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THE SAILPLANE AND GLIDER

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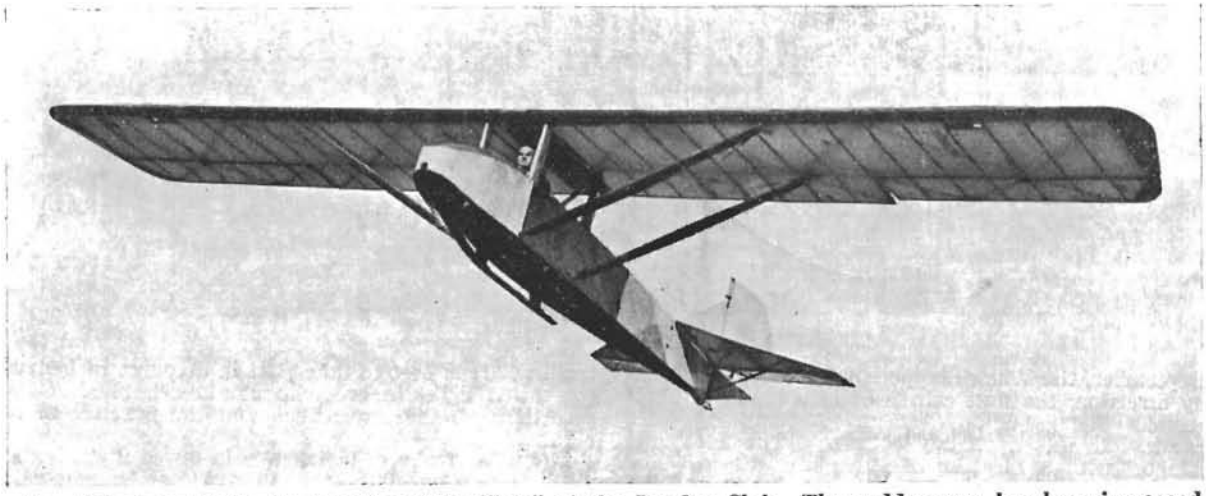
Edited by Thurstan James.



Mr. Robertson flying the modified "Prufling" of the London Club. The rudder area has been increased and the shape of the nose, as well as the decking behind the pilot, altered.

PERSONAL LIABILITY

Now that people are beginning to understand, and recently-instituted legal proceedings have rammed the understanding more hardly home, that they personally and individually are responsible for the debts incurred by the Clubs of which they are members, a very marked interest is being taken in the question of forming Clubs into limited liability companies. The last issue of THE SAILPLANE contained under "Official Notices" a resolution to the effect all gliding clubs affiliated to the B.G.A. should become limited liability companies; such is the way of official resolutions and the like that it was not possible to explain therein that the B.G.A. have under weigh a scheme whereby the costs of the transition are but a few pounds.

Club secretaries should therefore consult the Secretary of the Association before taking any definite steps as by so doing they will be enabled to take advantage of the scheme which is being prepared and not suffer the usual fate of pioneers, as did the London Club which is a limited liability company but had to pay somewhat heavily for the privilege.

It is being more generally appreciated that one of the reasons why deeply pondering persons of substance refrain from joining Gliding Clubs is that they realise not only the existence of a lack of financial stability in the Club and therefore the lack of a certain amount of responsibility in its actions but further that their own estate and bank balance automatically becomes liable for debts incurred by the Club. Now by limiting the liability of the Club the liability of members becomes limited and so prospective members are assured against assuming responsibility for the Club's debts.

Of this subject we propose to talk at length in a forthcoming number when various financial wizards have made available the results of their midnight struggling with complicated accounts. We would lay stress upon the necessity for the closest possible co-operation between the Association and its component clubs over this particular aspect of the Gliding Movement.

THE WAKEFIELD TROPHY

We are pleased to publish a letter from Mr. Norway of Airspeed Ltd., wherein he issues a challenge and an invitation. The Council of the Association declines to wash out the contest at Balsdean and therefore Mr. Norway's challenge perhaps is a little less effective. One might wonder however what would happen supposing that each of the three contestants for the Trophy at Balsdean amicably decided that they ought to have another try. The terrain at Ingleby Greenhow would appear to be particularly favourable and it certainly would be a marvellous sight to have the high-efficiency machines struggling for distance along the Yorkshire coast.

One might imagine that the R.F.D. sailplane, repaired after its roadside crash would also be an entrant. This machine with its trailer is for sale. At least that is how Mr. Dagnall puts it. Actually, Mr. Dagnall persisting in his generosity toward the Gliding Movement is wishful to make available a high-efficiency machine to a deserving group and he is prepared, having covered his costs partially with an advertising scheme, to hand over the R.F.D. sailplane and trailer to a group of private owners for a sum which shall reimburse him the balance of his expenses. This sum is less than £100, so four private owners can acquire a dual-purpose machine complete with trailer for less than £25 apiece. We imagine that at this low figure the R.F.D. sailplane will rapidly become private property.

AEROPLANE-TOWING IN GERMANY

We are very glad to be able to include in this number the translation of an article by Herr Fritz Stamer, which appeared in a recent number of FLUGSPORT, the German aeronautical publication. Herr Stamer is chief instructor at the Wasserkuppe.

Not only does this article show how useful aeroplane-towing can be in the education of a power pilot, but it also shows how important it is that glider pilots should obtain their soaring Certificate in a machine of which the controls are comparatively sensitive.

AEROPLANE TOWING

By FRITZ STAMER

Mr. Lowe Wylde shows how in a B.A.C. VI.

In September, the Wasserkuppe Flying School held, under my direction, the first course of instruction in aeroplane-towed flying at Griesheim Aerodrome, near Darmstadt. It was a six-day course. The aeroplane "Flamingo" with a Siemens SH12 engine was used for towing, and the sailplanes towed were the FALKE and the PROFESSOR. The "Flamingo" was piloted by Herr Riedel, who was indefatigable. The Griesheim camp provided accommodation and excellent catering for the pupils.

Sixteen men in all took part in the course, of which 8 were pilots of power-driven aircraft, and 8 pilots of sailplanes only and holders of the "C" Certificate. In spite of the rather bad weather, flying was carried out every day, although the machines often dripped with rain, and often disappeared into the clouds at altitude of only a thousand feet or so.

I may say at the start, that hardly any difference could be distinguished between the performance of gliders who were also pilots of power-driven aircraft and those who were simply gliders; the latter found themselves just as much at ease at a height of 3,000 feet as the pilots of power-driven machines who are accustomed to such altitudes. During the course each pupil carried out, on an average, 8 flights, in which the towing lasted 10—15 mins. and the glide 20—30 mins., so that the total duration of flight for each pupil was about 4—5 hours.

This course showed how important it is that "C" tests should be made on aircraft such as the FALKE, PRUFLING, MAYER I, etc., and not with aircraft such as HOLS DER TEUFEL and the like, if the "C" test is to be of any value as preliminary instruction. It should not be forgotten that, before taking part in the towed-flight course, the pupil must accustom himself to very exact action of the controls, as the aircraft towed by a power-driven aircraft always exceeds its normal speed, so that the action of the controls is considerably stronger.

When, for any reason, the aeroplane has to cast loose, it is the duty of the pilot of the sailplane also to cast loose at once. Only when the sailplane is flying at a high altitude over villages, electric power cables, or the like, can the rope be carried along and dropped on uninhabited ground. As the sailplane flys slowly, the tow-rope, which is 120m. long (about 400 ft.), hangs down almost vertically, and catches in bushes, trees, hedges, and the like. This would lead to a bad crash. Therefore, throw away the rope as soon as possible. It can easily be forgotten as it cannot be seen from the cockpit. It is much more serious to have a crash than to lose a rope.

A number of flags should be attached to the tow-rope, which makes it easier to be seen during the flight, and easier to find when cast off. Normally the sailplane casts the tow-rope loose, and the towing 'plane returns it to the starting place where it is dropped. Every aeroplane is not suitable for towing, and every sailplane is not suitable for trailing. It is best to take part in a course of instruction for towed flight in order to obtain reliable information regarding all these questions and the practice of towed flight.

The next course of instruction in towed flight is to take place from Nov. 3 to Nov. 10, 1931, at Griesheim, near Darmstadt. Anyone wishing to take part in this course and who is not already known to the directors of the Wasserkuppe Flying School, should enclose his flying certificate with the application, showing clearly what previous training he has had. All applicants must have passed the "C" test. If the applicant has not had sufficient preliminary training, he will, naturally, not be accepted.

During the course more than 100 flights were made at Griesheim, but no machines were damaged and none of the pupils were injured. It was clearly proved that towed flight can be learnt, but instruction is necessary, as difficulties often arise which can be overcome only by making use of the rich experience already collected by the Forschungs-Institut and by the school of the Rhon-Rossitten Gesellschaft.

At first towing was only carried out during calm periods, but afterwards in strong winds, gusty weather, strong vertical air-currents, and through small clouds. (It is foolishness to attempt towing through thick clouds; this should always be avoided). Then sharp curves were flown, and at a high speed. All the pupils who held licences for power-driven aircraft were taken up in the "Flamingo" to give them an idea of what the pilot had to do when towing. Some of the other pupils were also taken up in the "Flamingo" as in order that both pilots should be able to work well together it seemed important that the pilot of the glider should know the possibilities open to the pilot of the towing machine.

In accordance with the approved method of gliding and soaring instruction which stress the importance of the development of "air-sense," no instruments were fitted in the trailer FALKE which was first used, and not until several flights had been carried out was an altimeter fitted to check the flight. In the PROFESSOR which was used towards the end of the course an air-speed indicator, a variometer, and an altimeter were fitted. The PROFESSOR also carried a parachute.

RULES

A number of fundamental rules were drawn up, namely:—

Always pay attention to the towing rope; it is easier to prevent it becoming slack than to put it right afterwards.

Always keep 30—40 ft. above the power-machine; if you fly on the same level you will be in its slipstream and will draw its tail downwards.

Do not get too high above the towing machine (not more

than 60—100 ft.) as the glider then begins to carry the towing machine and can be overstressed.

When the tow-rope becomes slack, traction is reduced and, as the speed is also reduced, one feels that one should turn the nose of the glider downwards. The nose should, however, be turned gently upwards, as otherwise the tow-rope remains slack. If the towing aeroplane flys round a curve, try to fly round the same radius. If you make a sharper turn, the distance is shorter and rope becomes slack, whereas if you fly with a big radius you fly further, and therefore faster, thus you rise.

In this manner it is possible to correct the altitude in relation to the towing aeroplane. One may fly behind it, above it to the left or to the right, and can tell by the tube to which the towing cable is attached on the towing machine how far to the side one may go. If one rises too high above the aeroplane, it is no good to turn the nose of the glider downwards as this will only cause the rope to become slack; one should fly carefully to the right or to the left and back in order to increase the distance in comparison with that of the towing 'plane.

In starting, on leaving the ground the flight path of the glider should be so inclined that the desired height above the aeroplane is immediately attained, so that a normal flight position may be assumed, thus making it easier for the towing machine to rise. This height must be attained at once as, after leaving the ground, the aeroplane climbs fairly quickly.

When the tow-rope is released from the sailplane the speed is at once reduced, and the nose of the sailplane inclines downwards. But as when being towed the speed of the sailplane is in excess of its normal speed, this reduction of speed is quite normal, and it is not necessary to incline the nose of the sailplane downwards.

THE GOVERNMENT AND GLIDING

The Aeronautical Research Committee acts in an advisory capacity to the Secretary of State for Air. It also co-ordinates all the aeronautical research work done in this country. Once a year it issues a report, in which it not only describes what has been done but suggests future lines of development.

An appreciable part of the current report is devoted to Gliding and though the present financial situation renders financial support from the Government unlikely at the present juncture, there is plenty of ground for optimism in the report. Clubs which are interested in scientific investigation should see whether they cannot so organise themselves that when the time comes they are in a position to co-operate with the Committee.

WHAT THE REPORT SAYS

"The Gliding Movement has been brought to the attention of the Committee, and in their discussion of its bearing on research they have had the cordial co-operation of Mr. G. M. B. Dobson, Mr. Gordon England (the Chairman of THE BRITISH GLIDING ASSOCIATION), the Master of Sempill, Sir Gilbert Walker and Herr Lippisch (Director of the Research Section of the Rhon-Rossitten Gesellschaft on the Wasserkuppe).

"In Germany, flights in gliders have been made, in certain types of weather, for distances of over 100 miles, and from a hillock only 100 feet high a sailplane has been taken to a height of 2,500 feet. In this country, in attempts to make ascents from level ground, experiments have been commenced using motor-cars to give the velocity required to raise the glider to a height above the ground at which it can take advantage of up and down currents and so gain further height.

"Very high performance types of sailplane, with a drag/lift ratio as low as 1 in 20 or less, have been designed in Germany, and there appears to be some promise with this type of aircraft for increasing knowledge both of the aerodynamic properties of aeroplanes and of the movements and strengths of air currents. The Committee are of the opinion that any scientific advances to be gained from gliders in this country require prior successful development of the art of gliding. They are aware of the official encouragement which has been given by the Air Ministry to Light Aeroplane Clubs, and they have recommended a limited financial support of Gliding Clubs. Assistance for scientific purposes would best be given to a Club specially well suited to develop the art on scientific lines and prepared or willing to make an effort in this direction. If this were done the Committee would keep in touch with such a Club and be prepared to help it by advice so far as they were able, so as to be in a position to take advantage of any opportunities that might present themselves for scientific development."

AIR AND AVIATION LAW (Civil Aviation), by Wm. Marshall Freeman, London; Sir Isaac Pitman and Sons, Lad. Price, 7/6.

In this exposition of the Statute and Case Law affecting Air Navigation, Mr. Freeman, who is the Recorder of Stamford, has treated the subject after the manner of the ordinary legal text book. His one great sorrow seems to be that there is a such a dearth of legal problems arising out of the development of civil aviation.

The Table of Cases cited is pathetic in its brevity and out of the 16 or so cases comprising the list, not more than two or three are peculiar to aviation law but have been cited as having direct bearing upon problems of law which are likely to arise as the air becomes more and more a high-way, and air transport more and more a feature of our commercial system.

The Author accounts for this scarcity of legal problems in several ways. In the first place there are no new basic principals involved in flying and in the second place such legislation as has already been passed has anticipated any trouble in respect of the right to fly over other people's property and drop things on their heads.

On the other hand the Regulations and Directions, which in fact rule the civil aviator of this country and which give effect to the international and national law of flying are lengthy and involve many repetitions and cross references. These are set out with annotations and the Author has concentrated on his index. In a legal text book the index is the thing that matters and this book will therefore be of practical utility, both to private owners and to administrative offices of commercial aviation which wish to keep their flying on the right side of the law.

My only quarrel with the Author is over the remark on page 94—"that aviation must necessarily be an adventure to which exceptional danger is attached." I think he has here accepted, without question, a popular fallacy which is doing much to deprive the public of the full benefit of the conquest of the air.

This casual remark illustrates the exaggerated awe of aviation which is ingrained in most of us whether we fly or not and for which the war is largely to blame. When the public realise that the only dangers of air travel are the normal ones of fog and bad management, which they accept readily in ship, train and motor-car, then they will fill the air with vehicles and the list of cases in the law books will tend to creep over the page.—S.W.

CLUBS OUGHT TO INSURE

By J. A. Lynch.

[This paper was read before the B.G.A. Conference at Ilkley, and now published so that Clubs which were not represented at that Conference may be able to digest this paper with subsequent appreciation of the ways in which Insurance can be made to further their aims of more and better gliding.—Ed.]

Those of us who are interested in Aviation believe that instruction on gliders will continue to play a conspicuous part in its growth and for this reason alone we feel that the Gliding Movement is deserving of support. Most people feel at present, I think, that gliding is merely a sport or pastime, but we believe that gliding is the logical method of giving elementary instruction in flying.

The glider can be flown slowly and near the ground by the simple process of towing by motor-car thus enabling the instructors in the motor-car to speak to the pupil in the glider and to impart to him elementary instruction in the art of flying. I believe that experience will show that students who have received elementary training on gliders will ventually become pilots and not merely airmen.

Now I think everyone will agree that insurance plays a very important part in the industry of the world to-day. In fact it is safe to say that no business can grow without the support of insurance in some form or another and it is the function of those interested in insurance to cater for each new industry as it is born.

The Gliding Movement has been born and is growing apace. It, therefore, is in need of insurance facilities which are indeed essential to its growth. Such facilities are to hand and are being taken advantage of by all the great manufacturers of aircraft, dealers in aircraft, firms interested in oil and other essentials to flying, as well as flying clubs and schools. Yet some private owners continue to fly uninsured.

Is this wise? The answer, in my opinion, lies in the example set by the commercial man, the man who is in the industry to make his business pay and to make money for himself. He covers himself against all eventualities as far as is possible by means of insurance. Would a shrewd man do this if he did not think it would pay him. All business men know that it pays to insure, not only from the financial standpoint but also from the feeling of security which any insurance policy gives. This then is one of the reasons why insurance cover should be effected.

In discussing the question of insurance with people one sometimes hears the remark, "I can't afford to insure." I regard that remark as a contradiction in terms. I go father and say that a club or person who cannot afford to insure cannot afford to own a machine.

Consider for a moment a machine only, not the pilot himself, not other persons, animals or even the property of others. This machine which is owned by an individual or club is uninsured. It is damaged beyond repair, and there is no money to buy a new one. What is the result? In the case of the individual his sport or hobby is lost, and in the case of a club all the members suffer, moreover the loss of the machine means the loss of the capital invested in it and I have yet to meet the man who can afford to lose capital.

Again, if the machine in crashing damages the person or property of a third Party an action at law by the injured person would probably involve the owner/s of the machine in a further loss of capital. Lastly, should the pilot be killed in the accident his dependants would suffer owing to his not having effected a Personal Accident Policy.

I mention this last point, not because I wish to be morbid in regard to accidents but merely to emphasise the necessity of insurance cover. Accidents happen daily and will continue to happen as long as the human race continues to progress.

To turn to a more cheerful reason for affecting insurance cover I would commend to your notice the fact that nowadays a fairly decent reputation and a good insurance policy will enable you to purchase a glider on the Deferred Payment system. Some of you may smile at this and draw my attention to what I said just now regarding people who cannot afford to fly. My answer is this. The word "afford" has nothing whatever to do with the Deferred Payment system. Believe me it is not only the poor man who pays for things by instalments and when I say this I do know what I am talking about because we arrange insurance cover. Further support for my statement is to be found in statistics compiled in the U.S.A. When the big slump came, everyone anticipated serious defaulting in the Hire Purchase System, yet the actual number of defaulting amounted to only one-half per cent. of those dealing. Would this have been the case if only poor people had been taking advantage of this method.

POLICIES

Now when an insurance is effected a document known as a **policy** is drawn up. A policy is a contract between two parties: the insured and the insurers. The first in this case being the individual or Club insuring the glider and the second the Company or Group of Underwriters accepting the risk. It follows, therefore, that in order to keep this contract in force both parties must adhere closely to the conditions of the contract and a breach of the policy conditions by either side nullifies the contract. From the Underwriters' point of view they, in consideration of the payment of a sum of money known as a **premium**, undertake, on certain conditions, to shoulder certain responsibilities which properly belong to the insured.

I purposely give you this short explanation of the meaning of an insurance policy because many people, we find, seem to think that because they are insured they can do exactly as they like and that Underwriters will settle their liabilities. So please do read your policies, find out the risks against which you are covered, study the policy conditions and if you think any alteration necessary get into touch with your broker at once, ask his advice and tell him what further cover you require. Your broker will always be too pleased to give you any assistance he can and will always do his utmost to arange a satisfactory contract for you, providing you will confide in him exactly your requirements.

If you have ever heard the expression "Buying or Selling" cover please forget it, such an expression is most misleading. I mentioned just now that the consideration paid an Underwriter for acceptance of a risk was called a premium. Underwriters always try to keep premiums down to the lowest possible economic rate but they and their shareholders of "Names" as they are called at Lloyds, have got to live, hence they cannot afford to lose money. Yet at the same time rates must be reasonable or the insured will not be able to live either.

In order, therefore, to keep rates of premiums down Underwriters ask the insured to carry a portion of his responsibility himself. This portion we call the excess. Each section of the policy therefore carries with it a small excess which in addition to keeping rates down makes for more careful flying and encourages owners to be particular regarding the care and maintenance of their machines on the ground.

The policy for use in connection with the insurance of gliders is divided into two sections. First accidental damage to the glider; this portion is again divided up into four sub-divisions so that owners may choose their own form of insurance cover, but the section as a whole has been drawn up with a view to covering the glider against any accidental damage which it may receive while in the air, on the ground or in transit.

The second section covers the assured against sums which he may become legally liable to pay on account of damage done by him to the persons, animals or property of others, and without this form of cover I really do not think people should be allowed to fly. I know very well that no one wishes to spend more money than is absolutely necessary in these days but I assure you that it is simply spoiling the ship for a ha'porth of tar to fly uninsured, as an accident can quite easily cause such financial embarrassment (if nothing worse) to an owner, or club, as to prevent their further participation in this most attractive form of sport which deserves to succeed and which we all know will do a great and permanent good to aviation in this country and throughout the Empire.

Personal injury to pilots is catered for on the same lines as ordinary Accident Insurance, that is to say there are two policies available; one which provides for the payment of a capital sum on the death of the insured person as a result of an accident while gliding and the second which may be claimed on the loss of a limb or limbs, or loss of sight. Further, in the event of the insured becoming temporarily totally disabled as the result of a gliding accident a weekly benefit is payable for 52 weeks excluding the first week or disablement. In this connection I would remind clubs that if 25 or more members take out Personal Accident Policies a reduction in rate can be obtained.

SOME EXPERIMEMTS WITH ROCKETS

By P. ADORJAN

References have been made from time to time in THE SAILPLANE and elsewhere to the use of rockets for the launching and propulsion of aircraft. These notes, therefore, on rockets and their use may be of some interest.

Before the use of rockets as launching or propulsive agents are discussed a few words must be said of the principles on which they are based. The ordinary gunpowder rocket consists of a strong casing filled with tightly-packed gun-powder. When a light is set to the explosive, gases are produced in the rocket which owing to the high pressure leave the rocket through the opening in the rear end of the casing at a high speed. Every action must have its equal and opposite reaction and the casing with the gunpowder which has not yet exploded will travel in the opposite direction.

From the above considerations the differential equation of the rocket can be written down and if this is solved for velocity we get

$$V^t = C \log e \frac{Mo}{Mt} \quad . \quad . \quad . \quad (1)$$

where V^t = velocity of rocket at time t
C = explosion velocity of explosive
M^o = mass of rocket before start
M^t = mass of rocket at time t.

As the efficiency of the rocket is proportional to a function of the velocity, the designers of rockets aim for high velocities. This can be achieved by using an explosive with high velocity of explosion and designing the rocket so that the ratio of initial to final weight is high. The highest ratio achieved is in the neighbourhood of 10, but the ratio of 3 is considered good for commercial rockets.

To increase the velocity with which the gases leave the rocket it is usual to fit a nozzle to the opening by means of which thermal energy is transformed into dynamical energy. The explosion velocity of ordinary gunpowder is about 1,100 ft. per sec., that of special high-velocity powder ranges up to about 7,000 ft. per sec. It is claimed that a mixture of hydrogen and oxygen has produced explosive velocities of about 14,000 ft. per sec.

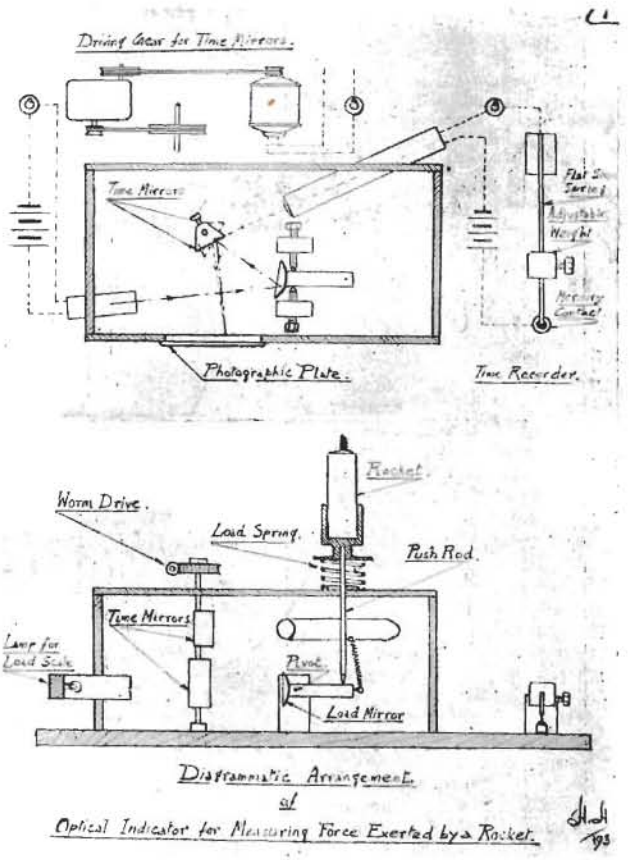
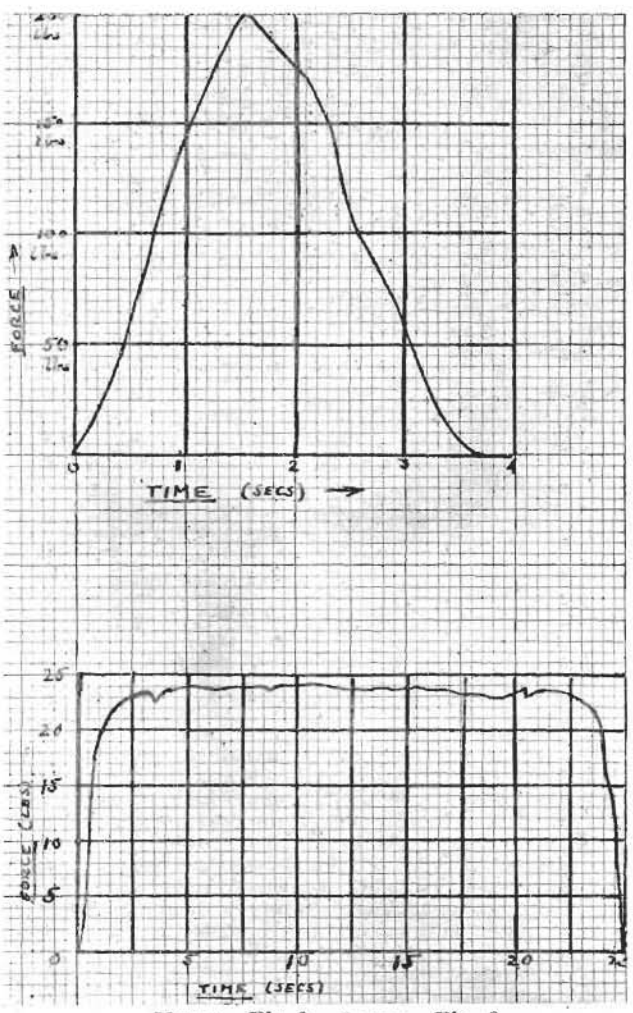


Fig. 1.



Upper: **Fig 2.** Lower: **Fig. 3.**

TYPES OF ROCKETS

As far as the launching and propulsion of flying machines is concerned, two types of rockets are required: (a) high force—short time; and (b) low force—long time.

(a) is suitable for starting, whereas (b) can be used when the machine is in the air and an increase of speed of the machine is required. It is obvious that to prevent disaster the characteristics of any type used must be known before any application of it is made to aircraft, therefore some form of experimental investigation is desirable. In connection with the model experiments carried out by Mr. H. Heywood, A.C.G.I., B.Sc., and the author, an optical indicator was used to measure the force exerted by a rocket. This indicator is based on the principle of the Dalby Optical Indicator, and is illustrated in Fig. 1.

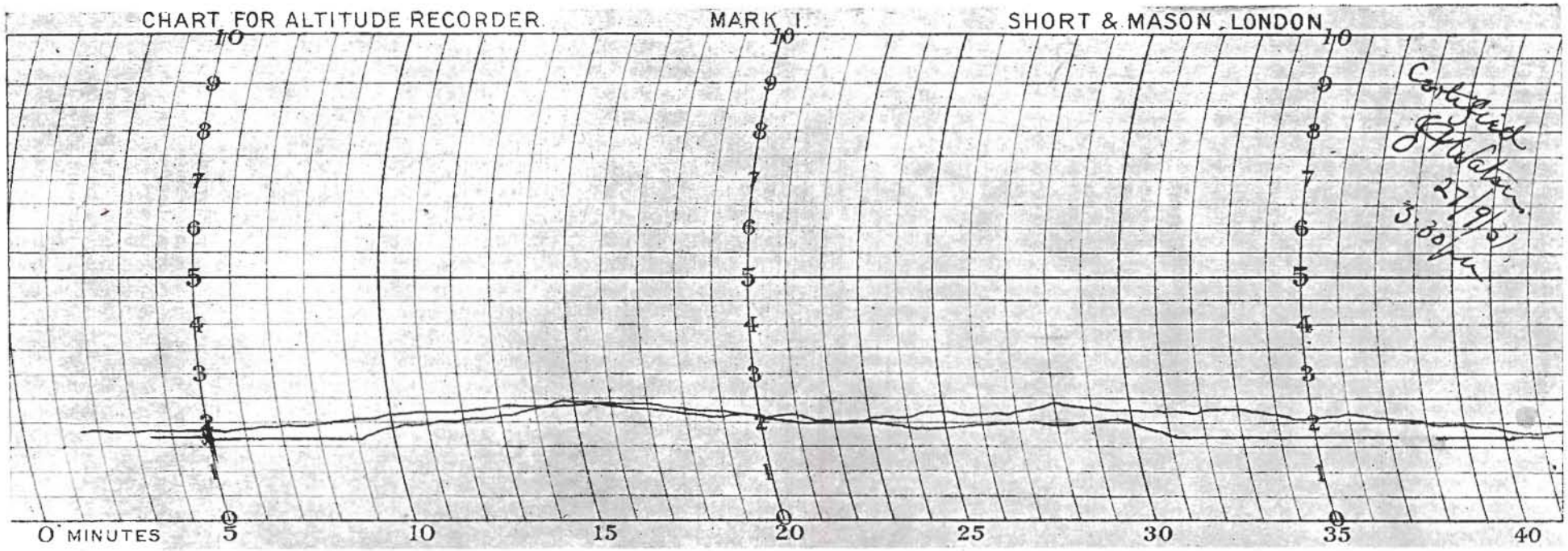
A spot light is first reflected from a concave mirror controlled by the force exerted by the rocket and secondly by a plane mirror rotated at a uniform speed. The path traced by the point of light as the resultant of these two motions is a graph of force to a base of time.

A flat spring vibrating at a known rate causes a lamp to flash and a beam from this lamp is concentrated onto a lense and thrown on to a plane mirror mounted on the same spindle as the time mirror for the force diagram. These two plane mirrors are so adjusted that the two spots of light when focussed on a ground glass-screen are in the same vertical line. The time mirrors are driven by an electric motor and reduction gear. A spiral spring is used to resist force exerted by the rocket.

When making a record, a photographic plate is placed in the place of the ground glass. The indicator diagram is drawn by one spot of light, the other makes a series of dots which enable the time to be scaled off. The load scale is determined by placing known weights on the socket in the top of the push rod.

Fig. 2 shows a rocket of similar characteristics to a small firework rocket but of much larger force. Such a rocket is suitable for launching a glider. It may be seen that the maximum force exerted is 200 lbs.; the average force for 3½ secs. is about 110 lbs.

In Fig. 3 we have the characteristics of a rocket which



TTH BRITISH ALTITURE RECORD?—The barograph of the flight made by Major Petre in the Airspeed "Tern," on Sept. 27, when a height of 785 ft. above the starting point was reached. This flight was made at Ingleby Greenhow, Yorks.

we classed above under (b). A mean force of 22 lbs. is exerted for 25 secs.

PRACTICAL EXPERIMENTS

The most important practical experiments with rocket-driven gliders were carried out at the Wasserkuppe by Herr A. Lippisch and Herr F. Stamer. These experiments were started on the initiative of the late Herr Valier (killed in the explosion of his rocket-car), Herr von Opel and Herr Sander. A detailed report of the experiments has been issued by the R.R.G. on June 28, 1928.

During these experiments rocket-propulsion was tried first on models and later on a full size machine. Herr Stamer was the pilot and he found the rockets very useful when there were no up-currents available. Electric ignition was used.

These experiments proved that rockets can be used successfully for the purpose of propulsion of flying machines but the rockets will have to be further improved. During one of the experiments Herr Stamer's machine caught fire while flying and the flames were only extinguished after landing.

CONCLUSIONS

The use of rockets for soaring machines should be carefully considered, as it offers many advantages. With the aid of a starting rocket the pilot can take off with his machine without a starting crew or complicated starting equipment, thus the pilot could make one or two halts during a lengthy cross-country flight. By means of slow-burning low-force rockets the pilot can gain height when necessary and in this manner he may reach a place where he can find a natural up-current.

However, improved rockets are required. The weight of the rockets must be small in order that the pilot can carry two or three starting, and five or six auxiliary, rockets. The rockets must be absolutely safe against explosion or detonation. In this last respect much improvement is required.

There are many other problems which have to be considered such as the position of the rocket. This is largely governed by the centre of gravity of the aircraft, and also by the danger of fire.

Experimenters should remember that the ordinary commercial rockets are not safe enough. Experiments should only be undertaken with specially built rockets.

THE REPORT OF THE RHON-ROSSITTEN GESELLSCHAFT

Good progress has been made, but activities have been limited by the lack of funds, although it is becoming more generally recognised that the development of gliding depends upon scientific investigation.

The Meteorological Department continued its investigations regarding the behaviour of air currents on the lee side of hills, and relationship was dicovered between the vertical movement of air currents and the temperature gradients. These experiments were carried out by means of pilot balloons which were first released from the ground, but later from an aeroplane; the latter method was employed in order to investigate the air currents at great height.

Besides these investigations, those already begun regarding the vertical velocity of the air were continued, and the methods improved. Particular attention was paid to the behaviour of air currents in the vicinity of cumulus clouds and storm clouds. Three power-driven aeroplanes were employed on this work.

As a result, the Forschungs-Institut drew up the so-called "Darmstädter Böigkeit-Skala" which in the meantime has been taken up all German aeronautical observatories. Improvements were made in the verious registering instruments.

Systematic investigations were carried out with sail planes towed into the air by a power-driven aeroplane.

The Aerodynamic Department carried out investigations regarding moments and wing characteristics. The wind tunnel at the Wasserkuppe was found to be too small to produce exact results; it was therefore rebuilt. The results of the investigations confirmed the theories Herr Lippisch arrived at in 1926 regarding swept-back wings.

The work of this department was directed chiefly towards:—

(1) the further development of the tail-less type of aeroplane;
(2) the production of a stable practice sailplane;
(3) the construction of a high-performance sailplane.

The tests carried out by Groenhoff with the STORCH, in October, 1929, at the Tempelhofer-Feld proved the construction of the tail-less type of aeroplane to be correct, and the Forschungs-Institut decided to follow the matter up. Fortunately, the Forschungs-Institut were at this time approached by the long-distance pilot, Capt. Dr. Köhl, who requested them to build him a tail-less power-driven machine suitable for long distance flights.

Under the direction of Herr Lippisch, an aeroplane of this type was constructed, first of all purely as a sailplane. This was completed at the time of the Rhön Competition and attracted much attention. This aeroplane was a considerable improvement as compared with former types, in that the fuselage was mostly placed in the thick wing, in fact hardly extended beyond it. Pilot and passenger were accommodated in a completely closed cabin.

The wing itself was somewhat V-shaped, and almost exactly the form of an isosceles triangle. The test flights were satisfactory, and in the Winter, 1930/31, another fuselage and a 36 h.p. Bristol Cherub engine were fitted. In consideration of the pusher air-screw, the fuselage had to be placed higher. A novel feature was its landing carriage with its three faired wheels. The tests carried out in May, 1931, fulfilled all expectations. Without an additional tank the machine had a range of action of approximately 1,800 km. at a cruising speed of 130 km. per hour.

Another type was produced in the Spring of 1930, namely the practice sailplane FALKE as a substitute for the PRUFLING and for the light sailplane, HANGWIND. The FALKE was given swept-back wings; its tranverse stability is good and its rudder action is sensitive. Greater protection was also provided for the pilot in the event of a crash by the cockpit being located further back. This new type at once proved to be satisfactory, so that the PRUFLING and the HANGWIND are now no longer being built for instructional purposes. A large number of FALKE constructional drawings were soon sold.

Investigations were also carried out independently by Capt. Roehre at Rossitten regarding the behaviour of air currents. He made a special study of birds of prey, and good results were obtained. The flight of birds was photographed with a cinematograph apparatus, and much information was gained regarding the movement of the air currents on the dunes and over the sea.

At the end of 1931 there were 23 practice grounds for gliding in Germany.

Thirteen courses of instruction were held at the Wasserkuppe between April and October, namely 7 for beginners and 6 for advanced pupils. This year, for the first time, a scientific training course was held for holders of the "C" certificates and pilots of power-driven aircraft. These courses were very successful. During the course the pupils undertook flights lasting several hours, and also carried out a number of long-distance flights—one of them 32 km. (20 miles). These long distance flights had to be limited owing to the loss of time involved in returning the aircraft.

During the year under consideration, 219 pupils attended the schools at the Wasserkuppe; of these, one third already held the "B" gliding certificate or were pilots of power-driven aircraft. Better results were obtained than in the previous year, in spite of the unfavourable weather. 4,342 starts were made as compared with 4,140 of the previous year. "C" tests 37, previous year 30. The number of A and B tests carried out were less than in the previous year (124 "A," 105 "B" as compared with 127 "A," and 113 "B" in 1929); this was owing to the reduced number of pupils (219 instead of 251).

ROSSITTEN SCHOOL.

In spite of the unfavourable yeather, very good results were obtained. The number of pupils was 43 less than in 1929, mainly on account of the expensive railway journey to Rossitten. Nevertheless, the number of "B" and "C" tests was increased (105, 42 as compared with 82, 32 in 1929). 128 pupils passed "A" tests. Number of starts, 6,623 (805 more than in the previous year). Individual pupils carried out on an average 25 flights each, as compared with 19 flights in 1929. A novel feature was the course for ladies; 12 ladies of ages between 18 and 32 took part. The result was good; all passed the "A" test, 10 passed the "B" test, and 1 the "C" test. It was made clear that gliding is as suitable a sport for ladies as any other.

There were very few accidents. At the Wasserkuppe there were two cases in which bones were broken. At Rossitten, in one accident bones were broken, and the second the pupil fractured his skull. In the last case the pupil died after a few weeks, but not as an immediate result of the crash.

Damage to aircraft by crashing was much less than in former years. At the Rhön there was only one serious crash, and at Rossitten only two, amounting to 60 per cent damage. The damage amounted generally to between 5 and 10 per cent., and the repairs were inexpensive.

The number of foreign visitors was—27 to the Wasserkuppe, and 12 to Rossitten. England 11, British Dominions 6, Belgium 5, U.S.A. 4, Spain 3, Czecho-Slovakia 3, France 2, Holland 2, Norway 1, Switzerland 1, Luxembourg 1.

The R.R.G. continued to supply constructional drawings of their gliders, etc. Owing to the general financial depression, at the end of 1930, the R.R.G. decided to reduce the price of the drawings by 20 to 25 per cent. It was decided that the price for foreigners would be twice the inland price. In the course of the year under consideration 68 sets of ZOGLING drawings, 15 sets of ZINGO, and 4 sets of PRUFLING drawings, 8 HANGWIND, 8 PROFESSOR, FALKE (Feb.-March) 15 sets.

On May 12, 1930, the R.R.G. cancelled the agreement made with the American Motorless Aviation Co., which led to the second expedition (Knott, Chlingersperg) being sent out—as it became clear that the American company had by no means fulfilled the expectations of the R.R.G., and also would not be able to do so in the near future. Herr Knott was therefore recalled to Germany (Herr Chlingersperg had already returned in 1929).

In 1930 England vied with France in gliding propaganda. THE BRITISH GLIDING ASSOCIATION, founded under the patronage of The Royal Aeronautical Society, soon succeeded in interesting the whole country in the new sport. Kronfeld's visit in June-July gave fresh impetus to the Movement.

The financial position of the Rhön-Rossitten Gesellschaf is sound. In view of the valuable results obtained in the scientific work of the Forschungs-Institut and in consideration of the high value of the courses of instruction, the state subsidy was again somewhat increased. The R.R.G. also received a subsidy from the Prussian Ministry for Trade and Industry. The Government of Hesse continued to give assistance. The Bavarian government also sent a welcome gift. The R.R.G. also received much financial and other assistance from private sources. The R.R.G. receipts for courses, etc., were considerably higher than in former years.

CORRESPONDENCE

The Wakefield Trophy

Sir,—I see in the issue of THE SAILPLANE for Oct. 14, an editorial paragraph dealing with the Wakefield Trophy, suggesting that the contest should be re-flown any time before Nov. 30.

We should be quite prepared to enter the TERN for any reasonable contest on these lines. As the suggestion is made, however, it appears to us that it gives a strong bias in favour of our own machine. You cannot put up a good soaring performance unless there are proper soaring sites to fly over, and from my own experience it appears that the South lacks soaring sites which are suitable for every wind, with the apparent exception perhaps of the Malvern Hills. If therefore the contest is run on the lines that you suggest, we shall walk away with it next Sunday at 2 p.m. precisely by a flight by Herr Magersuppe at Ingleby Greenhow.

In order to make the contest a little less one-sided, I should like to put up the following proposal to THE BRITISH GLIDING ASSOCIATION.

That the Balsdean contests for the Wakefield Trophy and also altitude should be washed out, and that a fresh contest should take place at as early a date as possible on a proper soaring site. That is to say, my proposal is that the London Club should send the PROFESSOR up for a week-end to Ingleby Greenhow to fly off these contests in competition with the TERN; needless to say any other machines will be very welcome. I think it is only by having the machines competing upon the same site that anything like a fair contest can be ensured.

If this suggestion should be adopted, I should be glad to make arrangements for the use of the site, as I have done before. I would suggest a two-day contest, the machines travelling up to Helmsley on Friday and leaving Saturday and Sunday free for flying.—(Signed)

N. S. NORWAY.

(Managing Director, Airspeed, Ltd.)

Insect Flight.

Sir,—In a recent number of THE SAILPLANE your correspondent, Mr. Stephenson raises the question of insect flight.

Schroder, in a very useful summary of the subject, in his "'Handbuch der Entomologie" distinguishes between: (1) **Fluttering** as in Mayflies; (2) **Propeller Flight,** Bees and Wasps; (3) **Hovering,** Syrphid Flies, Gadfly, etc.; (4) **Gliding,** Dragon Flies and Butterflies (mostly alternating with Fluttering Flight) (5) **Compound Flight,** as in Beetles, where the front wings are used as aerofoils and the hind wings for propulsion.

These categories shade into one another and are to some extent interchangeable. The Dragonflies, for example, are performers in several groups. The Hoverflies (Syrphidæ) appear to be pure helicopters. Bees, although possessing four wings, fly with the hind wings hooked on to the trailing edge of the front wing, so that aerodynamically they act like the two winged flies. Bees can fly backwards in just the same way as the hover flies.

The flight of the dragon fly was studied by Lucien Bull, about 1909, and his films show that the front and hind wings move independently of one another and **out of step,** the latter crossing under the former. Since it appears that the movements of the hindwings are more vigorous than those of the front wings, this may almost be considered a case of "compound" flight. The difficulty is that in the experiments of Marey on the wasp and of Demoll on a butterfly captive insects were used which were struggling to get free and it stands to reason their wing beats were somewhat abnormal.

I suspect also that Bull's dragonfly was taking off and therefore subject to the same objection. On the other hand Stellwaag has produced a good series of photographs of a bee in flight built up in the manner recommended by Sir Gilbert Walker in his lecture on bird flight given before The London Gliding Club last year. Nobody seems to have tried photographing insects flying in a wind tunnel.

The study of insect flight in undoubtedly most fascinating, but I do not think it can in general be classed as motorless flight nor offers any useful hints in the design of gliders.—(Signed) D. MORLAND.

[*Mr. Morland appears to us to have summarised the relation between motorless and insect flight in a most effective way.*—ED].

"Dorset Glider" Replies.

Sir,—In response to Mr. Whidborne's request in THE SAILPLANE for Sept. 25, may I give the following particulars with regard to the Dorset Gliding Club's financial working, having regard to the guinea subscription.

1. The Club has one primary and one secondary machine.
2. Membership for 1931—40.
3. Donations to Club: in cash, £4; in kind, use of tents, gramophone records (I believe), sundry mysterious but enjoyable bottles on occasion.
4. Further sources of income: (a) entrance fees, £50; (b) flying fees, £7 10s.; (c) profits from demonstrations, £70; dances, sweepstakes, £27; sale of "Gliding," £10.
5. I should say about £50 has been spent on repairs and maintenance, not counting ground rents, hangar cost (£40), etc.
6. We have 15 "A" Pilots and 3 "B" Pilots.
7. 50 per cent. roughly of last year's members resigned or failed to renew. Reasons—lack of interest, difficulty of access, shortage of cash.
8. Machines are amply sufficient for all wishing to glide.
9. There is no reserve actually ear-marked for purchase of new equipment.

Perhaps I may add a few comments, the first of which is that the Committee of the Dorset Gliding Club "regret" that I think the guinea subscription adequate (though I should like to see the faces of the general membership if they were "touched" for more). Their view is, I believe, that two guineas should be the rate in future years—for the reason that in their opinion newcomers should not reap the considerable advantages of membership that I enumerated some weeks ago without paying a little more as a contribution to what founder-members have built up by dint of extremely hard work.

The figures given above are merely approximate. A large number of resignations of memberships was only to be expected, for clubs have sprung up all round us (we attracted recruits from five counties). Moreover, many folk enrolled with the idea that they were going to flip through miles of atmosphere at every meeting and never do any work. Undoubtedly, we have felt the strain of industrial depression too.

The Club owes a tremendous debt to Westland Aircraft, Yeovil. Without the active support of this firm, we could not have gone far, and as I do not happen to be the Chairman (Mr. Norman W. Wright), Mr. V. S. Gaunt, or Mr. Wells, I can safely add that the same observation applies to them.—"DORSET GLIDER."

Wiltshire Finds a Champion

Sir,—Like "Dorset Glider" in his screed, "Displays that Disgust Us," I am feeling rather unhappy, not only because of his selfish moans, but because of the very apparent unsporting spirit of his Club so well indicated in his article.

I am not a member of the "distant club" mentioned, though I know it well, but I can claim to have had an excellent knowledge of "Dorset Gliders" egotistical group. The remarks made hereunder are therefore unbiassed and not made without knowledge, and it is hoped that they will to some extent defend the "distant club," which one knows to be Wiltshire, from the heavy and rather unwarrented assault that has been made on it.

It seems extraordinary to all sport-loving people that when the Dorset Club is invited to use the far superior gliding site of the Wiltshire Club, they should ask for payment in return for their inspiring and success-provoking presence, and especially that they should endeavour to extract money from a club which is not so strong numerically or financially, and which does not have the nearby facilities of a large and important aircraft works where skilled labour can repair its crashed gliders or even undertake the construction of a secondary machine. One would have imagined that the Dorset Club would be only too anxious to help its less fortunate neighbours, especially as a few of the Dorset members have some technical knowledge. But even if these members did not feel sporting enough willingly to lend an ungrasping hand, anyhow one would expect the Dorset Club to have put up a show and to have used the fine slopes of the Wiltshire grounds to

acquire a few more "A" Licences. It seems surprising indeed, considering the Club's technical facilities and the confident all-knowing air of some of its more newly-fledged pilots, that no further "A" Licences have been acquired since its great attempt on the Dagnall Prize when its many aeroplane pilots skilfully succeeded in rushing down a steep hill on a R.F.D. and passing the searching test for a gliding badge! Perhaps the rain of the Wiltshire downs damped their enthusiasm, or were they shy?

The excellent advice to those people who live in glass houses is well-known, though perhaps not by "Dorset Glider" and his associates, and it would be interesting to learn if the internal affairs of the Dorset Club are as well as they might be, and whether Wiltshire have lost the attendance of as many members—originally enthusiastic enough as Dorset, through poor management perhaps or the reprehensible conduct of members. Or are both clubs numerically as strong as ever?

One grieves to learn that there was no one to welcome the good Dorset man the night before the demonstration, but 11 p.m. is rather late. Anyhow, one has heard vague rumours of the wanderings and strange welcome of a celebrated German sail-plane pilot and his mechanics when they visited Dorset after spending the long day coming from the North and towing their PROFESSOR glider-trailer.

One gathered that most people found the routes to the demonstration gliding site quite well marked and that most people seemed to know the way. Reference to a map showed the route plainly and the location could hardly be mistaken. At the very outside no greater degree of skill was required to find the site than that demanded to locate the site of the Dorset Club's Meeting a year ago. It was also of interest to observe that the distinguished foreign sailplane pilot did not have to ask strangers how to obtain lunch at the Wilts meeting.

At the Wiltshire Demonstration there were five machines present, or quite enough to interest the crowd, and considering the vile weather it was wonderful that the machines turned up, while Dr. Allan's sportmanship in bringing his SCUD all the way from London was much to be admired. It surely is as absurd to suggest that Dr. Allan should be mulcted of £5 if he had failed to turn up without good reason as to fine private aircraft owners for non-attendance at light 'plane meetings.

One must agree with Mr. Bullivant's remarks on the £1 1s. subscription in contradiction to "Dorset Glider." A guinea is far too small to cover the workings of any club, especially when there are numerous crashes.

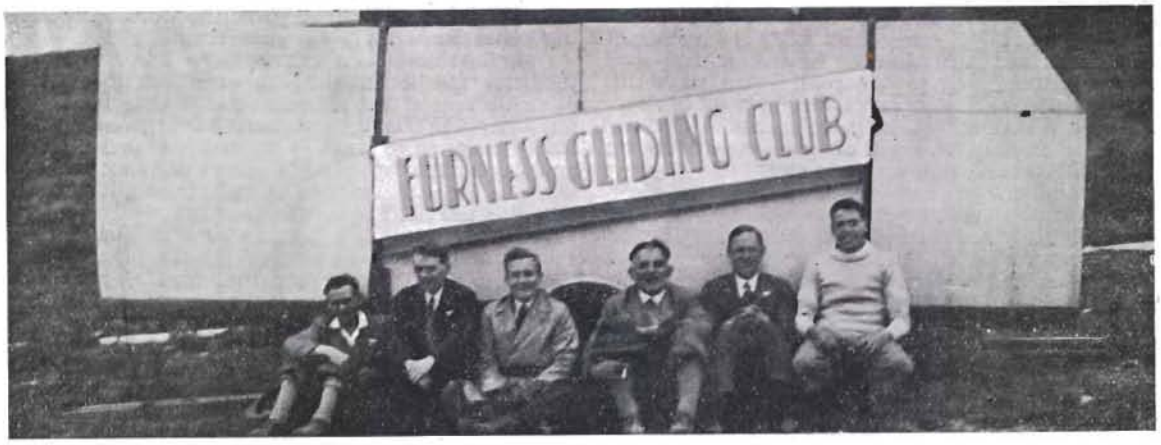
Only by Herculean efforts have the Dorset Club the facilities mentioned and the acquirement of these may have decreased the enthusiasm. One learns on good authority that many members have given up attending since they have been required to serve as manual labourers for hangar-building, site clearing, cottage cleaning, etc., or in default to abstain from gliding. Incidentally, one did not know that the Club were the actual proprietors of their gliding site; and if so their income must be well augmented by rents from the pumping station in the centre of their ground and that may explain their financial stability on a low subscription. In the same way one inferred from a previous copy of THE SAILPLANE that the oil engine was not really a material asset on the Club's books but was temporarily loaned as have been other gadgets, by the generosity of Petters Limited.

One is interested to learn that the Dorset Club have difficulty in getting members at £1 1s. The indication seems that it will be still harder to get members at that figure next year.

That amalgamation of Clubs meets with "Dorset Glider's" approval is good news, and we are in agreement. But why, oh why, the grasping for Government grants? Gliding is a sport first, foremost, and all the time. Does the Government subsidise other sports? Club Members who have "A" gliding licences have a very long way to go before they would be of any use in war and especially as many are physically, and perhaps mentally, unfit to be fighting pilots. If the glider training of club Members would assist them to be of any use in the next war perhaps the Government might have the slightest excuse for backing the Movement.

Gliding is a glorious sport and even toboganning on an elementary glider is thrilling and great fun, and it seems a pity that the sport should gradually die out through inter-club bickerings, and worse, through internal strife in clubs. "Dorset Glider's" article has well indicated this retrogressive spirit that is undermining gliding in this country. Let us have a little more unity, a lot more sportsmanship, and the movement will leap forward with those who have the sport enthusiastically at heart.—(Signed)

"WESSEX SOARER."



Barrow Enthusiasts !

A KENTISH MEETING

A year ago THE KENTISH EXPRESS kindly presented to the Gliding Movement in Kent, a silver cup to be competed for annually by the clubs within the county. The competition is limited to primary machines and the cup is held by the club whose team puts up the best aggregate time in duration. A year ago the cup was won by The Channel Gliding Club after an exciting contest with The Kent Club.

On Sunday, Sept. 20, the second annual competition was held on the grounds of the Channel Gliding Club. Four Clubs had entered, viz., the Kent, the Thanet, the Channel and the North Kent. The wind was blowing steadily from a direction unsuitable for flights on our usual ground and we visited a site which we hope to obtain for regular use in the future. It was the first time the Channel Gliding Club had made use of this but it was all to the general good as it removed any possibility of the Channel pilots securing a slight advantage owing to knowledge of local conditions.

An excellent afternoon's flying was enjoyed, the site and weather conditions being ideal for primary work. The stalwarts of the Kent Club had worked like heroes late into the previous night in order to have the machine ready in time. We were more than pleased to see our rivals of a year ago and also the pilots of the two new-comers in the competition. The standard of flying was of a very high order and demonstrated the strides made during the past twelve months.

Only one mishap marred the occasion. Mr. Pragnell of the North Kent Club, making the first flight of the day, landed heavily, the fuselage sustaining considerable damage. Fortunately the pilot was uninjured. The mishap ended a splendid flight of 24 secs., especially when one takes into consideration the fact that Mr. Pragnell was flying over ground entirely different from that to which he is accustomed.

After a thrilling contest the Channel Club re-won the cup by a margin of a fraction under 9 seconds over their nearest rival. The pilots and times, given in the order of the draw were :—

NORTH KENT

Mr. Pragnell :—24 seconds.

KENT

Lt.-Lt. G. Nicholls :— 20 3-5th seconds ; Mr. Dugdale :—22 1-5th seconds.

CHANNEL

Mr. C. M. C. Turner : 30 seconds ; Mr. W. Manuel : 36 2-5th seconds.

THANET

Fl.-Off. Mole : 32 3-5th seconds ; Sq.-Ldr. Cuckney. 25 seconds.

Mr. Penn was the time-keeper, to whom we tender our thanks for his services. After the competition Fl.-Lt. Bartlett and Sq.-Ldr. Cuckney made qualifying flights for their "A" certificates. Both are members of the Thanet Club and made splendid flights. Their times were 30 2-5 secs., and 34 secs., respectively.—L.H.H.

THE HERTS AND ESSEX GLIDING CLUB

This club have now acquired the use of an aerodrome (by kind permission of the owner) at Takeley, Herts. The aerodrome has an area of about 60 acres close to the main road between Bishops Stortford and Dunmow, about 5 miles from Bishop's Stortford. We have the use of this field until the end of October.

There were about 50 members and friends present on Sept. 18, when the Club met, and quite a large number of spectators. The Hon. Secretary of the Club, Mr. R. Dixey Gerrans, has acquired a B.A.C. two-seater sailplane, with which he is delighted. He says that it is a wonderful machine and answers to the controls marvellously, and that it is the ideal machine for Clubs to use for instructing their members. He has now made over 200 flights on the machine.

He gave instruction to other members of the Club, who are proceeding well. The average time for each flight was 2 minutes with a passenger on board.

The Club are meeting at Takeley each week-end now until the end of October. On behalf of the Club I would like to offer an invitation to any member of any other club who would like to see us at work. The Aerodrome is, as I have said about 60 acres and there is plenty of room for any other Club who would like to try our ground any week-end, and have a few friendly competitions. The aerodrome is really only suitable for auto-towed machines, but we should be very pleased to see anyone who cares to come over and see us.

Particulars may be obtained from R. Dixey Gerrans, Esq., Stanstead Road, Bishops Stortford.

THE OXFORD GLIDING CLUB.

A party from the Oxford Club spent a very enjoyable holiday at Balsdean with the Club machine and something like 100 flights were made as the weather was quite good during the week which the members spent there.

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