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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.

THE SITE FOR THE INTERNATIONAL MEETING

ALL doubts and misgivings will, at last, have been removed by the announcement made in the last issue of THE SAILPLANE that, not only has the date of the 1932 Competition been fixed, but a preliminary selection of sites has been made.

There has been a certain amount of uninformed criticism recently in regard to the activities, or rather the non-activities, of the Contest Committee, which has accepted the onerous task of organising the meeting. It is not appreciated, apparently, that the work of selecting a suitable site has been beset with many difficulties. The obvious way to select a site for a meeting of this kind would have been for some or all of the members of the Contest Committee to free themselves for a month or so from their normal occupations and to tour the country until they found the ideal place. Such a method is obviously impracticable; the members are already devoting more of their valuable time than they can well spare to the service of the Movement, and, at this juncture, official funds would certainly not permit of such a tour being made. Consequently, the Committee has had to depend very largely for its information on the replies to the questionnaire distributed early in the year.

So far as can be gathered, the main difficulty of the Committee has been in securing anything like an adequate response to its appeal for information. This is all the more surprising when consideration is given to the large number of almost ideal soaring sites which are to be found in the West and North of England, Wales and Scotland. Nobody can pass through these districts without being impressed by this fact. Surely it was not asking too much to request responsible gliding people to examine their respective districts and report on possible sites. If each club had made itself responsible for a definite area and had drawn up a comprehensive report for the information of the Contest Committee, the work of that Committee would have been lightened considerably.

However, a preliminary selection of sites has been made and it now remains to make the final choice. Until that has been done we will refrain from commenting upon the sites suggested. There is no doubt that when the final choice is made there will be certain criticism levelled at the Committee by those who think they could have done better. It is impossible in such matters to please everybody, and those who are inclined to criticise will do well to remember the difficulties under which the Committee has been working. The real measure of the value of their work will be determined by the success of the competition when it actually takes place, and if they have done this part of their work well they will be content to allow their vindication to rest upon the final outcome of their labours.

THE KENT GLIDING FATALITY.

While all concerned with the Gliding Movement will regret the fatal accident in which Mr. W. H. Cruse, of the North Kent Gliding Club, was involved, and will extend their sincere sympathy to his relatives, it must be emphasised that, among the thousands of gliding flights that have been made in this country since 1929, this is only the second fatal accident. Further, the first accident did not occur in normal flying practice, but in the course of tests on a new launching device. There is no other country, we believe, with such a record, which is attributable directly to the sound basis on which the Movement has been developed under the guidance of the British Gliding Association. The thoroughness of the methods of the Association is reflected in the report of the Chairman of the Technical Committee on the accident, a brief summary of which will be found on another page. It is by taking to heart the lessons of such untoward happenings that the future of Gliding will be secured upon an even surer and safer foundation than it is at present.

[We regret to announce that, at the time of going to press, news has just been received of another fatal accident, at Morecambe. Details will be given in the next issue of THE SAILPLANE.]

FROM GLIDING TO POWER FLYING.

Those who are interested in gliding as a preliminary training for power flying will be interested to learn that arrangements have been made with certain Flying Schools whereby special facilities will be granted to *ab initio* " C " glider pilots who wish to receive instruction in power flying.

As a result of negotiations between the London Gliding Club and the London Aeroplane Club, the latter club is offering special rates for instruction to approved members of any gliding club.

Arrangements have also been made with National Flying Services, Ltd., for special tests to be made at Hanworth of those *ab initio* " C " glider pilots who wish to become power pilots. The object of these tests is to ascertain whether it is possible for a " C " pilot who has not had any previous power-flying experience to reduce by a substantial amount the normal time taken for dual instruction and solo flying with a view to qualifying for his " A " pilot's licence. The tests will be carried out at the usual charge of £3 per hour for dual instruction and £2 10s. per hour for solo flying, but arrangements have been made to waive the usual minimum time for dual instruction.

GLIDING FATALITY IN KENT

The second fatal gliding accident in this country since the resuscitation of the Movement in 1929 occurred on Sunday, May 1st, when William Herbert Cruse, aged 27, a member of the North Kent Gliding Club, crashed during a preliminary training flight; he died from his injuries the following day. Mr. Cruse had been gliding for about six months, during which time he had shown himself to be a very promising pupil and had reached the " A " certificate stage, though he had not actually qualified.

The accident was fully investigated by the Chairman of the Technical Committee of the British Gliding Association. The following are the main points of Captain Needham's report:—

(1) The machine was an elementary training glider of the B.A.C.II type, built by Messrs. B.A.C., Ltd., Maidstone, Kent, and owned and operated by the North Kent Gliding Club. It was a " B.G.A. approved type." The Certificate of Airworthiness was issued in October, 1931. The machine was erected and examined on the day of the accident.

(2) The machine was being used for elementary training in a comparatively flat field. Mechanical launching was employed, the method used being one of those approved by the B.G.A.

(3) Flying operations were carried out on the day in question under the direction of Mr. C. H. W. Jiggers, the flight captain. Several flights had been made prior to the flight by the deceased.

(4) The launch appears to have been quite normal except that it was noticed that the glider had gone a little to the left of its course, apparently through the application of the left rudder.

(5) An examination of the glider after the accident led to the conclusion that it was in a thoroughly airworthy condition. There were no signs of any structural failure nor of failure of the control system.

(6) The opinion formed was that the pilot got into difficulties through erroneous use of the rudder and that probably, in order to correct yawing to the left, he aggravated the condition by pushing the rudder-bar still farther in the same direction. (This is a common fault with beginners, who are inclined to use the rudder-bar in the same way as the handles of a bicycle instead of the reverse way. The deceased, it is understood, was used to riding a motor-cycle.) This probably resulted in a stall, or side-slip under stalled conditions, from which it would be very difficult, even for an experienced pilot, to regain control when so close to the ground.

PERSONALITIES IN THE GLIDING MOVEMENT

MR. C. H. LOWE-WYLDE.

Mr. Lowe-Wylde, who is 32 years of age, was born in Northumberland. He served his apprenticeship at Armstrong Whitworth's, Gosforth Aerodrome, built his first glider at the age of 16, and afterwards built several private experimental power machines. He was technical instructor in the Royal Air Force for two years, subsequently Assistant Works Manager at Blackburn's aircraft factory, Phaleron, Greece, and then Experimental Production Engineer at Supermarine's, Southampton. He was always interested in gliding, and when the Movement was revived about two years ago he designed and built the B.A.C.I primary training glider on which he gained No. 1 glider pilot's licence. He then developed the B.A.C.II and III, and subsequently auto-towing, with which his name will always be connected.

Mr. Lowe-Wylde is at present touring the country with Sir Alan Cobham, giving demonstrations of auto-towed and aeroplane-towed gliding.

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, and must not have been published elsewhere, should be addressed, " The Editor of THE SAILPLANE, British Gliding Association, 19, Berkeley 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.

NEWS FROM OVERSEAS

Wolf Hirth landing 12 yards behind starting-point after "self-start" (i.e., being lifted off by wind force only, no catapult being used).

[*We are anxious to secure news for this page from all over the world, and information from responsible persons will be welcomed by Mr. Thurstan James, 24, Norland Square, London, W.11.*—ED.]

INDIA.

The Indian Gliding Association held a training camp at Aundh, Saltara, in December last, and during that month seven members passed the test for the "A" certificate. No news of their second camp is yet to hand, though this was to have been held in April.

They have one American primary glider. Two Kassel machines, one primary and one secondary, were under construction.

GERMANY.

During the last session of the Segelflugschule Zierenberg, which is on the Dörnberg close to Kassel, about 260 starts were made with no major damage to the machine. The courses at this school begin on the first and fifteenth of every month. Further information can be obtained from Herr B. Hurttig, Kassel, Bismarck-strasse 8, Germany.

In four weeks from the opening of the course at the Wasserkuppe on March 24th until April 22nd a total of thirty-nine "C" certificates was obtained.

The constitution of the Rhön-Rossiten Gesseltschaft has been modified. The executive action is in the hands of a Director, Herr Doktor Georgii, who is advised by a Council on which are representatives of the State and other interested parties, including Herr Oscar Ursinus, Editor of *Flugsport*.

Herr Lippisch is now in charge of both the Aerodynamik and Flugtechnik departments. The second tailless (Triangle) is nearly completed. It has been built on the Kuppe and will have a 20-h.p. engine. The third, with an 80-h.p. inverted Argus engine, is also well under way.

Riedel, flying the Super-Falke, recently remained in the air for 8 hr. 49 min.—nearly a record for the Rhön. After that, on another day in the same machine, he climbed to 6,500 feet in front of a storm-cloud and made a distance flight of 3 hr. 30 min. The Super-Falke has a span of 56 feet and is shorter in the nose than its prototype. Its special features are the segmentally shaped ailerons which are efficient at extremely low speeds.

UNITED STATES.

Using thermal currents, a sailplane pilot at Detroit climbed from 600 feet to 2,000 in a glider over Detroit Airport. Unfortunately, although this feat occurred last summer, the news is only now to hand.

Using 1,000 feet of manila rope, Mr. B. Wilson was towed up to 600 feet in an enclosed primary type glider. The airport is very large and light-coloured. It is also close to Lake Erie, and due to these factors considerable up-currents exist in which it was possible by steady circling to reach a height of 2,000 feet.

AUSTRALIA.

Writing of the Adelaide University Gliding Club, our correspondent outlines the position with naivity. He says: "We have only four active members at present, and will have no more until we enlist some 'freshers.' The treasury contains the munificent sum of 33s., and the glider lacks a fuselage." Cheer up, Australia; lots of British clubs have faced that stage—and passed it!

EGYPT.

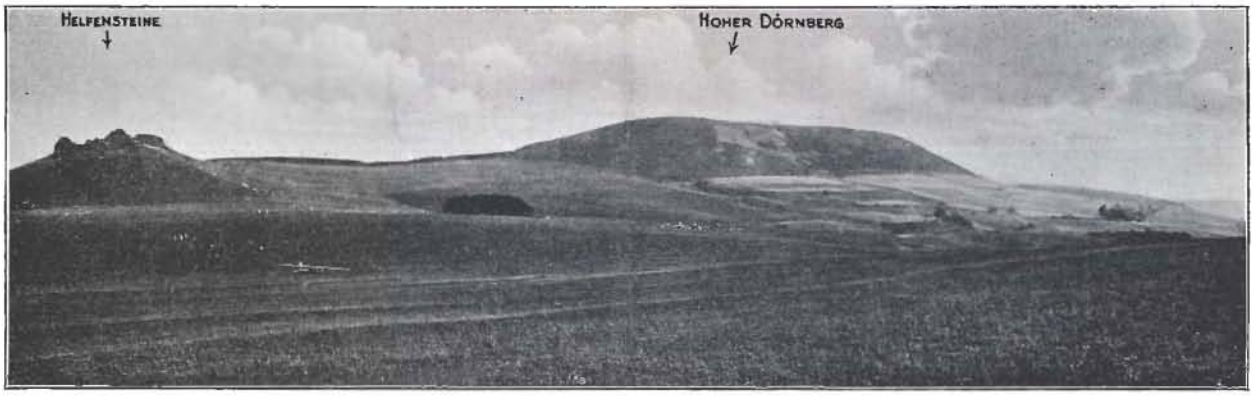
Early in April the first Egyptian gliding meeting (unless there were pre-historic attempts in Egypt as there certainly were in India) was held at Almaza Aerodrome. A demonstration of auto-towing was given on a locally built primary glider fitted with wheels. The Club will be known as the "Mouillard Group." Four flights were made before the machine was damaged.

SPAIN.

As the result of losing flying speed while towing a glider over Barajas aerodrome, near Madrid, Luis Moreno, the pilot of the aeroplane, lost his life. The pilot of the glider was saved by parachute.

A GERMAN GLIDING SITE

By HANS STECH.



The Dornberg, showing gliding slopes from the south. Note the cup-shaped formation similar to the Wasserkuppe.

The Dornberg is one of the best of the German gliding school sites. It is, however, not so well known abroad as the Wasserkuppe, although many of its former pilots, such as Herren Maggersuppe, Kegel and Hartig, are famous. Herr Kegel is well known as being the first pilot to fly in thunder clouds.

The Dornberg lies ten miles from Kassel, in Central Germany, and is 2,000 feet high, with many ridges and steep slopes. From the picture it will be observed that it bears a marked resemblance to the Wasserkuppe, but the plain between the two ridges at the Dornberg is very much greater than the Zucherfeld at the Wasserkuppe. The weather and terrain of the Dornberg are very suitable for soaring, and the site is almost free from fog—one of the Wasserkuppe's chief drawbacks.

" A " and " B " flights are flown from the Helgenstein, while " C " flights can be made from the Dornberg itself in a wind as light as 14 m.p.h. wind strength. " C's " can be made in north to north-west winds and also south to south-west winds; winds from these directions are very common.

There are three gliding schools on the Dornberg. The German Students' Society Gliding School (Die Segelflugschule der Deutschen Burstenschaft), the Air Police Gliding School, and the Kassel Club. Foreigners are only admitted to the Kassel Club, which does not possess the machines for training successfully above " A " standard.

Courses commence in March and last till November except at the Student Society School, which runs courses in the University vacations only—Easter, Whitsun, and the summer holidays. Each course lasts fourteen days. The three flying schools are very similar in construction and include a large hangar, a workshop, and living and sleeping accommodation for about thirty-five students, together with administration offices, all in one large building.

The Student Society School was founded in 1931 and has no less than 2,000 members. When the school started it had six ZÖGLINGS and four HOLS DER TEUFELS. The ZÖGLINGS have lasted very well, but the TEUFELS, in comparison, very poorly. In consequence the school bought, this year, another ZÖGLING, two FALKES, and a KASSEL 20. The club is very satisfied with these machines.

In the Easter course, of which the writer was one of the pupils, there was at first some snow which made landings very soft and long. This cleared later. All the beginners made " A's," and the majority " B's." The advanced course all made " C's," and a number made hour flights towards their official " C's."

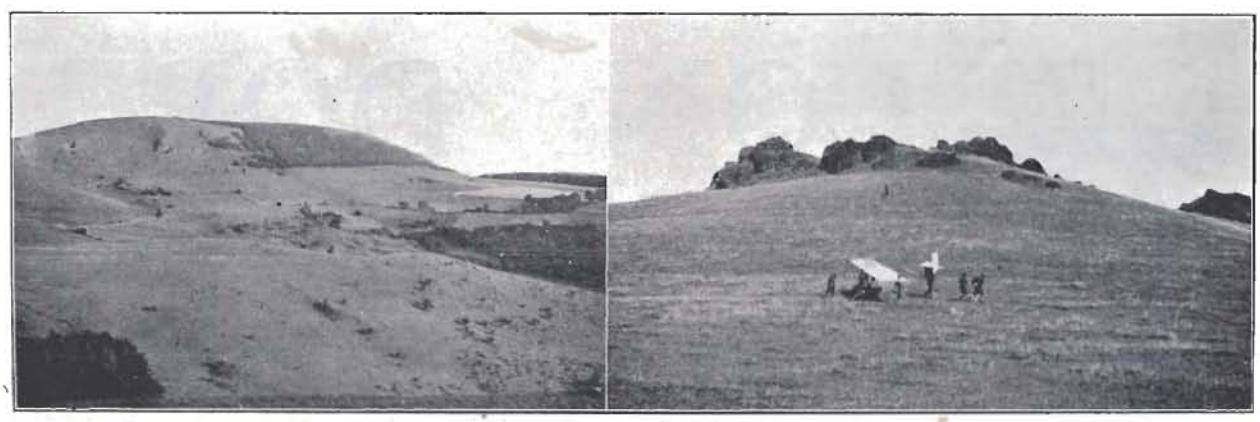
The Dornberg endurance record is 11 hours. The Student Society School has always had the best flying records on this site.

British gliding pilots visiting Germany should most certainly visit the Dornberg and see our schools at work.

CHANGE OF ADDRESS.

The address of the British Gliding Association offices is now 19, Berkeley Street, London, W.1.

Telephone: Mayfair 4032.



Another view. Left: the Dornberg. Right: the Helfensteine from which " A " and " B " flights are made.

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 the Technical Committee of the British Gliding Association.)

(The following section concludes the series on this subject by Mr. Lewitt. Previous sections will be found in Nos. 4, 5, 6 and 9, Vol. III.)

DESIGN OF STRUCTURAL PARTS.

Wing Spars.

The wing may consist of a front and rear spar as shown in Fig. 3, or of a single spar as shown in Fig. 11. In the former case, the limiting positions of the centre of pressure must be found and the total pressure divided between the spars. The worst condition of loading for each spar must be considered. The spars may now be stressed for bending, the maximum bending moment being found by the method shown in Fig. 8; this will depend on the type of wing suspension. If flying wires are fitted, the compression due to the horizontal component of the wire must be added to the bending stress. The stresses due to the drag bracing must also be added algebraically.

In the case of a wing with single spar (Fig. 11), the resultant force P will produce a bending moment and a twisting moment. The position of P must be noted for the extreme limits of the centre of pressure. The twisting moment will be a maximum when x is a maximum; that is, when the centre of pressure is in the extreme back position. The assumption may now be made that the scantlings take the bending stresses and the plywood takes the shear.

Let q = maximum shear stress in plywood.
J = polar moment of inertia of plywood on girder.
= maximum twisting moment.
T = P × x lb. inches.
r = maximum radius of plywood from centroid of girder.

Then, $\frac{T}{J} = \frac{q}{r}$

from which formula the value of q can be obtained.

The shear stress due to the spar as a beam must also be added to the shear stresses as found above.

The bending stresses will be obtained by applying the simple bending formula to the scantlings; the drag stresses must also be added, algebraically, to these.

The total pressure P on the wings may be taken as the weight of the machine plus pilot less the weight of the wings. This force may be assumed to be uniformly distributed over the wing surface; then the resultant will act at the centre of area of the wing surface.

Drag Bracing.

The drag bracing is usually of a diagonal type, fitting between the two wing spars. It causes the wing spars to act as the booms of the " N " girder thus formed. The maximum drag will be obtained from the L/D curve of Fig. 2, and occurs for the extreme back position of the centre of pressure. This force may be assumed to act uniformly along the leading edge of each wing, and thus the bending moment and shear may be obtained. The forces in the drag bracing and wing spars may now be found either from a stress diagram or by the method of sections.

For a single spar wing (Fig. 11) the drag force will be taken by the spar as a horizontal bending moment, and the stresses in the scantlings due to this cause may then be found from the simple bending formula.

Wing Ribs.

The ribs must be stressed to withstand the air pressure on the wing surface; they also form part of the drag bracing. On stressing the ribs it is usually found that they are many times too strong. This is because the skeleton members of the rib are made as light as possible; they are made of sufficient size to enable the joints to be rigid, and to withstand local failure.

Under normal conditions of flight, the air pressure on the wing is about 2 lb. per square foot of surface.

Rudder and Elevator.

These consist of ribs attached to a main spar. An air pressure of 2 lb. per square foot may be assumed to be acting on the surface. The main spar acts as a beam, due to the air pressure, and as a shaft due to the turning moment. The stresses due to both of these sources must be added algebraically.

Tailplane.

The worst condition of loading on the tailplane occurs when the machine is assumed to be flattening out after a steep nose dive. It is impossible to calculate the exact forces on the tail due to this extreme condition of loading; the usual procedure is to assume a loading of 25 lb. per square foot on the tailplane. Under normal conditions of flight, the loading on the tailplane may be assumed to be 5 lb. per square foot.

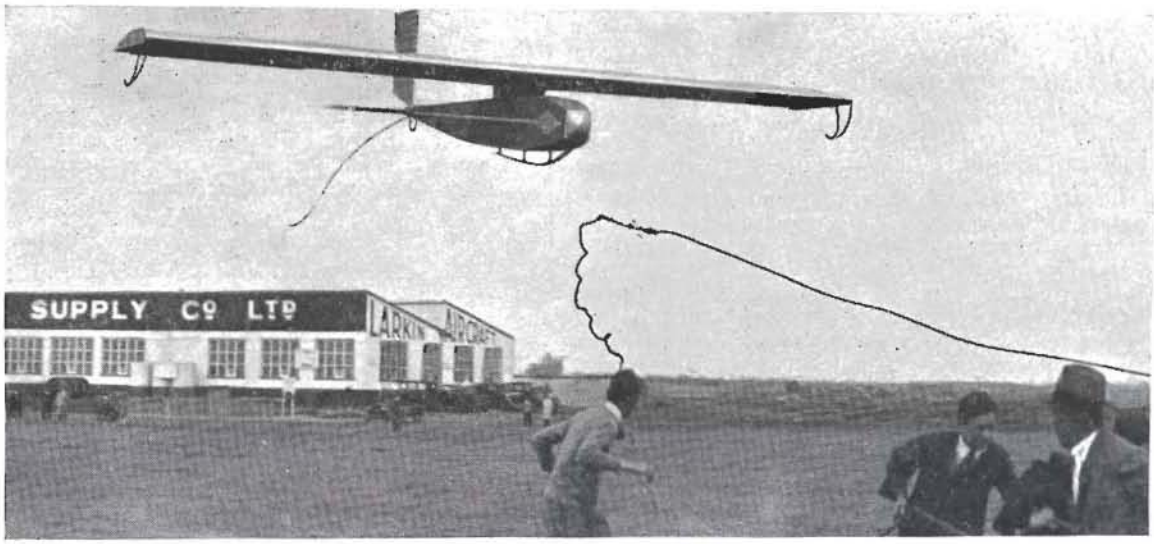
Fuselage.

The fuselage is supporting the forces on the tail, as a beam. The force on the rudder will cause a horizontal bending moment and shear; the forces on the tailplane and elevators will cause a vertical bending moment and shear. The maximum moments due to these forces must first be found.

The fuselage may consist of a box girder form. In this case, the scantlings will take the bending stresses. If plywood sides are fitted, the plywood will take the shear. If the sides are of fabric, diagonal bracing must be fitted to take the shear. Transverse diaphragms, or bulkheads, must be fitted.

In primary machines, the fuselage consists of a simple braced girder. In this case, it may be stressed by the method of sections or by a stress diagram.

THE "LARK" SAILPLANE



The "Lark" in flight.

[This machine was designed by Mr. Shackleton, of Messrs. Shackleton and Lee Murray, 175, Piccadilly, London, W.1.

Mr. Shackleton has asked us to state that he would be willing to design a similar machine and supply drawings free to any responsible firm or club who would undertake the manufacture at their own expense.

An important characteristic of "The Lark" is that, with ordinary catapult launching, it will make glides of over 500 yards' distance and 55 seconds' duration over a level aerodrome.

The machine is cheap to manufacture, having a parallel single-spar wing of only 38-ft. span. The idea of fitting canvas spoilers or air-brakes is original and makes it safe for use as a primary type.

Mr. Shackleton was the designer of the "Wee Bee," winner of the first prize of £2,000 in the 1924 Air Ministry Competition; the "Anec I," which tied for first place in the 1923 "Daily Mail" Competition by flying 87½ miles on less than one gallon of petrol; and the "Anec II," winner of the Air League Challenge Cup for 1927.—ED.]

This machine was designed as a combined glider and sailplane. When used for primary training purposes canvas spoilers or air-brakes are attached between the fuselage longerons and wing spar, thus reducing the optimum gliding angle from 17 to about 8 to 1. In this way also the average length of glide by catapult launching is reduced from 500 yards to only 100 or so, and the tendency to "float," so worrying to the beginner, entirely eliminated. By fairing in the cockpit opening and main skid, glides of 600 yards can be made over flat country against a five-mile wind, using four men on each side of the launching rope. The average duration of these glides is 55 seconds, giving a mean gliding speed of 22 m.p.h.

Undoubtedly the use of one machine for both primary and secondary training (and, under favourable conditions, advanced sailplaning) has much to recommend it. The pupil uses the same cockpit and controls throughout his training, and the cost of the machines and parts is greatly reduced. The closed type of fuselage, too, appears to have some advantages even for primary training. The trainee feels more secure than in the open Zögling type, and gets a better idea of the flying attitude and corresponding air speed of his machine. It is commonly believed that in the event of a crash the Zögling is likely to prove safer owing to the pilot being thrown clear of the wreckage (always assuming that the safety belt is released at the crucial moment). This is open to doubt. The "Lark" was on one occasion flown into a barbed-wire fence, and the whole impact was absorbed on the kapoc-filled bumper in the nose of the fuselage. Under the same conditions a primary glider of the usual type would have poked its skid through the fence and the pilot would literally have got the wires in the neck.

The wing is of the single-spar full-cantilever type, with plywood stiffening round the nose, to provide adequate tortional resistance. It is attached to the fuselage by four bolts only, and can be fixed or removed in a few minutes without interfering with the aileron controls. The fuselage is built on four spruce longerons, with spruce and plywood bulkheads, and is plywood-covered. The single central skid is of laminated ash, metal-faced. It is bolted up rigidly at the forward end, carried on an automobile-type spring shackle at the rear and midway provided with two shock-absorbing cylinders permitting up to 3-inch movement against compression rubbers. All four skid supports are designed to resist lateral movement. The empennage is of simple wooden construction, all components being readily removable. The pilot's seat is quickly adjustable fore and aft through four inches, a feature greatly appreciated by pilots. In addition, this adjustment automatically gives correct longitudinal trim with pilots of greatly varying weights. All control surfaces are large and positive in operation, the ailerons being differentially operated, to eliminate yaw in the lateral control.

Dimensions, Performances, etc.

Wing span: 38 ft.
Wing chord: 4 ft. 9 in.
Wing area: 180 sq. ft.
Wing loading: 2.1 lb. per sq. ft.
Length overall: 18 ft. 6 in.
Height overall: 4 ft. 7 in.
Aspect ratio: 8.
All-up weight, including pilot: 380 lb.
Load factor of wing: 7 at high incidence.
Static load factor on undercarriage: 3 at each point of support.
The wing beam is stressed to permit of the glider being lifted at the wing-tips only.
Optimum gliding angle as secondary: 17 to 1.

Corresponding gliding speed: 34 m.p.h.

Minimum falling rate: 2.7 feet per second.

Corresponding gliding speed: 32 m.p.h.

Landing speed: 20 m.p.h.

Optimum gliding angle as primary (when fitted with canvas air-brakes): 8 to 1.

Gliding range on level (catapult launching): 480 to 600 yards.

Gliding range on level (catapult launching), when fitted with air-brakes: 80 to 150 yards.

Longest duration flight to date: 2 hours.

FROM HERE AND THERE

A gliding display, organised by the Wessex Gliding Club in conjunction with the Bristol *Evening World*, was held at Crook's Peak, Somerset, on April 30th and May 1st. Owing to unfavourable soaring conditions, it was decided that the *Evening World* Open Challenge Trophy for the longest duration flight should be held over for another contest.

* * *

Mr. F. C. Longmore will give a gliding display at the Newcastle Aero Club's pageant to be held at Cramlington on May 28th.

* * *

Mr. P. Michelson, of the London Gliding Club, has abandoned his attempt to glide across the Channel, owing to his machine having been damaged.

* * *

Among the applications for membership of the new gliding club at Sunderland are several from women.

* * *

A new gliding club has been formed at Torquay, and operations are expected to commence in the very near future.

* * *

Two youths at Augsburg (Germany), Alois Langenwalder and Peter Philippi, have built a glider during their holidays for twenty-five shillings. Old pieces of wood and some starched canvas were the only materials used in its construction. The glider, which is a biplane, weighs 55 lb., and the wing spans are 19½ feet and 13½ feet. Only twenty minutes are needed to put it together or dismantle it for transport, when it can easily be carried on a bicycle. A number of successful flights have been made lasting several minutes and covering about 100 yards.

* * *

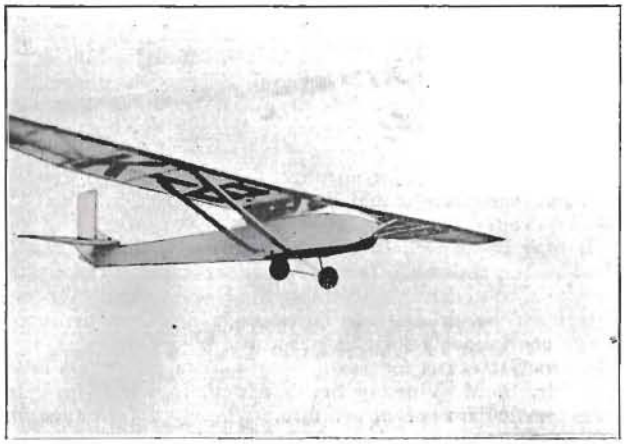
At the junction of Long Ash Lane on the Maiden Newton-Yeovil road a party of Dorset Gliding Club members in a motor-car happened upon a commercial traveller whose own car had somehow turned completely turtle.

They helped him to right it.

"I don't know how to thank you," he said to them, gratefully.

"Don't thank us," was the reply. "We know what crashes are; we go gliding."

THE NATIONAL AVIATION DAY CAMPAIGN



The B.A.C.VII, Mark II, which is being used by Mr. Lowe-Wylde in his demonstrations with the National Aviation Day Display.

Sir Alan Cobham's Campaign, preliminary details of which were given in THE SAILPLANE of April 1st, is now in full swing. Already over twenty different centres have been visited. The programme includes formation flying, aerobatics, air racing, inverted flying, parachute descents, and, last but not least, exhibitions of auto-towed and aeroplane-towed gliding. For this part of the programme Sir Alan has secured the services of Mr. Lowe-Wylde, who is well known in British Gliding circles.

We give below the itinerary for the second half of May. Members of local gliding clubs are recommended to turn out in force when the Display visits their neighbourhood. By so doing they will be assisting a movement of national importance and also helping to stimulate local interest in their own special activities.

We understand that a special display is to be given at Enfield on the 15th and 16th, while at Canterbury, on the 23rd, Sir Alan Cobham's visit will be the occasion of the official opening of the Kent Flying Club.

May 15-16.—Enfield: the old Polo Field, Bramleys Farm, Cockfosters Road.
,, 17. —Romford: Romford Aerodrome .
,, 18. —Chelmsford: Chelmsford Aerodrome, Broomfield.
,, 19. —Colchester: Bluebarns Aerodrome, Ardleigh.
,, 20. —Biggin Hill: Biggin Hill Aerodrome.
,, 21-22.—Maidstone: West Malling Aerodrome.
,, 23. —Canterbury: Bekesbourne Aerodrome.
,, 24. —Dover: Dover Aerodrome.
,, 25. —Chatham: Star Farm.
,, 26. —Heston: Heston Air Park.
,, 27. —High Wycombe: The Flying Ground, Marlow Hill.
,, 28-29.—Birmingham: Northfield Aerodrome.
,, 30. —Hereford: Oldfield, Kings Acre.
,, 31. —Llandrindod Wells: The Race-course.

AN ESTIMATE OF THE PERFORMANCE OF A VULTURE

By "KENTIGERN."

Many readers will remember the paper by Professor Melvill Jones before the Royal Aeronautical Society on the "Streamline Aeroplane," in which he described how the performance of a perfectly streamlined aeroplane could be estimated. He showed that the resistance of a streamline body in a real fluid such as air is chiefly due to the skin friction, and that the pressure distribution did not cause an appreciable amount of resistance. Thus the total drag of an ideal aeroplane could be the skin friction plus the induced drag.

(It may be as well to explain here that induced drag or aerodynamic resistance is the resistance experienced by the aeroplane or glider due to its method of support. It supports itself by driving air downwards and has to supply energy continuously for this purpose.)

In THE SAILPLANE for January 15th, 1932, there is a letter from Mr. S. M. Vine, of South Africa, in which he gives some particulars of a vulture, whose performance he describes.

Assuming that this bird is perfectly designed on the assumptions above, it is possible to calculate its soaring performance. The actual performance of the bird is not likely to be appreciably better than the estimate given. The particulars given were:—

Wing span	8 ft. 4 in.
Wing area	9·25 ft.²
Weight	18·6 lb.

and I assume that the surface area of body was 3.25 ft.², but exact value of this does not greatly affect the answer at soaring speeds.

The formulæ used are:—

$$K_L = \frac{W}{PSV^2}$$

W = weight in lb.
P = 0·00237 (for ground level performance).
S = area of wings.
V = speed in ft./secs.

Induced drag coefficient²

$$K_{di} = \frac{-2}{\pi}\frac{K_l^2}{A}$$

A = aspect ratio = $\frac{(\text{span})^2}{S}$

Profile drag coefficient

$$K_{D_p} = K_F \times \frac{2S + (\text{surface area of body and tail} = 3{\cdot}25)}{2S}$$

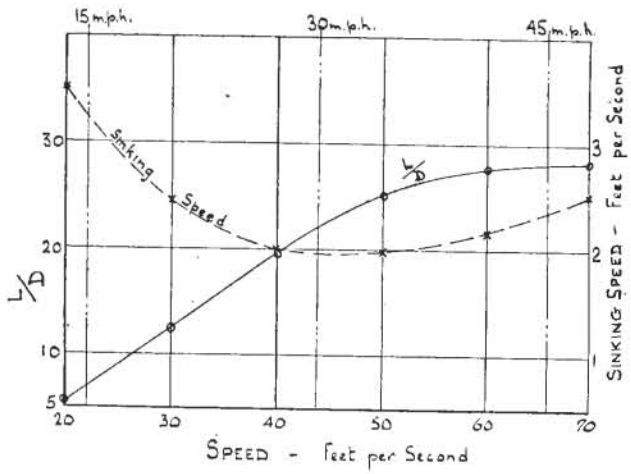
K_F from R. & M. 1199.

Total drag coefficient

$$K_{D(TOT)} = K_{D_i} + K_{D_p}$$

Gliding angle $= \frac{L}{D} = \frac{K_L}{K_{D(TOT)}}$

Sinking speed $= v \times \frac{D}{L}$



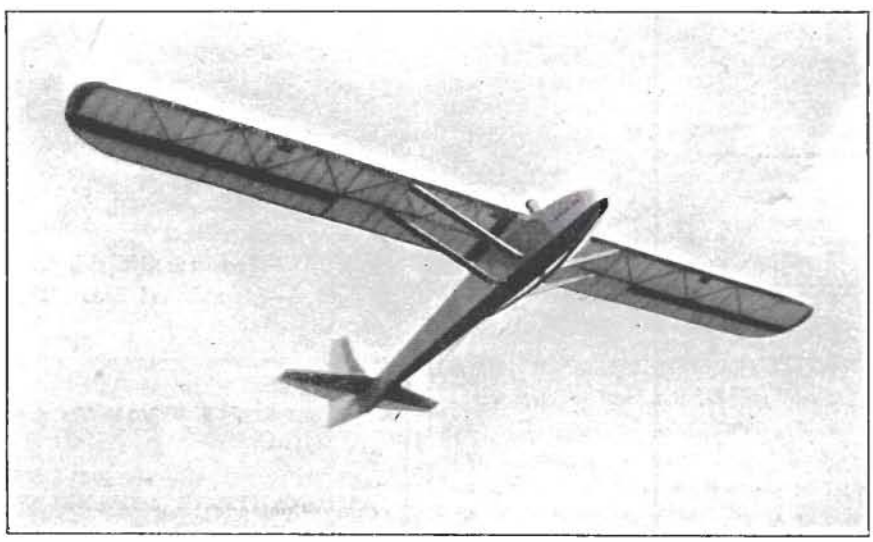
GLIDING ANGLE & SINKING SPEED OF VULTURE

Speed, ft./secs.	K_l	K_{di}	K_{dp}	K_d Total	$\frac{L}{D}$	Sinking Speed, ft./secs.
20	2·12	0·37	0·0040	0·37	6·7	3·5
30	0·946	0·073	,,	0·077	12·3	2·45
40	0·53	0·023	,,	0·027	19·7	2·02
50	0·34	0·0095	,,	0·0135	25·2	1·98
60	0·236	0·0046	,,	0·0086	27·6	2·26
70	0·173	0·0024	,,	0·006	28	2·5

The figures and curves show that induced drag is the greatest factor of resistance at lowest sinking speed and that the bird has a speed range up to 50 m.p.h. before its sinking speed goes out of the "sailplane" class. One can well imagine the remarkable appearance of a gliding angle of 28 or so at 50 m.p.h. At these speeds contraction of the wings does not seem to give an advantage in efficiency, but it would at higher speeds. It seems possible that the contraction is convenient for structural reasons, as the forces must become large.

I have not hesitated to put down a K_l of 2 for what is, I suppose, an efficiently slotted bird, but an air speed of 15 m.p.h., as mentioned by Mr. Vine, is rather lower than I should expect. I should like to ask if this is a reliable observation of the air speed in a steady glide.

The aerodynamic performance of this bird is rather worse than one might expect of a successful soarer, but perhaps we underestimate the effect of its manœuvrability and flying experience.



Mungo Buxton looks down from the "Kassel."

CORRESPONDENCE

THE NYBORG SAILPLANE.

SIR,—I feel compelled to comment on the Nyborg sailplane, described in your issue of May 2nd, 1932.

The machine would have a stalling speed not far from 50 m.p.h.

High stalling speeds are objectionable from several angles. The accelerations at take-off may be unpleasantly high; launching may be mechanically difficult; landing requires very considerable skill (and remember that every sailplane landing is a forced landing); and for a given gliding angle soaring is only possible with stronger up-currents.

The last point is one which is apt to be lost sight of. High speeds can only be looked for from sailplanes for use in areas where high vertical currents are formed, or in conjunction with higher efficiency.

I agree that higher loadings may be used, but feel that Mr. Nyborg has been led astray by dangerous analogies, and has carried the principle to extremes.

For the weight he mentions, 4 to 5 lb. a square foot would be much more satisfactory.

J. A. CHAMIER, Air Commodore.

SIR,—Captain Needham, in his discussion on the Nyborg sailplane in your last number, says that "Higher speeds in normal flight and for landing will need greater skill and judgment on the part of the pilot, but to compensate for this the inner two pairs of ailerons can be depressed together to form camber flaps and also to act as air brakes."

This statement suggests that the landing speed can be reduced by the use of air brakes. This, of course, is not so. The landing speed is purely a function of wing loading and lift coefficient, and an air brake can only make a landing easier to judge, by increasing the angle of glide.

I understood from conversation with Mr. Nyborg that the wing loading of this aircraft is 8 lb. per square foot, and, assuming a lift coefficient of 0.65, the landing speed should be of the order of 50 m.p.h.

Captain Needham, in his recent book on Sailplanes, over-emphasised rather than under-emphasised the necessity of low landing speeds for safety in gliding, and it is rather astonishing to find him here defending what must obviously be such a high landing speed.

In addition to ignoring the bad aerodynamic design of the Nyborg fuselage, he has not discussed the feature which helped to produce the instability in yaw at low speeds over the ground, i.e., the extreme shortness of the fuselage and low fin and rudder volume resulting. It is probable that this same feature will produce instability in pitch in flight. It is also understood that the centre of gravity of the aircraft is well behind the centre of pressure of the wings. One would imagine that with these characteristics the Nyborg aircraft would be extremely dangerous to fly.

It seems unfortunate that Mr. Nyborg, when endeavouring to make an entirely new departure in wing design, should at the same time incorporate features well known to have an adverse effect on flying qualities and thereby endanger the whole success of his experiment.

Yours faithfully,

S. SCOTT HALL.

ABOUT SITES.

SIR,—In Captain Latimer Needham's article on the choice of a site for soaring competitions (Vol. 3, No. 7), the author's comparison of hill configurations, pictorially at least, appears to be the ridge edges of differently shaped plateaux.

One's own idea of an ideal site would be a long-armed narrow L-shaped ridge, as per Fig. 1, but with slopes

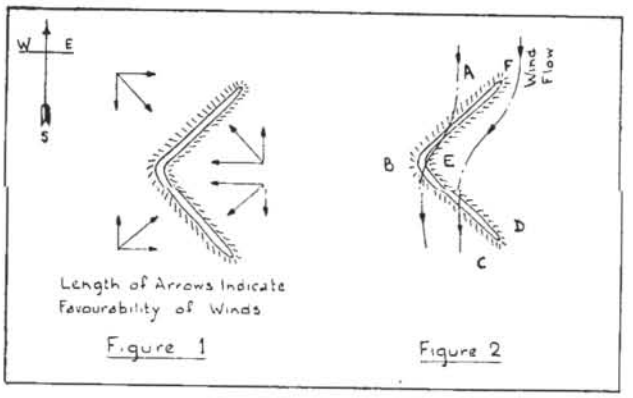


Figure 1 Figure 2

on both sides. Such would cater for all wind directions with varying suitability.

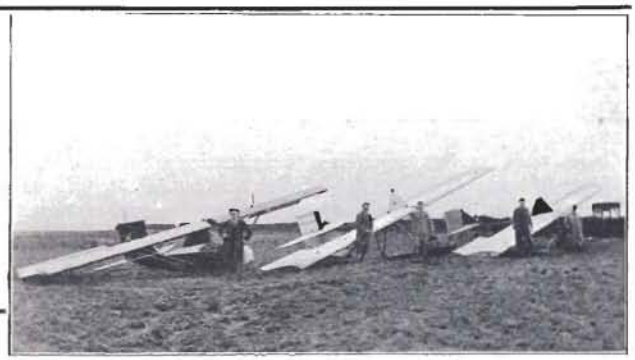
It appears that a northerly wind striking such a ridge would be deflected slightly as per Fig. 2, eddying in around F, striking ridge ED more squarely, and tending to minimise the blanked area in E. This effect would be reversed for southerly winds, making ridge EF more suitable.

Captain Latimer Needham's table of comparative values will be very useful indeed for all who wish to enter recommendations for sites.

Could some information be given as to the distance behind ridges (i.e., leeward side) of the approximate point at which the uptrend of air has again descended and regained its normal flow? Some relation between this, wind strength and height of ridge would be very useful.

L. P. M.

NEWS FROM THE CLUBS



Ready for the day's flying!

The Bradford and County Gliding Club's "Holdsworth," "Dickson," and "Reynard" awaiting inspection.

BRADFORD AND COUNTY GLIDING CLUB.

Sunday, April 24th.

Wind N.W., 10-15 m.p.h. We have quite a good slope for this wind direction, and determined to make the most of it. REYNARD, DICKSON and HOLDSWORTH sailplanes were completely rigged before lunch, and were all flown during the afternoon and evening.

Holdsworth's machine was performing very well until its owner, trying to find the most efficient angle, almost stalled at 150 feet, and went into a dive, pulling out at about 60 m.p.h. and about 10 feet off the ground. It then skimmed the grass-tops for 200 yards, and landed rather heavily, tipping on to its nose and damaging the three-ply fairing before settling down. No other damage was done, but before flying again Holdsworth intends to alter the shape of the skid and nose fairing so as to prevent the Scud-like rocking or landing.

Several members flew both DICKSON and REYNARD, and particularly good progress was made by Jackson and Robertson, who had five flights each in REYNARD, and both were finally launched from well over half-way up the Beacon.

The hero of the day was Hastwell, who turned up with an automatic tail release which he has quietly constructed. This was fitted to DICKSON, and functioned perfectly throughout the day. It is a splendid piece of work, and it is hoped that more will be manufactured. Quite apart from the work it saves, it also prevents our members from getting rheumatism through sitting on the great open spaces when the grass is wet.

Flying stopped just before 8 p.m., after what everyone agreed was one of our best days this season.

Saturday, April 30th.

Wind S., about 5 m.p.h. This is the only wind direction for which we have no slope. As no members were in need of flat field training, the afternoon was spent in maintenance work on the three machines—including the fitting of a new skid to DICKSON, the old one having worn very thin in places.

Sunday, May 1st.

Wind E.N.E., about 25 m.p.h., steady. The wind was too strong for any but the more experienced members, who all had several flights each in REYNARD.

We were glad to welcome several visitors from the Huddersfield Club, who came over to inspect our site, our instructors and our flying, and went away suitably impressed (we hope!).

At Whitsuntide the Club will be holding an instructional camp on its flying ground at Dobrudden, near Harksworth, and will welcome any members of other clubs who can come along—with or without machines. Official invitations, with full particulars, will have been sent to each Northern club by the time that this appears in print.

FURNESS GLIDING CLUB.

Sunday, April 17th.

Operations were carried out from a knoll overlooking and adjoining our site. Wind S.W. to W.; vel., 20-25 m.p.h.

Mr. Stevens, the ground captain, led off with a flight across our site, then by flying to and fro across the lower face, he was eventualy able to land in a field some 700 feet below his starting-point.

On account of the launching party being short-handed, it was decided that landings should be confined to the site. Mr. Redshaw, following, attained a height of 150 feet, and crossing over made a good qualifying flight of 48 sec. into the centre of the site proper.

C. A. Britton followed with two flights of just under the 45.

Mr. Redshaw now secured his second qualifying flight with a time of 52 sec., and just failed to cap this with a "B."

Messrs. Butterfield and Lock also had flights.

May 1st.

Wind direction, S.W.; wind light.

Burnett made a series of flights, but conditions did not permit of a qualifying flight being attained.

Following on this Messrs. Butterfield and Winder had useful flights, and then came the turn of our junior member, D. Todd, who, with an effort no doubt, had managed to drag himself away from the site where two "joy-riding" aeroplanes were operating. His flights, varying from 15 to 20 sec. each, were well controlled, and he gives promise of becoming quite expert.

During spasms of unsuitable weather, work proceeds on the conversion of the Club's R.F.D. machine, by the addition of a detachable nacelle, and of the B.A.C. machine by the acquisition of larger span taper wings.

IMPERIAL COLLEGE GLIDING CLUB.

During the latter half of last term several meetings were held at Kingsbury to continue the primary training of our *ab initios*, several more of whom were brought up to the "A" stage.

Owing to the kindness of the Worthing Gliding Club, we were able to spend one week-end last term, as well as the Easter Camp, on their ground near Storrington. On the first occasion two "A's" were gained, but at Easter we were greatly hampered by the weather, which only permitted flying on five afternoons during the eleven days of our stay. On four of these, only short flights were possible, but again much useful primary work was got in. On the fifth afternoon several longer flights were made in the excellent north valley, and two "45's" were secured. Altogether, 78 launches were made.

By the courtesy of the London Gliding Club, Saturday and Sunday, April 23rd and 24th, were spent on their ground at Dunstable. On the Saturday our Vice-Captain, Mr. J. B. E. Keeble, broke the Club record with a soaring flight of 15¼ min. in the IMPERIAL COLLEGE DAGLING fitted with a nacelle designed by himself. On the Sunday one "B" and one "A" were gained, as well as two "45's." This was altogether a very enjoyable week-end, and we are looking forward to an even more enjoyable Whitsun.

LONDON GLIDING CLUB.

Sunday, May 1st.

The wind being in the wrong direction, the whole day was spent in auto-launching the PRÜFLING, DAGLING and HOLS about four flights per man. A party of stout-hearted beginners were given seven launches each in the ZÖGLING.

Wednesday, May 4th.

A party of four, starting at 7.15 p.m., gave themselves four auto-launches each in the PRÜFLING,

Saturday and Sunday, May 7th and 8th.

A total of at least 100 hill-top launches, thanks to the devotion of the winchmen and of the instructors. In use: HOLS, PROFESSOR II, KASSEL 20, PRÜFLING, DAGLING, and IMPERIAL COLLEGE DAGLING. On the flat: ZÖGLING and DICKSON.

There were stalls, pancakes, unintentional stunts, and landings in hedges, down rabbit-holes and in distant valleys. There was also plenty of orderly flying. Cope obtained his "A," and Muir two "45's."

A light breeze of fluctuating strength blew up the hill most of the time. On Saturday a marked cold-front brought a short spell of good lift, upon which HOLS cruised freely, landing twice upon the top of the hill. On Sunday, HOLS soared for a long time upon next to nothing at all, again landing on the top. On one occasion the DAGLING held her height to the Bowl and back, but no other machine would consent to stay up. HOLS is a remarkable machine. She is under perfect control at 22 m.p.h. (some put it as low as 18 m.p.h.), she is still happy at 45 m.p.h., her design and ruggedness make her practically invulnerable to knocks on the ground, she is immorally delightful to fly, and she has not a vice in her. Let them fly rockets who like them.

As a final kick to a positive debauch of aeronautics, on Sunday evening Flight-Lieutenant Armour, one of the Prince of Wales's pilots, tried his hand with the PRÜFLING and with PROFESSOR II.

PRESTON AND DISTRICT GLIDER CLUB.

Considerable time has been devoted lately to the erection of our hangar at our auto-towing site at Middleton Sands. The hangar, which is the R.E.7 type used during the war, has a floor area of 2,520 square feet, is 20 feet high, and can accommodate three sailplanes, fully rigged, together with all our gear. This structure is a great acquisition, all the work of rigging and loading machines on the trailer being cut out. We shall gain at least four extra flying hours per day.

Our activities at Middleton are of interest to other clubs in the neighbourhood, for we have already had visits from the Barrow, Accrington and Ilkley Clubs.

On April 24th the Ilkley Club turned up in force at our invitation for a demonstration of training by auto-towing. The outcome of the meeting and discussion is a scheme of co-operation. They are equipping their machines for auto-towing, and will, in future, use our site for preliminary and advanced training, while we shall have the advantage of using Malham for soaring. Each Club will use the other's machines and co-operate in the work to be done. By this joint endeavour we shall therefore have two auto-towing primaries, one B.A.C. *V* secondary, and one HOLS DER TEUFEL and one nacelled and "hotted up" DAGLING.

May 1st.

A new winch for auto-towing was fitted to the Buick and tried out with success. Both the R.F.D. and B.A.C. *V* were flown; all the "B" members practised spot landings from 300 feet in the latter machine. Altogether, a very successful day.

The Whitsun holiday is being spent at Middleton, and in the event of getting the right wind during the four days we shall take the B.A.C. *V* to a soaring site not far away and give three or four members the opportunity to gain their "C" certificates.

OFFICIAL NOTICES

PLEASE NOTE THE CHANGE OF ADDRESS OF THE B.G.A. OFFICES—page 112.

DIARY OF FORTHCOMING EVENTS.

Monday, May 23rd, at 6.30 p.m., in the Library of the Royal Aeronautical Society, Albemarle Street, W.1.—Council meeting, British Gliding Association.

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 until further notice:—

To Members of the Association.

Free issue for six months to a member obtaining one new yearly subscriber.

Free issue for one year to a member obtaining two new yearly subscribers.

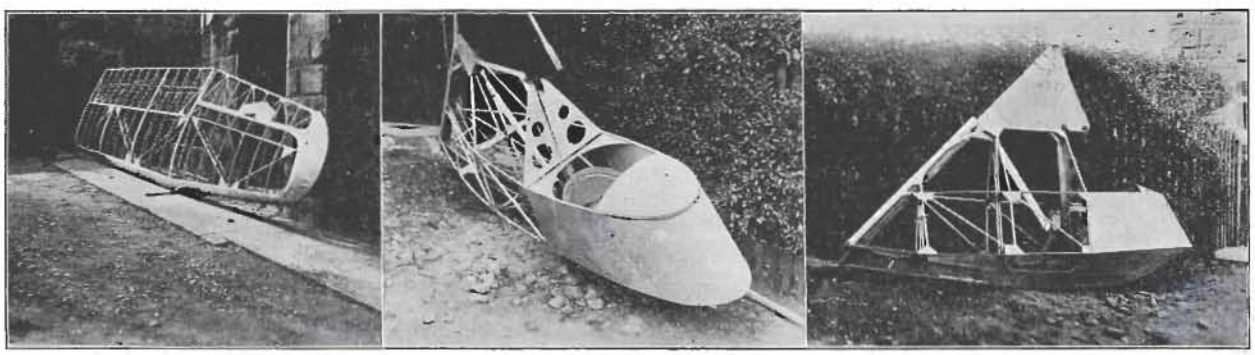
Free issue for one year and renewal of membership of the Association on obtaining four new subscribers for one year.

To Subscribers.

Free issue for one year on obtaining two new yearly subscribers.

DRAWINGS OF THE "GRUNAU BABY."

The British Gliding Association is now in a position to supply working drawings of the "Grunau Baby" Sailplane. Price 8 guineas per set. Reduction to affiliated Clubs.



The Furness Club's productions. Left: the B.A.C. taper wing. Right: the converted R.F.D. detachable nacelle.

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BOOKS TO READ

Gliding and Sailplaning By F. Stamer and A. Lippisch.	An excellent handbook for the beginner. It represents the collective results of the writers' experiences since 1921, related in a clear and simple manner, and is admirably illustrated. 5/6 post free.
Gliding and Motorless Flight By L. Howard-Flanders and C. F. Carr.	A practical, up-to-date handbook giving expert information regarding training of pilots, organization of gliding clubs, construction and repairs, meteorology, etc.; with interesting facts regarding past achievements and pilots, and official information regarding Certificates. Second edition now ready. 8/- post free.
Henley's A.B.C. of Gliding and Sailflying By Major Victor W. Page.	A simple and practical treatise on modern Gliding. It describes the construction, launching and control of the leading types of gliders and sailplanes and gives instructions for building a strong, yet simple, primary glider, including working drawings. 11/- post free.
Gliding and Soaring By Percival White and Mat White.	Especially adapted for those with no previous knowledge of the subject, this book gives a complete review of Gliding and Soaring flight and is distinctly above the average. 13/- post free.
"Gliding" (The Year Book published by The Dorset Gliding Club.)	A valuable handbook full of useful information, and one that must make a wide appeal, both to those merely interested in Gliding and to the advanced pilot who requires more technical information. 1/9 post free.
Handbook of the British Gliding Association	A useful reference book for all persons and organizations interested in Gliding. It includes a diary, Rules and Regulations issued by the Association, a Glossary, and authoritative articles on a number of interesting subjects. 1/6 post free.

Obtainable from the British Gliding Association, 44a, Dover Street, London, W.1.

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