May 2nd, 1932 Vol. 3 No. 9

THE SAILPLANE & GLIDER

Official Organ of the
British Gliding Association

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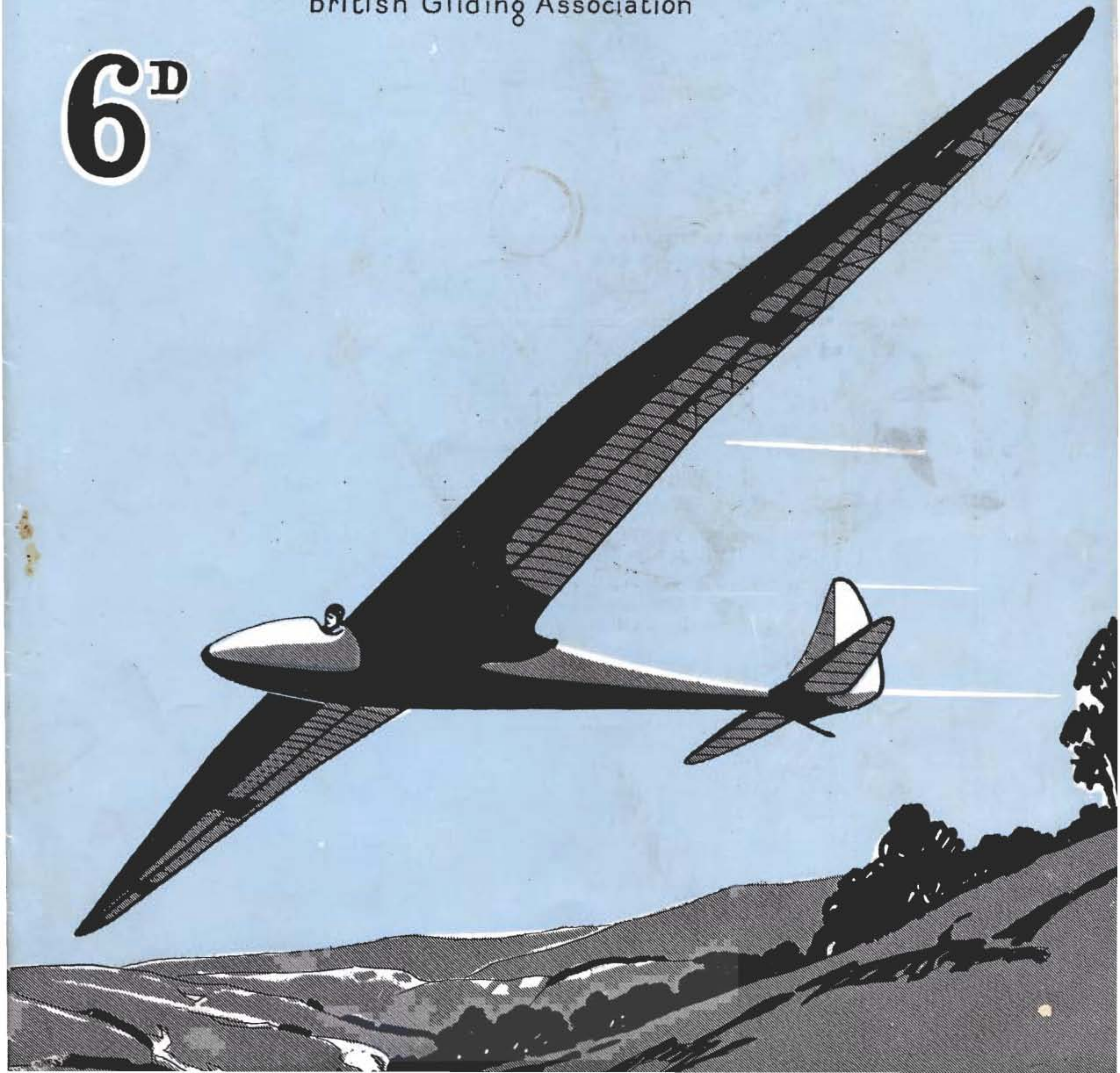

THE SAILPLANE & GLIDER

(*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.

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CONTENTS.

IN DEFENCE OF AN INSTITUTION

AFTER being away from British Gliding for so long on my return I am impressed by two things: one is taken for granted, and the other is debated with acrimony by those who glide; one is the amount of soaring that is done by clubs up and down the country, and the other the future of the B.G.A. I use the initials advisedly because that is the expression used colloquially.

The fact that so many can soar now and land above their start-point means that we have passed the goal which two years ago seemed almost out of reach; to-day clubs have their eyes fixed not on the Biblical hills, but on the clouds, and soon cloud-soaring will be no longer an aim but a fact. Its accomplishment will rest, however, not only on the achievement of individual members, but on the ability of their club to provide equipment and suitable sites.

I think that the hill which stands 200 feet above the neighbouring ground has proved ideal for training, because it is elevated enough to give good soaring, but low enough to make the return of machines to the top comparatively easy and speedy if mechanical recovery is used. On the other hand, I believe that there has only been one occasion when it has proved possible to make use of cloud up-currents from so low a start-point, and that was when Flight-Lieutenant Buxton made his outstanding flight from Totternhoe to Luton by way of Ivinghoe. To appreciate that route you want to look at a map.

It may be therefore that sites of greater elevation above the surrounding terrain will have to be found, though on the South Downs, the North Downs and the Chilterns it should be possible by auto-towing along the top of the hills to gain enough height to make contact with the clouds. I do know, however, that certain able pilots of sailplanes have already made up their minds to go on expeditions to favourable-seeming spots to investigate the problem further.

What of the future of the British Gliding Association? That is the question which I have heard debated, and I must make it clear that I do not speak as one inspired. When I was forced to give up THE SAILPLANE I dropped all contacts with British Gliding; its internal politics and its policies became a confused and distant murmuring of no immediate import; though from THE SAILPLANE I was able to learn what was being done in practical gliding by the clubs who have survived the original deluge of enthusiasm and handicap of inadequate finance.

Now, finance is a high-sounding word, frequently used to cover a multitude of mismanagement and uncareful spending; the unwise spending of money and the improvident lack of provision for future needs have rendered nugatory the enthusiasm and endeavour of many groups of people in British Gliding. In this number of THE SAILPLANE Mr. Adorjan analyses the expenses of the Imperial College Club. His article deserves the closest and most careful study, but he does not go far enough. He examines the case of a club with only one machine and finds that on a basis of forty members the cost to the club of keeping its organisation going is not less than £2 10s. per member per year.

But no club can hope to remain healthy unless it has a machine suitable for the needs of its advanced members and the provision of such is another charge on the capital of the club, which, as Mr. Adorjan points out, has to be raised besides the annual expenditure. On the other hand, this club have just managed to obtain their first "C" on a modified Dagling, the nacelle of which cost them about eight shillings. One must note, too, that the I.C. Club has been able to avoid the expense of building a hangar or club-house, without which no club can remain in a healthy condition. In this connection one may record the fact that the London Gliding Club spends something like £8 per year per member, and only £4 of this can be obtained from subscriptions and flying fees.

We may say with certainty that, though there are nothing like as many records of expenditure as there ought to be, there are enough to show that the sport of motorless flying is a game only for those who can afford to pay for it, and one in which the most careful financial control is absolutely essential.

All of which is by the way and does not solve the problem of the future of the B.G.A. People who pose the question to me explain that it has been brought about by the fact that, like so many non-profit-making concerns, the Association sometimes finds difficulty in meeting its expenditure out of income; in fact, these people say that the position cannot go on indefinitely, and something will have to be done. So in an encouraging sort of way one asks for the solution and it always boils down to something like this.

There are not enough people interested in British Gliding other than those who actually glide, to keep going by their subscriptions and donations a ruling body; the clubs who are actually operating are neither numerous nor wealthy enough to make up the deficit. To which the obvious reply is a question. If the British Gliding Association disappears, who is going to perform the necessary calculations and checkings for the issue of Certificates of Airworthiness, and who is going to supervise the maintenance of the airworthy condition?

During the existence of the British Gliding Association not a single case has occurred of structural failure in the air. How is that clean record to be obtained without the vigilant control exercised by the B.G.A.?

The cost of obtaining Certificates of Airworthiness from the Air Ministry would devolve upon British Gliding as a whole, and would have to be offset against their present contribution to the B.G.A. Apparently the problem of inspection might be solved by the intervention of the insurance people, who are already qualified to inspect aircraft for the renewal of Certificates of Airworthiness.

After this exchange of question and counter-question, one brings up the question of control and the international aspect. Out comes the answer pat: this could be exercised by a Council of Gliding Clubs affiliated like that for the Light Aeroplane Clubs to the Royal Aero Club, who is already the accredited representative of Fédération Aéronautique Internationale in this country. Presumably the reply to this is that a rose by any other name would smell as sweet, and such a Council already exists with all the advantages that obtain from independence and a full-time Secretary (who, to become personal, is regarded with affection by clubs throughout the country).

What good effect could such a change of constitution have internationally and what helpful effect would it contribute to the growth of the International Commission for the Study of Motorless Flight which is holding its first International Meeting in August this summer at the Wasserkuppe?

These interviews always leave one with the feeling that protagonists of the new constitution consider, like the Athenians, that some new thing is perennially desirable, but experience is all the other way. Fundamentals do not change, though changing conditions call for changing methods. If the cost of running the Association as it should be run cannot be borne by British Gliding in its present form, its activities might well be pruned until they are commensurate with the funds that can be raised to pay for them; but to discard in a moment of crisis an institution which represents the endeavours of those who have laboured without return for two difficult years is no credit to those who have taken advantage of such unpaid toil.

As an individual (and therefore only entitled to the first person singular), I consider that Government aid for British Gliding is absolutely unjustifiable except for the maintenance of an establishment which could make use of motorless flying for purposes of aerodynamical and meteorological research. This feeling is enhanced by the fact that I have to keep a family and pay taxes. The shillings that many spend on the "pictures" or the theatre I spend on following gliding, and the same is true of 98 per cent. of other club members. We have to pay for our pleasures. Why should such pleasures be made available to other people at the expense of the taxpayer? An appeal to the nation is only justified in preparation for an emergency, and if you want pilots for the next war, teach them to fly single-seater scouts, not high-efficiency sailplanes.

I think that if everyone who finds enough breath to criticise the B.G.A. were to expend the same breath in expounding schemes whereby enough money could be procured to enable the Association's necessary activities to continue on an economical basis, a solution would soon be found.

In any case, and this is my most potent argument, how can The Sailplane continue if its publishers are not enabled to continue their activities?

Thurstan James.

B.G.A. MEETING.

The date for the B.G.A. National Meeting has been fixed. Recommendations have been put forward for various sites, but the actual selection has yet to be made. Those who would know more should refer to the last page of the paper, where the proceedings of the Contest Committee are reported.

NEWS FROM OVERSEAS.

This feature does not appear this week, as its compiler is acting instead of Captain Entwistle. Luckily nothing momentous seems to have taken place, though as the paper went to press special communiqués arrived from the Continent, and these should make interesting reading in the next issue.

THE DESIGN OF MOTORLESS AIRCRAFT

By E. H. LEWITT, B.Sc., A.M.I.Mech.E.

(Vice-President of the Imperial College Gliding Club. Member of Technical Committee of the British Gliding Association.)

(Continued from p. 65, No. 6, Vol. III.)

TYPES OF GIRDERS.

The types of girders or spars used in gliders are usually of a built-up type consisting of plywood webs and spruce scantlings. Small girders consist merely of a plain rectangular piece of solid spruce. The girders may be required to resist bending, shear, torsion or thrust; in many cases the girder has to resist a combination of all these types of loading acting together.

In the case of solid spruce rectangular girders, the simple bending moment formula should be applied. That is:—

$$\frac{M}{I} = \frac{f}{y}$$

where M = maximum bending moment
f = allowable working stress in spruce
y = half depth of girder
I = moment of inertia of cross section about horizontal centre line
$= \frac{bd^3}{12}$

In the case of built-up girders, the assumption is made that the spruce scantlings take the bending whilst the plywood takes the shear. These sections are of I section, or of the box types shown in Fig. 10. All girders of the box type should be stiffened by placing diaphragms, transversely, inside the girders. These have the effect of stiffening up the plywood to enable it to take the compressive stress component due to the shear stress. The pitch of the stiffeners should be about 70 times the thickness of the plywood. In order to prevent the girder twisting sideways, the depth of the girder should not be greater than twice the width. These girders may be designed from the simple bending moment formula, but the moment of inertia of the girder should not include the web. The area of that portion of the plywood in contact with the scantling may be added to the area of the scantling when calculating the moment of inertia. The justification for this will be discussed later.

Any spar acting as a strut, or any unsupported length of

(*Continued on page 106.*)

AUTOBIOGRAPHY OF A SAILPLANE PILOT*

(*Continued from Vol. 3, No. 8, page 92.*)

In 1930 the beautiful "*Fafnir*" enters upon the scene, and ushers in a series of remarkable long-distance flights, in describing which Groenhoff gives much instructive detail.

The flight from Darmstadt to Bühl (eighty-six miles, with an aeroplane-towed start) was a combined cloud and hill flight, with frequent transitions from one to the other. The flight of 169 miles from Munich into Czecho-Slovakia, during which the "*Fafnir's*" wing-covering was pierced by hailstones, has been described in THE SAILPLANE of May 22nd, 1931 (page 298). This flight was similar in some features to that of 137 miles by which Groenhoff won the chief Rhön prizes last August, which has not been fully described in THE SAILPLANE. Both were made in the rising air caused by "cold fronts" travelling across country. During each flight, there was a time when he lost height through getting into the down-current in the rear of another thunderstorm which had formed in advance of the main "front." In the first case, he was able to find a slope over which he soared until the "front" had caught him up again. He had been forced down to within 500 feet of the ground, yet had no difficulty in connecting again with the up-current of the "front" when it arrived. But when the same thing happened last August, it had become too dark for him to find his way back to the rising currents and he had to land.

The start of this latter flight was one of the most spectacular things ever seen at the Wasserkuppe. Prof. Georgii had collected a round dozen of sailplanes and lined them up at the starting-point. Away in the west the lightnings and thunder of an approaching "front" came gradually nearer. When the Professor judged that the psychological, or rather the meteorological, moment had arrived, he gave the word and within seven minutes the whole fleet (or covey?) was up in the offing of the thunderstorm, deployed along a line from the Kuppe to Gersfeld, all cruising about in search of lift. Yet only Groenhoff and Hirth were able to achieve really long distances. Why was this? The probable reason is disclosed in this book. It appears that, unnoticed by them all, the "front" actually passed over and was now well away to the east. Suddenly realising this, Groenhoff turned tail and fled after it over mountain and valley, rising and falling in response to the lie of the land below, till, when he was over Geba Mountain, a distant patch of sunshine showed him where the evasive "front" had got to. Approaching the turbulent region *from behind*, he rose for three minutes at the prodigious rate of 18 feet per second, flew through it and out into the calmer area of lift in front of the line. Far down below, a thin white streak was moving to and fro over a wood; as the thunderstorm up-wind arrived, this detached itself and came gradually up towards him, finally resolving itself into Wolf Hirth and his "*Musterle.*"

Hirth, like Groenhoff in a previous flight, had got too far ahead and had been waiting over a convenient hill for the "front" to come up with him again.

The two kept company for an hour as they crossed the Thuringian Forest. Then, to pass the time, Groenhoff took the "*Fafnir*" to 10,000 feet to secure the altitude prize, afterwards flying out ahead of the storm to get a comprehensive view of it and see how far it extended to each side.

This is what he saw: "The whole *Gewitterwalze* [the whirling mass of cloud which forms the advancing edge of the thunderstorm] shows itself to be unbroken; within this cloud wall of perhaps 300 m. (1,000 feet) in height, inside of which is the most outlandish commotion and turbulence, the vaporous masses form and transform themselves. Eddies appear, become ever greater and vanish into the thunderstorm. Often whole cloud masses rotate in great whirls and are again broken up by small vortices which lie transversely to them."

As twilight approached, the "front" became irregular; the "*Fafnir*" dodged in and out of the clouds, got into a down-current, was chucked about horribly for four minutes "which seemed an eternity," and had to land. Before doing so, the thoughtful Groenhoff flashed his torch on to each wing in turn, so as to show any possible spectators what was coming down on top of them.

Other adventures described are the Jungfrau Joch flights (see THE SAILPLANE, August 28th, 1931, page 42), and the winning of a newspaper prize by flying from the Wasserkuppe to Berlin in a light tailless aeroplane. This was largely of his own construction, and was launched by bunjy, as the machine had only a skid; in the absence of a team, a mechanical release was used, and the rubber stretched to double length by a tractor placed 300 yards away.

Groenhoff was, of course, also the pilot of Lippisch's "flying triangle," which in its powered form has lately been attracting attention.

Although the text is in German, more than half the book consists of a wonderful collection of photographs, including some interesting historical ones. The photographs, which are beautifully reproduced, are alone well worth the money.

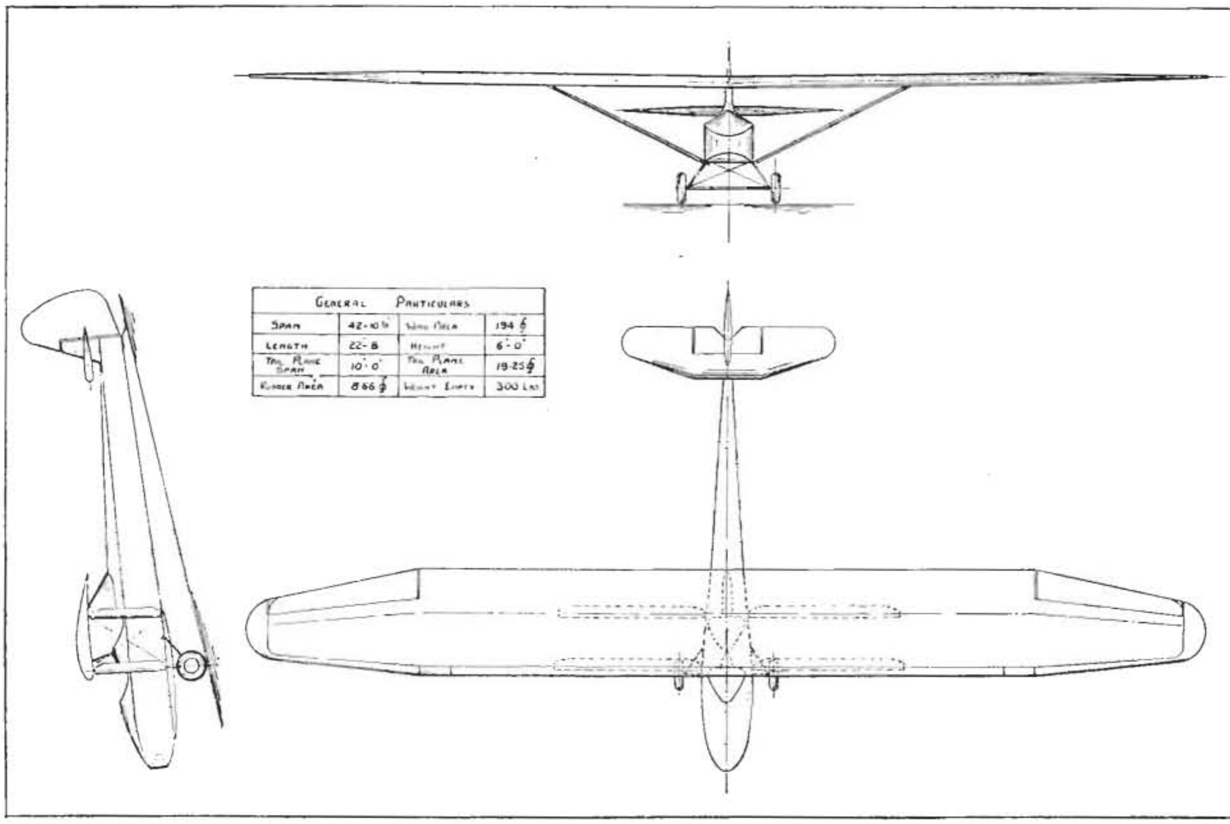
One realises from this book how comparatively little in the way of cross-country soaring has been done even by the "aces," and if so much about its possibilities has been discovered already, what may we not look forward to in the future? The exciting thing about the present stage of the Movement is that anyone who makes such flights cannot help continuously making fresh discoveries. But the pioneering days are not going to last for ever. Those who lose sight of the true goal of motorless flight through giving too much attention to its side-issues, will soon find nothing left to do but follow in the trails that have meanwhile been blazed by others.

It will be fine when there is an Air Lore comparable to the Sea Lore of the sailing men; when anyone who forced-lands through losing contact with his "front," or missing his thermals on a perfectly good summer day, will be laughed at as an inexperienced novice; but how much finer to have taken a share in building up the knowledge which will bring such things to pass!

A. E. S.

* "Ich fliege mit und ohne Motor" by Gunther Groenhoff. Published by the "Frankfurter Zeitung." Obtainable post free from the B.G.A., 44a, Dover Street, W.1., for 2/6.

THE LATEST B.A.C.



At the dress rehearsal of Sir Alan Cobham's circus at Hanworth not so long ago I had the opportunity of examining the latest Lowe-Wylde glider, which is officially known as the B.A.C.VII, Mk. II. It is obviously developed from the B.A.C.VII, but shows the influence of German design in the tailplane, which is similar to that of the *Schlesien in Not*, and in the addition of lift-spoilers on the leading edge of the wing. The machine also shows Mr. Lowe-Wylde's ingenious facility in producing gadgets to eliminate labour.

Unfortunately, the task of producing THE SAILPLANE has proved too much for my unaccustomed hands, and I have been unable to write the article I intended. Instead, we publish an official description from the B.A.C. Works, together with a line drawing and photographs of detail parts are shown herewith. No good flying pictures have yet come to hand.

T. J.

DESCRIPTION.

The B.A.C.VII, Mk. II, has been designed in an effort to add the advantages of greater comfort, quicker rigging and improved aerodynamic efficiency to the excellent flying characteristics of its prototype.

To these ends, the main-planes have been increased in span by two feet; the tail unit has been redesigned to avoid external bracing struts; quick releases have been fitted throughout, enabling rapid assembly or dismantling on the flying ground; and a door is provided for access to the front cockpit. The main-planes have been raised and are set at a dihedral.

It is expected that this will give the machine an increased lateral stability, though the old type left little to be desired in this respect, and in addition certainly adds a " sporting " touch to the appearance, which is strengthened by the clean lines of the new tail and rudder, around which the chief interest of the new design centres.

The fixed portion of the tail-plane has shrunk to a small cantilever section about 3 feet wide and extending for two-thirds of the chord from the trailing edge. This fixed portion is built very rigidly into the fuselage structure, being carried by two stiff members which form respectively the front fin-post and stern post.

The remainder of the tail surface is devoted to elevator, and it is hoped that by the improved position of this surface, which is in advance of, instead of behind, the fixed portion, and also by reason of the increase in elevator area, a considerably improved longitudinal manœuvrability will be obtained.

The arrangements for rapid assembly of the tail unit are also worthy of notice. Two levers project from the front edge of the fixed surface. These are connected to the control stick in the cockpit through a cross-shaft running across the leading edge of the fixed tail. These levers engage in steel pockets in the elevator, which is pushed into position, when rigging, from forward. Two small spring catches on the elevator rear spar then engage in notches in the levers holding the elevator in position and at the same time couple up the controls.

The rudder is a complete divergence from the square-edged type fitted to the B.A.C.VII and B.A.C.VII, Mk. I, and is more in line with power-craft practice. The area is approximately the same as that of the old rudder, the expected improvement in efficiency being anticipated from the improved aspect ratio and swept shape; there is, incidentally, some reduction in weight from that of the square-edged rudder.

Quick assembly arrangements are here also in evidence. The top hinge is provided with a spring-loaded pin. When this is pulled down, the eye on the rudder can be inserted into the jaws of the rudder post, the whole being locked by the pin on release.

The bottom hinge, which also constitutes the rudder lever, is near the bottom of the stern post, to which it is permanently attached, thus obviating the necessity of disconecting any of the tail surface controls when dismantling the machine after a day's gliding. Two dowels on a fitting near the base of the rudder engage in two holes in the lever, thus providing the drive for operating the control surface and at the same time locating the bottom end of the rudder on a suitable hinge.

As the main-planes have to be detached at the end of each Display, quick releases, in the form of draw-bolts, have been provided at the wing-root fittings. A safety spring prevents the possibility of these pins working out until they are intentionally withdrawn. The aileron control cables are fitted with a special quick-release device which not only rapidly couples up the cables or releases them, but also applies the necessary tension to the cable when coupling up without any special effort on the part of the operator.

Two metal flaps are fitted to the nose of the wings near the commencement of the ailerons. At first sight these might be taken for additional ailerons of the "interceptor" type. Examination of the controls, however, will discredit this idea, as they both rise and fall together, not alternately on the port and starboard sides, as in the case of an aileron. Their purpose is actually to destroy a part of the lift of the plane at the will of the pilot, thereby causing the machine to descend at a steeper angle than its normal gliding angle. This arrangement, together with brakes fitted to the wheels, should allow of a landing in a very restricted space.

The chassis embodies several notable features, the chief being wheel-brakes. These are of the internally expanding type, and were specially made for the machine by Bendix-Perrot Brakes, Ltd. They are controlled from a lever beside the pilot in the cockpit.

Dunlop low-pressure types are fitted and a spare axle immediately interchangeable with the "Dunlop" axle, but equipped with Goodyear "Airwheels," will be carried.

To give a wider undercarriage suitable for the increased span, the axle has been lengthened to such an extent that it would normally require an unduly wide trailer for transporting the machine. The difficulty has been overcome, however, by fitting a telescopic axle operated by a treadle plate in the centre. By pressure of the foot on this plate the axle is extended and bracing wires tensioned ready for flight, the whole automatically locking itself until the end of the plate is lifted by the lug provided for the purpose, when the chassis may be collapsed for stowage in the trailer.

These details should make it evident that the B.A.C.VII, Mk. II, is in many ways quite a new departure, the performance of which will be closely watched, not only by gliding "fans," but by those responsible for the design of the next step in the aviator's progress, the light aeroplane.

F. Hemshead, B.Sc.

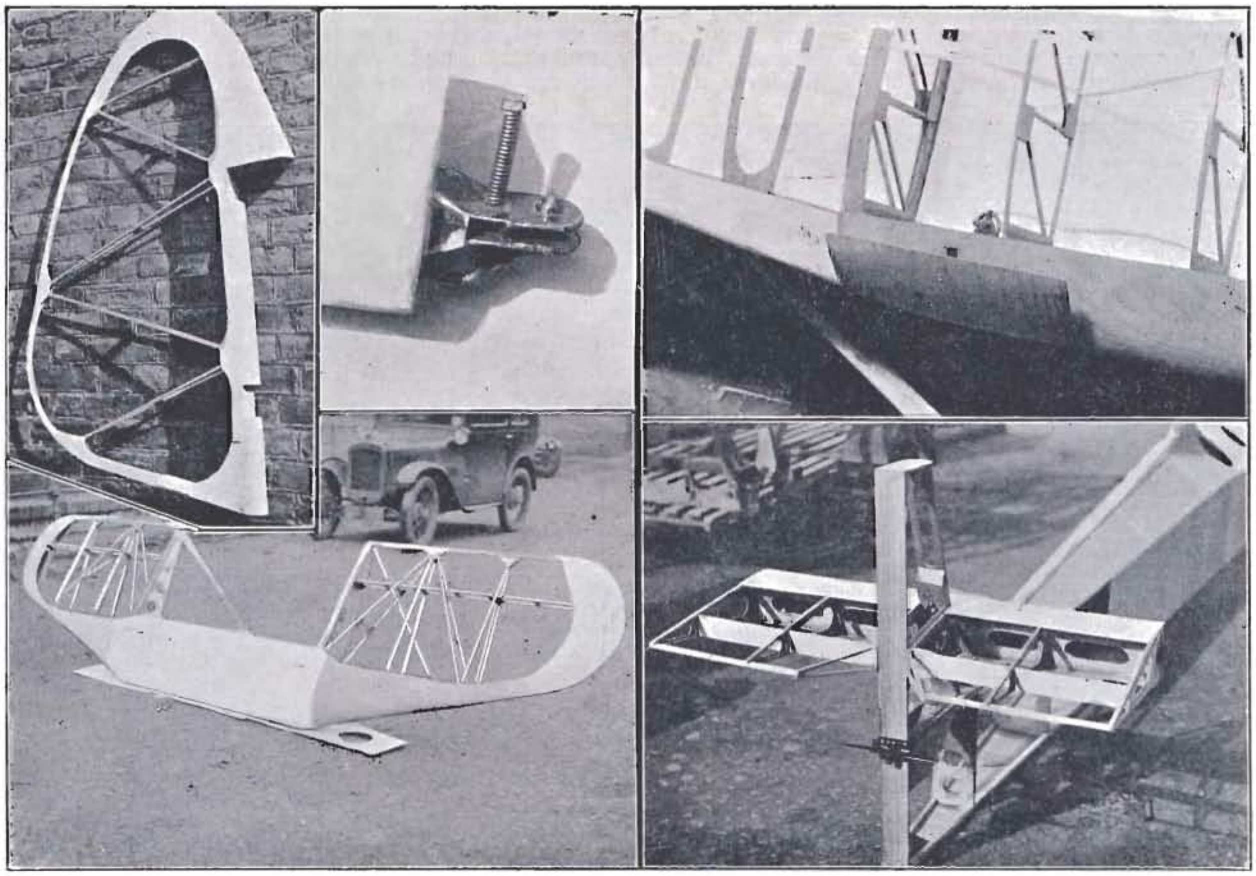
INTERNATIONAL COMMISSION FOR THE STUDY OF MOTORLESS FLIGHT.

The Fédération Aéronautique Internationale has established an Expert Gliding Commission, of which Professor Walter Georgii is Chairman. Colonel the Master of Sempill and Mr. Gordon England represent Great Britain, and the following other countries are also represented: Belgium, France, Italy, Holland, Switzerland, U.S.A. and Argentina.

The F.A.I. has accepted the proposal of the I.C.S.M.F. to the effect that in future International "A" and "B" Glider Pilot Certificates should be discontinued and only "C" Certificates shall be given by the F.A.I. This Certificate can only be granted to pilots over 16 years of age.

The first Gliding and Soaring Competition of the I.C.S.M.F. will be held at the Wasserkuppe during the first week in August. The R.R.G. is undertaking the organisation on behalf of the I.C.S.M.F. The number of competing machines will be limited to three per country, and it is hoped that entries will be received from all affiliated countries. The conditions of the competition, which will be issued shortly, will give consideration to the different grades of experience of the competitors.

Dr. Graf von Ysenburg has been elected Chairman of the Sports Committee of the I.C.S.M.F. in place of Mr. Gordon England, who resigned owing to pressure of business. In future the Chairman of the Sports Committee will be elected annually and will be a member of the Sports Committee of the country in which the next competition will be held.



BITS AND PIECES. From left to right: rudder; upper quick-release hinge-fitting on fin-post; spoiler-plate on leading edge of wing; elevator; tail-unit without elevator or rudder.

BOOK REVIEWS

SAILPLANES. By C. H. Latimer Needham. (Chapman & Hall, Ltd.; price 15s.)

It will be generally agreed that any subject must be of wide interest and well established before a book dealing with its specialities can be published. On this basis, the growing list of volumes on Gliding is a welcome sign, and the latest addition comes as a signpost for the progress of British Soaring. Certainly its aims could find no better champion than Captain Needham.

In amplifying the title, the author has chosen the sub-heading "Their Design, Construction and Pilotage," and by dealing with the extreme aspects in one book we may infer a moral which is not always realised. It is that a sailplane pilot will have to be conversant with the general principles of aerodynamic and structural design if he is to give the best performance.

Dealing with the actual contents, one finds the Introductory section unnecessary, since the reader will already have gliding experience, and should have learnt the historical side from other sources. But in Chapter I, Captain Needham comes to grips with his subject at once. A certain knowledge of engineering principles is assumed, but the text is generally within the understanding of the average enthusiast.

Part I, on design, comprises seven excellent chapters and two of slightly lower standard. The arrangement introduces and follows on in the order in which the information is used in design. The data given is lucidly explained and is complete. The sequence of sections shows that the author knows his work, and knows how to explain it. The eighth chapter deals with unusual designs, and should give more detailed treatment of the tailless type. The next chapter reviews existing types of high-efficiency machines, but also suffers from lack of detail.

Construction is dealt with in Part II, and, where the subject is definite the standard is high, but the final chapter on "Materials" is rather sketchy. It also contains a small error in the reference to duralumin. This metal cannot be welded without losing its characteristics.

With the present stage of knowledge in this country, Part III, on "Pilotage," deals with difficult matter, since the problem is not merely that of "control," but must include the nebulous "air sense." Our Movement has not yet attacked the meteorological side in true perspective, owing to the lack of advanced work in club activities, and only a broad outline is attempted in this volume. The exquisite diagrams of air-flow over various types of country are, therefore, mere generalisations and must be taken only as a basis for careful investigation. The soaring pilot must imbibe in his character some of the subtleties of the atmosphere. Here experience is the best tutor.

In the section on "Cloud Flying," it should be remembered that cloud formation by the condensation of moisture in a rising column of air is due to the fall in temperature as the air expands in the lower pressure of high levels, and not so much due to the relative temperature of the rising air and higher atmosphere.

Towing of gliders is ably considered, and the general high value of the text is enhanced by this chapter. Several appendices summarise much relevant matter, and the particulars of seven high-lift aerofoils are given in full.

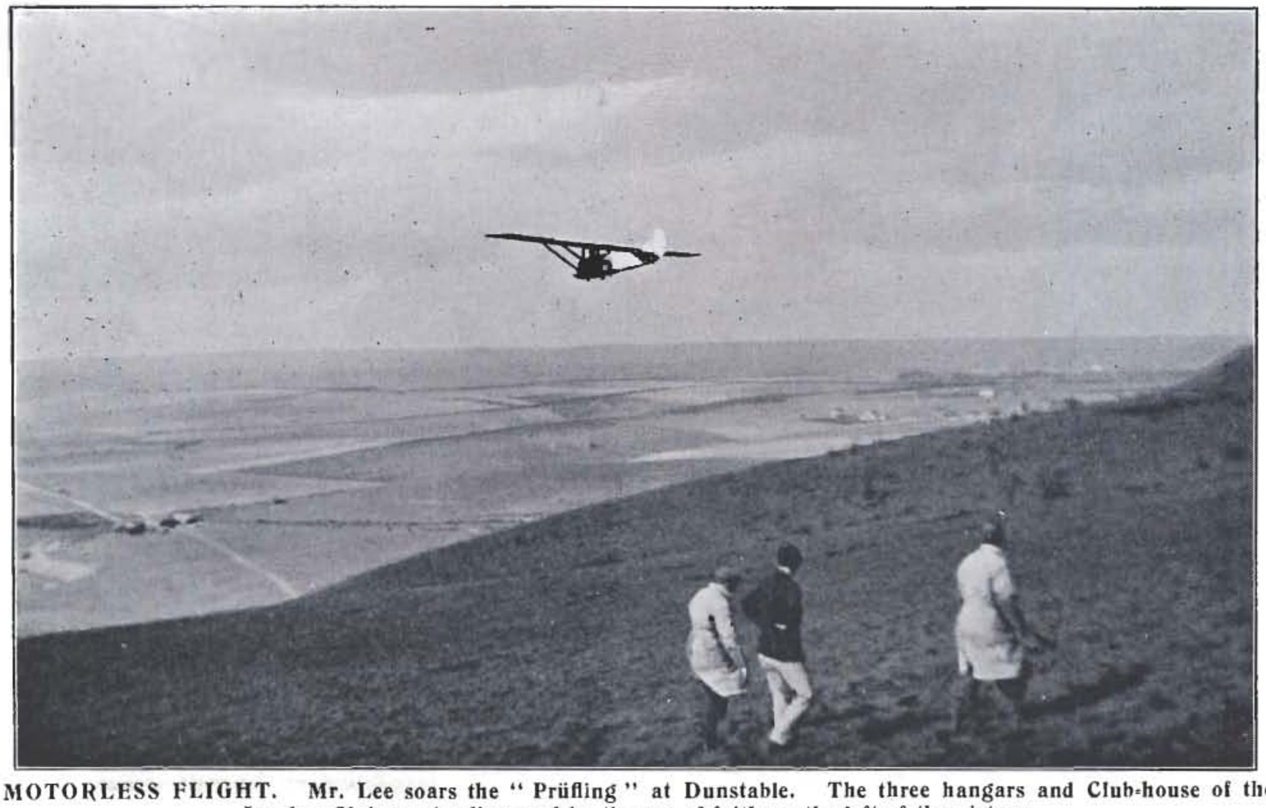
A useful collection of illustrations gives the final polish to a book which will prove invaluable to those who take a serious view of their efforts. Pilot, designer, ground engineer, and every enthusiast will find this volume a keystone to progress in the British Gliding Movement. It will take its place as a standard work of reference on "Sailplane Design."

WHO'S WHO IN BRITISH AVIATION. (Airways Publications, Ltd.; price 6s.)

To those engaged in the business side of aviation, a concise and complete record of important facts relative to such activities is essential, and it is plain from the outset that the Editors of "Who's Who" have succeeded in gathering much of the required information in this book.

It deals wholly with the personal and commercial aspects which may be required, and the data is well arranged and classified, so that reference is easily made. The book should appeal to all club secretaries, who so often need information at a moment's notice.

Gliding enthusiasts will be interested in the brief particulars of many of the leading personalities in the Movement. It is gratifying to find a large number of cases where reference is made to the membership of a gliding club, or the holding of a gliding certificate. Still more gratifying is the realisation from the notes that many of our leaders are ranked among the pioneers of aviation. On the other hand, there are one or two names, well known in the Movement, which are not included, and it is hoped that this will be rectified in the next issue. "FURNESS."



MOTORLESS FLIGHT. Mr. Lee soars the "Prüfling" at Dunstable. The three hangars and Club-house of the London Club can be discerned by the eye of faith on the left of the picture.

Photo by courtesy of "Flight."

CAPTAIN NEEDHAM DISCUSSES THE NYBORG SAILPLANE

During the past few years the design of high-efficiency sailplanes has tended to crystallise into one set type, as exemplified by the "*Wien*," from which very little divergence has been made. The variation in wing area, span, wing loading, and general outline has only been slight and even the structural differences have been of a minor nature only.

Generally speaking, designs that have broken away from the accepted standard have not proved altogether successful, so that the encouragement to try out new principles has been somewhat damped and to-day considerable courage is needed to launch an entirely original design. It is much easier to follow the well-beaten track than to carve a new way through the unknown.

And, again, we become so accustomed to what has become to be regarded as orthodox that we find difficulty in accommodating our minds to new principles, and do not with ease accept new ideas or appreciate their potentialities. These preliminary remarks are made in order that the following notes may be viewed in their proper perspective and that the experimental machine described may be regarded as a serious endeavour to try out new theories based on sound principles.

Mr. T. G. Nyborg, to whom I am indebted for much information concerning his machine, is a Danish engineer of no mean achievement who has made a careful study and analysis of both bird and mechanical flight over a period of thirty years. During this time he has designed and constructed a number of machines, with and without engines, to test his theories, but adverse circumstances seem to have dogged his efforts persistently, so that he has not attained the full measure of success he deserves.

Mr. Nyborg does not accept conventional figures for such factors as wing-loading, nor does he attempt to keep his designs within the usual empirical limits. For example, according to his theory there is only one span and one wing chord for a machine of given weight and speed, and any deviation from those proportions can only have an adverse effect on performance.

It has been stated that his design is based on the proportion of birds. This is not strictly correct, however: the wing section is first designed, according to certain novel theories, which determine the chord and the span follows. The results are then checked by the dimensions that a bird of similar weight would possess in accordance with analysis. The close agreement is a remarkable feature.

The following are the results, in brief, of his investigations of bird flight:—

(1) The weight carried per unit of span shows a steady increase with increase in weight.

(2) The weight carried per unit of area shows considerable variation for birds of less than 1 kg. weight, but above this amount the loading increases steadily with increase in weight.

(3) The value $\frac{\sqrt{W}}{S}$ varies more with the flying capacity of each particular bird than with the weight. By taking W in kgs. and S in metres it is seen that those birds having an index of less than one are good flyers or soaring birds, while those with an index greater than unity are heavy or flapping flyers. This applies to birds of over 1 kg. in weight only, the index becoming reduced below this weight.

(4) The value $\frac{\sqrt{W}}{S}$ is found to be practically constant, with a value of 3.2 for all birds over 1 kg. weight, while it varies somewhat below this weight, though in general it increases with diminishing weight.

(5) By comparing the wing chords of the various birds over 1 kg. in weight it is seen that this is apparently independent of the weight.

(6) Tabulation in order of wing chord values shows that all soaring birds over 1 kg. have chords between 0.21 and 0.29 metres, the chord apparently depending more on the condition of flight than upon the weight.* For example, the wanderer albatross weighs ten times as much as the kite, and yet its chord is less. The condor weighs seven times as much as the osprey, and their chords are the same.

(7) It is seen that the kite weighs ten times as much as the tern and has a wing span twice as great, while

* See also "Bird Flight" by the writer, THE SAILPLANE, February 1st, 1932.

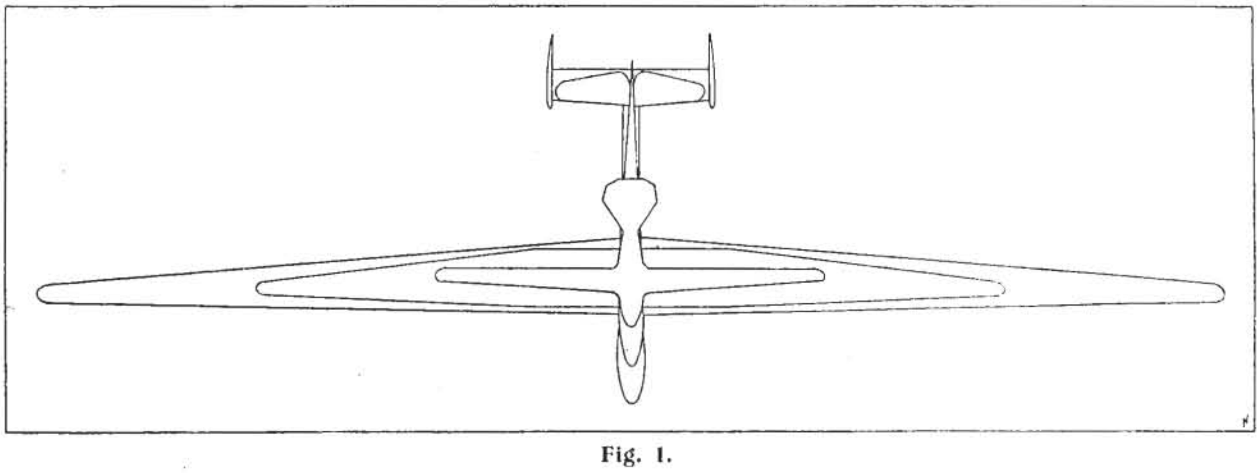


Fig. 1.

the albatross is ten times the weight of the kite and its wing span is again only double. The albatross is almost four times the scale of the tern for 100 times the weight, and they are of very much the same type, though the tern has the advantage in starting, while the albatross is the better in actual flight.

In the past, better performances have been sought, and attained, by a steady increase in span, although there are definite indications that an economical limit has been reached. For instance, the "*Meiningen*" (span 72¼ feet) and the "*Austria*" (span 100 feet), which were built nearly two years ago to supersede such machines as the "*Wien*" have so far proved somewhat disappointing and have no notable flights to their credit.

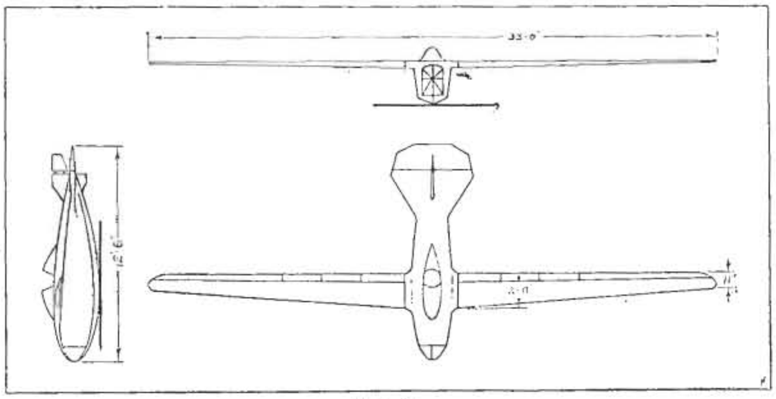


Fig. 2.

To-day there is slowly growing a school of thought that foreshadows a swing of the pendulum towards smaller sailplanes. If efficient machines of half, or even three-quarters, the present size could be evolved there would be an accompanying reduction in expenses of production, maintenance and housing, but obviously some new principle must be worked out before such can be built to equal the performance of the larger craft. It is no use merely reproducing a known type to a reduced scale in the hope that the performance will remain unchanged.

It has been shown in the case of birds that by doubling the span it is possible to carry ten times the weight with no falling off in performance. If this ratio holds good for still another unit increase of span beyond the largest bird, the condor, then we get the following figures:—

$$\text{Span} = 2 \times 4{\cdot}3 = 8{\cdot}6 \text{ metres, or } 28{\cdot}2 \text{ ft.}$$
$$\text{Weight} = 10 \times 16 = 160 \text{ kilogrammes, or } 352 \text{ lb.}$$
$$\text{Area} = \frac{\sqrt{160}}{3{\cdot}2} = 3{\cdot}95 \text{ sq. metres, or } 42{\cdot}5 \text{ sq. ft.}$$
$$\text{Mean Chord} = \frac{3{\cdot}95}{8{\cdot}6} = 0{\cdot}46 \text{ metres, or } 1{\cdot}51 \text{ ft.}$$
$$\text{Aspect Ratio} = \frac{(8{\cdot}6)^2}{3{\cdot}95} = 18{\cdot}7.$$

An inspection of Fig. 2 will show how closely the present design complies with these dimensions.

There is still, however, another important factor that needs very careful consideration, and that is speed. In most forms of flight there are three speeds to consider, these being the take-off, normal flight and landing, the last of which is generally the slowest speed at which flight is possible.

The take-off speed is almost invariably higher than the landing speed, owing chiefly to the smaller angle of incidence of the wing that can be utilised, and in part to the danger of stalling during taking-off. In sailplane work the normal flight speed has not so far received a great deal of consideration, the gliding angle and sinking speed having been considered as of paramount importance, but, as cross-country flying increases, more attention may be given to the attainment of higher speeds.

In general, any modification of a design that causes an increase or decrease in one of the flight speeds produces like alterations in the other two, so that a higher speed for normal flight results in proportional increases in both landing and taking-off speeds.

Now, returning to the analysis of bird flight, it is found that there is a steady increase in the speed of flight with increase in weight, and this applies likewise to the take-off and landing conditions. In fact, some of the largest birds are unable to rise at all unless there is a wind blowing, or, alternatively, a dive from some height is possible. (Incidentally, information on the speeds of flight of birds is very incomplete and any accurate results of observations would be welcomed.)

It follows, then, that higher speeds must be expected with a machine of correct bird-like proportions. This is not likely to be detrimental in taking-off, as somewhat stronger launches can be arranged for, although even this may be unnecessary on account of the lighter structural weight. For the preliminary tests of a new machine, however, this is a disadvantage. Higher speeds in normal flight and for landing will need greater skill and judgment on the pilot's part, but to compensate for this the inner two pairs of ailerons (see Fig. 2) can be depressed together to form camber flaps and also to act as air-brakes.

In the present design, the wing is in two parts, of 15 feet length each, which attach to short stub-wings near the top of the fuselage. Solid spars are used for the construction, and the whole covering is of plywood. Ailerons run the entire length of the wing and are divided into four pairs. They are connected differentially to give smaller movements to the inner portions, and, as already mentioned, the inner four are made to perform other duties.

The body, of bird-like shape, spreads out at the rear to form a tail-plane and to this a single elevator is attached. There are also small built-in vertical fins and a diminutive rudder, although the main ruddering effect is obtained by flaps on the underside of each wing, which can be pulled down to cause a drag on the inner wing during a turn.

The control arrangements are not quite orthodox, which is perhaps unfortunate, as in an emergency a pilot is most likely to obey what have become instinctive promptings.

No test flights have yet been made, although some preliminary towing has been carried out. Difficulty has been experienced in keeping a straight course, there being a big tendency to yaw at slow speeds. This might be overcome by fitting a double track skid or, preferably, by using a rudder of large volume, for the test stage at least, so as to retain directional control just after unsticking.

The construction was carried through by Mr. Nyborg and his assistant, Mr. H. Green. Altogether, the new machine is a very creditable effort, deserving of encouragement. It may not be an immediate success, but at least it may be the forerunner of a new era in sailplane design. The advent of true dynamic soaring flight may well be brought a step nearer with such a design.

Fig. 1 shows the Nyborg sailplane and the "*Austria*," the two extremes in size, drawn to the same scale, with the "*Wien*" included for the sake of comparison.

*[Captain Needham makes quite a convincing case for the heavily loaded sailplane of high aspect ratio. He does not, however, discuss the large cross-sectioned area and bad aerodynamic design of the Nyborg fuselage which can only have a detrimental effect on the distribution of lift over the span on which so much depends.—*Ed.]

WHAT DOES YOUR GLIDING COST?

The Imperial College Gliding Club holds a peculiar place in British Gliding. It is the only club that is run by engineers for engineers, and is the only club which has conducted any properly conceived research—we refer to the tests made with a Burley launching rope and published in "The Sailplane."

When gliding began again in this country we were told it was a poor man's sport—that anyone could afford to glide. Part of our difficult passage through the past two years has been due to our inability to appreciate the fundamental untruth of this belief.

Although some of the larger clubs have published accounts, no club has produced figures based on the same scientific records as the Imperial College Club, but it would appear from the most successful practice that it costs £8 per member per annum to run a gliding club on a basis of 100 flying members.

In this connection we draw particular attention to Mr. Adorjan's penultimate paragraph: "It is hardly possible to run a club with about forty members for less than £2 10s. per member per year, and the capital outlay has to be found besides this." One has to remember that Mr. Adorjan does *not* consider the running of a secondary machine without which a club's activities are unlikely to mature.—Ed.

The following report contains some data on the direct costs of primary training, based on one year's gliding by the Imperial College Gliding Club.

Conditions.

Period considered.—January, 1931, to December, 1931.
Type of machine used.—R.F.D. Primary.
Number of launches.—860.
Number of persons using machine.—55.
Number of days of gliding.—49.
Certificates gained.—12 "A"; 3 "B."
(Other members trained during this period have obtained their certificates since the beginning of 1932.)

Cost of Repairs.

A chart of the cost of repairs against the number of flights is given in Fig. 1. It may be seen that the total cost of repairs for this period amounts to £30.

There were three damages of over two pounds' value, the first of these representing about 40 per cent. of our total repair bill. The cost of repairs was kept down later by doing our own repairs.

The cost of repairs per launch works out to £30/860 flights or about 8½d. per launch.

Other Costs.

Beside the cost of repairs we have the cost of starting-rope, C. of A. of machine, insurance and transport. Where power launching is used, there is an additional cost to be considered.

The C. of A. and insurance costs are independent of the number of launches and can be taken as about £6 per annum. These give a cost of about 1½d. per launch.

The life of a starting-rope can be taken as 600 launches and this gives—for a five-guinea rope—a cost of about 2d. per launch.

The costs of auto-launching and transport are not considered here, as these vary very much with each Club.

Capital Depreciation and Interest.

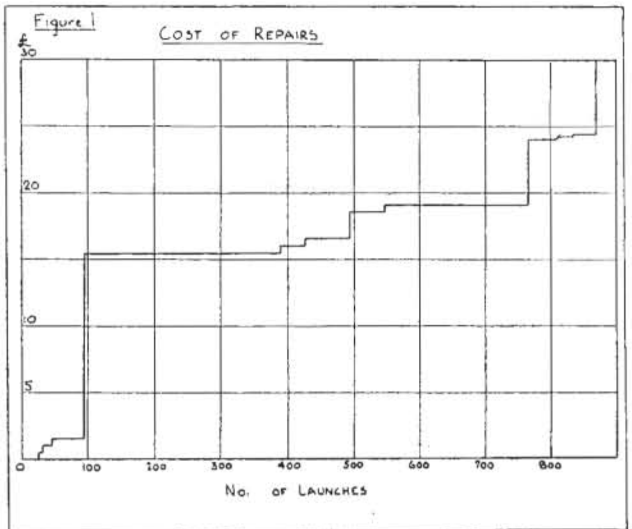
In the case of many Clubs the capital depreciation and interest must be considered. Fig. 2 is a graphical representation of these factors for a period of five years, taking the capital value as £60, the depreciation as 20 per cent. per annum, and the interest 5 per cent. per annum.

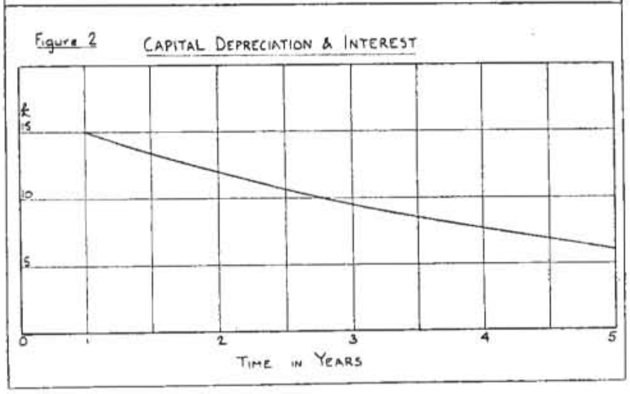
For the first year under the above conditions this represents an additional cost of about 4d. per launch.

Conclusions.

Then from the above the total cost of gliding can be determined as follows:—

	s. d.	
Cost of repairs	0 8½	per launch
Cost of C. of A. and insurance ...	0 1½	,,
Cost of launching-rope	0 2	,,
Total direct costs	1 0	per launch
Capital depreciation and interest ...	0 4	,,
	1 4	per launch





These figures were arrived at under highly unfavourable conditions. As may be seen from Fig. 1, this chart ends with one of the three biggest damages and therefore, by the theory of averages, a "horizontal" period can be expected. Further, this being based on a first year's primary training, probably shows a higher level for damage than the average would be for three or five years. Also, though the average membership was only 37, fifty-five individuals were using the machine.

Now if we neglect the capital depreciation and interest and take the direct cost of gliding at one shilling per launch, the cost for a year is 860 shillings, or 23 shillings per member.

It may seem surprising, but the fact remains that the actual cost of bringing a member to the "A" or "B" stage should not be much more than one pound.

The other expenses, such as the general Club expenses, affiliation fees, etc., may mean another four shillings per member, bringing the cost up to 27 shillings.

However, we cannot overlook the transport costs. These include the transport of machine from local ground to workshop and *vice versa*, and excursions to other Clubs' grounds. This may vary by several 100 per cent. for different Clubs. For the Imperial College Gliding Club it is about £40 per annum, which is quite a reasonable figure.

It can be seen from this report that it is hardly possible to run a Club with about forty members for less than £2 10s. per member per year, and the capital outlay has to be found beside this. (With many Clubs this is derived from entrance fees.)

If the depreciation of capital and interest be neglected, there is only a small additional upkeep cost for a second machine (£6 for C. of A. and insurance), and to have a second machine is a great advantage. It is then definitely possible to have a larger number of flights per year and thus keep down the overheads per flight. Also the enthusiasm of members can be kept up by continuous gliding meetings.

P. Adorjan.

(*Continued from page 98.*)

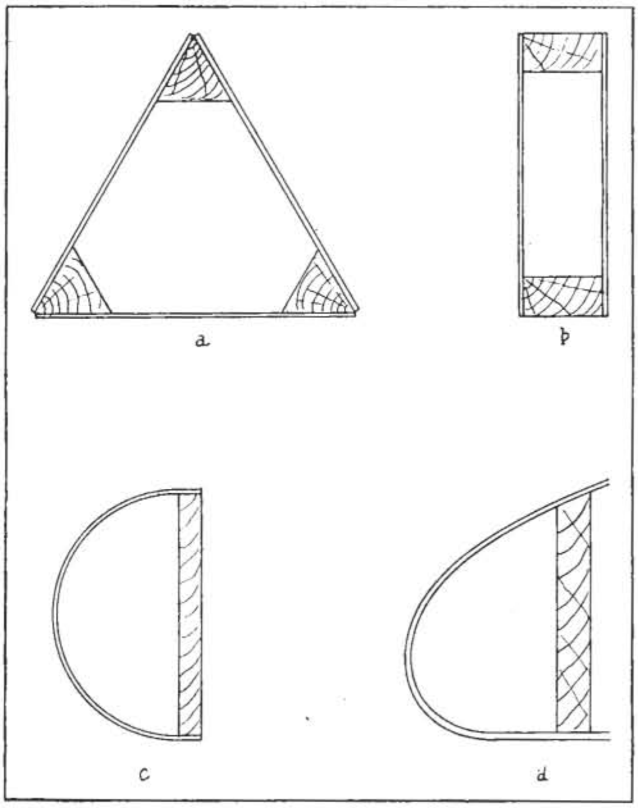


Fig. 10.

scantling which is in compression, may be designed by the Rankine-Gordon formula:—

$$f_b = \frac{f_c}{1 + a\,(l/k)^2}$$

where f_b = allowable buckling stress in strut
f_c = ordinary compressive stress in spruce
= 5,500 lbs. per sq. in.
l = unsupported length of strut in inches
k = radius of gyration of section
$= \frac{I}{A}$
$a = \frac{1}{2000}$ for ends free
$= \frac{1}{8000}$ for ends fixed
A = cross-sectional area of scantlings in sq. ins.

The girder sections shown in Fig. 10 are a selection of typical glider spars. The triangular section (a) is used for the spar of a single-spar wing. In this case the entire wing is supported by this girder. As the centre of pressure will not always be through the centroid of the girder, it follows that there will be a twisting moment, as well as a bending moment, acting on this spar (Fig. 11). In this case the plywood will take the torsion. The girder section (d) of Fig. 10 is used for the front spar of a wing, the plywood also acting as the fairing for the leading edge. The girder section (b) is a type used for wing spars and rudder and elevator spars. Another common type of section for rudder and elevator spars is shown in section (c); in this type the plywood will take the torsion due to the turning of the rudder or elevator.

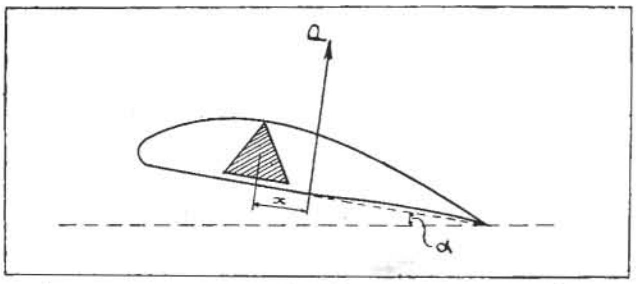


Fig. 11.

The Effect of Plywood on the Strength of the Girder.

Aeronautical wood girders usually consist of spruce scantlings held in position by sides or webs of plywood. It is always assumed by designers that the scantlings take the bending stresses only, whilst the plywood sides take the shear stresses only; but it is the practice of some designers to add to the scantling area the area of plywood which is in direct contact with the scantlings. This assumes that this portion of the plywood will be stressed, in bending, by the same amount as the scantlings. Other authorities object to this being done; they state that the equivalent elastic modulus of the plywood is very low compared with that of the spruce scantlings, and, consequently, the plywood will take a very small proportion of the corresponding stress in the spruce.

As there appears to be no definite knowledge of the actual value of the equivalent elastic modulus of plywood, tension tests have been carried out by the author on specimens of plywood in order to compare the equivalent elastic modulus of plywood with that of spruce.

A test piece consisting of a double thickness of three-plywood was tested in a Buckston testing machine in the direction of the grain, the extensions being measured with a Ewing's extensometer. From the results obtained, a load-extension diagram was plotted; this is shown in Fig. 12. Difficulty was experienced in clamping the extensometer to the plywood; this was overcome by riveting brass strips across the specimen directly under the points of the extensometer clamps. The test piece had a total cross-sectional area of .56 sq. in., and failed under a tensile load of 5,000 lb. This gives a failing stress of about 9,000 lb. per square inch.

It will be noticed from the load-extension curve that the test piece obeyed Hooke's Law up to a load of 3,000 lb., giving a perfect straight line; the yield point occurs at this load. The value of the equivalent elastic modulus, obtained

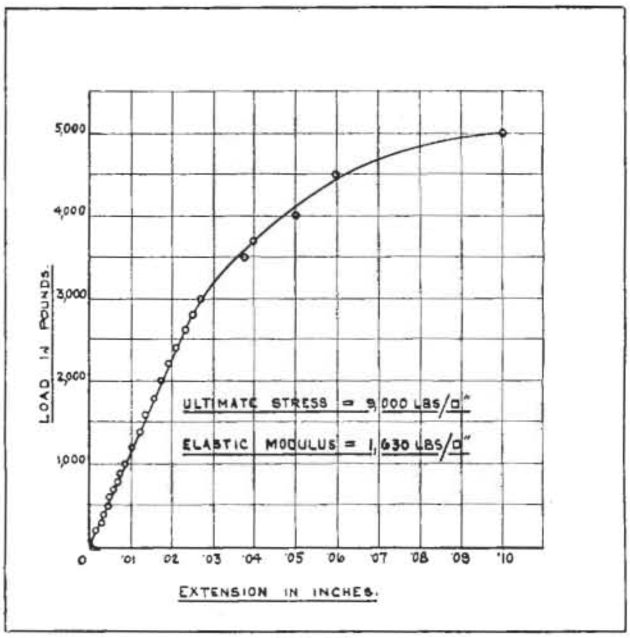


Fig. 12.

from this straight line, is 1,630,000 lb. per square inch, and the stress at yield point is 5,400 lb. per square inch.

These results compare very favourably with similar tests on spruce; the value of the elastic modulus for spruce being 1,500,000 lb. per square inch, and the failing stress in tension being about 10,000 lb. per square inch.

It may be concluded from these results that no appreciable error is made by assuming the equivalent elastic modulus of plywood and the elastic modulus of spruce to be the same. Their ultimate stresses may also be assumed to be equal. Hence, it follows that designers, when calculating the bending stresses in wood girders, are justified in adding to the area of the spruce scantlings that portion of the plywood which is in direct contact with the scantlings.

(*To be concluded.*)

NEWS FROM THE CLUBS

THE BORDER GLIDING CLUB.

We are going well ahead with our 1932 training, and a number of members who started last year are making steady flights across the field of from 10 to 35 seconds. Such progress is most encouraging, and we are looking forward to the application for certificates in the near future.

On April 12th, half a dozen members turned up and four made three flights each, one four flights, and the other one. Only two had any flying experience previous to last year, yet good times were made and good landings.

On April 16th only two turned up, both power pilots. The wind was from the east, 20-25 m.p.h. A lady who was not a member took on the driving of the car, and the two members took turn and turn about. There was a slight slope across the field into the wind, and so a certain amount of up-draught was felt which enabled a little soaring to be done, but owing to the proximity of walls, woods and telegraph wires, the machine had to be put down when it might have been held up much longer; 72 seconds from the "slip" was actually the longest flight, and this included a complete circle round the field which lost much height.

Auto-towing has decided advantages over the catapult when members are few, but suitable ground is more difficult to find.

*[Will this Club note that the Editor cannot edit "copy" not properly submitted? "Copy" must be written on one side of the sheet only.—*Ed.]

THE BRADFORD AND COUNTY GLIDING CLUB.

Saturday, April 16th.

No flying was possible, owing to heavy rain and a north-easterly gale.

Sunday, April 17th.

Wind E.N.E., 25 m.p.h., rather gusty. Calmer towards evening.

Conditions were judged to be too rough for the Reynard, but the Dickson and the Holdsworth sailplanes were both rigged and flown, the latter performing very well with the new aileron cables. For the first time, this machine was launched down a slight slope, and flew very steadily for about 200 yards before Holdsworth forced her down in order to avoid crossing the next ridge, which would have prolonged the flight down the long slope to the reservoirs, where the lands are not too good.

The Dickson was flown at least once by every member present, and in spite of several anxious moments reached the end of the day intact.

As usual, the sun was completely deceived by the Daylight Saving Act, and we were therefore able to continue flying until 7.45 p.m.

The machines were then put away (all three with tail units completely rigged), and we repaired to the farm for a belated tea. A very successful and enjoyable day.

THE CHANNEL GLIDING CLUB.

Saturday, April 23rd.

By dint of hard work the B.A.C.IV was got ready for air test in the evening, and was satisfactorily flown at dusk. We have rebuilt a complete new nose portion on Prüfling lines, and a new joy-stick unit has been installed.

Sunday, April 24th.

Wind N.W., 15 m.p.h. A happy day for all. Allen brought along an air-speed indicator made to the drawings in the last issue of The Sailplane. The dial was numbered from 0 to 20. Manuel was towed off and on the way up the instrument kept on the 13 mark. Perhaps this was an omen, as he wandered well away from the 'drome and on the return journey just failed to get in. One wing slid along the fence, breaking a strut. What language! He reported the best speed was between 6 and 7.

The machine was quickly made serviceable, and Francis made a flight of 1 min. 53 sec. to complete the two qualifying flights for his "B." (Timing begins when the pilot has cast the cable.)

This was an excellent flight by our youngest "A" member, and as he flew by the A.S.I. number as ordered by the instructor we are delighted with the instrument and thoroughly recommend it.

Allen and Griffiths flew next, the second flights on the B.A.C., good straight glides as per A.S.I., and Reece did a fine solo on the same machine. Three beginners were sent off on the R.F.D., and Francis finished the day by qualifying for his "B," clocking 1 min. 18 sec.

Total flights for the day, twenty-four.

THE LONDON GLIDING CLUB.

Sunday, April 17th.

Rain, gloom and mud. The Prüfling was given twenty-three low flights. Two aeroplanes visited us.

Saturday, April 23rd.

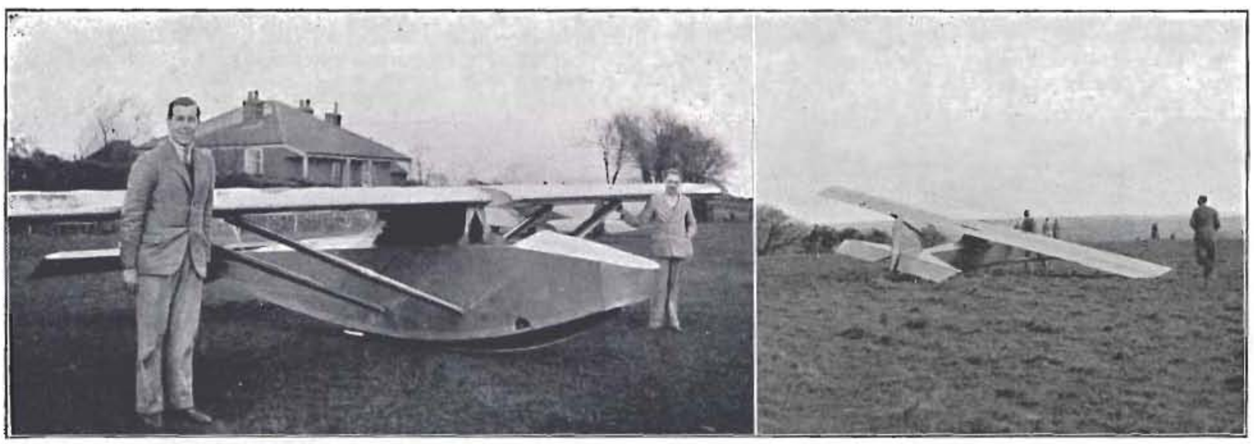
Ideal wind-direction; soaring conditions fair at first, improving to first-class for the slower machines. The wind-force increased to a good breeze, and the dissipation of the clouds seemed to steady the lift.

Imperial College Dagling. This machine is practically standard, but is fitted a nacelle designed and built at a cost of eight shillings by J. B. E. Keeble. He obtained his "C" with a perfect flight of 15½ min., landing on the top.

Miss Lippens arrived from Belgium in her Puss Moth, and made two prolonged descents in her sailplane.

Dagling. McClement flew his "C" with 21 min. 12 sec.; and Thomas, at a second attempt, followed suit with 10 min. 55 sec. Bowen took his "B" with 1½ min. Others took a good run round.

Prüfling. Hedges, Collins and Richardson, all close up to prolonged soaring, failed to hold her up for the five minutes, but obtained some of the vital practice in neat turning. Grice soared well for 4½ min., but then turned back over the hill and landed willy-nilly down-wind. Humphries soared for a couple of beats and then landed



THE BOLTON SECONDARY. This machine was designed by Mr. Bolton, of the Kent Club, and has taken two years to build. Mr. Weekes (left) was test pilot.

on the top by obeying the exact instructions of Buxton. Grimston soared high and hard, qualifying for his "C" with 25 min. 30 sec.

PROFESSOR I was soared by Symmons and Morland, the latter causing Biblically minded small boys to call out, "Now, then, Elisha; go *down*, thou bald-head!" But the she-bears were all locked up in Whipsnade Zoo.

HOLS DER TEUFEL absolutely revelled in the conditions. Hiscox, Humphries, Hamilton and Dewsbery had no difficulty in maintaining prodigious heights, three of the pilots landing on the top along the Buxton Line. One flight was stimulated by the sudden arrival of PROFESSOR I at a *lower* level. Later the two machines approached each other head-on, PROFESSOR still below, but not much. The HOLS pilot looked at the other pilot's goggles, thought of Demon Horsemen, and landed on the top. The PROFESSOR pilot's nerve was also justifiably shaken, and he landed promptly at the bottom. (N.B.—HOLS was up first.) Earlier a well-known red PUSS MOTH had dived in below HOLS.

The frequent landings on the top were successful when they adopted the approved line, and *vice versa*. *Verb. sap.*

Sunday, April 24th.

Conditions similar to yesterday, but less wind-force.

PROFESSOR I. Symmons took a couple of beats; Humphries flew her down. Morland flew her as well as ever; but, on landing, engaged his wing-tip in one of his particular dandelions. (No flowers, by request.)

IMPERIAL COLLEGE DAGLING. R. C. Rainey, 56 sec. for "A"; Graham, a first "45"; J. A. Colls, 60 sec. for a second "45"; G. Konried, 1 min. 34 sec. for "B."

PROFESSOR II. Miss Lippens flew the machine repeatedly and then returned to Belgium by air. With great generosity she left the machine for our better pilots to use without let or hindrance. This is the best compliment that we may ever hope to receive. Culver, Major Petre and D. C. Smith found the machine to be as superior to our own PROFESSOR as the latter is to our PRÜFLING. Major Petre soared far and wide in spite of rain.

DAGLING. Bowen adequately confirmed his "B" of yesterday with further steady flying; Burney, 35 sec. for "A" and 49 sec. for first "45"; Muir, 46 sec. for "A"; W. Stabb, 62 sec. for "A" and 65 sec. for first "45"; N. Stabb, 1½ min. for second "45" and 2 min. for "B" (let brotherly love continue).

DICKSON. Elementary ground-hops. Complete beginners did astonishingly well.

PRÜFLING. A horde of pre-"C" pilots went through their paces. The pressure on this machine is becoming terrific, but is relieved by the kindness of private owners.

HOLS. Hiscox again soared *ad lib.* and repeatedly. After shouting for obstructing cars to be moved, he finished one flight on top. Desoutter made two steady flights.

KASSEL 20. Miss Nicol and Dr. Slater made prolonged descents; Grimston put up a priceless show, hanging on like grim death to the lip of the hill.

Don't forget about the Whitsun camp!

ULSTER GLIDING AND AVIATION CLUB.

All members are enthusiastic about auto-towing as a means of training. The photographs show the club's REYNARD machine on the large trailer, and also on the small trailer which is used for returning to start-point. This has an outrigged wheel on the starboard side which supports the wing at the flying-wire anchorage and obviates the need for a runner to hold the wing-tip.

B.G.A. NOTICES

A meeting of the Contest Committee of the British Gliding Association was held on Thursday, April 14th, 1932.

Election to Committee.—The Committee unanimously nominated Captain F. Entwistle and Mr. R. G. Robertson to serve on the Committee.

Date of Competitions.—The Committee decided to recommend to the Council that the 1932 Competition be held from August 25th to September 4th.

Site for Competition.—The Committee carefully considered the replies received to the questionnaire, and were of opinion that the Furness and Sedburgh sites in the North and the Mendip site in the South appeared to offer the best facilities. The Committee will inspect these sites in due course.

Entrants to Competition.—The following recommendation was passed:—

> "That persons who have qualified for their 'C' glider pilot's certificate, whether over or under the age of 16, shall not be entitled to compete in competitions limited to 'A' and/or 'B' pilots."

Form of Application and Permit.—The Committee considered the forms to comply with Rules 16, 17, 18, 19 and 20 of the B.G.A. Open Competition Rules, and recommended their acceptance by the Council.

[*Note.*—The rules referred to above read as follows:—

16. NO MEETING WITHOUT A PERMIT. No meeting shall be held without a permit from the B.G.A. Such permit shall only be granted on the application of the promoter, at the discretion of the B.G.A. to recognised gliding clubs, to other bodies interested (to the satisfaction of the B.G.A.) in the Gliding Movement, under such conditions as the B.G.A. deems reasonable and may be withdrawn by the B.G.A. at its discretion.

17. NO PERMIT ASSIGNABLE. The B.G.A. may decline to grant a permit without assigning any reason. It shall be deemed a condition attached to all permits that no permit is assignable.

18. FEE AND FORM OF APPLICATION. The fee for a permit shall be two guineas for each day of the meeting; provided that, in case of application from any club affiliated to the B.G.A., the fee payable shall be 2s. 6d. for each such day. Every application for a permit shall be on the special form to be obtainable from the B.G.A., and shall be accompanied by the fee.

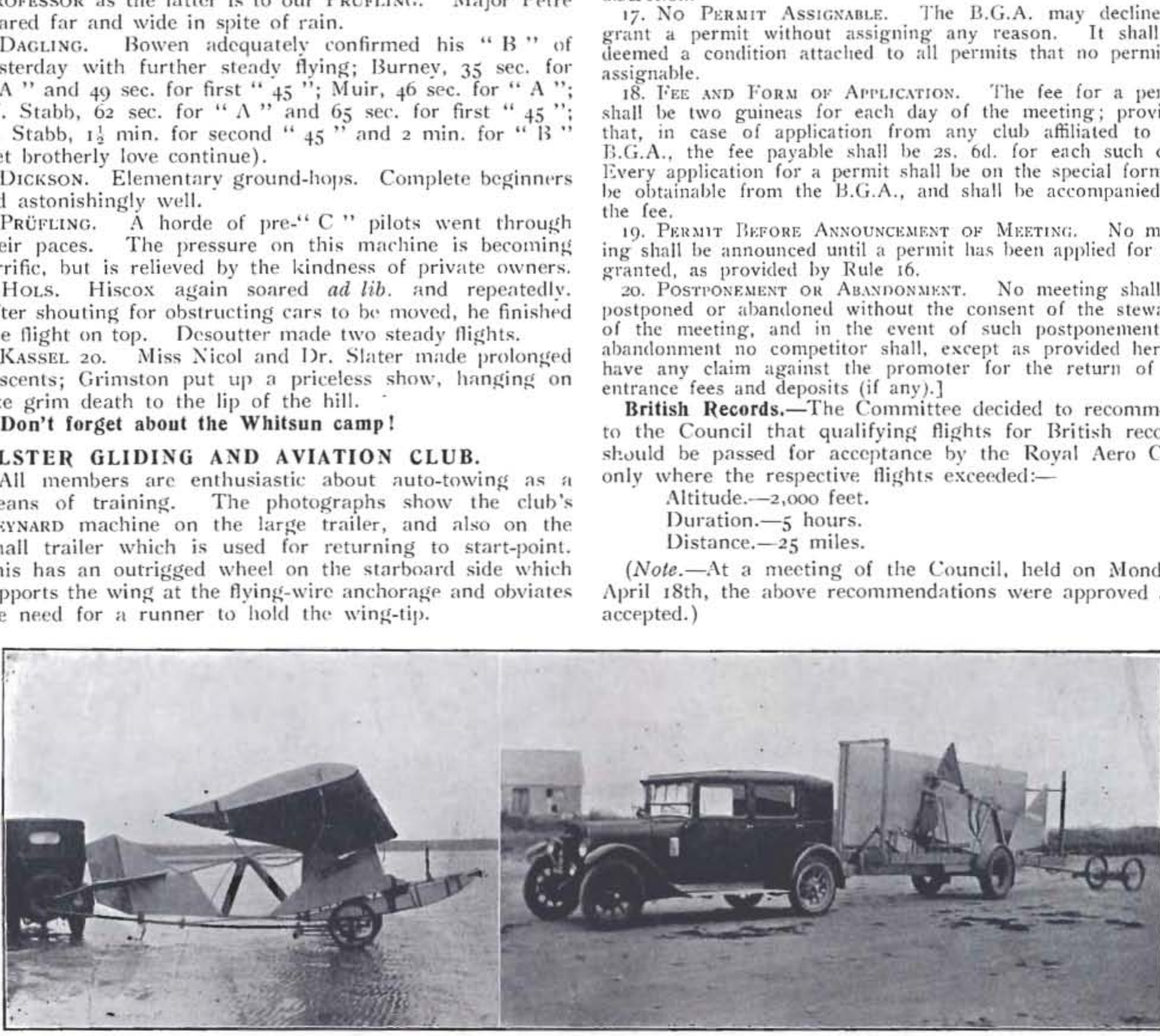
19. PERMIT BEFORE ANNOUNCEMENT OF MEETING. No meeting shall be announced until a permit has been applied for and granted, as provided by Rule 16.

20. POSTPONEMENT OR ABANDONMENT. No meeting shall be postponed or abandoned without the consent of the stewards of the meeting, and in the event of such postponement or abandonment no competitor shall, except as provided herein, have any claim against the promoter for the return of his entrance fees and deposits (if any).]

British Records.—The Committee decided to recommend to the Council that qualifying flights for British records should be passed for acceptance by the Royal Aero Club only where the respective flights exceeded:—

Altitude.—2,000 feet.
Duration.—5 hours.
Distance.—25 miles.

(*Note.*—At a meeting of the Council, held on Monday, April 18th, the above recommendations were approved and accepted.)



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