SAILPLANE AND GLIDER

OFFICIAL ORGAN of THE BRITISH GLIDING ASSOCIATION

EDITOR — A. E. SLATER

No. 6 Vol. 11 NOV.-DEC., 1940 Price 1/-
Published Bi-Monthly

PUBLISHER'S NOTE

OWING TO A FIRE AT THE WORKS OF THE PRINTERS, CAUSED THROUGH ENEMY ACTION — ALL BLOCKS BELONGING TO THE SAILPLANE HAVE BEEN DESTROYED — WHICH ACCOUNTS FOR THE CHANGED APPEARANCE OF THIS COVER

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THE SAILPLANE *and* GLIDER

Official Organ of The British Gliding Association

Editorial Offices: 68, Victoria Street, London, S.W.1 Telephone: Victoria 9132/3

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Editorial

BY putting an engine into a glider, we are told, it can be transformed into something useful, practical, and of national value, viz., an aeroplane. Among the many far-reaching effects of this transformation, we have to record that, some weeks ago, the London office of THE SAILPLANE AND GLIDER at 13, Victoria Street, was demolished by an item of so-called "useful load" dropped from one of these mechanically propelled flying machines. Or rather, two items on different days, one of which knocked down the back of the premises and the other the front. We are pleased to record that none of the publishing staff was hurt, but among the damage done was a considerable reduction in our stock of back numbers and other property.

The office has now found temporary accommodation further up the street, at No. 68, Victoria Street, London, S.W.1 (telephone Victoria 9132), which we hope will prove a luckier number, and to which communications should be sent. (Anything sent to No. 13 will nevertheless be delivered to the new address.)

A further blow was sustained during the raid on the City of London on the night of December 29th, when our printers, who have produced THE SAILPLANE AND GLIDER for over six years, had their works completely burnt out; though again, we are glad to say, without hurt to the staff. The destruction included the type and blocks for this number of THE SAILPLANE and all the blocks used for illustrations since 1934. This issue has, therefore, had to be set up again, a fact which must be taken as part excuse for its lateness in appearing.

Further lateness of the last few issues is due to the Editor having a lot of other work to do (e.g., earning a living), but we intend to keep THE SAILPLANE AND GLIDER going throughout the war provided it is physically possible. What the paper will contain depends upon the time we can give to it and the help we get from our large circle of readers. "Meaty" articles take an amount of time to prepare which is out of all proportion to their size, and limits to them are therefore set by the time available, and not by the material accessible, which is enough to fill dozens of issues and is still growing. But for the provision of news we must continue to rely in large part on the co-operation of readers. The practice of gliding and soaring is still unsuppressed in many parts of the world, and wherever it is done, we are always glad to know about it at first hand, particularly as many of our former channels of news have dried up.

As to news of what gliding people are now doing instead of gliding, it is evidently much in demand, for we have noticed that in these times the "News from the Clubs" section is the first to which readers turn on receiving their copy of the paper. But club secretaries, though they do their best, are finding it increasingly difficult to keep in touch with everybody, and we would like to have direct news from a lot more people than those who have written so far.

We do not feel justified in including births, engagements and marriages in the Club News section, except in special circumstances, but we invite those concerned to announce these events in the "Personal" column, for which the charge is only 9d. per line (minimum two lines).

Rope for Aero-Towing

IN Britain and Germany the aero-towing of sailplanes is done with wire cable, but in America rope is used. One of our readers has had the experience of trying both methods, and is, as a result, so enthusiastic about the advantages of rope that he wants it introduced into Britain when aero-towing is again permitted. He writes:—

"Believe me, it has got wire cable baked to a frazzle. There wasn't a single snatch in the odd hundred miles of towing I did with that rope, though the weather would have been fierce enough to cause the breakage of the B.G.A. approved weak link when using wire cable. When gliding gets going again, someone in the B.G.A. ought to find out about aero-towing with rope instead of cable, and make it compulsory, because honestly there's no comparison. The rope stretches just the right amount to take all the jerks right out, and all you feel is a lovely smooth and gentle acceleration when the rope gets taut. Bumpy weather becomes quite pleasant to tow in."

Lewin Barringer, in his new book, *Flight Without Power*, recommends ¼-inch Manila rope for aero-towing; he admits that the substitution of wire cable will reduce the drag on the aeroplane, but even then, he says, it must be supplemented with 20 ft. of ¼-inch rope at the aeroplane end, for elasticity and as a weak link. Our correspondent states that the plaited rope used by him had a 1,000 lbs. breaking strain.

Aerodynamics for All

A CLUB is composed of a number of Particles, each of which, owing to its peculiar Viscosity, possesses intense Vorticity. These Vortices communicate their motion to the whole club, which is thus said to revolve in circles.

Every club has a Boundary Layer, or layer-down of the Law. This layer, though apparently insignificant, often causes a complete breakdown of the smooth flow.

A Source is a point from which fluid is supposed to flow outwards in all directions. The serving member home on leave is a popular example. A Sink is exactly the opposite; examples are readily brought to mind.

The Secretary is a form of motion whose Potential Function is to apply a system of Impulsive Pressures in all directions, with the object of producing a steady flow towards the club bank-account (or Sink).

The Ground Engineer, who operates under the sign of integration, is liable to develop extreme Vorticity when expected to produce machines from within the fluid (or thin air). His state of internal stress may cause a sudden liberation of energy, which is propagated in the form of a wave of indignation which ultimately results in making a hole in the bank-account. This is known as Cavitation.

Downwash is the downward Velocity imparted to the fluid in the course of producing Uplift. The close connection between these two quantities may readily be observed in the Bar. It will also be noted that, as is well known, the Ceiling is limited by the decreasing Density (or specific gravity) of the medium. Attempts to exceed this ceiling infallibly result in temporary loss of control.

The tales of the club bore are best described in terms of the Complex Variable, $x + \sqrt{-1}.y$, which is seen to consist of real and imaginary parts. The real part is suitably denoted by x, the unknown quantity, while the imaginary part begins with $\sqrt{-1}$, the usual symbol for which is "i," or better, I think, "I." This latter symbol will be found to occur frequently throughout the narratives.

A Streamline is the path of a particle across the Field of Flow, or landing field. If the particle comes direct from a Source (or Bar), the Streamline may show a variety of interesting diversions. An important factor in this connection is the Specific Heat of the Instructor.

W. E. H.

From Here and There

ALLEGED DOWN-CURRENT CRASH.—On August 31st an air liner crashed near Lovetsville, Virginia, in the foothills of the Blue Ridge Mountains, and all 25 occupants were killed. The accident occurred in a terrific thunderstorm, and *The Times* New York correspondent states: "Apparently while trying to gain altitude the machine was caught by a downward air current and swerved into a small mountain."

WEATHER REPORTS.—We have already announced the cessation of the Air Ministry's publication of weather charts, even a fortnight in arrear, and the German attempts to counter this by sending aeroplanes out over the Atlantic from France. Apparently the warm and cold fronts were still slipping through unobserved, for the latest news is that a Norwegian patrol boat has captured a German meteorological expedition 50 strong which was trying to establish a weather station in Greenland.

BANKOPHOBIA.—Some *ab initio* pilots are instinctively averse to putting on enough bank when turning away from the wind; this is irrational, as anyone with aeroplane experience will be pleased to tell them. But they have a precedent in past history. Major C. C. Turner, writing in *Flight* on how he learned to fly in 1911, gives this example of his instructor's patter: "In turning in a wind be careful about banking. If the wind is blowing from the outside of the turn do not bank; but if the wind is blowing from the inside of the turn you can safely bank a good deal."

CHRISTMAS CARDS.—Our thanks for the season's cards, which this year included a larger proportion of crests of Service units, with mottoes such as *Nulli Secundus* (the Guards), *Labor Omnia Vincit* (the Pioneers) and, of course, *Per Ardua Ad Astra*. Mr. Eustace Thomas's card, which used to include "Pa CONDOR, Ma WREN, Billy Drone and Uncle Vega," with himself as circus master, this year shows only the dismantled "Drone," which is all they have left him. From Wally Setz in the U.S.A. came a picture which told its own story—a Polish sailplane flying at the International Contest on the Wasserkuppe in 1937.

MOUNTING YOUR MAP.—Mr. F. D. Bradbrooke, one time secretary of the British Gliding Association, has evolved an ingenious method of mounting a flying map of a whole country in one piece which will nevertheless not wander all over the cockpit. He cuts the whole of England into east-west strips (using two maps so as to include plenty of overlap) and then joins all the strips end to end. The resulting ribbon is 26 feet long and 9 inches wide, and he rolls it all on to two spools at the sides of the map case, which measures 9¼ inches square. This arrangement would suit cross-country sailplane pilots, a large proportion of whom start from a west slope and fly east, and if they cross from one strip to the next they need only turn the handle a few times. In *The Aeroplane* for September 20th, Mr. Bradbrooke explains how to make the mounting and how to avoid the various snags.

Australian Visit

FROM Owen P. Wingfield, of the Midland Gliding Club, who now spends most of his time at sea, we learned many matters of gliding interest last time he came ashore, chiefly concerning a voyage to Australia, and his contacts with soaring experts there.

On the way out, like every sailflying pilot, he looked out continually for signs of soarable air over the sea, but from Aden to Colombo there was nothing of note except an occasional cumulus, with hardly a breath of wind, it being the dry season (last December).

The first part of the voyage from Colombo to Fremantle, as far as Lat. 10° S., was through calm sea, with not much wind, but lots of ordinary cumulus, which formed in streets. In addition, there was occasional cumulo-nimbus with sheets of rain falling from it; the greatest number of rainstorms he ever saw at the same time was seven, but there were always one or two about in the daytime. At night it was usually more or less cloudless, but when cloud was encountered it was towering black stuff and always gave rain. The rain was heavy at first but continued less heavily, and in fact the night showers were longer than the day ones. (Discussing the possibility of soaring flights over the ocean, Dr. Georgii once pointed out that, in regions where this can be done by day, it should be equally possible at night, owing to the insignificant change in the sea's temperature).

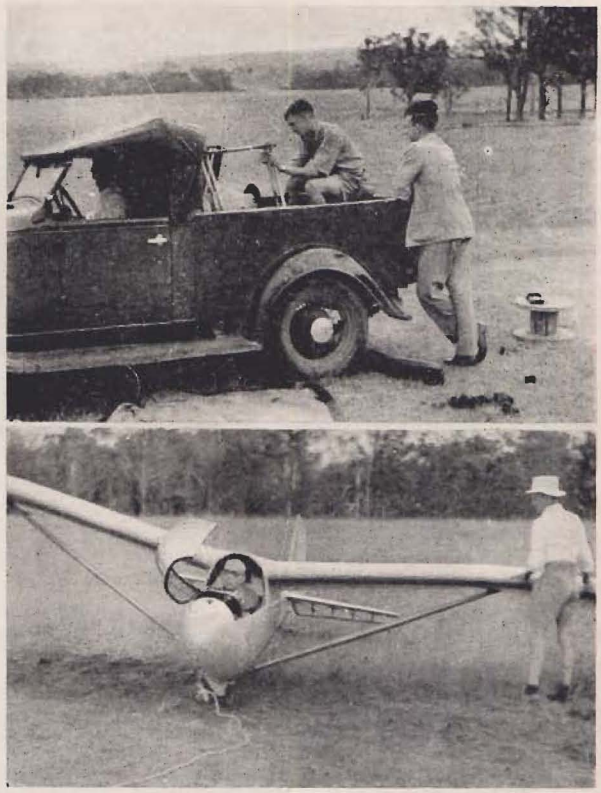
When the south-east trade winds were reached at 10° to 15° south, conditions altered completely, with an apparent wind (against the ship's 15 knots) of up to force 4 or 5, and comparatively cool.

Some observers of flying fish claim that they soar in the up-currents close to the waves. Mr. Wingfield, however, saw no soaring, and they seemed to him to fly in any direction. The flying fish, he says, " lands " by stalling, with tail down, and goes in head first.

The albatross was not seen till the ship was crossing the Great Australian Bight, about 35° S. While soaring, the bird never got up more than 40 to 60 ft. It seemed to do its turns by moving the trailing edge of the inner wing like an aileron. It flew with its wings at a " terrific anhedral " angle.

Sydney Gliding Club

Arrived at Sydney just after Easter, Mr. Wingfield found the newspapers featuring the new soaring records for height and distance, which were described in the May/June issue of THE SAILPLANE. So he rang up Dr. Heydon (who had done 101 miles distance and 9,200 ft. altitude on March 23rd), and arranged to meet the club at Camden the following Sunday. The four members present, Dr. Heydon, Stephen Newbigin, Martin Warner and Harry Ryan, gave him a good welcome, which he attributes to his being mistaken at first for his brother Charles, whose exploits they had read about in THE SAILPLANE (but who, they asked, was " Gracias " ?). He prudently declined the offer of a ride in the GULL, and watched them search for thermals and find nothing but a little slope lift off a wood of gum trees.



Above: The Sydney Gliding Club's winch at work, launching the GULL. Below: Dr. Heydon in the cockpit of the GULL, in which he and Len Schultz set up new Australian distance and altitude records last Easter

[Photos by O. P. Wingfield

Apparently they have no gliding certificates, as they lack any authority, although some of them have earned the " Silver C."

Len Schultz, who beat Dr. Heydon's records on March 25th with 11,600 ft. and 105 miles, has designed a small wireless transmitter set which weighs only 12 lbs. (?). The idea is that, during a cross-country flight, the ground team would listen in at appointed intervals, such as every half-hour or hour; the pilot would not call them up until after landing, as he would have to set up an aerial. Pilots would then no longer be confined to a pre-arranged route or to landing in the neighbourhood of houses, and, once this difficulty has been got over, there will be no holding them.

Sailflying Mail

A Johannesburg correspondent of *The Times* reports that migratory storks have been used to carry messages from Holland to the Northern Transvaal containing uncomplimentary remarks about the German occupation. One message, from " the people of Bergen-op-Zoom," was written on tape sewn round the bird's leg. Thus soaring flight has beaten the censorship, for storks, unlike pigeons, do a large proportion of their cross-country " goal flights " by thermal soaring.

Snow is in Season

SNOW does a number of things which have significance for the soaring pilot. The simplest of these is the way it makes the air-flow visible. Gliding club members will spend hours in clear weather discussing whether there is a down-current over their launching point in certain winds, when they could settle the matter in a few minutes by going out in a snowstorm to look. However, the clubhouse is more comfortable, and besides, one can still learn a lot from the stuff after it has fallen. Drifts show where there has been dead air, and are especially large where they have been "fed" by a local increase of wind, as through a gap in a hedge. Equally instructive is the snowdrift on the *windward* side of a wall, invariably separated from the foot of the wall by a scooped-out area due to an eddy blowing *down* the lower part of the wall—the same phenomenon as is found at the foot of a steep hill facing the wind.

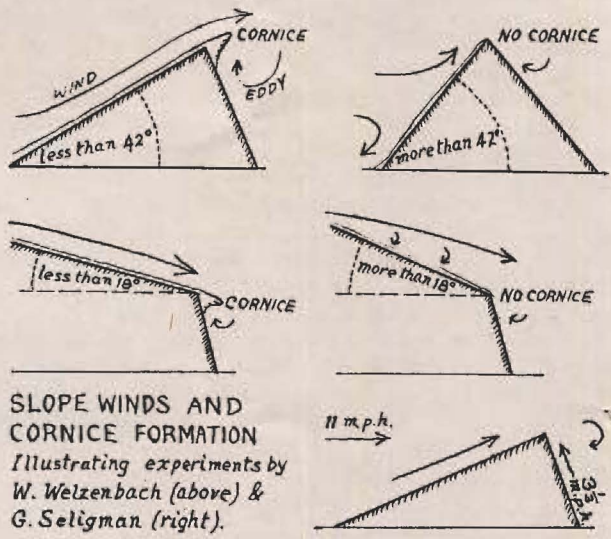
How steep must the slope of the hill be for this to happen? As no meteorologist seems to know, I must here introduce the reader to one of the most fascinating books ever produced: "Snow Structure and Ski Fields," by G. Seligman (Macmillan, 1936). It costs 25s. and is worth it. The pictures are marvellous. Not only has the author gathered a great amount of first-hand knowledge which nobody knew before, but his range of reading is immense. He even knows about the researches of the gliding organisation in Germany, which showed that a big stationary eddy in the lee of a hill can only exist in winds of less than 22 m.p.h.; in stronger winds it breaks up into smaller eddies which go travelling down wind.

This comes in the chapter on cornice formation. A snow cornice, which sticks out from a sharp crest and overhangs a lee slope, grows in the patch of dead air between the main wind-stream over the crest and the reverse eddy coming up the lee slope. Its presence shows, firstly, that the lee slope is steep enough for a reverse eddy to exist; and, secondly, that the air flow up the windward slope has been unobstructed over a long enough course to collect a large quantity of snow and to keep it moving all the way up to the top. If the windward slope is too steep, an eddy forms at the bottom, like the eddy at the foot of a wall already mentioned; the flow of snow is then impeded, and no cornice is found at the crest.

How steep, then, must the windward slope be for an eddy to form? Here the book quotes an enterprising experiment by Welzenbach on a plateau on the Hahnenkamm near Kitzbühel. He built a slope of snow 1½ metres high and 10 metres long at right angles to the prevailing wind. He made the windward slope vary gradually from 30° at one end to 60° at the other end. Where the slope was 30° he found there was strong cornice formation at the crest. But where it was 40° there were signs of an eddy, and at 42° and steeper there was no cornice formed at all. (It may be noted that the west slope of Dunstable Downs is in general not more than 30°, whereas parts of Sutton Bank and of Bradwell Edge are an almost vertical cliff).

Welzenbach confirmed his results by measuring natural cornices and found, again, that 42° was the critical steepness, provided that other conditions were favourable. Presumably the slope must be fairly smooth, or the wind near the ground would be slowed up. But he made another important observation. If the wind blows *down* a gentle slope, and the slope then suddenly becomes steeper, a cornice may actually form at the junction of the two different slopes. In this case the gentle downhill slope must not be steeper than 18°.

This is a most important conclusion, for it defines how steep a lee slope needs to be before the wind flow breaks away from it. That is, a sailplane pilot making an up-hill landing against the wind should be able to approach as he would for a landing on flat ground, provided the slope is less than 18° and is unobstructed at the top by anything to detach the air flow, such as trees, houses, or a sharp crest to the hill. But if the slope is more than 18° he must reckon on dropping into dead air and should come in with extra speed accordingly.



SLOPE WINDS AND CORNICE FORMATION
Illustrating experiments by W. Welzenbach (above) & G. Seligman (right).

Seligman made some experiments in his garden on a small scale with wooden boards for slopes and smoke to show the air flow. In a wind of 11 m.p.h., with a windward slope of 35° and a leeward of 70°, he got a lee eddy to form; but a really good, large, stationary eddy would never last more than a few seconds before breaking away down wind. In spite of this there was a continuous steady up-current up the lee slope, which he measured with an anemometer and found to have a velocity of 3⅛ m.p.h., or about a third of that of the main wind. It is astonishing to think that, on a larger scale, this would be enough to support a secondary glider, and with a wind of only 11 m.p.h. across the hill-top. It only remains for someone to continue the experiment by varying the steepness of the lee slope and seeing how it affects the up-current.

Snowflakes, like raindrops, give information of the state of the air whence they come.

Raindrops from the widespread sheet of nimbo-stratus tend to be small, but from the heaped-up cumulo-nimbus they are larger, for small drops cannot sink through a strong up-current, but get carried upwards and continue to grow.

The variation in snowflake size is, however, the other way round, for the nimbo-stratus of the warm front of a depression gives large complex flakes, while simpler forms of flake are generally seen in the rear of a depression, where cumulo-nimbus abounds. This is because the size of snowflakes is chiefly determined by the temperature at which they are formed. For instance, water droplets in a cumulo-nimbus cloud get carried swiftly up to very cold regions before they have time to freeze. G. Hellman, quoted by Seligman, gives the following figures:

Temperature of air	*Mean diameter of flake*
—6° Cent.	3.4 millimetres
—8° ,,	2.2 ,,
—12° ,,	1.2 ,,

W. A. Bentley, who photographed thousands of different shapes of snowflakes, is probably the only researcher to study the origins of these various forms. His conclusions, in summary, are:

"There is a difference between the form of snow crystals formed in general or local storms." (Presumably the division corresponds to nimbo-stratus and cumulo-nimbus respectively).

"Local storms and low detached clouds usually give frail tabular forms, or the granular type of crystal. Columnar and solid tabular forms are common only to general storms.

"Each cloud stratum, during mild weather (if no other clouds are present), commonly precipitates its own type of snow crystal:

"(i) Low detached nimbus deposits large frail branching tabular forms.

"(ii) Intermediate clouds deposit smaller branching tabular forms with solid hexagonal centres.

"(iii) High cirro-stratus clouds small compact tabular and columnar forms." (These, by the way, are responsible for the haloes that so often give warning of a coming depression).

The interest of this branch of the subject for soaring pilots is not merely in general meteorology, but also concerns ice accretion on aircraft. But this is a question which would need a separate article.

A.E.S.

News from Germany

From a source which may be regarded as reliable, we have received news of several German sailplane pilots.

Erwin Kraft, winner of the 1939 Rhön Contests, has been fighting in the *Luftwaffe* and has won a high decoration. In August, 1939, we received a picture postcard of his REIHER III, signed by him and a number of other sailplane pilots present at the meeting. His distance flights during the fortnight of the contest totalled 2,521 kms. (1,566 miles).

Hanna Reitsch has been very ill with scarlet fever, but is now flying again. Hanna took part in the international soaring contest of 1937 and visited England in August of that year in a two-seater MINIMOA, being aero-towed all the way by Wolf Hirth. She was at Dunstable during the Anglo-German camp and then flew over to see the Derbyshire and Lancashire Gliding Club.

Wolf Hirth occasionally ferries 'planes from one place to another.

Kurt Schmidt and Max Beck are both instructors. Kurt Schmidt leaped to fame by setting up a duration record of 36 hrs. 36 mins. in 1933. He then designed and built the ATALANTE, and in it won the Rhön Contest of 1936. He flew the same machine at the international meeting the following year. Max Beck was the winner among single-seater pilots at the 1937 Rhön Contest, where he put up the greatest total mileage of goal flights (9 goal flights, 1,468 km. = 912 miles).

Ludwig Hofmann is a test pilot. Wolfgang Späte is said to be an officer somewhere, but where we are not told. Both these pilots flew in the international contest of 1937, in which they were placed second and third respectively.

All the above are "Silver C" pilots, their numbers in the international series being: Hirth, 1; Reitsch, 25; Schmidt, 34; Hofmann, 44; Kraft, 67; Beck, 143; Späte, 178.

Gliding is still being done in Germany, but no cross-country flying is allowed.

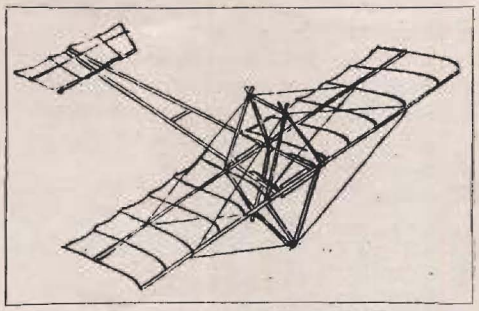
All the best-known German sailplane pilots are, we are assured, still alive.

In addition to the above, there is news of a new amphibian sailplane, of which particulars are given in *The Aeroplane*. The designer, stated to be Company Leader Jachtmann, is, no doubt, the Ernst Jachtmann who put up an international two-seater duration record at Sylt in November, 1937, by flying an amphibian sailplane for 14 hrs. 3 mins.

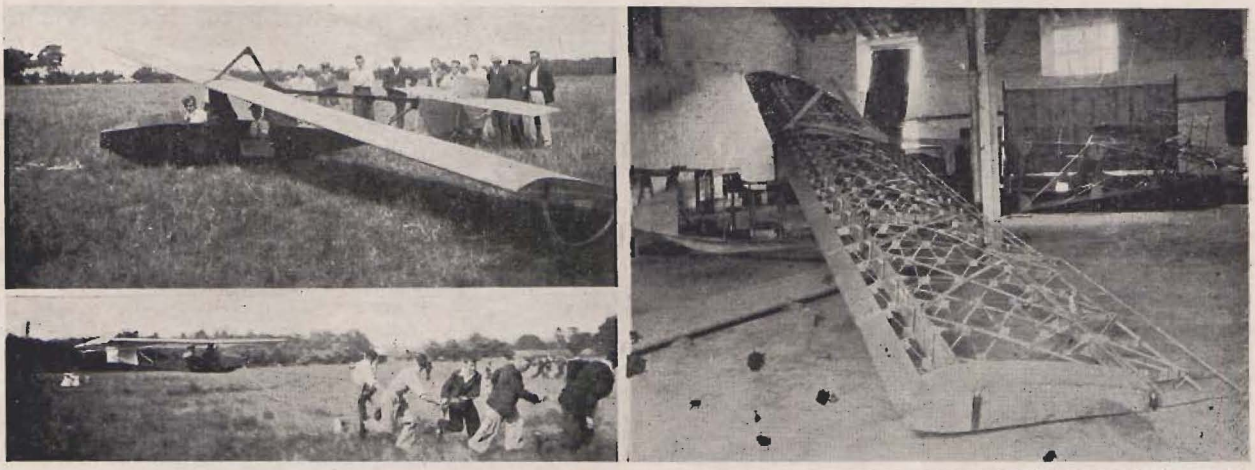
He demonstrated the new machine at the Rangsdorf aerodrome, near Berlin, by taking off from the Rangsdorf Lake, towed by a winch stationed on the shore. The sailplane, built by the Havel Boatbuilding Co., has a span of 18 metres (59 feet) and a weight of 170 kg. (375 lbs.). It is called JACHT 75. Balancing on the water is done by a pair of small floats projecting below the wing-tips. It is stated that Jachtmann is specialising in the design of multi-seater amphibian sailplanes. We are not told what for, but this one, a single-seater, has the word "Lufthansa" painted on its side.

Wally Setz, writing from America, confirms that the Germans are still doing "quite a bit" of soaring, but do not go across country and hold no meetings. He has heard from Wolf Hirth and Emi von Roretz ("Silver C" No. 206). Emi flew in the Austrian team at the International Contest, and was also well-known in England at the London and Yorkshire Gliding Clubs. The last we heard of her before the war was that she had a job as air hostess in the *Lufthansa*.

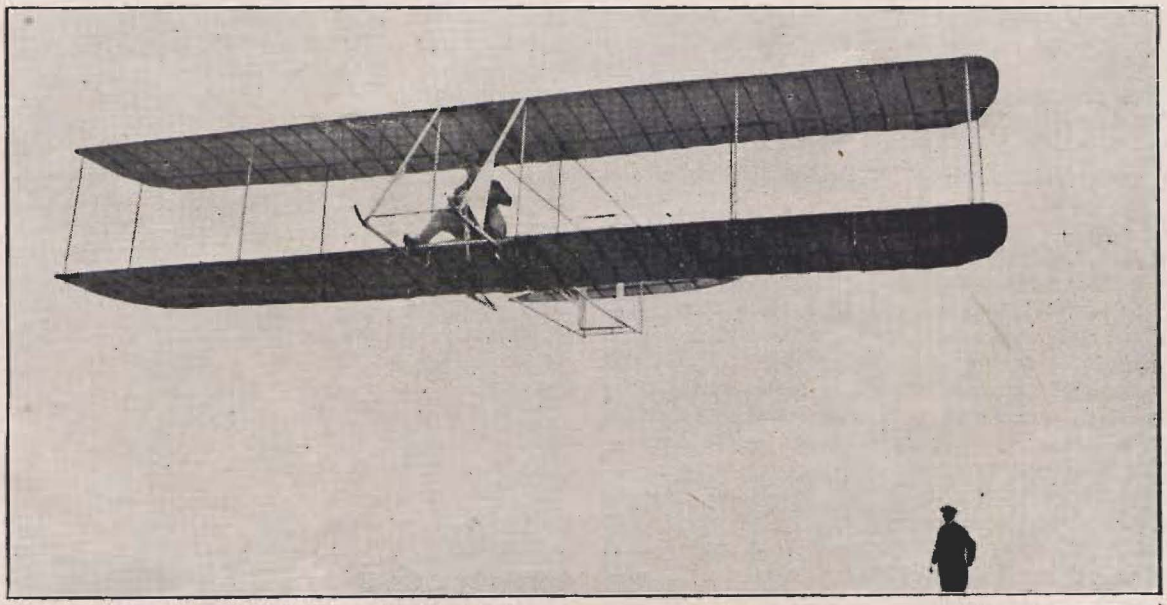
"EARLY BIRDS"



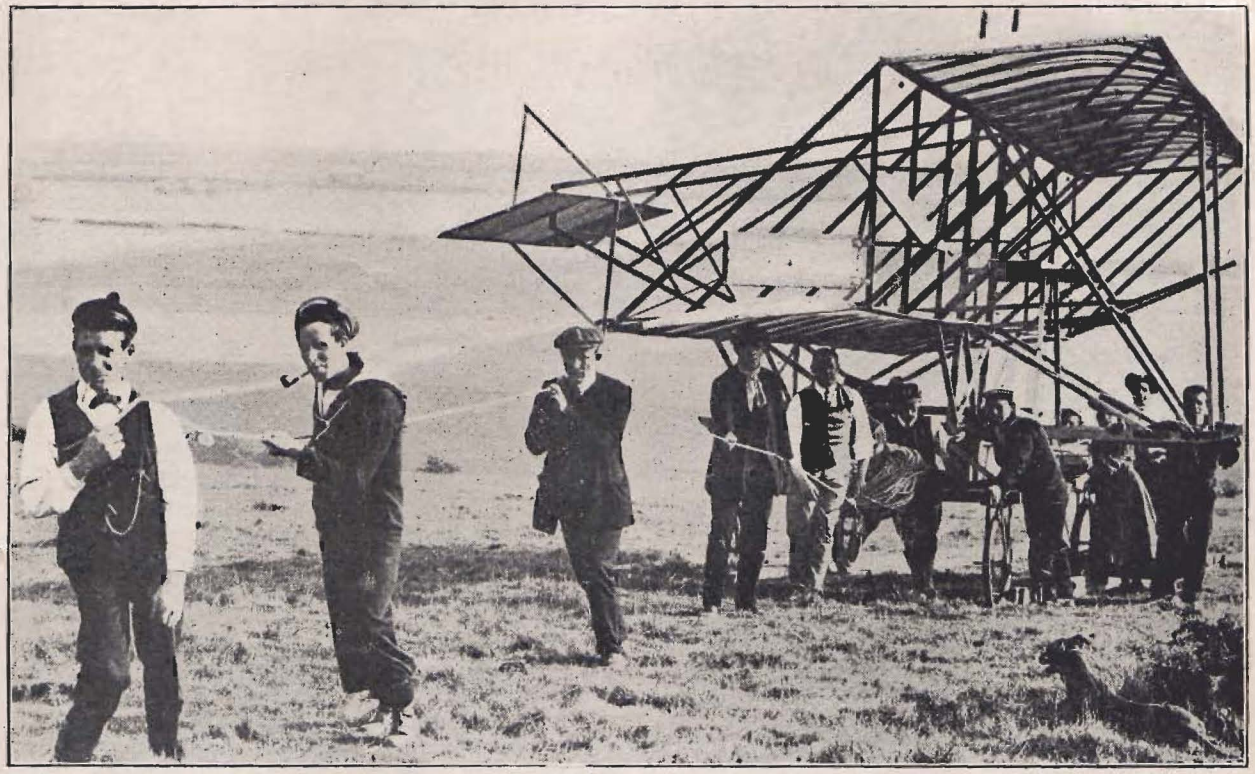
A "hang" glider built in 1911 by A. C. T. Isaac, who more recently started a Rugby Gliding Club and built himself a B.A.C. VII. The above glider was hopped on Parliament Hill early one morning until the police arrived and said: "Take it away"



Eight years ago Roy Scott, an apprentice in a garage, built this glider all alone out of materials bought with 3s. a week pocket money. It was his own design, a two-seater with a span of 44½ feet. Since then W. R. Scott, founder of the firm of Scott Light Aircraft, Ltd., has produced the VIKING high-performance sailplane, two examples of which flew at the last British National Contests, and another has set up a national distance record in Argentina



Gordon Bell flying a WRIGHT glider at Eastchurch, Kent, a year or two before the last war. Shortly after the photo was taken, it was crashed by—who do you think?—a power pilot, of course



The scene on September 17th, 1909, near Fort Southwick on Portsdown Hill, as sailors hauled a glider, designed by Lieuts. J. C. Porte and W. B. Pirie, of the Submarine Department. It had ailerons between the wings, a small "rudder" above each lower wing-tip, and an elevator at the rear. The designers sat in the machine side by side as it was launched from a trolley running down a wooden track 100 yards long. One account says that the glider failed to rise, and eventually pitched forward and collapsed, while another says that it rose near the end of the track and then, still flying, turned half over, where upon the two Lieutenants fell out



One of P. Y. Alexander's gliders, before the last war, being "flown" apparently as a kite. Lateral control is external

Gliding Instruction IV.

NOTES AND PATTER FOR INSTRUCTORS

Continued from Vol. 11 No. 5, Page 75

[*This is the last instalment of the system of instruction used by the Surrey Gliding Club. It was the first gliding club to adapt the method of standardised "patter," often used by aeroplane schools, which ensures that pupils should be told everything they ought to know.*—ED.]

Stage 7.—Circuits: "B" Stage

INSTRUCTOR'S NOTES.—It has been found advisable to give a really high launch and a full circuit after the gentle bends on straight flights, so that the pilot has a much greater chance to correct any faults than he would have if he was lower and just doing a U-shaped flight for his first real turns.

PATTER.—First of all climb as high as possible and do *not* release until the winch driver stops the winch. If the machine starts bucking at all, ease the nose down very slightly.

As soon as you have released, adjust for correct gliding angle and start the turn as soon as possible (point out local positions) and always turn out away from the hill.

Having got round the turn (180°) remember you are now flying down wind and, therefore, your apparent speed will be greater due to the ground speed being higher, so don't be misled and stall.

All the way down this leg, work out the approach; if you are low, get on with the next turn round into wind again. If you find that you cannot get right round again, don't try. Make about 20 ft. the minimum height ever at which to be turning (it is better to land without drift than try and turn into wind too low). Then level out and land straight ahead.

If you are still high, wait a bit before turning round into wind, but it is always better to come in slightly high and then do gentle "S" turns into wind than undershoot.

Figure 8, "B" flight (1 minute): A left turn as usual off the launch, crossing over the launching track, and a right-hand turn round into wind again. (Denote turning points on the field.)

WINCH DRIVER'S NOTES.—Full launch, stopping winch when machine is as far up as possible, although leaving a chopping margin for safety.

Appendix 3.—Steep Turns

On a gentle turn, plain bank and rudder is enough to make a good turn, but if the turn is to be steepened at all, it must be remembered that after a machine has been banked beyond 45° the tail controls will begin to change places. In other words the rudder becomes the elevator, and the elevator the rudder, so:

(1) To turn faster, stick must come back, as elevator is rudder.

(2) To increase speed, a *little* bottom rudder must be applied.

(3) To raise nose, top rudder must be applied.

Remember, however, to have plenty of speed for both going into and *coming out* of steep turns, and remember this only occurs when the bank is greater than 45°.

Stage 8.—Sideslips

INSTRUCTOR'S NOTES.—As there is usually a gap between "B" and soaring weather for "C," it is a good thing to have some sort of practice or qualifying flights. It is advisable to do slips on a KADET or TUTOR type, as NACELLE has too rapid a sink for safety.

PATTER.—Go up as for a circuit and round on to the down-wind leg as soon as possible, and if it is a left-hand circuit try a left-hand sideslip. (Never slip away from the landing ground.) To do this put on left bank and then enough right rudder to prevent the machine turning to the left. To correct, centralise all controls and continue the circuit by turning up-wind. If there is still enough height try the same thing again, coming out at least 20 ft. up. Remember one wing is right down and may be near the ground.

If at any time in the slip the speed seems excessive, ease the stick back slightly, remembering to let it go forward when levelling out.

WINCH DRIVER'S NOTE.—Full launch as usual.

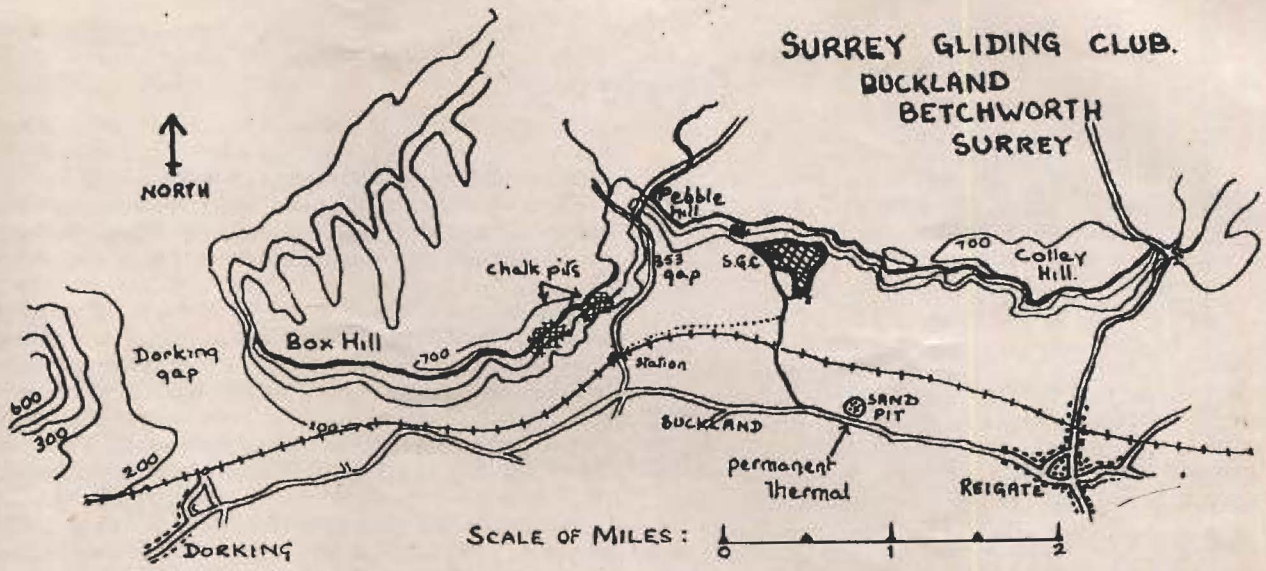
Stage 9.—"C" Flights

INSTRUCTOR'S NOTES.—KADET or TUTOR recommended.

Launch parallel to the hill, on previous practice circuits, and encourage pilot to drift towards hill on launch (or as suitable for site). Use as light a wind as possible, and a time when thermal activity is dying or not existent.

PATTER.—Drift towards hill on launch, and when at top, release and edge in towards the hill, flying straight along the ridge until you have settled down, then turn outwards away from the hill through 180° and fly back along the hill again until you get to the house or marked turning point. (This method is practicable on the Surrey Gliding Club's site, and is used as the landing ground is sheltered, and for the reason that the pupil shall not be faced with a turn off the launch down wind on to the hill.) Then turn again and fly back, etc. The best lift is right over the tree line, so keep that line as a guide, remembering that the wind is continually trying to drift you over the back of the hill, so that you always want to keep the nose of the machine facing a little out from the hill, and secondly, there is always a tendency to fly progressively slower and slower on a first soaring flight.

When it is time to come down, a flag will be waved by the winch when you are flying in this direction, so fly out from the hill on to the usual "B" circuit, which you may have to make wider than normal because of your increased height, and land as usual. *But* if you get low, come down and don't try and soar by pulling the stick back because it's *impossible.*



If you are not comfortable in any way, come down; you can always try again later.

WINCH DRIVER'S NOTES.—Full launch, but allowing for drift towards hill.

Appendix 4.—Inspection and Checking of Primary Gliders

The machine should be passed out according to the standard passing-out book, and all questions replied to. In addition the following points should be noted:

(*a*) That the wings are straight and have no anhedral angle (a small dihedral angle is permissible and is to be recommended when re-rigging, as stretch in the landing wires will otherwise cause droop after a few heavy landings).

(*b*) That the wings, when waggled up and down from the tips, should show no signs of fracture, buckling in the plywood or fabric. If any buckling is apparent, an inspection should be made of the ply former or spars at that point. Twisting in the wing itself denotes unequal tension in flying or landing wires.

(*c*) That the wings have the same angle of incidence and are parallel to the tailplane. Incidence can be corrected or altered by pulling the wing up at the droop by tightening the landing wires, or increasing the incidence by tightening the flying wires where necessary. It must be remembered that the corresponding wire on the other side of the wing will have to be slackened to compensate for the change in tension.

(*d*) That the ailerons are in adjustment with equal or no droop on both sides with the stick central. (The ailerons should on no account be up while the machine is on the ground.) The tension of the aileron cables should be such that the cables do not rattle inside the wing when the machine is moved, although the feel on the stick should not be heavy.

(*e*) That the flying wires are checked in between flights and after heavy landings for slackness.

(*f*) That bow in the lower tailbooms does not get excessive, as this will upset the rigging of the tail unit and will cause continued breakage at the tailplane bracing wires. A small amount of bow is harmless but the boom should be *carefully* straightened by hand *only* if the bow gets very bad.

A bowed lower boom will not break in flight as it is then in tension, but might facture on a really heavy landing.

Appendix 5.—Handling of Primary Gliders

(*a*) The machine should never be turned round on the ground by pulling or pushing on the wing tip only (as this causes strain in the fittings and slackness in the bracing wires), without someone else pressing down or lifting up on the nose or tail, as well.

(*b*) The machine should never be left facing into a strong wind as it may blow over.

(*c*) Neither the bracing wires nor their fittings should be used for pulling the machine along.

(*d*) The tail should never be carried by lifting in the centre of the tailbooms.

Appendix 6.—Early Flights of Different Types

PRIMARY TO NACELLE.—Pupil should be capable of continued safe high straights on the PRIMARY.

NACELLE: 1ST.—Plain medium straight, as pupil will need to get used to cockpit and may be slow in getting nose down at top of first winch launch.

NACELLE: 2ND.—High straight with "S" bends; after which, circuits and figure "8" if satisfactory.

NACELLE TO KADET.—(1) Plain straight to get used to flatter glide.

(2) High straight for gentle "S" bend.

(3) Circuits and figure "8s'."

KADET TO TUTOR.—Full circuit, with warning to watch for flatter glide and longer wing tips.

It is advisable to keep as much similarity as possible in the types of trainers throughout; for instance, PRIMARY, NACELLE, KADET, TUTOR and GRUNAU BABY are almost ideal as a series, as the flying properties of each are progressively similar.

To insert, for example, a FALCON into the training is not to be recommended, as its flying properties are so different from the other types mentioned that it will probably upset the pupil in one way or another.

A. C. E.

Reviews

THE WEATHER EYE: An Irreverent Discourse upon Meteorological Lore, Ancient and Modern, with Many Indiscreet References to the Art of Forecasting as now Practised. By C. R. BENSTEAD, Robert Hale, Ltd., 102, Great Russell Street, London, W.C.1. Price 8s. 6d.

Before Commander C. R. Benstead became a meteorologist in the Fleet Air Arm he had, like our own Christopher Nicholson, to submit to the usual course of instruction. In this ordeal he managed to regard the subject with due respect, but not the people who taught it; so his book, reflecting both these attitudes, combines instruction with entertainment. As he says, one " cannot take a fellow seriously who talks about bolometers and solemnly declares snow to be a black body." But do not laugh with him too hastily, for, " odious as the meteorologist undoubtedly is, there is one person more odious, and that is the ignorant layman who is for ever making fun of him."

Our author, of course, is privileged to make fun, and allows us to watch him at it, as, for instance, when he baited the Chief Forecaster, in the presence of all the lesser forecasters, about an " Ark in the sky," the countryman's name for a long belt of high cloud used as a weather prognostic. He appears to have got no satisfaction, and to have risked being thrown out through one of those " windows that, according to unkind critics, would enable our official forecasters to work with greater accuracy if they looked through them occasionally." He fared no better when, one day in the Meteorological Office, he put through a telephone call to the important ones " up above " in the hope of getting a definition of a *nimbus*, a cloud which has unaccountably been left out of the latest official classification. He made contact with a voice " of cirrus timbre," and the conversation proceeded:

" ' Can you please tell me,' I said, apologetically, ' what a nimbus is ? '

" ' Tell you what a what is ? ' The voice expressed surprise.

" ' A nimbus,' I repeated.

" ' A nimbus ? '

" ' Yes, a nimbus.' I began to understand the technique of a radio back-chat artist. It is a faithful reproduction of normality.

" ' A nimbus, eh ? Well, what do you want to know for, anyway ? '

" I explained. He appeared satisfied.

" ' A nimbus, now—well, that's easy. There's cumulo-nimbus and there's nimbo-stratus, you understand.'

" ' To be frank,' I said, faintly, ' I don't.'

" ' What, you don't understand ? '

" ' No.' . . . Then the ear-piece rattled painfully.

" ' You don't understand, eh ? '

" ' No,' I answered mildly.

" ' Well, let me make it clear. There's cumulo-nimbus and there's nimbo-stratus—'

" ' And,' I whispered, ' fracto-nimbus. But what,' I roared, possessed of a sudden devil, ' is a nimbus—a plain, ordinary, honest-to-God *nimbus* ? '

" I never discovered. The voice became infinitely remote. From the highest pinnacle on Olympus it told me to address my call to a place that sounded like Geneva. . . ."

There is much information about clouds, of which he says: " The Bjerknes theory of the polar front spreads them with the ease of an experienced cook spreading treacle over a tart." The author has the courage to give his own description of the various types instead of slavishly copying out the official definitions, which are not definitions at all but only inadequate descriptions. And in his selection of cloud photographs he has broken with the almost universal tradition of giving unrelated specimens of single types, and has, instead, chosen pictures which illustrate different types of *weather*. This conforms to the modern view that the " state of the sky " is what matters, not the names of the cloud types it contains. All but one of the eight photos in this book include more than one type, and particularly good is that entitled " A warm front passes."

On page 94, however, in an unguarded moment, our iconoclast has for once taken his meteorologists too seriously, for he says: " After sunset convection stops; the cumulus, no longer having a supply of moist rising air to support it, begins to sink and . . . therefore starts to evaporate." This idea that an individual cumulus lasts all day has doubtless been copied from other people's books, but it simply is not true, as many a sailplane pilot has found to his discomfiture.

The physics of the atmosphere is well treated, and there is a useful tip for getting a rough estimate of the height of cloud base in feet: multiply by 400 the difference between the wet and dry bulb temperatures in degrees Fahrenheit.

A discussion of anabatic winds (warm air flowing up a hill, in contrast to katabatic or cold air flowing down hill) leads to the only mention of gliding. One eminent meteorologist, the author says, doubts whether these winds exist. " But others, no less eminent, point to gliders soaring over the hills at Dunstable on a warm fine afternoon, and say: ' Behold ! Anabatic plus prevailing westerly ' . . . Nevertheless, it would take a particularly hardened forecaster to predict an obvious anabatic wind, even at Dunstable."

Commander Benstead being now a professional forecaster, his advice in forecasting is more thorough and practically useful than anything found in other popular books on the weather. He discusses all the various types of weather which influence the British Isles, classified according to wind direction and pressure distribution. And he advises on the art of forecasting which he defines as " the art of being plausibly indefinite," by an entertaining analysis of an old sea-dog's forecast published in a daily paper, taking this as an example of how not to do it, and showing that this ancient mariner is not only " untrained in the use of local," but " has broken the first rule of forecasting: he has made a definite statement."

A.E.S.

WEATHER IN THE MAKING. By DOROTHY FISK. Faber & Faber, Ltd., 24, Russell Square, London, W.C.1. Price 8s. 6d.

Miss Dorothy Fisk is an omnivorous reader, so this is the book for those who have an urge to read everything written that has any connection with meteorology, but cannot find the time to satisfy it. A great many facts are assembled which are usually kept out of elementary works and would normally take a lot of finding.

Of the twelve chapters, the first is astronomical; another is confined to rare clouds of the stratosphere and higher regions; a whole chapter is given to the physics of thunderstorms, and another to fog.

Taking the chapter on the common clouds, we find, for the first time in any book of the kind, a diagram of the up- and down-currents responsible for the pattern of cirro-cumulus, and the explanation is evidently taken from Professor Brunt. But not every reader can be expected to know where to follow up any side-line such as this which may interest him, as there is no bibliography or list of references. For instance, one would like to know the source of the statement that alto-cumuli frequently sink below their condensation level in the evening and evaporate, to reappear next morning, presumably because their layer is lifted up again by the expanding air below. This, if true, would tend to interfere with Professor Georgii's hope that in time soaring pilots will learn to stay up all night by using alto-cumuli.

In the cumulus section we find two novel diagrams. One, called "Typical air movements in a cumulus cloud," shows air going up into the cloud over the whole area of its base (would that it were always so!) The other, called "Air heated near ground: lift as used by gliders," shows a current going straight up from the ground into the middle third of a cumulus, and must be the first diagram of the kind to appear outside a soaring text-book.

Apart from this, gliding receives its only mention, curiously enough, in a discussion on land and sea breezes:—

"Recent gliding experiments have shown how very persistent the sea breeze can be even in the face of a wind blowing in the opposite direction. On more than one occasion it appeared to break in the form of a great roller over the cliffs of Devonshire, where it formed a gigantic bolster across the path of an anti-cyclonic wind blowing from the north-east. The land wind was forced to mount, at a steep angle, over the sea wind, and so provided a lift that carried the glider rapidly upwards as long as he kept to a course near the coast-line."

This bit of knowledge, which no other meteorological writer has yet shown evidence of being aware of, no doubt comes from *The Times*' description of Mr. Wills's distance record in 1938. The only objection to this passage is in the first three words. The author, in common with a former Under-Secretary for Air who answered a question on the subsidy in Parliament, appears to think that gliding is not yet past the experimental stage, and that people fly sailplanes, not in order to soar, but to perform some unspecified feat that has not yet been done.

Unfamiliar facts which have a bearing on soaring flight are met with here and there. For instance, the large-scale phenomenon described on page 89 is probably found also on a smaller scale:

"Where a continent consists of a low plain, or even of a plateau with a narrow coastal strip, there is nothing to increase the original impulse of the wind; but where the land slopes gradually upwards towards a central mass the impulse is cumulative, the force of the wind increases as it advances, and its acquired velocity may carry it over wide areas far beyond the district where the conditions originally responsible for it obtain."

The amount of heat received by the earth from the sun is known to vary slightly during the sun-spot cycle, being greatest when the spots are at a minimum. But its effect is, the author says, far outweighed by the influence of large volcanic eruptions, which throw dust into the upper air and may cut off part of the sun's heat for long periods. The effect of these changes on convection currents is, however, complicated, for hotter ground means more evaporation, therefore more cloud, which in turn blocks the sun's rays. The author does not pursue the subject, but our own guess is that a hotter earth means more cloud-soaring but less thermal soaring.

There is a reference on page 138 to "the small cumulus that sometimes occurs above an out-of-doors fire."

We do not approve of the statements that the separate clouds of strato-cumulus can be "herded together" (p. 138) and those of cirro-cumulus "blown together" (p. 132); this could only happen if some, at least, of the clouds, were to move less fast than the wind. Also, on p. 138, the sort of inversion which leads cumulus to spread out into strato-cumulus is wrongly called "an obstruction in the form of a layer of cool dense air."

The photographs of clouds are, excepting the stratospheric ones, supplied, as usual, by G. A. Clarke, of Aberdeen. Mr. Clarke's photos have illustrated so many books and pamphlets that one gets tired of seeing the same ones over and over again, but to our surprise he has been induced to furnish this book with an entirely new lot. The photograph facing page 80, called *fractonimbus* in the caption and *fractocumulus* in the index, appears to be a sheet of nimbo-stratus showing gaps. The sort of clouds normally called fracto-cumulus and fractonimbus are not broken portions of larger clouds, but are newly formed as such. The breaking process implied by the *fracto-* prefix has already been done on the layer of air which originally contained the moisture.

Misprints: P. 124: mean lower level of cumulus and cumulo-nimbus is not 16,000 feet but 1,600 feet. P. 217: the usual direction of tropical air is towards the N.E., not N.W., and of polar air S.E., not S.W. P. 222: "cumulo-stratus" has no official existence outside the nineteenth century; probably nimbo-stratus is meant.

Flight Without Power

There are at the moment no further copies available on this side of the Atlantic of Lewin Barringer's new soaring text-book, "Flight Without Power," as all imported stocks have been sold. Owing to restrictions on shipping space, we are unable to prophesy how long it will be before THE SAILPLANE office has more copies for sale.

News from the Clubs

London Gliding Club

The clubhouse at Totternhoe continues to attract a fair number of members every week-end. On some Sundays it has been pretty crowded by the time the bar opens in the evening, as, for instance, on November 3rd, when Wing Commander W. B. Murray made his first appearance since he went to France in the early days of the war. On Saturday, December 7th, three R.A.F. members, who had come independently from different directions, all arrived together: Bill Murray (whose normal working day is now 14 hours), D. F. Greig (last seen a year ago dressed as an Army officer and now just as resplendent in R.A.F. uniform), and Norman Lee (been flying "Battles" and about to transfer to "Hurricanes").

Next day these and many other club members were invited to Anne Wakefield's engagement party, which went off boisterously. Anne having been active as a flying member and as winch-driver at the cadet camps, it is hoped she will in due course make a motorless convert of her husband, Flight Lieutenant W. O. Hill (late Royal Welch Fusiliers).

Christmas morning was suitably celebrated by a gathering of all our local members in the clubhouse. Christmas cards were received by the club from Sproule, Ellis, Murray, Lacey, and Beck, and we were also delighted to get one from Wally Setz in the U.S.A., while Aspegren, one of our very oldest members (who got his gliding certificate at the Wasserkuppe in 1923), wired his greetings from Stockholm: "To you all a good cheer and a happier victorious New Year."

As to news of other club members: N. W. Burnett, flying a "Hurricane," was shot up and saved himself by parachute in most unusual circumstances which we will be asking the Censor to allow us to describe. E. Lavington is O.C. a radio station. T. T. Davies (also R.A.F.) is transferred to the Administration and Special Duties Branch.

In a letter from Southern Rhodesia, W. E. Wilbur writes that the thermals there are really vicious and chuck the training machine about "like nobody's business." He has got in touch with C. J. McGrane of the Umtali Gliding Club, hoping to spend a short leave there and try to complete his "Silver C," but he found, unfortunately, that the club has been unable to keep going under war conditions. The Chief Ground Instructor at his training school, name of Villiers, claims to be an ex-member of the London Gliding Club.

In the last issue we stated in error that Vigers was at Percival's. We also omitted from the paragraph about lady members the fact that Freda Davis (whose brother Ernest Collins is in Sweden) has given birth to a daughter since her husband, Laurie, was posted as missing.

We regret to report that Victor Burnett was killed while flying in Southern Rhodesia last November. He came to us as Cadet Officer to the first gliding camp ever held for Air Defence Cadets, in April, 1939. But in the capacity of Air Correspondent for the *Sunday Express* he was already familiar to us, and he did us proud with splash headlines right across the front page on the occasion when Murray and Sproule broke the international two-seater duration record in July, 1938.

Australian Gliding Association

The following are extracts from a circular letter issued by the Association on August 30th.

Sydney Gliding Club.—S. Newbigin states that his group is now operating once a fortnight on Sundays only at Quakers Hill, about 28 miles from Sydney. They are using a winch in a level paddock, 1,200 yards by 800 yards. On the last three week-ends flights of 35 mins. and 1 hour have been made—both thermal flights in a clear sky, in Slingsby GULL.

Pinjar Soaring Club.—R. New writes that his group operates at Lake Pinjar, about 20 miles from Perth. They have three machines: a KESTREL, a secondary, and a RHON RANGER primary. During the Christmas holidays, Mr. New made a flight of 30 mins. and reached about 3,000 ft., from a car tow to 800 ft., in cloud lift. He terminated the flight as he did not wish to enter the cloud without instruments. On the next flight another member had the misfortune to spin into the ground. The KESTREL was badly damaged and it was about three months before the machine was put into flying order again. Flying had to be abandoned later as the lake gets sticky in the winter months.

Queensland Gliding Association.—The Association has been fortunate after a lot of battling in regaining the use of the Eagle Farm Aerodrome subject to its being otherwise not in use. A newspaper reported a crash from 60 ft. at Cribb Island in April, in which the pilot suffered a broken ankle.

Gliding and Soaring Club of Tasmania.—"We have only flown on two week-ends since January. The majority of our members have enlisted and we have definitely closed all flying operations for the duration of the war."

Gliding Club of Victoria.—Training has been abandoned for a time owing to lack of a suitable training ground. Slope-soaring activity has been maintained at Beveridge. Work on the construction of the Kirby KADET is progressing slowly; the fuselage is practically completed; the tail surfaces are assembled, but not covered; the wings have been assembled excepting the ailerons. On July 7th the GOLDEN EAGLE was flown into a tree at Malvern Golf Links and one wing badly damaged; owner-pilot Richardson unhurt.

Gliding Subsidy.—In Parliament on May 11th the Minister for Air (Mr. Fairbairn) told Mr. Nairn that, now that every young man had an opportunity to learn to fly at the Government's expense, it was considered that former subsidies to gliding clubs could be cut out. This matter is being followed up at present; letters are being forwarded to all Federal Members asking for reintroduction of the subsidy.

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RECOMMENDED GLIDING CLUBS

London Gliding Club

(Affiliated to the B.G.A.)

Address:—Tring Road, Dunstable, Beds. (Tel.: Dunstable 419.) Flying ground, Dunstable Downs (1¼ miles S.W. of Dunstable). Primary training and soaring. Clubhouse and hangar; sleeping accommodation: 20 gliders and sailplanes for members' use. Subscription, 3 guineas p.a. (country member, 2 guineas); entrance fee, 2 guineas. Associate member, 2 guineas p.a.; no entrance fees. Flying charges, from 3s. per day. Resident full-time instructors. Flying on Sundays and every week-day except Thursday. London Secretary: Arthur Sweet, F.C.A., 11, Bow Churchyard, E.C.4. (Tel.: City 5997-8.)

Derbyshire and Lancashire Gliding Club

(Affiliated to the B.G.A.)

Address:—"Camphill," Great Hucklow, Near Buxton. The perfect hill soaring site, wind direction of no consequence. Evening thermals to 5,000 ft. a speciality. Comfortable clubhouse with sleeping accommodation. Hangar, full flying equipment, workshop and ground staff. Subscription, flying members, £3 3s. p.a., associate members, £1 1s. p.a. Flying charges from 6d. per flight, soaring 7s. 6d. per hour. Secretary, C. A. Kaye.

Southdown Gliding Club

(Affiliated to the B.G.A.)

Secretary:—S. G. Stevens, "Southerlea," Meadow Close, Hove. (Tel.: Preston 3284.) Soaring at Devil's Dyke and Atlingworth Ridge. One of the finest Primary and Secondary training sites in England. Clubhouse and hangar ½-mile S.S.W. of Devil's Dyke Station. Subscription, 2 guineas and 1 guinea entrance. Auto towing and winch launching facilities. Very moderate flying fees and expert tuition.

Oxford University and City Gliding Club

(Affiliated to the B.G.A.)

Secretary:—Miss B. M. Nicklin, 532, Banbury Road, Oxford. (Tel.: 58300.) Primary training and soaring site at the Lambert Arms, Aston Rowant, Oxon, 15 miles E.S.E. of Oxford on the Oxford-High Wycombe, London road and 39 miles from London. Resident full-time Instructor: R. Kronfeld, A.F.R.Ae.S. Flying every day except Mondays. Subscription, 3 guineas p.a. Entrance fee, 1 guinea. Flying charges, 1s. to 2s. per winch launch. Temporary (course) members, entrance fee, 1 guinea. Subscription, 1 guinea per week. Flying charges, 1s. to 2s. per launch.

Scottish Gliding Union

(Affiliated to the B.G.A.)

Patron: Lord Weir. President: Hon. A. R. Boyle. Secretary and Treasurer: R. B. Rogerson, 20, Blythswood Street, Glasgow, C.2. (Tel.: Central 4209 and Shettleston 1328.) Main training and soaring site and clubhouse: Feal Farm, Bishop Hill, Lochleven, Kinross; also other training sites in other parts of Scotland. Primary training and soaring. Full residential accommodation, including rooms for married couples. Flying and training every week-end, together with organised camps. Flying charges from 6d. per flight. Soaring flight from 2s. 6d. Subscription, £3 3s. flying member per annum. Associate, £1 1s. per annum. Entrance fee, £2 2s. Full range of machines for members' use. Large hangar accommodation.



With acknowledgments to SAILPLANE, *Dec., 1937:—*

TAILPIECE—One of our members was tackled by an acquaintance who had read in a newspaper of a cross-country flight of forty miles. Like this:—

"Did you say he was launched by catapult . . . ?"
"Yes."
". . . and he went forty miles?"
"Yes."
"Gosh! What a catapult!"

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Whilst every endeavour will be made to continue the publication of SAILPLANE AND GLIDER at regular intervals, circumstances may arise in the near future which will prevent this being done. It is hoped that, should such a condition arise, subscribers and regular readers will give every helpful consideration to those responsible for the publication. At the same time it is the sincere desire of the publisher to revert, as soon as possible, to a regular monthly date of issue.

H. O. DAVIES
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London, S.W.1

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