Gliding hints.
Wills flight page 19.

AUGUST, 1946

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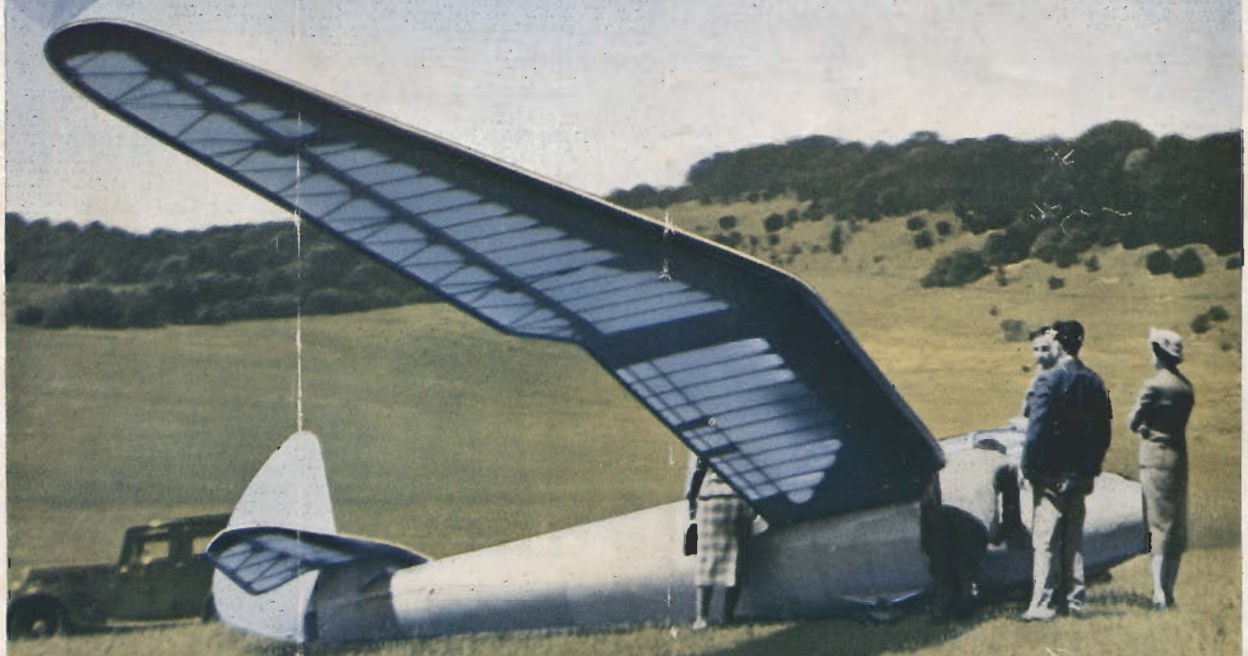
Sailplane and Glider

The First Journal devoted to Soaring and Gliding



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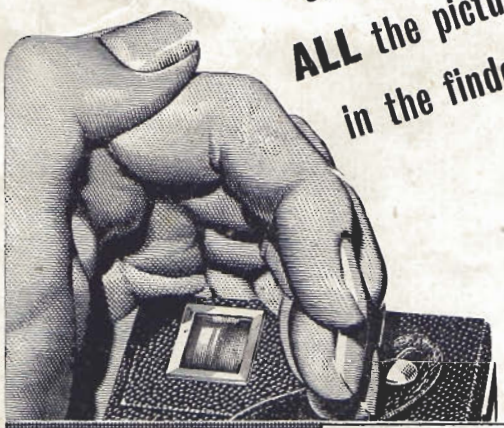

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Sailplane and Glider

THE FIRST JOURNAL DEVOTED TO SOARING AND GLIDING

AUGUST 1946 ★ Vol XIV No 8

EDITOR:
VERNON BLUNT

ASSOCIATE EDITOR:
ALAN. E. SLATER

ADVERTISING
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EDITORIAL OFFICES:
139 STRAND, W.C. 2
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CONTENTS

THE EDITOR RESUMES

EVER since the day the Editor sat next a total stranger at an English Cup Final—of which the other details are long since forgotten—and heard the toothless gums of his neighbour mutter aloud in alternate imprecation and prayer "All is not well with the State of Denmark" it has seemed to him that this quotation could only be used of serious things as football, cricket and now Soaring.

Is all well with the State of Denmark? Alas! No. The summer begins to wane and the nakedness of the land is all too apparent. It is true that those in possession of machines are putting in all the hours in the air that can possibly be mustered. Philip Wills' record height flight, Bira's 186 miles and heights of 13,500 and 14,000 ft., Nicholson's 170 mile flight. Wingfield's cross country from the Mynd to Redhill (147 miles), so soon after taking his Silver "C," Greig and Steve's cross country's, The Cambridge Club's 315 hours soaring in one week and so on. These are signs of vitality and great keenness, and added to the achievements of the Royal Air Force in Germany they are impressive figures. But, it will be noted the flights in England were accomplished by those devotees who are lucky enough to possess their own machines or be partners in a syndicate. The enormous figures put up at the Mynd were put up by seven machines, and only one club was operating. What could not be done if every club were able to hold a Soaring Week with even seven machines?

But alas this is almost all that has been done. There appears to be almost no "*ab initio*" training going on, and FForest Fawr could not begin for lack of machines Perhaps the situation in regard to aircraft will be remedied next year, despite the high export quota.

It is clear however that if the Government sets any store on the Gliding movement it will be necessary to grant a Subsidy to encourage newcomers. Those who have reached the "C" stage will probably take care of themselves. Indeed a most popular form of subsidy would be towards the purchase of primary and two-seater training machines. If the Government were to lower the price of surplus material, such as winches and hangars etc., to about one quarter of their present prices that would help even the established clubs. Otherwise the only new-comers will be those who have gone through the ranks of the A.T.C.—a most unwelcome thought—leaving out of account, as such a state of affairs would, not only the ex-service people but also the thousands of girls who wish to take up Gliding and Soaring.

Two other smaller points about the State of Denmark—petrol and cross countries. Now that the petrol situation is easier one brake on club's activities will be removed and winches and retrieving cars should no longer be starved of the essential spirit. But the question arises whether in encouraging cross countries we are not calling forth criticism from those who feel that petrol used on retrieving machines 200 miles away is wasted. And would it not be better to aim at "out and return" flights once the Silver "C" and Gold "C" distance flights have been accomplished? These are surely more skilful as well as more economical in petrol and time — especially in time on the ground of club or partnership machines in good flying weather.

Such a custom might well come to be regarded as "good form" in flying, just as a sign of a skilful pilot, (provided it is not attempted too soon by the inexperienced), is that he lands at the take off point to save time and effort in retrieving.

Such at attempt was made by Pringle of the Cambridge Club at the Leicester Meeting. All such attempts deserve to be commended since they show a recognition of the rights of the other club members as well as that there is more to Sailflying than merely going a long way even though it be in a comparatively short time. There is the journey back.

The Soaring Movement in Finland

EXCEPT for a few disconnected attempts, there was no real soaring activity before 1934 in Finland. That year, however, the Helsinki Technical High School student's Flying Club, popularly known in this country by the abbreviation PIK, made its first flights with gliders in Helsinki, and from this modest beginning the movement grew rapidly. Gliding clubs were founded all over the country, and in 1935 the Finnish Aeronautical Association established a Gliding School at Jamijarvi, where there is a small, 160 ft. high, suitable ridge. The pupils of the first courses cleared the field and built the necessary hangars themselves. During the same summer already 33 " A " and 24 " B " licenses as well as one " C " licence, were flown. In the following years soaring activities both throughout the country and at Jamijarvi developed at a good rate; so that between 1936 and 1939 about 5,000 flights were made yearly, the total flying time varying between 200 and 300 hours.

In the last summer before the war we were busy preparing thoroughly for the proposed 1940 Olympic Games, the soaring competitions of which were to be held at Jamijarvi. We also trained our own Olympic Team, achieving some good results. Of these may be mentioned, a 7.5 hours duration in pure thermal conditions, and a cross-country flight of 150 miles. The war, however, nullified the promising plans for the Olympic Games.

The activities of the following years were characterised by wartime with all its restrictions. The club work was nearly paralysed, whereas we still could on a limited scale give training for youth under drafting age at Jamijarvi.

In 1943 and 1944, however, soaring became more active, over 15,000 starts being made and 800 different licences taken.

POST WAR

During the first post-war summer, 1945, reconstruction of our gliding and soaring could begin, yet the difficulties were heavy. Pre-war planes and other materials had got into a rather bad shape and all kinds of new supplies were extremely hard to obtain—if obtainable at all. Nevertheless, activities in clubs throughout the country began gradually to wake to life, and during that year 1,200 starts were made and forty various licences taken in the clubs alone.

The Finnish Aeronautical Association had to deal with the same great difficulties at Jamijarvi, but it managed even to increase its activities, and so during the summer of 1945 more flights were made than in any previous year, the number being about 10,000, and 505 licences—264 " A," 188 " B," and 53 " C "—were taken. By now there are seven Silver " C's," 220 " C," 920 " B " and 1,275 " A " licences in this country.

The central body of all gliding and soaring, as well as of other spheres of sporting aviation in this country is the Finnish Aeronautical Association. This was, under the name of the Finnish Aero Club, founded in 1919 and was accepted a member of the Federation Internationale Aeronautique in 1921. The activities of the association, President of which is Col. V. A. M. Karikoski, are divided into five main spheres, dealt with by the corresponding Departments. These are the Aeronautical, Youth, Informations and Economical Departments. The Chief of the Aeronautical Department is Mr. K. Temmes, one of our best sailplane pilots; the Superintendent of the Jami Aviation School—that is its present name—is Mr. A. Lundin; responsible for the Youth Department is Mr. L. Poppius who, like Mr. Lundin is one of our foremost soaring pilots.

A " Grunau Baby " approaching to land on a frozen lake in winter, when most clubs in Finland are active.

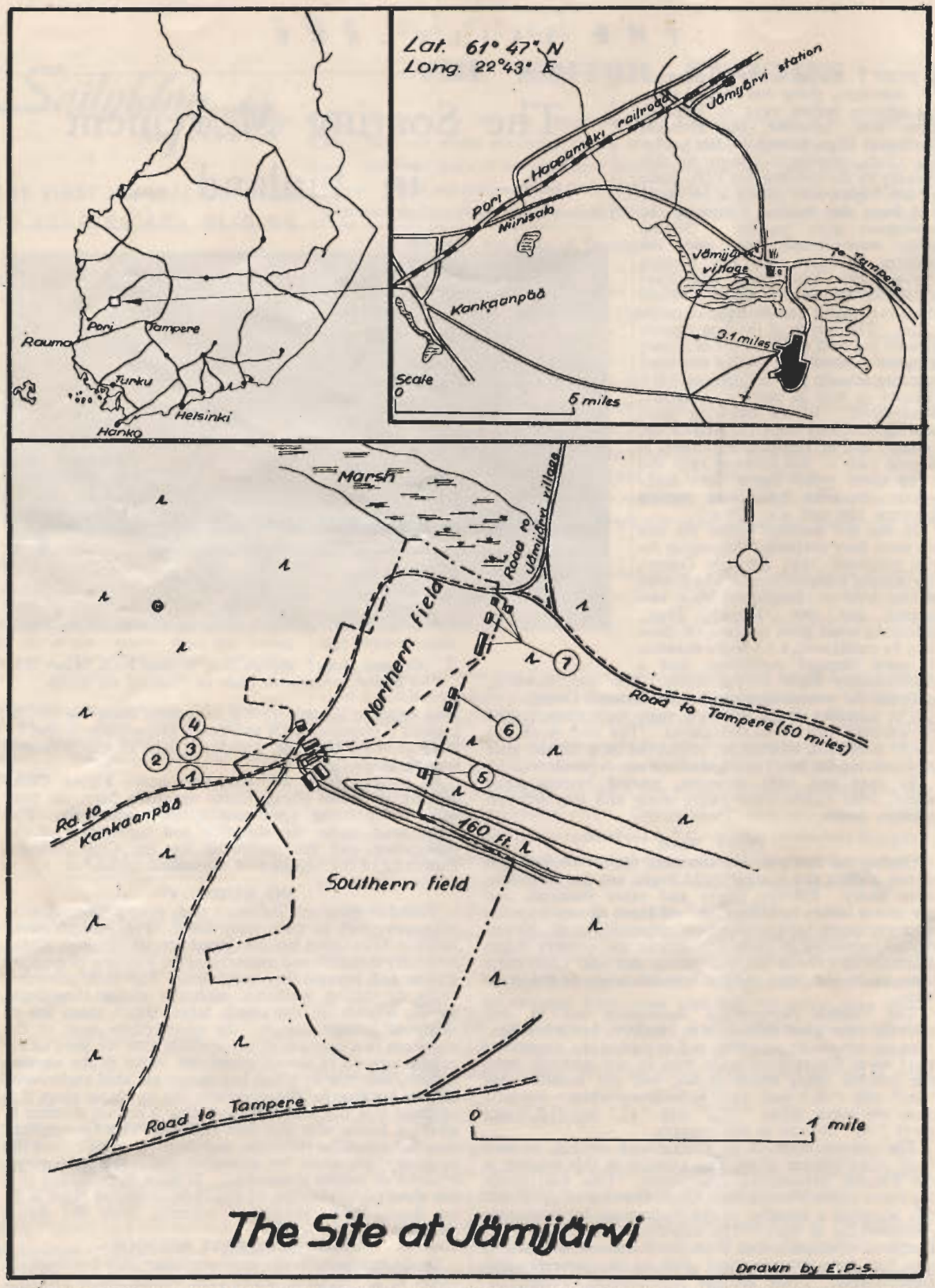
At present there are forty-two active Flying Clubs and eighty Model Flying Clubs operating here, the total membership being 1,500 and 2,000, respectively. The clubs work under the direction and supervision of the Association and are controlled by the Civil Aviation Authority of the Ministry of Communications.

NO SUBSIDY

The club members construct their planes themselves as voluntary work in their spare time. The Finnish Aeronautical Association has developed special kits with all the necessary materials and instructions for building elementary gliders and intermediate sailplanes. The more advanced clubs fly during weekends with the planes they built, during winters on the frozen lakes, which there are so many of in our country. In summertime most of the clubs are in a position to use airfields that we have in the neighbourhood of almost every city. Due to the circumstances, auto tow or winch launchings are used exclusively. Flights are free for the members, but to obtain them it is assumed that the members have done a certain number of working hours with the club aircraft. The Government does not subsidise the clubs, and they therefore collect the necessary resources by arranging exhibitions, displays, lotteries or parties themselves. It must be admitted that the economical situation of the clubs therefore often is by no means easy, sometimes affecting even the flying activities.

THE JAMIJARVI SCHOOL

In the summertime the most proficient club members are admitted to Jamijarvi, where their instruction is still free. At this school we train our club leaders, instructors and technical personnel. Paying pupils are also taken, but only on a limited scale.



The upper left map shows the position of Jamijarvi in South-Western Finland, with the railway connections and most important cities of that part of the country. The upper right map indicates the position of the site in the neighbourhood of the Pori-Haapamaki railway.

In the lower map of the site itself the numbers indicate:
1. *Main school building.* 2. *Hangar.* 3. *Technical and workshop building.* 4. *Hangars.* 5. *Lodgings.* 6. *Hangar.* 7. *Lodgings, kitchens, canteen, etc.*

The central buildings at Jamijarvi Aviation School. At left is the main school house, in the centre is a hangar, and in the background is the technical building with its workshops. The photograph is taken towards West.

The Jami Aviation School is in south-western Finland, about fifty miles north-west from the city of Tampere (Tammerfors). The site itself is very small by British standards, only 1.5 by .5 miles wide, but it is the best available in southern Finland which, on the average, is mainly flat, broken by thousands of lakes and large woods.

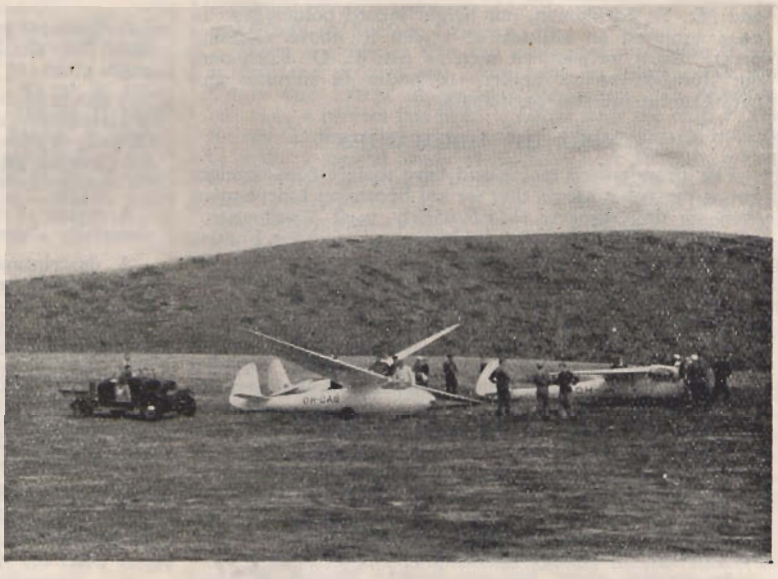
The site is crossed by a 160 ft. ridge, running from east to west and the terrain is almost plain, the ground being sand-bedded heath. The site is very suitable for its purpose, except that the ridge is all too low, preventing actual ridge-soaring save in a strong southerly wind. On the other hand, during the summer season the thermal currents are extremely strong. The surroundings are clad with a rather low, dry pine-forest, and there are larger cultivations only about thirty miles north and south of the site. This makes cross-country flights rather difficult, as there are not very many fields in the immediate vicinity of the site, which would allow for possible forced landings.

The School has four hangers, providing shelter for about fifty sailplanes and ten powered aircraft. The main school house has accommodation for more than a hundred pupils, and there are also some more buildings for lodging and administrative purposes. In addition, the School has a small technical and workshop factory, where a team of fifteen aircraft workers the year around construct and repair sailplanes for the School's use, and make kits for the clubs.

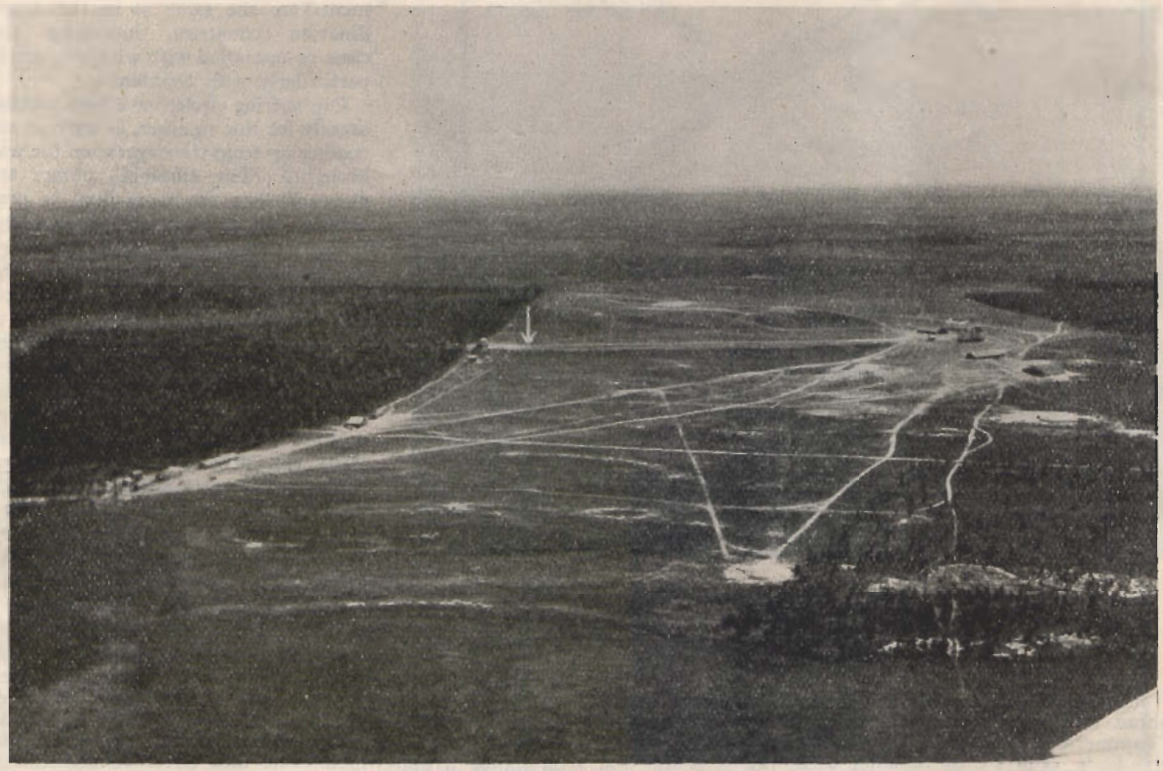
The soaring courses arranged at the School start usually on the first of June, continuing until the end of August. The length of the course is two to three weeks, during which time one licence may be flown. The requirements are the same as in the Scandinavian countries, indicating the close co-operation with which we work, particularly with Sweden.

Our soaring circles have been waiting eagerly for this summer, as we now are coming up from the depression the war brought. The summer courses are planned along the same lines as previously, but as a special occasion the Finnish National Soaring Competitions may be mentioned. These were for the first time held last summer at Jamijarvi, and are now planned to be held at Parola airfield, about thirty miles south-east of Tampere ; the place has been found to be excellently suitable for the Competitions. These are the more significant, as the best Finnish soaring pilots will be selected for the Scandinavian Soaring Competitions which are to be held in Sweden next year ; and the foremost pilots at the same time may train themselves for the 1948 Olympic Games, to be held in England in which we hope we may participate.

Many of our first-rate pilots took part in the last year's Competitions, and it may be said that the results were as good as they could be in the circumstances then prevailing. For instance, no aero-towing could be made before the last few days of the Contests, because the ban on motor flying, which came into effect simultaneously with the Armistice, was not lifted before that. Nevertheless, the contests were held and were won by Mr. Temmes, whose best result was an altitude of 10,100 ft. from a winch launch. He flew against such men as Mr. Poppius, one of our most experienced pilots, Mr. V.



In the upper picture : an " Olympia " and two " Weihe " sailplanes waiting for start below the Jamijarvi ridge, during the Finnish national soaring competitions last summer.



The site at Jamijarvi seen from North. Left are the central buildings and two hangars, to their left is the ridge, and in the extreme left are lodgings and a hangar.

Westermark, a well-known airline pilot, Warrant Officer J. Norola, who holds the 150 mile Finnish distance record, and Mr. P. Tarkkonen, our height record holder, who in 1944 achieved an altitude of 15,800 ft. above releasing point. Such well-known men as Mr. E. O. Korhonen, our duration record holder—10 hours 14 minutes and Mr. Lundin did not participate.

TYPES OF "PRIMARIES"

The aircraft used in Finland have mainly been foreign, but at present it seems that we are becoming independent even in this respect. Most widely used "primaries" are the "Schulgleiter 38," "Grunau 9" and the Finnish "Harakka" (the name means "Magpie"), which has been designed especially in view of easy construction and repair in the clubs, and has gained reputation due to its simple construction and pleasant flying qualities. As intermediate sailplanes we have used the Polish "Salamandra", which is famous for its extremely beautiful handling qualities, and of course the ubiquitous "Grunau Baby," both "IIA" and "IIB" versions. This is the most widely used sailplane in this country, and it is also built by many clubs. Of high-performance types the "Rhonbussard" has been in extensive use for many years, even among the clubs, but it is now being superseded by the "Olympia" sailplane. This is in small-scale production at Jamijarvi, where some "Weihe" single-seaters and "Kranich" two-seaters are also being used.

At present, there are two purely Finnish sailplane designs nearing completion. One of them, an intermediate called "PIK-5" will be flying next summer, and the other, a high-performance type, the "PIK-6," is in an advanced state of design.

Next Month's Features

A description by Philip Wills of his record breaking flight from the Long Mynd, including a copy of his baragraph chart.

A report of the first post war soaring contests to be held in Germany— at Oerlinghousen in June, which has been specially written by F/Lt. H. Neubroch, secretary of the Air Division gliding club. This will include a map of all the important flights made.

A report of the Hague gliding club's recent opening, pictorially illustrated.

A description of the new all-metal "De Schelde" glider. It is reported that the Dutch Royal Aero Club has ordered six of these machines, and that they are also intended for export. This machine has rently completed its test flights, which proved highly satisfactory.

It is hoped next month to publish details supplied by the B.G.A. which will considerably enlighten the confusion which has been prevalent owing mainly to the reports of the national press, in regard to the recent two-seater record attempts.

Will secretaries of clubs please let us have their reports earlier than usual as our press day has had to be advanced by one week.

APOLOGY

An apology is made for the printers' error in last month's SAILPLANE, concerning Philip Wlils' record height performance, which should of course, have been 15,000 ft.

BRITISH GLIDING ASSOCIATION
RESEARCH PROGRAMME

HISTORICAL

At its first post-war General Meeting in March, 1946, the British Gliding Association set up a Research Committee to co-ordinate investigations into matters relating to gliding and soaring, with special reference to meteorology and aerodynamics. This Committee, whose present membership and terms of reference are given in Appendix A, holds regular meetings each month and has already accumulated a considerable amount of information. In order to achieve a wider appreciation of its aims and objects it has now decided to prepare a single document outlining the programme of research which it hopes to initiate.

METHOD OF PROCEDURE

At an early meeting of the Committee it became clear that assistance in its research work would be forthcoming from a large number of Clubs and individuals, and to prevent overlapping and wastage of effort it was decided to appoint co-ordinators in each of a number of groups covering coherent sections of the programme. These co-ordinators have studied the proposals made by Clubs, and have prepared the relevant sections of this report in the light of these proposals and of their special knowledge of the problems involved.

ORGANISATION

Nine groups have been set up. The subjects and the names of the co-ordinators are given below :

Group 1. Detection from the Ground of Thermal Break-away.
- (a) By smoke and other wind indicators — Dr. A. E. Slater.
- (b) By radio and sonic methods — Mr. J. W. S. Pringle.
- (c) Nature of ground surface, by study of geology. — Mrs. A. C. Douglas.

Group 2. Aerodynamics — Mr. K. G. Wilkinson.
Group 3. Structures — Mr. K. G. Wilkinson.
Group 4. Properties of the atmosphere during convection.
- (a) Meteorological instruments in aircraft.
- (b) Analysis of flight records — Mrs. A. C. Douglas.
- (c) Relevant meteorological data — W/C R. M. Poulter.

Group 5. Sailplane instruments — Mr. A. L. Slater.
Group 6. Standing waves — D. W. E. Hick.
Group 7. Radio for gliding and soaring — Dr. W. E. Hick.
Group 8. Winches — Mr. A. L. Slater.
Group 9. Technique of mechanical launching — Mr. K. W. Turner.

Further groups may be set up as the research work develops.

PROGRAMME.

Group 1. Detection from the ground of thermal break-away.

(a) By smoke and other wind indicators.

The duration of flights over flat ground can be increased by so timing the launches that each pilot is in or near a thermal current at the moment of release. In order to secure general adoption of this practice, it is necessary not only to study the signs of thermal break-away, but to discover the simplest possible apparatus needed to ensure success.

A start will be made with wind indicators, which must show both changes of velocity (since the wind speed is reduced on the approach of a thermal and increases after it has gone by) and changes of direction (to show if the thermal is passing to one side of the indicator).

The research will determine :

1. Whether simple indicators, such as wind-socks or smoke-producers (e.g., burning oil-soaked rags, etc.) will give satisfactory results ; or whether more accurate instrumental recorders are essential, and if so, how their readings should be transmitted to the launching site.
2. Whether a single indicator, placed up-wind of the site, is sufficient, or whether several indicators at different points should be used.
3. What other signs of thermal break-away can usefully be correlated with these indicators (e.g., clouds and their shadows, tree movements, distant smoke, birds, etc.).
4. Exactly what signs indicate that the launch should commence.
5. The best technique to be employed by the pilot after release, and how it should be varied in accordance with variations in the signs of break-away.

(b) By Radio and Sonic Methods.

When convection is present in the lower atmosphere, the air at or near ground level undergoes periodic changes in temperature and velocity. If a source of energy (sound or radio) is placed on the ground with receiving apparatus at about 1 mile distant, changes will occur in the intensity and phase of the received signal if gradients of temperature or horizontal air velocity occur near the ground. These fluctuations are well within the range of measurement under the conditions likely to be present on a day when solar radiation is producing atmospheric convection.

It is proposed to set up one or more sources of radio and sonic energy and record changes in intensity and phase at a receiving station some distance away. At the same time sailplane launches will be made in order to correlate features in the record with the presence of thermal up currents near the ground.

Arrangements have been made for initial experiments to be carried out at Bourn aerodrome, the site of the Cambridge University Gliding Club, with sound detector equipment loaned by the Ministry of Supply (R.R.D.E.). If successful, it will be necessary to develop special apparatus to allow simultaneous recording over three or more channels from transmitters in different directions, in order to obtain an indication of the location of the thermal as well as evidence of its existence.

(c) Study of Surface Geology.

There is evidence that the geological formation of the surface and ground soil cover have an influence on the nature and extent of thermal convection. In order to test this, a project has been initiated with the help of the Surrey Gliding Club and the Royal Meteorological Society to make a special study of an area near Redhill, where a variety of geological formations is present in a small area. As a preliminary to the investigation a map has been prepared on a scale of 6 inches to the mile showing all features likely to be of interest. Recording instruments are being obtained on loan from the Meteorological Office for the measurement of air temperatures near the ground, and a detailed survey of the thermal currents over the area in various weather conditions will be made in sailplanes and light aircraft.

Group 2. Aerodynamics.

The initial programme in this group is mainly concerned with measurements of performance on standard British and German sailplanes types. No adequate flight data exist in this country and it must be a first objective to obtain these. The detailed programme to be carried out on the German sailplanes allotted by the Ministry of Aircraft Production is :—

(a) *Stability and Control Effectiveness.*

(1) Lateral and longitudinal stability measurements on the general lines of the B.G.A. Technical Committee handling schedule, with fuller investigation in special cases where this is justified. Special reference to spiral stability in circling flight, stick fixed and free, with parallel theoretical investigation.

(2) Aileron response measurement—rates of roll at operational range of speeds.
(3) Response in yaw following aileron application and adequacy of fin volumes.
(4) Effectiveness of rudder in producing co-ordinated turns.
(5) Longitudinal manoeuvrability—assessment of desireable margin.
(6) Determination of optimum handling qualified in relation to the pilot.

These tests will be carried out by various Gliding Clubs.

(b) *Fluid Motion Research at low Reynolds Number.*

(1) Tunnel tests on current glider wing sections at full scale Reynolds Number and low turbulence. These tests will be made partly by the Low Speed Aerodynamics Research Association at their Manchester tunnel, and partly at Cambridge University.

(2) Flight experiments to investigate transition, laminar separation and profile drag of wing sections on current high performance sailplanes. This will be carried out by the Cambridge University Gliding Club with the co-operation of the aerodynamics sub-department of the University.

(3) Analysis and correlation of tunnel and flight results and the design of new sections with improved characteristics. Special emphasis on achieving low drag over the whole operating range (e.g., by the use of chamber-changing flaps to give desired pressure distribution at high and low CL); also on producing good tip sections giving appropriate stall characteristics and control effectiveness near the stall.

(4) Determination of minimum standards of surface finish necessary to achieve low drag at sailplane Reynolds Number.

(c) *Performance Investigation.*

(1) Development of performance testing methods appropriate to sailplane (glide path recorders, etc.) and testing of modern high performance types.

(2) Analysis of results in conjunction with experimental data to determine efficiencies.

Group 3. Structures.

Much preliminary measurement work has to be done in relation to sailplane structures before the ideal construction will be attained. The initial programme is as follows :—

(a) *Collection of data on Structural Loadings.*

(1) Installation of V-G recorders on as many sailplane types as possible.

(b) *Aero-Elasticity.*

(1) Flight measurement of reversal speeds on typical aircraft.

(2) Consideration of control flutter problems peculiar to sailplanes.

(c) *Use of new structural Methods and Materials.*

Study of the application of plastics and light alloy to components and major structural members. At present it is proposed to engage an honorary adviser who will indicate profitable lines of investigation to be undertaken as and when resources permit.

Group 4. Properties of the atmosphere during convection.

This group covers a wide range of subjects, all related to the general problem of the detailed circulation of the lower atmosphere. The subject is of fundamental importance to the sailplane pilot, and under a different title—the structure of gusts—it is assuming an increasingly important role in aviation generally. The relatively slow-flying provides an ideal means of studying these phenomena.

(a) *Meteorological Instruments in aircraft.*

The initial programme consists mainly in the development of methods of measurement applicable to sailplanes, including :

(1) Study of the structure of thermal currents by laying a smoke trail across the area and subsequently photographing the shape and dispersion of the trail.

(2) Measurement of temperature gradients from a sailplane in flight by means of differentiamometersl ther at the wing-tips and tail of the plane.

(3) Measurement of electrical potential gradients from a sailplane in flight.

(4) Measurements of humidity gradients from a sailplane in flight.

These items will be carried out mainly by the Cambridge University Gliding Club.

The work of Group 3 (a) (1) is also of interest.

(b) *Analysis of flight records.*

(c) *Relevant Meteorological data.*

These two subjects are closely related. The Research Committee wishes to collect data on all soaring flights in which use has been made of vertical air currents other than normal hill-lift. A pro-forma has been prepared and circulated to Clubs, and a useful volume of data is already accumulating. By correlation of this information with meteorological data it is hoped to improve the methods of prediction of conditions suitable for soaring flight, and to elucidate in more detail the relation between the detailed circulation in the lower atmosphere and the synoptic charts. The reports from pilots will also provide data for other research groups, particularly Groups 1 (c) and 4 (a).

Group 5. Sailplane Instruments.

Whilst it is agreed that certain flying instruments are applicable to use both in Sailplanes and Powered aircraft and that considerable research has been done in certain respects, it is felt that further research is desirable in order to cover the field from the particular requirements of Sailplanes and other slow flying aircraft.

Airspeed indicators suffer from a certain amount of lag when reading in the 30—40 m.p.h. region and as this is the speed most commonly used by Sailplanes for maximum efficiency it is felt that investigation toward the removal of this feature would be of benefit.

Turn and Bank indicators and Artificial Horizons of the Venturi driven type need modification to make them operate efficiently at much lower speeds than has been the practice hitherto and research should also be carried out so that designs of electrically driven types of these instruments should be available at reasonable cost.

Sensitive Rate of Climb Indicators or Variometers, probably the most important instrument on the Sailplane panel, could be improved particularly from the lag angle. Investigation on the subject of Thermal Current Detectors (local and distant) should be made.

Recording instruments will be required for investigations by other Groups of the Research Committee and where these are not readily available from other sources, investigations on the design and manufacture of these instruments will be necessary.

Investigation into certain of the above fields is already in progress by certain Specialist Instrument Firms who have been contacted to find out what are the particular types of instrument on which they are working.

If these firms are willing to co-operate with the Research Committee of the B.G.A. much time and overlapping of effort should be saved.

Group 6. Standing Waves.

In certain parts of the British Isles wave formations are relatively common in the lower and middle layers of the atmosphere. These provide a means of soaring which has rarely been utilised by sailplanes pilots, though the results obtained on a very few occasions have been dramatic. The meteorology of these waves is not fully understood, and the Research Committee proposes to sponsor a particular investigation into the phenomenon of the Helm Wind at Hartside, Cumberland, in order to determine accurately the atmospheric conditions under which it occurs and the distribution of temperature and wind velocities through the wave. The initial programme, which will be undertaken by the Newcastle Gliding Club with the assistance of local authorities, is :—

(a) *Visual observations.*

(1) Plot track of section of atmosphere, using smoke rockets and photographing from side observations through a grid.

(2) Confirmation of smoke tracks from pilot observations.
(3) Plot wind speeds on ground over the Eden Valley.
(4) Record cloud features.
(b) *Flying observations.*
(1) To explore the horizontal, the vertical extent, and speeds of the rising air, using a sailplane, and to determine means of locating the sailplane position relative to the ground, preferably by using a vertical camera.
(2) To determine air temperature, pressure and humidity at various heights and positions.
(3) To determine cloud features at various altitudes.
(4) Sailplane to ground radio communications to co-ordinate ground and flight observations.

In parallel with this programme of work at Hartside an investigation of similar phenomena in Eastern Scotland and elsewhere may be made.

Group 7. Radio for gliding and soaring.

Several Gliding Clubs (including Newcastle, Leicester, and Cambridge University) are carrying out experiments with military radio equipment for two-way ground-to-air communication. This may be of value for initial training and advanced instructional purposes but much work has yet to be done to develop the ideal type of equipment for the purpose. The General Electric Co., Ltd., has agreed to loan suitable receiving and transmitting equipment for research purposes to one Club, and a frequency allocation is being sought from the General Post Office.

Group 8. Design of Winches.

Winches for launching Sailplanes have been in use ever since the movement started in this country but so varied have been the designs that it is considered desirable for the benefit of new Clubs just starting to operate to have available from the B.G.A. a standard design incorporating the ingenious ideas and experience that have been put into winches by the older Clubs. There is evidence too of much thought and work having been put into the design of winches in Germany and it is proposed to circularise the older Clubs asking for their opinions on design and to obtain if possible, sets of blue prints of the German designs. Converted Balloon Winches have also been used with considerable success by the A.T.C. for training purposes and as similar equipment may be made available to Clubs through the B.G.A., information regarding this type should be obtained.

Group 9. Technique of mechanical launching.

Efficient methods of mechanical launching are essential for glider training, including R.A.F. and A.T.C. programmes.

The objectives of the work of this Group are :—
(1) To enable launches to thermal-catching heights to be made in the most simple and cheap manner from small fields.
(2) To recommend special design features which may be found desirable for sailplanes, winches and launching cars employed for this purpose.
(3) To evolve the most suitable training procedure for use in particular by gliding clubs or groups to whom the ex-R.A.F. run-ways are available.

The programme is as follows :—
(a) Mathematical investigations. These are already in progress and form the basis of the practical experimental work.
(b) Development of technique of winch launching by "tension control" as opposed to the present "speed control."
(c) Series of experimental winch launching using abnormally long cable lengths, and development of techniques involving unwinding and rewinding of cable.
(d) Trials of car-towed launching along long R.A.F. airfield runways, both for training and for thermal-seeking flights. Compiling of operational data regarding cable-economy, petrol consumption, take-off frequency, etc.
(e) Development of utility devices to (1) give glider snatch take-off when launching car is already in top gear and (2) rewind cable on drum prior to return of car to take-off point or to retrieve landed glider.
(f) Development of utility parachute or other device to retard fall of, and straighten, cable after release from both winch and car-towed launches.

RESEARCH LIBRARY

In addition to its ten groups covering the sections of its programme, the Research Committee is undertaking, for general information, the compiling of a bibliography of scientific papers relating to its work. Reprints of these papers, where available, will be acquired by the Committee and will be available on loan to members of Affiliated Clubs.

RESEARCH CENTRE

Some of the work which the Committee wishes to undertake can hardly be carried out by Club Members as a spare time occupation, and in due course it may be found necessary to set up a small full-time nucleus staff at a research centre. Cambridge has been suggested for this, owing to the close relationship which could be established there with the Aerodynamics Sub-department in the University.

FACILITIES AND EXPENSES

It is already becoming clear to the Research Committee that much of the above programme cannot be carried out at present without considerable assistance to the Clubs and individuals concerned. Many of the instrumental demands might be met by loans from government research establishments if approval were given in principle for such loans to be made. The shortage of sailplanes, though serious, is only temporary and has been partly offset by the loan of six damaged but repairable German sailplanes from the Ministry of Supply and Aircraft Production. Some projects could, however, be hastened considerably by the release to the British Gliding Association of some further sailplanes now used for recreational purposes by isolated R.A.F. stations in this country.

The financial aspect of the programme is, however, much more serious. Very little of this research and none of the co-ordination and publication of results can be carried out without expenses which are far beyond the financial capabilities of the British Gliding Association or of Clubs and individuals, and many of the Committee's proposals are, of course, entirely conditional on the availability of adequate financial assistance. The total amount required is set out below.

The rise of post-war costs has left Gliding Clubs with no funds to spare for extra undertakings ; even the repair of the six German sailplanes alloted by M.S.A.P., to make them available to research groups, represents an expenditure which the British Gliding Association cannot undertake without assistance. The Research Committee is therefore asking for a grant from the Air Ministry, to enable it to carry out its programme, of £2,000 per annum for five years, with an additional initial sum of £3,000 for starting expenses.

Detailed assistance is also being sought in such matters as petrol allocation, use of R.A.F. aerodrome and facilities, and access to war-time secret information. To assist with all these matters, it is proposed to ask the Director of Scientific Research Air Ministry, to allow a member of his staff to attend meetings of the Committee.

TOTAL ESTIMATED EXPENSES OF RESEARCH PROGRAMME

(a) *Initial expenses.*

Repair, completion and equipping of German Sailplanes, including instruments required for tests in Group 2 specifically requested by Ministry of Aircraft Production on allocation of sailplanes	2,500	0	0
Other initial expenses	500	0	0
INITIAL TOTAL	£3,000	0	0

(*continued on page 27*)

CAMBRIDGE UNIVERSITY GLIDING CLUB

AT LONG MYND.

Welch flying the " Cambridge."

John Pringle in " Blue Gull " before setting off on cross-country—Sunday, June 23rd.

IN MAY it became obvious that many members of the Club would be ready to be initiated into hill soaring. The pre-war camp sites in Wiltshire were therefore inspected but were found unfortunately to be ploughed up and unusable. Arrangements were then made by kind co-operation with the Midland Gliding Club to hold a fortnights camp at their site at the Long Mynd.

Three " Cadets " and the " Cambridge I " were therefore packed into trailers at the end of term and moved on Friday, June 14th. The following private machines also came :—

" Weihe "	.. ..	Philip Wills.
" Minimoa "	.. ..	Prince Bira.
" Blue Gull "	.. ..	Grieg and Stephenson.
" Petrel "	.. ..	John Simpson.
" King Kite "	.. ..	Arnold and Williams.

" Gracias," and the " Wolfe " belonging to the Midland Club were there as usual.

Monday, June 17th. Strong westerly winds. A large amount of hill soaring but nobody got away.

Tuesday, June 18th. A great cross country day. The Westerly winds were combined with useful cloud. Prince Bira flew to Aldeburgh on the Suffolk coast, 183 miles in 4½ hours. Grieg went in the " Blue Gull " to Market Harborough—80 miles. In this Leicestershire district thermals seemed to cease completely as has been noticed by several pilots previously. The cause is probably the boulder clay subsoil which seems to damp out any thermal activity. Charles Wingfield went to Wolverhampton in " Gracias "—28 miles.

Wednesday, June 19th. Weather the same as the day before. Philip Wills went to Molesworth, near Huntingdon. This was 105 miles and 12,000 feet was reached. Owen Wingfield completed his Silver " C " by flying in " Gracias " to Birmingham—40 miles.

On these three great days Cambridge undergraduate members took their " C's." Eight were obtained. Six members each flew around for 5 hours and thus did this part of their Silver " C ". On Wednesday there was 58½ hours of flying, almost equal to the Mynd record.

Friday, June 21st. Stephenson flew to Bicester—90 miles.

Sunday, June 23rd. A day of light variable winds and no slope soaring was possible. There was however great cloud formation with thunder and lightening intermittant throughout the afternoon. With only poor winch launches practically everybody contacted thermal. Philip Wills reached 15,300 feet above the point of release. This flight was done in a huge anvil topped cumulo-nimbus which it is believed covered the whole of central Wales. Wills later landed at Newport, Mon. ; very near his goal at Cardiff.

Prince Bira did two great climbs in separate clouds both to over 13,000 feet on his way to Staverton in Gloucestershire. John Pringle in the " Blue Gull " went North of the site where the clouds were smaller and less rough. He eventually landed after taking a round-about route at High Ercall, near Shrewsbury, having reached 9,500 feet on the way. Stephenson test-flew the " King Kite " and its magnificent performance at speed was obvious from the ground. Unfortunately on the following Wednesday a serious accident occurred with this machine—the details of which gliding folk now know.

Monday, June 24th. A good westerly wind with lots of soaring. Two " C's " and two Silver " C " durations were obtained.

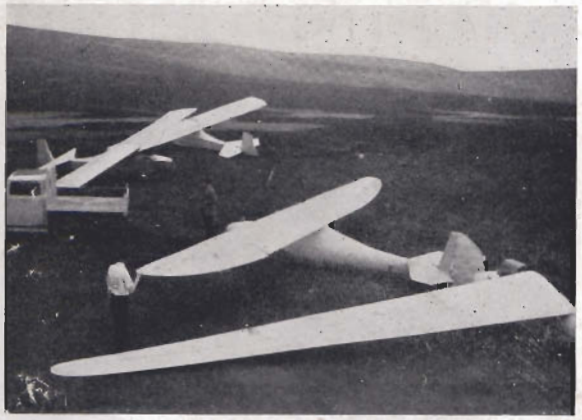
Wednesday, June 26th. A day very similar to Monday with a lot of hill soaring.

Friday, June 28th. Three pilots set out for Lowestoft —a destination which gives a Gold " C " distance. Grieg was let down at Much Wenlock while Bira, and Kit Nicholson in the " Weihe " struggled on under very difficult conditions. Bira reached Stamford 96 miles, while Nicholson landed at Attlebridge aerodrome, near Norwich ; very near his destination.

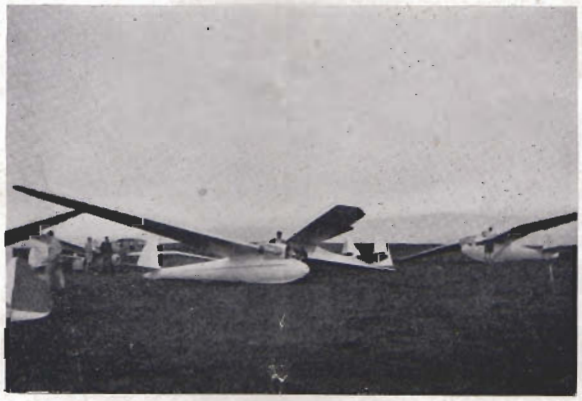
On the next day the " Cadets " were packed away and taken home and thus ended a very successful fortnight's flying. The total hourage of flying was 295, and the distances covered on cross countries totalled 910 miles. Ten " C's " and eleven Silver " C " durations were obtained. On three occasions cloud base at over 2,000 feet was reached in " Cadets."

The Cambridge Club are tremendously indebted to the Midland Club for giving us such a good time. Our thanks must go to their members who helped and organised for us, especially to Testar who gave members 2-seater experience and to Mrs. Jarrett who did the catering.

Bira's dog, Titch, being put into the "Minimoa" before setting off. Kit Nicholson and Philip Wills standing by.



A general view at the Mynd during the Cambridge Club's camp. Two "Cadets," the "Cambridge" belonging to the Club, and the "Weihe" being rigged.



Identification? Another view of the machines at the Mynd. Left to Right—"Wolfe"; "Minimoa"; "Weihe"; "Cadet"; "King Kite" (tail); "Blue Gull."

"Gracias" owned by Charles and Oliver Wingfield.

Keith Turner about to be bungied off in Prince Bira's "Minimoa."

The original "Cambridge" still owned by the Club at Bourne Aerodrome.

SOARING IN THE SWISS ALPS—II

Electric winch launch from Samaden.

THE recent "SAILPLANE" articles on Swiss gliding have aroused so much interest that it becomes desirable to consider the cost to the English visitor. This can be varied widely by the length of the visit, the location, the amount of flying and whether aero-towing is employed, etc. Moreover there is the question of whether one will go alone or with an organised party. First let us consider a few pilots making their own way across. They would be well advised, before going to one of the summer camps like Samaden, to visit one of the permanent schools to become acquainted with the Swiss machines, gadgets, flying terms and, not least, to be checked out as proficient. Travel to Switzerland by air van be arranged by "THE SAILPLANE" at 6d. per mile per passenger, that is, roughly £25 from Croydon to Zurich or Bern. This can be paid in England and will not come out of the allowance of foreign currency (£75). One should apply to the Federal Air Office, Bundeshaus-Nord, Bern for a permit to fly, submitting in person or by post ones B.G.A. certificate and log book (together with "A" license if power flying is proposed). The cost is trivial. One can now set off to one or other of the permanent flying schools such as :—

Segelflug schule	Birrfeld
Flugschule Santis	Altenrhein
Ae. C. S. Fliegerschule	Grenchen
Sportsfliegerschule	Bern

All these establishments will give facilities for sailplane flight. The writer would recommend the latter as being near the attractions of Bern city, having fairly good food and accommodation at a low figure (about 10/- per day inclusive) and being a very efficient school with all types of aircraft and aero-towing.

At Belpmoos, the airport of Bern, the charges are :—

	Basic charge,	plus flying minute.
Two-seater sailplane	4 francs	0.25 frs.
Single-seater sailplane	3 „	0.15 „
Aerobatic sailplane	3 „	0.25 „
Aero-towing	Nil	1.00 „

A franc is worth about 1/3d. We can guess at the approximate expense for three days with some imaginary flying :—

	frs.	frs.
Hotel charges, at 9 frs. per day ..		27.00
Two check flights in two-seater ..	8.00	
Plus 10 mins. flying charge, each ..	5.00	
6 flights in various single-seaters ..	18.00	
Say 2 flights off winch Total 10 min.	1.50	
Say 4 soaring flights „ 100 „	15.00	
Four aero-tows „ 25 „	25.00	
	72.50	
		72.50
Allow sundry expenses, say		30.50
		130.00

That is about £7 . 14 . 0 for the 3 day visit.

From these figures it will be seen that for £35 or under one can cover all the preliminaries and fares prior to a visit to Samaden or some other advanced soaring site. F/Lt. A. Mirsky who recently visited Bern and flew the "Kranich" for about 45 mins. has given below a wealth of information about Samaden from which the reader can estimate the rest of the costs. The question of insurance might be best settled in England with ones own broker before going over. In this case a certificate of insurance against third-party claims and covering any machine flown up to a value of 6.000 or 7.000 francs would save a lot of time and cost.

The foregoing relates mainly to free-lance visitors. Advantages would arise from organising a group. Insurance would be one of them, as something like a club policy could be taken out to cover the trip. The Sports-fliegerschule at Bern is proposing to conduct one or more summer camps at Reichenbach in the Bernese Oberland and the cost of transport machines would be very much less, while the transport of visitors is reduced to 20 mins. flying from Bern. However, the soaring conditions in this part of the Alps have yet to be proved as good as at Samaden and a group of visitors would be free to consider the position while at Bern, or any other school they might favour. Summer camps are being "laid on" at many places and small parties can be catered for, while a party of say 8 pilots could form a camp of their own by arrangement in advance. As a "Rapide" carries five passengers this is a convenient number from that angle as the chartered aircraft will take one direct to the gliding school, saving time and money.

We can take it that a visit of ten days will cost £50 or more according to ones thrift. Thrift is a quality difficult to practice with the shops full of coupons free clothing, watches and other personal needs. £75 should be more than adequate for a single visit as the amount that one is permitted to spend outside this country, apart from the air travel ticket bought before one sets off.

The excellent photographs of Teddy Heimgartner accompanying this article reveal what a fascinating holiday awaits the lucky soaring visitor. "THE SAILPLANE" will be glad to give further information and arrange transport. Readers should state full details of their desired visit.

J. CECIL RICE.

GLIDING PROSPECTS AT SAMADEN THIS SUMMER

In the may issue of the SAILPLANE AND GLIDER Mr. Hiscox gave some information about one of the most interesting gliding sites in Europe — Samaden in Switzerland.

I have just spent several days at Samaden, and thanks to Herr Risch the airfield manager there, I am able to give more detailed information below on the conditions and terms for foreign pilots who wish to fly in Switzerland.

Flying Certificates: The 'Eidgenoessische Luftamt' (Swiss Air Ministry) in Bern has ruled that a foreign pilot wishing to fly in Switzerland must obtain a Swiss flying license. This can easily be obtained on producing the B.G.A. certificate at a cost of a few Swiss Francs. (17 Francs—£1.0.0).

Insurance: The Swiss Aero Club insists that each pilot be personally insured, and the cost of the premium for a short term policy is about 15 Francs.

Flying charges at Samaden:

Charge per winch launch	.. .. ..	3.50 Fr.
Charge per hour, glider not insured*	..	15.00 Fr.
glider insured**	..	20.00 Fr.

The High Alpine soaring site of Switzerland, at Samaden in the Upper Engadine (5,300 ft.).

Soaring over the Rhone Valley at Montana—" Crans. S.16 " training type from Sion Sailplane Club.

A " Spyr III " and a " Grunau Baby," both of the Zurich Sailplane Club, on Alp Scheidegg (3,600 ft.).

All day hire, not insured	50.00 Fr.
All day hire, insured glider	65.00 Fr.

* A deposit of 6 to 8000 Fr. (depending on the value of the glider) is necessary).

** The insurance terms are that the first 300 Frs. in case of breakages are borne by the pilot. Hence a deposit of 300 Frs. is required.

Charge per week, not insured	250.00 Fr.
insured	350.00 Fr.
Charge for motorcycle retrieving cables, all day	10.00 Fr.

The gliders which are not incurred can be insured by visitors on the following terms :

Premium per year	20% of value of glider.
	10% of repair costs in cases of damage are borne by the pilot, and in any case the first 300 Francs.
Premium 2—4 days	12% of yearly premium
4—8 „	20% „ „ „
10—12 „ ..	25% „ „ „

As in the previous case a deposit of 300 Fr. is required.

I have given the detailed list of charges because the £75 . 0 . 0 which a person from Britain is entitled to spend abroad per year will not go a very long way unless some planning is done before setting out. Switzerland for a tourist these days is more expensive because apart from prices having risen considerably, there is much to buy ; however, hotel charges at Samaden (with full board) are reasonable—12 to 14 Fr. per day.

Glider types : There are a number of high performance " S.18 " sailplanes for hire at Samaden. They are all privately owned, and so far only one has been insured by its owner. The sink performance of an " S.18 " is comparable to that of an " Olympia," but its penetration is somewhat poorer. True to Swiss tradition the " S.18's " are laden with interesting gadgets apart from the standard ones. There are inclinometers, clocks, cable release and undercarriage jettison indicators, and a cockpit release knob for catapult launches. In a " Moswey III," a fully aerobatic machine there was an accelerometer for measuring the degree of " g ", and the much famed Slater Cobb variometer. A " Kranich " is also kept there in which each new arrival is taken up by Herr Wessel, the voluntary flying instructor from St. Moritz. Flying conditions in the mountains are such that even a proficient glider pilot would be wise to have a few words of advice in a " Kranich " before going up by himself. Average winds and thermals are fiercer than at most places, and forced landings some distance away from the airfield may present considerable difficulty.

One noteworthy feature at Samaden is the catapult launch from the top of the Muottas Muraigl, whose main soaring slope rises very steeply out of the valley. (The winch launches are done from the airfield in the valley). There is a funicular taking both pilots and gliders right up to the launching site.

Anyone wishing to receive further news about Samaden or detailed information about other gliding centres in Switzerland would do well to contact Herr Gehriger, the new Secretary General (Zentralsekretaer) of the Schweizer Aero Club at Zuerich, Hirschengraben 22. Herr Gehriger is a most helpful person and tremendously enthusiastic about furthering our visits to Switzerland as well as sending Swiss pilots to England the moment our clubs are in a position to offer flights.

MY SILVER "C" FLIGHT

JUNE 18th, 1946

BY PRINCE BIRA

APART from a cross-country flight to Deenethorpe from Rearsby, a distance of 22 miles last April, I had not ventured in this new form of travelling. I found it most thrilling but I myself was over worked. Every ounce of concentration went into that flight and 4 hrs. 26 mins. flashed by without one second of boredom.

On the morning of June 18th, I glanced skywards from my bedroom window at Ratlinghope Farm near Long Mynd and I thought it was likely to be a good " cross-country " day. We ate our breakfast quickly and hurried up to the Mynd.

There was already plenty of activity there with the " Blue Gull " and " Gracias," " Kirby Kite " soaring off into the blue. Being a novice at this game I consulted Philip Wills as to the best plan of attack, suggesting Cambridge as a possible destination. Wills readily agreed, adding that the other people were already on their way there, with the further aim of reaching the coast of Aldeburgh.

Having been strapped up inside the " Minimoa " perspex cock-pit cover, equipped with a parachute and lunch, I was ready for anything. I was shot off the hill at approximately 10.30 a.m. and soared quickly up to 800 feet above the site on hill lift. Thereupon I spotted a grey base cumulus cloud West of the hill and promptly left the slope for it. I came into contact with this cloud with surprisingly little loss of height. Within a few minutes I was gaily underneath this dark umbrella of cloud with a steady lift of 5 to 8 ft. per second. Just before I was completely sucked right up into the cloud I caught a glimpse of the " Weihe " machine belonging to Wills circling five hundred yeards away to the West of me, and a nasty thought passed through my mind whether we should meet at the top of the same cloud ! I took note that the wind

Prince Bira with " Titch," beside the " Minimoa."

direction was Westerly and as the drift was rapid, I knew that when I should eventually come through I would be well beyond Church Stretton, i.e., there was no turning back to resume the peaceful " slope soaring " once again. Not having done more than a few minutes at a time of blind-flying, I found it most disconcerting to have to give way to instruments rather than my own instincts. However, the book of the words had to be adhered to, so " Mini " and I stuck together for fifteen minutes when we shot out from the side of the cloud. Quickly looking round and downward, I noticed that I was over Craven Arms-Much Wenlock railway line and I was 4,500 ft. above sea level, so I dived back into the same cloud from which I had just emerged. Then I went through a series of strong down draught and up draught. This time I took no breather and struggled on as best I could with both eyes glued to the instrument panel. I must have wandered around all over the place inside this turbulent mass of air, neither gaining not losing much height when suddenly I was sent straight up like a lift in a fifteen feet per second climb with comparatively smooth air. The cockpit cover became lighter as I approached the South side of the cloud eventually to come out into dazzling sunshine at 6,500 ft. I was so relieved to see normal light again after 45 minutes of that uncanny world that I just straightened up and flew Eastward. I saw a huge town on my right which I thought to be Kidderminster but it appeared to be Birmingham so I must have drifted well North of my course. On skirting that city I went under another cloud which took me up from 3,000 ft. to 5,600 ft. in 5 minutes. I straightened up and headed for 130° and came through a cloud over Atherstone. I did two small climbs South of Leicester after which I decided that blind flying was tiring especially when the turn-bank battery was right down. I became depressed as I had to steer away from cumulus activities to a dead calm air towards Huntingdon and for twenty minutes my heart sank in proportion to the rate of sink of the aircraft. With 2,500 ft. left, I circled and prolonged my agony over Huntingdon. Having drifted with a weak thermal well past St. Ives, I then headed for Cambridge. I had to fly cross wind in order to reach Cambridge and soon found the earth appearing with clearer details than I liked to see, in fact it became obvious that I was not going to reach my goal; so I prepared to land at Oakington Aerodrome. As I was sizing up the situation at a height of 1,200 ft., I hit a colossal thermal which I heartily welcomed. This episode took me gaily up again to cloud base and I snapped my fingers at Marshall Aerodrome, Cambridge, thinking " I must get to the coast!" But I was mistaken for, leaving the lift I had a terrible sink of more than fifteen minutes before I struck another up current. By this time I had passed Newmarket and had Bury St. Edmunds on my left. Many aerodromes appeared which was encouraging. Then I caught sight of the coast line which made my heart thump, for the first time in real earnest. I flew towards a big black " cloud street " with a hard edge. In order, however, to get to Aldeburgh I had to make a detour around an area of rain storm which curtained off the sight I wished to see. I flew towards Ipswich only to find that the air over there was highly turbulent with strong gusts due, I supposed, to that front. As I rode the " up current " side of the " street " I flew towards Aldeburgh. From that vantage point of 3,200 ft. I chose an aerodrome nearest to the coast which I could see, and made it my objective rather than chancing the beach. I dived down with great gusto and as I must have been silent during my approach the control tower did not spot me until a few minutes after I was already sitting pretty on their front lawn.

After such tribulations which, nevertheless, I much enjoyed, I was delighted to find that I had accomplished a straight line distance of 184 miles, and I am naturally most happy to have completed the third leg of my Silver " C."

THERMALS

WE HAVE all been involved in arguments on the Bubble Theory of Thermals, but many of us considered the evidence unsatisfactory. Clearly in some cases a Thermal did not behave as a bubble, since pilots would contact their thermal at a very low altitude and continue to climb until long after the machines known sinking speed would have taken them out of the bottom of any normally shaped bubble. Examples described in THE SAILPLANE include J. E. Simpson's flight to Norwich (July, 1938) when he stayed 17 minutes in a thermal contacted at 1,300 ft. (he should have sunk through it in 9 minutes) also Collin's flight (May, 1934) in which he stayed 8 minutes in a thermal caught at 100 ft. Even " Rhonadler " sinks more than 2½ inches per second. And can bubbles be formed without surface tension?

It was therefore very satisfactory to have visual proof that thermals can be in the form of stable colums. Both in Sudan and in Poona district fine examples of dust devils were seen. These have been well described in THE SAILPLANE; the photos give an idea of their size. They begin as small whirls and rise rapidly to 2,000 ft. or more and reach a definite diameter and speed of rotation. They drift with the wind, and seem unaffected by the nature of the ground with which the base is in contact provided it is reasonably level, but they are usually broken at the base by any obstructions such as trees. When this happens, the base is rapidly sucked up and the whole loses form and ceases to spin, leaving a vague cloud of dust (shown in the last photo). The base is always of smaller diameter than the rest of the column. Both rotation directions occur, probably anti-clockwise in the majority. The most important fact is that in good conditions they last for very long periods, up to 15 minutes being observed. Cases of three columns on the same track at the same time were seen in a long valley with a level dry sandy floor in Sudan).

What theory fits? I read that a vortex in a perfect fluid is indestructible; but a vortex normally has no ends. If it is not a complete ring it could not contain a low pressure to balance the centrifugal forces, and would then become shorter and wider. However, in a thermal column we have the hot air at the top end of the tube maintaining the low pressure in the same way as a balloon produces tension in its cable (see Fig. 6). This is replenished by hot surface air which has entered at the bottom: and there was never any evidence of a column failing from the top end. The bottom end is sealed by the " end wall " effect of the ground, though owing to friction the speed of the rotating air is reduced and so the low pressure within the tube reduces the diameter until centrifugal forces again balance it. But if an obstruction slows down the air at the circumference the low pressure is unbalanced and air will flow into the centre of the tube, which will then expand and draw in its end.

Such a system would be stable when formed. The original circulation is probably largely accidental due to local features. The factors governing speed of rotation or diameter are doubtful: but a given column will increase in diameter if the upward pull becomes less strong. But any column could be of larger diameter if spun faster.

English thermals might then be large diameter columns of slow speed which would not produce sufficiently low pressure to lift dust. They seem to have narrow bases. They will not usually last so long due to the less regular surface and once broken from the ground will be similar to the little bubble we are so often disappointed to find. And note that if you are looking for a column you should not expect its base to remain in your favourite cornfield.

J.A.A.

LONG MYND TO MOLESWORTH

19th June, 1946 *by Philip Wills*

ALTHOUGH this flight was a complete failure in that I accomplished neither of the two objectives I set out for, it was nevertheless one of the most interesting I have ever made, and one about which I felt quite pleased with myself in the bargain. For it showed me that the six years enforced lack of sail-flying has not made me too old to go back and find the same fascination and the same tantalising vista of new worlds still awaiting to be conquered.

On the 19th the wind was light and W.N.W., almost straight up the hill. The forecast talked of cumulus, showers, occasional thunder, and such like intoxicating delights, but a slight shadow was cast by talk of a small polar low over Bristol travelling S.E. and then E., with associated low cloud.

However I decided to declare Cambridge as a goal, and also it was an obvious day to go for altitude on the way.

I took off at 11.30, the wind was just strong enough for a bungey launch and a very gentle climb up to 400 ft. Then just North of the clubhouse I struck lift up to 10 ft./sec., and 12 minutes after take off, was at cloud-base, 2,000 ft. above takeoff altitude and half way back to Church Stretton.

I switched on the turn-and-bank indicator, and hardly switched it off again for three hours.

I circled up in fairly gentle lift in this first cloud to 3,500 ft. (I will talk in general in altitudes above take-off. To get altitude above sea-level add the height of the Mynd, 1,450 ft., throughout) and then set off on my course, approximately 105° magnetic, still in cloud.

MAIN DIFFICULTY ENCOUNTERED

The main difficulty of the day was that the clouds were in large untidy lumps all over the place, and rather widely spaced apart, and cloud base was only just over 3,000 ft. above sea-level, a scandalous state of affairs for English mid-summer weather.

Thus it was necessary to keep above cloud-base as much as possible, and this I achieved, being above this level and mostly in cloud for three hours of the four and a quarter hours of the flight.

But in this condition I hardly ever got a good view of the clouds around ; when I came out for a few minutes ragged and titanic masses of tumbled cloud were all round, and I couldn't see the wood for the trees.

It was also necessary on these brief occasions to locate oneself by a glimpse of the shadowed world through the hole beneath one, fortunately my A.T.A. past stood me in good stead, as in the last six years I have come to know England from above in a pretty comprehensive way.

REPAIRS TO TURN AND BANK

I came out of my first cloud over the Southern end of Wenlock Edge, and almost immediately entered another just ahead, from which rain was falling fairly heavily. The lift was ahead of the rain, which I first flew through, and circled up rather slowly to 3,500 ft. again. Here, to my dismay, my turn-and-bank stopped working, and when from the complaining noises from the " Weihe " I realised this, I clapped on the air-brakes and let her sort herself out, whilst I fiddled about with the 4½v. torch battery in its container, eventually to my relief, finding a faulty contact, and getting the instrument going again.

I had lost about 600 ft. doing this, but on putting off the dive-brakes, found I was still in lift, and started circling again.

MY SYSTEM ON THE " WEIHE "

My system on the " Weihe " is as follows. First set the tail-trimmer so that the machine flies hands-off at 48 m.p.h. (10 m.p.h. above normal). Keep this trim unchanged during the blind-flight, circle about rate 2. When the speed tends to build up, rudder back until the turn needle is central again, ease off the speed on the elevator, and start circling again. *Never try to ease off the speed whilst still in the turn* ; that way lies the High Speed Spiral Dive, to which I give respectful capitals, having met it once unexpectedly face to face round a corner. (*See* THE SAILPLANE, July, 1936). Note that for blind-flying a sailplane *must* be stable in pitch, either positively like the " Minimoa," or neutrally like the " Weihe." It must also be stable in yaw and roll, but pitch stability is really vital from the safety point of view.

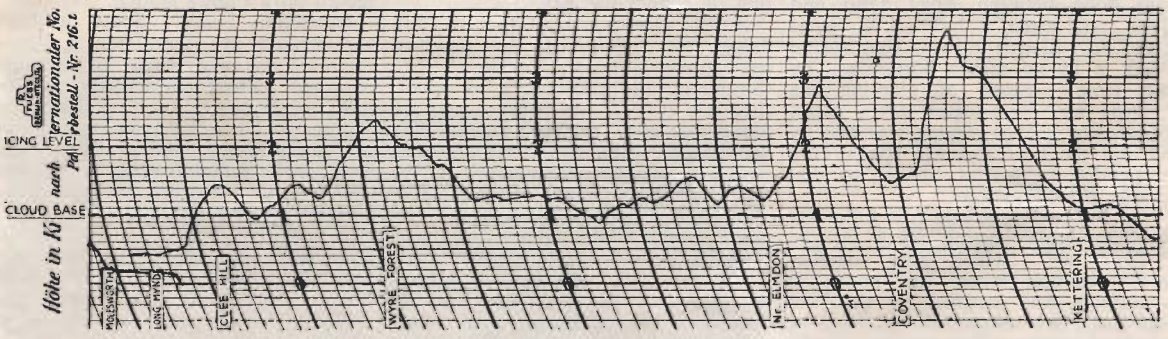
ICE FORMS

I now found myself climbing fairly well at about 10 ft./sec., but the air was not as smooth as in the more powerful up-currents I have met. In fact I rather think now that the stronger the up-current in a cloud, the smoother it is, in a rather sinister kind of way, and of course the higher it goes.

At 6,000 ft. we started to ice up, ice building up forwards on all protuberances and on the leading edge of the wing.

The pressure side of the pitot head grew its ice straw, just as in the old days, the war seeming to have made little impression on the habits of cumulo-nimbus ; and the rubber nail-brush of ice sprouted forwards on the wing.

At 7,000 ft. we reached rough air and the apparent top of the local lift, so on to course again. As we came down below the 6,000 ft. level the A.S.I. started to flicker and



The barograph record of Mr. Philip Wills shows considerable climb at an average rate of 35 ft./sec. and some down currents of even greater intensity.

die, as the ice-straw started to melt, so I kept straight on the turn-and-bank, and let the " Weihe " fly herself until at 4,500 ft. the lump of ice melted enough to blow off, struck the wind-screen with a resounding crack, and disappeared, leaving me instead with a registering air-speed, which exchange I much preferred.

THIRTY MINUTES BLIND FLYING

I now emerged after some 30 minutes blind, and found myself just East of Wyre Forest, near Kidderminster.

I fiddled about for some time in and out of rather unsatisfactory lumps of medium sized cumulus, never high enough to be really at ease, until I worked my way as far as Honiley, when I saw to the North towards Elmden a towering mass of cloud towards which I flew.

Gaining in cunning, I didn't start circling at the first piece of lift I found under its edge, as I had come to the conclusion that this only took one up into the edges of the main mass of the cloud, but flew on through this and a few down-currents, until I calculated I was nearer the real bulk overhead.

I then started circling in lift which gradually built up to 15 ft./sec.

At 6,000 ft. we re-assumed our excrescences of ice, and at 8,000 ft. a fine powder of snow started to penetrate crevices of the cockpit cover. At 8,300 ft. I started to get out of the cone of lift, probably by faulty circling, and as I was now shivering with cold, I straightened once more on my course, and set off in a glide at 50 m.p.h.

A.S.I. PRESENTS A PROBLEM

Back below 6,000 ft. again, the A.S.I. faltered and went out, and now I was faced with quite a problem. If I encountered big lift again before I got low enough to recover my A.S.I. I was in no condition to meet it—I would have to rely on my air-brakes to get me out. However, it was a bridge which did not have to be crossed, because I came down, lost my ice-lump at 4,500 ft., and emerged for a brief four minutes at 3,600 ft., just time to locate myself as North of Coventry, before once more flying into the side of another large cloud mass.

GREEN BALL DISAPPEARS THROUGH TOP

Soon I struck big stuff. The green ball went up to 15, 20, 25 ft./sec., and then disappeared in the top of the tube. I passed again through the icing level, then the powdery snow brought the shivers on again. This time it came in in quantities covering the inside of the cockpit, and I had to wipe it off the faces of the instruments.

It also covered a good deal of me, got into my shoes, and in general I must have looked like a modern, if rather cramped edition of Father Xmas.

I started to suck a toffee, a trick I find rather consoling in these conditions, and suddenly bit on a hard lump, which investigation showed to be a bit of tooth.

Over the constricted panorama of my rather ascetic little world was superimposed a vision of my dentist's waiting room, which sports a particularly opulent line of large electric fire. This vision of my earthly life was rather comforting.

At 11,000 ft. (12,500 ft. above sea-level) I again met turbulent air, and having no clues about the sort of shape of the cloud I was in, could do no more, but once more set sail for Cambridge, leaving another 3,000 ft. to go, to equal my previous best.

Once more through the reverse sequence, bunged-up A.S.I. and all, for over half an hour I sailed along through grey and lifeless cloud, until I came out and found myself pretty well on my course near Kettering.

Ahead the cumulus didn't look very hopeful, but I struggled on until, South of Thrapston I came to the very last cumulus, and found the remaining 25 miles ahead absolutely grey and lifeless. Evidently Bristol's Polar Low had done me dirt. I was foiled.

At least four airfields were in sight, so I picked the one that showed signs of occupation, approached it at 110 m.p.h., and landed at 15·45 hours, at Molesworth, 25 miles short of my goal.

CLUB SECTION

YORKSHIRE CLUB

A HILL-SOARING wind during part of Easter, followed by a good day on 22nd April gave us the idea that our sundry shortages and headaches were to be tempered to some extent by good weather conditions during the period notorious for being precisely the reverse. However, the cup of frustration is a bottomless affair these days, and nothing whatever was done between April 22nd and June 1st, when a light S.W. wind lured Billy Sharpe to prove that Sutton Bank is by no means bottomless, by the simple means of planting the " Type 20 " two-seater down there. Much fun and de-rigging was had by all and the beer shortage temporarily suspended to permit Sharpe to discharge his obligations.

On Sunday, June 2nd (the following day) an early rigging party on the " Type 20 " (which goes together easily enough when the knack is acquired)—was justified by the best day since we re-opened. A total of 18 hrs. 45 mins. was reached in the day, with one Club and four A.T.C. " C's." Heights over 2,000 feet were common, although the thermal activity was not of the order to tempt anyone to go away. Amongst other pre-war flying members who soared here for the first time since we began again, we were pleased to see O'Grady and Burningham, both well-known for their work in the Newcastle Club. Sutton, who qualified for his " C " in 1939, and now instructs at an A.T.C. school also flew here for the first time since the war.

A.T.C. Liaison. In addition to Club flying, June 2nd was the first practical test of our hospitality to the A.T.C. Command Gliding School; as stated, they got 4 " C "—certificates and we found that given a little good tow-line organization, their flying and our own ran very smoothly together. The A.T.C. " Cadet " was flying most of the day, and later their " Falcon III " made several flights, flown by C. D. Hartness.

Whitsuntide Week-end. Unfortunately the weather died again on the Saturday, and Sunday was intermittently fair with a light South-East wind. 10 launches were made for one hours' flying in all, the interesting part of which was the initial soaring flight for the prototype " Kite II "—flown of course by Slingsby. On Whit Monday it became possible to fly only late in the day, but Clark got his " C " certificate, and Kitching did his first hill soaring, having qualified for his " C " in thermal lift off an aero-tow sometime recently; rather the cart before the horse—he should perhaps atone for this by " dinting " a height record off a bungy launch.

Hambleton Lodge. Some furniture has arrived at Hambleton Lodge—there are not many beds but more are expected. There is definitely no bed-linen or blankets, and nothing but camping-out conditions—or should we say camping-in? are available. All that can be guaranteed is a roof, and cold water. We ask visitors to be patient, the domestic side of the club is just as difficult to re-establish as the flying side and we appeal to anyone who can give practical help with furniture on loan or as a gift, also domestic equipment and buildings of not more than three stories. Willing hands and organizing ability will also be very welcome.

G.A.H.

22nd Armoured Brigade Gliding Club

The Club has had a month of bad weather and some bad luck with winches, etc., this month. Nevertheless the present standing of the Club is as follows :

Launches to date	2300
(Including car launches and ground slides)	
"A" licences	27
"B" "	8
"C" "	4

Unfortunately only comparatively few of the completed forms for these licences have yet been sent to the R.Ae.C., due to the extreme difficulty in this sector of getting photos taken, but they'll be along in due course. The club is moving to the South in the near future—we are as yet forbidden to say just where, but at least we shall be in good soaring country like our lucky friends in the R.A.F. (Our present site is merely a flat field, and for our "C" licences we have to depend on thermals off a winch launch—a slow and sometimes exasperating business).

Crashery to date, touching lots of wood, has been low ; to be precise : one Primary wing broken a foot from the end after landing too close to some trees, and a couple of broken skids.

Our latest acquisitions are a "Weihe" and a "Rhonsperber" in good condition after a hair-raising trailer journey up a mountainside (where we found them stored in an old Schloss) which was only equalled by the journey down when at one stage, due to faulty brakes on the car four of us practically wore out our boots preventing the car from running away. But the prize was well worth the effort, and we are all looking forward to some better flying in August.

London Gliding Club

ACTIVITIES in June included some hill soaring on the 30th, when Hiscox brought his "Gull" and Lavington his "Kirby Kite" (which he used to share with two other people before the war). The wind was blowing obliquely from South-West, giving the best lift in the Bowl, but often it was impossible to proceed more than a few hundred yards from there along the main ridge. A lot depended on the initial launch, as soaring was easier higher up, possibly because of veering of the wind with height. Thus the Club "Tutor" could at times remain above the "Gull" once it got into that position. Total soaring time was about six hours.

On the previous Sunday, Hiscox took his "Gull" to Elstree, where he was provided with an aero-tow by the organization run by our former member Graham Humby. The charge for towing by an Auster is 1s. per minute from the aeroplane's take-off to its landing.

GERALD MANNING

The death of Gerald Manning, briefly reported last month, will be a blow to the Club as well as to the movement generally. Gliding was the overwhemling interest of his life, and he was active in many schemes for developing the Club's activities. He was member of the Club Committee, as well as of the Technical Committee of the B.G.A., which had also co-opted him recently on to the Research Committee to deal with "auxiliary launching devices." Manning took courses at the Polish gliding centre at Bezmiechova before the war, and spent much of the war at Malta, being promoted to Squadron Leader. His father, W. O. Manning, to whom the Club extends its sympathy, was also on the B.G.A. Technical Committee in its early years, and designed the sailplane-like "Wren" which flew at the so-called "motor-glider" meeting of 1923.

A "Grunau" circles overhead as the next pupil gets ready for his ground slide, at 22nd Armoured Brigade Gliding Club.

Our Dutch Correspondent reports . .

Items of Interest

Many clubs have got their "Fokker" primaries and started training. The production of the 24 "Fokker Grunau Babbies" has begun. The "Babies" will be fitted with a back placed hook and probably with a closed cockpit cover.

Results of the training-camp at Hoogeveen : In 2 weeks 3 "C," 3 "B," 10 "A" and 2 "Government Certificates." One participant made Silver "C" height. No cross country flights were made. All flights were made by winch. The pilots disposed of 5 "Primaries," one "Grunau Baby," one winch and one retrieving car.

The yearly contest is to be held at Eelde, airport of Groningen in the last week of July, and photos of this camp will appear in a future issue of SAILPLANE.

DERBYSHIRE AND LANCASHIRE CLUB

June 12th, Wednesday. There was no wind to speak of and training in hops and circuits was the order of the day. During the afternoon two terrific Cu-nimbs built up on eaither side of us leaving us in the clear. Several of the A.T.C. personnel contacted lift, Fl. Lt. Nadin reached 1,700 feet on the Sheffield side of the site and Clarke reached 1,500 feet on the Manchester side. Later these two storms closed in and we had the expected deluge.

June 13th, Thursday. Following yesterday's storms the wind veered to W.N.W. and we had the best day of the week. Nearly thirty hours soaring time was totalled by club members and our guests the A.T.C. Our secretary Bernard Thomas took the opportunity to qualify for his silver " C " duration with five and half hours. His first remark after landing was " Quick, a smoke." Robertson and Armstrong both reached over 3,000 feet, whilst the remaining members enjoyed themselves in the hill and thermal lift which made 1,000—1,200 feet quite easy at times. Altogether over fifty launches were made and several " C's " were flown off.

June 14th, Friday. With a gentle South-Easterly wind training continued and H. Campbell took a very nice " A " with 33 seconds. Whitworth and Peter Hicks were brought a stage forward under the careful supervision of L. R. Robertson who was spending the week with us. Jack Rice dropped in to see us in his " Tipsy " and watched the A.T.C. winch haul several pilots to over eight hundred feet to practise tight circling on the way down.

June 15th, Saturday. It rained all day.

June 16th, Sunday. Training continued during the morning but rain stopped play after lunch.

June 20th, Thursday. Conditions looked so good that parties rushed out from Manchester snd Sheffield to get some nice flying in the evening thermal which took Zeta Paddon, Armstrong, Thomas, and Horsley to nearly three thousand feet for a total time of three hours seventeen minutes.

June 22nd, Saturday. A West wind at about fifteen knots tempted nine pilots but only four of the experts could hold up for any length of time. Total time 3 hours.

" Quick ! a smoke!" Bernard Thomas feeling for a cigarette after his 5½ hour flight.

June 23rd, Sunday. Wind from all over the place made training difficult but 28 launches were got in thanks to hard work by everybody especially Lewis Slater who was the instructor of the day.

June 30th, Sunday. This was an excellent training day with 37 launches and 3½ hours flying time. What with cable chopping and machines landing out of bounds everyone had plenty of excitement. Campbell tried for his " B " and later tried for his " C " but was disqualified by landing out of bounds.

Summary of flying for the first six months of 1946. 532 launches. 110 hours soaring time. 4 " A." 4 " B." 11 " C " Certificates. 1 Silver " C " height and 2 Duration.

Aero-Modelling Section.
Edited by R. H. Warring.

MODEL MATTERS

J. R. Vanderbeek

ON re-joining a model aircraft club after an absence of over five years, one would expect to see definite advances in the types of models flown by one's fellow enthusiasts and to be immediately conscious of various new developments. I was, however, rather disappointed in this respect as, in general, the models constructed to-day do not show any great advance on those of 1939. The great majority of these are the same light-weight 'Paper-bags' which—and I am the first to admit it—have a very fine performance if this is based on sheer duration of flight, but are still largely dependent on finding natural lift for their long flights. Providing, of course, that these models are correctly trimmed it is always a matter of luck, as directly opposed to skill, whether they fly for their normal duration of 3 to 4 minutes or for perhaps 30 minutes. It is not possible for a record attempt to be made at any particular time ; these have to be established by any model finding more powerful thermal assistance than its less fortunate competitors.

Surely it is only in model flying that such a state of affairs would be allowed to flourish ? Would it not be equally just to say, for instance, that because a Meteor flies faster than an Auster it is the better aeroplane ? As there are many ways in which an Auster could be of considerably greater service than the Meteor—in spite of the latter's 600 m.p.h.—no one would seriously make such a statement. Yet a large proportion of contests are decided by what is obviously a matter of chance, and one which is more likely to retard the development of the movement rather than to foster its growth.

Attempts have been made to popuularise what may be termed the serious types of model aircraft but so far they have been relatively unsuccessful owing, chiefly, to the loud voiced 'light weight duration' fans, who are apparently quite happy to carry on constructing whole series of these models (aerodynamically dated about 1934) and literally trust to luck and good weather to win competitions. An excellent example of the type of competition which will do most good to the movement is the Handley-Page contest for Tail-less Models. The rules for this event, whilst sufficiently elastic to allow the fullest development of the type, call for definite and serious research to produce a winner. It is to be hoped that more contests of this nature—where something more than

the ability of the model to fly merely is called for—will be organised, and every effort be made by the Society of Moder Aeronautical Engineers to encourage those people who are more interested in the progress of our hobby as a science and not a game of chance.

The above remarks are directed chiefly against the open duration type of contest for gliders and rubber powered models. With the advent of petrol and compression-ignition engines in large numbers the scope for real experiment is immeasurably widened and, provided that proper direction is supplied for those experiments, we may expect to see great progress in this field. A point of interest is that it is solely because of the obvious fact that the more fuel carried the longer the flight, that duration competitions have not been accepted as the test medium for the type. In contests where other factors have been considered it is most gratifying to note that they have been won by models which have been more carefully designed and trimmed.

Let us now turn to some of the ways in which models may be used to some real purpose.

By far the greatest service which model aircraft may perform is that of supplying data which may be utilised in the design of full-size aircraft. This applies especially where the project is of unconventional form and wind tunnel tests are not able to provide adequate confirmation of stability in all directions. That this confirmation is necessary is shown in the fact that several 'flying scale models' of large new aircraft have been constructed recently. Any inherent instability is immediately apparent in a fast flying model and further tests, for example, spinning and recovery, may be made with full use of all control surfaces by the incorporation of auto-control units to operate them. All this is quite apart from the use of radio control which naturally gives complete control from the ground throughout the flight. Providing that a flight path may be decided upon before take-off, however, all control movements and the operation of flaps, undercarriage, etc., may be carried out as required using small electric or clockwork driven control units. The models for this work must necessarily be made to fine limits and incorporate specialised constructional methods so that, (*a*) results will not be distorted by aerodynamic inaccuracies, and (*b*) they are able to stand up to the inevitable rough treatment incurred in experimental flying. Both these features are readily obtainable at low cost in the light of recent developments, and models with speeds of 80 to 100 m.p.h. and wing loadings of up to 2.5 lbs. per sq. ft. are now definitely practical prepositions.

Models of this type could be successfully employed in sailplane research, and as there are several differences between full-size and model high efficiency sailplanes the results would be of great interest and possibly lead the way to sailplanes of even greater performance and improved flying qualities than those in use to-day. Due almost entirely to the lack of a pilot, a model sailplane incorporates features which would make a full-size aircraft so inherently stable as to be almost uncontrollable. Certain of these features, however, could be adapted to advantage to obtain :—

1. Complete control at near stalling attitudes and speeds.
2. A really gentle stall with little loss of height and no trace of wing dropping.
3. The ability to turn, if necessary, in a very small radius with no loss of height.
4. Complete stability at high angles of attack in winch launching.

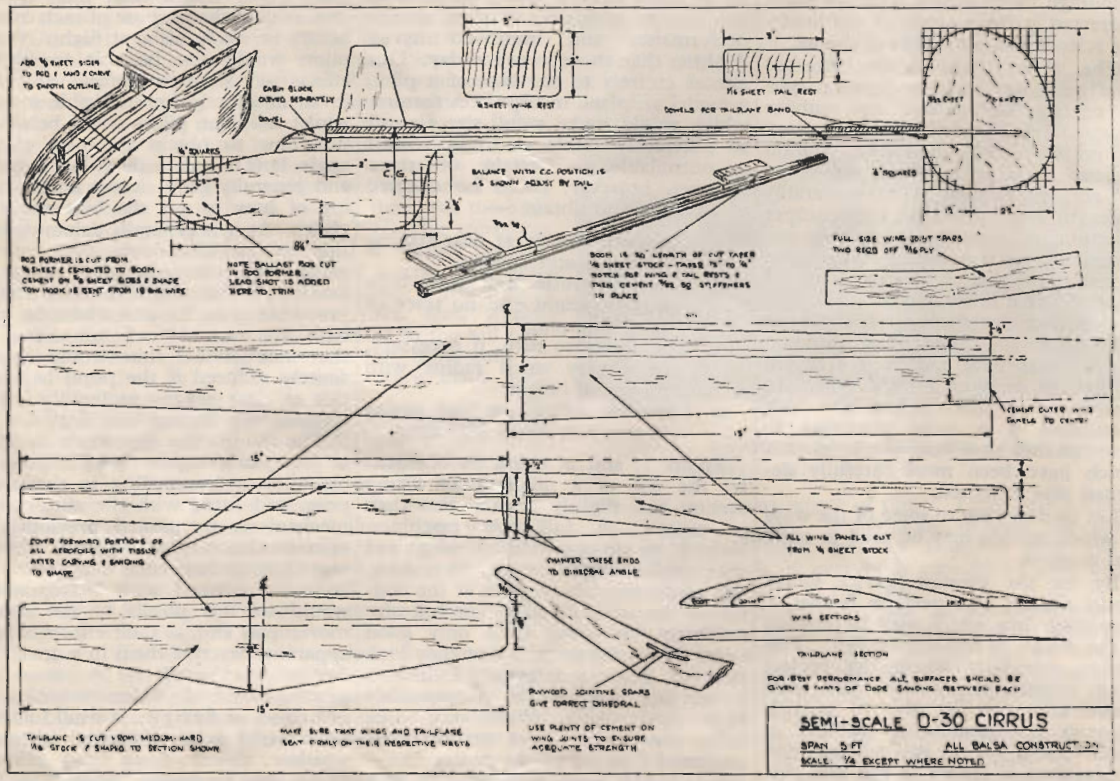
Points 1, and 2, could be obtained by the use of a tailplane of lifting section and slightly greater area than is normal on full size machines. Point 3, by use of polyhedral wings and with careful tail unit design. In passing, one might express surprise at the continued use of gull wings on full size machines, as about their only good point for model work is that they look pretty. Point 4, is greatly facilitated by tail unit design—a fin of reasonably high aspect ratio, about 20% area below the fuselage and its area concentrated forward of the centre line—being found most successful in this respect. Slight dihedral on the tailplane and its being placed so as to reduce 'blanketing' to a minimum are also beneficial for all points mentioned above. The incorporation of these features may possible increase the drag of the aircraft, but in my opinion the better flying qualities and easier trimming—of great importance in long soaring flights—make it worthwhile.

Apart from experimental flying, models could be used in the training of sailplane and power pilots for demonstrating the effects of control movements, and the movements necessary to perform various evolutions. Each pupil would then have a very clear idea of the purpose of each control before he made his first flight. Power pilots would also be able to see the effects of airscrew torque and flap in an absolutely unmistakable manner whilst sailplane pilots could be shown just how to obtain the best gliding angle, how to turn without losing height and generally get a clearer understanding of how to get the best out of a glider. As it is generally acknowledged that an onlooker sees most of the game, why not make pupil pilots onlookers while models show them just what does happen when the controls are moved? I am convinced that instructional time would be definitely reduced if the pupil had seen this at close range—preferably with a commentary during the flights.

The models for this work could be of simple design; petrol powered or sailplanes, according to their purpose, and fitted with the auto-control mechanisms mentioned previously to operate the control surfaces when a sage height has been reached. An instructor, armed with a stop-watch, would tell his pupils of the control movements and, as their effects became apparent, describe them in more detail. Surely this would be a cheap and practical method of demonstrating the principles of flying? It would also be very useful as an attraction when the weather closed down and full-size flying was impossible because of low visibility.

I have not attempted to go into any great detail in the above suggestions, but mean simply to show that, in my opinion, the possibilities of model aircraft are not realised in many quarters. Models served a useful purpose in war for recognition, gunnery and radar training, and if I have managed to point out possible future services this article has served its purpose. Detail will come later.

The author with a 6 ft. 3 ins. span sailplane used for experimental flying. Weight is 3.5 lbs. and wing loading 12.3 ozs. per sq. ft. The model incorporates special features to minimise the danger of damage in bad landings or crashes. The wing section is R.A.F. 30.



OUTSTANDING MODELS

"MODEL of the month" in this issue is an easy-to-build semi-scale model of the D-30 Cirrus high performance sailplane. It is not strictly true to scale since the tail surfaces areas must be greatly enlarged for adequate stability. Nevertheless the resulting model is very striking in appearance and also bears a close resemblance to its full scale prototype.

Solid construction is chosen on account of the high aspect ratio of the wings and the pod and boom fuselage. Besides making for accuracy and strength, this also reduces the building time, whilst the extra weight as compared with the standard built-up airframe, tissue covered, does not greatly affect flight performance.

In addition to an enlargement of the tail surfaces, chief departure from scale is the increase in boom length and rather exaggerated dihedral angle on the outer wing panels.

The model is rather more tricky to tow launch than the average, but once released from a height has a good, flat glide and excellent duration possibilities. It is not recommended as a contest machine, but chiefly as an interesting experimental model out of the orthodox rut.

Although the prototype has not yet achieved any long duration flights it is fitted with a dethermaliser unit of the air-brake type. This is illustrated in Fig. 5 of the article on Flight Control. (*See* May issue "SAILPLANE.")

Accuracy in construction and rigging is essential. Any warps or malalignment of the surfaces will show up badly during tow launching. Work to the C.G. position and rigging angles shown on the plan and trim for best performance by altering the angular setting of the tailplane. Optimum trim (minimum sinking speed) occurs when the model is trimmed to fly just below the stall.

More Paper for Sailplane

With the intervention on our behalf of the Minister of Civil Aviation, we are hoping to be able to print a much bigger supply of copies of SAILPLANE with the next issue. So soon as it can be arranged we shall have more pages and will be printed on all art paper. As from January next we hope to go back to the pre-war size of page of SAILPLANE but with more pages. There is now no reason why SAILPLANE cannot be bought on a regular order through your newsagent although to make sure it is better to become a subscriber through our distributors Messrs. the Rolls House Publishing Co. Ltd. Breams Buildings, Fetter Lane, E.C.4.

LETTERS TO THE EDITOR

DEAR SIR,

I have read with some surprise not untinged with amusement, the correspondence on gusts, bird's and air movements.

The idea of a concertina like compression and expansion is one of the quaintest I have ever heard, when one considers the low moment of inertia and high co-efficient of viscosity of air.

Surely, sir, all air in movement tends to travel in curves. Wind tunnel operators all confirm the extreme difficulty of persuading the air to travel in nicely combed stream lines.

I suggest, sir, tha ta gust is simply a rotating mass of air which also has a translational velocity. The axis of rotation may be at any angle but is frequently horizontal, and roughly at right angles to the direction of translation. But for illustration let us imagine a vertical axis, a translational speed of 30 and a rotational speed at the periphery of 10 m.p.h. An observer at the centre front sees only a fluctuation in wind direction. An observer at the advancing side feels a gust of 40 while one on the retiring side feels a lull of 20, all simultaneously. When the speed of rotation, exceeds that of translation we get whirlwinds, waterspouts or "Dust-devils" and the like. But the ordinary gust more often has a more or less horizontal axis, hence the downward acceleration of its forward surface.

The causes of rotation are apparently the relatively low mass and high viscosity of air, friction with land, sea, or other wind masses, variations in temperature and the movement of the earth itself. Two masses of air passing each other, caused say by two different pressure systems, can cause a whole series of secondary cyclic movements on the marginal line, and these again have lesser cyclic parasites, "and so *ad infinitum*."

Cyclic flow will also explain why hill lift is found some distance out from the hill face and not when some people would expect to find "Compression!" near the ground.

As to birds, they act in the same way as gliders, i.e., they are never actually "overtaken" by a following wind. What apparently happens is that this actual air speed is constantly fluctuating above and below a certain mean line, dependent on the conditions prevailing at the actual time and difficult to predict with precision, though easy to estimate on a given set of data for any given moment of time.

How many pilots realise that the air flowing over an airfoil performs an approximately circular path, being pushed up and forward by the upper surface and then due to its elasticity, continuing a circular or approximately circular track to finish near the point of origin—but not exactly then. The lower surface produces a different cyclic flow and the difference in diameter of the two systems is a measure of the lift generated. There have been too many misleading drawings of beautiful clean stream lines flowing over air foils. The movement of the air corpuscles is quite different, and the movement of a series of air corpuscles affected in series by the passage of an airfoil can be likened to a wave. In a perfect airfoil having no friction (after the initial impact) the movement of the particles of air would be a perfect ellipsi or circle, the particles would return to their original position, the wave path of a series of particles would be perfect (but the airfoil would not lift if it had no friction, which would be too bad).

The point, sir, is this, that the same laws of mechanics apply to all these cases, and to all other cases of movement, and it is unwise to invent special laws just to meet special instances. Far wiser to investigate how the already proved laws can produce the observed effects.

One further point. All the arguments as to whether a gust accelerates or decelerates lose their point if the matter be viewed from the point of view of rotation. A rotating mass accelerates and decelerates *in a given plane*, without having changed its rotational speed. For an example (very crude and not quite exact) compare a crank and piston and their relative movements.

Sorry I have been so long winded and perhaps not too clear in exposition.

Yours faithfully,

W. E. ASTIN.

Wishing you continued success with SAILPLANE.

DEAR SIR,

The suggested improvements to "Primaries" given in Mr. A. G. Payne's letter in the July SAILPLANE are very useful, and I think the desirability of differential ailerons and more repairable gates will be especially widely agreed. I would add that shock absorbing material is required in the seat cushions, in the form of a robust spring skid or airwheel, and possibly in the landing wire attachments. It may also be a good idea to fit a strong spring in the elevator control system which would come into action if the stick were moved more than say one inch aft of central.

Will Mr. Payne let us know what system of differential mechanism he found simplest to fit to the existing structure?

The value of improving the breed by such small experiments is very great, but there is one difficulty. The procedure for granting Certificates of Airworthiness seems to allow very little latitude for modifications, and a club which makes such experiments even with its ground engineer's approval is running a risk of losing the C. of A. for its machine unless it is willing to go to much trouble to obtain approval. I hope that such difficulties will not be allowed to hinder the steady progress of development work, which should help us to keep our maintenance costs within reason.

Yours faithfully,

J. A. ALLAN.

SIR,

I have read with great interest Dr. Lange's article on Thermals. His record of location of Thermal sources calls for comment. The Table he gives shows that 18 out of a total of 29 sources were located over or adjacent to "swamps"; what is meant by a "Swamp" is not exactly defined, but it does suggest a region where the air is more in contact with moisture than the air surrounding the "Thermal."

The explanation, I deduce, is as follows: We all know that air when heated, expands, and thereby decreasing density, rises. I suggest that a rising current can be produced without any increase in temperature, if the *air is moister* than the surrounding air. The "molecular weight" of air is 28.8 approximately, while the molecular weight of water vapour is only 18. According to the hypothesis of Avogadro equal volumes of gases contain equal numbers of molecules, so that air diluted by water vapour, will have a lower mean density than dry air, and will rise. The action is similar to that used in the method of pumping known as an "air lift." Most engineers know it.

Given the right conditions of temperature, vapour tension, etc., evaporation over marshy ground should provide the necessary dilution and hence, lift.

Please correct me if I am wrong.

I wonder has anyone tried soaring Cheshire, over the meres, or on the marshes between the Mersey and the Dee, or in similar Country elsewhere.

It also suggests one or two ideas of artificially producing Thermals at Soaring sites. For instance a sheltered corner could be covered with shingle or chippings and whitewash-sprayed, or maybe a group of fountains set up, rather like a "spray-cooler" as used in power stations. Hilly sites should furnish water and power enough. All that would be needed would be the piping system (and of course, the Gliding Clubs usual bug bear—money).

Your readers comments would prove interesting.

Yours faithfully,

W. E. ASTIN.

P.S. When I wrote that the "molecular weight" of air is 28.8, I realised that some purists may object that air as such has no molecular weight. What I mean of course is that the mean weight of air, having reference to the M.W's. of oxygen and nitrogen and the proportions of these gases in air, works out at approximately 28.8.

W.A.

FOR SALE

RHONADLER Sailplane, damaged B.G.A. Technical Report available. Trailer in good condition. Offers to Hon. Sec., C.U.G.C., Pembroke College, Cambridge.

B.A.C. "DRONE"

WANTED on purchase, hire, or loan. General Arrangement drawings of Drone fuselage. Detail drawings acceptable also. Advertiser would consider purchase of slightly damaged fuselage. Replies—108, Newtown Road, Malvern, Worcester.

FOREST FFAWR ANNOUNCEMENT.

It is regretted that owing to circumstances beyond their control, the proprietors of Forest Ffawr Gliding School are forced to cancel their programme, and all engagements, for gliding holidays this year.

AIRBORNE FORCES JOURNAL

A new quarterly journal "PEGASUS" devoted to the interests of glider pilots and ex-glider pilots, is appearing under the editorship of Charles Strafford, one time editor of "Pegasus Goes To It," the war-time daily news sheet of the 6th Airborne Division.

"PEGASUS" can be obtained price 1/, or 4/- per annum from 70, Eaton Place, S.W.1.

B.G.A. Research Programme

(*continued from page* 11).

(b) *Annual Expenses*			
Secretarial etc. ..		600	0 0
Cost of projects :—			
Group 1 ..	£1,000		
" 2 ..	200		
" 4 ..	1,450		
" 6 ..	300		
" 7 ..	100		
" 8 ..	350		
" 10 ..	200		
TOTAL	£2,700		
Half cost in first year		1,350	0 0
(c) *Purchase of Scientific papers and journals*		50	0 0
ANNUAL EXPENSES		£2,000	0 0

CLUB ANNOUNCEMENTS

THE BRISTOL GLIDING CLUB PTY. LTD.

Resumption of Activities

A General Meeting will be held in the near future. Meanwhile a new Register and Mailing List is being prepared, and prospective members are invited to write to the Hon. Secretary of the Organising Committee at the address below, mentioning any previous flying or gliding experience.

9, ROYAL PARK, CLIFTON, BRISTOL

THE MIDLAND GLIDING CLUB LIMITED

The Long Mynd, Church Stretton, Shropshire. Telephone: Linley 206.

Full particulars may be obtained from the Secretary, F. G. Batty, F.C.A. 2, Lombard Street, West Bromwich, Staffs.

THE YORKSHIRE GLIDING CLUB. SUTTON BANK, YORKSHIRE.

Full Flying facilities are offered to all *Soaring and Power Pilots.*

JOIN NOW and know Gliding at its BEST at Sutton Bank, Yorkshire.

For full particulars apply to: L. A. ALDERSON, "LYNDHURST," SINNINGTON, YORK. Hon. Secretary, Yorkshire Gliding Club.

THE SURREY GLIDING CLUB

The Surrey Gliding Club intends to open with limited facilities on August 5th in the Redhill area.

To begin with, the only machine for club use will be a fully-equipped "Kite II," which will be restricted to qualified pilots for Silver "C" attempts. When not required by such pilots it will be available to Silver "C" members.

As soon as training facilities can be made available, this will be announced.

Subscription, £5 5s. Soaring, 10/- per hour, during interim period.

Further particulars from the Secretary, A. D. Jones, 23, Rose Hill, Dorking.

NEWCASTLE GLIDING CLUB, Ltd

(founded Feb. 1930)

Applications for Membership now invited in Reorganised Post War Club.

Special Registration Fee 5/-

Ensures Membership when activities restart.

Further Particulars apply

HON. SEC., 25, HOLME AVENUE, NEWCASTLE 6

ROYAL AERO CLUB GLIDING CERTIFICATES.

We regret that owing to the large number of these now coming forward each month—usually several hundreds—we shall be unable to publish the list of those who gain "A" certificates for some time to come. It is hoped later to include them in a special supplement. For the time being only "B" and "C" certificates will be gazetted in SAILPLANE.

KENT GLIDING CLUB.

Will all ex-members and others interested and living in the Maidstone or Chatham area, contact the Secretary :

MRS. R. H. HADDOCK, "LENHURST," HARRIETSHAM, KENT.

SOUTHDOWN GLIDING CLUB LTD.

We shall commence Gliding and Soaring again at the Devil's Dyke. Old members and prospective members should write for details to :

Hon. Secretary, R. F. BRIGDEN, 99, NORTH STREET, BRIGHTON.

DERBYSHIRE & LANCASHIRE GLIDING CLUB,

GREAT HUCKLOW, TIDESWELL, DERBYSHIRE

The Club is now able to undertake *ab-initio* training conversion for service pilots. Full soaring facilities in club sailplanes on the famous Derbyshire Ridge.

Entrance fee, £2. 2s. 0d.; subscription, £4. 4s. 0d.; Associate Members, £1. 1s. 0d.

Full particulars from The Secretary, 87, Fargate, Sheffield 1.

ROYAL AERO CLUB

GLIDING CERTIFICATES

"A" CERTIFICATES : 158 (Nos. 4693-4850)

"B" CERTIFICATES : 54

No.	*Name*	*A.T.C. School or Gliding Club*	*Date*
1531	James Arthur Key	186 G.S., Speke	24. 3.46
1822	Norman William George Marsh	London G.C.	11. 6.46
2085	Frank Patrick Geary	44 G.S., Bruntingthorpe	21. 4.46
2274	Kenneth James Jones	50 G.S., Hereford	12. 5.46
2721	Dennis Woods	183 G.S., Woodford	9. 9.45
3019	John Michael Stephenson	Air Division, Barntrup	31. 3.46
3763	George Frederick Young	S.1., G.S., Dungavel	28. 4.46
3764	James Shirlaw	S.1., G.S., Dungavel	26. 5.46
4176	Roy John Jennings	168 G.S., Rochester	21. 5.46
4265	Arthur Dudley Marshall	168 G.S., Rochester	21. 5.46
4387	Cyril Albert Nepean Bishop	124 G.S., Aldenham	12. 5.46
4461	John Dill Jackson	Cambridge University G.S.	29. 5.46
4496	Douglas Benson Mills	25 G.S., Leconfield	12. 5.46
4514	Roger David Dickson	Derby and Lancs., G.C.	17. 3.46
4515	Ian Hamilton Paxton	Cambridge University G.C.	20. 3.46
4516	John Ancell Pressland	Air Division, Barntrup	20. 1.46
4518	Paul Eden	Air Division, Barntrup	27. 1.46
4517	Stanley George Pereira	Air Division, Barntrup	23. 9.45
4538	Hubert Arthur Farley	B.A.F.O., G.C., Minderheide	7. 4.46
4543	Derrick Albert Sandison Colvin	Derby and Lancs. G.C.	19. 4.46
4553	Philip Rayvatha Wijewardine	Cambridge University G.C.	18. 3.46
4569	Maurice W. Rolfe	126 G.S., Booker	26. 5.46
4572	Stuart Haslett Walters	41 G.S., Hockley Heath	9. 6.46
4612	Barnaby John Howard	Cambridge University	11. 5.46
4689	James Messenger	13 O.T.U.G.C., Middleton St. George	26. 5.46
4694	Arthur Ernest Biscoe	B.A.F.O., 2 Group	29.10.45
4700	Robert Dumello Rose	103 G.S., Westley	19. 5.46
4701	Arthur Herbert Corbin	103 A.A. Bde.	10. 9.45
4702	Henry Charles Hicks	105 G.S., Cambridge	26. 5.46
4704	George Gilbert Dent	41 G.S., Hockley Heath	22. 4.46
4720	Kenneth Harvey Tickle	186 G.S., Speke	12. 5.46
4724	Harry Susands	Air Division, Barntrup	30. 4.46
4725	Frederick Kirkman	2 Group, B.A.F.O.	7. 4.46
4732	William Rutherford Sloane	205 G.S., Newtownards	18. 5.46
4734	June Gwyneth Lee	B.A.F.O., G.C., Minderheide	22. 4.46
4735	Robert Marie de Marolles	Air Division, Barntrup	10.10.45
4736	Cecil Graham Batty	188 G.S., Cark	28. 4.46
4739	Hugh Dean	B.A.F.O., Minderheide	6. 4.46
4747	Arthur Irving Sherriff	Leicester G.C., Rearsby	23. 4.46
4748	Percy Robert Hatfield	Halton Apprentices	15. 5.46
4761	Victor Ernest Smeed	70 G.S., Swansea	31. 3.46
4763	David Brian Barrett	Cambridge University	26. 5.46
4783	George Stuart Murdoch	181 G.S., Blackpool	14. 2.46
4785	Frank John Sugden	R.A.F.G.C., Oerlinghausen	19. 4.46
4798	Alec Murray McKillop	161 G.S., Ford	28. 4.46
4802	Antony Robert Hislop van Baerle	Air Division, Barntrup	24. 3.46
4803	Hans Neubroch	Air Division, Barntrup	27. 3.46
4804	John Terence Riley	Air Division, Barntrup	22. 4.46
4805	Arthur Willis Haywood	Air Division, Barntrup	25. 5.46
4821	Peter Frederick Charles Austin Thorn	183 G.S., Woodford	21. 4.46
4827	Gordon Don Bedson	123 G.S., Bray	25. 5.46
4840	Allan Pickup	Air Division, Barntrup	10. 5.46
4842	Gordon Bennett Tolputt	2 Group, Oerlinghausen	20.10.45
4843	Herbert Kenneth Cartwright	106 G.S., Henlow	8. 6.46

"C" CERTIFICATES : 21

No.	*Name*	*A.T.C. School or Gliding Club*	*Date*
1709	Edward Brian Clarke	Derby and Lancs. G.C.	10. 6.46
1822	Norman William George Marsh	London G.C.	11. 6.46
2796	Henry Humphreys	Derby and Lancs. G.C.	13. 6.46
3998	George Dennis Ivor Neale	Air Division G.C., Barntrup	19.12.45
4166	Frederick Leslie Clark	Yorkshire G.C.	10. 6.46
4352	Kenneth Hugh Varney	Derby and Lancs. G.C.	13. 6.46
4514	Roger David Dickson	Derby and Lancs. G.C.	23. 3.46
4516	John Ancell Pressland	Air Division G.C., Barntrup	20. 3.46
4518	Paul Eden	Air Division G.C., Barntrup	30. 3.46
4517	Stanley Paul Pereiria	Air Division G.C., Barntrup	27. 1.46
4538	Hubert Arthur Farley	B.A.F.O., Minderheide	14. 4.46
4543	Derrick Albert Sandison Colvin	Derby and Lancs. G.C.	19. 4.46
4553	Philip Rayvatha Wijewardene	Cambridge University	23. 4.46
4694	Arthur Ernest Biscoe	B.A.F.O., 2 Group	21. 4.46
4739	Hugh Dean	B.A.F.O., Minderheide	12. 5.46
4785	Frank John Sugden	R.A.F., G.C., Oerlinghausen	18. 5.46
4802	Antony Robert Hislop van Baerle	Air Division, Barntrup	12. 5.46
4803	Hans Neubroch	Air Division, Barntrup	16. 5.46
4804	John Terance Riley	Air Division, Barntrup	19. 5.46
4840	Allan Pickup	Air Division, Barntrup	31. 5.46
4842	Gordon Bennett Tolputt	2 Group, Oerlinghausen	21. 4.46

SILVER BADGES :

63	Joseph Stanley Armstrong	(Cert. 970)	21. 4.46
64	John Ancell Pressland	(Cert. 4516)	7. 6.46

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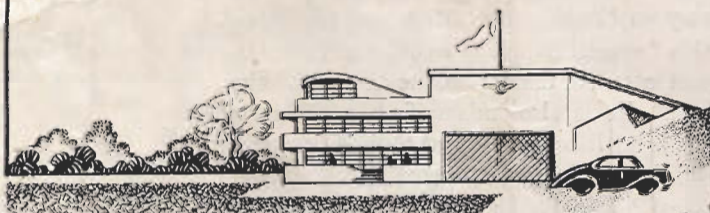

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