Sept. 6, 1930. Vol. 1. No. 1.

THE SAILPLANE AND GLIDER

Price 3d.



THE PRETTIEST YET.—The "Fafnir," which has been designed by Herr Lippisch to replace the "Wien." This machine piloted by Groenhoff tied with the "Wien" piloted by Kronfeld in the difficult out and return flight round the Kreuzberg.



AT THE WASSERKUPPE.—The starting place in the foreground. In the background to the left is the school, with the hangars to the right.

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The "Luftikus" which Herr Bedau is said to have looped.



The two-seat "Poppenhausen" of the London Club, of the type which won a duration prize in this year's competition at the Rhoen.

SOME QUESTIONS OF POLICY.

The appearance of THE SAILPLANE marks a definite point in the history of British Gliding. There have been gliding enthusiasts since the earliest days of aviation, and in fact were it not for their untiring efforts, power-driven flight would never have reached its present state of efficiency.

We must remember the work of the pioneers, although some of the younger additions to the aeronautical fraternity have no use for ancient history,—because they are too young to understand that if we knew *all* history we should save ourselves about 75% of the mistakes we make in life.

There was Engineer-Lieut. Percy Pilcher, R.N., who was killed near Northampton by the breaking of his glider, much as the great pioneer Lilienthal was killed in Germany.

There was Lieut. Dunn, still alive, who experimented with an inherently stable glider at Blair Athol in 1907-08.

There were Eric Gordon England (now a motive force in British Gliding), and Gerald Leake (now an artist in America), who in 1908-09 did amazing glides, up to a mile in length, from Amberley Mount, near Arundel, on tailless gliders with birdlike wings, controlled by their wing-tips, and built by the late José Weiss, a famous artist, and his friend, Alexander Keith. And there were others.

After power-flying began in 1909 gliding and soaring died out altogether till the outburst of interest at Itford in 1922,—which some of our present enthusiasts regard as such ancient history that they do not even know that the late M. Maneyrol soared for 3 hrs. 21 mins., and Sq. Ldr. Alec Gray for an hour. Till those figures are beaten we cannot consider that modern soaring has begun in England.

But never before has the interest become a national movement as it has to-day.

The Movement is big enough to have a paper of its own, to report its doings, to ventilate its grievances, to disseminate authoritative information from abroad and to make known throughout the Movement what its advertisers have to sell for the service of the Movement. For such purposes THE SAILPLANE AND GLIDER is published.

But the movement is at a definite turning-point, it must go forward or weaken finally to die. Clubs must realise they have to improve their tactics. There have been quite enough public demonstrations of Zoglings. These aerial toboggans have lost their first power to thrill, which was chiefly due to the absurd accelerations produced by excessive man-power applied to the ropes. Clubs should see that their shows at least demonstrate the elementary principles of soaring flight with a Prufling or something of the intermediate class.

Next is the question of Clubs giving their "B" licence pilots something better to fly than a Zogling. We have in the country now a number of quite capable Zogling pilots, but these must be given a chance to go ahead and learn to sail along the crests of suitable hills and soar in the winds that are diverted thereby.

But intermediate types cannot be bought for nothing. No sane Club will buy further machines, as many have had to buy their first equipment, out of income. This principle is one of fundamental importance. Sound finance is essential to the health of a Club and through the individual to the movement as a whole.

Capital expenditure must be met by raising capital, and this should be done on the lines which have been accepted as the best as the result of long experience. Club committees or councils must get out schemes of debentures or bonds on which they will guarantee to pay reasonable interest and a certain amount of amortisation. In other words they must not go and beg for money. They must offer a proposition to business people.

Clubs will find by such means that capital is forthcoming. Then Club hangars, Club accommodation, aircraft, and the like, can be bought without disturbing the regular income, which must be used for the salary of instructors, ground engineers, repairs, rent, and paying the interest on the debentures or bonds and writing-off the borrowed capital.

A scheme on these lines is being got out by the British Gliding Association so that Clubs which have not got much financial experience shall be able to obtain the outlines of a sound scheme which has been prepared by competent authority with the necessary documents.

Another point of policy. Clubs must have efficient inspection and maintenance. Lack of inspection on the training types has not resulted in much harm. Wings of this type are much more likely to drop off on landing than fall away in the air. Bumps on the ground are generally harder than those which the Zogling meets in the air. But adequate inspection is essential for sailplanes and intermediate types. One can get the most surprising ill-treatment in the air as Mr. Flanders shows in his article.

Gliding has so far astonished its critics by its lack of really gory incident. Exposed seats and crude makeshift equipment look horrid to the owners of modern luxurious light aircraft. But these exposed seats have proved their worth, people are thrown clear in crashes.

The duty of every club is to ensure that all its craft are airworthy. A breakage in the air will not only affect the reputation of the Club, it will set back the whole Movement.

Certain people, especially young and opinionated persons who have not yet had the chance of learning by experience, write at intervals to THE AEROPLANE and complain about its frequent references to history. Its value is once again demonstrated by the happenings at Harrogate on Saturday last (Sept. 30), when certain Clubs formed the Northern Gliding Association. Here are the seeds of a new outbreak of the ancient feud of the North and South.

Whether its supporters realise this or whether the N.G.A. has been formed solely to represent the corporate interests of the Northern Clubs is not yet clear. If this be solely the intention, well and good. No association is 100 per cent. efficient. The best it can hope to do is to follow some policy which it believes will ultimately benefit the movement as a whole, but two Associations can only fight for mastery and their campaigning must disintegrate the movement throughout the country.

Harrogate, Bradford, Newcastle, Bolton and Connonley ought to know that they can do more good backing a central organisation than manœuvring on their own. The North has money, for the North knows how to make it, but apart from questions of finance there are bigger questions of national and international character.

Responsibility for airworthiness can be delegated to one organisation but not to two. The recommendations for gliding certificates should only come from one body. Besides this there are the questions of entries in International Contests and liaison with the International Committee for the Study of Motorless Flight.

We have not enough experience of gliding to segregate into groups which shall keep their own experiences to themselves. Frequent collaboration and friendly interchange of experiences are necessary for progress.

What are wanted are plenty of inter-Club competitions on the lines of the recent match between Lancashire and London. The N.G.A. will do lasting good if it applies itself to such ends and finds a team which shall worthily represent the North against the picked teams of the South. Let the N.G.A. attend to this.—T J.

THE JOURNAL OF THE B.G.A.

The second number of the Journal of the British Gliding Association has been issued. This has not the mass of solid meat that the first contained. But that was an exceptional number which reprinted the lectures which Dr. Georgii and Herr Stamer read before the Royal Aeronautical Society.

The first page of the new issue has a list of licensed glider pilots and though the number seems small there is a hope of better things, for among the names are those of club-trained *ab initio* pilots. Still one hopes by the next issue the list will be much more imposing as there is bound to be a hiatus in training when winter comes, unless club members are frightfully enthusiastic.

The rest of the journal contains accounts of various important demonstrations and news from Clubs. The accounts of visits to the Wasserkuppe are also worth reading.

That only 20 of the odd sixty or more clubs which are forming, or are formed, have affiliated themselves to the central organisation seems disappointing. If the British Gliding Association is to do real good, it must represent the body of Club opinion throughout the country.

Copies of the Journal [why call it a journal when it appears at intervals of months?—ED.] can be had from the Secretary of the B.G.A., 44A, Dover Street, W.1.

THE TIME FACTOR.

Sir,—I am moved by your expression "wasting time on aerial tobogganing" to write that I think you over-estimate the possible speed of progress of gliding, much of the aviation interest of this country being absorbed in power aircraft.

The average *ab initio* "A" test is a good, steady flight (of 30 seconds), with a turn, if necessary, at the bottom; but the six or eight minutes of aerial tobogganing practice needed to get to this stage, may take six months of week-ends or three weeks in a gliding camp. For a "B" test, another three months (or week) may be necessary.

When there is a demand, no doubt advanced gliders will be made, but at present there are few "C" pilots in the country. Meanwhile I wish you good success with THE SAILPLANE AND GLIDER.—(Signed) KENTIGERN.

SOME ASPECTS OF THE GLIDING MOVEMENT.

BY L. HOWARD-FLANDERS, M.I.AE.E., A.R.AE.S., A.M.I.MECH.E., M.R.S.T.

The suddenly awakened interest in gliding which is sweeping round the World is bringing the freedom of the air nearer to the realisation of people in general rather than the few.

Now the interest in gliding is many-sided. One person expects to find his realisation of free flight, which is such an important feature in the day-dreams of everyone. Another has an eye on the cups and other prizes which are being, and will be, offered for competitions,—to him gliding is a new field for "pot-hunting," and as it is one of skill rather than physical fitness it appeals to those who can never win a 100 yards race. To yet another it is a stepping-stone towards learning to fly a power-driven aeroplane. The scientific-minded man finds that gliding will give him knowledge of meteorological conditions. The aircraft designer expects to be able to make full-scale experiments to enable him to check wind-tunnel experiments. The inventor sees a new field for his activities.

All these, and other, motives draw people into the gliding game, and while some see one aspect and others see another, it is necessary to take an all-round view to realise some of the tremendous potentialities of soaring flight, so that any one interest may be fully developed.

The sporting aspect of gliding implies climbing, speed, duration, and distance. These necesssitate a suitably designed glider, a good knowledge of meteorological and geographical conditions, as well as the ability to pilot the machine.

The designer's interest must include the sporting aspect to provide him with comparative tests.

On the other hand the man who is attracted to soaring flight because of its silent passage through the air, and the meteorological student, are only interested in obtaining a glider which is good enough for their purpose.

The generic term "glider" includes all motorless heavier-than-aircraft, but the term "sail-plane" is used to define a high-performance glider which has a sinking speed of less than .8 metres (2 ft. 7½ ins.) per second. This is an excellent definition because it may be found by a simple formula, it implies a fine gliding angle and high efficiency without imposing any restriction on design.

Design must be as unhampered as possible. But the would-be designer must not start with the assumption that because the glider has no engine therefore anything will do.

Actually the true position is rather the reverse. The soaring pilot makes use of those violent air currents that the pilot of the power-driven aircraft avoids because he knows that they cause such violent bumps that they make him, or at any rate his passengers, very uncomfortable. The glider must be able to withstand the most severe gusts of wind and changes in direction without risk of structural failure.

An indication of the bumps that a glider may have to withstand was shown by a primary training glider which was fitted with a standard aeroplane seat that had passed A.I.D. inspection. The seat collapsed in the air during a flight of less than 30 seconds. Several cases of glider seats giving way in the air have shown that they must be made stronger (especially against side loads) than those of power-driven aeroplanes.

It is obvious from this little example that all parts of a glider must be capable of withstanding very severe stresses, and that glider design is not necessarily easy. It is not sufficient to take the picture of a sail-plane and make something which looks like it. The various aerofoil sections have very different properties, and a comparatively small alteration in the shape of the ribs may require a longer fuselage to give enough control and stability.

It seems usual to select an aerofoil section which has a small movement of centre of pressure when designing a sail-plane, because this allows of a shorter fuselage and consequent saving in weight and cost.

The amateur designer of gliders must make each individual part strong enough for the work that it will have to do.

The controls must be so designed that the pilot has at all times full command of his machine if it is intended for anything other than primary training. Those who saw the "Peyret" tandem monoplane in 1922 will remember that it only gained the prize by virtue of its marvellous controllability. The chief point to remember in this connection is that the mechanism of all controls must be so free that they will respond to the touch of a finger, and must be powerful enough to give immediate response at all times, even when on the point of stalling. The glider has no engine that the pilot can switch on to regain control.

Gliding is particularly a winter sport. When the winds are high and turbulent, and the power-driven aeroplane is safe in its shed, then, the heavily-loaded fast sail-plane may be flown without fear of being "becalmed" or loosing the wind. For such wind as is prevalent during the South West winds of the Autumn or the North East winds of Spring a loading of about 2¾ lbs. per square foot will give ample speed for control. Whereas the light summer breezes demand a much lighter loading.

There seems to be an idea prevalent that a low sinking speed necessitates a slow flying speed and light loading. This is not so. A sail-plane may be designed to have a fine gliding angle and low-sinking speed with a comparatively high loading and fast-flying speed, such a machine is suitable for flying in winds which would make a lightly-loaded machine quite uncontrollable.

There is scope for much experiment in the design of sail-planes. The present high cantilever monoplanes, with high aspect-ration, developed in Germany, are one solution to the problem of attaining an efficiency which is comparable to that of a bird. But there are very many directions for research. The extremities of a soaring bird's wing are tandem multiplanes, the bird varies its area and camber when flying. The biplane may show some advantages. And the manœuvrability of the small light sail-plane may eclipse the aerodynamic advantages of the large-span cantilever monoplane,—which has already reached nearly 100 ft. span.

This brief survey is intended to show that motorless flying needs the close co-operation of the sportsman, the scientific designer, and the meteorologist (a horrid word, why not call him the "wind guesser"?) all this requires finance and organisation. It is not the "glory thieves" (or the me-toos of gliding), who are so prominent in the present-day photographs of gliding, who will bring motorless flying up to the full possibilities that are latent in the turbulent winds which sweep over this Island and give power for soaring flight such as is not to be found in such measure over Central Europe.

The following is worthy of consideration. Now that the design of sail-planes has reached a point where their efficiency is comparable with that of birds, we may truly say that wherever a heavily loaded bird can soar there a man can soar also. In the tropics vultures can soar all day long without a visible movement of the wings, and over level ground. Surely at such places there is the possibility of motorless flight as a means of commercial transport. However the future always keeps its secrets until they are brought into the present by the pioneers.

Mr. Howard Flanders.

A very large number of people will learn with regret that Mr. Howard Flanders has resigned the position of Secretary to the British Gliding Association. Mr. Flanders has been co-opted Member of Council and will continue to edit the Journal.

Mr. Flanders was probably responsible more than any other individual for getting the interest of those public figures who are now so interested in Gliding. Mr. Flanders wore out his car and himself touring the country looking for sites in the same way that his consistent overwork in the office at Dover Street affected his health.

Much as one regrets that Mr. Flanders is not able to continue with his secretarial work which has so recently become remunerative for him, yet one is glad to know that the Association will still have the benefit of his advice on its Council. Here, no doubt, his efforts to bring the new sport within the reach of poorer people, and specially of the youth of the community, will finally bear fruit.

A New Secretary for the B.G.A.

Mr. J. R. L. Waplington has been appointed Secretary to the British Gliding Association in place of Mr. Howard Flanders, so in future all communications to the Association should be addressed to Mr. J. L. R. Waplington, at 44A, Dover Street, W.1.

The North Kent Gliding Club.

A gliding club has been formed with Bexley Heath as base. The idea is to cater for persons who are interested in gliding and who do not reside in districts served by either the Kent Gliding Club or the Channel Gliding Club.

The real problem of gliding is not the formation of clubs in various districts so that everyone interested has a club close at hand, but the finding of suitable localities. These are few and far between, and in most cases the Mahomet has to go to the mountain.

The Hon. Sec. of this club is Mr. W. T. Davies, Warren House, Bexley Heath.

A Gliding Club for Bradford.

A Gliding Club has been formed in Bradford and already has a membership of over 50. The President is Sir Benjamin Dawson, Bt., with Lt.-Col. A. Gadie, J.P., as Vice-President.

A Dixon type glider is being built locally and is being presented to the Club by *The Bradford Telegraph and Argus and The Yorkshire Observer.*

There are three branches of membership, flying members pay an entrance fee of one guinea with an annual subscription of one guinea, non-flying members and junior members pay no entrance fee and a subscription of half a guinea and five shillings respectively.

The Honorary Secretary is Mr. S. Young, whose address is 17, Roslyn Place, Bradford.

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THE ELEVENTH GLIDING COMPETITION AT THE WASSERKUPPE.

No account of the Gliding Competitions of this year at the Wasserkuppe would be complete without a public acknowledgment of the kindnesses and courtesies which were shown by their German hosts to the British Contingent.

Britain had easily the largest number of visitors at the Competitions and among them were people from the Air Ministry, the Royal Aeronautical Society, the British Gliding Association, the London Gliding Club and the Kent Club, whose President flew up in his own Widgeon.

Visitors also came from Belgium, France, Hungary, Italy, Russia and the United States. The Hungarians are sending regular quotas of pilots to be trained at the ordinary courses at the Wasserkuppe. One hears also that Signor Mussolini has decreed that Gliding shall form part of the official selection tests for the Italian Air Force. The Belgian Aero Club are founding a gliding school.



A group of visitors and officials at the Wasserkuppe.

The British were impressed by the conventional appearance and construction of most of the gliders. There were exceptions such as Kronfeld's new machine, the *Austria*, with its queer tubular-spar fuselage for supporting its twin-ruddered tail and the *Fafnir* with its bird-like wings, shoulder-wings the Germans call them.

There were also tailless machines of various types. The one designed by Herr Lippisch, which has an enclosed cockpit, is particularly interesting. The more so as this is to have an engine and carry a passenger. First it is being tried out without engine and without passenger. It has been tested with ballast to make up the weight of the engine, but will have to soar with such ballast before the engine is put into it. The Germans are confident that this machine is going to have a high performance with a light engine.

There seems reason for this when one considers the excellent results which were gained with the Storch IV which was a single-seat tailless-machine with a 5 h.p.h. motor-cycle engine and had a top speed of 78 m.p.h. Apparently the Germans expect a lot from the tailless type. We must hope, however, that people over here will not immediately start building aircraft with minute engines and so divert the Gliding movement into one for lighter light-aeroplanes.

Gliding in this country has to be fostered as a sport to induce a wider interest in flying and as a means of research with full-sized aerofoils and control-surfaces.

The *Fafnir* which has been designed by Herr Lippisch as a *Wien* replacement has pleased its producers enormously. Everyone is amazed with its controllability, which appears to be streets ahead of any other glider. It is built on more or less orthodox lines of German glider practice except that the pilot has a lid over his head and looks out through openings on either side. The wings which form a marked dihedral on the centre-section are pure cantilevers. The outer extensions are set so that they are at zero dihedral although on the ground the wings appear to droop giving the machine an appearance of possessing a negative dihedral angle.

One gathers that three aerofoil sections are used in the



A two-seat sailplane with bulkheads built to alight on water.

wing and these merge from one to the next out to the conventional Clark Y at the tips. The middle portion attached to the fuselage has the Gottingen 652 section, the part between that and the Clark Y portions uses Gottingen 536. The wing has two spars with the ply-wood covered nose that the Germans use to resist torsion. There is a ply-wood covered fin with an unbalanced rudder, but there is no fixed tailplane, the elevators of the balanced type taking its place. This is usual and has been seen here in the *Wien* and other *Professor* types. The span is 19 m. (62 ft. 4 in.) and the wing area 18.6 sq. m. (200 sq. ft.).

A point of importance was the increased performance



The tail unit of the "Austria."

which resulted from the modification of the existing streamlining. When the *Fafnir* was first flown its performance was most disappointing. So the fairing of the wing into the fuselage was modified with plastic wood and the *Fafnir* became the star performer. Its pilot, Groenhoff, who has done his thousand hours in the air though he is not a power-pilot, was doing the most spectacular banked turns without the loss of any apparent height.

The *Austria* which has been designed by Dr. Cooper has not been flown or rather no reports of its performance since the British left have yet come to hand so what it can do remains to be seen.

Unlike other sailplanes the wings of the *Austria* are completely covered with plywood. Because of the deflection of the enormously long wings on landing and to prevent them from breaking, the nacelle is a long way beneath the wing. The tail unit is carried on a long, slender, tapering spar with rudders at the end of the tailplane and elevator.

Of this machine and its appearance two stories are told characteristic of those inspired persons who made them. Sir Sefton Brancker, our Director of Civil Aviation, on his way from one place to the next and inspecting the Do.X. managed to spend a night at the Wasserkuppe. He arrived there in a Puss-Moth which certainly staggered the natives, who were frightfully impressed with the latest product of the De Havilland Company. He was piloted by Mr. Pike.

The *Austria* is rather a cuckoo in the Wasserkuppe nest, it was not designed there and goes against their theories. So all the knowledgeable persons were wandering round the machine, stroking their noses and making hissing noises redolent of disapproval and critical irritation. Sir Sefton Brancker regarding the machine and its detractors with a smile, said, "Well, thank God, I'm not a technical expert."



Herr Kronfeld bringing out the "Austria."

Mr. Pike ventured to ask Herr Robert Kronfeld whether he had yet flown the tailless machine built by the designer of the *Austria*, to which query he was answered in the negative. So, looking at the tail of the *Austria* shivering in the breeze, he suggested to Herr Kronfeld that he might be wise to put in some practice right away as he might have to fly the *Austria* without a tail.

Another interesting machine which put up an excellent show but on the face of it does not appear such a super streamlined craft is the *Aachen*, designed and flown by Dipl. Ing. Mayer. This machine, which was built by the Aachen Flying Club, is developed from their entry of the previous year.

The wings have been made bigger. The span of this high-wing monoplane which has a strut-braced middle section is 20 m. (65 ft. 7 in.). The extremities are tapering with rounded ends. The wing area is 20 sq. m. (205 sq. ft.). This enormous wing has only one main spar with plywood covering round the nose and back to the front spar to stiffen the wing against torsion. There is also an auxiliary spar.

The *Meinigen* had the largest span of any machine which flew, this was about 72 feet. This machine was wrecked on landing. A multi-lattice spar construction was used and is the first of its type to be used at the Rhoen so one was told. The spars were arranged in "W" formation as seen at a wing section.

On Aug. 9, the opening day of the competition, about 28 entries had arrived out of the 43 which had been entered. Most of the rest came along before the end of the competition.

A feature of the occasion was that Mr. Latimer-Needham was honoured by being made a member of the Technical Commission and was thereby empowered to approve or disapprove the awards of Cs. of A. to entries. There was great disappointment that the two British entries failed to arrive. These were the *Alert*, an interesting new sailplane which has been built by E. D. Abbott Ltd. of Farnham, and a *Professor*, which was to have been flown by a member of the London Gliding Club.

The arrangements for the competitions are somewhat flexible. There are the four main contests, those for height, distance, duration and covering a circular course. Then there are two competitions every day that flying is possible. These are for seniors and juniors. These competitions are always arranged to suit the weather conditions at the moment. This seems an excellent scheme and allows a programme which shall always keep up the interest and be flexible enough to meet changes of weather.

A new feature was having an out and return flight as a main contest. This was to the Kreuzberg and back and was first flown by Kronfeld early in the first week. He thus won the prize. This performance was equalled by Groenhoff about a week later on the *Fafnir* after this machine had been modified.

Apparently there are only a few pilots who have any idea of cloud-soaring and among these are Mayer, Groenhoff, Bedau and Kronfeld.

On Aug. 24 Kronfeld beat his own long distance cross-country record and flew more than 100 miles, which beat by a few feet a record he had made the previous week. This flight lasted some six hours and was made in front of a line-squall.

Queries about the spinning propensities of sailplanes have been more or less settled as sailplanes have been seen indulging in this vicious practice. Bedau in the *Luftikus* had climbed some 5,900 feet into a cloud and was seen to fall out of the cloud in a spin which lasted for over 3,000 feet. He managed to get into a steep spiral and levelled off safely. One report says that he did two sloppy loops before he got out of the spin. Anyway he got out of it and flew for another five hours.

Kronfeld seems to have collected all the important prizes again though he has had to share one with Groenhoff.

One thing is quite certain and that is that England has plenty of ideal gliding terrain. The Wasserkuppe is far from ideal and one hears that if they could the R.R.G. would find another site. The landing crashes per day are terrific. The sailplanes have so flat a gliding angle that they cannot help charging the rocks which are scattered over the hills and tearing their skids and fuselages. The *Austria* is fitted with air-brakes for this purpose. Her two rudders can be drawn inwards and thus act as air-brakes.—T. J.

A DATE TO BE NOTED.

The North Staffordshire Gliding Club are holding a demonstration at The Cloud, Congleton, Cheshire, on Sunday, Sept. 14, starting at 14.00 hours. Exhibitions on British gliders will be given by Mr. C. H. Lowe-Wylde, of the British Aircraft Company, Maidstone. Members of the Lancashire, Nottingham and Wolverhampton Gliding Clubs have been invited to attend with their gliders.

The Isle of Wight Gliding Club.

The Isle of Wight Gliding Club, which was officially formed on July 3, held its first general meeting on July 28 in the Guildhall, Newport, I.O.W. The Mayor of Newport, Councillor H. W. Horan, J.P., was in the Chair. Sir A. Verdon Roe was unanimously elected President of the Club and has since generously presented the Club with all the necessary materials for making a glider.

Mr. F. W. Merriam, formerly well known as an instructor with the Bristol Co., and later with the R.N.A.S., has placed his gliding site, his shed and glider at the service of the Club and offered himself as instructor. This glider is to be used for preliminary ground instruction.

As the Club has many members in the aircraft industry a technical committee has been formed to supervise the building of the first glider.

The address of the Hon. Secretary is 61, Swanmore Road, Ryde, I.O.W.



The filled-in angle is shown white.



The un-amended shoulder-joint of the "Fafnir," which upset the streamlines and deprived it of control.

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Printed for AERONAUTICS LTD., by BONNER & CO. LTD., The Chancery Lane Press, Rolls Passage, London, E.C.4; and Published by AERONAUTICS LTD., at Cannon House, Pilgrim Street, Ludgate Circus, E.C.4.

EDITORIAL AND ADVERTISEMENT OFFICES OF "THE SAILPLANE," 175, PICCADILLY, LONDON, W.1.
ACCOUNTS AND PUBLISHING OFFICES, CANNON HOUSE, PILGRIM STREET, LUDGATE CIRCUS, E.C.4.
Telephones: Editorial, Gerrard 5407; Advertising, Gerrard 6023; Publishing, Central 5822.