SAILPLANE

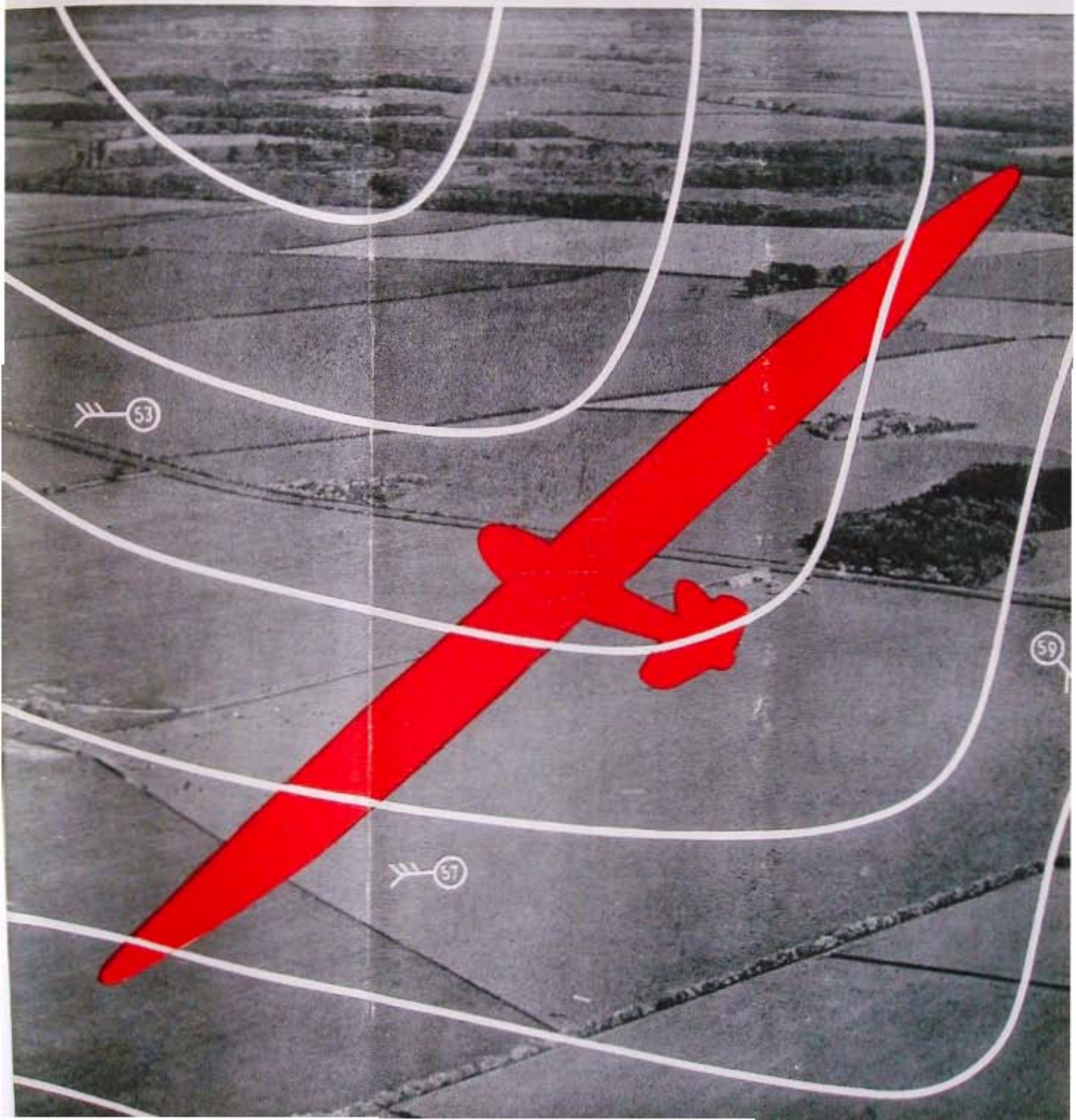
NOVEMBER
1936
Vol. 7 No. 11

AND GLIDER

PUBLISHED
MONTHLY
Editorial Offic
13, Victoria St., S.

Official Organ of the British Gliding Association

EDITED BY ALAN E. SLATER



THE SAILPLANE *and* GLIDER

Official Organ of The British Gliding Association

Editorial Offices: 13, VICTORIA STREET, LONDON, S.W.1 Telephone: ABBey 2615-6-7

Vol. 7 No. 11 NOVEMBER, 1936 Published Monthly

Gliding on the Films

TAKING the narrow view, if anyone wishes to spend his spare time messing about with gliders, he is under no obligation to persuade the world at large that what he is doing is a rational thing to do. It has been found in practice, however, that a pilot can get much more actual flying, in proportion to the time, trouble, and money spent on this gliding business, if he can persuade a large number of other people to do the same, and, in addition, can convince outsiders such as landlords, bank managers, and the Air Ministry that "there is something in it after all."

To get the public to realise that there is such a thing as soaring as well as gliding, intensive and repeated efforts are needed. The average newspaper reader may learn one day that a sailplane has flown from sunrise to sunset, or from the Midlands to the coast, but a week later he will refuse to believe it possible to keep one up at all. Press photographs of gliding must have "human interest," so that none has a chance of reproduction unless the machine is shown on or near the ground.

As to films, there is one now going the rounds of the picture houses called "Air Hoppers." As an exhibition of trick flying on gliders it is certainly worth seeing by gliding men, though it is a pity the general public have to be admitted too. Pete Smith is the commentator. He begins by recommending gliding as a suitable activity to take up "if you don't want to live long." After that we know what's coming. Sailplanes are looped and spun, dived under high tension cables, made to lift haycocks off fields and knock tiles off roofs. It is a wonderful exhibition of skill, and will thrill the heart of every gliding man, but only confirm the rest of the audience in their view that "you can't control them without an engine." In the end Pete Smith is forced, against his will (of course), into a dual-control machine and taken for a ride. He interferes with the controls and has to be given a knock-out blow with a spanner. Finally we see him back on *terra firma*, grovelling up handfuls of it and murmuring hysterically, "Earth, earth!"

It is only fair to say that the American gliding men who took part in making the film did their best to persuade the producers to treat the subject seriously, but found the attempt hopeless.

Prospects of getting a real soaring flight film shown to the public are now, however, improving. The hard work put in every week-end by the Shell Company's film unit at Dunstable promises to result in a very good film showing a typical (?) day's activities at a gliding club, but it is not likely to be ready for some time yet.

A film which, however, is expected to be "trade shown" next month and generally released in the early spring of next year is likely to give a great fillip to the public's ability to understand the purpose and achievements of the modern sailplane. It has been compiled by Bosworth Goldman, the well-known author, himself a soaring pilot. Over two years have been spent in collecting material, and out of 6,000 feet of film exposed about 1,700 feet are actually being used. Mr. P. Smith was not asked to supply the commentary; instead, it has been written by Mr. P. A. Wills, so that its suitability and excellency can be assured.

A private showing of this film was recently given to a small audience which included THE SAILPLANE. The first "shots" show a gull floating on an up-current, and as you watch it you suddenly find you are looking at a sailplane, doing the same thing. Then follow alternate pictures of a number of gulls and a number of sailplanes (we do not know the correct "nouns of multitude"), the latter having been "shot" at the Sutton Bank meeting of 1934, over the South Slope. Other reminiscences of the same meeting occur from time to time, including a SCUD's bad landing below, and the YELLOW WREN in a spin. The training methods, from primary work through secondaries up to sailplanes, are shown in detail; and the pleasures of private ownership are pictorially described, starting with a trailer being towed out of its garage on to the road, and finishing up over the hills and far away.

Near the end a reply is given to the unspoken question of the average picture-goer: "Why don't you put little engines in them?" A "Flying Flea" is shown in all its glory (*sic*), complete with sound effects, followed by the simple comment: "That is the answer."

As soon as this excellent film is available, it is to be hoped that all members of the gliding fraternity in different parts of the country will get their local cinemas to give it a showing, so that the public may at last pick up some genuine knowledge of what our activities are all about.

From Here and There

Channel Glider's Estate.—Mr. Lissant Beardmore, the first pilot to cross the Channel in a glider, who lost his life in an aeroplane accident last June, left estate of the gross value of £5,519 in England, with net personalty £1,409.

* * *

Club at Port Elizabeth.—The Johannesburg *Star* states that the gift by a leading industrialist of a glider to the Port Elizabeth Aero Club has hastened the formation of a gliding section of the club. Two members have been sent to Pretoria for instruction.

* * *

A Russian Honour.—It is reported that, as a reward for their skill in gliding, and for their courage and perseverance in trying to break international records, Comrades Ovsiannikoff, Kartasheff, and Kimmelman have been granted the title of "Masters of the Gliding Sport."

* * *

East African Fatality.—Mr. R. L. Davey, aged 23, a ground engineer of Imperial Airways at Mbeya, Tanganyika, has died as the result of injuries in a glider crash on October 16th. He was making the first flight of the newly formed Mbeya Gliding Club, which he had founded. It is stated to be the first gliding club in East Africa.

* * *

Midland Club's Appeal.—An appeal for £2,000 to provide "simple but adequate housing and feeding accommodation on the Long Mynd site, where members may stay for week-ends at low rates, thereby reducing transport and hotel expenses by a substantial amount, and so permit more hours in the air," has been launched on behalf of the Midland Gliding Club by the club chairman, Mr. C. Espin Hardwick.

* * *

Named after Gliding Pioneer.—The Lilienthal Society for Aeronautical Research was inaugurated at the Kroll Opera House in Berlin on October 13th. General Göring, who founded the organisation, made a speech in which he asked the foreign representatives to collaborate cordially in the work of the society, thus serving the cause of peace, which, he said, "could alone place mankind in possession of the great blessings of aviation."

* * *

"Unexpected" Down-currents.—The Air Ministry's report on the accident to the flying boat "Scipio" at Crete, on August 22nd, attributes it firstly to a wrong setting of the tailplane, causing the machine to pitch downwards when the engines were opened out on approaching the water. Further, "the pilot's error of judgment when approaching to alight, the result of which was to necessitate his opening-out the engines at the last moment, must be attributed to his comparative lack of experience of the local conditions, *i.e.*, the intensity and extent of the down-currents and where they were likely to be encountered.

Correspondence

Adventure with a Rudder

SIR,

With the diffidence appropriate to one whose "C" is only a few months old I should like to suggest that a prevalent form of rudder mechanism is open to serious objection. I refer to the attachment of the backs of the pedals to the nose of the machine by two separate pieces of rubber rope under tension. If anything gives way on the right-hand side, then left rudder is applied by the remaining effective piece of rubber rope attached to the left pedal. This piece of elementary mechanics was brought to my notice recently, very shortly after a catapult launch, while flying a single-seater FALKE of foreign construction on a strange site as guest of a club which shall be nameless. As a result I conceived a definite prejudice in favour of the design in which a single piece of rubber rope passes over a pulley in the nose of the machine; should anything break with this design one is presumably left with no rudder bias at all, which I think is preferable.

To find oneself with more or less full left rudder and no obvious means of taking it off is particularly distressing if, as in the incident referred to, the only available landing ground happens to be well ahead and to the right. I found that full right stick would just keep the machine from turning to the left at a normal speed for such a vigorous side-slip. To make the necessary slow turn to the right the speed had to be increased to about 50 m.p.h., when the increased wind pressure was presumably taking off some of the left rudder. Right stick was only eased off completely just before landing, and although the machine described a semi-circle before it stopped sliding along the ground no structural damage was done.

After landing I experimented to see if it would have been possible to take off left rudder by pulling on the left rudder wire. The rubber rope was too strong and the position in the machine too cramped for this to be possible. It was later suggested to me that it might have been better to try and get the toe of my left shoe behind the pedal and force it back. This I have not tried, but the practicability or otherwise of such expedients does not, I think, affect my general argument.

Having on two occasions had ocular demonstration of the great strength of the remarkably light machines of a well-known British constructor of sailplanes, I hasten to add that I regard rudder breakage on a British FALCON, for example, as utterly unlikely. Nevertheless, if the possibility of wing breakage be admitted in the discussion of the relative merits of wheel and stick for aileron control, then I shall postulate that the last man to fly the machine may have been a Rowing Blue or that somebody may have forgotten a safety pin somewhere.

JAMES WOOLCOCK.

Norton Hall, Norton, Stockton-on-Tees.

A Two-Seater Rhönsperber

[For the following account of an interesting new German two-seater sailplane, the "Kranich," which is in effect an enlarged version of the well-known "Rhönsperber" type, we are indebted to the German Research Institute for Soaring Flight (D.F.S.), under whose auspices the machine was produced. The accompanying photographs are by the D.F.S. and by Frl. E. von Roretz. Incidentally, the fears expressed as to the effect of side-by-side seating have proved unjustified in the case of the British "Falcon III." design, which in spite of this arrangement has a surprisingly good performance.—Ed.]

THE sailplane type Kranich has been produced by the D.F.S. for the purpose of instruction in thermal soaring and blind flying. In designing this type, the chief care has been to obtain a sailplane of high performance with good manœuvrability, while the question of expense has been considered of less importance, the higher first cost being offset by the much reduced running expenses. This is especially important with aeroplane towing, where a high performance two-seater attains a much longer flying time with a tow to a given altitude.

The design of a two-seater sailplane is essentially influenced by the seating arrangement. The following possibilities were considered:—

(1) Seats side by side;
(2) Seats in tandem, high-wing design;
(3) Seats in tandem, middle-wing design.

The first arrangement results in a very large fuselage cross-section, resulting in doubtful aerodynamic efficiency, though the pilots would enjoy good intercommunication and good visibility.

The second arrangement seemed unfavourable, particularly for thermal training, as the upward view would be too restricted, even if large windows were installed in the top surface of the wing.

The middle-wing design best fulfils the required conditions; it is true that the downward view is restricted for the instructor in the rear seat; the pupil's view, however, is excellent. In any case, the numerous flights already made by the Kranich have shown that the view from the back seat is quite satisfactory.

The experience obtained with the Rhönsperber has been made use of in designing the Kranich; the latter, therefore, may be regarded as a perfected version of the former.

The wing is in two parts; it is of single-spar construction, with a torsion-resisting plywood leading edge, and an auxiliary spar. The twisting forces in the wing are transferred to the wall of the fuselage by a strong wing attachment. The main spars are joined together within the fuselage, as in the Rhönsperber. The wings are slightly swept back in order to bring the back seat at the centre of gravity.

To facilitate landing, air brakes are installed at a depth of about 40 per cent. of the chord on either side of the wing; these increase the sinking speed to nearly three metres per second. Both instructor and pupil can operate the flaps.

In order to obtain high efficiency the ailerons are very large, and are provided with Flettner controls so as to reduce the force needed to operate them. To obtain good stability in turns, and to keep the wing tips clear of the ground, the gull-wing shape has been adopted. The wing section is Göttingen 535 as far as the bend, and from there passes into a symmetrical section at the tip.

The fuselage is of conventional design. In order to stiffen the cockpit where it is cut away, a strong stringer has been used, terminating in front in a shock absorption diagonal.

As supplementary stiffening of the cockpits, these are provided with an interior covering and a resistant floor. Both cockpits are very spacious and either seat will accommodate any extra tall pilot. The occupants sit on their parachutes, so that undue lengthening of the fuselage is avoided; this is particularly important in the back seat, which is restricted by the placing of the main and auxiliary spar.

The suspension of the tail unit is of normal type, the weights of the two control surfaces being compensated.

The KRANICH has been designed by Hans Jacobs, chief of the Soaring Flight Department of the D.F.S., and constructed with the collaboration of Ing. Lück. The D.F.S. carried out the construction. The license for building the machine is in the hands of the firm Flugzeugbau Schweyer, Mannheim [also, we understand, Schleicher of Poppenhausen.—ED.].

The data are: Gliding angle, 1 in 24 with covered cockpits, 1 in 20 with them open; sinking speed with closed cockpits, 0.65 to 0.70 metres (25½ to 27½ inches) per sec.; with them open, 0.75 to 0.80 metres (29½ to 31½ inches) per second; weight empty, 255 kg. (562 lbs.); loading, 180 kg. (397 lbs.); span, 18 metres (59 feet); surface, 22.68 sq. m. (248.15 sq. ft.).

Soaring an Aeroplane

From time to time someone has an idea that one of the public's "long-felt wants" is a machine which can be used either as a light aeroplane or as a sailplane, ignoring the fact that, although light aeroplanes can often be soared if their pilots care to try, none of them ever appears to have the slightest desire to do so.

An exception to this rule is Captain Thoret, the French pilot, who, in the middle of August this year, soared an aeroplane for ten hours with its propeller stopped, thus, it is reported, beating his own previous record by 15 minutes.

Captain Thoret has been doing this sort of thing, off and on, for years. After a world's soaring duration record of 3 hours 12 minutes had been set up at Itford Hill, on the South Downs, in October, 1922, Thoret was the first to beat it, which he did by soaring an 80 h.p. two-seater "Hanriot," with engine stopped, for 7 hours 3 minutes at Biskra, Algeria, on January 29th of the following year. In 1924 he soared a "Hanriot" for over nine hours, and in 1925 for over three hours with a passenger. But his greatest triumph was to soar a "Hanriot" seaplane, weighing a ton, for 3½ hours over the coast of Corsica, covering a sinuous course of 25 miles (*not* measured in a straight line).

If some of our rich aeroplane pilots would try soaring their aeroplanes under clouds, they might add much to meteorological knowledge—provided they were intelligent enough to discover anything.

Cross-Country Flight in South Africa

On October 11th the officials at the Rand Airport at Germiston, Transvaal, were astonished to see a KIRBY KITE sailplane appear from out the blue and glide down to land. Mr. P. A. Wills, who is on a visit to South Africa from England, had flown it 30 miles from Quaggapoort, which is five miles west of Pretoria.

During the flight the pilot had climbed 5,400 feet above his starting point in thermal lift, which means that he got up to nearly 11,000 feet above sea level. It is reported that, owing to the rarified atmosphere at this height, he found the down-draughts between the areas of lift "rather fierce."

The KIRBY KITE, which was built and sent out by Slingsby Sailplanes, was afterwards on exhibition at Messrs. Richard Curry Motors, Ltd., in Johannesburg, by invitation of the Rand Gliding Club.

As a result of the flight, much interest was stimulated in a luncheon held two days afterwards at Quaggapoort by the South African Gliding Association, to which a number of important personages were invited, including Brigadier-General Sir Pierrie van Kyneveld, Chief of the General Staff and Director of Civil Aviation, and Major-General Brink, Secretary for Defence.

The former made an encouraging speech, in which he declared: "If we in the service can help you, we shall do so with pleasure and intensity; we shall form a gliding club in the Air Force." He considered, he said, that "gliding means as much to the air arm as polo does to the cavalry."

Major-General Brink, who had attended a gliding demonstration held before the lunch, said he was glad to see "what you people have done, the progress you have made, and, in fact, how you spend Government money."

He thought there should be a section of the Central Flying School devoted to gliding and sailplaning as a portion of flying training, and hinted that the Government might buy the KIRBY KITE if nobody else would.

Mr. Wills described the development of gliding in Britain, and said that it had been found that the attitude of being able to stand on our own feet was what Governments wanted before giving a subsidy. He concluded: "I am quite sure that with the conditions you have out here you will knock spots off the English performances, and we will have to come out here for instruction."

Three Thunderstorm Flights

WHEN a thunderstorm of the "cold front" type crossed Dunstable Downs on Sunday, October 25th, and passed away eastwards, it carried with it three members of the London Gliding Club in the rising air along its front edge. The result was that three exciting flights were made, one of which exceeded the previous distance record for a flight of this kind in England.

R. S. Rattray, in the CAMBRIDGE II. sailplane (Dart Aircraft, Ltd.) in which he has a half share, flew to Hatfield Aerodrome, 14½ miles.

J. S. Fox, in a KIRBY KITE (Slingsby Sailplanes) in which he has one-third share, flew to Puckeridge, four miles S.S.E. of Buntingford, Herts., a distance of 24 miles.

P. B. N. Davis, in a SCUD II. (Abbot-Baynes Sailplanes) which he shares with his elder brother, flew 48 miles to Gosfield, near Halstead, Essex.

Captain Rattray has now only to soar a somewhat longer distance to get his "Silver C" certificate, since he has already done the duration test, and on this thunderstorm flight he got up to 4,024 feet (by calibrated barograph) before leaving the storm to glide on down-wind to a landing.

Mr. Fox, after his flight, paid a call at the Meteorological Office in London to find out all he could about the storm. Further, he read up what Robert Kronfeld, who, seven years ago, was the first pilot ever to make use of such a storm for going across country, has to say on the subject. In the following account Mr. Fox gives readers the benefit of his researches as well as describing his own flight.

Mr. Davis, who is a Cambridge undergraduate, got all three gliding certificates last year within a period of under two months; the "A" on April 19th, "B" on May 19th, and "C" on June 8th. He was at that time an *ab initio*, but has since learned to fly aeroplanes. His flight was a splendid effort, and, as will be seen from his account of it, which follows that of Mr. Fox, he had by no means an easy time; nor was it made any more comfortable by the knowledge that, unlike the other two, he had neither parachute nor blind flying instruments. He was also, unfortunately, without a barograph, so the flight will not be able to count towards a "Silver C" award.

The line of cloud which formed the front of the storm was described by some observers as a "street," a term used to denote a long line of cloud parallel to the wind. In this case the cloud, though parallel to the wind in which it was formed, lay transverse to the direction of the undercutting cold air which was the real cause of its formation. In Mr. Davis's account, therefore, "up-wind" is south-west and "down-wind" is north-east.

PREVIOUS COLD FRONT FLIGHTS IN ENGLAND.

July 29th, 1934.—G. E. Collins in "Rhönadler"; Dunstable Downs to Blakesware, 25 miles.

September 4th, 1934.—J. P. Dewsbery in "Blue Wren"; Sutton Bank to Hawsker, 31 miles. G. M. Buxton in "Scud II"; Sutton Bank to North Ormesby, 23 miles. G. E. Collins in "Rhönadler"; Sutton Bank to Pickering, 18½ miles.

April 12th, 1936.—H. L. Richardson in "White Wren"; Mam Tor to Wrinehill, near Crewe, 33 miles.

The Thunderstorm of October 25th.

Some of those who read this article may have already seen Wolf Hirth's book "Die Hohe Schule des Segelfluges." It is excellent; and before the October thunderstorm is referred to, there are some interesting things from this book which deal with the theory of storm flights, and also some points from actual flights done by Hirth, Kronfeld, Grœnhoff and others, which are worth mentioning as an introduction.

Firstly, we might mention the two types of storms, which are totally different in structure and general behaviour. The most usual type is the convection storm, caused by heat on warm days, which provides the most dangerous and difficult flying conditions which exist for a glider pilot.

The other kind, which occurred at Dunstable on October 25th, and which three pilots were lucky enough to be able to make use of, is the "front" type, in which a cold wind (usually northerly in origin) cuts under a lighter warm wind (usually southerly in origin) and pushes the latter up to a considerable height. The all-important thing to realise is that it is the lower *cold* wind which controls the *direction* in which the *front* will move.

In 1929 Hirth and Kronfeld used a storm exactly similar to ours, and moving in the same direction. In Hirth's book Kronfeld makes two interesting generalisations. He says (1929—after the above flight) that the up-current is generally found in the front right-hand corner of the storm; this was the case at Dunstable. And in 1932 he mentions that it is the usual rule for a storm to approach from a westerly direction; sometimes, however, it may possibly approach from the east, but that no really successful flight can be expected to be made from such a storm. I have an idea that these observations may be just geographical, and not necessarily general.

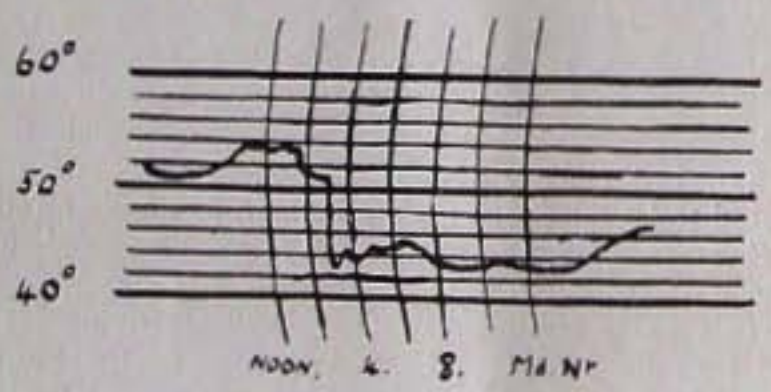
Hirth's chief comment on the 1929 storm modestly states that he flew into the dying part of the storm, owing to lack of experience, and had to land. Kronfeld also admits that the development of the storm was very puzzling, and he afterwards realised that the storm had split itself up into two parts. Hirth, in his introductory to the subject of storm flying, writes: "If the front is still young, well developed, and hanging together it is an easy matter to make use of it. It becomes, however, much more difficult if it is split up and branches out in different directions." Further advice appears throughout his book, in which it says that of course the first essential thing is, while hurrying away in front of the rain, to gain height. Having achieved this the whole success or failure of the succeeding flight depends entirely on how far one is able to picture the structure of the storm, and to accurately judge its development. The speed of movement of the "front" can be judged by the time taken to reach any known spot. Having ascertained the direction in

which the front is moving one should choose a landmark and try to pass over it. It is also necessary to note a compass bearing (which may differ from the general direction in which one is travelling with the front) so that if one gets enveloped in cloud, which can often suddenly form around you, one will then be able to find one's way out again without accidentally flying back into a thick part of the storm.

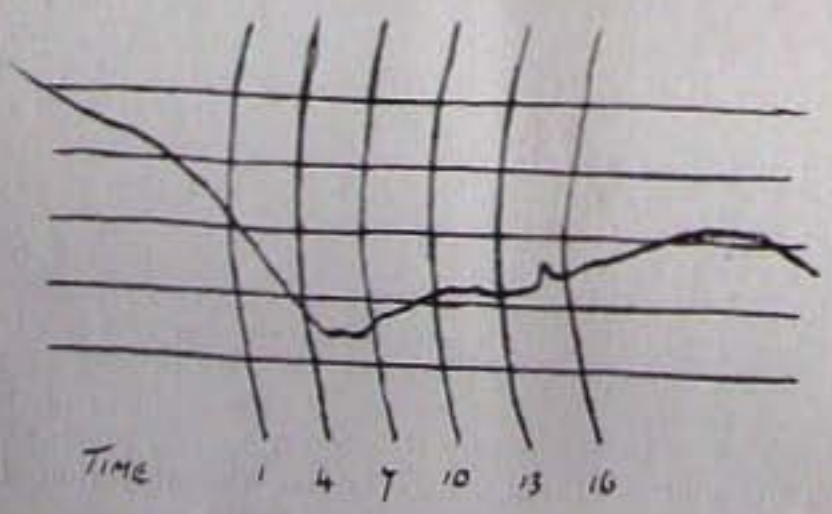
The hardest part of storm flying is usually the "Anschluss," i.e., making contact. With an aero-tow it is easy. The usual trouble is that prior to the storm there is often a dead calm when no slope-soaring is possible. In 1929 Hirth was lucky and was 3,000 feet up, while Kronfeld was on the ground in a calm. The moment the wind got up, however, he was launched; he rose rapidly over the Wasserkuppe and immediately shot down-wind and reached the front.

In 1931 he did a very similar thing. This front, incidentally, also came from the west. Grœnhoff got away, and Kronfeld was not ready. He got off two minutes later and rose as the first storm gusts arrived. He says: "One gained height very rapidly over the hill until light rain started to fall. This was the sign no longer to wait, but to turn down-wind." With a strong wind, and hill lift in two places on the way to help him, he reached the front, soared rapidly, cut on up through a small piece of the forehead of the cloud, and flew out into the clear sky beyond, where he found Grœnhoff enjoying himself. He semi-circled in and out of this forehead of the cloud to gain height. He then flew a mile or so ahead, where he says one finds a quiet steady rising current, to see how things were developing, whether the storm was splitting up, and to avoid possible cloud-formation close to the main cloud itself, regulating height by flying closer in or further forward.

TEMPERATURE CHART.



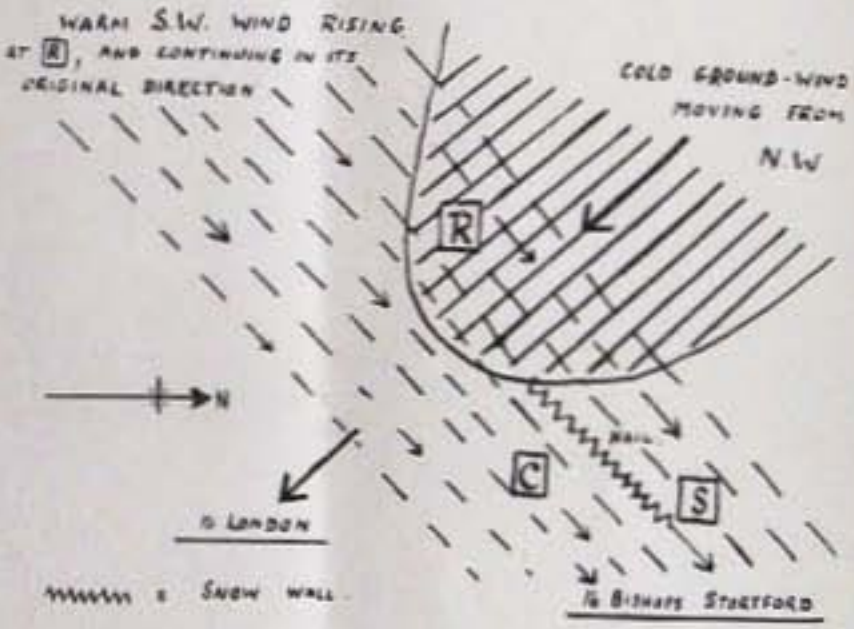
BAROMETER CHART.



The Flight from Dunstable.

Returning to Dunstable—the sketch will help to explain the structure and movement of the "front" at 2.15 p.m. on October 25th.

In normal cross-country flying among clouds, one knows that if one follows the shadows of those clouds one must be going in the right direction. This time, however, it was the *wrong* direction. The direction of the ground-wind causing the front was towards London; this I followed until well over St. Albans, gaining height fairly steadily up to an occasional 15 feet per second. From 300 feet to 3,300 I timed at roughly 7½ minutes, an average of seven feet per second, but I was not in such a good section of the front as the other two planes. I had curved away from the London direction by the time I was past St. Albans, and the 4,000 feet cloud shadows (somewhere near the point "C") were heading straight for Bishop's Stortford. It was in this direction that all three planes eventually flew. If, on the other hand, any of us had been clever enough to follow the correct direction of the front we should have had a wonderful flight right over the centre of London.*

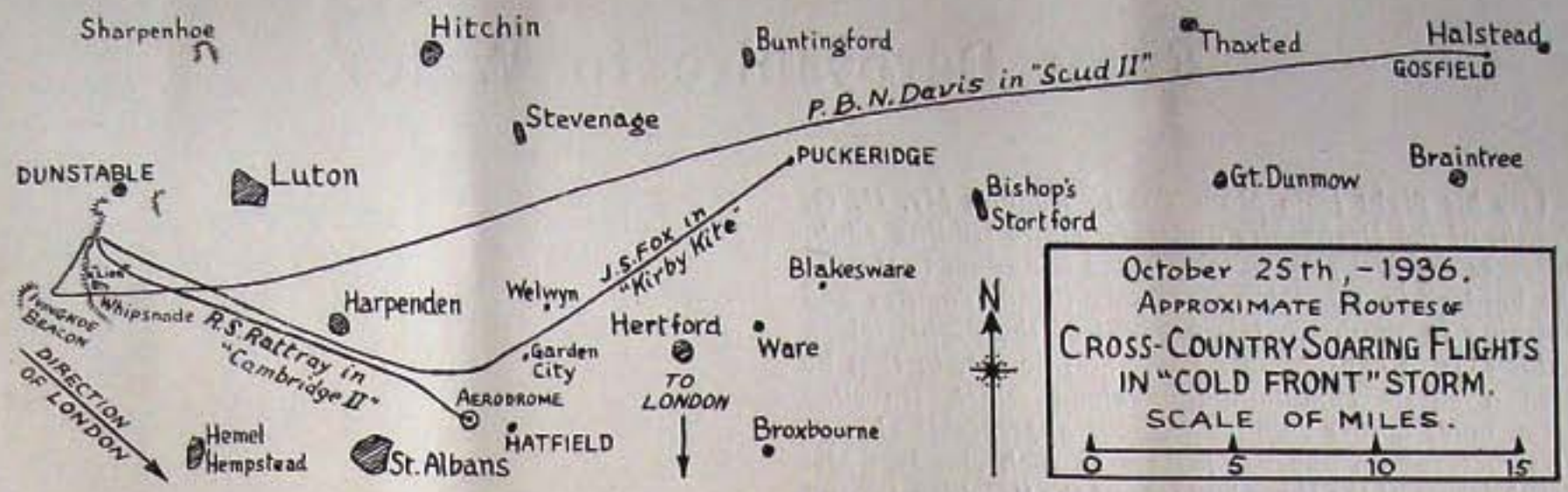


I followed the snow wall for a long time, turning into it once to see if any of the snow was going up, only to be bombarded by some enormous hail stones, and then to have the KITE nearly shaken to pieces after a rope of lightning shot down at very frightening proximity.

Captain Rattray was on ahead of me along the snow wall, and he turned away to the right in order to land at Hatfield, which he succeeded in doing. I went on in the Bishop's Stortford direction, landing at Puckeridge (24 miles from start).

Peter Davis, in his SCUD, did a magnificent flight with no instruments at all. He was right out at the Whipsnade end of the hill and got the lift there early, with Captain Rattray not far behind him. He then flew straight out towards Ivinghoe Beacon, and he must have been at about 3,000 feet before I reached the lift at all. When I had risen to 3,000 feet he was still a long way above me. He eventually got into cloud and came out in a spin. He then must have flown through part of the snow and hail region "S," because

* Since writing this article I have discussed this question with Kronfeld, and he says that in doing cloud-front flights it is always necessary to fly at roughly 45° to the upper wind direction.



he came over well to the left of me at Puckeridge with still 2,000 to 3,000 feet to spare, and landed gloriously a good 48 miles from Dunstable.

It was a great day; but we shall all do much better next time.

The storm reached London soon after three o'clock and created quite remarkable disturbances on the weather charts at Kingsway. There was a sudden burst of pressure which was partly due to the convergence of the two air streams, and partly, they said, due to the sudden arrival of the heavier colder air. The temperature chart was the most phenomenal of the two. It showed a sudden drop, as the cold front arrived, of about 10 degrees F., and I traced a copy of both these charts to show what really did happen.

Our storm was actually only a very secondary affair, as the daily weather report showed an extensive cold front which passed over about 7 a.m. as shown by the trough of pressure at that time on the chart. It was travelling at 36 m.p.h., which is probably the speed at which the whole system, including our little storm, was still moving in the afternoon.

One most unfortunate fact was that the relative humidity, which I measured at Dunstable before going up, was in the neighbourhood of 73 per cent. Air as moist as this, I calculated, could easily give cloud on this day down to 3,000 feet. There seemed to be a tremendous lot of dirty grey-looking cloud connected with the storm, and if only the air had been in a drier condition a nice clear-cut thunder cloud would have been formed, in front of which a real joy ride could have been made.

The best part of this story is, I think, its conclusion, in which I would like to translate Kronfeld's advice. He says: "The best way for a young pilot to learn to understand storm fronts is for him to take every possible opportunity of studying them, even when he is not sitting in a sailplane."

J. S. Fox.

Dunstable to Gosfield.

After taking off at about 1.20 p.m., I had been soaring over the hill for nearly an hour. Then, when over the Lion at Whipsnade, I happened to fly away from the hill up-wind, and noticed that the variometer showed a steady climb. It was then that I saw the "front" approaching, and after about ten minutes, during which time my height was steadily increasing, I reached it and continued up-wind, flying under the part of the cloud which looked most turbulent.

When my height must have been about 2,500 feet (no altimeter) I turned down-wind. As far as I could see there was snow falling all along the up-wind (left hand) side of the cloud street, and the greatest lift seemed to be obtained by flying just inside it, keeping well to the down-wind fringe and under the clouds. By doing this my height increased to somewhere about 4,000 feet, and, when roughly over Stevenage, the very strong lift took me into the cloud, in spite of holding the SCUD's nose well down.

Once in the cloud, side-slipping seemed rather awkward without blind flying instruments, so I continued flying at about 45 m.p.h. in the vain hope of re-emerging. All went well for about five minutes, but then the speed increased rapidly, and continued to increase in spite of pulling the stick back. The needle of the air-speed indicator was not in view after 60 m.p.h., so I pulled the stick right back and held it there. For a moment the speed continued to increase, but then, as I was pressed hard into the seat, the dive changed into, I suppose, a vertical climb, and from that into a spin.

On leaving the cloud, the SCUD responded immediately to opposite rudder. It would certainly have been wiser to have gone into a spin on purpose as soon as I entered the cloud. Presumably I got into the dive by having dropped one wing, or even being completely inverted. Anyway, in view of this experience, I thoroughly agree that one should never remain in a cloud without blind flying instruments, but should go into a spin without hesitation.

I now flew on as before, but taking care (by side-slipping) not to re-enter the cloud, and soon reached the down-wind end of the front. For some time I circled around travelling along with it. But the end of the street was rather broken up, and this, combined with the fact that I flew too far out ahead of it, made me land. This was about an hour after leaving Dunstable.

Needless to say it was the most fascinating experience. Away on one side there was blue sky and sunshine; on the other, thick snow. Just above were dark, thundery clouds. Down below the fields and roads looked comfortably small and distant. And the absence of noise made it all perfect.

P. B. N. DAVIS.

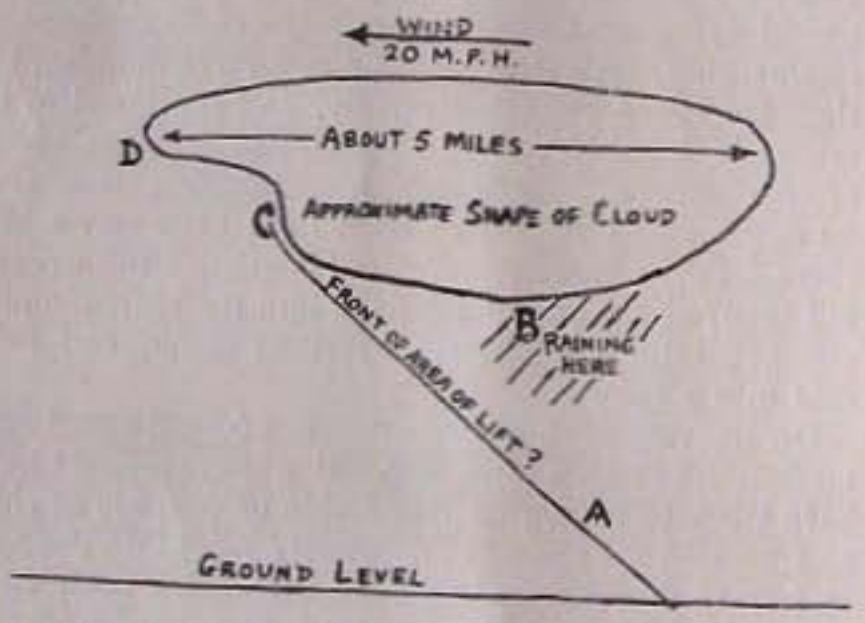
From Derbyshire to Wales

*[By his flight from Mam Tor to Ruabon Mr. G. O. Smith, of the Derbyshire and Lancashire Gliding Club, becomes the first pilot in the United Kingdom to "cross the border" in a sailplane, starting in one country and finishing in another. His account of the flight, which follows, is of considerable scientific interest, in that he used a single cumulo-nimbus cloud which travelled many miles across country without appreciable change of structure—an unusual feature in such clouds. Mr. Smith is one of the three builders of the "Golden Wren" sailplane in which the flight was made.—*Ed.*]*

EVERYBODY knows that Monday is always the best day of the week for any sort of soaring, so when I found myself with a Monday to spare on September 28th, it was fairly obvious that something should be done about it.

The wind was E.N.E., which meant taking off at Castleton, and owing to trouble with the trailer it was half-past one before everything was ready. Some beautiful cumulus in streets had just gone over, and as I rigged with one hand and tried to eat some lunch with the other, I felt sure I was just too late as usual.

I took off at 1.40 p.m. with a one-a-side launch and spent a thoroughly uncomfortable hour and a quarter



over Castleton at heights varying from 1,400 to 300 feet. Odd cumulus was coming over again now and there was lift about, but the down-draughts in between times were nothing short of alarming, and one never seemed able to get anything except when too low to take advantage of it safely.

I was at about 600 feet when the one good and obvious chance of the day came along; a small "front" consisting of one very large black and ominous-looking cloud, very different in appearance from the cumulus that had preceded it and much lower. By this time I was thoroughly disgusted with myself, the machine, the weather and everything, and I determined that if there was any lift at all under this cloud I would go away with it if I only got a mile and a half.

At least half the cloud had gone over, and I was beginning to think there was nothing to it, when the lift came (point "A" on diagram), and I circled diligently up to the cloud base at "B," which to my disgust was at less than 2,000 feet here. However, the hill was out of reach by now, so I decided to try and work down-wind towards the "leading edge" of the cloud, which one is led to suppose is the proper place to be.

This turned out to be a good move, although the next 20 minutes or so were very much in the balance—sudden sinking feeling, feverish searching for lift, circling with bated breath, all to find oneself at just the same height as before.

Eventually I reached a sort of step in the cloud base where the lift seemed fairly secure (point "C" on diagram) and I was pleasantly surprised to find that the height had crept up to almost 3,000 feet. I tried to work up the vertical wall at "C" and out to the very leading edge at "D," but I could never get more than half way up the wall, and any attempt to cut straight out to point "D" always resulted in loss of height. The strongest lift (outside the cloud) was always at point "C," but one had to be close to the cloud, say within 100 yards of the wall, to maintain height. Inside the cloud there was definitely more lift, but I never went far enough in to get completely blind. Twice I lost the lift altogether, I think by getting too far forward of point "C," but each time I was able to pick it up again by flying back towards point "B" and then working up to "C" again.

All this rather suggests that the area of lift sloped *back* from the leading edge of the cloud, and although this may be so with a cumulus cloud and its "thermal" it hardly sounds right in the case of a "front." Of course, it only remains now for the technically minded to argue that this wasn't a "front" at all, and the discussion immediately becomes interesting. Be that as it may, it certainly was not a cumulus cloud.

I had been at or around point "C" for something over two hours when the cloud began to break up and I found myself sinking again. The Welsh mountains were in sight, it was nearly five o'clock in the afternoon, ground mist was coming up in the valleys and it was time to be thinking of landing in any case, so I went on ahead and made a few glorious miles down-wind to land at Ruabon, having covered 58 miles at about 22 m.p.h. ground speed. Maximum height was 3,400 feet above the start.

The whole flight was made on the Slater-Cobb experimental variometer, as the fuselage had blown over while rigging and upset the liquid one. While this instrument is not yet in production form it is already delightful to use and the only argument I could provoke was by telling the designer of it that I had had both of the balls up together, which he said was impossible. Anyway, it was a good argument.

G. O. Smith.

Gliding Certificates

The following gliding certificates were granted by the Royal Aero Club at the committee meetings held in September and October.

Previous lists of certificates granted have been published this year in our issues of February (p. 24–25), August (p. 157), and October (p. 204). In the last, Major C. A. Bill's "C" certificate (Midland Club) should have been dated 2.8.36, not 26.4.36.

Since any future subsidy a club may receive is likely to be influenced by the number of certificates earned in the past year, club secretaries should see that all members who have made qualifying test flights should take the further step of obtaining their certificates from the Royal Aero Club.

The "A" Certificate is given for a straight glide of 30 seconds; the "B" for a flight of one minute with right and left turns; and the "C" for a soaring flight of over five minutes above the level of the starting-point.

"A" Certificates

No.	*Name.*	*Club.*	*Date.*
568	F. J. Box	London	30.5.36
569	R. B. Bucknell	London	15.6.35
570	S. C. O'Grady	Yorkshire	4.8.36
571	R. H. Bailey	Yorkshire	9.8.36
572	A. F. Eadon	Derby & Lancs.	29.7.36
573	M. Booth	London	11.8.36
574	D. F. Greig	London	16.8.36
575	R. S. Bryant	London	9.8.36
576	A. L. Jones	Derby & Lancs.	29.7.36
577	W. H. Benson	London	13.8.36
578	F. L. Felton	Midland	23.8.36
579	C. T. Locke	Yorkshire	11.7.36
580	W. G. Edwards	Midland	11.7.36
581	W. J. Tremellen	Yorkshire	5.8.36
582	J. R. Micklethwait	Yorkshire	4.8.36
583	J. Quinn	London	13.8.36
584	H. Spillman	London	30.8.36
585	A. A. J. Thorburn	Yorkshire	9.8.36
586	P. Shaw	Yorkshire	9.8.36
587	E. Sharples	Midland	19.7.36
588	G. R. B. Bell	London	15.8.36
589	F. W. West	London	22.8.36
590	E. Swale	Derby & Lancs.	13.9.36
591	H. Leach	Yorkshire	9.8.36
592	E. R. Kearney	London	30.8.36
593	P. J. Johnson	Midland	4.8.36
594	E. Lamplugh	London	9.8.36
595	G. T. Tait	London	12.8.36
596	I. N. Gunn	Austrian Aero	4.5.36
597	M. F. Young	Derby & Lancs.	4.10.36
598	S. A. Melville	Rand (S.A.)	15.12.35
599	R. N. Graham	London	5.7.36
600	B. Thomas	Derby & Lancs.	11.10.36
601	L. L. D. Orme	Derby & Lancs.	11.10.36
602	A. H. Bell	Newcastle	20.9.36

"B" Certificates

No.	*Name.*	*Club.*	*Date.*
555	K. G. Ferguson	Derby & Lancs.	1.7.36
564	D. E. Stanford	Midland	19.7.36
566	D. A. Hannay	Midland	19.7.36
492	J. S. Jepson	Midland	26.7.36
550	Miss B. M. Goldney	London	25.7.36
567	P. G. Everall	Midland	25.7.36
568	F. J. Box	London	1.8.36
570	S. C. O'Grady	Yorkshire	4.8.36
548	F. T. Gardiner	Cambridge Univ.	21.7.36
569	R. B. Bucknell	London	15.6.35
518	C. A. Reilly	Midland	18.4.36
562	J. F. Copeland	Southdown	16.8.36
407	Miss M. S. Thring	London	11.8.36
573	M. Booth	London	13.8.36
575	R. S. Bryant	London	18.8.36
579	C. T. Locke	Yorkshire	25.7.36
580	W. G. Edwards	Midland	13.7.36
508	A. Holland	Midland	30.8.36
585	A. A. J. Thorburn	Yorkshire	13.8.36
581	W. J. Tremellen	Yorkshire	5.8.36
586	P. Shaw	Yorkshire	11.8.36
587	E. Sharples	Midland	19.7.36
574	D. F. Greig	London	23.8.36
584	H. Spillman	London	13.9.36
515	H. Blackmore	London	11.7.36
582	J. R. Micklethwait	Yorkshire	5.8.36
593	P. J. Johnson	Midland	6.9.36
104	J. H. Safery	London	2.7.36
595	G. T. Tait	London	13.8.36
594	E. Lamplugh	London	11.8.36
552	A. G. Shepard	Derby & Lancs.	27.9.36
565	H. Leeson	Derby & Lancs.	4.10.36
590	E. Swale	Derby & Lancs.	4.10.36
554	D. Upton	Derby & Lancs.	2.9.36
596	I. N. Gunn	Austrian Aero	9.5.36
598	S. A. Melville	Rand (S.A.)	15.12.35
291	L. G. Griffiths	Channel	10.10.36
509	A. H. Sheffield	Midland	30.8.36
578	F. L. Felton	Midland	18.10.36

"C" Certificates

No.	*Name.*	*Club.*	*Date.*
410	R. A. B. Williams	Midland	18.4.36
423	F. J. Davies	Midland	26.4.36
459	L. G. Beeton	Midland	19.4.36
474	D. C. Timings	London	18.4.36
564	D. E. Stanford	Midland	19.7.36
378	J. V. Gurteen	London	20.7.36
566	D. A. Hannay	Midland	19.7.36
492	J. S. Jepson	Midland	26.7.36
567	P. G. Everall	Midland	25.7.36
537	S. Dickson	Derby & Lancs.	24.7.36
473	L. B. Wise	Midland	26.4.36
560	G. Thompson	Derby & Lancs.	21.7.36
570	S. C. O'Grady	Yorkshire	4.8.36
504	R. A. C. Evans	London	4.8.36
382	A. E. Firmin	London	4.8.36
569	R. B. Bucknell	London	22.9.35
518	C. A. Reilly	Midland	19.4.36
481	R. d'A. Gifford	Midland	26.4.36
482	R. A. Wagstaffe	Yorkshire	8.8.36
483	A. H. James	Yorkshire	8.8.36
550	Miss B. M. Goldney	London	12.8.36
580	W. G. Edwards	Midland	13.7.36
508	A. Holland	Midland	30.8.36
581	W. J. Tremellen	Yorkshire	18.8.36
586	P. Shaw	Yorkshire	13.8.36
587	E. Sharples	Midland	19.7.36
502	G. H. Stephenson	London	5.9.36
503	R. Pasold	London	5.9.36
574	D. F. Greig	London	6.9.36
543	C. Forman	Derby & Lancs.	29.8.36
582	J. R. Micklethwait	Yorkshire	5.8.36
579	C. T. Lecke	Yorkshire	25.7.36
593	P. J. Johnson	Midland	6.9.36
104	J. H. Safery	London	11.7.36
598	S. A. Melville	Rand (S.A.)	5.1.36
509	A. H. Sheffield	Midland	30.8.36
578	F. L. Felton	Midland	18.10.36
460	J. E. Marshall	London	18.10.36
356	D. A. Smith	London	18.10.36

Do Thermals Rotate?

IN the September SAILPLANE AND GLIDER Mr. H. C. Bergel put forward a theory that the air in thermal currents is not merely rising, but also rotating on a vertical axis, like a miniature edition of a cyclone. He reasoned from the analogy of dust whirls often seen near the ground, from the fact that newly-forming cumulus cloud can sometimes be seen rotating in a horizontal plane, and from the natural tendency for such whirls to form, as for instance in water running out of a bath.

If such rotation exists, it would be advantageous for a sailplane to circle against it rather than with it, since less bank would be required and the machine would therefore be flying more efficiently, and also because, Mr. Bergel believes, a sailplane has a better performance flying against a wind than with it.

He suggested that watch should be kept on dust whirls, the rotation of cumulus, and the comparative performance and time of circling of sailplanes in right and left-handed circles, to discover how often such rotation exists, and whether it is always the same way round.

"Coreolis' Forces."

Two members of the Derbyshire and Lancashire Gliding Club write to THE SAILPLANE as follows:—

SIR,

Mr. H. C. Bergel's suggestion that a "thermal" is like a very miniature edition of a cyclone is of great interest. The cause of cyclones is well known. Over a fairly large region a state of low pressure exists. Due to higher pressure, the surrounding air moves inwards from all directions to fill this up.

Now, owing to the fact that the earth is spherical and rotates about an axis, any body moving over its surface experiences forces, known to meteorology as "Coreolis' Forces." In the Northern Hemisphere, facing the direction of motion, this force acts to the right, and its magnitude depends upon the velocity of the moving body and upon the sine of the angle of latitude. Thus, it is non-existent at the equator, whilst at the poles it is a maximum. For substances of low density, such as air, the effect of these forces becomes appreciable. Thus the incoming air in the cyclone is deflected to its right, and a rotational motion is set up in this direction. Therefore, in the Northern Hemisphere, a cyclone, viewed from above, always rotates in an anti-clockwise direction.

Our theory is, then, that after a thermal bubble has broken free, the surrounding air, moving inwards to replace it, is subjected to the previously mentioned forces, forming a miniature cyclone beneath it. By friction, this rotational motion is imparted to the rising bubble. This motion is further assisted as the bubble rises, by the continual flow of air beneath it. The picture that we wish to convey is that of a bubble sitting on a swirling inverted cone of air. By friction with the surrounding air, and also due to the reduction in speed of ascent, this motion will gradually cease. We believe that by the time cloud level is reached, little rotational motion would be detectable.

We feel, then, that the answers to Mr. Bergel's questions would be:—

(*a*) All thermals rotate, unless local conditions tend to destroy the formation of the cyclone.

(*b*) and (*c*) The direction of rotation in the Northern Hemisphere is anti-clockwise viewed from above.

In conclusion, we do not anticipate that the speed of rotation would at any time be very great.

H. PEARSON, B.A.
S. GREEN.

A Pilot's Experiences.

Mr. J. C. Neilan, who has much experience of thermal soaring, was asked for his opinion on whether thermals rotate, and has sent an interesting letter, in which he says:—

"I have experienced thermals in which for half a circle there has been a rush of head-wind, in which one just pulled the stick back and climbed like a rocket with the nose up, and for the second half of the circle one has been left completely stalled, and whipped into the beginning of a spin, a most unpleasant experience when only about 300 feet up! Some thermals seem to be quite steady, but this is rather unusual. I generally find that one gets heaved up and given a bit more airspeed on one part of the circle, and is rather left in the lurch for the rest of the circle, but I expect this is due to different rates of vertical movement in the different parts of the thermal, and if one could get the centre of one's circle to coincide with the centre of the thermal, it would be smoother. But that doesn't tell you anything about their rotation.

"It would appear to me that thermals can be of two kinds: (*a*) in bubbles, and (*b*) in columns like tree-trunks. I would expect type (*b*) to be the ones that rotate. Some thermals seem to have particularly violent down-draughts around them. These must be type (*a*) thermals, displacing air downwards as they go up."

Mr. Neilan adds an interesting observation on thermals in general:

"Until the afternoon, thermals are very often too small in diameter to keep in, but are very violent, and between them one gets just as violent down-draughts. Later in the day they are often further apart, but much

wider, and sometimes quite steady, and without the violent down-draughts at their edges. These are the useful ones."

Commander Quentin H. Paterson, writing from Worksop, discusses in particular Mr. Bergel's belief that a sailplane's performance is better against than with the wind. This, however, opens up a large field for further discussion, and for the present we must confine ourselves to the question of rotating thermals.

Some Comments.

In discussing this problem, it is evident that we have to do with what is known as "vortex motion." If a particle of fluid, revolving round a centre, is drawn in towards that centre, its speed of revolution will be increased, in accordance with the "law of conservation of angular momentum." If, then, fluid is withdrawn from a point, and the surrounding fluid has already even the slightest degree of rotation, a so-called "simple vortex" will be set up, in which the velocity of any particle is in inverse proportion to its distance from the point of withdrawal.

Where the earth's rotation is responsible for the forming of a simple vortex, in the manner described above by H. Pearson and S. Green, the circulation can be calculated, assuming certain "ideal" conditions. A formula for doing so is given in Professor D. Brunt's *Physical and Dynamical Meteorology,* on page 291 (last paragraph but one). What the formula amounts to, simplified, is this: Assume a large disc of air, of unit thickness; remove from its centre the air contained in a smaller disc of radius q (unit thickness); this causes the larger disc to shrink, as a result of which a certain particle of air is now only at a distance r from the centre, round which it has begun to revolve, due to the effect of the earth's rotation. The speed at which it revolves is got by dividing q^2 by r, then multiplying by the earth's angular velocity of rotation and by the sine of the angle of latitude.

A circle performed by a sailplane in 20 seconds will have a radius of about 150 feet. Imagine the air contained in a disc of 150 feet radius to have gone up in a thermal, and a sailplane is doing 20-second circles in the replacing air; it will, according to formula, encounter air moving at about 31 feet *per hour* due to the earth's rotation. (This is at the latitude of England.) If, however, the thermal has drawn air from a disc half a mile in diameter, the corresponding vortex motion where the sailplane is flying is nearly half a mile an hour—supposing the formula to cover such a case.

Here the important point made by H. Pearson and S. Green should be emphasised: the rotation, if any, is established in the air which comes in to replace a thermal "bubble"; not in the bubble itself, except in so far as the motion is communicated to it by friction. But where the thermal continues for some time, and the air drawn in gets heated and becomes part of the thermal before there is time for its vortex motion to be dissipated, then a true rotating thermal might become established.

A point to be noted from the formula is that the intensity of the vortex is proportional to the amount of air previously removed, *provided* that the air in the vortex has been drawn in horizontally all the time the thermal has been feeding itself from ground level. It follows that, with this proviso, for the earth's rotation to cause a vortex motion of any great magnitude, the thermal must draw off air either from a small area for a considerable time, or from a large area all at once.

The first condition is fulfilled in a tropical revolving storm (hurricane, cyclone, typhoon); it would also be fulfilled on an island in the middle of a large expanse of sea. Something of the sort happens even in the British Isles; at Aberdeen, for instance, "the sea breeze has been found to set in suddenly as a breeze from the sea, and to veer in the course of the day until it blows nearly parallel to the coast." (Brunt, *Op. cit.*, p. 172-3.) Thus, the longer the duration of the up-current, the greater the effect of the earth's rotation on the air drawn in.

As to the effect depending on the size of the area over which fluid is removed, some facts were given by Professor E. N. da C. Andrade in a lecture to the Royal Institution on May 22nd, on "Whirlpools and Vortices." Professor Andrade stated that the whirlpool in an emptying bath is equally likely to go round in either direction, according to what slight motion there happened to be in the bath before the plug was pulled; the effect of the earth's rotation is so small that it can be ignored. But over large sheets of water, where a vertical pipe serves for the intake for water turbines, cyclonic circulation is observed; in three known cases in the Northern Hemisphere it is anti-clockwise, whereas at a turbine intake at Arapuni, New Zealand, there is a clockwise whirlpool.

"Sand Devils."

Further evidence has just come to light in a Meteorological Office publication on "Sand Devils," by William D. Flower (Professional Notes No. 71, H.M. Stationery Office, price 3d.).

Sand devils may be regarded as concentrated thermal currents possessing a whirling motion which carries up fine particles of sand. Mr. Flower has collected observations upon them from meteorological stations in the Middle East and Iraq, made during the past 10 years, and has tabulated the results, especially in regard to their direction and rotation.

Some interesting facts emerge. The first is that there is hardly any preponderance of anti-clockwise over clockwise circulation, although, the latitude being about 30°, the effect of the earth's rotation is still nearly two-thirds of what it would be in England. The figures are: anti-clockwise, 200; clockwise, 175. As in the case of the bath plug-hole, local irregularities of motion appear to determine which way round the whirl should go. This is strikingly borne out by the observations at two stations, Heliopolis and Ismailia. At both places the prevailing wind in the "devil" season is northerly. Both are surrounded by open desert except on one side. But, whereas at Heliopolis the town and aerodrome are on the west side, at Ismailia there are buildings and vegetation to the east. So that the wind is slowed up on one side but not on the other, and the resulting slight rotary motion should, one would expect, be enormously magnified (according to the "angular momentum" law) when concentrated into a sand devil. This is just what is found, for, while at Heliopolis clockwise whirls predominate in the proportion 31 to 9, at Ismailia the predomination is anti-clockwise in the proportion 39 to 7.

Sand devils vary greatly in size; heights may be anything from 5 to 4,000 feet, and diameters from 2 feet or less up to 300 feet. The larger ones, therefore, are comparable in size with the ordinary thermal currents used by sailplane pilots. How about their rotation?

Mr. Flower classifies his "devils" both according to height and to diameter; and finds, as might be expected from theory, that in the wider ones (diameters of 80 feet and more) there is a good preponderance of anti-clockwise rotation.

But, when arranged according to height, there is no preponderance, except, curiously enough, in those under 20 feet high, of which 44 were anti-clockwise to 7 clockwise. One wonders how far this unexpected result may be due to the fallacy that a whirl seen from above appears to be going the opposite way round to what it would be doing if looked at from below. J. Durward, writing in *Nature* (September 5th, 1931, p. 412), once drew attention to this and gave reasons for thinking that nearly all sand devils were anti-clockwise as seen from above. Mr. Flower, however, says in his paper that his observers were put on guard against this mistake.

Similar phenomena to these "devils" are occasionally seen in England; *e.g.*, according to the Norfolk Gliding Club, they are called "Rogers" in that county. Some of them get reported in the *Meteorological Magazine*; but out of a number of small dust whirls described at various times during the last two years, in only four was the direction of rotation noted, and of these two were anti-clockwise and two clockwise.

Whirlwinds and Thermals.

Now, how far is knowledge of the behaviour of "devils" and other small whirlwinds applicable to thermals of the size used by sailplanes?

In the first place, it is obvious from the "angular momentum" theory that the extremely rapid rotation is due to the up-current being concentrated over a very small area of ground, so that a sailplane circling round it would be right outside the up-current. Whereas if the area of rising air is large enough for a sailplane to circle in, any rotational velocity would be likely to be small, since "simple vortex" conditions exist only as far inwards as its outer border.

Occasionally, however, sand devils would be big enough for a sailplane to soar round in, against the current, the consequent reduction in ground speed enabling a smaller circle to be turned. One example quoted by W. D. Flower had a diameter of 90 feet, with a velocity at the periphery of 12 miles an hour. But who would want to fly in all that sand?

There is some evidence that a narrow whirlwind at the ground can become an ordinary thermal higher up. For one thing, such whirls are usually shaped like an inverted cone, broader at the top. Further, an example was given in THE SAILPLANE for January, 1934 (p. 10), of a case in which a mass of hay, drawn up by a whirlwind, was later seen descending from a solitary cloud.

But the intensity of the up-current in a whirlwind is likely to be much reduced when spread out over an area large enough to suit a sailplane, though R. G. Veryard says of "dust devils" in N.W. India: "They sometimes extend up to several thousands of feet, and aircraft flying over or through them have occasionally experienced severe bumps." (*Met., Mag.*, December, 1934, p. 268.) But up-currents in whirlwinds vary considerably; some will gather up chairs or flowerpots (THE SAILPLANE, October, 1935, p. 164; and March, 1936, p. 36); whereas in such sand devils quoted by W. D. Flower as could be measured, up-currents were estimated at only 200 to 500 feet a minute.

Since a whirlwind is usually nothing but a concentrated thermal, it seems to me that there must be in the atmosphere, on an unstable day, many whirls of larger diameter which are not intense enough to lift up solid matter and become visible. But the larger the diameter, in all probability the less the whirl, and the important question is whether a thermal wide enough to be used by a sailplane (it might do part of a circle inside the thermal and part outside) is likely to have enough rotation to be worth taking account of; and if so, how can the pilot guess which way round it goes? From evidence on sand devils, it would seem that the direction of the wind, combined with the distribution of obstructions round the base of the whirl, have much influence in deciding the matter, so the pilot must get to know his local peculiarities.

Effect of Earth's Rotation.

When larger thermals are considered, there may come a point at which the earth's rotation outweighs local influences; but at what point this stage is reached nobody appears to know. From arguments already given, it seems probable that the effect would be negligible unless the thermal were of long duration *and* there were no other thermals for miles around. It would be useful, as Mr. Bergel suggests, to watch cumulus clouds; though observations had best be confined to those that pass directly overhead, as clouds watched from one side are nearly always seen to be turning on a horizontal axis, and, as he says, it is hard to distinguish the one rotation from the other.

There is some evidence that still more extensive rising currents, such as those which build up cumulonimbus clouds, tend to have a cyclonic rotation. When Professor V. Bjerknes and his helpers were working out the modern "polar front" theory of depressions, they established a close network of stations all over Southern Norway in order to observe "lines of flow" of air at ground level. Two of his maps, published in *Q.J. Roy. Met. Soc.* (1920, p. 137) and reproduced in Sir Napier Shaw's *Forecasting Weather* (2nd Edn., p. 312), show "Lines of Flow of Air leading up to the Formation of Local Showers and Rain" at 2 p.m. on two successive days. On the first day, air is shown converging towards five different points, moving in a clockwise spiral in four cases, and without rotation in the fifth, while from two other points air (from down-current?) is diverging in a clockwise spiral. On the following day there are two anti-clockwise convergencies and one clockwise.

One more point: thermals always lean over in the direction of the wind, if any. Presuming they rotate in a plane perpendicular to their axis, the plane of rotation must be tilted, so that air is moving up on one side and down on the other. What is the technique by which a pilot can discover whether this is happening, and, having discovered it, best make use of it? This is a question which I will now leave expert soaring pilots to argue out.

A. E. SLATER.

News from the Clubs

List of Gliding Clubs

The following additional changes should be made in the list of British Gliding Clubs and their secretaries' addresses, given in our September issue:—

FURNESS.—J. S. Redshaw, 18, Fairfield Lane, Barrow-in-Furness, Lancs.

JERSEY.—A. J. Scriven, "Alcala," Samares, Jersey.

New Club

STOKE-ON-TRENT.—H. N. W. Goss, 36, Crewe Road, Alsager, Cheshire. (The club has formed a committee and has bought a B.A.C. II. primary glider, which is to be fitted with a new tail.)

Yorkshire Gliding Club

Annual Report.

The secretary's report for the year ending July 31st, 1936, which we have received, declares that the club has at last achieved the position which its founders have been working for ever since the year 1930, when the original Bradford Gliding Club was started. For whereas in past years there has usually been more work than flying, in the year under review "the average member has had a good deal of flying and has had to do comparatively little work to make that flying possible."

Comparing the present facilities with those existing a year before, the secretary states that there are now three times as many machines in commission and almost three times as much hangar accommodation. Although the number of new members who joined during the year is the highest on record, the club can cope with almost double the present membership; when they come, it will be possible to operate more economically and to offer still better facilities.

The National Competitions of the British Gliding Association were held on the site, during the year under review, for the third year in succession, and this is regarded as a very great tribute to the Yorkshire Club in the suitability of its headquarters for such an event.

Flying and Aircraft.—The increase in gliding certificates gained, and in total flying time, show beyond doubt that, so far as this club is concerned, the Government subsidy is fulfilling the purposes for which it was granted. In all, 10 "A," 15 "B," 15 "C," and two "Silver C" certificates have been qualified for during the year. The last two were acquired by Mr. J. C. Neilan and Flight-Lieut. P. M. Watt, and are the first "Silver C's" to be obtained entirely on a provincial club's site in Great Britain.

As to flying time, the club has for the first time (except during competitions) exceeded 100 hours in one month, the figure for July this year being 116 hours all but three minutes. There has been a great increase in the use of two-seater machines for both passenger carrying and dual instruction. New machines purchased (all from Slingsby Sailplanes) are a FALCON I. (previously on loan), a GRUNAU BABY II., a HOLS DER TEUFEL (as a replacement), a DAGLING type training glider, and a FALCON III. two-seater—the last through the generous assistance of the chief instructor.

The method of instruction with the winch, which in the previous year had shown itself to be at least as efficient as training on a slope, is now considered to have been proved even better and simpler than the old method.

As in the previous year, there have been no accidents to members involving serious personal injury. There has, however, been more damage than usual to machines, the training types having suffered rather than the advanced sailplanes.

Buildings and Site.—The loan which was used for the erection of the old hangar and club house in 1934 has now been completely paid off. The fine new hangar, which had become necessary to house the machines without de-rigging, and to protect them from excessive damp, was brought into being by subsidy assistance supplemented by a loan from two club members, A. M. Verity and H. T. Blakeston. Before it could be built, however, it was necessary to make sure of the site. It proved impossible to buy the land outright, but a lease of 21 years duration has been obtained from the Ecclesiastical Commissioners through the good offices of Mr. P. A. Wills and the British Gliding Association, and the assistance of the club's hon. solicitor, Mr. R. C. Yablon.

The Future.—As the club, during the year under review, achieved all it had set out to do, a statement of its future policy is worth taking note of. This, in broad outline, will consist in

(1) Maintenance or replacement of existing machines and equipment;

(2) Provision of reserve fund for repayment of loan;

(3) If any surplus is available after attending to the first two items, the balance would be available for further expansion if and when this becomes necessary.

It is recognised that the time is ripe for the introduction of aeroplane-towing and blind-flying instruction for those who are sufficiently advanced to undertake it, and every effort will be made to introduce these facilities. It is also becoming necessary to extend the launching facilities, as sometimes, on good soaring days, machines cannot be got off the ground fast enough. It is also hoped to add still further to the opportunities for mid-week flying.

Mr. Charles E. Craven, who has done a great deal of work as hon. treasurer and secretary of the company, has resigned for business reasons, and Mr. W. R. Watson has taken his place.

Midland Gliding Club

Autumn Camp.—This was held from September 14th to 21st, and was thoroughly enjoyed by all those present, the visitors leaving with the promise that they would be with us again next year.

The flying conditions were unfortunate, inasmuch as soaring was only possible on the Monday of the camp, on which day, however, a lot of valuable dual instruction was given. It was fortunate that this day happened to come at the beginning of the camp, as beginners were able to acquire enough experience to enable their training to be continued by means of ground-hopping with the winch.

In consequence of the contrary winds the winch put in a lot of good work, both ground-hopping beginners and giving man-sized launches to the more experienced. One minor crash occurred in which the nose of a KADET was stove in as a result of a heavy landing.

On the Thursday, Barnes with a gang of stalwarts packed H17 into a trailer and went to sample a N.E. wind site at Corndon, some six miles away. It was impossible to get the trailer to the hill top, so the machine had to be dragged, fully rigged, to the ridge. During the 1½ hours taken to get there the wind had dropped considerably, so that Barnes was forced to land after only two beats.

Wynne, who came to the camp armed with a gun, was wont to go off alone for a bit of shootin'; judging by the number of reports and the size of the bag, we have come to the conclusion that he is more at home with the stick than the gun. Nevertheless, those rabbits in the hands of Mrs. Jarrett, Mrs. Davies, and Mrs. Thompson made good eating. We must pay tribute to the hard work put in by these three ladies who so efficiently looked after the feeding arrangements.

September 27th.—Gusty west wind and low rain clouds, which did not clear sufficiently to allow flying until mid-day. Barnes was then "push-launched" over the edge in H17 and spent a terrifying 23 minutes in the chaotic conditions over the Mynd. Olver took Batty up in FALCON III. a little later, but soon had enough and made for home after about 15 minutes.

Conditions improved later in the afternoon and all machines except the KADETS were flying. Felton got tired of FALCON II. just before sundown and went to earth on the ridge about a mile from the hangar. A rescue party took a bungy and Healey flew the machine back home.

October 18th.—Several members spent the night in the hangar on the Saturday night and vowed to be up and doing at daybreak. Olver, however, was as much surprised as anyone to find himself and H17 in the air at 7.15 a.m., and actually watched the sun rise over the hills. After about an hour the thought of ham and eggs brought him down.

This was a day such as we dream of—a steady west wind blowing up the hill all day and cloud lift in abundance. The KITE twice reached cloud base at something over 2,000 feet and was looped several times out of sheer exuberance by Edwards and Mecke. A total of over 27 hours was put in during the day, which is a record for the club.

H17 was in the air for 3¼ hours; it is now regularly operated by three, including the pilot, whenever there is a wind of 25 m.p.h. or so. The crew of two push from the top strut fittings and the machine lifts out of their hands in a few yards.

The PROFESSOR was soared for the first time by Wynne and Olver, and performed in her usual stately manner.

Welcome visitors were Mr. and Mrs. Thompson; Thompson enjoyed himself for 50 minutes in a KADET.

October 24th and 25th.—This was the week-end of gale warnings, but it did not prevent flying, though machines were frequently to be seen moving backwards with their noses well down. The wind speed actually exceeded 45 m.p.h. for considerable periods. Barnes made best height for the day in H17 with 2,000 feet. Dr. Gifford put in one of his rare but welcome appearances and soon found a skyhook at about 1,200 feet in KADET and remained stationary, admiring the landscape for half an hour or so. Felton again thought it funny to put down FALCON II. just before dusk a mile or so away from the hangar. This time it was Olver's turn to fly the machine back and land by the light of car headlights.

Primary Training.—Of late, these notes have concerned our soaring activities only, but it must be remembered that primary training continues apace at both Birmingham and Hereford, from both of which branches pilots are regularly graduating to the Mynd. "A" certificates have recently been obtained at Northfield by Allen, Drew, Sanders, and Johnson. The last named has since obtained his "C." We are very glad to learn of Allen's progress, as he has done such excellent work as local branch secretary.

We are very pleased to record that Nyborg has been conventional enough to obtain an "A" certificate.

London Gliding Club

In spite of the ending of Summer Time, the equinoctial gales, and the general lateness of the "season," the club is as active as ever. On an average there is flying five days a week (out of a possible six, as our resident instructor must have his day off, and it can't be Sunday), and local residents are usually in evidence, even if nobody will come out from London. Murray, being with the Air Force at Wendover, gets over whenever he can; while Ronald Price and his wife (formerly Joan Mealkin), after six months with Scott's Flying Display, are spending a well-earned holiday in Dunstable, so that the former can learn to glide (he is an *ab initio*). If there aren't enough to set things going, someone is borrowed from the workshop, or Alexander may look in to "handle the delicate machinery."

Our active chairman, Dudley Hiscox, keeps the club up to scratch, finds work for idle hands to do, leads the way into the air if others won't, organises side shows like aero-towing at Fenny Stratford and soaring on the east wind site at Sharpenhoe, and, with the help of sundry nieces, puts pep into the social life of the club.

Sunday, September 27th.—A depression moving from north produced a west wind in its warm sector, in which a few people went up and soared in the rain. But when the cold front came just after lunch, it pushed the wind round to north.

Sunday, October 4th.—In the south-easterly wind, and with the winch out of action, activities were confined to ground-hopping; which was a pity, because we had some Distinguished Visitors.

Peter Riedel, over from Germany to stay with English friends, paid the club his second visit. (The first was over two years ago, when he soared Eric Collins's RHÖNADLER.) He kindly allowed himself to be roped in by the Film Unit as a "super." Herr Riedel thinks the whole world (not only the London Club) is on the wrong track as regards gliding instruction. They put the cart before the horse (our metaphor, not his). Aero-towing should come first; after which, pupils who are considered *quite* reliable should be allowed to progress to slope-soaring. His

Visitors at the London Gliding Club: Left, Peter Riedel, the German pioneer soaring pilot. Right, a famous editor, C. G. Grey, of "The Aeroplane." Has he at last been converted to the view that the Young Idea should be introduced to aviation through Gliding?

argument is, it is so much safer to stall on a turn when one is gliding down from an aero-tow, than to do so when trying to maintain height a few feet above a hill top.

Then there was a Danish hotel porter from Copenhagen, who was apparently spending the season's earnings touring Europe. Himself a glider pilot, he had a tremendous admiration for Peter Riedel, who had recently visited his country. When he found that his hero was on this very spot, this very day, he nearly collapsed. An introduction was effected, and our Danish friend was in the Seventh Heaven.

And there was C. G. Grey, of *The Aeroplane*, who, as all the world knows, has (or had) no use for gliding, yet who came complete with wife and family. What *has* happened to him?

The air to-day was full of gossamer—one of nature's methods of heavier-than-air motorless flight. We were continuously wiping cobwebs off our faces and picking spiders off our shoulders. These tiny spiders keep up because the "skin friction" of their threads against the air is enormously greater than their own weight (see an article in THE SAILPLANE, December, 1933, p. 224). In the direction of the sun, the ground showed a curious sheen, like hoar frost; on closer inspection, the gossamer was seen to cover every inch of ground—several threads to the inch—and showed a rippling motion in the wind which suggested the shimmering of the lowest layers of air on an unstable summer's day. Peter Riedel thought there were thermals about, and the spiders had apparently agreed, judging it a good day for cross-country flying.

Aero-towing.

Sunday, October 11th.—A large number of pilots received aero-towing instruction at the Fountain Hotel Aerodrome, just beyond Fenny Stratford. An "Avro Lynx" was hired for the day from Phillips and Powis, of Reading, and Flying Officer Stonhill nobly gave his services free as its pilot. Mrs. Price also gave her services as instructor, sitting in the aeroplane during most flights and signalling to the sailplane pilot: "too high," "too low," or "time to unhitch." Members were charged 12s. 6d. per tow.

The aeroplane staggered along with its tail well down, and the "flying train" appeared to be doing about 55 m.p.h., in reference to the cloud background. Most pilots were taken up to about 2,000 feet, and there was a little thermal lift about, at least at mid-day. Some looked for it under clouds, while Fox kept up for 25 minutes (without a variometer) by going round and round in a stationary thermal which, he thought, was coming off a group of cottages below.

Two club and two private machines were in use, and all finally went home by air, being towed up to 3,000 feet and left within easy gliding distance of the club ground—except Fox, who lost his bearings and didn't see the chalk lion at Whipsnade until it was too late, so he landed a mile short.

Hervey got his flight over early so that he could go back to the club and instruct ground-hoppers. R. G. Robertson came from Nottingham, and J. S. Sproule from Yorkshire, to join in the sport.

All flew with confidence, and, although the field was none too big, all got down into it except the owner of the RHÖNADLER, who, evidently regarding the GRUNAU BABY as a mere secondary trainer, underestimated its gliding performance and overshot into the next field.

To-day's Distinguished Visitor was Frau Ursinus, whose husband is the real father of the soaring flight movement throughout the world.

Below is a list of the day's flights.

Pilot and Machine.	*Start.*	*Landing.*	*Duration.*
Mrs. Price: Slingsby G.B. ...	—	—	11 mins.
Fox: ,, ...	—	—	25 ,,
Collins: ,, ...	12. 0	12.25	15 ,,
Baker: Baker's G.B.	12.17	12.31	14 ,,
Ruffle: Slingsby G.B.	12.35	12.48	13 ,,
Robertson: Brooklands G.B....	12.51	1. 1	10 ,,
Hiscox: Baker's G.B.... ...	1. 1	1.14	13 ,,
Barker: Slingsby G.B. ...	1.12	1.24	12 ,,
Withall: Brooklands G.B. ...	1.21	1.33	12 ,,
Hervey: Slingsby G.B. ...	1.53	2. 5	12 ,,
Wilkinson: Brooklands G.B....	2. 0	2.12	12 ,,
Baker: Baker's G.B.	2.10	2.19	9 ,,
Burnett: Slingsby G.B. ...	2. 9	2.20	11 ,,
Bucknell, Brooklands G.B. ...	2.25	2.33	8 ,,
Hiscox: Baker's G.B. ...	2.35	Dunstable	
Sproule: Slingsby G.B. ...	2.48	2.55	7 ,,
Rainey: Brooklands G.B. ...	3. 9	3.11	6 ,,
Furlong: Slingsby G.B. ...	3.17	3.28	11 ,,
Fox: Kirby Kite	3.12	Totternhoe	
Turner: Brooklands G.B. ...	3.40	3.49	9 ,,
Rattray: Slingsby G.B. ...	4. 2	4.11	9 ,,
Vigers: Brooklands G.B. ...	4.10	4.15	5 ,,
Thomas (E.): Slingsby G.B. ...	4.19	4.29	8 ,,
Murray: ,, ...	4.38	Dunstable	
Bergel: Brooklands G.B. ...	4.53	Dunstable	

Friday, October 16th.—Mrs. Price went up in a howling wind to do a five-hours' flight. But after 4¼ hours the wind let her down. This is the second time such a thing has happened; last time she was only five minutes short of the goal.

Saturday, October 17th.—South-west wind almost too strong for flying, but the FALCON III. had got a brand-new pair of wheels for transport, so it had to be transported to the hill top. Hiscox took it up twice, flying sometimes backwards, sometimes very slightly forwards. Armstrong went up in the grey KITE, and another stalwart flew a GRUNAU.

Sunday, October 18th.—To-day was notable for a record number of machines all up together. Some said it was 11, some said 12, while one observer said he counted 13, but admitted he had reckoned on the ground-hopper making a hop while the nacelled DAGLING was doing a descent. Anyhow, it was easily a record. As there was thermal lift about at the time (Hiscox circled up to 1,200 feet), and a stiffish wind reduced everybody's ground speed (or should have done so), the home slope was not too congested.

The TOTTERNHOE was flown by Miss Goldney and showed what it is really capable of in skilful hands; hitherto no one else has got such a performance out of it. One pilot in the KADET *would* do his turns very low down behind the brow of the hill; the lower wing tip must have been dipping into the dead air every time, and he was lucky to escape without turning over. Gesticulations by the instructor, though seen, produced no effect.

Aeroplane-towing at Fenny Stratford: showing, above, a "Grunau Baby" being towed up by an "Avro Lynx" (the cable is too thin to be seen); and, below, the fitting for the cable attachment under the aeroplane's tail.

A Cross-country Flight.

Fox managed to fly his KIRBY KITE 24 miles to a point south of Broxbourne. He started off in a thermal current, in which he gradually rose to 4,100 feet, whereupon the thermal started to turn into cloud around him. So as not to get dragged into the cloud, he went alternately away from and back to it, circling in it at intervals. Finally he went off down-wind, passing over Hatfield, and continuing until it was time to land. He made his approach over an extensive area of glass houses, missing the last of them by only 6 feet owing to a down-draught in the lee of a tree which he had circled round during the approach.

Eustace Thomas was tremendously pleased with his newly-arrived CONDOR II., specially made to measure in Germany and fitted with wing-spoilers in addition to all the usual accessories. It is painted a bright red on the woodwork, with the fabric white. He took it up on the winch for its maiden flight, and stayed in the air for over an hour, flying it beautifully.

Visitors were Norman Sharpe, chairman of the Yorkshire Club, and "Ould Oireland," our anonymous benefactor, on his annual visit.

The day closed without breakage of any kind.

The total flying time, 32 hours 8½ minutes, excluding ground-hops, was not quite a record, as the club did 32½ hours on March 31st last year. But to show what went on, we will give a list of the actual flights for the day. The figures after each name represent the number of minutes in the air:—

OPEN DAGLING.—Holt, Lassam, Read, Watts: one ground-hop each.

NACELLED DAGLING.—Greig, 30; Orchard, 2½; Wilkinson, 28; Jackson ("C" test), 8; Miss Archer, 4; Bergel, 2; Cohen, 1; Bolton, 7.

TOTTERNHOE.—Miss Goldney (2 flights), 69; Passold (2 flights), 110; Bullwinkle, 57; Jones, 30.

KIRBY KADET.—Stephenson, 32; Saffery, 31; Evans, 23; Smith, 4; Marshall ("C" test), 19; D. A. Smith ("C" test), 15.

FALCON I.—Ellis, 26; Edmunds, 33; Adcock, 27; Himmelreich, 24.

Brooklands GRUNAU BABY and Slingsby GRUNAU BABY.—Bucknell, 44; Armstrong, 30; Heath, 25; Wilkinson, 39; Rainey, 56; Collins, 12; Ruffle, 45; Grant, 35; Keeble, 36; Burnett, 33; Slater, 20; Richardson, 32.

FALCON III. Two-seater.—Humphries (7 flights with passenger), 143; Bergel (2 flights with passenger), 37.

RHÖNADLER.—Vigers, 40; Ivanoff, 70; Vigers, 37.

CONDOR.—Thomas, 82.

Grey KIRBY KITE.—Fox (cross-country), 105.

Brown KIRBY KITE.—Hiscox (2 flights), 158.

CAMBRIDGE II.—Rattray (2 flights), 105; Furlong, 80.

Baker's GRUNAU BABY.—Baker, 33; Mrs. Baker, 40.

Adcock's PRÜFLING.—Adcock, 2; H. Adcock, 27.

The last seven are private machines, the rest club-owned. Note also that there were two Bergels and two Wilkinsons, probably two Adcocks and possibly two Smiths.

Sunday, October 25th.—A tremendous wind, in which, nevertheless, 28 hours' flying was done, three cross-country flights made, and some exciting moments experienced.

Miss Archer continued a turn too long and charged down-wind across the road along the top of the Downs, into the hedge beyond, in a nacelled DAGLING. She was removed to Luton with a damaged knee, but will no doubt fly again soon, which is more than the DAGLING will.

Thunderstorm Flights.

At about 1.45, according to report, a cold front approached from the west; it slowly crossed over and went away eastwards, taking with it Peter Davis in his SCUD II., Fox in his KIRBY KITE, and Rattray in his CAMBRIDGE II. The joke is that, when Rattray landed on the aerodrome of the London Aeroplane Club, he found that flying had been prohibited for the day, owing to the high wind! The flights themselves, however, were no joke. Neither Fox nor Davis had a parachute. This is the second time the same SCUD II. has got mixed up in a thunder cloud without a parachute, for it is the identical machine in which Buxton, two years ago, established the present British height record at Sutton Bank. The knowledge that the SCUD had done it before without breaking up must have been some consolation to a pilot who, never having gone across country before, chose with tremendous pluck to use a thunderstorm for his first attempt.

The flights are described elsewhere; but while they were going on, Humphries was flying Thomas's CONDOR, and went through an unpleasant time in the same storm. The trouble was the transparent roof which covers the cockpit completely except for a small hole on one side. The first raindrop to hit it immediately spread out into a disc three inches across. The next raindrop did the same, and the next, and soon there was an end of the "transparency." Humphries put up the lift-spoilers and tried to side-slip down, but there was so much lift in the "front" that nothing happened. So he went out to Totternhoe and tried there, when suddenly, at 800 feet, the CONDOR "fell out of the sky." Dashing back, half blind, he suddenly heard a loud noise and saw a flash as the machine brought down four telephone wires. But it flew on to a nice landing, with nothing more than a few scratches on its nose.

The result was that the three cross-country flyers couldn't get in touch with the club to announce where they had got to. When they tried, they were told that "the storm had interrupted communications."

Club Dances.—On October 31st a very successful supper party, cabaret and dance was held in the club house. Bobbie Gordon and her tap dancing "babies" (aged nine upwards) received a tremendous ovation. Another party is to be held on Saturday, November 28th; members are asked to turn up in *large* numbers, "with wives, sweethearts, and whatnots," and tickets should be obtained as early as possible.

B.B.C. Broadcast.—Some weeks ago Mr. J. de Lotbiniere, of the B.B.C., came to see if a broadcast of club activities was a feasible proposition. After a long wait for a reluctant winch to start, he was eventually got into the air in the two-seater, and thereupon decided that it was. So the result will be heard on November 14th.

In the following Summary of Flying, ground-hops are not included in the total flying times.

Summary of Flying.

Date.	Ground-hops.	Winch launches.	Hilltop launches.	Aero-tows	Flying Time. h	m.	s
Sept. 22, Tu. ...	—	—	3	—	—	2	2
,, 23, Wed. ...	42	—	—	—	—	—	—
,, 25, Fri. ...	15	—	2	—	—	5	40
,, 26, Sat. ...	20	5	—	—	—	10	11
,, 27, Sun. ...	30	27		—	2	17	31
Sept. 30, Wed. ...	25	—	—	—	—	—	—
Oct. 2, Fri. ...	43	—	—	—	—	—	—
,, 3, Sat. ...	56	2	—	—	—	4	0
,, 4, Sun. ...	85	16	—	—	—	30	0
Oct. 6, Tu. ...	19	—	—	—	—	—	—
,, 7, Wed. ...	25	—	—	—	—	—	—
,, 9, Fri. ...	11	—	—	—	—	—	—
,, 10, Sat. ...	36	—	—	—	—	—	—
,, 11, Sun. ...	33	—	—	25	5	34	0
Oct. 12, Mon. ...	—	—	6	—	—	29	57
,, 13, Tu. ...	—	—	7	—	—	9	20
,, 14, Wed. ...	—	—	7	—	—	6	27
,, 16, Fri. ...	—	—	9	—	5	45	38
,, 17, Sat. ...	—	—	4	—	—	30	0
,, 18, Sun. ...	4	21	38	—	32	8	35
Oct. 20, Tu. ...	6	—	5	—	3	18	35
,, 21, Wed. ...	9	—	8	—	1	25	35
,, 24, Sat. ...	27	—	12	—	5	34	0
,, 25, Sun. ...	—	45		—	28	4	0

Certificate Flights.

September 27th.—Wilkinson, "C."
October 12th.—Price, "A."
October 13th.—Price, "B."
October 18th.—Jackson, "C"; Marshall, "C"; D. A. Smith, "C."
October 20th.—Lacey, "B."
October 21st.—Chirgwin, "C."

Totals.

Week ending	*Launches*	*Flying Time*	*Certificates*
September 27th ...	144	2 hrs. 35 mins.	1
October 4th	227	34 mins.	–
October 11th	149	5 hrs. 34 mins.	–
October 18th	96	39 hrs. 10 mins.	5
October 25th	112	38 hrs. 22 mins.	2

Derbyshire and Lancashire Gliding Club

A certain amount of club flying was done during competition week which deserves mention. In the phenomenal conditions of Saturday evening (August 29th) Garner took a NACELLE up to a positively indecent height, and Forman just had time to get his "C" before darkness fell. In the meantime Robertson in the GOLDEN WREN threw three consecutive loops, starting from about 65 m.p.h. and going over very smoothly and comfortably. The second competition week-end also saw the club's NACELLES and KADET in the air in the hands of Leech, Kaye, Garner, Thompson, and Booth.

September 17th.—Wind west, 5 to 10 m.p.h.—The GOLDEN WREN would just not soar, but Robertson had a last fling in the RHÖNADLER before returning it to London and crept about the sky alone for four hours at 200 to 500 feet. It was, however, an ideal training day and much primary work was put in, Swale getting his "A." Later on we had a recurrence of the evening lapse rate experienced on competition Saturday, and the GOLDEN WREN, KADET, and Coleman GRUNAU were able to take advantage of it.

September 20th.—Wind east, 15 to 20 m.p.h. Training all day at the club, while the GOLDEN WREN "enjoyed" (sometimes) some low cloud dodging at Mam Tor.

September 26th and 27th.—Wind N. to N.E. Training with winch and bungy at Camphill. No certificates, but some 40 to 50 launches were made during the week-end.

September 28th.—Smith brought the club's total of "Silver C's" up to three by flying the GOLDEN WREN from Mam Tor to North Wales. It is rather interesting (and possibly significant) that three "Silver C" flights from Derbyshire have been made in three entirely different directions, N.N.E. to Yorkshire, E.S.E. to the Wash, and now W.S.W. to North Wales.

October 4th.—Wind east, about 5 m.p.h. Another good training day, resulting in an "A" for Young and "B's" for Leeson and Swale.

October 11th.—Wind N.E., 5 to 10 m.p.h. A further crop of "A's," this time to Orme, W. Taylor, and B. Thomas.

October 25th.—Wind west, 30 to 35 m.p.h. Only the WREN group flew, and we suspect they wished they hadn't. They were finally snowed down at 3.30 p.m., having got in about an hour and a half between storms.

October 31st.—E. Taylor, not to be outdone by his younger brother, proceeded to get his "A."

November 1st.—A decent soaring day at last. Wind west, about 15 m.p.h. Lapse rate improving. At first the GOLDEN WREN could only just keep up, but soon it was fit for the NACELLE, and Swale (who was flying "Camels" when most of us were at school) went off for his "C." Poor conditions and faulty tactics brought him down after two minutes, but later in the day he did 20 odd minutes for his "C." Shepard also made a very pretty "C" flight of almost half an hour. The KADET was flown by Robertson junior and Thompson, and later on S. Hobson flew his GRUNAU in a tentative "C" attempt, but was forced down after two beats.

Hull Gliding Club

Flying was practically at a standstill during the first fortnight in August owing to the absence of several members at Sutton Bank, but upon the return of the prodigals everyone got down to it again.

August 16th was an ideal day. The weather was warm and bright and the wind being easterly we had an auto-launching run of nearly three-quarters of a mile. Lawson, Coates, Paris, Beedham, Anson, and Havercroft had eight flights each, all making good glides up to 35 seconds. Lawson beat the club's duration record with a fine circuit of 98 seconds. Coates, inspired by this performance, was launched on the 400 feet cable, but when making his approach found, to his consternation, that he had not enough height and made a hasty down-wind descent on the wrong side of the railway line which bounds the aerodrome.

Discussion is still rife among the Aero Club members as to who ran the fastest to see the fun.

Apart from this incident training has been comparatively uneventful and several members are doing circuits and S-turns.

We have completed 522 launches since May, but all our fun came to an abrupt end on September 20th, when one of our lady members stalled at about 50 feet and the machine is considered to be a complete "write-off."

Luckily, the primary is well under way, and it ought to be flying before Christmas.

The Jersey Gliding Club's fleet lined up at St. Ouen's Bay. The large gull-winged machine is R. A. Wagstaffe's "Kirby Kite"; on its left is K. Carter's home-built "Scud I."

[Photo courtesy "Jersey Evening Post."

Jersey Gliding Club

During the last few weeks we have had little opportunity for flights as wind direction has been mostly east, which made anything but ground hops impossible. Wagstaffe returned from a week's training at the Yorkshire Club, where he obtained his "C." He has also ordered a KIRBY KITE from Slingsby.

On September 29th the club with the aid of several ladies organised a dance and bridge tournament, which proved a great help (£35), and several new members, flying and non-flying, have joined, so at the moment the total membership is 45. Apparently we now have the public interest, and in the near future we hope to have some very interesting information to report regarding a new site.

Wagstaffe's KIRBY KITE has arrived, and to-day, October 18th, we rigged this for the first time. The marvellous finish and beautiful lines were greatly admired by everyone, and we had a large number of visitors who came out specially to see it. For their benefit we gave Carter one flip off the top of the hill, though with an unfavourable wind. Wagstaffe was not able to have a launch as the winch car is not yet ready, so we must wait a few weeks before seeing the KITE soaring.

We have re-organised the club and formed a committee under the chairmanship of Mr. A. S. M. Glassford. The hon. secretary and treasurer is Mr. A. J. Scriven, Alcala, Samares. The idea of this reorganisation is to prepare the way for a general meeting in January, when we hope to adopt an ambitious programme for 1937.

We have been able to give launches for the new members on most Sundays, so that when a favourable wind makes an appearance they should be fit for work from the Gully.

Southdown Gliding Club

August 30th.—Weather fair; 2/10 cloud. Wind S.W., 10-15 m.p.h. No action by private owners to-day. Filmer is in Derbyshire with his GRUNAU BABY, and Dunning is walking about with a stiff leg and a walking stick, results of a little argument with his pet "Flea."

The TWIN made short flights from the S.W. slope. Goodwin just missed his "B" by one second on his last flight. W. Hatcher had a 60 and a 61 second flight to his credit. A few seconds are lost by pilots having to be sure of landing on the only "smoothish" spot in the valley, a narrow cart track running down the centre. The rest of the valley is covered with two-foot molehills, and they're not so easy on the skids.

Captain Little has passed the Primary DAGLING, which has been extensively repaired, as airworthy, so training on this machine will begin again. Finally, R. Dyke had three short flights in the TWIN, whilst J. Copeland made two "S" turn hops in his PRÜFLING.

September 13th.—Fine, wind variable, N.-S.W., 0 to 5 m.p.h. Little, Stevens, Dunning, and Hatcher flew Dunning's GRUNAU BABY for most of the day. Sixteen flights were made altogether. On the last one, Little took the machine back to the hangar, putting her down with a yard to spare, right outside the doors. Good flying.

The TWIN made practice flights all day.

September 20th.—Cloudy showers. Wind east, 15-20 m.p.h.; gusty. Little soared the GRUNAU BABY for 15 minutes along the East Slope. Decided that the breeze was too erratic to be comfortable, put her down close to the hangar, and adjourned for lunch. After some rain the weather improved, and by 5.20 both the GRUNAU and the TWIN were ready on top of the hill. In the GRUNAU Stevens made two soaring flights of 4 minutes and 4½ minutes, whilst Miles had a 3 minute flight. Goodwin, in the TWIN, unsuccessfully tried again for his "B."

October 4th.—Fine; wind south, 0 to 5 m.p.h. Training was started again on the Primary DAGLING; during the morning 23 ground slides were made. W. Hatcher came to grief in the TWIN on the first and only flight in this machine. Cut a fence too fine and broke a landing wire and a rib (the TWIN's, of course). Dunning had his GRUNAU up several times during the day.

October 11th.—Fine, wind south, 0 to 5 m.p.h. Another good day for primary training. The DAGLING is working full time nowadays, and new members are enrolling most rapidly. Rubick, in charge of training, is certainly bringing them on. The more advanced members practised in the TWIN; Goodwin succeeded in breaking a pair of landing wires after sliding down the East Slope—result of a bad launch. Dunning had the GRUNAU up quite a lot, whilst the PRÜFLING put in her usual hard day's work, flown by Copeland, Jameson, and L. Hatcher.

October 18th.—Wind N.W., 15 to 25 m.p.h. More primary training. One unlucky fellow pulled her up to 25 feet, stalled, and landed just too, too heavy. How despondent she looks with broken landing wires! Nevertheless, the well-equipped workshop enabling repairs in record time, the machine was soon back again in action. The TWIN was flown from the top of the West Slope.

October 25th.—Showers; wind 20 to 25 m.p.h., W.N.W. to W. The PRÜFLING and the TWIN were early in readiness on the West Slope. L. Hatcher, i/c for the day, took the PRÜFLING up and along the ridge, demonstrating to Copeland and W. Hatcher the turn out of wind.

After dubious looks, doubtful words and several attempts the two "passed," agreeing that a good deal of knowledge had been gained. At 4.30 p.m. the wind dropped, and so out came the PRIMARY for ground hops until dark.

Published by H. O. Davies, 13, Victoria Street, London, S.W.1, and Printed by Hicks, Wilkinson & Sears, 4, Dorset Buildings, Salisbury Square, E.C.4.