.

The propeller stream can be bent in any direction merely by stopping the compensating air flow (with a suitable plane of some kind) on the side toward which it is desired to attract the air stream. I think the writer is wrong in supposing that the air stream will support the force of the compensating air currents on the other side of the air stream from the intercepting plane and it is only because of the convex formation of his card that he got any appreciable lift in his experiment as indicated in Fig. 4. This was due to the fact that the air current on one side of the card struck a convex surface, while the current on the other side encountered a concave one; the pressure on the concave surface being slightly greater (a fact recognized in the Robinson anemometer).

However, this force holds good only when there is a considerable displacement of the medium and the object is nearly at rest. With an airplane, during flight, the medium is more nearly at rest and the object moves forward through it; so the actual lifting force due to the air stream would be comparatively small. In addition to this, the bending of the propeller stream would cause a loss of the negative pressures over the rear part of the wing, thus counterbalancing any advantage gained by the lifting force mentioned.

Suppose it were granted that this force is sufficient to actually lift the machine in the air, under full propeller action, provided the airplane were hitched with a rope from behind. The moment the rope were cut and the machine moved forward, it would descend to the ground, on account of the diminution of the lifting force (the force being at its maximum when the machine is at rest) and by the time it had attained sufficient speed to rise on its wings, the force (which would diminish with the forward motion of the machine) would be comparatively small and what there was left of it would be neutralized by the loss of the negative pressure on the rear part of the wing, as indicated above.

I would like to hear how nearly right I am in my line of reasoning.

JULIUS A. PAYNE.

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Hogs and the War

(Concluded from page 328)

refers to kitchen refuse, including table waste, cull vegetables, etc. On the average farm all garbage is fed raw and precaution is taken not to introduce any poisonous or otherwise unfit materials in garbage which is to be fed to pigs. Enormous quantities of garbage are collected from the hotels and restaurants of large cities and carted to outlying districts there to be fed to pigs. At these large feeding establishments where large numbers of hogs are kept in close confinement and not immunized to hog cholera, it has been found by experience that cooking the garbage for several hours prior to feeding is the only safeguard against disease. The garbage is boiled in large tanks for six to eight hours, after which it is of about the consistency of thin soup. This material is then conveyed to the different pens by means of long troughs or chutes passing through the main alleyway with outlets branching into each pen.

If the hogs have been inoculated for cholera it becomes feasible and safe to feed them raw garbage, the serum in this case preventing cholera infection but in no wise curing it if it already exists in the animals.

Feeding is not the only subject which has been studied carefully by agricultural experiment stations during recent months. The management of hogs from birth to the time they are sold, has also received due attention; and as a direct outcome of all this there have been obtained reliable data dealing with the breeding of hogs, treatment, housing, marking, dipping for lice, and so on.

To conclude, the hog raiser no longer need go about his work in a haphazard, rule-of-thumb manner, for he has available the best data any business man could wish for in carrying his enterprise along on a successful and profitable basis.

The San Diego Aviator Factory

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with motor testing blocks, and more elaborate paraphernalia generally, than installed at any other flying school in this country.

The navy will build nearly as big a plant on the bay side of the island, just as soon as the army gentlemen remove their annoying and superfluous persons from the navy's assigned bailiwick. These will include great hangars for the big seaplanes, a concrete dock, a boulevard connecting with Coronado, and a railroad running along the shore and connecting the two schools and their store-houses.

The present School is situated on the San Diego side of the island, with three fields, well apart and separate each from the other. The main hangars and the shops are near the boat landing on the bay side and within rifle shot of the city. The hangars and the shop buildings, of light frame construction, give evidence of hasty and temporary design, but they house more than fifty of the most modern types of the planes adapted to the purpose of the school—that of giving military aviators their lower grades—the grammar grades—of instruction. The great Curtiss JN 4, types A and B, predominate and according to the army gentlemen, give the greatest satisfaction. They are all of the dual control type, with two seats, each furnished with a complete set of the controlling mechanism of the plane. The engines are eight-cylinder, developing about eighty horse-power at 1,400 revolutions per minute. There are some planes of a Pacific Coast make at the school, including the triplane construction instead of the biplane, but the officers state that the Curtiss gives the most satisfaction.

All of the machines at the school are of the tractor type—with the propeller and engine ahead of the aviator. This type of machine is undoubtedly undesirable in some ways because the propeller and engine come between the aviator and a good look ahead and below. In spite of this, it has been adopted for a reason which is probably pretty well known by

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The San Diego Aviator Factory

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this time, but which may stand repeating here. This is merely the cold-blooded one that the tractor, when it falls, doesn't calmly drop the 600-pound engine on the poor pilot. When the tractor gets out of control and goes bump on the hard ground it merely stands on its head and turns a neat somersault, throwing the pilot clear as a rule. The pusher, with engine behind, does its best, under the same conditions, to deposit the heavy engine on the frame of the pilot—and usually succeeds. The result is that the Government is saved hospital bills, but after a while becomes shy of aviators.

The officers of the San Diego school cold-bloodedly figure on falls and plenty of them—and the falls come off as per figure. Between August 1st and the middle of September, according to one undenied report, 39 machines came to grief. This does not mean complete wrecks—most of the damage came from little errors on the part of the students as to location of the ground and speed of the descending ship. The damage was therefore, in many cases, merely smashed wheels and running gear, propellers broken, wings and rudders put out of commission. At the same time there are plenty of falls—the results of which are minimized by the strong construction of the planes and by their tendency to right themselves and fall softly if fall they must. There is never the plunging, rocket-stick sort of earthward progress, imaged by the layman; the fall is always a spiral flutter that does not at any time get up much speed. The Curtiss plane has one wing tip slightly curved to resist the tendency of the engine to drive it sideways, in a fall, and it is as nearly inherently stable as a plane can be without special stabilizing apparatus.

Grief in such cases comes to the student merely from lack of experience, doing the wrong thing that no amount of instruction can guard against, any more than it can prevent the tyro automobile driver from pulling the equivalent fool stunts when he gets out alone in his car. Trying to climb at too steep an angle, banking too sharply and other little tricks that make the plane lose headway and slide down the air are responsible for the actual falls that take place. Engine trouble is rarely back of falls, merely because the student is never in such a position that he cannot reach home with the engine entirely dead. Also he is taught early in the game that regardless of where he happens to be in the air or how tempting the target in actual fighting—if the pampered and temperamental beast under the hood shows the first sign of trouble, it is up to him to point the nose of that ship for home and get there pronto. One miss, one cough, one little spit of blue smoke in the wrong place, very likely means a motor that is getting ready to lie down on its back and quit its job—and said quitting may happen in the next 30 seconds.

Because of the delightful reliability of the gas motor in the airplane and because the army gentlemen don't care to see some student having to make a forced landing in the chimney pots of Citizen Spriggins over in San Diego, there is a strict rule that regardless of the position of the plane of the learner, the old reliable ratio of eight to one must be kept. That is, the plane, being able to make eight feet of forward progress to one of drop with the engine dead, must always be such height that this ratio of progress will carry it to its home field. If the pilot flies 8,000 feet from the field, he must be at least 1,000 feet high, if he flies—to reverse the case—5,000 feet high, he can go 40,000 feet or some eight miles from the field. This is of course not adhered to in the case of the more advanced students, men who make cross-country flights to the nearby towns and finally to the beach town of Venice, near Los Angeles and 120 miles from the aviation school.

The students for the school are taken from the ranks of the officers of the regular army, and from the school of military aeronautics at the University of California in Berkeley. Here the student

gets the principles of the airplane and of the gas engine and learns shop practice, but gets no actual flying. At North Island the student goes aloft with one of the many competent instructors for his preliminary flights. He follows the moves of the instructor through the duplicate control, but during the first few flights makes no volunteer moves. Then the instructor removes his hands from the wheel and his feet from the foot controls at intervals and lets the student handle the machine, correcting errors as they are made, until finally the student guides the machine alone.

Regular traffic rules govern the scores of planes that roar above the fields at the school. Traffic over a given field must move in the one direction. The man leaving the ground must not start with a machine coming down and so possibly get in the way of or bother the descending pilot.

One of the strict rules of the school is that no student or instructor, regardless of his proficiency, shall perform any stunts within view of the student fliers. While there are a dozen men at the school in the capacity of instructors and lecturers who can neatly perform all the gymnastics peculiar to the finished fighting aviator, they can't perform them in the sight of the students, lest some of the young and therefore ambitious chaps seek to do likewise because of the apparent ease of the stunt. The work of the most finished student ready to graduate is confined to long cross-country flights, to circling certain pylons with neatness and accuracy, and to cutting his engine and landing in a given spot. Also there is the matter of hurdling an obstacle such as a wood might be, and then making the landing at a new spot beyond.

The learner, losing headway and starting to fall, finds the most difficult task he's called on to perform is the correct solution of the "fix" he's gotten into. This is merely to turn her nose down and let her drop until she gets up sufficient speed to allow the nose to be turned up again and still keep the acquired headway. The beginner instead leans back, very horrified, and hauls up her head, which assists still more in losing headway and guaranteeing that the ship fall.

The school boasts two finished French fighting aviators, sent over to us as instructors, Lieutenants Henri Marguise and Robert Mairesse, both "ace men" of the French aviation corps and both of them men who have won the highest respect and liking of the Yankee flying men associated with them. In spite of their ferocious reputation and their skill they are tall, rosy cheeked, boyish-looking chaps, having all the war-hardened air of the average freshman of the inland college. They fly but little, and are used more to lecture to the students and to give the benefit of their advice generally.

The North Island school is at present under the command of Col. Alexander Dade, whose interest before his present command had been in the flying one does on the hurricane deck of a cavalry horse. Maj. Thurman Bane is the secretary of the school. The aeronautical assignment nearly completes the major's experience in the various branches of the army, as he has served in turn in the engineers, the artillery, the cavalry and the ordnance department, avoiding only the down-trodden infantry.

The instructors and some of the officers at the school wear the new insignia of the flying corps, the silver shield on the breast with the silver wings. The junior aviator wears the shield and one wing, the finished product wears both wings and so the symmetrical decoration.

Youth, and therefore reckless abandon and courage mark the men at the school. The young, restless, unsettled, dashing type of officer predominates. The man over thirty-five is better at some other task. The job demands youth, quickness of reaction, the absence of the cold blooded consideration of the chances that must be taken—the carping one might say the absence of the good, if prudent, sense that marks the man over his reckless and care-free days.

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