January 15, 1932 Vol. 3. No 2

THE SAILPLANE & GLIDER

Official Organ of the
British Gliding Association

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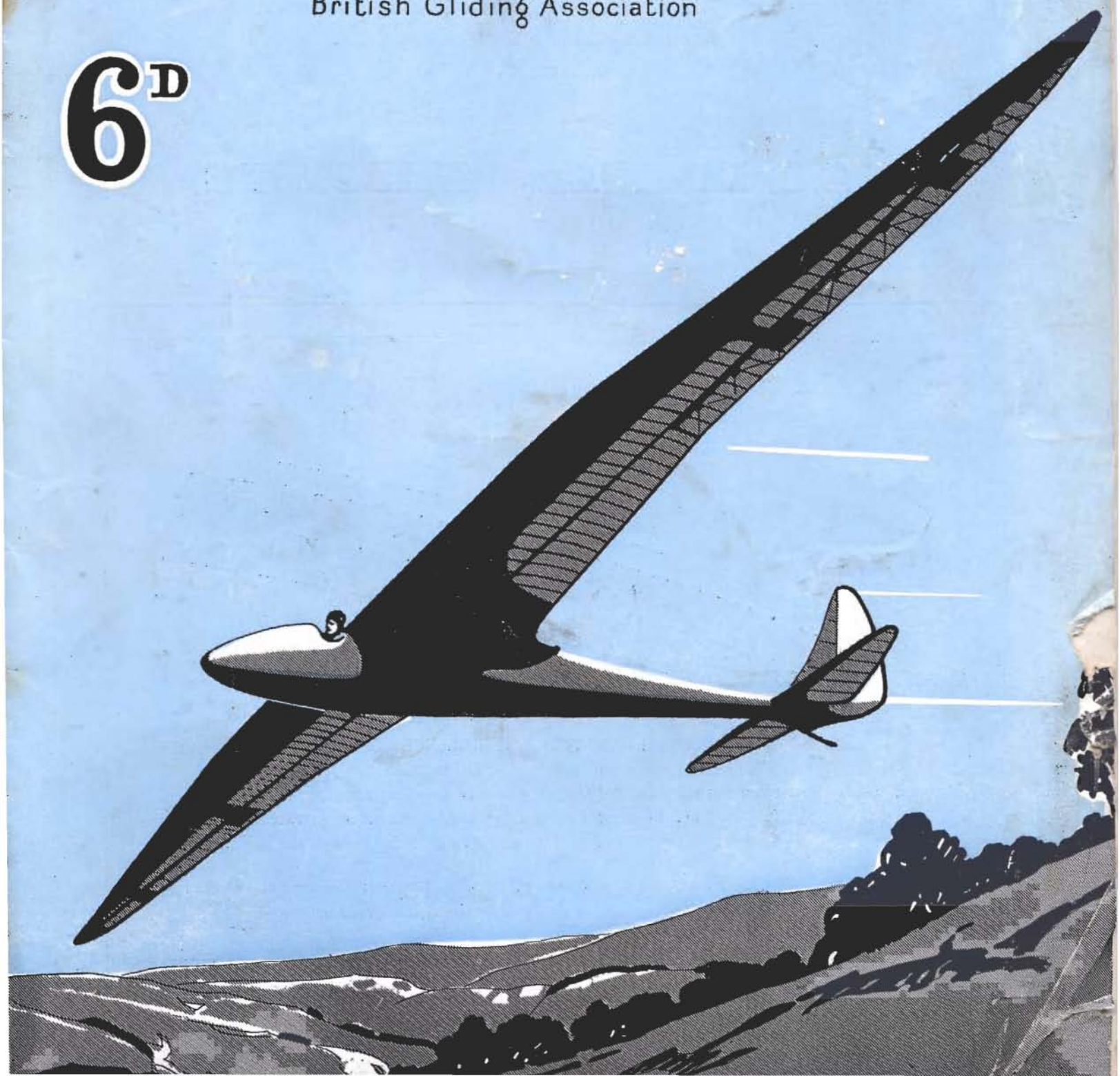

THE SAILPLANE & GLIDER

(*Founded in September*, 1930, *by* THURSTAN JAMES)

The only Journal in the World devoted solely to Motorless Flight.

OFFICIAL ORGAN OF THE BRITISH GLIDING ASSOCIATION.

Editor: F. ENTWISTLE.

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CONTENTS.

THE PAST AND THE FUTURE

In any great undertaking it is a very salutary procedure to pause from time to time to take stock—to look back on the past and review the progress made, and to consider what lessons should have been learned from the experience gained, and, even more important, to formulate plans for the future and to decide on the steps by which they should be carried out. The entry upon a New Year offers an obvious opportunity to put this procedure into practice, and it cannot but benefit those associated with the Gliding Movement if they will pause for a moment and apply it to their past and future activities.

The reference to the future leads us to ask "What is the goal towards which the British Gliding Movement is working?" Perhaps this is not an easy question to answer off-hand. The pioneers of power flying could have had little conception of the great advances which have marked aviation during the last ten or fifteen years. So it may well be with the Gliding Movement. We may, in years to come, see developments in, and applications of motorless flight of which, to-day, we have but little idea. Nevertheless, unless we have a definite goal before us, progress will be but desultory and the Gliding Movement will lack that energy and fire which should mark every healthy institution.

Some time ago a well-known figure in British aviation circles remarked that the gliding enthusiasts in this country were extremely busy in trying to find an apology for being so enthusiastic and were terribly anxious to prove that gliding had some peculiar use. In his opinion gliding and soaring were to be regarded solely as a fascinating sport. We venture to suggest that the speaker had mis-read the spirit which actuates the Gliding Movement. Nobody will deny that gliding and soaring provide probably the most fascinating sport ever invented, and if we never get beyond developing gliding for gliding's sake the Movement will justify itself. Already hundreds of young men and young women have been attracted to it, not only in this country but all over the world, and find delight in spending a large part of their leisure in this exhilarating pastime. But the Gliding Movement has a national importance and application which raise it above the general level of sporting activities. The realisation of this fact on the part of those engaged in it stimulates their work and makes for progress. If they speak of it, it is not because they have any apology to make for motorless flying but rather because responsible people in the country should be made to realise that the Movement is one of national importance and, as such, is deserving of national support.

It may assist, therefore, in considering the end towards which the activities of motorless flying should be directed, to review briefly some of the more obvious applications which experience has shown gliding to possess.

The development of aviation, both from the point of view of national defence and the establishment of rapid communication between distant centres has been one of the most far-reaching changes in the world's history, and there is little doubt that the country that will come to the fore in the long run is the country which maintains a lead in aviation and, necessarily, in its aircraft industry. It is towards the development of aviation that gliding and soaring flight have their most important application. In the first place, a progressive gliding movement can do more than anything else towards making an air-minded nation, without which the development of aviation must be inevitably hampered. Secondly, gliding has already been proved to provide a sound preliminary training for power flying. Thirdly it has an important application to certain branches of technical research. It provides, for example, a ready means of carrying out full-scale tests on aerofoils, which are not possible with an engine-driven aircraft, and there is little doubt that this contribution to aeronautics will become more and more important as time goes on. Finally soaring flight provides a definite means of examining at first hand the behaviour and movements of air-currents on which flying depends. It is no exaggeration to say that our knowledge of the atmosphere and its machinery has already been increased by this means.

The exponents of gliding and soaring flight have, thus, much to work for. And, it should be noted, it is soaring flight which has the more important practical applications. Gliding, in fact, is but a step towards soaring. A "C"

certificate should be the starting point of the motorless-flying pilot's real work, not the end of his ambition. As progress in soaring flight is made, so will the contributions towards the development of aviation become more important and not only so, but with increased knowledge, greater advances in soaring will become possible and greater personal enjoyment will come as a reward to the pilot.

Our aim, then, should be to develop gliding and especially soaring, keeping progress, and still more progress, in soaring flight before us as the great objective. Activities such as the design of new types of machines, methods of launching, etc., should all be carried out with this end in view. As the art of soaring flight is developed so will its practical contributions to the development of aviation and meteorological knowledge increase and widen in their scope.

But in thinking of the future let us not forget the lessons of the past. Perhaps the most important of these is not to allow ourselves to be diverted from the objective towards which we are working. All who were associated with the Itford Hill Contest will remember the enthusiasm that fired those taking part in it. Questions such as the design of more efficient machines and the possibilities of soaring flight were eagerly discussed. But, within a year, gliding was as good as dead as far as this country was concerned. The gliders of 1922 gave place to the light aeroplanes of 1923, and while we may claim that this, in itself, was a remarkable development from gliding, we cannot but deplore the loss which the empty years, from 1923 to 1929, have meant to British motorless flying. We have only to look at Germany to realise what the steady pursuit of gliding and soaring flight during those seven years would have meant to us to-day.

But if we take to heart this lesson of the past and pursue steadily the aims which have been stated, albeit somewhat clumsily, earlier, the British Gliding Movement will have nothing to fear, but will go forward increasing in its contribution to the national enjoyment and to the national well-being.

No progress is possible without co-ordination of effort. The day may come when we shall see established in this country a Central Research Institute to guide and direct the technical and flying activities of the various Clubs and to carry out specialised research for their benefit. But in the meantime the British Gliding Association, with its various committees, is doing its best to carry out this function and the surest way towards progress is for all associated with the Gliding Movement to pull together loyally, to work with the B.G.A. and to direct their activities towards the common goal.

AUTO-TOWING CERTIFICATES.

Should "A" and "B" certificate flights be subject to the same conditions with auto-towing as when the machine is hand-launched?

The question is taken up in FLUGSPORT by Wolf Hirth, who suggests that some modifications should be introduced. He maintains that the most difficult part of an auto-towed flight is that performed while the machine is still on the tow-rope; even "B" pilots, trained by hand-launching methods, have to undergo several auto-tows before they can fly a reasonably straight course behind the car, which shows that this feat is harder to perform than a free glide.

With a hand launch the pilot is not really in control of the machine until the rope falls off, and in any case the launch occupies only a fraction of the total time in the air, so there is no need in include it when timing the duration of the flight. With outo-towing it is different; the tow is an integral part of the flight, and not the easiest part either.

Hirth therefore makes two important suggestions, the first of which is that the duration of auto-towed or auto-launched flight should be reckoned from the moment of leaving the ground.

Further, many flying grounds are so small that the pilot cannot be towed up sufficiently high to make an S-turn before landing. Hirth proposes that, instead, only half the S should be flown at a time; that is, that each of the five flights of 60 secs. should include a single turn of 180°, say 2 in one direction and 3 in the other. Or, better still, 3 to the right and 3 to the left, as with auto-towing an extra flight or so makes no odds; in fact, the whole "B" test should not take more than half-an-hour.

A NEW DURATION RECORD.

It is reported that Lieutant William Cocke, United States Army, on December 19, 1931 remained aloft in a sailplane for 21 hours 36 minutes, thus creating a new duration record. This record awaits official confirmation. The previous record was 14 hours 7 minutes set up by F. Schulze (Germany) in May, 1927.

HOW CAN A DRAGON-FLY SOAR?

In the current issue of "Scientific American," Mr. Alexander Klemin draws attention to the correspondence which has appeared in THE SAILPLANE on this absorbing subject.

After quoting Mr. Stevenson's question and Sir Gilbert Walker's reply, Mr. Klemin goes on to say that while Sir Gilbert Walker's letter is most interesting, his answer is not complete in one respect.

"It is not necessary," Mr. Klemin says, "to imitate the dragon-fly's wing path exactly. A similar hovering result could be achieved by rotating airfoil blades about a horizontal axis, at right angles to the general line of flight, and at the same time changing the angle of incidence along the circular path in appropriate mechanical fashion. Such an idea has been suggested many times, and we venture the prediction that some day a machine of this type may yet be tried out."

[Earlier notes on this subject were published in the issues of THE SAILPLANE *of September 25, October 23, and November 6, 1931].*

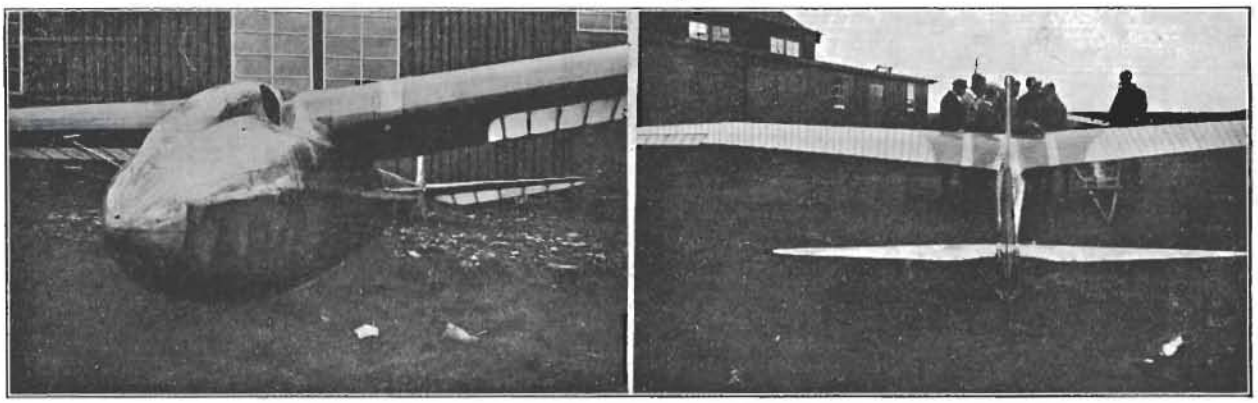
"SPEED AND SPORT"

The second of Mr. Gordon England's articles appears this month in "Speed and Sport," the official journal of the Automobile Racing Association. Originally planned as a magazine devoted solely to the interests of members of the Association, the demand for "Speed and Sport" has been so great that it had been necessary to put it on the Bookstalls. It can now be obtained from Messrs. W. H. Smith and Sons, but it may be pointed out, to everybody interested in Gliding, that membership of the Automobile Racing Association, in addition to other benefits, entitles them to a magazine, post free, at practically the same price that they pay for it on the stalls. The first article on our own particular sport was written by the Master of Semphill, in No. 1, and Mr. Gordon England's article, with that light touch with so much seriousness behind it, made a notable feature of No. 2 and the present number. A few copies of the previous numbers are still on sale, and can be had on application to The Editor, "Speed and Sport," 22 Surrey Street, Strand, W.C.2.

TWO QUESTIONS FOR CLUBS

1.—Do you send your Club News regularly to THE SAILPLANE?

2.—Is every Member of your Club a subscriber to THE SAILPLANE?



The high finish of the "Fafnir" is well illustrated in these photographs. It is finished in natural colours with clear varnish, and has been described as the most beautiful Sailplane.

CLUB CONSTRUCTED MACHINES

By "SEGELFLIEGER."

IV.—THE FINISHING TOUCHES

It is quite safe to say that the adding of the finishing touches to a club-built machine is as important, if not more important than any other part of the building of the machine.

A machine, when once finished, must be made and protected in such a way that it can withstand the hardest of handling and the worst of bad weather. Hence in many cases, the "finishing touches" of a machine must of necessity be done before the machine even begins to take shape. This applies especially to the metal parts. All metal parts should be thoroughly protected from the effects of weather. As soon as they are finished, and before they are mounted on the machine, they should be covered with a good coat of protective lead paint. This is one of the easiest and cheapest ways, and, in the long run, the best method.

All bolts which are used for mounting such metal parts on wooden parts of the machine should be greased, and when fixed should be given a good coat of the same protective paint.

The main spars of the machine should also be protected before the machine is covered. By far the best way of doing this is to give them a coat of ordinary size, followed by a coat of varnish. This applies especially to the aileron spars and tail plane spars. It is desirable that the inside of the cockpit should be finished in a similar manner.

The covering of the wings, comes under the heading of "finishing touches." So far as is known to the writer, there is only one really satisfactory method of covering sailplanes, which overcomes all difficulties and, when done, forms a lasting job.

The fabric which is usually used is light, and must be handled with care. It should be glued on to the ribs and spars with **cold water glue**. No stitching should be done. Tape is unnecessary except on the underside of the wing.

A point here is worth considering. It will be found in every machine of continental design, that the leading edge three-ply is taken from the top of the front spar, round the nose of the wing, and is attached to the bottom edge of the front spar. This is done, first to add to the strength of the spar, and also to help in the covering of the machine. The fabric should first be glued to the top-side of the front spar and allowed to dry.

Next the fabric should be stretched back and glued to the trailing edge, which should be of wooden construction. As the upper surface of the wing is convex, glue should be worked through the fabric on to the ribs from above. This method gives a far finer job, than first gluing the ribs and then stretching the fabric back to the trailing edge.

The underside of the wing, however, presents fresh difficulties, as it is generally concave in outline. Here the ribs must of necessity be glued first, and the fabric stretched back and glued to the underside of the front spar. If the fabric has been stretched in a proper way, it ought to be standing clear of the ribs.

In order to get this fabric glued down to the concave ribs, strips of thin three-ply, ¾-inch wide should be cut, and should be given a coat of beeswax, or clear furniture polish. These strips should then be very lightly pinned down to the ribs, the fabric being brought down on to the glue on the ribs, evenly, along the whole length of the rib.

When the glue is dry, the three-ply strips can be pulled off, leaving the fabric firmly glued to the ribs. The beeswax, prevents the strips from becoming attached to the fabric.

The writer can vouch for this method, as that generally followed, and as one which gives absolute satisfaction.

When the machine is completely covered, it ought to be rigged, ready for the finishing coats of dope and varnish. Two coats of clear dope are sufficient for the light fabric generally used.

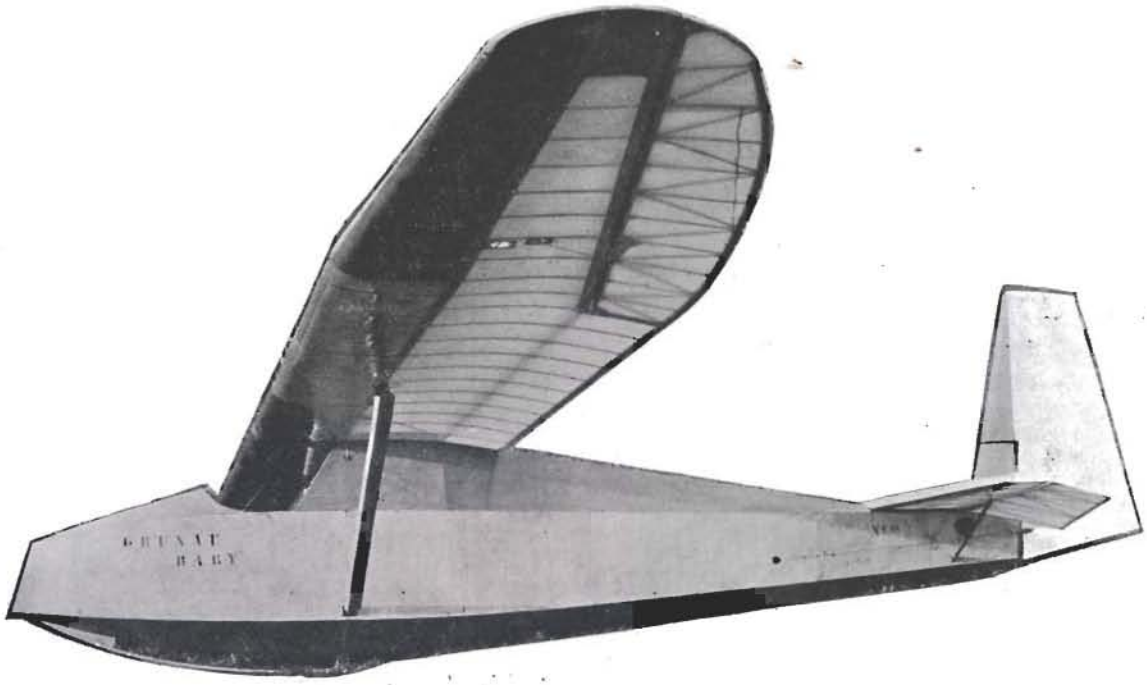
When these are dry, the whole machine should be given a good coat of size, including the wings, fuselage, and in fact, every external part of the machine. The size will dry in 30 minutes, and then the first coat of clear varnish should be applied.

Clubs are advised to obtain the very best carriage varnish they can find, and to apply the first coat with a brush to ensure evenness. This coat should be allowed to dry **and harden**.

If a superfine finish is desired, and is it well worth while, another coat of the same varnish applied with a spray will give a really marvellous polished effect.

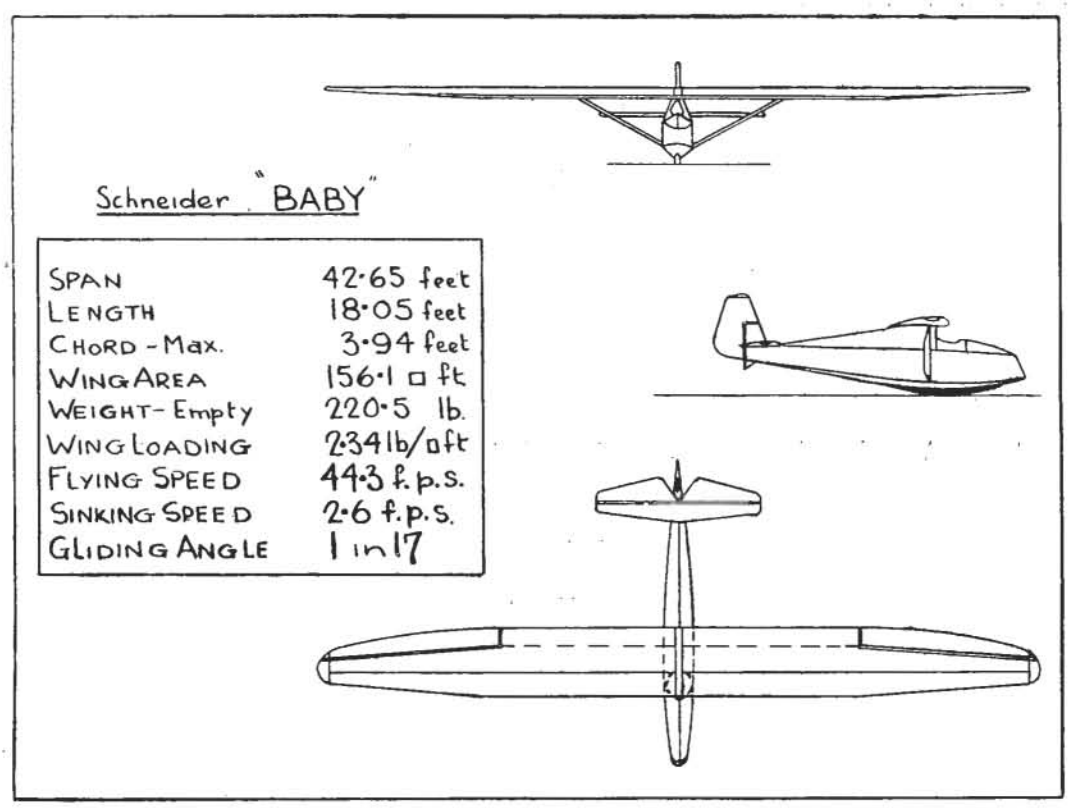
The result will be a machine with a fine glossy surface, in natural colours, which, in the writer's view is by far the best looking finish that can be obtained.

THE E.S.G. 31—SCHNEIDER "BABY"



The E.S.G. 31 — "Baby" has been designed for the advanced student of soaring flight and is described as a high performance sailplane for all round use.

Each wing is constructed with one main and one secondary spar. The tips and leading edges up to the main spar are covered with carefully selected ply wood. The tail unit is built of ply wood and is braced to both sections of the wing with one strut of stream-lined steel tubing.



General Arrangement.

SOME NOTES ON THE ELEMENTS OF SOARING FLIGHT

FOR BEGINNERS ONLY

Given a good machine fitted with a reliable air-speed indicator, a good site and good steady wind conditions, elementary soaring flight is infinitely easier than the beginner is led to suppose; provided always that the pilot correctly makes up his mind before-hand exactly what he intends to do. The precise course, turning-points and air-speed can be dictated to him before he is launched, and then the results depend solely upon his ability to master emotion and to use nothing but such reasoning power as he may possess.

The infallible way to conquer fear is to see a ready means of escape from any difficulty that may crop up. The budding "C" pilot has already learnt these exits. He knows the cure for stalls, side-slips and dives, and he knows how to dodge obstacles by a firm and gentle use of rudder and bank. He therefore, using a machine that will not spin, has only one big bogey left—bumpiness.

Bumps are, frankly, frightening, or, to put it euphemistically, nervously exhausting. They spoil more would-be "C" flights than any other factor. Half-a-dozen violent bumps in quick succession will rattle any inexperienced pilot, and, in no time at all, his stick is well forward and the machine headed for the ground. An even worse phenomenon is the sickening drop that takes place when the course has been allowed to slip away down-wing into the area where the air tends to curl downwards or to cease to rise, behind the brink of the hill. The tendency is for the pilot to mistake the drop for a stall and push the nose down; whereas, having cocked an eye at the air-speed indicator, or an ear at the sound of the wind, a more wary pilot will sit motionless and wait for the machine to emerge unaided or, at worst, to make a safe landing on an even keel upon the hill-top. Many a good nose has been rammed in unnecessarily by panic-measures under such conditions.

Faith, therefore, is wanted more than any other quality. One can never forget one's astonishment after one's first flight from a height; all the controls functioned perfectly! Slow gentle movements actually caused a corresponding response in the machine! Private experiments subsequently proved that steep banks and dives and sharp turns could not only be put on, but could also be taken off, at will.

Once the beginner has reached this state of faith, soaring flight is far nearer than he suspects. It remains for him to develop his faith in his instructions and in his air-speed indicator, and to make the most of his opportunities, and he will be soaring long before he expects to do so. Always provided that he can exorcise the demon Panic.

The first sign of panic is the pushing down of the nose in an effort to run away as far as possible from the dreaded stalling limit. Conversely, it calls for a certain amount of strength of mind to hold the nose up, especially on big turns, until the beginner realises that the dangers of stalling, **at a height,** are grossly over-rated—the simple remedy being a gentle easing forward of the stick.

The critical point in a soaring flight is the first about-turn. Once this is properly achieved, the remainder is child's play.

The machine is making its first beat along the ridge. The course is correct and gently rising. Check air-speed and bring it back to its prescribed figure; you will certainly be flying too fast till then. Now then, here comes the turning point. Hold the speed, by ear, where it is; firm smooth rudder and let it soak tranquilly; gentle bank. Round she goes, steady as a locomotive turn-table. Keep your ear on the wind. Glance at the depressed wing-tip and see that it is nicely over-lapping the horizon. You have the authority of the graphs in the R.A.F. Flying Training Manual, Part I, for using little bank and practically no extra speed at these gentle velocities and low rates of turn.

In no time your nose is back on the course. Gently off with the bank, gently off with the rudder, and away you go again. You have done what you never expected to do, by keeping your wits about you and by refusing to let the unusual conditions dismay you. As soon as you have straightened out, check up your air-speed, and keep it right down to the prescribed limit. Do not be a slave to your indicator, but use it to teach yourself the **sound** of the different air-speeds.

It is impossible to harp too much on air-speed. Apart from its obvious importance in maintaining height, it has several subtleties. One is that at a high speed you may career unknowingly through an area of miraculous lift which otherwise you could utilise by centreing your flight upon it. Another is that, by keeping rigidly to a low, but safe, speed, you may gain many feet by elementary dynamic soaring.

This last sounds a little pretentious, but it is a phenomenon which allows even an elementary machine to be thrown up many feet. You are proceeding steadily when there is a sudden surge in air-speed. You ease your nose up and run off the extra speed by gently climbing a long aerial slope. You have been struck by a gust and you have made full use of it instead of butting through it bullet-headed. This may even happen in the middle of a turn, and in consequence your ground-critics half-a-mile away will later condemn you for doing "disgraceful climbing turns." Don't argue with them.

Incongruous though it may sound to a beginner, the most difficult part of a soaring flight is the descent, and until you have mastered this part you are not to be trusted with a PROFESSOR. On a real soaring day you may easily find yourself in an awkward corner before you reach the ground, and, being tired, you will cut the Gordian knot by forcing the machine downward at a scandalous speed, whereupon you will be horror-struck by the enormous bumps and vibration. Your tail will seem to be altogether twisted, and you will have serious doubts as to whether the machine will ever pull out of its dive. Unless you keep your head and flatten out gently, something serious may well happen.

The simplest way is to lay your course on parallel lines further and further up-wind from the hill, and when at last you seem to have emerged from the lift, which by now has become a curse rather than a blessing, go up to the far end of your beat and dive down the return journey, finishing with a windward turn at the last moment.

The beauty of the PRUFLING is that it can be thrown about, and forced down, with impunity. The PROFESSOR must be treated with far more respect in descent, and calls for subtle handling, including side-slips. The difference between PRUFLING and PROFESSOR is similar to the difference between a handy sailing-dinghy of low degree and a delicate international 14-footer. But all these things come by sheer experience rather than by midnight oil.

The real point is that elementary soaring flight is a matter of simple faith, patience, and clear-headed thought, and that most failures to take advantage of good soaring conditions are due to nothing but panic, however specious the pilot's excuses may sound.

A "SAILPLANE" COMPETITION

Until further notice a year's subscription to THE SAILPLANE will be presented for the best photograph received during any one month, illustrating any feature of the Gliding Movement such as the activities of Clubs, etc.

Photographs, which must be original, should be addressed, "The Editor of THE SAILPLANE, British Gliding Association, 44a Dover Street, London, W.1." Envelopes should be marked "Competition" in the top left-hand corner. The competitor's name and address, and Club (if any) should be written on the back of the photograph. Descriptive matter, which should be brief, should be written on the back of the photograph or on a separate sheet of paper.

The Editor reserves the right to publish any photograph submitted whether a winning photograph or otherwise. The Editor's decision on all matters will be final.

AN APOLOGY.

It is very much regretted that the last number of THE SAILPLANE, which should have been published on Jan. 1, was a week late in reaching subscribers. The Christmas holidays and the associated postal delays were partly responsible, but the main reason for so long a delay as a week was the new cover, the block-making and printing having taken longer than was anticipated. We can only hope that readers will regard the new coloured cover as some compensation for the inconvenience caused.

THE AUTO-TOWED LAUNCHING OF GLIDERS

By WOLF HIRTH.

(*Continued from Vol. 3, No. 1, page 7*)

II. AUTO-TOWING FOR FLYING PRACTICE AND PROPAGANDA

Apart from aeroplane-towing, which is comparatively costly, all gliding clubs in flat country must rely entirely on auto-towing for training their members. There are clubs in the U.S.A. which fly exclusively by this means, without having soaring flight as their objective at all. If this is not correctly pointed out, some of the performance figures of one of these clubs, the "Engineers' Glider Club of Detroit," might be misleading. In 6 months there were 82 flying days. Number of flights, 2,340. Ground skids without taking off, 357. Twenty-two pupils were thereby trained and 10 were advanced further. The first 15 members alone made 2,156 flights, which shows that their interest in flying did not cease as soon as they were trained, but that they went in for further practice. There were 3 severe crashes and 7 minor breakages, such as broken rigging wires, bent axles, etc. Nobody was injured. The club pilots who had finished their training (15 in 6 months) made flights to to 220 m. (20ft.) high on a cable of 350 m. (1,150ft.) length. From this height they confidently performed figures of 8, spirals and such-like turns, landing each time at the starting-point.

The demonstration flights, which are seldom omitted from an American flying display, are also of this type. At American gliding displays in flat country the entire programme has consisted of such flights. The writer carried out his first auto-towed flights at just such a display at Rochester in October, 1930, in front of 20,000 spectators. The show included among other items a duration competition, a flight to a pre-determined spot, and balloon-bursting; and finally an aeroplane-tow up to 1,000 m. (3,300ft.). The duration of the auto-towed flights was 1½ to 2½ minutes. These times could be increased to 5 minutes by using a longer cable and better machines.

III. THE AUTO-LAUNCH FOR SOARING FLIGHTS.

Once in America it befell an unsuspecting pilot to get into a thermic up-current after an auto-launch; he reached a height of 1,000 m. (3,300ft.) and flew for 22 minutes and this with a very primitive machine. But that was by accident. Heights of 1,000 ft., even 1,300 ft. could be reached by us if only the necessary arrangements were prepared. Compared with these, auto-towed flights in the Tropics might bring even greater surprises.

Apart from this, it will more often happen that, with good soaring weather and on a suitable ground, there will be too few people available to form a starting team for a launch with an elastic rope. There again a car can help. The only soaring flight so far made by the writer in England (2 hours and 13 minutes) was performed after an auto-launch Altogether there were 5 persons present, of whom 4 actually took part.

But there is another important point. Often the most excellent soaring country cannot be used, owing to its being wooded, or else there may be no way to get there, or a launch may be impossible. But there may perhaps be at its foot a fine meadow, or a road with no hedges, or perhaps a frozen lake or a flat sandy beach. There the car can be driven; the pilot casts off at 300 ft., flies to the slope, and proceeds to soar there for some hours. The writer did this in New Jersey in January, 1931, using the frozen "Stag Lake."

Apart from the normal method of auto-towing, which alone has been discussed here so far, there are other modifications. For instance, auto-launching with a pulley. As with the "high launch" by means of pulley and tackle, the aircraft moves with double the speed of the towing vehicle. This variety of towed flight is hardly suited to elementary instruction, but is better for practice flights on small flying grounds or where a low-powered car has necessarily to be used. Without doubt auto-launching with a pulley is associated with greater risk than the normal method, especially in the case where the cable, in spite of every precaution, fails to release itself from the aircraft. Furthermore, not enough experience has been obtained yet with this type of launch. One hundred successful launches by a single club are not sufficient evidence. It is certain that the direct tow, with its slow acceleration, represents the best method of teaching.

It is not to be expected that towed flight behind a car will have the same range of application in Germany as in America, as the running of a car is dis-proportionately more expensive in Germany. For another thing, the low powered light cars preponderate with us.

For all that, it offers one group or another the possibility of allowing their professionally occupied members to glide . This applies above all to groups operating in flat country, but also to those who have cars and suitable towing grounds available.

An EXAMPLE OF WHAT CAN HAPPEN THROUGH FAILURE TO NOTICE AN IMPORTANT POINT.

One day instructional flights were being carried out with a hitherto well-tried auto-towed machine, which had been launched hundreds of times before. The instructor started first with two satisfactory test-flights up to 160ft., after which a beginner performed his 8th 9th and 10th flights up to a height of 30 ft. and in a straight line. Finally it came to the turn of an advanced pupil, who did two faultless flights up to a height of 130 ft., and turns of half a circle.

All these flights were carried out with a rope 260 ft. long and ½-in. thick. In order that the advanced pupil, who flew very steadily and had already done soaring flights up to 10 minutes' duration, could make further progress, a longer cable was brought into use, actually a steel cable 0.1 in. thick and 500 ft. long. This cable had rather a large, heavy ring at both ends, in order to ensure the certainty of the cable falling off the hook both at the glider and at the car.

The launch passed off well. When the pupil had attained a height of 200 ft. he worked the release gear. The instructor in the car saw the ring fall off the glider and noticed that the pupil, as previously arranged, began a right turn. He turned the car sharply round to the left, so as to be able to look out sideways and watch the further progress of the machine. Just as the glider came into view, there was a sharp whirr; the cable became stretched and cut through the grass some way off; a jolt, and it broke a few yards away from the car. As the cable became stretched, the glider's nose suddenly went down; it was at this time still 100 or 130 ft. up. Sixty or 70 ft. above the ground it went over on its back, slowed up and sank down quite gently from about 16 ft. The shock was taken by the cabane, which was little damaged. The spars of both wings were broken, as was also the tail. The pilot himself, who was luckily well-strapped in, was absolutely uninjured and helped forthwith to dismantle the machine.

The Inquiry into this Accident gave the following results:

The pilot had, as before, released the cable as instructed, but without having looked down over the side, as the instructor had enjoined him, to confirm that the cable had fallen off. He had been satisfied on hearing the snap of the release, as before. Thereupon he began his glide and turned to the right.

The instructor in the car, who held his right hand ready to work the release gear at his end, had seen the ring fall off the glider; so had a near-by helper and an independent spectotor.

Actually the ring had really fallen off the hook, but at the same time, owing possibly to the jerk, a small tuft of grass was shaken off; it had perhaps been caught up by the rope or by the release mechanism during the tow along the ground. In any case the participants were under the firm impression that the whole of the cable had fallen to the ground. Actually that was not the case. It is much more probable that, owing to a strain on the cable at the moment of release the section of cable in the vicinity of the aircraft was jerked upwards; that the heavy ring, on being released, fell downwards at the same time faster than the cable, and that a loop was thus formed.

In addition, it so happened that the pilot put his nose down more forcibly than was necessary, and in doing so flew his release gear into the loop. As the releasing machanism was not enclosed and there was a notch in its upper part, it was possible for the cable to get caught in it, whereupon the connection between aircraft and car was unknowingly re-established.

The sequel already described was quick to follow, in that the car driver was no longer able to break his connection with the cable in time.

The accident could thus have been avoided if (a) the releasing device on the aircraft had been enclosed;

(b) the pilot had used eyes to confirm the falling off of the cable;

(c) the cable had had pieces of rag tied on;

(d) the weight of the ring had not been too great, but more in conformity with the weight of the cable.

The particulars of the materials used were:—(a) thickness of cable, 2½mm. (0.1in.); (b) ring, weight, 320g. (11.3oz.); thickness of iron (circular section), 12mm. (½-in.); diameter of ring, 120 mm. (3.72in.).

The Recommended Dimensions are:

Rope for elementary instruction: hemp rope ½-in. thick, 260—330 ft. long. Cable for advanced instruction: steel 2½—3 mm. (0.1 to 0.12in.) thick, 500—1,000 ft. long. Ring: circular-section iron 8 mm. (5-16in.) thick; diameter, 2 to 2⅜in.; weight, 100 g. (3½oz.).

Book Review

GLIDING AND SOARING

By PERCIVAL WHITE and MAT WHITE

This well printed American compilation is intended as an introduction to the subject for boys and others who have no previous knowledge of it.

For this standard, the treatment is complete although some explanations (notably the lift of a wing) are somewhat misleading as the extreme simplicity of the style makes technical description vague.

In Part 1, chapters are devoted to reasons for gliding, methods of training, history (with good photographs), and the qualifications of a pilot.

Part 2, called Ground Instruction, has chapters on meteorology (with good photographs of clouds but no mention of the up-currents of a cold front), kites, what the glider looks like, why the glider stays in the air, and how the controls work.

Part 3 contains six chapters giving elementary flying instruction (up to "B" standard) including one on water gliders.

Part 4 deals with soaring and has chapters on wind currents and their behaviour, how birds fly and soar, static soaring, dynamic soaring and acrobatics, and duration and long distance flights. These are not dealt with fully as may be judged by the fact that a subsection, headed "How to make a Long Distance Flight" is completed in 9 lines.

Part 5, "Construction," gives a description of glider building and the materials used but might indicate more clearly that its contents are not adequate to be used as instructions.

In Part 6, the future of gliding, auxiliary motors, rockets, and commercial aeroplane towing are mentioned and also the use of a glider as a "slip coach" from an airship with a photograph of the PRUFLING that was dropped from the Los Angeles.

The conclusion, in the right spirit, says that the glider is the greatest scientific pastime ever known.

Thus the the book gives a complete view of the subject and may be recommended as a suitable gift for anybody who is interested.—K.

Open Quick Release Hook used by the Channel Gliding Club

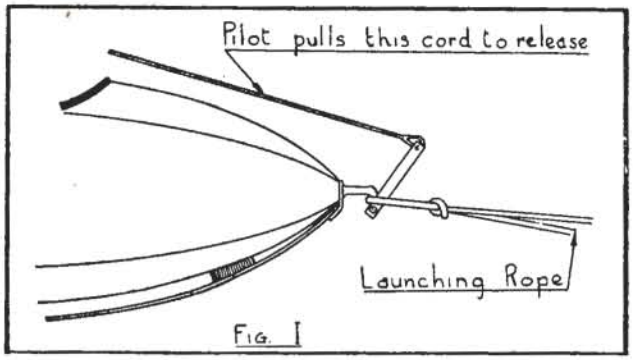


FIG. I

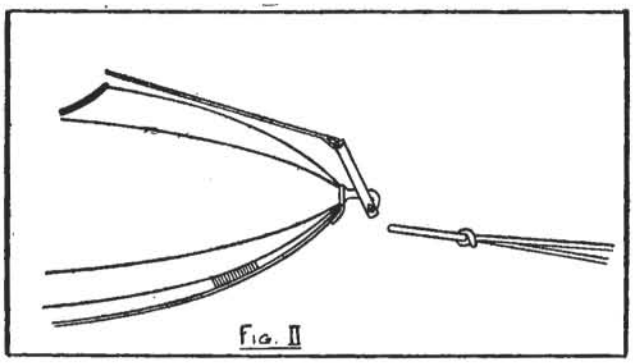


FIG. II

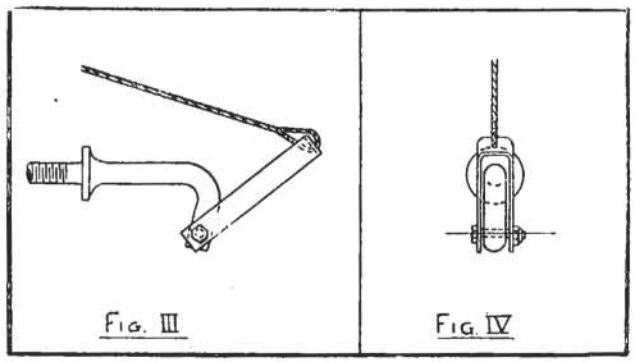


FIG. III

FIG. IV

The action of the hook will be clearly understood from the sketches.

It is worth noting that this simple attachment makes possible high auto-towing in a sailplane owing to the increased effective backward bend that it gives the hook (see Fig III). At the same time there is no question of its failing to release.

ACCELERATION TEST ON A GLIDER

[The following preliminary report of tests carried out by the Imperial College Gliding Club, to determine the acceleration given to a glider by an elastic rope, has been supplied by Mr. P. Adorjan, Captain of the Club. It is hoped that further reports on other matters of interest, prepared by the Imperial College Gliding Club, will be published shortly.—ED.]

Tests have been carried out by members of the Imperial College Gliding Club to determine the acceleration given to a glider by means of an elastic rope. The method of procedure was as follows:

A knotted rope attached to the tail of the machine passes through a recording apparatus in such a way that each knot, as it passes, presses a pencil on to a sheet of paper mounted on a drum, the latter being rotated at a constant speed.

The knots are placed on the rope at known intervals; in the latest form they are spaced as follows:—

6 — 6 inches apart;
10 — 1 foot apart;
10 — 2 feet apart;
10 — 6 feet apart.

Since the drum of the recorder is rotated at a constant speed, the spaces between the dots made by the pencil on the paper correspond to a certain interval of time, and as the distance between any two knots is known, a Displacement-Time curve can be drawn. From this, curves of Velocity and Acceleration are obtained by differentiation.

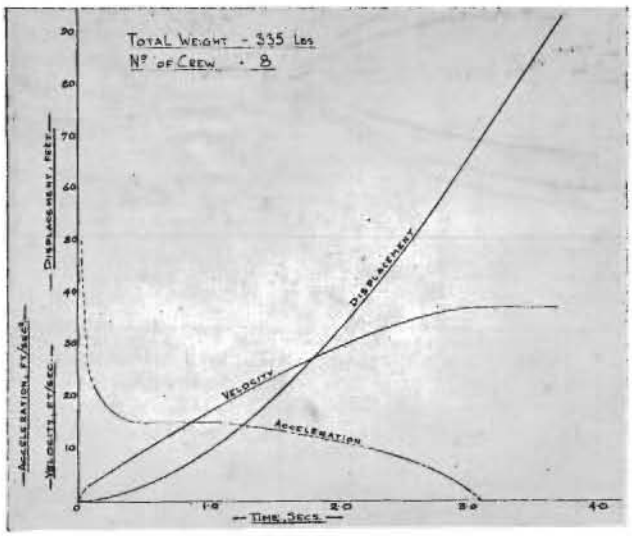


Fig. 1.

The tests show that there are two phases in the take-off:—

(1) A period of 1—1½ secs. during which the acceleration is almost constant and of the order of ½G;

(2) A period of about 1½ secs. during which the acceleration decreases progressively until the rope falls off and the acceleration becomes zero, or even negative.

In most cases the take-off takes 3 secs. from the start to the fall of the rope.

The above results were obtained with a R.F.D. primary machine, using a single rope and hand launching.

Three typical graphs are shown giving results obtained under different conditions.

No. 1, was obtained on a fairly dry ground in a moderate wind, but the pilot "pulled" badly and consequently did not attain a very high speed;

No. 2, was obtained under similar conditions, and the effect of not pulling the stick can be seen. The acceleration is greater, the speed attained is higher, and the take-off time is less;

No. 3, was obtained under very bad conditions, the ground being so wet and slippery that the launching crew were unable to get a proper grip. The acceleration obtained, however, is normal, which is partly due to the decreased friction between the machine and the ground, but mainly to the pilot keeping the nose down in the proper way.

It has been found that under good conditions the pull

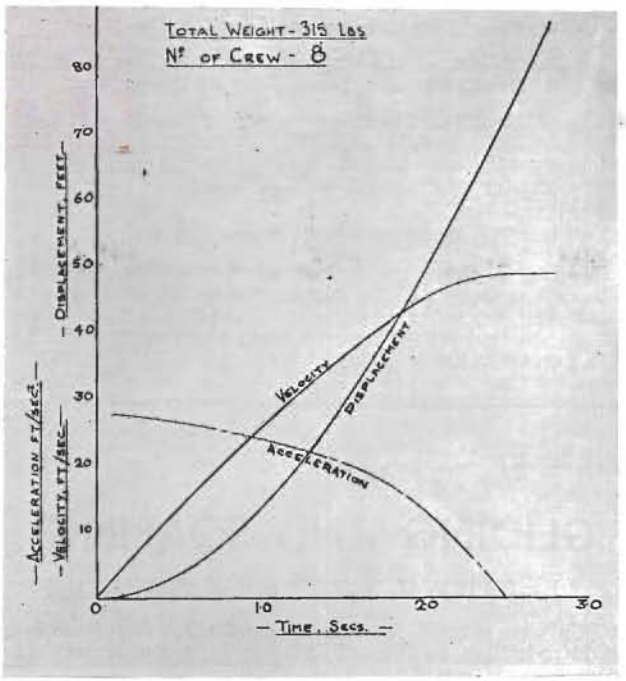


Fig. 2.

of the launching crew amounts to 60—70 lbs. per man, while on a wet ground, as in case No. 3, it is reduced to 35 lbs. per man. The drag due to friction when the machine is just moving varies from about 100 to 50 lbs. with a 10 stone pilot.

It will be seen that immediately after the start, the acceleration appears to have a very high value, up to 2G and even more. Under the conditions obtaining at the time these curves were taken, this would mean a pull of over 700 lbs. on the starting rope, which could not possibly be attained with the man-power available. In order to investigate this phenomenon, it is proposed to add more knots at the beginning of the rope, and so obtain more accurate information about the initial acceleration.

It is proposed to make further experiments with more men on the rope, and also with a double rope and with auto-launching. The machine is being fitted with a nacelle and the effect of this on the acceleration will be investigated. The effect of launching the machine from a greased plank will also be examined.

It is desired to place on record the thanks of the Imperial College Gliding Club to Messrs. Burleys Ltd., and to Mr. Thurstan James for their assistance in connection with the tests.

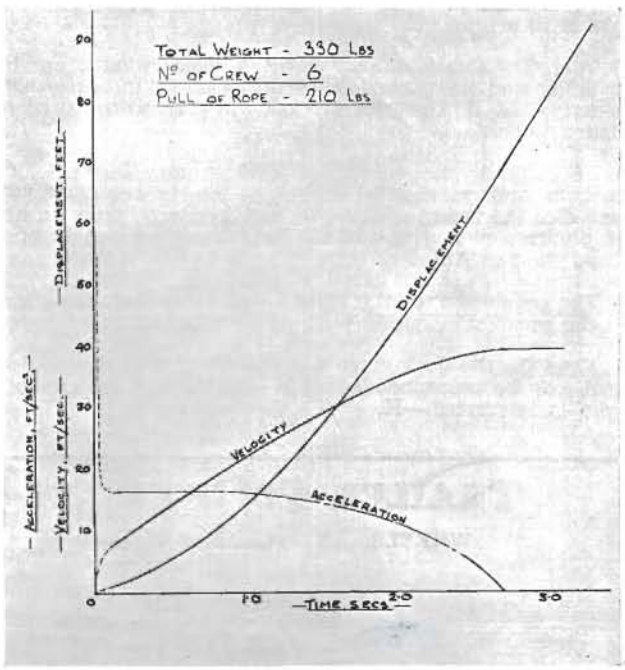


Fig. 3.

A LETTER FROM SOUTH AFRICA

[We are glad to have the opportunity of publishing the following letter which Mr. Gordon England has received from Mr. S. M. Vine. An earlier article by Mr. Vine appeared in THE SAILPLANE *of November* 20, 1931 *and a photograph of his latest machine in the number of December* 18.—ED.].

In THE SAILPLANE of October 14, I was interested in the report of the meeting of the I.C.S.M.F., particularly with regard to the resolutions dealing with experiments in tropical countries concerning thermal currents, winds and air conditions generally. Perhaps I may state that I have lived in this country for the past 22 years (I am an engineer by profession) and have given a lot of time to the study of motorless flight and also to the study of bird flight.

My earliest experiments were in Pretoria (4,600 ft. above sea level) in 1910 and 1911 when I built a very light biplane type glider weighing 78 lbs. On this machine I made numerous glides until I was proficient enough to be launched from the top of a kopje, from which point some fine glides were obtained to the valley below.

Launching was accomplished with the aid of six husky natives by means of sash-cord attached to the outer wing struts. Front elevators were tried and also rear elevators, but these were discarded as better results were obtained by using my body as a balance. For this purpose I fitted the centre of the bottom plane with parallel bars upon which I had a grip, using my legs for taking off and as a pretty good "landing chassis." Although the wing area was 200 sq. feet (2 planes, 20ft. x 5ft. chord) cambered wing section but ¾in. thick throughout the chord, I felt quite satisfied that with improvement in design and greater proficiency in piloting, a machine would be able to soar at this altitude without power.

After these experiments I was unable to do much more in the practical line until 18 months ago, when the news of the wonderful flights of some of the German experts renewed my enthusiasm and I determined to start again.

During the past 18 months I have designed and built three machines: one primary type, one intermediate type and now I have just completed a sailplane which I think and hope will prove the suitability of conditions for soaring at this altitude. I may mention that the intermediate type machine was wrecked by being carried away by the wind before its trials were completed. The primary machine had a very good performance and has served its purpose in preparing me for the sailplane which will undergo its trials in a week or so.

With regard to bird flight in this country I have numerous drawings and specifications of some of the best performing soaring birds: wing loadings, wing sections, etc., etc. The greatest accuracy has been observed in compiling these and notes have been prepared on particulars of methods and performance in flight.

In my opinion the study of bird flight will help in the perfection of motorless flight more than most people imagine, provided the observations are recorded by a person who has a technical mind and who is fully able and competent to apply his observations in a practical manner. In the issue of THE SAILPLANE of Nov. 6, I notice a table of ratios of wing areas and weights of various birds and insects, and in this table the Vulture is credited with a wing loading of 1.22 lbs. per sq. ft. The species of Vulture is not specified. As an example of misunderstanding which many readers of this table might have regarding the Vulture, I might say there are many varieties of this bird and all vary in different localities. The Vulture which is common to this locality is the most efficient soarer and performer of all birds at this altitude (6,000 ft. above sea level). This bird is a perfect master in all forms of soaring and flying. He is equally proficient in static soaring in thermal up-currents and slope winds and in dynamic soaring in calms and horizontal winds; he reaches great altitudes in flight and travels far in search of food over hilly and flat country. He can vary his speed, whilst soaring, from 15 m.p.h. to well over 60 m.p.h., by the alteration of his wing loading by means of contracting his wings. I have repeatedly seen one of these birds sailing along like an old Henry Farman biplane and in the next few seconds change himself into a 1931 Schnieder Trophy machine under the same conditions of wind-speed and direction. While the great speed merchants of the world of flying talk of contracting wings to further increase speed, this bird has made good use of the idea for a long time past. A few random particulars of this Vulture may be of interest:—

At a speed of approximately 50 m.p.h. when flying into a light wind of 15 m.p.h. with wings contracted, the gliding angle being almost flat, the above figures become much

Wing span, 8ft. 4in.; maximum chord, 17½ins.; over-all length, 34ins; total wwing area, 9.25 sq. ft.; total weight, 18 lbs. 9.5 oz.; wing loading, 2.009 lbs. per sq. ft.; specific weight of wing, 0.384 lbs. per sq. ft.; wing weight, 19% of total weight; tail area, 120 sq. ins.; tail area, 8.6% of wing area; body and tail, 81% of total weight.

different:—

Wing area 7 sq. ft.; wing loading, 2.65 lbs. per sq. ft.

These figures were obtained by means of a photograph of the bird's plan in flight and comparative measurements from the bird when shot.

A noticeable feature of this bird is the low specific wing weight and consequent small inertia moments which enable him to take advantage of the lightest currents by rapid turns and manœuvres.

There are many features in these particular birds which are of the greatest interest especially when one considers the fact that they fly sometimes at heights of 9,000 ft. above sea level.

There are many points of great interest regarding thermal currents in this country, owing to extreme temperatures during day and night. At times and in seasons, night temperature may be 35°—40°F. and day temperature 90°—100°F. Cumulus clouds are seen to form to a respectable size in 60 secs. in a perfectly clear blue sky. Vertical currents sometimes attain terrific velocities as witness the breaking up of Commander Glen Kidston's Puss Moth, and now lately the breaking up of Captain Davenport's Puss Moth (Union Airways). The Puss Moth undoubtedly has a factor of safety equal to severe conditions of flight, but I maintain the conditions were abnormal in each accident, and such conditions do not occur in temperate climates. Gliding and soaring teaches one lesson of great value and that is "that where one finds an up-current, a down-current is not far away."

These few facts which I have stated may be of interest to you and your Association and I would be only too pleased at any time to obtain information or data which may be of use to the cause of Motorless Flight.

Before closing I would like to mention that Mr. P. M. Goedvolk, a science teacher in the High School here, has become very interested in this cause and during the past year has been a constant help and companion in many excursions into the countryside to gather our information.

S. M. VINE, Krugersdorp, Transvaal.

—AND AN EXTRACT FROM A LETTER FROM CANADA

May I take this opportunity of saying that THE SAILPLANE has been a source of much interest to me during the past year, and I have noticed improvement in almost each issue. The technical articles and the pictures interest me most, and perhaps this is true of most of your distant readers.

Pictures! Let us have lots of them, even if you must reduce their size to get more into an issue. Line drawings are welcome too, when they illustrate new designs, whether British or foreign.

Wishing THE SAILPLANE and the B.G.A. continued success in 1932.—O. BARRY, Montreal, Canada.

Dec. 29, 1931.

THE B.A.C. VII.

B.A.C. Ltd. announce that their B.A.C. VII two-seater auto-tow sailplane has definitely proved its worth both as an instructional and utility machine and that many of the Gliding Clubs, while urgently wanting this type, are unable to meet the financial outlay involved. They have therefore made arrangements to manufacture all parts ready to assemble complete with the necessary drawing information for a total of £62, this including wing and fuselage parts, fittings, nuts and bolts, fabric and dope, Goodyear Air Wheels and chassis parts. They are also willing to supply the units in parts as below.

All mainplane parts for the B.A.C. standard type tapered wing, made up ready to assemble and including glue powder, fabric, dope, plywood, fittings, bolts, etc.	£19	14	8
All fuselage parts for B.A.C. type VII, made up ready to assemble and including glue powder, plywood, fittings, bolts, etc. ...	£19	0	3
All metal parts for B.A.C. standard tail unit	£1	3	6
All parts for type VII chassis, less wheels ...	£3	15	6
Two Goodyear Air Wheels	£14	0	0
Main Bracing Struts, complete with pin ...	£5	14	0

CORRESPONDENCE

In Amplification of a "Leader."

Sir,—As one who appreciates, perhaps more fully than the majority of your readers, the technical difficulties of producing the paper in its latest form, I should like to add my commendation to the pile of congratulatory letters which you are sure to have received. THE SAILPLANE is now in a form that befits the Movement it represents. May its new guise attract an ever-increasing number of subscribers!

I miss the photographs which were once, I thought, a particularly attractive feature and look forward to the time when the cost of the cover has been offset by increased sales and the publishing of photographs can be re-started.

[*The lack of photographs in the last issue was fortuitous and was not due to the cause ascribed.*—ED.].

I miss, too, the stimulating and thought-provoking comments of the Editor. The authorative statements of the Chairman of "The British Gliding Association" are always eagerly read as indicating the trend of opinion within the Council, but room can always be made for them at the expense of a translation from a continental contemporary.

It does seem however a most opportune time, in view of the national interest in "value for money," to explain exactly what the Movement is getting for the £1,650 (average income for last two years) which it, or its supporters subscribe, donate, and pay to "The British Gliding Association." People will be heartened to read the 16 paragraphs in which Mr. England succinctly sets out the services of The Association.

It is amazing to learn from the cold black and white of actual fact that a Movement, whose activities are represented by the odd half-dozen Clubs or less whose news **appears in THE SAILPLANE (the activities of** the silent ones can obviously not be gauged), should be able to spend so much, probably ten time the average income of a Gliding Club on Control, Legislation, Propaganda—including the hospitality which such propaganda needs, Renewals of Airworthiness for the odd 95 gliders officially certified, the issue of 246 "A" (largely power pilots), 75 "B" and 30 "C" licences and General Liason work.

But one paragraph I think does require considerable amplification. Mr. England says:

"There is one other good and important work that can be placed to the lasting credit of the B.G.A. At the time when this paper was threatened with extinction by its late owners, the B.G.A. took it over and so saved the whole Movement from what would have been a major disaster, because it may be said with truth that the loss of our own paper would have had a most depressing and demoralising effect on those in the Movement. As it is, with justice we can claim that THE SAILPLANE has expanded in influence and scope under the ownership of the B.G.A. and at no cost to its finances Surely this number is a good proof of its progressive policy."

Naturally my first feeling is one of embarassment to have what was purely a labour of love, and an enthusiastically pursued hobby described as being of such major importance to the Movement.. It is no small reward for the work which the regular weekly appearance of THE SAILPLANE entailed. Mr. England however makes a serious omission and the result seems likely to be a wide-spread idea that the B.G.A. assumed a liability when taking over THE SAILPLANE.

I must therefore ask leave to make the following point: Aeronautics Ltd. not only handed the paper with its goodwill, World-wide circulation (literally) and used blocks to the value of many pounds (they have since been put to profit-making uses by the Association), but they also gave the Association a cheque for something like £100. Further, through their generosity, its Editor was enabled to show The Association how to run the paper **at a profit**, and in spite of bad debts, the paper has consistently made a small profit for the Association. This excellent result was largely due to the efforts of Mr. Waplington who was responsible for securing the advertisements without which no paper can thrive.

Perhaps this lengthy paragraph will remove any impression that THE SAILPLANE was a liability. Its Trading Account shows it to rank with the Assets, quite apart from its publicity value.—THURSTAN JAMES.

NEWS FROM THE CLUBS

D. Dent flying the Kassel 20. This machine has made several soaring flights and has a very good performance.
(This photograph is one of the first submitted for the SAILPLANE Competition.—See page 17).

(Club News will always be welcome, but owing to the limited space available, contributions should be confined to items of outstanding interest and irrelevant matter should be excluded. News items should reach the Editor not later than the first post on the Monday preceding the date of publication.)

LONDON GLIDING CLUB.

Sunday, Jan. 3.

A gusty W. by S. wind kicked the air-speed indicator in the PRUFLING up to 27 m.p.h., while the machine was still stationary on the ground. Buxton leapt off to an abnormal height and, for a quarter-of-an-hour, hung almost motionless, apart from much bucking, over the launching-point. Having by then considered the extreme difficulties of descent, which in the PROFESSOR would have been almost insuperable, he turned slightly off-wind, flicked back behind the ridge, headed into wind again, and ran off his height with a long side-slip into a field on the plateau. Later in the day he flew the machine back to the hangar.

This is the kind of soaring described by "Kentigern" as needing "considerable integrity of judgment." On a similar, but less violent, occasion the PROFESSOR was landed six miles away down-wind.

In the absence of a privately-owned PRUFLING there was no further flying, although several lion-hearts were anxious to try their luck.

PORTSMOUTH & SOUTHSEA GLIDING CLUB.

Sunday, Dec. 27,1931.

Light westerly breeze; fine; conditions not suitable for hill flights. Elementary training carried out. Auto-elastic launches, 20.

January, 1932.

We feel that this year will be a big one for the Movement and are confident that our Club, for one, has learnt its lessons, and is ready to take its place in the British Gliding Movement and be a credit to it. **Steady progress** is our motto, and with the help and guidance of the B.G.A. through THE SAILPLANE, which we really do appreciate, we feel confident of great achievement in this and succeeding years.

We hope in the near future to study auto-towing first-hand, following the glowing report of a member who went all the way to Maidstone to test it.

One of our members leaves us next month for Palestine and Egypt where he hopes to demonstrate that **British** sailplanes and British enterprise are unsurpassed. He has promised to keep us in touch with his activities, so we hope to be able, from time to time, to include in these notes news from him, which should be of interest to many of our readers, since he will be able to compare English conditions with those in sub-tropical climates.

We have overcome the difficulty of unfavourable winds on our site by auto-elastic launches on lines described in THE SAILPLANE.

With the help of a slightly sloping field, good flights of 29 secs. are usual. We have successfully used an Essex 6, a Morris Minor and a Harley-Davidson combination. Where there is a will there **is** a way.

Sunday, Jan. 3.

Moderate breeze south-west by west. Conditions good.

Hill launches were the order of the day; there was good flying on the Primary with some soaring. The proximity of a down-draught showed us how well-spent those days of elementary training have been. The airmanship displayed was a credit to our instructor and no damage was done by even the least experienced pilot.

B.G.A. REGULATIONS GOVERNING MECHANICAL LAUNCHING

Approved Methods.

The following methods are at present approved for general use :—

1. The launch is made with the aid of one motor-car attached to the glider with about 60 ft. of double ⅝-in. shock cord and a length of rope of at least 100 ft. For launching the glider faces directly into wind with the car in front, the tail being held back in the usual manner. A small flag, or other suitable mark, is placed in front of the car at a distance equal to the length of elastic. The launch is made by driving the car forward until the shock cord is stretched to double length, as determined by the fixed mark, when the release is made. As soon as the elastic falls clear of the glider the car is driven to the left to avoid collision.

2. This method is similar to (1) but employs a pulley affixed to the ground at a distance of at least 200 ft. in front of the glider, at which point the rope is turned through an angle of 90 deg., or thereabouts, so that the motor-car is driven in a direction at right-angles to that of the glider. Regulation (3) is of the utmost importance with this method of launching.

Regulations.

NOTE.—Mechanical launching has a greater element of danger than the orthodox team method and if used extreme care should be exercised.

These regulations refer only to launching done with the aid of a motor-car in place of the launching crew. (Autotowing is covered by separate regulations.)

1. Only methods of mechanical launching as approved by the B.G.A. shall be used. Clubs or individuals wishing to make use of other methods must first submit full descriptions of their scheme for approval by the B.G.A.

2. Mechanical launching shall only be used when a capable instructor superintends its use.

3. For any method of mechanical launching, a quick release, operable by the pilot, must be incorporated with the launching hook. The release lever shall be as close to the pilot's hand as can be arranged. The launching hook shall be of the open "drop off" type.

4. The speed and direction of the wind must be carefully measured or estimated and allowed for in the speed of the launch.

5. The joint between the cable and shock cord must be well made and periodically inspected.

Recommendations.

1. Private groups are recommended not to employ mechanical launching unless in possession of at least the "B" certificate.

2. A pilot flying any new type of machine should receive gentle launches for the first few flights and these should be made by the shock cord method.

3. It is recommended that the pilot should not give the command "release" at the launch, but that this should be done by someone near the machine on receiving a signal from someone in the car, or standing near the flag or mark.

4. In any method employing the use of a pulley, care should be taken to make sure that it is well fixed to the ground by two or more long stakes, driven well in and roped together, and the pulley should be kept well greased to prevent overheating and possible seizure. A pulley with large flanges is recommended and it should not be possible for the rope to ride over or jam in any way.

5. If the shock cord is inserted between the car and the cable there is little likelihood of either the pilot or the machine getting damaged in the event of a breakage of the shock cord.

OFFICIAL NOTICES

DIARY OF FORTHCOMING EVENTS.

Monday, Jan. 18, at 6.30 p.m.—Council Meeting, British Gliding Association.

Monday, Feb. 22, 7.30 p.m., in the Library, Royal Aeronautical Society, Albermarle St., W.1.—Annual General Meeting, British Gliding Association.

THE IMPERIAL COLLEGE GLIDING CLUB.

The following Lectures will be held jointly with The British Gliding Association, in Room 15, The City and Guilds (Eng.) College, Exhibition Road, South Kensington, at 6 o'clock. Visitors will be welcome.

Thursday, Jan. 28.—Mr. C. H. Barnes, "Indoor Flying Models." Chairman—Professor F. T. Hill. (Joint Lecture with T.H.A.C.).

Wednesday, Feb. 10.—Mr. F. Entwistle, B.Sc., "Some Aspects of Meteorology in Relation to Gliding and Soaring Flight." Chairman—Col. H. T. Tizard, C.B. (Joint Lecture with City and Guilds Engineering Soc.).

Monday, Feb. 29.—Mr. C. H. Jackson, "Flying Boats on Commercial Air Routes." Chairman—Capt. G. T. R. Hill.

ROYAL METEOROLOGICAL SOCIETY

Exhibition at the Science Museum, South Kensington.

On January 11, an exhibition, arranged by the Royal Meteorological Society, was opened by Sir Napier Shaw in the Geophysical Gallery of the Science Museum. The exhibits include modern types of observing instruments approved by the Meteorological Office, a number of historic instruments and several stands of instruments of special interest, shown by some of the leading British makers. Another feature is a magnificent collection of cloud photographs.

The exhibition will remain open for one month, during which public lectures will be given on Thursdays at 4.30 p.m. The programme of lectures is as follows :—

January 14.—Mr. D. Brunt, on "Meteorology in History."
January 21.—Dr. G. C. Simpson, F.R.S., on "Weather Forecasting."
January 28.—Capt. C. J. P. Cave, on "Clouds."
February 4.—Sir Henry Lyons, F.R.S., on "Historic Meteorological Instruments."

Those interested in motorless flight will find much of interest in the exhibition. In addition to certain of the instruments, the cloud photographs should make considerable appeal. Capt. Cave's lecture on Jan. 28, should not be missed.

HOW TO GET YOUR "SAILPLANE" FREE.

It has been decided that in order to encourage Members of the Association and subscribers in obtaining new subscribers to THE SAILPLANE, free issue of the journal will be awarded as follows :—

To Members of the Association.

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